



South Texas Project Electric Generating Station 4000 Avenue F – Suite A Bay City, Texas 77414

October 21, 2008
ABR-AE-08000075

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Request for Additional Information

The purpose of this letter is to respond to the NRC staff's Request for Additional Information (RAI) letter number 52 related to South Texas Project Units 3 & 4 Combined License Application (COLA) Part 2, Tier 2 Section 2.5S. Attached is the response to RAI question number 02.05.04-1. This submittal completes the response to RAI letter number 52.

No COLA revision is required as a result of this RAI response.

There are no commitments in this letter.

If you have any questions regarding the attached response, please contact me at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 10/21/08


Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

ccc

Attachments:

1. Question 02.05.04-1
2. Power Block Boring Location Plan (Question 02.05.04-1)
3. Boring Logs B-443, B-444, B-445, B-940, B-949 (Question 02.05.04-1)
4. CPT Log C-405S (Question 02.05.04-1)



STI# 32366319

cc: w/o attachment except*
(paper copy)

Director, Office of New Reactors
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

Richard A. Ratliff
Bureau of Radiation Control
Texas Department of State Health Services
1100 West 49th Street
Austin, TX 78756-3189

C. M. Canady
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

*Steven P. Frantz, Esquire
A. H. Gutterman, Esquire
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Ave. NW
Washington D.C. 20004

*George F. Wunder
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852

(electronic copy)

*George Wunder
Loren R. Plisco
U. S. Nuclear Regulatory Commission

Steve Winn
Eddy Daniels
Joseph Kiwak
Jim von Suskil
NRG South Texas 3/4 LLC

Jon C. Wood, Esquire
Cox Smith Matthews

J. J. Nesrsta
R. K. Temple
Kevin Pollo
L. D. Blaylock
CPS Energy

RAI 02.05.04-1:**QUESTION:**

Figure 2.5S.4-2, Power Block Plan STP COLA site, does not show borings located within the footprint of the STP 4 Radwaste building or the pump houses at the UHS Basin. The STP Unit 4 Radwaste building substructure and UHS structure are Category 1 safety related structures (see ABWR DCD Table 3.2-1). Soil profiles underlying specific structures may vary from site-wide soil properties, and soil data within the footprint of each Category 1 structure is specified by Regulatory Guide (RG) 1.132. Please provide static and dynamic soil data and the related stability analyses for the Radwaste Building and UHS structure, based on considerations of subsurface data obtained at those locations.

RESPONSE:

This response was developed using the information presented in STP 3&4 COLA Revision 1 which was under review at the time this RAI question was sent. Prior to this RAI response, the Ultimate Heat Sinks and associated structures were redesigned and relocated, and the Radwaste Building classification was changed, as described in Revision 2 of the COLA. The following analysis, although not applicable to the current UHS location, is accurate for the locations of the additional boring logs obtained in the third quarter of 2007 based on the structure locations and classifications as described in COLA Revision 1.

This response presents: (1) data that were obtained from the supplemental subsurface investigation performed in July through September of 2007 (Reference 1) for the Unit 4 Radwaste Building, for the pump houses for the Ultimate Heat Sink (UHS), and for the Reactor Service Water (RSW) tunnel; (2) a comparison of the geotechnical properties based on the data from the original subsurface investigation (Reference 2) and the values based on the original plus the supplemental subsurface investigation; and (3) results of bearing capacity, settlement and liquefaction analysis for the Unit 4 Radwaste Building, the UHS, and the RSW tunnel based on the parameters from the original and supplemental subsurface investigations.

- (1) The power block subsurface investigation plan (Attachment 2) shows the locations, ground surface elevations and depths of the sample borings and cone penetrometer tests (CPTs) performed for the supplemental subsurface investigation. Borings B-443, 444 and 445 and CPT C-405S were conducted beneath the Unit 4 Radwaste Building location, borings B-940 and 949 were conducted beneath the UHS pump houses, and the remaining eight borings and ten CPTs were conducted beneath the RSW tunnel. For the Unit 4 Radwaste Building and the UHS pump houses, the logs of the borings are in Attachment 3 and the CPT logs are in Attachment 4.

The subsurface profile beneath the Unit 4 Radwaste Building based on the supplemental investigation results is shown on Figure 1. The subsurface profile beneath the UHS based on the results of the original and the supplemental investigations is shown on Figure 2. These figures indicate the thickness of each layer and the high strain (or static)

elastic modulus (E_s) and the stratum thickness (H) employed in the settlement analysis described in (3) below.

- (2) Table 1 shows the geotechnical engineering properties derived from the subsurface investigation data for each stratum. Note that, at the STP Units 3 and 4 site, the properties are generally consistent for each stratum. Some scatter is expected due to inherent sampling and testing variations. However, no pattern to the scatter and no distinct sets of properties at different locations were identified. Thus the properties are derived on a site-wide basis, rather than beneath each structure.

In Table 1, where a single value is shown, the property value did not change (within the shown significant numbers) with the addition of the data from the supplemental investigation. Where two values are shown for a property (in bold), the first value is the value derived from the original investigation data while the second value is derived from the data from the original investigation plus the supplemental investigation. (Note that the results from the 16 Resonant Column Torsional Shear (RCTS) tests from the original investigation which were not available for Revision 1 of the FSAR have now been added to the data from the original plus the supplemental investigations in Table 1. Natural moisture content and Atterberg limits were measured as part of the ten RCTS tests on clay, and unit weight was measured as part of all 16 of the RCTS tests. Thus, although the deepest supplemental boring [B-443 under the Unit 4 Radwaste Building] was drilled to 200 feet depth, i.e., into Stratum J [Clay 2], there are differences in the Table 1 properties below Stratum J due to the inclusion of the moisture content, Atterberg limits, and unit weight results from the RCTS tests. The Atterberg limits and unit weights, in turn, can have an effect on the elastic and shear moduli values. Also, the difference in the measured N-values for Sand N in Table 1 [N = 97 and 98] are due to rounding differences, not to any new data; similarly, the differences in the shear modulus for this stratum are due to rounding differences.)

The only additional dynamic testing that was performed for the supplemental field and laboratory investigation was a seismic CPT (C-405S) to 100 feet depth beneath the Unit 4 Radwaste Building. The shear wave velocity results from C-405S were enveloped by the large amount of data generated during the initial investigation, and thus no modifications were made to the previously established shear wave velocity profile.

- (3) Analyses were made to estimate the bearing capacity and settlement beneath the Unit 4 Radwaste Building and the UHS, and to assess the liquefaction potential of the soil beneath these structures and the RSW tunnel.

The bearing capacity, c , of the soil supporting each structure was computed using the method presented in Section 2.5S.4.10.3 of Revision 1 of the FSAR (no change for Revision 2), applying weighted average parameters from the layers within the effective shear depth below the foundation.

Settlement was estimated using the elastic compression approach and Boussinesq-type stress distribution outlined in Section 2.5S.4.10.4 of Revision 1 of the FSAR (no change for Revision 2).

Liquefaction analyses were performed using the methods described in Section 2.5S.4.8.2 of Revision 1 of the FSAR. Each boring standard penetration test (SPT) N-value, each CPT reading, and each shear wave velocity measurement from the supplemental program was analyzed.

Results of these analyses are presented below:

Unit 4 Radwaste Building

This structure will be approximately 127 ft x 217 ft in plan dimensions (see Attachment 2) with foundation base at El. -20 ft, or about 54 ft below final grade.

Bearing Capacity

For the Unit 4 Radwaste Building, computed $c = 73.5$ ksf. The estimated demand, d , (design load) under static loading conditions is 4 ksf. Thus, $c/d \approx 18$. (Note that for the Unit 3 Radwaste Building, computed $c = 91.8$ ksf, giving $c/d \approx 23$.)

Settlement

Estimated pre-consolidation pressures exceeded the combined stresses from existing overburden and applied load at the center of each stratum, and thus virgin compression was not considered. The computed average settlement beneath the Unit 4 Radwaste Building = 0.8 inches.

Liquefaction

One SPT sample indicated a factor of safety (FS) against liquefaction of 1.0, less than the required 1.1. This sample is above the foundation elevation and will thus be excavated out.

There were four CPT readings with computed FS values ranging from 0.96 to 1.1. These were all from relatively near-surface strata that will be excavated out.

There was one shear wave velocity reading that gave a FS reading lower than 1.1. This was in Stratum A, which is a non-liquefiable clay and will be excavated out.

UHS Structure

The UHS basin is approximately 380 ft in diameter, with 110 ft x 125 ft pump houses on the northeast and southwest ends (see Attachment 2). The basin embedment depth is about 32 ft below final grade and the floor of each pump house is 7 ft below the basin floor. For bearing capacity and settlement, the UHS structure is considered as a whole; the pump houses are not considered separately. However, the results of the two supplemental borings under the pump houses have been included in the analyses.

Bearing Capacity

Since the area occupied by the UHS is so large and there is some variability in stratum thickness across this area, different soil strata occur within the same elevation range below the UHS. Two soil conditions/profiles were thus developed for bearing capacity calculation purposes. These were labeled "Clay Preferred" and "Sand Preferred." For soil conditions/profiles with the label "Clay Preferred," the clay stratum below the foundation and its characteristic undrained shear strength, s_u , represent the elevation range containing the different soil types. Similarly, for soil conditions/profiles with the label "Sand Preferred," the sand stratum below the foundation and its characteristic friction angle, Φ , represent the elevation range containing the different soil types. It is expected that these two subsurface profiles will provide the lower and upper boundaries of bearing capacity.

With the data from the supplemental borings beneath the pump houses included, for the UHS the computed $c = 26.8$ ksf for the "Clay Preferred" profile and $c = 174.9$ ksf for the "Sand Preferred" profile. The estimated demand, d , (design load) under static loading conditions is 6 ksf. Thus, $c/d \approx 4.5$ for the "Clay Preferred" profile and $c/d \approx 29$ for the "Sand Preferred" profile. Without the data from the supplemental borings beneath the pump houses included, for the UHS the computed $c = 24.7$ ksf for the "Clay Preferred" profile and $c = 170.6$ ksf for the "Sand Preferred" profile. This gives $c/d \approx 4.1$ for the "Clay Preferred" profile and $c/d \approx 28$ for the "Sand Preferred" profile.

Settlement

Estimated pre-consolidation pressures exceed the combined stresses from existing overburden and applied load at the center of each stratum, and thus virgin compression was not considered. With the data from the supplemental borings beneath the pump houses included, the computed average settlement beneath the UHS is 6.1 inches. Without the data from the supplemental borings beneath the pump houses included, the computed average settlement beneath the UHS is 6.0 inches.

Liquefaction

Analysis of the SPT N-values from the supplemental UHS pump house borings indicates no FS values less than 1.1. No CPTs or shear wave velocity measurements were taken below the pump houses.

RSW Tunnel

The RSW tunnels are 39-ft wide, 14.5-ft high structures that link the UHS pump house to the Control Building of each unit (see Attachment 2).

Bearing Capacity and Settlement

Since the overburden pressure from the soil removed to construct the tunnel will be as large as or greater than the weight of the tunnel itself, then there should be no bearing capacity issues with the tunnel, and settlements should be negligible. This will be confirmed during final design.

Liquefaction

Analysis of the SPT N-values from the eight supplemental RSW tunnel borings indicates no FS values less than 1.1.

