



CCR Groundwater Monitoring System



Gibbons Creek Environmental Redevelopment Group, LLC

Site F Landfill – Shallow & Deep Networks
Scrubber Sludge Pond
Ash Ponds – A, B, C

Anderson, Texas

Updated April 2024

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Professional Engineer Certificate

"I hereby certify that the groundwater monitoring system described in this report for the CCR landfill known as the Site F Landfill CCR Unit, the CCR surface impoundment known as the Ash Ponds CCR Unit and the Scrubber Sludge Pond CCR Unit at the Gibbons Creek Steam Electric Station, owned by the Gibbons Creek Environmental Redevelopment Group, LLC., has been designed and constructed to meet the requirements of the Coal Combustion Residual Rule 40 CFR 257.91. I am a duly licensed Professional Engineer under the laws of the State of Texas."

Print Name: David C. Vogt

Signature: 

Date: April 4, 2024

License #: 93905



My license renewal date is March 31, 2025.

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1 Introduction

On April 17, 2015 the U.S. Environmental Protection Agency (EPA) published the final rule for the regulation and management of Coal Combustion Residuals (CCR) under the Resource Conservation and Recovery Act (RCRA). The Federal CCR Rule – effective on October 19, 2015 – applies to Gibbons Creek Environmental Redevelopment Group's (GCERG's) Gibbons Creek Steam Electric Station (GCSES).

The GCSES is located at 12824 FM 244 Road, Anderson, Texas 77830. The GCSES was a single unit, 470-megawatt, coal-fired power plant. The GCSES initially operated by burning lignite from the adjacent Gibbons Creek Lignite Mine in 1982. In 1996, the GCSES converted to Powder River Basin coal and the lignite mine was closed. The GCSES was retired from the Electric Reliability Council of Texas (ERCOT) System on October 30, 2019. The Site was obtained by GCERG in 2021.

The CCR Rule, 40 CFR Subpart D-Standards for the Disposal of CCRs, Section §257.91 requires a groundwater monitoring system that consists of sufficient number of wells at appropriate locations and depths, based on site-specific technical information, to yield groundwater samples from the uppermost aquifer that:

- Accurately represent the quality of both background groundwater, and groundwater passing the boundary of the CCR unit
- Monitor potential contaminant pathways

The groundwater monitoring system at the GCSES for the Site F Landfill (SFL), Scrubber Sludge Pond and Ash Ponds CCR units was established and meets the requirements of the Federal CCR Rule. This report includes the following sections in support of the certification.

- Section 1.0 Introduction
- Section 2.0 Facility Background
- Section 3.0 GCSES Area Hydrogeology Summary
- Section 4.0 Groundwater Monitoring System

2 Facility Background

The Ash Ponds (APs) were clean closed in 2022. The APs were an unlined, interconnected, three-cell impoundment area which was separated by earthen dikes, constructed in 1977 to 1978 as part of the original GCSES construction. These ponds were approximately 260 ft wide, 1,800 ft long and 20 ft deep. The top of the perimeter berms/dikes were at an elevation of approximately 270 feet above mean sea level (AMSL).

The Scrubber Sludge Pond (SSP) was clean closed in 2022. The former SSP is located to the west of the APs and was a single impoundment constructed from 1977 to 1978. A liner was added to the bottom of the pond in 1983. The pond measurements were approximately 260 feet and 350 feet wide and 615 feet and 635 feet long (measured at the bottom of the impoundment).

GCERG has completed the clean closure process of the SSP & AP CCR units by dewatering and removing all CCR material and soil material beneath the CCR units. The CCR clean closure is

documented in the Closure Completion CCR Surface Impoundments, submitted on June 2, 2022. The CCR material removed from the SSP/AP CCR units was placed within the SFL CCR unit. In addition, the SFL CCR unit stormwater collection pond is currently being cleaned out, all stormwater control ditches around the area of the coal pile and coal pile runoff pond have been excavated, and the coal pile itself has been removed. These excavated materials are being dewatered and placed within the SFL CCR unit.

The SFL, located northeast of the decommissioned power generating plant and constructed in 1990, is approximately 114 acres in area and received solid CCR generated by the GCSSES. The SFL CCR unit is currently being closed with the following capping system:

- 6-inches of erosion layer;
- Underlain by 18-inches of infiltration layer;
- Underlain by a geocomposite;
- Underlain by a 40-mil low-linear density polyethylene (LLDPE) geomembrane layer;
- Underlain by 2-feet of recompacted clay liner (RCL) with a hydraulic conductivity of 1×10^{-5} centimeters per second (cm/sec) or slower;
- Underlain by 1-foot of intermediate cover.

Closure activities associated with the SFL stormwater pond cleanout and SFL CCR unit is anticipated to be completed by end of year 2024.

3 GCSSES Area Hydrogeology Summary

Geologically, the GCSSES is located on an outcrop of the middle member of the Wellborn Formation of the Jackson-Yegua Group of the Tertiary-aged System. The Wellborn Formation is described as fine to very fine quartz sand interbedded with brown, lignitic clay and lignite, with abundant fossil wood and imprints of marine megafossils. Moving south of the GCSSES Site, the Manning Formation overlies the Wellborn Formation. The Manning Formation is a lignite-bearing formation which is described as a fine to medium-grained, lignitic, quartz sand, interbedded with sandy, lignitic clay, and lignite, with abundant fossil wood. The Manning Formation has well developed lignite seams. The Gibbons Creek Lignite Mine was located in the Manning Formation located approximately two miles south of GCSSES. Quaternary-aged alluvium and terrace deposits are present in the Brazos River, Navasota River, and Gibbons Creek valleys [Horbaczewski, 2011].

The geological formation of the GCSSES area is based on the cyclothem model in which the sea transgressed over land and then regressed. Sedimentary rock was stacked over time in a pattern that was indicative of the presence and absence of the sea. This depositional process is described in more detail in the Field Guidebook Minesoil and Acid Seep Workshop document for the Gibbons Creek Lignite Mine [Horbaczewski, 2011]. The GCSSES area is located in the Texas Coastal Plain region which was developed by this depositional process.

Lignite mining has been conducted in eastern and east-central Texas along the lignite belt depositional area. This lignite belt follows the Tertiary-aged coastal region.

Borings conducted at the site indicate a subsurface stratigraphy consisting of stratified, heterogeneous layers of clays, silts, and sands. The clay and silt intervals consisted of high plasticity material. Silty sand intervals generally consisted of fine, poorly graded sands with occasional high plasticity clay and silt lenses. Occasional sandstone layers were detected in select borings across the Site. Lignite and lignitic clay seams have been identified in soil borings at the Site. Bedrock material is sandstone [ERM, 2005]. Boring logs for monitoring wells included in the Site's groundwater monitoring network are provided in **Appendix A**.

The topography of the GCSES and locations of the CCR units are generally flat with surface elevation decreasing from north to south and southwest. Surface water drainage is generally to the south and southwest. Gibbons Creek Reservoir is located immediately adjacent to the GCSES and CCR units on the east and south sides. The reservoir was established as a cooling pond for the GCSES. Impoundment of Gibbons Creek Reservoir began in spring 1981. Discharge from the reservoir feeds into Gibbons Creek which is a tributary of the Navasota River which is a tributary of the Brazos River.

The uppermost groundwater at GCSES CCR units ranges from approximately 220 to 250 feet AMSL. The uppermost groundwater aquifer at the Site is considered confined to semi-confined due to the stratified nature of the sedimentary sediments and influences of weathering and erosion. General groundwater flow direction at the Site is from the northwest to southeast. The groundwater flow generally follows topography with the flow towards the Gibbons Creek Reservoir and the Gibbons Creek valley.

4 Groundwater Monitoring System

The CCR Rule requires, at a minimum, one upgradient and three downgradient monitoring wells per CCR unit to be completed in the uppermost aquifer. Section 40 CFR §257.90 of the Rule states that the operator: "...may install a multiunit groundwater monitoring system instead of separate groundwater monitoring systems for each CCR unit." In addition, the Rule states that downgradient monitoring wells should be installed to: "accurately represent the quality of groundwater passing the waste boundary of the CCR unit. The downgradient monitoring system must be installed at the waste boundary that ensures detection of groundwater contamination in the uppermost aquifer."

4.1 Site F Landfill

The SFL CCR unit monitoring well network of both monitoring wells and piezometers installed by Amec Foster Wheeler in 2016 and 2017, and wells installed by Black and Veatch in 1988.

The SFL monitoring network has historically consisted of the following wells:

- Background Well: MNW-18
- Compliance Wells: SFL MW-2, SFL MW-3, SFL MW-4, SFL MW-5, SFL MW-6, SFL MW-7, and MNW-15
- Piezometers: MNW-11, MNW-16, and MNW-17

During the 2023 ASD (HDR, 2023), a review of boring logs at the Site and interpretation of historic monitoring data determined that multiple groundwater units are being monitored at the Site. Compound this with differences in pH and ORP of the shallow groundwater versus deeper monitored groundwater; background and compliance monitoring wells were deemed to not be monitoring the same groundwater unit.

For the SFL, monitoring well MNW-18 has historically been considered the up-gradient / background monitoring well used for the SFL CCR unit. The screen interval for monitoring well MNW-18 is below a confined portion of the aquifer. Compliance and water level only monitoring wells that are in the same aquifer unit as MNW-18 are MNW-11, MNW-16, MNW-17, SFL MW-4, and SFL MW-7. These monitoring wells had pH measurements that averaged greater than or equal to 6.2 and ORP, if data was available, averaged less than or equal to 22.1 millivolts (mV). The monitored groundwater at these wells was less oxidized and pH was less likely to be impacted by weathered pyrite.

Monitoring wells SFL MW-2, SFL MW-3, SFL MW-5, SFL MW-6, and MNW-15 monitor the shallower groundwater at the Site F Landfill. Based on the December 2022 groundwater elevation measurements, the water column relative to the top of screen (TOS) ranged from approximately -0.7 to 16.2 feet. These monitoring wells had pH measurements that averaged less than or equal to 6.2 and ORP averaged greater than or equal to 209.4 mV. The oxidized groundwater at these monitoring wells has lower pH due to the weathering of pyrite at the Site.

Based on the differences in chemistry measured at the SFL CCR unit, monitoring wells that monitor deeper groundwater versus shallower groundwater, the monitoring network was refined to accurately monitor down-gradient groundwater relative to the CCR unit. For the deeper monitoring network, groundwater generally flows south to southwest, and MNW-18 is still an up-gradient monitoring point relative to the CCR unit. For the shallow monitoring network, groundwater generally flows south to southeast and monitoring well SFL MW-6 is generally up-gradient to the CCR unit.

Figure 1 depicts the shallow monitoring well network and **Figure 2** depicts the deep monitoring well network for the SFL CCR Unit.

Table 1: Site F Landfill Monitoring Network

Monitoring Well	Date Installed	Well Depth	Top of Casing (feet AMSL)	Screen Interval (feet AMSL)	Monitoring Program
<i>Shallow Monitoring Network</i>					
<i>Upgradient/ Background</i>					
SLF MW-6	5/23/2016	20.0	286.66	264.0 – 269.0	Assessment
<i>Downgradient/Compliance</i>					
SFL MW-2	3/16/2016	21.0	268.31	244.7 – 249.7	Assessment
SFL MW-3	5/31/2016	24.5	275.00	247.2 – 252.2	Assessment
SFL MW-5	5/23/2016	21.0	276.25	252.3 – 257.3	Assessment
MNW-15	2/23/1988	34.5	257.33	230.3 – 235.3	Assessment
<i>Deep Monitoring Network</i>					
<i>Upgradient/Background</i>					
MNW-18	2/18/1988	48.9	270.76	219.7 – 224.7	Assessment
<i>Downgradient/Compliance</i>					
SFL MW-4	5/31/2016	39.5	269.53	227.0 – 232.0	Assessment
SFL MW-7	5/3/2017	55.0	264.63	209.8 – 214.8	Assessment
MNW-11	2/26/1988	47.5	267.95	220.7 – 225.7	Assessment
<i>Water Level Only</i>					
MNW-16	2/25/1988	28.8	263.19	222.8 – 227.8	WLO
MNW-17	2/17/1988	49.0	293.72	243.5 – 248.5	WLO

Notes:

AMSL = above mean sea level

WLO = Water Level Only

4.2 Scrubber Sludge Pond / Ash Ponds

The SSP/AP CCR unit monitoring well networks (as shown on **Figure 3**) consist of both monitoring wells and piezometers. The piezometers are used for water level data collection only, groundwater quality samples are only collected from monitoring wells. The monitoring well network includes:

Table 2: Scrubber Sludge Pond & Ash Ponds Monitoring Network

Monitoring Well	Date Installed	Well Depth	Top of Casing (feet AMSL)	Screen Interval (feet AMSL)	Monitoring Program
<i>Scrubber Sludge Pond</i>					
<i>Upgradient/Background</i>					
SSP/AP MW-1	5/26/2016	39.5	272.53	229.8 – 239.8	Assessment
<i>Downgradient/Compliance</i>					
SSP MW-2	6/2/2016	43.5	283.66	237.1 – 242.1	Assessment
SSP MW-3	6/3/2016	44.5	283.97	236.5 – 241.5	Assessment
SSP MW-4	6/3/2016	48.0	283.86	232.9 – 237.9	Assessment
<i>Water Level Only</i>					
SSP MW-1	3/14/2016	31.7	281.18	249.8 – 254.8	WLO
<i>Ash Ponds Monitoring Network</i>					
<i>Upgradient/Background</i>					
SSP/AP MW-1	5/26/2016	39.5	272.53	229.8 – 239.8	Assessment
<i>Downgradient/Compliance</i>					
AP MW-1D	5/24/2016	39.5	272.04	229.5 – 234.5	Assessment
AP MW-3	5/25/2016	39.5	274.68	232.0 – 237.0	Assessment
AP MW-4	6/1/2016	49.5	274.16	221.4 – 226.4	Assessment
AP MW-5	6/1/2016	35.5	274.13	235.7 – 240.7	Assessment
<i>Water Level Only</i>					
AP MW-1	3/15/2016	24.9	271.56	245.9 – 250.9	WLO
AP MW-2	3/15/2016	20.0	274.97	255.1 – 260.1	WLO
AP MW-6	5/5/2017	46.0	277.95	228.7 – 233.7	WLO
AP PZ-1	5/24/2016	26.0	265.67	236.7 – 241.7	WLO
AP PZ-2	5/24/2016	39.0	274.91	232.2 – 237.2	WLO
AP PZ-3	5/25/2016	39.5	259.11	216.3 – 221.3	WLO
AP PZ-4	6/2/2016	45.3	273.65	227.9 – 232.9	WLO

Notes:

AMSL = above mean sea level

WLO = Water Level Only

5 References

Amec Foster Wheeler Environment & Infrastructure, Inc. (AFWEI). 2017. *Groundwater Monitoring Plan: Gibbons Creek Steam Electric Station, Grimes County, Texas*. October 16.

Black & Veatch. 1986. *Texas Municipal Power Agency Gibbons Creek Steam Electric Station: Preliminary Ash and Sludge Disposal Study*. November.

ERM. 2005. *Phase IIn and IIp: Ground Water Monitor Well and Soil Boring Documentation: Texas Municipal Power Agency Gibbons Creek Steam Electric Station*. August 11.

Horbaczewski, J.K. 2011. *Field Guidebook Minesoil and Acid Seep Workshop*. February 2.

HDR. 2023. *Alternative Source Demonstration: Gibbons Creek Steam Electric Station*. September 2023.

