



REPORT

# STRUCTURAL STABILITY ASSESSMENT REPORT

Oak Grove Steam Electric Station

**Submitted To:** Luminant  
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Dallas, TX 75201

**Submitted By:** Golder Associates Inc.  
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Professional Engineering Firm  
Registration Number F-2578

October 2016

Project No. 1648164





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## 1.0 INTRODUCTION

### 1.1 Purpose

The “Disposal of Coal Combustion Residuals (CCR) from Electric Utilities rule” (40 Code of Federal Regulations (40 CFR) Part 257), effective October 19, 2015, requires that existing CCR surface impoundments meeting the requirements of §257.73(b) conduct initial and periodic structural stability assessments in accordance with §257.73(d). This report provides the structural stability assessments for the Oak Grove Steam Electric Station’s (OGSES’s) CCR Impoundments, identified as flue gas desulfurization (FGD) Ponds FGD-A, FGD-B, and FGD-C.

### 1.2 Site Background

The OGSES generates bottom ash, fly ash, boiler slag and flue gas desulfurization (FGD) sludge (gypsum) during electricity generation. The following surface impoundments, shown on Figure 1, are in operation at the OGSES:

- FGD-A Pond;
- FGD-B Pond; and
- FGD-C Pond.

### 1.3 Previous Slope Stability Evaluations

Golder performed previous evaluations on the FGD-A, and FGD-B ponds as part of the below reports submitted to Luminant:

- FGD-B Slope Stability Investigation Report (Revised), Luminant Oak Grove SES, Robertson County, Texas, dated June 2010
- FGD-A Slope Stability Evaluation Report, Luminant Oak Grove SES, Robertson County, Texas, dated March 2011
- Addendum To Slope Stability Investigation Reports Luminant Oak Grove SES, Robertson County, Texas, March 2014

These studies found the pond slopes to be adequately stable.

Construction of FGD-C Pond began on August 21, 2015. During the design of FGD-C Pond, Golder evaluated the stability of the embankments.



## 2.0 SUBSURFACE CONDITIONS

### 2.1 Regional Geology

The OGSES site is located in the Sandy Hills physiographic province of Texas. Ground elevations range from 400 to 425 feet MSL (mean sea level), and the topography is characterized by low rolling hills and shallow stream valleys (Espey, Huston & Associates, 1987). The regional terrain consists of a thick series of unconsolidated sediments consisting of sand, silt, clay, and lignite. The major geologic units are the tertiary age 'bedrock' strata and the quaternary age fluvial deposits. Eroded bedrock is overlain by alluvium and terraces along the valleys of larger streams. The approximate thickness of alluvium in the area of the site varies from 0 to 50 ft. The alluvium typically consists of sand, silt, silty clay and sandy clay and is not easily differentiated from the underlying bedrock strata in many instances.

### 2.2 Site Geology

#### 2.2.1 Subsurface Investigations and Laboratory Testing

Information from previous subsurface investigations was used to characterize the subsurface site conditions. Golder conducted a subsurface investigation for the FGD-A Pond in July 2008, prior to construction of the clay liner within the pond. Golder completed nine borings within the pond footprint with boring depths ranging from 16 to 28 feet below ground surface (bgs) (Golder, 2008). Golder also conducted a subsurface investigation for the FGD-B Pond in March 2010 (Golder, 2010). In December 2014, Golder completed another subsurface investigation including ten geotechnical boreholes and installation of 3 groundwater monitoring wells, to facilitate design and construction of the FGD-C Pond. Appendix A includes the boring location maps and select, representative boring logs.

For each investigation, laboratory testing was performed on selected samples, in accordance with commonly accepted methods and practices. Undisturbed and disturbed soil samples were tested to determine water content, Atterberg limits, grain size distribution, and shear strength. Water content determination was performed in accordance with ASTM D2216; Atterberg limits were determined in accordance with ASTM D4318; and grain size distribution was performed in accordance with ASTM D422. Shear strength testing consisted of unconsolidated-undrained (UU) and consolidated-undrained (CU) triaxial compression tests in general accordance with ASTM D2850 and D4767, respectively. Laboratory data are presented in Appendix B.

The findings from the above subsurface investigations were reviewed for their applicability to this study, and are summarized in the following sections.



## 2.2.2 Subsurface Site Conditions

### 2.2.2.1 FGD-A Pond

The soils encountered under the FGD-A Pond consist of lean clays, sandy clays, silty clays, sands, silty sands, clayey sands, and sandy silts. The near surface soils under the pond generally consist of fine-grained soils extending to depths ranging from approximately 6 feet to more than 19 feet below the pond bottom. Coarse-grained soils (i.e., sands) were generally encountered at depths greater than 6 feet below the pond bottom. Sands were encountered at shallower depths in the northwest portion of the pond than in the southeast portion of the pond.

Historical monitoring well measurements near the FGD-A Pond indicate that the groundwater level is between approximately 406 and 409 ft-msl.

### 2.2.2.2 FGD-B Pond

The soils encountered in the borings generally consisted of very stiff to hard clays and compact to very dense sands. The surficial soils were generally classified as very stiff to hard sandy (lean and fat) clay and ranged in thickness from 8 to 27 ft. The surficial clay stratum was underlain by layers of compact to very dense sand, clayey sand, silty sand, and/or very stiff to hard silty clay or clay.

Historical monitoring well measurements near FGD-B Pond indicate that the groundwater level is between approximately 405 and 410 ft-msl.

### 2.2.2.3 FGD-C Pond

Based on the results of the geotechnical investigations at this facility, soils in the footprint of the FGD-C Pond in general comprise the following:

- Laminated clays, silty clays and sandy clays having low horizontal and vertical hydraulic conductivity;
- Thinly bedded clays, clayey silts, and silty sands characterized by low to moderate horizontal permeability and low net vertical permeability; and
- Bedded sands, silty sands, clayey sands, and silts of moderate to relatively high horizontal and moderate vertical permeability.

Based on monitoring well measurements near FGD-C, the groundwater level ranges from approximately 410 ft-msl to 412 ft-msl.



### **3.0 STRUCTURAL STABILITY ASSESSMENT - §257.73(d)(1)(i)-(vii)**

The CCR rules require conducting periodic structural stability assessments by a qualified professional engineer to document whether the design, construction, operation and maintenance is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater that can be impounded therein.

#### **3.1 Foundations and Abutments - §257.73(d)(1)(i)**

As noted above, the foundation soils consist of native soils and fill. The foundation soils and abutments are stable.

#### **3.2 Slope Protection - §257.73(d)(1)(ii)**

The downstream slopes of the embankments in each FGD pond are protected from erosion and deterioration by the establishment of a vegetative cover. The vegetative cover is inspected weekly for erosion, signs of seepage, animal burrows, sloughing, and plants that could negatively impact the embankment.

#### **3.3 Dikes (Embankment) - §257.73(d)(1)(iii)**

Each of the embankments was constructed of compacted site soils. No construction testing of the original embankment fill in FGD-A and FGD-B Ponds are available.

A compacted clay liner was constructed within FGD-A in 2008. Based on testing of Shelby tube samples, the 3-foot thick compacted clay liner has a hydraulic conductivity of less than  $1 \times 10^{-7}$  cm/s.

In 2011, the base and embankment elevations of FGD-B Pond were raised and the pond was lined with a composite geomembrane/clay liner system. The subgrade was raised 5 feet using structural fill to increase the separation depth from the groundwater. Approximately 150,000 cy of structural fill was placed in 6-inch lifts and compacted to 95% of the maximum standard Proctor dry density.

The FGD-C Pond embankment was constructed of compacted site soils, placed in 6-inch lifts compacted to 95% of the standard Proctor maximum dry density and within -1% to +3% of the standard Proctor optimum water content. FGD-C Pond is lined with a composite liner consisting of a 2-ft thick clay liner, a 60-mil HDPE geomembrane and a 2-ft thick soil/ash protective cover. The clay liner was placed in 6-inch thick lifts compacted to achieve a hydraulic conductivity of less than  $1 \times 10^{-7}$  cm/s.

Based on a review of past inspection reports and on recent observations, each of the embankments are sufficient to withstand the range of loading conditions they are subjected to.



### 3.4 Vegetated Slopes - §257.73(d)(1)(iv)

As of June 14, 2016 the US Court of Appeals for the District of Columbia Circuit issued an Order that remanded and vacated the CCR rule requirement that vegetation on the exterior portions of dikes on CCR surface impoundments be maintained not to exceed six inches in height. EPA will issue a new rulemaking in the future to address this issue.

Each of the CCR surface impoundments at the OGSES are inspected weekly. Luminant maintains the vegetation in a manner that ensures adequate inspections can be conducted.

### 3.5 Spillways - §257.73(d)(1)(v)

There are no spillways on any of the surface impoundments.

### 3.6 Hydraulic Structures - §257.73(d)(1)(v)

Sludge and waste water enter FGD-A Pond through high density polyethylene (HDPE) pipes near the southern portion of the eastern embankment. Water can be recycled from FGD-A Pond back to the SES through pipes connecting to a reclaim/recycling pump station located near the northern portion of the eastern embankment. In addition, FGD-A Pond can discharge into FGD-B Pond through a 12-inch HDPE pipe located across the pond from the inlet pipes. Flow through this pipe is controlled with a valve located near the toe of the western embankment.

There are no pipes that pass through or under the FGD-B embankment.

Sludge and waste water enter FGD-C through HDPE pipes passing above the embankment crest elevation near the southwestern corner of the pond. There are two pipes that pass through the embankment: a 24-inch diameter HDPE recycle/reclaim pipe and a 12-inch diameter drain pipe located near the middle of the eastern pond embankment. Water can be recycled from the FGD-C Pond back to the SES through the 24-inch diameter HDPE recycle/reclaim pipe that ties into the FGD-A Pond Pump station. The water in FGD-C can also be drained by the 12-inch diameter pipe which can be connected to the 24-inch diameter HDPE recycle/reclaim pipe when needed.

No significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, or debris were observed that may negatively affect the operation of the surface impoundments.

### 3.7 Downstream Slopes Adjacent to Water Body - §257.73(d)(1)(vii)

The west side of the FGD-B Pond borders a cove off of the Twin Oak Reservoir. This man-made reservoir is designed for a maximum water surface at EL 410 ft-msl. The toe of the FGD-B west embankment is at an elevation of approximately 420 ft-msl; therefore, the embankment will likely never be inundated and never subjected to rapid drawdown.



### 3.8 Structural Stability Deficiencies - §257.73(d)(2)

No structural stability deficiencies were identified during this assessment.

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#### 4.0 CONCLUSION

Based on our review of the information provided by Luminant, on information prepared by Golder Associates Inc., and on our on-site observations, no structural stability deficiencies were identified in the surface impoundments during this assessment.

Golder appreciates the opportunity to assist Luminant with this project. If you have any questions, or require further assistance from Golder, please contact the undersigned at (281) 821-6868.

#### GOLDER ASSOCIATES INC.

A handwritten signature in blue ink, appearing to read 'Varenya Kumar', located below the company name.

Varenya Kumar  
Staff Engineer

VK/JF/kc

A handwritten signature in blue ink, appearing to read 'Jeffrey B. Fassett', located below the company name.

Jeffrey B. Fassett, PE  
Associate Geotechnical Engineer

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## 5.0 CERTIFICATION

I hereby certify that this report has been prepared in general accordance with normally accepted civil engineering practices and in accordance with the requirements of 40 CFR 257.73(d).



\_\_\_\_\_  
Jeffrey B. Fassett, PE  
Golder Associates Inc.  
Firm Registration Number F-2578

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## 6.0 REFERENCES

Espey, Huston & Associates, Inc., 1987, Hydrogeologic Assessment of Proposed Surface Impoundment Areas, Twin Oak SES, Robertson County, Texas.

Golder Associates Inc. 2008, Data Report - Oak Grove SES, FGD Pond Subsurface Investigation, Robertson County, Texas.

Golder Associates Inc. 2010, FGD-B Slope Stability Investigation Report (Revised), Luminant Oak Grove SES, Robertson County, Texas.

Golder Associates Inc. 2011, FGD-A Slope Stability Evaluation Report, Luminant Oak Grove SES, Robertson County, Texas.

Golder Associates Inc. 2014, Addendum to Slope Stability Investigation Reports, Luminant Oak Grove SES, Robertson County, Texas.

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REFERENCE(S)  
 AERIAL PHOTO SOURCED FROM GOOGLE EARTH PRO DATED 2016

*J. B. Fassett*  
 10/11/16

Professional Engineering Firm  
 Registration Number F-2578



Path: \\bussan\cadd\1648164 - luminant\1648164 - luminant\1648164 - PRODUCTION\A-SLOPE STABILITY\_1 File Name: 1648164\1648164.dwg

CLIENT  
 LUMINANT POWER  
 OAK GROVE

CONSULTANT	YYYY-MM-DD	2016-09-29
	DESIGNED	VK
	PREPARED	TNB
	REVIEWED	MX
	APPROVED	JBF



PROJECT  
 2016 COAL COMBUSTION RESIDUALS  
 ENGINEERING SERVICES

TITLE  
**GENERAL SITE MAP**

PROJECT NO.  
 1648164

REV.  
 A

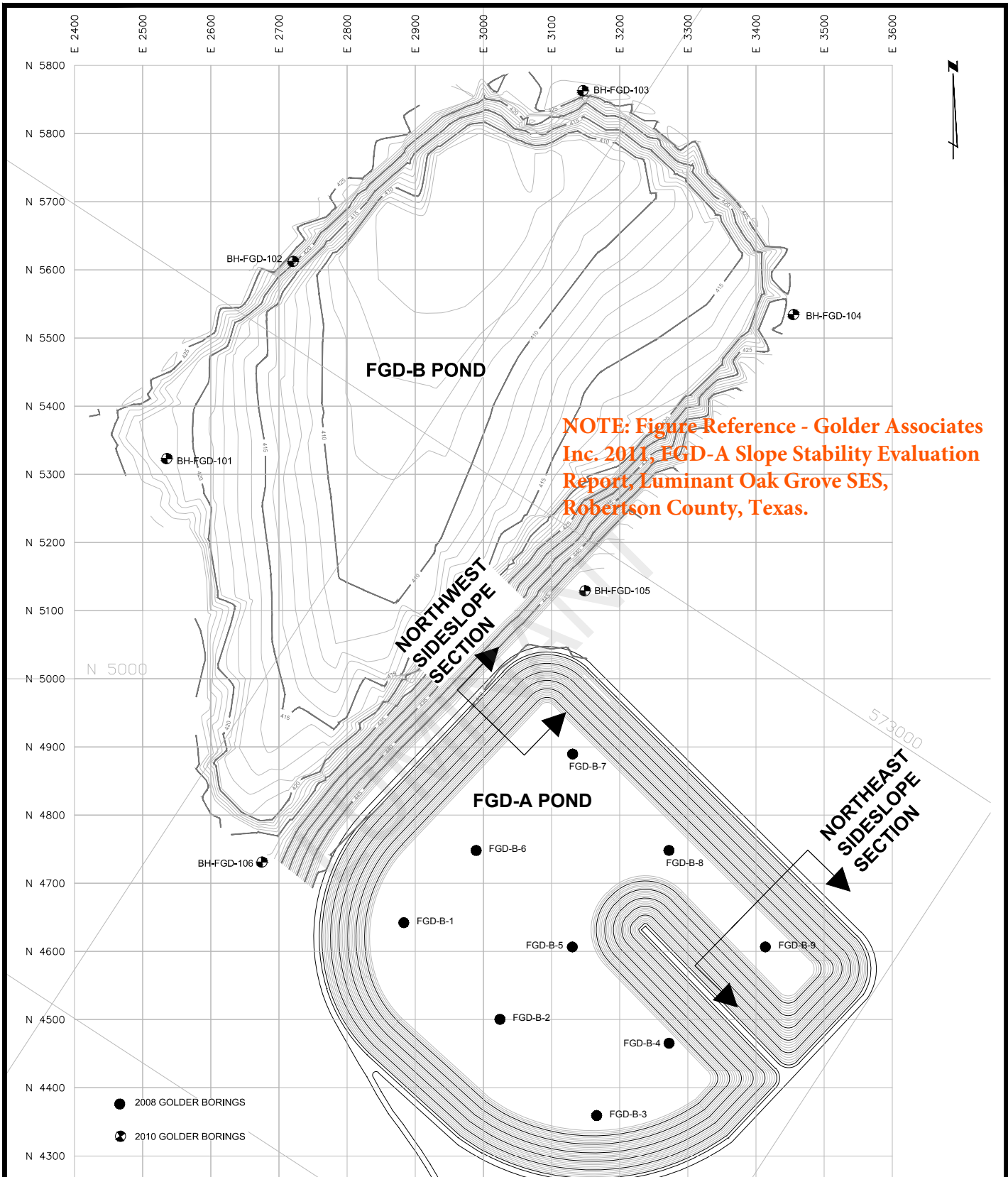
FIGURE  
 1

1 in. IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B

**APPENDIX A**  
**BORING LOCATION MAPS & BORING LOGS**

LUMINANT

Drawing File: J:\113-94790 - Oak Grove\A - FGD-A Pond\11394790A003.dwg | La.out: ---- | Modified: 3/11/2011 12:16:58 PM | Title: FGD-A Pond | Plotted: Friday, March 11, 2011 12:22:58 PM | TLE



- 2008 GOLDER BORINGS
- ⊙ 2010 GOLDER BORINGS



TITLE

**EXISTING BORING LOCATION PLAN**

PROJECT	<b>FGD-A-POND SLOPE STABILITY ANALYSIS LUMINANT OAK GROVE SES ROBERTSON COUNTY, TEXAS</b>
---------	---

DRAWN	TLE	DATE	MARCH 2011
CHECKED	PCM	SCALE	AS SHOWN
REVIEWED	PCM	JOB NO.	113-94790
FILE NO.		DWG NO.	11394790A003

FIGURE NUMBER	<b>3</b>
---------------	----------

# RECORD OF BOREHOLE FGD-B-7

SHEET 1 OF 2  
DATUM: LOCAL

PROJECT: OAK GROVE SES  
LOCATION: FRANKLIN, TEXAS

BORING STARTED: 17-Jul-2008  
BORING FINISHED: 17-Jul-2008

DRILLING EQUIPMENT: MOBILE B-57 BUGGY  
DRILLING OPERATOR: Lewis Environmental Drilling

NORTHING (ft): 4889.56  
EASTING (ft): 3130.96  
ELEVATION (ft): 422.24

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			ROCK QUALITY DESIGNATION (RQD) %				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE	BLOWS/0.5 FT	UNDRAINED SHEAR STRENGTH Cu	WATER CONTENT PERCENT			
								CU - ● P.P. - ⊕ Field Vane Shear ■ UU - ⊕ TORV. - ▲ UCS - ✱	20 40 60 80 PL ———— W ———— LL			
0		GROUND SURFACE		422.2								
		Stiff to very stiff, reddish brown, sandy CLAY, damp		0.0	1	SB	4 7 8 N15					
		dark brown at 1.5'										
2		Very stiff, reddish brown and yellowish brown, CLAY, trace sand, damp		2.0	2	SH						perm sieve
4												
6		Dense, reddish brown to brown, SAND, with clay, damp		6.0	3	SB	7 10 13 N23					sieve
8		light brown, sandy clay layer at 8.0'			4	SB	12 22 24 N46					
		reddish brown at 8.5'										
10		dense to very dense at 10.0'			5	SB	12 17 21 N38					sieve
12		light brown at 12.0'			6	SB	11 14 17 N31					
14		clayey at 14'			7	SB	17 30 28 N58					
16		moist at 16.0'			8	SB	17 17 22 N39					sieve
18												
20		light gray at 19.0'			9	SB	10 14 18 N32					
					10	SB	12 24 26 N50					

— CONTINUED NEXT PAGE —

OAK GROVE - FGD\_94281GINT.GPJ GLDR\_HOU.GDT 10/31/08

DEPTH SCALE  
1 inch to 2.5 feet



LOGGED: CS  
REVISD October 21, 2008  
CHECKED: CFR

# RECORD OF BOREHOLE FGD-B-7

SHEET 2 OF 2  
DATUM: LOCAL

PROJECT: OAK GROVE SES  
LOCATION: FRANKLIN, TEXAS

BORING STARTED: 17-Jul-2008  
BORING FINISHED: 17-Jul-2008

DRILLING EQUIPMENT: MOBILE B-57 BUGGY  
DRILLING OPERATOR: Lewis Environmental Drilling

NORTHING (ft): 4889.56  
EASTING (ft): 3130.96  
ELEVATION (ft): 422.24

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			ROCK QUALITY DESIGNATION (RQD) %				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE	BLOWS/0.5 FT	UNDRAINED SHEAR STRENGTH		WATER CONTENT PERCENT			
20	Hollow Stem Auger	— CONTINUED FROM PREVIOUS PAGE —		20.0									
				11	SB	12 24 24 N48							
22		TOTAL DEPTH AT 22.0'		22.0									
24													
26													
28													
30													
32													
34													
36													
38													
40													

