



March 4, 2016

TLI Solutions
5460 Ward Road, Suite 205
Arvada, Colorado 80002

ATTENTION: Mr. Walt Foutz, CPG – *Project Manager*
wfoutz@tlisolutions.com

Subject: **REPORT OF LIMITED GEOTECHNICAL EXPLORATION**
Outfall 200 Mercury Treatment Facility
Y-12 National Security Complex
Oak Ridge, Anderson County, Tennessee
GEOservices Project No. 21-15652
DOE Purchase Agreement DE-SC0003835

Dear Mr. Foutz:

We are submitting the results of the limited geotechnical exploration performed for the subject project. The geotechnical exploration was performed in accordance with our Proposal No. 11-15231R1, dated September 2, 2015. The following report presents our findings in the area of the proposed construction. Should you have any questions regarding this report, or if we can be of any further assistance, please contact us at your convenience.

Sincerely,

GEOservices, LLC

Matt T. Bible, E.I.T.
Staff Professional

MTB/ACA/DAG/mtb

Adam C. Alexander, P.E.
Geotechnical Manager

Dennis A. Huckaba, P.E.
Principal

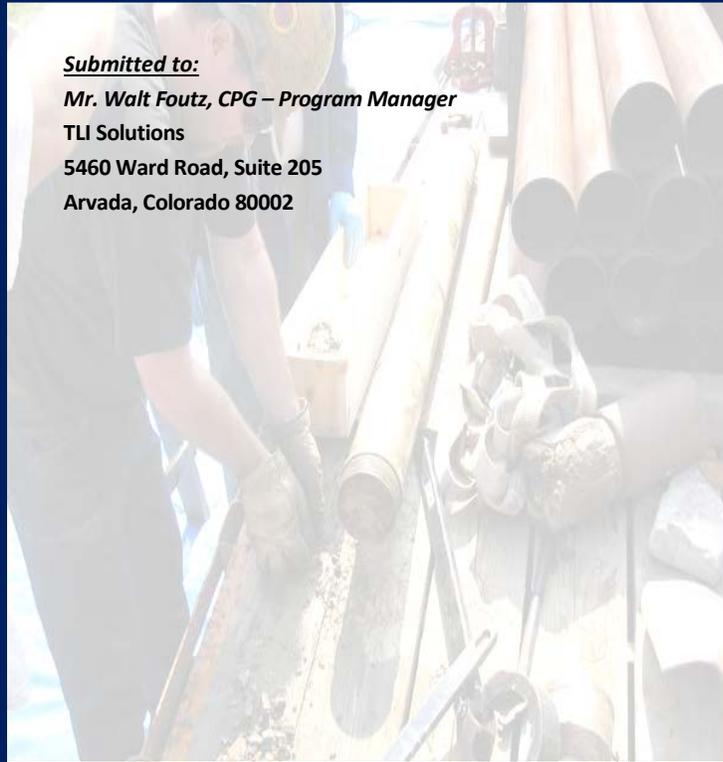
Submitted to:

Mr. Walt Foutz, CPG – Program Manager

TLI Solutions

5460 Ward Road, Suite 205

Arvada, Colorado 80002



**REPORT OF LIMITED
GEOTECHNICAL
EXPLORATION**

**OUTFALL 200 MERCURY
TREATMENT FACILITY**

Submitted by:

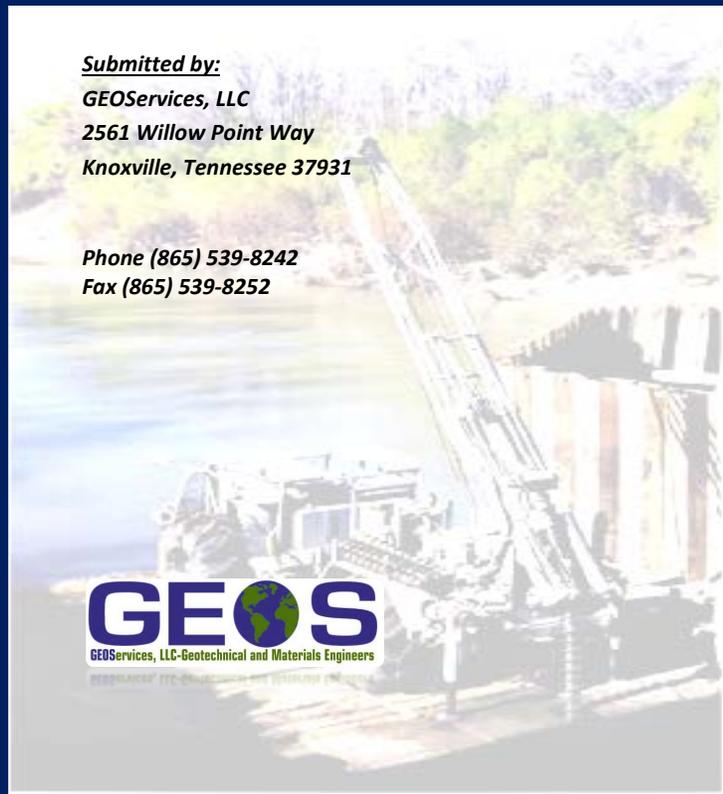
GEOServices, LLC

2561 Willow Point Way

Knoxville, Tennessee 37931

Phone (865) 539-8242

Fax (865) 539-8252



**Y-12 NATIONAL SECURITY
COMPLEX**

OAK RIDGE, TENNESSEE

GEOSERVICES, LLC

PROJECT NO. 21-15652

TABLE OF CONTENTS

<u>Contents</u>	<u>Page</u>
1.0 INTRODUCTION.....	1
1.1 PURPOSE.....	1
1.2 PROJECT INFORMATION AND SITE DESCRIPTION	1
1.3 SCOPE OF STUDY.....	2
2.0 EXPLORATION AND TESTING PROGRAMS	3
2.1 FIELD EXPLORATION.....	3
2.2 LABORATORY TEST PROGRAM.....	4
3.0 SUBSURFACE CONDITIONS	5
3.1 GEOLOGIC CONDITIONS	5
3.2 SOIL STRATIGRAPHY	6
APPENDICES	
APPENDIX A –	Figures and Test Boring Records
APPENDIX B –	Soil Laboratory Data

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this limited geotechnical exploration was to characterize the subsurface conditions for the design and construction of the proposed Outfall 200 Mercury Treatment Facility to be located within the Y-12 National Security Complex in Oak Ridge, Tennessee. This limited report provides field data and laboratory testing for limited geotechnical exploration conducted. No engineering recommendations, or designs, for foundation support of any proposed structures, tanks, or pavements are provided.

1.2 PROJECT INFORMATION AND SITE DESCRIPTION

The project site is located in the south-central portion of the Y-12 National Security Complex in Oak Ridge, Tennessee. Specifically the project consists of two (2) separate areas: Outfall 200 Headworks and the Outfall 200 Mercury Treatment Facility. The Headworks Area is generally located south of the Building 9204-1 and Treatment Facility is generally located in the southeastern quadrant of the intersection of B Road and Second Street (Building 9720-8 site).

Based on provided information, it is our understanding that historical missions of Y-12 have resulted in the release of mercury to the environment and contamination has been identified in soil, sediment, surface water, groundwater, buildings, drains, and sumps. In addition, mercury continues to be released into the Upper Fork Poplar Creek (UEFPC) from both point and non-point sources with the Y-12 complex. It is our understanding that the mercury contamination in this area is considered the greatest environmental risk on the DOE Oak Ridge Reservation. Therefore, the DOE's Oak Ridge Office of Environmental Management (OREM) has proposed and completed the conceptual design for a surface water treatment facility, the Outfall 200 Mercury Treatment facility, to be located downstream of Outfall 200. This facility will provide effective relief regarding mercury loading to the Upper Fork Poplar Creek. Construction of this facility is anticipated to begin in late 2017. The overall construction will contain three separate areas:

- Outfall 200 Mercury Treatment Facility (Building 9720-8 site)
 - Equalization Tank
 - Chemical Reaction Tanks
 - Inclined Plate Clarifiers
 - Clarifier Effluent Tank
 - Treatment Building
 - Treated Water Tank
 - Chemical Storage,
 - Various Underground / Above Ground Utilities
- Headworks Area (adjacent to Outfall 200)
 - Weir Intake Structure
 - Grit Removal Chamber
 - Storage Tanks
 - Pumping Station
- Above Grade Pipeline Corridor (located on southern side of UEFPC)

Topographic information for the project site was not provided. However, based on our field exploration, the Outfall 200 Headworks area generally slopes gently downhill from the south to the East Fork of Poplar Creek located on the north side of the project. The Outfall 200 Mercury Treatment Facility area generally slopes downhill from the north to the East Fork of Poplar Creek located on the south side of the project. Finished floor elevations (FFE) were not provided at the time of this report. However, we anticipate the FFE for the new additions will match the existing facilities' FFE. Therefore, we have assumed that maximum earthwork cuts and fills of up to 25 feet will be required.

The Headworks area currently consist of bare earth, gravel, short grassed areas, remnants of past construction (building foundations and slabs), and multiple overhead utility lines. The Mercury Treatment Facility area currently consists of asphalt paved and concrete parking/drive areas, a non-operational rail-line, and short grasses.

1.3 SCOPE OF STUDY

This geotechnical exploration involved a site reconnaissance, field drilling and laboratory testing. The following sections of this report present discussions of the field exploration and site conditions. Following the text of this report, Appendix A presents figures and test boring records and Appendix B presents a summary of laboratory test results.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air, on, or below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes.

2.0 EXPLORATION AND TESTING PROGRAMS

2.1 FIELD EXPLORATION

The existing subsurface conditions were explored with the requested thirty (30) soil test borings. It should be noted that the original project scope consisted of thirty-one (31) borings. Boring A-09 was eliminated due to proximity of utility lines and three borings (A-13, A-15, and A-16) were eliminated due to changes in proposed utility arraignments and/or conflicts with existing utilities. Furthermore, it should be noted that boring A-01 was moved due to conflict with overhead utility lines and boring A-08 was moved due to encountering an unknown vault. Three borings (B-32, B-33, and B-34) were added in order to reach the required rock coring depths. Finally, boring A-17 was conducted as a direct push sounding due to a conflict with overhead utility lines.

The locations and depths were selected by CH2M personnel and staked in the field by the Department of Energy (DOE) personnel. Drilling was performed from November 20, 2015 to January 21, 2016. The borings were advanced using 3.25-inch inside diameter hollow stem augers (HSA) with a CME 550 ATV mounted drill rig and 2.25-inch inside diameter HSAs with a 7822DT GEOProbe mounted drill rig. The locations of the test borings performed on site are referenced in boring location surveys provided in Appendix A of to this report. Detailed logs for soil test borings can be found in Appendix A of this report. The drill crew worked in general accordance with ASTM D 6151 (HSA Drilling). Rock coring to explore auger refusal material was performed in accordance with ASTM D 2113. Sampling of overburden soils was accomplished using the standard penetration test procedure (ASTM D 1586) and thin-walled tube sampling (ASTM D 1587). The approximate locations of the test borings performed on site are

referenced in Figure 2. Detailed test boring records and cross-sections of the building boring logs are presented in Appendix A.

Within each boring, SPT and split-spoon sampling were performed at approximately 2.5-foot intervals in the upper 10 feet, and 5 feet intervals thereafter. The drill crew worked in accordance with ASTM D 6151 (hollow stem auger drilling). Standard Penetration Tests and split-spoon sampling were performed in accordance with ASTM D 1586.

In split-spoon sampling, a standard 2-inch O.D. split-spoon sampler is driven into the bottom of the boring with a 140 pound hammer falling a distance of 30 inches. The number of blows required to advance the sampler the last 12 inches of the standard 18 inches of total penetration is recorded as the Standard Penetration Resistance (N-value). These N-values are indicated on the boring logs at the testing depth, and provide an indication of strength of cohesive materials.

2.2 LABORATORY TEST PROGRAM

After completion of the field drilling and sampling phase of this project, the soil samples were returned to our laboratory where they were visually classified in general accordance with the Unified Soil Classification System (USCS – ASTM D 2487) by a GEOServices geotechnical professional. Laboratory testing of selected soil samples will include the following:

- Moisture Content (ASTM D 2216)
- Atterberg Limits (ASTM D 4318)
- Moisture Density Relationship (ASTM D 1557)
- California Bearing Ratio (ASTM D 1883)
- Consolidation (ASTM D 2435)
- Unconfined Compression (Soil) (ASTM D 2166)
- Particle Size Analysis (ASTM D 422)
- Unconfined Compression (Rock) (ASTM D 2938)
- Triaxial Shear (Consolidated Undrained) (ASTM D 4767)
- Specific Gravity (Soil) (ASTM D 854)

The laboratory test results are further discussed in the following sections of this report and a summary is provided in Appendix B.

3.0 SUBSURFACE CONDITIONS

3.1 GEOLOGIC CONDITIONS

The site lies within the Appalachian Valley and Ridge Physiographic Province of East Tennessee. This Province is characterized by elongated, northeasterly-trending ridges formed on highly resistant sandstone and shale. Between ridges, broad valleys and rolling hills are formed primarily on less resistant limestone, dolomite, and shale.

Published geologic information indicates the project site is underlain by bedrock of the Copper Ridge Dolomite formation of the Knox Group. This formation is generally composed of gray, coarse to medium-grained, knotty dolomite in the upper zone and dark-gray crystalline dolomite in the lower zone. This formation typically weathers to produce a thick silty clay residual soil with dark iron stains. Silica in the form of chert is resistant to weathering and scattered in various quantities throughout the residuum.

Since the bedrock formations underlying the site contain carbonate rock (i.e. limestone/dolomite), the site is susceptible to the carbonate hazards of irregular weathering, cave and cavern conditions, and overburden sinkholes. Carbonate rock, while appearing very hard and resistant, is soluble in slightly acidic water. This characteristic, plus differential weathering of the bedrock mass is responsible for the hazards. Of these hazards, the occurrence of sinkholes is potentially the most damaging to overlying soil-supported structures. In East Tennessee, sinkholes occur primarily due to differential weathering of the bedrock and "flushing" or "raveling" of overburden soils into the cavities in the bedrock. The loss of solids creates a cavity or "dome" in the overburden. Growth of the dome over time or excavation over the dome can create a condition in which rapid, local subsidence or collapse of the roof of the dome occurs.

A certain degree of risk with respect to sinkhole formation and subsidence should be considered at any site located within this geologic setting. While a rigorous effort to assess the potential for sinkhole development at this site was beyond our scope of services, we did not encounter any obvious surficial signs of sinkhole activity. Furthermore, from a review of the United States

Geological Survey (USGS – Bethel Valley and Lovell, TN Quadrangles), no closed contour depressions (which are indicative of past sinkhole activity) were observed within the vicinity of the site

Site geology may also have been influenced by water-deposited (alluvial) materials within the flood plain of the nearby East Fork of Poplar Creek and its tributaries. These alluvial materials are usually soft and compressible, having never been consolidated by pressures in excess of their present overburden. Alluvial material composed of brown, orangish brown, and grayish clay was encountered in multiple borings conducted across the site.

3.2 SOIL STRATIGRAPHY

The following subsurface description is of a generalized nature to highlight the subsurface stratification features and material characteristics at the boring locations. The boring logs included in Appendix A of this report should be reviewed for specific information at each boring location. Information on actual subsurface conditions exists only at the specific boring locations and is relevant only to the time that this exploration was performed. Variations may occur and should be expected at the site. It should be noted that five borings (A-04B, A-04C, A-32, A-33, and A-34) were conducted as auger probes to the auger refusal depths and that boring A-17 was conducted as a direct push sounding. Therefore, no soil sampling was conducted in the above mentioned areas. Furthermore, two borings (A-08A and A-12) encountered conditions that did not allow for sampling of the material underlying the surficial materials (i.e. open vault in A-08A and refusal on concrete/wood on A-12).

Surface

The following table summarizes the surficial materials encountered.

Table 1: Surficial Material Thicknesses Encountered

Boring	Asphalt (in)	Concrete (in)	Basestone (in)	Boring	Material	Material Thickness (in)
A-10	8		24	MA-01	Topsoil with some Gravel	12
A-12*	3	3		A-02	Topsoil with Gravel	24
A-18	9	5		A-03	Topsoil with some Gravel	12
A-19	3.5	8.5		A-04	Gravel with Soil	8
A-20	6.75	8.25		A-04B	Gravel with Soil	8
A-21	7.5	7.5		A-04C	Topsoil with Gravel	18
A-22	4	8		A-05	Gravel	12
A-23	8	7.75		A-06	Gravel with some clay	12
A-24	3.25	8.25		A-07	Gravel with some clay	12
A-25	8	7.5		A-08A	Concrete into Open Vault	6
A-26	5.5	7.5		A-08B	Gravel with some clay	12
A-27	4.75	9.5		A-11	Gravel with some clay	12
A-28	1.25	8		A-14	Topsoil with some Gravel	8
A-29	0.75	9		*Did not penetrate surficial material		
A-30	7	9				
A-31	4.5	8.5				
A-32	5	8				
A-33	8.5	7.5				
A-34	5	9				

Fill Soils

From the existing ground surface, fill soil was encountered in twenty-four borings performed on site to depths ranging from 4 to 20 feet beneath the existing ground surface. Existing fill depths are provided in the table below.

Table 2: Existing Fill Material Depth

Boring	Existing Fill Depth (ft)	Boring	Existing Fill Depth (ft)	Boring	Existing Fill Depth (ft)
MA-01	11	A-11*	6.8	A-26	7
A-02*	8.3	A-18	4	A-27*	7
A-03	11	A-19*	15.5	A-28	11
A-04	7.5	A-20	14	A-29	20
A-05	7.5	A-21	6	A-30	7
A-06	11	A-22	7	A-31*	9.5
A-07	11	A-23	9.5	*Auger Refusal within Fill Material	
A-08B	9.5	A-24	14.5		
A-10	5	A-25	12		

Fill is generally classified as soils that have been transported and placed by man. The fill soils generally consisted of brown, dark brown, grayish brown, and gray lean clays (CL) with varying amounts of rock fragments and sand. The SPT N-values used to evaluate the consistency of the fill soil encountered ranged from weight of hammer (essentially 0 blows per foot) to 50 blows with 1 inch of penetration, indicating a relative soil fine grained consistency ranging from very soft to very hard (very loose to very dense). It should be noted that the soft, or worse, consistency fill soil (blow counts less than 5 blows per foot) were generally isolated to borings A-24, A-25, and A-26 and the hard, or greater, consistency soils encountered (blow counts greater than 30 blows per foot) were generally encountered in five borings (A-19, A-24, A-25, A-28, and A-31) in the presence of abundant rock fragments. Therefore, the fill soil encountered was generally firm to very stiff (loose to medium dense) in consistency.

The natural moisture content of selected samples of fill material ranged from about 3.7 to 35.5 percent. Atterberg limits testing on a selected sample of the fill soil indicate a liquid limit (LL) range of 25 to 52 percent and plasticity indices (PI) ranging from 10 to 31 percent. The existing fill soils tested for atterberg limits and grain size are classified as lean clay (CL), fat clay (CH), and clayey sand (SC) in accordance with the Unified Soil Classification System (USCS).

Alluvial

Beneath the existing fill soils, alluvial soils were encountered in eighteen borings to depths ranging from 8.5 to 25.9 feet beneath the existing ground surface. Alluvial soil depths are provided in the table below.

Table 3: Alluvial Material Depth

Boring	Alluvial Material Depth (ft)	Boring	Alluvial Material Depth (ft)	Boring	Alluvial Material Depth (ft)
MA-01	16	A-10*	13	A-25*	19.9
A-03*	16.7	A-18	13.5	A-26	11
A-04*	8.5	A-20*	20.9	A-27	23.5
A-05*	12.5	A-21	11	A-28*	21.3
A-06*	20	A-23*	20.2	A-29*	25.9
A-07*	20	A-24*	21	A-30*	17.1

*Auger Refusal within Alluvial Material

Alluvial soils are defined as any material that has been transported and placed by water. The alluvial soil generally consisted of brown, reddish brown, grayish brown, and orangish brown lean clays (CL) with sand and rounded rock fragments. The SPT N-values used to evaluate the consistency of the alluvial soil ranged from 1 blow per foot (bpf) to 50 blows with no penetration, indicating a relative soil consistency ranging from very soft to very hard (very loose to very dense). It should be noted that the soft, or worse, consistency alluvial soil (blow counts less than 5 blows per foot) were generally isolated to borings A-18 and A-30 and the hard, or greater, consistency soils encountered (blow counts greater than 30 blows per foot) were generally encountered in to borings A-8B and A-22 in the presence of abundant rock fragments. Therefore, the alluvial soil encountered was generally firm to very stiff (loose to medium dense) in consistency.

The natural moisture content of selected samples of alluvial material ranged from about 17.9 to 46.6 percent. Atterberg limits testing on selected samples of the alluvial soil indicated liquid limits (LL) ranging from 26 to 64 percent and plasticity indices (PI) ranging from 6 to 39 percent. The alluvial soils tested for atterberg limits and grainsize are classified as lean clays (CL), fat clays (CH), and silty lean clays (CL-ML) in accordance with the Unified Soil Classification System (USCS).

Residual Soil

Beneath the alluvial soils encountered in four borings (A-1, A-18, A-21, and A-26), beneath the existing fill material encountered in borings A-8B and A-22, and beneath the surficial material encountered in boring A-14, residual soil was encountered to depths ranging from 4.5 to 19.6 feet beneath the existing ground surface. Residual soil depths are provided in the table below.

Table 4: Residual Soil Depth

Boring	Residual Material Depth (ft)
MA-01*	19.6
A-8B*	14.5
A-14*	4.5
A-18*	17.5
A-21*	17
A-22*	18
A-26*	22

*Auger Refusal within Residual Material

Residual soils are formed from the in-place weathering of the underlying parent bedrock. The residual soils generally consisted of light brown, brown, and orangish brown lean clay (CL) with varying amounts of shale and limestone fragments. The SPT N-values used to evaluate the consistency of the residual soil ranged from 7 to 50/1” bpf, indicating a relative soil consistency ranging from firm to very hard. It should be noted that the hard, or greater, consistency residual soils encountered (blow counts greater than 30 blows per foot) were generally encountered in to borings A-5 and A-10 in the presence of abundant rock fragments. Therefore, the residual soil encountered was generally firm to very stiff (loose to medium dense) in consistency.

The natural moisture content of selected samples of residual material ranged from about 20.7 to 37.6 percent. Atterberg limits testing on selected samples of the residual soil indicated liquid limits (LL) ranging from 35 to 66 percent and plasticity indices (PI) ranging from 16 to 41 percent. The residual soils tested for atterberg limits and grainsize are classified as lean clay (CL) and fat clay (CH) in accordance with the Unified Soil Classification System (USCS).

Auger Refusal

Auger refusal was encountered in twenty-nine test borings, and in two offset borings (A-04B and A-04C), at depths ranging from approximately 4.5 to 25.9 feet beneath the existing ground surface. Auger refusal depths are provide in a table below Auger refusal is a designation applied to any material that cannot be penetrated by the power auger. Auger refusal may indicate dense gravel or cobble layers, boulders, rock ledges or pinnacles, or the top of continuous bedrock.

Table 5: Auger Refusal Depths

Boring	Auger Refusal (ft)						
MA-01	19.6	A-07	20	A-20	20.9	A-28	21.3
A-02	8.3	A-08B	14.5	A-21	17	A-29	25.9
A-03	16.7	A-10	13	A-22	18	A-30	17.1
A-04	8.5	A-11	6.8	A-23	20.2	A-31	9.5
A-04B	17.2	A-14	4.5	A-24	21	A-32	19.9
A-04C	13.1	A-17	15	A-25	19.9	A-33	17.5
A-05	12.5	A-18	17.5	A-26	22	A-34	17.5
A-06	20	A-19	15.5	A-27	7		

Rock coring was performed in twenty-nine borings to characterize the refusal materials encountered. The rock core samples obtained during coring operations revealed the underlying bedrock consisted of dark gray and gray limestone and dolomite with slightly to heavily fractured and weathered zones. The recovery (REC) percentages and the rock quality designation (RQD) of the rock cores ranged from 0 to 100 percent a, indicating a rock quality of very poor to excellent per ASTM D 6032. Multiple voids were encountered within the bedrock ranging from 2 inches to 10 feet in thickness. Void locations and depths are provided in the table below.

Table 6: Bedrock Voids Locations and Thicknesses

Boring	Void From (depth)	Void To (depth)	Void Thickness (ft)	Boring	Void From (depth)	Void To (depth)	Void Thickness (ft)
MA-01	21.7	23.2	1.5	A-10	16.7	18.2	1.5
A-02	18.8	27.1	8.3		18.5	25.6	7.1
	32.9	38.1	5.2	A-11	17.1	18.6	1.5
	39.3	42.1	2.8		19	20.1	1.1
A-03	43.5	50.5	7	A-21	19.4	22.5	3.1
A-04	11.1	11.6	0.5		22.7	27	4.3
	19	19.8	0.8	A-22	25.2	25.4	0.2
A-04B	18.6	25.2	6.6		26	27	1
	26	27.6	1.6	A-23	32.7	33	0.3
	28.8	30.8	2	A-26	25	25.2	0.2
A-04C	16	20.1	4.1		28	36	8
A-05	16.7	18.3	1.6		37	39.4	2.4
	20.4	30.4	10	A-28	23.8	24	0.2
A-06	23.8	27.6	3.8		34	34.3	0.3

Results of unconfined compression tests on selected samples of rock core obtained indicated unconfined compressive strengths ranging from 1,222 kips per square feet (ksf) to 2,964 ksf.

Ground Water

Ground water was encountered in twenty-one borings at varying depths. Ground water depths and measurement dates are provided in the table below. It should be noted that ground water measurement dates were staggered to minimize the influence of abnormally heavy rainfall that occurred during the field exploration.

Table 7: Ground Water Measurements

Boring	Ground Water Depth (ft)	Measurement Date Reference to boring Completion	Boring	Ground Water Depth (ft)	Measurement Date Reference to boring Completion
A-02	4	2 days	A-24	10.2	24 hours
A-03	4	2 days		3	10 days
A-04	6	24 hours	A-25	9.5	Completion
A-04B	6	24 hours		10	24 hours
A-04C	6	24 hours		2.5	10 days
A-05	6	24 hours	A-26	14	Completion
A-08B	13	Completion		14	24 hours
	13	1 hour	A-28	15	Completion
	12	3 days		15	24 hours
A-10	10	Completion		4	9 days
A-18	13	Completion	A-29	10	Completion
A-19	6	13 days		10	24 hours
A-20	8.2	Completion		2	10 days
	8.1	24 hours	A-30	6	Completion
	1	13 days		6	24 hours
A-22	16	Completion		1	9 days
	16	24 hours	A-31	8	Completion
A-23	17	Completion		8	24 hours
	17	24 hours		3.8	9 days
	2.8	9 days	A-33	16	Completion
A-24	10.2	Completion		14	1 day

Subsurface water levels may fluctuate due to seasonal changes in precipitation amounts. However, areas of perched water may exist in the existing fill material, overburden, and/or near the contact with bedrock, particularly in the Treatment Facility Area under the existing parking lot.

Bulk Samples

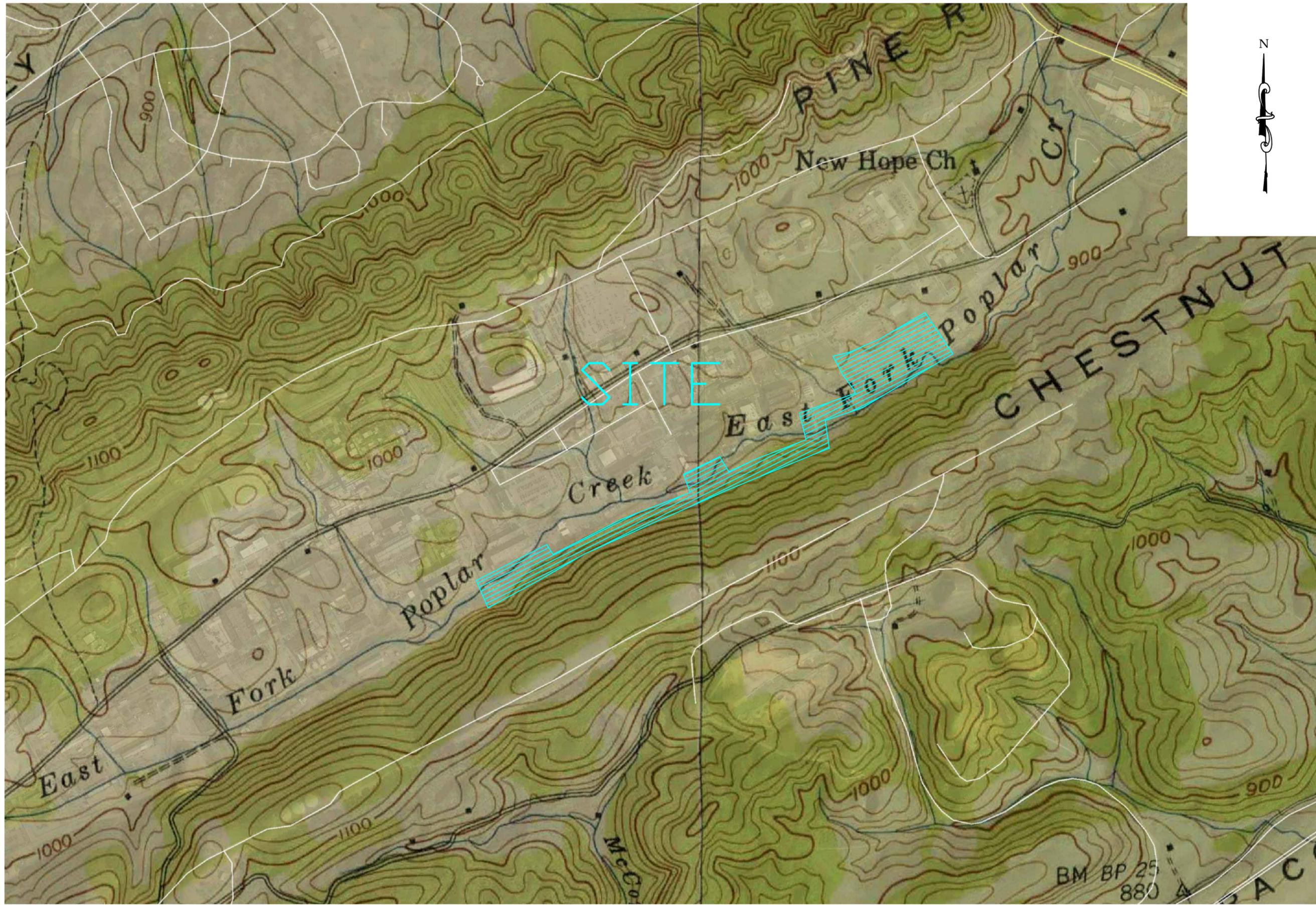
Standard Proctor tests (ASTM D 698) conducted on bulk samples collected from borings A-04B (0-10 feet), A-34 (0-10 feet), and a combination of borings conducted in the Treatment Facility Area (varying depths) indicated maximum dry densities of 114.3, 114.2, and 111.1 pounds per cubic foot (pcf) with optimum moisture contents of 13.1, 13.2, and 15.7 percent, respectively. California Bearing Ratio (CBR) testing on the above mentioned three samples indicated CBR values ranging from 2.1 to 4.5 percent.

Undisturbed Samples

The results of consolidation testing on undisturbed samples collected from varying locations indicated pre-consolidation pressures ranging from 1.92 to 5.96 tons per square foot (tsf), compression indices ranging from 0.13 to 0.22, and initial void ratios (e) ranging from 0.554 to 0.772. Unconfined compression strength testing conducted on undisturbed samples obtained from borings A-01, A-03, A-04B, A-06, A-07 A-21, A-22, A-256, A-28, and A-29 revealed unconfined compressive strengths ranging from 2,160 to 3,810 pounds per square feet (psf) and undrained shear strength values ranging from 1,415 to 1,630 psf. Consolidated undrained (CU) triaxial shear testing conducted on borings A-03, A-06, and A-20 revealed effective friction angles of 27.9, 26.4, and 26.8 degrees and effective cohesions of 420, 600, and 320 psf, respectively.

APPENDIX A

Figures and Test Boring Records

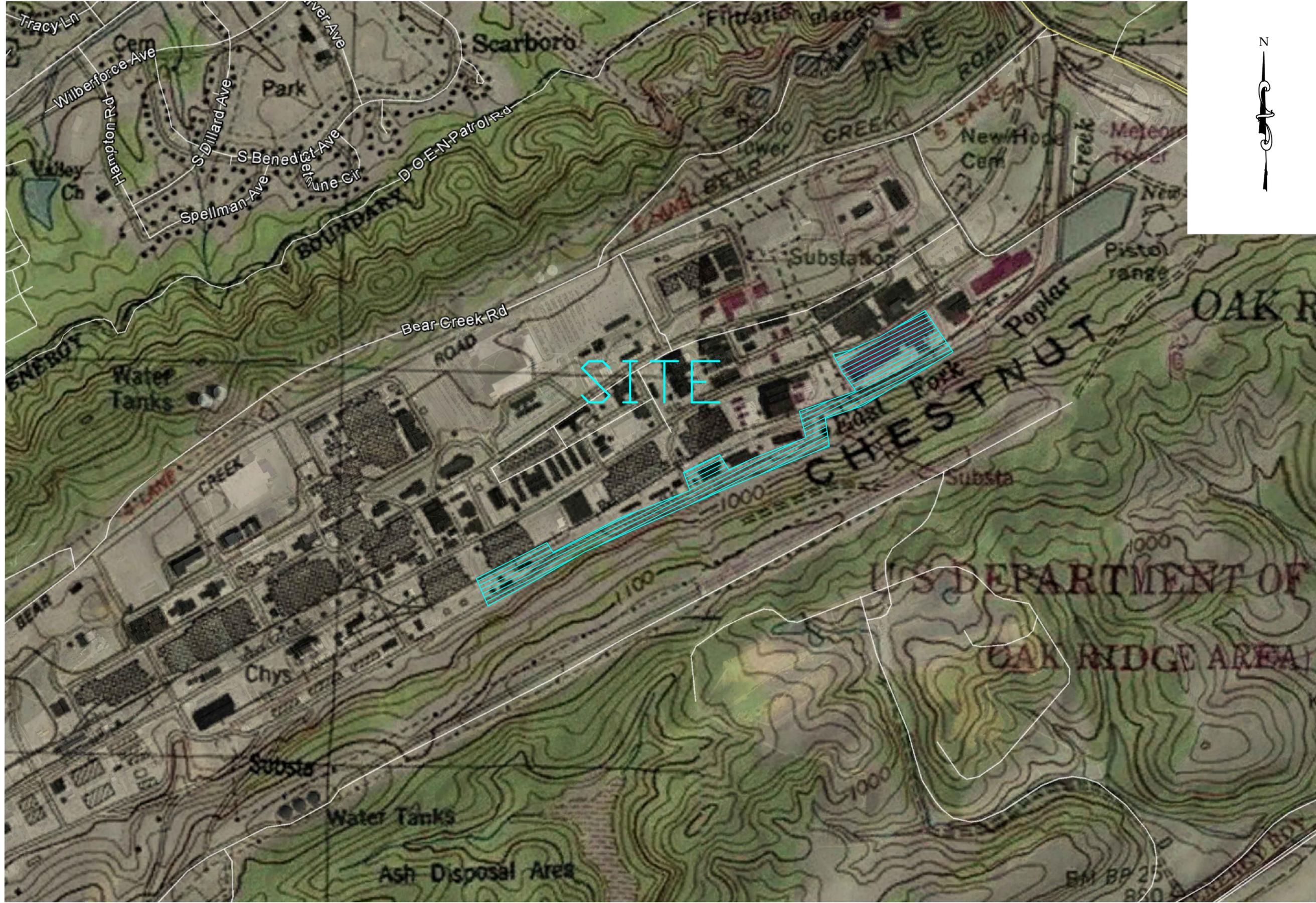


DRAWN BY:	MTB
APPROVED BY:	ACA
SCALE:	N.T.S.
JOB NO.:	21-15652
DATE:	3-1-2016

GEOS
 Geotechnical and Environmental Engineers
 2561 Millow Point Way
 Knoxville, Tennessee 37931
 Office: 865-595-8242
 Fax: 865-595-8232

SITE VICINITY MAP - 1941 TOPO
 OUTFALL 200 MERCURY TREATMENT FACILITY
 Y-12 NATIONAL SECURITY COMPLEX
 OAK RIDGE, TENNESSEE

NOTES:
 1) BASE MAP: USGS QUADRANGLE (LOVELL AND BETHEL VALLEY, TENNESSEE)



NOTES:

- 1) BASE MAP: USGS QUADRANGLE (LOVELL AND BETHEL VALLEY, TENNESSEE)

SITE VICINITY MAP - 1980 TOPO

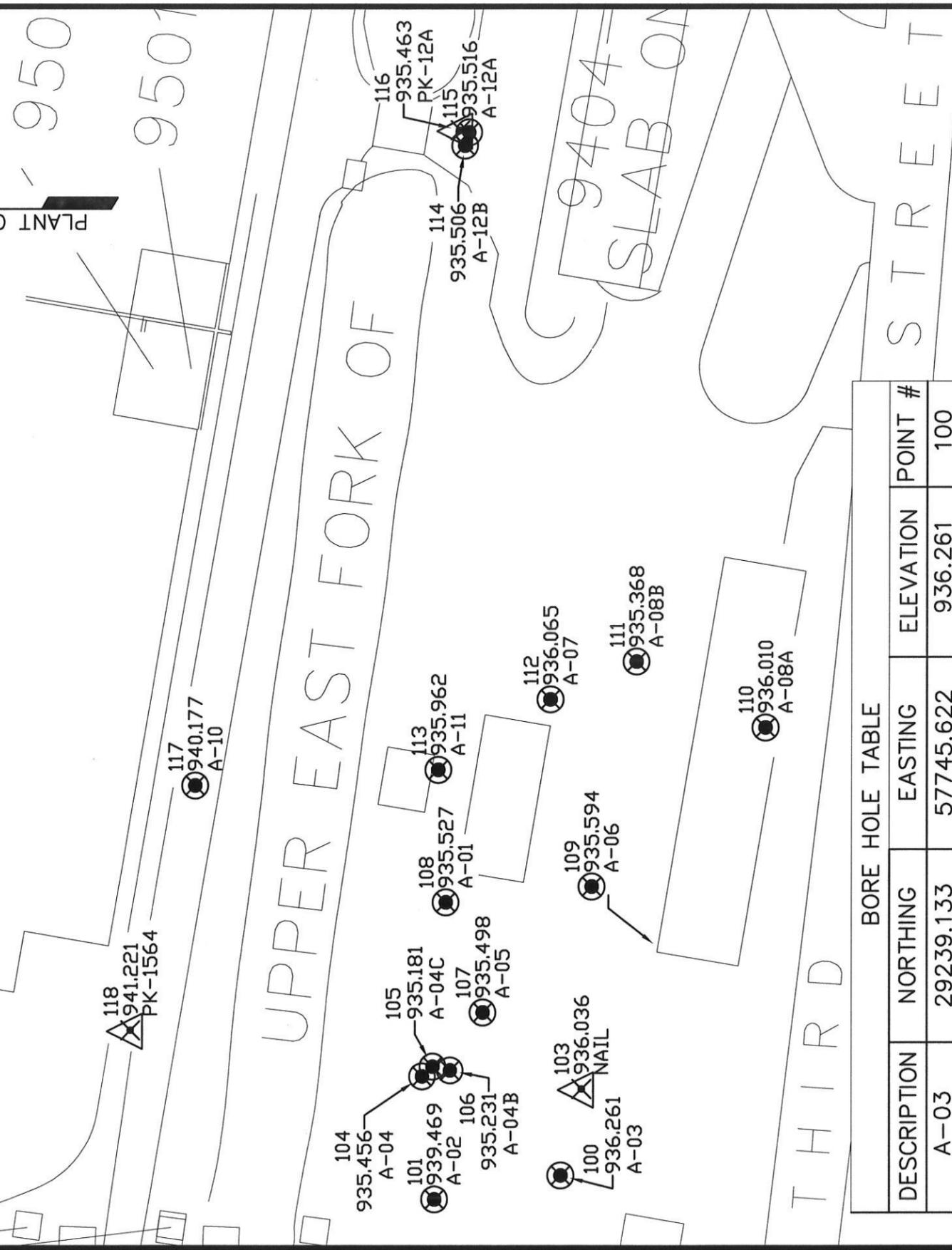
OUTFALL 200 MERCURY TREATMENT FACILITY
Y-12 NATIONAL SECURITY COMPLEX

OAK RIDGE, TENNESSEE

DRAWN BY:	MTB
APPROVED BY:	ACA
SCALE:	N.T.S.
JOB NO.:	21-15652
DATE:	3-1-2016

GES
 Geotechnical and Environmental Engineers
 2561 Millbrook Point Way
 Knoxville, Tennessee 37931
 Office: 865-595-8242
 Fax: 865-595-8232

DESCRIPTION	NORTHING	EASTING	ELEVATION	POINT #
NAIL	29232.811	57771.993	936.036	103
PK-12A	29270.475	58064.435	935.463	116
PK-1564	29370.747	57789.839	941.221	118
cp-816pub	29129.900	57667.900	946.130	1



DESCRIPTION	NORTHING	EASTING	ELEVATION	POINT #
A-03	29239.133	57745.622	936.261	100
A-02	29277.791	57738.318	939.469	101
A-04	29281.571	57775.852	935.456	104
A-04C	29278.351	57778.798	935.181	105
A-04B	29273.003	57777.653	935.231	106
A-05	29262.929	57795.307	935.498	107
A-01	29274.350	57828.824	935.527	108
A-06	29229.728	57833.627	935.594	109
A-08A	29176.513	57882.053	936.010	110
A-08B	29216.066	57902.203	935.368	111
A-07	29242.353	57890.662	936.065	112
A-11	29276.697	57869.178	935.962	113
A-12B	29269.002	58059.714	935.506	114
A-12A	29267.762	58063.757	935.516	115
A-10	29350.949	57864.379	940.177	117



GRAPHIC SCALE



SHEET 1 OF 3



BENCHMARK ASSOCIATES, INC.

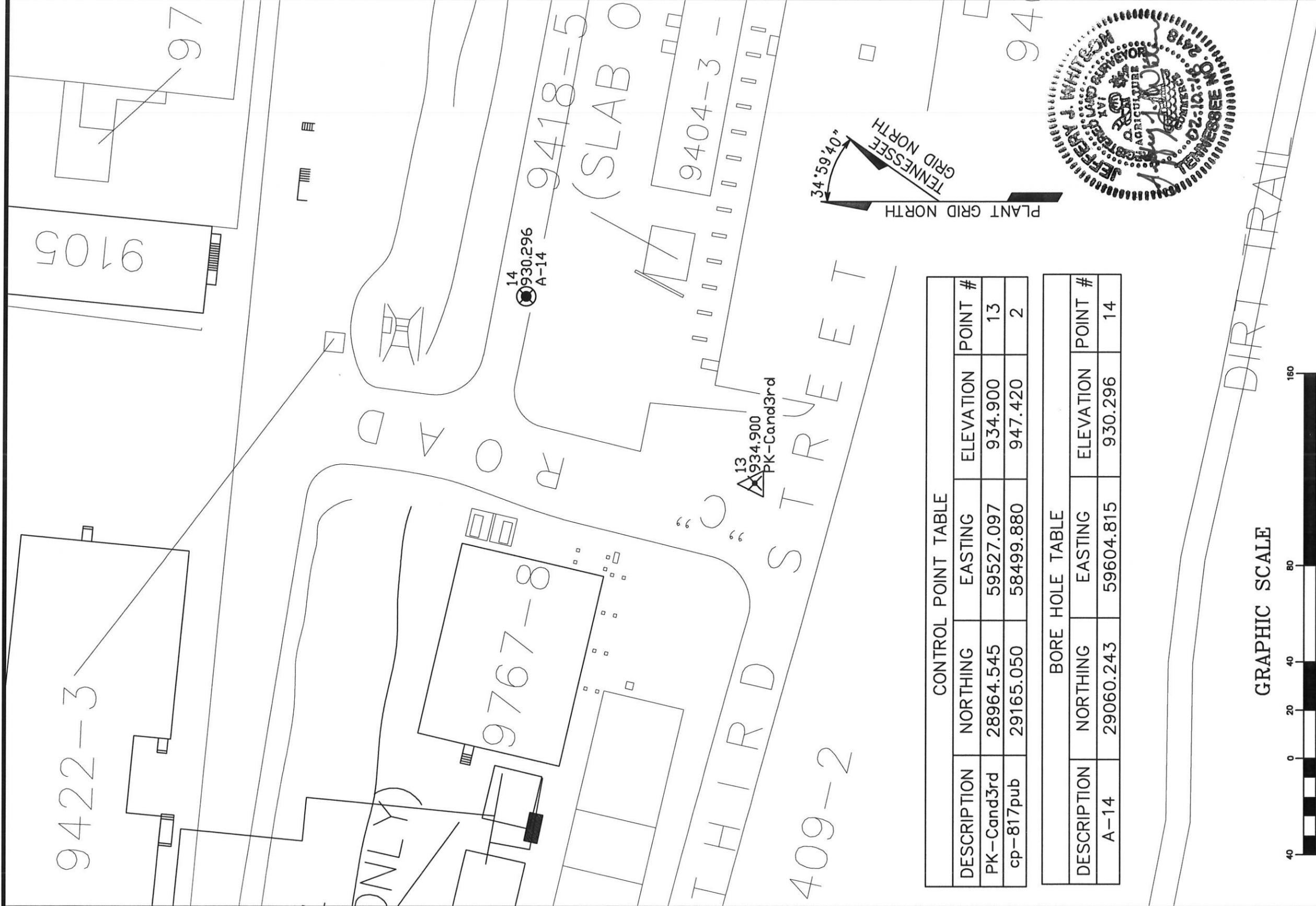
10308 Hardin Valley Road
Knoxville, Tennessee 37932

Member
Tennessee Association
of Professional Surveyors

Land Planners • Land Surveyors

Phone (865) 692-4090
Facsimile (865) 692-4091

This document shall not be loaned, copied, reproduced, transferred to magnetic media or sold and is maintained as an instrument of service and shall retain all common law, statutory and other reserved rights, including the copyright. © 2016 BENCHMARK ASSOCIATES, INC.

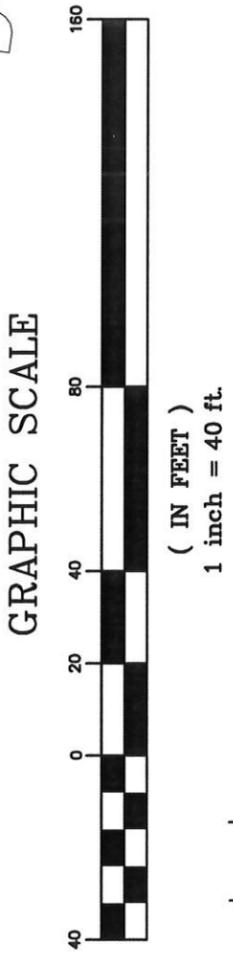


CONTROL POINT TABLE

DESCRIPTION	NORTHING	EASTING	ELEVATION	POINT #
PK-Cand3rd	28964.545	59527.097	934.900	13
cp-817pub	29165.050	58499.880	947.420	2

BORE HOLE TABLE

DESCRIPTION	NORTHING	EASTING	ELEVATION	POINT #
A-14	29060.243	59604.815	930.296	14



SHEET 2 OF 3



BENCHMARK ASSOCIATES, INC.

10308 Hardin Valley Road
Knoxville, Tennessee 37932

Member:
Tennessee Association
of Professional Surveyors

Land Planners ♦ Land Surveyors

Phone (865) 692-4090
Facsimile (865) 692-4091

This document shall not be loaned, copied, reproduced, transferred to magnetic media or sold and is maintained as an instrument of service and shall retain all common law, statutory and other reserved rights, including the copyright. © 2016 BENCHMARK ASSOCIATES, INC.



R O A D

217
923.347
A-18

218
921.274
A-17

UPPER POPLAR CREEK

- 201 926.477 A-22
- 202 926.737 A-21
- 203 926.804 A-33
- 204 926.797 A-23
- 205 926.502 A-32
- 206 926.532 A-26
- 207 926.754 A-25
- 208 926.451 A-31
- 209 926.663 A-30
- 210 926.149 A-28
- 211 926.503 A-27
- 212 926.161 A-29
- 213 926.469 A-24
- 214 926.678 A-20
- 215 926.487 A-34
- 216 926.420 A-19

BORE HOLE TABLE

DESCRIPTION	NORTHING	EASTING	ELEVATION	POINT #
A-22	29035.968	61395.352	926.477	201
A-21	28999.510	61410.287	926.737	202
A-33	28984.138	61441.555	926.804	203
A-23	29001.139	61461.399	926.797	204
A-32	29031.144	61438.937	926.502	205
A-26	29028.908	61492.183	926.532	206
A-25	28971.853	61509.781	926.754	207
A-31	28935.580	61564.703	926.451	208
A-30	28976.829	61611.701	926.663	209
A-28	28910.582	61648.531	926.149	210
A-27	29028.123	61649.689	926.503	211
A-29	28910.205	61490.929	926.161	212
A-24	28938.451	61466.911	926.469	213
A-20	28962.672	61416.800	926.678	214
A-34	28941.480	61399.036	926.487	215
A-19	28928.368	61384.577	926.420	216
A-18	28887.556	61237.640	923.347	217
A-17	28799.792	61179.827	921.274	218

CONTROL POINT TABLE

DESCRIPTION	NORTHING	EASTING	ELEVATION	POINT #
pk-A1.PRKLOT-2ND	29144.502	61365.36	928.880	200
d-bwsc.poss0810	29215.749	61062.644	926.334	1108



GRAPHIC SCALE



(IN FEET)
1 inch = 60 ft.

SHEET 3 OF 3



BENCHMARK ASSOCIATES, INC.

10308 Hardin Valley Road
Knoxville, Tennessee 37932

Member:
Tennessee Association
of Professional Surveyors

Land Planners ♦ Land Surveyors

Phone (865) 692-4090
Facsimile (865) 692-4091

This document shall not be loaned, copied, reproduced, transferred to magnetic media or sold and is maintained as an instrument of service and shall retain all common law, statutory and other reserved rights, including the copyright. © 2016 BENCHMARK ASSOCIATES, INC.



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **MA-1**
 SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION MA-1 DRY ON COMPLETION ? Yes

DATE December 15, 2015 SURFACE ELEV. 935.5 FT.
 REFUSAL: Yes DEPTH 19.6 FT. ELEV. 915.9 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 19.6 FT. ELEV. 915.9 FT.
 BEGAN CORING DEPTH 19.6 FT. ELEV. 915.9 FT.
 FOOTAGE CORED (LF) 30.4 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. _____ FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. _____ FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. _____ FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
0.0 - 2.5										Topsoil with some Gravel (12 Inches)
2.5 - 5.0	2.5	4.5	1	SS	6					Lean CLAY with Sand (CL) - with rock fragments - brown (10YR 5/3) - moist (FILL)
5.0 - 7.5	5.0	7.0	ST-1	ST	2' Recovery		31	13	19.8	
7.5 - 10.0	7.5	9.5	2	SS	8				26.1	Lean CLAY (CL) - brown (10YR 5/3 and 7.5YR 4/3) and trace gray with oxide staining - moist (FILL)
10.0 - 12.5										
12.5 - 15.0	12.5	14.5	3	SS	11					Fat CLAY (CH) - brown and orangish brown (10YR 5/4) - slightly moist - stiff (ALLUVIUM)
15.0 - 17.5										
17.5 - 19.6	17.5	19.5	4	SS	7		53	32	37.5	Fat CLAY (CH) - brown mottled grayish brown (10YR 5/3 and 10YR 5/1) - wet - firm (RESIDUUM)
19.6 - 20.0										Auger Refusal at 19.6 Feet

REMARKS: Location moved approximately 50 feet east/northeast to avoid overhead utility lines - Black denotes locations of voids
Kept most core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **MA-1**
 SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION MA-1 DRY ON COMPLETION ? Yes

DATE December 15, 2015 SURFACE ELEV. 935.5 FT.
 REFUSAL: Yes DEPTH 19.6 FT. ELEV. 915.9 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 19.6 FT. ELEV. 915.9 FT.
 BEGAN CORING DEPTH 19.6 FT. ELEV. 915.9 FT.
 FOOTAGE CORED (LF) 30.4 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
-										Continued
-										Begin Coring at 19.6 Feet
-										Run #1 (19.6 to 20.1 Feet)
-										REC - 20% RQD - 20%
22.5										Limestone and dolomite - light gray and dark gray - with calcite healed veins - moderately fractured and slightly weathered - no discernible dip angle
-										Run #2 (20.1 to 25.1 Feet)
25.0										REC - 70% RQD - 70%
-										Limestone and dolomite - light gray and dark gray - with calcite healed veins - highly fractured and highly weathered - no discernible dip angle - evidence of water transport 21.0 to 21.5 feet
27.5										VOID 21.7 to 23.2 Feet
-										Run #3 (25.1 to 30.1 Feet)
30.0										REC - 93% RQD - 85%
-										Limestone and dolomite - light gray, dark bluish gray, and dark gray - with abundant calcite healed veins and trace shale seams - highly fractured and highly weathered - no discernible dip angle
32.5										Run #4 (30.1 to 35.1 Feet)
-										REC - 98% RQD - 98%
35.0										Dolomite with some limestone - light gray, dark bluish gray, and dark gray - with abundant calcite healed veins and trace shale seams - slightly fractured and slightly weathered - no discernible dip angle
-										Run #5 (35.1 to 40.1 Feet)
37.5										REC - 100% RQD - 100%
-										Dolomite with some limestone - light gray, dark bluish gray, and dark gray - with abundant calcite healed veins and trace shale seams - slightly fractured and slightly weathered - no discernible dip angle
40.0										(continued)

REMARKS: Location moved approximately 50 feet east/northeast to avoid overhead utility lines - Black denotes locations of voids
Kept most core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **MA-1**
 SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION MA-1 DRY ON COMPLETION ? Yes

DATE December 15, 2015 SURFACE ELEV. 935.5 FT.
 REFUSAL: Yes DEPTH 19.6 FT. ELEV. 915.9 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 19.6 FT. ELEV. 915.9 FT.
 BEGAN CORING DEPTH 19.6 FT. ELEV. 915.9 FT.
 FOOTAGE CORED (LF) 30.4 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM FT.	TO FT.			N-Value	Qu	LL	PI	%M	
-										Continued
42.5										Run #6 (40.1 to 45.1 Feet) REC - 100% RQD - 100%
45.0										Dolomite with some limestone - light gray, dark bluish gray, and dark gray - with trace calcite healed veins and shale seams - slightly fractured and moderately weathered - no discernible dip angle
47.5										Run #7 (45.1 to 50.0 Feet) REC - 97% RQD - 97%
50.0										Dolomite with some limestone - light gray, dark bluish gray, and dark gray - with trace calcite healed veins and shale seams - slightly fractured and slightly weathered (moderately weathered zone 49-50 feet) - no discernible dip angle - evidence of water transport 49.0-50.0 Feet
52.5										Coring Terminated at 50.0 Feet
55.0										
57.5										
60.0										

REMARKS: Location moved approximately 50 feet east/northeast to avoid overhead utility lines - Black denotes locations of voids
Kept most core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-02
 SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-02 DRY ON COMPLETION ? Yes

DATE December 28, 2016 SURFACE ELEV. 939.5 FT.
 REFUSAL: Yes DEPTH 8.3 FT. ELEV. 931.2 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 8.3 FT. ELEV. 931.2 FT.
 BEGAN CORING DEPTH 8.3 FT. ELEV. 931.2 FT.
 FOOTAGE CORED (LF) 42.7 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 889.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 2 DAYS: DEPTH 4.0 FT.
 ELEV. 935.5 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM FT.	TO FT.			N-Value	Qu	LL	PI	%M	
0.0 - 2.5										Topsoil and Gravel (24 Inches)
2.5 - 5.0	2.5	4.5	1	SS	19					Lean CLAY (CL) - with abundant rock fragments and silt throughout and brick fragments at depth - dark brown (10YR 4/2) - moist (FILL)
5.0 - 7.5	5.0	7.0	2	SS	8					
7.5 - 10.0	7.0	9.0	ST-1	ST	6" Recovery					Auger Refusal at 8.3 Feet Begin Coring at 8.3 Feet Run #1 (8.3 to 9.7 Feet) REC - 100% RQD - 100%
10.0 - 12.5										Limestone - dark gray - with abundant calcite healed veins and shale seams - slightly fractured and slightly weathered - no discernible dip angle
12.5 - 15.0										Run #2 (9.7 to 11.8 Feet) REC - 100% RQD - 100%
15.0 - 17.5										Limestone - dark gray - with calcite healed veins and shale seams - slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport at 15.3'
17.5 - 20.0										Run #3 (11.8 to 16.8 Feet) REC - 100% RQD - 100%
										Run #4 (16.8 to 21.8 Feet) REC - 40% RQD - 40%
										Limestone - dark gray - with abundant calcite healed veins and shale seams ...

(continued)

REMARKS: Black denotes locations of voids
 Lost approx 1/2 of core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-02
 SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-02 DRY ON COMPLETION ? Yes

DATE December 28, 2016 SURFACE ELEV. 939.5 FT.
 REFUSAL: Yes DEPTH 8.3 FT. ELEV. 931.2 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 8.3 FT. ELEV. 931.2 FT.
 BEGAN CORING DEPTH 8.3 FT. ELEV. 931.2 FT.
 FOOTAGE CORED (LF) 42.7 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 889.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 2 DAYS: DEPTH 4.0 FT.
 ELEV. 935.5 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
22.5 - 917.0										Continued Limestone - dark gray - with abundant calcite healed veins and shale seams - moderately fractured and heavily weathered - no discernible dip angle
25.0 - 914.5										SOIL FILLED VOID 18.8 to 27.1 Feet Run #5 (21.8 to 26.8 Feet) REC - 0% RQD - 0%
27.5 - 912.0										No Recovery SOIL FILLED VOID 18.8 to 27.1 Feet Run #6 (26.8 to 31.8 Feet) REC - 54% RQD - 52%
30.0 - 909.5										Limestone - dark gray - with abundant calcite healed veins and shale seams - moderately fractured and heavily weathered - no discernible dip angle
32.5 - 907.0										Run #7 (31.8 to 36.8 Feet) REC - 22% RQD - 22%
35.0 - 904.5										Limestone - dark gray - with abundant calcite healed veins and shale seams - moderately fractured and heavily weathered - no discernible dip angle
37.5 - 902.0										SOIL FILLED VOID 32.9 to 38.1 Feet Run #8 (36.8 to 41.8 Feet) REC - 24% RQD - 0%
40.0 - 899.5										Limestone - dark gray - with calcite healed veins and shale seams - moderately fractured and heavily weathered ...

(continued)

REMARKS: Black denotes locations of voids
 Lost approx 1/2 of core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-02
 SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-02 DRY ON COMPLETION ? Yes

DATE December 28, 2016 SURFACE ELEV. 939.5 FT.
 REFUSAL: Yes DEPTH 8.3 FT. ELEV. 931.2 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 8.3 FT. ELEV. 931.2 FT.
 BEGAN CORING DEPTH 8.3 FT. ELEV. 931.2 FT.
 FOOTAGE CORED (LF) 42.7 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 889.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 2 DAYS: DEPTH 4.0 FT.
 ELEV. 935.5 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
—										Continued
—										Limestone - dark gray - with calcite healed veins and shale seams - moderately fractured and heavily weatherd - no discernible dip angle
42.5 — 897.0										VOID 39.3 to 42.1 Feet
—										Run #9 (41.8 to 46.8 Feet) REC - 90% RQD - 76%
45.0 — 894.5										Limestone - dark gray - with calcite healed veins and shale seams - slightly fractured and moderately weatherd - no discernible dip angle
47.5 — 892.0										Run #10 (46.8 to 50.0 Feet) REC - 62% RQD - 60%
50.0 — 889.5										Limestone - dark gray - with calcite healed veins and shale seams - slightly fractured and moderately weatherd - no discernible dip angle
52.5 — 887.0										Coring Terminated at 50.0 Feet
55.0 — 884.5										
57.5 — 882.0										
60.0 — 879.5										

REMARKS: Black denotes locations of voids
 Lost approx 1/2 of core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-03**
 SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-03 DRY ON COMPLETION ? Yes

DATE December 22, 2016 SURFACE ELEV. 936.3 FT.
 REFUSAL: Yes DEPTH 16.7 FT. ELEV. 919.6 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 16.7 FT. ELEV. 919.6 FT.
 BEGAN CORING DEPTH 16.0 FT. ELEV. 920.3 FT.
 FOOTAGE CORED (LF) 34.0 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 886.3 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH 4.0 FT.
 ELEV. 932.3 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
0.0 - 2.5										Topsoil with some Gravel (12 Inches)
2.5 - 5.0	2.5	4.5	1	SS	12					Fat CLAY (CH) - with rock fragments and trace construction debris (steel wire) - dark brown (10YR 4/2) - slightly moist (FILL)
5.0 - 7.5	5.0	7.0	ST-1	ST	2' Recovery		53	32	20.4	
7.5 - 10.0	7.5	9.5	2	SS	12					Fat CLAY (CH) - with abundant rock fragments - dark brown mottled black (10YR 4/6 and 10YR 2/1) - slightly moist (FILL)
10.0 - 12.5	10.0	12.0	ST-2	ST	2' Recovery				17.9	
12.5 - 15.0	12.5	14.5	3	SS	14		53	32	26.1	Fat CLAY (CH) - with trace rounded rock fragments - orangish brown and brown (10YR 4/3) - slightly moist - stiff (ALLUVIUM)
15.0 - 17.5										Auger Refusal at 16.7 Feet Begin coring at 16 Feet
17.5 - 20.0										Run #1 (16.0 to 20.4 Feet) REC - 87% RQD - 87% Limestone and dolomite - light gray and dark gray - with calcite healed veins and shale seams - slightly fractured and slightly weathered - no

(continued)

REMARKS: Kept all core water until 43.5 feet, then lost all core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-03**
 SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-03 DRY ON COMPLETION ? Yes

DATE December 22, 2016 SURFACE ELEV. 936.3 FT.
 REFUSAL: Yes DEPTH 16.7 FT. ELEV. 919.6 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 16.7 FT. ELEV. 919.6 FT.
 BEGAN CORING DEPTH 16.0 FT. ELEV. 920.3 FT.
 FOOTAGE CORED (LF) 34.0 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 886.3 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH 4.0 FT.
 ELEV. 932.3 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
—										Continued
—										Limestone and dolomite - light gray and dark gray
—										- with calcite healed veins and shale seams -
—										slightly fractured and slightly weathered - no
22.5										discernible dip angle
—										-----
—										Run #2 (20.4 to 25.4 Feet)
—										REC - 100% RQD - 100%
—										Limestone and dolomite - light gray and dark gray
—										- with calcite healed veins and shale seams -
—										slightly fractured and slightly weathered - no
25.0										discernible dip angle
—										-----
—										Run #3 (25.4 to 30.4 Feet)
—										REC - 100% RQD - 100%
—										Limestone and dolomite - light gray and dark gray
—										- with calcite healed veins and shale seams -
—										slightly fractured and slightly weathered - no
27.5										discernible dip angle
—										-----
—										Run #4 (30.4 to 35.4 Feet)
—										REC - 100% RQD - 100%
—										Limestone and dolomite - light gray and dark gray
—										- with calcite healed veins and abundant shale
—										seams - very slightly fractured and slightly
—										weathered - no discernible dip angle
30.0										-----
—										Run #5 (35.4 to 40.4 Feet)
—										REC - 96% RQD - 96%
—										Limestone and dolomite - light gray and dark gray
—										- with calcite healed veins and abundant shale
—										seams - slightly fractured and slightly weathered -
—										no discernible dip angle - evidence of water
—										transport at 38 feet
37.5										-----
—										
40.0										(continued)

REMARKS: Kept all core water until 43.5 feet, then lost all core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-03**
 SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-03 DRY ON COMPLETION ? Yes

DATE December 22, 2016 SURFACE ELEV. 936.3 FT.
 REFUSAL: Yes DEPTH 16.7 FT. ELEV. 919.6 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 16.7 FT. ELEV. 919.6 FT.
 BEGAN CORING DEPTH 16.0 FT. ELEV. 920.3 FT.
 FOOTAGE CORED (LF) 34.0 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 886.3 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH 4.0 FT.
 ELEV. 932.3 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
42.5 - 893.8										Continued Run #5 (40.4 to 45.4 Feet) REC - 62% RQD - 62%
45.0 - 891.3										Limestone and dolomite - light gray and dark gray - with calcite healed veins and abundant shale seams - slightly fractured and slightly weathered - no discernible dip angle
47.5 - 888.8										VOID 43.5 to 50.5 Feet
50.0 - 886.3										Run #6 (45.4 to 50.5 Feet) REC - 0% RQD - 0%
52.5 - 883.8										No recovery, tagged rock at 50.5 Feet
55.0 - 881.3										Coring Terminated at 50.0 Feet
57.5 - 878.8										
60.0 - 876.3										

REMARKS: Kept all core water until 43.5 feet, then lost all core water
 Black denotes location of voids encountered



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-04**
 SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-04 DRY ON COMPLETION ? No

DATE December 15, 2015 SURFACE ELEV. 935.5 FT.
 REFUSAL: Yes DEPTH 8.5 FT. ELEV. 927.0 FT.
 SAMPLED 29.0 FT. 8.8 M
 TOP OF ROCK DEPTH 8.5 FT. ELEV. 927.0 FT.
 BEGAN CORING DEPTH 8.4 FT. ELEV. 927.1 FT.
 FOOTAGE CORED (LF) 20.6 FT.
 BOTTOM OF HOLE DEPTH 29.0 FT. ELEV. 906.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HR: DEPTH TNP FT.
 ELEV. FT.
 AFTER 24 HRS. DEPTH 6.0 FT.
 ELEV. 929.5 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL	
0.0 - 2.5	933.0									Gravel with soil (8 Inches)
2.5 - 5.0	930.5		1	SS	8					Lean CLAY (CL) – brown (7.5YR 4/3 and 7.5YR 4/4) – moist (FILL)
5.0 - 7.5	928.0		2	SS	17		34	17	15.7	Fat CLAY (CH) – yellowish brown and orangish brown (10YR 5/4) – with trace rounded rock fragments – moist (ALLUVIUM)
7.5 - 10.0	925.5		3	SS	50/1"					Auger Refusal at 8.5 Feet Begin Coring at 8.4 Feet Run #1 (8.4 to 10.5 Feet) REC – 95% RQD – 95%
10.0 - 12.5	923.0									Limestone - dark gray and dark bluish gray - fine grained – with calcite healed veins and shale seams - slightly weathered and no fracturing - no discernible dip angle
12.5 - 15.0	920.5									Run #2 (10.5 to 15.5 Feet) REC – 87% RQD – 87%
15.0 - 17.5	918.0									Limestone - dark gray and dark bluish gray - fine grained – with calcite healed veins and shale seams - moderately weathered and slightly fractured - no discernible dip angle
17.5 - 20.0	915.5									VOID 11.1 to 11.6 Feet Run #3 (15.5 to 20.5 Feet) REC – 17% RQD – 0%
										Limestone - dark gray and dark bluish gray - fine grained

(continued)

REMARKS: Black denotes location of voids
 Lost some core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-04**
 SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-04 DRY ON COMPLETION ? No

DATE December 15, 2015 SURFACE ELEV. 935.5 FT.
 REFUSAL: Yes DEPTH 8.5 FT. ELEV. 927.0 FT.
 SAMPLED 29.0 FT. 8.8 M
 TOP OF ROCK DEPTH 8.5 FT. ELEV. 927.0 FT.
 BEGAN CORING DEPTH 8.4 FT. ELEV. 927.1 FT.
 FOOTAGE CORED (LF) 20.6 FT.
 BOTTOM OF HOLE DEPTH 29.0 FT. ELEV. 906.5 FT.

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HR: DEPTH TNP FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH 6.0 FT.
 ELEV. 929.5 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
—										Continued
—										Limestone - dark gray and dark bluish gray - fine grained – with calcite healed veins and shale seams - highly weathered and highly fractured - no discernible dip angle
22.5 — 913.0										
—										SOIL FILLED VOID 19.0 to 19.8 Feet
—										Run #4 (20.5 to 25.5 Feet) REC – 83% RQD – 82%
25.0 — 910.5										Limestone - dark gray and dark bluish gray - fine grained – with calcite healed veins and abundant shale seams - moderately weathered and slightly fractured - no discernible dip angle
—										Run #4 (25.5 to 29.0 Feet) REC – 70% RQD – 70%
27.5 — 908.0										Limestone with dolomite - dark gray, light gray, and dark bluish gray - fine grained – with shale seams - moderately weathered and heavily fractured - no discernible dip angle
—										Coring Terminated at 29.0 Feet
30.0 — 905.5										
—										
32.5 — 903.0										
—										
35.0 — 900.5										
—										
37.5 — 898.0										
—										
40.0 — 895.5										

REMARKS: Black denotes locations of voids
Lost some core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-04B**
 SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-04B DRY ON COMPLETION ? No

DATE January 5, 2016 SURFACE ELEV. 935.2 FT.
 REFUSAL: Yes DEPTH 17.2 FT. ELEV. 918.0 FT.
 SAMPLED 32.0 FT. 9.8 M
 TOP OF ROCK DEPTH 17.2 FT. ELEV. 918.0 FT.
 BEGAN CORING DEPTH 17.2 FT. ELEV. 918.0 FT.
 FOOTAGE CORED (LF) 14.8 FT.
 BOTTOM OF HOLE DEPTH 32.0 FT. ELEV. 903.2 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HR: DEPTH TNP FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH 6.0 FT.
 ELEV. 929.2 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL	
0.0 - 0.5										Gravel with soil (8 Inches)
2.5 - 3.0		932.7								
5.0 - 5.5		930.2								
5.0 - 7.0			5.0	7.0	ST-1	ST	1' Rec.	31	14	13.3
7.0 - 9.0			7.0	9.0	ST-2	ST	1.5' Rec.			15.9
10.0 - 10.5		925.2								
12.5 - 13.0		922.7								
15.0 - 15.5		920.2								
17.5 - 18.0		917.7								
20.0 - 20.5		915.2								
Auger Refusal at 17.2 Feet Began Coring at 17.2 Feet Run #1 (17.2 to 21.9 Feet) REC - 30% RQD - 30% Limestone - dark gray - with shale seams - moderately weathered and slightly fractured ...										

(continued)

REMARKS: Black denotes location of voids, bulk sample collected 0-10'
 Lost most core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-04B**
 SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-04B DRY ON COMPLETION ? No

DATE January 5, 2016 SURFACE ELEV. 935.2 FT.
 REFUSAL: Yes DEPTH 17.2 FT. ELEV. 918.0 FT.
 SAMPLED 32.0 FT. 9.8 M
 TOP OF ROCK DEPTH 17.2 FT. ELEV. 918.0 FT.
 BEGAN CORING DEPTH 17.2 FT. ELEV. 918.0 FT.
 FOOTAGE CORED (LF) 14.8 FT.
 BOTTOM OF HOLE DEPTH 32.0 FT. ELEV. 903.2 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HR: DEPTH TNP FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH 6.0 FT.
 ELEV. 929.2 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM FT.	TO FT.			N-Value	Qu	LL	PI	%M	
22.5										Continued Limestone - dark gray - with shale seams - moderately weathered and slightly fractured - no discernible dip angle
25.0										SOIL FILLED VOID 18.6 to 25.2 Feet Run #2 (21.9 to 26.9 Feet) REC - 0% RQD - 0%
27.5										SOIL FILLED VOIDS 18.6 to 25.2 Feet & 26.0 to 27.6 Feet Run #3 (26.9 to 31.9 Feet) REC - 60% RQD - 35%
30.0										Limestone - dark gray - with abundant calcite healed veins and abundant shale seams - heavily weathered and heavily fractured - no discernible dip angle
32.5										VOID 28.8 to 30.8 Feet Run #3 (26.9 to 31.9 Feet) SEE BELOW
35.0										Core Barrell and casing broke off into void (approximately 32 feet) Could not advance hole as broken casing/core barrell is blocking core hole and is not retrievable
37.5										Coring Terminated at 32 Feet
40.0										

REMARKS: Black denotes locations of voids
Lost most core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-04C**
 SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-04C DRY ON COMPLETION ? Yes

DATE January 6, 2016 SURFACE ELEV. 935.2 FT.
 REFUSAL: Yes DEPTH 13.1 FT. ELEV. 922.1 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 13.1 FT. ELEV. 922.1 FT.
 BEGAN CORING DEPTH 13.0 FT. ELEV. 922.2 FT.
 FOOTAGE CORED (LF) 37.0 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.2 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH 6.0 FT.
 ELEV. 929.2 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
0.0 - 2.5										Topsoil and Gravel (18 Inches)
2.5 - 5.0										Auger Probe
5.0 - 7.5										
7.5 - 10.0										Auger Refusal at 13.1 Feet Begin Coring at 13.0 Feet Run #1 (13.0 to 16.8 Feet) REC - 63% RQD - 50%
10.0 - 12.5										Limestone and Dolomite - dark gray and dark bluish gray - with shale seams - heavily weathered and moderately fractured - no discernible dip angle - evidence of water transport at 15 feet
12.5 - 15.0										VOID 16.0 to 20.1 Feet
15.0 - 17.5										Run #2 (16.8 to 21.8 Feet) REC - 36% RQD - 32%
17.5 - 20.0										Limestone and Dolomite - dark gray and dark bluish gray - with shale seams - heavily weathered and heavily fractured - no discernible dip angle
										VOID 16.0 to 20.1 Feet

(continued)

REMARKS: Black denotes locations of voids
 Lost approx 1/2 of core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-04C**
 SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-04C DRY ON COMPLETION ? Yes

DATE January 6, 2016 SURFACE ELEV. 935.2 FT.
 REFUSAL: Yes DEPTH 13.1 FT. ELEV. 922.1 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 13.1 FT. ELEV. 922.1 FT.
 BEGAN CORING DEPTH 13.0 FT. ELEV. 922.2 FT.
 FOOTAGE CORED (LF) 37.0 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.2 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH 6.0 FT.
 ELEV. 929.2 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
-										Continued
-										Run #3 (21.8 to 26.8 Feet) REC - 86% RQD - 38%
22.5 - 912.7										Limestone and Dolomite - dark gray and dark bluish gray - with shale seams - heavily weathered and heavily fractured - no discernible dip angle
25.0 - 910.2										
27.5 - 907.7										Run #4 (26.8 to 31.8 Feet) REC - 90% RQD - 90%
30.0 - 905.2										Limestone - dark gray - with trace calcite healed veins and trace shale seams - slightly fractured and slightly weathered
32.5 - 902.7										Run #5 (31.8 to 36.8 Feet) REC - 100% RQD - 100%
35.0 - 900.2										Limestone - dark gray - with trace calcite healed veins and trace shale seams - slightly fractured and slightly weathered
37.5 - 897.7										Run #6 (36.8 to 41.8 Feet) REC - 92% RQD - 92%
40.0 - 895.2										Limestone - dark gray - with trace calcite healed veins and trace shale seams - slightly fractured and slightly weathered

(continued)

REMARKS: Black denotes locations of voids
Lost approx 1/2 of core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-04C**
 SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-04C DRY ON COMPLETION ? Yes

DATE January 6, 2016 SURFACE ELEV. 935.2 FT.
 REFUSAL: Yes DEPTH 13.1 FT. ELEV. 922.1 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 13.1 FT. ELEV. 922.1 FT.
 BEGAN CORING DEPTH 13.0 FT. ELEV. 922.2 FT.
 FOOTAGE CORED (LF) 37.0 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.2 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH 6.0 FT.
 ELEV. 929.2 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
-										Continued
-										Limestone - dark gray - with trace calcite healed veins and trace shale seams - slightly fractured and slightly weathered
42.5 - 892.7										Run #7 (41.8 to 46.8 Feet) REC - 98% RQD - 98%
-										
45.0 - 890.2										Limestone - dark gray - with trace calcite healed veins and trace shale seams - slightly fractured and slightly weathered - evidence of water transport at 42-42.5 feet
-										
47.5 - 887.7										Run #8 (46.8 to 50.0 Feet) REC - 88% RQD - 88%
-										
50.0 - 885.2										Limestone - dark gray - with trace calcite healed veins and trace shale seams - slightly fractured and slightly weathered
-										
52.5 - 882.7										Coring Terminated at 50.0 Feet
-										
55.0 - 880.2										
-										
57.5 - 877.7										
-										
60.0 - 875.2										

REMARKS: Black denotes locations of voids
 Lost approx 1/2 of core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-05**
 SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-05 DRY ON COMPLETION ? No

DATE December 14, 2015 SURFACE ELEV. 935.5 FT.
 REFUSAL: Yes DEPTH 12.5 FT. ELEV. 923.0 FT.
 SAMPLED 32.7 FT. 10.0 M
 TOP OF ROCK DEPTH 12.5 FT. ELEV. 923.0 FT.
 BEGAN CORING DEPTH 12.7 FT. ELEV. 922.8 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 32.7 FT. ELEV. 902.8 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HR: DEPTH TNP FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH 6.0 FT.
 ELEV. 929.5 FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
0.0 - 933.0										Gravel (12 Inches)
2.5 - 933.0	2.5	4.5	1	SS	11					Clayey SAND with Gravel (SC) – with abundant rock fragments, trace asphalt fragments, and trace sand – dark brown (7.5YR 5/4 and 7.5YR 5/6) slightly moist (FILL)
5.0 - 930.5	5.0	7.0	2	SS	22					
7.5 - 928.0	7.5	9.5	3	SS	11					Fat CLAY (CH) – brown mottled grayish brown (7.5YR 5/6) – slightly moist to moist – stiff (ALLUVIUM)
10.0 - 925.5										
12.5 - 923.0	12.5	12.7	4	SS	50/2"					Auger Refusal at 12.5 Feet Begin Coring at 12.7 Feet
15.0 - 920.5										Run #1 (12.7 to 15.4 Feet) REC – 100% RQD – 100%
17.5 - 918.0										Limestone - dark gray and dark bluish gray - fine grained – with calcite healed veins - slightly weathered and slightly fractured - no discernible dip angle
20.0 - 915.5										Lithology changes to light gray dolomite at 15 feet – with shale seams and trace calcite healed veins – slightly fractured and slightly weathered – no discernible dip angle
										Run #2 (15.4 to 20.4 Feet) REC – 60% RQD – 60%

(continued)

REMARKS: Black denotes location of voids
 Lost most core water past 16 Feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-05**
 SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-05 DRY ON COMPLETION ? No

DATE December 14, 2015 SURFACE ELEV. 935.5 FT.
 REFUSAL: Yes DEPTH 12.5 FT. ELEV. 923.0 FT.
 SAMPLED 32.7 FT. 10.0 M
 TOP OF ROCK DEPTH 12.5 FT. ELEV. 923.0 FT.
 BEGAN CORING DEPTH 12.7 FT. ELEV. 922.8 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 32.7 FT. ELEV. 902.8 FT.