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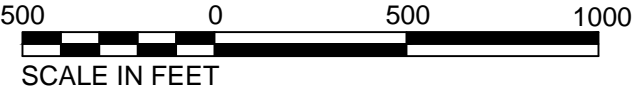


Figure 1

Site F Landfill CCR Unit
Shallow Groundwater
Monitoring Network

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C:\pwworking\central01\3820433\Figure 1 - SITE F LANDFILL MONITORING NETWORK.dwg, SHALLOW, 1/18/2024 3:34:54 PM, WNICHOLSON



LEGEND:

-  MONITORING WELL
-  WASTE BOUNDARY

NOTES:

1. * - WELLS ARE WATER LEVEL ONLY

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400





April 4, 2024



**GIBBONS CREEK STEAM ELECTRIC STATION
GCSES ENVIRONMENTAL REDEVELOPMENT GROUP
SITE F LANDFILL - SHALLOW NETWORK**

CCR GROUNDWATER MONITORING SYSTEM

DATE
JANUARY 2024

FIGURE
FIGURE 1

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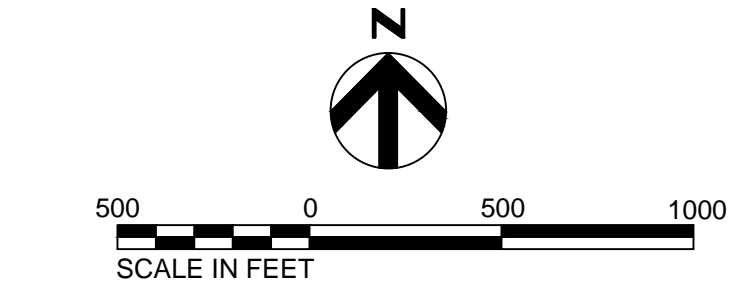
Figure 2

Site F Landfill CCR Unit

Deep Groundwater
Monitoring Network

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C:\pwworking\central01\3820433\Figure 1 - SITE F LANDFILL MONITORING NETWORK.dwg, SHALLOW, 1/18/2024 3:37:01 PM, WNICHOLSON



LEGEND:

Ⓜ MONITORING WELL

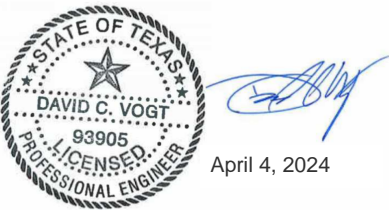
— WASTE BOUNDARY

NOTES:

1. * - WELLS ARE WATER LEVEL ONLY

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400



April 4, 2024



**GIBBONS CREEK STEAM ELECTRIC STATION
GCSES ENVIRONMENTAL REDEVELOPMENT GROUP
SITE F LANDFILL - SHALLOW NETWORK**

CCR GROUNDWATER MONITORING SYSTEM

DATE
JANUARY 2024

FIGURE
FIGURE 1

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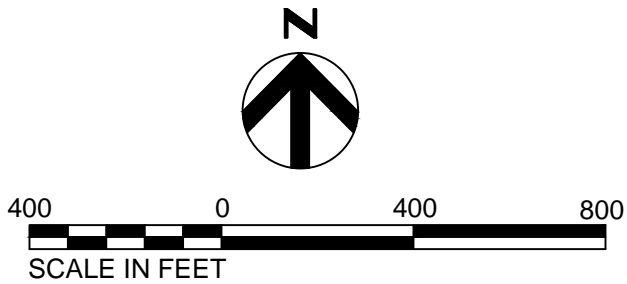


Figure 3

Scrubber Sludge Pond & Ash
Ponds CCR Unit

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C:\pwworking\central01\03820433\Figure 2 - ASH POND_SCRUBBER SLUDGE MONITORING NETWORK.dwg, Layout1, 1/18/2024 3:15:21 PM, WNICHOLSON



LEGEND:

- Ⓜ MONITORING WELL
- POND BOUNDARIES

NOTES:

1. * - WELLS ARE WATER LEVEL ONLY

HDR
Firm Registration No. F-754

17111 Preston Road, Suite 300
Dallas, Texas 75248-1229
972.960.4400



April 4, 2024



**GIBBONS CREEK STEAM ELECTRIC STATION
GCSES ENVIRONMENTAL REDEVELOPMENT GROUP
SCRUBBER SLUDGE/ASH PONDS MONITORING NETWORK**

CCR GROUNDWATER MONITORING SYSTEM

DATE
JANUARY 2024

FIGURE
FIGURE 3

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Appendix A

GCSES Monitoring Well
Documentation

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PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. AP MW-1D				
BORING LOCATION: Northeast Corner of Ash Ponds					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 5/24/16		DATE FINISHED: 5/24/16		
DRILLING METHOD: HSA					TOTAL DEPTH (ft.): 40.0		SCREEN INTERVAL (ft.): 34.5'-39.5		
DRILLING EQUIPMENT: 8 5/8" OD HSA Truck Mounded Rig					DEPTH TO WATER ATD: 35		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot			NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
					Sandy clay fill to 4.5'	
5					Slightly SANDY CLAY (CH): light yellowish-brown, dry, hard, trace calcium carbonate nodules, fine-grained sand to 5' SANDY CLAY (CH): light yellowish-brown, slightly moist, hard, fine-grained sand, trace pebbles Lignite, dark brown, slightly moist, firm 7'-8.5'	
10					SANDY CLAY (CL): light olive brown, moist, very stiff, fine-grained sand, trace of small gravel size nodules, minor ferrous staining SANDY CLAY (CL): light olive brown, brown lenses, dry, fine-grained sand, stiff	
					SILTY SAND (SM): dark gray, very moist	
15					CLAYEY SAND (SC): light olive brown, moist, very stiff, fine-grained sand CLAYEY SAND (SC): light olive brown, moist, firm, fine-grained sand SILTY SAND (SM): light olive brown, wet, loose, fine-grained at 16'	
20					SILTY SAND (SM): light olive brown, wet, loose, fine-grained sand	
25						

WELL3

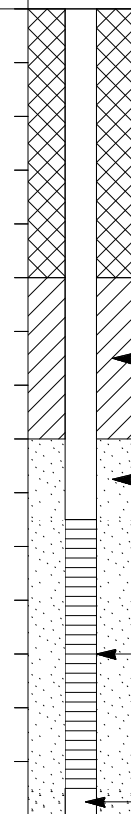
PROJECT: TMPA Gibbons Creek Plant Carlos, Texas						Log of Well No. AP MW-1D (cont'd)	
DEPTH (feet)	SAMPLES				OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
30						1" hard shaley sand lenses at 25.5' SILTY SAND (SM): light olive brown, wet, loose, fine-grained, one ferrous stained sand lense at 16' SILTY SAND (SM): light olive brown, wet, loose, fine-grained sand 2" sandstone lense, hard at 31.5' 4" sandstone lense, hard at 33' 3" sandstone lense, ferrous staining, hard, blocky at 34.25' SILTY SAND (SM): light olive brown, wet, loose, fine-grained sand SILTY SAND (SM): light olive brown with very thin lignite lenses 2" hard sandstone layer at 40'	<p>Bentonite</p> <p>20/40 Grade Silica Sand</p> <p>Schedule 40 PVC 0.010 Slot Screen</p> <p>6" End Cap</p>
40						Total Depth = 40'	
45							
50							
55							

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. AP-MW-3				
BORING LOCATION: Northeast Corner of Ash Ponds					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 5/25/16		DATE FINISHED: 5/25/16		
DRILLING METHOD: HSA					TOTAL DEPTH (ft.): 40.0		SCREEN INTERVAL (ft.): 34.5'-39.5		
DRILLING EQUIPMENT: 8 5/8" OD HSA Truck Mounded Rig					DEPTH TO WATER ATD: 20		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

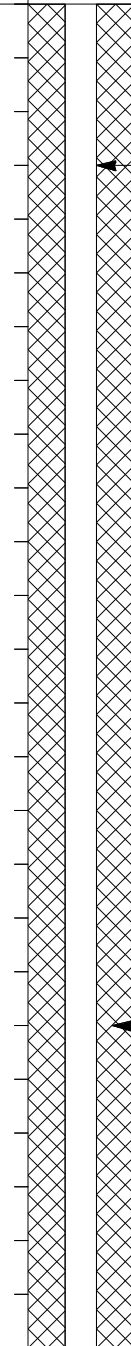
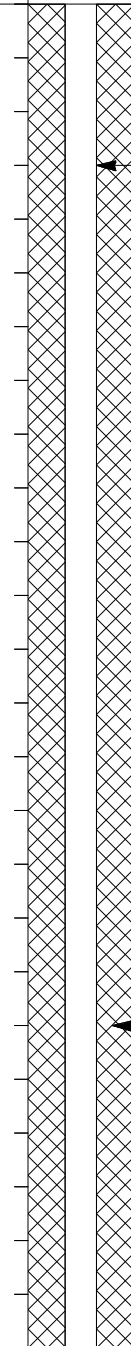
DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	
					Surface Elevation:	
5					SANDY CLAY with gravel (CH): brown, moist, firm, fine-grained sand, few small gravel, (fill)	
					SANDY CLAY with gravel (CL): brown and reddish-brown, moist, very stiff, fine-grained sand, few small gravel, few clay clasts, 3-4' layers (fill)	
10					SANDY CLAY with gravel (CL): brown mottled, moist, very stiff, fine-grained sand, trace of small gravel (fill)	
					SILTY SAND (SM): light olive brown, moist, firm, fine-grained sand	
15					SILTY SAND (SM): light olive brown, moist, fine-grained sand	Grout
20					SILTY SAND (SM): light olive brown, wet, fine-grained sand	
25						

WELL3

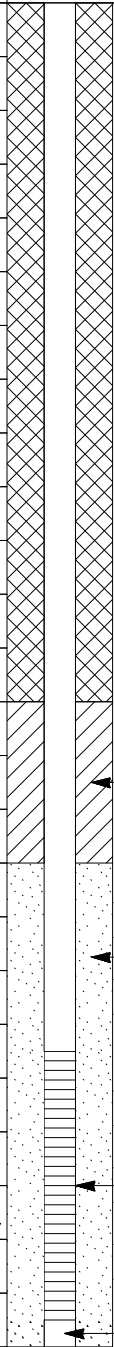
PROJECT: TMPA Gibbons Creek Plant Carlos, Texas						Log of Well No. AP-MW-3 (cont'd)	
DEPTH (feet)	SAMPLES				OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
30						SILTY SAND (SM): light olive brown, wet, fine-grained sand - siltstone interbedded with loose sand 27.5'-28.75' Siltstone, light olive gray, dry, hard at 28.75' and 29.5' SILTY SAND (SM): light olive brown, moist, fine-grained sand SITLY SAND (SM): light olive brown, wet, fine-grained sand	
35						SILTY SAND (SM): light olive brown, wet, fine-grained sand	
40						Total Depth = 40'	
45							
50							
55							

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. AP MW-4				
BORING LOCATION: East of Ash Ponds					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 6/1/16		DATE FINISHED: 6/1/16		
DRILLING METHOD: CME 75 HSA					TOTAL DEPTH (ft.): 50.0		SCREEN INTERVAL (ft.): 44.5'-49.5'		
DRILLING EQUIPMENT: CME 75 8 5/8" OD HSA					DEPTH TO WATER ATD: 48		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot			
	Surface Elevation:					
5					SANDY CLAY (CL): dark yellowish-brown, brown, moist, stiff, fine-grained sand, sand fill to 3.5'	 2" Diameter PVC
					SANDY CLAY (CH): brown, moist, stiff, fine-grained sand SANDY CLAY (CH): brown, mottled, moist, firm, clay clasts, fine-grained sand	
10					SANDY CLAY (CL): yellowish-brown, moist, firm, fine-grained sand, few pebbles	 Grout
15					SANDY CLAY (CL): olive brown and yellowish-brown, moist, stiff, 3" lignite lense at 14.75' SANDY CLAY (CL): yellowish-brown, moist, stiff, fine-grained sand, bedding planes, yellow and black streaks	
20					SANDY CLAY (CL): yellowish-brown, moist, stiff, fine-grained sand, bedding planes	
25					Lignite, black, moist, firm 23.5'-25'	

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas						Log of Well No. AP MW-4 (cont'd)		
DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS		
	Sample No.	Sample	Blows/ Foot					
30					SANDY CLAY (CH): yellowish-brown, moist, soft, fine-grained sand, discontinuous lignite lenses			
					Lignite, black, moist, firm 26.5'-30'			
35					SANDY CLAY (CH): olive-brown, moist, fine-grained sand, stiff			
					Perched water at 32'			
40					Lignite, black, dry, stiff 34'-37.5'			
					Interbedded silty sand and sandy clay, thin bedded (1/4" - 1/2"), olive brown, sandy clay, gray silty sand, dry, stiff, fine-grained sand			
45					Lignite, black, dry, hard, 6"			
					CLAY (CL): black, dry, hard, blocky, some interbedded black lignite			
50					SANDY CLAY (CL): black, dry, hard, fine-grained sand, platty			
					SILTY SAND (SM): dark olive brown, wet, loose, bedding planes, fine-grained sand			
55					Total Depth =50'			

WELL3

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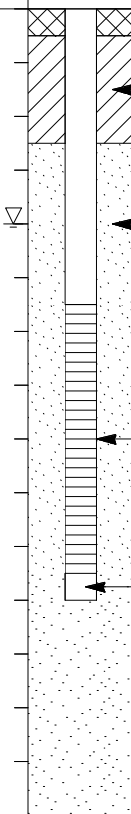
Project No. 6706150060.01.006

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PROJECT: TMPA Gibbons Creek Plant Carlos, Texas				Log of Well No. AP MW-5			
BORING LOCATION: East Center of Ash Ponds				GROUND SURFACE ELEVATION AND DATUM: NA			
DRILLING CONTRACTOR: Best Drilling				DATE STARTED: 6/1/16		DATE FINISHED: 6/1/16	
DRILLING METHOD: CME 75 HSA				TOTAL DEPTH (ft.): 40.0		SCREEN INTERVAL (ft.): 30.5'-35.5'	
DRILLING EQUIPMENT: CME 75 8 5/8" OD HSA				DEPTH TO WATER ATD: 29		CASING:	
SAMPLING METHOD: 5' x 4" Core Barrel				LOGGED BY: Daniel B. Haug, P.G.			
HAMMER WEIGHT: NA		DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.		REG. NO. 1773	

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	
				Surface Elevation: NA	
				Sand and clay fill to 2.5'	
5				SANDY CLAY (CH): yellowish-brown, moist, firm to hard, fine-grained sand, some mottling	2" Diameter PVC
				SANDY CLAY (CH): light yellowish-brown, moist, stiff, trace of small gravel, fine-grained sand	
10				SANDY CLAY (CL): reddish-brown then light yellowish-brown, (14'-15'), moist, stiff, sand lense at 14.5', fine-grained sand	Grout
				SANDY CLAY (CH): yellowish-brown, moist, firm, fine-grained sand	
15				CLAYEY SAND (SC): yellowish-brown, wet, firm, fine-grained sand, few gravel	
20				SANDY CLAY (CL): yellowish-brown, moist, firm, fine-grained sand, clay clasts SANDY CLAY (CH): reddish-brown mottled with grayish-brown, moist, firm, fine-grained sand	
25				SANDY CLAY (CH): brown mottled with few reddish-brown streaks, moist, fine-grained sand, few pebbles	

