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American Electric Power Service Corporation

Landfill - CCR Groundwater Monitoring Well Network Evaluation

J. Robert Welsh Power Plant
1187 County Road 4865
Titus County
Pittsburg, Texas

May 2, 2016

ARCADIS

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Tables

Figures

Appendices

Acronyms and Abbreviation

AEP	American Electric Power Service Cooperation
amsl	above mean sea level
ARCADIS	ARCADIS U.S., Inc.
BAP	bottom ash pond
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
EPRI	Electric Power Research Institute
FAP	fly ash pond
FGD	flue gas desulfurization
ft	feet
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
PTI	Permit to Install
TDS	total dissolved solids

1. Objective

This report was prepared by ARCADIS U.S., Inc. (ARCADIS) for American Electric Power Service Corporation (AEP) to assess the adequacy of the groundwater monitoring well network included in the Coal Combustion Residual (CCR) requirements, as specified in Code of Federal Regulations (CFR) 40 CFR 257.91, for the existing landfill (CCR Unit) at the AEP J. Robert Welsh Generating Plant (Plant) located at 1187 County Road 4865 in Pittsburg, Titus County, Texas (**Figure 1**). The CCR requirements include an evaluation of the adequacy of the groundwater monitoring well network to characterize groundwater quality up and down gradient of the CCR unit.

Three regulated CCR units associated with the Plant were identified for review, which include the primary ash pond, existing landfill, and bottom ash storage pond (**Figure 2**). This report summarizes the evaluation of the groundwater monitoring well network in the uppermost aquifer at the existing landfill (landfill). The evaluation of location restriction criteria is not included in this report and will be completed under separate cover.

This evaluation included a review of AEP-provided data associated with previously completed subsurface investigation activities in the vicinity of the landfill CCR unit, as well as publically-available geologic and hydrogeologic data. This report also presents the current Conceptual Site Model based on all documents reviewed and will further describe the uppermost aquifer, include an evaluation of the adequacy of the existing monitoring well network, and provide recommendations for monitoring well augmentation, as necessary.

2. Background Information

This section provides background information for the AEP Welsh Generating Plant landfill.

2.1 Facility Location Description

The AEP J. Robert Welsh Plant is located in southern Titus County, approximately 8 miles northeast of Pittsburg, Texas, and approximately two miles northwest of Cason, Texas. The landfill CCR unit is located approximately 2,000 feet southwest of the Plant generating units, directly south of the primary ash pond CCR unit, and approximately 800 feet west of the Welsh Reservoir (**Figures 1** and **2**).

2.2 Description of Landfill CCR Unit

The following section will discuss the embankment configuration, area, volume, construction and operational history, and surface water control associated with the landfill.

2.2.1 Embankment Configuration

The landfill was placed into operation in approximately 1977, and is located in a topographically high area south of the primary ash pond. The landfill is approximately 40 acres in size, and is located directly above native clayey soils. The base of the landfill ranges in elevation from approximately 355 feet amsl on the west side to 345 feet amsl on the east side. These landfill base elevations were confirmed by soil borings installed through the landfill in 2014 (ETTL, 2015).

The western two thirds of the landfill is used as a temporary storage and processing area for marketable CCR that is sold for beneficial reuse including road base material. The eastern third of the landfill is an approximate 13-acre active ash disposal area where ash is placed above the base of the landfill to a top surface elevation that currently ranges from approximately 364 to 380 feet amsl.

Ash material had previously been placed into the landfill against an earthen embankment with 2:1 side slopes (2 feet horizontal, 1 foot vertical). However, to reduce the potential for slope failure, the side slopes of the landfill embankment were re-graded to 3:1 (3 feet horizontal, 1 foot vertical) in 2010.

2.2.2 Area/Volume

The landfill occupies an area of approximately 40 acres. A capacity analysis of the landfill was conducted by AEP in 2008 (AEP, 2008). The capacity analysis concluded the landfill has a maximum ash storage capacity of approximately 1,770,000 cubic yards beyond April 2008. Based on soil borings installed through the landfill (ETTL, 2015), the maximum ash thickness is approximately 33 feet, and the average ash thickness within the 40-acre landfill is approximately 20 feet. This corresponds to a current ash volume of approximately 800 acre-feet (1,290,000 cubic yards).