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HR: DEPTH TNP FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH 6.0 FT.
 ELEV. 929.5 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
22.5										Continued Dolomite – gray and light gray - fine grained - with shale seams and trace calcite healed veins - slightly weathered and slightly fractured - no discernible dip angle
25.0										VOID 16.7 to 18.3 Feet Run #3 (20.4 to 25.4 Feet) REC - 0% RQD – 0%
27.5										VOID 20.4 to 30.4 Feet Run #4 (25.4 to 32.7 Feet) REC - 33% RQD – 33%
30.0										Dolomite – gray and light gray - fine grained - with shale seams and trace calcite healed veins - slightly weathered and slightly fractured - no discernible dip angle, abundant vertical fracturing
32.5										VOID 20.4 to 30.4 Feet
35.0										Coring Terminated at 32.7 Feet
37.5										
40.0										

REMARKS: Black denotes locations of voids
 Lost most core water past 16 Feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-06**
 SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-06 DRY ON COMPLETION ? Yes

DATE December 18, 2015 SURFACE ELEV. 935.6 FT.
 REFUSAL: Yes DEPTH 20.0 FT. ELEV. 915.6 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 20.4 FT. ELEV. 915.2 FT.
 BEGAN CORING DEPTH 20.3 FT. ELEV. 915.3 FT.
 FOOTAGE CORED (LF) 29.7 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.6 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
2.5 - 933.1										Gravel with some clay (12 Inches)
	2.5	4.5	1	SS	16		32	14	17.1	
5.0 - 930.6										
	5.0	7.0	2	SS	16				17.3	Lean CLAY (CL) - with abundant rock fragments - dark brown (7.5YR 5/4) - wet (FILL)
7.5 - 928.1										
	7.0	9.0	ST-2	ST	2' Recovery				19.8	
10.0 - 925.6										
12.5 - 923.1										
	12.5	14.5	3	SS	6		64	39	43.0	
15.0 - 920.6										
										Fat CLAY (CH) - with trace chert fragments - brown and orangish brown (10YR 5/4) - moist - firm (ALLUVIUM)
17.5 - 918.1										
	17.5	19.5	4	SS	7				43.6	
20.0 - 915.6										Auger Refusal at 20.0 Feet

REMARKS: Lost approximately 1/2 of core water
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-06**
 SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-06 DRY ON COMPLETION ? Yes

DATE December 18, 2015 SURFACE ELEV. 935.6 FT.
 REFUSAL: Yes DEPTH 20.0 FT. ELEV. 915.6 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 20.4 FT. ELEV. 915.2 FT.
 BEGAN CORING DEPTH 20.3 FT. ELEV. 915.3 FT.
 FOOTAGE CORED (LF) 29.7 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.6 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
22.5										Continued Begin Coring at 20.3 Feet Run #1 (20.3 to 25.3 Feet) REC - 64% RQD - 64% Dolomite with limestone - light gray and dark gray - with calcite healed veins and shale seams - moderately fractured and highly weathered - no discernible dip angle
25.0										VOID 23.8 to 27.6 Feet Run #2 (25.3 to 30.3 Feet) REC - 22% RQD - 20%
27.5										Dolomite with limestone - light gray and dark gray - with abundant calcite healed veins and shale seams - heavily fractured and heavily weathered - no discernible dip angle
30.0										Run #3 (30.3 to 35.3 Feet) REC - 38% RQD - 34% Limestone - dark bluish gray and dark gray - with abundant calcite healed veins and abundant shale seams - moderately fractured and heavily weathered - no discernible dip angle - evidence of water transport 31 to 32 feet
32.5										Run #4 (35.3 to 40.3 Feet) REC - 70% RQD - 50% Limestone - dark bluish gray and dark gray - with trace calcite healed veins and trace shale seams - moderately fractured and slightly weathered - no discernible dip angle - evidence of water transport at 36 and 38 to 40 feet
40.0										

(continued)

REMARKS: Lost approximately 1/2 of core water
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-06**
 SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-06 DRY ON COMPLETION ? Yes

DATE December 18, 2015 SURFACE ELEV. 935.6 FT.
 REFUSAL: Yes DEPTH 20.0 FT. ELEV. 915.6 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 20.4 FT. ELEV. 915.2 FT.
 BEGAN CORING DEPTH 20.3 FT. ELEV. 915.3 FT.
 FOOTAGE CORED (LF) 29.7 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.6 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
—										Continued
—										Run #5 (40.3 to 45.3 Feet)
—										REC - 50% RQD - 32%
42.5 — 893.1										Limestone - dark bluish gray and dark gray - with trace calcite healed veins and trace shale seams - slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport 45 feet
—										
45.0 — 890.6										VOID 41.3 to 42.3 Feet
—										Run #6 (45.3 to 50.0 Feet)
—										REC - 96% RQD - 96%
47.5 — 888.1										Limestone - dark bluish gray and dark gray - with calcite healed veins and trace shale seams - slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport 46 to 47 feet
—										
50.0 — 885.6										Coring Terminated at 50.0 Feet
—										
52.5 — 883.1										
—										
55.0 — 880.6										
—										
57.5 — 878.1										
—										
60.0 — 875.6										

REMARKS: Lost approximately 1/2 of core water
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-07
 SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-07 DRY ON COMPLETION ? Yes

DATE December 17, 2015 SURFACE ELEV. 936.1 FT.
 REFUSAL: Yes DEPTH 20.0 FT. ELEV. 916.1 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 20.0 FT. ELEV. 916.1 FT.
 BEGAN CORING DEPTH 20.4 FT. ELEV. 915.7 FT.
 FOOTAGE CORED (LF) 29.6 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 886.1 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FROM	TO			N-Value	Qu	LL	PI	%M		
FT.	FT.	FT.									
2.5										Gravel with some clay (12 Inches)	
5.0	2.5	4.5	1	SS	7						
7.5	5.0	7.0	ST-1	ST	1' Recovery				14.9	Fat CLAY (CH) - with abundant rock fragments - dark brown (7.5YR 5/4) - wet (FILL)	
10.0	7.0	9.0	ST-2	ST	2' Recovery				17.4		
12.5											
15.0	12.5	14.5	3	SS	14			51	30	29.1	Fat CLAY (CH) - with trace chert fragments - brown and orangish brown (10YR 5/4) with abundant oxide staining at depth - moist - stiff (ALLUVIUM)
17.5											
20.0	17.5	19.5	4	SS	9					44.4	
											Auger Refusal at 20.0 Feet

REMARKS: Kept most core water - lost some core water past 32 feet (likely into void)
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-07**
 SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-07 DRY ON COMPLETION ? Yes

DATE December 17, 2015 SURFACE ELEV. 936.1 FT.
 REFUSAL: Yes DEPTH 20.0 FT. ELEV. 916.1 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 20.0 FT. ELEV. 916.1 FT.
 BEGAN CORING DEPTH 20.4 FT. ELEV. 915.7 FT.
 FOOTAGE CORED (LF) 29.6 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 886.1 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
22.5										Continued Begin Coring at 20.4 Feet Run #1 (20.4 to 25.4 Feet) REC - 90% RQD - 84%
25.0										Dolomite with limestone - light gray and dark gray - with calcite healed veins and trace shale seams - moderately fractured and slightly weathered - no discernible dip angle
27.5										Run #2 (25.4 to 30.4 Feet) REC - 100% RQD - 98% Limestone and dolomite - light gray, dark bluish gray, and dark gray - with abundant calcite healed veins and shale seams - moderately fractured and moderately weathered - no discernible dip angle - evidence of water transport at 28.5 feet
30.0										Run #3 (30.4 to 35.4 Feet) REC - 74% RQD - 68% Limestone - dark bluish gray and dark gray - with calcite healed veins and shale seams - slightly fractured and slightly weathered - no discernible dip angle
32.5										VOID 32.3 to 33.8 Feet
35.0										Run #4 (35.4 to 40.4 Feet) REC - 84% RQD - 84% Limestone - dark bluish gray and dark gray - with trace calcite healed veins and trace shale seams - slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport at 37 feet
37.5										
40.0										

(continued)

REMARKS: Kept most core water - lost some core water past 32 feet (likely into void)
 Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-07
 SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-07 DRY ON COMPLETION ? Yes

DATE December 17, 2015 SURFACE ELEV. 936.1 FT.
 REFUSAL: Yes DEPTH 20.0 FT. ELEV. 916.1 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 20.0 FT. ELEV. 916.1 FT.
 BEGAN CORING DEPTH 20.4 FT. ELEV. 915.7 FT.
 FOOTAGE CORED (LF) 29.6 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 886.1 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL		PI
-	-	-	-	-	-	-	-	-	-	-	Continued
-	-	-	-	-	-	-	-	-	-	-	Run #5 (40.4 to 45.4 Feet) REC - 100% RQD - 84%
42.5	893.6	-	-	-	-	-	-	-	-	-	Limestone - dark bluish gray and dark gray - with trace calcite healed veins and trace shale seams slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport 41.5 to 41.8 feet
45.0	891.1	-	-	-	-	-	-	-	-	-	Run #6 (45.4 to 50.0 Feet) REC - 94% RQD - 94%
47.5	888.6	-	-	-	-	-	-	-	-	-	Limestone - dark bluish gray and dark gray - with trace calcite healed veins and trace shale seams slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport 47 and 48 feet
50.0	886.1	-	-	-	-	-	-	-	-	-	Coring Terminated at 50.0 Feet
52.5	883.6	-	-	-	-	-	-	-	-	-	-
55.0	881.1	-	-	-	-	-	-	-	-	-	-
57.5	878.6	-	-	-	-	-	-	-	-	-	-
60.0	876.1	-	-	-	-	-	-	-	-	-	-

REMARKS: Kept most core water - lost some core water past 32 feet (likely into void)
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-08A
 SHEET 1 OF 1

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-08A DRY ON COMPLETION ? Yes

DATE December 17, 2015 SURFACE ELEV. 936.0 FT.
 REFUSAL: Yes DEPTH N/A FT. ELEV. #VALUE! FT.
 SAMPLED N/A FT. ##### M
 TOP OF ROCK DEPTH N/A FT. ELEV. #VALUE! FT.
 BEGAN CORING DEPTH N/A FT. ELEV. #VALUE! FT.
 FOOTAGE CORED (LF) N/A FT.
 BOTTOM OF HOLE DEPTH N/A FT. ELEV. #VALUE! FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH N/A FT.
 ELEV. ##### FT.
 AFTER 1 HRS: DEPTH N/A FT.
 ELEV. ##### FT.
 AFTER 3 DAYS: DEPTH N/A FT.
 ELEV. ##### FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL	
0.0										Concrete (6 Inches)
2.5	933.5									
5.0	931.0									
7.5	928.5									
10.0	926.0									Vault and/or basement Exact Depth and Extents of Vault/Basement Unknown Drilling Terminated due to unknown capability of existing concrete slab to support drilling equipment weight
12.5	923.5									
15.0	921.0									
17.5	918.5									
20.0	916.0									

REMARKS: _____



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-08B**
 SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-08B DRY ON COMPLETION ? Yes

DATE January 8, 2016 SURFACE ELEV. 935.4 FT.
 REFUSAL: Yes DEPTH 14.5 FT. ELEV. 920.9 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 20.0 FT. ELEV. 915.4 FT.
 BEGAN CORING DEPTH 13.4 FT. ELEV. 922.0 FT.
 FOOTAGE CORED (LF) 36.6 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.4 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 13.0 FT.
 ELEV. 922.4 FT.
 AFTER 1 HRS: DEPTH 13.0 FT.
 ELEV. 922.4 FT.
 AFTER 3 DAYS: DEPTH 12.0 FT.
 ELEV. 923.4 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL	
0.0 - 2.5	932.9									Gravel with some clay (12 Inches)
2.5 - 5.0	930.4		1	SS	6					Clayey SAND with Gravel (SC) - with rock fragments and brick fragments - dark brown (7.5YR 4/4 and 7.5YR 4/3) - slightly moist (FILL)
5.0 - 7.5	927.9		2	SS	8	35	17	18.6		
7.5 - 10.0	925.4		3	SS	13			15.5		
10.0 - 12.5	922.9		ST-1	ST	2' Recovery	52	30	27.9		Lean CLAY (CL) - with trace limestone fragments - orangish brown (10YR 5/3) - moist to very moist (RESIDUUM)
12.5 - 15.0	920.4		4	SS	50/1"					Auger Refusal at 14.5 Feet Begin Coring at 13.4 Feet Run #1 (13.4 to 16.9 Feet) REC - 100% RQD - 100%
15.0 - 17.5	917.9									Dolomite - dark gray - with shale seams - slightly fractured and slightly weathered - no discernible dip angle
17.5 - 20.0	915.4									Run #2 (16.9 to 22.2 Feet) REC - 100% RQD - 100% Dolomite - dark gray - with calcite healed veins - slightly fractured ...

(continued)

REMARKS: Lost 1/2 core water - location offset approx. 40' north and 8' east of proposed original A-8 locaiton
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-08B**
 SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-08B DRY ON COMPLETION ? Yes

DATE January 8, 2016 SURFACE ELEV. 935.4 FT.
 REFUSAL: Yes DEPTH 14.5 FT. ELEV. 920.9 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 20.0 FT. ELEV. 915.4 FT.
 BEGAN CORING DEPTH 13.4 FT. ELEV. 922.0 FT.
 FOOTAGE CORED (LF) 36.6 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.4 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 13.0 FT.
 ELEV. 922.4 FT.
 AFTER 1 HRS: DEPTH 13.0 FT.
 ELEV. 922.4 FT.
 AFTER 3 DAYS: DEPTH 12.0 FT.
 ELEV. 923.4 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
22.5	912.9									Continued Dolomite - dark gray - with calcite healed veins - slightly fractured and moderately weathered - no discernible dip angle - evidence of water transport at 19 feet Run #3 (22.2 to 27.2 Feet) REC - 96% RQD - 96%
25.0	910.4									Dolomite - dark gray - with calcite healed veins - slightly fractured and moderately weathered - no discernible dip angle Run #4 (27.2 to 32.2 Feet) REC - 82% RQD - 72%
27.5	907.9									Dolomite - dark gray - with calcite healed veins - slightly fractured and moderately weathered, zone of highly weathered and moderately fractured rock 30-32.2 feet - no discernible dip angle
30.0	905.4									VOID 31.0 to 31.8 Feet
32.5	902.9									Run #5 (32.2 to 37.2 Feet) REC - 96% RQD - 96% Dolomite - dark gray - with abundant calcite healed veins - slightly fractured and moderately weathered - no discernible dip angle - evidence of water transport at 33.5 feet
35.0	900.4									Run #6 (37.2 to 42.2 Feet) REC - 98% RQD - 98% Dolomite - dark gray - with calcite healed veins - heavily fractured and moderately weathered - no discernible dip angle
37.5	897.9									
40.0	895.4									

(continued)

REMARKS: Lost 1/2 core water - location offset approx. 40' north and 8' east of proposed original A-8 locaiton
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-08B**
 SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-08B DRY ON COMPLETION ? Yes

DATE January 8, 2016 SURFACE ELEV. 935.4 FT.
 REFUSAL: Yes DEPTH 14.5 FT. ELEV. 920.9 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 20.0 FT. ELEV. 915.4 FT.
 BEGAN CORING DEPTH 13.4 FT. ELEV. 922.0 FT.
 FOOTAGE CORED (LF) 36.6 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 885.4 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 13.0 FT.
 ELEV. 922.4 FT.
 AFTER 1 HRS: DEPTH 13.0 FT.
 ELEV. 922.4 FT.
 AFTER 3 DAYS: DEPTH 12.0 FT.
 ELEV. 923.4 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM FT.	TO FT.			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
-										Continued
42.5 - 892.9										Dolomite - dark gray - with calcite healed veins - heavily fractured and moderately weathered - no discernible dip angle
45.0 - 890.4										Run #7 (42.2 to 50.0 Feet) REC - 73% RQD - 73%
47.5 - 887.9										Dolomite - dark gray - with calcite healed veins and trace shale seams - slightly fractured and moderately weathered - no discernible dip angle
50.0 - 885.4										Coring Terminated at 50.0 Feet
52.5 - 882.9										
55.0 - 880.4										
57.5 - 877.9										
60.0 - 875.4										

REMARKS: Lost 1/2 core water - location offset approx. 40' north and 8' east of proposed original A-8 locaiton
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-10**
 SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-10 DRY ON COMPLETION ? Yes

DATE January 4, 2016 SURFACE ELEV. 940.2 FT.
 REFUSAL: Yes DEPTH 13.0 FT. ELEV. 927.2 FT.
 SAMPLED 34.2 FT. 10.4 M
 TOP OF ROCK DEPTH 13.0 FT. ELEV. 927.2 FT.
 BEGAN CORING DEPTH 12.1 FT. ELEV. 928.1 FT.
 FOOTAGE CORED (LF) 32.1 FT.
 BOTTOM OF HOLE DEPTH 34.2 FT. ELEV. 906.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 10.0 FT.
 ELEV. 930.2 FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM FT.	TO FT.			N-Value	Qu	LL	PI	%M	
0.0 - 2.5										Asphalt (8 Inches) - Basestone (2 Feet)
2.5 - 5.0	2.5	4.5	1	SS	16					Rock Fill - trace dry clay - dry (FILL)
5.0 - 7.5	5.0	7.0	2	SS	6					Fat CLAY (CH) - with trace rounded rock fragments throughout and abundant limestone fragments at depth - orangish brown and reddish brown (5YR 5/8 and 2.5YR 5/4) - moist to wet increasing with depth - firm (ALLUVIUM)
7.5 - 10.0	7.0	9.0	ST-1	ST	1.5' Recovery					
10.0 - 12.5										Auger Refusal at 13.0 Feet Begin Coring at 12.1 Feet
12.5 - 15.0	12.5	13.0	3	SS	50/0"					Run #1 (12.1 to 15.2 Feet) REC - 100% RQD - 62%
15.0 - 17.5										Limestone - dark gray and bluish gray- with calcite healed veins - heavily fractured and moderately weathered - no discernible dip angle
17.5 - 20.0										Run #2 (15.2 to 20.2 Feet) REC - 40% RQD - 30%
										Limestone - dark gray and bluish gray- with calcite healed veins - heavily fractured and heavily weathered - no discernible dip angle, evidence of water transport 18-18.5 Feet
										...

(continued)

REMARKS: _____



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-10**
 SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-10 DRY ON COMPLETION ? Yes

DATE January 4, 2016 SURFACE ELEV. 940.2 FT.
 REFUSAL: Yes DEPTH 13.0 FT. ELEV. 927.2 FT.
 SAMPLED 34.2 FT. 10.4 M
 TOP OF ROCK DEPTH 13.0 FT. ELEV. 927.2 FT.
 BEGAN CORING DEPTH 12.1 FT. ELEV. 928.1 FT.
 FOOTAGE CORED (LF) 32.1 FT.
 BOTTOM OF HOLE DEPTH 34.2 FT. ELEV. 906.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 10.0 FT.
 ELEV. 930.2 FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
22.5 - 917.7										Continued Limestone - dark gray and bluish gray- with calcite healed veins - heavily fractured and heavily weathered - no discernible dip angle, evidence of water transport 18-18.5 Feet
25.0 - 915.2										SOIL FILLED VOID 16.7 to 18.2 and 18.5 to 25.6 Feet Run #3 (20.2 to 25.2 Feet) REC - 0% RQD - 0%
27.5 - 912.7										No Recovery - All Void
30.0 - 910.2										Run #4 (25.2 to 30.2 Feet) REC - 85% RQD - 85% Limestone and Dolomite - dark gray and light gray- with calcite healed veins and shale seams - slightly fractured and moderately weathered (heavily weathered zone 26-26.5 Feet) - no discernible dip angle - evidence of water transport 26 to 26.5 Feet
32.5 - 907.7										Run #5 (30.2 to 34.2 Feet) REC - 90% RQD - 90% Limestone and Dolomite - dark gray and light gray- with calcite healed veins and shale seams - slightly fractured and moderately weathered - no discernible dip angle
35.0 - 905.2										Coring Terminated at 34.2 Feet
37.5 - 902.7										
40.0 - 900.2										

(continued)

REMARKS: _____



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-11**
 SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-11 DRY ON COMPLETION ? Yes

DATE December 16, 2016 SURFACE ELEV. 936.0 FT.
 REFUSAL: Yes DEPTH 6.8 FT. ELEV. 929.2 FT.
 SAMPLED 40.5 FT. 12.3 M
 TOP OF ROCK DEPTH 6.8 FT. ELEV. 929.2 FT.
 BEGAN CORING DEPTH 6.6 FT. ELEV. 929.4 FT.
 FOOTAGE CORED (LF) 33.9 FT.
 BOTTOM OF HOLE DEPTH 40.5 FT. ELEV. 895.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
2.5 933.5										Gravel with some clay (12 Inches)
										No Recovery in Split Spoon
5.0 931.0	2.5	4.5	1	SS	8					
										Fat CLAY (CH) - with rock fragments - dark brown and dark gray (7.5YR 3/4 and Gley 1 5/N) - slightly moist (FILL)
7.5 928.5										Auger Refusal at 6.8 Feet Begin Coring at 6.6 Feet Run #1 (6.6 to 10.5 Feet) REC - 100% RQD - 62%
10.0 926.0	5.0	7.0	2	SS	9					Limestone - dark gray and bluish gray- with shale seams - slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport at 8.5 feet
										Run #2 (10.5 to 15.5 Feet) REC - 100% RQD - 98%
12.5 923.5										Limestone - dark gray and bluish gray- with shale seams - slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport at 14.0 feet
										Run #3 (15.5 to 20.5 Feet) REC - 100% RQD - 98%
15.0 921.0										Limestone - dark gray and bluish gray- with abundant shale seams - slightly fractured and slightly weathered - no discernible dip angle
17.5 918.5										
20.0 916.0										VOIDS 17.1 to 18.6 and 19 to 20.1 Feet

(continued)

REMARKS: _____



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-11**
 SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-11 DRY ON COMPLETION ? Yes

DATE December 16, 2016 SURFACE ELEV. 936.0 FT.
 REFUSAL: Yes DEPTH 6.8 FT. ELEV. 929.2 FT.
 SAMPLED 40.5 FT. 12.3 M
 TOP OF ROCK DEPTH 6.8 FT. ELEV. 929.2 FT.
 BEGAN CORING DEPTH 6.6 FT. ELEV. 929.4 FT.
 FOOTAGE CORED (LF) 33.9 FT.
 BOTTOM OF HOLE DEPTH 40.5 FT. ELEV. 895.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM FT.	TO FT.			N-Value	Qu	LL	PI	%M	
-										Continued
22.5										Run #4 (20.5 to 25.5 Feet) REC - 100% RQD - 95%
										Limestone with some dolomite - dark gray, dark bluish gray, and light gray - with shale seams - moderately fractured and heavily weathered - no discernible dip angle - evidence of water transportation 22 to 23 feet
25.0										Run #5 (25.5 to 30.5 Feet) REC - 100% RQD - 100%
										Limestone - dark gray and dark bluish gray - with abundant shale seams and abundant calcite healed veins - slightly fractured and moderately weathered - no discernible dip angle - evidence of water transportation at 29 feet
27.5										Run #6 (30.5 to 35.5 Feet) REC - 92% RQD - 92%
										Limestone - dark gray and dark bluish gray - with abundant shale seams and abundant calcite healed veins - slightly fractured and moderately weathered - no discernible dip angle - evidence of water transportation at 34 feet
30.0										Run #7 (35.5 to 40.5 Feet) REC - 100% RQD - 93%
										Limestone - dark gray and dark bluish gray - with abundant shale seams and abundant calcite healed veins - slightly fractured and moderately weathered - no discernible dip angle - evidence of water transportation at 34 feet
32.5										
35.0										
37.5										
40.0										Coring Terminated at 40.5 Feet

REMARKS: _____



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-12
 SHEET 1 OF 1

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-12 DRY ON COMPLETION ? Yes

DATE January 7, 2016 SURFACE ELEV. 935.5 FT.
 REFUSAL: Yes DEPTH N/A FT. ELEV. #VALUE! FT.
 SAMPLED N/A FT. ##### M
 TOP OF ROCK DEPTH N/A FT. ELEV. #VALUE! FT.
 BEGAN CORING DEPTH N/A FT. ELEV. #VALUE! FT.
 FOOTAGE CORED (LF) N/A FT.
 BOTTOM OF HOLE DEPTH N/A FT. ELEV. #VALUE! FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION: DEPTH N/A FT.
 ELEV. ##### FT.
 AFTER 1 HRS: DEPTH N/A FT.
 ELEV. ##### FT.
 AFTER 3 DAYS: DEPTH N/A FT.
 ELEV. ##### FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
-										Asphalt (3 Inches) - Concrete (3 Inches)
2.5 - 933.0										Concrete never penetrated in either offset
5.0 - 930.5										Boring Terminated due to unknown constituents of strong chemical odor
7.5 - 928.0										
10.0 - 925.5										
12.5 - 923.0										
15.0 - 920.5										
17.5 - 918.0										
20.0 - 915.5										

REMARKS: Offset 5' south from original location to avoid bridge abutment, 1st refusal at approximately 6 inches, offset 2' west
Encountered wood chips and strong chemical odor on second offset, discontinued hole



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-14**
 SHEET 1 OF 1

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-14 DRY ON COMPLETION ? Yes

DATE December 16, 2015 SURFACE ELEV. 930.3 FT.
 REFUSAL: Yes DEPTH 4.5 FT. ELEV. 925.8 FT.
 SAMPLED 4.5 FT. 1.4 M
 TOP OF ROCK DEPTH 4.5 FT. ELEV. 925.8 FT.
 BEGAN CORING DEPTH FT. ELEV. FT.
 FOOTAGE CORED (LF) FT.
 BOTTOM OF HOLE DEPTH 4.5 FT. ELEV. 925.8 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 3 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
0.0 - 0.5										Topsoil with some Gravel (8 Inches)
2.5 - 2.5	2.5	4.5	1	SS	15					Fat CLAY (CH) - with abundant limestone fragments - orangish brown and brown (5YR 4/4) moist - very stiff (RESIDUUM)
5.0 - 5.0										Auger Refusal at 4.5 Feet
7.5 - 7.5										
10.0 - 10.0										
12.5 - 12.5										
15.0 - 15.0										
17.5 - 17.5										
20.0 - 20.0										

REMARKS: 1st Refusal at 4.5 Feet, offset 2' west, 2nd refusal at 4.0 Feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-17
 SHEET 1 OF 1

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-17 DRY ON COMPLETION ? No

DATE January 21, 2016 SURFACE ELEV. 921.3 FT.
 REFUSAL: Yes DEPTH 15.0 FT. ELEV. 906.3 FT.
 SAMPLED FT. 0.0 M
 TOP OF ROCK DEPTH FT. ELEV. FT.
 BEGAN CORING DEPTH FT. ELEV. FT.
 FOOTAGE CORED (LF) FT.
 BOTTOM OF HOLE DEPTH 15.0 FT. ELEV. 906.3 FT.

WATER LEVEL DATA (IF APPLICABLE)

COMPLETION: DEPTH TNP FT.
 ELEV. FT.
 AFTER 1 HR: DEPTH TNP FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: POWER AUGERING PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL		PI
2.5	918.8									Direct Push - No Soil Sampling	
5.0	916.3										
7.5	913.8										
10.0	911.3										
12.5	908.8										
15.0	906.3										
17.5	903.8										
20.0	901.3										
											Direct Push Refusal at 15.0 Feet

REMARKS: 1st Refusal at 15.0 feet, offset 4' west, 2nd direct push refusal at 12.8 feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-18**
 SHEET 1 OF 1

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-18 DRY ON COMPLETION ? No

DATE January 21, 2016 SURFACE ELEV. 923.4 FT.
 REFUSAL: Yes DEPTH 17.5 FT. ELEV. 905.9 FT.
 SAMPLED 17.5 FT. 5.3 M
 TOP OF ROCK DEPTH 17.5 FT. ELEV. 905.9 FT.
 BEGAN CORING DEPTH FT. ELEV. FT.
 FOOTAGE CORED (LF) FT.
 BOTTOM OF HOLE DEPTH 17.5 FT. ELEV. 905.9 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 13.0 FT.
 ELEV. 910.4 FT.
 AFTER 1 HR: DEPTH TNP FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
0.0 - 923.4										Asphalt (9 Inches) - Concrete (5 Inches)
2.5 - 920.9	2.5	4.5	1	SS	9					Fat CLAY (CH) - with rock fragments - reddish brown, dark brown, and orangish brown (10YR 4/6) - moist (FILL)
5.0 - 918.4	5.0	7.0	2	SS	2		26	11	21.8	Lean CLAY with Sand (CL) - with trace root structure in the upper 5 feet and trace rounded rock fragments - brown and grayish brown (10YR 5/2 and 10YR 7/3) - moist to very moist increasing with depth - very soft (ALLUVIUM)
7.5 - 915.9	7.5	9.5	3	SS	2				20.3	
12.5 - 910.9	12.5	14.5	4	SS	5					
15.0 - 908.4										Lean CLAY (CL) - with trace shale fragments - grayish brown and brown (10YR 4/1) - slightly moist - firm (RESIDUUM)
17.5 - 905.9										Auger Refusal at 17.5 Feet
20.0 - 903.4										

REMARKS: _____



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-19**

SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-19 DRY ON COMPLETION ? No

DATE November 20, 2015 SURFACE ELEV. 926.4 FT.
 REFUSAL: Yes DEPTH 15.5 FT. ELEV. 910.9 FT.
 SAMPLED 35.7 FT. 10.9 M
 TOP OF ROCK DEPTH 15.5 FT. ELEV. 910.9 FT.
 BEGAN CORING DEPTH 15.5 FT. ELEV. 910.9 FT.
 FOOTAGE CORED (LF) 20.2 FT.
 BOTTOM OF HOLE DEPTH 35.7 FT. ELEV. 890.7 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 13 DAYS: DEPTH 6.0 FT.
 ELEV. 920.4 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FROM	TO			N-Value	Qu	LL	PI	%M		
FT.	FT.	FT.									
0.0 - 0.5											Asphalt (3.5 Inches) - Concrete (8.5 Inches)
2.5 - 923.9											Gravel - trace clay
	2.5	4.5	1	SS	60						
5.0 - 921.4											
	5.0	7.0	2	SS	13						
7.5 - 918.9											
	7.5	9.5	3	SS	9		25	10	12.5		
10.0 - 916.4											Lean CLAY with Sand (CL) - with rock fragments with trash plastic debris at depth - brown and orangish brown (2.5YR 5/6)- moist (FILL)
12.5 - 913.9											
	12.5	14.5	4	SS	16				25.1		
15.0 - 911.4											Auger Refusal at 15.5 Feet Begin Coring at 15.5 Feet
17.5 - 908.9											Rune #1 (15.5 to 19.6 Feet) REC - 91% RQD - 91%
20.0 - 906.4											Limestone - dark gray and dark bluish gray - fine grained - with trace shale seams - slightly weathered and slightly fractured - no discernible dip angle

(continued)

REMARKS: Acetate liners utilized in split-spoon sampling - Likely inflated SPT values, Third Ground water measurement taken at the end of 3-day 5 inch rain event, Lost core water past 17.5 feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-19**

SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-19 DRY ON COMPLETION ? No

DATE November 20, 2015 SURFACE ELEV. 926.4 FT.
 REFUSAL: Yes DEPTH 15.5 FT. ELEV. 910.9 FT.
 SAMPLED 35.7 FT. 10.9 M
 TOP OF ROCK DEPTH 15.5 FT. ELEV. 910.9 FT.
 BEGAN CORING DEPTH 15.5 FT. ELEV. 910.9 FT.
 FOOTAGE CORED (LF) 20.2 FT.
 BOTTOM OF HOLE DEPTH 35.7 FT. ELEV. 890.7 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH TNP FT.
 ELEV. FT.
 AFTER 13 DAYS: DEPTH 6.0 FT.
 ELEV. 920.4 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
-										Continued
-										Run #2 (19.6 to 20.7 Feet)
-										REC - 100% RQD - 100%
22.5	903.9									Limestone - dark gray and dark bluish gray - fine grained - with shale seams and dolomite - slightly weathered and slightly fractured - no discernible dip angle
-										Run #3 (20.7 to 25.7 Feet)
-										REC - 100% RQD - 96%
25.0	901.4									Limestone - dark gray and dark bluish gray - fine grained - with shale seams and calcite healed veins - slightly weathered and slightly fractured - no discernible dip angle
-										Run #4 (25.7 to 30.7 Feet)
-										REC - 100% RQD - 83%
27.5	898.9									Limestone - dark gray and dark bluish gray - fine grained - with shale seams and calcite healed veins - slightly weathered and slightly fractured (moderately weathered and fractured zone 28 to 29 ft) - no discernible dip angle
-										Run #5 (30.7 to 35.7 Feet)
-										REC - 100% RQD - 100%
32.5	893.9									Limestone - dark gray and dark bluish gray - fine grained - with trace shale seams - slightly weathered and slightly fractured (moderately weathered and fractured zone 33 to 34 ft) - no discernible dip angle
-										Run #6 (35.7 to 35.7 Feet)
-										REC - 100% RQD - 100%
35.0	891.4									Limestone - dark gray and dark bluish gray - fine grained - with trace shale seams - slightly weathered and slightly fractured (moderately weathered and fractured zone 33 to 34 ft) - no discernible dip angle
-										Run #7 (35.7 to 35.7 Feet)
-										REC - 100% RQD - 100%
37.5	888.9									Limestone - dark gray and dark bluish gray - fine grained - with trace shale seams - slightly weathered and slightly fractured (moderately weathered and fractured zone 33 to 34 ft) - no discernible dip angle
-										Run #8 (35.7 to 35.7 Feet)
-										REC - 100% RQD - 100%
40.0	886.4									Limestone - dark gray and dark bluish gray - fine grained - with trace shale seams - slightly weathered and slightly fractured (moderately weathered and fractured zone 33 to 34 ft) - no discernible dip angle

Coring Terminated at 35.7 Feet

REMARKS: Lost core water past 17.5 feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-20**
 SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-20 DRY ON COMPLETION ? Yes

DATE November 20, 2015 SURFACE ELEV. 926.7 FT.
 REFUSAL: Yes DEPTH 20.9 FT. ELEV. 905.8 FT.
 SAMPLED 40.8 FT. 12.4 M
 TOP OF ROCK DEPTH 20.9 FT. ELEV. 905.8 FT.
 BEGAN CORING DEPTH 20.6 FT. ELEV. 906.1 FT.
 FOOTAGE CORED (LF) 20.2 FT.
 BOTTOM OF HOLE DEPTH 40.8 FT. ELEV. 885.9 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 8.2 FT.
 ELEV. 918.5 FT.
 AFTER 24 HRS: DEPTH 8.1 FT.
 ELEV. 918.6 FT.
 AFTER 13 DAYS: DEPTH 1.0 FT.
 ELEV. 925.7 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
—										— Asphalt (6.75 Inches) - Concrete (8.25 Inches)
2.5 — 924.2										—
—	2.5	4.5	1	SS	12					— Gravel - with trace clay and slag
5.0 — 921.7										—
—	5.0	7.0	ST-1	ST	<1' Recovery					—
7.5 — 919.2										—
—	9.0	11.0	ST-2	ST	2' Recovery				19.2	— Fat CLAY (CH) - with trace rock fragments - orangish brown and brown (2.5YR 4/4) - moist to very moist increasing with depth (FILL)
10.0 — 916.7										—
12.5 — 914.2										—
—	12.5	14.5	2	SS	11					—
15.0 — 911.7										—
17.5 — 909.2										— Sandy Silty Lean CLAY (CL-ML) - brown (7.5YR 5/4) - wet - firm (ALLUVIUM)
—	17.5	19.5	3	SS	5		26	6	25.8	—
20.0 — 906.7										—

(continued)

REMARKS: Acetate liners utilized in split-spoon sampling - Likely inflated SPT values
 Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-20**

SHEET 2 OF 2

DRILLER Shannon Snow

ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-20 DRY ON COMPLETION ? No

DATE November 20, 2015 SURFACE ELEV. 926.7 FT.
 REFUSAL: Yes DEPTH 20.9 FT. ELEV. 905.8 FT.
 SAMPLED 40.8 FT. 12.4 M
 TOP OF ROCK DEPTH 20.9 FT. ELEV. 905.8 FT.
 BEGAN CORING DEPTH 20.6 FT. ELEV. 906.1 FT.
 FOOTAGE CORED (LF) 20.2 FT.
 BOTTOM OF HOLE DEPTH 40.8 FT. ELEV. 885.9 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH TNP FT.
 ELEV. FT.
 AFTER 13 DAYS: DEPTH 1.0 FT.
 ELEV. 925.7 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
—										Continued
—										Auger Refusal at 20.9 Feet
—										Begin Coring at 20.6 Feet
—										Run #1 (20.6 to 25.4 Feet)
22.5	—	—								REC - 100% RQD - 100%
—										Limestone - gray and dark bluish gray - fine grained - with shale seams and calcite healed veins - slightly weathered and slightly fractured - no discernible dip angle
25.0	—	—								Run #2 (25.4 to 30.4 Feet)
—										REC - 100% RQD - 100%
27.5	—	—								Limestone - gray and dark bluish gray - fine grained - with shale seams and calcite healed veins - slightly weathered and slightly fractured - no discernible dip angle
—										Run #3 (30.4 to 35.4 Feet)
30.0	—	—								REC - 100% RQD - 100%
—										Limestone - gray and dark bluish gray - fine grained - with shale seams, imbedded chert fragments, and calcite healed veins - no weathering and no fracturing - no discernible dip angle
32.5	—	—								Run #4 (35.4 to 40.8 Feet)
—										REC - 100% RQD - 100%
35.0	—	—								Limestone - gray and dark bluish gray - fine grained - with shale seams, imbedded chert fragments, and calcite healed veins - no weathering and no fracturing - no discernible dip angle
37.5	—	—								
40.0	—	—								Coring Terminated at 40.8 Feet

REMARKS: No core water lost
Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-21**

SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-21 DRY ON COMPLETION ? Yes

DATE December 4, 2015 SURFACE ELEV. 926.7 FT.
 REFUSAL: Yes DEPTH 17.0 FT. ELEV. 909.7 FT.
 SAMPLED 37.2 FT. 11.3 M
 TOP OF ROCK DEPTH 17.0 FT. ELEV. 909.7 FT.
 BEGAN CORING DEPTH 17.2 FT. ELEV. 909.5 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 37.2 FT. ELEV. 889.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 13 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
0.0 - 926.7										Asphalt (7.5 Inches) - Concrete (7.5 Inches)
2.5 - 924.2	2.5	4.5	1	SS	14					Lean CLAY (CL) - with abundant limestone fragments - orangish brown mottled gray (7.5YR 5/4) - moist to wet (FILL)
5.0 - 921.7	4.5	6.5	ST-1	ST	2' Recovery					
7.5 - 919.2	7.5	9.5	2	SS	8					Lean CLAY (CL) - with trace organics - brown and grayish brown (10YR 5/3) - slightly moist to moist - firm (ALLUVIAL)
10.0 - 916.7										
12.5 - 914.2	12.5	14.5	3	SS	17					Lean CLAY (CL) - orangish brown (7.5YR 6/6) - slightly moist - very stiff (RESIDUUM)
15.0 - 911.7										
17.5 - 909.2										Auger Refusal at 17.0 Feet Begin Coring at 17.2 Feet Run #1 (17.2 to 19.7 Feet) REC - 85% RQD - 85%
20.0 - 906.7										Limestone - dark gray and dark bluish gray - fine grained - with shale seams ...

(continued)

REMARKS: Black denotes location of void
 Lost all core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-21**

SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-21 DRY ON COMPLETION ? Yes

DATE December 4, 2015 SURFACE ELEV. 926.7 FT.
 REFUSAL: Yes DEPTH 17.0 FT. ELEV. 909.7 FT.
 SAMPLED 37.2 FT. 11.3 M
 TOP OF ROCK DEPTH 17.0 FT. ELEV. 909.7 FT.
 BEGAN CORING DEPTH 17.2 FT. ELEV. 909.5 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 37.2 FT. ELEV. 889.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 13 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	ELEV.	FT.	FT.							
-										Continued
22.5	904.2									Limestone - dark gray and dark bluish gray - fine grained - with shale seams - slightly weathered and slightly fractured - no discernible dip angle
										VOIDS 19.4 to 22.5 Feet
25.0	901.7									Run #2 (19.7 to 24.7 Feet) REC - 0% RQD - 0%
										Limestone - gray and dark bluish gray - fine grained - with shale seams and calcite healed veins - slightly weathered and slightly fractured - no discernible dip angle
27.5	899.2									VOIDS 19.4 to 22.5 and 22.7 to 27.0 Feet
										Run #3 (24.7 to 29.7 Feet) REC - 54% RQD - 52%
30.0	896.7									Limestone - gray and dark bluish gray - fine grained - with shale seams and calcite healed veins - slightly weathered and slightly fractured (heavily weathered zone 24.7 to 27.0 feet) - no discernible dip angle
32.5	894.2									VOIDS 22.7 to 27.0 Feet
										Run #4 (29.7 to 34.7 Feet) REC - 67% RQD - 67%
35.0	891.7									Limestone - gray and dark bluish gray - fine grained - with shale seams and calcite healed veins - moderately weathered and moderately fractured (heavily weathered zone 32.0 to 34.0 feet) - no discernible dip angle
37.5	889.2									VOIDS 32.4 to 34.0 Feet
										Run #5 (34.7 to 37.2 Feet) REC - 100% RQD - 100%
40.0	886.7									Limestone - gray and dark bluish gray ...

REMARKS: Lost all core water
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-21
 SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-21 DRY ON COMPLETION ? Yes

DATE December 4, 2015 SURFACE ELEV. 926.7 FT.
 REFUSAL: Yes DEPTH 17.0 FT. ELEV. 909.7 FT.
 SAMPLED 37.2 FT. 11.3 M
 TOP OF ROCK DEPTH 17.0 FT. ELEV. 909.7 FT.
 BEGAN CORING DEPTH 17.2 FT. ELEV. 909.5 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 37.2 FT. ELEV. 889.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 13 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL		PI
-											Continued
42.5	884.2										Limestone - gray and dark bluish gray - fine grained - with shale seams - slightly weathered and slightly fractured - no discernible dip angle
45.0	881.7										----- Coring Terminated at 37.2 Feet
47.5	879.2										
50.0	876.7										
52.5	874.2										
55.0	871.7										
57.5	869.2										
60.0	866.7										

REMARKS: Lost all core water
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-22**

SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-22 DRY ON COMPLETION ? Yes

DATE December 4, 2015 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 18.0 FT. ELEV. 908.5 FT.
 SAMPLED 38.2 FT. 11.6 M
 TOP OF ROCK DEPTH 18.0 FT. ELEV. 908.5 FT.
 BEGAN CORING DEPTH 18.2 FT. ELEV. 908.3 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 38.2 FT. ELEV. 888.3 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 16.0 FT.
 ELEV. 910.5 FT.
 AFTER 24 HRS: DEPTH 16.0 FT.
 ELEV. 910.5 FT.
 AFTER 13 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FROM	TO			N-Value	Qu	LL	PI	%M		
FT. ELEV.	FT.	FT.									
0.0 924.0										Asphalt (4.0 Inches) - Concrete (8.0 Inches)	
2.5 924.0	2.5	4.5	1	SS	8					Fat CLAY (CH) - with limestone fragments - grayish brown and orangish brown (10YR 5/6) - slightly moist to very moist (FILL)	
5.0 921.5	5.0	7.0	ST-1	ST	1.5' Recovery				21.2		
7.5 919.0	7.0	9.0	ST-2	ST	2' Recovery			35	16	20.7	Lean CLAY (CL) - orangish brown and brown with oxide staining (7.5YR 6/6) - slightly moist - stiff (RESIDUUM)
10.0 916.5											
12.5 914.0	12.5	14.5	2	SS	12					37.6	
15.0 911.5											
17.5 909.0											
20.0 906.5	17.5	18.0	3	SS	50/0						Auger Refusal at 18.0 Feet Begin Coring at 18.2 Feet Run #1 (18.2 to 20.2 Feet) REC - 100% RQD - 100%

(continued)

REMARKS: _____



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-22**

SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-22 DRY ON COMPLETION ? Yes

DATE December 4, 2015 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 18.0 FT. ELEV. 908.5 FT.
 SAMPLED 38.2 FT. 11.6 M
 TOP OF ROCK DEPTH 18.0 FT. ELEV. 908.5 FT.
 BEGAN CORING DEPTH 18.2 FT. ELEV. 908.3 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 38.2 FT. ELEV. 888.3 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 16.0 FT.
 ELEV. 910.5 FT.
 AFTER 24 HRS: DEPTH 16.0 FT.
 ELEV. 910.5 FT.
 AFTER 13 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	ELEV.	FT.	FT.							
—	—									Continued
22.5	904.0									Limestone - gray and dark bluish gray - fine grained - with shale seams and calcite healed veins - moderately weathered and heavily fractured - no discernible dip angle - evidence of water transport at 19 to 20 feet
—	—									Run #2 (20.2 to 25.2 Feet) REC - 98% RQD - 98%
25.0	901.5									Limestone - gray, dark gray, and dark bluish gray - fine grained - with shale seams and trace calcite healed veins - highly weathered and highly fractured - no discernible dip angle to vertical fracturing past 23 feet
—	—									Run #3 (25.2 to 30.2 Feet) REC - 75% RQD - 63%
27.5	899.0									Limestone - gray, dark gray, and dark bluish gray - fine grained - with shale seams and trace calcite healed veins - highly weathered and highly fractured
—	—									VOIDS 25.2 to 25.4 and 26.0 to 27.0 Feet
30.0	896.5									Run #4 (30.2 to 35.2 Feet) REC - 95% RQD - 92%
32.5	894.0									Limestone - gray, dark gray, and dark bluish gray - fine grained - with abundant shale seams and trace calcite healed veins - moderately to heavily fractured and moderately weathered
—	—									Run #5 (35.2 to 38.2 Feet) REC - 94% RQD - 92%
35.0	891.5									Limestone - dark gray and dark bluish gray - fine grained - with trace shale seams - moderately fractured and slightly weathered - no discernible dip angle
37.5	889.0									Coring Terminated at 38.2 Feet
40.0	886.5									

REMARKS: Lost most core water past 24 feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-23**

SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-23 DRY ON COMPLETION ? No

DATE November 24, 2015 SURFACE ELEV. 926.8 FT.
 REFUSAL: Yes DEPTH 20.2 FT. ELEV. 906.6 FT.
 SAMPLED 40.2 FT. 12.3 M
 TOP OF ROCK DEPTH 20.2 FT. ELEV. 906.6 FT.
 BEGAN CORING DEPTH 20.2 FT. ELEV. 906.6 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 40.2 FT. ELEV. 886.6 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 17.0 FT.
 ELEV. 909.8 FT.
 AFTER 24 HRS: DEPTH 17.0 FT.
 ELEV. 909.8 FT.
 AFTER 9 DAYS: DEPTH 2.8 FT.
 ELEV. 924.0 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. / ELEV.	FT.	FT.								
0.0 - 924.3										Asphalt (8.0 Inches) - Concrete (7.75 Inches)
2.5 - 924.3	2.5	4.5	1	SS	27					Stone and trace brick fragments - with trace clay
5.0 - 921.8	5.0	7.0	2	SS	11		32	16	17.0	Lean CLAY (CL) - with rock fragments, abundant rock fragments at depth - brown (7.5YR 2.5/2) - slightly moist to moist (FILL)
7.5 - 919.3	7.5	9.5	3	SS	19					
10.0 - 916.8										
12.5 - 914.3	12.5	14.5	4	SS	15				32.7	Lean CLAY (CL) - with trace rounded rock fragments - orangish brown, grayish brown, and brown (7.5YR 6/4) - slightly moist to moist - stiff (ALLUVIUM)
15.0 - 911.8										
17.5 - 909.3	17.5	19.5	5	SS	5					Lean CLAY (CL) - with trace rounded rock fragments - brown mottled grayish brown (7.5YR 4/3) - wet - firm (ALLUVIUM)
20.0 - 906.8										

(continued)

REMARKS: Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-23**

SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-23 DRY ON COMPLETION ? No

DATE November 24, 2015 SURFACE ELEV. 926.8 FT.
 REFUSAL: Yes DEPTH 20.2 FT. ELEV. 906.6 FT.
 SAMPLED 40.2 FT. 12.3 M
 TOP OF ROCK DEPTH 20.2 FT. ELEV. 906.6 FT.
 BEGAN CORING DEPTH 20.2 FT. ELEV. 906.6 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 40.2 FT. ELEV. 886.6 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 17.0 FT.
 ELEV. 909.8 FT.
 AFTER 24 HRS: DEPTH 17.0 FT.
 ELEV. 909.8 FT.
 AFTER 9 DAYS: DEPTH 2.8 FT.
 ELEV. 924.0 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	ELEV.	FT.	FT.							
-										Continued
-										Auger Refusal at 20.2 Feet
-										Begin Coring at 20.2 Feet
-										Run #1 (20.2 to 25.2 Feet)
22.5	904.3									REC - 60% RQD - 33%
-										Limestone - dark gray and dark bluish gray - fine grained - with trace shale seams and calcite healed veins - heavily weathered and moderately fractured - no discernible dip angle
25.0	901.8									Run #2 (25.2 to 30.2 Feet)
-										REC - 100% RQD - 90%
-										Limestone - dark gray and dark bluish gray - fine grained - with trace shale seams and trace calcite healed veins - slightly weathered and slightly fractured (heavily weathered and moderately fractured zone from 27 to 28 ft) - no discernible dip angle
27.5	899.3									Run #3 (30.2 to 35.2 Feet)
-										REC - 95% RQD - 90%
-										Limestone - dark gray and dark bluish gray - fine grained - with shale seams and calcite healed veins - slightly weathered and slightly fractured (moderately weathered and moderately fractured zone from 23.2 to 33 ft) - no discernible dip angle
30.0	896.8									VOID
-										32.7 to 33.0 ft
32.5	894.3									Run #3 (35.2 to 40.2 Feet)
-										REC - 98% RQD - 85%
-										Limestone - dark gray and dark bluish gray - fine grained - with shale seams and calcite healed veins - slightly weathered and slightly fractured moderately weathered and moderately fractured zone from 40.0 to 40.2 ft) - no discernible dip angle
35.0	891.8									
-										
37.5	889.3									
-										
40.0	886.8									

Coring Terminated at 40.2 Feet

Black denotes location of voids encountered - some core water lost (<1 gal/min) at 30 and 33 ft

REMARKS: Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-24**

SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-24 DRY ON COMPLETION ? Yes

DATE November 23, 2015 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 21.0 FT. ELEV. 905.5 FT.
 SAMPLED 41.0 FT. 12.5 M
 TOP OF ROCK DEPTH 21.0 FT. ELEV. 905.5 FT.
 BEGAN CORING DEPTH 20.8 FT. ELEV. 905.7 FT.
 FOOTAGE CORED (LF) 20.2 FT.
 BOTTOM OF HOLE DEPTH 41.0 FT. ELEV. 885.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 10.2 FT.
 ELEV. 916.3 FT.
 AFTER 24 HRS: DEPTH 10.2 FT.
 ELEV. 916.3 FT.
 AFTER 10 DAYS: DEPTH 3.0 FT.
 ELEV. 923.5 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
0.0 924.0										Asphalt (3.25 Inches) - Concrete (8.25 Inches)
2.5 924.0	2.5	4.5	1	SS	30					Gravel - with trace clay
5.0 921.5	5.0	7.0	2	SS	18			14.2		Lean CLAY (CL) - with trace root structure - dark brown and grayish brown (5YR 5/4 and 5YR 4/3) - slightly moist to moist (FILL)
7.5 919.0	7.5	9.5	3	SS	w.o.h.		28	12	21.0	
10.0 916.5										
12.5 914.0	12.5	14.5	4	SS	9					Fat CLAY (CH) - with trace rounded shale fragments - brown (5YR 3/2) - wet - firm (ALLUVIUM)
15.0 911.5										
17.5 909.0	17.5	19.5	5	SS	6				21.9	
20.0 906.5										

(continued)

REMARKS: Acetate liners utilized in split-spoon sampling - Likely inflated SPT values (particularly in gravel fill layer)
 Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-24**

SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-24 DRY ON COMPLETION ? No

DATE November 23, 2015 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 21.0 FT. ELEV. 905.5 FT.
 SAMPLED 41.0 FT. 12.5 M
 TOP OF ROCK DEPTH 21.0 FT. ELEV. 905.5 FT.
 BEGAN CORING DEPTH 20.8 FT. ELEV. 905.7 FT.
 FOOTAGE CORED (LF) 20.2 FT.
 BOTTOM OF HOLE DEPTH 41.0 FT. ELEV. 885.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 10.2 FT.
 ELEV. 916.3 FT.
 AFTER 24 HRS: DEPTH 10.2 FT.
 ELEV. 916.3 FT.
 AFTER 10 DAYS: DEPTH 3.0 FT.
 ELEV. 923.5 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL		PI
—	—	—	—	—	—	—	—	—	—	—	Continued
—	—	—	—	—	—	—	—	—	—	—	Auger Refusal at 21.0 Feet
—	—	—	—	—	—	—	—	—	—	—	Begin Coring at 20.8 Feet
22.5	904.0	—	—	—	—	—	—	—	—	—	Run #1 (20.8 to 23.6 Feet)
—	—	—	—	—	—	—	—	—	—	—	REC - 77% RQD - 57%
—	—	—	—	—	—	—	—	—	—	—	Limestone - gray and dark bluish gray - fine grained - with shale seams - moderately weathered and moderately fractured - no discernible dip angle
25.0	901.5	—	—	—	—	—	—	—	—	—	Run #2 (23.6 to 25.2 Feet)
—	—	—	—	—	—	—	—	—	—	—	REC - 100% RQD - 100%
—	—	—	—	—	—	—	—	—	—	—	Same as above - no lithology change
—	—	—	—	—	—	—	—	—	—	—	Run #3 (25.2 to 30.2 Feet)
27.5	899.0	—	—	—	—	—	—	—	—	—	REC - 100% RQD - 100%
—	—	—	—	—	—	—	—	—	—	—	Limestone - gray and dark bluish gray - fine grained - with shale seams - slightly weathered and slightly fractured - no discernible dip angle
30.0	896.5	—	—	—	—	—	—	—	—	—	Run #4 (30.2 to 36.0 Feet)
—	—	—	—	—	—	—	—	—	—	—	REC - 100% RQD - 100%
—	—	—	—	—	—	—	—	—	—	—	Limestone - gray and dark bluish gray - fine grained - with shale seams - slightly weathered and slightly fractured - no discernible dip angle
32.5	894.0	—	—	—	—	—	—	—	—	—	Run #5 (36.0 to 41.0 Feet)
—	—	—	—	—	—	—	—	—	—	—	REC - 100% RQD - 100%
—	—	—	—	—	—	—	—	—	—	—	Limestone - gray and dark bluish gray - fine grained - with shale seams - slightly weathered and slightly fractured - no discernible dip angle
35.0	891.5	—	—	—	—	—	—	—	—	—	Run #5 (36.0 to 41.0 Feet)
—	—	—	—	—	—	—	—	—	—	—	REC - 100% RQD - 100%
—	—	—	—	—	—	—	—	—	—	—	Limestone - gray and dark bluish gray - fine grained - with shale seams - slightly weathered and slightly fractured - no discernible dip angle
37.5	889.0	—	—	—	—	—	—	—	—	—	Run #5 (36.0 to 41.0 Feet)
—	—	—	—	—	—	—	—	—	—	—	REC - 100% RQD - 100%
—	—	—	—	—	—	—	—	—	—	—	Limestone - gray and dark bluish gray - fine grained - with shale seams - slightly weathered and slightly fractured - no discernible dip angle
40.0	886.5	—	—	—	—	—	—	—	—	—	Coring Terminated at 41.0 Feet

REMARKS: No core water lost

Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-25
 SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-25 DRY ON COMPLETION ? Yes

DATE November 23, 2015 SURFACE ELEV. 926.8 FT.
 REFUSAL: Yes DEPTH 19.9 FT. ELEV. 906.9 FT.
 SAMPLED 39.9 FT. 12.2 M
 TOP OF ROCK DEPTH 19.9 FT. ELEV. 906.9 FT.
 BEGAN CORING DEPTH 18.5 FT. ELEV. 908.3 FT.
 FOOTAGE CORED (LF) 21.4 FT.
 BOTTOM OF HOLE DEPTH 39.9 FT. ELEV. 886.9 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 9.5 FT.
 ELEV. 917.3 FT.
 AFTER 24 HRS: DEPTH 10.0 FT.
 ELEV. 916.8 FT.
 AFTER 10 DAYS: DEPTH 2.5 FT.
 ELEV. 924.3 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
—										Asphalt (8.0 Inches) - Concrete (7.5 Inches)
2.5 — 924.3										Gravel - with trace clay
—	2.5	4.5	1	SS	33					
5.0 — 921.8										
—	5.0	7.0	2	SS	10					
7.5 — 919.3										Fat CLAY (CH) - brown and orangish brown (2.5YR 5/6 and 2.5YR 4/4) - moist to very moist (FILL)
—	7.5	9.5	3	SS	3		52	31	35.5	
10.0 — 916.8										
—	12.5	14.5	4	SS	12		37	20	22.4	
15.0 — 911.8										
—	15.0	17.0	ST-1	ST	2' Recovery				19.4	Lean CLAY (CL) - with trace sand - grayish brown (5YR 4/3 and 5YR 4/2) - very moist to wet increasing with depth - firm to stiff (ALLUVIUM)
17.5 — 909.3										
—	17.5	19.5	5	SS	6				46.6	
20.0 — 906.8										

(continued)

REMARKS: Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-25**

SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-25 DRY ON COMPLETION ? No

DATE November 23, 2015 SURFACE ELEV. 926.8 FT.
 REFUSAL: Yes DEPTH 19.9 FT. ELEV. 906.9 FT.
 SAMPLED 39.9 FT. 12.2 M
 TOP OF ROCK DEPTH 19.9 FT. ELEV. 906.9 FT.
 BEGAN CORING DEPTH 18.5 FT. ELEV. 908.3 FT.
 FOOTAGE CORED (LF) 21.4 FT.
 BOTTOM OF HOLE DEPTH 39.9 FT. ELEV. 886.9 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 10.4 FT.
 ELEV. 916.4 FT.
 AFTER 24 HRS: DEPTH 10.0 FT.
 ELEV. 916.8 FT.
 AFTER 10 DAYS: DEPTH 2.5 FT.
 ELEV. 924.3 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	ELEV.	FT.	FT.							
-										Continued
-										Auger Refusal at 19.9 Feet
-										Begin Coring at 18.5 Feet
-										Run #1 (18.5 to 19.9 Feet)
22.5	904.3									REC - 0% RQD - 0%
-										Trace fractured limestone with mud
-										Run #2 (19.9 to 24.9 Feet)
-										REC - 95% RQD - 90%
25.0	901.8									Limestone - dark gray and dark bluish gray - fine grained - with shale seams and imbedded chert fragments - slightly weathered and slightly fractured - no discernible dip angle - evidence of water transport at 24 feet
-										Run #3 (24.9 to 29.9 Feet)
27.5	899.3									REC - 100% RQD - 93%
-										Limestone - gray and dark bluish gray - fine grained - with shale seams, dolomite, and imbedded chert fragments - slightly weathered and slightly fractured - no discernible dip angle
30.0	896.8									Run #4 (29.9 to 34.9 Feet)
-										REC - 100% RQD - 100%
32.5	894.3									Limestone - gray and dark bluish gray - fine grained - with shale seams and imbedded chert fragments - slightly weathered and slightly fractured - no discernible dip angle
-										Run #5 (34.9 to 39.9 Feet)
35.0	891.8									REC - 98% RQD - 93%
-										Limestone - gray and dark bluish gray - fine grained - with shale seams and imbedded chert fragments - slightly weathered and slightly fractured - no discernible dip angle
37.5	889.3									
-										
40.0	886.8									Coring Terminated at 39.9 Feet

REMARKS: Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-26**
 SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-26 DRY ON COMPLETION ? No

DATE December 4, 2015 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 22.0 FT. ELEV. 904.5 FT.
 SAMPLED 42.5 FT. 13.0 M
 TOP OF ROCK DEPTH 22.0 FT. ELEV. 904.5 FT.
 BEGAN CORING DEPTH 22.0 FT. ELEV. 904.5 FT.
 FOOTAGE CORED (LF) 20.5 FT.
 BOTTOM OF HOLE DEPTH 42.5 FT. ELEV. 884.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 14.0 FT.
 ELEV. 912.5 FT.
 AFTER 24 HRS: DEPTH 14.0 FT.
 ELEV. 912.5 FT.
 AFTER 13 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL		PI
0.0 - 0.5											Asphalt (5.5 Inches) - Concrete (7.5 Inches)
2.5 - 2.5	924.0		2.5	4.5	1	SS	8				Lean CLAY (CL) - with abundant rock fragments - dark brown and grayish brown (10YR 3/4) - slightly moist to moist increasing with depth (FILL)
5.0 - 5.0	921.5		5.0	7.0	2	SS	4				
7.5 - 7.5	919.0		7.5	9.5	3	SS	8				Lean CLAY (CL) - with trace rounded rock fragments - brown and orangish brown (7.5YR 3/4) - slightly moist - firm (ALLUVIAL)
10.0 - 10.0	916.5										Fat CLAY (CH) - with trace limestone fragments - orangish brown (7.5YR 5/6) - slightly moist to very moist - stiff (RESIDUUM)
12.5 - 12.5	914.0		12.5	14.5	4	SS	15	66	41	29.8	
15.0 - 15.0	911.5		17.5	19.5	5	SS	10				
17.5 - 17.5	909.0										
20.0 - 20.0	906.5										

(continued)

REMARKS: _____



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-26**

SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-26 DRY ON COMPLETION ? No

DATE December 4, 2015 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 22.0 FT. ELEV. 904.5 FT.
 SAMPLED 42.5 FT. 13.0 M
 TOP OF ROCK DEPTH 22.0 FT. ELEV. 904.5 FT.
 BEGAN CORING DEPTH 22.0 FT. ELEV. 904.5 FT.
 FOOTAGE CORED (LF) 20.5 FT.
 BOTTOM OF HOLE DEPTH 42.5 FT. ELEV. 884.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 14.0 FT.
 ELEV. 912.5 FT.
 AFTER 24 HRS: DEPTH 14.0 FT.
 ELEV. 912.5 FT.
 AFTER 13 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL		PI
—	—	—	—	—	—	—	—	—	—	—	Continued
—	—	—	—	—	—	—	—	—	—	—	Lean CLAY (CL) - with trace limestone fragments - orangish brown (7.5YR 5/6) - slightly moist to very moist - stiff (RESIDUUM)
22.5	904.0										Auger Refusal at 22.0 Feet Begin Coring at 22.0 Feet Run #1 (22.0 to 25.2 Feet) REC - 68% RQD - 36%
—	—	—	—	—	—	—	—	—	—	—	Limestone - dark gray and dark bluish gray - fine grained - with trace shale seams - moderately weathered and heavily fractured - no discernible dip angle
25.0	901.5										VOID 25.0 to 25.2 Feet Run #2 (25.2 to 30.2 Feet) REC - 53% RQD - 53%
—	—	—	—	—	—	—	—	—	—	—	Limestone - dark gray and dark bluish gray - fine grained - with shale seams - moderately weathered and moderately fractured (heavily weathered zone 26 to 27 feet) - no discernible dip angle - evidence of water transport 26 to 27 feet
27.5	899.0										VOID 28.0 to 36.0 Feet Run #3 (30.2 to 35.2 Feet) REC - 0% RQD - 0%
—	—	—	—	—	—	—	—	—	—	—	VOID - No Rock Encountered 28.0 to 36.0 Feet Run #4 (35.2 to 42.5 Feet) REC - 21% RQD - 21%
30.0	896.5										Limestone - gray and dark bluish gray - fine grained - with trace shale seams and imbedded chert fragments - heavily weathered and moderately fractured - no discernible dip angle
32.5	894.0										VOID 28.0 to 36.0 Feet and 37.0 to 39.4 Feet
—	—	—	—	—	—	—	—	—	—	—	Coring Terminated at 42.5 Feet
35.0	891.5										
—	—	—	—	—	—	—	—	—	—	—	
37.5	889.0										
—	—	—	—	—	—	—	—	—	—	—	
40.0	886.5										

REMARKS: Black denotes location of void
 Lost all core water until 39.4 feet, then returned all core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-27**
 SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-27 DRY ON COMPLETION ? Yes

DATE December 4, 2015 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 7.0 FT. ELEV. 919.5 FT.
 SAMPLED 27.9 FT. 8.5 M
 TOP OF ROCK DEPTH 7.0 FT. ELEV. 919.5 FT.
 BEGAN CORING DEPTH 7.1 FT. ELEV. 919.4 FT.
 FOOTAGE CORED (LF) 20.8 FT.
 BOTTOM OF HOLE DEPTH 27.9 FT. ELEV. 898.6 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 13 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
—										— Asphalt (4.75 Inches) - Concrete (9.5 Inches)
2.5 — 924.0										—
—	2.5	4.5	1	SS	17					— Abundant rock fragments with trace gray clay - very moist to wet (FILL)
5.0 — 921.5										—
—	6.0	8.0	ST-1	ST	No Recovery					— Auger Refusal at 7.0 Feet Begin Coring at 7.1 Feet Run #1 (7.1 to 14.9 Feet) REC - 9% RQD - 9%
7.5 — 919.0										—
—										— Limestone - dark gray and dark bluish gray - fine grained - with shale seams - moderately weathered and slightly fractured - no discernible dip angle - FILL MATERIAL
10.0 — 916.5										— ALLUVIAL SOILS 8 to 23.5 Feet
—										—
15.0 — 911.5										— Run #2 (14.9 to 19.9 Feet) REC - 0% RQD - 0%
—										— ALLUVIAL SOILS 8 to 23.5 Feet
17.5 — 909.0										—
—										—
20.0 — 906.5										—

(continued)

REMARKS: Lost most core water past 24 feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-27
 SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-27 DRY ON COMPLETION ? Yes

DATE December 4, 2015 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 7.0 FT. ELEV. 919.5 FT.
 SAMPLED 27.9 FT. 8.5 M
 TOP OF ROCK DEPTH 7.0 FT. ELEV. 919.5 FT.
 BEGAN CORING DEPTH 7.1 FT. ELEV. 919.4 FT.
 FOOTAGE CORED (LF) 20.8 FT.
 BOTTOM OF HOLE DEPTH 27.9 FT. ELEV. 898.6 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH Dry FT.
 ELEV. FT.
 AFTER 24 HRS: DEPTH Dry FT.
 ELEV. FT.
 AFTER 13 DAYS: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
-										Continued
-										Run #3 (19.9 to 24.9 Feet)
-										REC - 35% RQD - 13%
22.5										Limestone - light gray and dark bluish gray - fine grained - with shale seams - heavily weathered and heavily fractured - no discernible dip angle - evidence of water transport at 24 feet
25.0										ALLUVIAL SOILS 8 to 23.5 Feet
-										Run #4 (24.9 to 27.9 Feet)
-										REC - 100% RQD - 100%
27.5										Limestone - dark gray and dark bluish gray - fine grained - with shale seams - slightly weathered and slightly fractured - no discernible dip angle
30.0										Coring Terminated at 27.9 Feet
32.5										
35.0										
37.5										
40.0										

REMARKS: Lost most core water past 24 feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-28**
 SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-28 DRY ON COMPLETION ? No

DATE November 24, 2015 SURFACE ELEV. 926.1 FT.
 REFUSAL: Yes DEPTH 21.3 FT. ELEV. 904.8 FT.
 SAMPLED 41.3 FT. 12.6 M
 TOP OF ROCK DEPTH 21.3 FT. ELEV. 904.8 FT.
 BEGAN CORING DEPTH 20.5 FT. ELEV. 905.6 FT.
 FOOTAGE CORED (LF) 20.8 FT.
 BOTTOM OF HOLE DEPTH 41.3 FT. ELEV. 884.8 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 15.0 FT.
 ELEV. 911.1 FT.
 AFTER 24 HRS: DEPTH 15.0 FT.
 ELEV. 911.1 FT.
 AFTER 9 DAYS: DEPTH 4.0 FT.
 ELEV. 922.1 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
0.0 926.1										Asphalt (1.25 Inches) - Concrete (8.0 Inches)
2.5 923.6	2.5	4.5	1	SS	17					Stone - trace clay
5.0 921.1	5.0	7.0	2	SS	24					
7.5 918.6	7.5	8.1	3	SS	50/1"					Fat CLAY (CH) - with rock fragments - brown (7.5YR 5/3) - moist (FILL)
10.0 916.1	10.0	12.0	ST-1	ST	1.5' Recovery				23.0	
12.5 913.6	12.5	14.5	4	SS	8					Lean CLAY (CL) - with trace rounded rock fragments - brown, orangish brown, and mottled grayish brown (7.5YR 5/6, 7.5YR 5/4, and mottled Grey 1 5/10) - slightly moist to wet - firm to stiff (ALLUVIUM)
15.0 911.1										
17.5 908.6	17.5	19.5	5	SS	9					
20.0 906.1										

(continued)

REMARKS: Smelled chemical odor at 7' (sulfur odor) - no PID/RAD/Mecury Readings, lost approximately 1/3 of core water
Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-28**

SHEET 2 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-28 DRY ON COMPLETION ? No

DATE November 24, 2015 SURFACE ELEV. 926.1 FT.
 REFUSAL: Yes DEPTH 21.3 FT. ELEV. 904.8 FT.
 SAMPLED 41.3 FT. 12.6 M
 TOP OF ROCK DEPTH 21.3 FT. ELEV. 904.8 FT.
 BEGAN CORING DEPTH 20.5 FT. ELEV. 905.6 FT.
 FOOTAGE CORED (LF) 20.8 FT.
 BOTTOM OF HOLE DEPTH 41.3 FT. ELEV. 884.8 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 15.0 FT.
 ELEV. 911.1 FT.
 AFTER 24 HRS: DEPTH 15.0 FT.
 ELEV. 911.1 FT.
 AFTER 9 DAYS: DEPTH 4.0 FT.
 ELEV. 922.1 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FROM	TO			N-Value	Qu	LL	PI	%M		
FT.	ELEV.	FT.	FT.								
-										-	Continued
-										-	Auger Refusal at 21.3 Feet
-										-	Begin Coring at 20.5 Feet
-										-	Run #1 (20.5 to 24.6 Feet)
22.5	903.6									-	REC - 89% RQD - 69%
-										-	Limestone - dark gray and dark bluish gray - fine grained - with calcite healed veins - heavily weathered and moderately fractured - no discernible dip angle - evidence of water transport at 24 ft
25.0	901.1									-	VOID
-										-	23.8 to 24.0 Feet
-										-	Run #2 (24.6 to 29.6 Feet)
27.5	898.6									-	REC - 100% RQD - 100%
-										-	Limestone - dark gray and dark bluish gray - fine grained - with calcite healed veins and trace shale seams - slightly weathered and slightly fractured - no discernible dip angle
30.0	896.1									-	Run #3 (29.6 to 34.6 Feet)
-										-	REC - 85% RQD - 67%
-										-	Limestone - dark gray and dark bluish gray - fine grained - with shale seams - moderately weathered and moderately fractured (heavily weathered zone 34.0 to 34.3 ft) - no discernible dip angle
32.5	893.6									-	VOID
-										-	34.0 to 34.3 Feet
-										-	Run #4 (34.6 to 41.3 Feet)
35.0	891.1									-	REC - 71% RQD - 60%
-										-	Limestone - dark gray and dark bluish gray - fine grained - with shale seams - moderately weathered and moderately fractured (heavily weathered and heavily fractured zone 35.0 to 38.0 ft) - no discernible dip angle
37.5	888.6									-	
-										-	
40.0	886.1									-	

Coring Terminated at 41.3 Feet

REMARKS: Lost approximately 1/3 of core water, black denotes locations of voids encountered
Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-29**
 SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-29 DRY ON COMPLETION ? Yes

DATE November 23, 2015 SURFACE ELEV. 926.2 FT.
 REFUSAL: Yes DEPTH 25.9 FT. ELEV. 900.3 FT.
 SAMPLED 45.9 FT. 14.0 M
 TOP OF ROCK DEPTH 25.9 FT. ELEV. 900.3 FT.
 BEGAN CORING DEPTH 25.0 FT. ELEV. 901.2 FT.
 FOOTAGE CORED (LF) 20.9 FT.
 BOTTOM OF HOLE DEPTH 45.9 FT. ELEV. 880.3 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 10.0 FT.
 ELEV. 916.2 FT.
 AFTER 24 HRS: DEPTH 10.0 FT.
 ELEV. 916.2 FT.
 AFTER 10 DAYS: DEPTH 2.0 FT.
 ELEV. 924.2 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
0.0 - 0.75										Asphalt (0.75 Inches) - Concrete (9.0 Inches)
2.5 - 923.7										Stone - trace clay
	2.5	4.5	1	SS	17					
5.0 - 921.2										
	6.0	8.0	ST-1	ST	2' Recovery				24.4	
7.5 - 918.7										
	8.0	10.0	2	SS	5		36	20	24.5	
10.0 - 916.2										
12.5 - 913.7										Lean CLAY (CL) - with trace sand - brown and grayish brown (7.5YR 3/4) - very moist (FILL)
	12.5	14.5	3	SS	10					
15.0 - 911.2										
17.5 - 908.7										
	17.5	19.5	4	SS	4				32.7	
20.0 - 906.2										

(continued)

REMARKS: Acetate liners utilized in split-spoon sampling - Likely inflated SPT values (particularly in gravel fill layer)
 Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-29**

SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-29 DRY ON COMPLETION ? No

DATE November 23, 2015 SURFACE ELEV. 926.2 FT.
 REFUSAL: Yes DEPTH 25.9 FT. ELEV. 900.3 FT.
 SAMPLED 45.9 FT. 14.0 M
 TOP OF ROCK DEPTH 25.9 FT. ELEV. 900.3 FT.
 BEGAN CORING DEPTH 25.0 FT. ELEV. 901.2 FT.
 FOOTAGE CORED (LF) 20.9 FT.
 BOTTOM OF HOLE DEPTH 45.9 FT. ELEV. 880.3 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 10.0 FT.
 ELEV. 916.2 FT.
 AFTER 24 HRS: DEPTH 10.0 FT.
 ELEV. 916.2 FT.
 AFTER 10 DAYS: DEPTH 2.0 FT.
 ELEV. 924.2 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
22.5 - 903.7	22.5	24.5	5	SS	1					Continued Lean CLAY (CL) - brown and grayish brown (7.5YR 5/4) - wet (ALLUVIUM)
25.0 - 901.2										Auger Refusal at 25.9 Feet Begin Coring at 25.0 Feet Run #1 (25.0 to 30.1 Feet) REC - 37% RQD - 16%
27.5 - 898.7										Limestone - gray and dark bluish gray - fine grained - with sand and dolomite - heavily weathered and heavily fractured - no discernible dip angle - evidence of water transport from 25 to 29 feet
30.0 - 896.2										VOID 28.6 to 29.1 Feet
32.5 - 893.7										Run #2 (30.1 to 35.1 Feet) REC - 100% RQD - 88%
35.0 - 891.2										Limestone - gray, dark gray, and dark bluish gray - fine grained - with shale seams and dolomite - moderately weathered and moderately fractured (heavily weathered zone 30.1 to 31 ft) - no discernible dip angle
37.5 - 888.7										Run #3 (35.1 to 40.1 Feet) REC - 100% RQD - 90%
40.0 - 886.2										Limestone - gray, dark gray, and dark bluish gray - fine grained - with shale seams and dolomite - moderately weathered and slightly fractured - no discernible dip angle

(continued)

REMARKS: Lost all core water
Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-29**

SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-29 DRY ON COMPLETION ? No

DATE November 23, 2015 SURFACE ELEV. 926.2 FT.
 REFUSAL: Yes DEPTH 25.9 FT. ELEV. 900.3 FT.
 SAMPLED 45.9 FT. 14.0 M
 TOP OF ROCK DEPTH 25.9 FT. ELEV. 900.3 FT.
 BEGAN CORING DEPTH 25.0 FT. ELEV. 901.2 FT.
 FOOTAGE CORED (LF) 20.9 FT.
 BOTTOM OF HOLE DEPTH 45.9 FT. ELEV. 880.3 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 10.0 FT.
 ELEV. 916.2 FT.
 AFTER 24 HRS: DEPTH 10.0 FT.
 ELEV. 916.2 FT.
 AFTER 10 DAYS: DEPTH 2.0 FT.
 ELEV. 924.2 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL		PI
-	-	-	-	-	-	-	-	-	-	-	Continued
-	-	-	-	-	-	-	-	-	-	-	Run #4 (40.1 to 45.9 Feet)
-	-	-	-	-	-	-	-	-	-	-	REC - 100% RQD - 100%
42.5	883.7	-	-	-	-	-	-	-	-	-	Limestone - gray, dark gray, and dark bluish gray
-	-	-	-	-	-	-	-	-	-	-	fine grained - with shale seams, calcite healed
-	-	-	-	-	-	-	-	-	-	-	veins, and trace dolomite - slightly weathered and
45.0	881.2	-	-	-	-	-	-	-	-	-	moderately fractured - no discernible dip angle
-	-	-	-	-	-	-	-	-	-	-	Coring Terminated at 45.9 Feet
47.5	878.7	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
50.0	876.2	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
52.5	873.7	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
55.0	871.2	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
57.5	868.7	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
60.0	866.2	-	-	-	-	-	-	-	-	-	-

REMARKS: Lost all core water
Third Ground water measurement taken at the end of 3-day 5 inch rain event



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-30**
 SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-30 DRY ON COMPLETION ? No

DATE November 24, 2015 SURFACE ELEV. 926.7 FT.
 REFUSAL: Yes DEPTH 17.1 FT. ELEV. 909.6 FT.
 SAMPLED 37.0 FT. 11.3 M
 TOP OF ROCK DEPTH 17.1 FT. ELEV. 909.6 FT.
 BEGAN CORING DEPTH 17.0 FT. ELEV. 909.7 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 37.0 FT. ELEV. 889.7 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 6.0 FT.
 ELEV. 920.7 FT.
 AFTER 24 HRS: DEPTH 6.0 FT.
 ELEV. 920.7 FT.
 AFTER 9 DAYS: DEPTH 1.0 FT.
 ELEV. 925.7 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
0.0 926.7										Asphalt (7.0 Inches) - Concrete (9.0 Inches)
2.5 924.2	2.5	4.5	1	SS	20					Stone - with trace brown clay (5YR 5/3) - dry
5.0 921.7	5.0	7.0	2	SS	14					Fat CLAY (CH) - with sand and abundant rock fragments - brown (7.5YR 5/4) - wet (FILL)
7.5 919.2	7.5	9.5	3	SS	1		47	28	35.5	
10.0 916.7										
12.5 914.2	12.5	14.5	4	SS	3				20.7	Lean CLAY (CL) - with rounded shale fragments - brown (7.5YR 7/4 and 7.5YR 6/3) - wet - very soft to soft (ALLUVIUM)
15.0 911.7										
17.5 909.2										Auger Refusal at 17.1 Feet Begin Coring at 17.0 Feet
										Run #1 (17.0 to 20.0 Feet) REC - 94% RQD - 94%
20.0 906.7										Limestone - dark gray and dark bluish gray - fine grained - with shale seams ...

(continued)

REMARKS: Washed casing down to 17 feet, encountered hard obstacle at 8.5 feet
Lost all core water past 25 feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-30**

SHEET 2 OF 2

DRILLER Shannon Snow

ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-30 DRY ON COMPLETION ? No

DATE November 24, 2015 SURFACE ELEV. 926.7 FT.
 REFUSAL: Yes DEPTH 17.1 FT. ELEV. 909.6 FT.
 SAMPLED 37.0 FT. 11.3 M
 TOP OF ROCK DEPTH 17.1 FT. ELEV. 909.6 FT.
 BEGAN CORING DEPTH 17.0 FT. ELEV. 909.7 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 37.0 FT. ELEV. 889.7 FT.