Factors of safety against liquefaction of less than 1.1 were computed for several readings from CPTs along the RSW tunnel route. At all locations except one, these soils will either be excavated out during construction for the tunnel (Strata A and B), and/or are clay soils that are considered non-liquefiable (Stratum D). A 1.4 ft-thick interval in sand Stratum C in C-949 has a FS less than 1.1. The RSW tunnel will be a large mat-supported structure, capable of spanning limited areas with reduced subgrade support, and thus limited zones of potentially liquefiable material should not be a problem.

No shear wave velocity measurements were taken below the RSW tunnel.

Summary

Static and dynamic soil data and the results of the related stability analyses for the Radwaste Building and UHS structure have been provided, based on considerations of subsurface data obtained at those locations. The locations of the supplemental explorations points beneath these structures, as well as subsurface profiles beneath these structures, have also been provided. The soil strata properties derived from the supplemental investigation are tabulated in this response, and are shown to be very similar to those derived based on the original investigation.

There is a current NRC commitment (COM 2.5S-2) to update STP 3 & 4 FSAR Section 2.5S to include confirmatory subsurface investigation to accommodate the addition of the Radwaste Building in the STP 4 area, although the classification of the Radwaste Building was changed in Revision 2. In addition, the UHS as described in Revision 1 of the COLA was relocated as described in Revision 2. Necessary changes to the COLA in response to COM 2.5S-2 and to reflect subsurface investigations associated with the relocation of the UHS and associated structures will be provided in a future COLA revision in accordance with a current NRC commitment (COM 3H-2). The information presented in this RAI response will be included in a future COLA revision as part of the general site characterization, in accordance with the above NRC commitments.

References

1. MACTEC Engineering and Consulting, Inc. "Attachment J – Addendum to Subsurface Investigation and Laboratory Testing Data Report Summary, STP COL Project Units 3 and 4," Charlotte, NC, July 2008.
2. MACTEC Engineering and Consulting, Inc. "Geotechnical Subsurface Investigation Data Report, Combined Operating License Application Project, South Texas Project, Matagorda County, Texas", Raleigh, NC, April 2007.

Table 1: Summary of Geotechnical Engineering Properties

Parameter ⁽¹⁾	Stratum				
	A FILL	A CLAY	B SILT	C SAND	D CLAY
Average thickness, feet	2	18	7.5	19.5, 19	21.5, 22
USCS symbol	GP	CH, CL	ML, CL, SM	SM, SP-SM	CH, CL
Natural moisture content (MC), %	5	23, 24	24	24, 23	25, 26
Moist unit weight (γ_{moist}), pcf	124	124	121	122	121, 122
Fines content, %	N/A ⁽²⁾	95	70	25	70, 75
Liquid limit (LL), %	N/A ⁽²⁾	57	38 ⁽³⁾	N/A ⁽²⁾	58, 57
Plasticity index (PI), %	N/A ⁽²⁾	40	20 ⁽³⁾	N/A ⁽²⁾	40
Measured SPT N-value, bpf	8	10	9	25	15
Adjusted SPT (N_1) ₆₀ -value, bpf	15	15	10	35	15
Shear Wave Velocity, ft/sec	N/A ⁽²⁾	575	725	785	925
Undrained shear strength (s_u), ksf	1.9	1.6	N/A ⁽²⁾	N/A ⁽²⁾	3.0
Friction angle (ϕ'), degree	N/A ⁽²⁾	N/A ⁽²⁾	30	35	16
Cohesion (c'), ksf	N/A ⁽²⁾	N/A ⁽²⁾			1.0
Elastic modulus (high strain) (E_s), ksf	N/A ⁽²⁾	1,050	460	850	2,500
Shear modulus (high strain) (G_s), ksf	N/A ⁽²⁾	360	180	320	850
Coefficient of Subgrade Reaction (k_1), kcf (for 1-ft. sq. area)	N/A ⁽²⁾	150	160	600	300
Earth Pressure Coefficients					
Active (K_a)	N/A ⁽²⁾	0.5	0.3	0.3	0.5
Passive (K_p)	N/A ⁽²⁾	2.0	3.0	3.7	2.0
At Rest (K_0)	N/A ⁽²⁾	0.7	0.5	0.4	0.7
Coefficient of Sliding	N/A ⁽²⁾	0.30	0.35	0.40	0.30
Consolidation Properties					
C_c [C_r]	N/A ⁽²⁾	0.235 [0.017]	N/A ⁽²⁾	N/A ⁽²⁾	0.255, 0.285 [0.023], [0.026]
P_p , ksf [OCR]	N/A ⁽²⁾	6.3 [7.0]	N/A ⁽²⁾	N/A ⁽²⁾	12.3 [3.3]
Notes.					
⁽¹⁾ The values tabulated above are for use as a guideline only. Reference should be made to specific boring and CPT logs and laboratory test results for appropriate modifications at specific locations and for specific calculations.					
⁽²⁾ N/A indicates that the properties are either not measured or not applicable.					
⁽³⁾ Nine of 17 Atterberg Limit tests for Stratum B yield Non-Plastic results. Values shown are average of Plastic results.					

Table 1: Summary of Geotechnical Engineering Properties (Cont'd)

Parameter ⁽¹⁾	Stratum				
	E SAND	F CLAY	H SAND	J (CLAY)	J (SAND)
Average thickness, feet	18	16.5, 17	19, 18	61 ⁽³⁾	37.5 ⁽⁴⁾
USCS symbol	SP-SM, SM	CH, CL	SP-SM, SM	CH, CL	SM, ML
Natural moisture content (MC), %	21	24, 25	19	23	23
Moist unit weight (γ_{moist}), pcf	122, 123	125	128, 125	125	125
Fines content, %	20	90	15, 25	90	40, 50
Liquid limit (LL), %	N/A ⁽²⁾	58	N/A ⁽²⁾	54	N/A ⁽²⁾
Plasticity index (PI), %	N/A ⁽²⁾	40	N/A ⁽²⁾	35	N/A ⁽²⁾
Measured SPT N-value, bpf	35	22	44	31	65
Adjusted SPT (N_1) ₆₀ -value, bpf	30	15	30	15	35
Shear Wave Velocity, ft/sec	1,080	945	1,075	1,145	1,275
Undrained shear strength (s_u), ksf	N/A ⁽²⁾	3.2, 3.3	N/A ⁽²⁾	3.5, 3.4	N/A ⁽²⁾
Friction angle (ϕ'), degree	35	8	35	8	33
Cohesion (c'), ksf		2.0		2.5	
Elastic modulus (high strain) (E_s), ksf	1,100	2600, 2650	1150, 1130	3500, 3450	1,500
Shear modulus (high strain) (G_s), ksf	425, 430	900, 920	450, 430	1200, 1190	600, 580
Coefficient of Subgrade Reaction (k_1), kcf (for 1-ft. sq. area)	600	300	600	N/A ⁽²⁾	N/A ⁽²⁾
Earth Pressure Coefficients					
Active (K_a)	0.3	0.5	0.3	N/A ⁽²⁾	N/A ⁽²⁾
Passive (K_p)	3.7	2.0	3.7	N/A ⁽²⁾	N/A ⁽²⁾
At Rest (K_0)	0.4	0.7	0.4	N/A ⁽²⁾	N/A ⁽²⁾
Coefficient of Sliding	0.40	0.30	0.40	N/A ⁽²⁾	N/A ⁽²⁾
Consolidation Properties					
C_c [C_r]	N/A ⁽²⁾	0.24, 0.238 [0.039][0.028]	N/A ⁽²⁾	0.228, 0.224 [0.040][0.035]	N/A ⁽²⁾
P_p' , ksf [OCR]	N/A ⁽²⁾	15.5 [2.6]	N/A ⁽²⁾	16.5 [1.7]	N/A ⁽²⁾
Notes.					
⁽¹⁾ The values tabulated above are for use as a guideline only. Reference should be made to specific boring and CPT logs and laboratory test results for appropriate modifications at specific locations and for specific calculations.					
⁽²⁾ N/A indicates that the properties are either not measured or not applicable.					
⁽³⁾ Thickness of J (CLAY 1) (29 ft) & J (CLAY 2) (32 ft) combined.					
⁽⁴⁾ Thickness of J (Interbed 1) (9, 8.5 ft), J (SAND 1) (13.5 ft), & J (Interbed 2) (15, 14.5 ft) combined.					

Table 1: Summary of Geotechnical Engineering Properties (Cont'd)

Parameter ⁽¹⁾	Stratum					
	K (CLAY)	K (SAND)	L CLAY	M SAND	N (CLAY)	N (SAND)
Average thickness, feet	18.5	25.5	5	15	228 ⁽³⁾	93.5 ⁽⁴⁾
USCS symbol	CL, CH	SM, ML	CH	SP-SM	CH, CL	SM, SP-SM
Natural moisture content (MC), %	20, 23	21	29	21 ⁽⁵⁾	25	23, 22
Moist unit weight (γ_{moist}), pcf	129, 124	127	129, 124⁽⁶⁾	127 ⁽⁵⁾	121, 123	128
Fines content, %	75	45	75 ⁽⁶⁾	45 ⁽⁵⁾	75	20
Liquid limit (LL), %	39, 50	N/A ⁽²⁾	73	N/A ⁽²⁾	65	N/A ⁽²⁾
Plasticity index (PI), %	25, 35	N/A ⁽²⁾	50	N/A ⁽²⁾	45	N/A ⁽²⁾
Measured SPT N-value, bpf	15	75	23	75 ⁽⁵⁾	33	98, 97
Adjusted SPT (N_{160})-value, bpf	6	30	8	30 ⁽⁵⁾	7	20
Shear Wave Velocity, ft/sec	1,170	1,370	975	1,165	1,290	1,655
Undrained shear strength (s_u), ksf	3.0	N/A ⁽²⁾	3.0	N/A ⁽²⁾	3.0	N/A ⁽²⁾
Friction angle (ϕ'), degree		33		33 ⁽⁵⁾		36
Cohesion (c'), ksf	N/A ⁽²⁾		N/A ⁽²⁾		N/A ⁽²⁾	
Elastic modulus (high strain) (E_s), ksf	3100, 3500	1,650	3100, 3000	1,300	4,500	2,100
Shear modulus (high strain) (G_s), ksf	1050, 1200	630	1050, 1020	500	1500, 1560	800, 820
Coefficient of Subgrade Reaction (k_1), kcf (for 1-ft. sq. area)	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾
Earth Pressure Coefficients						
Active (K_a)	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾
Passive (K_p)	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾
At Rest (K_0)	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾
Coefficient of Sliding	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾	N/A ⁽²⁾
Consolidation Properties						
C_c [C_r]	0.176 [0.017]	N/A ⁽²⁾	0.176 ⁽⁶⁾ [0.017] ⁽⁶⁾	N/A ⁽²⁾	0.336 [0.050]	N/A ⁽²⁾
P_p' , ksf [OCR]	18.3 [1.7]	N/A ⁽²⁾	16.0 [1.0]	N/A ⁽²⁾	28.5 [1.0]	N/A ⁽²⁾

Notes.

⁽¹⁾The values tabulated above are for use as a guideline only. Reference should be made to specific boring and CPT logs and laboratory test results for appropriate modifications at specific locations and for specific calculations.

⁽²⁾N/A indicates that the properties are either not measured or not applicable.

⁽³⁾Thickness of N (CLAY1) (59 ft), N (CLAY 2) (8 ft), N (CLAY 3) (8.5 ft), N (CLAY 4) (30 ft), N (CLAY 5) (54 ft), & N (CLAY 6) (68.5 ft) combined.