2.2.3 Construction and Operational History

The AEP J. Robert Welsh Plant began operations in 1977 with three coal-fired generating units (Units 1, 2, and 3). Throughout the life of the generating plant, CCR materials (fly ash, bottom ash, economizer ash) have been generated. All of these byproducts were stored in the primary ash pond and in the landfill that was constructed in the late 1970's. In 2000, the 22-acre bottom ash storage pond was installed south of the landfill (**Figure 3**).

The landfill received fly ash, bottom ash, and economizer ash from the generating plant. The ash was sluiced to the landfill between approximately 1982 and 2000. Currently, dry ash is trucked to the landfill. The landfill is also utilized for disposal of ash dredged from the bottom ash storage pond that was constructed in 2000. The ash is currently stored in the eastern third of the landfill, and the western two thirds of the landfill is currently used as a temporary storage and processing area for marketable ash material that is sold for beneficial reuse, loaded into trucks, and transported offsite for reuse (highway road base, etc.).

2.2.4 Surface Water Control

Surface water flow within the landfill is controlled by drainage ditches at the north and east toes of the landfill. Surface water in the drainage ditches flows to a culvert at the northeast corner of the landfill, then discharges into the primary ash pond directly north of the landfill.

2.3 Previous Investigations

The initial soils investigation for the site was provided in a 1973 report prepared by McClelland Engineers, Inc. entitled "*Soils Investigation, Welsh Power Plant, Cason,*

Texas". This investigation included advancement of soil borings in the primary ash pond area, and geotechnical soil testing to characterize the area encompassed by the primary ash pond.

In 2001, five monitoring wells (AD-1 through AD-5) were installed in the area of the primary ash pond and bottom ash storage pond to obtain hydrologic data for the uppermost water-bearing unit. Twelve additional monitoring wells (AD-4a, AD-4b, AD-4c, AD-6 through AD-14) were installed in the area of the primary ash pond, bottom ash storage pond, and landfill by Eagle Environmental Services in 2009 to obtain more detailed hydrologic data for the uppermost water-bearing unit. Monitoring well completion diagrams are provided in **Appendix A.**

In 2015, ETTL conducted a *Geotechnical Investigation* of the Landfill (ETTL, 2015). The report concluded the risk of slope failure due to liquefaction is very low, and recommended regrading of the top surface of the existing ash at the southeast corner of the landfill to eliminate ponding of surface water. The report also recommended dredged ash be spread out to drain water prior to placement in the landfill, emplacement of a 3-foot-thick clay cap on the existing side slopes in the eastern third of the landfill on a 3:1 slope (3 feet horizontal, 1 foot vertical), and improve drainage along the toe of the eastern third of the landfill using either horizontal drains at the toe of the slope or trenches containing perforated pipe with a geotextile cover.

In December 2015, Auckland Consulting further expanded the groundwater monitoring well system at the Plant by installation of monitoring wells AD-15 through AD-18 (Auckland Consulting, 2016). Monitoring well completion diagrams are provided in **Appendix A.**

2.4 Hydrogeologic Setting

The site area is located within the West Gulf Coastal Plain. Cretaceous formations crop out in belts that extend in a northeasterly direction parallel to the Gulf of Mexico, and dip gently southeast. The Site is located on the outcrop of the Eocene-age Recklaw Formation, which consists of very fine to fine grained sand and clay (Flawn, 1966).

These features are further illustrated on five lines of cross section that were prepared through the landfill area, with three lines trending from west to east (A-A'; B-B'; C-C'), and the other two lines trending from north to south (D-D'; E-E'). The cross section

location map is included as **Figure 3** and the lines of cross section are included as **Figure** 4 (A-A') through **Figure 8** (E-E').