OAK GROVE - FGD 94281GINT.GPJ GLDR HOU.GDT 10/31/08

DEPTH SCALE  
1 inch to 2.5 feet



LOGGED: CS  
REVISÉ October 21, 2008  
CHECKED: CFR



# RECORD OF BOREHOLE FGD-B-8

SHEET 1 OF 2  
DATUM: LOCAL

PROJECT: OAK GROVE SES  
LOCATION: FRANKLIN, TEXAS

BORING STARTED: 17-Jul-2008  
BORING FINISHED: 17-Jul-2008

DRILLING EQUIPMENT: MOBILE B-57 BUGGY  
DRILLING OPERATOR: Lewis Environmental Drilling

NORTHING (ft): 4748.26  
EASTING (ft): 3272.19  
ELEVATION (ft): 426.97

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES		ROCK QUALITY DESIGNATION (RQD) %		ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER TYPE	UNDRAINED SHEAR STRENGTH (Cu)	WATER CONTENT PERCENT (PL, W, LL)		
0		GROUND SURFACE		427.0					
0.0		Stiff to very stiff, reddish brown, CLAY, with sand, damp		0.0	1 SB	3 4 6 N10			
2		silty at 1.5'			2 SB	11 10 10 N20			
4					3 SB	4 4 6 N10			
6		Stiff to very stiff, light brown and yellowish brown, silty CLAY, trace sand, damp		6.0	4 SB	4 7 8 N15			
8		very stiff, brown with mottled yellowish brown at 8'			5 SH			perm sieve	
10	Hollow Stem Auger	reddish brown at 10.0'			6 SB	3 4 6 N10			
12					7 SB	3 3 5 N8			
14		dark brown at 14.5'			8 SB	3 3 4 N7			
16					9 SH			sieve	
18					10 SB	8 17 19 N36			
19.0		Hard, reddish brown, sandy CLAY, damp		19.0					

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OAK GROVE - FGD 94281GINT.GPJ GLDR HOU.GDT 10/31/08

DEPTH SCALE  
1 inch to 2.5 feet



LOGGED: CS  
CHECKED: CFR  
REVISED October 21, 2008

# RECORD OF BOREHOLE FGD-B-8

SHEET 2 OF 2  
DATUM: LOCAL

PROJECT: OAK GROVE SES  
LOCATION: FRANKLIN, TEXAS

BORING STARTED: 17-Jul-2008  
BORING FINISHED: 17-Jul-2008

DRILLING EQUIPMENT: MOBILE B-57 BUGGY  
DRILLING OPERATOR: Lewis Environmental Drilling

NORTHING (ft): 4748.26  
EASTING (ft): 3272.19  
ELEVATION (ft): 426.97

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			ROCK QUALITY DESIGNATION (ROD) %				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS						
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE	BLOWS/0.5 FT	UNDRAINED SHEAR STRENGTH Cu	WATER CONTENT PERCENT PL ———— W ———— LL									
								400	800	1200	1600	20	40	60	80			
20	Hollow Stem Auger	--- CONTINUED FROM PREVIOUS PAGE ---																
		Compact to dense, brown, clayey SAND, moist		20.0	11	SB	7 17 24 N41											sieve
22		light brown at 21.5'			12	SB	4 7 10 N17											
24					13	SB	14 19 24 N43											
26		Firm, gray, CLAY		25.5														sieve
26		TOTAL DEPTH 26'		26.0														
28																		
30																		
32																		
34																		
36																		
38																		
40																		

OAK GROVE - FGD 94281GINT.GPJ GLDR HOU.GDT 10/31/08

DEPTH SCALE  
1 inch to 2.5 feet



LOGGED: CS  
REVISIED October 21, 2008  
CHECKED: CFR

# RECORD OF BOREHOLE FGD-B-9

SHEET 1 OF 2  
DATUM: LOCAL

PROJECT: OAK GROVE SES  
LOCATION: FRANKLIN, TEXAS

BORING STARTED: 17-Jul-2008  
BORING FINISHED: 17-Jul-2008

DRILLING EQUIPMENT: MOBILE B-57, BUGGY  
DRILLING OPERATOR: Lewis Environmental Drilling

NORTHING (ft): 4606.63  
EASTING (ft): 3413.66  
ELEVATION (ft): 427.99

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES		ROCK QUALITY DESIGNATION (RQD) %				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS				
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER TYPE	UNDRAINED SHEAR STRENGTH (Cu)	WATER CONTENT PERCENT (PL, LL, W)								
						400	800	1200	1600	20	40	60	80		
0		GROUND SURFACE		428.0											
		Firm to stiff, yellowish brown and brown, CLAY, with sand, damp		0.0	1 SB	2	4	4	N8						
2		mottled reddish brown and light gray at 3.0'			2 SB	3	4	4	N8						
4		Stiff to very stiff, brown with occasional yellow brown seams, silty CLAY, damp		4.0	3 SB	4	4	6	N10						
8					4 SB	4	6	6	N12						
10	Hollow Stem Auger	dark brown with occasional streaks of reddish brown at 10.0'			5 SH										
12					6 SB	3	4	5	N9						
14					7 SB	4	10	10	N20						
16		Hard, light gray with occasional yellowish brown and brown, CLAY, trace sand, moist		16.0	8 SH										
18					9 SB	11	12	19	N31						
20					10 SB	7	17	24	N41						

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OAK GROVE - FGD 94281GINT.GPJ GLDR HOU.GDT 10/31/08

DEPTH SCALE  
1 inch to 2.5 feet



REVISED October 21, 2008

LOGGED: CS  
CHECKED: CFR

# RECORD OF BOREHOLE FGD-B-9

SHEET 2 OF 2  
DATUM: LOCAL

PROJECT: OAK GROVE SES  
LOCATION: FRANKLIN, TEXAS

BORING STARTED: 17-Jul-2008  
BORING FINISHED: 17-Jul-2008

DRILLING EQUIPMENT: MOBILE B-57 BUGGY  
DRILLING OPERATOR: Lewis Environmental Drilling

NORTHING (ft): 4606.63  
EASTING (ft): 3413.66  
ELEVATION (ft): 427.99

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES		ROCK QUALITY DESIGNATION (RQD) %		ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER TYPE	UNDRAINED SHEAR STRENGTH Cu	WATER CONTENT PERCENT PL — W — LL		
20	Hollow Stem Auger	— CONTINUED FROM PREVIOUS PAGE —							
		Hard, dark brown with occasional reddish brown, sandy CLAY, moist	20.0	11	SB	5 18 28 N46			sieve
22			gray with occasional reddish brown at 23'	12	SB	18 29 33 N62			sieve
24		TOTAL DEPTH 24.0'		24.0					
26									
28									
30									
32									
34									
36									
38									
40									

OAK GROVE - FGD 94281GINT.GPJ GLDR HOU.GDT 10/31/08

DEPTH SCALE  
1 inch to 2.5 feet



LOGGED: CS  
REVISIED October 21, 2008  
CHECKED: CFR

# RECORD OF BOREHOLE BH-FGD-105

SHEET 1 OF 2  
DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation  
LOCATION: Oak Grove, Texas

BORING STARTED: 24-Mar-2010  
BORING FINISHED: 24-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig  
DRILLING OPERATOR: Van & Sons

NORTHING (ft): 5129  
EASTING (ft): 3149  
ELEVATION (ft): 449

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	CU - ●	P.P. - ⊕	Field Vane Shear - ⊕	UU - ⊕	TORV. - ▲	UCS - ✱	PL		
0		Grass		449.0													
		Very stiff, mottled dark brown, sandy fat CLAY (CH), trace organics, damp			44	SH		37									
		hard, light brown at 2.0'			45	SH		33									
		dark brown at 4.0'			46	SH		30									
5		light brown at 6.0'			47	SH		50									
					48	SH		67									
10					49	SH		30									
		mottled, trace lignite at 13.0'			50	SH		37									
15					51	SH		37									
		very stiff, dark gray at 18.0'			52	SH		50									
20																	
		hard, dark brown at 23.0'															
25																	
		Very stiff, mottled dark gray to brown, silty CLAY (CL-ML), few sand, moist		28.0													
30																	

(3) CU c'=278 psf  
phi'=26 deg

--- CONTINUED NEXT PAGE ---

HOU SOIL AUG2009 94565GINT.GPJ GLDR HOU.GDT 4/23/10

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM

# RECORD OF BOREHOLE BH-FGD-105

SHEET 2 OF 2  
DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation  
LOCATION: Oak Grove, Texas

BORING STARTED: 24-Mar-2010  
BORING FINISHED: 24-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig  
DRILLING OPERATOR: Van & Sons

NORTHING (ft): 5129  
EASTING (ft): 3149  
ELEVATION (ft): 449

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE	BLOWS/0.5 FT	RECOVERY %	CU - ●	P.P. - ⊕	Field Vane Shear ■	UU - ⊙	TORV. ▲	UCS - ✱			PL
-- CONTINUED FROM PREVIOUS PAGE --																	
30				30.0													
		Stiff, black, sandy SILT (ML), trace clay, some organics, some wood fragments, moist		33.0													
		Stiff, dark brown, fat CLAY (CH), trace organics, trace sand, moist		33.8	53	SH		50									
35																	
		Very dense, light brown, fine, poorly-graded SAND (SP), trace clay, damp		38.0	54	SS	50/6" N>50	56									
40																	
		Very dense, light brown, fine, poorly-graded SAND (SP-SM), with silt, moist		43.0	55	SS	24 34 38 N72	67									
45																	
		Very dense, grayish brown, silty SAND (SM), trace clay, moist		48.0	56	SS	22 26 50/5" N>50	83									
50		BORING TERMINATED AT 50.0'		50.0													
55																	
60																	

HOU\_SOIL\_AUC2009\_94563GINT.GPJ GLDR HOU.GDT 4/23/10

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM

# RECORD OF BOREHOLE BH-FGD-101

SHEET 1 OF 2

DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation  
 LOCATION: Oak Grove, Texas

BORING STARTED: 24-Mar-2010  
 BORING FINISHED: 25-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig  
 DRILLING OPERATOR: Van & Sons

NORTHING (ft): 5323  
 EASTING (ft): 2535  
 ELEVATION (ft): 421

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	1000	2000	3000	4000	20	40	60		
0		Cleared ground		421.0													
		Very stiff, mottled, sandy lean CLAY (CL), damp			88	SH											
		hard, mottled reddish brown at 2.0'			89	SH											
		trace silt at 4.0'			90	SH											
5		very stiff, reddish brown and light gray, some silt at 6.0'			91	SH											
		Dense, grayish brown, SAND (SP-SM), with silt, damp		8.0	92	SH											
10		Very stiff, grayish brown, clayey fine SAND (SC), with some silt, layered gray and light brown at 13.5'		13.0	93	SH											
15		Very dense, light brown, fine, poorly-graded SAND (SP), damp		18.0	94	SS	35 50/6" N>50	50									
20		little clay at 23.0'			95	SS	40 50/4" N>50	83									
25		dense, wet at 28.0'			96	SS	7 14 21 N35	83									
30		BORING TERMINATED AT 30.0'															
		--- CONTINUED NEXT PAGE ---															

HOU SOIL\_AUG2009 94563GINT.GPJ GLDR\_HOU.GDT 4/27/10



27' 03/24/2010

DEPTH SCALE  
1 inch to 3.8 feet

LOGGED: DM  
CHECKED: PCM

# RECORD OF BOREHOLE BH-FGD-101

SHEET 2 OF 2

DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation

BORING STARTED: 24-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig

NORTHING (ft): 5323

LOCATION: Oak Grove, Texas

BORING FINISHED: 25-Mar-2010

DRILLING OPERATOR: Van & Sons

EASTING (ft): 2535

ELEVATION (ft): 421

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	CU - ● P.P. - ⊕ Field Vane Shear ■ UU - ⊕ TORV. - ▲ UCS - ✱				PL  -----○W-----  LL 20 40 60 80				
30		--- CONTINUED FROM PREVIOUS PAGE ---		30.0													
35																	
40																	
45																	
50																	
55																	
60																	

HOU SOIL\_AUG2009 94563GINT.GPJ GLDR HOU.GDT 4/27/10

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM



# RECORD OF BOREHOLE BH-FGD-102

SHEET 1 OF 2  
DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation  
LOCATION: Oak Grove, Texas

BORING STARTED: 24-Mar-2010  
BORING FINISHED: 24-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig  
DRILLING OPERATOR: Van & Sons

NORTHING (ft): 5612  
EASTING (ft): 2721  
ELEVATION (ft): 421

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	1000	2000	3000	4000	PL	W	LL		
0		Grass		421.0													
		Hard, mottled light brown, sandy lean CLAY (CL), damp			79	SH											
		very stiff, brown at 2.0'			80	SH											
		hard at 4.0'			81	SH											
5		light gray, moist at 6.0'			82	SH											
		very stiff at 8.0'			83	SH											
10		little silt at 13.0'			84	SH											
15					85	SH											
20		Stiff, light to dark gray, silty fat CLAY (CH), trace sand, moist		18.0													
25		Stiff, gray, sandy lean CLAY (CL), trace silt, moist		23.0													
30		Very dense, light brown, fine, poorly-graded SAND (SP-SM), with clay, wet BORING TERMINATED AT 30.0'		28.0													
		--- CONTINUED NEXT PAGE ---			87	SS	2 7 34 38 N72	67									

HOU SOIL AUG2009 94563GINT.GPJ GLDR HOU.GDT 4/23/10

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM

# RECORD OF BOREHOLE BH-FGD-102

SHEET 2 OF 2

DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation

BORING STARTED: 24-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig

NORTHING (ft): 5612

LOCATION: Oak Grove, Texas

BORING FINISHED: 24-Mar-2010

DRILLING OPERATOR: Van & Sons

EASTING (ft): 2721

ELEVATION (ft): 421

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	CU - ● P.P. - ⊕ Field Vane Shear ■ UU - ⊕ TORV. - ▲ UCS - ✱				PL  -----○W-----  LL 20 40 60 80				
30		--- CONTINUED FROM PREVIOUS PAGE ---		30.0													
35																	
40																	
45																	
50																	
55																	
60																	

HOU SOIL\_AUG2009 94563GINT.GPJ GLDR HOU.GDT 4/23/10

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM

# RECORD OF BOREHOLE BH-FGD-103

SHEET 1 OF 2  
DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation  
LOCATION: Oak Grove, Texas

BORING STARTED: 24-Mar-2010  
BORING FINISHED: 24-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig  
DRILLING OPERATOR: Van & Sons

NORTHING (ft): 5863  
EASTING (ft): 3146  
ELEVATION (ft): 426

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	1000   2000   3000   4000 CU - ● P.P. - ⊕ Field Vane Shear ■ UU - ⊕ TORV. - ▲ UCS - ✱				20   40   60   80 PL ———— ⊕ ———— LL				
0		Grass		426.0													
		Very soft to soft, light brown, sandy fat CLAY (CH), trace roots, damp			66	SH		27					○				
		stiff at 2.0'			67	SH		30			⊕		○				
		light brown to dark grayish brown at 4.0'			68	SH		40			⊕		○				
5		hard at 6.0'			69	SH		40			⊕		○				
		mottled at 8.0'			70	SH		23			⊕		○	— —			
10																	
					71	SH		38			⊕		○	— —			
15																	
		Stiff, brown, silty CLAY (CL-ML), with sand, trace lignite, moist		18.0	72	SH		47			⊕		○				
20																	
		stiff to very stiff, mottled, damp at 23.0'			73	SH		40			⊕		○				
25																	
		Stiff, mottled, sandy lean CLAY (CL), damp		28.0	74	SH		57			●	5500	○	— —			
30																	
		--- CONTINUED NEXT PAGE ---															

HOU SOIL AUG2009 94563GINT.GPJ GLDR HOU.GDT 4/23/10

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM

# RECORD OF BOREHOLE BH-FGD-103

SHEET 2 OF 2  
DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation  
LOCATION: Oak Grove, Texas

BORING STARTED: 24-Mar-2010  
BORING FINISHED: 24-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig  
DRILLING OPERATOR: Van & Sons

NORTHING (ft): 5863  
EASTING (ft): 3146  
ELEVATION (ft): 426

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	CU - ●	P.P. - ⊕	Field Vane Shear - ■	UU - ⊕	TORV. - ▲	UCS - ✱	PL		
30		--- CONTINUED FROM PREVIOUS PAGE ---															
			30.0														
		Compact, light gray, SILT (ML), with sand, wet	33.0														
		Firm, light gray and brown, silty SAND (SM), wet	33.7	75	SH	8 7 9 N16	67										
35																	
		Very stiff, mottled light gray, lean CLAY (CL), trace lignite, trace sand, wet	38.0	76	SH		57										
40																	
		hard at 43.0'		77	SH		27										
45																	
		interbedded with sand layers at 48.0'		78	SH		37										
50		BORING TERMINATED AT 50.0'															
			50.0														
55																	
60																	

▼  
32' 03/24/2010

HOU SOIL AUG2009 94563GINT.GPJ GLDR HOU.GDT 4/23/10

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM

# RECORD OF BOREHOLE BH-FGD-104

SHEET 1 OF 2

DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation  
 LOCATION: Oak Grove, Texas

BORING STARTED: 24-Mar-2010  
 BORING FINISHED: 24-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig  
 DRILLING OPERATOR: Van & Sons

NORTHING (ft): 5534  
 EASTING (ft): 3455  
 ELEVATION (ft): 425

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	1000	2000	3000	4000	20	40	60		
0		Grass		425.0													
		Very stiff, light brown to dark brown, sandy lean CLAY (CL), damp			57	SH											
		hard, light brown at 2.0'			58	SH											
		mottled to dark brown, trace silt at 4.0'			59	SH											
5		grayish brown at 6.0'			60	SH											
					61	SH											
10																	
		very stiff, moist at 13.0'			62	SH											
15																	
		hard, damp at 18.0'															
		Very dense, grayish brown, medium to fine, silty clayey SAND (SC/SM), trace organic		18.5	63	SH											
20																	
		Compact, light brown and gray, poorly-graded SAND (SP-SM), with silt, wet		23.0	64	SS	5 9 14 N23										
25																	
		Dense, fine, silty SAND (SM), trace clay		28.0	65	SS	11 12 19 N31										
30																	
		--- CONTINUED NEXT PAGE ---															

HOU SOIL\_AUG2009 94563GINT.GPJ GLDR\_HOU.GDT 4/27/10

▼  
22' 03/24/2010

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM

# RECORD OF BOREHOLE BH-FGD-104

SHEET 2 OF 2

DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation

BORING STARTED: 24-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig

NORTHING (ft): 5534

LOCATION: Oak Grove, Texas

BORING FINISHED: 24-Mar-2010

DRILLING OPERATOR: Van & Sons

EASTING (ft): 3455

ELEVATION (ft): 425

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	CU - ● P.P. - ⊕ Field Vane Shear ■ UU - ⊕ TORV. - ▲ UCS - ✱				PL  -----○W-----  LL				
								1000	2000	3000	4000	20	40	60	80		
30		--- CONTINUED FROM PREVIOUS PAGE ---															
		BORING TERMINATED AT 30.0'		30.0													
35																	
40																	
45																	
50																	
55																	
60																	

HOU SOIL\_AUG2009 94563GINT.GPJ GLDR HOU.GDT 4/27/10

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM

# RECORD OF BOREHOLE BH-FGD-105

SHEET 1 OF 2  
DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation  
LOCATION: Oak Grove, Texas

BORING STARTED: 24-Mar-2010  
BORING FINISHED: 24-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig  
DRILLING OPERATOR: Van & Sons

NORTHING (ft): 5129  
EASTING (ft): 3149  
ELEVATION (ft): 449

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	1000	2000	3000	4000	20	40	60		
0		Grass		449.0													
		Very stiff, mottled dark brown, sandy fat CLAY (CH), trace organics, damp			44	SH											
		hard, light brown at 2.0'			45	SH											
		dark brown at 4.0'			46	SH											
5		light brown at 6.0'			47	SH											
					48	SH											
					49	SH											
		mottled, trace lignite at 13.0'			50	SH											
15					51	SH											
		very stiff, dark gray at 18.0'			52	SH											
20					53	SH											
		hard, dark brown at 23.0'			54	SH											
25					55	SH											
		Very stiff, mottled dark gray to brown, silty CLAY (CL-ML), few sand, moist		28.0	52	SH										(3) CU c'=278 psf phi'=26 deg	
30																	
		--- CONTINUED NEXT PAGE ---															

HOU SOIL AUG2009 94563GINT.GPJ GLDR HOU.GDT 4/23/10

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM

# RECORD OF BOREHOLE BH-FGD-105

SHEET 2 OF 2  
DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation  
LOCATION: Oak Grove, Texas