WELL3

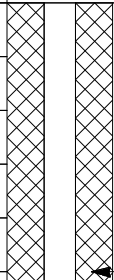
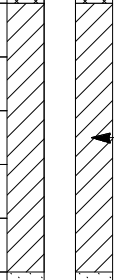
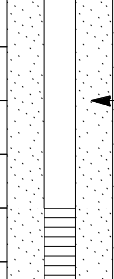
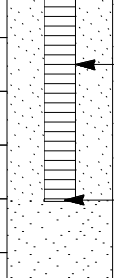
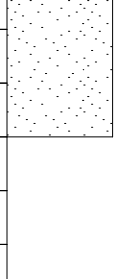
PROJECT: TMPA Gibbons Creek Plant Carlos, Texas						Log of Well No. AP MW-5 (cont'd)	
DEPTH (feet)	SAMPLES				OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
30						SANDY CLAY (CH): brown, moist, fine-grained sand to small gravel	 Bentonite 20/40 Grade Silica Sand Schedule 40 PVC 0.010 Slot Screen 6" End Cap
						CLAYEY SAND (SC): brown, wet, firm, fine- to coarse-grained sand	
35						SANDY CLAY (CL): light yellowish-brown, moist, stiff, fine-grained sand, ferrous staining	
						SANDY CLAY (CL): light yellowish-brown, very moist to wet, medium-grained sand	
40						CLAYEY SILTY SAND (SC-SM): dark greenish gray, slightly moist, fine-grained sand	
						Total Depth = 40'	
45							
50							
55							

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas				Log of Well No. AP MW-6			
BORING LOCATION: West Side of Ash Ponds				GROUND SURFACE ELEVATION AND DATUM:			
DRILLING CONTRACTOR: Tolunay-Wong				DATE STARTED: 5/3/17		DATE FINISHED: 5/5/17	
DRILLING METHOD: HSA with Continuous Core Borell				TOTAL DEPTH (ft.): 50.0		SCREEN INTERVAL (ft.): 41'-46'	
DRILLING EQUIPMENT: CME 75				DEPTH TO WATER ATD:		CASING:	
SAMPLING METHOD: 5' x 4.25" OD Core Barrel				LOGGED BY: Daniel B. Haug, P.G.			
HAMMER WEIGHT: NA		DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.		REG. NO. 1773	

DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
5				0.3	Grass at the surface, gravel, sand and clay material to 4.25' (probable fill)	<p>2" Schedule 40 PVC Riser</p> <p>Bentonite Grout</p>
				0.1	SANDY CLAY (CL): yellowish-brown, moist, stiff, ferrous nodules, trace of caliche, fine-grained sand	
					SILT (ML) with lignite: reddish-brown, dry, firm, very little recovery	
10				0.1	CLAY (CL): reddish-brown, slightly moist, firm Lignite with clay, dark red, slightly moist, firm	
					SANDY CLAY (CL): yellowish-brown, dry, firm, very fine-grained sand	
15				1.8	2" lignite seam, dark reddish-brown, slightly moist, soft CLAY (CH): yellowish-brown, slightly moist to moist, stiff, ferrous staining Interbedded CLAY and LIGNITE (O-CL): black to reddish-brown, dry, firm to hard 1" cemented lenses with gypsum	
					LIGNITE (O) with hard lenses of cemented clay and silt with organics: dark brown, dry, hard	
20				2.1	SANDY CLAY (CL): dark brown, dry, stiff, very fine-grained sand, numerous thin very fine-grained sand partings, laminated	
25						

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. AP MW-6 (cont'd)		
DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS	
	Sample No.	Sample	Blows/ Foot				
30				2.5	Interbedded SAND and LIGNITE (SP-0): sand - olive gray, lignite - black, very moist to wet, mostly sand, fine-grained sand		Bentonite Grout
				4.3	LIGNITE (0): black, dry, hard - Lignite to 30.25' CLAY (CL): light gray, slightly moist, hard		
35					CLAYEY SAND (SC): very dark grayish-brown, dry, dense, very fine-grained sand, lignite fragments		Bentonite Chips
				4.9	CLAYEY SAND (SC): olive gray, slightly moist to moist, dense, fine-grained sand, weakly cemented, laminated		
40					Slightly CLAYEY SAND (SC): olive gray, moist to very moist, 42.5'-43' wet, moist below 43' and silty, medium dense, very fine- to fine grained sand		16/30 Grade Silica Sand
				4.4			
45					Very slightly CLAYEY SILTY SAND (SM): olive gray, moist, dense, fine-grained sand, trace of lignite lenses		2" Schedule 40 PVC Screen 0.010 Slot 5.5" End Cap
				0.6			
50					- Sulfur smell		
					Total Depth = 50"		
55							

WELL3

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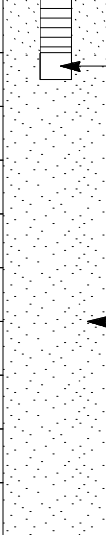
Project No. 6706150060.01.006

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PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. AP PZ-1				
BORING LOCATION: West of Limestone Storage Building					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 5/24/16		DATE FINISHED: 5/24/16		
DRILLING METHOD: HSA					TOTAL DEPTH (ft.): 35.0		SCREEN INTERVAL (ft.): 21'-26'		
DRILLING EQUIPMENT: 8 5/8" OD HSA Truck Mounded Rig					DEPTH TO WATER ATD: 21		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot				
					Surface Elevation:	
					6" ash	
					Sandy clay with few small gravel fill to 2"	
5					SANDY CLAY (CH): yellowish-brown, moist, stiff, fine- to coarse-grained sand	2" Diameter PVC
					CLAYEY SAND (SC): light yellowish-brown, moist, stiff, fine-grained sand	Grout
10					0.5" sandstone lense at 9.25'	
					CLAYEY SAND (SC): light yellowish-brown, slightly moist, stiff, fine-grained sand	
					sandstone nodules and 0.5" sand lense at 12'-12.5'	
					- trace of ferrous staining	
15					- interbedded sand and sandy clay	
					CLAYEY SAND and SAND (SP, SC) olive-gray, dry to moist, loose to firm	Bentonite
					CLAY (CL): brown, dry, hard, with interbedded sand and clay	
					SILTY SAND (SM): brown, dry, loose to firm, fine-grained sand, clay lenses	
20					CLAY (CL): yellowish-brown, dry, hard, thin fine-grained sand lenses, trace of pebbles	20/40 Grade Silica Sand
					CLAYEY SAND with sandstone lenses, brown, wet, dense, fine-grained to small gravels size	
					SANDY CLAY (CL): brown, dry, hard, fine-grained sand lamina	Schedule 40 PVC 0.010 Slot Screen
25					SILTY SAND (SM): olive gray, moist, loose to firm, fine-grained sand	

WELL3

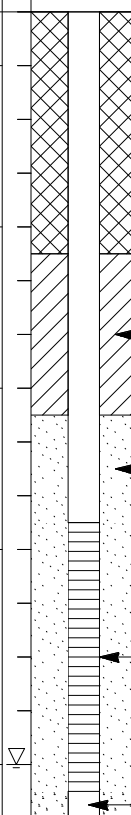
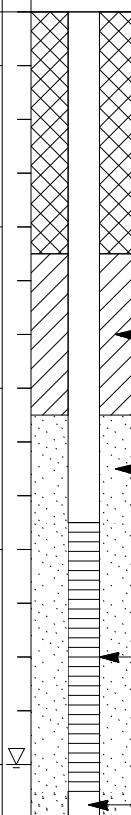
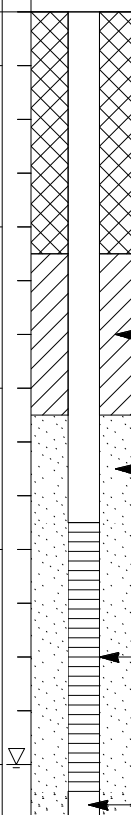
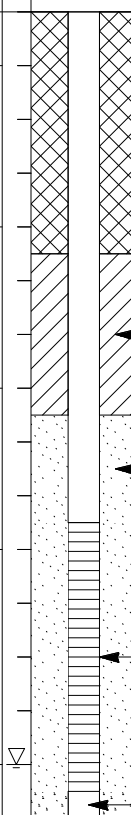
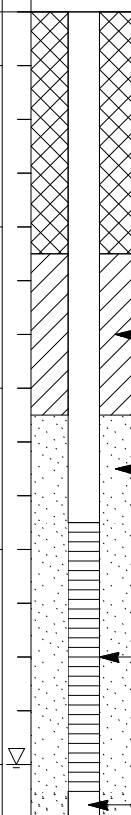
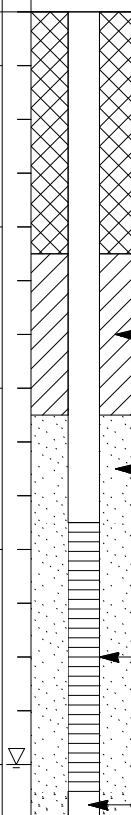
PROJECT: TMPA Gibbons Creek Plant Carlos, Texas						Log of Well No. AP PZ-1 (cont'd)	
DEPTH (feet)	SAMPLES				OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
						SILTY SAND (SM): light olive gray, wet, hard, fine-grained sand, very thin lignite seams	 <div>6" End Cap</div> <div>20/40 Grade Silica Sand</div>
						CLAY (CH): olive, dry, hard, blocky	
30						CLAY (CH): olive, dry, hard, blocky	
35						Total Depth = 35'	
40							
45							
50							
55							

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. AP PZ-2				
BORING LOCATION: North of Fly Ash Silos					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 5/23/16		DATE FINISHED: 5/24/16		
DRILLING METHOD: HSA					TOTAL DEPTH (ft.): 40.0		SCREEN INTERVAL (ft.): 34'-39'		
DRILLING EQUIPMENT: 8 5/8" OD HSA 2" Rods					DEPTH TO WATER ATD: 39		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot				
5					SILTY SAND (SM): dark gray, slightly moist, loose, fine- to coarse-grained sand, roots, fly ash	
					SILTY SANDY CLAY (CH): brown, moist, firm, fine- to coarse-grained sand	
					SILTY SANDY CLAY (CL): brown, moist, firm, fine- to coarse-grained sand, increasing sand content	
10					SANDY CLAY (CH): yellowish-brown, moist, soft, fine- to coarse-grained	
					SILTY SANDY CLAY (CH): yellowish-brown, moist, hard, fine-grained sand, ferrous staining - lignite seam 9'-9.5'	
					CLAYEY SAND (SC): light olive brown, dry, dense, fine- to medium-grained sand, wood fragments SILTY CLAYEY SAND (SC): light yellowish-brown, moist, firm, fine-grained sand	
15					SANDY CLAY (CH): yellowish-brown, dry, hard, fine-grained sand, lignite seam (thin)	
					CLAYEY SILTY SAND (SM): gray, wet, firm, fine-grained sand	
					SANDY CLAY (CH): light yellowish-brown, dry, hard, layered, fine-grained sand	
20					SILTY SANDY CLAY (CL): light olive brown, dry with few moist intervals, hard to very stiff, fine-grained sand, drier after 22'	
25						

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. AP PZ-2 (cont'd)				
DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS			
	Sample No.	Sample	Blows/ Foot						
30					SILTY SAND (SM): light olive brown, very moist, fine-grained sand, soft			Bentonite	
					Slightly SANDY CLAY (CH): brown, dry, hard, fine-grained sand lenses				
					- increased sand content with depth				
35					SILTY SAND (SM): light olive brown, moist, fine-grained sand, firm			20/40 Grade Silica Sand	
					CLAYEY SILTY SAND (SM): light olive gray, very moist, firm, 1/4" lignite seams, fine-grained sand				
					SANDY CLAY (CL): light olive brown, moist to dry, hard, fine-grained sand, very hard lenses, organics (wood) in sandstone				
40					SILTY SAND (SM): light olive brown, wet to 39', tan lignite lenses (1/4"), fine-grained sand			Schedule 40 PVC 0.010 Slot Screen	
					CLAY (CH): brown, moist, hard				
					Total Depth = 40'				
45								6" End Cap	
50									
55									

WELL3

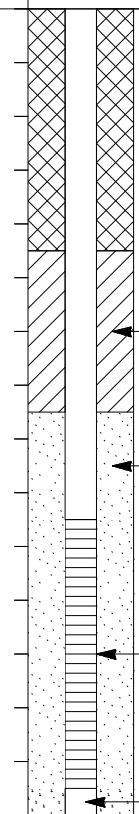
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WELL3

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PROJECT: TMPA Gibbons Creek Plant Carlos, Texas						Log of Well No. AP PZ-3 (cont'd)	
DEPTH (feet)	SAMPLES				OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
						SILTY SAND (SM): light olive brown, wet, fine-grained sand, hard siltstone at 28.75' to 29' and 1" lense at 27.5' ferrous staining around siltstone lenses	
30						SILTY SAND (SM): light olive brown, wet, loose, fine-grained sand Sandstone, light to olive brown, wet, hard, platy 32.5'-33'	
35						SILTY SAND (SM): light olive brown, wet, loose, fine-grained sand Sandstone, pale yellow, wet, hard, platy 34'-34.5'	
						SILTY SAND (SM): light olive brown, wet, loose, fine-grained sand	
						Siltstone, olive brown, wet, hard, platy 36.5'-36.75'	
						SILTY SAND (SM): light olive brown, wet, loose to firm, fine-grained sand	
						SILTY SAND (SM): olive gray, wet, firm, fine-grained sand, layered	
40						CLAY (CH): olive gray, dry, hard, blocky	
						Total Depth = 40'	
45							
50							
55							
							 <p>Bentonite</p> <p>20/40 Grade Silica Sand</p> <p>Schedule 40 PVC 0.010 Slot Screen</p> <p>6" End Cap</p>
							WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. AP PZ-4				
BORING LOCATION: Southwest Corner of Ash Ponds					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 6/2/2016		DATE FINISHED: 6/2/2016		
DRILLING METHOD: HSA					TOTAL DEPTH (ft.): 45.0		SCREEN INTERVAL (ft.): 38.5'-43.5'		
DRILLING EQUIPMENT: 8 5/8" OD HSA Truck Mounded Rig					DEPTH TO WATER ATD: 40		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

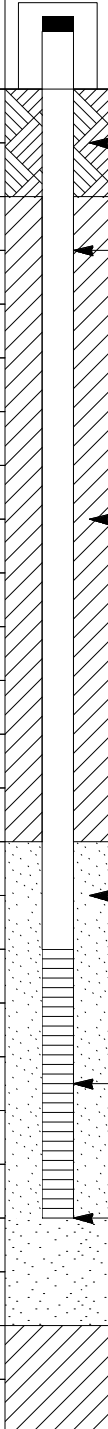
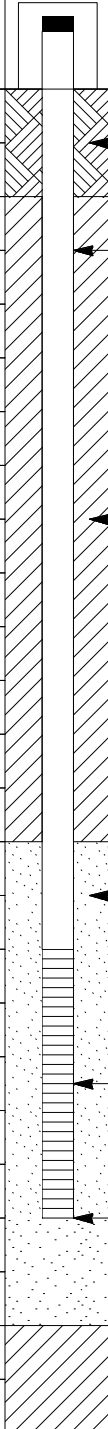
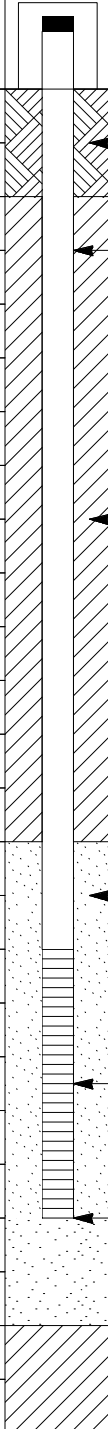
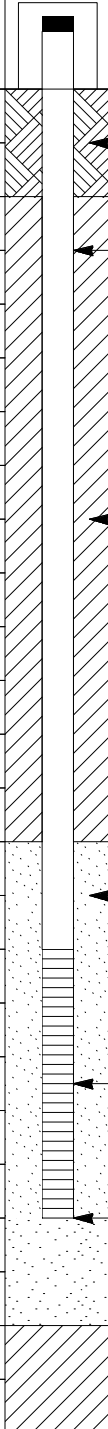
DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
					Clay and gravel fill to 3'	
5					SANDY CLAY (CL): light yellowish-brown, moist, stiff, fine-grained sand Interbedded sandstone and SANDY CLAY (CL): light yellowish-brown, moist, hard, fine-grained sand SANDY CLAY (CL): light yellowish-brown, moist, stiff, fine-grained sand, ferrous partings	
10					SANDY CLAY (CL): light yellowish-brown, moist, stiff to 14.5', hard to 15', fine-grained sand, ferrous staining, reddish-brown with increased clay content at 14.5-15'	
15					SANDY CLAY (CL): olive brown, dry, hard, very fine-grained sand, discontinuous silt and sand partings	
20					SANDY CLAY (CL): olive brown, dry, very stiff, fine-grained sand	
25					Lignite, black, dry, hard 23.5'-25' - 2" sand and clay lenses	