⁽⁴⁾Thickness of N (SAND 1) (17 ft), N (SAND 2) (32.5 ft), N (SAND 3) (18.5 ft), N (SAND 4) (8 ft), & N (SAND 5) (17.5 ft) combined.

⁽⁵⁾Value for K (SAND) adopted.

⁽⁶⁾Value for K (CLAY) adopted.

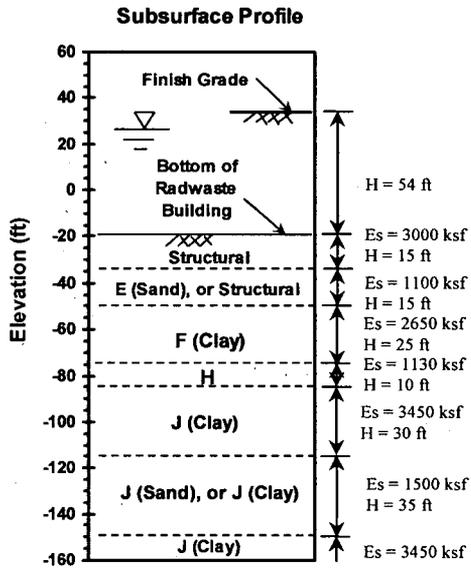


Figure 1: Subsurface Profile at Unit 4 Radwaste Building

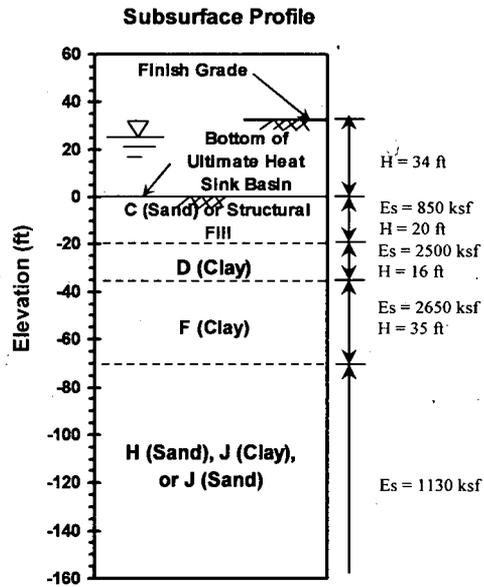


Figure 2: Subsurface Profile at UHS

STP SOIL STP2007.GPJ WLA.GDT 5/20/08

Project Name :STP COL PROJECT		MACTEC		SOIL LOG - Boring No. B-443	
Project Number: 6234-07-4257					
Type and Diameter of Boring Solid Stem Auger/Mud Rotary / 6 inches/4 inches		Boring Location RADWASTE BUILDING N 363182.01 E 2942133.49		Total Depth 200 feet	
Drilling Contractor and Rig JEDI Drilling / CME 75		Elevation at boring 30.61 feet		Ground Water Depth See Remarks	
Sampling Method Split Spoon/UD		Sample Driving Hammer/Drop 139.2 / 29.5 inches		No. of Samples 61	
		Borehole Inclination 0		Logged by A. Osorio/M. Cooke	
				Date Started 7/30/07	
				Date Completed 8/5/07	

Reviewed by / Date MJH 5-25-08

Reviewed by / Date KAW 5-28-08

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
0											
1	X	SS 1	11	12	18				SP-SM	FILL; yellowish brown (10YR 5/6); silt, SAND (SP-SM) - dry; firm; poorly graded; fine to medium; tan CLAY on tip of spoon at 1.5 feet.	FILL to 0.5 feet
2	X	SS 2	11	12	18				CH	BEAUMONT; greenish gray (Gley 1 10Y-6/1); CLAY (CH) - moist; firm; high plasticity.	4 inch O.D. Solid Stem Augers to 12.0 feet.
3	X	SS 3	11	10	18				CH	BEAUMONT; greenish gray (Gley 1 10Y-6/1); CLAY (CH) - dry; firm; high plasticity; medium to high toughness; some black ferrous sulfate nodules.	
4	X	SS 4	11	18	18				CL-ML	BEAUMONT; light olive brown (2.5YR-5/3); CLAY (CH) - dry; stiff; high plasticity; high toughness; some black nodules.	
5	X	SS 5	11	18	18				ML	Gradational contact to silty CLAY at 6.0 feet.	
6	X	SS 6	11	18	18				SM	BEAUMONT; light gray (2.5Y-7/1); silt, CLAY (CL-ML) - dry; stiff; low plasticity; low toughness; reddish orange mottles; trace fine sand.	
7	X	SS 7	11	18	18				SM	BEAUMONT; light gray (2.5Y-7/1); silt, CLAY (CL-ML) - dry; stiff; low plasticity; low toughness; reddish orange mottles; trace fine sand.	
8	X	SS 8	11	18	18				CH	BEAUMONT; light gray (2.5Y-7/1); sand, SILT (ML) - moist; stiff; nonplastic; little fine sand.	
9	X	SS 9	11	18	18				CH	BEAUMONT; brown (7.5YR-5/4); silt, SAND (SM) - moist to wet; firm; fine; little silt; quartz; trace mica (muscovite).	
10	X	SS 10	11	18	18				CH	BEAUMONT; brown (7.5YR-5/4); silt, SAND (SM) - moist to wet; firm; fine; little silt; quartz; trace mica (muscovite). 3 inch seam of clay SAND (SC) at 13.0 feet.	
11	X	SS 11	11	18	18				CH	BEAUMONT; brown (7.5YR-5/4); silt SAND (SM) - moist to wet; loose; fine; little silt; quartz; trace mica (muscovite). Strong brown CLAY at 14.75 feet.	
12											Wet Spoon at 12.0 feet Water level measured to 12 feet at time of drilling Switch to Mud Rotary 4 inch Nominal Drag Bit at 12.0 feet
13											
14											
15											
16											
17											
18											
19	X	SS 12	11	18	18				CL-ML	BEAUMONT; strong brown (7.5YR-4/6); sand, silt CLAY (CL-ML) - wet; stiff; nonplastic; little to some fine sand; reddish brown silty SAND on tip of spoon at 25 feet.	
20									SM		
21											
22											
23											
24	X	SS 13	11	10	18					BEAUMONT; reddish brown (5YR-5/4); silt, SAND (SM) - wet; firm; fine; poorly graded; little to some silt; quartz; trace mica (muscovite).	
25											
26											
27											
28											
29	X	SS 14	11	18	18					BEAUMONT; reddish brown (5YR-5/4); silt, SAND (SM) - wet; firm; fine; poorly graded; little to some silt; quartz; mica (muscovite).	
30											
31											
32											
33											
34	X	SS 15	11	12	18					BEAUMONT; strong brown (7.5YR 5/6); silt, SAND	
35											
36											
37											
38											
39	X	SS 15	11	12	18					BEAUMONT; strong brown (7.5YR 5/6); silt, SAND	
40											

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT

Project Number: 6234-07-4257



SOIL LOG - Boring No. B-443

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
40									SM	(SM) - wet; firm; fine; poorly graded; little to some silt; quartz; mica (muscovite).	
41											
42											
43											
44	X	SS 16	0	18					CH	BEAUMONT; strong brown (7.5YR-4/6); CLAY (CH) - moist to dry; stiff; high plasticity; high toughness; blocky texture; some light brownish tan striations	Moderately Difficult Drilling 45 to 48.5 feet.
45											
46											
47											
48											
49	X	SS 17	3	18					CH	BEAUMONT; gray (7.5YR-5/1); CLAY (CH) - moist; firm; high plasticity; high toughness; firm; scattered shell hash.	
50											
51											
52											
53											
54	X	SS 18	4	18					CH	BEAUMONT; greenish gray (Gley 1 6/1); CLAY (CH) - moist; stiff; high plasticity; high toughness; some gravel; presence of some calcite nodules.	
55											
56											
57											
58											
59	X	SS 19	8	18					CL	BEAUMONT; brown (7.5 YR 5.4) mottled with greenish gray (Gley 1 6/1); silt; CLAY (CL) - moist; very stiff; high plasticity; high toughness; some gravel; presence of some calcite deposits.	
60											
61											
62											
63											
64	X	SS 20	5	18	20.4	97.1	39/25		CL	BEAUMONT; brown (7.5YR-5.4); mottled with greenish gray (Gley 1 6/1); silt; CLAY (CL) - moist; stiff; high plasticity; high toughness; some gravel; some calcite deposits.	
65											
66											
67											
68											
69	X	SS 21	7	18					CL	BEAUMONT; brown (7.5YR-5/4) mottled with greenish gray (Gley 1 6/1) silt; CLAY (CL) - moist; stiff; high plasticity; high toughness; presence of some silty clay materials from 69 to 69.25 feet with medium toughness and plasticity.	
70											
71											
72											
73											
74	X	SS 22	23	12	16.8	10.0			SP-SM	BEAUMONT; reddish brown (5YR-4/4); silt; SAND (SP-SM) - moist; very dense; non plastic; fine to medium grained; poorly graded; color transition to yellowish brown (10YR-5/4) at about 74.5 feet bgs.	
75											
76											
77											
78											
79	X	SS 23	21	15					SP	BEAUMONT; yellowish brown (10YR-5/4); SAND (SP) - moist; very dense; nonplastic; poorly graded;	
80											

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT Project Number: 6234-07-4257	SOIL LOG - Boring No. B-443
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Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
80									SP	some black stripes at about 79 to 79.5 feet bgs.	
81											
82											
83											
84	X	SS 24	8 13	18 18	26.6	98.3	52/34		CH	BEAUMONT; brown (7.5YR-4/4); CLAY (CH) - moist; very stiff; high plasticity; high toughness; some calcite deposits.	
85											
86											
87		UD 1		25.5 24	22.7		61/37			BEAUMONT; brown (7.5YR-4/4); CLAY (CH) - moist; high plasticity; high toughness.	
88											
89	X	SS 25	7 14	20.5 18						BEAUMONT; brown (7.5YR-4/4); CLAY (CH) - moist; very stiff; high plasticity; high toughness; some calcite deposits.	
90											
91											
92		UD 2		0 24						POOR RECOVERY; sample obtained on side of tube appeared to be a brown CLAY (CH).	
93											
94		UD 2A		27.5 24	25.7		55/31			BEAUMONT; brown (7.5YR-4/4); CLAY (CH) - moist; high plasticity; high toughness.	
95											
96											
97		UD 3		24 24	25.6		62/37			BEAUMONT; brown (7.5YR-4/4); CLAY (CH) - moist; high plasticity; high toughness.	
98											
99	X	SS 26	10 12	18 18						BEAUMONT; brown (7.5YR-4/4); CLAY (CH) - moist; very stiff; high plasticity; high toughness; some calcite deposits.	
100											
101											
102		UD 4		24 24	29.1		55/30			BEAUMONT; brown (7.5YR-4/4) mottled with some greenish gray (Gley 1-6/1); CLAY (CH) - moist; high plasticity; high toughness.	
103											
104	X	SS 27	3 10 20	18 18	25	55.8			ML	BEAUMONT; brown (7.5YR-4/4); mottled with some dark gray (7.5YR-4/1); CLAY (CH) - moist; very stiff; high plasticity; high toughness, grading to sand.	
105											
106		UD 5		2 7					SM	BEAUMONT; gray (7.5YR-5/1); sand SILT (ML) - moist; very stiff, nonplastic; mostly medium grained sand; poorly graded.	
107											
108		UD 5A		0 14.5						BEAUMONT; brown (7.5YR-5/4); silt SAND (SM) - moist; nonplastic; with some silt; fine grained sand. NO RECOVERY	
109											
110	X	SS 28	14 8 5	18 18	21.7	43.8			CH	BEAUMONT; brown (7.5YR-5/4); silt, SAND (SM) - moist; firm; nonplastic; poorly graded; with gravel up to about 1" in diameter.	
111											
112		UD 6		12 24	26.7		63/36			BEAUMONT; brown (7.5YR-5/4); mottled with some greenish gray Gley1-6/1; CLAY (CH) - moist; stiff; high plasticity; high toughness.	
113											
114	X	SS 29	7 12	18 18	25	96.7				BEAUMONT; greenish gray (Gley1-6/1); CLAY (CH) - moist; high plasticity; high toughness.	
115											
116											
117											
118											
119	X	SS 30	10 10 14	18 18						BEAUMONT; greenish gray (Gley1-6/1) mottled	
120											