BORING STARTED: 24-Mar-2010  
BORING FINISHED: 24-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig  
DRILLING OPERATOR: Van & Sons

NORTHING (ft): 5129  
EASTING (ft): 3149  
ELEVATION (ft): 449

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	1000	2000	3000	4000	PL	W	LL		
		--- CONTINUED FROM PREVIOUS PAGE ---															
30				30.0													
		Stiff, black, sandy SILT (ML), trace clay, some organics, some wood fragments, moist		33.0													
		Stiff, dark brown, fat CLAY (CH), trace organics, trace sand, moist		33.8	53	SH		50									
35																	
		Very dense, light brown, fine, poorly-graded SAND (SP), trace clay, damp		38.0	54	SS	50/6" N>50	56									
40																	
		Very dense, light brown, fine, poorly-graded SAND (SP-SM), with silt, moist		43.0	55	SS	24 34 38 N72	67									
45																	
		Very dense, grayish brown, silty SAND (SM), trace clay, moist		48.0	56	SS	22 26 50/5" N>50	83									
50		BORING TERMINATED AT 50.0'		50.0													
55																	
60																	

HOU SOIL AUG2009 94563GINT.GPJ GLDR HOU.GDT 4/23/10

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM



# RECORD OF BOREHOLE BH-FGD-106

SHEET 1 OF 2

DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation

BORING STARTED: 23-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig

NORTHING (ft): 4731

LOCATION: Oak Grove, Texas

BORING FINISHED: 23-Mar-2010

DRILLING OPERATOR: Van & Sons

EASTING (ft): 2675

ELEVATION (ft): 425

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE		SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE		BLOWS/0.5 FT	1000	2000	3000	4000	PL	W	LL		
0		Grass		425.0													
		Stiff, mottled dark gray, sandy lean CLAY (CL), trace silt, damp			97	SH											
		light brown to dark brown at 2.0'			98	SH											
		hard, brownish red, moist at 4.0'			99	SH											
5		damp at 6.0'			100	SH											
		mottled brownish red at 8.0'			101	SH											
10																	
		mottled gray, little silt at 13.0'			102	SH											
15																	
					103	SH											
20																	
		Compact, light gray, fine silty SAND (SM), moist		23.0	104	SH											
25																	
		wet at 28.0'			105	SS	7 10 17 N27										
30																	
--- CONTINUED NEXT PAGE ---																	

HOU SOIL AUG2009 94563GINT.GPJ GLDR HOU.GDT 4/23/10

DEPTH SCALE  
1 inch to 3.8 feet



LOGGED: DM  
CHECKED: PCM

# RECORD OF BOREHOLE BH-FGD-106

SHEET 2 OF 2  
DATUM: GEODETIC

PROJECT: Luminant Pond Stability Geotechnical Investigation  
LOCATION: Oak Grove, Texas

BORING STARTED: 23-Mar-2010  
BORING FINISHED: 23-Mar-2010

DRILLING EQUIPMENT: Buggy Mounted Rig  
DRILLING OPERATOR: Van & Sons

NORTHING (ft): 4731  
EASTING (ft): 2675  
ELEVATION (ft): 425

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE			SAMPLES			RECOVERY %	UNDRAINED SHEAR STRENGTH Cu (psf)				WATER CONTENT PERCENT				ADDITIONAL LAB. TESTING	INSTALLATION NOTES AND GROUNDWATER OBSERVATIONS
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	NUMBER	TYPE	BLOWS/0.5 FT		CU - ● P.P. - ⊕ Field Vane Shear ■ UU - ⊕ TORV. - ▲ UCS - ✱				PL  -----○ W -----  LL					
								1000	2000	3000	4000	20	40	60	80			
30		--- CONTINUED FROM PREVIOUS PAGE ---																
		BORING TERMINATED AT 30.0'				30.0												
35																		
40																		
45																		
50																		
55																		
60																		

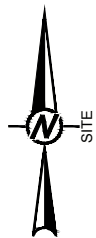
HOU SOIL\_AUG2009 94563GINT.GPJ GLDR HOU.GDT 4/23/10

DEPTH SCALE  
1 inch to 3.8 feet



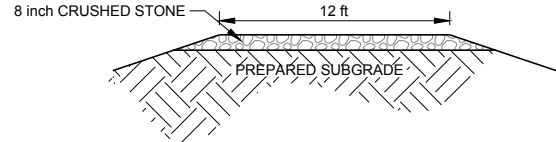
LOGGED: DM  
CHECKED: PCM

**NOTE: Figure Reference - Golder Associates Inc. 2015. TCEQ Registration Package, Oak Grove Steam Electric Station, FGD-C Pond, Robertson County, TX.**



- LEGEND**
- 25 ft EXISTING CONTOUR
  - 5 ft EXISTING CONTOUR
  - CURRENT POND CONSTRUCTION AREA
  - FGD-C-01 BOREHOLE
  - FGD-01 MONITORING WELL

- NOTES**
1. EXISTING GROUND TOPOGRAPHY IS FROM AN AERIAL SURVEY PERFORMED BY GEODETIX, INC. ON MAY 27, 2010 AND GROUND SURVEY PERFORMED BY SAM INC. ON OCTOBER 23, 2014. EXISTING GROUND TOPOGRAPHY ELSEWHERE IS FROM FLOUR ENTERPRISE, INC. DRAWING A2YF00-0-CV-0-SW.PL.-01, AS PROVIDED BY LUMINANT. COORDINATES ARE BASED ON OAK GROVE STEAM ELECTRIC STATION PLANT GRID SYSTEM.
  2. ELEVATIONS ARE BASED ON MEAN SEA LEVEL DATUM.
  3. CLAY MATERIAL AND STRUCTURAL FILL STOCKPILE AREAS NEED TO BE CLEARED AND GRUBBED PRIOR TO STOCKPILING ACTIVITIES.



SCALE 1" = 10'

1 ACCESS ROAD

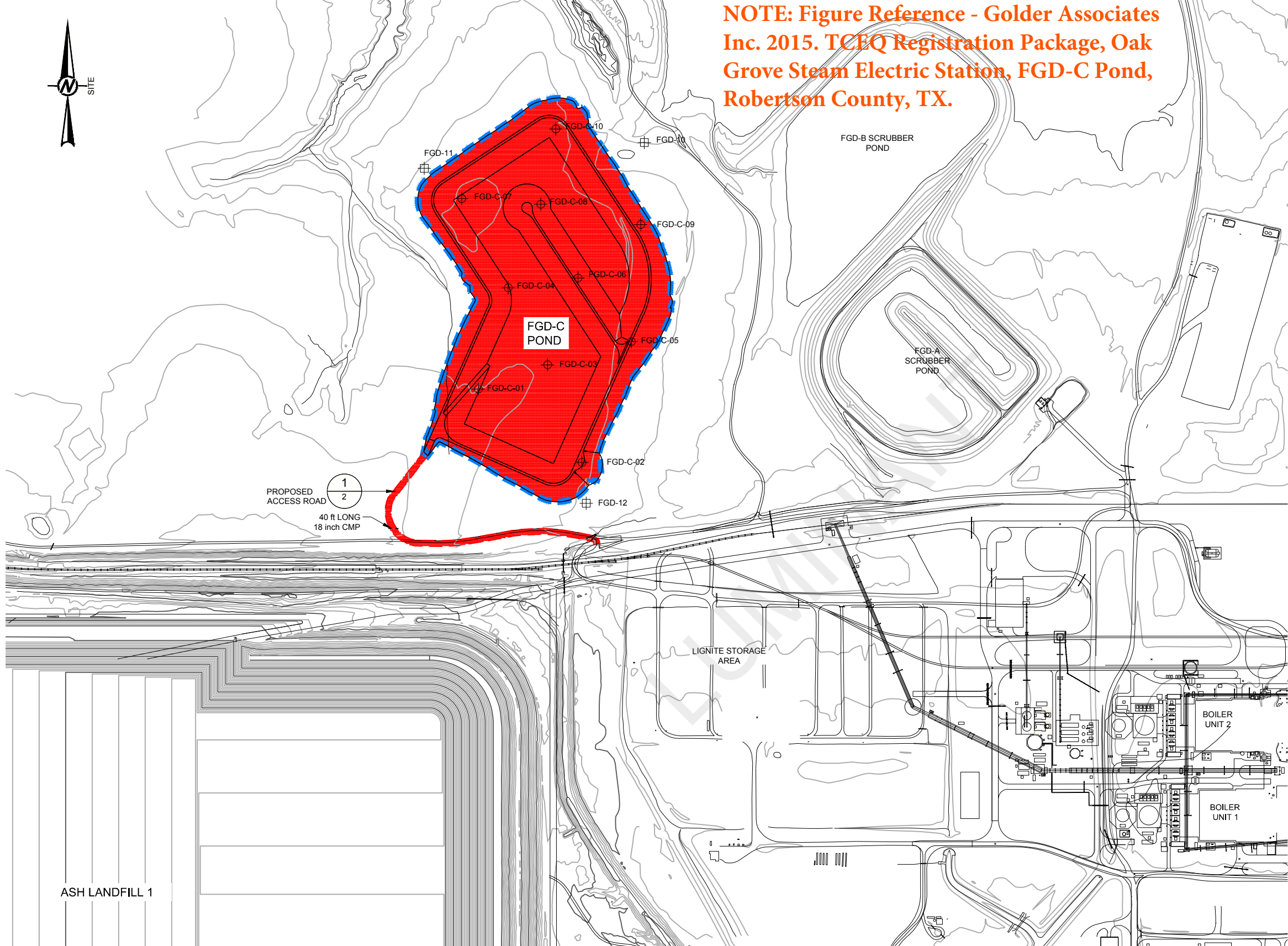
2

PROPOSED ACCESS ROAD

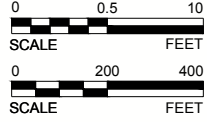
1

2

40 ft LONG  
18 inch CMP



**ISSUED FOR CONSTRUCTION**



Rev.	YYYY-MM-DD	DESCRIPTION	PREPARED	DESIGN	REVIEW	APPROVED
0	2015-04-29	ISSUED FOR CONSTRUCTION	AA	CEI	CEI	JBF
B	2015-04-23	ISSUED FOR CLIENT REVIEW	AA	CEI	CEI	JBF
A	2015-03-30	ISSUED FOR CLIENT REVIEW	AA	CEI	CEI	JBF

SEAL

JEFFREY B. FASSETT  
85675  
LICENSED PROFESSIONAL ENGINEER  
STATE OF TEXAS

GOLDER ASSOCIATES INC.  
TEXAS REGISTRATION F-2578

CLIENT

Luminant

CONSULTANT

Golder Associates

HOUSTON OFFICE  
500 CENTURY PLAZA DR  
HOUSTON, TEXAS 77073  
USA  
(281) 821-6868  
www.golder.com

PROJECT

OAK GROVE STEAM ELECTRIC STATION  
FGD-C POND  
ROBERTSON COUNTY, TEXAS

TITLE

**SITE OVERVIEW**

PROJECT No. 1406296 LUMINANT DRAWING NO. A2YF00-0-CV-0-SW.PL-02 Rev. 0 2 of 7 FIGURE 2

Path: \\uswest\eng\drafting\_2014\1406296\_Luminant\_FGD-C\PRODUCTION\FGD-C\_POND\_1.dwg; File Name: 1406296B02.dwg

1 in. IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B



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# BOREHOLE FGD-C-01

PAGE 1 OF 2

**CLIENT** Luminant Power  
**PROJECT NUMBER** 1406296  
**DATE STARTED** 11/25/14 **COMPLETED** 11/25/14  
**DRILLING CONTRACTOR** Envirotech  
**DRILLING METHOD** Auger  
**LOGGED BY** DMW **CHECKED BY** AQ  
**NOTES** \_\_\_\_\_

**PROJECT NAME** Luminant  
**PROJECT LOCATION** Oak Grove SES  
**GROUND ELEVATION** 444.5 ft **HOLE SIZE** 6 inches  
**GROUND WATER LEVELS:**  
**AT TIME OF DRILLING** \_\_\_\_\_  
**AT END OF DRILLING** \_\_\_\_\_  
**AFTER DRILLING** \_\_\_\_\_

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲			
								PL	MC	LL	
								□ FINES CONTENT (%) □			
								20	40	60	80
0		(CH) Very stiff, brown and red, CLAY, topsoil, organics, moist									
		hard, brown, sandy below 2.0'	ST	50		2.5					
		brown and tan at 4.0'	ST	83		4.5					
5			ST	83		4.5		●	—	—	□
		(CL) Hard, tan, sandy SILTY CLAY, moist									
		white and orange at 12.0'	SS	75	3-17-25-26 (42)					▲	
			SS	88	7-15-28-24 (43)					▲	
			SS	92	8-16-26-29 (42)					▲	
			SS	92	12-15-24-26 (39)			●	—	—	□
			SS	92	13-21-34-25 (55)					▲	
			SS	92	13-17-20-24 (37)					▲	
			SS	92	7-12-18-20 (30)					▲	
20		(CL) Very stiff, gray, SILTY CLAY, with silt partings									
		interbedded clay layer at 21.0'	SS	71	6-8-10-15 (18)					▲	
			SS	92	21-6-11-14 (17)					▲	
			SS	92	4-11-12-15 (23)					▲	
		becomes black at 25.5'									
		black and gray, moist at 26.0'									
		(CH) Hard, black, CLAY, moist	SS	83	12-20-26-31 (46)					▲	
		(CL) Hard, black and gray, SILTY CLAY, moist									
		interbedded black clay in gray silt at 29.0'	SS	92	13-46-48-50 (94)						▲
30											

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GEO TECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ



CLIENT Luminant Power

PROJECT NAME Luminant

PROJECT NUMBER 1406296

PROJECT LOCATION Oak Grove SES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲	
								PL	MC LL
								□ FINES CONTENT (%) □	
								20 40 60 80	20 40 60 80
30		(CL) Hard, black and gray, SILTY CLAY, moist (continued) gray at 30.0'	SS	71	12-24-48-50 (72)				▲
		(SM) Very dense, brown and gray, SILTY SAND, moist							
		(CL) Hard, gray and black, SILTY CLAY, moist	SS	83	18-30-48-50 (78)				▲
		3" silty sand seam at 33.0'							
		dark gray and sandy at 34.0'							
35		(CH) Hard, black, CLAY, moist, little silt	SS	79	10-15-28-27 (43)			▲	
		(CL) Hard, gray, sandy SILTY CLAY, moist to wet	SS	83	16-24-44-46 (68)				▲
40		wet at 41.0'	SS	92	20-36-50 (86)				▲
		moist at 42.0'	SS	63	14-18-32-40 (50)			▲	
		silt partings at 44.0'	SS	92	15-24-45-50 (69)				▲
			SS	92	12-22-42-48 (64)				▲
50			ST	100					□

Bottom of borehole at 50.0 feet.

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ



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# BOREHOLE FGD-C-02

PAGE 1 OF 2

**CLIENT** Luminant Power  
**PROJECT NUMBER** 1406296  
**DATE STARTED** 11/17/14 **COMPLETED** 11/17/14  
**DRILLING CONTRACTOR** Envirotech  
**DRILLING METHOD** Auger  
**LOGGED BY** DMW **CHECKED BY** AQ  
**NOTES** \_\_\_\_\_

**PROJECT NAME** Luminant  
**PROJECT LOCATION** Oak Grove SES  
**GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 6 inches  
**GROUND WATER LEVELS:**  
▽ **AT TIME OF DRILLING** 35 35 ft bgs  
**AT END OF DRILLING** \_\_\_\_\_  
**AFTER DRILLING** \_\_\_\_\_

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DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲			
								PL	MC	LL	
								□ FINES CONTENT (%) □			
								20	40	60	80
0		(CH) Stiff, red and brown, CLAY, moist									
		hard, friable, dry at 2.0'	ST	50		1.25					
			ST	88		4.5					
5		stiff, sandy, moist at 4.0'	ST	83		1.0					
		Brown, sandy SILT (ML) and sandy CLAY (CH), moist	SS	83	4-5-8-8 (13)	0.75		▲			
		(CH) Stiff, brown, CLAY, moist, with silt partings	SS	67	4-5-6-7 (11)	1.75		▲			
10		brown to red at 10.0'	SS	67	4-5-7-12 (12)	2.5		▲	—	□	
		hard, brown, increased silt content, dry at 12.0'	SS	83	13-13-20-18 (33)				▲		
15		(ML) Compact, brown and gray, SILT, dry	SS	79	11-11-17-17 (28)				▲		
		Very stiff, brown and gray, CLAYEY SILT (ML) and SILTY CLAY (CL), moist to dry	SS	79	6-10-13-16 (23)				▲		
20			SS	75	6-5-11-11 (16)				▲		
		(SM) Compact, gray and brown, SILTY SAND, dry	SS	83	8-9-12-12 (21)				▲		
		with brown, clayey silt layer at 23.5', moist	SS	83	5-7-10-8 (17)				▲		
25		Dense, tan, SAND, dry	SS	92	13-16-20-17 (36)				▲		
			SS	75	14-13-22-19 (35)				▲		
		very dense, tan and gray, moist at 28.0'	SS	100	14-17-30-26 (47)				▲		

(Continued Next Page)



CLIENT Luminant Power

PROJECT NAME Luminant

PROJECT NUMBER 1406296

PROJECT LOCATION Oak Grove SES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲	
								PL	MC LL
								□ FINES CONTENT (%) □	
								20 40 60 80	20 40 60 80
30		(CL) Hard, brown and gray, sandy SILTY CLAY, moist, with silt partings iron staining at 31.0'	SS	100	20-28-30-28 (58)				
		Dense, tan and gray, SAND, iron staining	SS	83	16-17-19-27 (36)				
35		(CL) Hard, brown and gray, SILTY CLAY, moist to wet	SS	92	15-17-29-32 (46)				
		Very dense, brown, tan, and gray, SAND, wet	SS	83	13-15-45-50 (60)				
		6" clay layer at 37.5'							
		Very dense, brown and gray, SANDY SILT, with silt partings, wet	SS	83	28-38-48-50 (86)				
40		Hard, brown, SANDY CLAY, moist	SS	92	8-6-20-50 (26)				
		silty sand layer at 41.5'							
		Hard, brown and gray, SILTY CLAY, iron staining, moist	SS	92	16-20-30-38 (50)				
45		increased silt content at 44.0'	ST	46					

Bottom of borehole at 46.0 feet.

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# BOREHOLE FGD-C-03

PAGE 1 OF 2

**CLIENT** Luminant Power  
**PROJECT NUMBER** 1406296  
**DATE STARTED** 11/24/14 **COMPLETED** 11/25/14  
**DRILLING CONTRACTOR** Envirotech  
**DRILLING METHOD** Auger  
**LOGGED BY** DMW **CHECKED BY** AQ  
**NOTES** \_\_\_\_\_

**PROJECT NAME** Luminant  
**PROJECT LOCATION** Oak Grove SES  
**GROUND ELEVATION** 443.7 ft **HOLE SIZE** 6 inches  
**GROUND WATER LEVELS:**  
**AT TIME OF DRILLING** \_\_\_\_\_  
**AT END OF DRILLING** \_\_\_\_\_  
**AFTER DRILLING** \_\_\_\_\_

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲		
								20	40	60
								PL      MC      LL 20    40    60    80		
								<input type="checkbox"/> FINES CONTENT (%) <input type="checkbox"/> 20    40    60    80		
0		(CH) Very stiff, red, CLAY, organics, top soil, moist								
		red and orange, sandy, moist at 2.0'	ST	54		2.5				
		increasing sand at 3.5'	ST	50		3.0				
		hard, orange, friable at 4.0'	ST	46		4.0				
		(CL) Hard, tan and white, sandy SILTY CLAY, moist	SS	79	12-14-20-13 (34)					
		increasing amounts of silt and sand at 7.0'	SS	79	12-16-20-21 (36)					
		very silty at 10.0'	SS	79	7-14-15-15 (29)					
		Very stiff, gray, SILTY CLAY (CL), interbedded with CLAY (CH), moist	SS	71	10-11-14-16 (25)					
		gray and orange, with silt partings at 16.0'	SS	75	10-12-18-18 (30)					
		gray at 19.0'	SS	83	7-10-16-20 (26)					
		brown to gray, increasing silt at 20.0'	SS	79	7-9-15-14 (24)					
		sandy, moist at 24.0'	SS	79	6-9-10-12 (19)					
			SS	88	6-8-14-14 (22)					
			SS	83	13-32-30-28 (62)					
			SS	88	14-26-24-20 (50)					
		(SM) Dense, gray, SILTY SAND, moist	SS	75	20-24-24-30 (48)					
30		(CL) Hard, gray, SILTY CLAY, moist								

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# BOREHOLE FGD-C-03

PAGE 2 OF 2

CLIENT Luminant Power

PROJECT NAME Luminant

PROJECT NUMBER 1406296

PROJECT LOCATION Oak Grove SES

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DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲										
								20	40	60	80							
								PL MC LL										
30		(CL) Hard, gray, SILTY CLAY, moist ( <i>continued</i> ) red, brown, and yellow at 30.5'																
		very stiff to hard, gray at 31.5'	X	88	16-28-36-35 (64)													
		moist to wet at 32.0'																
		increased sand at 33.0'	X	71	10-11-10-16 (21)													
35																		
			X	75	12-22-46-45 (68)													
		increased silt and sand at 37.0'	X	79	14-30-36-42 (66)													
			X	92	12-26-39-39 (65)													
40		black clay, less silt at 39.0'																
			X	92	12-13-16-25 (29)													
		Very dense, orange and gray, SILTY SAND moist at 42.0'																
		iron staining at 43.0'	X	71	20-30-46-50 (76)													
45																		
			X	92	14-25-40-48 (65)													
		gray at 46.5'	X	75	14-40-48-50 (88)													

Bottom of borehole at 48.0 feet.