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. AP PZ-4 (cont'd)				
DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS			
	Sample No.	Sample	Blows/ Foot						
30					Lignite, dark brown and black, dry, stiff, few interbedded ironstone, sand, clay (thin beds-large majority lignite 25'-30')				
					Sandstone: olive brown, moist, hard				
35					Lignite, brown to dark brown, dry, stiff 31'-32.75'				
					Interbedded olive brown sand, brown clay and lignite				
					Lignite, brown to dark brown, dry, stiff, platy 33'-35'				
40					Lignite, brown to dark brown, dry, stiff, blocky 35'-36'				
					Interbedded sandy clay, lignite (thin beds), medium gray sand, fine-grained sand, dark brown clay and lignite				
					Lignite, brown to dark brown, dry, stiff, blocky 39'-40'				
45					Sand interbedded with lighnite, black, wet, loose, fine- to medium-grained				
					Lignite, black dry, very stiff 41'-41.75'				
					SANDY SILT (ML): olive gray, slightly moist, stiff, very fine-grained sand				
50					Total Depth = 45'				
55									

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WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. SFL MW-2				
BORING LOCATION: South Side of Landfill F, West of Outfall					GROUND SURFACE ELEVATION AND DATUM: 269'				
DRILLING CONTRACTOR: Vortex Drilling					DATE STARTED: 3/16/16		DATE FINISHED: 3/16/16		
DRILLING METHOD: HSA					TOTAL DEPTH (ft.): 50.0		SCREEN INTERVAL (ft.): 16'-21'		
DRILLING EQUIPMENT: 4 1/4 ID HSA (8" Borehole)					DEPTH TO WATER ATD: 17.5'		CASING:		
SAMPLING METHOD: Split Spoon					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	
DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS		
	Sample No.	Sample	Blows/ Foot		Surface Elevation: NA				
5			1 1/4	0.0	CLAY CH): dark gray, moist, soft, grading to yellowish-brown at 2'		 <div>Concrete</div> <div>8" Diameter PVC</div> <div>Bentonite</div> <div>12/20 Grade Sand</div> <div>0.010 Slot Schedule 40 PVC</div> <div>5.5" End Cap</div>		
			3/7 50/1"	0.0	CLAYEY SILTY SAND (SM-SC): light yellowish-brown, dry, hard, platy, fine-grained sand				
			50/1"		3.0	SANDY SILT (ML): pale yellow, moist, hard, very fine-grained sand			
10			50/5"	3.0	SILT (ML): pale yellow, moist, hard, very fine-grained sand		 <div>Concrete</div> <div>8" Diameter PVC</div> <div>Bentonite</div> <div>12/20 Grade Sand</div> <div>0.010 Slot Schedule 40 PVC</div> <div>5.5" End Cap</div>		
			21/35	0.8	SILT (ML): pale yellow, moist to wet, hard, very fine-grained sand				
			11/ 24/ 30	5.0	SANDY SILT (ML): pale yellow, moist to wet, hard, wet to 13', then very moist, siltier-a trace of clay (unconsolidated)				
15			30/ 50/2"	4.3	SILTY SAND (SM): light yellowish-brown, moist, hard, unconsolidated, very fine- to fine-grained sand, trace iron oxide staining		 <div>Concrete</div> <div>8" Diameter PVC</div> <div>Bentonite</div> <div>12/20 Grade Sand</div> <div>0.010 Slot Schedule 40 PVC</div> <div>5.5" End Cap</div>		
			19/ 31/ 32	3.8	SILTY SAND (SM): light yellowish-brown, moist to wet, hard, unconsolidated, very fine- to fine-grained sand, iron oxide staining 19-20'				
			20/ 50/4"	3.9	SANDY SILTY (SM): light yellowish-brown, wet, unconsolidated, hard, iron oxide staining				
20			41/ 60/6"	2.3	SILTY CLAY (CL): brown, dry, hard at 22.25 SANDY SILTY CLAY (CL): dark gray, dry, hard, bedding planes SANDY SILTY CLAY (CL): dark gray, dry, hard, bedding		 <div>Concrete</div> <div>8" Diameter PVC</div> <div>Bentonite</div> <div>12/20 Grade Sand</div> <div>0.010 Slot Schedule 40 PVC</div> <div>5.5" End Cap</div>		
25									

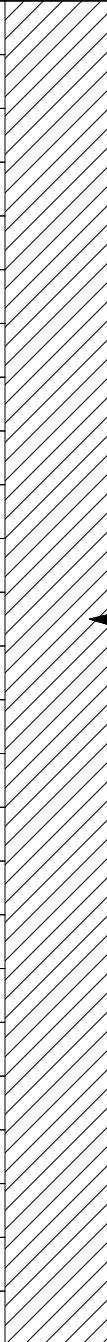
WELL3

Amec Foster Wheeler Environment & Infrastructure, Inc.

Project No. 6706150060.01.006

Page 1 of 2

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. SFL MW-2 (cont'd)		
DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.		WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot				
30			20/ 50/5"	3.7	CLAY (CH): dark gray, dry, hard, lenses of sandy clay, fine-grained sand SANDY CLAY (CL): olive gray, moist (clayey interval, dry), hard, fine-grained sand SANDY CLAY (CL): olive gray, dry, hard, fine-grained sand		
			15/ 21/ 37	3.2			
			15/ 21/ 21	2.0	Slightly SANDY CLAY (CL): dark gray, dry, hard, fine-grained sand		
			12/ 29/ 40	2.5	SILTY CLAY (CH): dark gray, dry, hard, thin linear structures in the clay		
35			20/20 60/6"	2.0	SILTY CLAY (CH): olive gray, dry, hard, silt lenses at 35.5', moist		
					SILTY CLAY (CH): olive gray, dry, hard, silt lenses <1/4, thin, dry		
			10/ 17/ 17	1.1			
40			10/ 11/ 15	1.9	SILTY CLAY (CH): olive gray, moist, firm to hard, few silt partings		
			8/ 12/ 15	2.1	SILTY CLAY (CH): olive gray, moist, firm to hard, few silt partings, one pyrite nodule		
			12/ 12/ 17	2.2	CLAY (CH): olive gray, moist, firm to hard, silt partings		
45					CLAY (CH): olive gray, moist, firm to hard, few silt partings		
			10/ 12/ 31	2.2			
50	Total Depth = 50'						
55							

WELL3

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Project No. 6706150060.01.006

Page 2 of 2

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. SFL MW-3				
BORING LOCATION: Southeast of Landfill F					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 5/31/16		DATE FINISHED: 5/31/16		
DRILLING METHOD: CME 75 HSA (Buggy Rig)					TOTAL DEPTH (ft.): 25.0		SCREEN INTERVAL (ft.): 19.5'-24.5'		
DRILLING EQUIPMENT: CME 75 8 5/8" OD HSA					DEPTH TO WATER ATD: 22		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

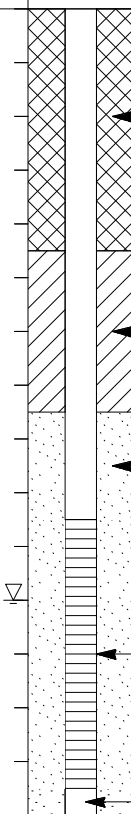
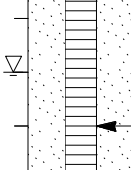

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot			
				Surface Elevation:	
				SILTY SAND (SM): light yellowish-brown, moist, loose, fine-grained sand, trace ferrous staining	
5				SANDY CLAY (CH): brown mottled with blackish-brown, moist, firm, fine-grained sand, minor ferrous staining SANDY CLAY (CH): brown, mottled, moist, firm, fine-grained sand	2" Diameter PVC Grout
10				SANDY CLAY (CL): yellowish-brown, slightly moist, fine-grained sand, bedding planes, stiff Slightly SANDY SILTY CLAY (CL): yellowish-brown, slightly moist, very firm, fine-grained sand	
15				SANDY SILTY CLAY (CL): yellowish-brown, slightly moist, stiff, very fine-grained sand, few bedding planes	Bentonite
20				Interbedded sandy clay and sandstone, reddish-brown, hard to very stiff, fine-grained sand SILTY SAND (SM): light olive brown, wet, loose to firm, fine-grained sand	20/40 Grade Silica Sand Schedule 40 PVC 0.010 Slot Screen
25				CLAY (CL): light to olive green, dry, hard Total Depth = 25'	6" End Cap

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. SFL MW-4				
BORING LOCATION: South of Landfill F					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 5/31/16		DATE FINISHED: 5/31/16		
DRILLING METHOD: CME 75 HSA					TOTAL DEPTH (ft.): 40.0		SCREEN INTERVAL (ft.): 34.5'-39.5		
DRILLING EQUIPMENT: CME 75 8 5/8" OD HSA					DEPTH TO WATER ATD: 36		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	
5					CLAYEY SAND (SC): medium gray, moist, firm, fine-grained sand Interbedded silty sand and sandstone, medium gray, slightly moist, firm to hard, fine-grained CLAYEY SILTY SAND (SC-SM): medium gray, slighty moist, very firm, fine-grained sand	
					SANDY CLAY (CL): light olive brown, dry, hard, fine-grained sand, ferrous staining SANDY SILTY CLAY (CL): light olive brown, slightly moist, very fine-grained sand	
10					SANDY SILTY CLAY (CL): light olive brown, slightly moist, very fine-grained sand, minor ferrous staining	
15					SANDY SILTY CLAY (CL): brown, dry, very stiff, bedding planes, fine-grained sand	
20					SANDY CLAY (CL): dark olive brown, dry, hard, bedding planes, trace of gypsum, fine-grained sand Lignite lense, dark gray to balck, loose to firm	
25					SILTY SAND (SM): light olive gray, slightly moist, fine-grained sand, bedding planes, firm	

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas						Log of Well No. SFL MW-4 (cont'd)	
DEPTH (feet)	SAMPLES				OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
30						SILTY SAND (SM): light olive gray, dry, very fine-grained sand, 25'-26' interbedded siltstone CLAYEY SANDY SILT (ML): dark gray, dry, fine-grained sand, discontinuous thin sand lenses SANDY SILTY CLAY (CL): dark gray, dry, very fine-grained sand, discontinuous thin silt lenses	 Grout Bentonite 20/40 Grade Silica Sand
35						Interbedded clay and sand; clay, black, dry, hard; sand, olive gray, dry, loose, very fine-grained sand SAND (SP): olive gray, wet, loose, very fine-grained sand	 Schedule 40 PVC 0.010 Slot Screen
40						SILTY SAND (SM): olive gray, dry, firm, fine-grained sand Total Depth = 40'	 6" End Cap
45							
50							
55							

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas				Log of Well No. SFL MW-5	
BORING LOCATION: Landfill F				GROUND SURFACE ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Best Drilling				DATE STARTED: 5/23/16	DATE FINISHED: 5/23/16
DRILLING METHOD: HSA				TOTAL DEPTH (ft.): 25.0	SCREEN INTERVAL (ft.): 16'-21'
DRILLING EQUIPMENT: 8 5/8" OD HSA 2" Rods				DEPTH TO WATER ATD: 16	CASING:
SAMPLING METHOD: 5' x 4" Core Barrel				LOGGED BY: Daniel B. Haug, P.G.	
HAMMER WEIGHT: NA		DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.	REG. NO. 1773

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot			
				Surface Elevation:	
				SILTY SAND (SM): dark grayish-brown, moist, loose, fine-grained sand, roots	
				SANDY CLAY (CH): dark yellowish-brown, moist, soft, fine-grained sand, roots	
				SILTY SANDY CLAY (CL): yellowish-brown, dark yellowish-brown lenses, moist, fine-grained sand, firm	
5				SILTY SANDY CLAY (CL): yellowish-brown, dry, hard, very fine-grained sand, ferrous staining	
				SILTY SAND (SM): light brownish-gray, mottled with brownish-yellow, soft, moist (slightly) increasing clay content to 8.5', fine-grained sand	
				Slightly CLAYEY SILTY SAND (SM): light olive brown, loose, moist, fine-grained sand	
10				Slightly CLAYEY SILTY SAND (SM): light olive brown, slightly firm, moist, trace of pebbles	
15				SILTY SAND (SM): light olive brown, wet to very moist, firm, faint stratification, fine-grained sand	
20				SANDSTONE (SS): light yellowish-brown, dry, hard, ferrous staining along fractures, layered	
				Shale (SILTY CLAY) (CL): gray, dry, hard, very fine-grained sand, silt partings	
25				Total Depth = 25'	

2" Diameter PVC

Grout

Bentonite

20/40 Grade Silica Sand

Schedule 40 PVC 0.010
Slot Screen

6" End Cap

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. SFL MW-6				
BORING LOCATION: Southwest Corner of Landfill					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 5/23/16		DATE FINISHED: 5/23/16		
DRILLING METHOD: HSA					TOTAL DEPTH (ft.): 20.0		SCREEN INTERVAL (ft.): 14.5'-19.5		
DRILLING EQUIPMENT: 8 5/8" OD HSA Truck Mounded Rig					DEPTH TO WATER ATD: 15		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot				
					Surface Elevation:	
					Sandy Clay fill, few gravel fill to 4.5'	
5					SANDY SILTY CLAY (CL): pale brown, dry, hard, dark gray partings, very fine-grained sand	
					CLAYEY SAND SILT (ML): pale brown, dry, very stiff to hard, dark gray clay partings, fine-grained sand, increased ferrous staining after 8', few sand partings, wood fragments in a few partings	
10					SILTY SANDY CLAY (CH): pale brown, dry, hard, light brown partings to reddish-brown, fine-grained sand, ferrous staining	
15					Layered SILTY SAND (SM) and SANDY SILTY CLAY (CL): pale brown, some brown layers after 17', very moist to dry, fine-grained sand	
20					SANDY SILTY CLAY (CL): gray silt and sand, dark gray clay, layered, dry, hard, very fine sand	
					Total Depth = 20'	
25						