Switch to 6 inch Drag Bit Reamed Hole to 112 feet

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT	SOIL LOG - Boring No. B-443
Project Number: 6234-07-4257	MACTEC

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Remarks
120									CH	with brown (10YR-5/6); CLAY (CH) - moist; very stiff; high plasticity; high toughness.
121										
122		UD 7		5 24						BEAUMONT; yellowish brown (10YR-5/6); mottled with greenish gray (Gley1-6/1); CLAY (CH) - moist; high plasticity; high toughness.
123									CL	BEAUMONT; yellowish brown (10YR-5/6); mottled with greenish gray (Gley1-6/1); silt, CLAY (CL) - moist; high plasticity; high toughness.
124		UD 7A		24 24	23.4		48/29			
125										
126										
127		UD 8		0 24						NO RECOVERY IN SHELBY TUBE
128										
129		SS 31	10 13 18	18 18	23.9	99.0			CH	BEAUMONT; reddish brown (5YR-4/4) with slight mottling of greenish gray (Gley 1-6/1); CLAY (CH) - moist; high plasticity; high toughness.
130										
131										
132		UD 9		0 24						NO RECOVERY IN SHELBY TUBE
133										
134		UD 9A		22 24	16.3		52/18			BEAUMONT; reddish brown (5YR-4/4) with slight mottling of greenish gray (Gley 1-6/1); CLAY (CH) - moist; high plasticity; high toughness.
135										
136		SS 32	8 14 18	18 18	16.3	72.3			ML	BEAUMONT; greenish gray (Gley1-6/1) with slight yellowish brown (10YR-5/8); sand, SILT (ML) to CLAY (CH) - moist; hard; high toughness; presence of calcite deposits.
137										
138										
139		SS 33	10 14 14	18 18					CH	BEAUMONT; greenish gray (Gley1-6/1) with slight yellowish brown (10YR-5/8); CLAY (CH) - moist; very stiff; high plasticity; high toughness; presence of calcite deposits; strong reaction to HCl.
140										UD-10 Not Performed. Replaced by SS-32 and SS-33 as directed by BECHTEL.
141		UD 11		12.5 24			61/42			
142										
143										
144		SS 34	19 25 20	16.5 18	20.1	84.2	26/8		CL	BEAUMONT; greenish gray (Gley1-6/1); sandy lean CLAY (CL) - moist; hard; medium plasticity; high to medium toughness; fine grained sand; some hard dense sand at bottom of shoe.
145										
146										
147										
148										
149		SS 35	15 23 22	14 18	20.2	41.8			SM	BEAUMONT; yellowish brown (10YR5/8); silt, SAND (SM); moist, dense, nonplastic, poorly graded; fine grained sand; some gray dense sand at about 149.5 feet bgs (~2 inches thick).
150										NO RECOVERY
151										
152		UD 12		0 24						
153										
154		UD 13		3 24						BEAUMONT; yellowish brown (10YR-5/6); silt, SAND with clay (SM); moist; firm; poorly graded; fine; some fines; quartz.
155										Begin Logging by Matt Cooke 8/4/07
156										
157		UD 14		13.5 24	24.2		67/43		CH	BEAUMONT; strong brown (7.5YR 5/6); CLAY (CH); moist to dry; high plasticity; greenish gray mottles.
158										Difficult Drilling with Pitcher Sampler for UD-14 156 to 158 feet
159		SS 36	19 24 25	18 18	18.5	92.4			ML	
160										Difficult Drilling 158.5 to 163.5 feet

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT



SOIL LOG - Boring No. B-443

Project Number: 6234-07-4257

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
160										(ML); moist; hard; low plasticity; little fine sand.	
161											
162											
163											
164	X	SS 37	15 14	18 18	26.2	296.7	24/3			BEAUMONT; strong brown (7.5YR 4/6); sand, SILT (ML); moist; hard; nonplastic; some fine sand.	
165											
166											
167									CH		
168											
169	X	SS 38	9 14	18 18	21.7	99.5	54/37			BEAUMONT; strong brown (7.5YR 4/6); silt, CLAY (CH); moist; very stiff; low plasticity; little fine sand; blocky texture.	
170											
171											
172											
173		UD 15		14.5 24	25.7		51/31			BEAUMONT; strong brown (7.5YR 4/6); silt CLAY (CH); moist; low plasticity; little fine sand; blocky texture.	Pitcher Sampler Used for UD-15
174											Switch Back to 4 inch Drag Bit at 174 feet
175											
176											
177											
178											
179	X	SS 39	9 14	18 18	20.0	94.8			CL	BEAUMONT; strong brown (7.5YR 4/6); CLAY (CL); dry; very stiff; high plasticity; medium toughness; very stiff; trace fine sand; blocky texture.	Difficult Drilling 178.5 to 183.5 feet
180											
181											
182											
183											
184	X	SS 40	10 16	18 18					CH	BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; hard; high plasticity; medium toughness; blocky texture; yellowish brown mottles.	
185											
186											
187											
188											
189	X	SS 41	7 12	18 18	29.5		72/43			BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; very stiff; high plasticity; medium toughness; blocky texture; yellowish brown mottles.	Difficult Drilling 188.5 to 193.5 feet
190											
191											
192											
193											
194	X	SS 42	7 38	18 18					SP-SM	TOP 15 inches of sample SS-42 = BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; hard; high plasticity; medium toughness; blocky texture; yellowish brown mottles.	Difficult Drilling to 195 to 198.5 feet
195			50/3*					CL	BOTTOM 3 inches of SS-42 = BEAUMONT; yellowish brown (10YR 5/4); silt, SAND (SP-SM); wet; very dense; fine; poorly graded; few fines; quartz.		
196											
197											
198											
199	X	SS 43	8 16	14 18	19.3	81.2	29/16			BEAUMONT; brown (10YR 5/3); silt, sand, CLAY	
200											

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT Project Number: 6234-07-4257	MACTEC SOIL LOG - Boring No. B-443
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Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (Inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Remarks
200										(CL), moist; hard; some fine sand. Boring terminated at 200 ft bgs
201										
202										
203										
204										
205										
206										
207										
208										
209										
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233										
234										
235										
236										
237										
238										
239										
240										

STP SOIL STP2007.GPJ WLA.GDT 5/20/08

Project Name :STP COL PROJECT		MACTEC		SOIL LOG - Boring No. B-444	
Project Number: 6234-07-4257					
Type and Diameter of Boring: Solid Stem Auger/Mud Rotary / 4 inches		Boring Location RADWASTE BUILDING N 363057.98 E 2942133.5		Total Depth 100 feet	
Drilling Contractor and Rig JEDI Drilling / CME 75		Elevation at boring 30.01 feet		Ground Water Depth See Remarks	
Sampling Method Split Spoon/UD		Sample Driving Hammer/Drop 139.2 / 29.5 inches		No. of Samples 27	
		Borehole Inclination 0		Logged by A. Osorio/M. Cooke	
				Date Started 7/23/07	
				Date Completed 7/24/07	

Reviewed by / Date MJH 5-25-08
 Reviewed by / Date KAW 5-28-08

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
0									SM	FILL; yellowish brown (10 YR 5/8) SAND (SM) with gravel; moist; loose; non plastic; medium grained sand with gravel	
1	X	SS 1	3	7					SM		
2	X	SS 2	4	16.5					CH	BEAUMONT; dark greenish gray (Gley 1, 4/1); CLAY (CH); moist; stiff; high plasticity; high toughness; presence of few black ferrous sulfate nodules.	
3	X	SS 3	4	21					CH	BEAUMONT; dark greenish gray (Gley 1, 4/1); CLAY (CH); moist; stiff; high plasticity; high toughness; presence of black ferrous sulfate nodules; some fine gravel; roots	
4	X	SS 4	5	21					CH	BEAUMONT; dark greenish gray (Gley 1, 4/1); CLAY (CH); moist; stiff; high plasticity; high toughness; presence of black ferrous sulfate nodules; some fine gravel; roots	
5	X	SS 5	5	4					CH	BEAUMONT; dark greenish gray (Gley 1, 4/1); CLAY (CH); moist; firm; high plasticity; high toughness; presence of fine gravel	
6	X	SS 6	5	18					CH	BEAUMONT; dark greenish gray (Gley 1, 4/1); CLAY (CH); moist; firm; high plasticity; high toughness; presence of fine gravel	
7	X	SS 7	5	16.5					CH	BEAUMONT; dark greenish gray (Gley 1, 4/1); CLAY (CH); moist; firm; high plasticity; high toughness; presence of fine gravel	
8	X	SS 8	5	19					CH	BEAUMONT; yellowish red (5 YR, 5/6); CLAY (CH); dry; firm; high plasticity; high toughness; presence of gravel and sulfate nodules	
9	X	SS 9	5	23					CH	BEAUMONT; yellowish red (5YR, 5/6); CLAY (CH); dry; stiff; high plasticity; high toughness; presence of calcite nodules; black ferrous sulfate nodules and gravel.	
10	X	SS 10	5	18.5					CH	BEAUMONT; yellowish red (5 YR 5/6); mottled with greenish gray (Gley 1, 6/1); CLAY (CH); dry; stiff; high plasticity; high toughness; presence of calcite nodules; black ferrous sulfate; gravel	
11											Auger to 15 feet begin mud rotary 7:30 am 7/24/07
12											Groundwater not encountered prior to filling, hole with drilling fluid.
13											Groundwater not measured.
14	X	SS 11	3	24					CL-ML	BEAUMONT; red (5 YR, 5/6); mottled with some greenish gray (Gley 1, 6/1); CLAY (CH); dry; stiff; high plasticity; high toughness; presence of calcite nodules; black ferrous sulfate; gravel	
15											difficult drilling at 22 feet
16											
17											
18	X	SS 12	5	12					SM	BEAUMONT; strong brown (7.5 YR 4/6); silt; CLAY (CL-ML); moist; firm; medium plasticity; some silt; medium toughness	
19											
20											
21											
22											
23											
24	X	SS 13	7	12					SP-SM	BEAUMONT; dark yellowish brown (10 YR 4/6); silt; SAND (SP-SM); moist; firm; non plastic; with some silt; poorly graded; fine sand and quartz.	
25											
26											
27											
28											
29	X	SS 14	4	13.5					SP-SM	BEAUMONT; dark yellowish brown (10 YR 4/6); silt SAND (SP-SM); moist; firm; non plastic; some silt; poorly graded fine grained sand	
30											
31											
32											
33											
34	X	SS 15	10	15					SP-SM	BEAUMONT; yellowish brown (10 YR 5/6); silt SAND (SP-SM); moist; very firm; non plastic; trace	
35											
36											
37											
38											
39	X	SS 15	10	15					SP-SM	BEAUMONT; yellowish brown (10 YR 5/6); silt SAND (SP-SM); moist; very firm; non plastic; trace	
40											