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# BOREHOLE FGD-C-04

PAGE 1 OF 2

**CLIENT** Luminant Power  
**PROJECT NUMBER** 1406296  
**DATE STARTED** 11/20/14 **COMPLETED** 11/20/14  
**DRILLING CONTRACTOR** Envirotech  
**DRILLING METHOD** Auger  
**LOGGED BY** DMW **CHECKED BY** AQ  
**NOTES** \_\_\_\_\_

**PROJECT NAME** Luminant  
**PROJECT LOCATION** Oak Grove SES  
**GROUND ELEVATION** \_\_\_\_\_ **HOLE SIZE** 6 inches  
**GROUND WATER LEVELS:**  
∇ **AT TIME OF DRILLING** 42 42 ft bgs  
**AT END OF DRILLING** \_\_\_\_\_  
**AFTER DRILLING** \_\_\_\_\_

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲			
								PL	MC	LL	
								20	40	60	80
								20	40	60	80
								□ FINES CONTENT (%) □			
								20	40	60	80
0		(CH) Soft, brown, sandy CLAY, with organics, grass, moist									
		hard to dense, more sand at 2.0'	ST	54		0.5					
			ST	71		3.5					
5		dense, brown and tan, mostly sand at 4.0'									
		stiff, brown, less sand at 6.0'	ST	71		3.75			●	—	□
			SS	25	2-4-7-8 (11)	0.75			▲		
		very stiff, red and brown at 8.5'	SS	67	5-6-10-12 (16)	4.5			▲		
10			SS	63	3-5-6-9 (11)	4.5			▲●	—	□
		orange, more sand at 12.0'	SS	46	21-8-20-18 (28)				▲		
15		(SC) Dense to compact, white, CLAYEY SAND, moist	SS	79	9-14-28-24 (42)						
			SS	71	10-11-14-20 (25)				▲		
		brown, 1' sandy clay layer at 20.5'	SS	100	8-12-22-26 (34)				▲		
20			SS	79	6-16-24-26 (40)						
		white and orange, with silt and clay at 23.5'	SS	67	11-8-20-20 (28)				▲		
25		iron staining at 25.0'	SS	83	10-12-24-26 (36)						
		1' clay layer at 26.5'	SS	75	10-24-14-30 (38)						
30			SS	100	20-34-46-45 (80)						▲

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CLIENT Luminant Power

PROJECT NAME Luminant

PROJECT NUMBER 1406296

PROJECT LOCATION Oak Grove SES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲	
								PL	MC LL
								□ FINES CONTENT (%) □	
								20 40 60 80	20 40 60 80
30		Hard, brown and tan, red mottling, sandy CLAY (CH) to CLAYEY SAND (SC), moist, increasing sand with depth	SS	83	7-15-40-48 (55)	1.25			
			SS	100	12-20-28-35 (48)				
35		(CL) Hard, gray, SILTY CLAY, moist 1' thick brown and tan silty clay at 35.0' silt partings and interbedded clay seams at 36.0'	SS	100	13-20-48-42 (68)				
			SS	100	10-16-20-24 (36)				
40			SS	83	15-20-24-48 (44)				
		increasing sand content at 41.0' moist to wet at 42.0'	SS	79	7-22-24-45 (46)				
			SS	83	13-17-40-45 (57)				
45			SS	92	16-23-45-47 (68)				
		increase in clay at 47.0'	SS	75	13-26-38-48 (64)				
50			ST	100					

Bottom of borehole at 50.0 feet.

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ



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# BOREHOLE FGD-C-05

PAGE 1 OF 2

**CLIENT** Luminant Power  
**PROJECT NUMBER** 1406296  
**DATE STARTED** 11/18/14 **COMPLETED** 11/18/14  
**DRILLING CONTRACTOR** Envirotech  
**DRILLING METHOD** Auger  
**LOGGED BY** DMW **CHECKED BY** AQ  
**NOTES** \_\_\_\_\_

**PROJECT NAME** Luminant  
**PROJECT LOCATION** Oak Grove SES  
**GROUND ELEVATION** 440.3 ft **HOLE SIZE** 6 inches  
**GROUND WATER LEVELS:**  
▽ **AT TIME OF DRILLING** 34 34.0 ft bgs  
**AT END OF DRILLING** \_\_\_\_\_  
**AFTER DRILLING** \_\_\_\_\_

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲					
								20	40	60	80		
0													
0 - 2.0	[Diagonal Hatching]	Stiff, brown and red, CLAY, moist very stiff, some red mottling at 2.0'	ST	25		2.0							
2.0 - 3.75	[Diagonal Hatching]		ST	100		3.75							
3.75 - 4.5	[Diagonal Hatching]	(CL) Very stiff, brown and red, sandy SILTY CLAY, moist, red mottling	ST	54		4.5							
4.5 - 4.5	[Diagonal Hatching]	with brown silt at 7.0' stiff, brown clay at 8.0'	ST	71		4.5							
4.5 - 4.5	[Diagonal Hatching]		SS	75	5-6-7-10 (13)	4.5							
4.5 - 3.75	[Diagonal Hatching]	Very stiff, brown, SILTY CLAY, red and black mottling, moist, trace gravel	SS	75	6-6-12-22 (18)	3.75							
3.75 - 4.5	[Diagonal Hatching]	brown and red, with silt partings at 12.0'	SS	75	9-13-19-20 (32)	4.5							
4.5 - 15	[Diagonal Hatching]	hard, brown and gray, with silt partings at 14.0'	SS	67	7-7-17-22 (24)								
15 - 17.5	[Diagonal Hatching]	red and brown, sandy at 17.5'	SS	92	10-9-20-23 (29)								
17.5 - 20	[Diagonal Hatching]		SS	83	17-12-28-22 (40)								
20 - 25	[Diagonal Hatching]	(SM) Very dense, gray and brown, SILTY SAND, moist, with clay seams	SS	83	7-21-34-21 (55)								
25 - 25	[Diagonal Hatching]		SS	92	8-15-20-15 (35)								
25 - 0.75	[Diagonal Hatching]		SS	83	6-20-16-20 (36)	0.75							
0.75 - 25	[Diagonal Hatching]		SS	75	6-16-24-25 (40)								
25 - 1.5	[Diagonal Hatching]	(CH) Hard brown, sandy CLAY, moist	SS	83	14-22-34-45 (56)	1.5							
1.5 - 30	[Diagonal Hatching]												

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ

(Continued Next Page)



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# BOREHOLE FGD-C-05

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CLIENT Luminant Power

PROJECT NAME Luminant

PROJECT NUMBER 1406296

PROJECT LOCATION Oak Grove SES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲		
								20	40	60
								PL      MC      LL 20    40    60    80		
								□ FINES CONTENT (%) □ 20    40    60    80		
30		(CH) Hard brown, sandy CLAY, moist ( <i>continued</i> ) very stiff, tan and brown at 30.0'	SS	100	13-17-20-21 (37)	1.75				
		(CL) Hard, gray, SILTY CLAY becomes sandy, moist to wet at 32.0'	SS	83	12-24-34-45 (58)					
35		(CH) Stiff, brown, sandy CLAY, moist to wet wet at 36.0'	SS	83	20-27-31-25 (58)					
		moist at 37.0'	SS	100	6-8-9-12 (17)					
40		(SM) Very dense, brown and red, SILTY SAND, wet interbedded sandy clay, moist at 39.0'	SS	92	17-20-34-47 (54)					
		wet at 40.0'	SS	83	12-20-30-42 (50)					
		moist at 41.5'	SS	83	20-34-47-50 (81)					
45		gray with iron staining at 45.0'	ST	50						
		loose at 46.5'	ST	50						
			ST							

Bottom of borehole at 49.5 feet.

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ



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# BOREHOLE FGD-C-06

**CLIENT** Luminant Power  
**PROJECT NUMBER** 1406296  
**DATE STARTED** 11/24/14 **COMPLETED** 11/24/14  
**DRILLING CONTRACTOR** Envirotech  
**DRILLING METHOD** Auger  
**LOGGED BY** DMW **CHECKED BY** AQ  
**NOTES** \_\_\_\_\_

**PROJECT NAME** Luminant  
**PROJECT LOCATION** Oak Grove SES  
**GROUND ELEVATION** 450.9 ft **HOLE SIZE** 6 inches  
**GROUND WATER LEVELS:**  
**AT TIME OF DRILLING** \_\_\_\_\_  
**AT END OF DRILLING** \_\_\_\_\_  
**AFTER DRILLING** \_\_\_\_\_

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲		
								PL	MC	LL
								□ FINES CONTENT (%) □		
0		(CL) Stiff, brown, SILTY CLAY, topsoil, organics								
0-2.0		(CH) Stiff, brown and tan, sandy CLAY, moist hard at 2.0'	ST	75		1.0				
2.0-5.0			ST	75		4.5				
5.0-6.0		increasing silt at 5.0' very stiff, tan at 6.0'	ST	42						
6.0-9.5			SS	88	8-8-7-10 (15)					
9.5-10.0		increasing sand at 9.5'	SS	67	5-8-7-8 (15)					
10.0-15.5		(SC) Compact, tan and white, CLAYEY SAND, moist	SS	63	4-7-7-9 (14)					
15.5-18.0		(CL) Hard, dark brown, SILTY CLAY, moist very stiff, tan and brown, sandy at 15.5'	SS	75	7-8-7-9 (15)					
18.0-20.0		interbedded with gray clay at 18.0'	SS	75	6-10-13-12 (23)					
20.0-22.0			SS	100	6-8-11-13 (19)					
22.0-25.0			SS	100	5-8-10-10 (18)	1.5				
25.0-28.0		(SC) Dense, white and tan, CLAYEY SAND, moist	SS	88	5-8-10-12 (18)	2.5				
28.0-30.0			SS	75	9-12-20-21 (32)					
30.0-32.0			SS	83	10-12-16-23 (28)					
32.0-34.0			SS	83	9-19-28-30 (47)					
34.0-36.0		tan and orange at 28.0'	SS	75	18-24-40-46 (64)					

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GEOTECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ



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# BOREHOLE FGD-C-06

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CLIENT Luminant Power

PROJECT NAME Luminant

PROJECT NUMBER 1406296

PROJECT LOCATION Oak Grove SES

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲				
								20	40	60	80	
								PL	MC	LL		
								20	40	60	80	
								□ FINES CONTENT (%) □				
								20	40	60	80	
30		(SC) Dense, white and tan, CLAYEY SAND, moist ( <i>continued</i> ) 6" clay layer at 30.0' very dense, tan, white, and orange, iron staining at 30.5'	SS	83	7-30-46-44 (76)	3.0						
			SS	88	15-22-24-34 (46)							
35		(CH) Hard, brown and orange, sandy CLAY, moist, silt partings increased sand, less cohesive at 35.0'	SS	88	10-26-39-46 (65)							
		increased sand at 37.0'	SS	88	16-26-32-42 (58)							
40		some gray clay and increased silt at 40.0'	SS	88	20-32-50 (82)							
		increased silt, moist to wet at 42.5'	SS	88	12-30-34-48 (64)							
45		(CL) Hard, gray, SILTY CLAY, moist	SS	83	21-38-50 (88)							
			SS	88	23-48-48-50 (96)							
50			ST									

Bottom of borehole at 50.0 feet.



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# BOREHOLE FGD-C-07

PAGE 1 OF 2

**CLIENT** Luminant Power  
**PROJECT NUMBER** 1406296  
**DATE STARTED** 11/20/14 **COMPLETED** 11/21/14  
**DRILLING CONTRACTOR** Envirotech  
**DRILLING METHOD** Auger  
**LOGGED BY** DMW **CHECKED BY** AQ  
**NOTES** \_\_\_\_\_

**PROJECT NAME** Luminant  
**PROJECT LOCATION** Oak Grove SES  
**GROUND ELEVATION** 449.7 ft **HOLE SIZE** 6 inches  
**GROUND WATER LEVELS:**  
**AT TIME OF DRILLING** \_\_\_\_\_  
**AT END OF DRILLING** \_\_\_\_\_  
**AFTER DRILLING** \_\_\_\_\_

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲				
								20	40	60	80	
0		(CL) Very stiff, brown and tan, sandy SILTY CLAY, moist										
		mostly brown at 2.0'	ST	75		3.5						
			ST	121		3.0						
5			ST	92		2.0						
		increasing sand content, red and orange mottling at 5.5'										
		(CH) Very stiff, brown and tan, sandy CLAY, moist	SS	50	3-9-14-12 (23)							
		increasing sand content, red and orange mottling at 9.0'	SS	79	5-8-9-10 (17)							
10			SS	75	4-6-5-10 (11)							
		white and tan, silty clay at 11.5' very stiff to stiff, brown at 12.0'	SS	100	8-9-12-9 (21)							
15			SS	100	6-7-13-10 (20)							
		some gravel at 15.0'										
		brown and tan, small amount of gray clay at 16.0'	SS	79	3-4-5-11 (9)							
		increasing sand content with depth at 17.5'	SS	83	8-8-12-17 (20)							
20			SS	33	6-9-27-25 (36)							
		gray, with silt partings at 19.5' hard, brown and orange at 20.0'	SS	100	26-21-32-30 (53)							
25			SS	71	20-28-48-40 (76)							
		more white than gray at 25.0'	SS	58	16-24-46-48 (70)							
			SS	100	16-28-30-50 (58)							
30		dense, white at 28.0'										

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CLIENT Luminant Power PROJECT NAME Luminant  
PROJECT NUMBER 1406296 PROJECT LOCATION Oak Grove SES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲	
								PL	MC LL
								□ FINES CONTENT (%) □	
								20 40 60 80	20 40 60 80
30		(SC) Very dense, gray, CLAYEY SAND, moist, with orange iron stains, and silt partings <i>(continued)</i>	SS	75	28-30-48-50 (78)				
			SS	96	28-34-48-50 (82)				
35		moist to wet at 35.0'	SS	100	20-46-46-50 (92)				
		brown, moist at 36.0'	SS	75	28-29-48-50 (77)				
			SS	50	38-50				
40			SS	50	38-50				
		(CH) Hard, brown and tan, sandy CLAY, wet	SS	83	40-42-48-35 (90)				
45			SS	75	32-36-42-36 (78)				
		(CL) Hard, gray, sandy SILTY CLAY, interbedded with clay, moist	SS	83	40-46-50 (96)				
50			ST	100					

Bottom of borehole at 50.0 feet.

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ



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# BOREHOLE FGD-C-08

PAGE 1 OF 2

**CLIENT** Luminant Power  
**PROJECT NUMBER** 1406296  
**DATE STARTED** 11/19/14 **COMPLETED** 11/19/14  
**DRILLING CONTRACTOR** Envirotech  
**DRILLING METHOD** Auger  
**LOGGED BY** DMW **CHECKED BY** AQ  
**NOTES** \_\_\_\_\_

**PROJECT NAME** Luminant  
**PROJECT LOCATION** Oak Grove SES  
**GROUND ELEVATION** 448.7 ft **HOLE SIZE** 6 inches  
**GROUND WATER LEVELS:**  
**AT TIME OF DRILLING** \_\_\_\_\_  
**AT END OF DRILLING** \_\_\_\_\_  
**AFTER DRILLING** \_\_\_\_\_

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲			
								PL	MC	LL	
								□ FINES CONTENT (%) □			
0								20	40	60	80
0 - 1.75	[Hatched]	(CL) Stiff, brown and gray, sandy SILTY CLAY, moist, with red slatey gravel	ST	75		1.75					
1.75 - 3.0	[Hatched]	very stiff at 2.0'	ST	83		3.0					
3.0 - 3.5	[Hatched]	no gravel, increasing sand content at 4.0'	ST	88		3.5		●	—	□	
3.5 - 4.9	[Hatched]	stiff, brown and tan, increasing sand content at 6.0'	SS	79	3-5-7-8 (12)			▲			
4.9 - 6.0	[Hatched]	(SC) Compact, brown and tan, CLAYEY SAND, moist	SS	50	6-13-10-10 (23)						
6.0 - 7.8	[Hatched]	tan and white at 10.0'	SS	42	4-4-5-10 (9)			▲			
7.8 - 8.8	[Hatched]		SS	54	7-8-11-8 (19)						
8.8 - 10.5	[Hatched]	(CL) Stiff, brown and tan, sandy SILTY CLAY, moist with gravel at 15.0'	SS	63	5-6-8-6 (14)						
10.5 - 11.5	[Hatched]	brown and black, friable, increasing clay at 16.0'	SS	75	6-5-6-5 (11)			●	—	□	
11.5 - 12.5	[Hatched]	soft, black wood debris at 18.0'	SS	58	3-2-2-2 (4)			▲			
12.5 - 13.5	[Hatched]	more wood debris, some sandy clay at 20.0'	SS	38	2-2-2-3 (4)			▲			
13.5 - 14.5	[Hatched]	some black wood/organics at 22.5'	SS	46	3-2-3-10 (5)			▲			
14.5 - 15.5	[Hatched]	Dense, red, orange, and brown, CLAYEY SAND (SC) to sandy CLAY (CH), moist	SS	96	4-12-20-23 (32)						
15.5 - 16.5	[Hatched]	gray and tan, red staining at 27.0'	SS	88	10-20-24-24 (44)						
16.5 - 17.5	[Hatched]	becomes brown with depth at 28.0'	SS	88	5-12-24-28 (36)						

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GEO TECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ



CLIENT Luminant Power

PROJECT NAME Luminant

PROJECT NUMBER 1406296

PROJECT LOCATION Oak Grove SES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲				
								20	40	60	80	
								PL	MC	LL		
								20	40	60	80	
								□ FINES CONTENT (%) □				
								20	40	60	80	
30		(CH) Hard, brown to gray, sandy CLAY, with silt partings, moist	SS	100	8-14-25-28 (39)	2.6						
		(CL) Very stiff, gray, SILTY CLAY, with silt partings, moist	SS	96	6-10-20-18 (30)							
35		hard at 34.0' red mottling, increase in sand content at 35.0'	SS	100	7-16-30-32 (46)							
			SS	100	10-26-36-28 (62)							
40		little sand, more silt at 39.0' wet at 40.0' moist to wet at 41.0'	SS	100	10-14-32-37 (46)							
		1" thick clayey sand layer at 43.0'	SS	83	14-15-43-32 (58)							
45		increasing silt at 45.0' moist, some clay and silt partings at 46.0'	SS	92	8-16-40-30 (56)							
		increasing silt, some silty clay at 48.0'	SS	100	16-18-36-46 (54)							
50			ST	58								
			ST	79								

Bottom of borehole at 52.0 feet.