WATER LEVEL DATA (IF APPLICABLE)		
COMPLETION:	DEPTH	<u>6.0</u> FT.
	ELEV.	<u>920.7</u> FT.
AFTER 24 HRS:	DEPTH	<u>6.0</u> FT.
	ELEV.	<u>920.7</u> FT.
AFTER 9 DAYS:	DEPTH	<u>1.0</u> FT.
	ELEV.	<u>925.7</u> FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
-										Continued
-										Limestone - dark gray and dark bluish gray - fine grained - with shale seams - moderately weathered and slightly fractured - no discernible dip angle
22.5										Run #2 (20.0 to 25.0 Feet) REC - 95% RQD - 95%
-										Limestone - dark gray and dark bluish gray - fine grained - with shale seams - slightly weathered and no fracturing - no discernible dip angle - evidence of water transport at 23.5 to 24 feet
25.0										Run #3 (25.0 to 30.0 Feet) REC - 100% RQD - 100%
-										Limestone - dark gray and dark bluish gray - fine grained - with trace calcite healed veins - slightly weathered and no fracturing - no discernible dip angle
27.5										Run #4 (30.0 to 35.0 Feet) REC - 100% RQD - 100%
-										Limestone - dark gray and dark bluish gray - fine grained - with trace calcite healed veins - slightly weathered and no fracturing - no discernible dip angle
30.0										Run #4 (35.0 to 37.0 Feet) REC - 100% RQD - 100%
-										Limestone - dark gray and dark bluish gray - fine grained - with trace calcite healed veins - slightly weathered and no fracturing - no discernible dip angle
32.5										Run #4 (35.0 to 37.0 Feet) REC - 100% RQD - 100%
-										Limestone - dark gray and dark bluish gray - fine grained - with trace calcite healed veins - slightly weathered and no fracturing - no discernible dip angle
35.0										Run #4 (35.0 to 37.0 Feet) REC - 100% RQD - 100%
-										Limestone - dark gray and dark bluish gray - fine grained - with trace calcite healed veins - slightly weathered and no fracturing - no discernible dip angle
37.5										Run #4 (35.0 to 37.0 Feet) REC - 100% RQD - 100%
-										Limestone - dark gray and dark bluish gray - fine grained - with trace calcite healed veins - slightly weathered and no fracturing - no discernible dip angle
40.0										Coring Terminated at 37.0 Feet

REMARKS: Lost all core water past 25 feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-31**

SHEET 1 OF 2

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-31 DRY ON COMPLETION ? No

DATE November 24, 2015 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 9.5 FT. ELEV. 917.0 FT.
 SAMPLED 29.5 FT. 9.0 M
 TOP OF ROCK DEPTH 9.5 FT. ELEV. 917.0 FT.
 BEGAN CORING DEPTH 9.5 FT. ELEV. 917.0 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 29.5 FT. ELEV. 897.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 8.0 FT.
 ELEV. 918.5 FT.
 AFTER 24 HRS: DEPTH 8.0 FT.
 ELEV. 918.5 FT.
 AFTER 9 DAYS: DEPTH 3.8 FT.
 ELEV. 922.7 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
0.0 926.5										Asphalt (4.5 Inches) - Concrete (8.5 Inches)
2.5 924.0										Gravel - with brown clay (7.5YR 3/4) - dry
	2.5	4.5	1	SS	49					
5.0 921.5										Fat CLAY (CH) - with trace rock fragments - orangish brown, brown, and grayish brown (5YR 5/6) - slightly moist (FILL)
	5.0	7.0	2	SS	15					
7.5 919.0										Fat CLAY (CH) - with rock fragments - light brown and brown (7.5YR 6/3) - wet (FILL)
	7.5	9.5	3	SS	21					
10.0 916.5										Auger Refusal at 9.5 Feet Begin Coring at 9.3Feet Run #1 (9.3 to 10.5 Feet) REC - 66% RQD - 66%
										Placed Limestone (FILL) - Recovered limestone 9 inches in thickness
12.5 914.0										Run #2 (10.5 to 15.5 Feet) REC - 0% RQD - 0%
										SANDY ALLUVIAL MATERIAL 10.0 to 15.6 Feet
15.0 911.5										Run #2 (15.5 to 20.5 Feet) REC - 96% RQD - 96%
17.5 909.0										Limestone - dark gray, gray, and dark bluish gray - fine grained - with shale seams, trace dolomite, trace calcite healed veins, and trace shale seams - slightly weathered and no fracturing - no discernible dip angle
20.0 906.5										

(continued)

REMARKS: Third Ground water measurement taken at the end of 3-day 5 inch rain event
Lost all core water 10.0 to 20.5 feet, got most core water back 20.5 to 29.5 feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-31**

SHEET 2 OF 2

DRILLER Shannon Snow

ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-31 DRY ON COMPLETION ? No

DATE November 24, 2015 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 9.5 FT. ELEV. 917.0 FT.
 SAMPLED 29.5 FT. 9.0 M
 TOP OF ROCK DEPTH 9.5 FT. ELEV. 917.0 FT.
 BEGAN CORING DEPTH 9.5 FT. ELEV. 917.0 FT.
 FOOTAGE CORED (LF) 20.0 FT.
 BOTTOM OF HOLE DEPTH 29.5 FT. ELEV. 897.0 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 8.0 FT.
 ELEV. 918.5 FT.
 AFTER 24 HRS: DEPTH 8.0 FT.
 ELEV. 918.5 FT.
 AFTER 9 DAYS: DEPTH 3.8 FT.
 ELEV. 922.7 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL	
22.5	904.0									Continued Run #4 (20.5 to 25.5 Feet) REC - 100% RQD - 92% Limestone - dark gray, gray, and dark bluish gray fine grained - with shale seams, trace dolomite, trace calcite healed veins, and trace shale seams - slightly weathered and no fracturing (moderately weathered zone 24.0 to 24.5 ft) - no discernible dip angle
25.0	901.5									
27.5	899.0									Run #4 (25.5 to 29.5 Feet) REC - 98% RQD - 98% Limestone - dark gray, gray, and dark bluish gray fine grained - with shale seams, trace dolomite, trace calcite healed veins, and trace shale seams - slightly weathered and moderately fractured - no discernible dip angle
30.0	896.5									
32.5	894.0									Coring Terminated at 29.5 Feet
35.0	891.5									
37.5	889.0									
40.0	886.5									

REMARKS: Third Ground water measurement taken at the end of 3-day 5 inch rain event
Lost all core water 10.0 to 20.5 feet, got most core water back 20.5 to 29.5 feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-32
 SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-32 DRY ON COMPLETION ? Yes

DATE January 12, 2016 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 19.9 FT. ELEV. 906.6 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 19.9 FT. ELEV. 906.6 FT.
 BEGAN CORING DEPTH 19.9 FT. ELEV. 906.6 FT.
 FOOTAGE CORED (LF) 31.1 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 876.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH DRY FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH TNP FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL	
0.0 - 0.5	924.0									Asphalt (5.0 Inches) - Concrete (8.0 Inches)
2.5 - 3.0	924.0									
5.0 - 5.5	921.5									
7.5 - 8.0	919.0									
10.0 - 10.5	916.5									Auger Probe
12.5 - 13.0	914.0									
15.0 - 15.5	911.5									
17.5 - 18.0	909.0									
20.0 - 20.5	906.5									Auger Refusal at 19.9 Feet Begin Coring at 19.9 Feet Run #1 (19.9 to 21.9 Feet)

(continued)

REMARKS: Lost 1/2 of core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-32**
 SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-32 DRY ON COMPLETION ? Yes

DATE January 12, 2016 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 19.9 FT. ELEV. 906.6 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 19.9 FT. ELEV. 906.6 FT.
 BEGAN CORING DEPTH 19.9 FT. ELEV. 906.6 FT.
 FOOTAGE CORED (LF) 31.1 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 876.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH DRY FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH TNP FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL	
22.5	904.0									Continued Run #1 (19.9 to 21.9 Feet) REC - 75% RQD - 30% Limestone - dark gray - with shale seams - moderately fractured and slightly weathered - no discernible dip angle - evidence of water transport at 20.5 to 21 feet
25.0	901.5									Run #2 (21.9 to 26.9 Feet) REC - 98% RQD - 78% Limestone - dark gray - with shale seams - slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport at 22.5 to 26.0 feet
27.5	899.0									Run #3 (26.9 to 31.9 Feet) REC - 100% RQD - 98% Limestone - dark gray - with shale seams and calcite healed veins - slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport at 28.5 to 30.5 feet
30.0	896.5									Run #4 (31.9 to 36.9 Feet) REC - 90% RQD - 86% Limestone - dark gray - with shale seams and calcite healed veins - slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport at 34 to 36.5 feet
32.5	894.0									Run #5 (36.9 to 41.9 Feet) REC - 62% RQD - 58% Limestone - dark gray - with shale seams - slightly fractured and moderately weathered, heavily weathered zone 36.5 to 40.5 - no discernible dip angle
35.0	891.5									(continued)
37.5	889.0									
40.0	886.5									

REMARKS: Lost 1/2 of core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING A-32
 SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-32 DRY ON COMPLETION ? Yes

DATE January 12, 2016 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 19.9 FT. ELEV. 906.6 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 19.9 FT. ELEV. 906.6 FT.
 BEGAN CORING DEPTH 19.9 FT. ELEV. 906.6 FT.
 FOOTAGE CORED (LF) 31.1 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 876.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH DRY FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH TNP FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
42.5 - 884.0										Continued
										Limestone - dark gray - with shale seams - slightly fractured and moderately weathered, heavily weathered zone 36.5 to 40.5 - no discernible dip angle
										Run #6 (41.9 to 46.9 Feet) REC - 74% RQD - 58%
45.0 - 881.5										Limestone - dark gray - with shale seams and calcite healed veins - slightly fractured and slightly weathered, moderately weathered at 43.5 feet - no discernible dip angle
47.5 - 879.0										Run #7 (46.9 to 50.0 Feet) REC - 84% RQD - 84%
50.0 - 876.5										Limestone - dark gray - with shale seams and calcite healed veins - slightly fractured and slightly weathered - no discernible dip angle - evidence of water transport at 48 feet
										Coring Terminated at 50.0 Feet
52.5 - 874.0										
55.0 - 871.5										
57.5 - 869.0										
60.0 - 866.5										

REMARKS: Lost 1/2 of core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-33**
 SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-33 DRY ON COMPLETION ? Yes

DATE January 11, 2016 SURFACE ELEV. 926.8 FT.
 REFUSAL: Yes DEPTH 17.5 FT. ELEV. 909.3 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 17.5 FT. ELEV. 909.3 FT.
 BEGAN CORING DEPTH 18.2 FT. ELEV. 908.6 FT.
 FOOTAGE CORED (LF) 31.8 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 876.8 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 16.0 FT.
 ELEV. 910.8 FT.
 AFTER 1 HRS: DEPTH TNP FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH 14.0 FT.
 ELEV. 912.8 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL	
0.0 - 0.5										Asphalt (8.5 Inches) - Concrete (7.5 Inches)
2.5 - 3.0	924.3									
5.0 - 5.5	921.8									
7.5 - 8.0	919.3									
10.0 - 10.5	916.8									
12.5 - 13.0	914.3									
15.0 - 15.5	911.8									
17.5 - 18.0	909.3									Auger Refusal at 17.5 Feet Begin Coring at 18.2 Feet
18.2 - 22.1										Run #1 (18.2 to 22.1 Feet) REC - 49% RQD - 49%
20.0 - 20.5	906.8									Limestone - dark gray - with shale seams - (continued)

REMARKS: Lost 1/2 of core water
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-33**
 SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-33 DRY ON COMPLETION ? Yes

DATE January 11, 2016 SURFACE ELEV. 926.8 FT.
 REFUSAL: Yes DEPTH 17.5 FT. ELEV. 909.3 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 17.5 FT. ELEV. 909.3 FT.
 BEGAN CORING DEPTH 18.2 FT. ELEV. 908.6 FT.
 FOOTAGE CORED (LF) 31.8 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 876.8 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 16.0 FT.
 ELEV. 910.8 FT.
 AFTER 1 HRS: DEPTH TNP FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH 14.0 FT.
 ELEV. 912.8 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION	
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL		PI
-	-	-	-	-	-	-	-	-	-	-	Continued
22.5	904.3										Limestone - dark gray - with shale seams - heavily weathered and moderately fractured- no discernible dip angle - appears to be coring along side of pinnacle
											Run #2 (22.1 to 27.1 Feet) REC - 0% RQD - 0%
25.0	901.8										VOID 22.1 to 29.5 Feet
27.5	899.3										Run #3 (27.1 to 32.1 Feet) REC - 68% RQD - 68%
30.0	896.8										Limestone - dark gray - with shale seams - heavily weathered and moderately fractured- no discernible dip angle - appears to be coring along side of pinnacle
											VOID 22.1 to 29.5 Feet
32.5	894.3										Run #4 (32.1 to 32.7 Feet) REC - 100% RQD - 100%
											Run #5 (32.7 to 37.7 Feet) REC - 100% RQD - 100%
35.0	891.8										Limestone - dark gray - with trace shale seams - no weathering and no fracturing - no discernible dip angle
37.5	889.3										Run #6 (37.7 to 42.7 Feet) REC - 100% RQD - 93%
40.0	886.8										Limestone - dark gray - with trace shale seams - moderately fractured and moderately weathered, heavily weathered zone 41.5 to 42.7 Feet - no

REMARKS: Lost 1/2 of core water
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-33**
 SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-33 DRY ON COMPLETION ? Yes

DATE January 11, 2016 SURFACE ELEV. 926.8 FT.
 REFUSAL: Yes DEPTH 17.5 FT. ELEV. 909.3 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 17.5 FT. ELEV. 909.3 FT.
 BEGAN CORING DEPTH 18.2 FT. ELEV. 908.6 FT.
 FOOTAGE CORED (LF) 31.8 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 876.8 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH 16.0 FT.
 ELEV. 910.8 FT.
 AFTER 1 HRS: DEPTH TNP FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH 14.0 FT.
 ELEV. 912.8 FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT. ELEV.	FT.	FT.								
-										Continued
42.5 - 884.3										Limestone - dark gray - with trace shale seams - moderately fractured and moderately weathered, heavily weathered zone 41.5 to 42.7 Feet - no discernible dip angle - evidence of water transport at 41.5 to 42.7 and 42.0 to 42.7 feet
45.0 - 881.8										Run #5 (42.7 to 47.7 Feet) REC - 100% RQD - 100%
47.5 - 879.3										Limestone - dark gray - with trace shale seams - moderately fractured and moderately weathered, heavily weathered zone 43.0 to 45.0 Feet - no discernible dip angle
50.0 - 876.8										Run #6 (47.7 to 50.0 Feet) REC - 100% RQD - 100%
52.5 - 874.3										Limestone - dark gray - with trace shale seams - slightly fractured and slightly weathered - no discernible dip angle
55.0 - 871.8										Coring Terminated at 50.0 Feet
57.5 - 869.3										
60.0 - 866.8										

REMARKS: Lost 1/2 of core water
Black denotes location of voids



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-34**
 SHEET 1 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-34 DRY ON COMPLETION ? Yes

DATE January 13, 2016 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 17.5 FT. ELEV. 909.0 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 17.5 FT. ELEV. 909.0 FT.
 BEGAN CORING DEPTH 18.0 FT. ELEV. 908.5 FT.
 FOOTAGE CORED (LF) 32.0 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 876.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH DRY FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH TNP FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL	
0.0										Asphalt (5.0 Inches) - Concrete (9.0 Inches)
2.5	924.0									
5.0	921.5									
7.5	919.0									
10.0	916.5									
12.5	914.0									
15.0	911.5									
17.5	909.0									Auger Refusal at 17.5 Feet Begin Coring at 18.0 Feet
20.0	906.5									Run #1 (18.0 to 21.6 Feet) REC - 33% RQD - 33% Limestone - dark gray ...

(continued)

REMARKS: Lost 1/2 of core water
Bulk Sample collected 0 to 10 feet



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-34**
 SHEET 2 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-34 DRY ON COMPLETION ? Yes

DATE January 13, 2016 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 17.5 FT. ELEV. 909.0 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 17.5 FT. ELEV. 909.0 FT.
 BEGAN CORING DEPTH 18.0 FT. ELEV. 908.5 FT.
 FOOTAGE CORED (LF) 32.0 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 876.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH DRY FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH TNP FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FROM	TO			N-Value	Qu	LL	PI	%M	
FT.	FT.	FT.								
-										Continued
22.5										Limestone - dark gray - heavily fractured and heavily weathered - no discernible dip angle - evidence of water transport at 20 feet - "in and out" of voids
										Run #2 (21.6 to 26.6 Feet) REC - 56% RQD - 34%
25.0										Limestone - dark gray - moderately weathered and moderately fractured, heavily fractured zone 21.6 to 23 feet - no discernible dip angle - appears to be coring along side of pinnacle
27.5										Run #3 (26.6 to 31.6 Feet) REC - 0% RQD - 0%
30.0										VOID 26.8 to 33.1 Feet
32.5										Run #3 (31.6 to 36.6 Feet) REC - 40% RQD - 20%
35.0										Limestone - dark gray - with shale seams - heavily fractured and heavily weathered - no discernible dip angle - appears to be coring along side of void
37.5										Run #4 (36.6 to 42.4 Feet) REC - 76% RQD - 74%
40.0										Limestone and Dolomite - dark gray and light gray - with shale seams - moderately fractured and slightly weathered, heavily weathered zone at 40.0 Feet - no discernible dip angle

(continued)

REMARKS: Lost 1/2 of core water



Outfall 200 Mercury Treatment Facility
Oak Ridge, Tennessee
 GEOServices Project # 21-15652

LOG OF BORING **A-34**
 SHEET 3 OF 3

DRILLER Shannon Snow
 ON-SITE REP. Matt Bible

BORING NO. / LOCATION A-34 DRY ON COMPLETION ? Yes

DATE January 13, 2016 SURFACE ELEV. 926.5 FT.
 REFUSAL: Yes DEPTH 17.5 FT. ELEV. 909.0 FT.
 SAMPLED 50.0 FT. 15.2 M
 TOP OF ROCK DEPTH 17.5 FT. ELEV. 909.0 FT.
 BEGAN CORING DEPTH 18.0 FT. ELEV. 908.5 FT.
 FOOTAGE CORED (LF) 32.0 FT.
 BOTTOM OF HOLE DEPTH 50.0 FT. ELEV. 876.5 FT.

WATER LEVEL DATA (IF APPLICABLE)
 COMPLETION: DEPTH DRY FT.
 ELEV. FT.
 AFTER 1 HRS: DEPTH TNP FT.
 ELEV. FT.
 AFTER 1 DAY: DEPTH TNP FT.
 ELEV. FT.

BORING ADVANCED BY: _____ POWER AUGERING X PROPOSED FINAL GRADE ELEVATION: _____ FT.

STRATUM DEPTH	SAMPLE DEPTH		SAMPLE OR RUN NO.	SAMPLE TYPE	FIELD RESULTS		LABORATORY RESULTS			STRATUM DESCRIPTION
	FT.	ELEV.			FROM FT.	TO FT.	N-Value	Qu	LL	
-										Continued
42.5	884.0									Limestone and Dolomite - dark gray and light gray - with shale seams - moderately fractured and slightly weathered, moderately weathered zone at 47.0 Feet - no discernible dip angle
										Run #6 (42.4 to 47.4 Feet) REC - 100% RQD - 98%
45.0	881.5									Limestone and Dolomite - dark gray and light gray - with shale seams - moderately fractured and slightly weathered, moderately weathered zone at 47.0 Feet - no discernible dip angle
										Run #7 (47.4 to 50.0 Feet) REC - 100% RQD - 98%
47.5	879.0									Limestone and Dolomite - dark gray and light gray - with shale seams - moderately fractured and slightly weathered - no discernible dip angle
50.0	876.5									Coring Terminated at 50.0 Feet
52.5	874.0									
55.0	871.5									
57.5	869.0									
60.0	866.5									

REMARKS: Lost 1/2 of core water

GENERAL NOTES

FINE AND COARSE GRAINED SOIL PROPERTIES

PARTICLE SIZE

BOULDERS:	GREATER THAN 300 mm
COBBLES:	75 mm to 300 mm
GRAVEL:	4.74 mm to 75 mm
COARSE SAND:	2 mm to 4.74 mm
MEDIUM SAND:	0.425 mm to 2 mm
FINE SAND:	0.075 mm to 0.425 mm
SILTS & CLAYS:	LESS THAN 0.075 mm

COARSE GRAINED SOILS (SANDS & GRAVELS)

N-VALUE	RELATIVE DENSITY
0 - 4	VERY LOOSE
5 - 10	LOOSE
11 - 30	MEDIUM DENSE
31 - 50	DENSE
OVER 50	VERY DENSE

FINE GRAINED SOILS (SILTS & CLAYS)

N-VALUE	CONSISTENCY	Qu, PSF
0 - 2	VERY SOFT	0 - 500
3 - 4	SOFT	500 - 1000
5 - 8	FIRM	1000 - 2000
9 - 15	STIFF	2000 - 4000
16 - 30	VERY STIFF	4000 - 8000
OVER 31	HARD	8000 +

STANDARD PENETRATION TEST (ASTM D1586)

THE STANDARD PENETRATION TEST AS DEFINED BY ASTM D1586 IS A METHOD TO OBTAIN A DISTURBED SOIL SAMPLE FOR EXAMINATION AND TESTING AND TO OBTAIN RELATIVE DENSITY AND CONSISTENCY INFORMATION. THE 1.4 INCH I.D./2.0 INCH O.D. SAMPLER IS DRIVEN 3-SIX INCH INCREMENTS WITH A 140 LB. HAMMER FALLING 30 INCHES. THE BLOW COUNTS REQUIRED TO DRIVE THE SAMPLER THE FINAL 2 INCREMENTS ARE ADDED TOGETHER AND DESIGNATED THE N-VALUE. AT TIMES, THE SAMPLER CAN NOT BE DRIVEN THE FULL 18 INCHES. THE FOLLOWING REPRESENTS OUR INTERPRETATION OF THE STANDARD PENETRATION TEST WITH VARIATIONS.

BLOWS/FOOT (N-VALUE)

DESCRIPTION

25.....25 BLOWS DROVE SAMPLER 12" AFTER INITIAL 6" SEATING
75/10".....75 BLOWS DROVE SAMPLER 10" AFTER INITIAL 6" SEATING
50/PR.....PENETRATION REFUSAL OF SAMPLER AFTER INITIAL 6" SEATING

SAMPLING SYMBOLS

ST:	UNDISTURBED SAMPLE
SS:	SPLIT SPOON SAMPLE
CORE:	ROCK CORE SAMPLE
AU:	AUGER OR BAG SAMPLE

SOIL PROPERTY SYMBOLS

N:	STANDARD PENETRATION, BPF
M:	MOISTURE CONTENT %
LL:	LIQUID LIMIT %
PI:	PLASTICITY INDEX %
Qp:	POCKET PENETROMETER VALUE, TSF
Qu:	UNCONFINED COMPRESSIVE STRENGTH, TSF
DUW:	DRY UNIT WEIGHT, PCF

ROCK PROPERTIES

ROCK HARDNESS

ROCK QUALITY DESIGNATION (RQD)

PERCENT	QUALITY
90 TO 100	EXCELLENT
75 TO 90	GOOD
50 TO 75	FAIR
25 TO 50	POOR
0 TO 25	VERY POOR

VERY SOFT:	ROCK DISINTEGRATES OR EASILY COMPRESSES TO TOUCH: CAN BE HARD TO VERY HARD SOIL.
SOFT:	ROCK IS COHERANT BUT BREAKS EASILY TO THUMB PRESSURE AT SHARP EDGES AND CRUMBLES WITH FIRM HAND PRESSURE.
MODERATELY HARD:	SMALL PIECES CAN BE BROKEN OFF ALONG SHARP EDGES BY CONSIDERABLE HARD THUMB PRESSURE: CAN BE BROKEN BY LIGHT HAMMER BLOWS.
HARD:	ROCK CAN NOT BE BROKEN BY THUMB PRESSURE, BUT CAN BE BROKEN BY MODERATE HAMMER BLOWS.
VERY HARD:	ROCK CAN BE BROKEN BY HEAVY HAMMER BLOWS.

APPENDIX B

Soil Laboratory Data

TABLE II-1

Moisture-Density Test Results
 Outfall 200 Mercury Treatment Facility
 GEOServices Project No. - 21-15652

Boring Number	Sample Depth (Feet)	Sample Type	Soil Strata	Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Natural Moisture Content (%)	Moist Unit Weight (pcf)	Atterberg Limits			Percent Finer Than No. 200 Sieve	USCS Classification
								Liquid Limit	Plastic Limit	Plasticity Index		
A-01	7.5-9.5'	SPT	FILL			26.1%					82.1	
	17.5-19.5'	SPT	RESIDUUM			37.5%		53	21	32		CH ⁽³⁾
A-03	12.5-14.5'	SPT	ALLUVIUM			26.1%		53	21	32	86.2	CH
A-04	5.0-7.0'	SPT	FILL			15.7%		34	17	17		CL ⁽³⁾
A-05	2.5-4.5'	SPT	FILL			16.7%					32.9	SC
A-06	2.5-4.5'	SPT	FILL			17.1%		32	18	14		CL ⁽³⁾
	5.0-7.0'	SPT	FILL			17.3%						
	12.5-14.5'	SPT	ALLUVIUM			43.0%		64	25	39		CH ⁽³⁾
	17.5-19.5'	SPT	ALLUVIUM			43.6%					86.2	
A-07	12.5-14.5'	SPT	ALLUVIUM			29.1%		51	21	30		CH ⁽³⁾
	17.5-19.5'	SPT	ALLUVIUM			44.4%					96	
A-08	5.0-7.0'	SPT	FILL			18.6%		35	18	17		CL ⁽³⁾
	7.5-9.5'	SPT	FILL			15.5%					40.7	SC
A-14	2.5-4.5'	SPT	RESIDUUM			23.5%						
A-18	5.0-7.0'	SPT	ALLUVIUM			21.8%		26	15	11		CL ⁽³⁾
	7.5-9.5'	SPT	ALLUVIUM			20.3%					76.4	
A-19	7.5-9.5'	SPT	FILL			12.5%		25	15	10		CL ⁽³⁾
	12.5-14.5'	SPT	FILL			25.1%					82	
A-20	17.5-19.5'	SPT	ALLUVIUM			25.8%		26	20	6	50.6	CL-ML
A-21	2.5-4.5'	SPT	FILL			3.7%						
A-22	12.5-14.5'	SPT	RESIDUUM			37.6%					96.2	
A-23	5.0-7.0'	SPT	FILL			17.0%		32	16	16		CL ⁽³⁾
	12.5-14.5'	SPT	ALLUVIUM			32.7%						
A-24	5.0-7.0'	SPT	FILL			14.2%						
	7.5-9.5'	SPT	FILL			21.0%		28	16	12		CL ⁽³⁾
	17.5-19.5'	SPT	ALLUVIUM			21.9%						
A-25	7.5-9.5'	SPT	FILL			35.5%		52	21	31		CH ⁽³⁾
	12.5-14.5'	SPT	ALLUVIUM			22.4%		37	17	20		CL ⁽³⁾
	17.5-19.5'	SPT	ALLUVIUM			46.6%					92.6	
A-26	12.5-14.5'	SPT	RESIDUUM			29.8%		66	25	41	88.5	CH
A-29	8.0-10.0'	SPT	FILL			24.5%		36	16	20	87.6	CL
	17.5-19.5'	SPT	FILL			32.7%						
A-30	7.5-9.5'	SPT	ALLUVIUM			35.5%		47	19	28		CL ⁽³⁾
	12.5-14.5'	SPT	ALLUVIUM			20.7%					88.1	
A-04B	0.0-10.0'	BULK #1	N/A	114.3	13.1	20.1%		34	15	19	66.4	CL

**Table II-2
 CBR Test Results
 Outfall 200 Mercury Treatment Facility
 GEOServices Project No. -**

21-15652

Sample Identification	Depth (Feet)	Geologic Origin	Unified Soil Classification	Standard Proctor Maximum Dry Density (pcf)	Standard Proctor Optimum Moisture Content (%)	As Molded Percent Compaction (%)	As Molded Relative Moisture Content*	CBR at 0.1 inch	Swell (%)
A-04B	0-10	FILL/ALLUVIUM	Lean Clay	114.3	13.1	98.0	0	3.4	1.8
A-34	0-10	FILL/ALLUVIUM	Lean Clay	114.2	13.2	100.0	0.2	4.5	1.2
A-34	0-10	FILL/ALLUVIUM	Lean Clay	114.2	13.2	98.0	0.4	3.9	1.7
A-34	0-10	FILL/ALLUVIUM	Lean Clay	114.2	13.2	95.0	0.4	2.7	1.8
A-19 to A-31	0-20+	NA	NA	111.1	15.7	100.0	-2.4	2.1	0.9
A-19 to A-31	0-20+	NA	NA	111.1	15.7	100.0	0	2.6	1.2
A-19 to A-31	0-20+	NA	NA	111.1	15.7	100.0	0.3	3.4	1.6

*Relative to optimum moisture content (OMC).

**Value interpolated to 98% standard Proctor maximum dry density at optimum moisture content.

Test Methods:

Liquid Limit	ASTM D 4318
Plasticity Index	ASTM D 4318
Unified Soil Classification	ASTM D 2487
Standard Proctor Compaction	ASTM D 698
CBR	ASTM D 1883

Table II-3
Soil Strength Test Results
Outfall 200 Mercury Treatment Facility
GEOServices Project No. - 21-15652 1 of 2

Boring Number	Sample Depth (Feet)	Description	Triaxial Compression (CU)				Triaxial Compression (UU)		Unconfined Compressive Strength (ksf)
			Total		Effective		Total		
			Cohesion, C (ksf)	Friction Angle, ϕ (degrees)	Cohesion, C' (ksf)	Friction Angle, ϕ' (degrees)	Cohesion, C (ksf)	Friction Angle, ϕ (degrees)	
A-01	5.0-7.0'	FILL	--	--	--	--	--	--	3.26
A-03	5.0-7.0'	FILL	--	--	--	--	--	--	2.83
A-03	10.0-12.0'	ALLUVIUM	0.59	20.70	0.42	27.90	--	--	--
A-04B	5.0-7.0'	FILL	--	--	--	--	--	--	3.03
A-04B	7.0-9.0'	FILL	--	--	--	--	--	--	3.05
A-06	7.0-9.0'	FILL	0.81	22.50	0.60	26.40	--	--	--
A-07	5.0-7.0'	FILL	--	--	--	--	--	--	2.91

⁽¹⁾ - Description based on visual-manual examination

Table II-3
Soil Strength Test Results
Outfall 200 Mercury Treatment Facility
GEOServices Project No. - 21-15652 2 of 2

Boring Number	Sample Depth (Feet)	Description	Triaxial Compression (CU)				Triaxial Compression (UU)		Unconfined Compressive Strength (ksf)
			Total		Effective		Total		
			Cohesion, C (ksf)	Friction Angle, ϕ (degrees)	Cohesion, C' (ksf)	Friction Angle, ϕ' (degrees)	Cohesion, C (ksf)	Friction Angle, ϕ (degrees)	
A-20	9.0-11.0'	FILL	0.41	20.40	0.32	26.80	--	--	--
A-21	4.5-6.5'	FILL	--	--	--	--	--	--	2.60
A-22	5.0-7.0'	FILL	--	--	--	--	--	--	2.35
A-22	7.0-9.0'	RESIDUUM	--	--	--	--	--	--	3.81
A-25	15.0-17.0'	ALLUVIUM	--	--	--	--	--	--	2.35
A-28	10.0-12.0'	FILL/ALLUVIUM	--	--	--	--	--	--	2.37
A-29	6.0-8.0'	FILL	--	--	--	--	--	--	2.16

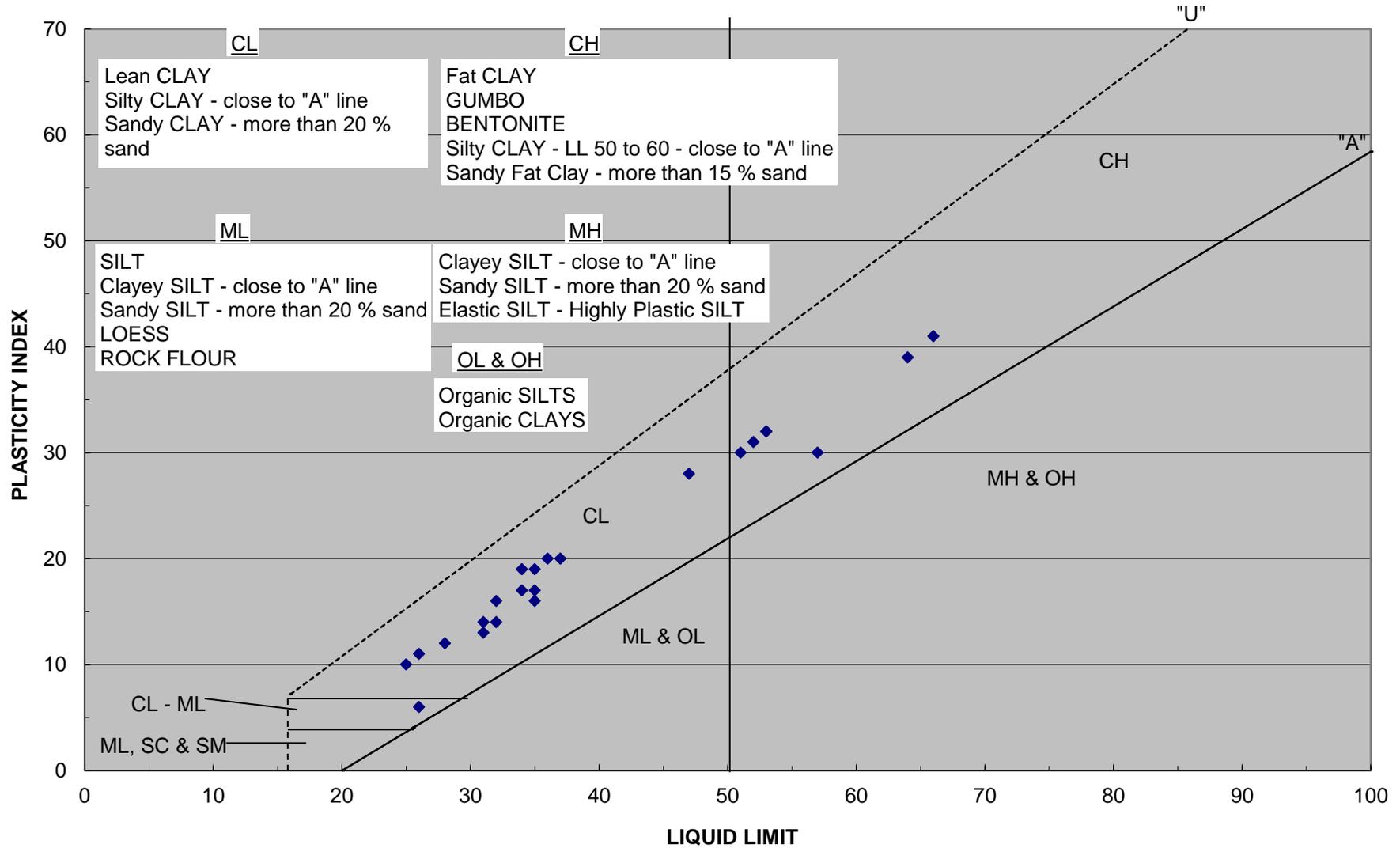
⁽¹⁾ - Description based on visual-manual examination

TABLE II - 4**Consolidation Laboratory Test Results****Outfall 200 Mercury Treatment Facility****GEOServices Project No. - 21-15652**

Boring Number	Sample Depth (Feet)	Sample Type	USCS Classification	Initial Moisture Content (%)	Initial Dry Density (pcf)	Initial Void Ratio e_o	"Laboratory" Compression Index, C_c	Preconsolidation Pressure, P_c (tsf)
A-07	7.0-9.0'	FILL		17.4	103.0	0.576	0.19	1.92
A-08	10.0-12.0'	RESIDUUM	CH	27.9	93.6	0.772	0.22	3.81
A-20	9.0-11.0'	FILL		19.2	106.5	0.554	0.13	2.80
A-22	5.0-7.0'	FILL		20.6	106.4	0.555	0.15	5.75
A-22	7.0-9.0'	RESIDUUM		20.7	105.6	0.588	0.19	5.96
A-25	15.0-17.0'	ALLUVIUM		19.6	104.2	0.557	0.15	4.91
A-28	10.0-12.0'	FILL/ALLUVIUM		22.3	102.3	0.586	0.17	3.28
A-29	6.0-8.0'	FILL		22.0	103.5	0.599	0.15	3.10

UD = Undisturbed Shelby Tube

UNIFIED SOIL CLASSIFICATION SYSTEM - FINES



Job No: 21-12352

Job Name: Y-12 Outfall 200 Mercury Treatment Fac.

Sample No: Boring A-04B / Geotechnical Bulk 1

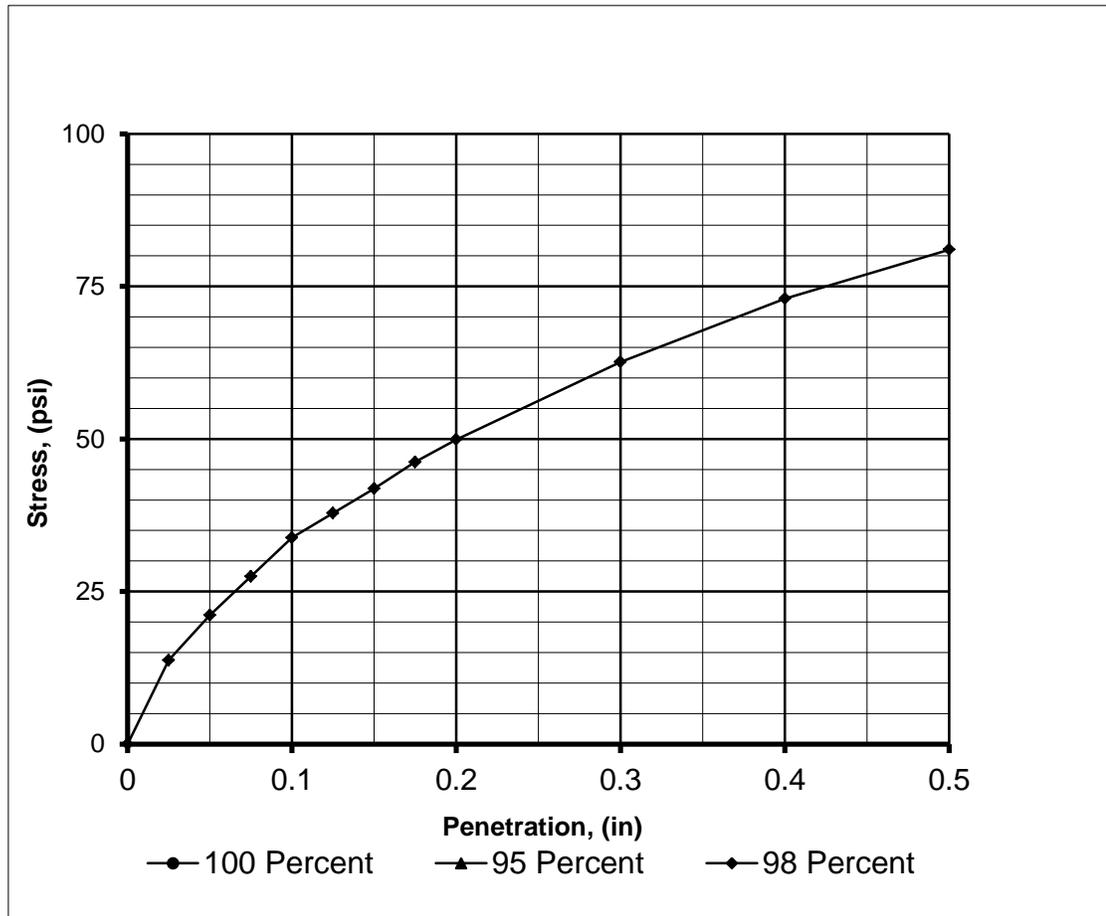
Sample Description: Light Tan Silty Clay with Rock Fragments

98 Percent Compaction

Wet Density	_____	pcf
Dry Density	_____	pcf
Water Content	_____	
Compaction	_____	
Swell	_____	
CBR @ .1"	_____	
CBR @ .2"	_____	

Wet Density	125.9	pcf
Dry Density	111.3	pcf
Water Content	13.0%	
Compaction	97.4%	
Swell	1.81%	
CBR @ .1"	3.4	
CBR @ .2"	3.3	

Wet Density	_____	pcf
Dry Density	_____	pcf
Water Content	_____	
Compaction	_____	
Swell	_____	
CBR @ .1"	_____	
CBR @ .2"	_____	





CALIFORNIA BEARING RATIO AASHTO T193

Job Name: Y-12 Outfall 200 Mercury Treatment Fac.

Job No: 21-15652

Sample No: Boring A-04B / Geotechnical Bulk 1

Sample Description: Light Tan Silty Clay with Rock Fragments

100 Percent Compaction

Wet Density _____ pcf
 Water Content _____
 Dry Density _____
 % Compaction _____
 CBR @ .1" _____

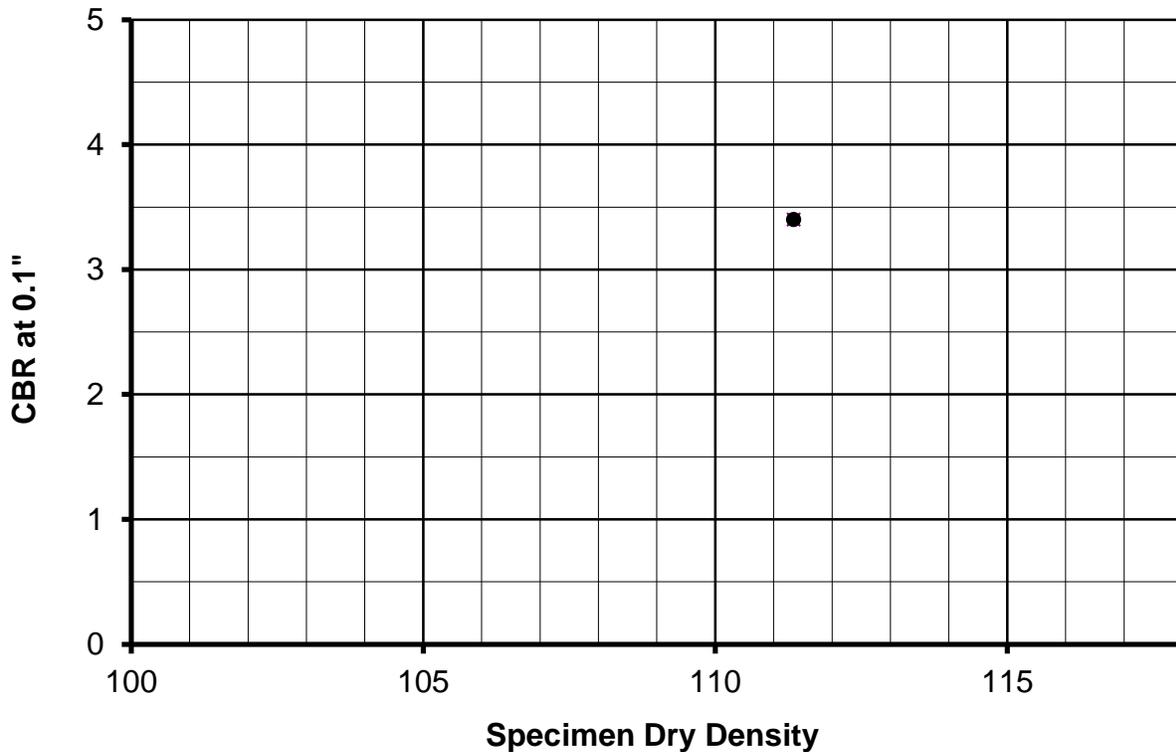
98 Percent Compaction

Wet Density 125.9 pcf
 Water Content 13.0%
 Dry Density 111.3
 % Compaction 97.4%
 CBR @ .1" 3.4

95 Percent Compaction

Wet Density _____ pcf
 Water Content _____
 Dry Density _____
 % Compaction _____
 CBR @ .1" _____

CBR vs. Dry Density



Job No: 21-12352

Job Name: Y-12 Outfall 200 Mercury Treatment

Sample No: Boring #24-Bulk Sample

Sample Description: Light Tan Silty Clay with Rock Fragments

100 Percent Compaction

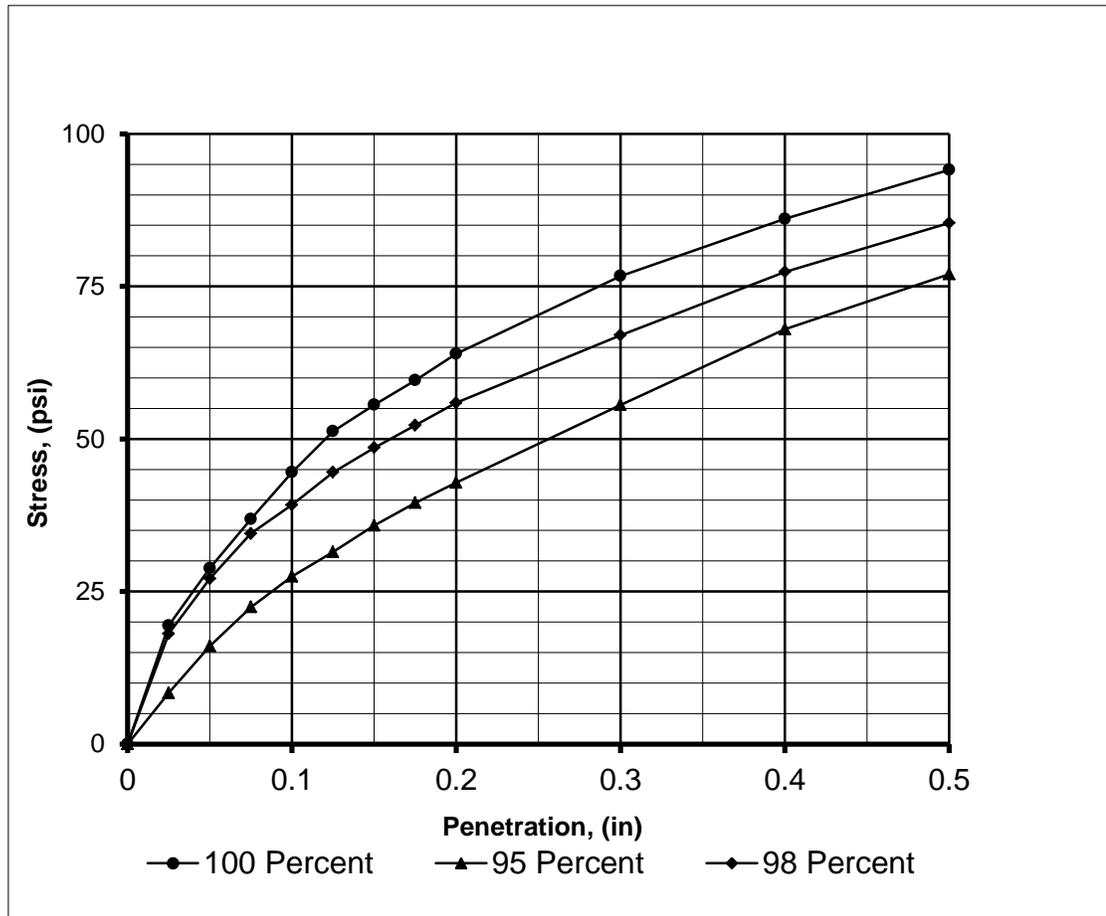
Wet Density	129.8	pcf
Dry Density	114.4	pcf
Water Content	13.4%	
Compaction	100.2%	
Swell	1.24%	
CBR @ .1"	4.5	
CBR @ .2"	4.3	

98 Percent Compaction

Wet Density	125.2	pcf
Dry Density	110.1	pcf
Water Content	13.6%	
Compaction	96.4%	
Swell	1.68%	
CBR @ .1"	3.9	
CBR @ .2"	3.7	

95 Percent Compaction

Wet Density	121.8	pcf
Dry Density	107.1	pcf
Water Content	13.6%	
Compaction	93.8%	
Swell	1.79%	
CBR @ .1"	2.7	
CBR @ .2"	2.9	



Job Name: Y-12 Outfall 200 Mercury Treatment

Job No: 21-15652

Sample No: Boring # A-34 /Bulk# 2 Sample

Sample Description: Light Tan Silty Clay with Rock Fragments

100 Percent Compaction

Wet Density	129.8	pcf
Water Content	13.4%	
Dry Density	114.4	
% Compaction	100.2%	
CBR @ .1"	4.5	

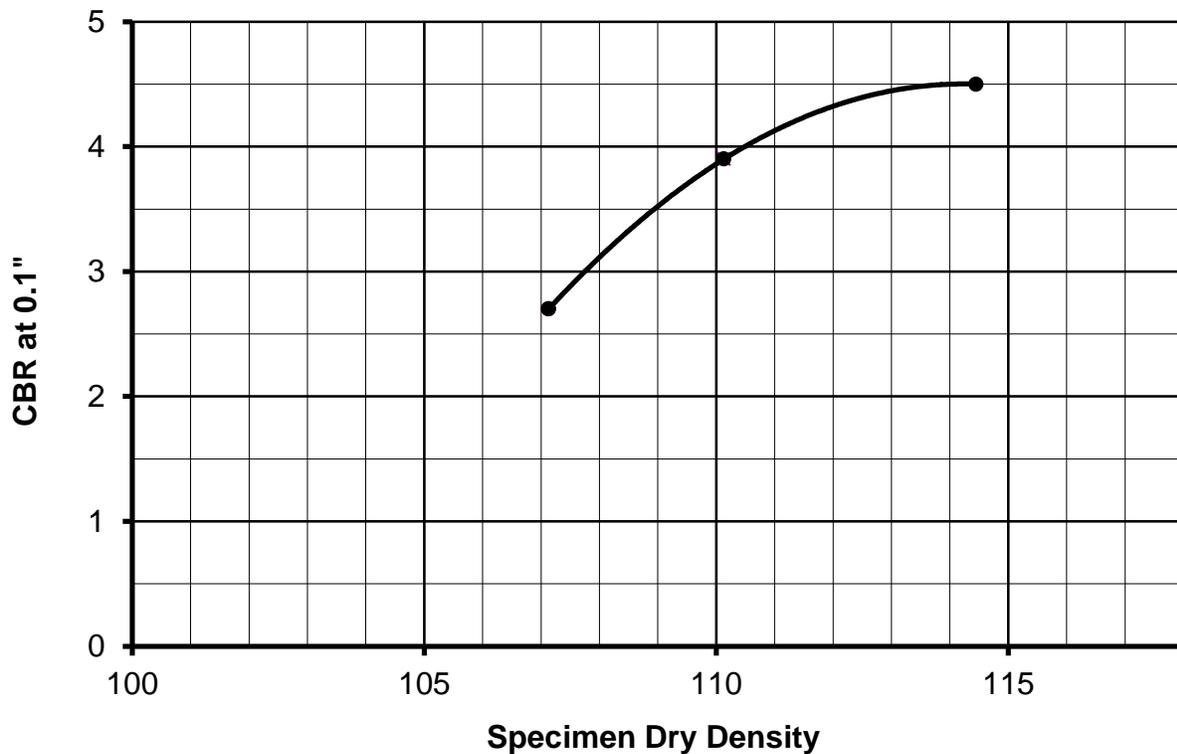
98 Percent Compaction

Wet Density	125.2	pcf
Water Content	13.6%	
Dry Density	110.1	
% Compaction	96.4%	
CBR @ .1"	3.9	

95 Percent Compaction

Wet Density	121.8	pcf
Water Content	13.6%	
Dry Density	107.1	
% Compaction	93.8%	
CBR @ .1"	2.7	

CBR vs. Dry Density



Job No: 21-12352

Job Name: Y-12 Outfall 200 Mercury Treatment

Sample No: MTF Multiple / Geotechnical Bulk 3

Sample Description: Light Tan Silty Clay with Rock Fragments

2% Below Optimum

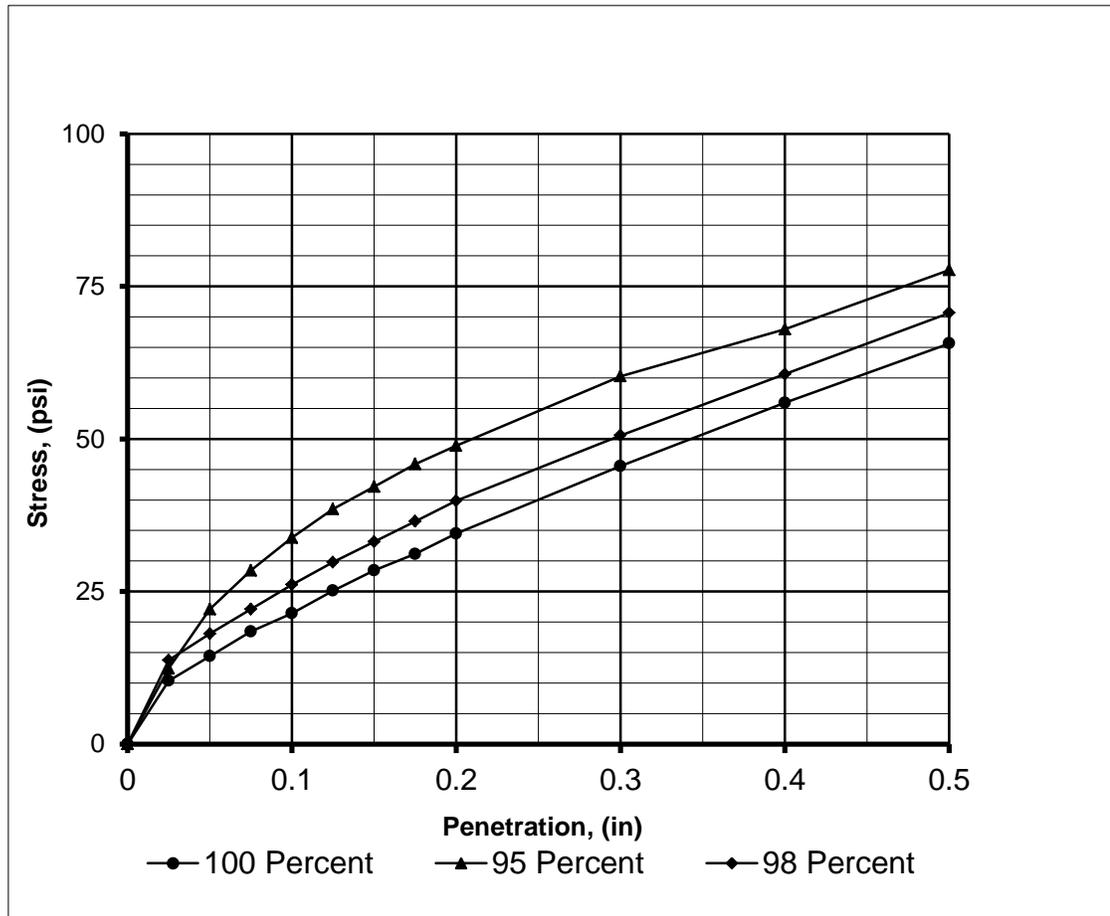
Wet Density	124.4	pcf
Dry Density	109.8	pcf
Water Content	13.3%	
Compaction	98.9%	
Swell	0.87%	
CBR @ .1"	2.1	
CBR @ .2"	2.3	

AT Optimum

Wet Density	127.0	pcf
Dry Density	109.7	pcf
Water Content	15.7%	
Compaction	98.8%	
Swell	1.20%	
CBR @ .1"	2.6	
CBR @ .2"	2.7	

2% Above Optimum

Wet Density	126.4	pcf
Dry Density	108.9	pcf
Water Content	16.0%	
Compaction	98.0%	
Swell	1.55%	
CBR @ .1"	3.4	
CBR @ .2"	3.3	



Job Name: Y-12 Outfall 200 Mercury Treatment

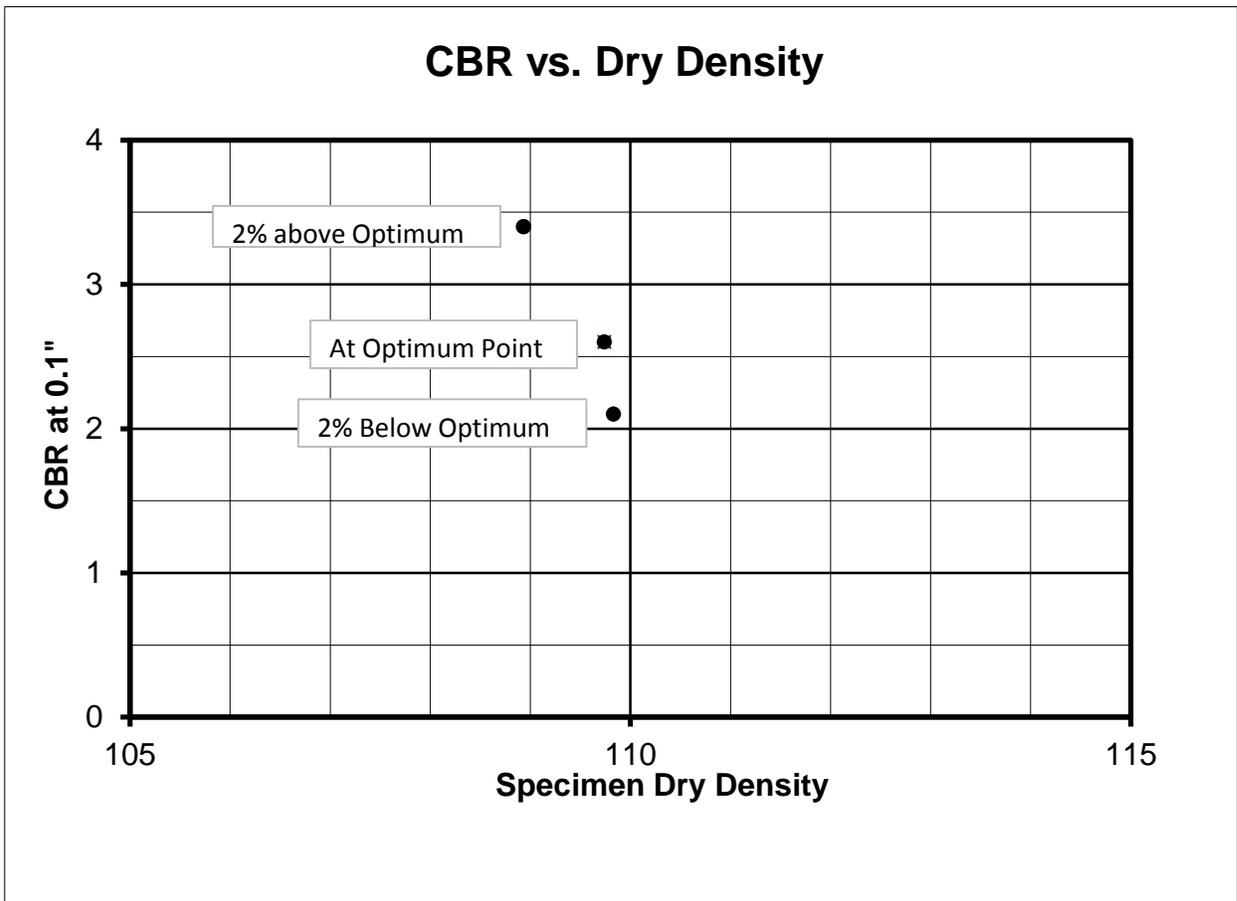
Job No: 21-15652

Sample No: MTF Multiple / Geotechnical Bulk 3

Sample Description: Light Tan Silty Clay with Rock Fragments

2% Below Optimum		At Optimum		2% Above Optimum	
Wet Density	124.4 pcf	Wet Density	127.0 pcf	Wet Density	126.4 pcf
Water Content	13.3%	Water Content	15.7%	Water Content	16.0%
Dry Density	109.8	Dry Density	109.7	Dry Density	108.9
% Compaction	98.9%	% Compaction	98.8%	% Compaction	98.0%
CBR @ .1"	2.1	CBR @ .1"	2.6	CBR @ .1"	3.4

Note: the points being in reverse order may be related to saturation of soils at time of molding

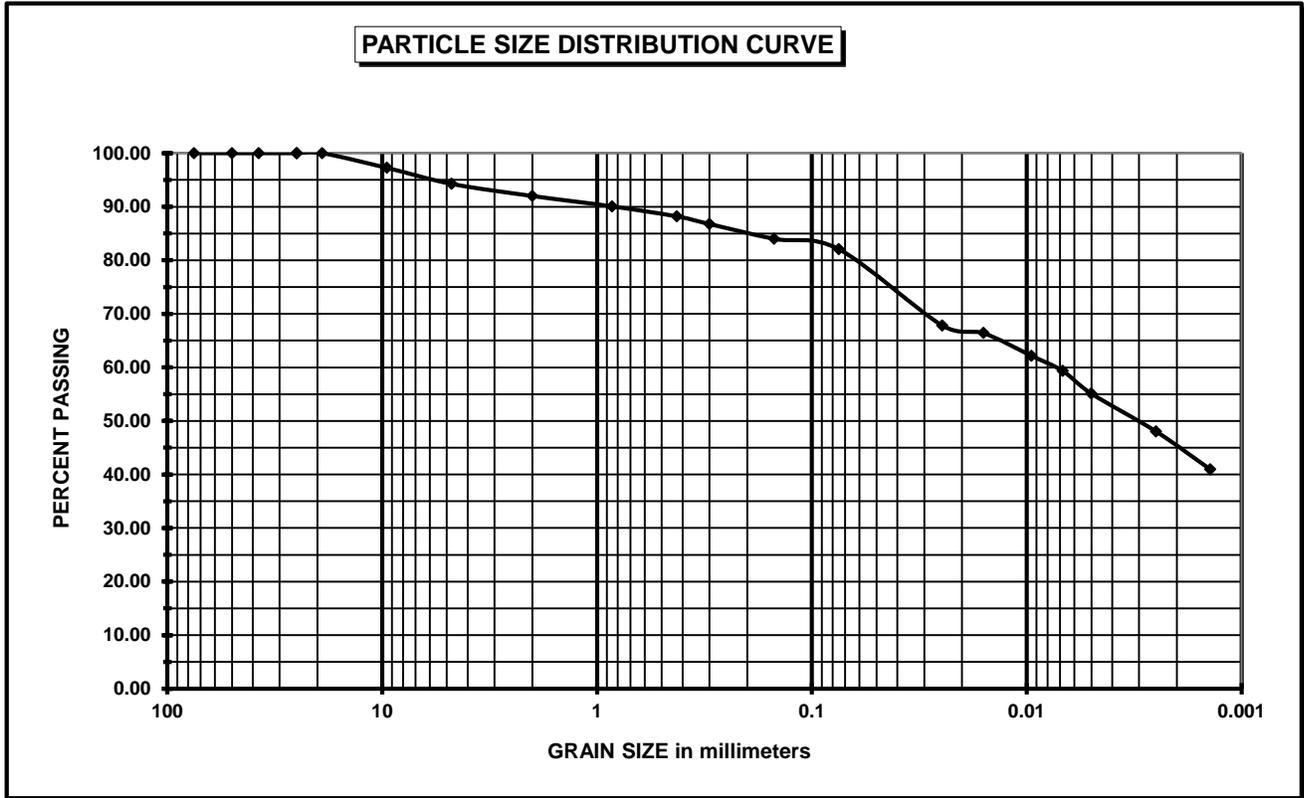


Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-01 / Sample # SS-2

Sample Depth: 7.5-9.5'

Sample Description: Brown Clay with Sand

USCS: TNP

GRAIN SIZE DATA	
% GRAVEL	5.7
% SAND	12.2
% SILT	27.0
% CLAY	55.1

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

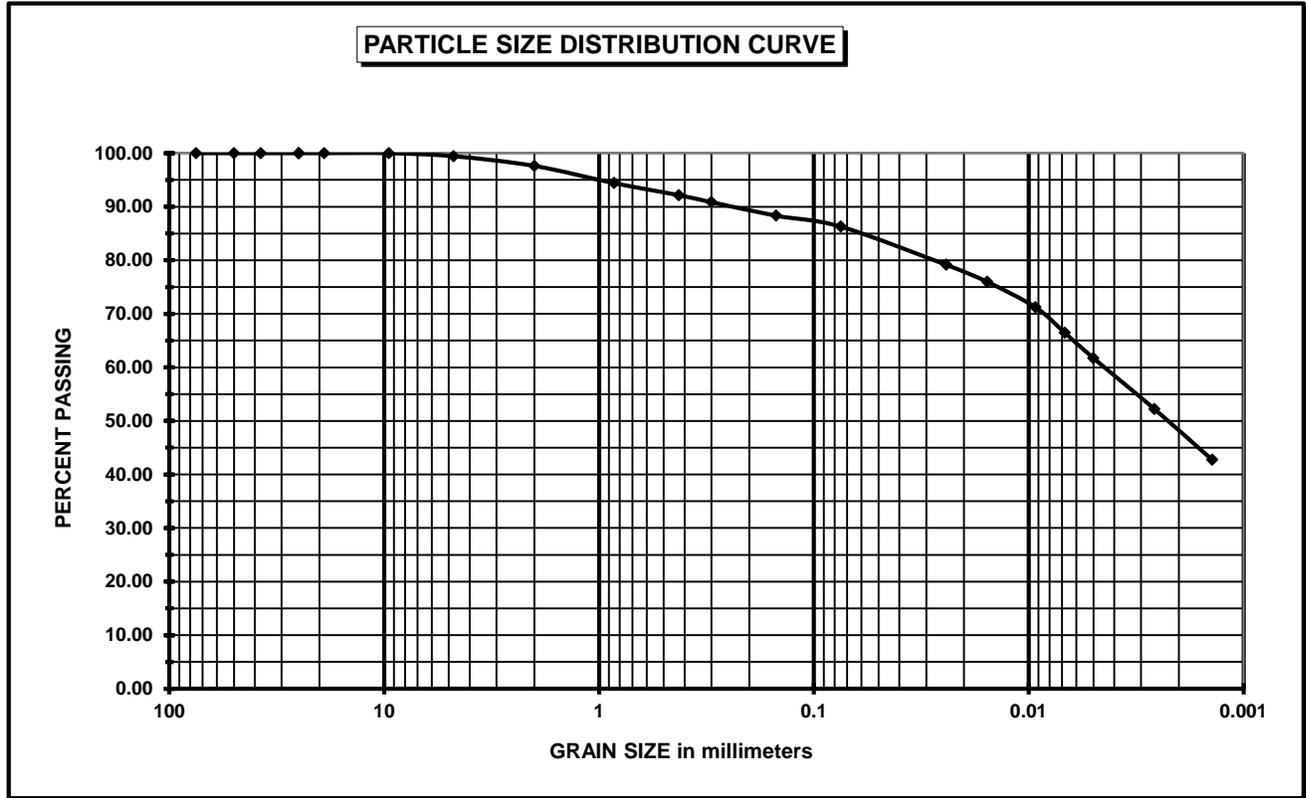
ATTERBERG LIMIT DATA	
Liquid Limit	Test Not Performed
Plastic Limit	Test Not Performed
Plasticity Index	Test Not Performed
Fine Fraction Soil Type	Test Not Performed

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-03 / Sample # SS-3

Sample Depth: 12.5-14.5'

Sample Description: Orangish Brown and Brown Clay

USCS: CH

GRAIN SIZE DATA	
% GRAVEL	0.6
% SAND	13.2
% SILT	24.5
% CLAY	61.7

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

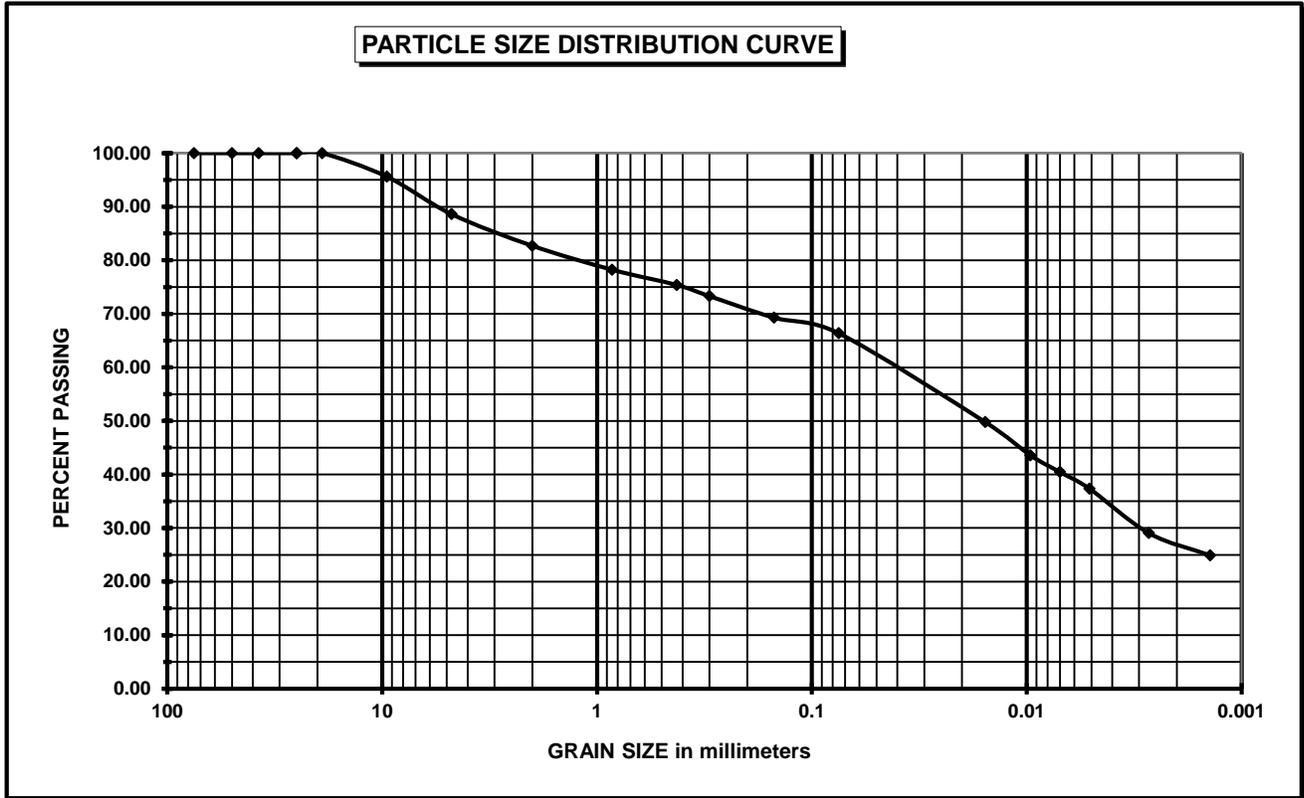
ATTERBERG LIMIT DATA	
Liquid Limit	53
Plastic Limit	21
Plasticity Index	32
Fine Fraction Soil Type	CH

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-04B / Bulk Sample

Sample Depth: 0.0-10.0'

Sample Description: Brown Sandy Clay

USCS: CL

GRAIN SIZE DATA	
% GRAVEL	11.4
% SAND	22.2
% SILT	29.3
% CLAY	37.1

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

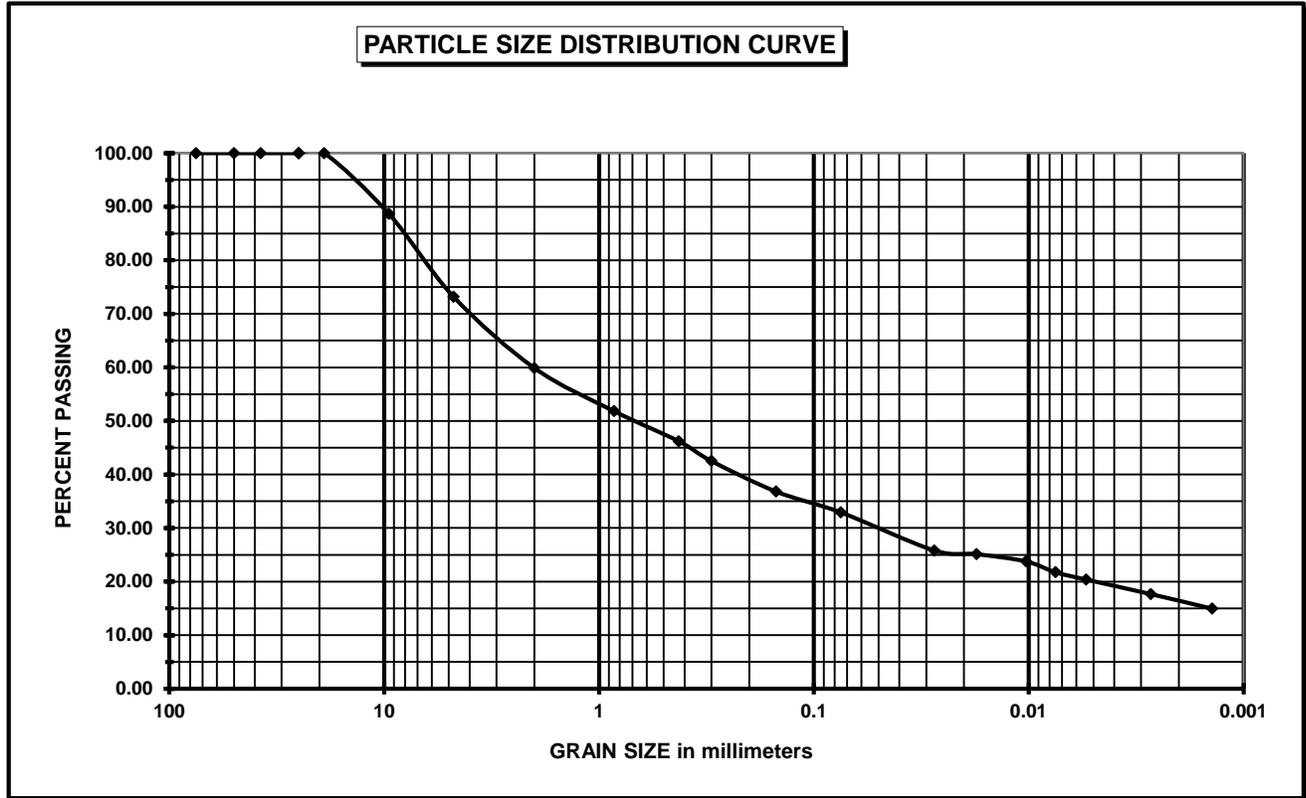
ATTERBERG LIMIT DATA	
Liquid Limit	34
Plastic Limit	15
Plasticity Index	19
Fine Fraction Soil Type	CL

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-05 / Sample # SS-1

Sample Depth: 2.5-4.5'

Sample Description: Dark Brown Clayey Sand with Gravel

USCS: TNP

GRAIN SIZE DATA	
% GRAVEL	26.8
% SAND	40.3
% SILT	12.8
% CLAY	20.1

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

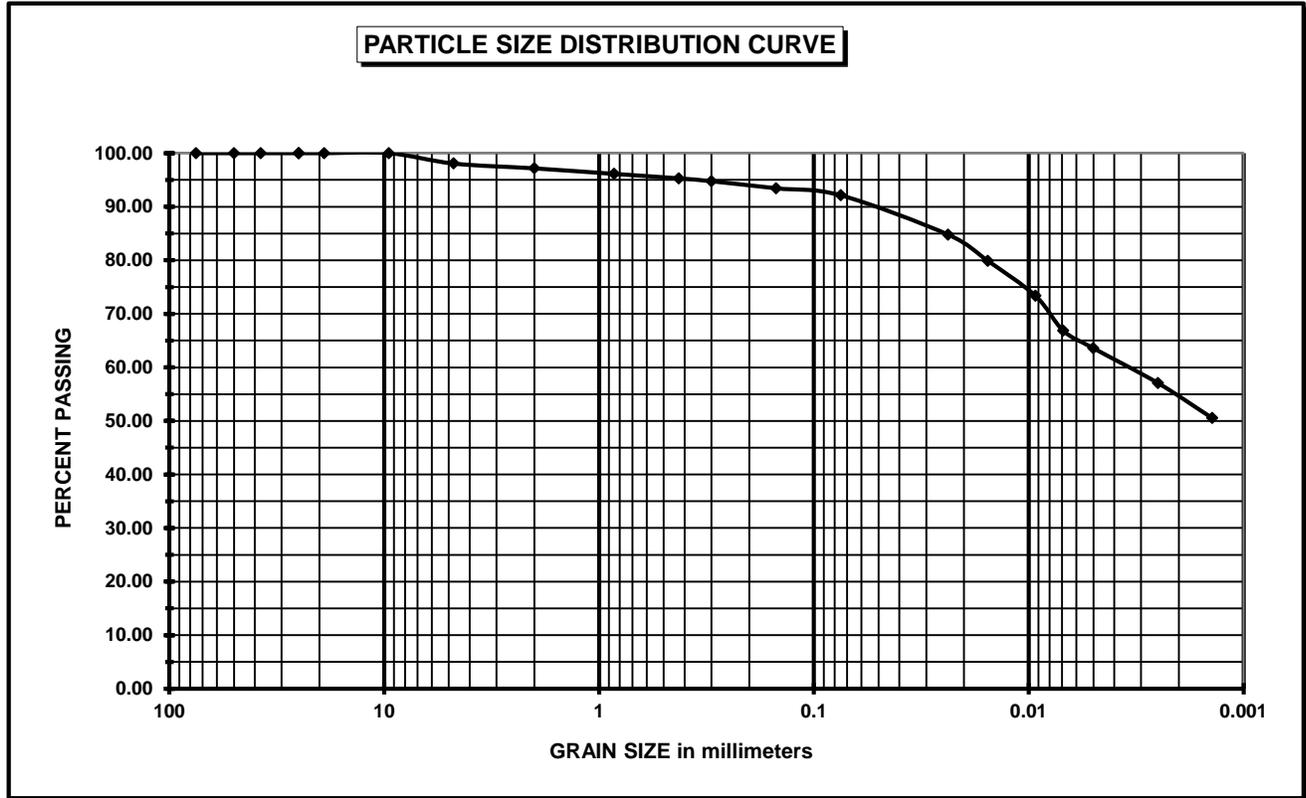
ATTERBERG LIMIT DATA	
Liquid Limit	Test Not Performed
Plastic Limit	Test Not Performed
Plasticity Index	Test Not Performed
Fine Fraction Soil Type	Test Not Performed

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-06 / Sample # SS-4

Sample Depth: 17.5-19.5'