2" Diameter PVC

Grout

Bentonite

20/40 Grade Silica Sand

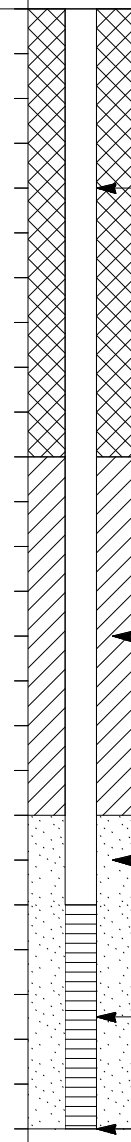
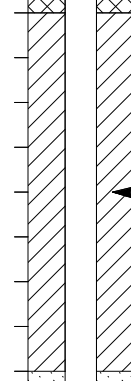
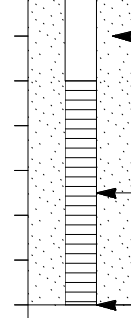
Schedule 40 PVC 0.010 Slot Screen

6" End Cap

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. SFL MW-7				
BORING LOCATION: Southeast Side of Landfill F					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Tolunay-Wong					DATE STARTED: 5/2/17		DATE FINISHED: 5/3/17		
DRILLING METHOD: HSA with Continuous Core Borell					TOTAL DEPTH (ft.): 55.0		SCREEN INTERVAL (ft.): 50'-55'		
DRILLING EQUIPMENT: CME 75					DEPTH TO WATER ATD:		CASING:		
SAMPLING METHOD: 5' x 4.25" OD Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

DEPTH (feet)	SAMPLES		OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot			
				Surface Elevation:	
			2.6	Grass at surface SILTY SAND (SM): yellowish-brown, dry, firm, very fine-grained sand (fill)	
5			1.1	SANDY CLAY (CH): gray, slightly moist, firm, very fine-grained sand	8" Diameter PVC
10			0.8	SANDY CLAY (CH): brown, slightly moist to moist, firm, olive gray mottling and some ferrous staining, very fine-grained sand, fill to approximately 12'	
15			0.4	SANDY CLAY (CL): brown, slightly moist, very fine-grained sand, some lamination, couple of thin greenish-gray sand lenses CLAY (CL): dark brown, slightly moist, very fine-grained sand intervals (thin)	
20			0.8	SANDY CLAY (CL) with lignite fragments: very dark brown, hard, very fine-grained sand, slightly moist to dry - Layered sand and clay with lignite 19.5'-20', very dark brown to light gray, hard, slightly moist, pyrite nodules CLAY (CH): very dark gray, dry, hard, very thin sand lenses, greenish-gray, lignite fragments along bedding planes, platy	Bentonite Grout
25			0.4	CLAY (CH) with interbedded thin sand lenses: very dark gray, dry, hard, very fine-grained sand, lignite fragments along bedding planes in the clay, clay breaks along horizontal laminae, platy	
30					

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. SFL MW-7 (cont'd)		
DEPTH (feet)	SAMPLES				DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS	
	Sample No.	Sample	Blows/ Foot	OVN Reading			
35				0.3	CLAY (CL): with numerous thin sand lenses interbedded with clay: very dark gray clay, greenish-gray sand, dry, hard, lignite fragments along bedding planes in the clay, very fine-grained sand, platy	 2" Schedule 40 PVC Riser	
40				0.3	CLAY (CH): with sand partings: very dark gray, dry, hard, very fine-grained sand, lignite fragments along bedding planes in the clay, platy, sand greenish-gray		
45				0.2	CLAY (CH) with SAND partings: very dark gray, dry, hard, very fine-grained sand, lignite fragmenst along bedding planes in the clay, platy, sand greenish-gray	 Bentonite Chips	
50				0.2	SAND (SP): olive gray, wet, loose, fine- to very fine-grained sand CLAY (CH): dark greenish-gray, dry to hard at 46' CLAY (CH): very dark gray, dry, hard, platy		
55				0.2	SILTY SAND (SM): dark gray, wet, loose, very fine- to fine-grained sand Interbedded SAND (SP) and lignite: olive gray, wet, loost to firm 2" lignite seam SAND (SP) with thin lignite lenses, olive gray, wet, loose to firm Total Depth = 55'	 16/30 Grade Sand 2" Schedule 40 PVC Screen 0.010 Slot 5.5" End Cap	
60							
65							

WELL3

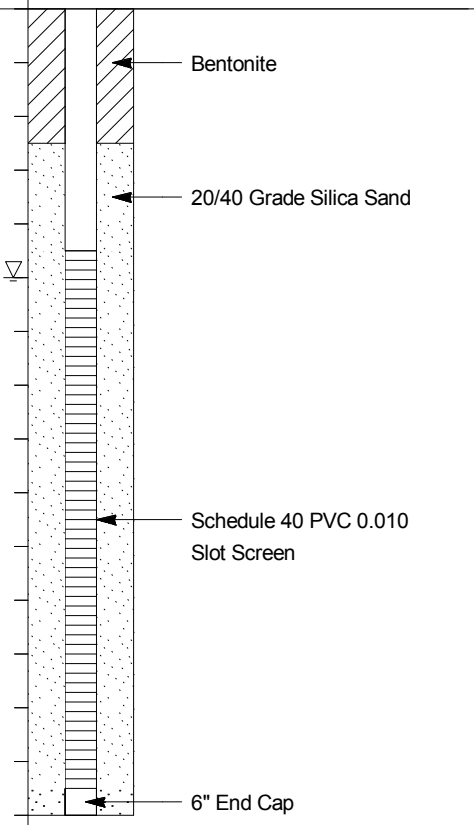
PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. SSP/AP MW-1				
BORING LOCATION: North of Sludge Pond					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 5/25/16		DATE FINISHED: 5/26/16		
DRILLING METHOD: HSA					TOTAL DEPTH (ft.): 40.0		SCREEN INTERVAL (ft.): 29.5'-39.5'		
DRILLING EQUIPMENT: 8 5/8" OD HSA Truck Mounded Rig					DEPTH TO WATER ATD: 30		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot				
					Surface Elevation:	
					Silty sand, fly ash and sandy clay, fill to 3.5'	
5					SANDY CLAY (CL): light yellowish-brown, moist, very stiff, fine-grained sand	
					SILT (ML): yellowish-red, moist, firm to hard, after 3" grading to clay, yellowish-red, moist, hard	
					SANDY CLAY (CL): reddish-brown, moist, very stiff, fine-grained sand	
10					Slightly SANDY CLAY (CH): reddish-brown, moist, very stiff, very fine-grained sand	
					Lignite, black, dry, hard 12'-16'	
15						
					Slightly SANDY CLAY (CH): dark grayish-brown, dry, hard, very fine-grained sand	
20						
					SANDY CLAY (CL): dark grayish-brown, moist, hard, fine-grained sand, lithofied sandy lenses from 20.5' to 25', sandier and softer toward 25', platy where hard	
25						

2" Diameter PVC

Grout

WELL3

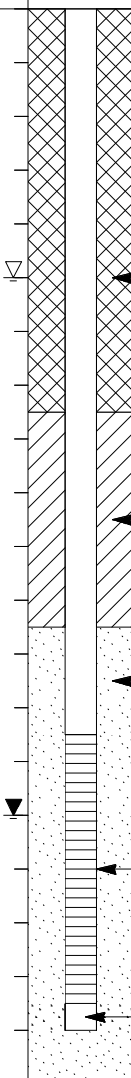
PROJECT: TMPA Gibbons Creek Plant Carlos, Texas						Log of Well No. SSP/AP MW-1 (cont'd)	
DEPTH (feet)	SAMPLES				OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
						SILTY SAND (SM): dark olive brown, slightly moist, hard, platy when hard, fine-grained sand	
30						Slightly SILTY SAND (SM): dark olive brown, wet, loose, fine-grained sand	
35						CLAYEY SILTY SAND (SM-SC): dark olive brown, dry to moist, fine-grained sand, firm	
40						Total Depth = 40'	
45							
50							
55							

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. SSP MW-2				
BORING LOCATION: West of Center of Scrubber Sludge Pone					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 6/2/06		DATE FINISHED: 6/2/06		
DRILLING METHOD: CME 75 HSA					TOTAL DEPTH (ft.): 45.0		SCREEN INTERVAL (ft.): 38.5'-43.5'		
DRILLING EQUIPMENT: CME 75 8 5/8" OD HSA					DEPTH TO WATER ATD: 30		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	
					Surface Elevation:	
					9" ash, black, loose	
					SANDY CLAY (CL): yellowish-brown, moist, firm, fine-grained sand, few pebbles	
5					SANDY CLAY (CL): medium gray, moist, firm, fine-grained sand, few pebbles SANDY CLAY (CL): brown, moist, firm, fine-grained sand, few small gravel	2" Diameter PVC
10					SANDY CLAY (CH) with small gravel: brown, moist, firm to stiff, fine-grained sand with pebbles and small gravel, clay clasts, some red and greenish-gray streaking, trace yellow nodules	
15					SANDY SILTY CLAY (CL): brown, moist, stiff, fine-grained sand, trace roots, few bedding planes	Grout
20					SILTY SAND (SM): light olive brown, moist, firm, fine-grained sand, bedding planes, brown organic lenses, very thin	
25						

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas						Log of Well No. SSP MW-2 (cont'd)	
DEPTH (feet)	SAMPLES				OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
30						CLAYEY SILTY SAND (SC-SM): light olive brown, moist, firm, fine-grained sand	 <p>Grout</p> <p>Bentonite</p> <p>20/40 Grade Silica Sand</p> <p>Schedule 40 PVC 0.010 Slot Screen</p> <p>6" End Cap</p>
						SILTY SAND (SM): light olive brown, wet, 30'-33', sandstone at 33', fine-grained sand	
						Slightly SILTY SAND (SM): light olive brown, slightly moist, firm, fine-grained sand	
35							
40						SANDY CLAY (CH) with few gravel: reddish-brown, wet, firm	
						SANDY CLAY (CH): dark olive brown, moist, stiff, fine-grained sand	
45						CLAYEY SILTY SAND (SM-SC): dark olive brown, dry, dense, fine-grained sand	
						Total Depth = 45'	
50							
55							

WELL3

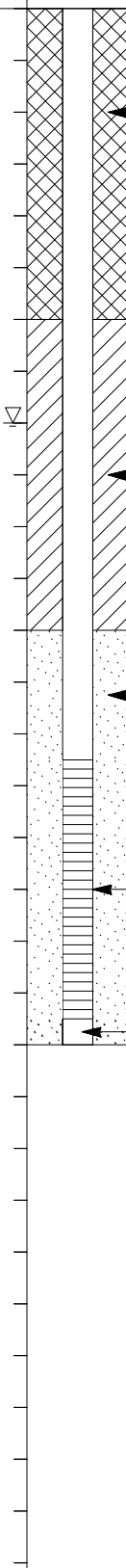
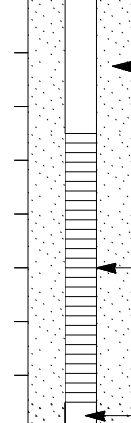
PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. SSP MW-3	
BORING LOCATION: Southwest Corner of Scrubber Sludge Pond					GROUND SURFACE ELEVATION AND DATUM:	
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 6/3/16	DATE FINISHED: 6/3/16
DRILLING METHOD: CME 75 HSA					TOTAL DEPTH (ft.): 45.0	SCREEN INTERVAL (ft.): 39.5'-44.5'
DRILLING EQUIPMENT: CME 75 8 5/8" OD HSA					DEPTH TO WATER ATD: 33	CASING:
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.	
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.	REG. NO. 1773

DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION		WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS	
	Sample No.	Sample	Blows/ Foot		NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.			
					Surface Elevation:			
					Gravelly sandy clay at surface to 1.5'			
5					SANDY CLAY (CL): yellowish-brown, moist, stiff, fine-grained sand			
					SANDY CLAY (CL) with gravel: yellowish-brown, moist, stiff, fine-grained sand			
10					CLAY and SANDY CLAY (CL-CH): yellowish-brown, reddish-brown, reddish-gray layers (fill), moist, stiff, fine-grained sand			
					Probably fill above 14'			
15					Slightly SANDY CLAY (CH): olive gray to 17.5', moist, stiff, fine-grained sand			
					SANDY CLAY (CL): reddish-yellow, moist, stiff, fine-grained sand			
20					SANDY CLAY (CL): light reddish-brown, dry, stiff, fine-grained sand			
25								

2" Diameter PVC

Grout

WELL3

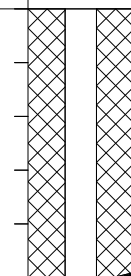
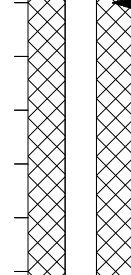
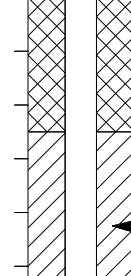
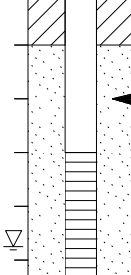
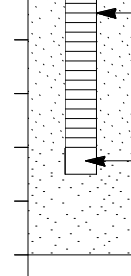
PROJECT: TMPA Gibbons Creek Plant Carlos, Texas						Log of Well No. SSP MW-3 (cont'd)	
DEPTH (feet)	SAMPLES				OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
30						SANDY CLAY (CL): light brown, dry, hard Sandstone, light brown, dry, hard 29.5'-30' 1" of sandstone in core barrel, loose, fine-grained wet sand washed out of core barrel	 Grout Bentonite 20/40 Grade Silica Sand
35						SILTY SAND (SM): light olive brown, wet, soft, fine-grained sand	
40						SILTY SAND (SM): light olive brown, wet, soft, fine-grained sand 1" lignite seam, brown, wet, soft at 41.75, very thin lignite lenses at 42' and 43.5'	 Schedule 40 PVC 0.010 Slot Screen 6" End Cap
45						SILTY SAND (SM): light olive brown, wet, stiff, fine-grained sand Total Depth = 45'	
50							
55							

WELL3

PROJECT: TMPA Gibbons Creek Plant Carlos, Texas					Log of Well No. SSP MW-4				
BORING LOCATION: Southeast Corner of Scrubber Sludge Pond					GROUND SURFACE ELEVATION AND DATUM:				
DRILLING CONTRACTOR: Best Drilling					DATE STARTED: 6/3/16		DATE FINISHED: 6/3/16		
DRILLING METHOD: CME 75 HSA					TOTAL DEPTH (ft.): 50.0		SCREEN INTERVAL (ft.): 43'-48'		
DRILLING EQUIPMENT: CME 75 8 5/8" OD HSA					DEPTH TO WATER ATD: 44.75		CASING:		
SAMPLING METHOD: 5' x 4" Core Barrel					LOGGED BY: Daniel B. Haug, P.G.				
HAMMER WEIGHT: NA			DROP: NA		RESPONSIBLE PROFESSIONAL: Daniel B. Haug, P.G.			REG. NO. 1773	

DEPTH (feet)	SAMPLES			OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter. Surface Elevation:	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample Blows/ Foot				
5					Sand, gravel, clay fill	
					SANDY CLAY (CH): layered yellowish-brown, moist, stiff, fine-grained sand, probable fill	
					SANDY CLAY - CLAYEY SAND (CH-SC): brown, moist, firm, fine-grained sand, probable fill	
10					SANDY CLAY (CH): brown and olive brown layered (fill); moist, stiff, fine-grained sand	
15					Probably fill above 14'	
					SANDY CLAY (CL): yellowish-brown, moist, firm, fine-grained sand, black organic streaks	
20					SANDY CLAY (CH): yellowish-red, very moist, fine-grained sand, soft	
					CLAY (CH): dark reddish-brown, moist, firm	
25					Lignite, black, moist, firm 22.5'-23'	
					SANDY CLAY (CL): light yellowish-brown, moist, stiff, fine-grained sand	