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT	SOIL LOG - Boring No. B-444
Project Number: 6234-07-4257	MACTEC

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blow/6 inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
40									SP-SM	silt; poorly graded fine grained sand	
41											
42											
43											
44	X	SS 16	51	24.5					CH	BEAUMONT; yellowish red (5 YR 5/6); CLAY (CH); moist; stiff; high plasticity; high toughness; presence of some calcite	difficult drilling at 48 feet
45											
46											
47											
48											
49	X	SS 17	43	26						BEAUMONT; dark greenish gray (Gley 1, 4/1); mottled with trace yellowish red (5 YR 4/6); CLAY (CH); moist; firm; high plasticity; high toughness; trace silt; presence of pieces of shells	
50											
51											
52											
53											
54	X	SS 18	30	24						BEAUMONT; greenish gray (Gley 2, 5/1); CLAY (CH); moist; stiff; high plasticity; high toughness	
55											
56											
57											
58											
59	X	SS 19	5	17					SC-SM	BEAUMONT; strong brown (7.5 YR 5/6); silt, CLAY, SAND (SC-SM); moist; firm; low to medium plasticity; with silt; medium and fine grained sand; some gravel	
60											
61											
62											
63											
64	X	SS 20	4	19.5	20.7		26/11		CL	BEAUMONT; strong brown (7.5 YR 4/8); silt; sand CLAY (CL); moist; stiff; medium plasticity; some silt; some gravel; presence of calcite nodules	
65											
66											
67											
68											
69	X	SS 21	13	18	20.9	54.3			ML	BEAUMONT; strong brown (7.5 YR 5/6); sand, SILT (ML); moist; very dense; non plastic; some silt; fine grained sand	
70											
71											
72											
73											
74	X	SS 22	28	18	19.8	15.8			SM	BEAUMONT; brown (7.5 YR 4/4); silt; SAND (SM); moist; very dense; non plastic; some silt; poorly graded medium grained sand	
75											
76											
77											
78											
79	X	SS 23	14	15					SP-SM	BEAUMONT; brown (10 YR 5/3) silt; SAND (SP-SM); moist; very dense; non plastic; trace silt;	
80											

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT Project Number: 6234-07-4257	SOIL LOG - Boring No. B-444
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Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
80									SP-SM	poorly graded medium grained sand	
81											
82											
83											
84	X	SS 24	12	18	24.2		50/28		CH	BEAUMONT; brown (7.5 YR 4/4); CLAY (CH); moist; very stiff; high plasticity; high toughness; slight mottling of greenish gray (Gley 1 6/1) at about 84.5 ft	
85											
86											
87											
88											
89	X	SS 25	11	20.5	25.6					BEAUMONT; brown (7.5 YR 4/4); CLAY (CH); moist; very stiff; high plasticity; high toughness	
90											
91											
92											
93											
94	X	SS 26	12	21	30.0	99.2				BEAUMONT; brown (7.5 YR 4/4); CLAY (CH); moist; very stiff; high plasticity; high toughness	
95											
96											
97											
98											
99	X	SS 27	11	24	33.2					BEAUMONT; brown (7.5 YR 4/4); CLAY (CH); moist; very stiff; high plasticity; high toughness	
100										Boring Terminated at 100 ft bgs	
101											
102											
103											
104											
105											
106											
107											
108											
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117											
118											
119											
120											

STP SOIL STP2007.GPJ WLA.GDT 5/20/08

Project Name :STP COL PROJECT		MACTEC		SOIL LOG - Boring No. B-445	
Project Number: 6234-07-4257					
Type and Diameter of Boring Solid Stem Auger/Mud Rotary / 4 inches		Boring Location RADWASTE BUILDING N 363058.02 E 2942240.48		Total Depth 100 feet	
Drilling Contractor and Rig JEDI Drilling / CME 75		Elevation at boring 31.34 feet		Ground Water Depth See Remarks	
Sampling Method Split Spoon		Sample Driving Hammer/Drop 139.2 / 29.5 inches		No. of Samples 27	
		Borehole Inclination 0		Logged by M. Cooke	
				Date Started 8/6/07	
				Date Completed 8/7/07	

Reviewed by / Date MJH 5-25-08
 Reviewed by / Date KAW 5-28-08

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blow/s 6 inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Remarks
0									CH	SURFACE = grass and thin layer of topsoil, scattered gravel
1	X	SS 1	2	18					CH	4 inch O.D. Solid Stem Augers to 15 feet.
2	X	SS 2	12	18					CH	BEAUMONT; black (7.5YR 2.5/1); CLAY (CH); dry; soft; high plasticity; scattered small to medium sized roots.
3	X	SS 3	12	18					CH	BEAUMONT; black (7.5YR 2.5/1); CLAY (CH); dry; stiff; high plasticity; small roots.
4	X	SS 4	15	18					CH	BEAUMONT; brown (7.5YR 4/4); CLAY (CH); dry; stiff; high plasticity.
5	X	SS 5	14	18					CH	BEAUMONT; greenish gray (Gley1 10Y 5/1); CLAY (CH); dry; stiff; high plasticity; brown staining; black nodules; white calcareous nodules.
6	X	SS 6	18	18					CH	BEAUMONT; greenish gray (Gley1 10Y 5/1); CLAY (CH); dry, stiff, mixed with some brown 7.5YR 4/4; large calcareous nodules.
7	X	SS 7	18	18					CH	BEAUMONT; brown (7.5YR 5/4); CLAY (CH); moist; stiff; abundant calcareous nodules; little fine sand; gravel sized calcareous nodules.
8	X	SS 8	18	18					CH	BEAUMONT; brown (7.5YR 5/4); CLAY (CH); moist; firm, abundant calcareous nodules; little sand; gravel sized calcareous nodules.
9	X	SS 9	18	18					CH	BEAUMONT; brown (7.5YR 5/4); CLAY (CH); moist; stiff, abundant calcareous nodules; little fine sand; gravel sized calcareous nodules.
10	X	SS 10	14	18					CH	BEAUMONT; brown (7.5YR 5/4); CLAY (CH); moist; stiff, abundant calcareous nodules; little fine sand; gravel sized calcareous nodules.
11	X	SS 11	3	11					CH	BEAUMONT; yellowish red (5YR 4/6); CLAY (CH); dry; stiff; high plasticity; blocky texture; white calcareous nodules.
12	X	SS 12	2	12					SM	BEAUMONT; yellowish red (5YR 4/6); CLAY (CH); dry; stiff; high plasticity; blocky texture; white calcareous nodules.
13	X	SS 13	12	12					SM	BEAUMONT; brown (7.5YR 5/4); silt, SAND (SM); wet; very loose; poorly graded; fine; quartz; little fines.
14	X	SS 14	12	12					SM	BEAUMONT; brown (7.5YR 5/4); silt, SAND (SM); wet; firm; poorly graded; fine; quartz; little fines.
15	X	SS 15	6	14					SM	BEAUMONT; brown (7.5YR 5/4); silt, SAND (SM); wet; loose; poorly graded; fine; little silt; quartz; muscovite.
16										Switched to Mud Rotary 4 inch nominal drag bit at 15 feet.
17										Groundwater not encountered prior to filling hole with drilling fluid.
18										Groundwater not measured.
19										SPT Energy Test Performed SS-11
20										
21										
22										
23										
24	X	SS 12	2	12					SM	SPT Energy Test Performed SS-12
25										
26										
27										
28										
29	X	SS 13	12	12					SM	SPT Energy Test Performed SS-13
30										
31										
32										
33										
34	X	SS 14	3	15					SM	
35										
36										
37										
38										
39	X	SS 15	6	14					SM	
40										

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT

Project Number: 6234-07-4257



SOIL LOG - Boring No. B-445

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blow/6 inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
40									SM	wet; firm; poorly graded; fine; little silt; quartz; muscovite.	
41											
42											
43											
44	X	SS 16	6	18					CH	BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; stiff; high plasticity; blocky texture.	
45											
46											
47											
48											
49	X	SS 17	2	18					CL-ML	BEAUMONT; dark gray (7.5YR 4/1); silt, CLAY (CL-ML); moist; soft; medium plastic; trace fine sand.	
50											
51											
52											
53											
54	X	SS 18	5	18						BEAUMONT; greenish gray (10GY 5/1); silt CLAY (CL-ML); dry; stiff; medium plastic; trace fine sand.	Moderately difficult drilling 53.5 to 58.5 feet
55											
56											
57											
58											
59	X	SS 19	8	18						BEAUMONT; greenish gray (10GY 5/1); silt, CLAY (CL-ML); dry; very stiff; medium plastic; trace fine sand.	
60											
61											
62											
63											
64	X	SS 20	7	14					SM	BEAUMONT; brown (7.5YR 5.3); silt, SAND (SM); wet; firm; poorly graded; fine; quartz; muscovite; few heavy minerals; brown clay on tip of spoon; little fines.	
65											
66											
67											
68											
69	X	SS 21	8	15	21.3	13.8				BEAUMONT; brown (7.5YR 5.3); silt SAND (SM); wet; dense; poorly graded; fine; quartz; muscovite; few heavy minerals; brown clay on tip of spoon; little fines, some light gray clayey mottles.	
70											
71											
72											
73											
74	X	SS 22	39	14	18.2	23.6				BEAUMONT; brown (7.5YR 5/3); silt, SAND (SM); wet to moist; very dense; poorly graded; fine; few fines; quartz; muscovite; few heavy black minerals	
75											
76											
77											
78											
79	X	SS 23	13	13	21.6	10.4			SP-SM	BEAUMONT; brown (7.5YR 5/3); silt, SAND (SP-SM); moist to wet; very dense; poorly graded;	
80											

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT



SOIL LOG - Boring No. B-445

Project Number: 6234-07-4257

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type [USCS]	Lithology	Remarks
80									SP-SM	fine; quartz; muscovite; some heavy dark minerals; subrounded.	
81											
82											
83											
84	X	SS 24	18 43	12 37	17.8						
85										BEAUMONT; brown (7.5YR 5/3); silt; SAND (SP-SM); moist to wet; very dense; poorly graded; fine; quartz; muscovite; some heavy dark minerals; subrounded.	
86											
87											
88											
89	X	SS 25	9 12	18 18	28.5		58/39		CH		
90										BEAUMONT; brown (7.5YR 5.4); CLAY (CH); dry; very stiff; high plasticity; blocky texture; greenish gray mottles.	Difficult drilling 88.5 to 93.5 feet.
91											
92											
93											
94	X	SS 26	11 14	18 18	26.7		52/31				
95										BEAUMONT; brown (7.5YR 5/4); CLAY (CH); dry; very stiff; high plasticity; blocky texture.	
96											
97											
98											
99	X	SS 27	8 10 12	18 18	29.5						
100										BEAUMONT; brown (7.5YR 5/4); CLAY (CH); dry; very stiff; high plasticity; blocky texture. Boring terminated at 100 ft bgs	
101											
102											
103											
104											
105											
106											
107											
108											
109											
110											
111											
112											
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114											
115											
116											
117											
118											
119											
120											