Sample Description: Brown and Orangish Brown Clay

USCS: TNP

GRAIN SIZE DATA	
% GRAVEL	1.9
% SAND	5.9
% SILT	28.6
% CLAY	63.6

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

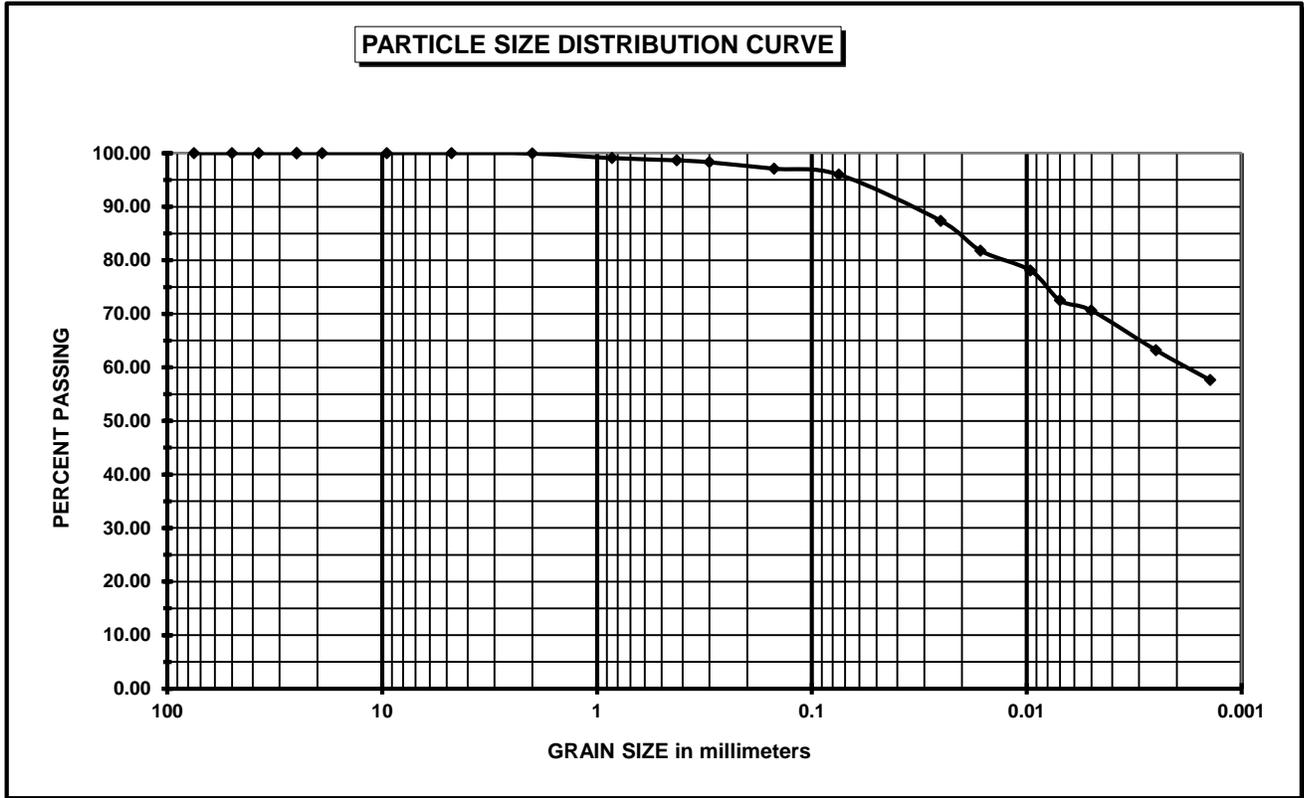
ATTERBERG LIMIT DATA	
Liquid Limit	Test Not Performed
Plastic Limit	Test Not Performed
Plasticity Index	Test Not Performed
Fine Fraction Soil Type	Test Not Performed

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-07 / Sample # SS-3

Sample Depth: 17.5-19.5'

Sample Description: Brown and Orangish Brown Clay

USCS: TNP

GRAIN SIZE DATA	
% GRAVEL	0.0
% SAND	4.0
% SILT	25.4
% CLAY	70.6

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

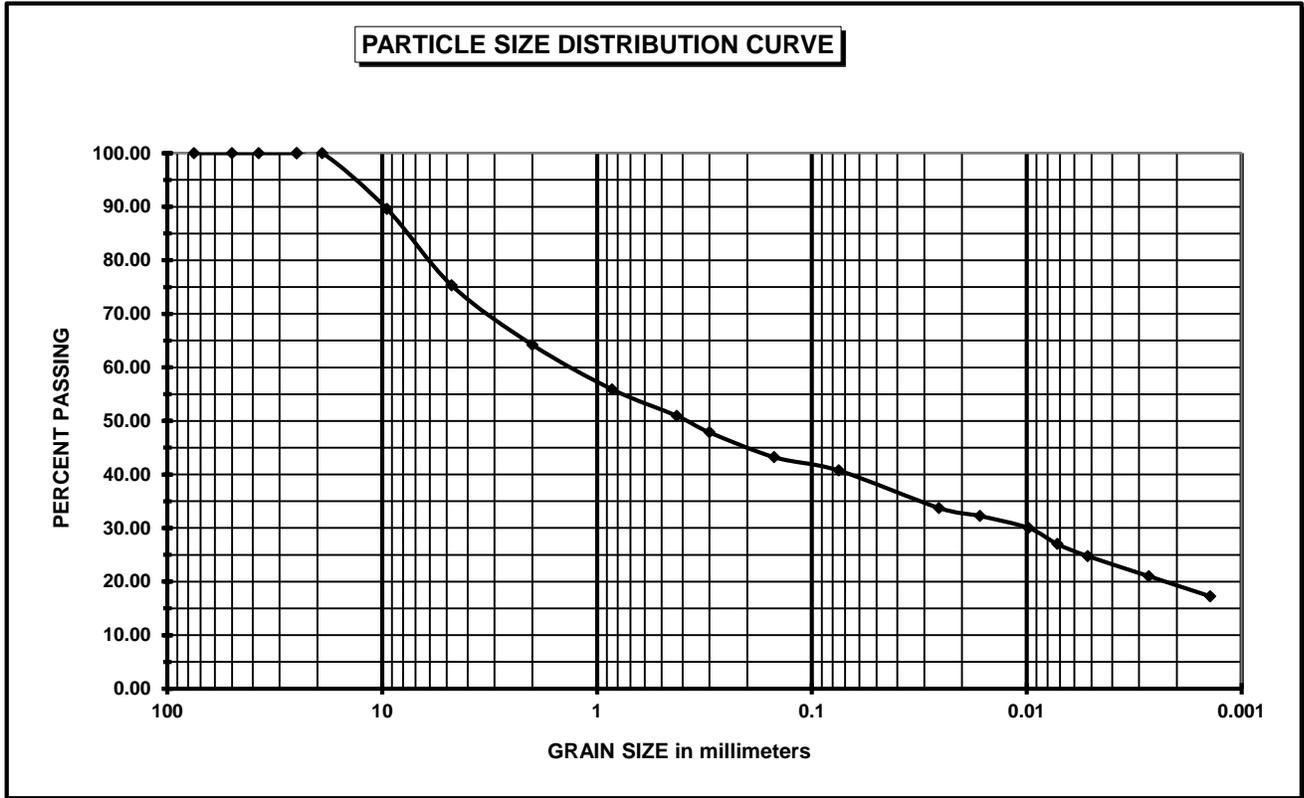
ATTERBERG LIMIT DATA	
Liquid Limit	Test Not Performed
Plastic Limit	Test Not Performed
Plasticity Index	Test Not Performed
Fine Fraction Soil Type	Test Not Performed

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-08 / Sample # SS-3

Sample Depth: 7.5-9.5'

Sample Description: Dark Brown and Orangish Brown Clayey Sand with Gravel

USCS: TNP

GRAIN SIZE DATA	
% GRAVEL	24.7
% SAND	34.6
% SILT	16.2
% CLAY	24.5

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

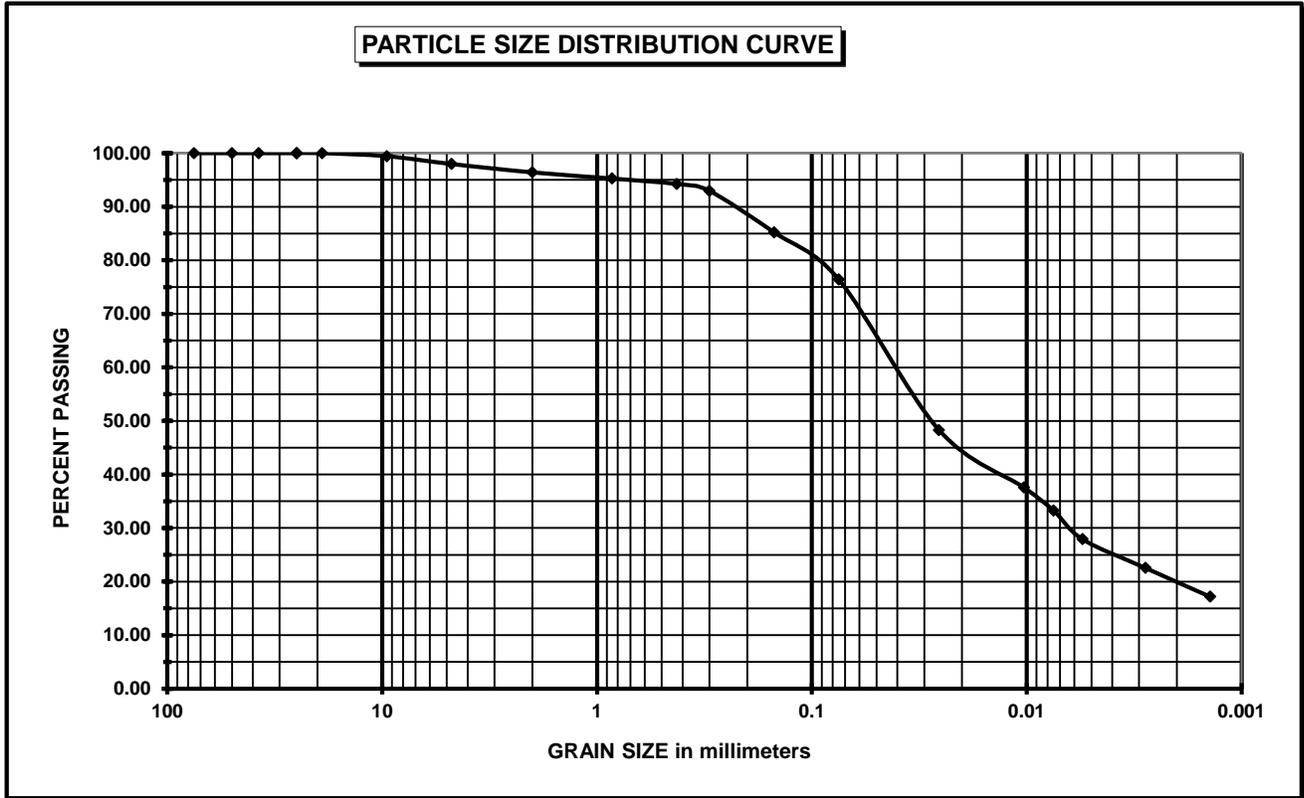
ATTERBERG LIMIT DATA	
Liquid Limit	Test Not Performed
Plastic Limit	Test Not Performed
Plasticity Index	Test Not Performed
Fine Fraction Soil Type	Test Not Performed

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-18 / Sample # SS-3

Sample Depth: 7.5-9.5'

Sample Description: Brown Clay with Sand

USCS: TNP

GRAIN SIZE DATA	
% GRAVEL	2.0
% SAND	21.6
% SILT	49.3
% CLAY	27.1

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

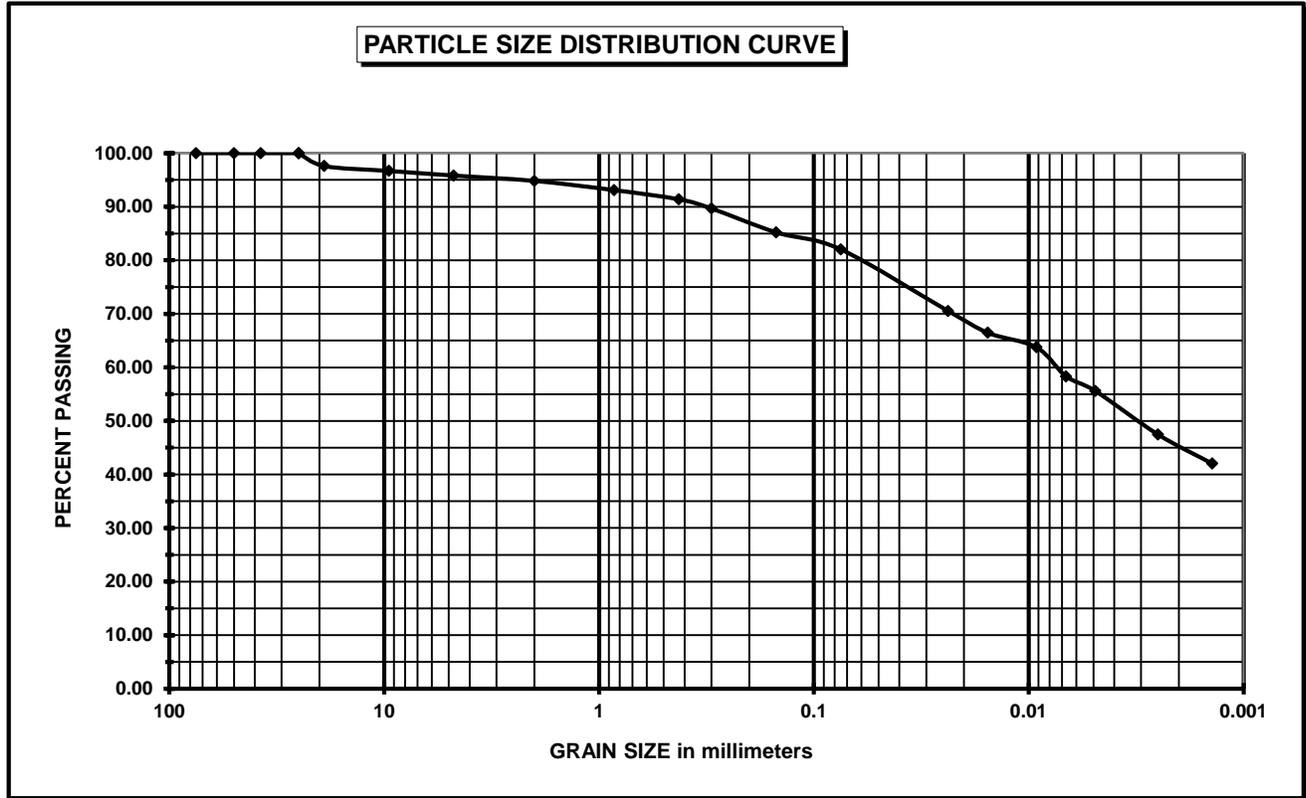
ATTERBERG LIMIT DATA	
Liquid Limit	Test Not Performed
Plastic Limit	Test Not Performed
Plasticity Index	Test Not Performed
Fine Fraction Soil Type	Test Not Performed

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-19 / Sample # SS-4

Sample Depth: 12.5-14.5'

Sample Description: Brown and Orangish Brown Clay with Sand

USCS: TNP

GRAIN SIZE DATA	
% GRAVEL	4.2
% SAND	13.8
% SILT	26.2
% CLAY	55.8

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

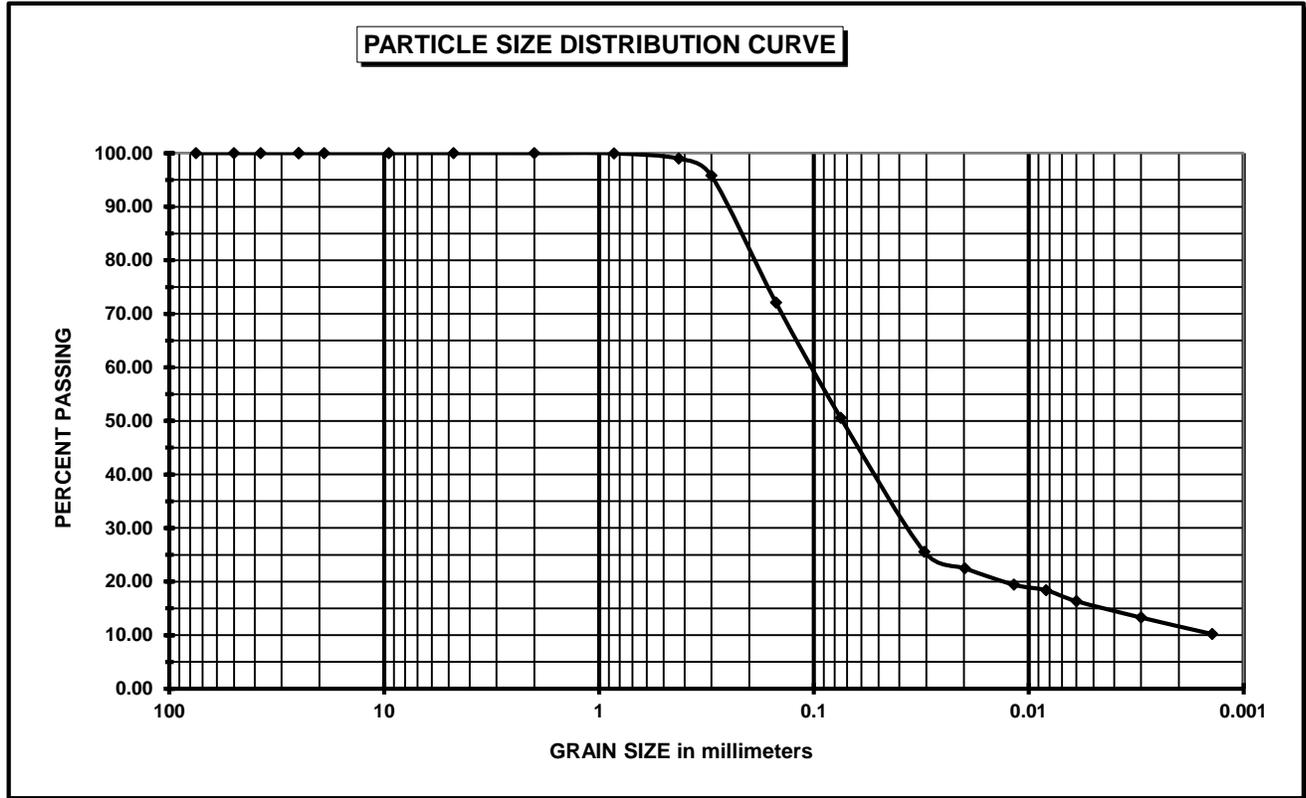
ATTERBERG LIMIT DATA	
Liquid Limit	Test Not Performed
Plastic Limit	Test Not Performed
Plasticity Index	Test Not Performed
Fine Fraction Soil Type	Test Not Performed

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-20 / Sample # SS-3

Sample Depth: 17.5-19.5'

Sample Description: Orangish Brown Sandy Clay

USCS: CL-ML

GRAIN SIZE DATA	
% GRAVEL	0.0
% SAND	49.4
% SILT	35.1
% CLAY	15.5

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

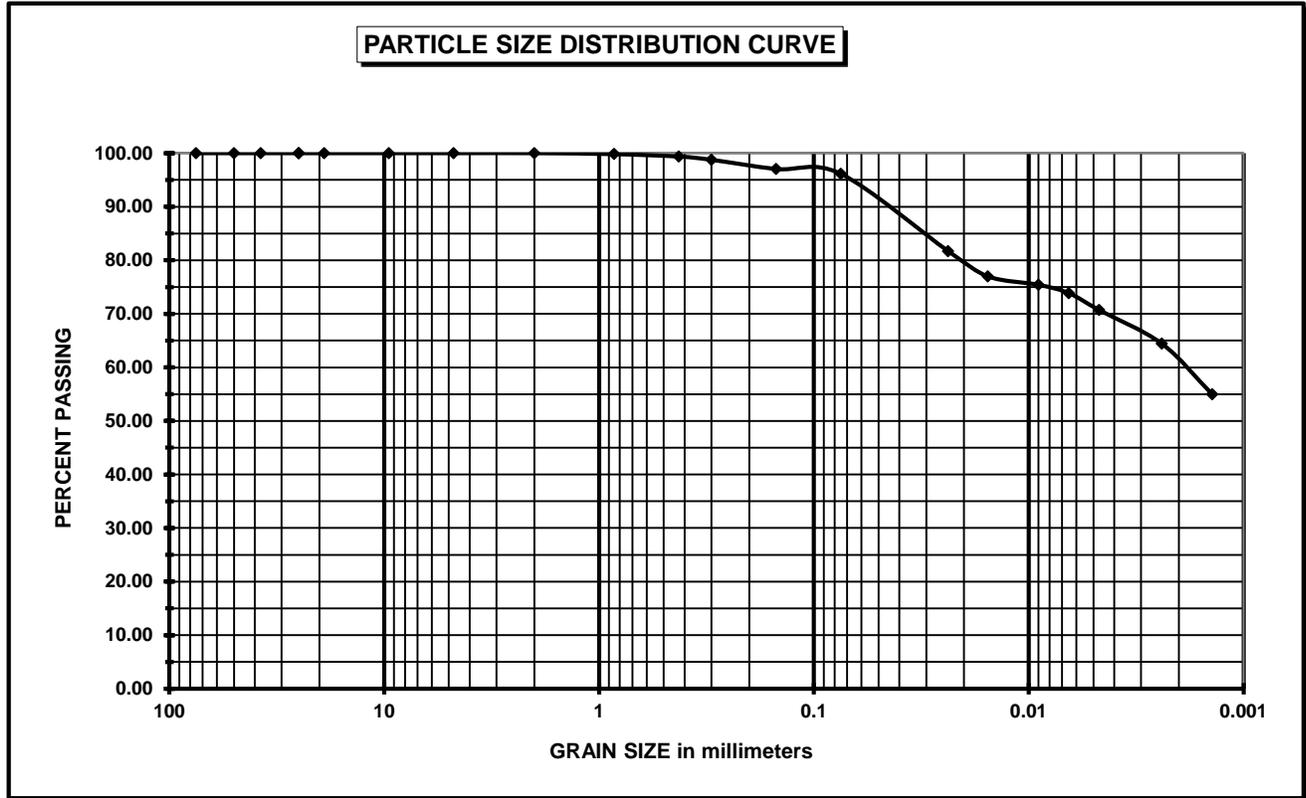
ATTERBERG LIMIT DATA	
Liquid Limit	26
Plastic Limit	20
Plasticity Index	6
Fine Fraction Soil Type	CL-ML

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016

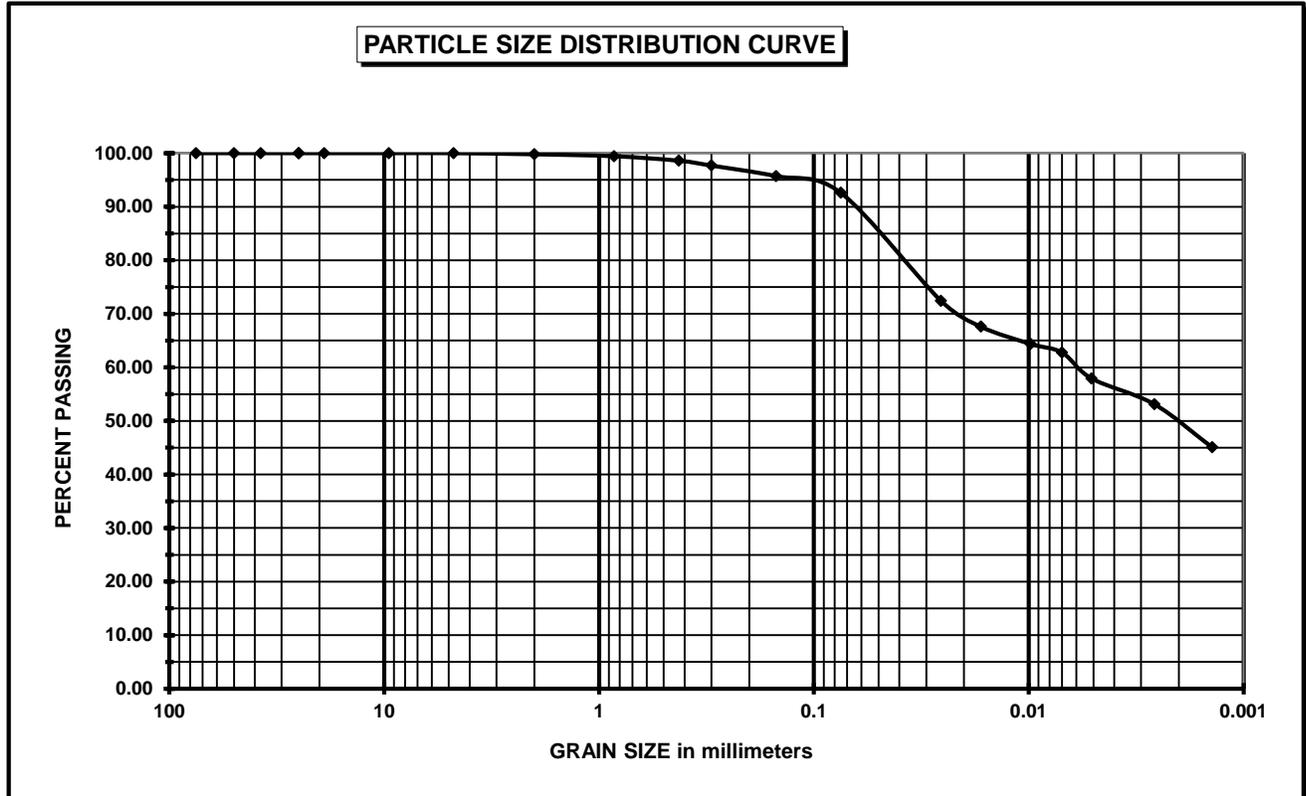


Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-25 / Sample # SS-5

Sample Depth: 17.5-19.5'

Sample Description: Grayish Brown Silty Clay

USCS: TNP

GRAIN SIZE DATA	
% GRAVEL	0.0
% SAND	7.4
% SILT	34.8
% CLAY	57.8

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

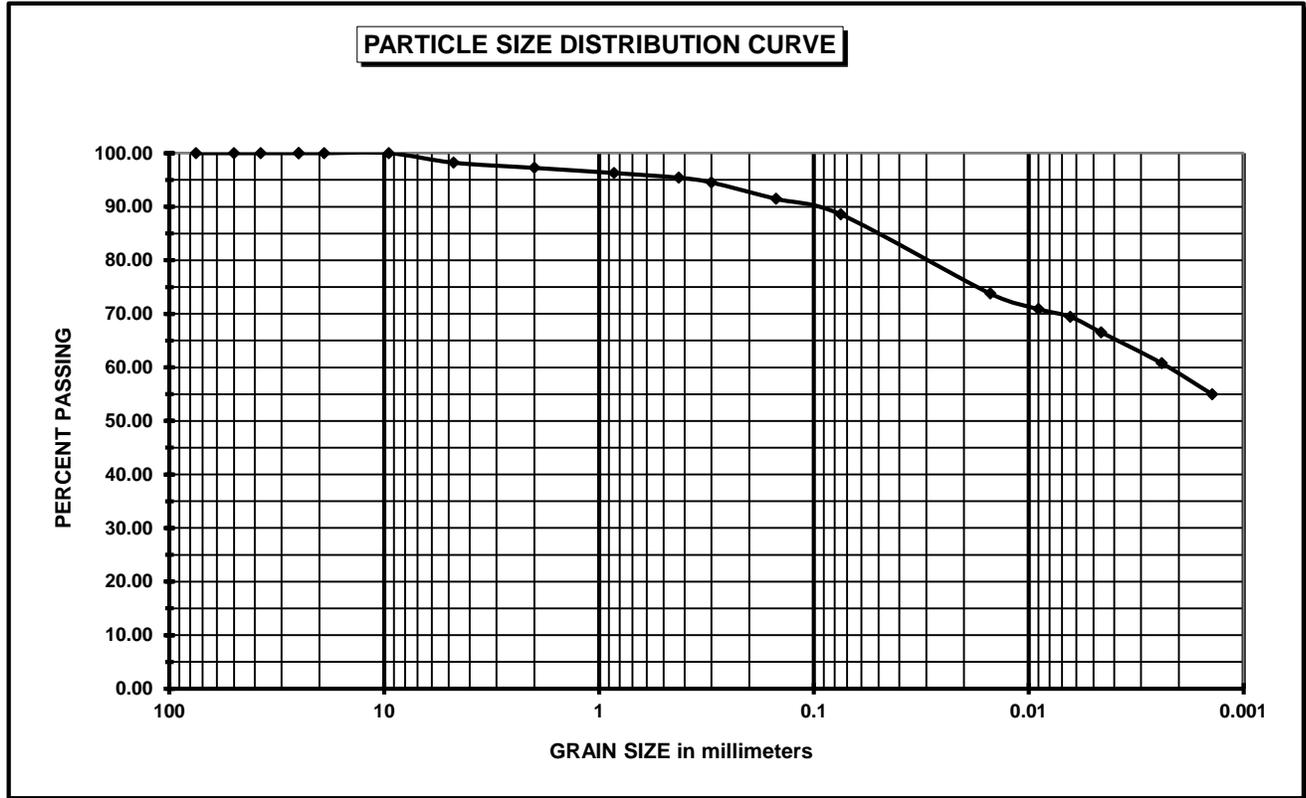
ATTERBERG LIMIT DATA	
Liquid Limit	Test Not Performed
Plastic Limit	Test Not Performed
Plasticity Index	Test Not Performed
Fine Fraction Soil Type	Test Not Performed

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-26 / Sample # SS-4

Sample Depth: 12.5-14.5

Sample Description: Orangish Brown Clay

USCS: CH

GRAIN SIZE DATA	
% GRAVEL	1.8
% SAND	9.7
% SILT	21.2
% CLAY	67.3

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

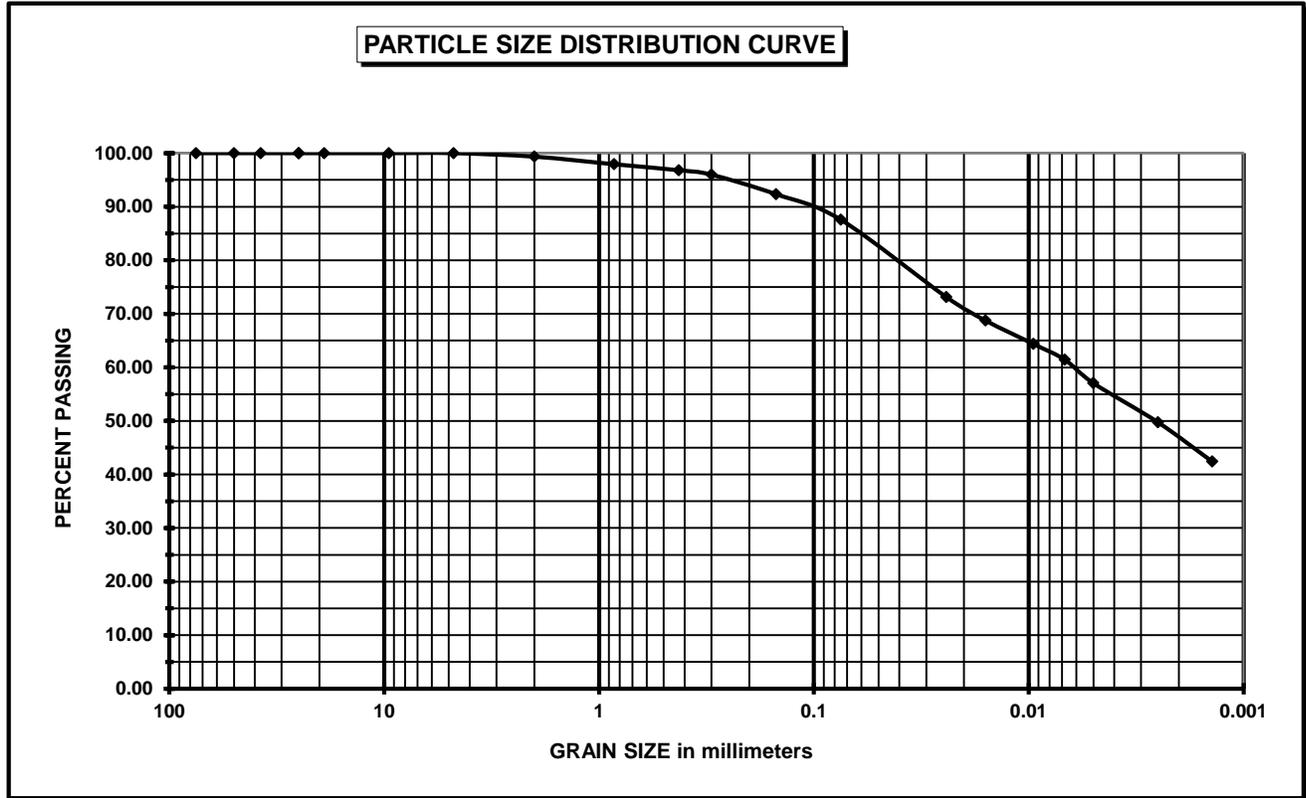
ATTERBERG LIMIT DATA	
Liquid Limit	66
Plastic Limit	25
Plasticity Index	41
Fine Fraction Soil Type	CH

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-29 / Sample # SS-2

Sample Depth: 8.0-10.0'

Sample Description: Brown and Grayish Brown Clay

USCS: CL

GRAIN SIZE DATA	
% GRAVEL	0.0
% SAND	12.4
% SILT	30.5
% CLAY	57.1

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

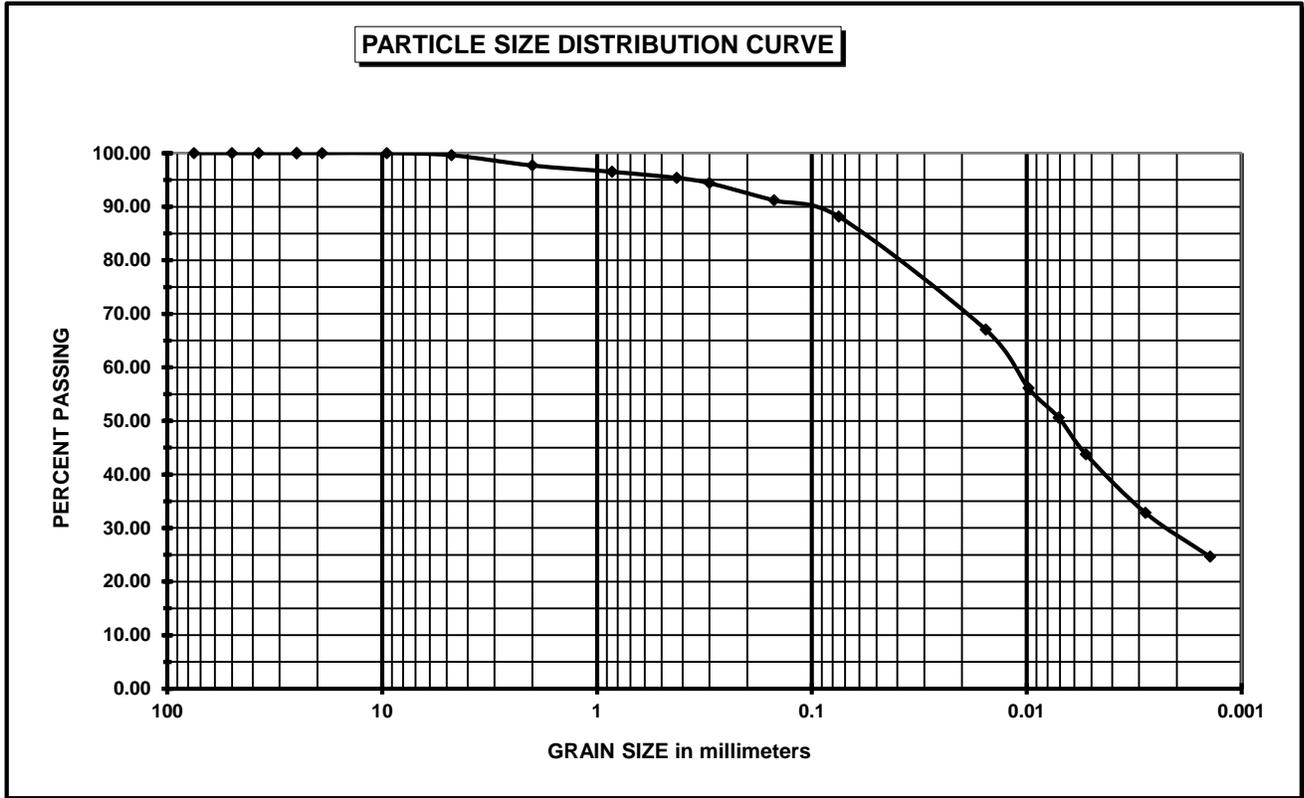
ATTERBERG LIMIT DATA	
Liquid Limit	36
Plastic Limit	16
Plasticity Index	20
Fine Fraction Soil Type	CL

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-30 / Sample # SS-4

Sample Depth: 12.5-14.5'

Sample Description: Brown Clay

USCS: TNP

GRAIN SIZE DATA	
% GRAVEL	0.4
% SAND	11.5
% SILT	45.3
% CLAY	42.8

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

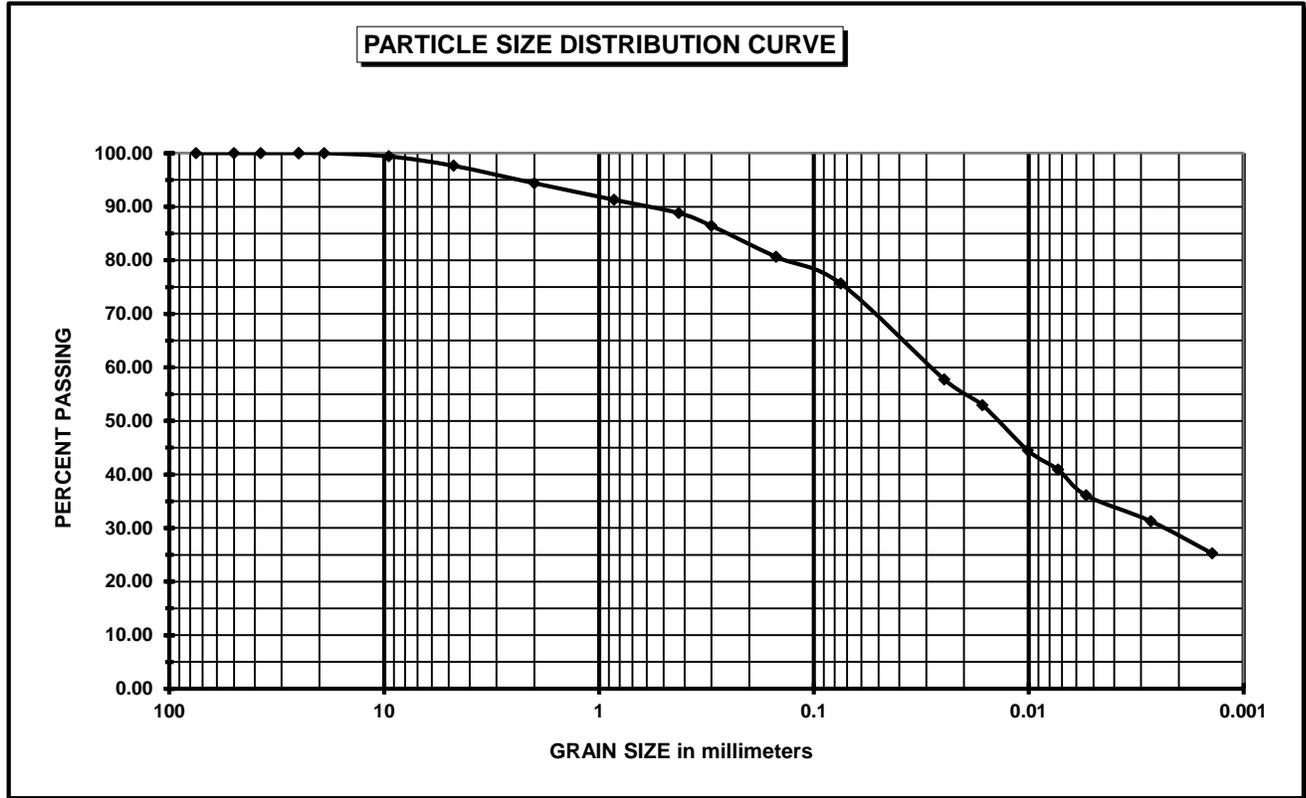
ATTERBERG LIMIT DATA	
Liquid Limit	Test Not Performed
Plastic Limit	Test Not Performed
Plasticity Index	Test Not Performed
Fine Fraction Soil Type	Test Not Performed

Job Name: Y-12 Outfall 200 Mercury Treatment Facility

Date Received: 2/2/2016

Job Number: 21-15652

Date Completed: 2/9/2016



Sample ID: Boring # A-34 / Bulk Sample

Sample Depth: 0.0-10.0'

Sample Description: Brown and Orangish Brown Clay

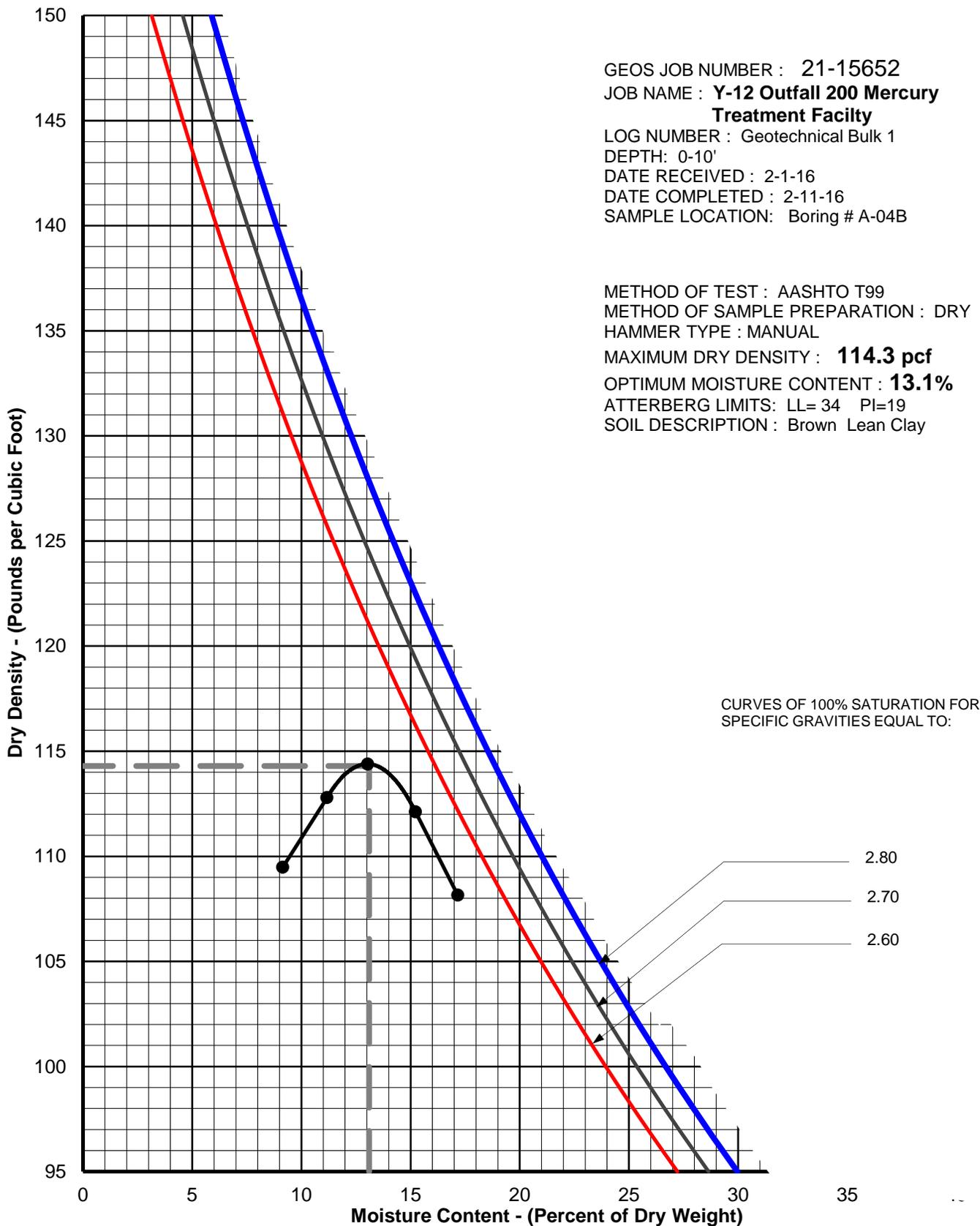
USCS: CL

GRAIN SIZE DATA	
% GRAVEL	2.4
% SAND	22.0
% SILT	40.1
% CLAY	35.5

Gravel	< 75 mm and > 4.75 mm
Coarse Sand	< 4.75 mm and > 2.00 mm
Medium Sand	< 2.00 mm and > 0.425 mm
Fine Sand	< 0.425 mm and > 0.075 mm
Silt	< 0.075 mm and > 0.005 mm
Clay	< 0.005 mm

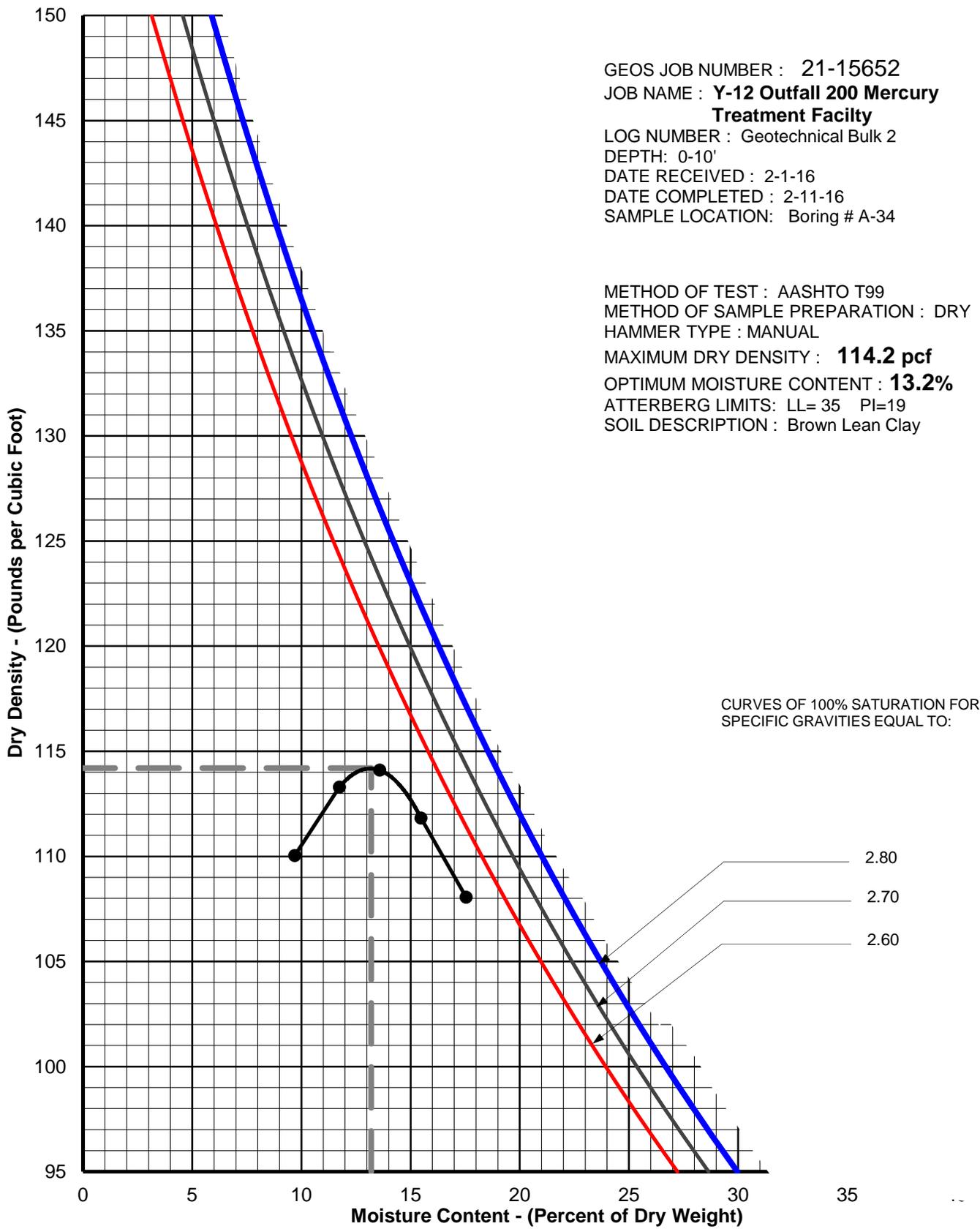
ATTERBERG LIMIT DATA	
Liquid Limit	35
Plastic Limit	16
Plasticity Index	19
Fine Fraction Soil Type	CL

MOISTURE-DENSITY RELATIONSHIP



This document was prepared pursuant to a specific agreement to address the unique requirements of a GEOServices, LLC client. Prior to further use, a GEOServices, LLC professional should be contacted for a complete explanation of its preparation and contents.

MOISTURE-DENSITY RELATIONSHIP

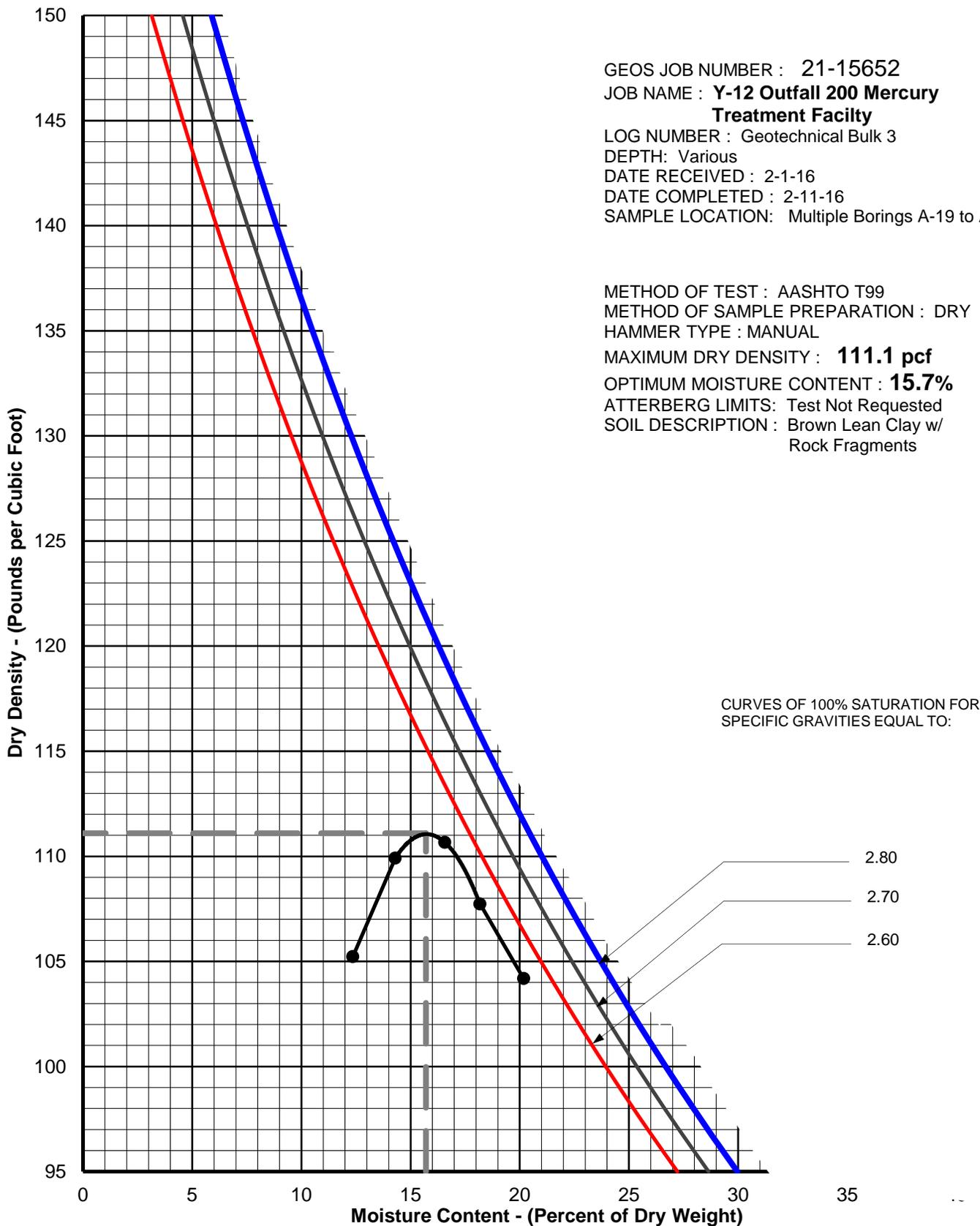


GEOS JOB NUMBER : 21-15652
 JOB NAME : Y-12 Outfall 200 Mercury
Treatment Facility
 LOG NUMBER : Geotechnical Bulk 2
 DEPTH : 0-10'
 DATE RECEIVED : 2-1-16
 DATE COMPLETED : 2-11-16
 SAMPLE LOCATION : Boring # A-34

METHOD OF TEST : AASHTO T99
 METHOD OF SAMPLE PREPARATION : DRY
 HAMMER TYPE : MANUAL
 MAXIMUM DRY DENSITY : **114.2 pcf**
 OPTIMUM MOISTURE CONTENT : **13.2%**
 ATTERBERG LIMITS: LL= 35 PI=19
 SOIL DESCRIPTION : Brown Lean Clay

This document was prepared pursuant to a specific agreement to address the unique requirements of a GEOServices, LLC client. Prior to further use, a GEOServices, LLC professional should be contacted for a complete explanation of its preparation and contents.

MOISTURE-DENSITY RELATIONSHIP

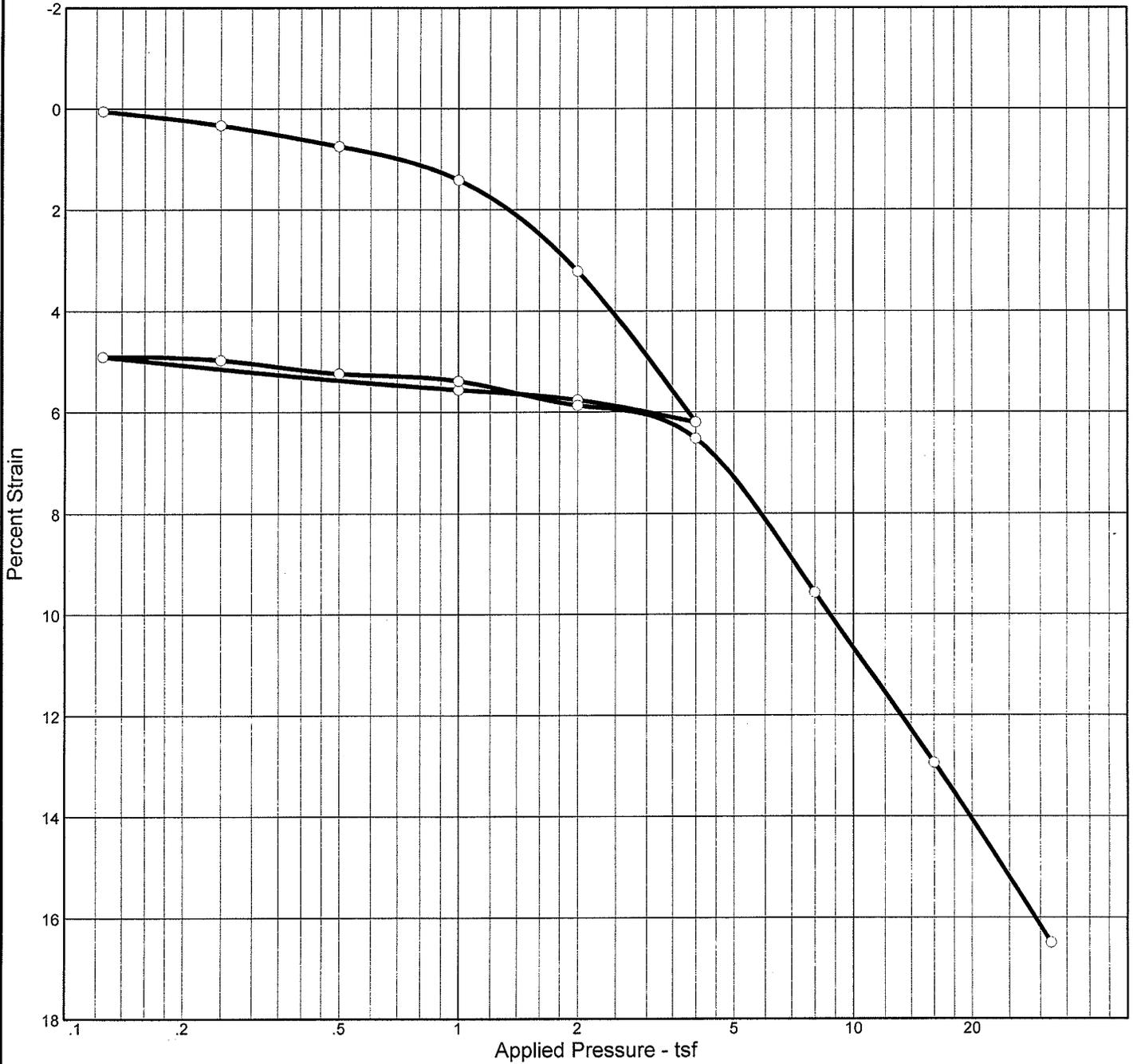


GEOS JOB NUMBER : 21-15652
 JOB NAME : Y-12 Outfall 200 Mercury
 Treatment Facility
 LOG NUMBER : Geotechnical Bulk 3
 DEPTH: Various
 DATE RECEIVED : 2-1-16
 DATE COMPLETED : 2-11-16
 SAMPLE LOCATION: Multiple Borings A-19 to A-31

METHOD OF TEST : AASHTO T99
 METHOD OF SAMPLE PREPARATION : DRY
 HAMMER TYPE : MANUAL
 MAXIMUM DRY DENSITY : **111.1 pcf**
 OPTIMUM MOISTURE CONTENT : **15.7%**
 ATTERBERG LIMITS: Test Not Requested
 SOIL DESCRIPTION : Brown Lean Clay w/
 Rock Fragments

This document was prepared pursuant to a specific agreement to address the unique requirements of a GEOServices, LLC client. Prior to further use, a GEOServices, LLC professional should be contacted for a complete explanation of its preparation and contents.

CONSOLIDATION TEST REPORT



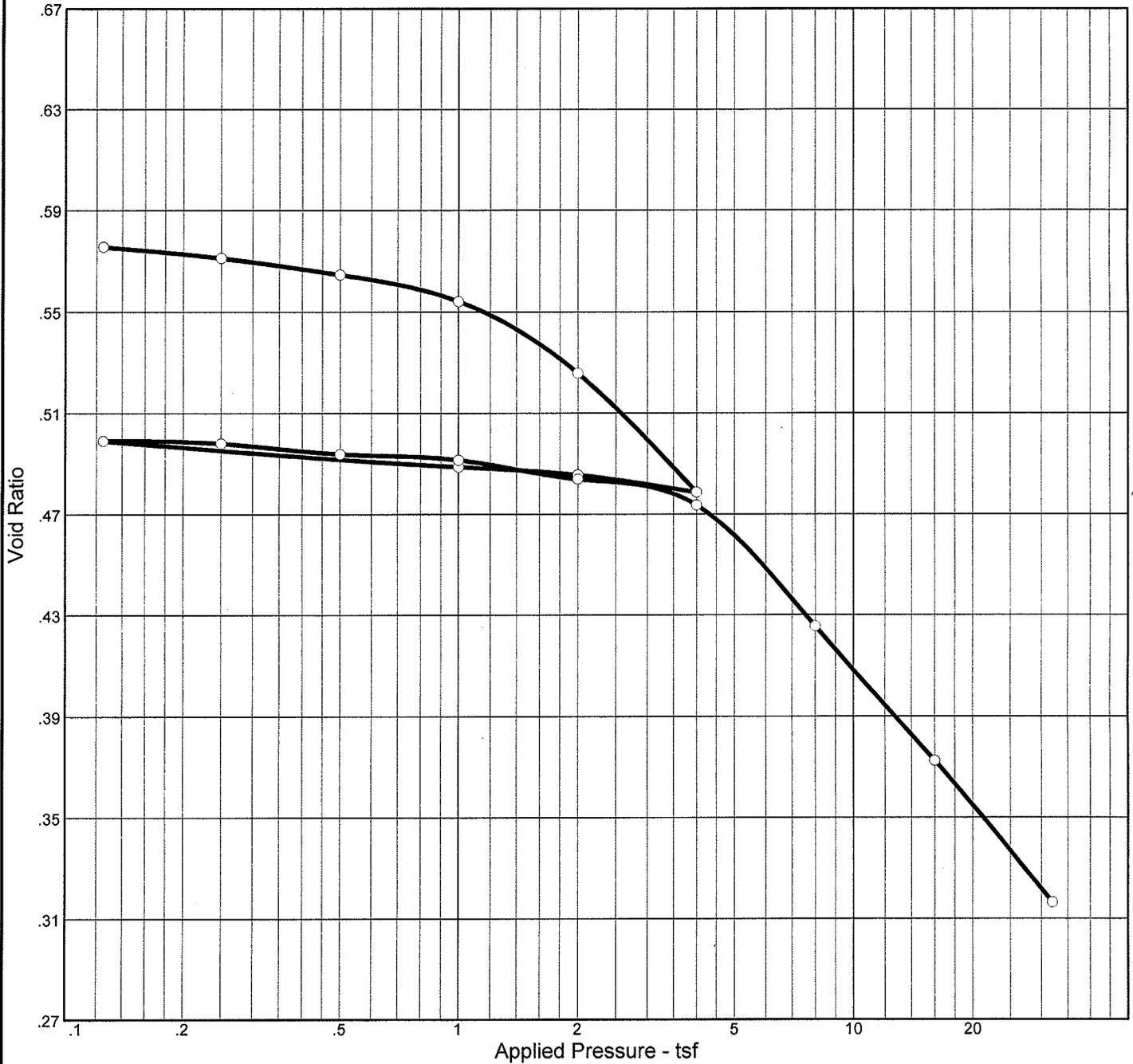
	Natural									
Saturation	Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
78.4 %	17.4 %	103.0	na	na	2.60		1.92	0.19	0.02	0.576

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, dark brown w/rock	--	--

Project No. 21-15652 Project: Y-12 Outfall 200	Client: GEOServices, LLC Sample No.: A-07 ST-2 Elev./Depth: 7'-9'	Remarks:
Schnabel Engineering, LLC Knoxville, Tennessee		

Figure 1

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
Saturation	Moisture									
78.4 %	17.4 %	103.0	na	na	2.60		1.92	0.19	0.02	0.576

MATERIAL DESCRIPTION								USCS	AASHTO
Clay, silty, dark brown w/rock								--	--

Project No. 21-15652 Project: Y-12 Outfall 200 Source:	Client: GEOServices, LLC Sample No.: A-07 ST-2 Elev./Depth: 7'-9' Schnabel Engineering, LLC Knoxville, Tennessee	Remarks: <div style="text-align: right;">Figure 1</div>
---	--	---

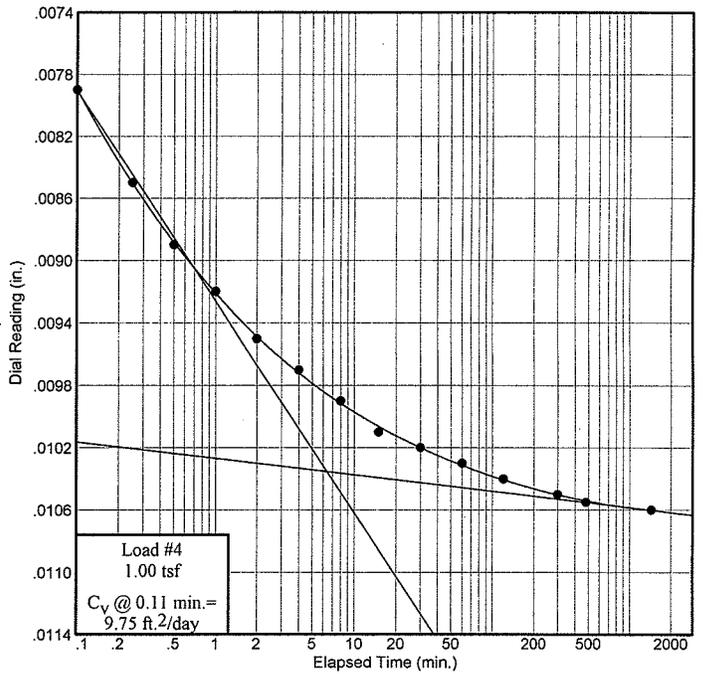
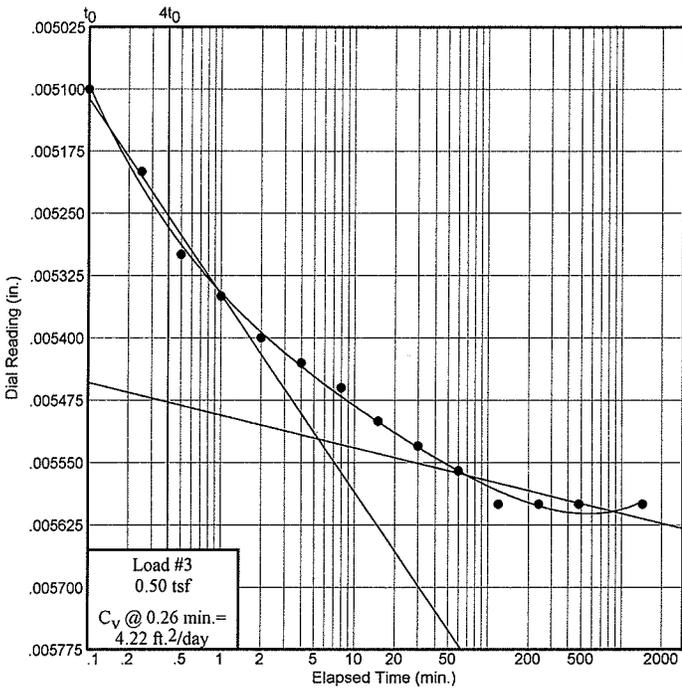
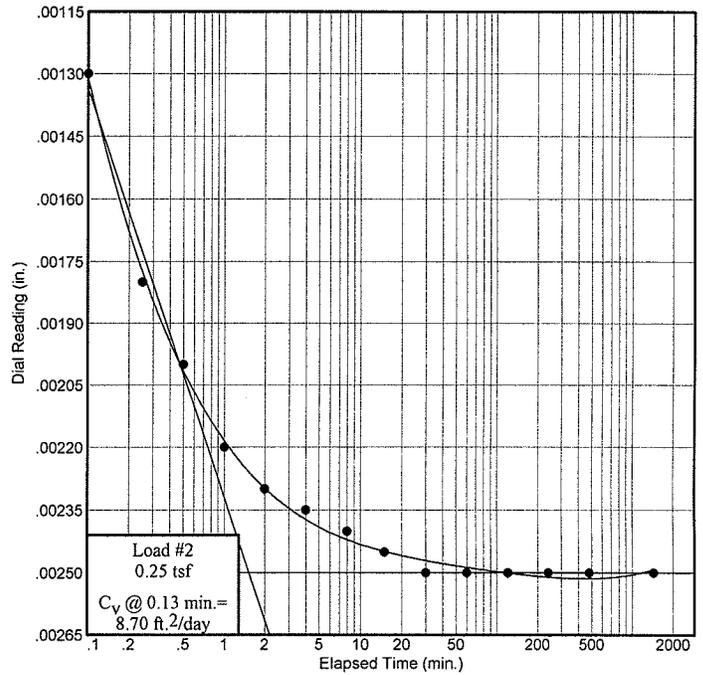
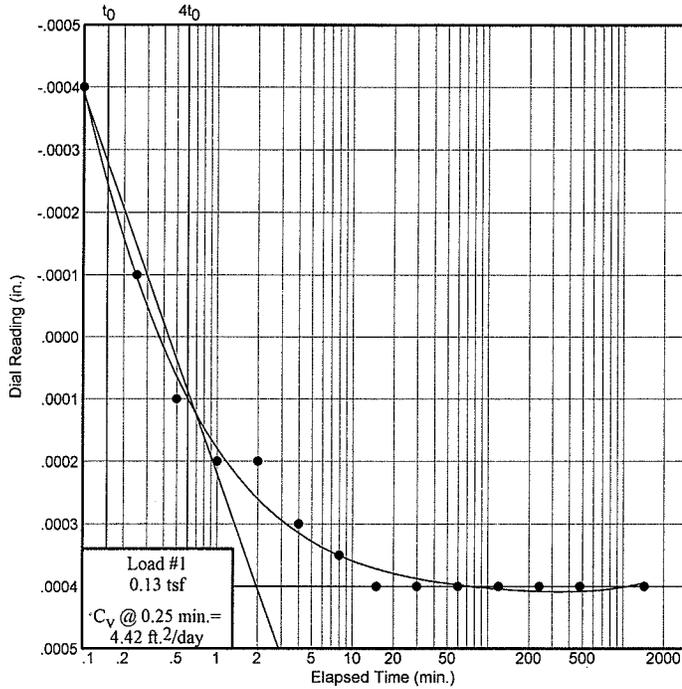
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-07 ST-2

Elev./Depth: 7'-9"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure

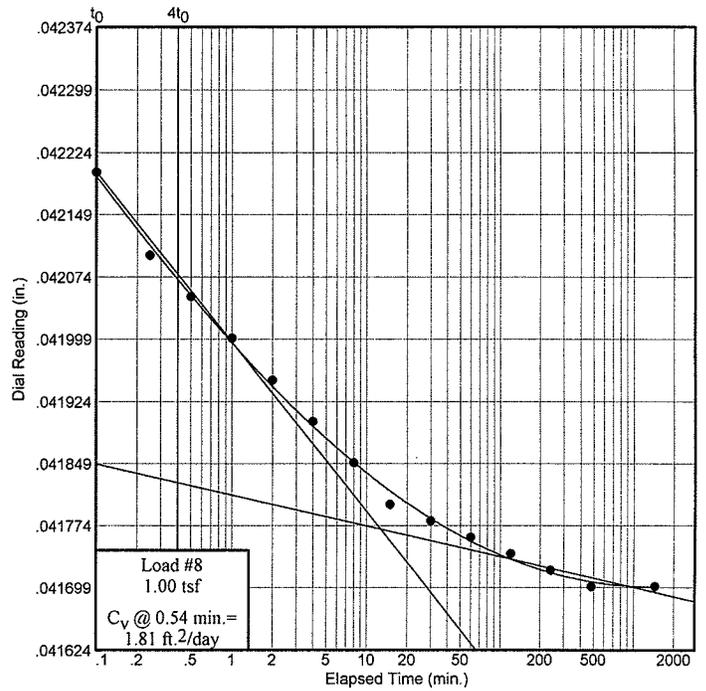
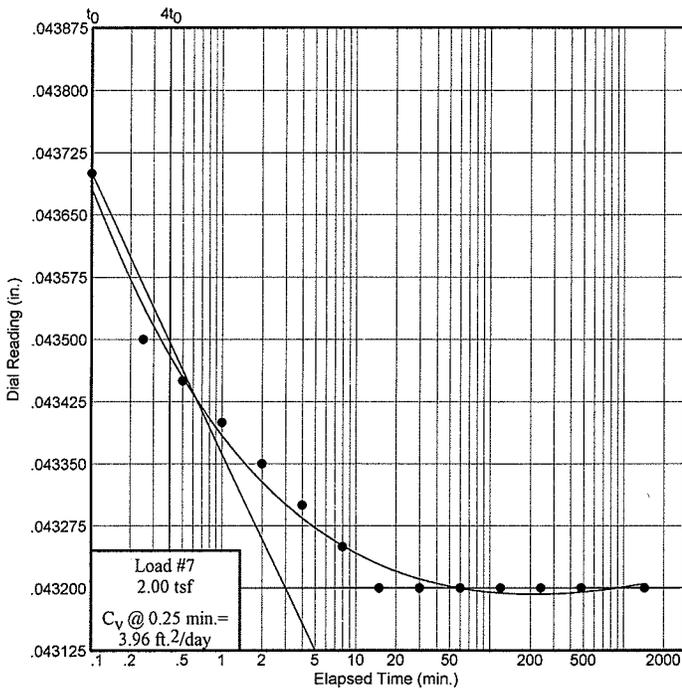
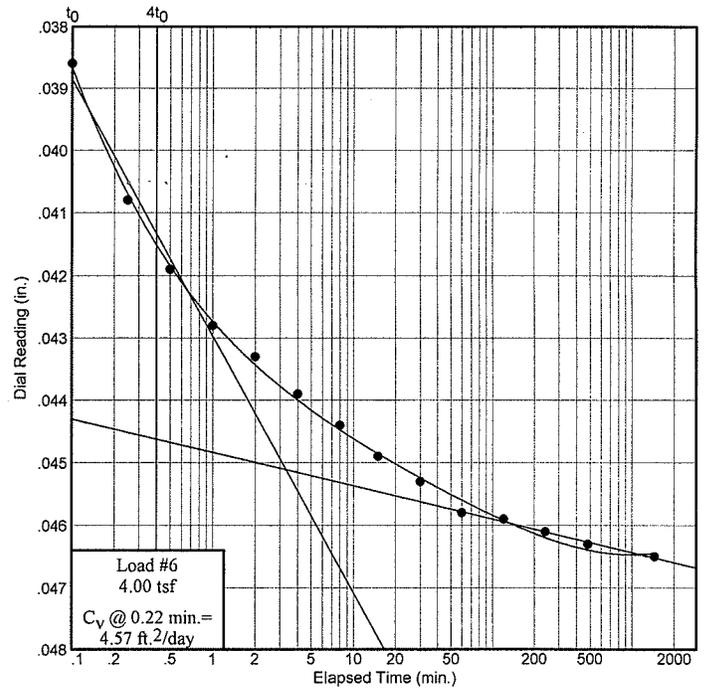
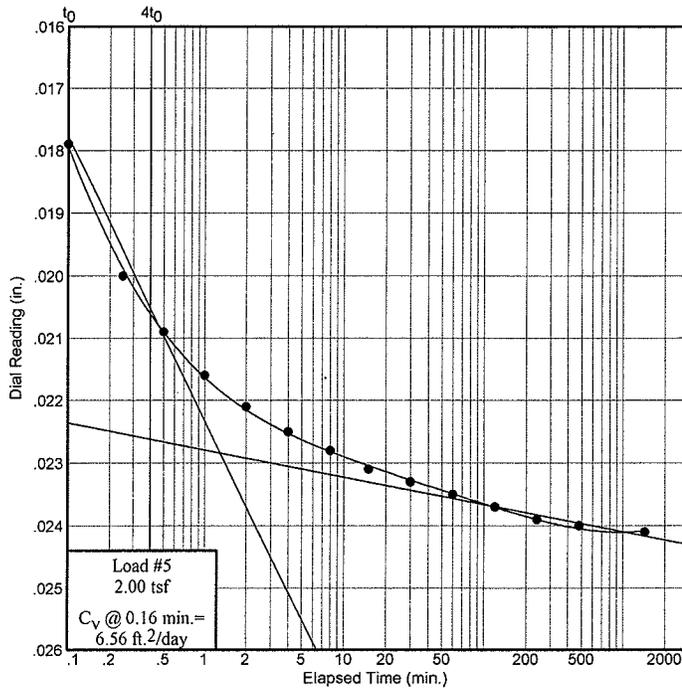
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-07 ST-2

Elev./Depth: 7'-9"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure

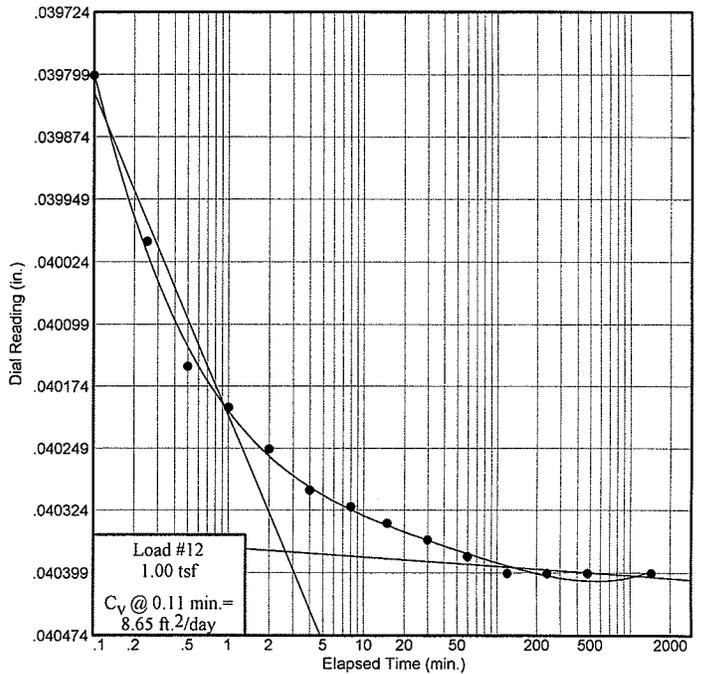
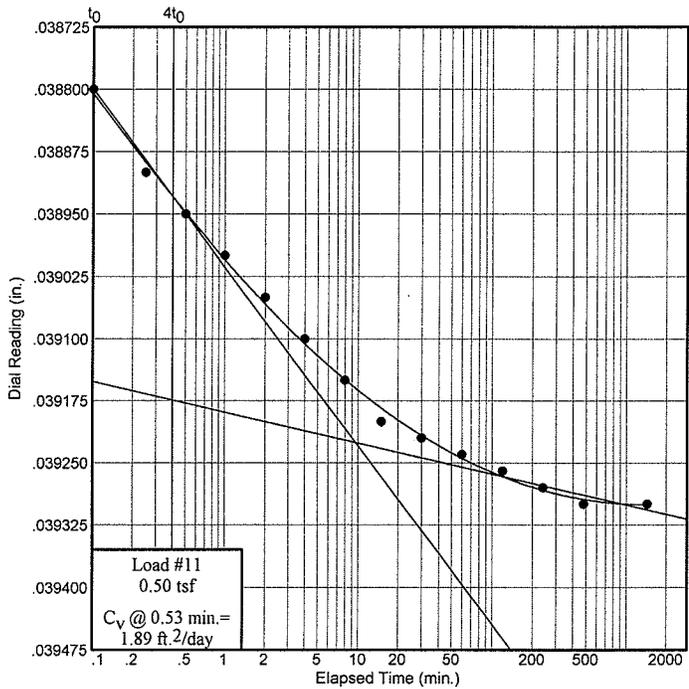
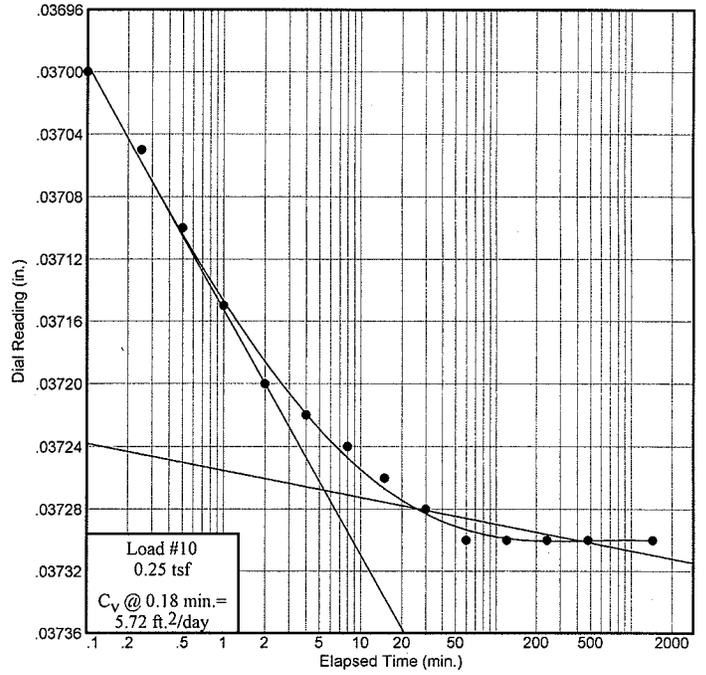
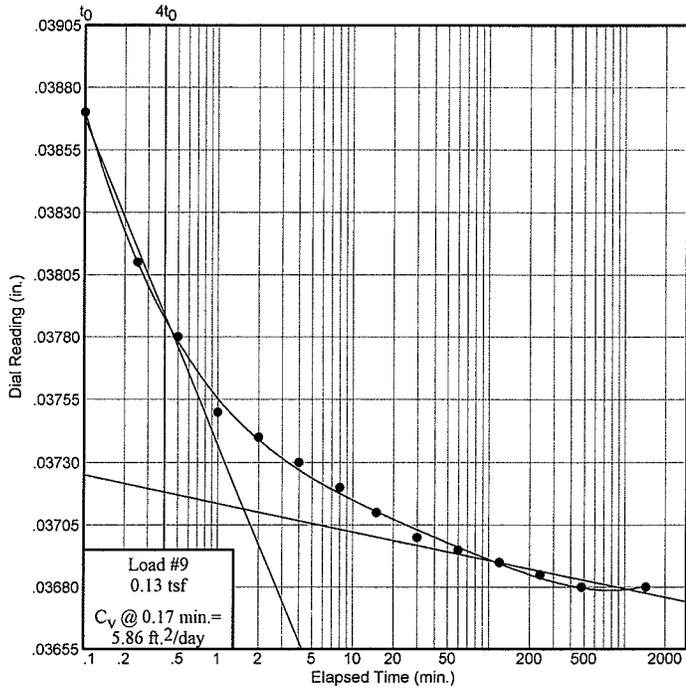
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-07 ST-2