WELL3

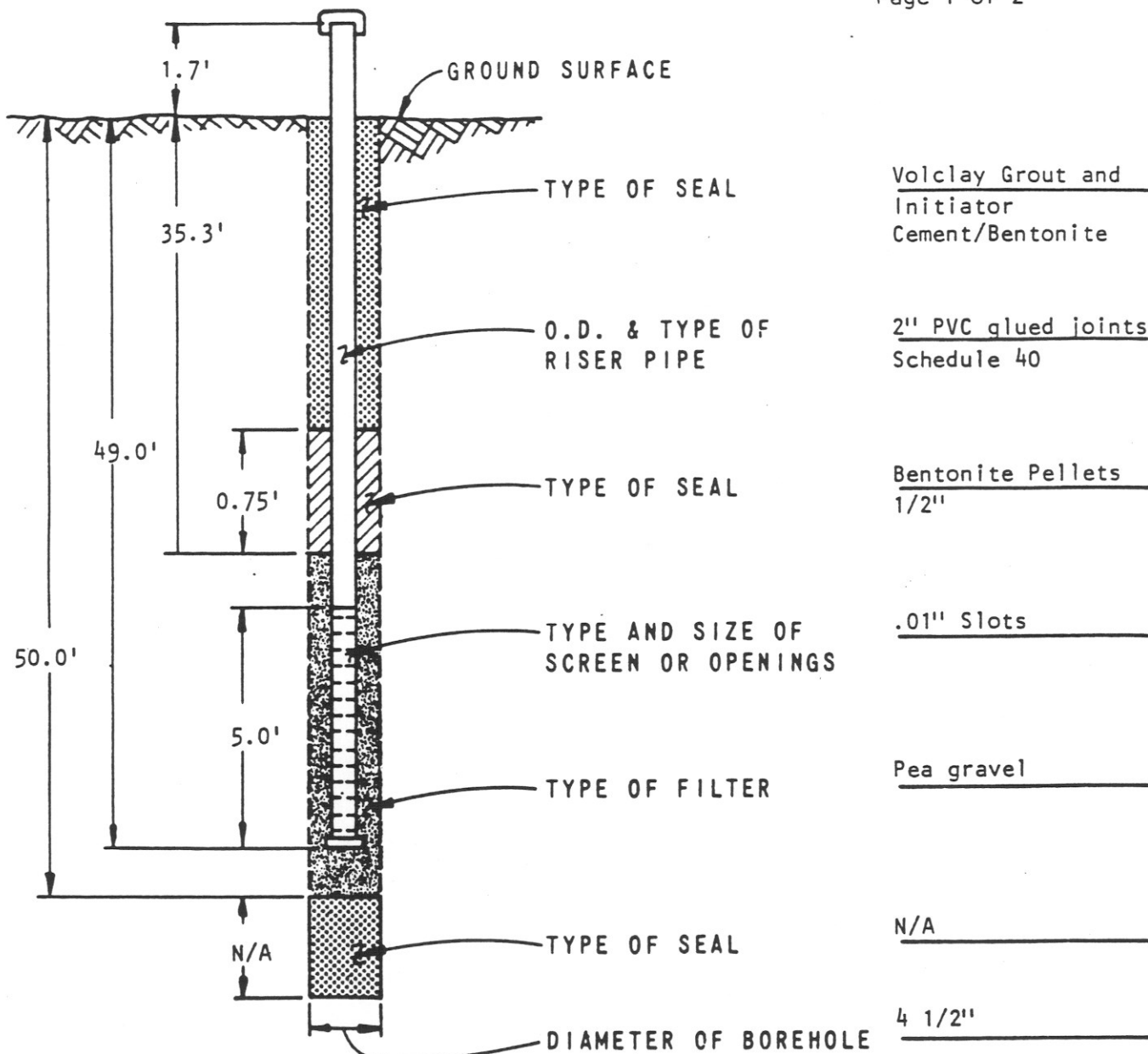
PROJECT: TMPA Gibbons Creek Plant Carlos, Texas						Log of Well No. SSP MW-4 (cont'd)	
DEPTH (feet)	SAMPLES				OVM Reading	DESCRIPTION NAME (USCS): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
	Sample No.	Sample	Blows/ Foot	Foot			
30						SANDY CLAY (CL): light yellowish-brown, moist, very stiff, fine-grained sand, ferrous streaks	
						SANDY CLAY (CL): light yellowish-brown, moist, very stiff, fine-grained sand, ferrous streaks	
35						Lignite, black, moist, firm 34.75'-35.25'	
						SANDY CLAY (CL): dark grayish-brown, dry, hard, fine-grained sand	
40						Lignite, dark brown, dry, hard 38.25'-38.75'	
						SANDY CLAY (CL): dark grayish-brown, dry, hard, fine-grained sand, interbedded black clay lenses Interbedded sand and clay to 44.75'; CLAY (CH): black, dry, hard and; SAND (SP): olive gray, dry, dense	
45						SAND (SP): olive gray, moist, dense, fine-grained sand, wet	
						SANDY CLAY (CL): dark gray, moist, wet at 45'-46' (sandier interval), moist to dry below 46', hard, fine-grained sand	
50						Total Depth = 50'	
55							

WELL3




CLIENT Texas Municipal Power Agency		PROJECT Gibbons Creek		PROJECT NO 14578
PROJECT LOCATION Carlos, Texas		COORDINATES N378330 E3339148	GROUND ELEVATION 266.8'	DATE 2-26-88
STRATUM MONITORED Sandstone and clay			INSPECTOR K. M. Blevins-McCosh	
CHECKED BY M. C. Schluter		APPROVED BY L. J. Almaleh		

Page 1 of 2



METHOD OF INSTALLATION: Boring drilled to completion; set riser pipe and screen; placed filter and seal; grouted to surface; poured surface pad

REMARKS: Installed piezometer in fluid-filled hole; added approximately 2 gallons of bentonite pellets for seal but only 9" arrived at 35'- rest hung up- didn't have any more bentonite developed well on 2-27-88 by flushing w/clean water for 3 minutes and blowing it out w/air

CLIENT Texas Municipal Power Agency										PROJECT Gibbons Creek SES					PROJECT NO. 14578					
PROJECT LOCATION Carlos, Texas					COORDINATES N378329 E3339148					ELEVATION (DATUM) 266.7'			TOTAL DEPTH 50'		DATE START 2-26-88					
SURFACE CONDITIONS Clearing in woods										INSPECTOR K. M. Blevins-McCosh					DATE FINISH 2-26-88					
SAMPLING SAMP SAMP SET 2ND 3RD N SAMP TYPE NO. 6" 6" 6" VAL REC'D										CHECKED BY M. C. Schluter					APPROVED BY L. J. Almaleh					
CORING CORE RUN RUN RUN RQD % SIZE NO. LENG RECV RECV RECV RQD										DEPTH IN FEET		SAMPLE TYPE GRAPHICS LOG		CLASSIFICATION OF MATERIAL					REMARKS	
TW	1					1.6	1		Silty CLAY; reddish-brown; stiff; high plasticity; moist; organics; roots; iron staining (Top soil)					Advanced boring w/4 1/2" rotary wash						
TW	2					0.8	2		Grading brown w/some sand; trace gravel below 2'					pp. 2.75						
TW	3					1.1	3		Grading w/some sandstone seams and some gravel w/trace roots below 4'											
TW	4					1.2	4													
TW	5					1.4	5													
TW	6					1.2	6		Sandy CLAY; tan to buff; stiff; low plasticity; moist; iron stained; w/trace gravel and some silt											
TW	7					1.5	7													
TW	8					1.3	8		Clayey SILT; tan to buff; hard; high plasticity; moist; some sand; iron staining especially on joints; joints spaced 2-6" horizontal											
TW	9					1.5	9													
TW	10					1.5	10													
TW	11					1.8	11													
TW	12					1.9	12													
TW	13					1.9	13													
TW	14					1.7	14													
TW	15					2.0	15													
							16	Interbedded with silty sand below 10'												
							17	Grading tan to brown with iron nodules and few cemented sand fragments; platy below 12'												
							18	Blocky structure below 14'												
							19	Cemented sand grades out below 14';												
							20													
							21	CLAY; greenish-grey; hard; high plasticity; moist w/silt filled joints and some silt; trace sand; trace lignite 22'-24'												
							22													
							23	Grading greenish-grey and dark grey banded below 23'												
							24													
							25													
							26	Slickensided below 26'												
							27													
							28													
							29													
							30													

CLIENT Texas Municipal Power Agency							PROJECT Gibbons Creek SES			PROJECT NO. 14578	
PROJECT LOCATION Carlos, Texas			COORDINATES N378329 E3339148			ELEVATION (DATUM) 266.7'		TOTAL DEPTH 50'		DATE START 2-26-88	
SURFACE CONDITIONS Clearing in woods							INSPECTOR K. M. Blevins-McCosh			DATE FINISH 2-26-88	
SAMPLING							CHECKED BY M. C. Schluter		APPROVED BY L. J. Almaleh		
SAMP TYPE	SAMP NO.	SET 6"	2ND 6"	3RD 6"	N VAL	SAMP RECV					
CORING							DEPTH IN FEET	SAMPLE TYPE GRAPHICS LOG	CLASSIFICATION OF MATERIAL		REMARKS
CORE SIZE	RUN NO.	RUN LENG	RUN RECV	RQD RECV	% RECV	RQD					
TW	16					1.8	1		Trace pyrite below 32'		pp. 4+
TW	17					1.9	2				
TW	18					1.9	3		Bands grading out below 34'		
TW	19					2.0	4				
TW	20					1.7	5		Trace lignite below 41'		pp. 4+
TW	21					1.9	6		Grading dark grey below 42'; 1/2" silt seam at 42.3'		
TW	22					2.0	7				
TW	23					1.1	8				
TW	24					0	9		Silty CLAY; dark grey; hard; high plasticity; dry; some iron staining		pp. 4+
							10				
							11				
							12				
3"	1	2	48' 1.3	0.3	65	17	13		SANDSTONE; argillaceous; grey; fine grained; slightly weathered; w/trace lignite; horizontal joints		TW 24 no sample cored w/2' core barrel
							14				
							15				
							16				
			50'				17				Bottom of boring 49.8'. Groundwater level unknown. Reamed 0-3' w/6 7/8" bit Reamed 3-50' w/4 1/2" bit. Installed 2-20' sections of 2" PVC pipe; 1-7.2' section of 2" PVC and 1-5' screen.
							18				
							19				
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							50				

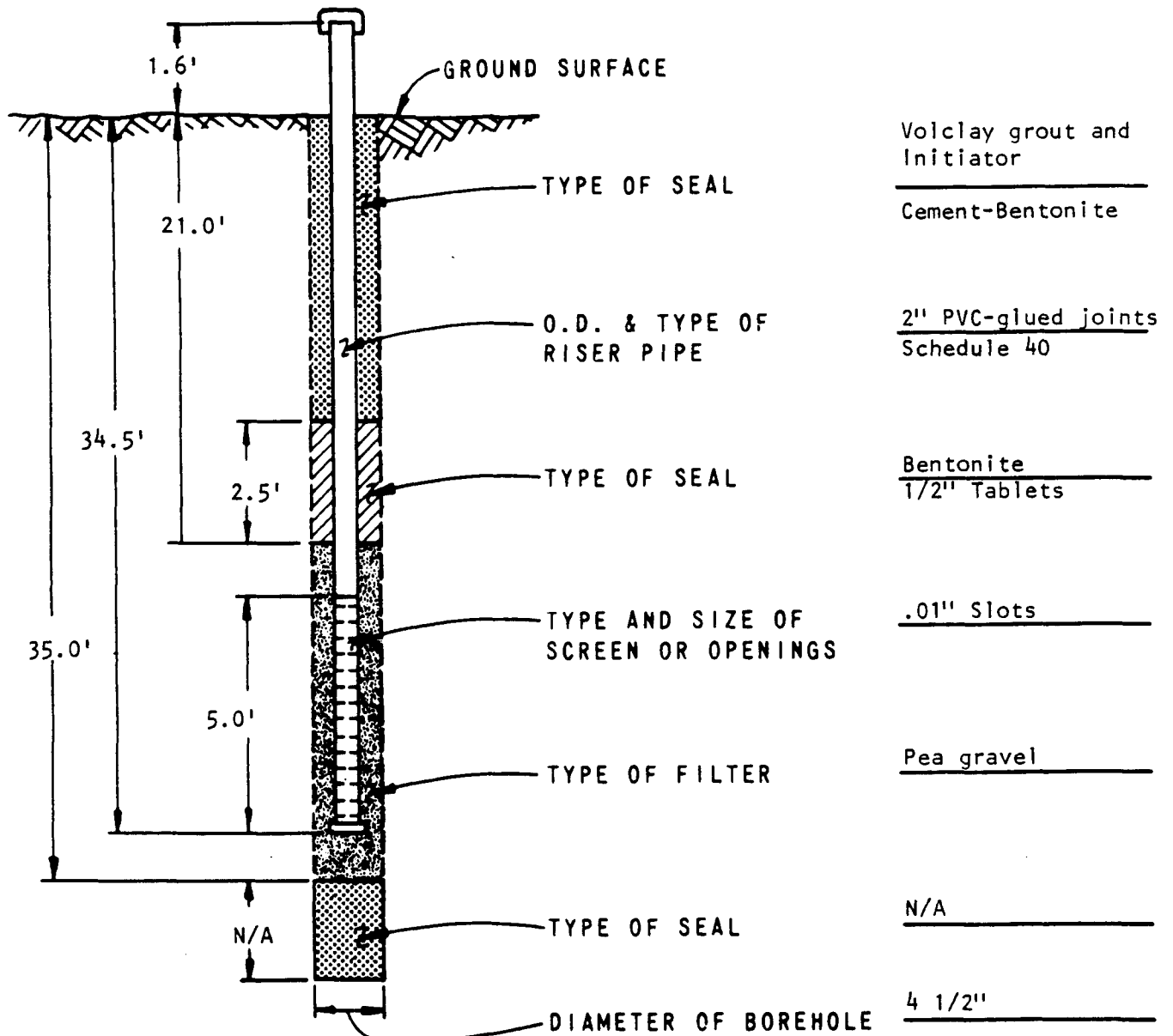


BLACK & VEATCH
CONSULTING ENGINEERS

PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-15

CLIENT Texas Municipal Power Agency		PROJECT Gibbons Creek	PROJECT NO 14578
PROJECT LOCATION Carlos, Texas	COORDINATES N378200 E3342496	GROUND ELEVATION 261.5'	DATE 2-23-88
STRATUM MONITORED Sandstone		INSPECTOR K. M. Blevins-McCosh	
CHECKED BY M. C. Schluter	APPROVED BY L. J. Almaleh		



METHOD OF INSTALLATION: Boring drilled to completion; set riser pipe and screen; placed filter and seal; grouted to surface; poured surface pad.