STP SOIL STP2007.GPJ WLA.GDT 5/19/08

Project Name :STP COL PROJECT		MACTEC		SOIL LOG - Boring No. B-940	
Project Number: 6234-07-4257					
Type and Diameter of Boring Solid Stem Auger/Mud Rotary / 6 inches/4 inches		Boring Location PUMP HOUSE N 363443.68 E 2941391.11		Total Depth 125 feet	
Drilling Contractor and Rig LEWIS ENV / Mobile B-57		Elevation at boring 29.66 feet		Ground Water Depth Sea Remarks	
Sampling Method Split Spoon/UD		Sample Driving Hammer/Drop 139.92 / 29.75		No. of Samples 40	
		Borehole Inclination 0		Logged by M. Cooke	
				Date Started 8/1/07	
				Date Completed 8/3/07	

Reviewed by / Date MJH 5-25-08

Reviewed by / Date KAW 5-28-08

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Remarks
0									GM	CRUSHED STONE AT SURFACE (old road bed near RR Tracks)
1	X	SS 1	10	8					CH	BEAUMONT; dark gray (7.5YR 4/1); silty, sandy, GRAVEL (GM); moist; very loose; poorly graded; subrounded to subangular; road fill. BEAUMONT; very dark gray (7.5YR 3/1); CLAY (CH); moist; firm; high plasticity; high toughness. BEAUMONT; very dark gray (7.5YR 3/1); CLAY (CH); moist; firm; high plasticity; high toughness. BEAUMONT; brown (7.5YR 4/2); CLAY (CH); moist; firm; high plasticity; high toughness. BEAUMONT; yellowish red (5YR 4/6); CLAY (CH); dry; soft; medium to high plasticity; medium toughness; blocky texture BEAUMONT; yellowish red (5YR 4/6); CLAY (CH); dry; soft; medium to high plasticity; medium toughness; blocky texture BEAUMONT; yellowish red (5YR 4/6); CLAY (CH); dry; stiff; high plasticity; medium toughness; tan mottles; blocky texture; light gray calcareous nodules. BEAUMONT; yellowish red (5YR 4/6); silt, CLAY (CL); dry; stiff; medium plastic; low toughness; tan mottles; blocky texture; calcareous nodules. BEAUMONT; yellowish red (5YR 4/6); silt, CLAY (CL); dry; stiff; medium plastic; low toughness; tan mottles; blocky texture; calcareous nodules. BEAUMONT; yellowish red (5YR 4/6); silt, CLAY (CL); dry; stiff; medium plastic; low toughness; tan mottles; blocky texture; calcareous nodules. BEAUMONT; strong brown (7.5YR 5.8); silt, SAND (SM); wet; firm; fine; poorly graded; quartz; trace muscovite. BEAUMONT; strong brown (7.5YR 5.8); silt, SAND (SM); wet; fine; poorly graded; quartz; trace muscovite; some fines. BEAUMONT; strong brown (7.5YR 5.8); silt, SAND (SM); wet; firm; fine; poorly graded; quartz; trace muscovite; some fines. BEAUMONT; strong brown (7.5YR 5.8); silt, SAND (SM); wet; loose; fine; poorly graded; quartz; trace muscovite; some fines.
2	X	SS 2	12	12					CH	
3	X	SS 3	14	18					CH	
4	X	SS 4	18	18					CH	
5	X	SS 5	18	18					CH	
6	X	SS 6	18	18					CH	
7	X	SS 7	12	18					CH	
8	X	SS 8	14	18					CL	
9	X	SS 9	13	18					CL	
10	X	SS 10	13	18					CL	
11	X	SS 11	3	14					SM	
12										
13										
14	X	SS 12	7	0						NO RECOVERY; firm
15										
16										
17										
18										
19	X	SS 13	7	8						
20										
21										
22										
23										
24	X	UD 1		8						Pitcher Sampler Used UD-1
25										
26										
27										
28										
29	X	UD 2		10.5						Pitcher Sampler Used UD-2
30										
31	X	SS 14	7	9						Obtained additional SPT sample 35.5 to 37.0 feet as instructed by BECTHEL rep. G. Lefevre
32										
33										
34	X	SS 15	7	9	24.9	52.9			ML	Moderately difficult drilling 35.5 to 38.5 feet

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT

Project Number: 6234-07-4257



SOIL LOG - Boring No. B-940

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 inches	Recovery (inches)	Water Content (%)	Fines Content (%)	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
40									ML	muscovite; some fines.	
41											
42		UD 3		16/24	28.4		67/41		CH	BEAUMONT; strong brown (7.5YR 5.8); sand SILT (ML); wet; fine; poorly graded; quartz; trace muscovite; some fines.	
43											
44	X	SS 16	4/6/10	18/18	27.0	99.7	62/41			BEAUMONT; strong brown (7.5YR 5/8); CLAY (CH); moist; dry; high plasticity; medium toughness; greenish gray staining.	
45											
46											
47		UD 4		24/24	32.1		61/38			BEAUMONT; strong brown (7.5YR 5/8); CLAY (CH); moist; very stiff; high plasticity; medium toughness; greenish gray staining.	
48											Switch to 4 inch nominal drag bit at 45 feet.
49	X	SS 17	4/4/5	18/18	35.4	98.9				BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); moist; high plasticity; medium toughness.	
50										BEAUMONT; greenish gray (Gley 1 10Y 5/1); silt, CLAY (CH); moist; stiff; medium to low plasticity; low toughness; some brown mottles.	
51											
52											
53											
54	X	SS 18	5/7/10	18/18						BEAUMONT; greenish gray (Gley 1 10Y 5/1); silt, CLAY (CH); moist; very stiff; medium to low plasticity; low toughness; some brown mottles; scattered black nodules	
55											
56											
57		UD 5		24/24	27.0		50/32			BEAUMONT; greenish gray (Gley 1 10Y 5/1); silt, CLAY (CH); moist; medium to low plasticity; low toughness; some brown mottles; scattered black nodules	
58											
59	X	SS 19	6/9/11	18/18	22.2	99.0				BEAUMONT; strong brown at bottom of tube	
60										BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; very stiff; high plasticity; medium toughness; blocky texture; scattered calcareous nodules	
61											
62											
63											
64	X	SS 20	6/10/13	18/18						BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; very stiff; high plasticity; medium toughness; scattered calcareous nodules; black staining or nodules.	
65											
66											
67		UD 6		24/24	25.1		54/33			BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; high plasticity; medium toughness; scattered calcareous nodules; black staining or nodules.	
68											
69	X	SS 21	6/8/10	18/18	26.5	99.1				BEAUMONT; yellowish red (5YR 4/6); CLAY (CH); dry; very stiff; high plasticity; medium toughness; scattered calcareous nodules; black staining or nodules.	
70											
71											
72											
73											
74	X	SS 22	6/9/11	18/18						BEAUMONT; reddish brown (5YR 5/4); CLAY (CH); dry; very stiff; high plasticity; medium toughness; scattered calcareous nodules; black staining or nodules.	
75											
76											
77		UD 7		22.5/24	22.1		55/34			BEAUMONT; brown (7.5YR 5/4); CLAY (CH); moist; high plasticity; medium toughness.	
78											
79	X	SS 23	5/8/12	18/18	25.3	96.9				BEAUMONT; brown (7.5YR 5/4); CLAY (CH);	
80											

STP SOIL STP2007.GPJ W.A.GDT 4/24/08

Project Name :STP COL PROJECT



SOIL LOG - Boring No. B-940

Project Number: 6234-07-4257

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blow# inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
80									CH	moist; very stiff, high plasticity; medium toughness; scattered calcareous nodules.	
81											Moderately difficult drilling -81 to 83.5 feet.
82											
83											
84	X	SS 24	6 10	18 18						BEAUMONT; brown (7.5YR 5/4); CLAY (CH); moist; very stiff, high plasticity; medium toughness; scattered calcareous nodules.	
85											
86											
87											
88											
89	X	SS 25	4 7 9	18 18						BEAUMONT; brown (7.5YR 5/4); CLAY (CH); moist; very stiff, high plasticity; medium toughness; scattered calcareous nodules.	
90											
91											
92		UD 8		24 24	24.4		61/39			BEAUMONT; brown (7.5YR 5.4); CLAY (CH); dry; high plasticity; medium toughness; white calcareous nodules.	
93											
94	X	SS 26	4 8 11	18 18	23.4	90.5				BEAUMONT; brown (7.5YR 5.4); CLAY (CH); dry; very stiff; high plasticity; medium toughness; white calcareous nodules; scattered small shell fragments.	
95											
96											
97											
98											
99	X	SS 27	9 14 21	18 18	21.1	86.6			ML	BEAUMONT; brown (7.5YR 5.4); sand, SILT (ML); moist; hard; non-plastic; some fine sand; occasional cemented sand nodules.	Difficult drilling 100 to 103.5 feet
100											
101											
102											
103											
104	X	SS 28	6 8 11	18 18	20.3		48/33		CL	BEAUMONT; greenish gray (Gley 1 10Y 6/1); silt, CLAY with sand (CL); dry; very stiff; medium plastic; medium toughness; reddish brown staining.	
105											
106											
107											
108											
109	X	SS 29	5 7 10	18 18					CH	BEAUMONT; greenish gray (Gley 1 10Y 6/1); CLAY (CH); dry; very stiff; medium plastic; calcareous nodules; brownish red mottling.	
110											
111											
112											
113											
114	X	SS 30	7 9 12	18 18	24.2		60/44			BEAUMONT; greenish gray (Gley 1 10Y 6/1); CLAY (CH); dry; very stiff; medium plastic; calcareous nodules more abundant; brownish red mottling.	
115											
116											
117											
118											
119	X	SS 31	13 15 20	18 18						BEAUMONT; greenish gray (Gley 1 10Y 6/1);	
120											

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT Project Number: 6234-07-4257	MACTEC SOIL LOG - Boring No. B-940
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Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (Inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
120									CH	CLAY (CH); dry; hard; medium plastic; calcareous nodules more abundant; brownish red mottling.	
121											
122											
123											
124	X	SS 32	12	18	21.4		40/28		CL	BEAUMONT; greenish gray (Gley 1 10Y 6/1) and brown; silt CLAY (CL); dry; very stiff; medium plastic; calcareous nodules.	
125											
126										Boring Terminated at 125 ft bgs	
127											
128											
129											
130											
131											
132											
133											
134											
135											
136											
137											
138											
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160											

STP SOIL STP2007.GPJ W.A.GDT 5/20/08

Project Name :STP COL PROJECT		MACTEC		SOIL LOG - Boring No. B-949	
Project Number: 6234-07-4257					
Type and Diameter of Boring Solid Stem Auger/Mud Rotary / 4 inches/6 inches		Boring Location PUMP HOUSE N 363604.32 E 2941778.93		Total Depth 125 feet	
Drilling Contractor and Rig LEWIS ENV / Mobile B57		Elevation at boring 28.67 feet		Ground Water Depth See Remarks	
Sampling Method Split Spoon		Sample Driving Hammer/Drop 139.92 / 29.75 inches		No. of Samples 40	
		Borehole Inclination 0		Logged by M. Cooke	
				Date Started 7/24/07	
				Date Completed 8/1/07	