Elev./Depth: 7'-9"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure

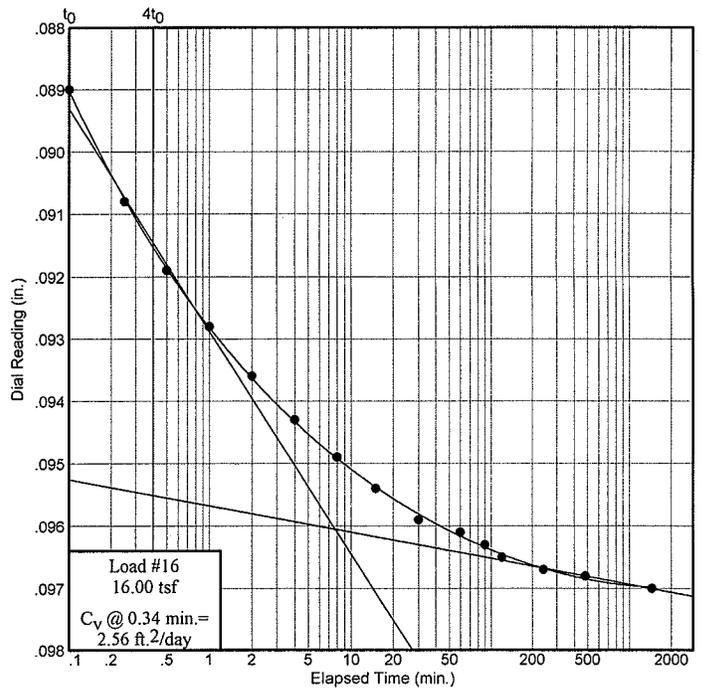
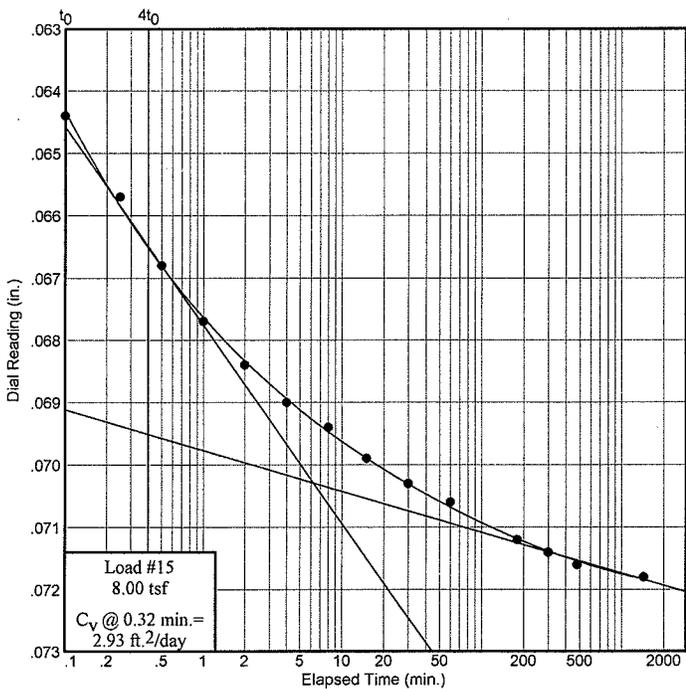
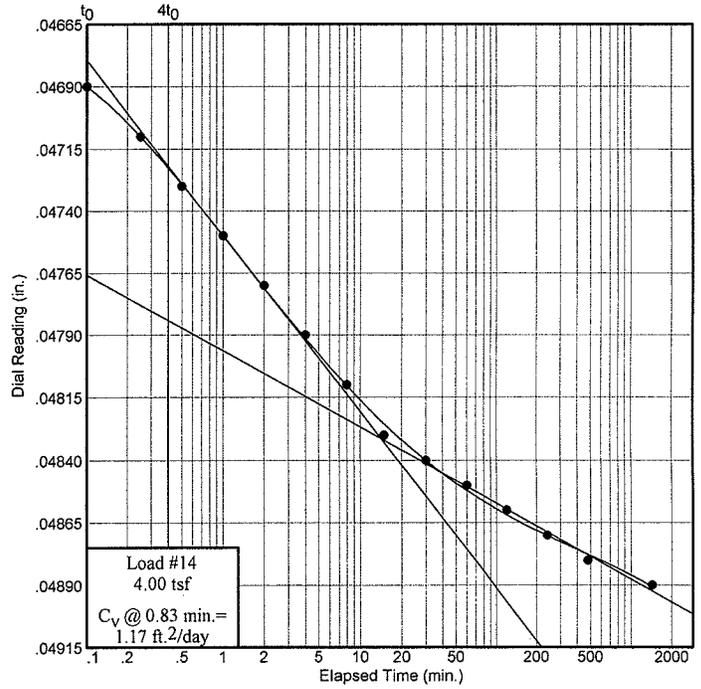
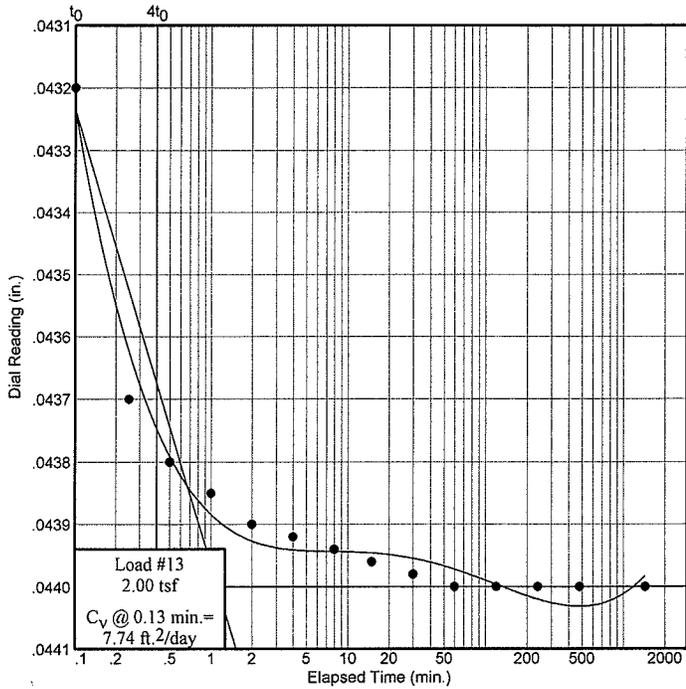
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-07 ST-2

Elev./Depth: 7'-9"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure

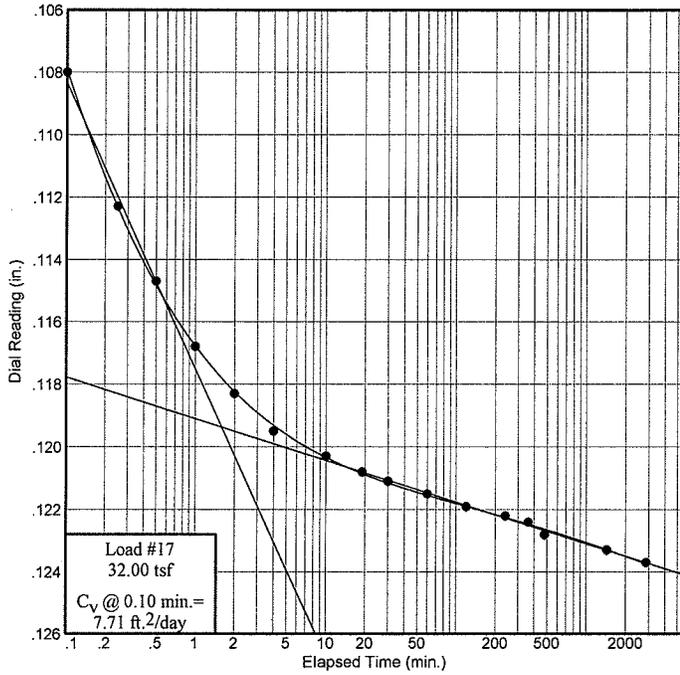
Dial Reading vs. Time

Project No.: 21-15652
Project: Y-12 Outfall 200

Source:

Sample No.: A-07 ST-2

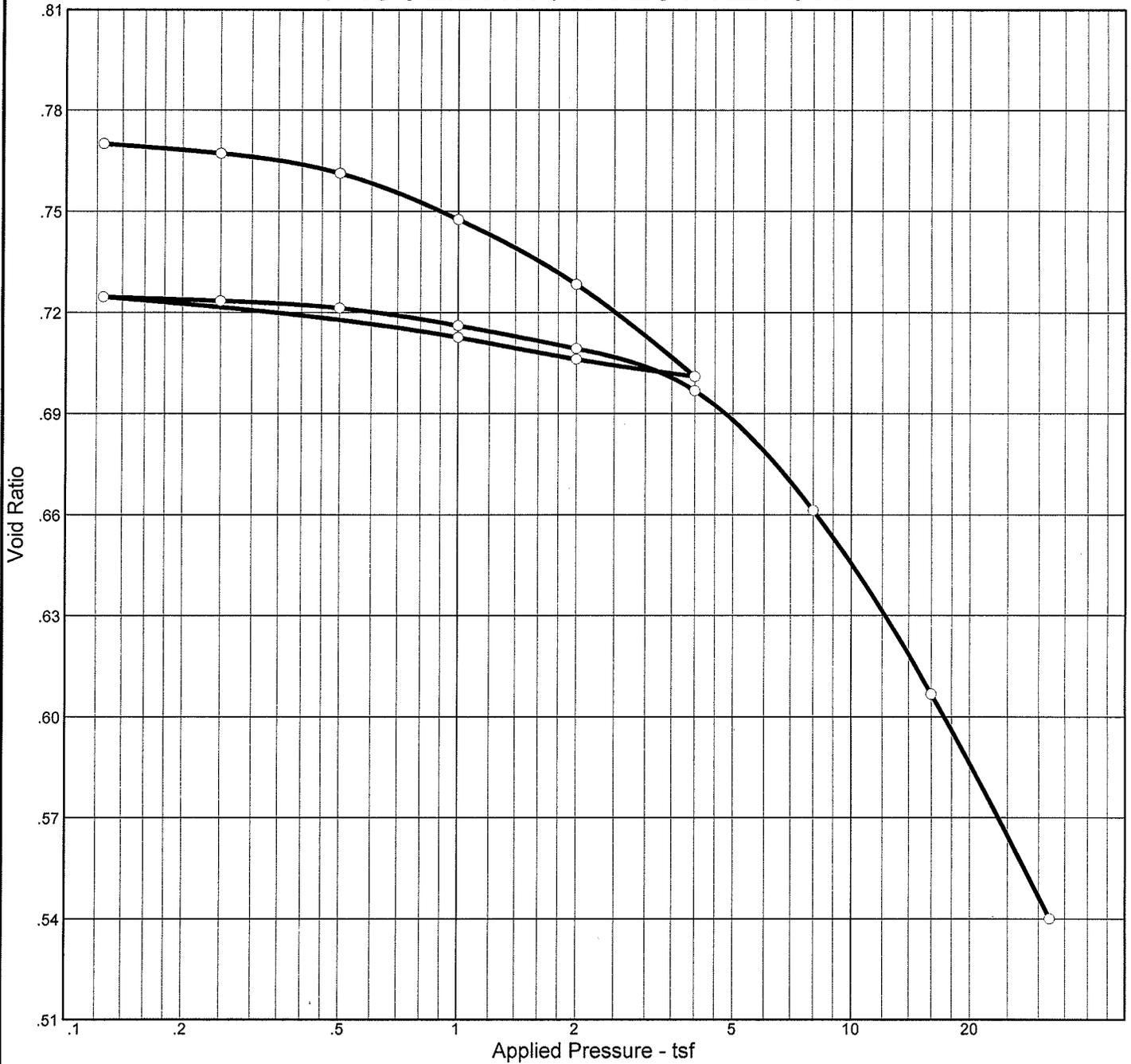
Elev./Depth: 7'-9"



Schnabel Engineering, LLC
Knoxville, Tennessee

Figure

CONSOLIDATION TEST REPORT



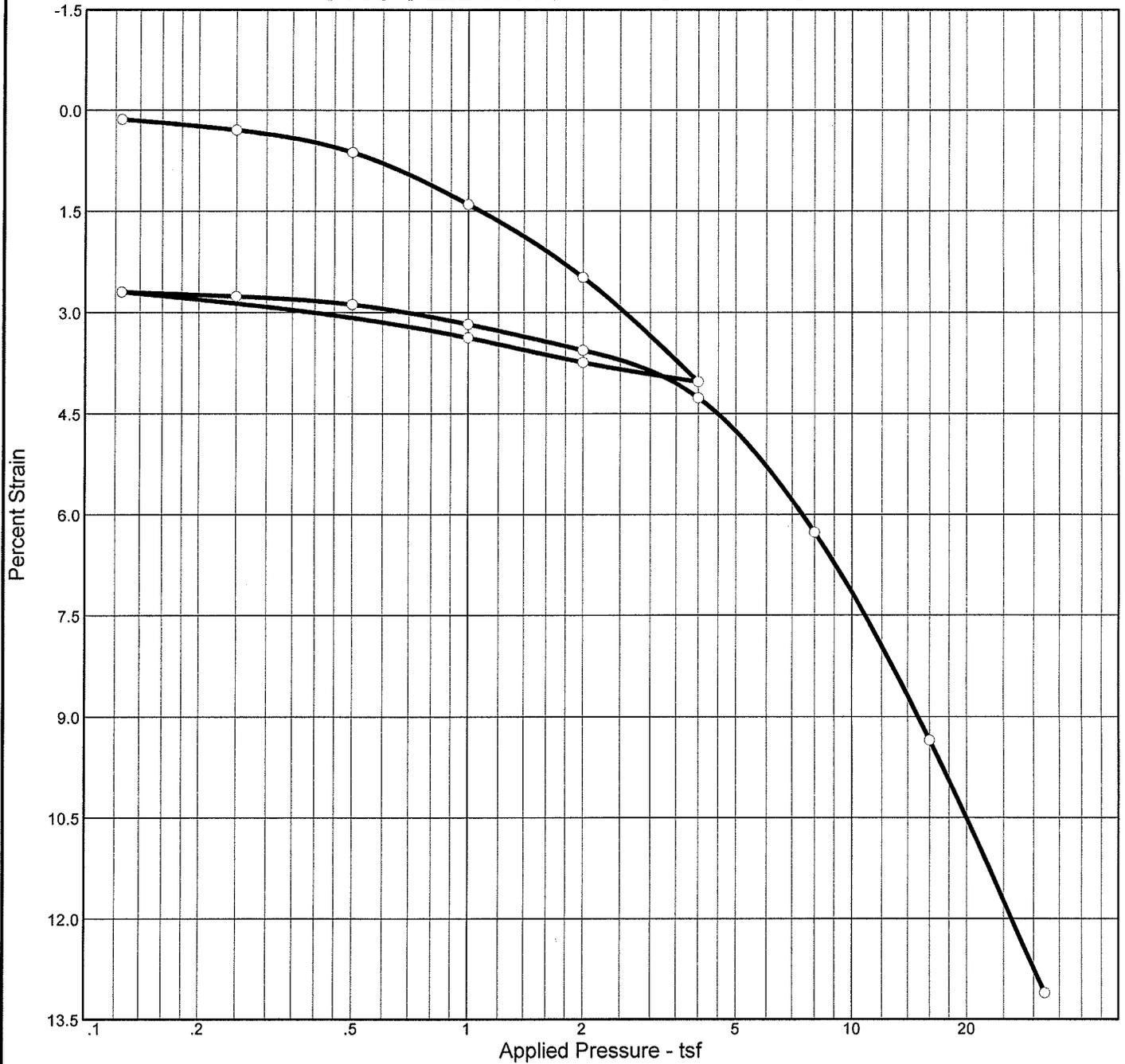
	Natural									
Saturation	Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
93.9 %	27.9 %	93.6	57	30	2.60		3.81	0.22	0.02	0.772

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, brown w/ black streaks	--	--

Project No. 21-15652 Project: Y-12 Outfall 200	Client: GEOServices, LLC	Remarks:
Source:	Sample No.: A-08 ST-1 Elev./Depth: 10'-12'	
Schnabel Engineering, LLC Knoxville, Tennessee		

Figure 1

CONSOLIDATION TEST REPORT



	Natural									
Saturation	Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
93.9 %	27.9 %	93.6	57	30	2.60		3.81	0.22	0.02	0.772

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, brown w/ black streaks	--	--

Project No. 21-15652 Client: GEOServices, LLC Project: Y-12 Outfall 200 Source: Sample No.: A-08 ST-1 Elev./Depth: 10'-12' <div style="text-align: center;">Schnabel Engineering, LLC Knoxville, Tennessee</div>	Remarks: <div style="text-align: right;">Figure 1</div>
---	---

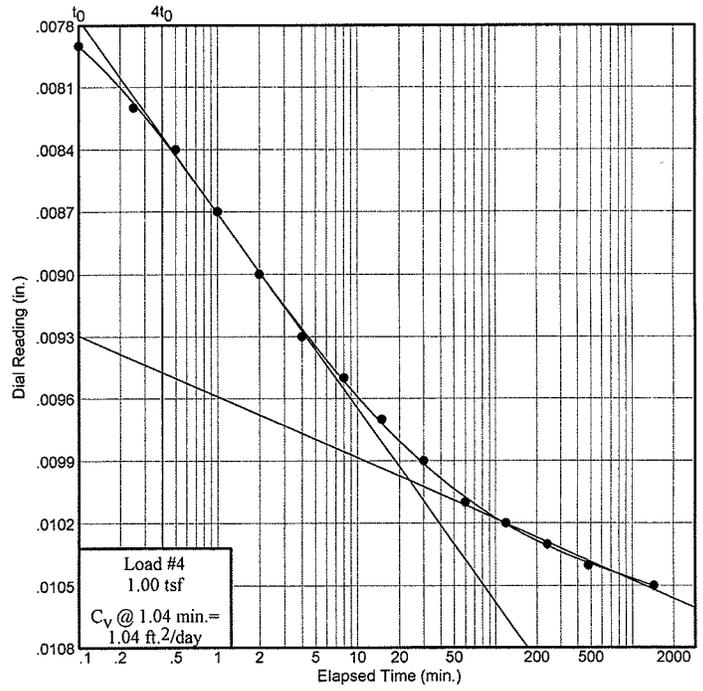
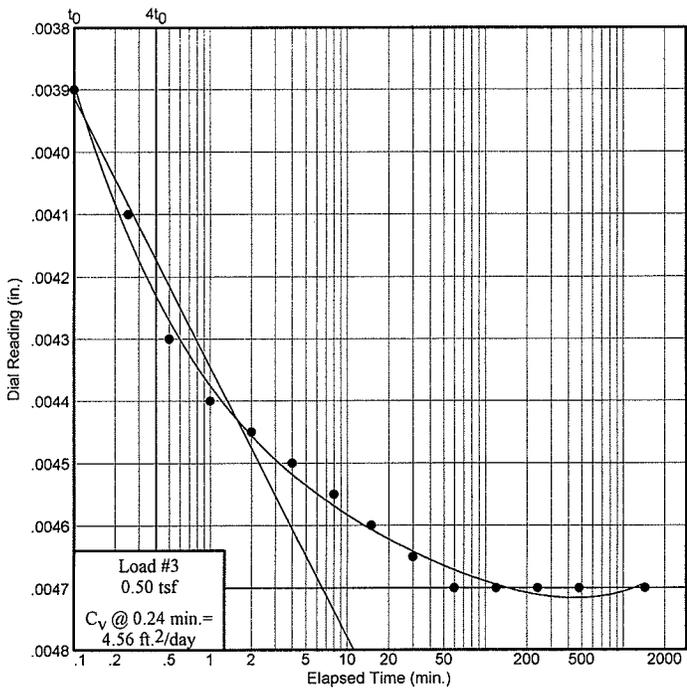
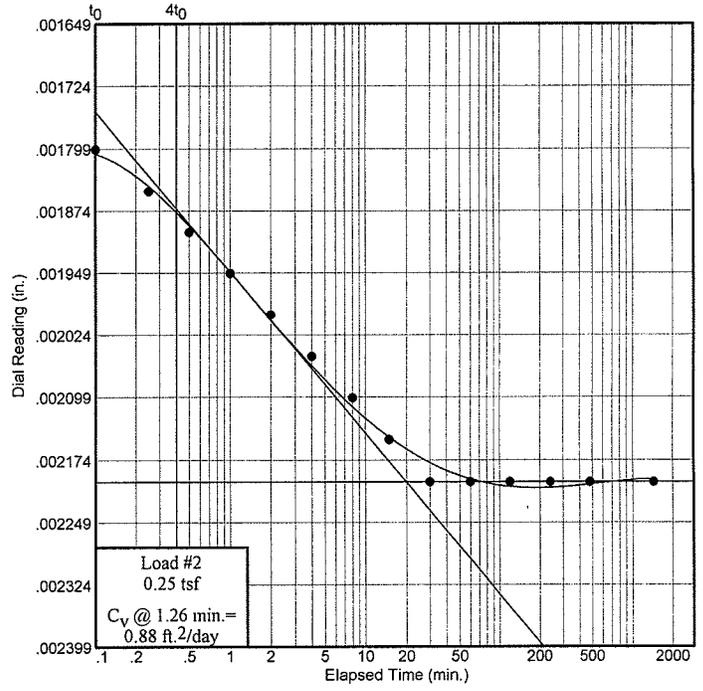
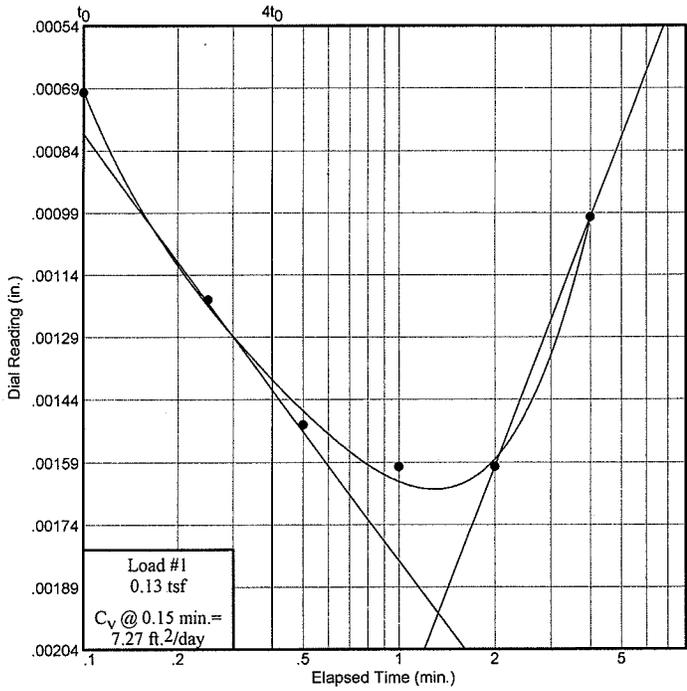
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-08 ST-1

Elev./Depth: 10'-12'



Schnabel Engineering, LLC
 Knoxville, Tennessee

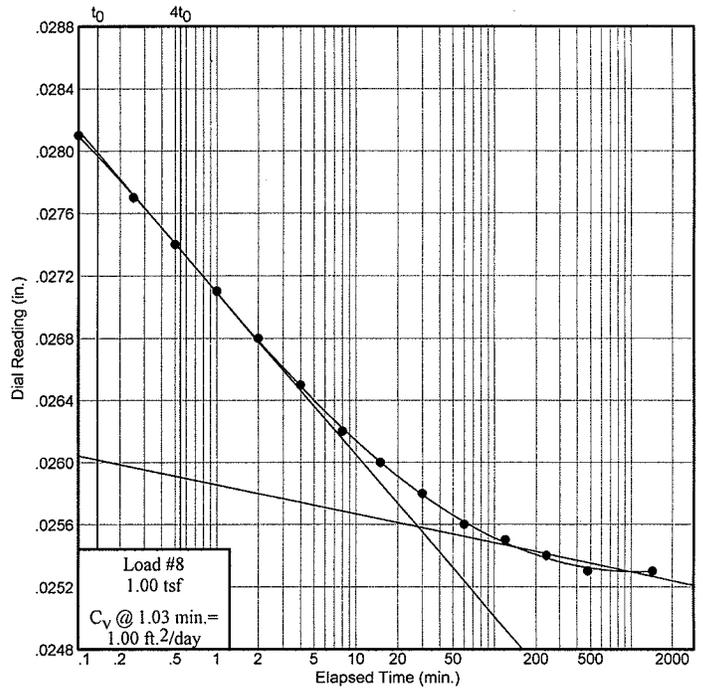
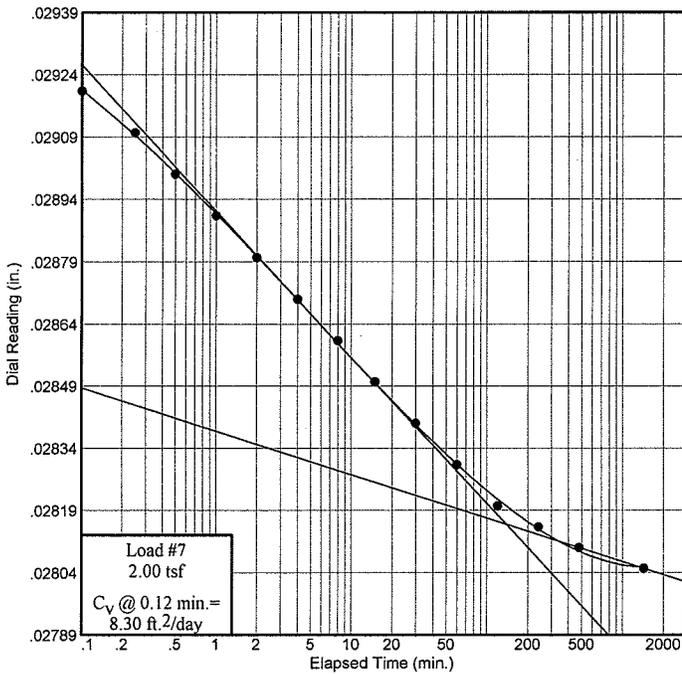
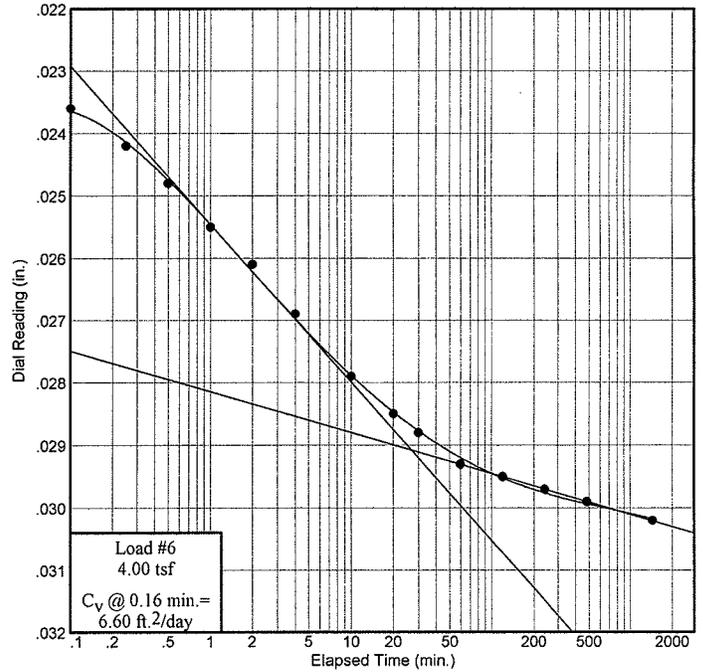
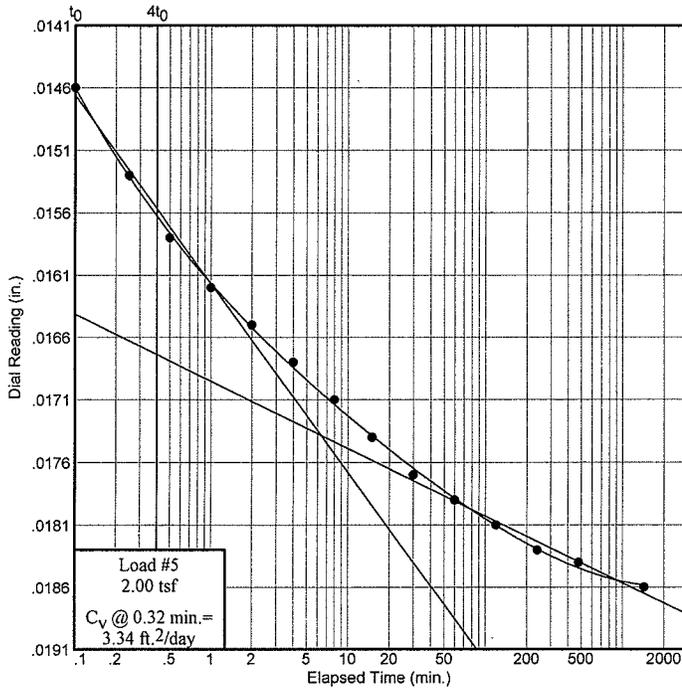
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-08 ST-1

Elev./Depth: 10'-12'



Schnabel Engineering, LLC
 Knoxville, Tennessee

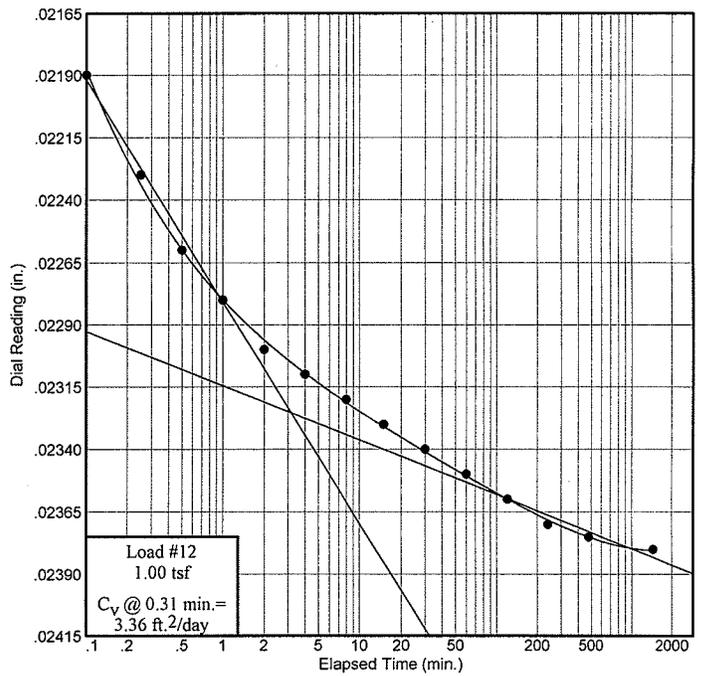
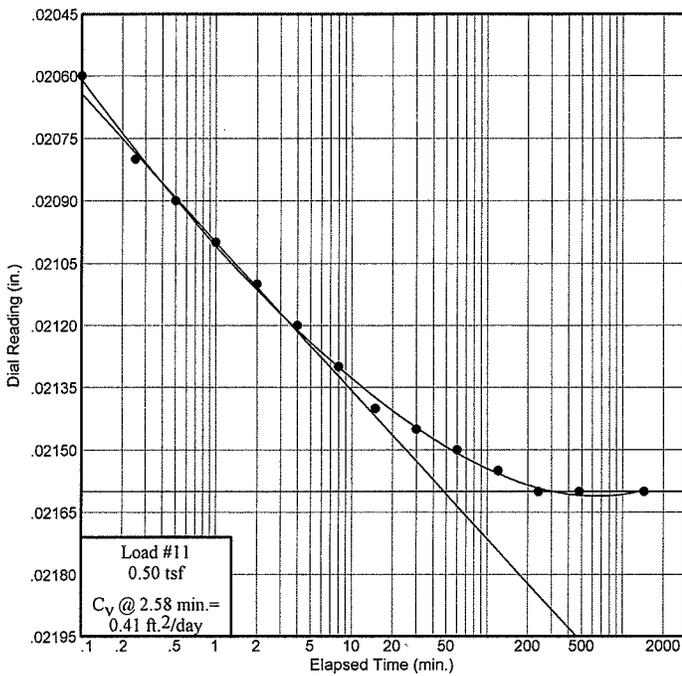
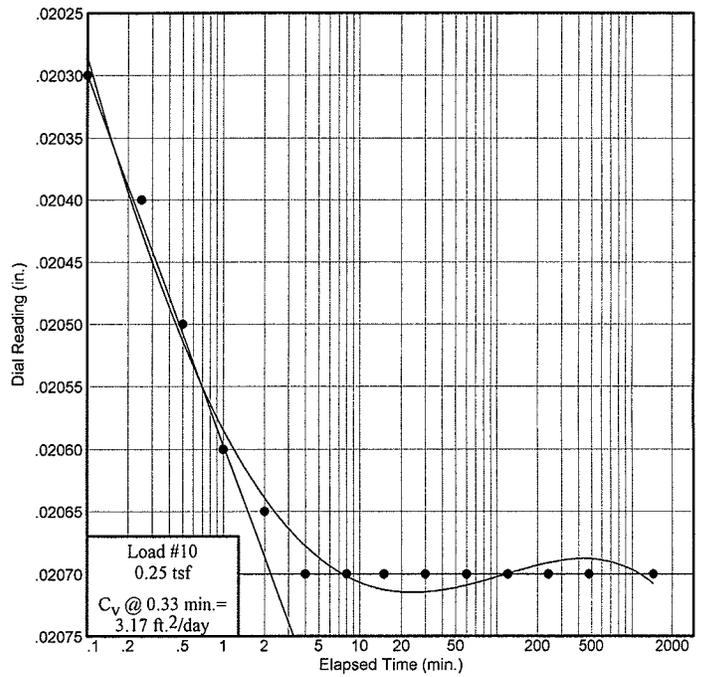
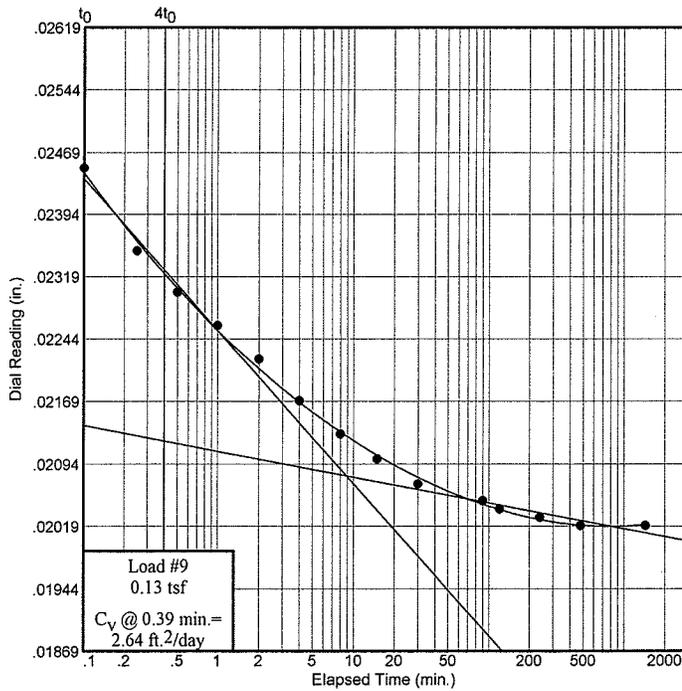
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-08 ST-1

Elev./Depth: 10'-12'



Schnabel Engineering, LLC
 Knoxville, Tennessee

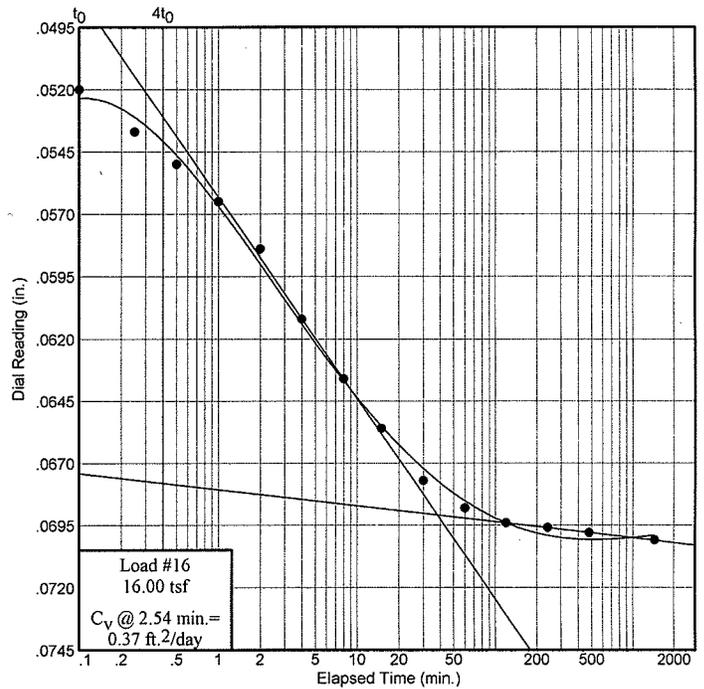
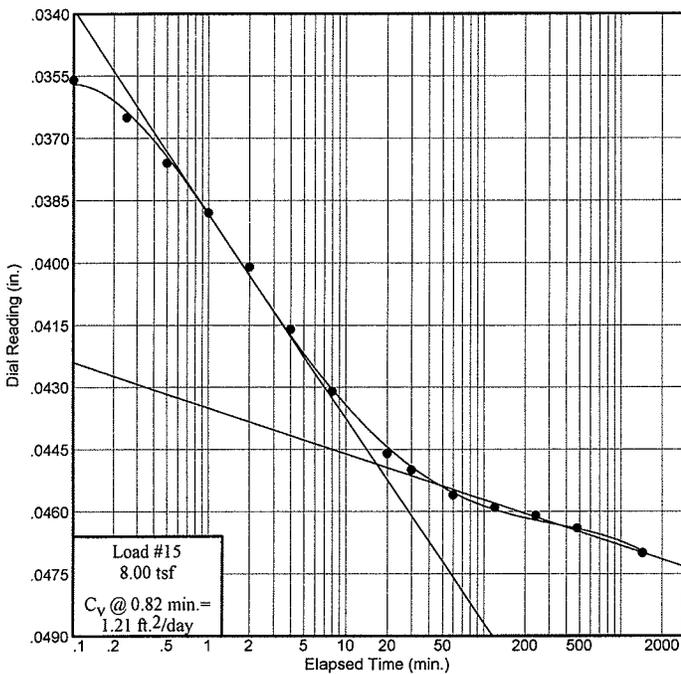
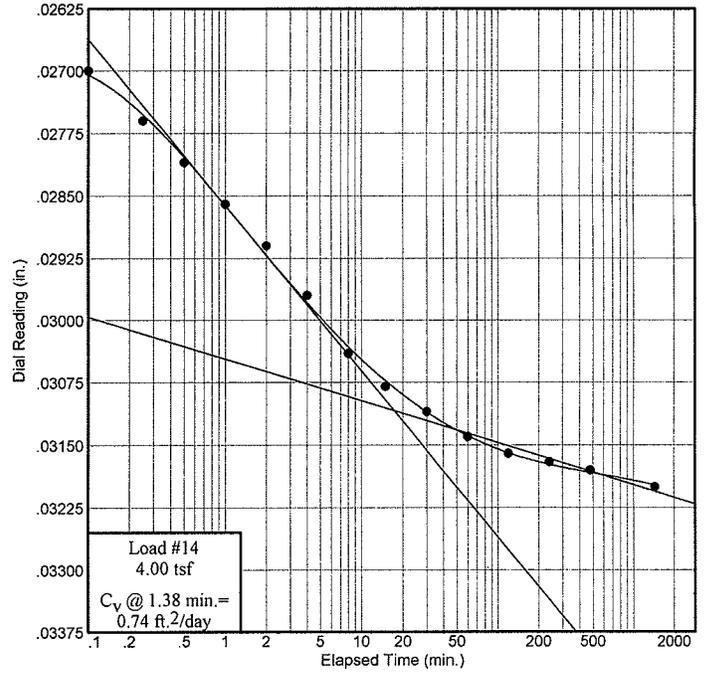
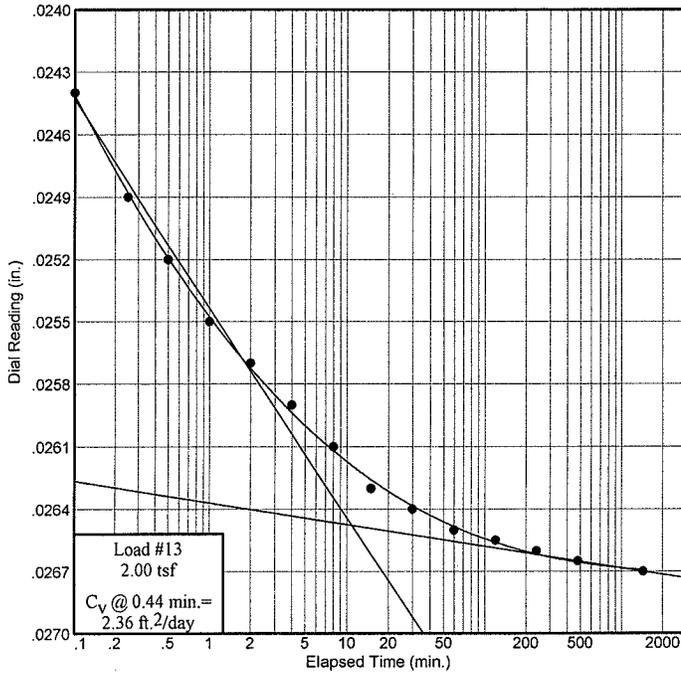
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-08 ST-1

Elev./Depth: 10'-12'



Schnabel Engineering, LLC
 Knoxville, Tennessee

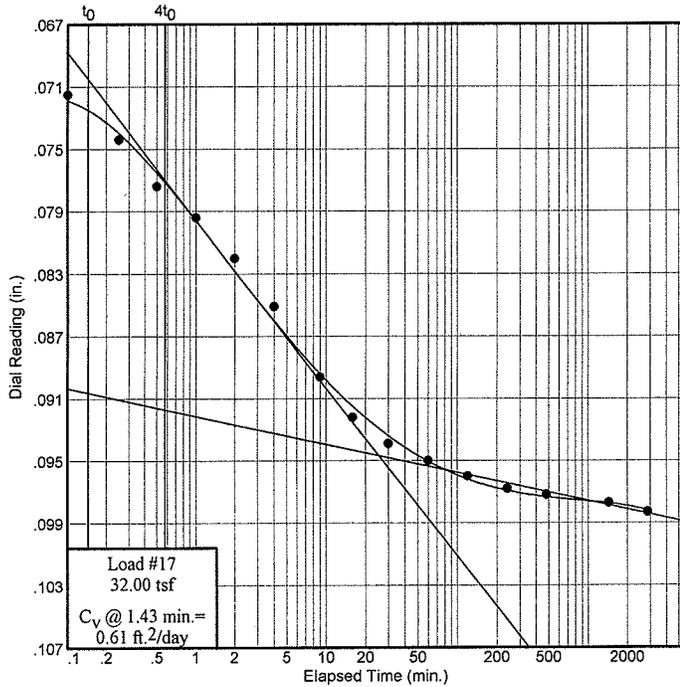
Dial Reading vs. Time

Project No.: 21-15652
Project: Y-12 Outfall 200

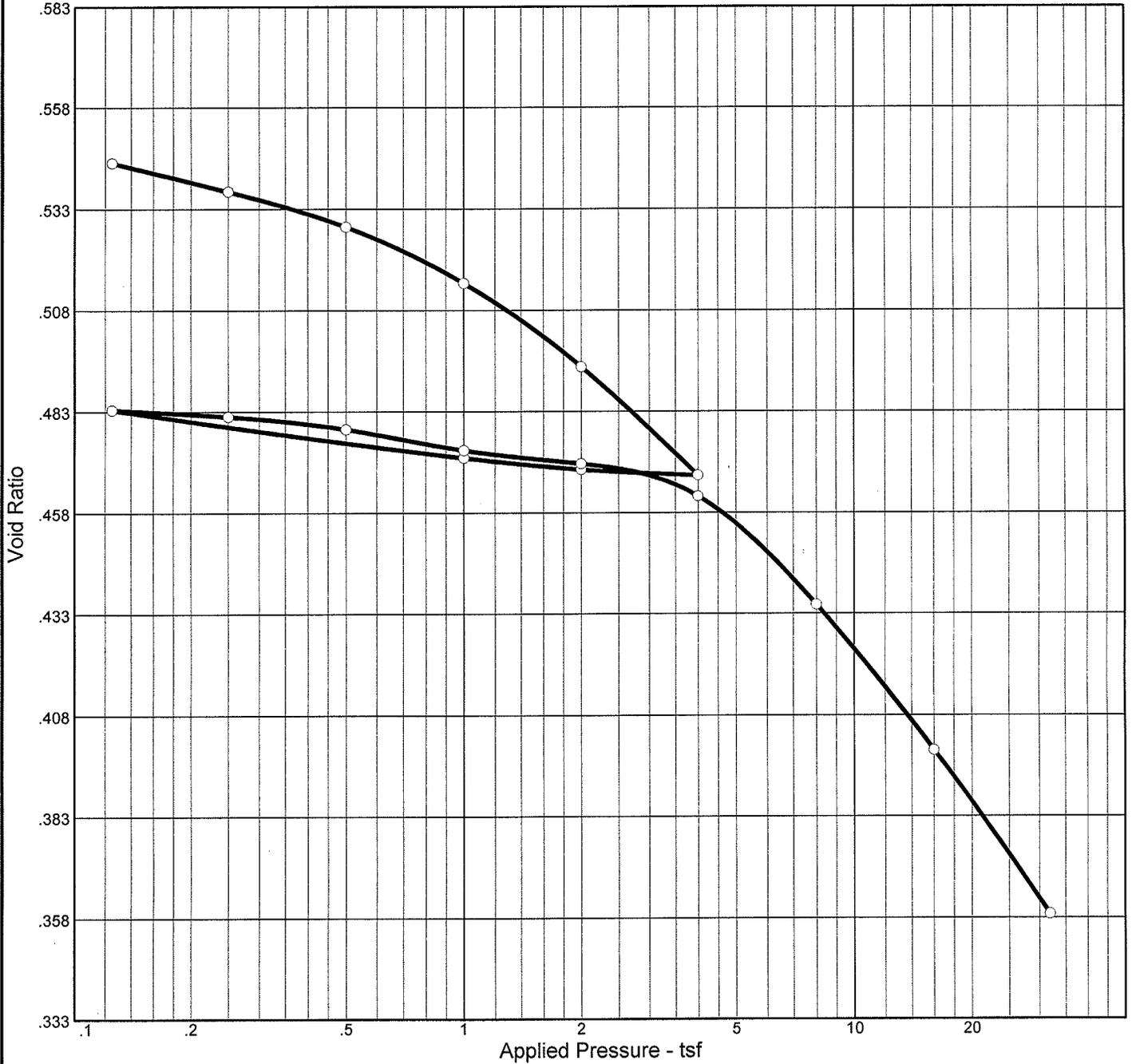
Source:

Sample No.: A-08 ST-1

Elev./Depth: 10'-12'



CONSOLIDATION TEST REPORT



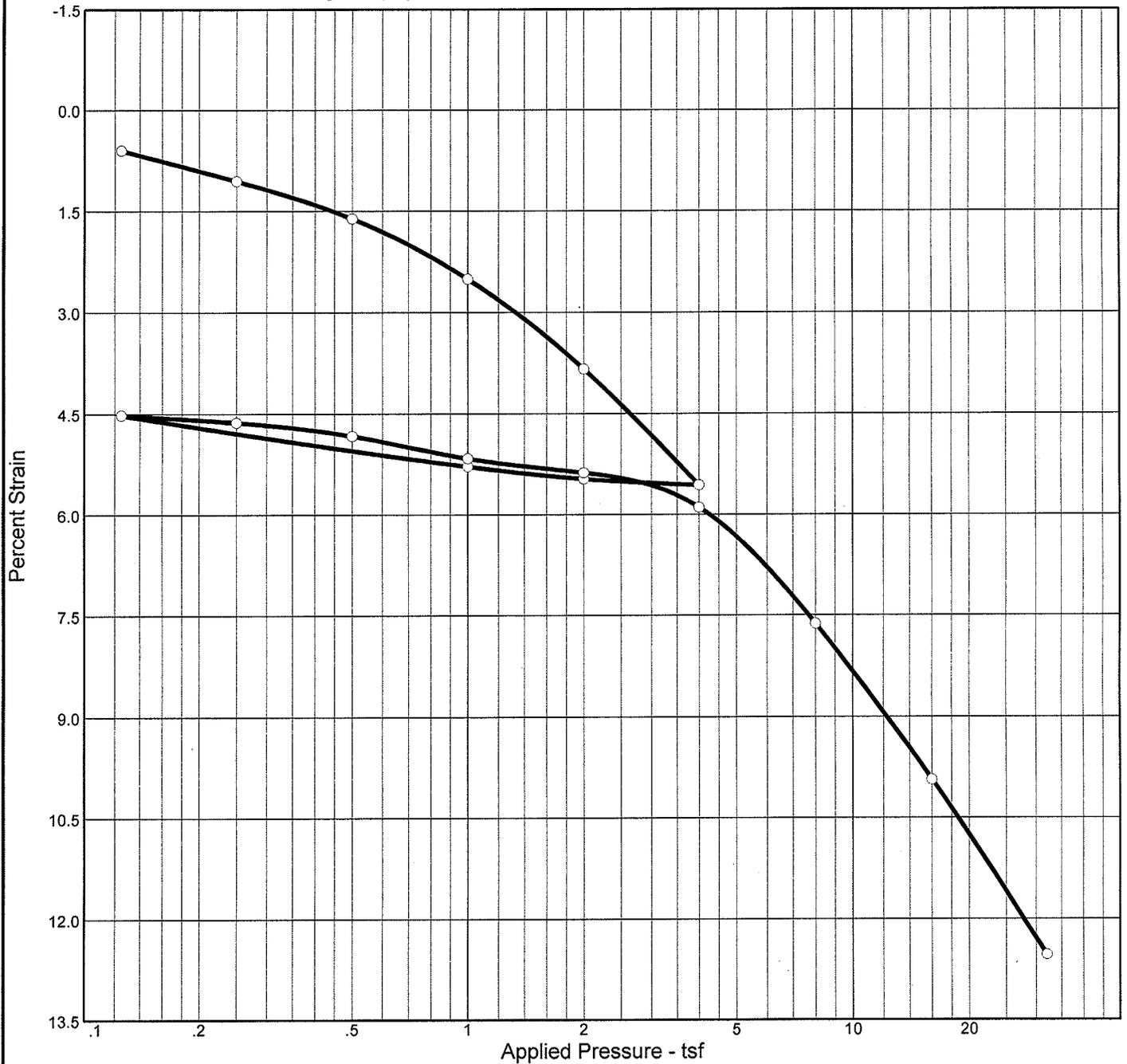
	Natural									
Saturation	Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
92.1 %	19.2 %	106.5	na	na	2.65		2.80	0.13	0.01	0.554

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, light brown w/ rock	--	--

Project No. 21-15652 Project: Y-12 Outfall 200 Source:	Client: GEOServices, LLC Sample No.: A-20 ST-2 Elev./Depth: 9'-11' Schnabel Engineering, LLC Knoxville, Tennessee	Remarks:
---	---	-----------------

Figure 1

CONSOLIDATION TEST REPORT



	Natural									
Saturation	Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
92.1 %	19.2 %	106.5	na	na	2.65	2.80	0.13	0.01	0.554	

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, light brown w/ rock	--	--

Project No. 21-15652 Client: GEOServices, LLC Project: Y-12 Outfall 200 Source: Sample No.: A-20 ST-2 Elev./Depth: 9'-11' <div style="text-align: center; margin-top: 5px;"> Schnabel Engineering, LLC Knoxville, Tennessee </div>	Remarks: <div style="text-align: right; margin-top: 20px;">Figure 1</div>
--	---

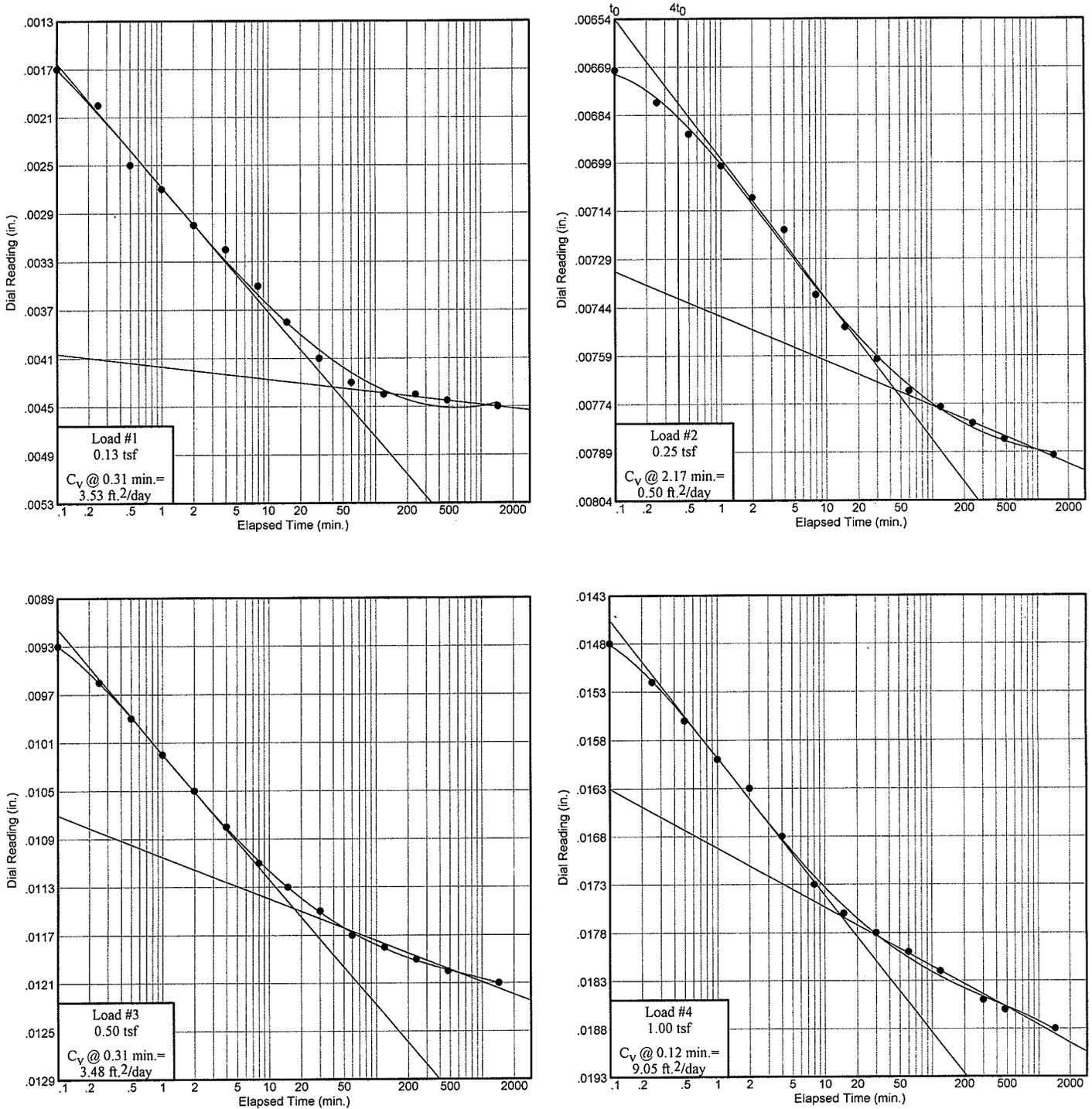
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-20 ST-2

Elev./Depth: 9'-11'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 2

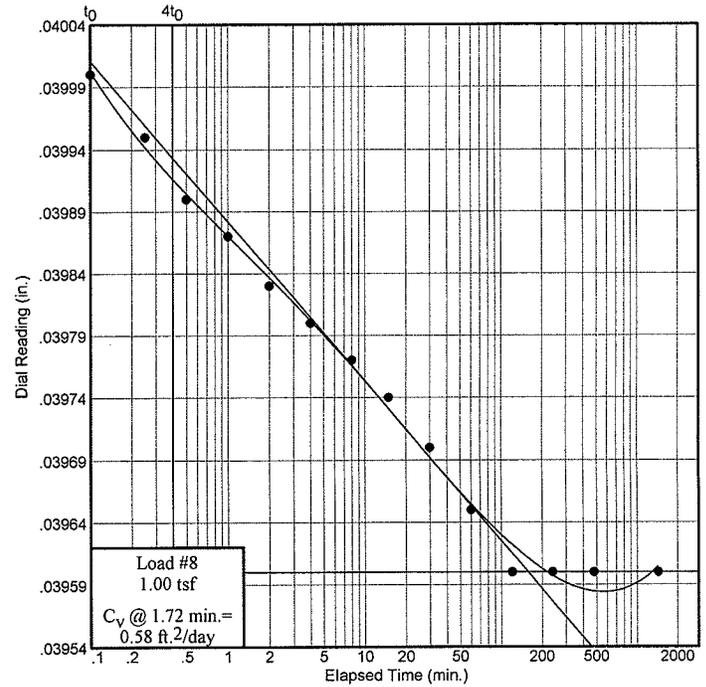
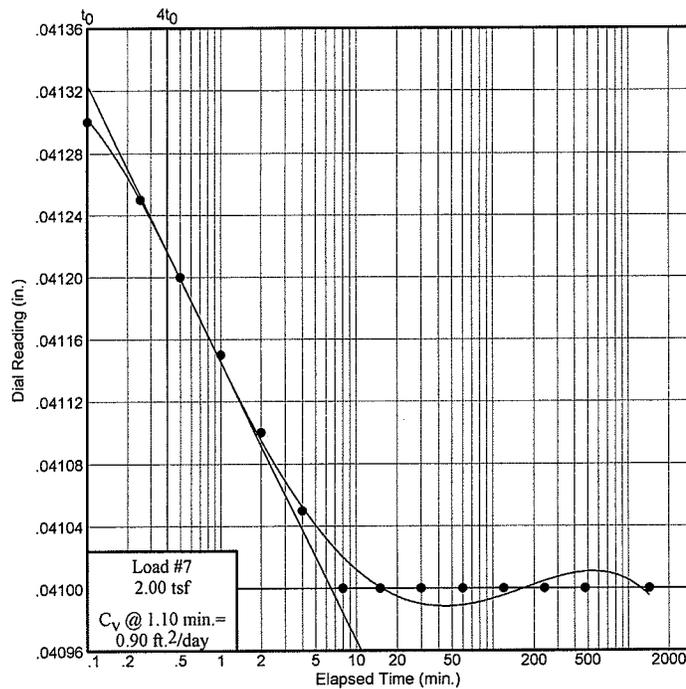
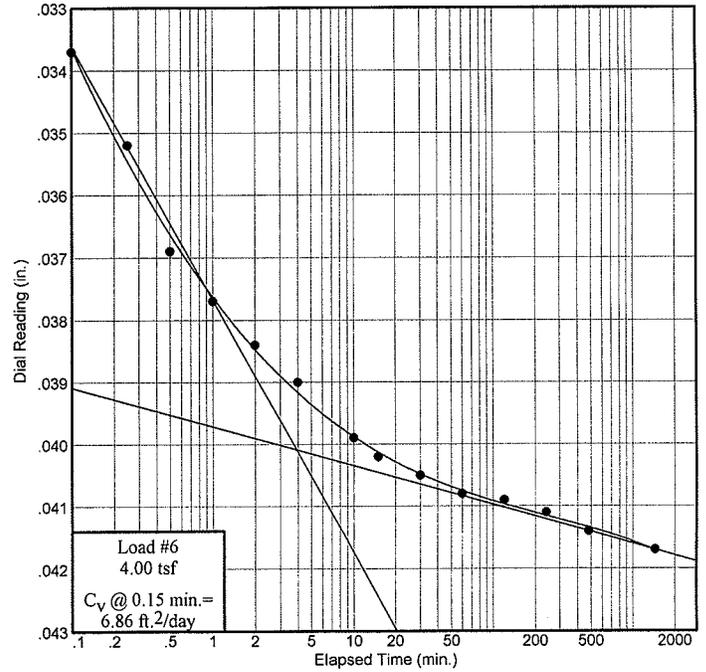
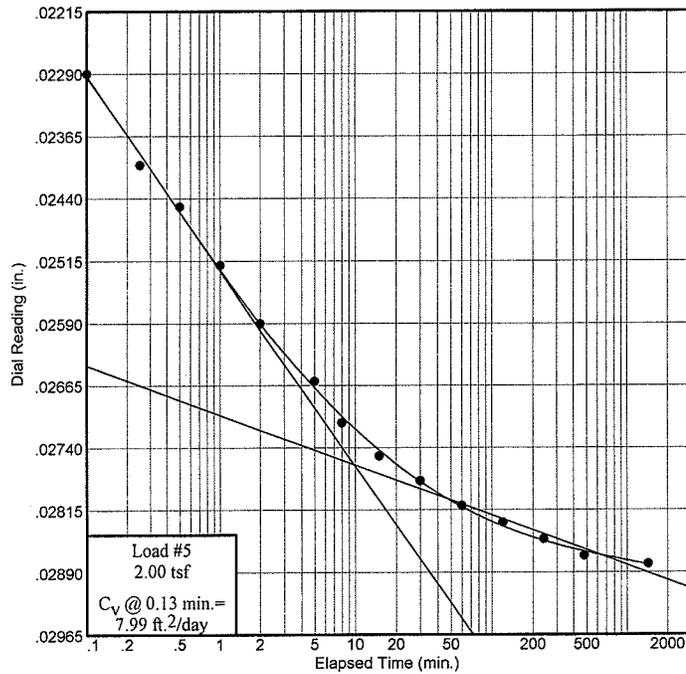
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-20 ST-2

Elev./Depth: 9'-11'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 3

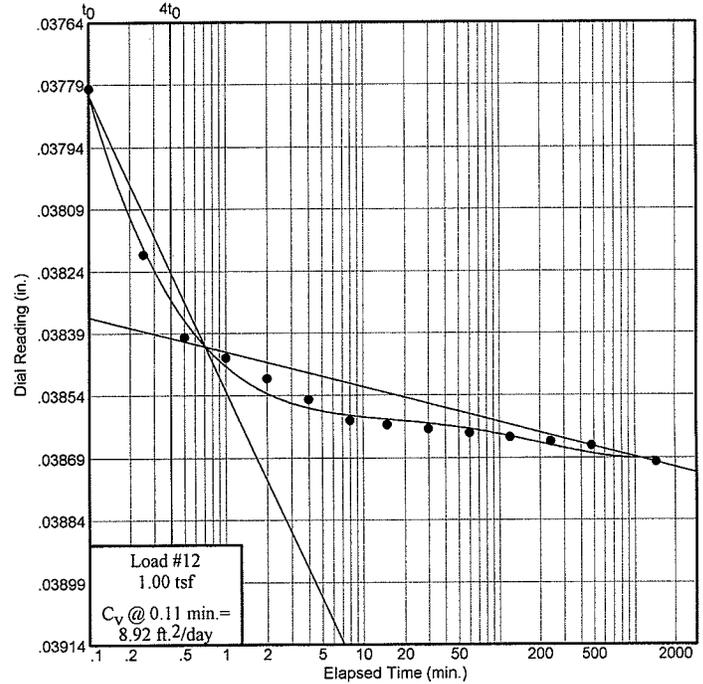
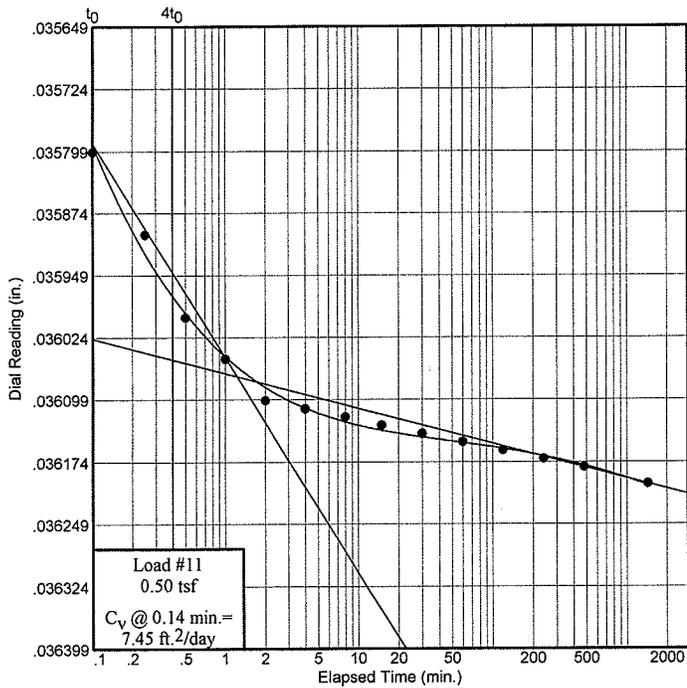
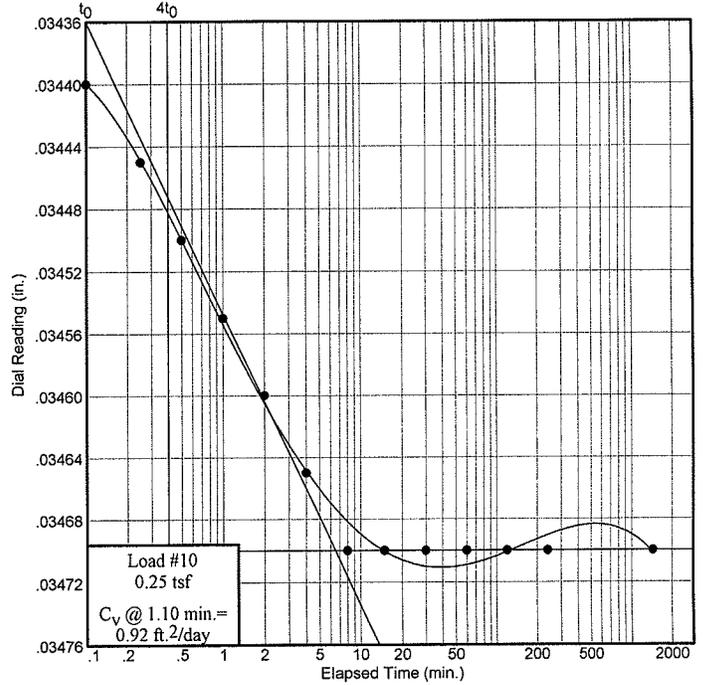
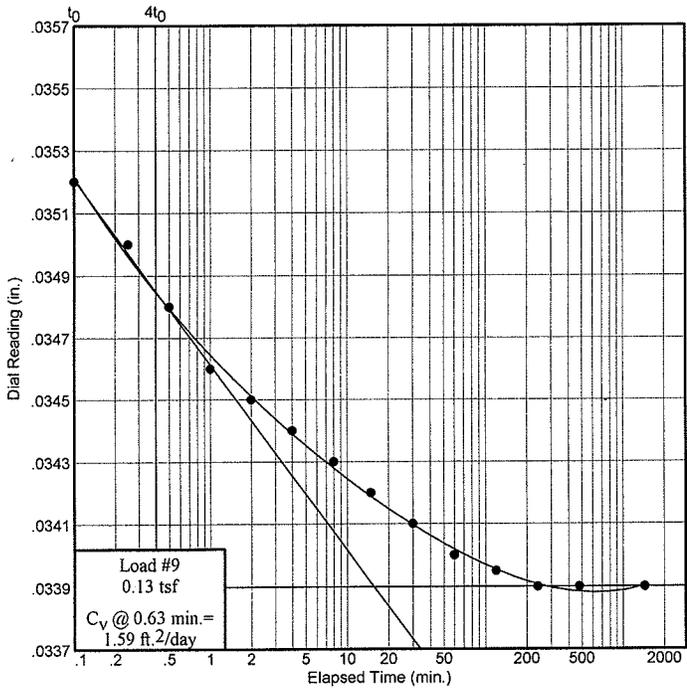
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-20 ST-2

Elev./Depth: 9'-11'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 4

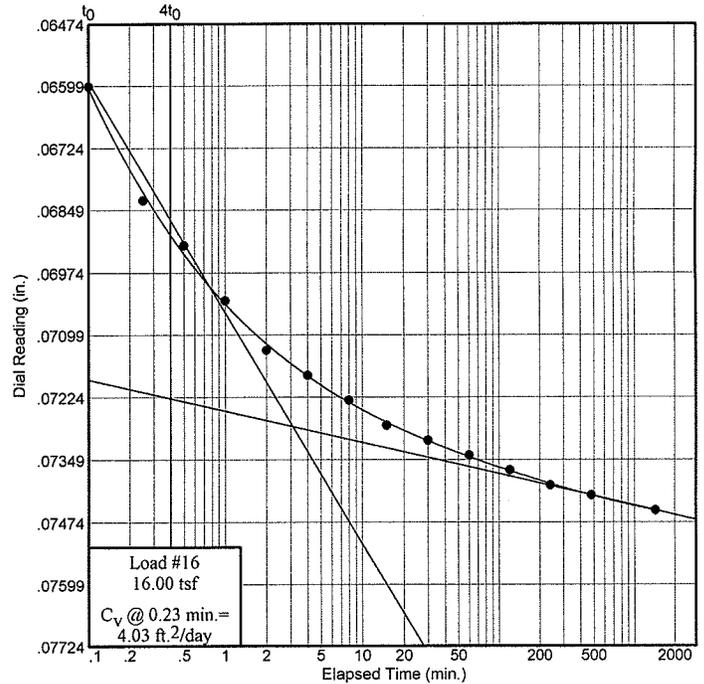
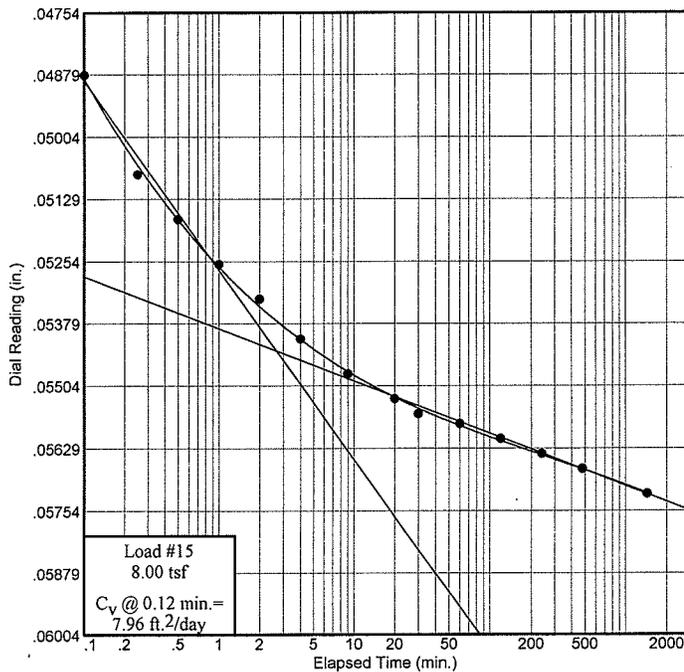
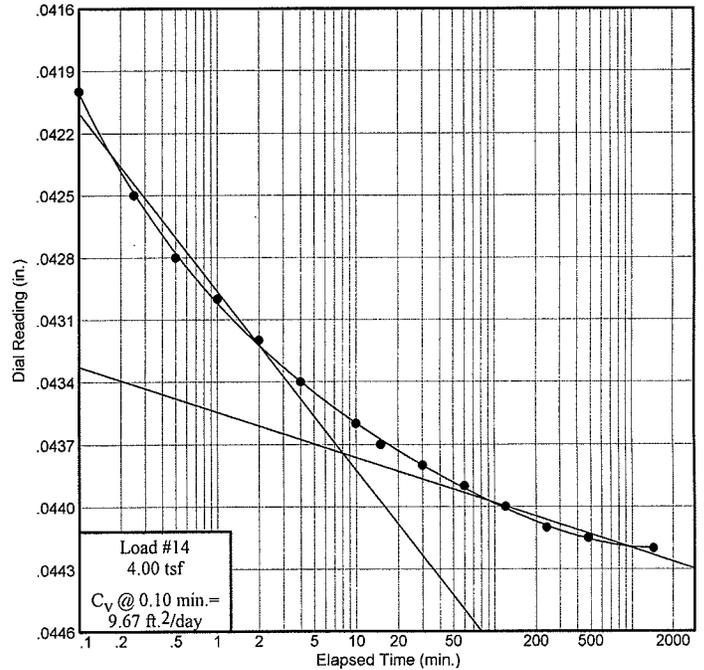
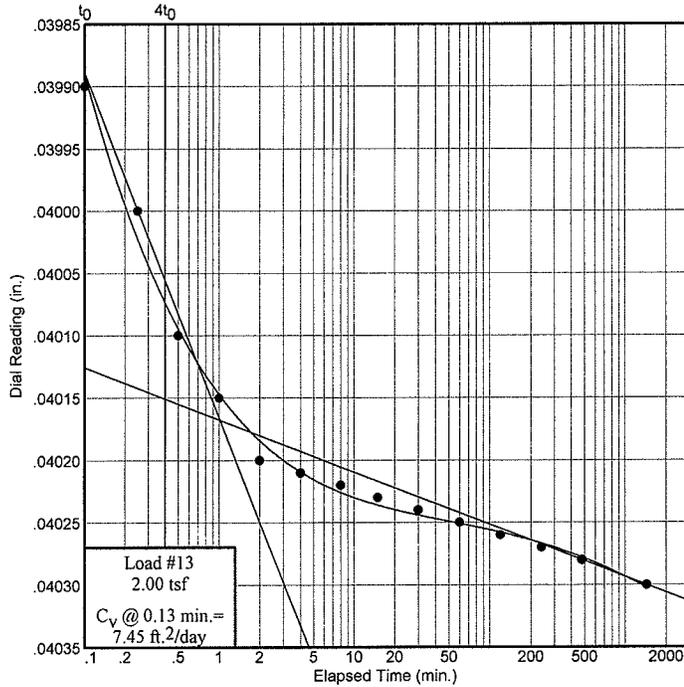
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-20 ST-2

Elev./Depth: 9'-11"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 5

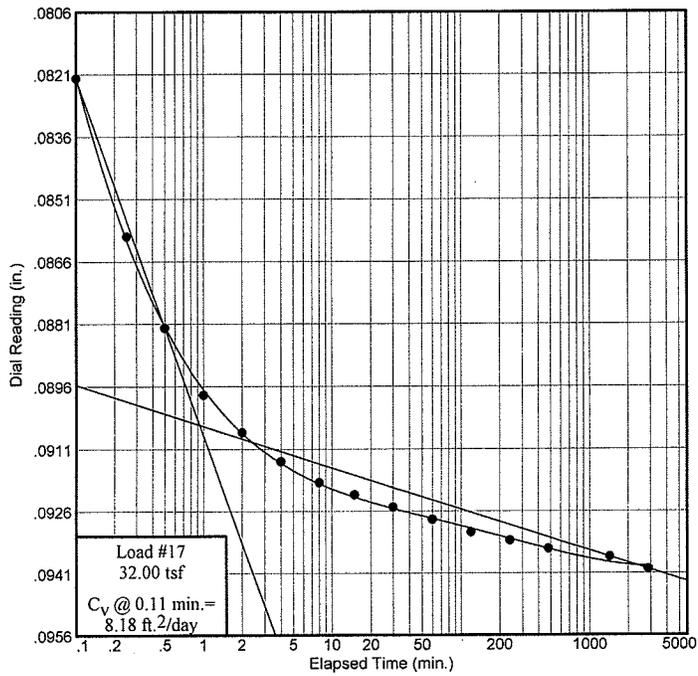
Dial Reading vs. Time

Project No.: 21-15652
Project: Y-12 Outfall 200

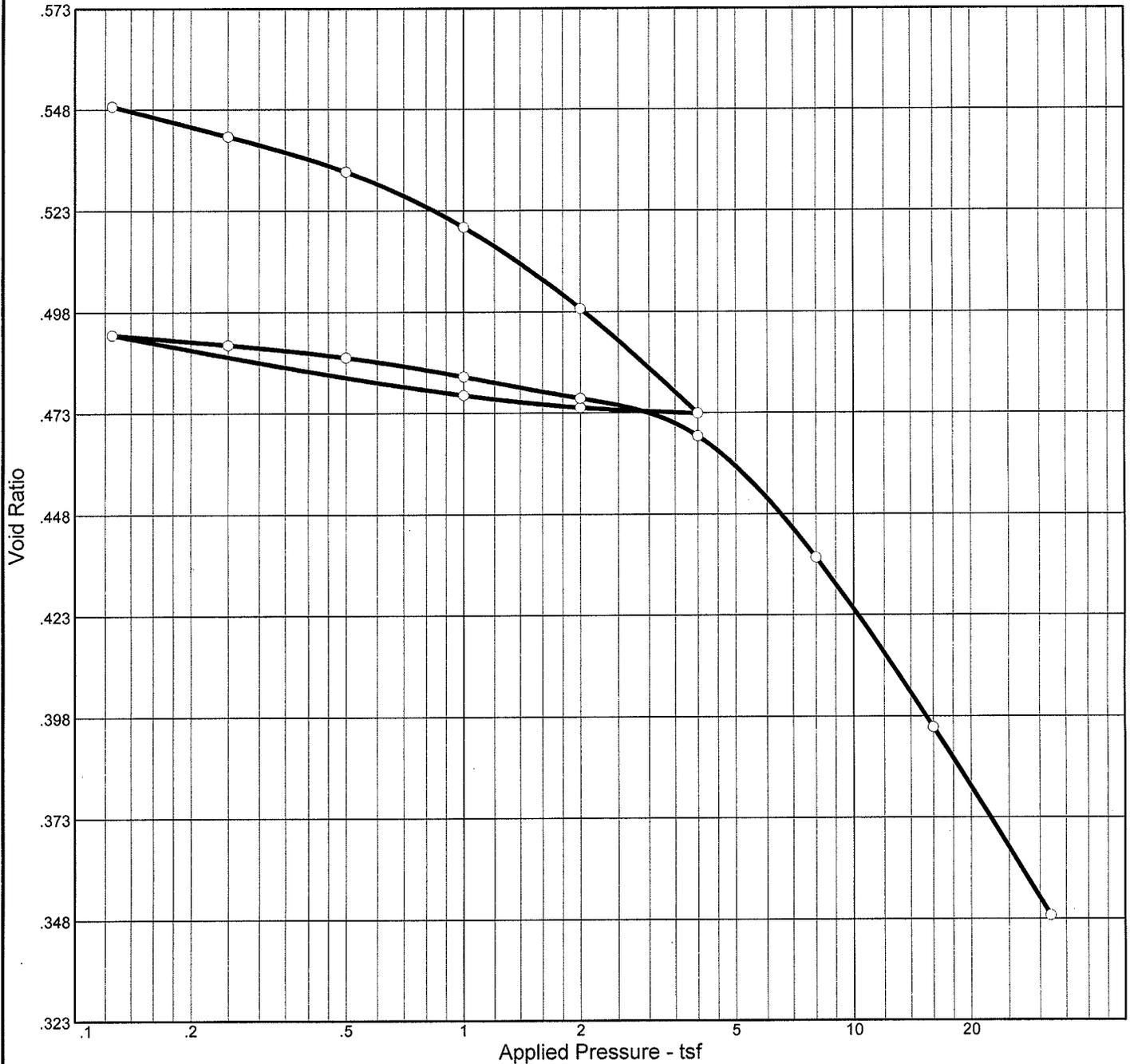
Source:

Sample No.: A-20 ST-2

Elev./Depth: 9'-11'



CONSOLIDATION TEST REPORT

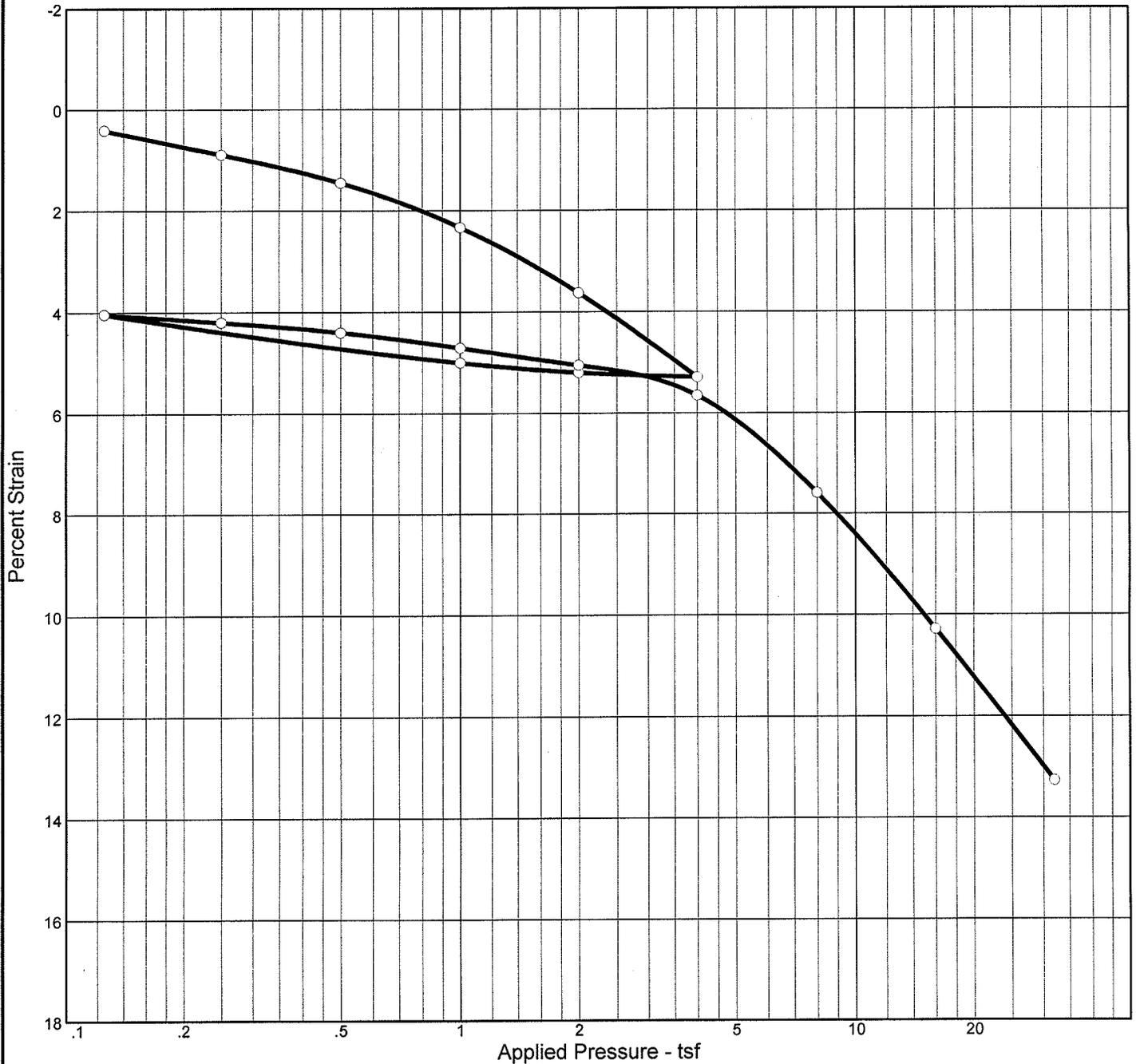


	Natural	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
Saturation	Moisture									
	98.4 %	106.4	na	na	2.65		5.71	0.15	0.01	0.555

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, brown w/rock	--	--

Project No. 21-15652 Client: GEOServices, LLC Project: Y-12 Outfall 200 Source: Sample No.: A-22 ST-1 Elev./Depth: 5'-7' Schnabel Engineering, LLC Knoxville, Tennessee	Remarks: <div style="text-align: right;">Figure 1</div>
---	---

CONSOLIDATION TEST REPORT



	Natural									
Saturation	Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
98.4 %	20.6 %	106.4	na	na	2.65		5.71	0.15	0.01	0.555

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, brown w/rock	--	--

Project No. 21-15652 Project: Y-12 Outfall 200 Source:	Client: GEOServices, LLC Sample No.: A-22 ST-1 Elev./Depth: 5'-7' Schnabel Engineering, LLC Knoxville, Tennessee	Remarks: <div style="text-align: right;">Figure 1</div>
---	--	---

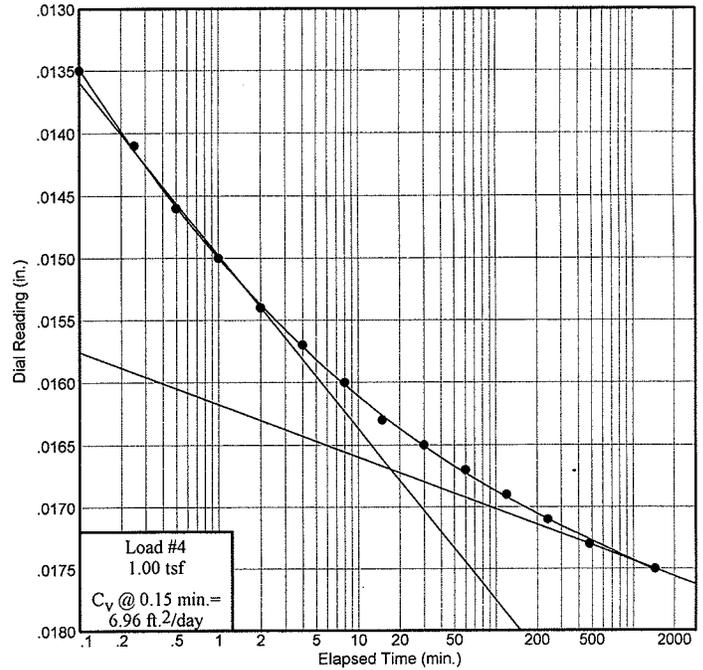
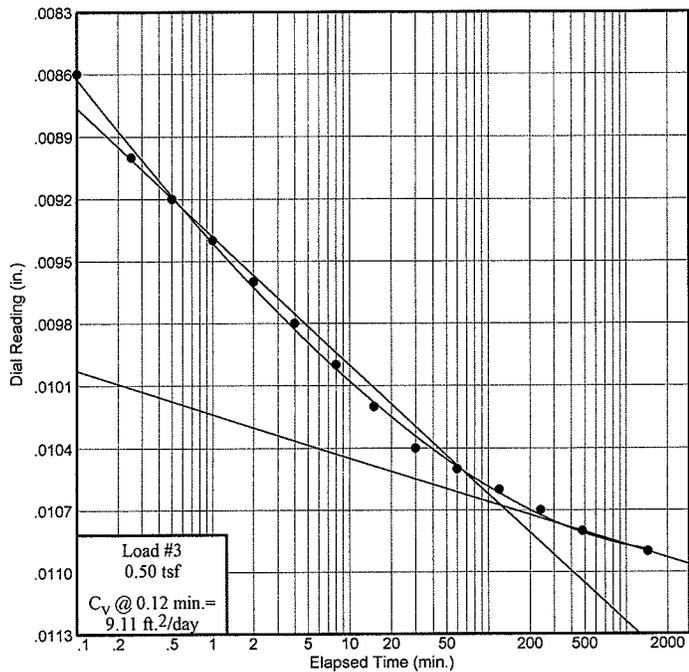
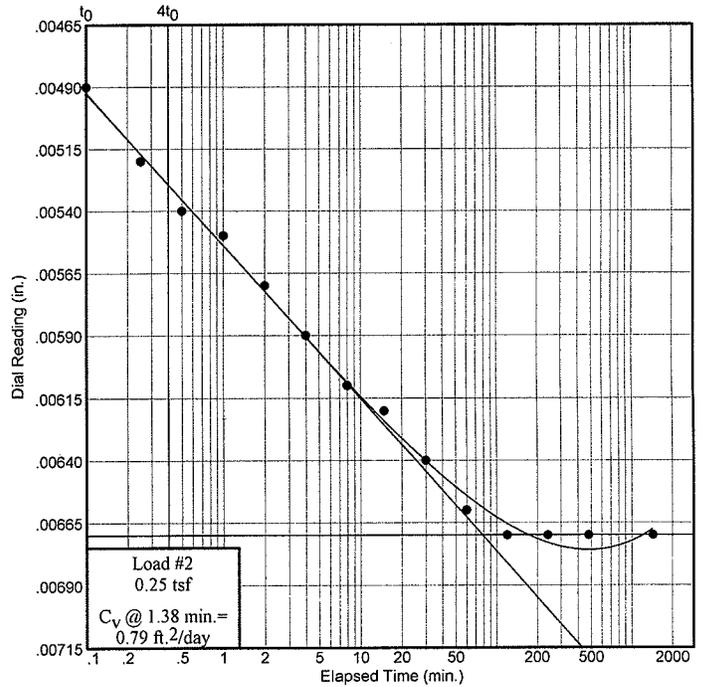
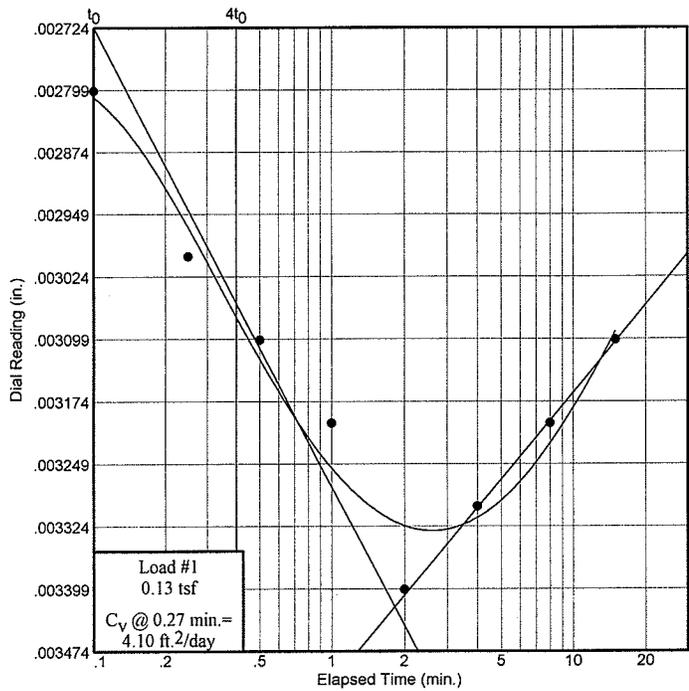
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-22 ST-1

Elev./Depth: 5'-7"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 2

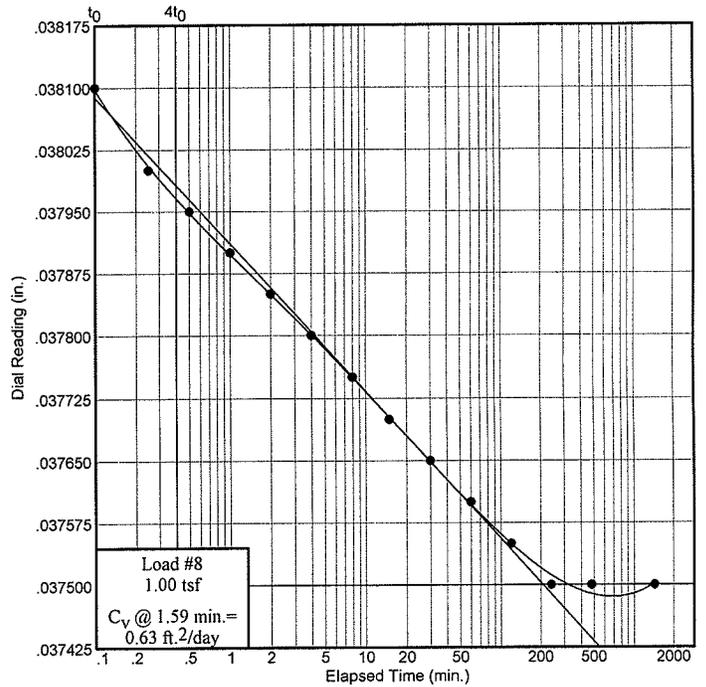
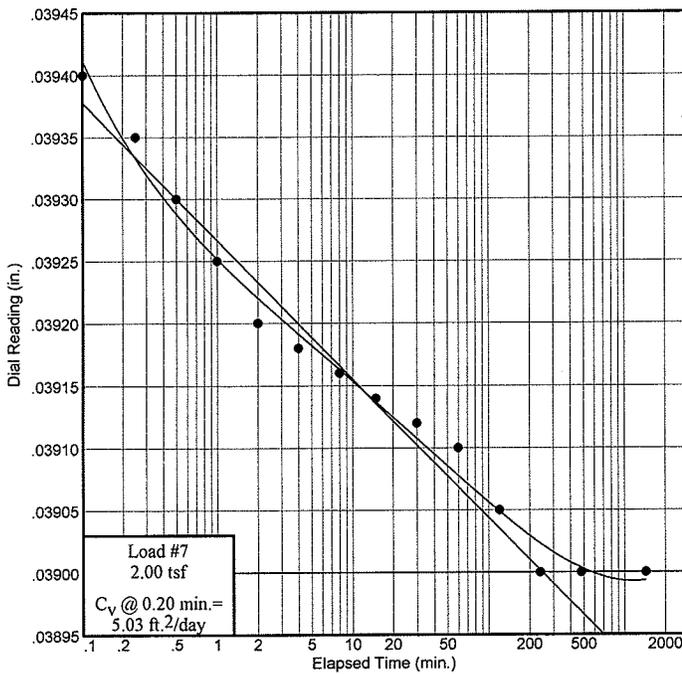
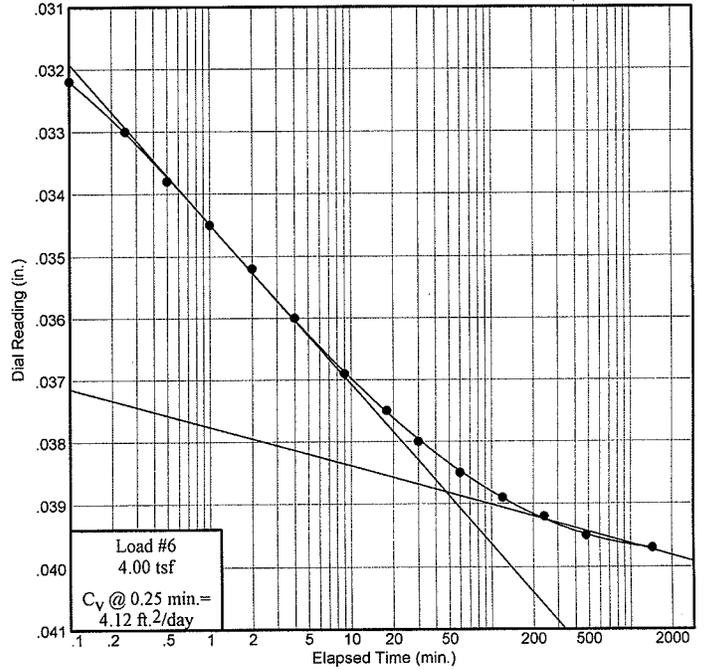
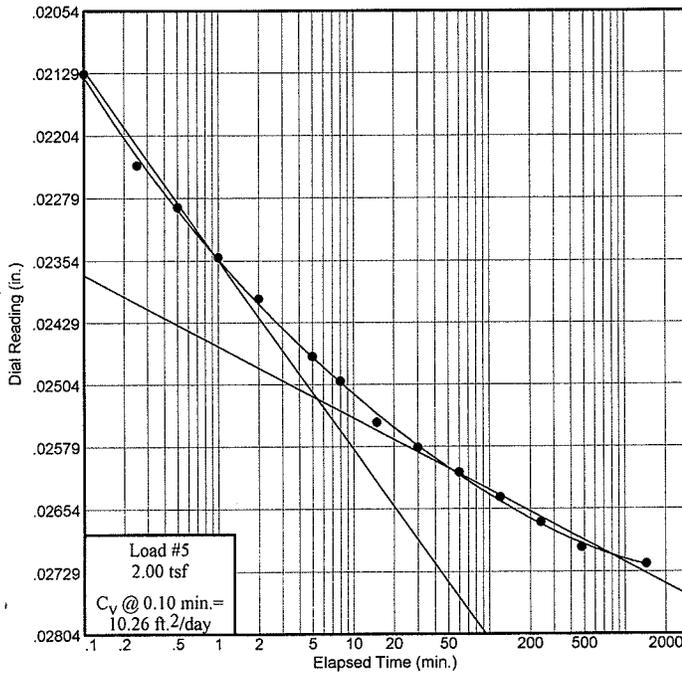
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-22 ST-1

Elev./Depth: 5'-7'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 3

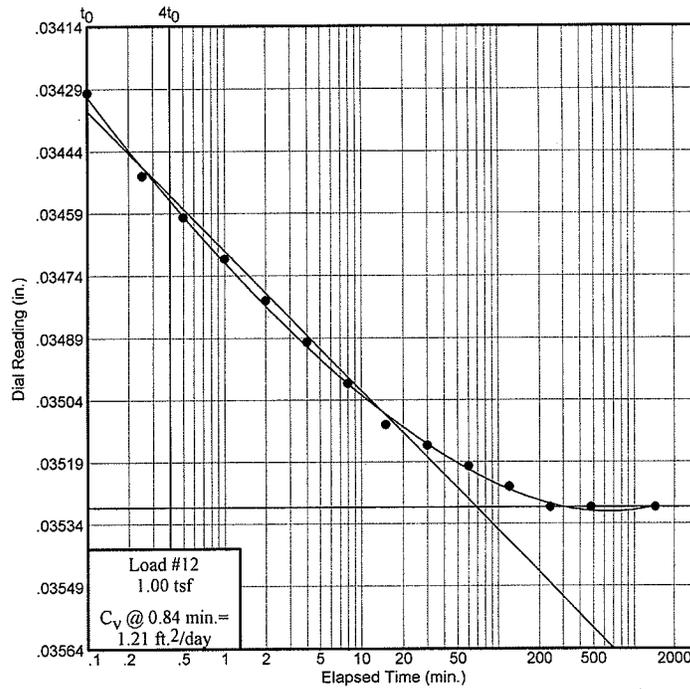
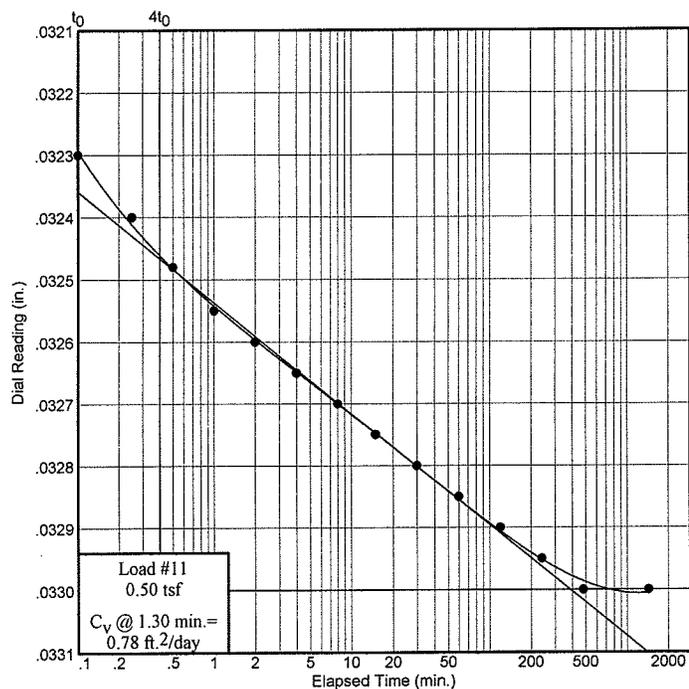
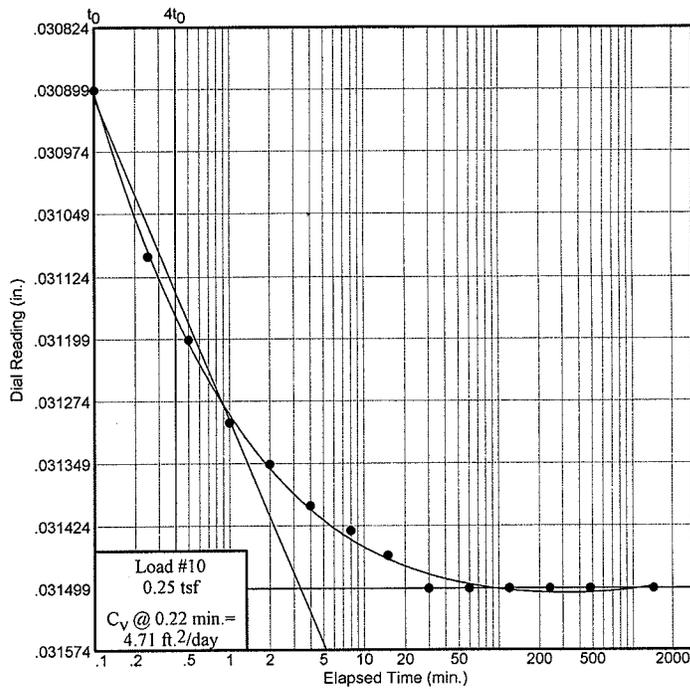
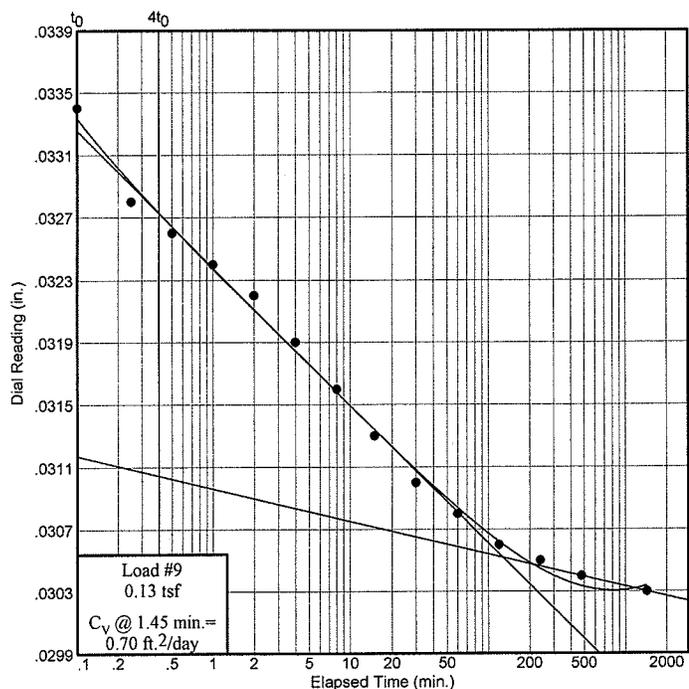
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-22 ST-1

Elev./Depth: 5'-7"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 4

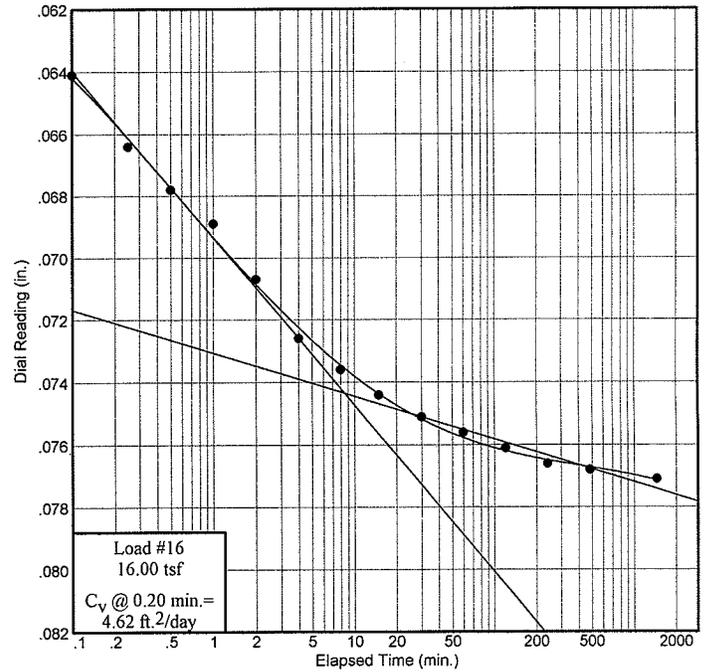
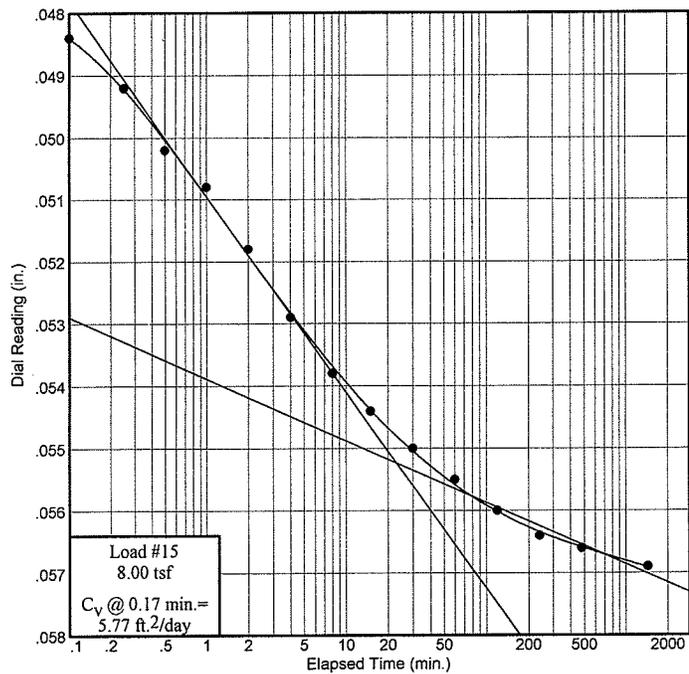
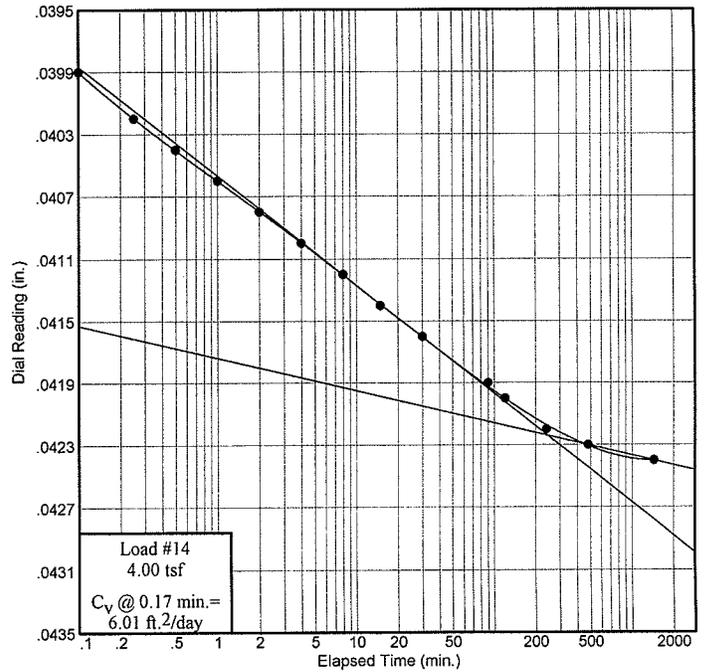
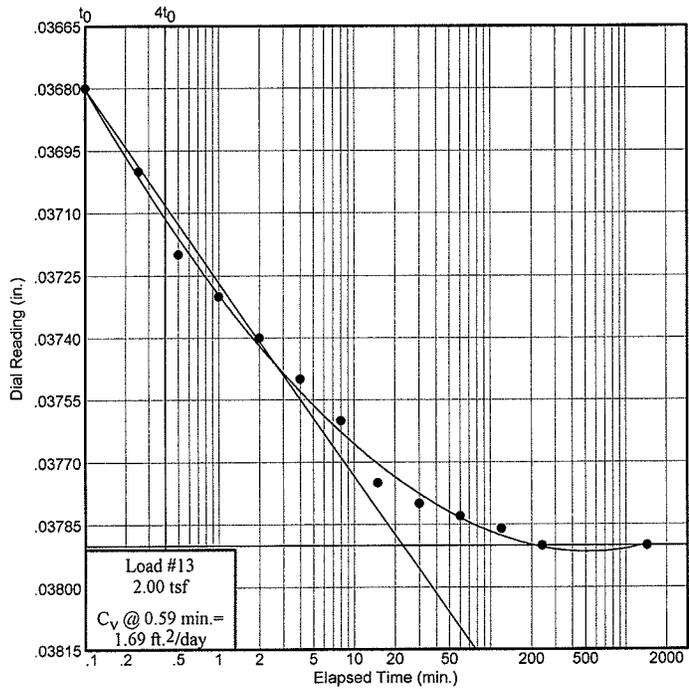
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-22 ST-1

Elev./Depth: 5'-7'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 5

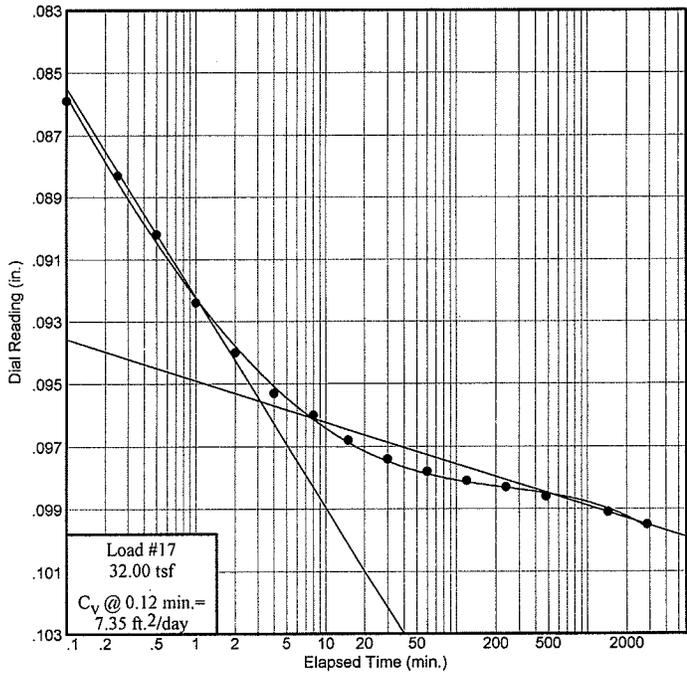
Dial Reading vs. Time

Project No.: 21-15652
Project: Y-12 Outfall 200

Source:

Sample No.: A-22 ST-1

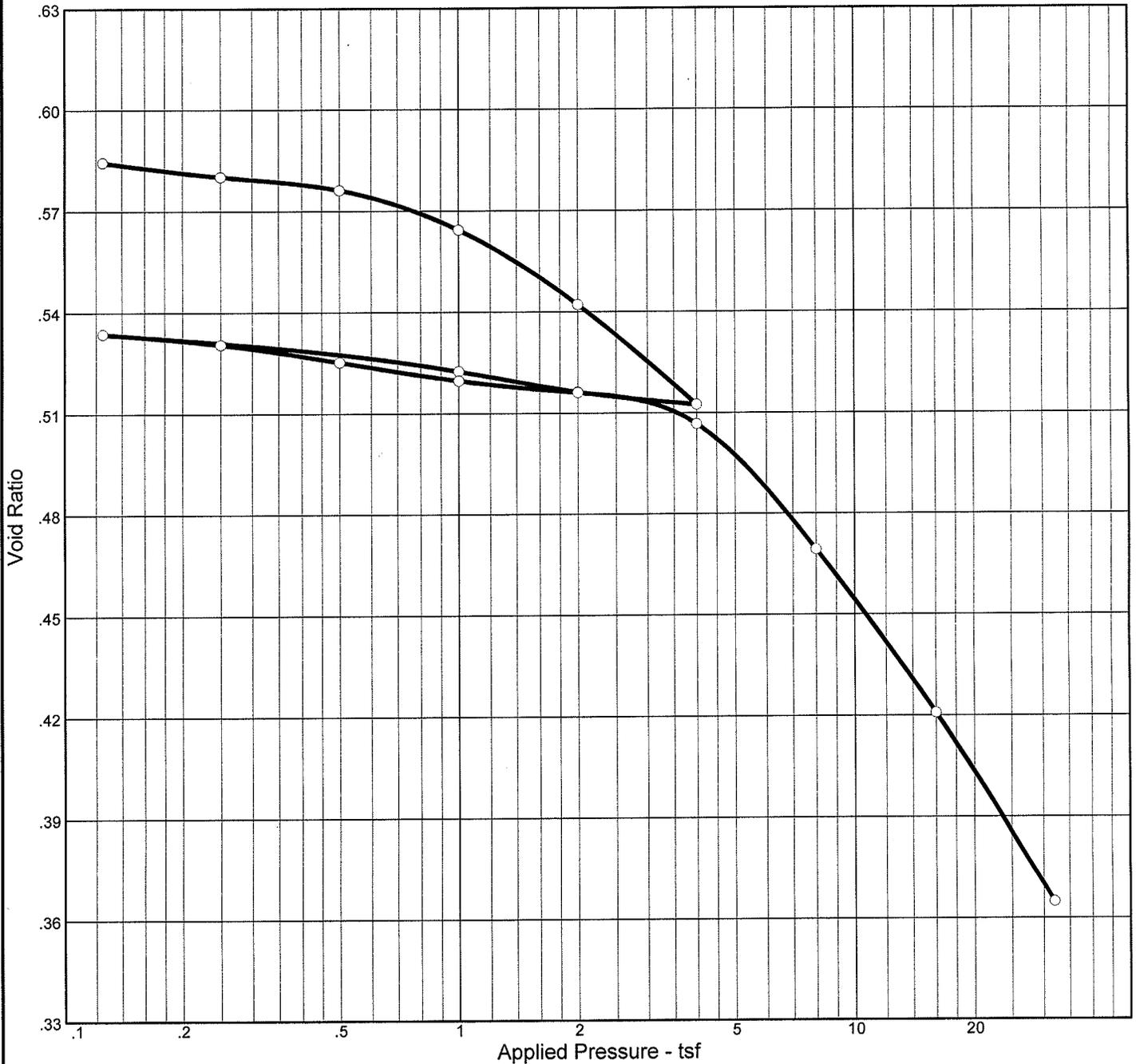
Elev./Depth: 5'-7'



Schnabel Engineering, LLC
Knoxville, Tennessee

Figure 6

CONSOLIDATION TEST REPORT



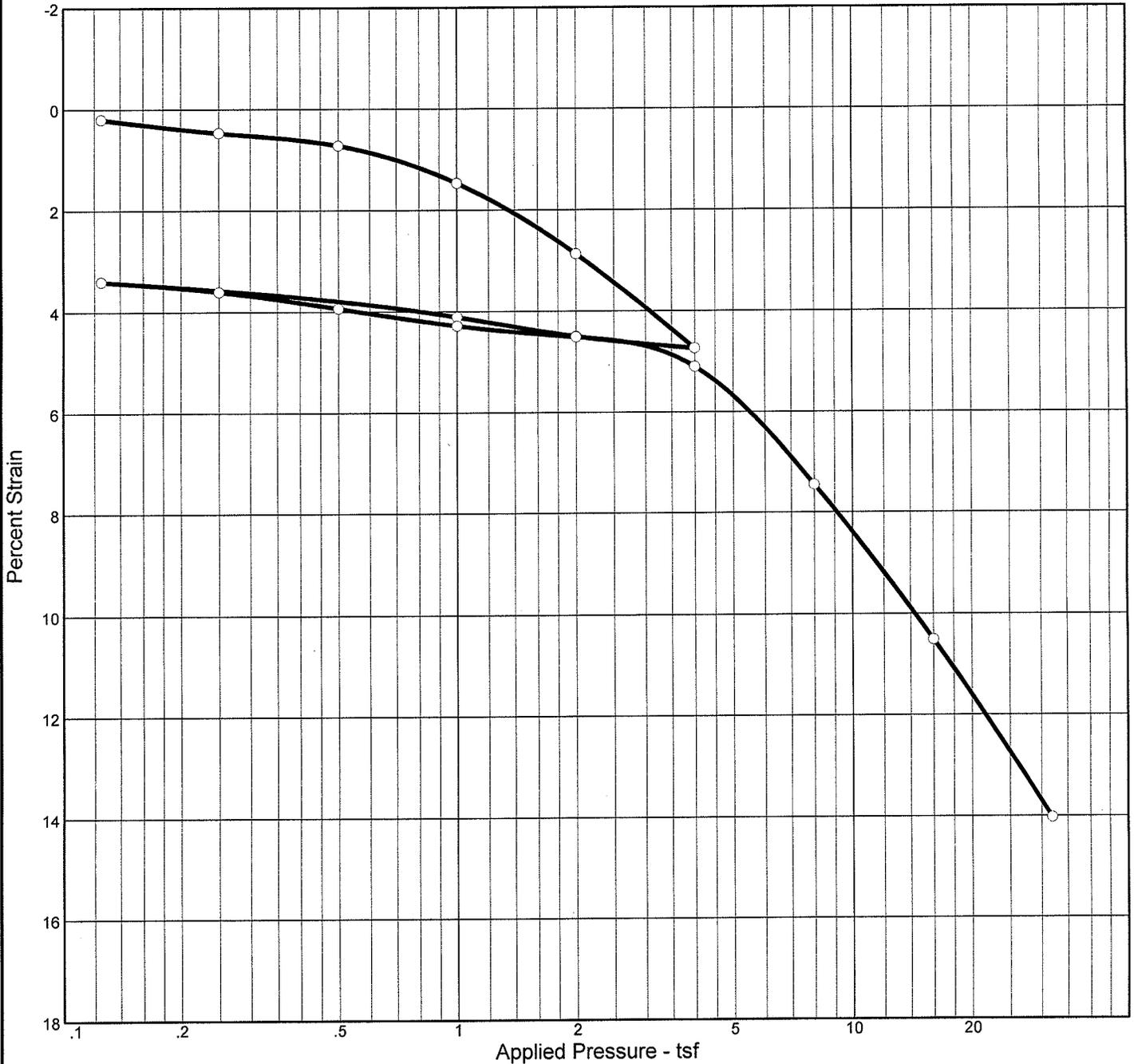
Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P_c (tsf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
93.1 %	20.7 %	105.6	35	16	2.65		5.96	0.19	0.02	0.588

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, light brown, mottled gray w/rock	--	--

Project No. 21-15652 Client: GEOServices, LLC Project: Y-12 Outfall 200 Source: Sample No.: A-22 ST-2 Elev./Depth: 7'-9' <div style="text-align: center;">Schnabel Engineering, LLC Knoxville, Tennessee</div>	Remarks:
---	---

Figure 1

CONSOLIDATION TEST REPORT



	Natural	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
Saturation	Moisture									
	93.1 %	105.6	35	16	2.65		5.96	0.19	0.02	0.588

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, light brown, mottled gray w/rock	--	--

Project No. 21-15652 Client: GEOServices, LLC Project: Y-12 Outfall 200 Source: Sample No.: A-22 ST-2 Elev./Depth: 7'-9' <div style="text-align: center;">Schnabel Engineering, LLC Knoxville, Tennessee</div>	Remarks: <div style="text-align: right;">Figure 1</div>
---	---

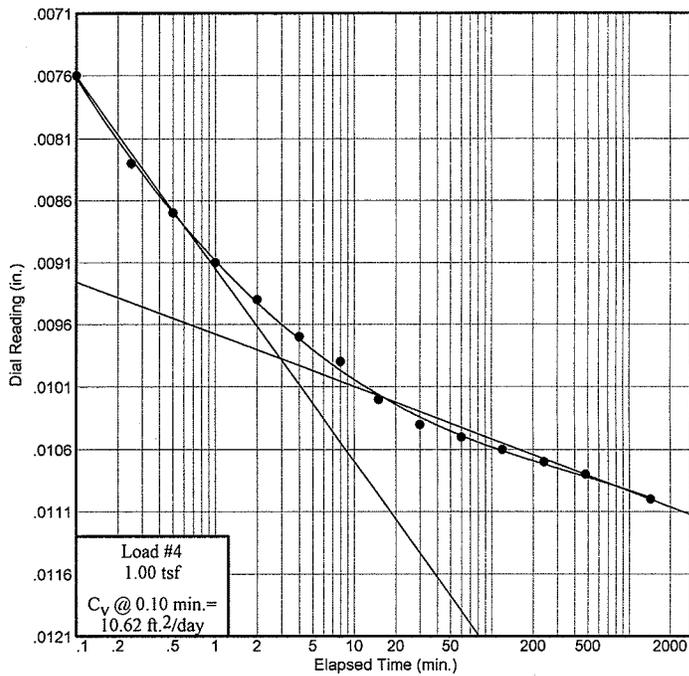
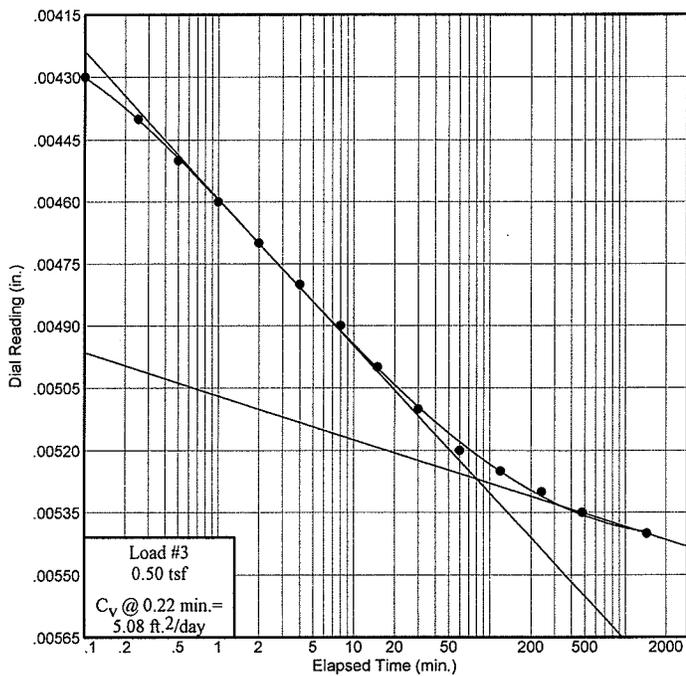
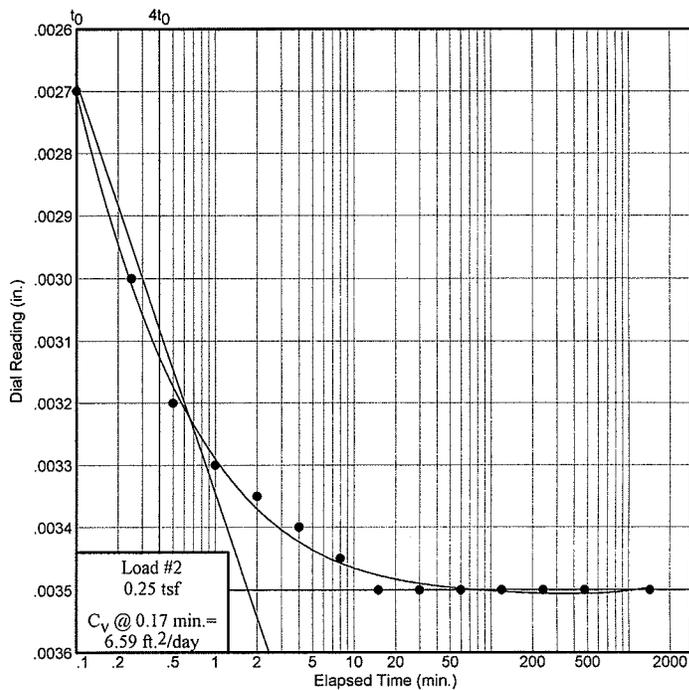
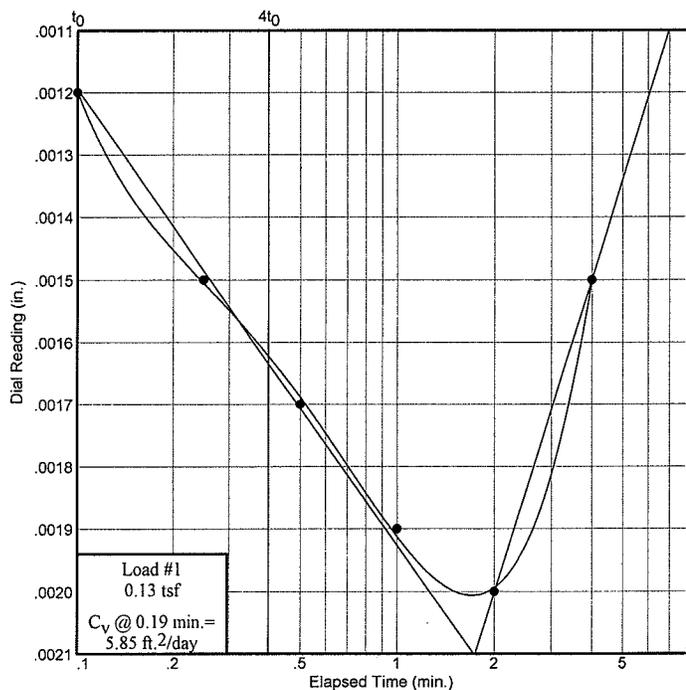
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-22 ST-2

Elev./Depth: 7'-9"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 2

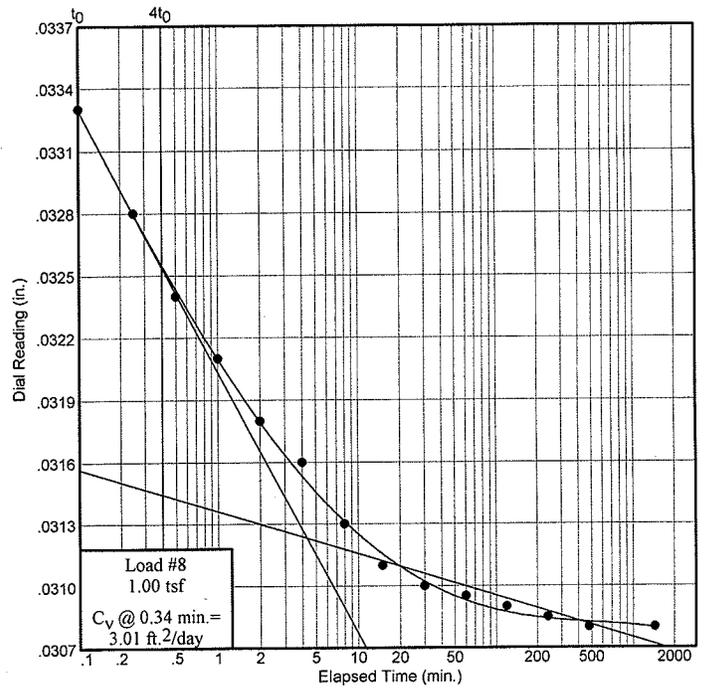
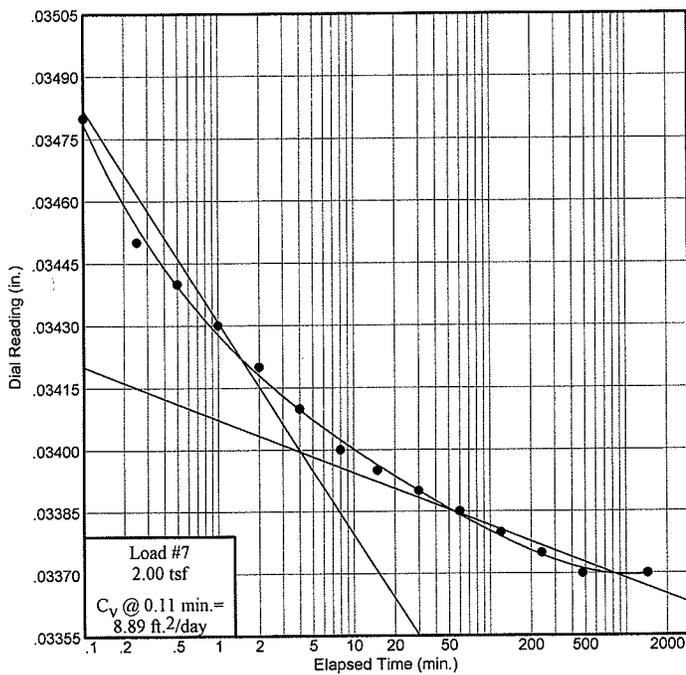
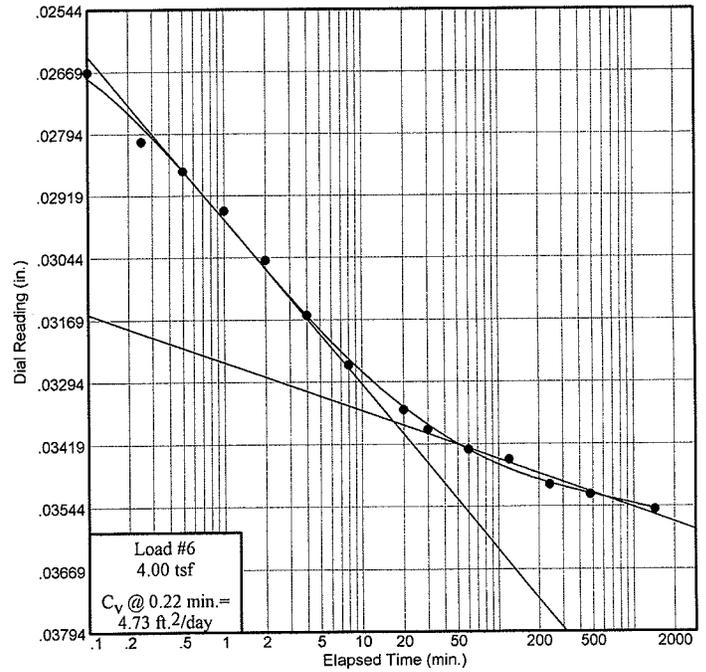
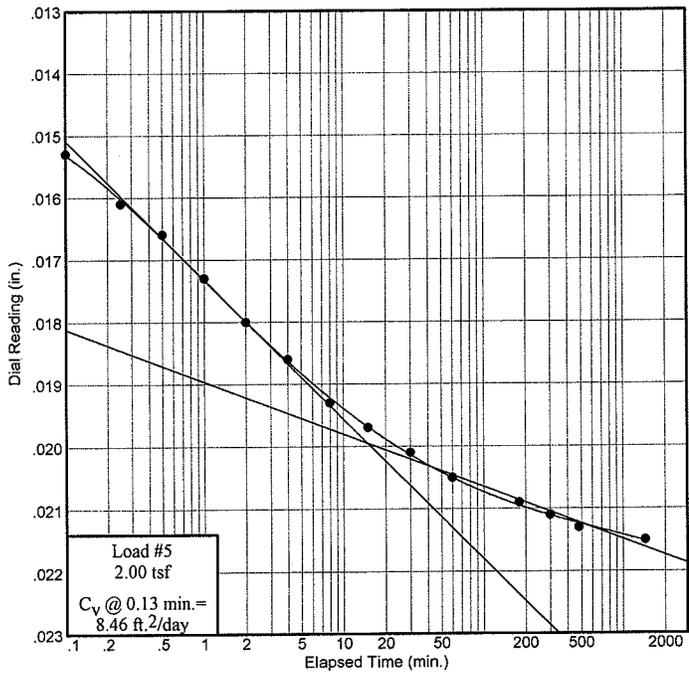
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-22 ST-2

Elev./Depth: 7'-9"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 3

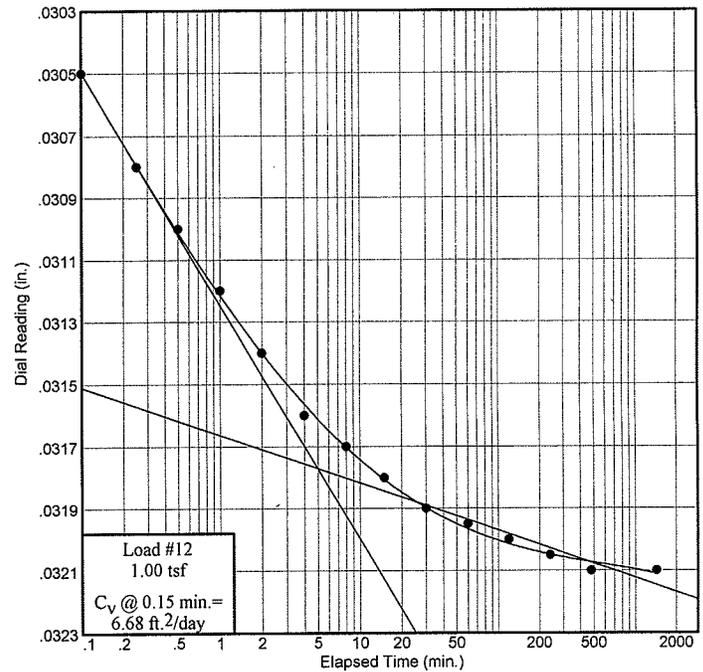
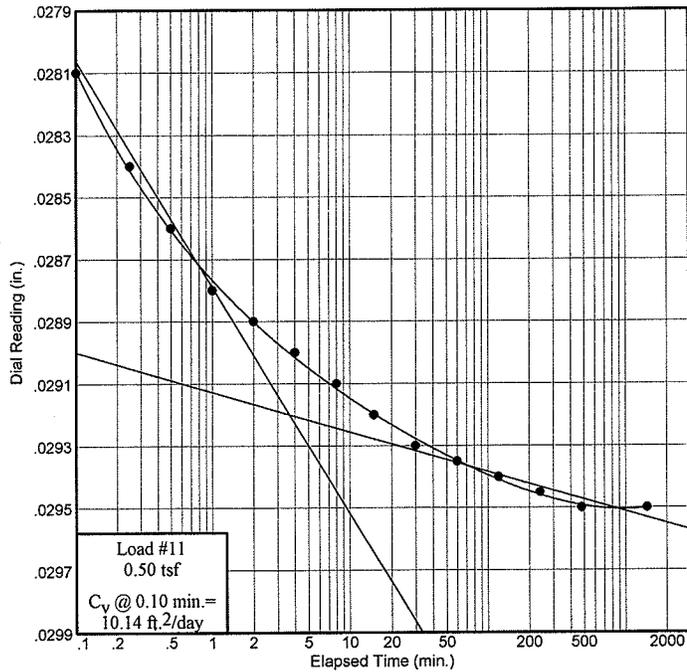
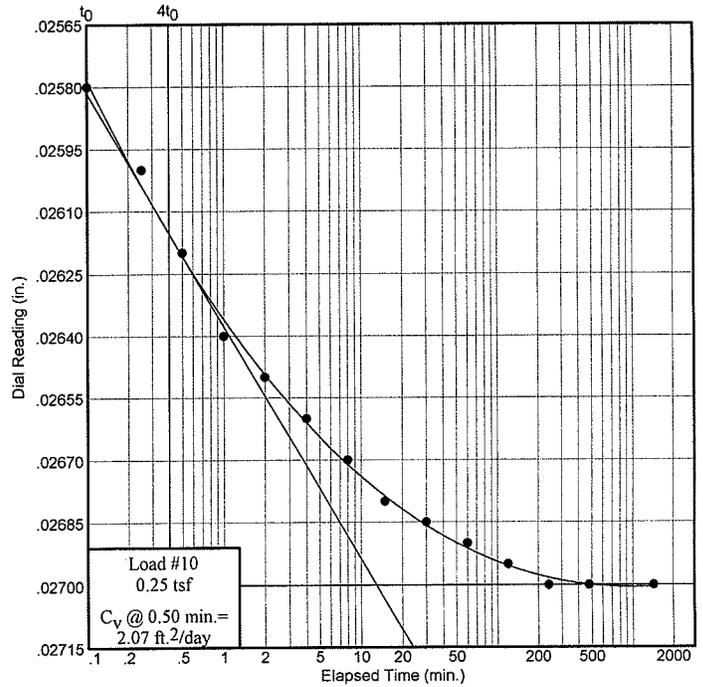
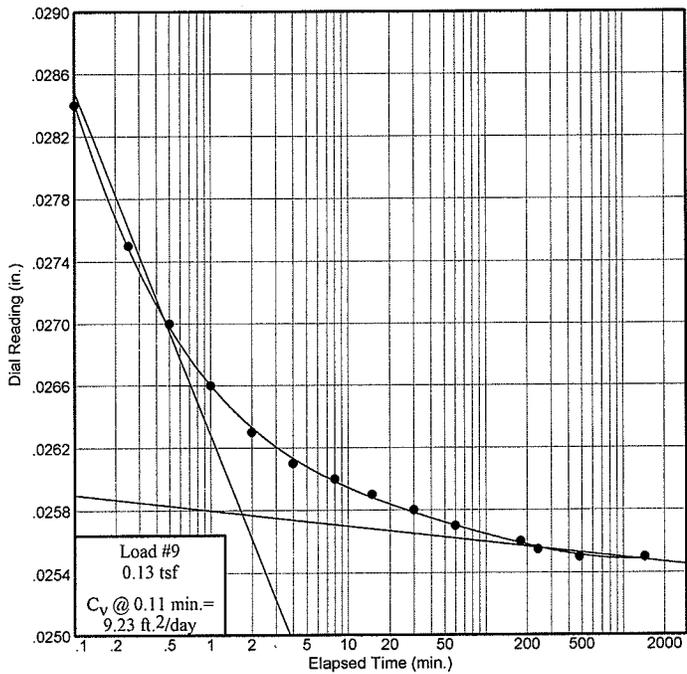
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-22 ST-2

Elev./Depth: 7'-9"



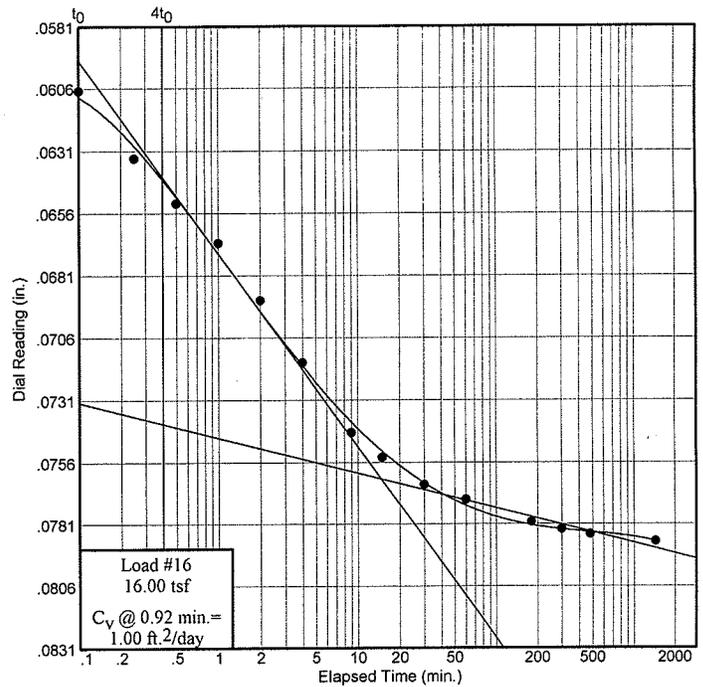
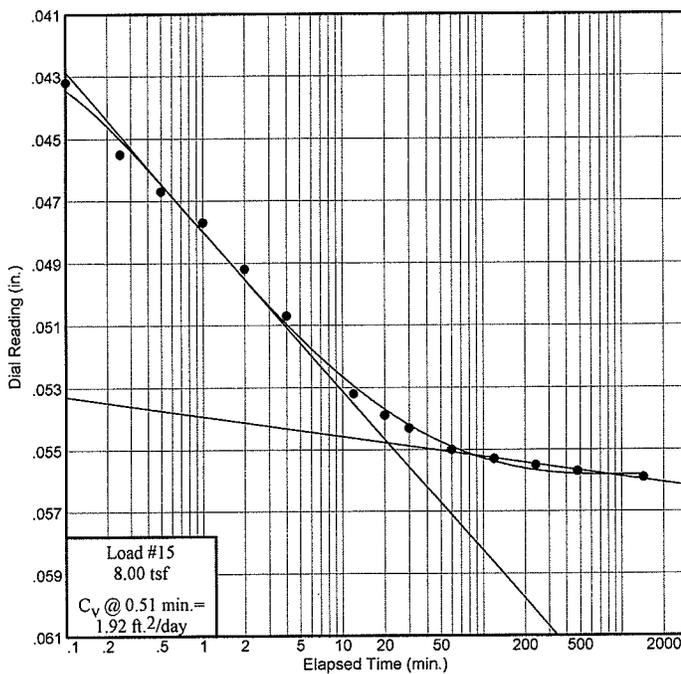
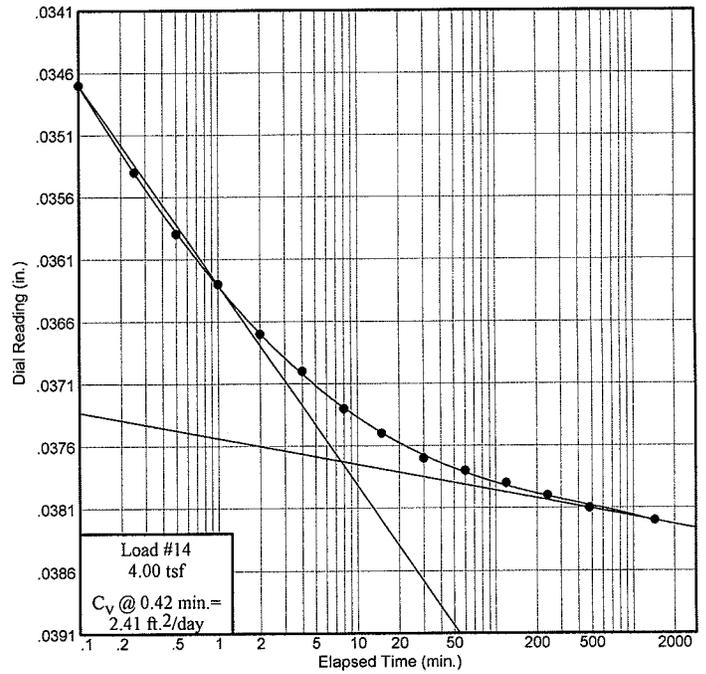
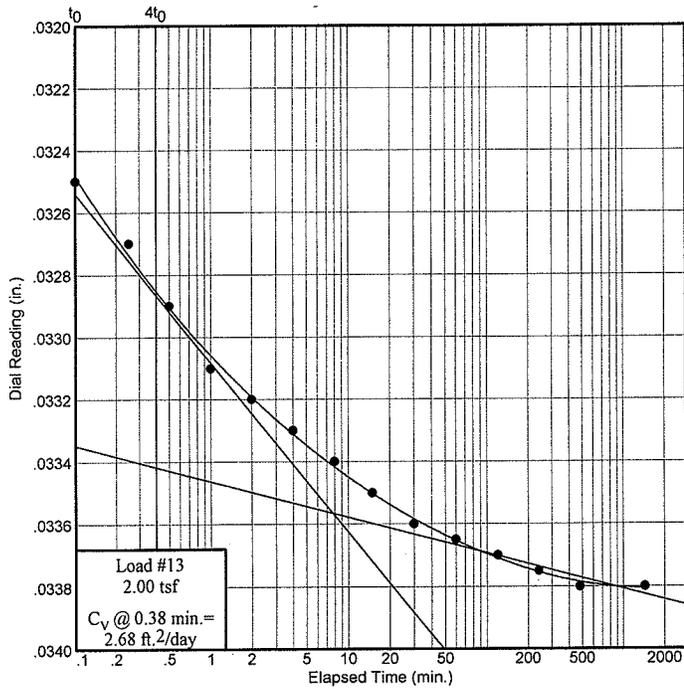
Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 4

Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source: Sample No.: A-22 ST-2 Elev./Depth: 7'-9'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 5

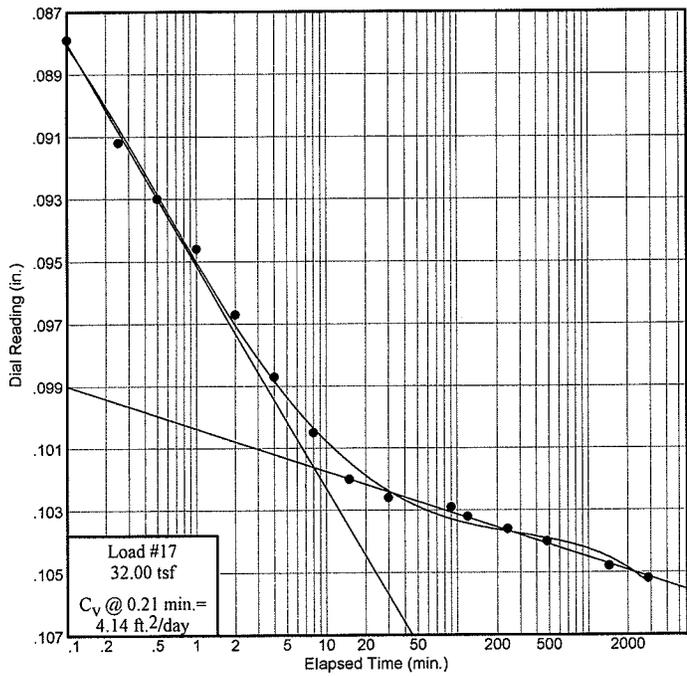
Dial Reading vs. Time

Project No.: 21-15652
Project: Y-12 Outfall 200

Source:

Sample No.: A-22 ST-2

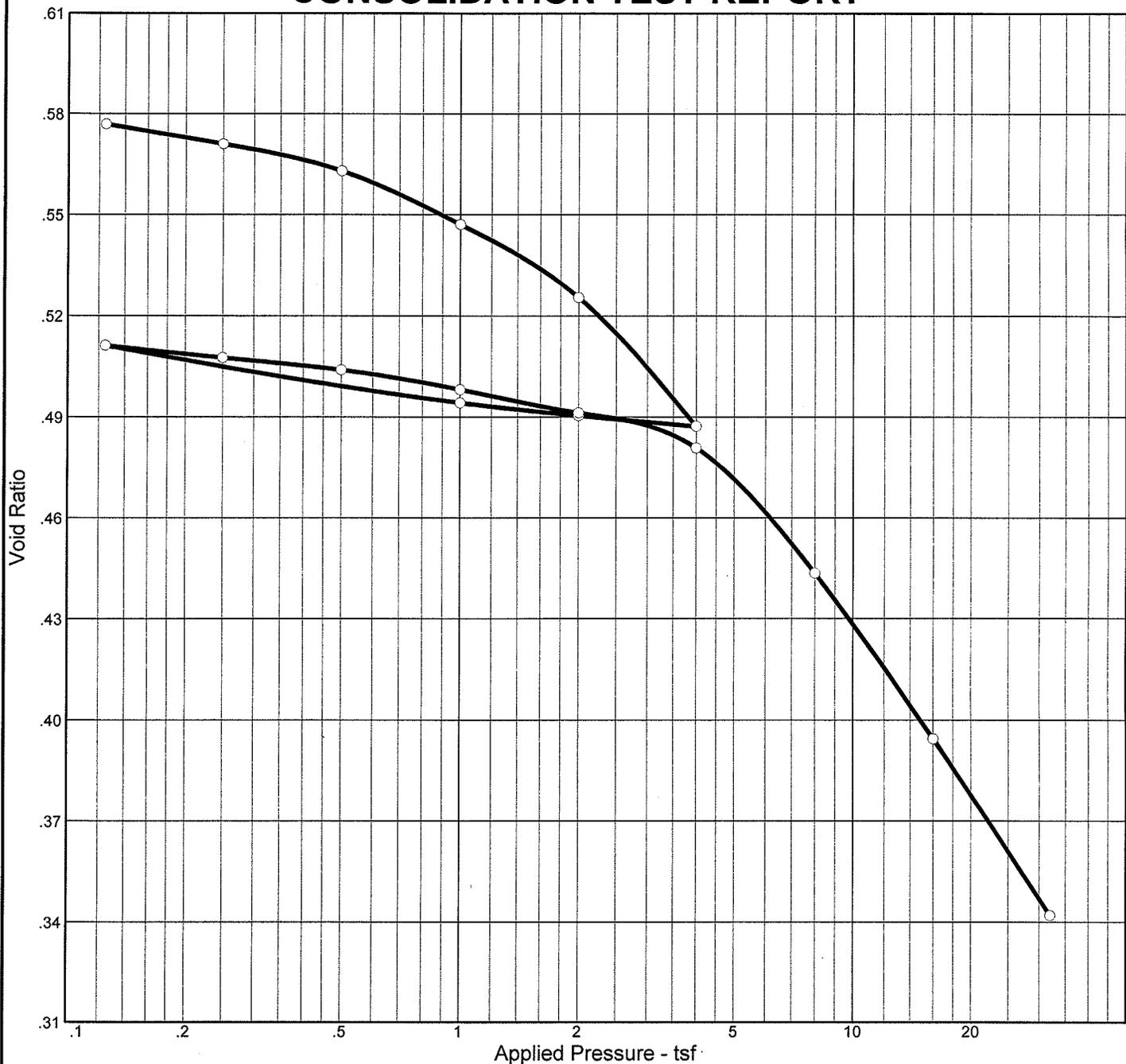
Elev./Depth: 7'-9"



Schnabel Engineering, LLC
Knoxville, Tennessee

Figure 6

CONSOLIDATION TEST REPORT



	Natural									
Saturation	Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
99.1 %	22.3 %	102.3	na	na	2.60		3.28	0.17	0.02	0.586

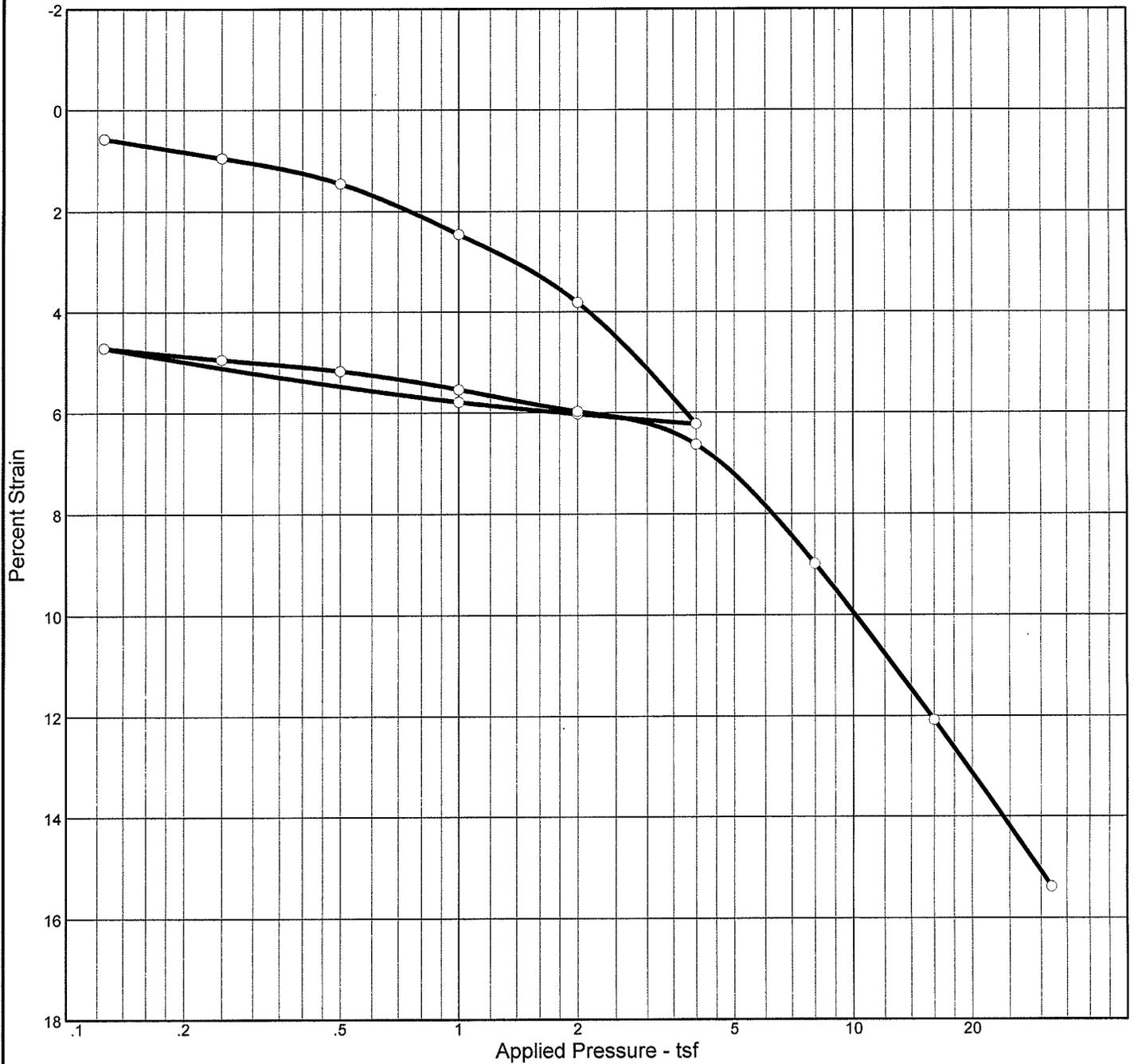
MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, light brown to medium brown, mottled w/ rock	--	--

Project No. 21-15652	Client: GEOServices, LLC
Project: Y-12 Outfall 200	
Source:	Sample No.: A-28 ST-1 Elev./Depth: 10'-12'
Schnabel Engineering, LLC	
Knoxville, Tennessee	

Remarks:

Figure 1

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
Saturation	Moisture	102.3	na	na	2.60		3.28	0.17	0.02	0.586
99.1 %	22.3 %									

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, light brown to medium brown, mottled w/ rock	--	--

Project No. 21-15652	Client: GEOServices, LLC	Remarks:
Project: Y-12 Outfall 200		
Source:	Sample No.: A-28 ST-1 Elev./Depth: 10'-12'	
Schnabel Engineering, LLC		
Knoxville, Tennessee		Figure 1

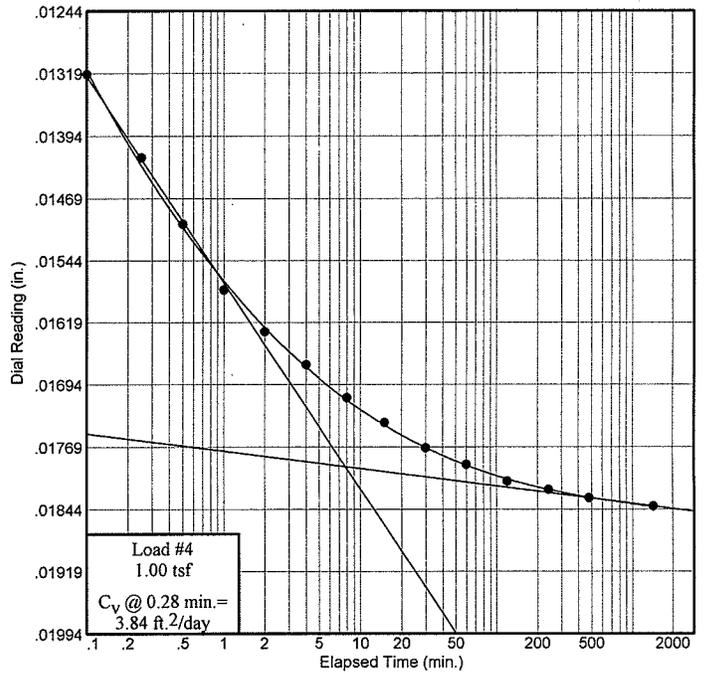
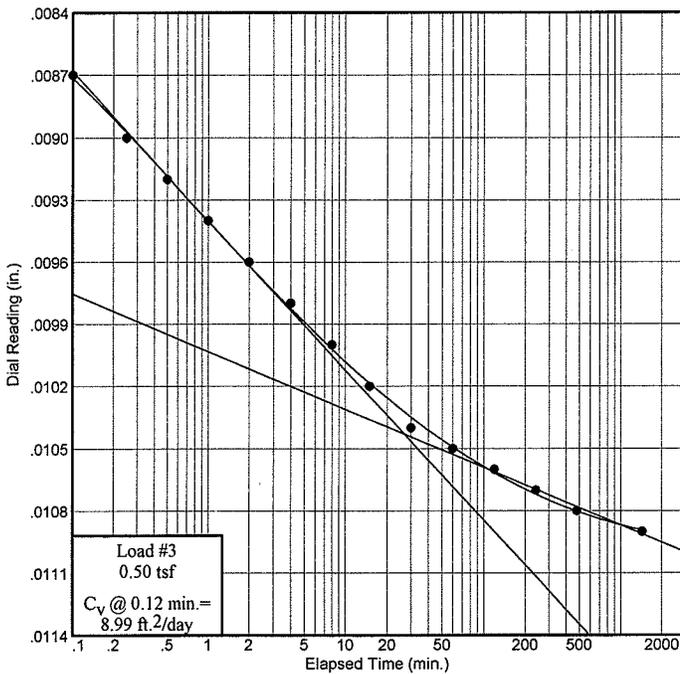
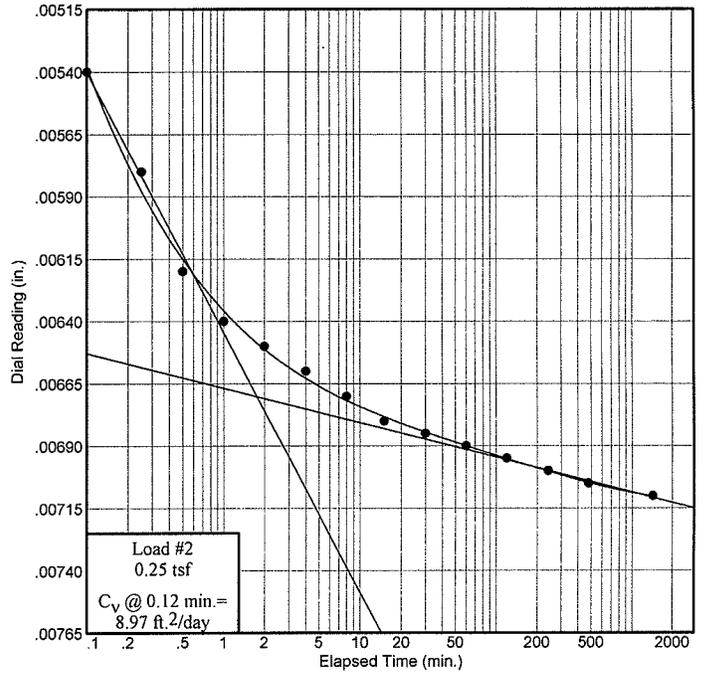
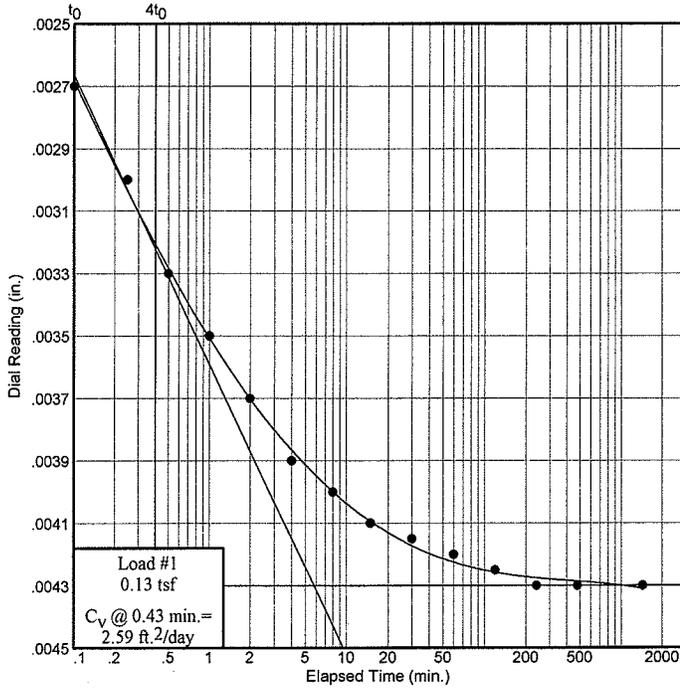
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-28 ST-1