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ



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# BOREHOLE FGD-C-09

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**CLIENT** Luminant Power  
**PROJECT NUMBER** 1406296  
**DATE STARTED** 11/18/14 **COMPLETED** 11/19/14  
**DRILLING CONTRACTOR** Envirotech  
**DRILLING METHOD** Auger  
**LOGGED BY** DMW **CHECKED BY** AQ  
**NOTES** \_\_\_\_\_

**PROJECT NAME** Luminant  
**PROJECT LOCATION** Oak Grove SES  
**GROUND ELEVATION** 445 ft **HOLE SIZE** 6 inches  
**GROUND WATER LEVELS:**  
**AT TIME OF DRILLING** \_\_\_\_\_  
**AT END OF DRILLING** \_\_\_\_\_  
**AFTER DRILLING** \_\_\_\_\_

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲			
								PL	MC	LL	
								□ FINES CONTENT (%) □			
								20	40	60	80
0		Brown and black, SAND and SILT, moist	ST	46							
		(MH) Brown and tan, sandy CLAYEY SILT, moist	ST	50							
5			ST	50							
		(CL) Very stiff, brown and tan, SILTY CLAY, with gravel, red mottling, friable, dry	SS	46	5-7-11-11 (18)						
		no gravel at 9.0'	SH	67	7-10-9-8 (19)						
10		stiff, more cohesive at 10.0'	SS	75	21-5-8-8 (13)						
		sandy, dry at 12.0'	SS	79	8-6-8-7 (14)						
		friable at 14.0'	SS	67	5-6-7-8 (13)						
15		1' thick silty sand at 17.0'	SS	58	8-7-7-12 (14)						
			SS	92	9-7-10-10 (17)						
20		5" of dark brown, interbedded clay at 21.0'	SS	96	5-5-8-9 (13)						
		very stiff, gray, sandy, moist at 23.0'	SS	100	10-11-15-19 (26)						
25		with silt partings at 24.0'	SS	96	8-19-23-28 (42)						
		sand at 25.5'	SS	100	8-21-24-28 (45)						
		(SC) Dense, red, brown, and orange, CLAYEY SAND, with silt, moist	SS	100	8-21-24-28 (45)						
		gray and tan, silt partings, mostly silt and sand at 28.0'	SS	92	27-21-45-48 (66)						
30											

(Continued Next Page)



CLIENT Luminant Power

PROJECT NAME Luminant

PROJECT NUMBER 1406296

PROJECT LOCATION Oak Grove SES

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲				
								20	40	60	80	
								PL	MC	LL		
								□ FINES CONTENT (%) □				
								20	40	60	80	
30		(CL) Hard, brown and tan, SILTY CLAY, moist										
		6" silty sand layer at 31.5'	SS	92	9-20-46-50 (66)							
		brown and gray, iron staining at 32.0'										
		increasing silt and sand at 33.0'	SS	83	13-28-48-32 (76)							
35			SS	100	14-26-46-48 (72)							
		gray, with silt partings, moist at 36.0'										
		with interbedded brown, silty clay at 37.0'	SS	92	20-32-48-50 (80)							
40			SS	92	18-22-33-43 (55)							
		moist to wet at 39.0'										
		moist at 40.0'	SS	42	24-34-46-30 (80)							
		with silt partings at 42.0'										
			SS	67	26-32-38-34 (70)							
45			SS	92	13-40-48-50 (88)							
		with interbedded gray, clay at 45.0'										
		brown, sandy at 46.0'										
		with interbedded gray clay at 47.0'	SS	75	14-39-44-48 (83)							
50			ST	67		3.5						
		(CH) Very stiff, brown and gray, sandy CLAY, moist										
		gray, with silt partings at 52.0'	ST	50		3.5						
			ST	100		3.5						
55			ST	100		4.0						
		stiff, increasing sand with depth at 56.0'										
			ST	75		1.75						
60		Stiff, gray, SILTY CLAY										
		with black mudstone or slate at 59.0'	ST	67		1.75						

Bottom of borehole at 60.0 feet.



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# BOREHOLE FGD-C-10

**CLIENT** Luminant Power  
**PROJECT NUMBER** 1406296  
**DATE STARTED** 11/19/14 **COMPLETED** 11/20/14  
**DRILLING CONTRACTOR** Envirotech  
**DRILLING METHOD** Auger  
**LOGGED BY** DMW **CHECKED BY** \_\_\_\_\_  
**NOTES** \_\_\_\_\_

**PROJECT NAME** Luminant  
**PROJECT LOCATION** Oak Grove SES  
**GROUND ELEVATION** 445 ft **HOLE SIZE** 6 inches  
**GROUND WATER LEVELS:**  
**AT TIME OF DRILLING** \_\_\_\_\_  
**AT END OF DRILLING** \_\_\_\_\_  
**AFTER DRILLING** \_\_\_\_\_

GEO TECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲		
								20	40	60
								PL      MC      LL 20    40    60    80		
								□ FINES CONTENT (%) □		
								20    40    60    80		
0		(CL) Hard, brown and gray, silty CLAY, with gravel, moist orange mottlings at 1.0'	ST	83		4.5		●		□
			ST	75		4.5		●		□
5		very stiff, sandy at 4.0'	ST	100		2.25		●		□
		brown at 6.0'								
		increasing sand content, maroon staining in middle depth, iron staining throughout at 7.0' stiff at 8.0'	SS	83	5-5-9-10 (14)			▲		
		increasing sand with depth at 9.0'	SS	50	5-8-8-9 (16)			▲		
10		very stiff, organics and gravel at 10.0'	SS	88	6-7-9-11 (16)			▲		
		more sand at 13.0'	SS	79	10-5-6-7 (11)			▲		
15		(CH) Very stiff, brown and and tan, sandy CLAY	SS	83	5-5-6-9 (11)			▲		
		orange mottling, very sandy at 15.5' brown and orange, moist at 16.0'								
		orange mottling at 17.0'	SS	100	5-6-9-10 (15)			▲		
		orange and tan, increasing sand at 19.0'	SS	88	6-11-13-12 (24)			▲		
20		more gray, increasing silt, but no partings, organic material, roots at 21.0'	SS	100	9-10-12-13 (22)			▲		
		(SC) Dense, gray and tan, CLAYEY SAND, with silt partings, moist less cohesive at 23.0'	SS	88	11-16-24-26 (40)				▲	
		very dense at 24.0'								
25		increasing sand at 25.0'	SS	83	18-24-38-35 (62)					▲
		very dense, white and orange, moist at 26.0'	SS	71	14-30-35-34 (65)					▲
		(CL) Hard, gray and brown, SILTY CLAY, moist								
30		orange mottling at 29.5'	SS	92	14-20-35-34 (55)					▲

(Continued Next Page)



CLIENT Luminant Power PROJECT NAME Luminant  
 PROJECT NUMBER 1406296 PROJECT LOCATION Oak Grove SES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT. (pcf)	▲ SPT N VALUE ▲	
								PL	MC LL
								□ FINES CONTENT (%) □	
								20 40 60 80	20 40 60 80
30		(CL) Hard, gray and brown, SILTY CLAY, moist ( <i>continued</i> )							
		increasing clay content, interbedded clay at 31.0'	SS	96	10-18-34-36 (52)				
			SS	92	10-20-26-24 (46)				
35		interbedded clay, increasing silt and sand with depth, silt partings at 35.0'	SS	100	24-20-36-48 (56)				
		gray, moist to wet at 36.0'	SS	100	20-22-48-40 (70)				
		more cohesive at 39.0'	SS	79	22-42-48-50 (90)				
40		sandy at 40.0'	SS	83	22-26-42-50 (68)				
		less cohesive, more sand, less clay at 41.0'	SS	100	20-48-48-50 (96)				
		tan and brown at 42.0'	SS	92	18-28-42-50 (70)				
		increasing sand at 43.0'	SS	100	24-44-48-48 (92)				
45		more iron staining than previous at 44.0'	SS	92	18-28-42-50 (70)				
		gray and black, with silt partings at 45.0'	SS	100	24-44-48-48 (92)				
		gray and brown, sand at 46.5'	SS	100	24-44-48-48 (92)				
		very silty at 47.0'	SS	100	24-44-48-48 (92)				
50			ST	50					

Bottom of borehole at 50.0 feet.

GEOTECH BH PLOTS - GINT STD US LAB.GDT - 4/1/15 15:18 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ

**APPENDIX B  
LABORATORY TEST RESULTS**

LUMINANT



SUMMARY OF SOIL DATA AND LABORATORY TEST RESULTS

Sample				SPT N Value (blows/ 1 ft)	Moisture Content (%)	Soil Description	Atterberg Limits					Particle Size Analysis				Dry Unit wt (pcf)	Moist Unit wt (pcf)	CU Triaxial		UU Triaxial		Consolidation				Organic Content (%)		
Borehole Number	Sample Number	Depth Interval (ft-bgs)	Elevation of Top (ft)				Sample Type	LL	PL	PI	LI	USCS	Gravel (%)	Sand (%)	Silt (%)			Clay (%)	c' (psf)	phi' (deg)	UU - c <sub>u</sub> (psf)	Confining Pressure (psf)	Type	Cc <sub>c</sub>	Cr <sub>c</sub>		σ' <sub>v</sub> (psf)	Gs
BH-FGD-101	88	0.0-2.0		SH		18.2	Very stiff, mottled, sandy lean CLAY (CL), damp																					
BH-FGD-101	89	2.0-4.0		SH		11.9	hard, mottled reddish brown at 2.0'																					
BH-FGD-101	90	4.0-6.0		SH		18.4	trace silt at 4.0'																					
BH-FGD-101	91	6.0-8.0		SH		13.6	very stiff, reddish brown and light gray, some silt at 6.0'																					
BH-FGD-101	92	8.0-10.0		SH		18.4	Dense, grayish brown, SAND (SP-SM), with silt, damp																					
BH-FGD-101	93	13.0-15.5		SH		27.0	Very stiff, grayish brown, clayey fine SAND (SC), with some silt, layered																					
BH-FGD-101		-					gray and light brown at 13.5'																					
BH-FGD-101	94	18.0-20.0		SS	50	25.5	Very dense, light brown, fine, poorly-graded SAND (SP), damp																					
BH-FGD-101	95	23.0-25.0		SS	50	27.6	little clay at 23.0'																					
BH-FGD-101	96	28.0-30.0		SS	35	28.7	dense, wet at 28.0'																					
BH-FGD-101		-					BORING TERMINATED AT 30.0'																					

LUMINANT



Project: Luminant Pond Stability Geotechnical Investigation  
 Location: Oak Grove, Texas

SUMMARY SHEET - 9458 LUMINANT - 9458 GINT.GPJ GDR - HOU.GDT 4/27/10





SUMMARY OF SOIL DATA AND LABORATORY TEST RESULTS

Sample				SPT N Value (blows/ 1 ft)	Moisture Content (%)	Soil Description	Atterberg Limits					Particle Size Analysis				Dry Unit wt (pcf)	Moist Unit wt (pcf)	CU Triaxial		UU Triaxial		Consolidation				Organic Content (%)		
Borehole Number	Sample Number	Depth Interval (ft-bgs)	Elevation of Top (ft)				Sample Type	LL	PL	PI	LI	USCS	Gravel (%)	Sand (%)	Silt (%)			Clay (%)	c' (psf)	phi' (deg)	UU - c <sub>u</sub> (psf)	Confining Pressure (psf)	Type	C <sub>c</sub>	C <sub>r</sub>		σ' <sub>v</sub> (psf)	G <sub>s</sub>
BH-FGD-104	57	0.0-2.0		SH		14.7	Very stiff, light brown to dark brown, sandy lean CLAY (CL), damp																					
BH-FGD-104	58	2.0-4.0		SH		21.0	hard, light brown at 2.0'																					
BH-FGD-104	59	4.0-6.0		SH		17.6	mottled to dark brown, trace silt at 4.0'																					
BH-FGD-104	60	6.0-8.0		SH		13.3	grayish brown at 6.0'																					
BH-FGD-104	61	8.0-10.0		SH		15.6																						
BH-FGD-104	62	13.0-15.0		SH		18.6	very stiff, moist at 13.0'																					
BH-FGD-104	63	18.0-20.0		SH		15.2	hard, damp at 18.0'																					
BH-FGD-104		-					Very dense, grayish brown, medium to fine, silty clayey SAND (SC/SM), trace organic																					
BH-FGD-104	64	23.0-24.5		SS	23	23.4	Compact, light brown and gray, poorly-graded SAND (SP-SM), with silt, wet					0.0	83.8	16.2														
BH-FGD-104	65	28.0-30.0		SS	31	23.7	Fine, silty SAND (SM), trace clay																					
BH-FGD-104		-					BORING TERMINATED AT 30.0'																					

LUMINANT



Project: Luminant Pond Stability Geotechnical Investigation  
 Location: Oak Grove, Texas

SUMMARY SHEET - 94561 LUMINANT - 94561 GINT.GPJ GDR - HOU.GDT 4/23/10

SUMMARY OF SOIL DATA AND LABORATORY TEST RESULTS

Sample				SPT N Value (blows/1 ft)	Moisture Content (%)	Soil Description	Atterberg Limits					Particle Size Analysis				Dry Unit wt (pcf)	Moist Unit wt (pcf)	CU Triaxial		UU Triaxial		Consolidation				Organic Content (%)		
Borehole Number	Sample Number	Depth Interval (ft-bgs)	Elevation of Top (ft)				Sample Type	LL	PL	PI	LI	USCS	Gravel (%)	Sand (%)	Silt (%)			Clay (%)	c' (psf)	phi' (deg)	UU - c <sub>u</sub> (psf)	Confining Pressure (psf)	Type	Cc <sub>c</sub>	Cr <sub>c</sub>		σ' <sub>v</sub> (psf)	Gs
BH-FGD-105	44	0.0-2.0		SH		8.3	Very stiff, mottled dark brown, sandy fat CLAY (CH), trace organics, damp																					
BH-FGD-105	45	2.0-4.0		SH		19.3	hard, light brown at 2.0'																					
BH-FGD-105	46	4.0-6.0		SH		13.5	dark brown at 4.0'																					
BH-FGD-105	47	6.0-8.0		SH		10.3	light brown at 6.0'																					
BH-FGD-105	48	8.0-10.0		SH		16.3	51	19	33	-0.07	CH	0.0	12.3	87.7		278	26											
BH-FGD-105	49	13.0-15.0		SH		16.0	mottled, trace lignite at 13.0'																					
BH-FGD-105	50	18.0-20.0		SH		18.0	51	19	32	-0.02								4300	2434									
BH-FGD-105	51	23.0-25.0		SH		15.9	hard, dark brown at 23.0'																					
BH-FGD-105	52	28.0-30.0		SH		18.9	Very stiff, mottled dark gray to brown, silty CLAY (CL-ML), few sand, moist																					
BH-FGD-105		-																										
BH-FGD-105	53	33.0-35.0		SH		22.3	Stiff, black, sandy SILT (ML), trace clay, some organics, some wood fragments, moist																					
BH-FGD-105		-					Stiff, dark brown, fat CLAY (CH), trace organics, trace sand, moist																					
BH-FGD-105	54	38.0-39.5		SS	50	12.5	Very dense, light brown, fine, poorly-graded SAND (SP), trace clay, damp					1.2	62.0	36.8														
BH-FGD-105	55	43.0-45.0		SS	72	23.6	Very dense, light brown, fine, poorly-graded SAND (SP-SM), with silt, moist					0.0	78.8	21.2														
BH-FGD-105	56	48.0-50.0		SS	50	26.4	Very dense, grayish brown, silty SAND (SM), trace clay, moist					0.0	74.6	25.4														
BH-FGD-105		-					BORING TERMINATED AT 50.0'																					

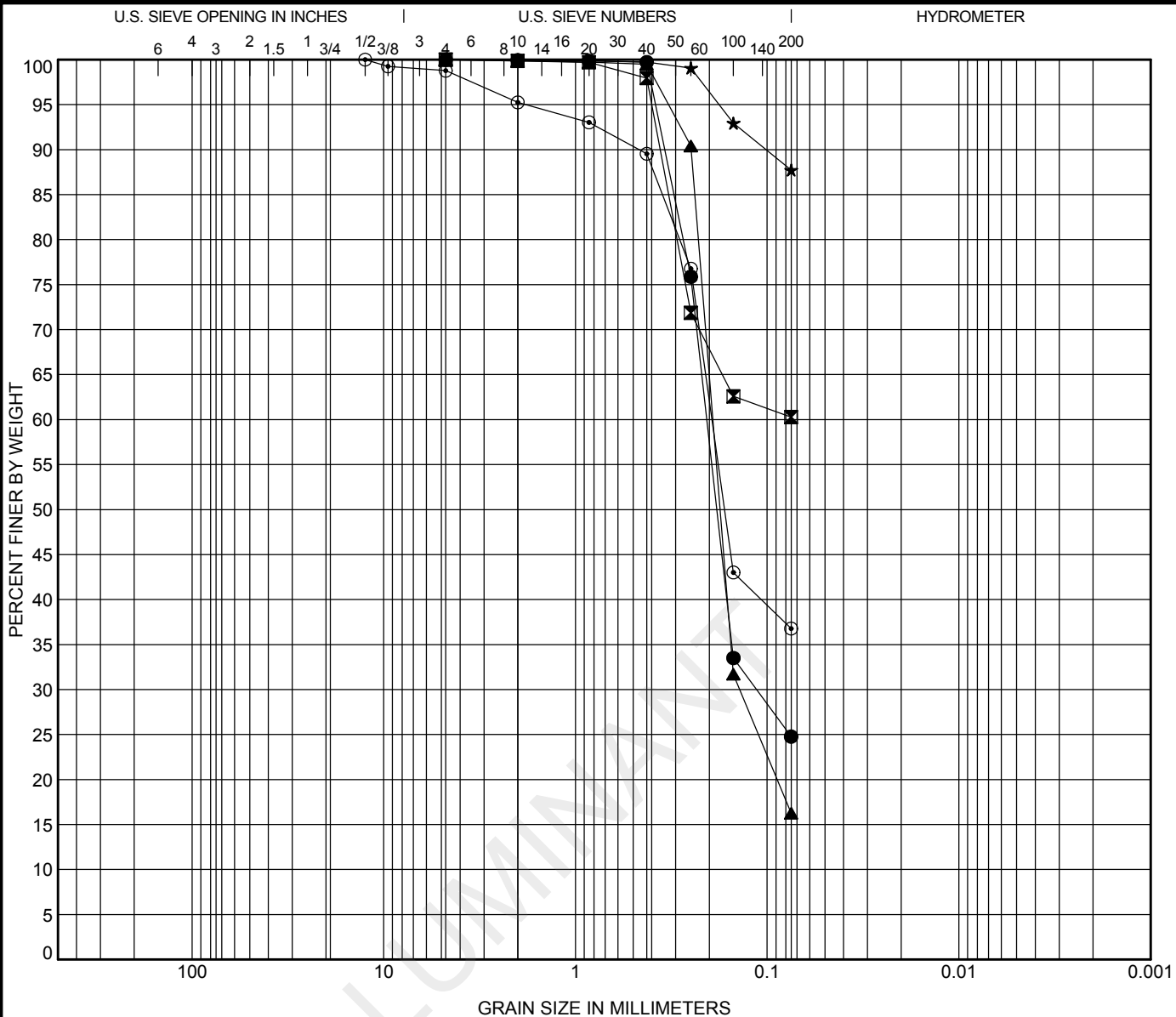


Project: Luminant Pond Stability Geotechnical Investigation  
 Location: Oak Grove, Texas

SUMMARY SHEET - 9455LUMINANT 9455SGINT.GPJ GDR HOUGDT 4/23/10







COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● BH-FGD-102 28.00ft										
☒ BH-FGD-103 33.00ft										
▲ BH-FGD-104 23.00ft										
★ BH-FGD-105 8.00ft	<b>FAT CLAY(CH)</b>					<b>51</b>	<b>19</b>	<b>32</b>		
◎ BH-FGD-105 38.00ft										
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● BH-FGD-102 28.00 ft	4.75	0.206	0.114		0.00	75.23	24.77			
☒ BH-FGD-103 33.00 ft	4.75				0.00	39.73	60.27			
▲ BH-FGD-104 23.00 ft	4.75	0.192	0.139		0.00	83.76	16.24			
★ BH-FGD-105 8.00 ft	4.75				0.00	12.26	87.74			
◎ BH-FGD-105 38.00 ft	12.5	0.194			1.23	62.00	36.77			