Reviewed by / Date MJC 5-25-08
 Reviewed by / Date KAW 5-28-08

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
0										TOPSOIL - top 2 inches	
1	X	SS 1	18	18					CH	BEAUMONT; black (10YR 2/1); CLAY (CH); moist; soft; high plasticity; medium toughness; small roots; scattered caliche nodules.	Begin drilling with 4 inch O.D. Solid Stem Augers
2	X	SS 2	14	18					CH	BEAUMONT; black (10YR 2/1); CLAY (CH); moist; soft; high plasticity; medium toughness; small roots; scattered caliche nodules.	
3	X	SS 3	14	18					CH	BEAUMONT; pale brown (10YR 6/3); CLAY with sand (CH); dry to moist; firm, high plasticity; trace sand; medium to high toughness; abundance of caliche	
4	X	SS 4	14	18					CH	BEAUMONT; brown (7.5YR 5/4); CLAY with sand (CH); dry to moist; firm, high plasticity; trace sand; medium to high toughness; abundance of caliche	
5	X	SS 5	14	18					CH	BEAUMONT; yellowish red (5YR 5/6); CLAY with sand (CH); dry to moist; firm, high plasticity; trace sand; medium to high toughness; abundance of caliche; thin tan laminations	
6	X	SS 6	14	18					CH	BEAUMONT; yellowish red (5YR 5/6); CLAY with sand (CH); dry to moist; firm, high plasticity; trace sand; medium to high toughness; abundance of caliche; thin tan laminations	
7	X	SS 7	14	18					CH	BEAUMONT; yellowish red (5YR 5/6); CLAY with sand (CH); dry to moist; firm, high plasticity; trace sand; medium to high toughness; abundance of caliche; thin tan laminations	
8	X	SS 8	14	18					CH	BEAUMONT; yellowish red (5YR 5/6); CLAY with sand (CH); dry to moist; firm, high plasticity; trace sand; medium to high toughness; abundance of caliche; thin tan laminations	
9	X	SS 9	14	18					CH	BEAUMONT; yellowish red (5YR 5/6); CLAY with sand (CH); dry to moist; firm, high plasticity; trace sand; medium to high toughness; abundance of caliche; thin tan laminations	
10	X	SS 10	15	18					CH	BEAUMONT; yellowish red (5YR 5/6); CLAY with sand (CH); dry to moist; firm, high plasticity; trace sand; medium to high toughness; abundance of caliche; thin tan laminations	
11											Switch to Mud Rotary at 15 feet
12											4 inch drag bit
13											Groundwater not encountered prior to filling hole with drilling fluid.
14											Groundwater not measured.
15											Install 8 inch I.D. PVC casing to 5 feet
16											Ream borehole to 18.5 feet with 6 inch drag bit
17											
18											
19	X	SS 11	18	18					ML	BEAUMONT; reddish brown (2.5YR 5/3); CLAY (CH); moist to dry; stiff, high plasticity; medium toughness; few fine to medium sand	Some difficult drilling 25 to 28.5 feet Likely cemented sand layers based on SS-13 Cemented sand layers
20									SM	BEAUMONT; strong brown (7.5YR 5/6); sand; SILT (ML); moist; stiff, nonplastic; some fine sand	
21											
22											
23	X	SS 12	12	18					ML	BEAUMONT; brown (7.5YR 4/4); silt, SAND (SM) wet; firm; fine; little silt; subrounded; quartz; trace mica (muscovite)	Difficult drilling 28.5 to 33.5 feet
24									SM	BEAUMONT; brown; (7.YR 4/4); sand; SILT (ML); wet; fine; little silt; stiff; strongly cemented gravel sized sandstone fragments; likely cemented layers broken by the SPT sampler	
25											
26											
27											
28											
29	X	SS 13	12	18	21.9	52.6			ML	BEAUMONT; brown (7.5YR 4/4); silt, SAND (SM) wet; firm; fine; little silt; subrounded; quartz; trace mica (muscovite)	Cemented sand layers 30 to 33.5 based on rig chatter
30									SM	BEAUMONT; brown (7.5YR 5/4); silt, SAND (SM); wet; very firm; fine; little silt; poorly graded; quartz sand (subrounded); trace mica.	
31											
32											
33											
34	X	SS 14	12	14					SM	BEAUMONT; brown (7.5YR 5/4); silt, SAND (SM); wet; very firm; fine; little silt; poorly graded; quartz sand (subrounded); trace mica.	
35											
36											
37											
38											
39	X	SS 15	12	14	21.2	10.2			SP-SM	BEAUMONT; brown (7.5YR 4/4); silt, SAND (SP-SM); moist to wet; dense; poorly graded; fine;	
40											

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT



SOIL LOG - Boring No. B-949

Project Number: 6234-07-4257

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows#6 inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
40										few silt; subrounded; quartz; trace mica.	
41									SP-SM		
42									CH	Estimated contact at 41.5 feet.	
43											
44	X	SS 16	4 4	18 18						BEAUMONT; brown (7.5YR 4/3); CLAY (CH); moist to dry; stiff; high plasticity; high toughness; blocky texture; some tan vertical and horizontal laminations	
45											
46											
47											
48											
49	X	SS 17	5 5	18 18	27.3		51/33			BEAUMONT; greenish gray (Gley 1 5GY 6/1); CLAY (CH); dry; stiff; highly plastic; high toughness; some reddish brown iron oxide staining	SPT Energy Test performed SS-17
50											
51		UD 1		26 24						BEAUMONT; greenish gray (Gley 1 5GY 6/1); CLAY (CH); dry; high plasticity	UD-1 THICK WALLED (14 gauge) TUBE USED
52											UD-2 obtained from 53.5 to 55.5 feet to replace UD-1
53											
54		UD 2		21 24	32.3		65/36			BEAUMONT; greenish gray (Gley 1 5GY 6/1); CLAY (CH); dry; highly plastic	
55											
56	X	SS 18	7 7	18 18	31.1	97.4				BEAUMONT; greenish gray (Gley 1 5GY 6/1); CLAY (CH); dry; very stiff; highly plastic; high toughness; some reddish brown iron oxide staining; some scattered hard white caliche nodules	SPT Energy Test performed SS-18
57											
58											
59	X	SS 19	8 8	18 18	22.0		53/37			BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; very stiff; highly plastic; high toughness; some black MN staining; blocky texture	SPT Energy Test performed SS-19
60											
61		UD 3		22 24	23.3		64/31			BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; highly plastic; high toughness; blocky texture	
62											
63											End Drilling 7/25/07 at 63 feet
64	X	SS 20	6 6	18 18						BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; very stiff; highly plastic; high toughness; blocky texture	Water level at 2 feet Begin Drilling 7/26/07 Heavy AM rainfall
65											
66											
67											
68											
69	X	SS 21	6 6	18 18	28.4					BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; very stiff; highly plastic; high toughness; blocky texture	
70											
71											
72		UD 4		16 24	24.9		58/32			BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; highly plastic; high toughness; blocky texture	
73											
74	X	SS 22	6 6	18 18	27.4	99.4				BEAUMONT; strong brown (7.5YR 4/6); CLAY (CH); dry; very stiff; highly plastic; high toughness; some light green and tan mottles.	
75											
76											
77											
78											
79	X	SS 23	6 6	18 18	25.0		52/33			BEAUMONT; strong brown (7.5YR 5/6); CLAY	
80											

STP SOIL STP2007.GPJ WLA.GDT 4/24/08

Project Name :STP COL PROJECT		SOIL LOG - Boring No. B-949
Project Number: 6234-07-4257		

Depth (feet)	Sample	Sample Type & No.	Uncorrected Blow# inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
80									CH	(CH); dry; very stiff; high plasticity; high to medium toughness	
81											
82		UD 5		0							
83				24							
84		UD 6		22.5	24.0		66/43				
85				24						BEAUMONT; strong brown (7.5YR 5/6); CLAY (CH); dry; high plasticity; high toughness	
86											
87											
88											
89	X	SS 24	6 9 13	18 18	26.1	99.4					
90										BEAUMONT; strong brown (7.5YR 5/6); CLAY (CH); dry; very stiff; high plasticity; high toughness	
91											
92		UD 7		24	28.1		60/36				
93				24						BEAUMONT; brown (7.5YR 4/3); CLAY (CH); dry; medium plastic; medium toughness; blocky texture	
94	X	SS 25	9 7 10	18 18					CL-ML	BEAUMONT; brown (7.5YR 4/3); silt, CLAY (CL-ML); dry; very stiff; medium plastic; medium toughness; blocky texture	
95											
96											
97											
98											
99	X	SS 26	20 22 34	13 18					SM	BEAUMONT; light brown (7.5YR 6/4); silt; SAND (SM); wet to moist; very dense; poorly graded, fine to medium; few silt; subrounded; quartz; mica; trace dark minerals.	
100											
101											
102		UD 8		16.5	18.6	19.2					
103				24						BEAUMONT; light brown (7.5YR 6/4); silt; SAND (SM); wet to moist; poorly graded, fine to medium; few silt; subrounded; quartz; mica; trace dark minerals.	
104	X	SS 27	6 8 16	10 18						BEAUMONT; brown (7.5YR 5/4); silt; SAND (SM); wet to moist; very firm; fine to medium; few silt; subrounded; quartz; mica; trace dark minerals.	
105											
106											
107											
108										Cemented/gravelly layers	
109	X	SS 28	11 6 4	14 18						BEAUMONT; brown (7.5YR 5/4); silt, SAND (SM); wet; loose; medium to coarse; poorly graded; quartz; cemented sand and calcareous nodules	
110									CH	BEAUMONT; brown (7.5YR 4/3); CLAY (CH); moist; firm; high plasticity; high toughness; trace fine to medium sand	
111		UD 9		8	13.7	54.6	27/17		CL	BEAUMONT; brown (7.5YR 4/3); sandy lean CLAY (CL) wet; medium to coarse; poorly graded; little gravel; some sand; 1" diameter subrounded gravel in bottom of tube	
112				24							
113											
114		UD 10		4.5						BEAUMONT; brown (7.5YR 4/3); sand lean CLAY (CL) wet; medium to coarse; poorly graded; little gravel; some sand; 1" diameter subrounded gravel in bottom of tube; very coarse sand and gravel	
115				24							
116											
117											
118											Pitcher sampler refusal at 115 feet.
119	X	SS 29	9 14 17	18 18	21.6		48/31			BEAUMONT; yellowish red (5YR 4/6); silt, CLAY	
120											

STP SOIL STP2007.GPJ WLAGDT 4/24/08

Project Name : STP COL PROJECT Project Number: 6234-07-4257	SOIL LOG - Boring No. B-949
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Depth (feet)	Sample	Sample Type & No.	Uncorrected Blows/6 Inches	Recovery (inches)	Water Content	Fines Content	Atterberg Limits	Lithology	Soil Type (USCS)	Lithology	Remarks
120											
121											
122											
123											
124	X	SS 30	10	18	19.4	90.6	39/28				
125										BEAUMONT; yellowish red (5YR 4/6); silt, CLAY (CL); dry; very stiff; low plasticity; low toughness; greenish gray mottles; some fine sand at bottom of interval	
126										Boring Terminated at 125 feet bgs	
127											
128											
129											
130											
131											
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160											