Elev./Depth: 10'-12'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 2

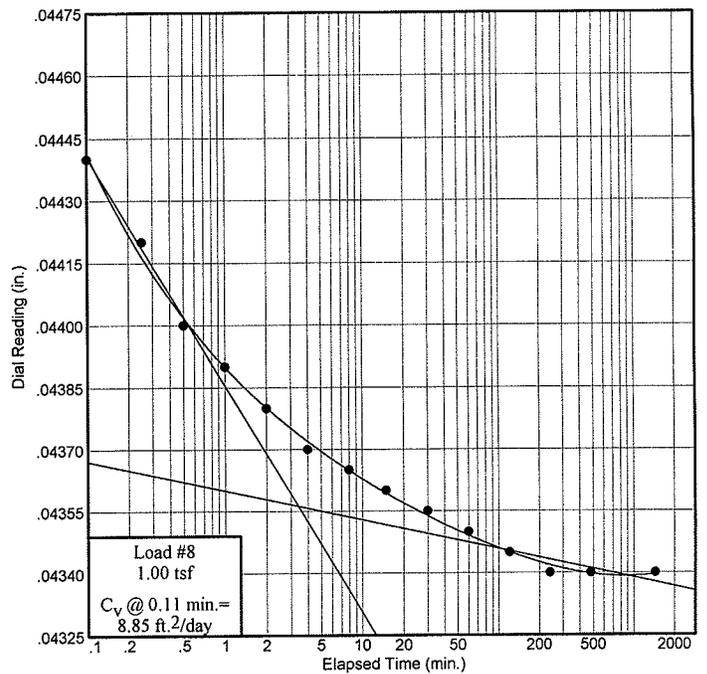
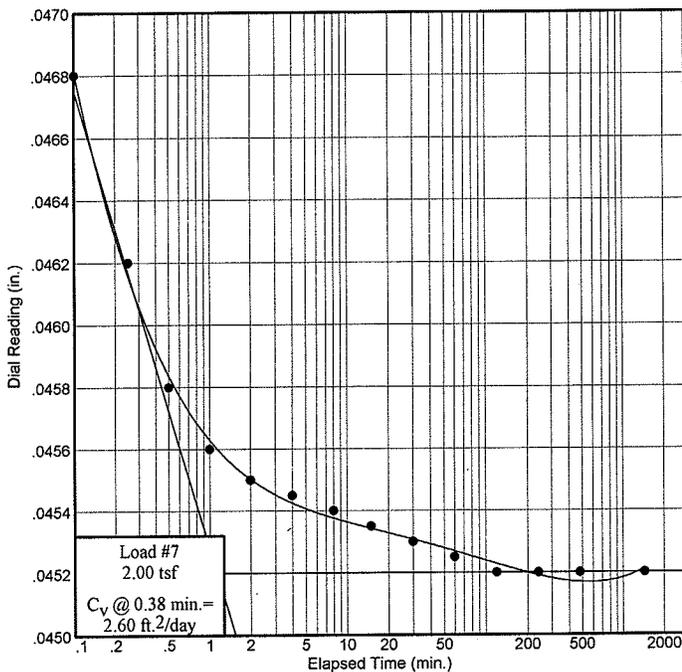
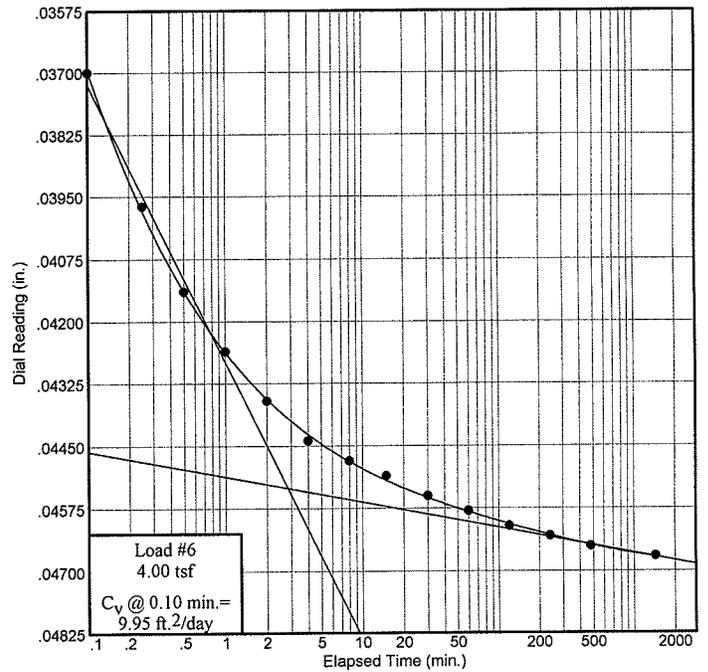
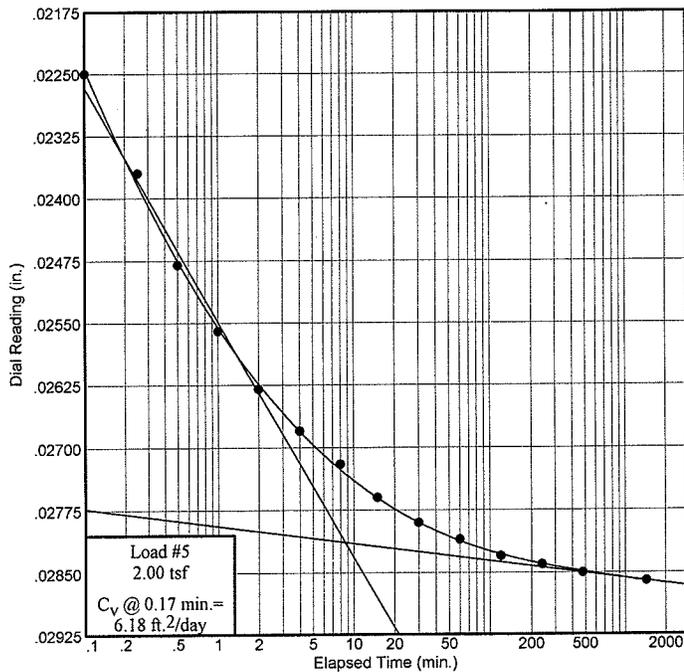
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-28 ST-1

Elev./Depth: 10'-12'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 3

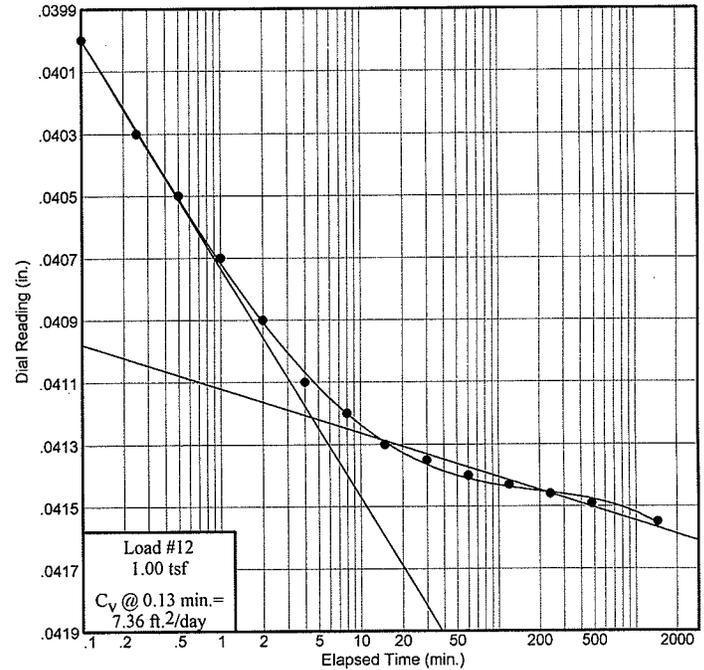
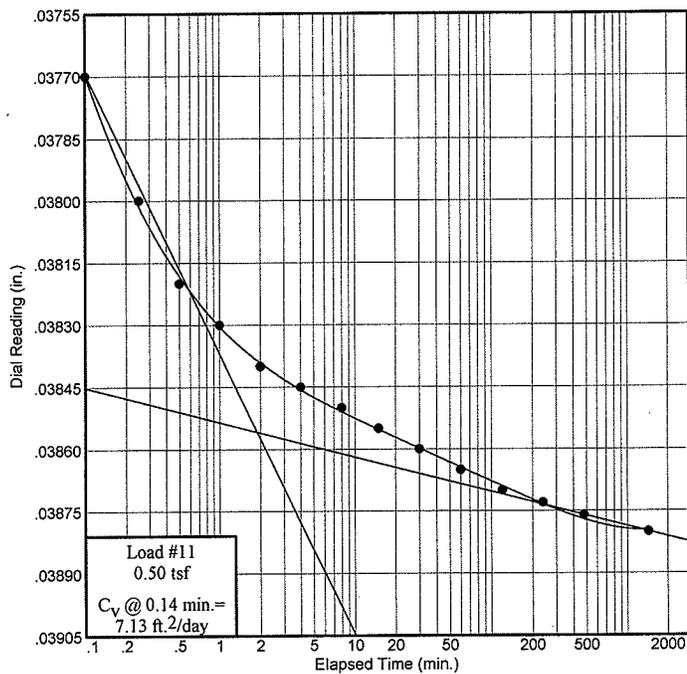
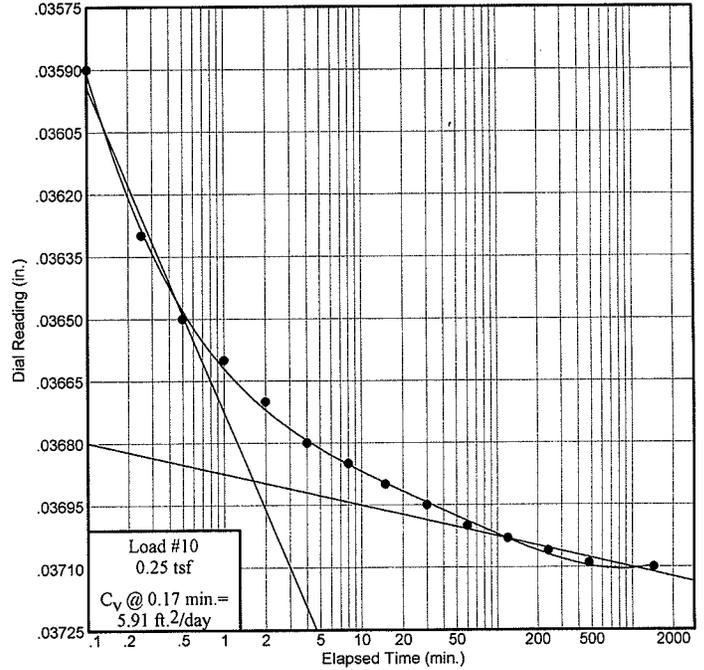
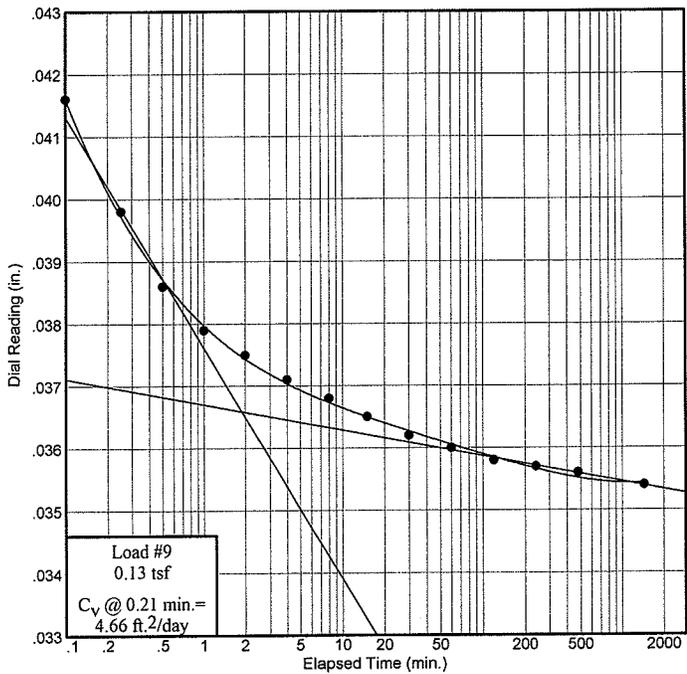
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-28 ST-1

Elev./Depth: 10'-12'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 4

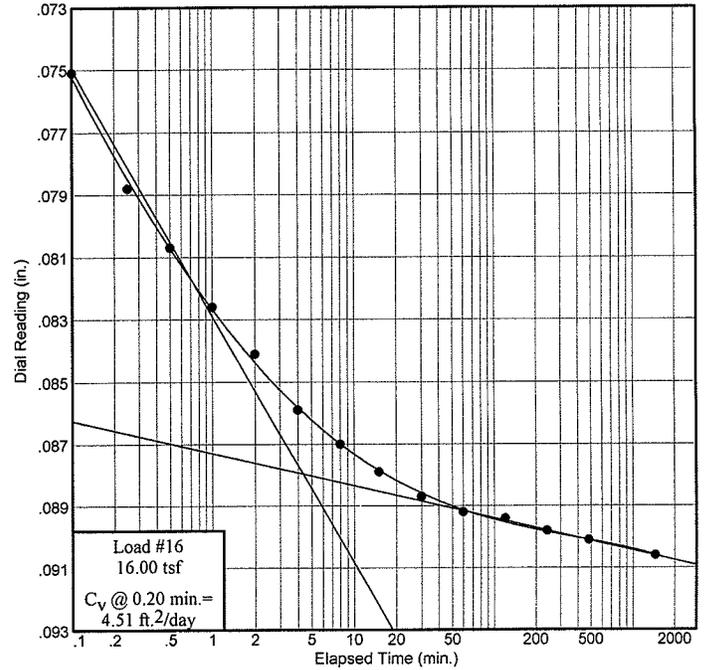
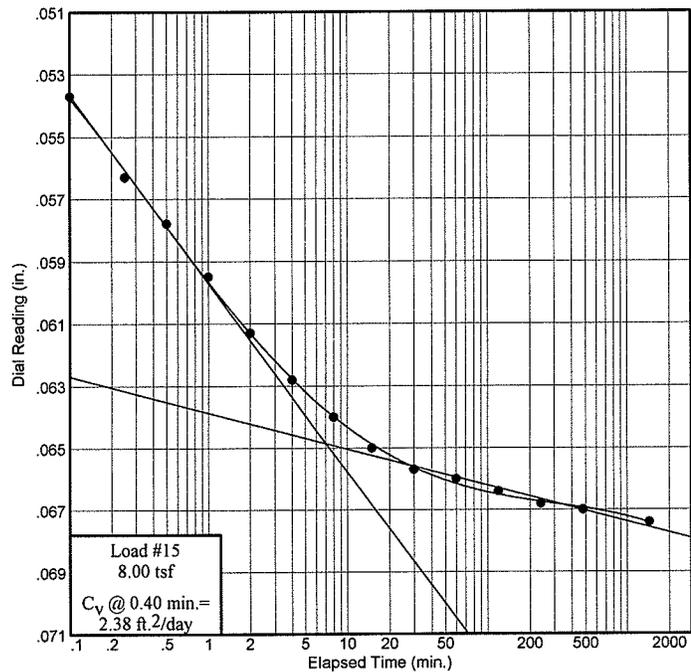
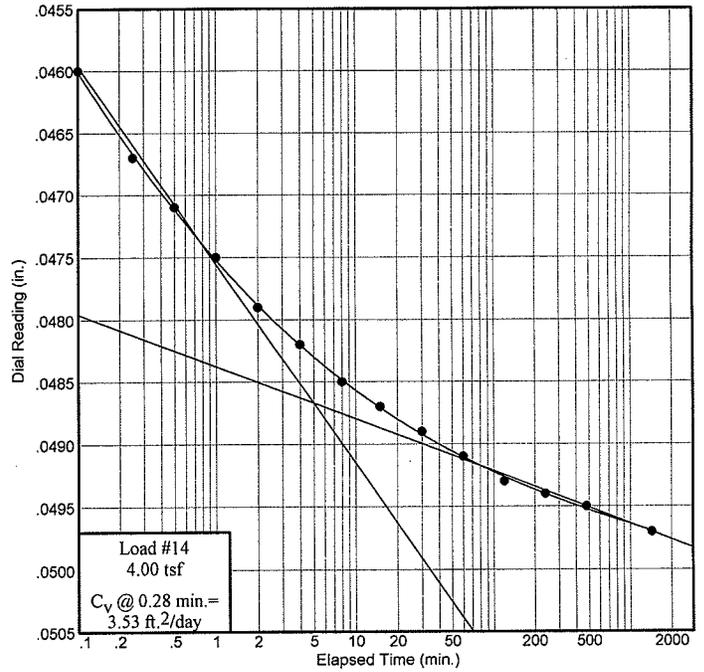
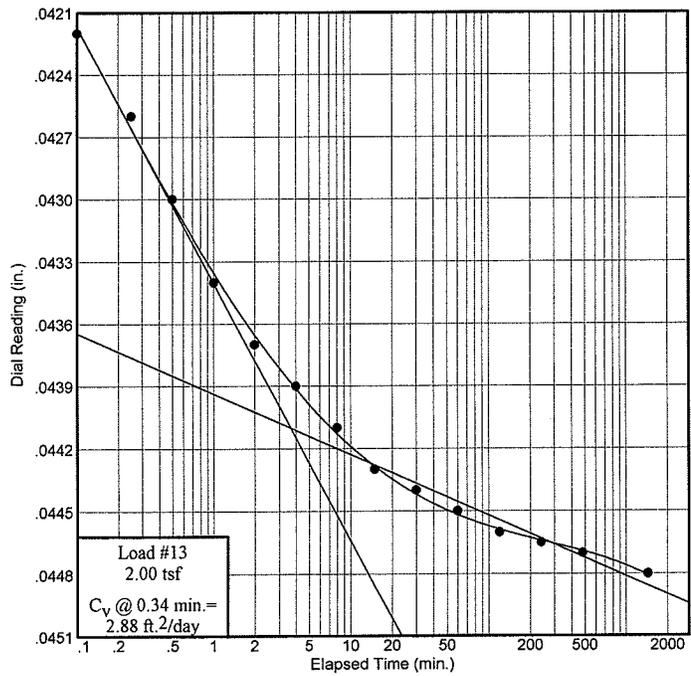
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-28 ST-1

Elev./Depth: 10'-12'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 5

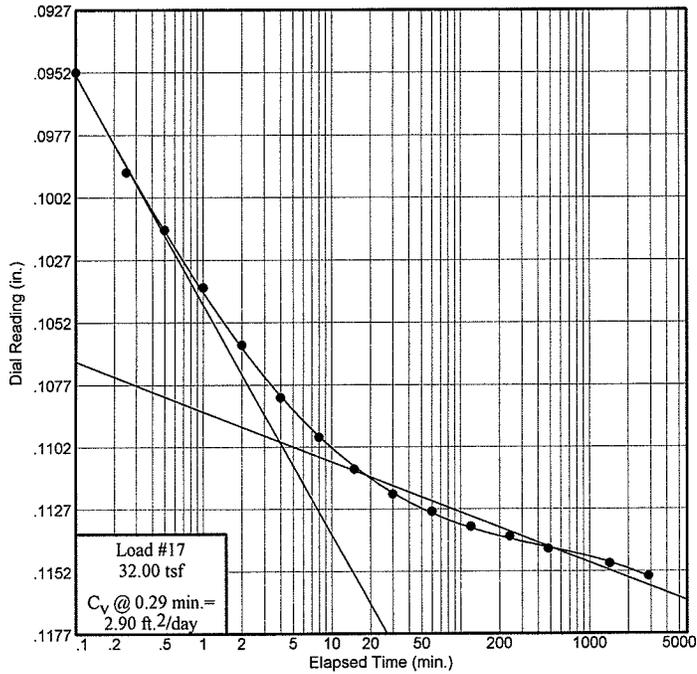
Dial Reading vs. Time

Project No.: 21-15652
Project: Y-12 Outfall 200

Source:

Sample No.: A-28 ST-1

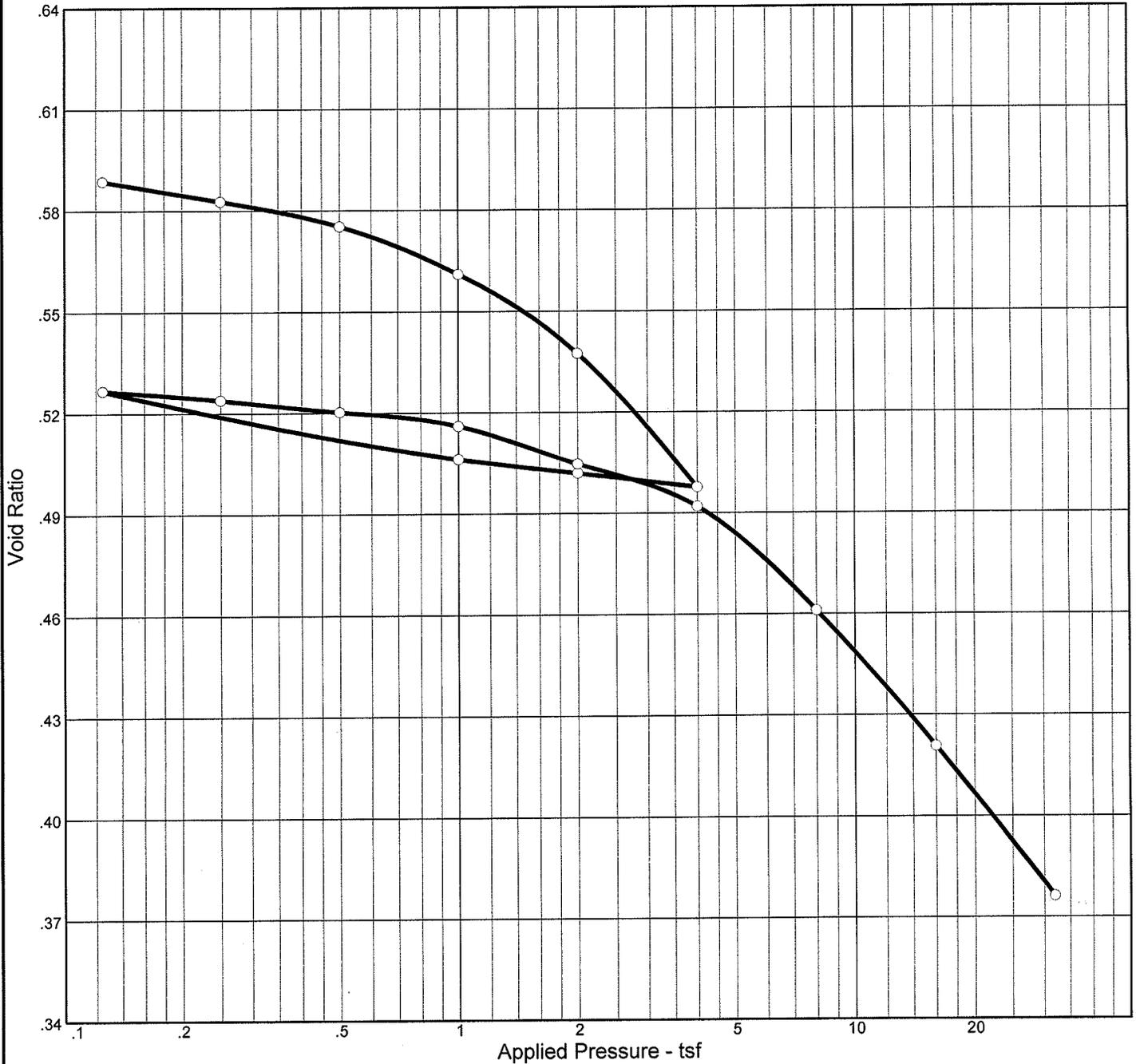
Elev./Depth: 10'-12'



Schnabel Engineering, LLC
Knoxville, Tennessee

Figure 6

CONSOLIDATION TEST REPORT

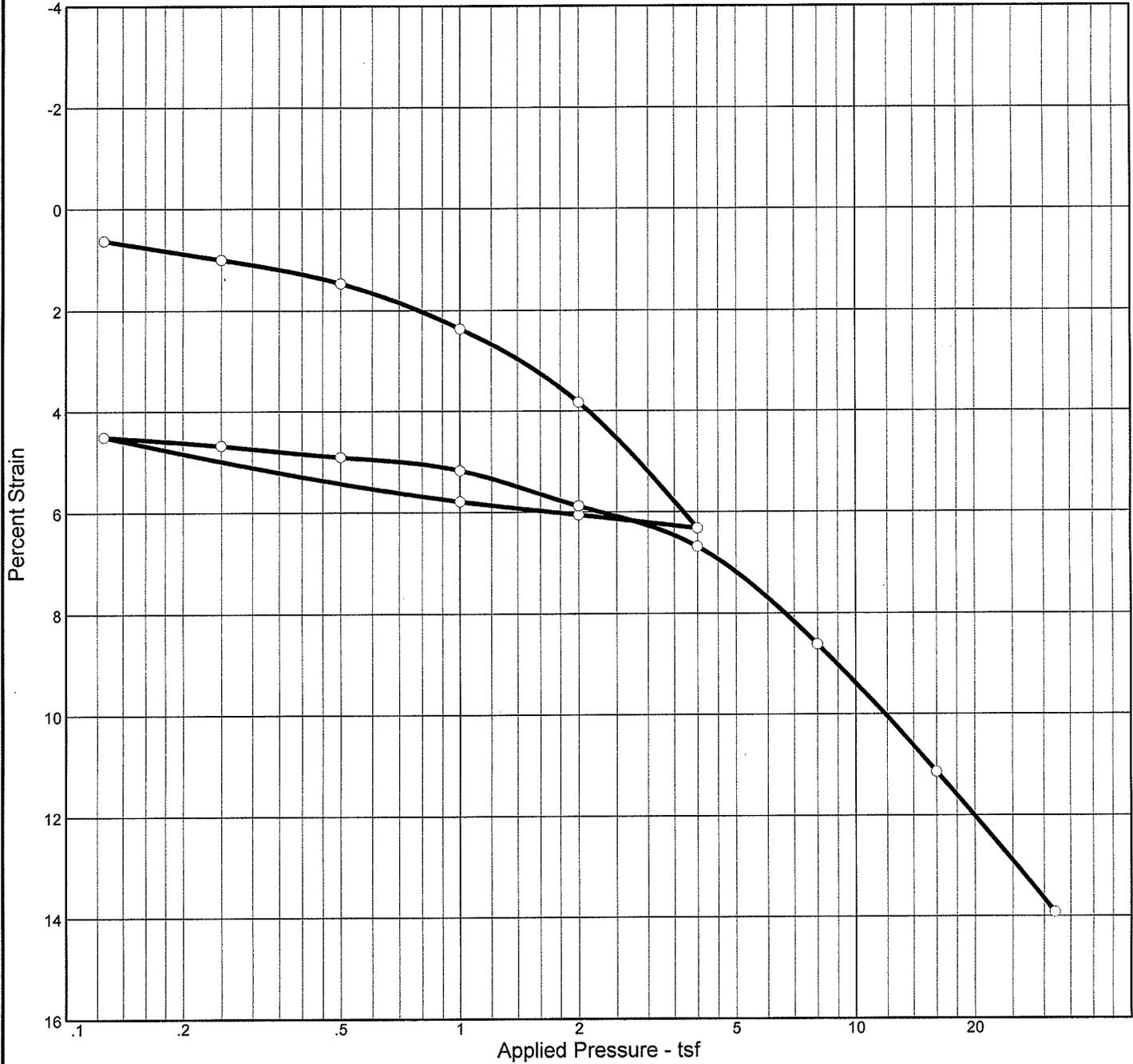


Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
Saturation	Moisture									
97.4 %	22.0 %	103.5	na	na	2.65		3.10	0.15	0.02	0.599

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, light brown to medium brown, mottled	--	--

Project No. 21-15652 Client: GEOServices, LLC Project: Y-12 Outfall 200 Source: Sample No.: A-29 ST-1 Elev./Depth: 6'-8' <div style="text-align: center;">Schnabel Engineering, LLC Knoxville, Tennessee</div>	Remarks: <div style="text-align: right;">Figure 1</div>
---	---

CONSOLIDATION TEST REPORT



	Natural	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
Saturation	Moisture	103.5	na	na	2.65		3.10	0.15	0.02	0.599
97.4 %	22.0 %									

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, light brown to medium brown, mottled	--	--

Project No. 21-15652 Client: GEOServices, LLC Project: Y-12 Outfall 200 Source: Sample No.: A-29 ST-1 Elev./Depth: 6'-8' <div style="text-align: center;">Schnabel Engineering, LLC Knoxville, Tennessee</div>	Remarks: <div style="text-align: right;">Figure 1</div>
---	---

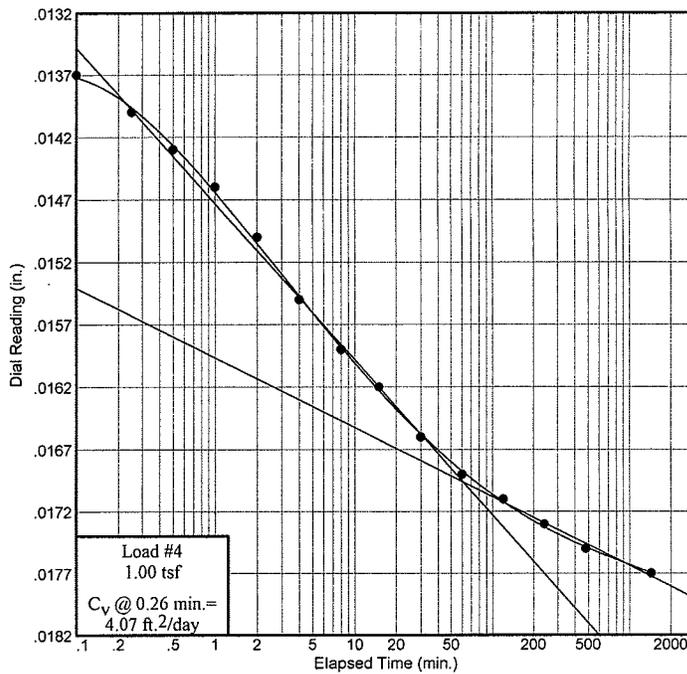
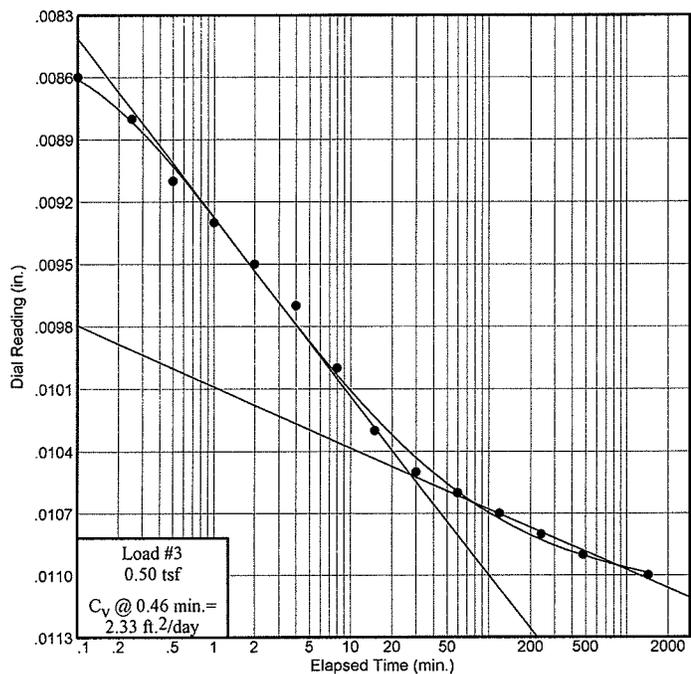
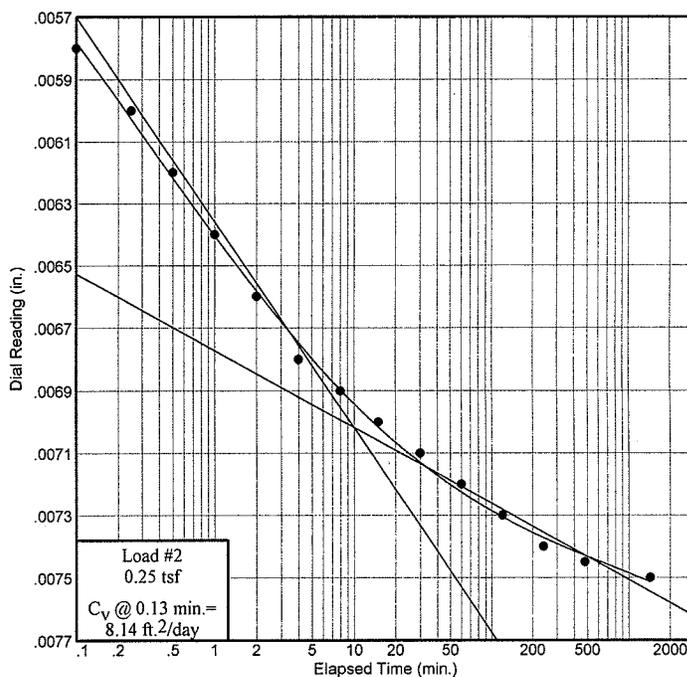
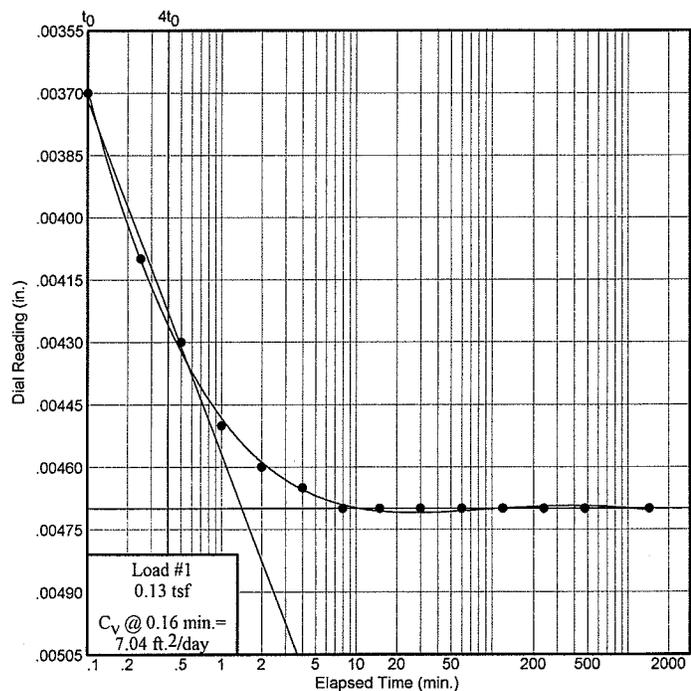
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-29 ST-1

Elev./Depth: 6'-8"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 2

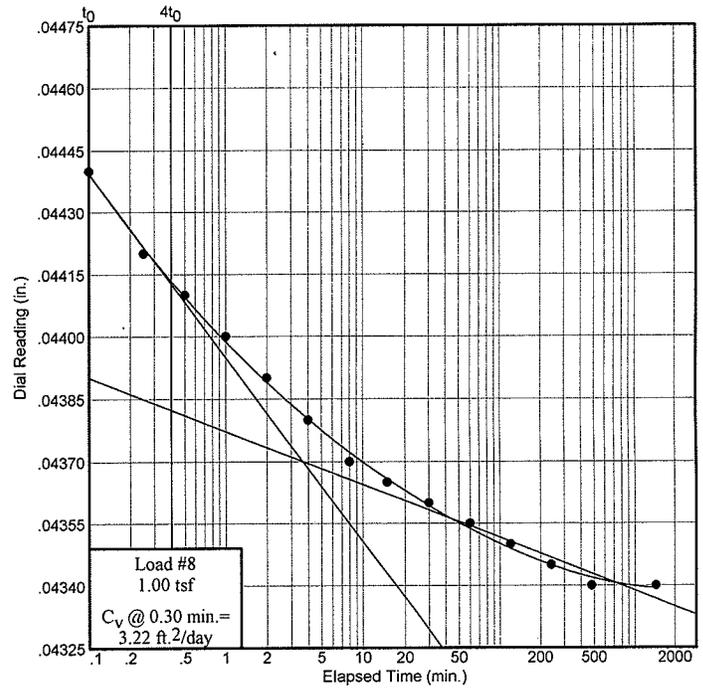
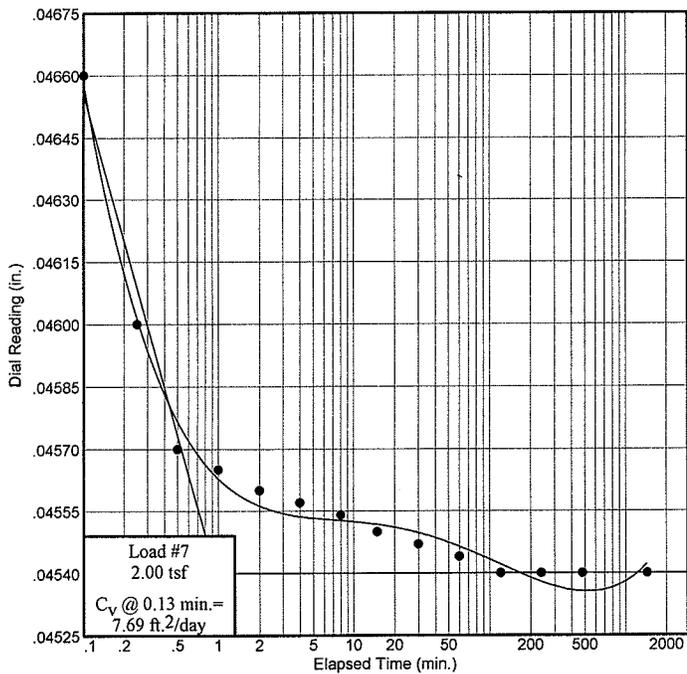
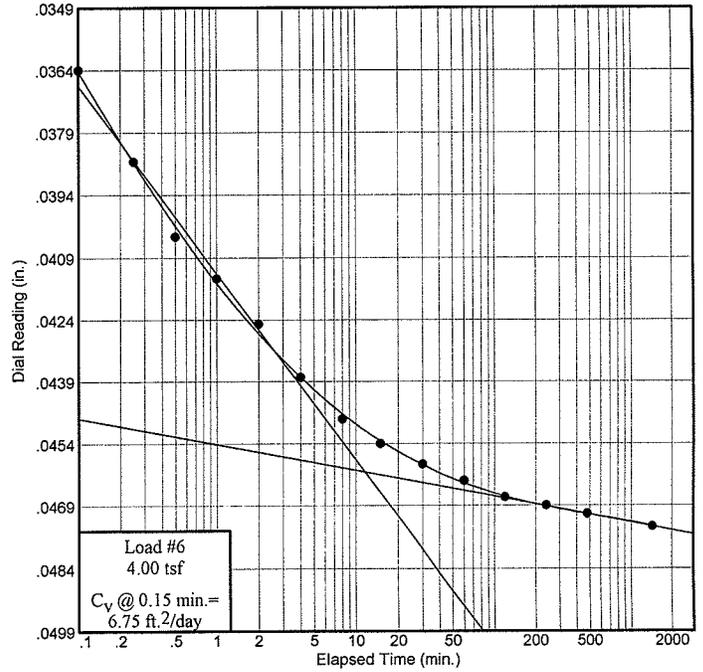
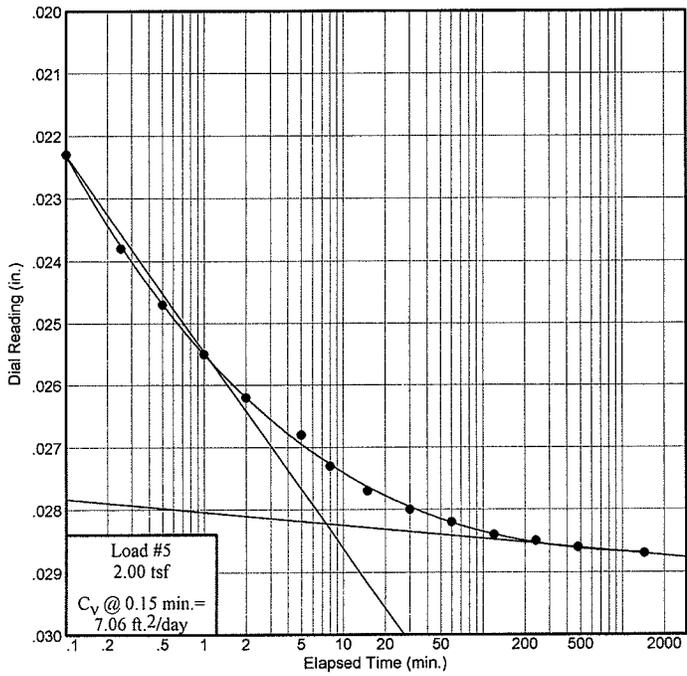
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-29 ST-1

Elev./Depth: 6'-8"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 3

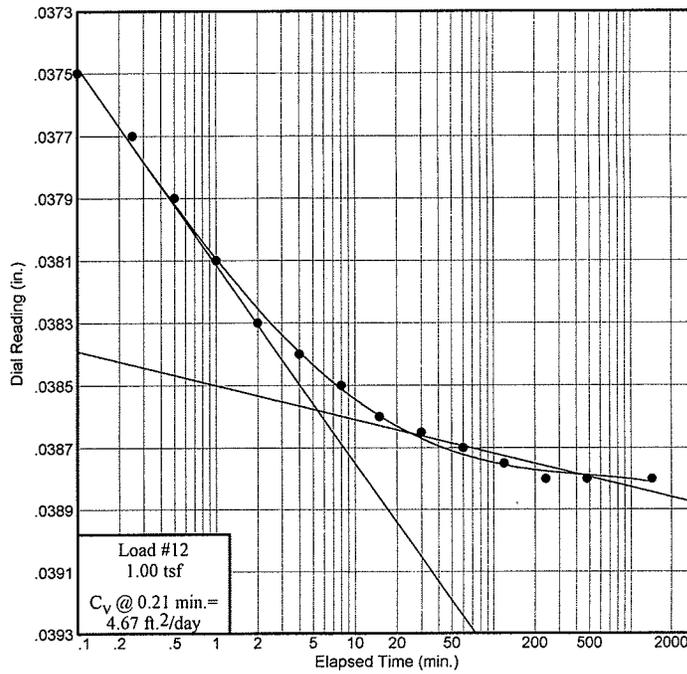
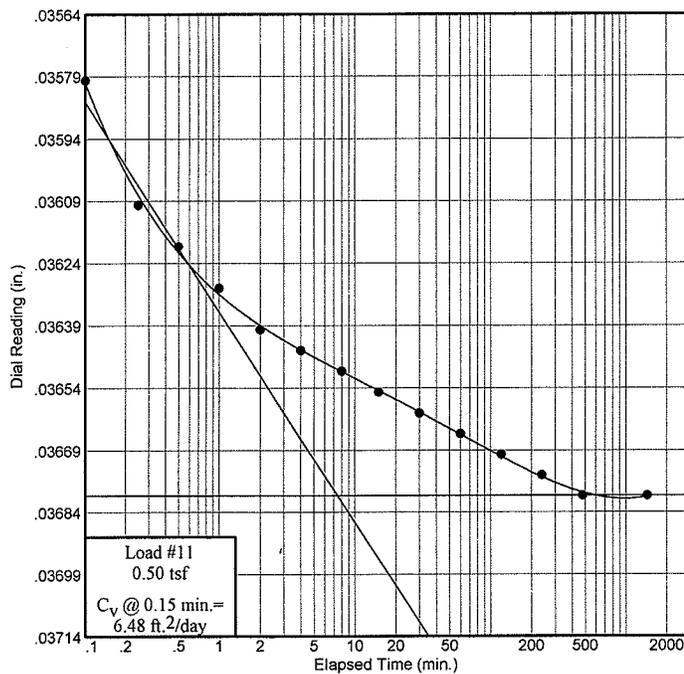
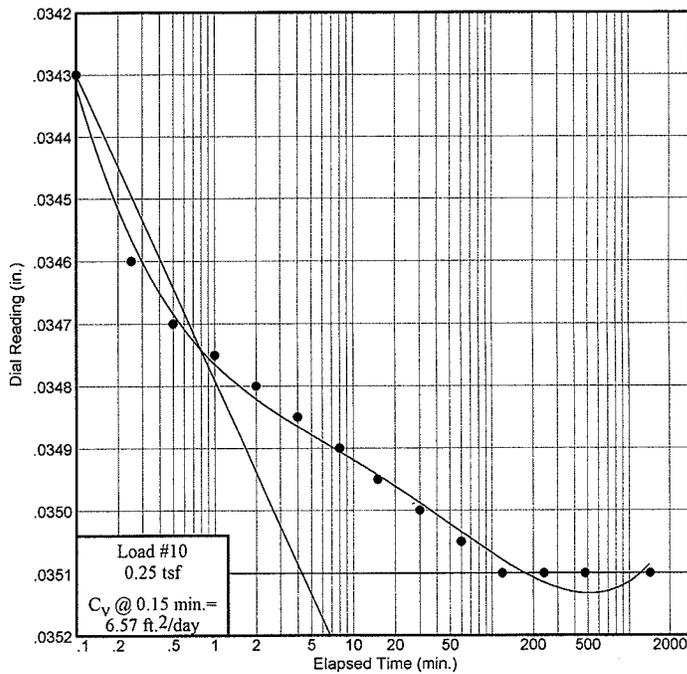
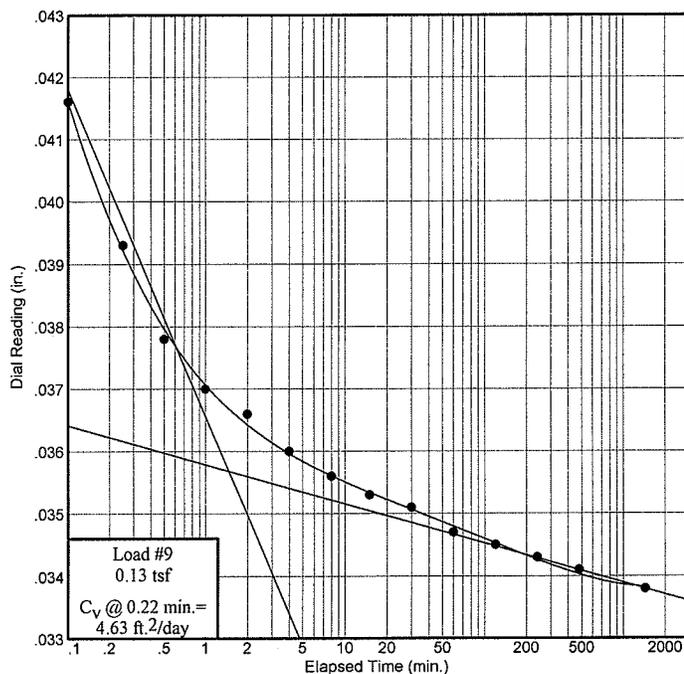
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-29 ST-1

Elev./Depth: 6'-8"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 4

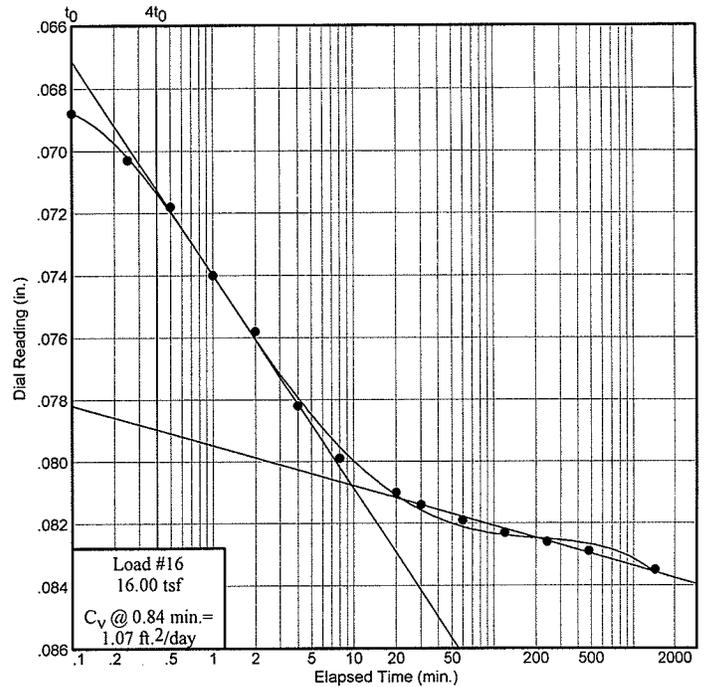
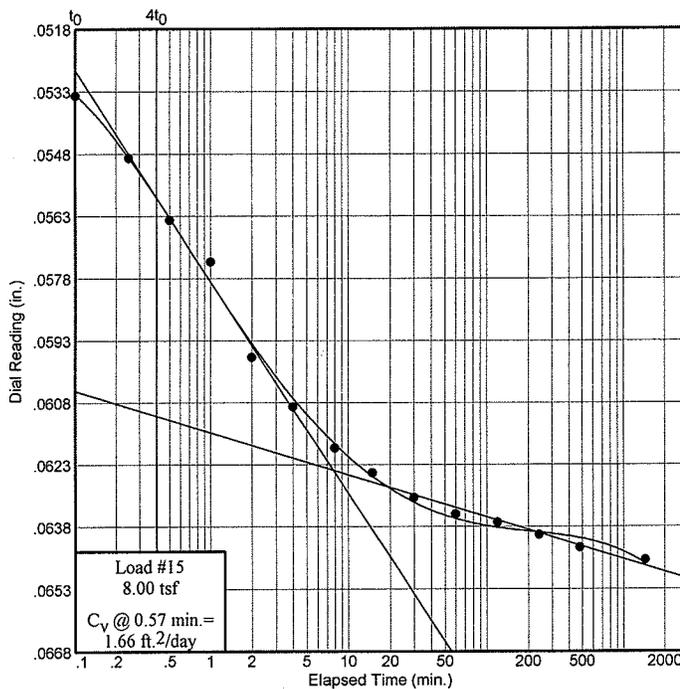
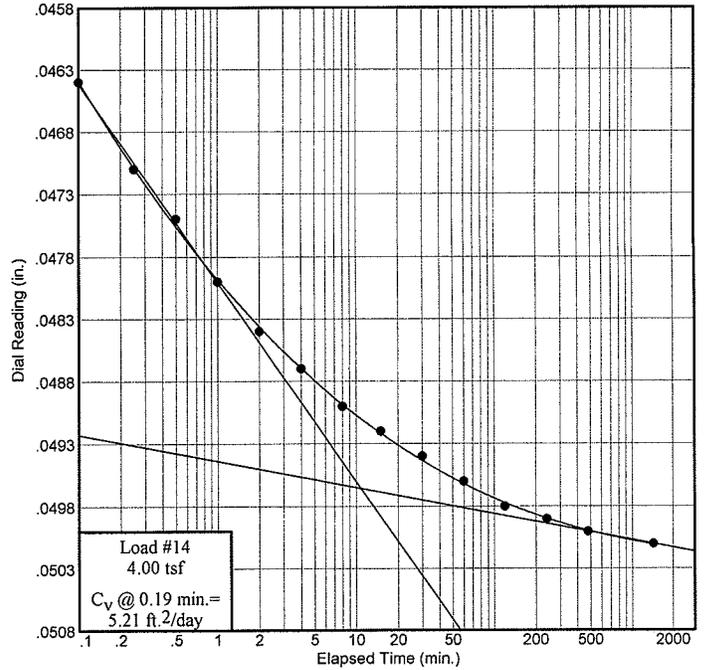
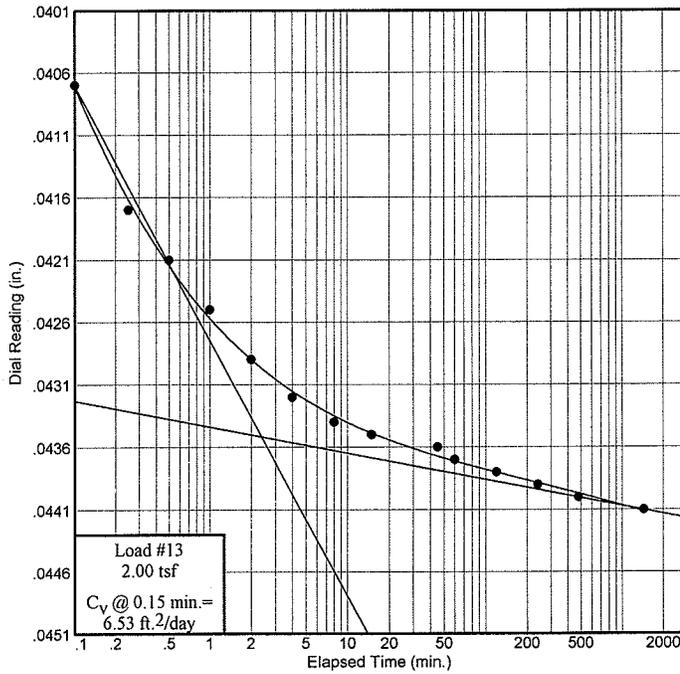
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-29 ST-1

Elev./Depth: 6'-8"



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 5

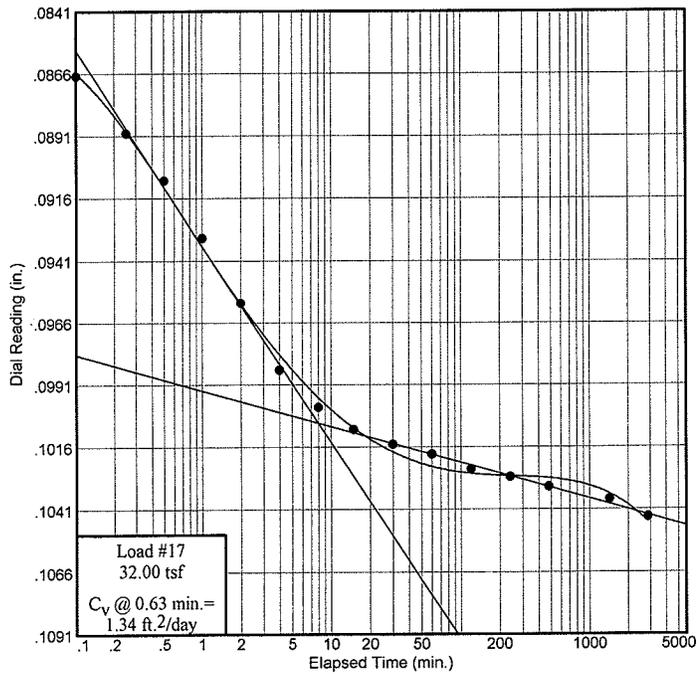
Dial Reading vs. Time

Project No.: 21-15652
Project: Y-12 Outfall 200

Source:

Sample No.: A-29 ST-1

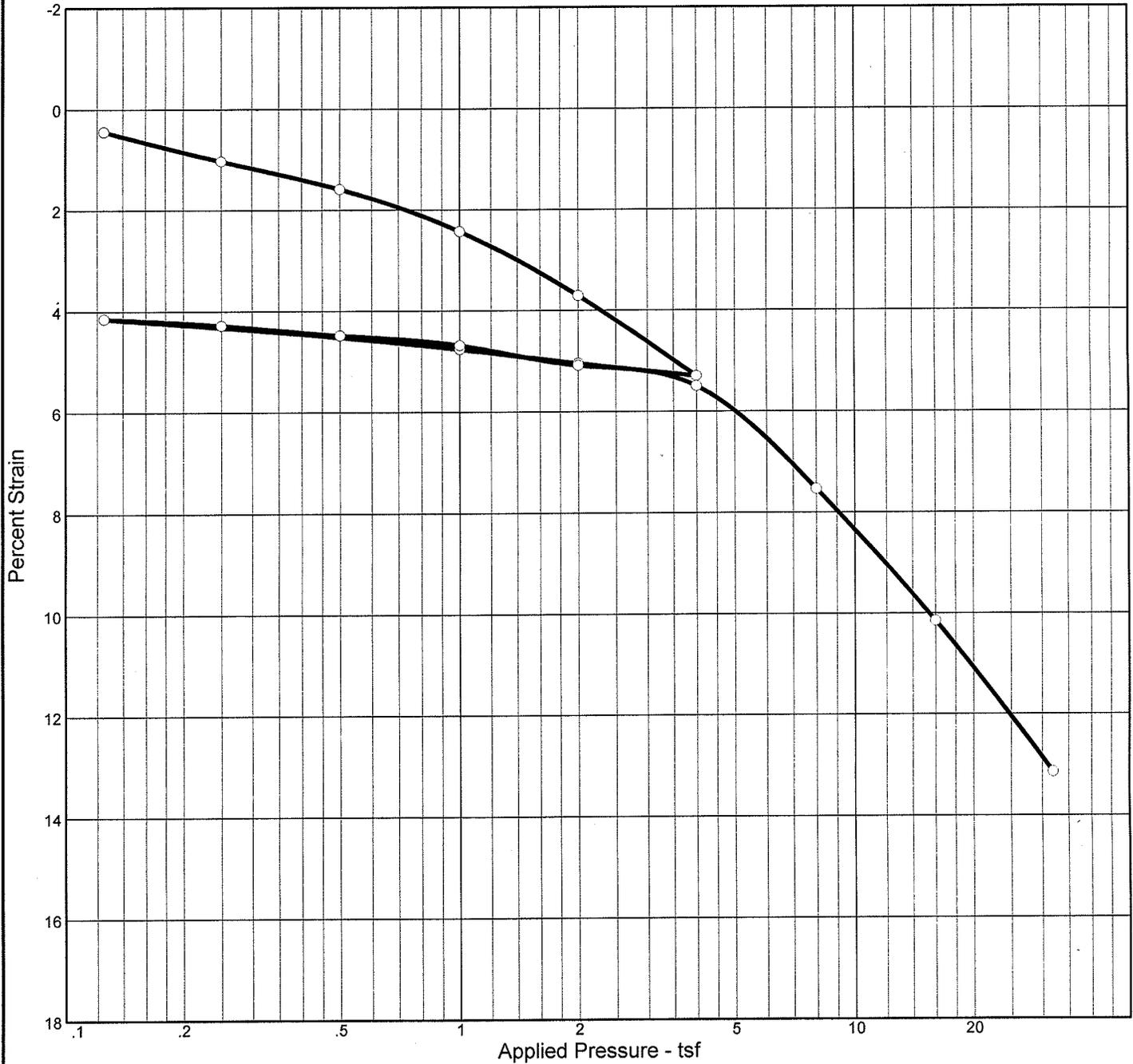
Elev./Depth: 6'-8"



Schnabel Engineering, LLC
Knoxville, Tennessee

Figure 6

CONSOLIDATION TEST REPORT

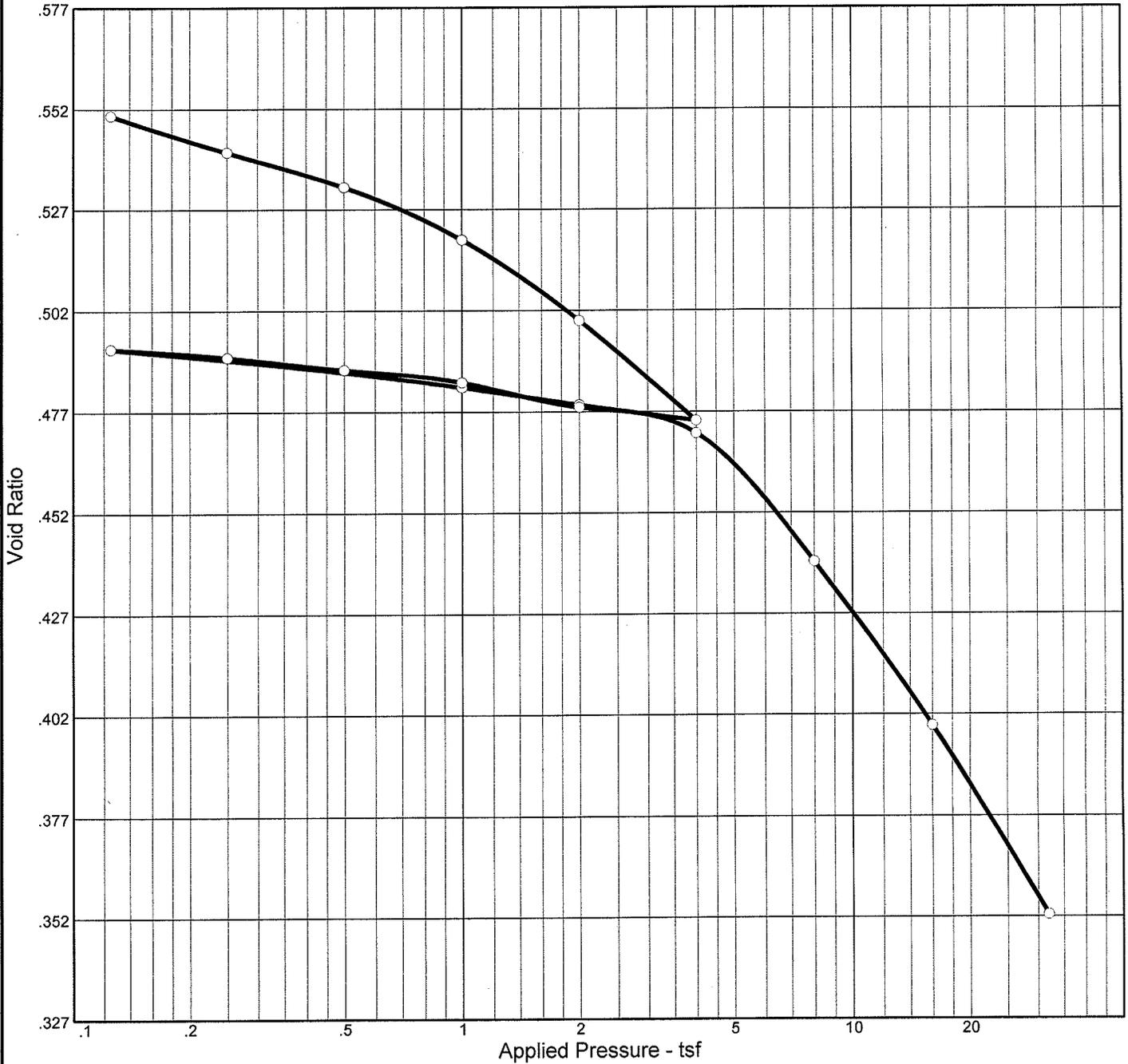


	Natural									
Saturation	Moisture	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
91.6 %	19.6 %	104.2	na	na	2.60		4.91	0.15	0.01	0.557

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, light brown w/rock	--	--

Project No. 21-15652 Client: GEOServices, LLC Project: Y-12 Outfall 200 Source: Sample No.: A-25 ST-1 Elev./Depth: 15'-17' Schnabel Engineering, LLC Knoxville, Tennessee	Remarks: <div style="text-align: right;">Figure 1</div>
---	---

CONSOLIDATION TEST REPORT



Natural	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	P _c (tsf)	C _c	C _r	Initial Void Ratio
Saturation	Moisture								
91.6 %	19.6 %	104.2	na	na	2.60	4.92	0.15	0.01	0.557

MATERIAL DESCRIPTION	USCS	AASHTO
Clay, silty, light brown w/rock	--	--

Project No. 21-15652 Client: GEOServices, LLC Project: Y-12 Outfall 200 Source: Sample No.: A-25 ST-1 Elev./Depth: 15'-17' Schnabel Engineering, LLC Knoxville, Tennessee	Remarks: <div style="text-align: right;">Figure 1</div>
---	---

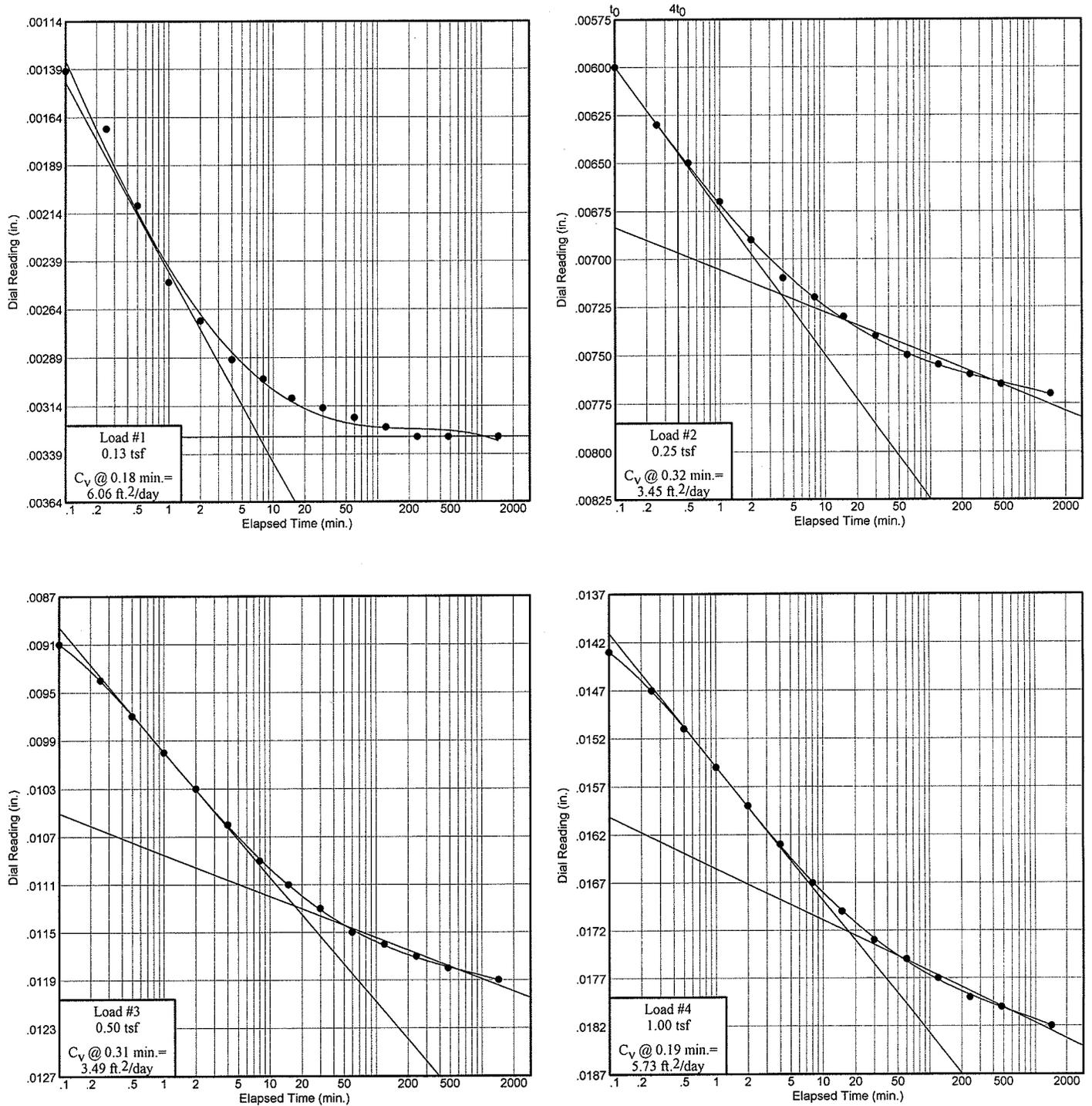
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-25 ST-1

Elev./Depth: 15'-17'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 2

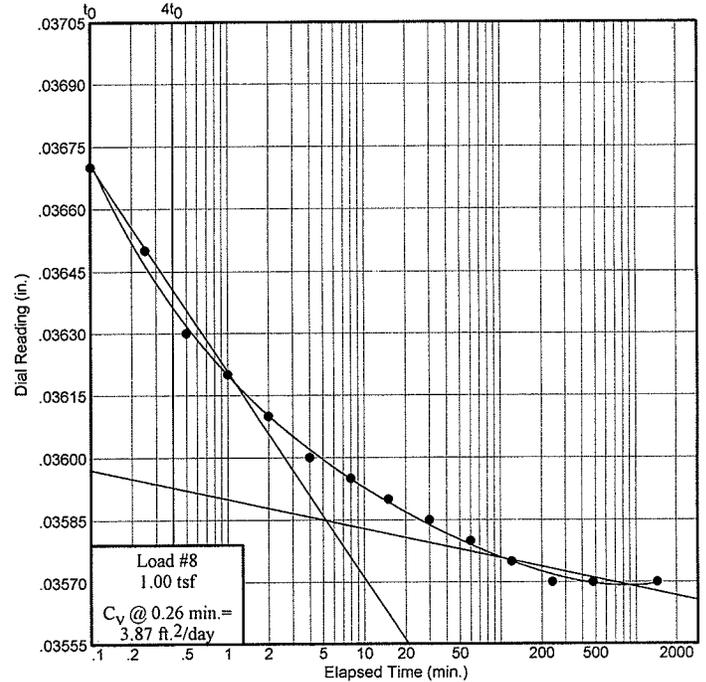
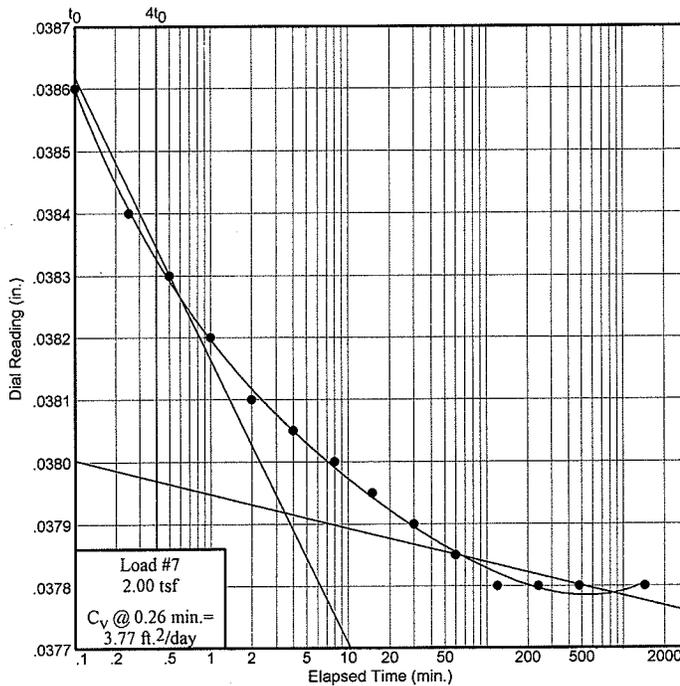
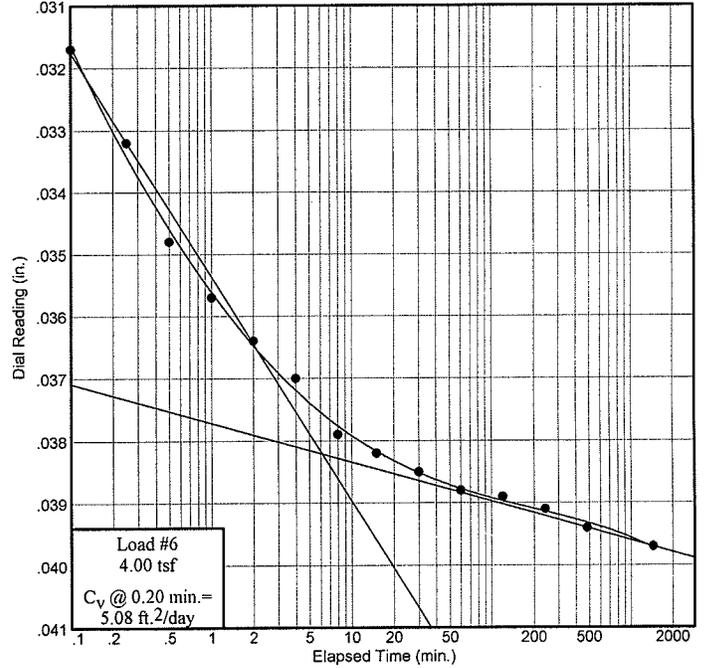
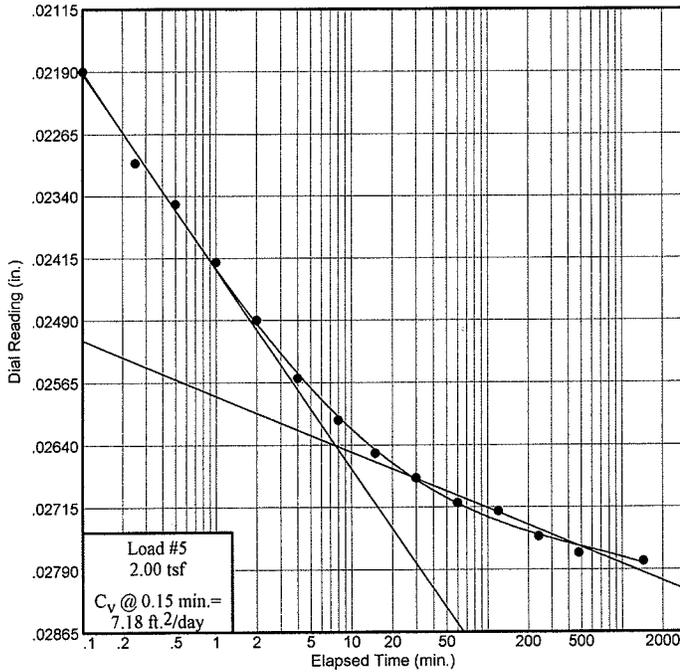
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-25 ST-1

Elev./Depth: 15'-17'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 3

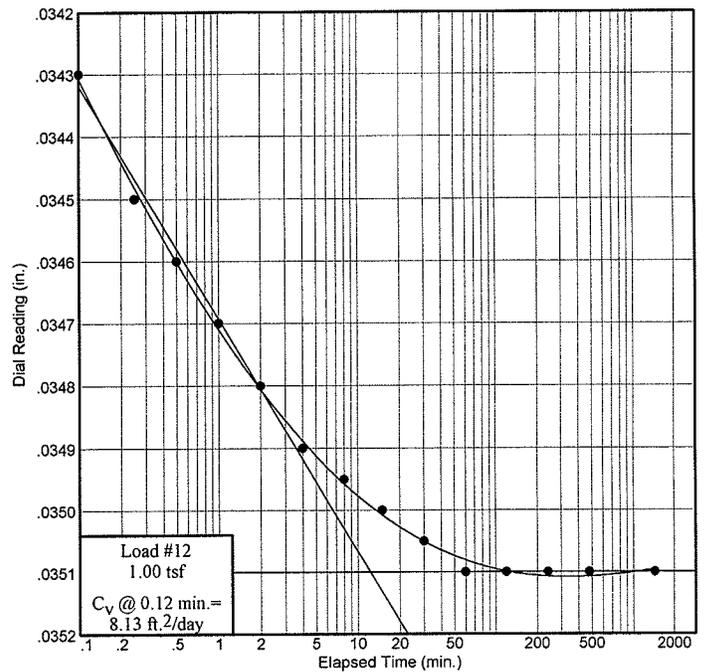
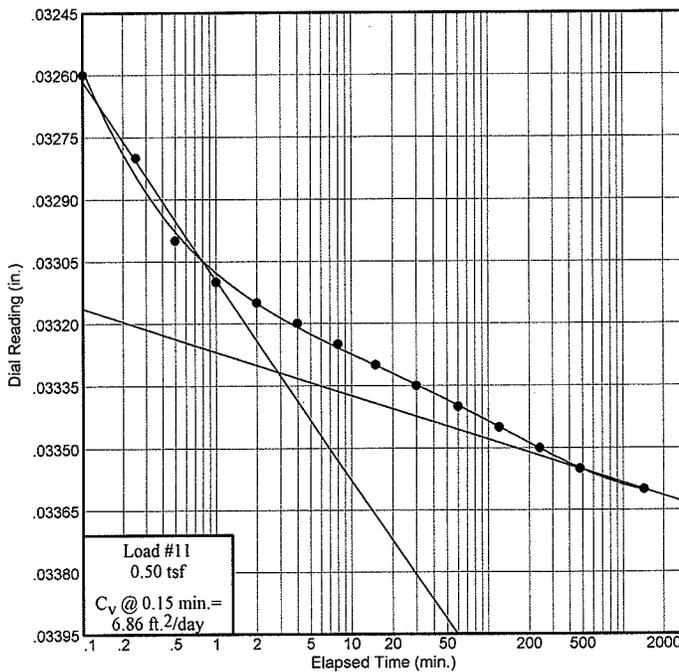
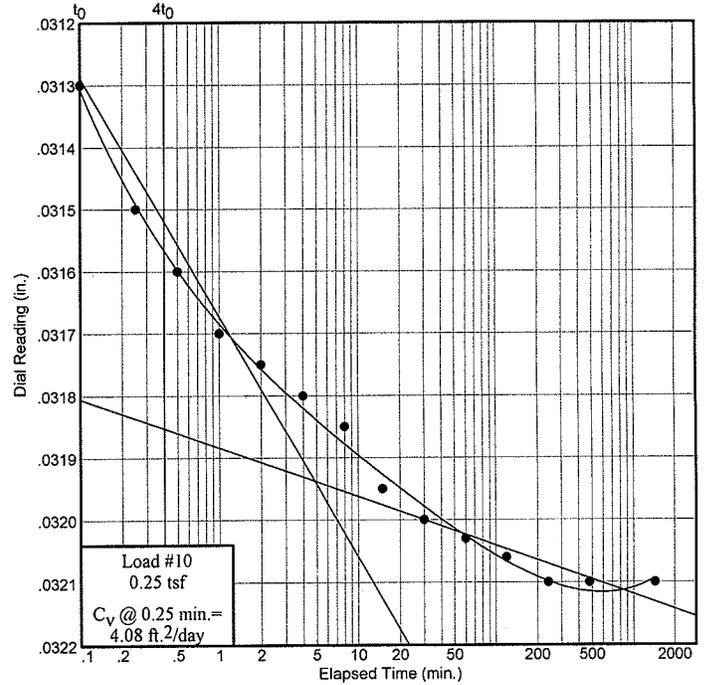
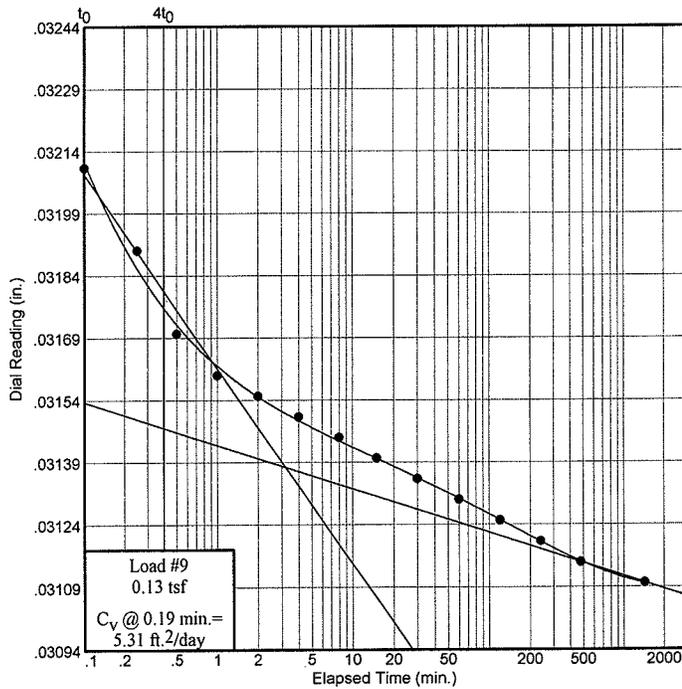
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-25 ST-1