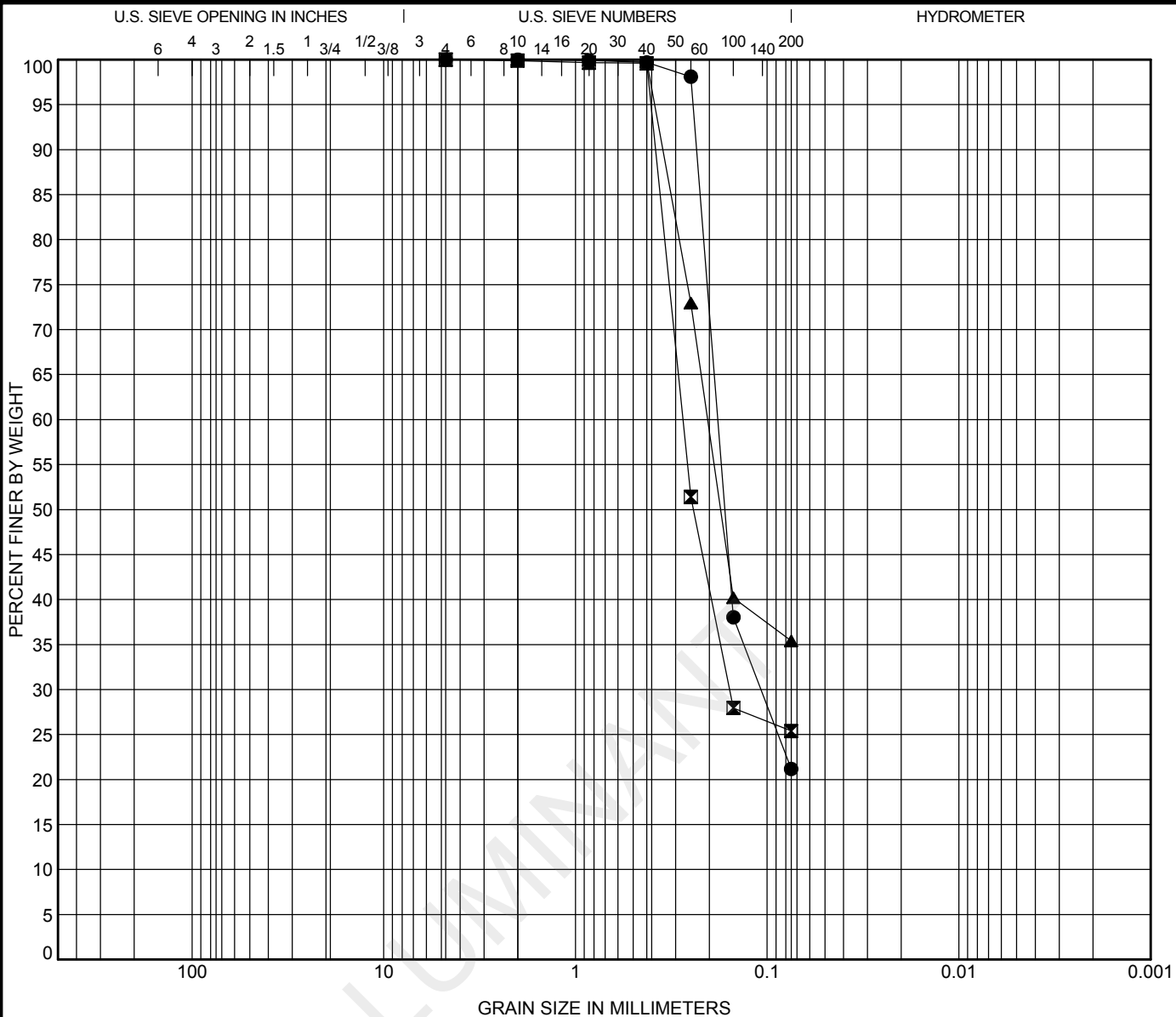
### GRAIN SIZE DISTRIBUTION

Project: Luminant Pond Stability Geotechnical

Investigation

Location: Oak Grove, Texas





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● BH-FGD-105 43.00ft						
⊠ BH-FGD-105 48.00ft						
▲ BH-FGD-106 23.00ft						

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● BH-FGD-105 43.00 ft	4.75	0.181	0.108		0.00	78.83	21.17	
⊠ BH-FGD-105 48.00 ft	4.75	0.275	0.157		0.00	74.61	25.39	
▲ BH-FGD-106 23.00 ft	2	0.204			0.00	64.60	35.40	



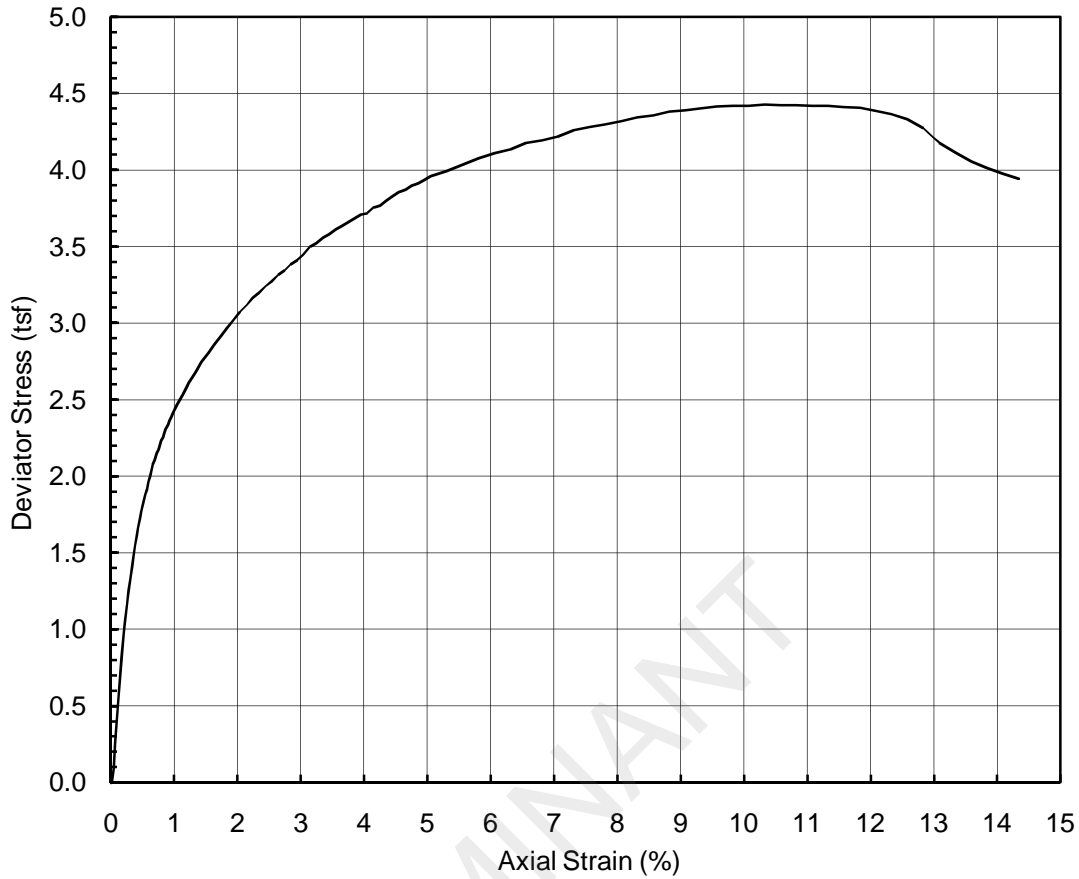
### GRAIN SIZE DISTRIBUTION

Project: Luminant Pond Stability Geotechnical

Investigation

Location: Oak Grove, Texas

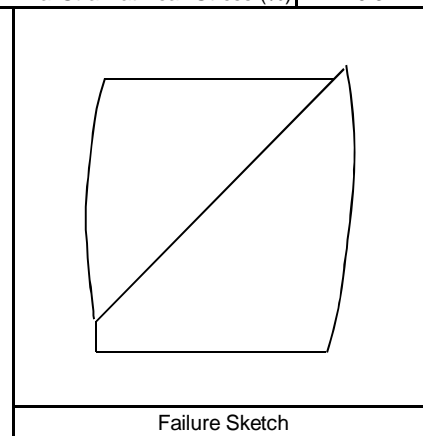
**UNCONSOLIDATED / UNDRAINED COMPRESSIVE STRENGTH  
ASTM D 2850**



Specimen Description		Reddish Brown Sandy Clay					
LL	63	PI	43	LI	0.0	USCS	CH

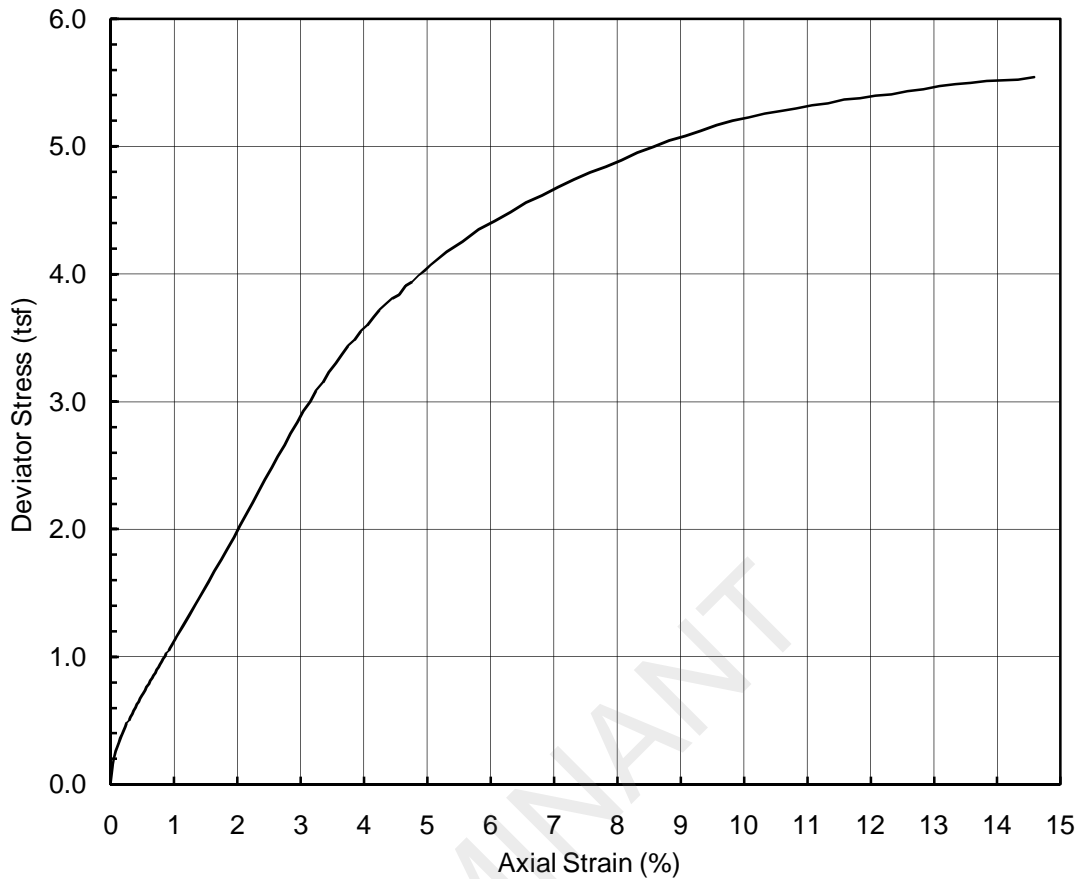
Depth (ft)	13.0	Confining Pressure (psi)	10.7
Specimen Height (inch)	5.5	Strain Rate (%/min)	1.0
Specimen Diameter (inch)	2.8	Peak Deviator Stress (tsf)	4.4
Initial Specimen Weight (g)	1113.5	Axial Strain at Peak Stress (%)	10.3
Moist Unit Weight (pcf)	125.0		
Initial Water Content (%)	19		
Initial Dry Unit Weight (pcf)	104.8		

Project Title	Luminant Pond Stability	
Project Number	103-94563	
Sample Type	Shelby Tube	
Sample ID	FGD-103	SA-71
Comments		



Performed by	PN
Date	27-Mar-10
Check	DM
Review	PCM

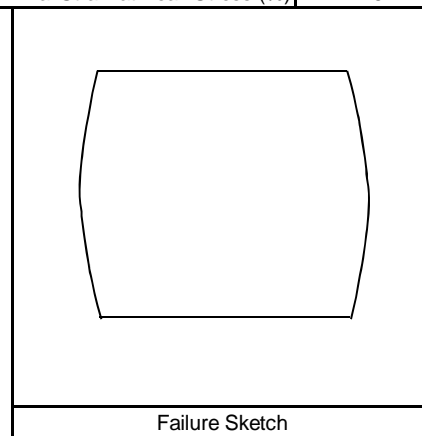
**UNCONSOLIDATED / UNDRAINED COMPRESSIVE STRENGTH  
ASTM D 2850**



Specimen Description		Light brown Sandy Clay					
LL	38	PI	22	LI	0.1	USCS	CL

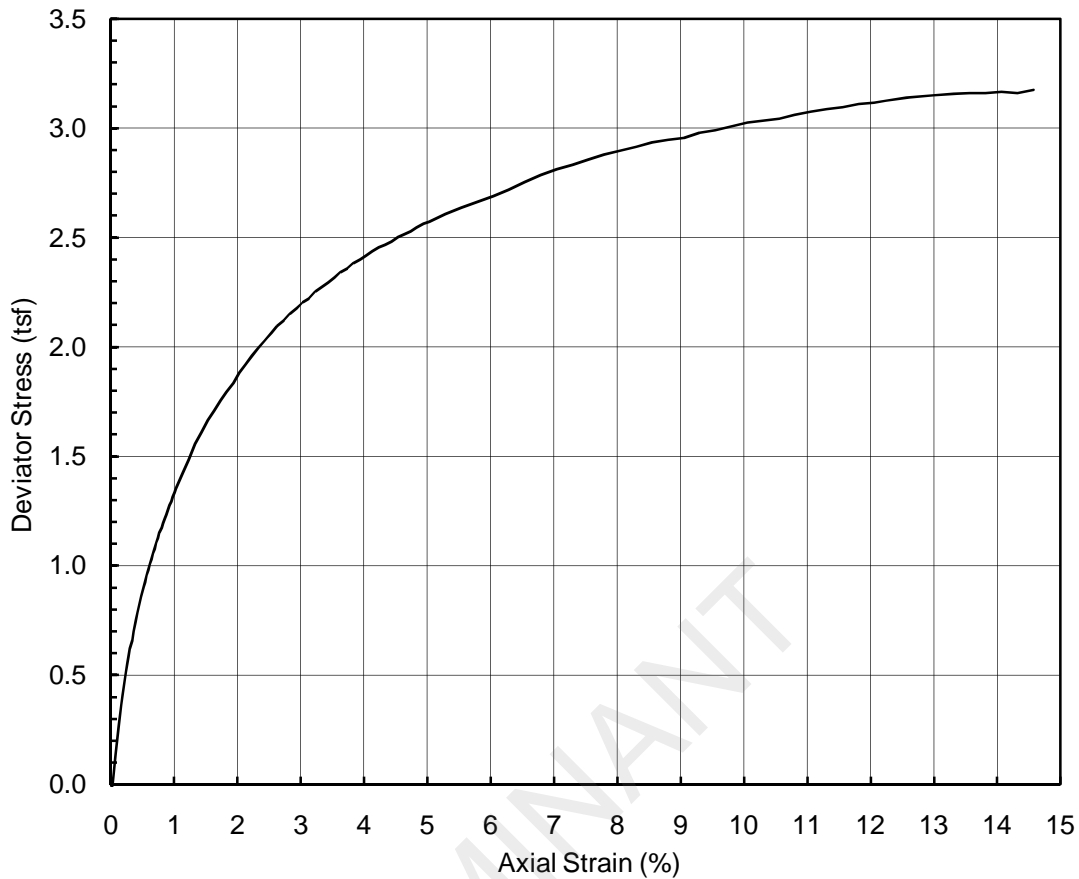
Depth (ft)	28.0	Confining Pressure (psi)	24.8
Specimen Height (inch)	5.6	Strain Rate (%/min)	1.0
Specimen Diameter (inch)	2.8	Peak Deviator Stress (tsf)	5.5
Initial Specimen Weight (g)	1225.2	Axial Strain at Peak Stress (%)	14.8
Moist Unit Weight (pcf)	132.8		
Initial Water Content (%)	19		
Initial Dry Unit Weight (pcf)	111.8		

Project Title	Luminant Pond Stability	
Project Number	103-94563	
Sample Type	Shelby Tube	
Sample ID	FGD-103	SA-74
Comments		



Performed by	PN
Date	29-Mar-10
Check	DM
Review	PCM

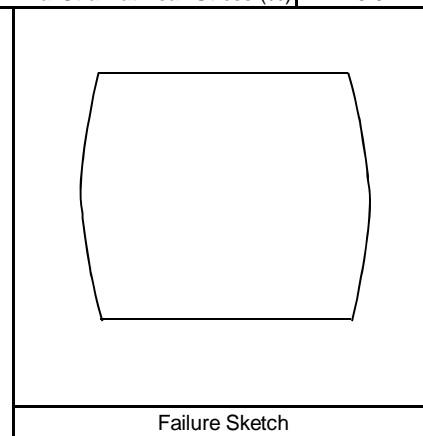
**UNCONSOLIDATED / UNDRAINED COMPRESSIVE STRENGTH  
ASTM D 2850**



Specimen Description		Light gray Sandy Clay					
LL	35	PI	19	LI	0.0	USCS	CL

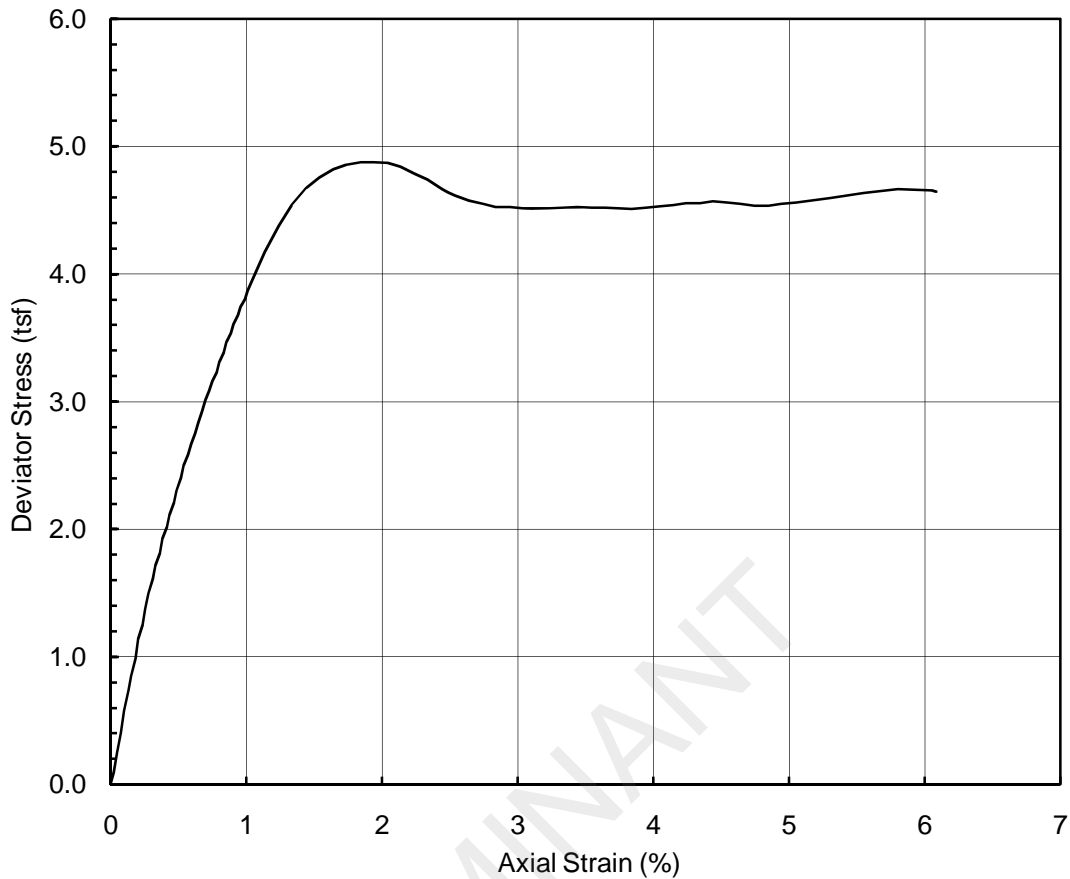
Depth (ft)	38.0	Confining Pressure (psi)	30.8
Specimen Height (inch)	5.5	Strain Rate (%/min)	1.0
Specimen Diameter (inch)	2.8	Peak Deviator Stress (tsf)	3.2
Initial Specimen Weight (g)	1131.4	Axial Strain at Peak Stress (%)	15.0
Moist Unit Weight (pcf)	129.7		
Initial Water Content (%)	16		
Initial Dry Unit Weight (pcf)	111.8		

Project Title	Luminant Pond Stability
Project Number	103-94563
Sample Type	Shelby Tube
Sample ID	FGD-103 SA-76
Comments	



Performed by	PN
Date	27-Mar-10
Check	DM
Review	PCM

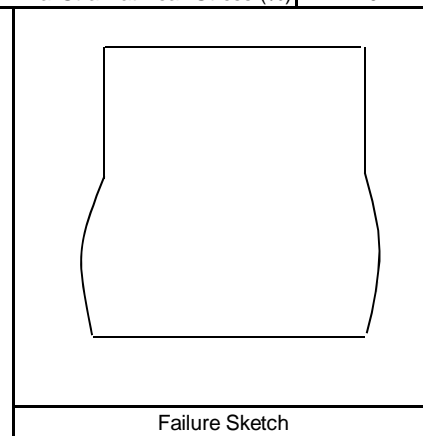
**UNCONSOLIDATED / UNDRAINED COMPRESSIVE STRENGTH  
ASTM D 2850**



Specimen Description		Yellowish Brown Sandy Clay					
LL	53	PI	35	LI	-0.1	USCS	CH