REMARKS: Flushed cuttings from hole; hole remained fluid filled during installation. Developed well on 2-27-88 by flushing well with clean water for 6 min. blew out water from well with air compressor water level recorded at 23'-10" from TOC

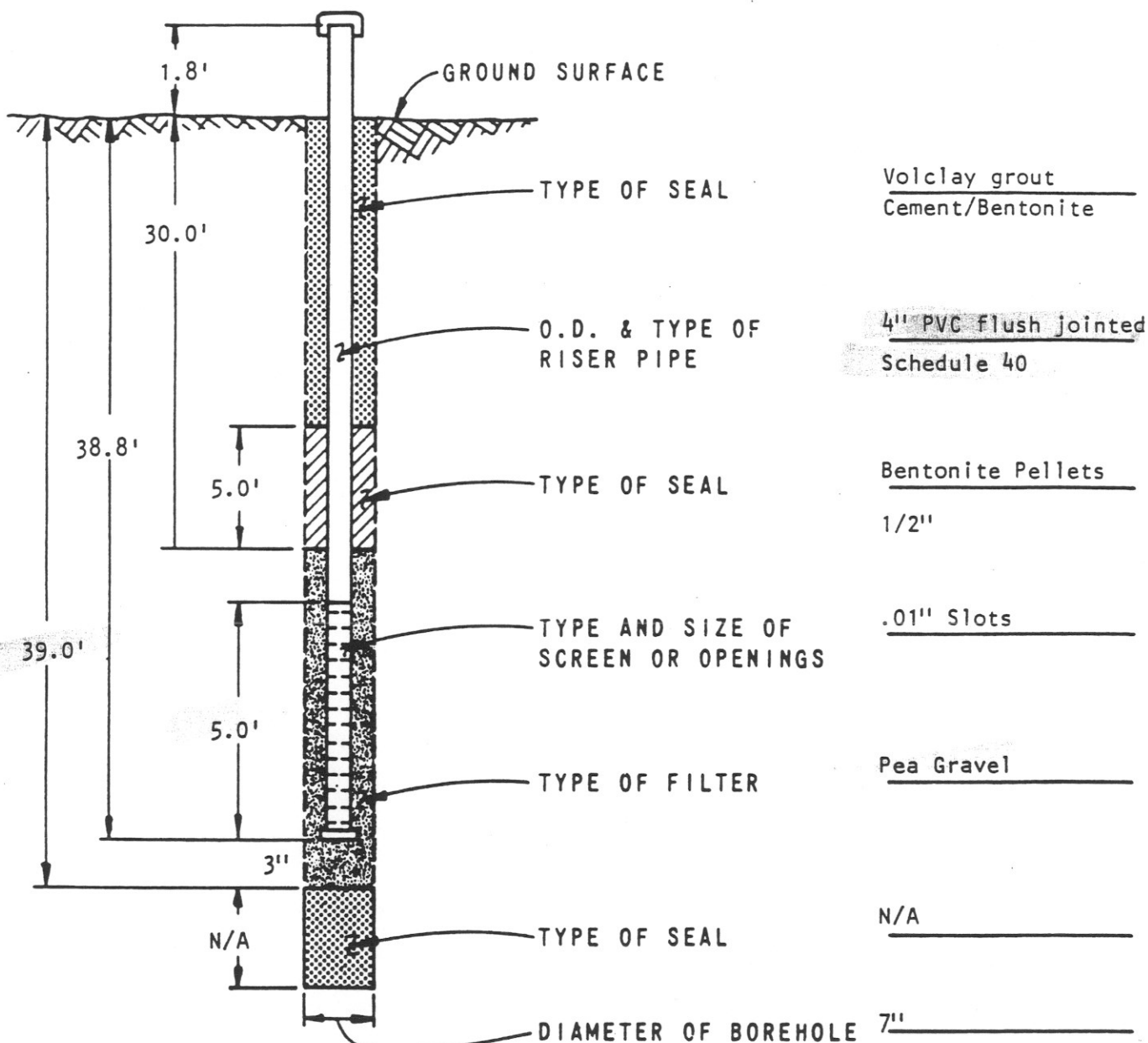
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CLIENT Texas Municipal Power Agency							PROJECT Gibbons Creek SES			PROJECT NO. 14578		
PROJECT LOCATION Carlos, Texas				COORDINATES N378200 E3342496			ELEVATION (DATUM) 261.5'		TOTAL DEPTH 35.0'		DATE START 2-23-88	
SURFACE CONDITIONS Open pasture							INSPECTOR K. M. Blevins-McCosh			DATE FINISH 2-23-88		
SAMPLING							CHECKED BY M. C. Schluter		APPROVED BY L. J. Almaleh			
SAMP TYPE	SAMP NO.	SET 6"	2ND 6"	3RD 6"	N VAL	SAMP RECV	DEPTH IN FEET	SAMPLE TYPE GRAPHICS LOG	CLASSIFICATION OF MATERIAL		REMARKS	
CORE SIZE	RUN NO.	RUN LENG	RUN RECV	RQD RECV	% RECV	RQD						
TW	1					1.2	1		Undifferentiated overburden		Advanced hole using 4 1/2" rotary wash	
TW	2					0.8	2		Silty <u>CLAY</u> ; brown; medium dense; stiff to hard; low plasticity; moist; some sand Grading to more silt at 3'-3.5'			
TW	3					0.5	3					
TW	4					0.8	4		Sandy <u>CLAY</u> ; tan to brown; hard; low plasticity; moist; trace silt		pp. 4+	
3"	1	2	10'	0	0	0	5					
3"	2	2	12'	0	65	0	6		Clayey <u>SAND</u> ; tan to brown; poorly graded; fine grained; some silt; iron staining		Tried to push TW Tried SPT - cored at 10' so reamed w/rotary wash looked at cuttings	
3"	3	2	14'	0	60	0	7		<u>SANDSTONE</u> ; argillaceous; yellowish-tan; fine to medium grained; iron staining; highly weathered		Sample recovery below 12' in 1-3" sections	
3"	4	2	16'	0	0	0	8		Argillaceous grading out below 14'			
3"	5	2	18'	0	0	0	9		Grading grey below 16'			
3"	6	5	20'	0	0	0	10		Iron staining on joints below 20'		Missed sample at 18-20' rotary washed. Continued drilling with 3" diameter 5' core barrel below 20'.	
3"	7	5	25'	0.33	90	7	11		Lignite partings starting at 21.7'			
3"	8	5	30'	0.83	80	12	12		Grading greenish-grey below 23' and slightly argillaceous			
							13		Lignite partings grading out below 27.5'			
							14					
							15					
							16					
							17					
							18					
							19					
							20					
							21					
							22					
							23					
							24					
							25					
							26					
							27					
							28					
							29					
							30					

CLIENT Texas Municipal Power Agency							PROJECT Gibbons Creek SES			PROJECT NO. 14578				
PROJECT LOCATION Carlos, Texas				COORDINATES N378200 E3342496			ELEVATION (DATUM) 261.5'		TOTAL DEPTH 35.0'		DATE START 2-23-88			
SURFACE CONDITIONS Open pasture							INSPECTOR K. M. Blevins-McCosh			DATE FINISH 2-23-88				
SAMPLING SAMP SAMP SET 2ND 3RD N SAMP TYPE NO. 6" 6" 6" VAL RECV							CHECKED BY M. C. Schluter			APPROVED BY L. J. Almaleh				
CORING CORE RUN RUN RUN RQD % SIZE NO. LENG RECV RECV RECV RQD							DEPTH IN FEET		SAMPLE TYPE GRAPHICS LOG		CLASSIFICATION OF MATERIAL		REMARKS	
3" 8 5 30' 2.2 0 44 0							1				Horizontal fractures spaced generally from 1-3" apart; numerous lignite partings below 30'			
							2							
							3							
							4							
35'							35						Bottom of boring 35'. Ground water level unknown. Reamed hole using 4 1/2" bit. Flush cuttings out of hole installed 1-20' section and 1-11' section of 2" PVC and 5' section of screen.	
							6							
							7							
							8							
							9							
							40							
							1							
							2							
							3							
							4							
							45							
							6							
							7							
							8							
							9							
							50							
							1							
							2							
							3							
							4							
							55							
							6							
							7							
							8							
							9							
							60							



CLIENT Texas Municipal Power Agency		PROJECT Gibbons Creek		PROJECT NO 14578
PROJECT LOCATION Carlos, Texas		COORDINATES N379581 E3339416	GROUND ELEVATION 261.7'	DATE 2-25-88
STRATUM MONITORED Sandstone			INSPECTOR K. M. Blevins-McCosh	
CHECKED BY M. C. Schluter		APPROVED BY I. J. Almaleh		



METHOD OF INSTALLATION:
Boring drilled to completion; set riser pipe and screen; placed filter and seal; grouted to surface; poured surface pad

REMARKS: Cuttings washed from hole; piezometer installed in fluid-filled hole; well developed on 2-27-88 by flushing hole w/clean water for 8 min. and pumping until dry. Water level recorded at 38.2' from TOC.

CLIENT Texas Municipal Power Agency										PROJECT Gibbons Creek SES				PROJECT NO. 14578			
PROJECT LOCATION Carlos, Texas					COORDINATES N379581 E3339416					ELEVATION (DATUM) 261.7'		TOTAL DEPTH 39.0'		DATE START 2-25-88			
SURFACE CONDITIONS Clearing in woods										INSPECTOR K. M. Blevins-McCosh				DATE FINISH 2-25-88			
SAMPLING SAMP TYPE SAMP NO. SET 6" 2ND 6" 3RD 6" N VAL SAMP RECV										CHECKED BY M. C. Schluter				APPROVED BY L. J. Almaleh			
CORING CORE SIZE RUN NO. RUN LENG RUN RECV RQD RECV % RECV RQD										DEPTH IN FEET		SAMPLE TYPE GRAPHICS LOG		CLASSIFICATION OF MATERIAL		REMARKS	
TW	1						0.7	1			Silty <u>CLAY</u> ; dark brown; medium dense; high plasticity; moist; organics; roots (Top soil)	Boring advanced using 6 7/8" rotary wash					
TW	2						1.5	2			<u>CLAY</u> ; dark brown; stiff; high plasticity; moist; some silt						
								3				pp. 1.25					
TW	3						1.1	4			Trace gravel and iron staining below 4'	pp. 1.5					
								5									
TW	4						1.8	6				pp. 2.0					
								7			Silty <u>CLAY</u> ; brown; stiff; high plasticity; moist; iron staining; jointed						
TW	5						1.7	8			Gypsum seam at 7.5' and 9'; slickensided below 7'						
								9									
TW	6						1.8	10			Horizontal and 45° to vertical joints below 10' filled w/gypsum crystals and iron staining	pp. 2.5					
								1				pp. 2.75					
TW	7						1.5	2									
								3									
TW	8						1.7	4			Gypsum filled vertical joint at 14'- joint is 4" long; banded brown and dark brown below 14'. Gypsum filled joint spacing generally 8"-1.5'	pp. 2.75 pp. 3.5					
								15									
TW	9						1.7	6				pp. 3.0					
								7									
TW	10						1.7	8			<u>CLAY</u> ; olive grey to dark grey; hard; high plasticity; moist; with silt seams on joints below 20'; trace iron staining; trace sand in joints; occasional silty sand pockets below 16'; thinly bedded	pp. 4+					
								9									
TW	11						1.6	20				pp. 4+					
								1									
TW	12						1.3	2				pp. 4+					
								3									
								4				pp. 4+					
TW	13						1.3	25				pp. 4+					
								6									
TW	14						1.2	7									
								8									
								9			Lignitic below 29' - lignite seams up to 1"						
	15						0.4	30									

CLIENT Texas Municipal Power Agency							PROJECT Gibbons Creek SES			PROJECT NO. 14578				
PROJECT LOCATION Carlos, Texas				COORDINATES N379581 E3339416			ELEVATION (DATUM) 261.7'		TOTAL DEPTH 39.0'		DATE START 2-25-88			
SURFACE CONDITIONS Clearing in woods							INSPECTOR K. M. Blevins-McCosh			DATE FINISH 2-25-88				
SAMPLING SAMP SAMP SET 2ND 3RD N SAMP TYPE NO. 6" 6" 6" VAL RECV							CHECKED BY M. C. Schluter			APPROVED BY L. J. Almaleh				
CORING CORE RUN RUN RUN RQD % SIZE NO. LENG RECV RECV RECV RQD							DEPTH IN FEET		SAMPLE TYPE GRAPHICS LOG		CLASSIFICATION OF MATERIAL		REMARKS	
3"	1	1	0.2 31'	0	20	0	1			SANDSTONE; argillaceous; greenish-grey; fine grained; weathered				
TW	16					0.5	2			Clayey SAND; greenish-grey; partially cemented; fine grained; poorly graded; some silt (maybe extremely weathered sandstone)				
3"	2	5	34' 4'	1.3	80	26	3							
							4			SANDSTONE; argillaceous; greenish-grey; fine grained; weathered; w/lignite seams; horizontal and vertical joints - weathering on joints				
			39'				35							
							6							
							7							
							8							
							9							
							40							
							1							
							2							
							3							
							4							
							45							
							6							
							7							
							8							
							9							
							50							
							1							
							2							
							3							
							4							
							55							
							6							
							7							
							8							
							9							
							60							

Bottom of boring
at 39'.
Groundwater level
unknown. Reamed
hole w/6 7/8" bit.
Installed 3-10'
sections 4" PVC
and 1-5.8' section
4" PVC; set 1-5'
section .01" slot
screen.

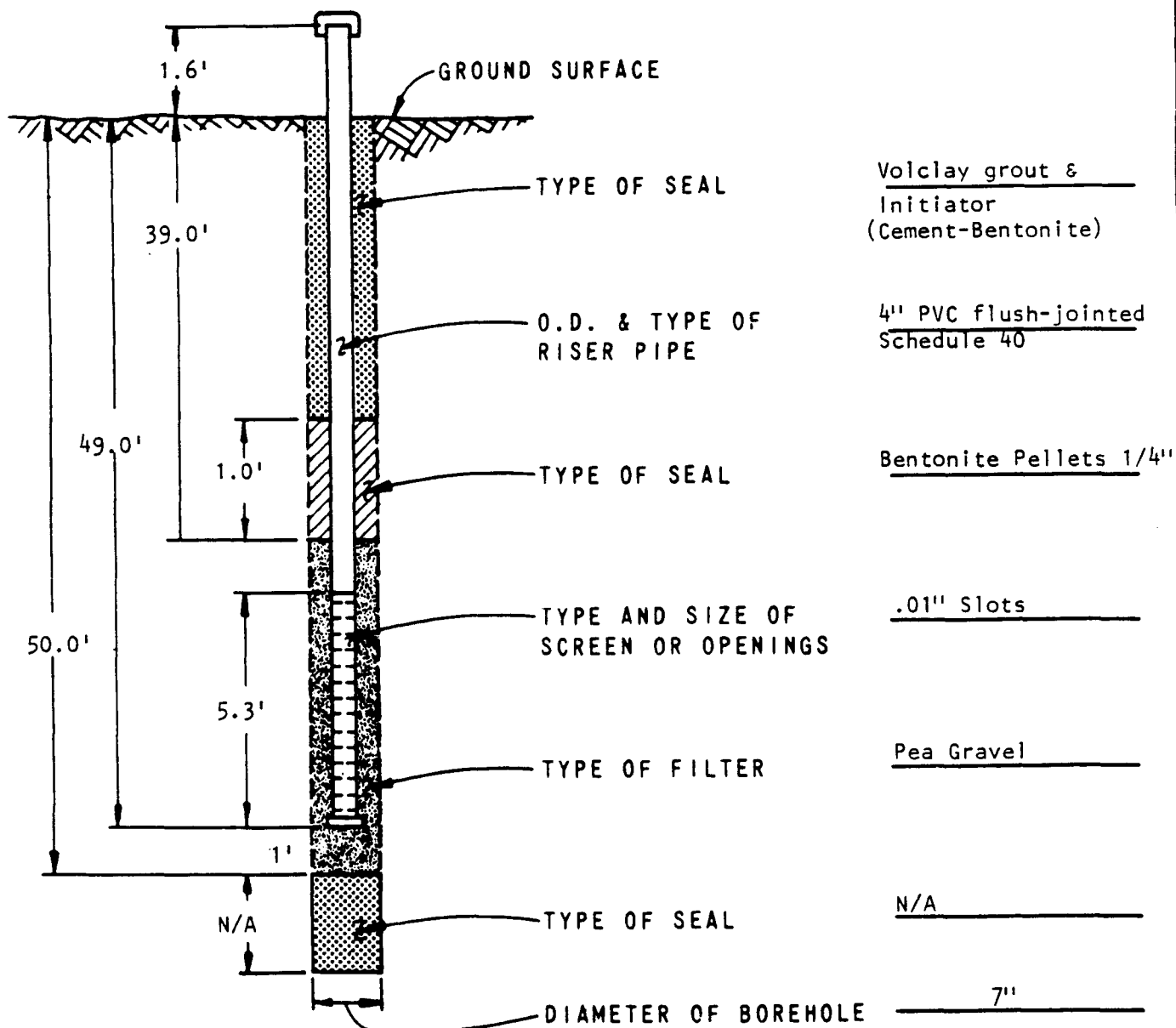


BLACK & VEATCH
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PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-17

CLIENT Texas Municipal Power Agency		PROJECT Gibbons Creek	PROJECT NO 14578
PROJECT LOCATION Carlos, Texas	COORDINATES N381087 E3340991	GROUND ELEVATION 292.3'	DATE 2-17-88
STRATUM MONITORED Clay		INSPECTOR K. M. Blevins-McCosh	
CHECKED BY M. C. Schluter	APPROVED BY I. J. Almaleh		



METHOD OF INSTALLATION Boring drilled to completion; set riser pipe and screen; placed filter and seal; grouted to within 5' of ground surface filled remaining 5' with dry grout and cuttings

REMARKS Developed well on 2-27-88 by flushing w/clean water for 7 min.; pumped well dry; water level recorded at 48.5' from TOC.