MACTEC

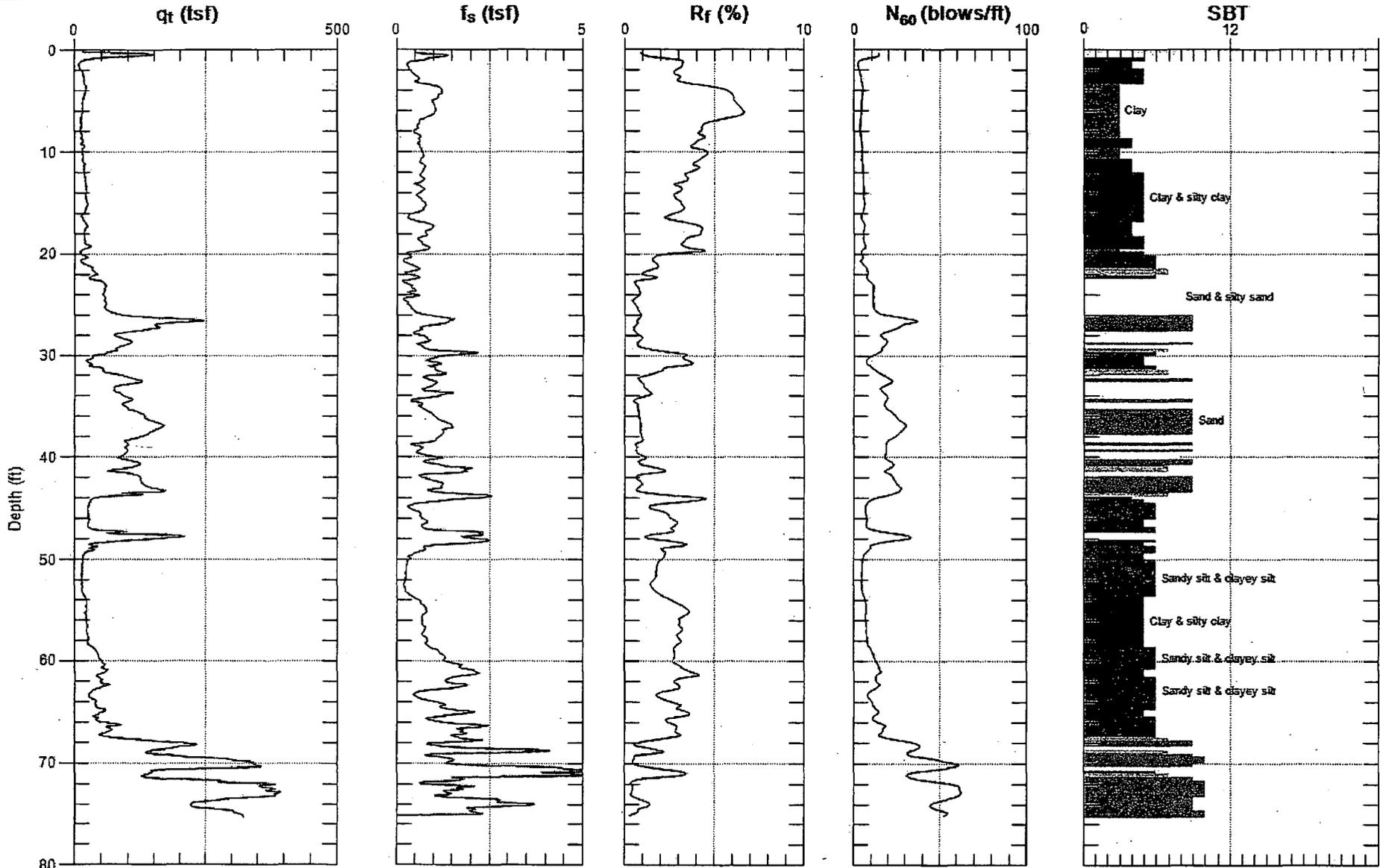
Site: SOUTH TEXAS PROJ.

Engineer: M.COOK

Sounding: C-405s

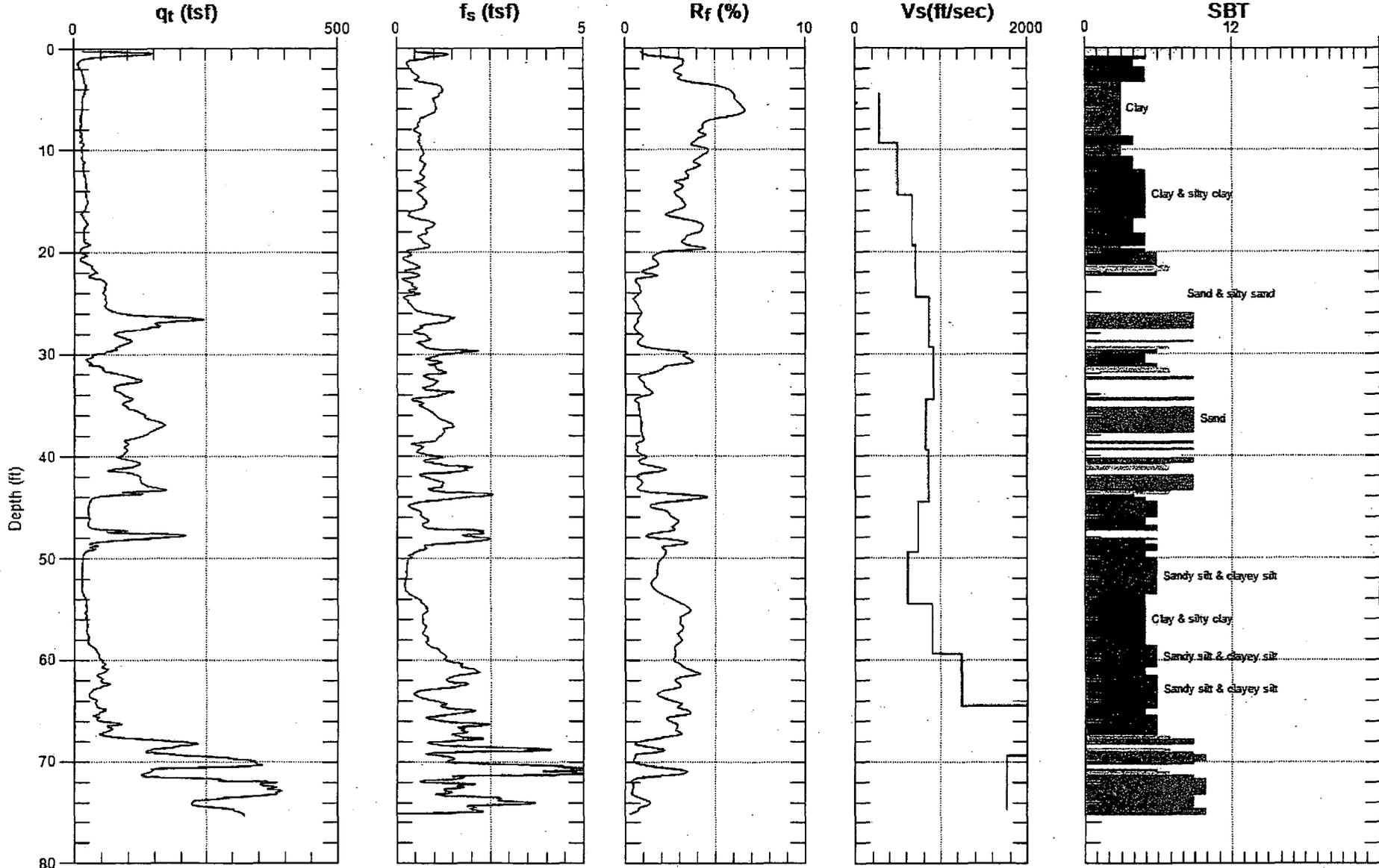
Date: 7/23/2007 11:53

Question 02.05.04-1
CPT Log C-405S



Max. Depth: 75.295 (ft)
Avg. Interval: 0.328 (ft)

SBT: Soil Behavior Type (Robertson 1990)



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MACTEC

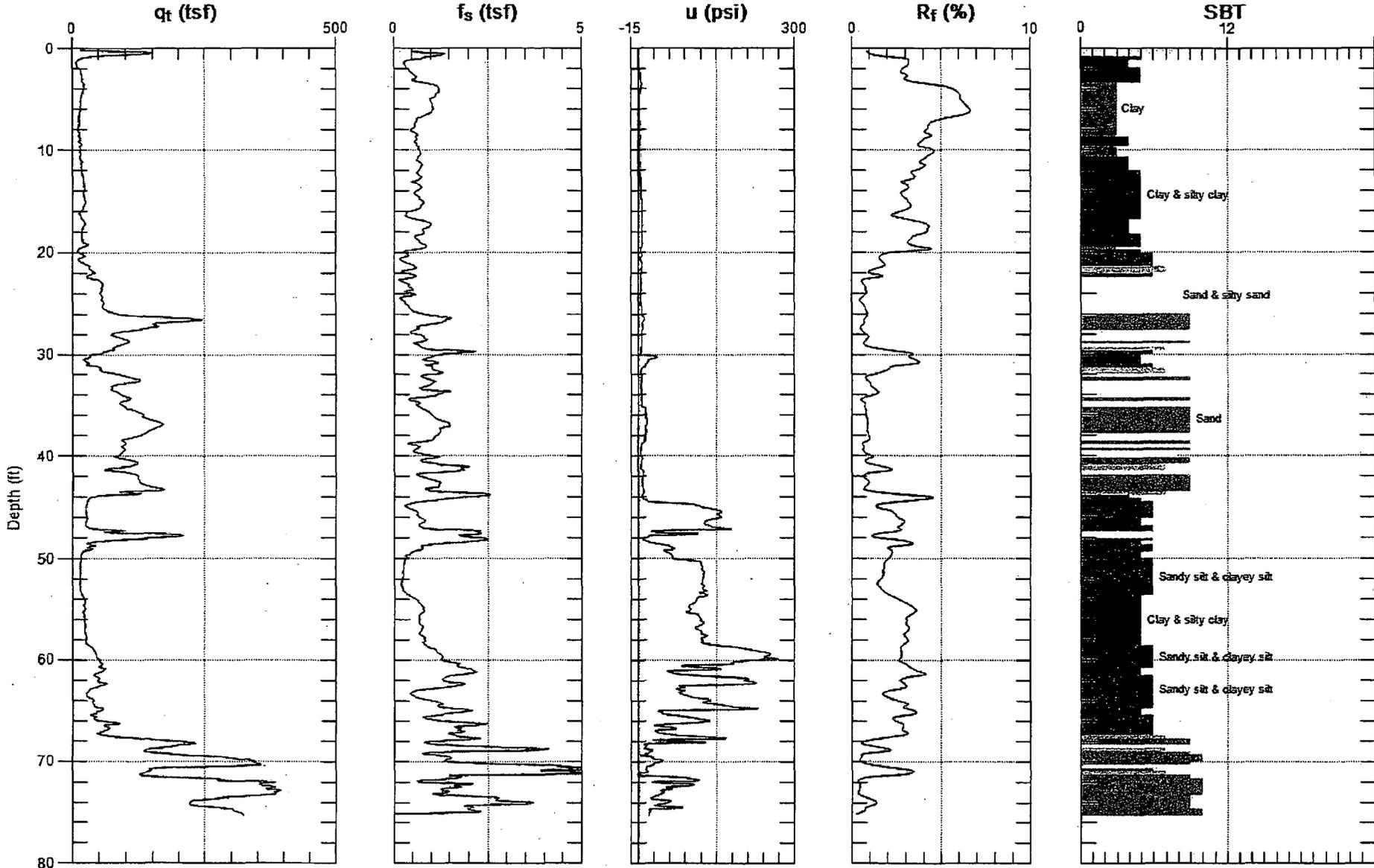
Site: SOUTH TEXAS PROJ.

Engineer: M.COOK

Sounding: C-405s

Date: 7/23/2007 11:53

Question 02.05.04-1
CPT Log C-405S



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