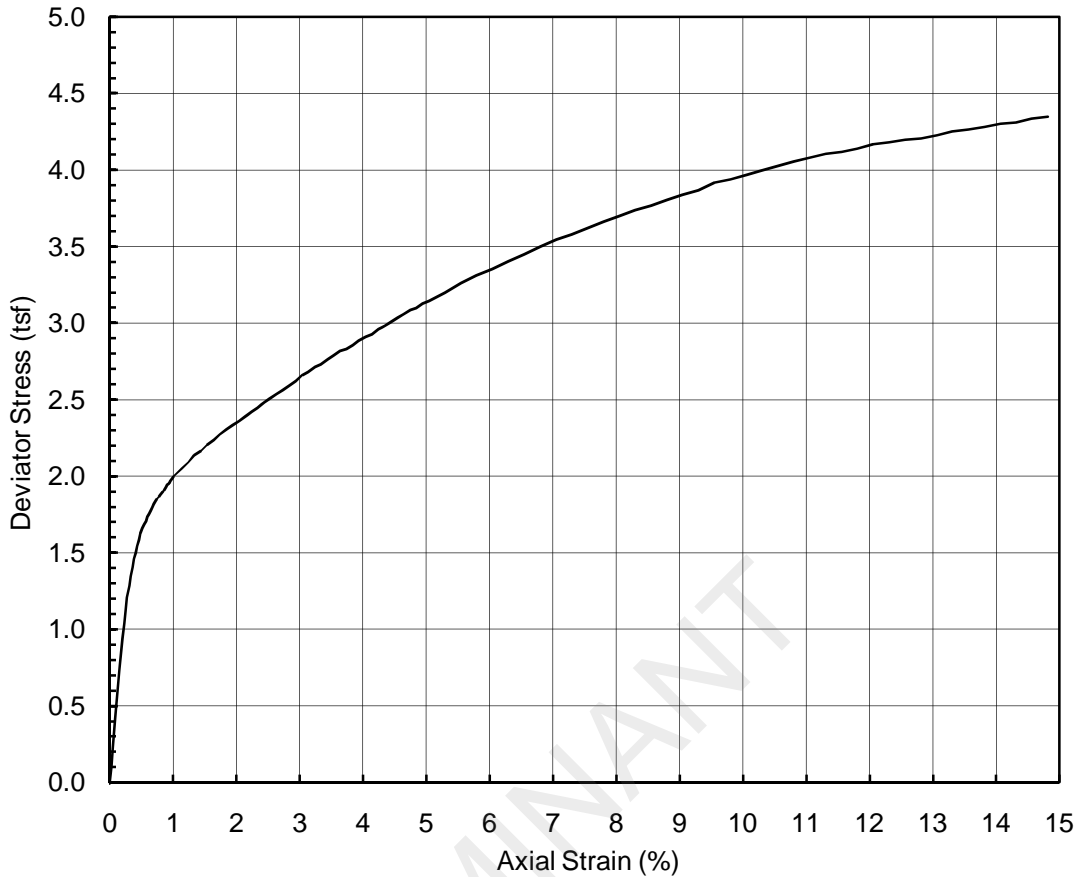
Depth (ft)	8.0	Confining Pressure (psi)	7.8
Specimen Height (inch)	5.6	Strain Rate (%/min)	1.0
Specimen Diameter (inch)	2.8	Peak Deviator Stress (tsf)	4.9
Initial Specimen Weight (g)	1108.3	Axial Strain at Peak Stress (%)	1.9
Moist Unit Weight (pcf)	126.0		
Initial Water Content (%)	15		
Initial Dry Unit Weight (pcf)	109.2		

Project Title	Luminant Pond Stability	
Project Number	103-94563	
Sample Type	Shelby Tube	
Sample ID	FGD-103	SA-70
Comments		



Performed by	PN
Date	27-Mar-10
Check	DM
Review	PCM

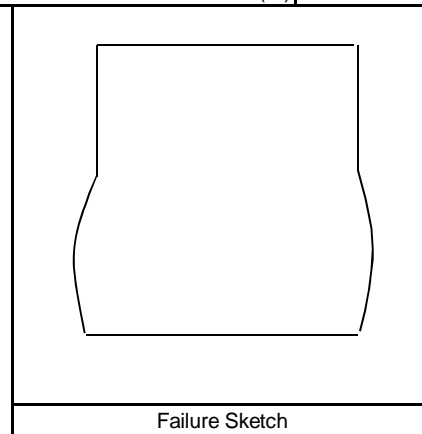
**UNCONSOLIDATED / UNDRAINED COMPRESSIVE STRENGTH  
ASTM D 2850**



Specimen Description		Brown Sandy Clay					
LL	51	PI	32	LI	0.0	USCS	CH

Depth (ft)	18.0	Confining Pressure (psi)	16.9
Specimen Height (inch)	5.0	Strain Rate (%/min)	1.0
Specimen Diameter (inch)	2.8	Peak Deviator Stress (tsf)	4.3
Initial Specimen Weight (g)	1035.2	Axial Strain at Peak Stress (%)	15.0
Moist Unit Weight (pcf)	127.3		
Initial Water Content (%)	18		
Initial Dry Unit Weight (pcf)	107.9		

Project Title	Luminant Pond Stability	
Project Number	103-94563	
Sample Type	Shelby Tube	
Sample ID	FGD-105	SA-50
Comments		



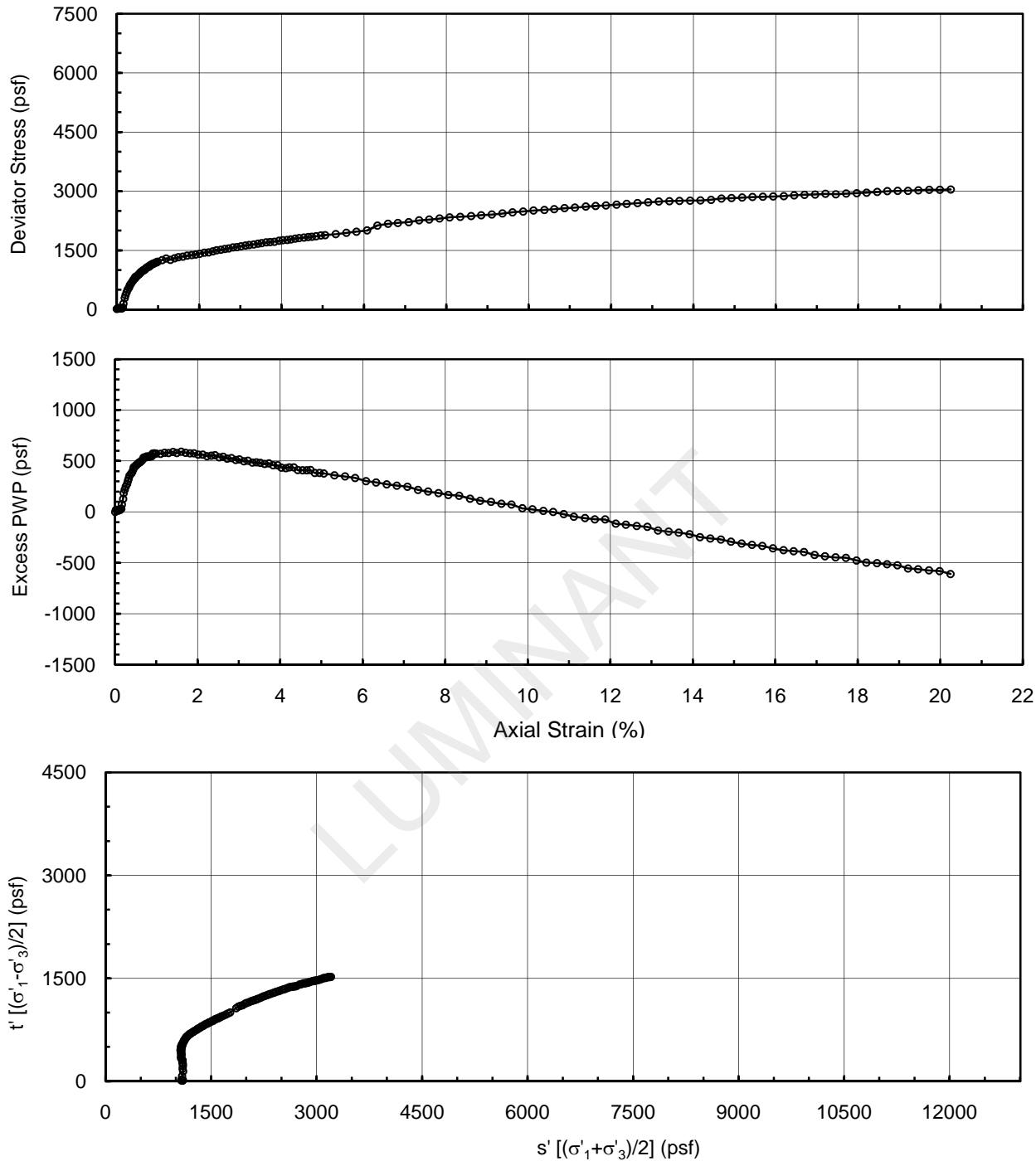
Performed by	PN
Date	27-Mar-10
Check	DM
Review	SBK

## Isotropically Consolidated Undrained Triaxial Test (ICU)

**Project Title:** Luminant Pond  
**Boring Number:** FGD-105

**Project Number:** 103-94563  
**Specimen Name:** SA-48

**Date:** 08-Apr-10  
**Depth (ft):** 8.9



Specimen Description: Light Brown Fat CLAY

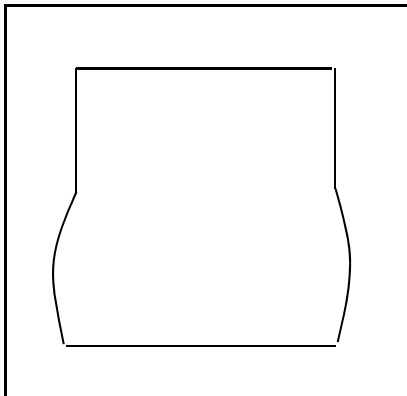
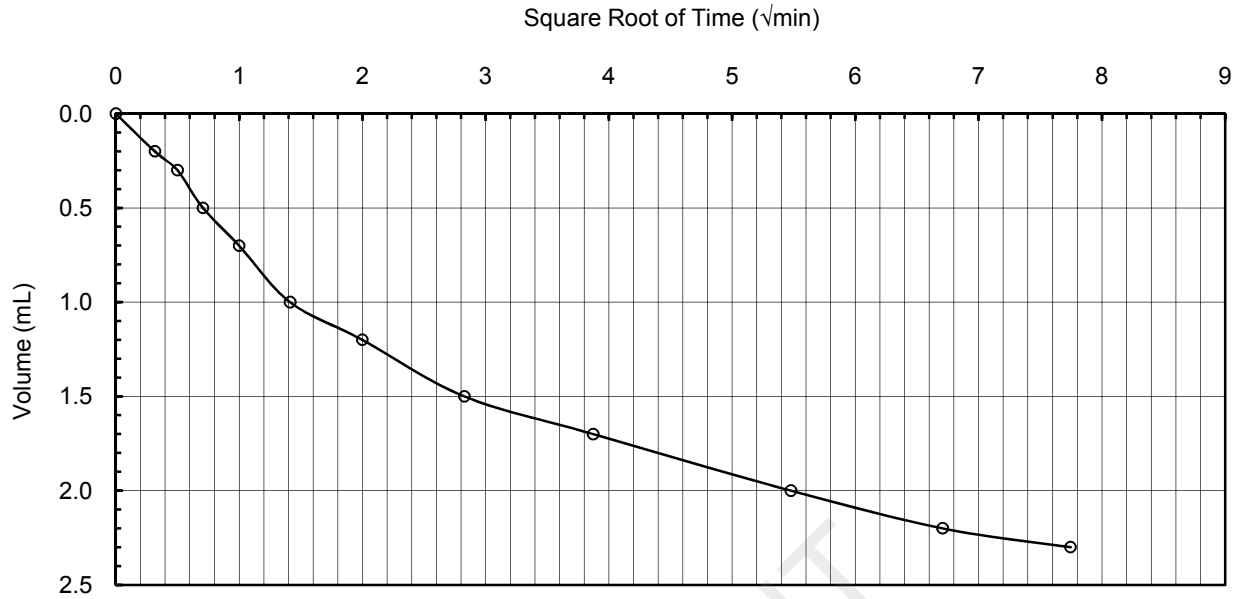
Initial Specimen Diameter (inch) =	2.94	Initial Specimen Height (inch) =	5.29
Initial Water Content (%) =	15.5	Water Content at End of Test (%) =	22.4
Initial Moist Unit Weight (pcf) =	121.8	B-value =	0.95
Back Pressure (BP, psf) =	10800	Consolidation Stress ( $\sigma'_3$ , psf) =	1088
Initial Lateral Stress ( $\sigma'_3$ , psf) =	1088	Consolidation $t_{50}$ (min) =	3
Initial Deviator Stress ( $\sigma_1 - \sigma_3$ , psf) =	16	Rebound Stress ( $\sigma'_3$ , psf) =	NA
Test Strain Rate (%/hour) =	1.0	Rebound $t_{50}$ (min) =	NA
LL =	51	PI =	32
USCS	CH	Performed by	DM
Comments:		Reviewed by	PCM

# Isotropically Consolidated Undrained Triaxial Test (ICU)

**Project Title:** Luminant Pond  
**Boring Number:** FGD-105

**Project Number:** 103-94563  
**Specimen Name:** SA-48

**Date:** 08-Apr-10  
**Depth (ft):** 8.9



FAILURE SKETCH

Consolidation Stress ( $\sigma'_3$ , psf) =		1088	
Consolidation $t_{50}$ (min) =		3	
Consolidation Volume Change (mL) =		2.3	
Unloading Stress (psf) =		NA	
Unloading $t_{50}$ (min) =		NA	
Unloading Volume Change (mL) =		NA	
LL =	51	PI =	32
USCS	CH		
Gs =	2.65	assumed	

**Performed by** DM  
**Reviewed by** PCM

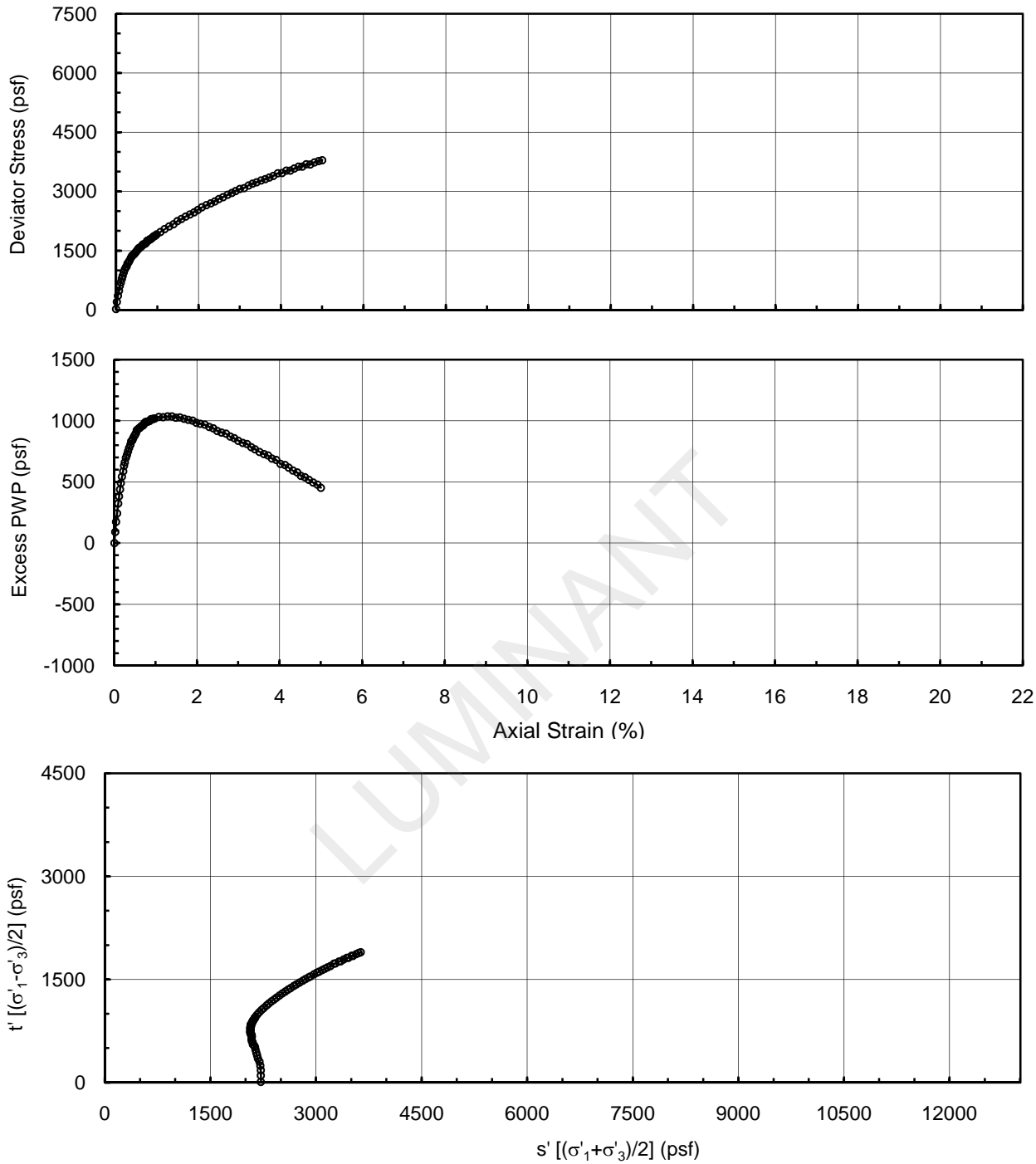


## Isotropically Consolidated Undrained Triaxial Test (ICU)

**Project Title:** Luminant Pond  
**Boring Number:** FGD-105

**Project Number:** 103-94563  
**Specimen Name:** SA-48

**Date:** 09-Apr-10  
**Depth (ft):** 8.0



Specimen Description: Light Brown Fat CLAY

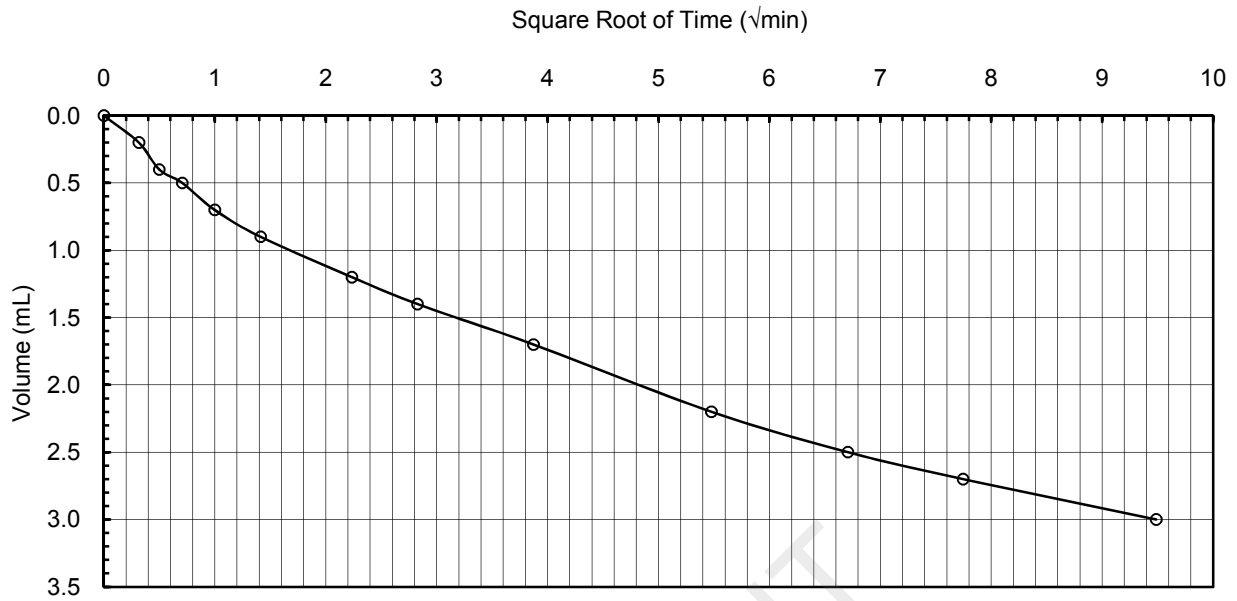
Initial Specimen Diameter (inch) =		2.94		Initial Specimen Height (inch) =		5.56	
Initial Water Content (%) =		16.3		Water Content at End of Test (%) =		-	
Initial Moist Unit Weight (pcf) =		123.6		B-value =		0.95	
Back Pressure (BP, psf) =		9360		Consolidation Stress ( $\sigma'_3$ , psf) =		2209	
Initial Lateral Stress ( $\sigma'_3$ , psf) =		2209		Consolidation $t_{50}$ (min) =		17	
Initial Deviator Stress ( $\sigma_1 - \sigma_3$ , psf) =		18		Rebound Stress ( $\sigma'_3$ , psf) =		NA	
Test Strain Rate (%/hour) =		1.0		Rebound $t_{50}$ (min) =		NA	
LL =	51	PI =	32	USCS	CH	Performed by	DM
Comments: Specimen #2 - Stage 1						Reviewed by	PCM