P-ST-021B

CLIENT Texas Municipal Power Agency							PROJECT Gibbons Creek SES			PROJECT NO. 14578				
PROJECT LOCATION Carlos, Texas				COORDINATES N381083 E3340991			ELEVATION (DATUM) 292.3'		TOTAL DEPTH 50.0'		DATE START 2-17-88			
SURFACE CONDITIONS Clearing in pasture							INSPECTOR K. M. Blevins-McCosh			DATE FINISH 2-17-88				
SAMPLING SAMP SAMP SET 2ND 3RD N SAMP TYPE NO. 6" 6" 6" VAL RECV							CHECKED BY M. C. Schluter			APPROVED BY L. J. Almaleh				
CORING CORE RUN RUN RUN RQD % SIZE NO. LENG RECV RECV RECV RQD							DEPTH IN FEET		SAMPLE TYPE GRAPHICS LOG		CLASSIFICATION OF MATERIAL		REMARKS	
							1		10" Undifferentiated overburden		Advanced hole by rotary wash			
TW 1							1.5		Silty CLAY; brown; stiff; med. plasticity; very moist; w/some roots		pp. 1.0			
TW 2							1.2		Roots grade out below 3' Grading grey below 2.5 with trace sand		pp. 4+			
TW 3							1.1		1" sand layer at 4.25'		pp. 4+			
TW 4							0.9		Clayey SILT; brown to tan; hard; poorly graded; moist; with sand; trace lignite below 11'					
TW 5							1.2							
TW 6							0.9							
TW 7							0.7		CLAY; tan; hard; high plasticity; moist with cemented sand stringers; platy in areas with iron staining at plate faces		pp. 4+			
TW 8							1.3		Grading silty with 2" sandy silt seam at approximately 15.7'					
TW 9							1.5		Clayey SILT; tan to buff; hard; low plasticity; moist; with some sand and iron staining on plates					
TW 10							0.9		Sandy SILT; tan to buff; poorly graded; moist with some clay; trace iron staining					
TW 11							0.8		Silty CLAY; brown/tan mottled; hard; high plasticity; moist; with trace sand and iron staining; platy					
TW 12							1.2		3" sandy silt layer at 22.5'; grading brown below 23					
TW 13							1.8		CLAY; brown; hard; high plasticity; moist; iron staining on plates and joints; gypsum crystals at 25.8'		pp. 4+			
TW 14							1.2		Clayey SILT; brown; high plasticity; moist; iron staining					
TW 15							1.4		CLAY; greenish-grey; high plasticity; hard; moist; with trace silt; trace iron					

CLIENT Texas Municipal Power Agency							PROJECT Gibbons Creek SES			PROJECT NO. 14578				
PROJECT LOCATION Carlos, Texas			COORDINATES N381083 E3340991			ELEVATION (DATUM) 292.3'		TOTAL DEPTH 50.0'		DATE START 2-17-88				
SURFACE CONDITIONS Clearing in pasture							INSPECTOR K. M. Blevins-McCosh			DATE FINISH 2-17-88				
SAMPLING SAMP TYPE SAMP NO. SET 6" 2ND 6" 3RD 6" N VAL SAMP RECV							CHECKED BY M. C. Schluter			APPROVED BY L. J. Almaleh				
CORING CORE SIZE RUN NO. RUN LENG RUN RECV RQD RECV % RECV RQD							DEPTH IN FEET		SAMPLE TYPE GRAPHICS LOG		CLASSIFICATION OF MATERIAL		REMARKS	
TW 16							2.0		1		Grading to trace silt below 35'			
TW 17							1.8		2					
TW 18							1.8		3					
TW 19							1.7		4					
TW 20							1.9		35		Grading to laminated banded (greenish-grey and grey) below 38' with trace lignite at 39.8';			
TW 21							1.9		6					
TW 22							1.8		7					
TW 23							2.0		8					
TW 24							1.8		40		Banding grading out below 44'			
TW 25							1.6		1					
									2					
									3					
									4		Banded below 47'			
									45					
									6					
									7					
									8		Bottom of boring at 50'. Groundwater level unknown. Hole reamed using 6 1/2" diameter auger bit.			
									9					
									50					
									1					
									2		Set 4-10' and 1-4.6' section of 4" diameter schedule 40 threaded flush-jointed PVC pipe, 5' screen.			
									3					
									4					
									55					
									6					
									7					
									8					
									9					
									60					

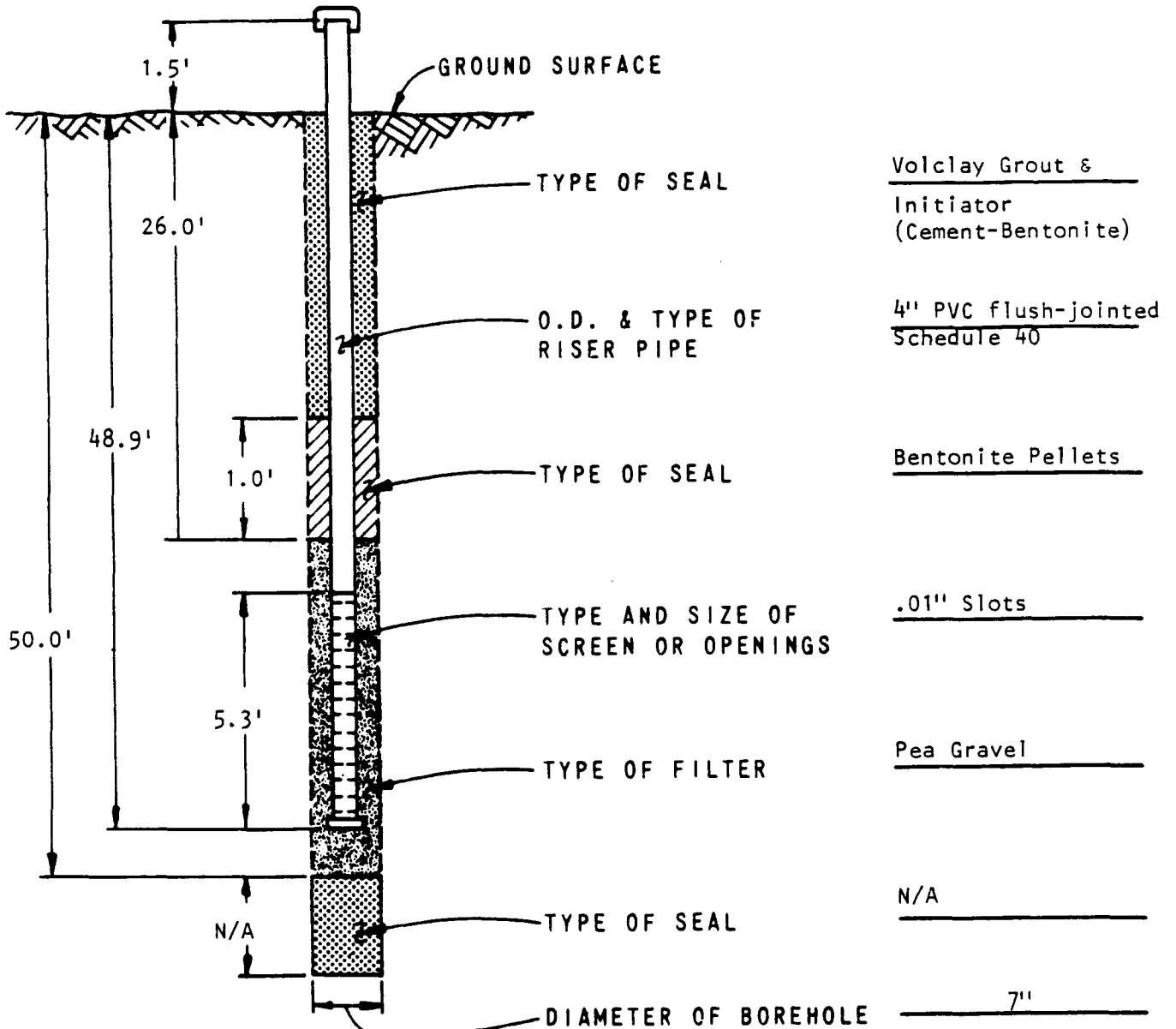


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PIEZOMETER INSTALLATION LOG

PIEZOMETER NO. B-18

CLIENT Texas Municipal Power Agency		PROJECT Gibbons Creek		PROJECT NO 14578
PROJECT LOCATION Carlos, Texas		COORDINATES N381539 E3342922	GROUND ELEVATION 269.1'	DATE 2-18-88
STRATUM MONITORED Clay			INSPECTOR K. M. Blevins-McCosh	
CHECKED BY M. C. Schluter		APPROVED BY L. J. Almaleh		



METHOD OF INSTALLATION: Boring drilled to completion; set riser pipe and screen; placed filter and seal; grouted to surface; poured surface pad.

REMARKS: Riser pipe started to rise so had to fill with water during installations; well developed on 2-27-88 by flushing w/clean water for 7 min., and then pumping well dry. Water level 50' from TOC.

P-ST-0218

CLIENT Texas Municipal Power Agency										PROJECT Gibbons Creek SES				PROJECT NO. 14578	
PROJECT LOCATION Carlos, Texas					COORDINATES N381539 E3342922					ELEVATION (DATUM) 269.1		TOTAL DEPTH 50.0'		DATE START 2-17-88	
SURFACE CONDITIONS Clearing in pasture										INSPECTOR K. M. Blevins-McCosh				DATE FINISH 2-17-88	
SAMPLING							CHECKED BY M. C. Schluter				APPROVED BY L. J. Almaleh				
SAMP TYPE	SAMP NO.	SET 6"	2ND 6"	3RD 6"	N VAL	SAMP REC'D									
CORING							DEPTH IN FEET	SAMPLE TYPE GRAPHICS LOG	CLASSIFICATION OF MATERIAL				REMARKS		
CORE SIZE	RUN NO.	RUN LENG	RUN REC'D	RQD REC'D	% REC'D	RQD									
							1		Undifferentiated overburden				Boring advanced using 4 1/2" rotary wash		
							2								
							3								
TW	1					0.6	4		Sandy <u>SILT</u> ; tan; poorly graded; moist; with cemented sand stringers; some clay; iron staining						
							5								
TW	2					1.5	6		Clayey <u>SILT</u> ; reddish-brown; hard; high plasticity; moist; trace sand; iron staining; grading some sand below 7'						
							7								
TW	3					1.3	8						pp. 4+		
							9								
TW	4					1.7	10		Sandy <u>SILT</u> ; reddish-brown; poorly graded; moist; with clay and iron staining; grading to silty clay; interbedding with lignitic clay below 10'; few gypsum crystals						
							1								
TW	5					1.3	2								
							3								
TW	6					1.5	4		Silty <u>CLAY</u> ; dark brown to black; hard; highly plastic; moist; lignitic; iron staining; with trace sand below 16'				pp. 4+		
							15								
TW	7					0.9	6								
							7								
TW	8					0.9	8						pp. 4+		
							9								
TW	9					0.7	9		Silty <u>SAND</u> ; tan; poorly graded; moist; trace clay; iron staining				pp. 4+		
							20								
TW	10					1.4	1		Clayey <u>SILT</u> ; greenish-grey; highly plastic; moist; with trace thin silty sand laminae; trace iron staining						
							2								
							3								
TW	11					1.8	4								
							25								
TW	12					0.8	6		Sandy <u>SILT</u> ; greenish-grey; poorly graded; moist; with trace to some clay						
							7								
TW	13					1.2	8		Silty <u>CLAY</u> ; greenish-grey; high plasticity; moist; with some sandy silt layers						
							9								
TW	14					1.3	30								

CLIENT Texas Municipal Power Agency							PROJECT Gibbons Creek SES			PROJECT NO. 14578				
PROJECT LOCATION Carlos, Texas				COORDINATES N381539 E3342922			ELEVATION (DATUM) 269.1		TOTAL DEPTH 50.0'		DATE START 2-17-88			
SURFACE CONDITIONS Clearing in pasture							INSPECTOR K. M. Blevins-McCosh			DATE FINISH 2-17-88				
SAMPLING SAMP SAMP SET 2ND 3RD N SAMP TYPE NO. 6" 6" 6" VAL RECV							CHECKED BY M. C. Schluter			APPROVED BY L. J. Almaleh				
CORING CORE RUN RUN RQD % SIZE NO. LENG RECV RECV RECV RQD							DEPTH IN FEET		SAMPLE TYPE GRAPHICS LOG		CLASSIFICATION OF MATERIAL		REMARKS	
TW	15					1.4	1		2" sandy silt seam at 32.5'; grading to low plasticity; sandy silt filled fractures spacing about 4" in sample					
TW	16					1.4	2							
							3		Grading to interbedded green and greenish grey silty clay below 34'; trace cemented sand					
TW	17					1.5	4							
							35							
TW	18					0.9	6							
							7							
							8		2" sandy silt seam at 37.8'					
TW	19					2.0	9		Grading greenish-grey below 38'					
							40							
TW	20					2.1	1		Grading to high plasticity below 40'; sandy silt seam grading out; becoming greenish grey and grey banded clay					
							2							
TW	21					2.0	3							
							4							
TW	22					1.7	45		Slickensides at 44.5'					
							6							
TW	23					1.9	7							
							8							
TW	24					1.6	9							
							50							
							1							
							2							
							3							
							4							
							55							
							6							
							7							
							8							
							9							
							60							

Bottom of boring at 50'.
Groundwater level unknown. Reamed hole twice using 6 3/4" auger bit. Installed 4-10' and 1-5.5' section of 4" PVC, 1-5' section of screen.