Elev./Depth: 15'-17'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 4

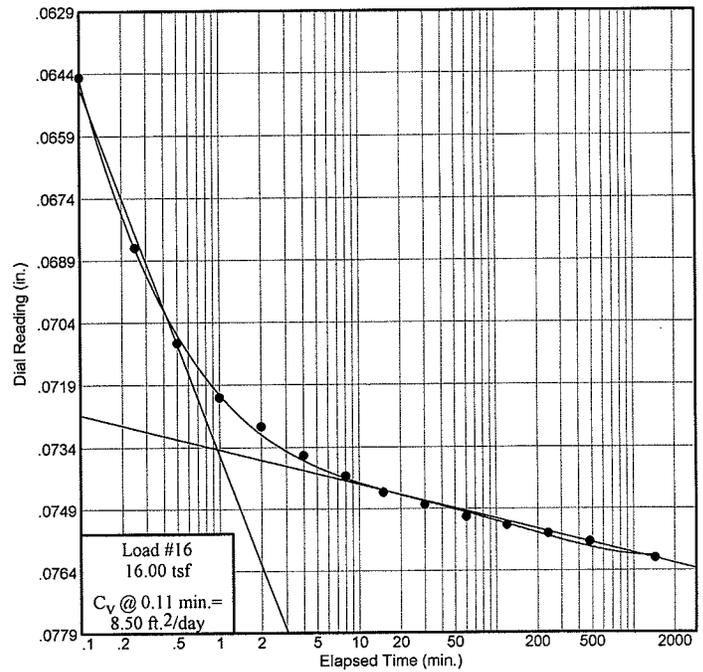
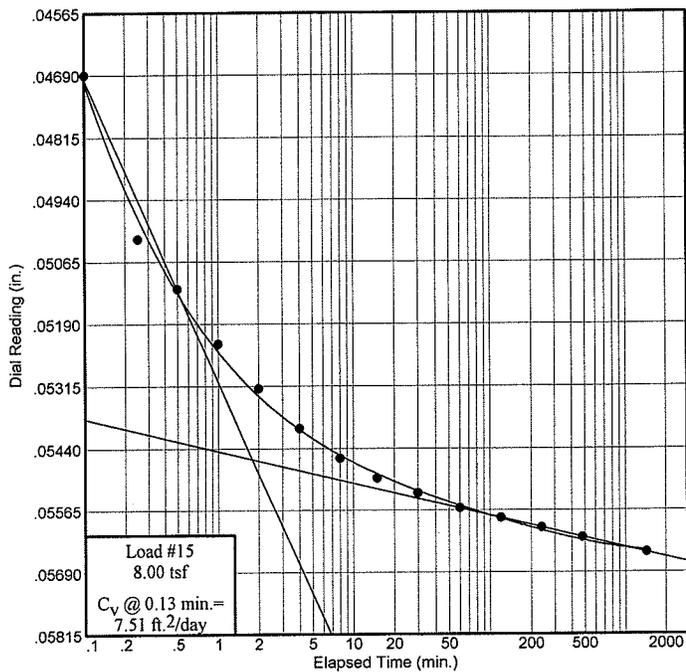
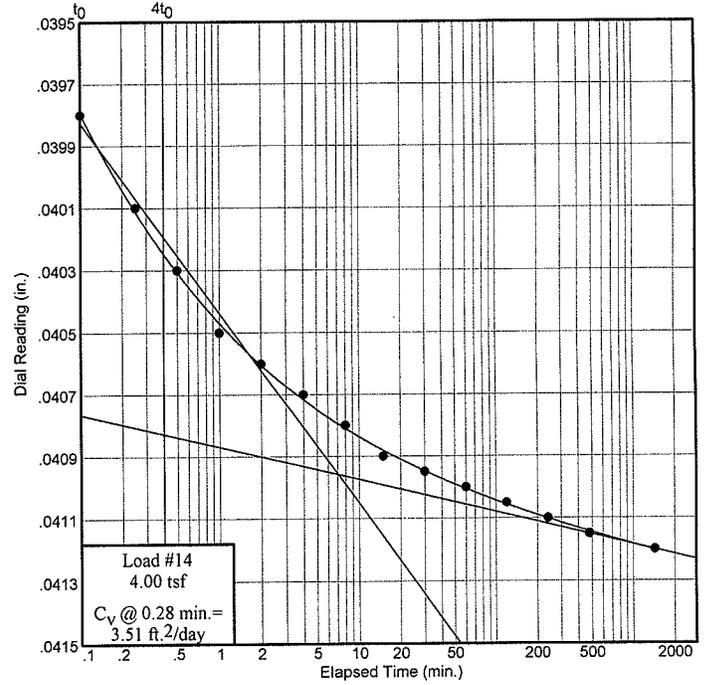
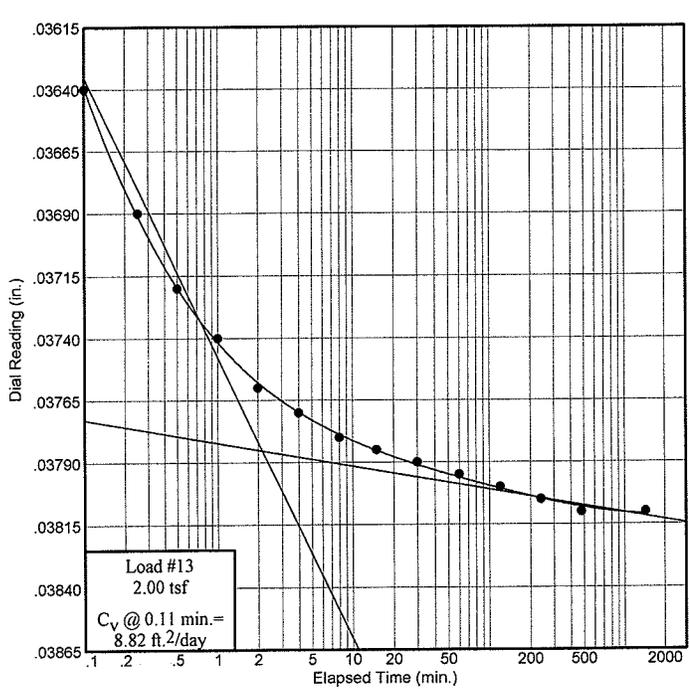
Dial Reading vs. Time

Project No.: 21-15652
 Project: Y-12 Outfall 200

Source:

Sample No.: A-25 ST-1

Elev./Depth: 15'-17'



Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 5

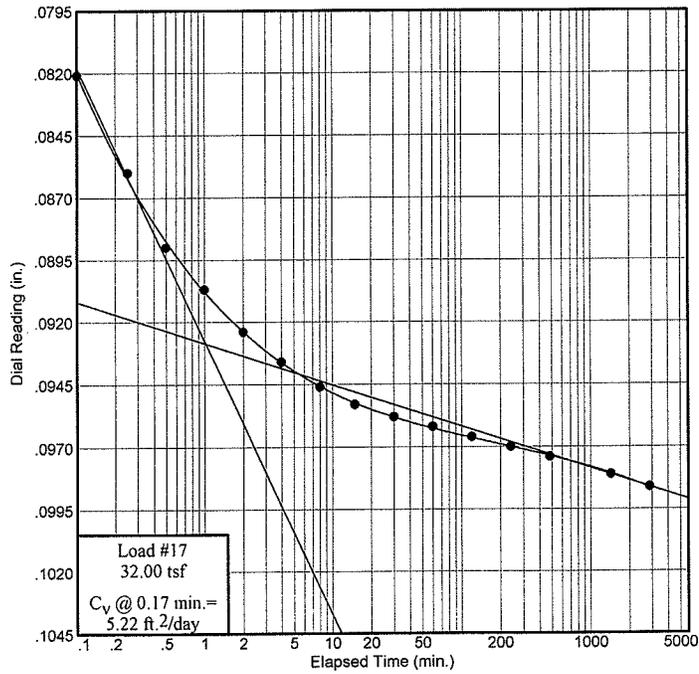
Dial Reading vs. Time

Project No.: 21-15652
Project: Y-12 Outfall 200

Source:

Sample No.: A-25 ST-1

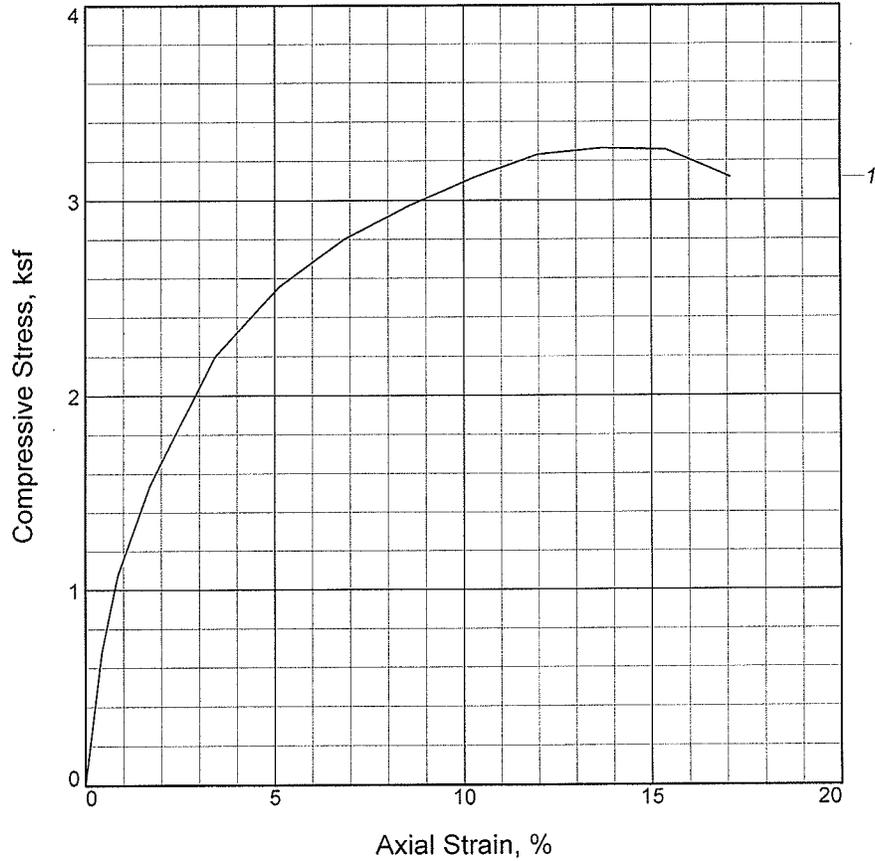
Elev./Depth: 15'-17'



Schnabel Engineering, LLC
Knoxville, Tennessee

Figure 6

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	3.26			
Undrained shear strength, ksf	1.63			
Failure strain, %	13.7			
Strain rate, in./min.	0.100			
Water content, %	19.8			
Wet density, pcf	129.1			
Dry density, pcf	107.7			
Saturation, %	98.0			
Void ratio	0.5361			
Specimen diameter, in.	2.880			
Specimen height, in.	5.850			
Height/diameter ratio	2.03			

Description: Clay, silty, dark brown w/ black streaks & rock

LL = **PL =** **PI =** **Assumed GS= 2.65** **Type: Shelby Tube**

Project No.: 21-15652
Date Sampled: 01/11/16
Remarks:

Client: GEOServices, LLC

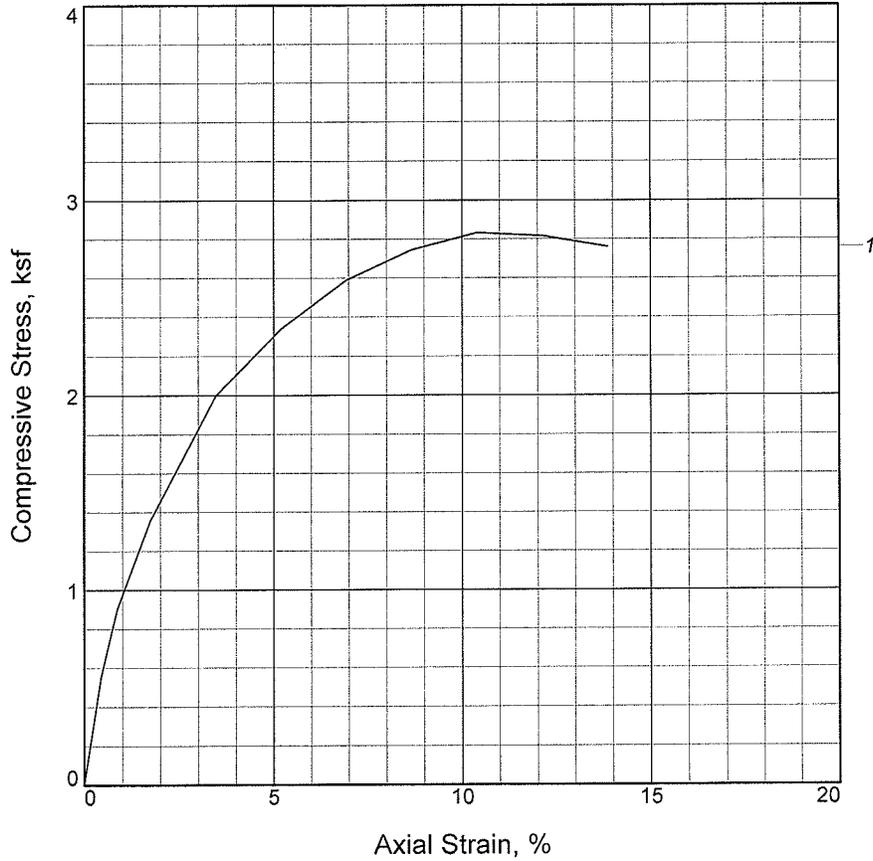
Project: Y-12 Outfall 200

Sample Number: A-01 ST-1 **Depth:** 5'-7'

UNCONFINED COMPRESSION TEST
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1

UNCONFINED COMPRESSION TEST



Sample No.	1		
Unconfined strength, ksf	2.83		
Undrained shear strength, ksf	1.42		
Failure strain, %	10.4		
Strain rate, in./min.	0.100		
Water content, %	20.4		
Wet density, pcf	128.0		
Dry density, pcf	106.2		
Saturation, %	97.2		
Void ratio	0.5572		
Specimen diameter, in.	2.870		
Specimen height, in.	5.770		
Height/diameter ratio	2.01		

Description: Clay, silty, brown w/ black streaks & rock

LL = 31 **PL = 18** **PI = 13** **Assumed GS= 2.65** **Type: Shelby Tube**

Project No.: 21-15652
Date Sampled: 01/11/16
Remarks:

Client: GEOServices, LLC

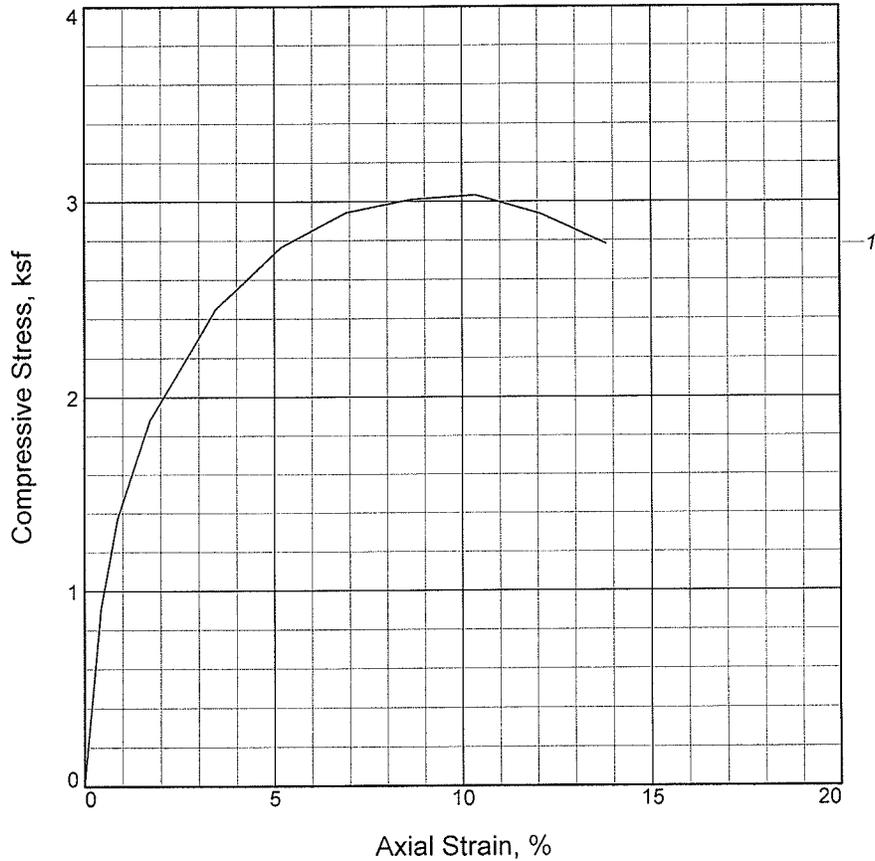
Project: Y-12 Outfall 200

Sample Number: A-03 ST-1 **Depth:** 5'-7'

UNCONFINED COMPRESSION TEST
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	3.03			
Undrained shear strength, ksf	1.52			
Failure strain, %	10.4			
Strain rate, in./min.	0.100			
Water content, %	13.3			
Wet density, pcf	125.1			
Dry density, pcf	110.5			
Saturation, %	70.7			
Void ratio	0.4977			
Specimen diameter, in.	2.870			
Specimen height, in.	5.790			
Height/diameter ratio	2.02			

Description: Clay, silty, brown w/rock

LL = 31 **PL = 17** **PI = 14** **Assumed GS= 2.65** **Type: Shelby Tube**

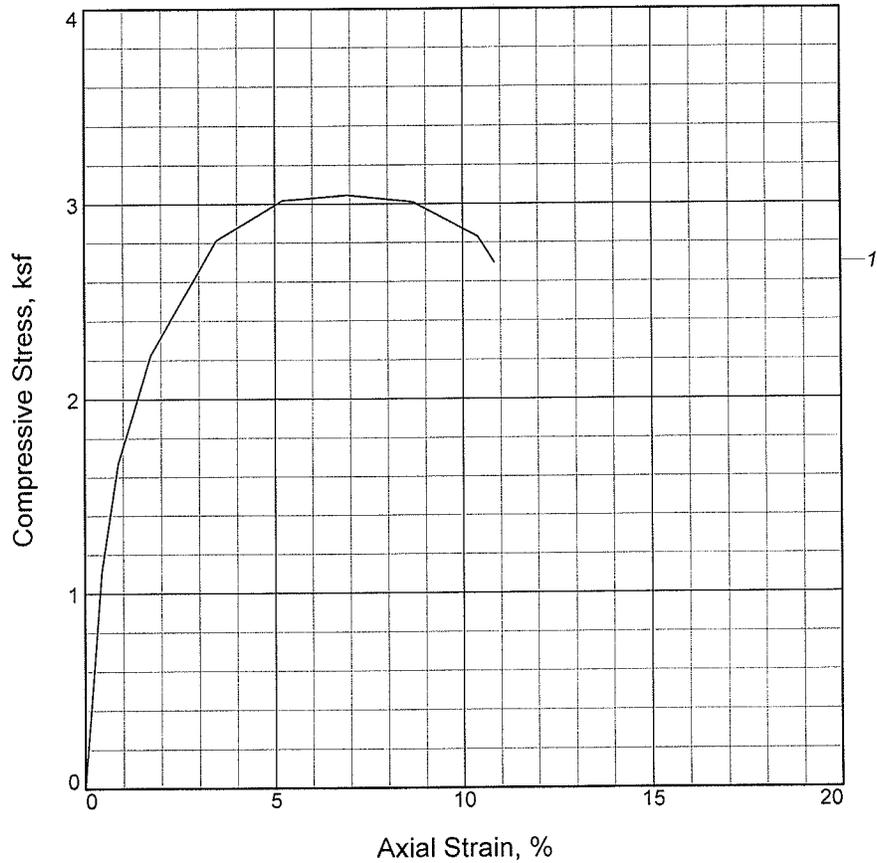
Project No.: 21-15652
Date Sampled: 01/12/16
Remarks:

Client: GEOServices, LLC
Project: Y-12 Outfall 200
Sample Number: A-04B ST-1 **Depth:** 5'-7'

UNCONFINED COMPRESSION TEST
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	3.05			
Undrained shear strength, ksf	1.52			
Failure strain, %	6.9			
Strain rate, in./min.	0.100			
Water content, %	15.9			
Wet density, pcf	128.4			
Dry density, pcf	110.9			
Saturation, %	85.4			
Void ratio	0.4923			
Specimen diameter, in.	2.860			
Specimen height, in.	5.770			
Height/diameter ratio	2.02			

Description: Clay, silty, brown w/ black streaks & rock

LL = **PL =** **PI =** **Assumed GS= 2.65** **Type: Shelby Tube**

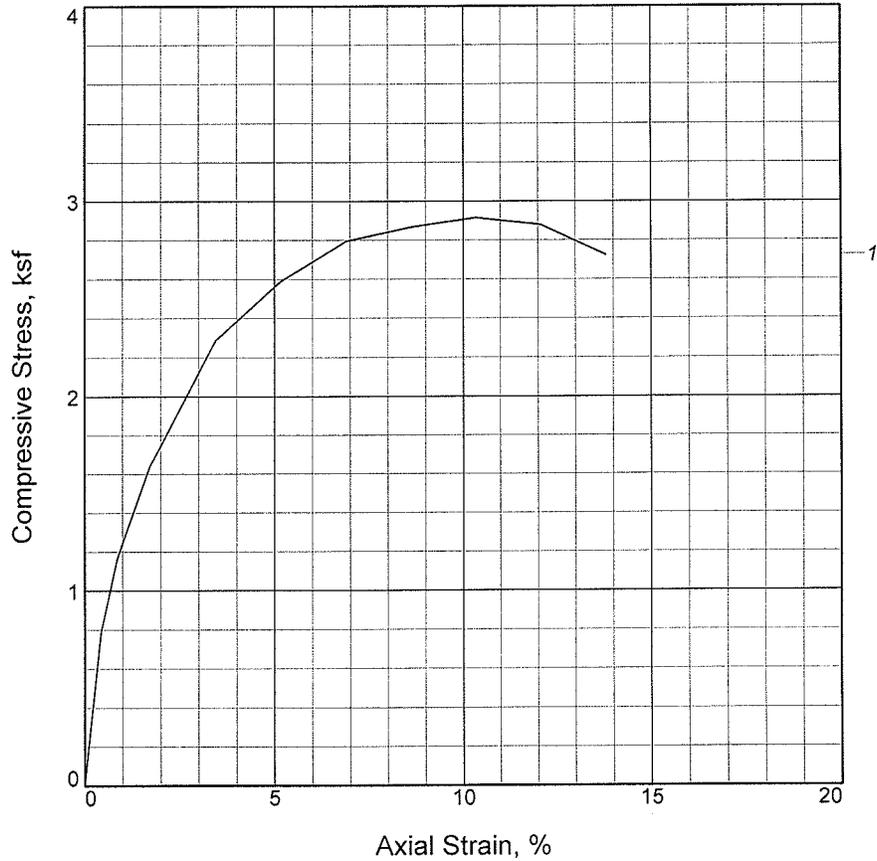
Project No.: 21-15652
Date Sampled: 01/12/16
Remarks:

Client: GEOServices, LLC
Project: Y-12 Outfall 200
Sample Number: A-04B ST-2 **Depth:** 7'-9"

UNCONFINED COMPRESSION TEST
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	2.91			
Undrained shear strength, ksf	1.46			
Failure strain, %	10.3			
Strain rate, in./min.	0.100			
Water content, %	14.9			
Wet density, pcf	127.0			
Dry density, pcf	110.5			
Saturation, %	79.5			
Void ratio	0.4971			
Specimen diameter, in.	2.850			
Specimen height, in.	5.800			
Height/diameter ratio	2.04			

Description: Clay, silty, medium brown to brown w/rock

LL = **PL =** **PI =** **Assumed GS= 2.65** **Type: Shelby Tube**

Project No.: 21-15652
Date Sampled: 01/12/16
Remarks:

Client: GEOServices, LLC

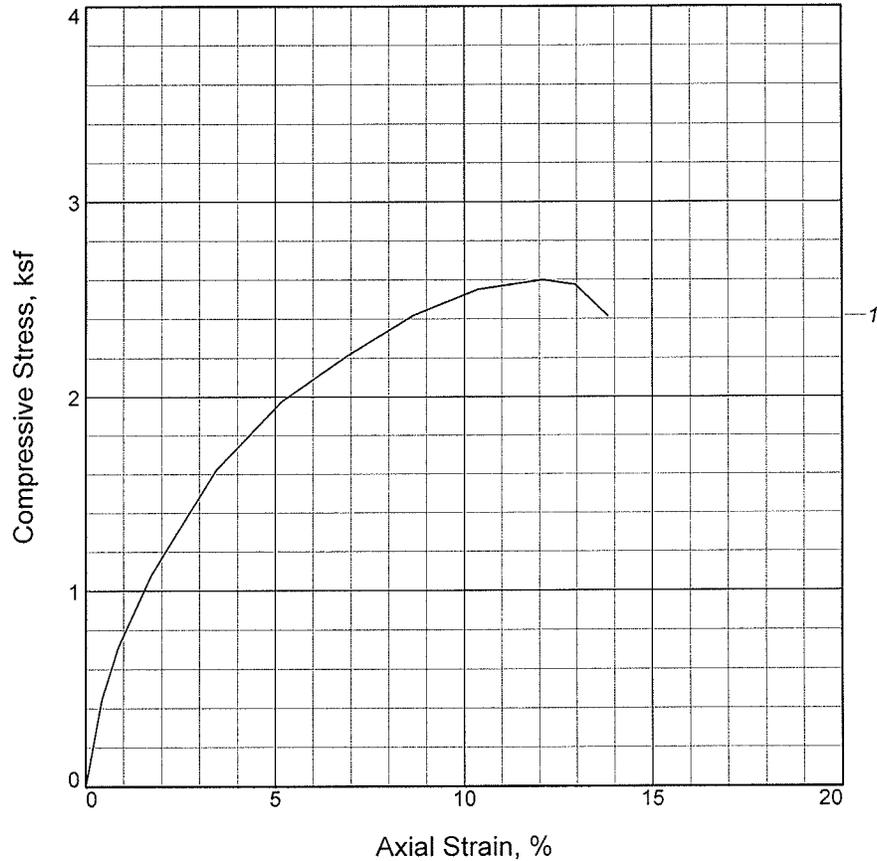
Project: Y-12 Outfall 200

Sample Number: A-07 ST-1 **Depth:** 5'-7'

UNCONFINED COMPRESSION TEST
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1

UNCONFINED COMPRESSION TEST



Sample No.	1		
Unconfined strength, ksf	2.60		
Undrained shear strength, ksf	1.30		
Failure strain, %	12.1		
Strain rate, in./min.	0.100		
Water content, %	19.0		
Wet density, pcf	130.4		
Dry density, pcf	109.7		
Saturation, %	98.7		
Void ratio	0.5086		
Specimen diameter, in.	2.860		
Specimen height, in.	5.790		
Height/diameter ratio	2.02		

Description: Clay, silty, light brown to medium brown w/rock

LL = **PL =** **PI =** **Assumed GS= 2.65** **Type: Shelby Tube**

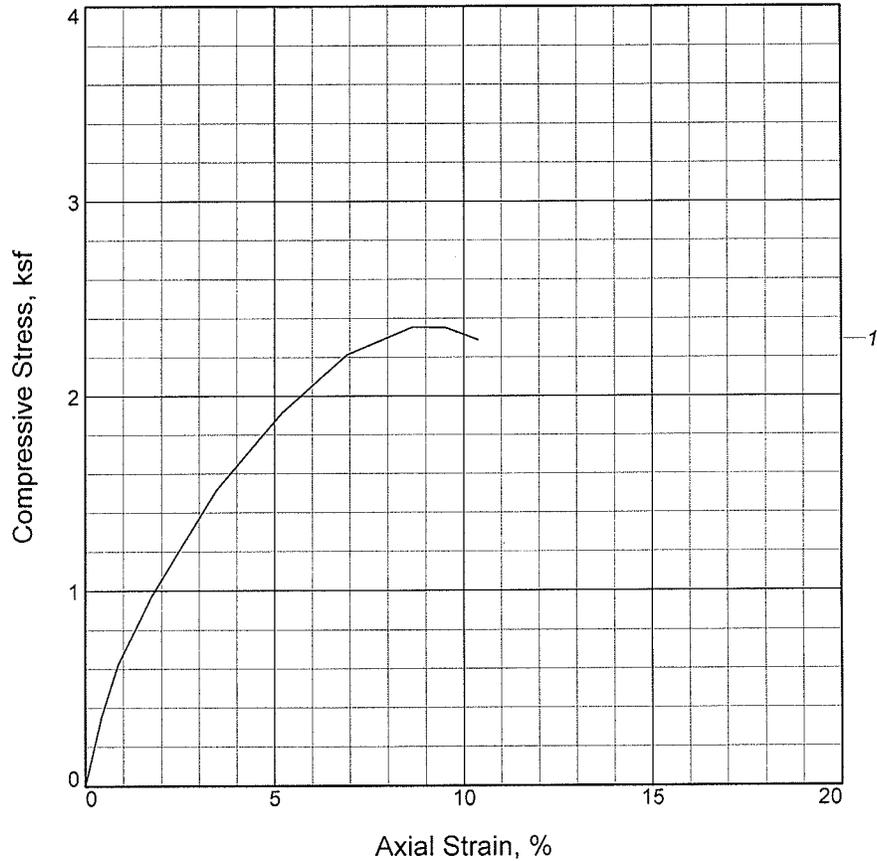
Project No.: 21-15652
Date Sampled: 01/12/16
Remarks:

Client: GEOServices, LLC
Project: Y-12 Outfall 200
Sample Number: A-21 ST-1 **Depth:** 4.5'-6.5'

UNCONFINED COMPRESSION TEST
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	2.35			
Undrained shear strength, ksf	1.18			
Failure strain, %	8.7			
Strain rate, in./min.	0.100			
Water content, %	21.2			
Wet density, pcf	127.9			
Dry density, pcf	105.6			
Saturation, %	98.9			
Void ratio	0.5672			
Specimen diameter, in.	2.860			
Specimen height, in.	5.780			
Height/diameter ratio	2.02			

Description: Clay, silty, brown w/rock

LL =	PL =	PI =	Assumed GS= 2.65	Type: Shelby Tube
------	------	------	------------------	-------------------

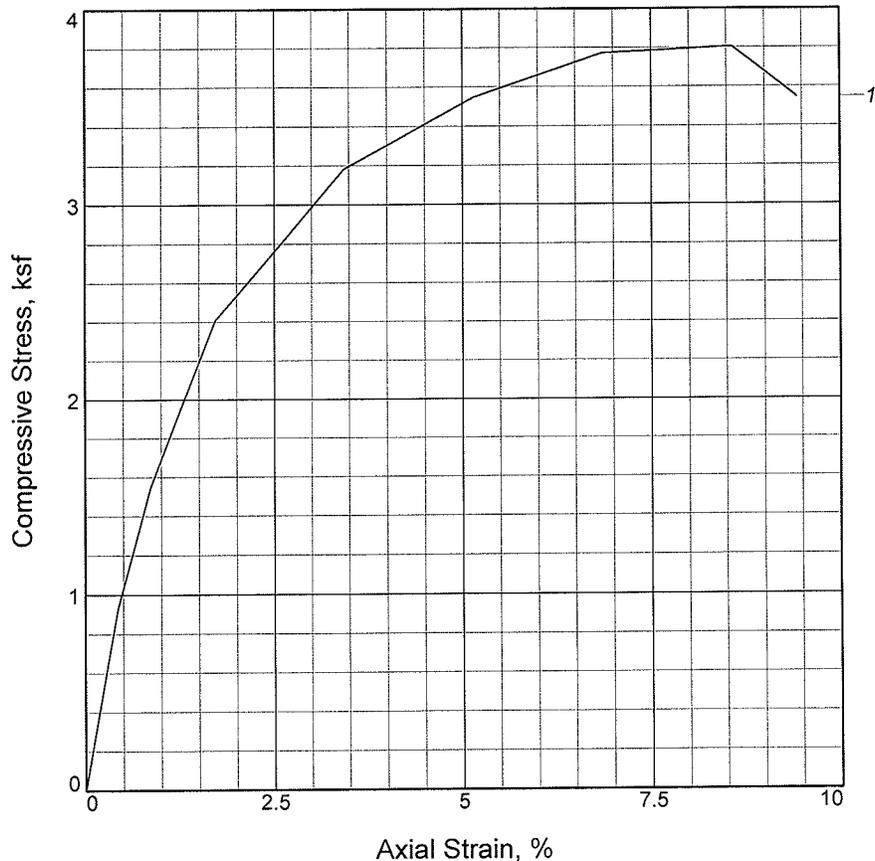
Project No.: 21-15652
Date Sampled: 01/12/16
Remarks:

Client: GEOServices, LLC
Project: Y-12 Outfall 200
Sample Number: A-22 ST-1 **Depth:** 5'-7'

Figure 1

UNCONFINED COMPRESSION TEST
 Schnabel Engineering, LLC
 Knoxville, Tennessee

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	3.81			
Undrained shear strength, ksf	1.90			
Failure strain, %	8.6			
Strain rate, in./min.	0.100			
Water content, %	20.9			
Wet density, pcf	129.7			
Dry density, pcf	107.3			
Saturation, %	98.1			
Void ratio	0.5770			
Specimen diameter, in.	2.870			
Specimen height, in.	5.830			
Height/diameter ratio	2.03			

Description: Clay, silty, light brown, mottled gray w/rock

LL = 35 **PL = 19** **PI = 16** **GS = 2.71** **Type: Shelby Tube**

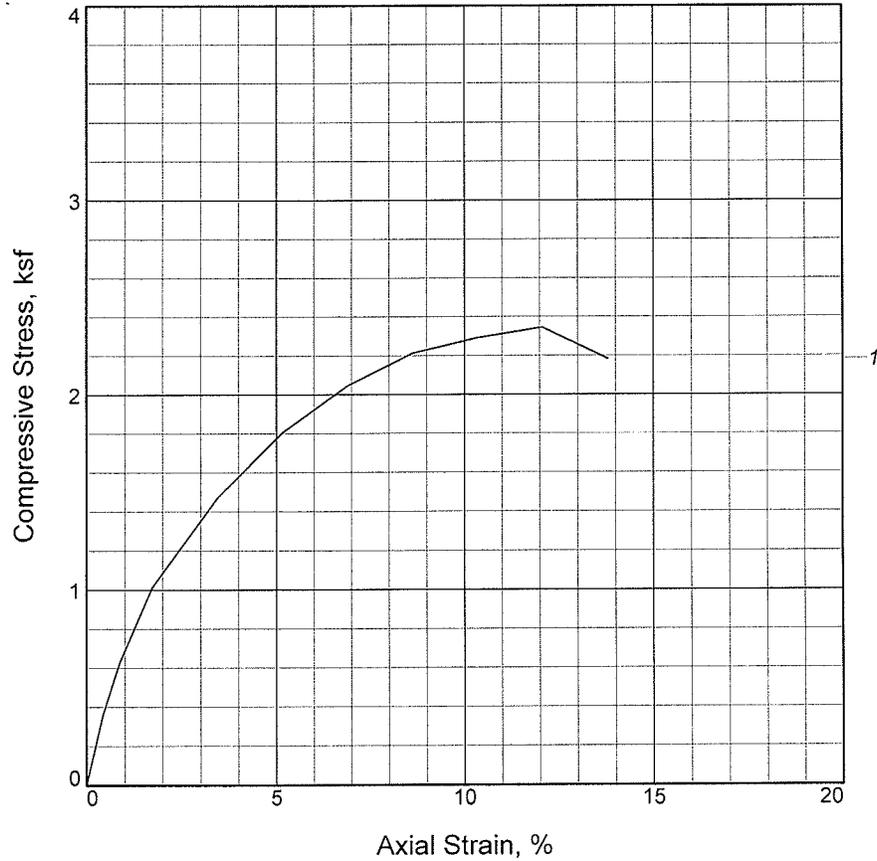
Project No.: 21-15652
Date Sampled: 01/08/16
Remarks:

Client: GEOServices, LLC
Project: Y-12 Outfall 200
Sample Number: A-22 ST-2 **Depth:** 7'-9'

UNCONFINED COMPRESSION TEST
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	2.35			
Undrained shear strength, ksf	1.17			
Failure strain, %	12.1			
Strain rate, in./min.	0.100			
Water content, %	19.4			
Wet density, pcf	127.3			
Dry density, pcf	106.6			
Saturation, %	93.2			
Void ratio	0.5512			
Specimen diameter, in.	2.860			
Specimen height, in.	5.800			
Height/diameter ratio	2.03			

Description: Clay, silty, light brown w/rock

LL = **PL =** **PI =** **Assumed GS= 2.65** **Type: Shelby tube**

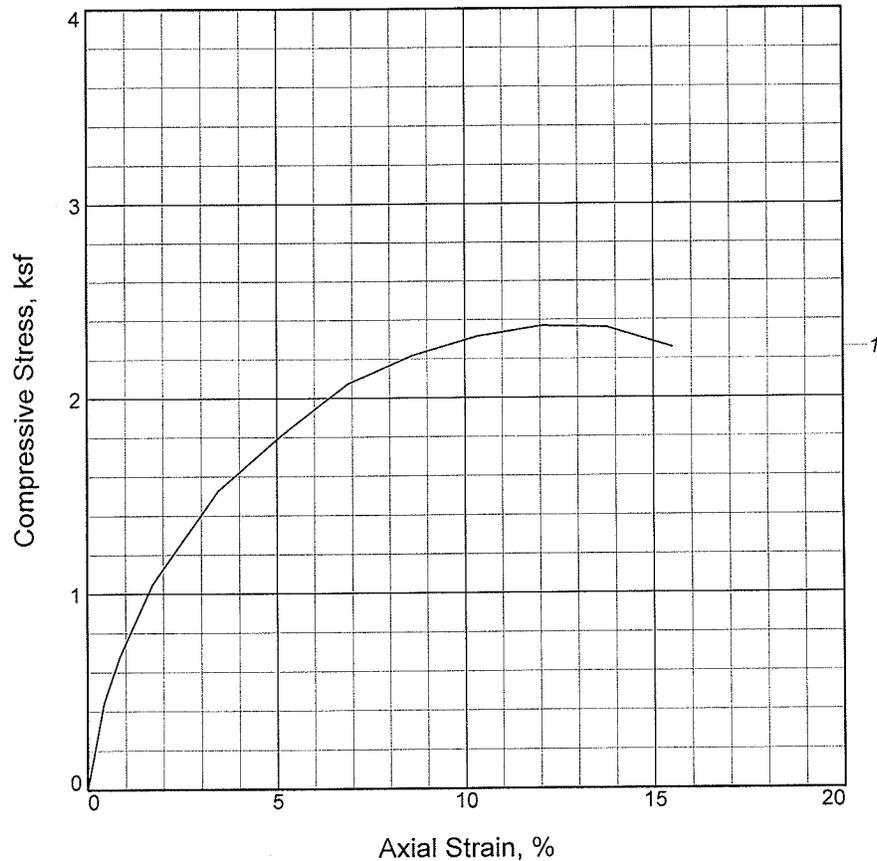
Project No.: 21-15652
Date Sampled: 01/12/16
Remarks:

Client: GEOServices, LLC
Project: Y-12 Outfall 200
Sample Number: A-25 ST-1 **Depth:** 15'-17'

UNCONFINED COMPRESSION TEST
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	2.37			
Undrained shear strength, ksf	1.18			
Failure strain, %	12.0			
Strain rate, in./min.	0.100			
Water content, %	23.0			
Wet density, pcf	125.8			
Dry density, pcf	102.3			
Saturation, %	98.9			
Void ratio	0.6176			
Specimen diameter, in.	2.870			
Specimen height, in.	5.810			
Height/diameter ratio	2.02			

Description: Clay, silty, light brown to medium brown, mottled w/ rock

LL = **PL =** **PI =** **Assumed GS= 2.65** **Type: Shelby Tube**

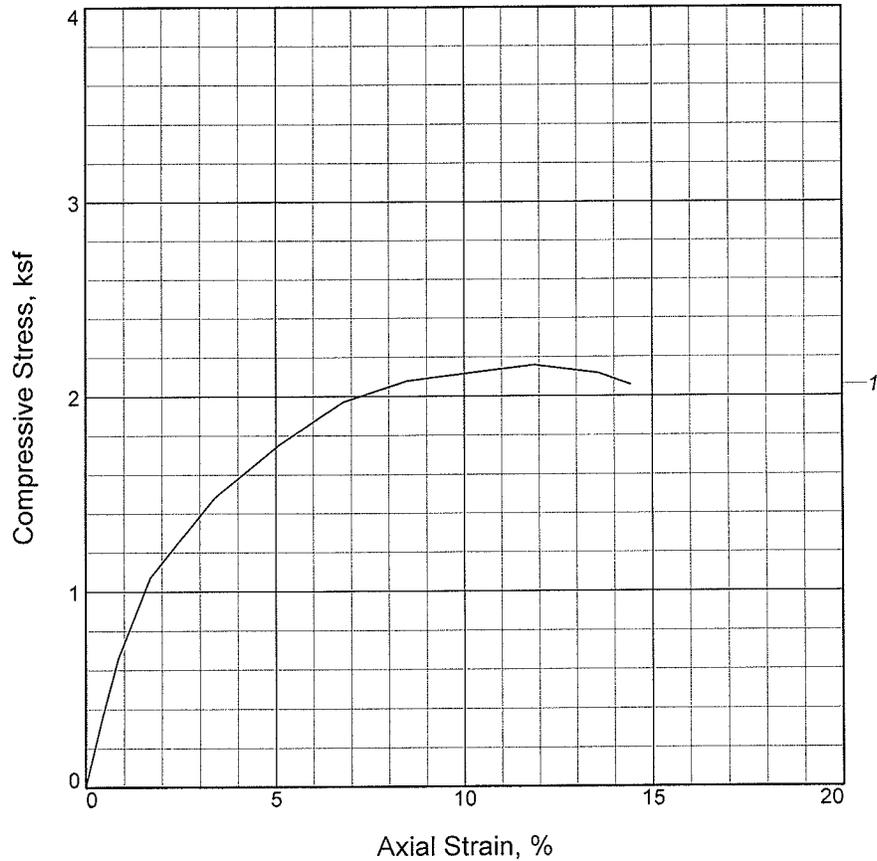
Project No.: 21-15652
Date Sampled: 01/11/16
Remarks:

Client: GEOServices, LLC
Project: Y-12 Outfall 200
Sample Number: A-28 ST-1 **Depth:** 10'-12'

UNCONFINED COMPRESSION TEST
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1

UNCONFINED COMPRESSION TEST



Sample No.	1			
Unconfined strength, ksf	2.16			
Undrained shear strength, ksf	1.08			
Failure strain, %	11.9			
Strain rate, in./min.	0.100			
Water content, %	24.4			
Wet density, pcf	124.6			
Dry density, pcf	100.1			
Saturation, %	99.1			
Void ratio	0.6519			
Specimen diameter, in.	2.870			
Specimen height, in.	5.890			
Height/diameter ratio	2.05			

Description: Clay, silty, light brown to medium brown, mottled

LL = **PL =** **PI =** **Assumed GS= 2.65** **Type: Shelby Tube**

Project No.: 21-15652
Date Sampled: 01/12/16
Remarks:

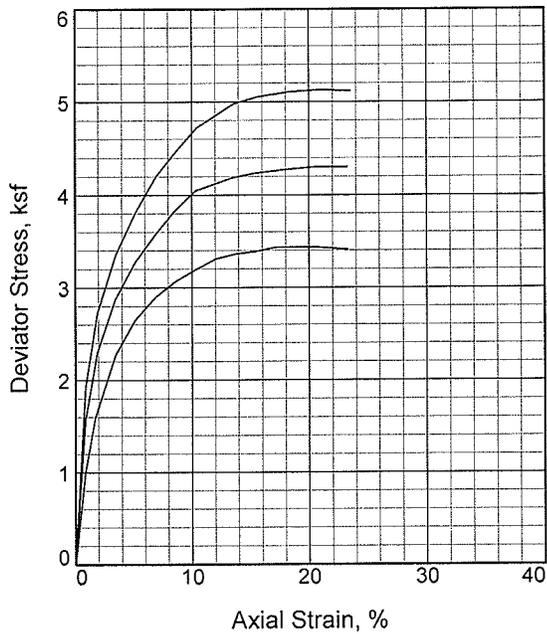
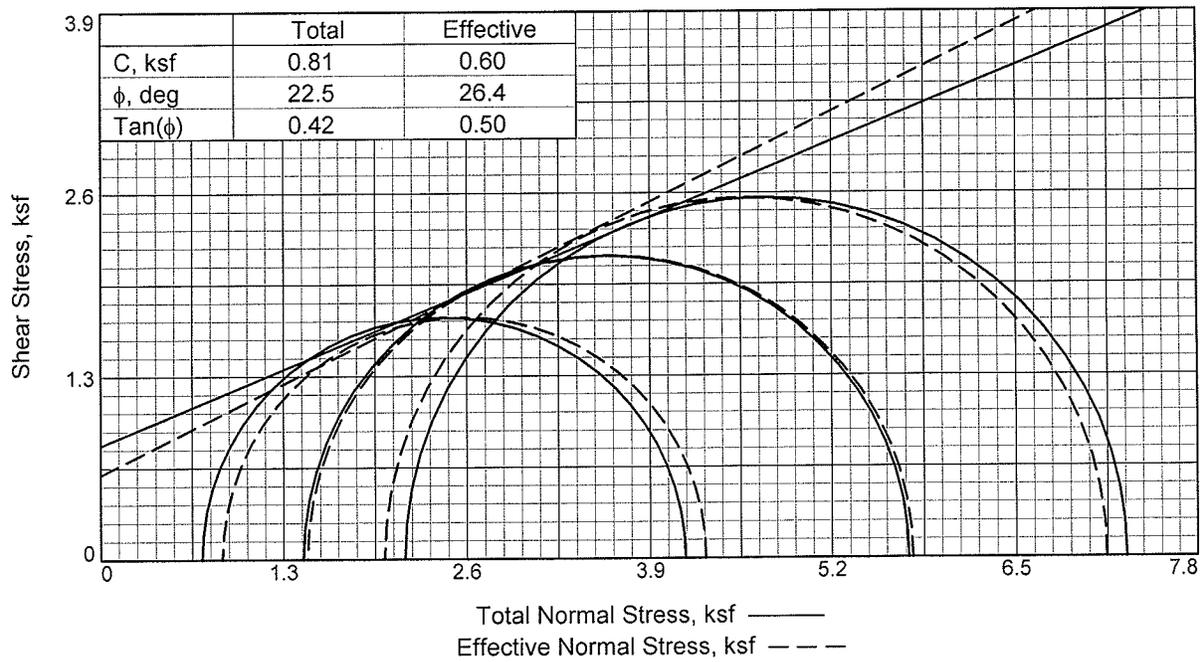
Client: GEOServices, LLC

Project: Y-12 Outfall 200

Sample Number: A-29 ST-1 **Depth:** 6'-8'

UNCONFINED COMPRESSION TEST
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1



Sample No.		1	2	3
Initial	Water Content, %	20.0	19.8	19.7
	Dry Density, pcf	105.4	104.0	108.9
	Saturation, %	90.8	86.9	97.9
	Void Ratio	0.5926	0.6140	0.5425
	Diameter, in.	2.860	2.860	2.840
	Height, in.	5.820	5.840	5.790
At Test	Water Content, %	21.5	21.7	18.6
	Dry Density, pcf	106.3	105.9	111.9
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.5795	0.5851	0.5004
	Diameter, in.	2.852	2.843	2.814
	Height, in.	5.804	5.805	5.737
Strain rate, in./min.		0.003	0.003	0.003
Back Pressure, psi		30.00	30.00	30.00
Cell Pressure, psi		35.00	40.00	45.00
Fail. Stress, ksf		3.43	4.30	5.13
Total Pore Pr., ksf		4.18	4.29	4.46
Ult. Stress, ksf				
Total Pore Pr., ksf				
$\bar{\sigma}_1$ Failure, ksf		4.30	5.77	7.14
$\bar{\sigma}_3$ Failure, ksf		0.86	1.47	2.02

Type of Test:

CU with Pore Pressures

Sample Type: Shelby Tube

Description: Clay, silty, brown w/ black streaks & rock

Specific Gravity= 2.69

Remarks:

Pore pressure stability check : B-value 0.99

Client: GEOServices, LLC

Project: Y-12 Outfall 200

Sample Number: A-06 ST-1

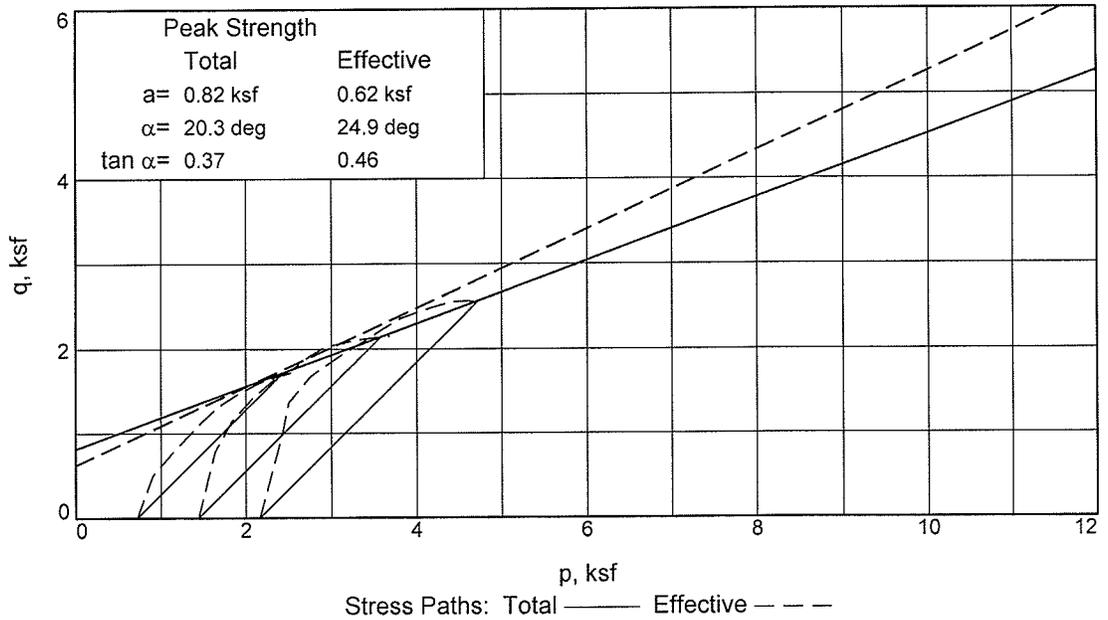
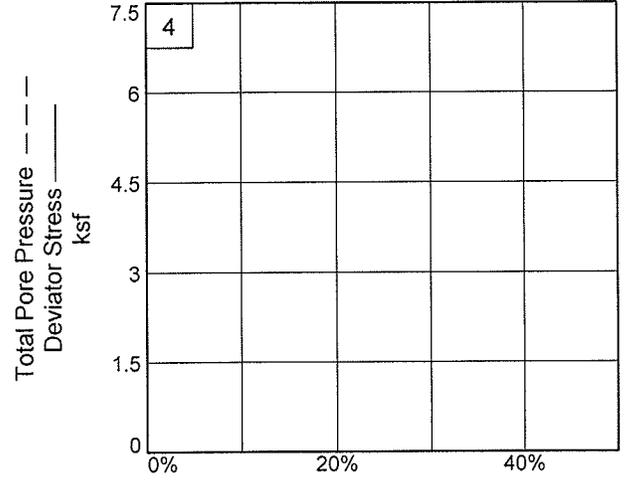
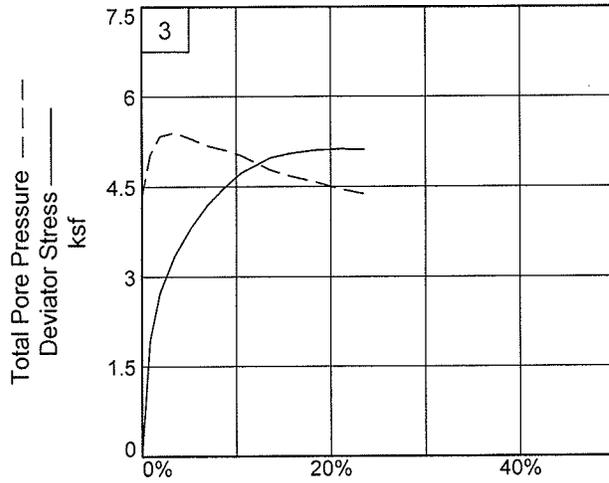
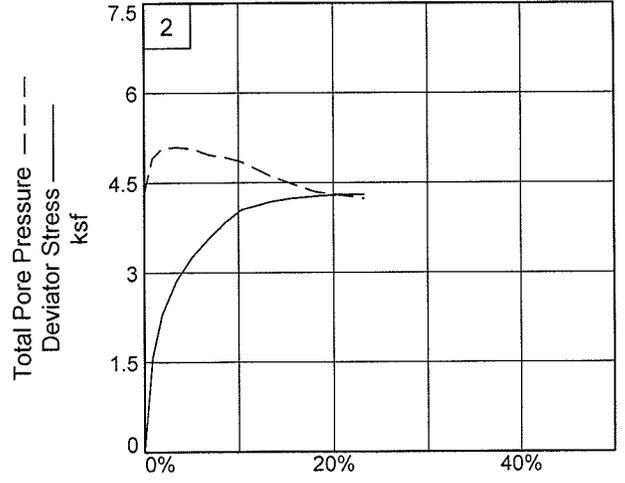
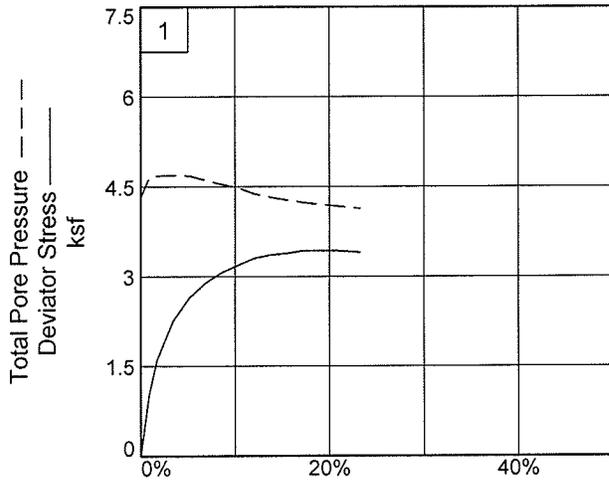
Depth: 7'-9'

Proj. No.: 21-15652

Date Sampled: 01/15/16

TRIAXIAL SHEAR TEST REPORT
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1



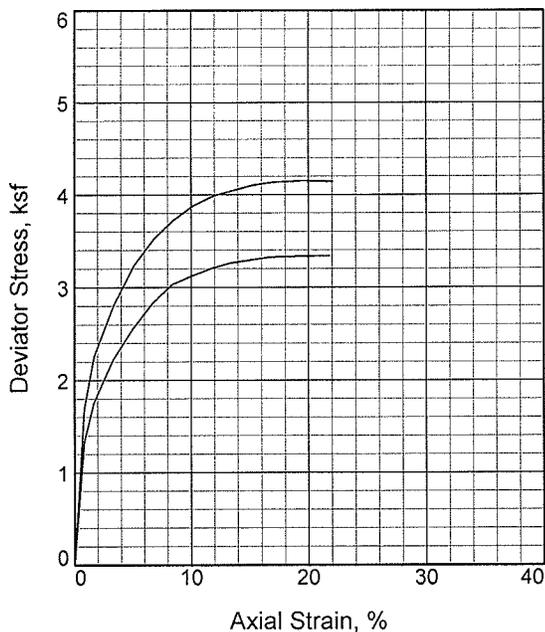
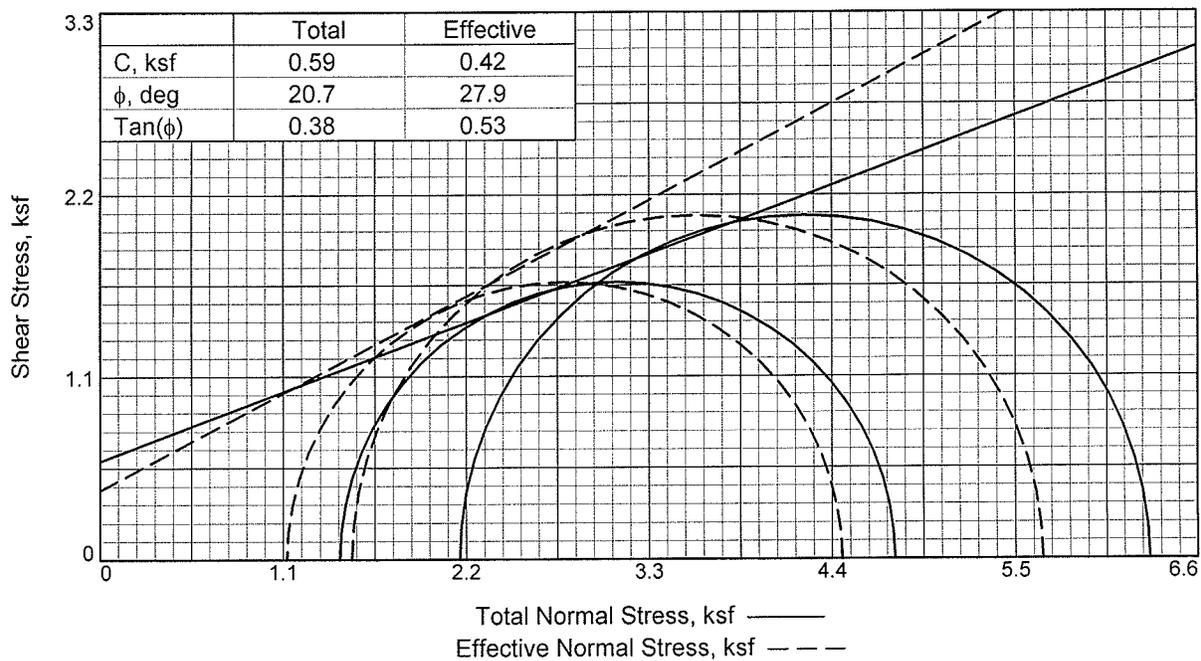
Client: GEOServices, LLC

Project: Y-12 Outfall 200

Depth: 7'-9' Sample Number: A-06 ST-1

Project No.: 21-15652

Figure 2



Sample No.		1	2
Initial	Water Content, %	18.2	17.6
	Dry Density, pcf	109.9	111.4
	Saturation, %	96.4	97.1
	Void Ratio	0.4990	0.4793
	Diameter, in.	2.840	2.860
	Height, in.	5.980	5.930
At Test	Water Content, %	18.6	17.0
	Dry Density, pcf	110.5	113.7
	Saturation, %	100.0	100.0
	Void Ratio	0.4915	0.4495
	Diameter, in.	2.835	2.841
	Height, in.	5.970	5.890
Strain rate, in./min.	0.003	0.003	
Back Pressure, psi	30.00	30.00	
Cell Pressure, psi	40.00	45.00	
Fail. Stress, ksf	3.34	4.15	
Total Pore Pr., ksf	4.64	4.97	
Ult. Stress, ksf			
Total Pore Pr., ksf			
$\bar{\sigma}_1$ Failure, ksf	4.46	5.66	
$\bar{\sigma}_3$ Failure, ksf	1.12	1.51	

Type of Test:

CU with Pore Pressures

Sample Type: Shelby Tube

Description: Clay, silty, brown w/ black streaks & rock

Specific Gravity= 2.64

Remarks:

Pore pressure stability check : B-value 0.98

Client: GEOServices, LLC

Project: Y-12 Outfall 200

Sample Number: A-03 ST-2

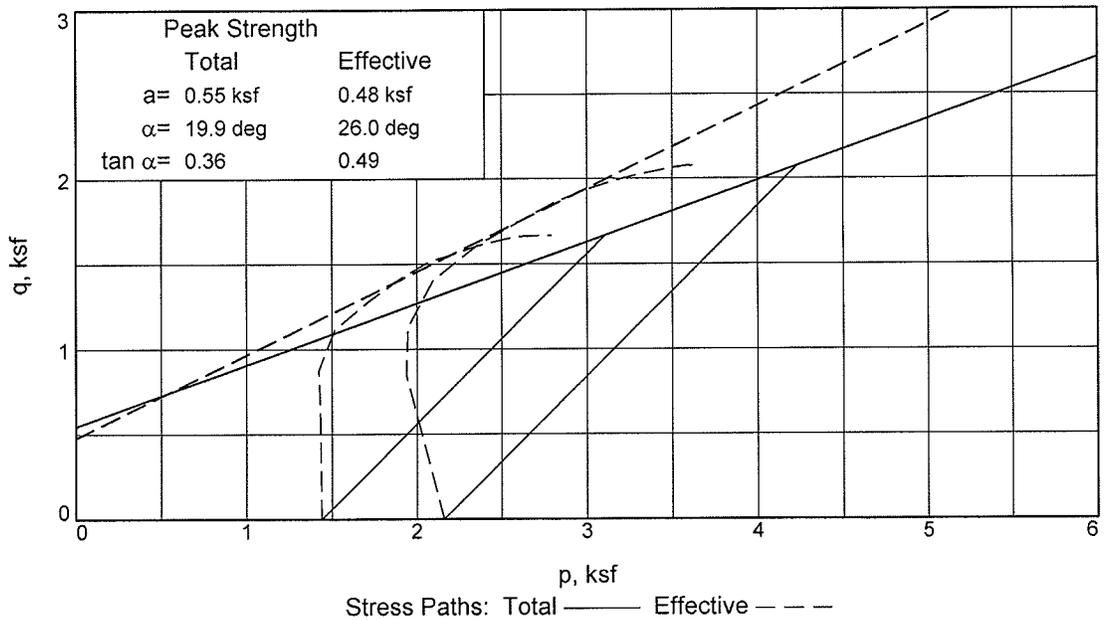
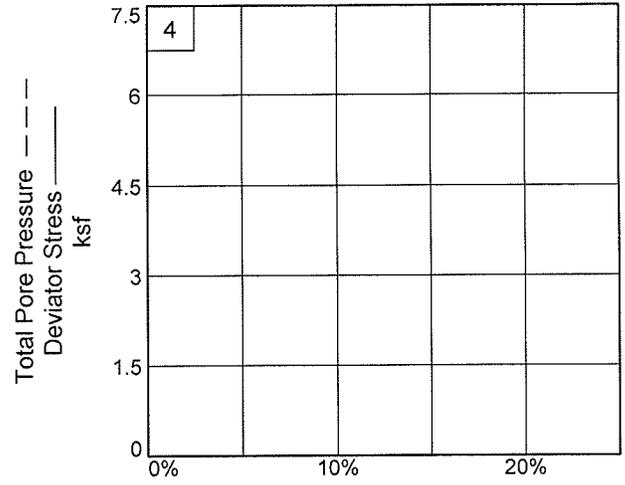
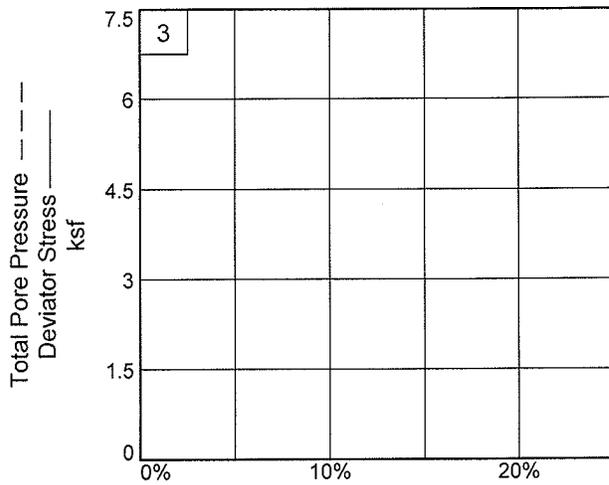
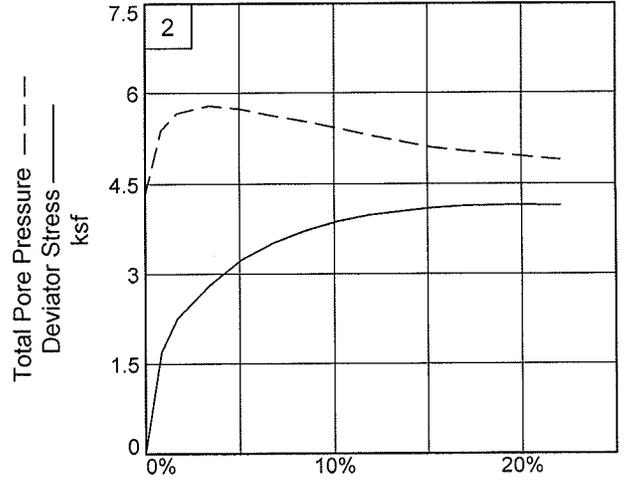
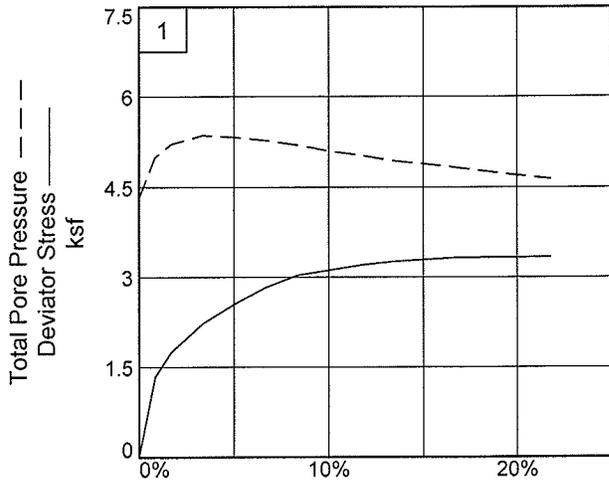
Depth: 10'-12'

Proj. No.: 21-15652

Date Sampled: 01/20/16

TRIAXIAL SHEAR TEST REPORT
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1



Client: GEOServices, LLC

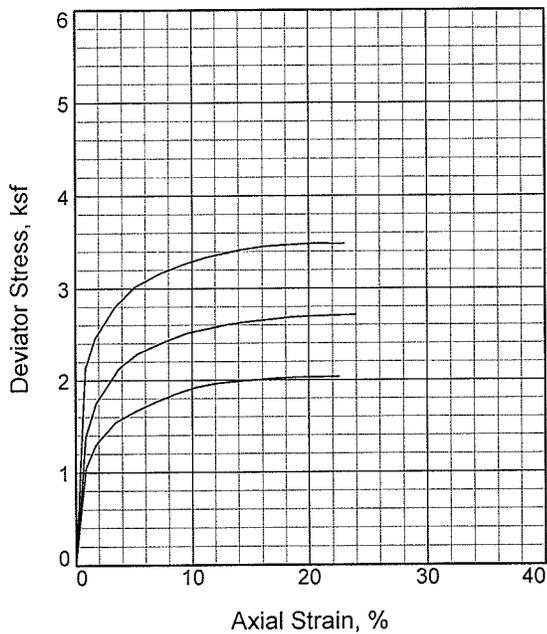
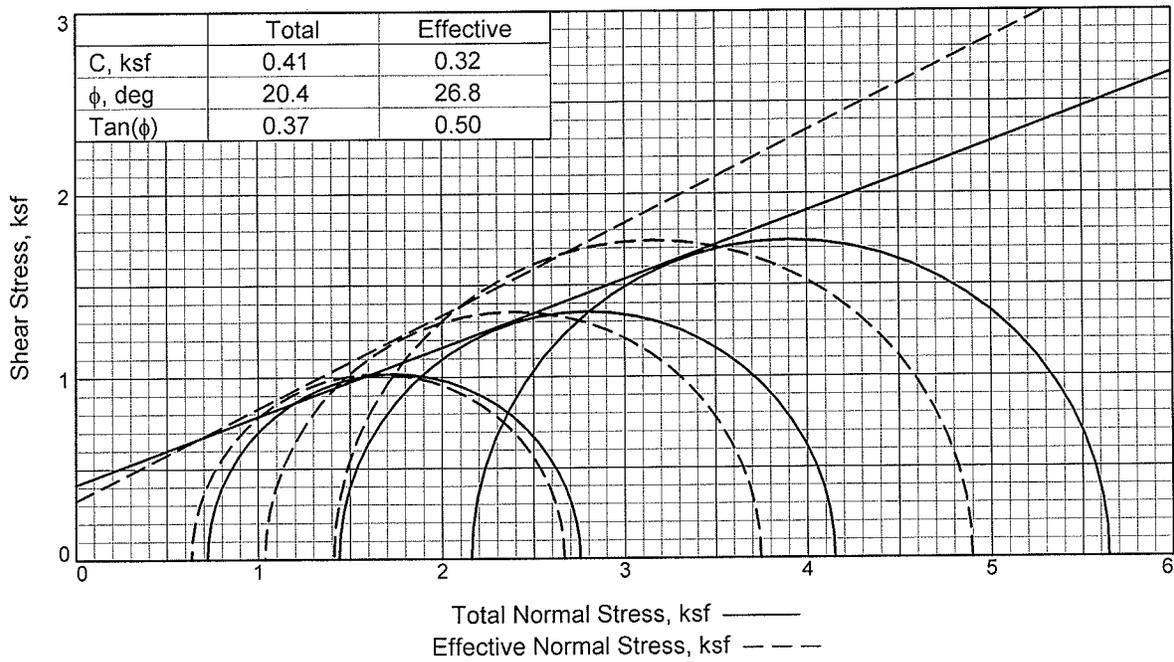
Project: Y-12 Outfall 200

Depth: 10'-12' Sample Number: A-03 ST-2

Project No.: 21-15652

Figure 2

Schnabel Engineering, LLC



Sample No.		1	2	3
Initial	Water Content, %	19.8	20.0	19.4
	Dry Density, pcf	108.3	108.4	109.0
	Saturation, %	96.3	97.3	95.7
	Void Ratio	0.5561	0.5556	0.5464
	Diameter, in.	2.840	2.860	2.810
	Height, in.	5.780	5.650	5.920
At Test	Water Content, %	20.2	20.1	19.1
	Dry Density, pcf	109.0	109.3	111.3
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.5464	0.5415	0.5145
	Diameter, in.	2.834	2.851	2.790
	Height, in.	5.768	5.633	5.879
Strain rate, in./min.		0.003	0.003	0.003
Back Pressure, psi		30.00	30.00	30.00
Cell Pressure, psi		35.00	40.00	45.00
Fail. Stress, ksf		2.03	2.71	3.49
Total Pore Pr., ksf		4.41	4.72	5.07
Ult. Stress, ksf				
Total Pore Pr., ksf				
$\bar{\sigma}_1$ Failure, ksf		2.67	3.75	4.90
$\bar{\sigma}_3$ Failure, ksf		0.63	1.04	1.41

Type of Test:

CU with Pore Pressures

Sample Type: Shelby Tube

Description: Clay, silty, light brown w/ rock

Assumed Specific Gravity= 2.70

Remarks:

Pore pressure stability check : B-value 0.99

Client: GEOServices, LLC

Project: Y-12 Outfall 200

Sample Number: A-20 ST-2

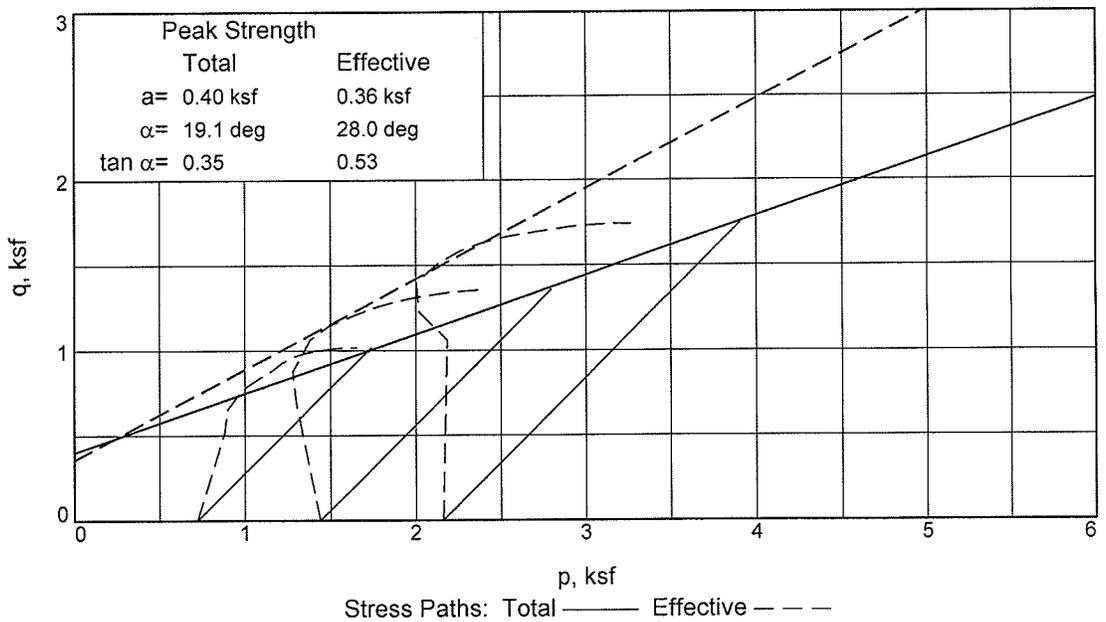
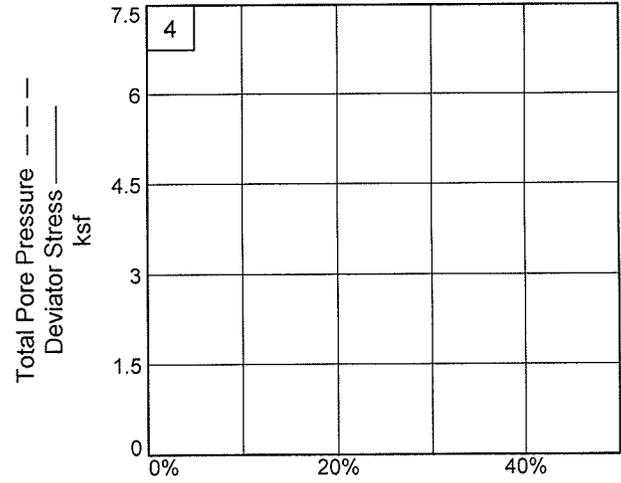
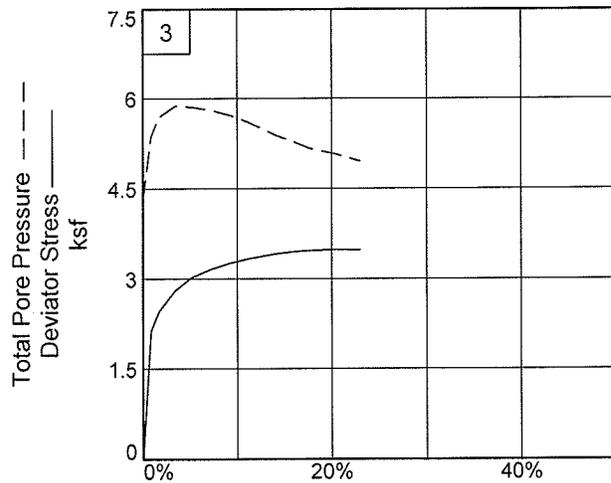
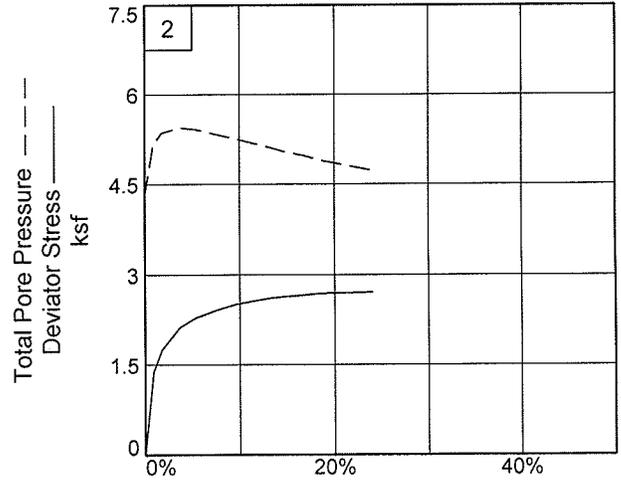
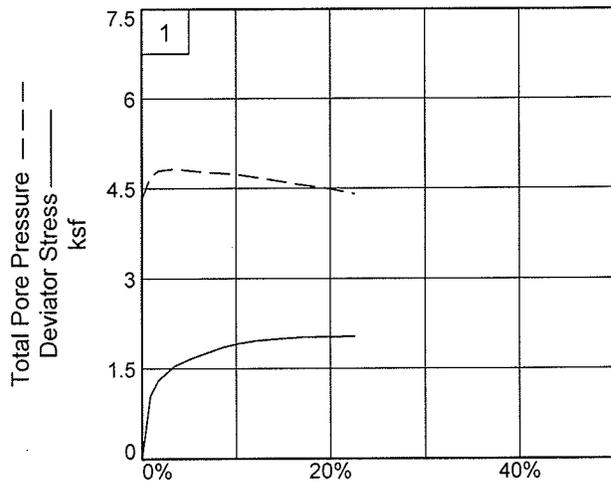
Depth: 9'-11'

Proj. No.: 21-15652

Date Sampled: 01/19/16

TRIAXIAL SHEAR TEST REPORT
 Schnabel Engineering, LLC
 Knoxville, Tennessee

Figure 1



Client: GEOServices, LLC

Project: Y-12 Outfall 200

Depth: 9'-11' Sample Number: A-20 ST-2

Project No.: 21-15652

Figure 2