# Isotropically Consolidated Undrained Triaxial Test (ICU)

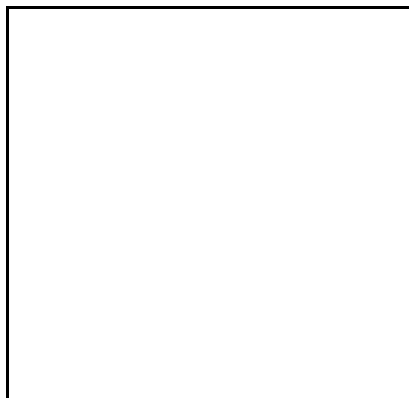
**Project Title:** Luminant Pond  
**Boring Number:** FGD-105

**Project Number:** 103-94563  
**Specimen Name:** SA-48

**Date:** 09-Apr-10  
**Depth (ft):** 8.0



LUMINANT



FAILURE SKETCH

Consolidation Stress ( $\sigma'_3$ , psf) =		2209	
Consolidation $t_{50}$ (min) =		17	
Consolidation Volume Change (mL) =		3.0	
Unloading Stress (psf) =		NA	
Unloading $t_{50}$ (min) =		NA	
Unloading Volume Change (mL) =		NA	
LL =	51	PI =	32
USCS	CH		
Gs =	2.65	assumed	

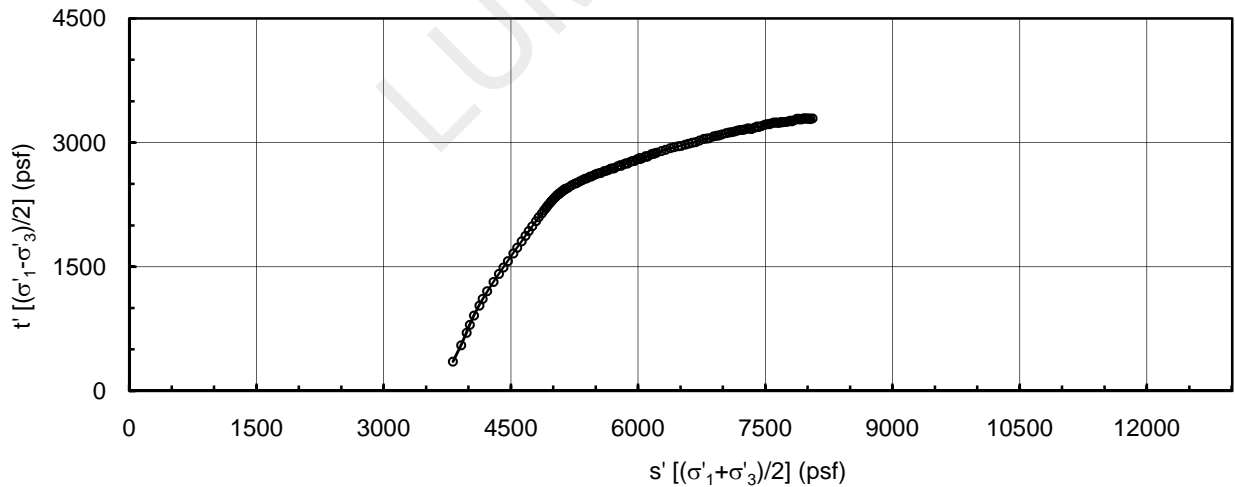
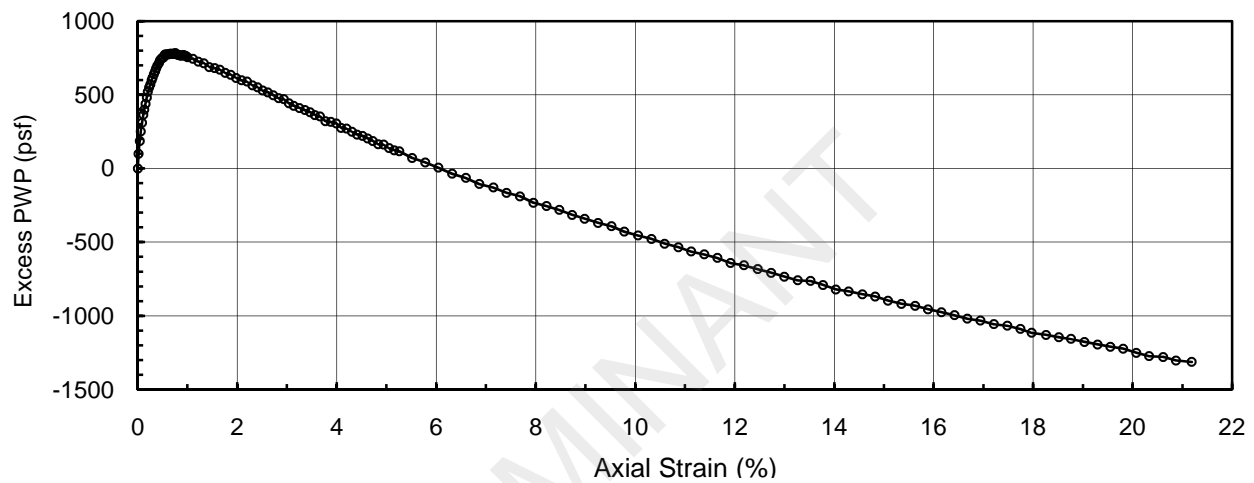
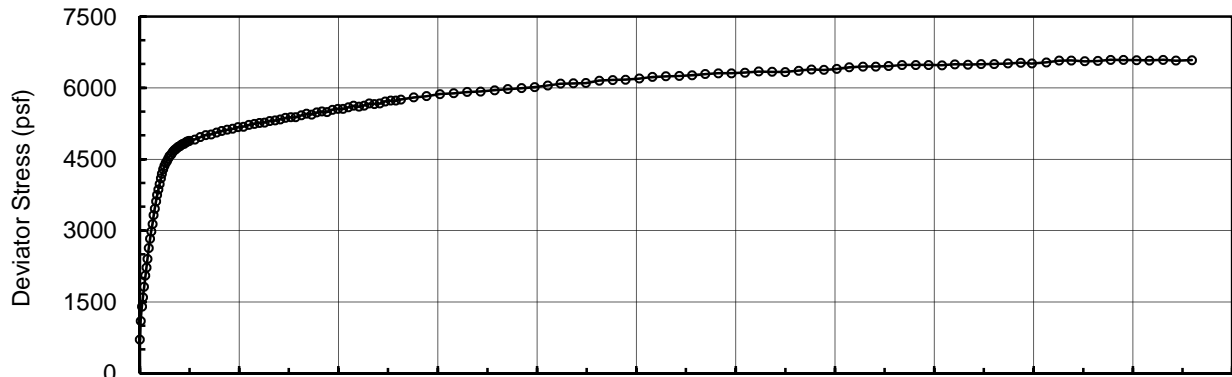
**Performed by** DM  
**Reviewed by** PCM

## Isotropically Consolidated Undrained Triaxial Test (ICU)

**Project Title:** Luminant Pond  
**Boring Number:** FGD-105

**Project Number:** 103-94563  
**Specimen Name:** SA-48

**Date:** 10-Apr-10  
**Depth (ft):** 8.0



Specimen Description: Light Brown Fat CLAY

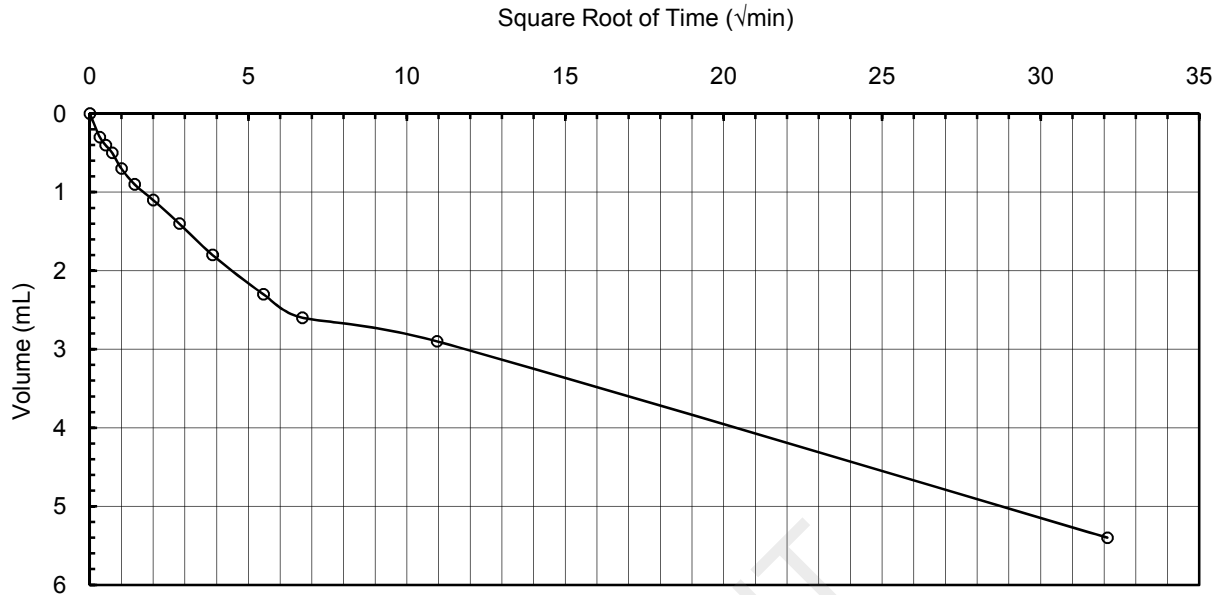
Initial Specimen Diameter (inch) =	3.00	Initial Specimen Height (inch) =	5.28
Initial Water Content (%) =	-	Water Content at End of Test (%) =	21.2
Initial Moist Unit Weight (pcf) =	-	B-value =	-
Back Pressure (BP, psf) =	9360	Consolidation Stress ( $\sigma'_3$ , psf) =	3463
Initial Lateral Stress ( $\sigma'_3$ , psf) =	3463	Consolidation $t_{50}$ (min) =	6
Initial Deviator Stress ( $\sigma_1 - \sigma_3$ , psf) =	708	Rebound Stress ( $\sigma'_3$ , psf) =	NA
Test Strain Rate (%/hour) =	1.0	Rebound $t_{50}$ (min) =	NA
LL =	51	PI =	32
USCS	CH	Performed by	DM
Reviewed by	PCM	Comments: Specimen #2 - Stage 2	

# Isotropically Consolidated Undrained Triaxial Test (ICU)

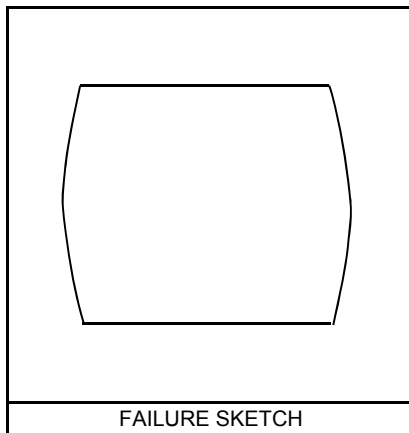
**Project Title:** Luminant Pond  
**Boring Number:** FGD-105

**Project Number:** 103-94563  
**Specimen Name:** SA-48

**Date:** 10-Apr-10  
**Depth (ft):** 8.0



LUMINANT



Consolidation Stress ( $\sigma'_3$ , psf) =		3463	
Consolidation $t_{50}$ (min) =		6	
Consolidation Volume Change (mL) =		5.4	
Unloading Stress (psf) =		NA	
Unloading $t_{50}$ (min) =		NA	
Unloading Volume Change (mL) =		NA	
LL =	51	PI =	32
USCS	CH		
Gs =	2.65	assumed	

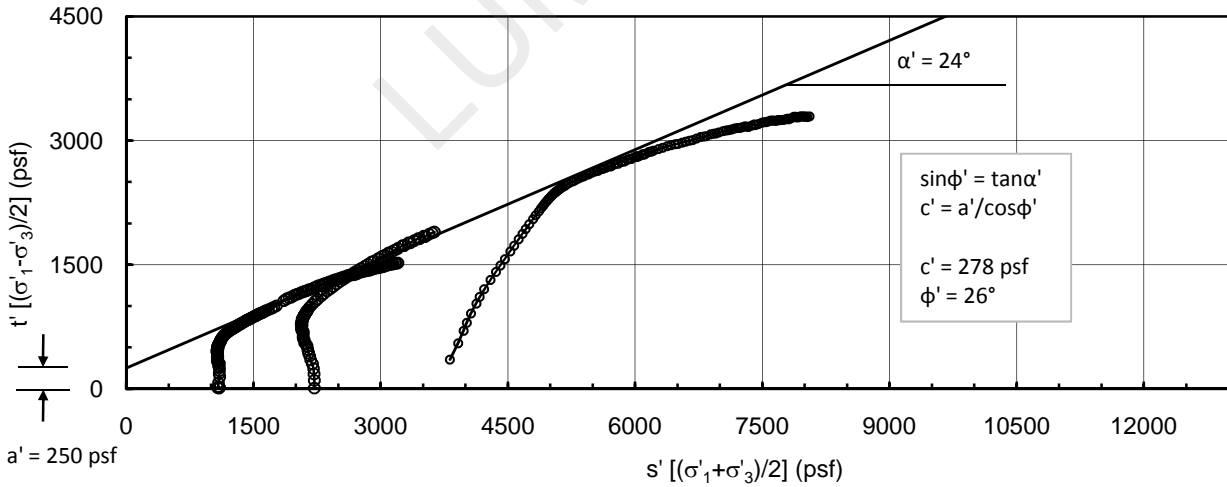
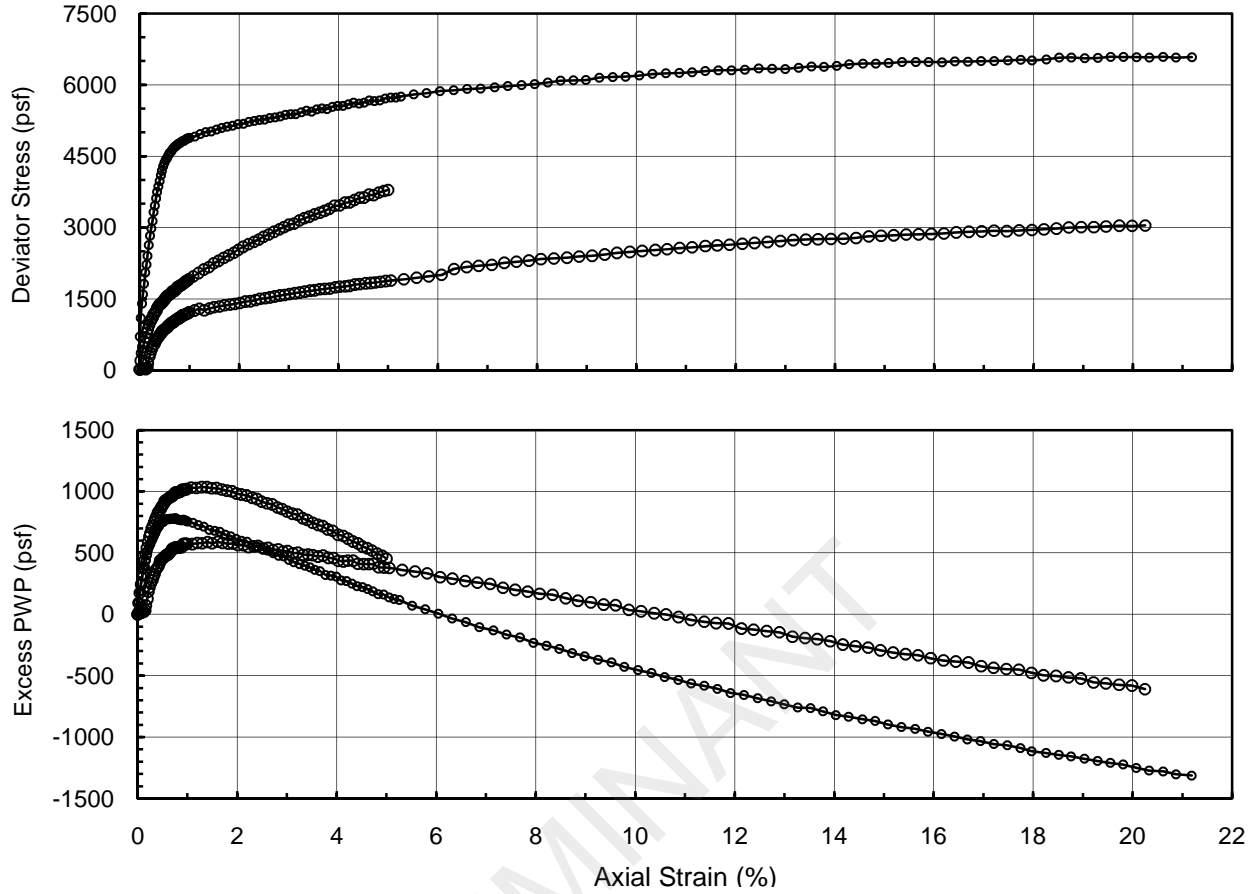
**Performed by** DM  
**Reviewed by** PCM

# Isotropically Consolidated Undrained Triaxial Test (ICU)

**Project Title:** Luminant Pond  
**Boring Number:** FGD-105

**Project Number:** 103-94563  
**Specimen Name:** SA-48

**Date:** 10-Apr-10  
**Depth (ft):**



Specimen Description:		Light Brown Fat CLAY	
Initial Specimen Diameter (inch) =		Initial Specimen Height (inch) =	
Initial Water Content (%) =		Water Content at End of Test (%) =	
Initial Moist Unit Weight (pcf) =		B-value =	
Back Pressure (BP, psf) =		Consolidation Stress ( $\sigma'_3$ , psf) =	
Initial Lateral Stress ( $\sigma'_3$ , psf) =		Consolidation $t_{50}$ (min) =	
Initial Deviator Stress ( $\sigma_1 - \sigma_3$ , psf) =		Rebound Stress ( $\sigma'_3$ , psf) =	
Test Strain Rate (%/hour) =		Rebound $t_{50}$ (min) =	
LL =	51	PI =	32
USCS	CH	Performed by	DM
Comments: 3 Stages on 2 Specimens		Reviewed by	PCM



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# SUMMARY OF LABORATORY RESULTS

CLIENT Luminant Power

PROJECT NAME Luminant

PROJECT NUMBER 1406296

PROJECT LOCATION Oak Grove SES

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Classification	Water Content (%)	Dry Density (pcf)	Saturation (%)	Specific Gravity
CELL 4 SF-01	0.0	45	14	31	9.5	58	CL	17.8			
FGD-10	4.0				4.75	82		14.8			
FGD-10	26.0				4.75	33		28.0			
FGD-10	32.0	46	20	26	4.75	77	CL	21.5			
FGD-11	4.0	52	17	35	4.75	93	CH	20.6			
FGD-11	22.0				4.75	15		8.2			
FGD-11	40.0				4.75	24		34.5			
FGD-12	28.0				4.75	20		22.8			
FGD-C-01	4.0	52	17	35	4.75	78	CH	11.5			
FGD-C-01	12.0	39	20	19	4.75	77	CL	8.6			
FGD-C-02	10.0	51	17	34	9.5	90	CH	15.1			
FGD-C-02	36.0				4.75	60		28.3			
FGD-C-03	4.0	39	20	19	4.75	67	CL	8.5			
FGD-C-03	8.0	41	21	20	4.75	89	CL	9.0			
FGD-C-03	36.0	36	24	12	4.75	51	CL	26.1			
FGD-C-04	4.0	46	15	31	4.75	49	SC	6.6			
FGD-C-04	10.0	68	21	47	4.75	61	CH	16.2			
FGD-C-04	40.0	36	16	20	4.75	68	CL	18.5			
FGD-C-05	2.0	56	17	39	4.75	84	CH	22.5			
FGD-C-05	32.0	34	19	15	9.5	28	SC	29.9			
FGD-C-06	16.0	41	15	26	9.5	66	CL	11.4			
FGD-C-06	24.0				4.75	29		5.1			
FGD-C-07	14.0	45	15	30	9.5	74	CL	12.3			
FGD-C-07	36.0	NP	NP	NP	4.75	30	SM	24.1			
FGD-C-08	4.0	37	17	20	9.5	59	CL	13.4			
FGD-C-08	16.0	31	16	15	9.5	45	SC	8.3			
FGD-C-09	12.0	39	15	24	4.75	62	CL	11.6			
FGD-C-10	0.0	41	19	22	9.5	79	CL	19.8			
FGD-C-10	2.0	42	18	24	9.5	73	CL	13.4			
FGD-C-10	4.0	41	17	24	4.75	67	CL	13.9			

LAB SUMMARY - GINT STD US LAB.GDT - 3/19/15 09:17 - L:\14- 2014 FILE FOLDER\1406296- LUMINANT\_FGD-C\1406296 LUMINANT.GPJ

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