2.4.1 Climate and Water Budget

The climate of Titus County, Texas is moist subhumid. The average January temperature is 45° Fahrenheit (F), and the average July temperature is 82.9°F. The mean annual growing season is 228 days (Broom, 1965). Average annual precipitation (including liquid water equivalent from snowfall) is approximately 47 inches according to weatherdb.com.

2.4.2 Regional and Local Geologic Setting

The Site is located on the outcrop of the Eocene-age Recklaw Formation, which consists of very fine to fine grained sand and clay (Flawn, 1966). The Recklaw Formation attains a thickness of approximately 110 feet in Titus County, and is underlain by the Eocene-age Carrizo Sand which consists of fine to coarse sand, silt, and clay (Broom, 1965). In the topographically low areas underling the Welsh Reservoir to the east of the landfill, Quarternary alluvial sediments associated with Swauano Creek are present (Flawn, 1966).

Detailed regional geologic characterization can be found in several published reports including Texas Water Commission Bulletin 6517 "*Ground-Water Resources of Camp, Franklin, Morris and Titus Counties, Texas*" (Broom, 1965), and The University of Texas at Austin Bureau of Economic Geology "*Geologic Atlas of Texas – Texarkana Sheet*" (Flawn, 1966).

Detailed regional and site geologic characterization can be found in the 2015 ETTL report entitled "*Geotechnical Investigation, Phase 1 Landfill Seepage Evaluation and Vertical Expansion, Pittsburg, Texas"* (ETTL, 2015).

2.4.3 Surface Water and Surface Water Groundwater Interactions

The Site is generally less than one-half mile from Swauano Creek, which was dammed near the southern end of the site during plant development to form the Welsh Reservoir. Groundwater flow direction at the Site is generally from west to east, following surface topography towards the Welsh Reservoir. The Welsh Reservoir is likely a gaining surface water feature, and groundwater elevations on site are higher than the normal stage elevation of the Welsh Reservoir (approximately 320 feet amsl).

Figure 9 is a potentiometric surface map based on March 2016 water level data for the uppermost aquifer at the Site, and water level elevations in the Site monitoring wells are summarized on **Table 1**. As shown on **Figure 9**, a hydraulic ridge is present in the uppermost aquifer in the area of monitoring well AD-12 at the west end of the landfill. Shallow groundwater flow often follows surface topography, and the hydraulic ridge location corresponds to a topographically high area of the Site. Shallow groundwater flow direction at the landfill is easterly toward the Welsh Reservoir at an average hydraulic gradient of approximately 0.01 foot per foot. Shallow groundwater flow directly west of the landfill in the area of monitoring well AD-17 is westerly toward a topographically low-lying area west of monitoring well AD-17.

2.4.4 Water Users

A water well inventory conducted by Banks Information Solutions showed one water well within a ½-mile radius of the Site (Banks, 2013). The water well is located on-site to the northwest (up gradient) of the landfill, and was installed for Southwestern Electric Company in 1974 with screens from 515 to 535 feet below ground surface, and plugged at a later date.

3. Groundwater Monitoring Well Network Evaluation

The existing monitoring well network present at the Site was evaluated to determine if any of the wells were viable for continued use as part of the groundwater monitoring well network or also retained as part of a larger groundwater hydraulic monitoring well network. The hydrogeologic conditions were also evaluated to determine if the uppermost aquifer unit has an effective well network. The evaluation was completed in accordance with 40 CFR 257.91 to have an established monitoring well network that effectively monitors the uppermost aquifer up gradient and down gradient of the Site. The up gradient wells represent background groundwater quality and the down gradient wells are to be placed down gradient of the CCR unit boundary to monitor water quality.

3.1 Hydrostratigraphic Units

3.1.1 Horizontal and Vertical Position Relative to CCR Unit

Geologic data from soil borings and monitoring wells installed at the site show the uppermost aquifer in the area of the landfill is a very fine to fine grained clayey and silty sand stratum with an average thickness of approximately 10 feet that is located between an average elevation of approximately 325 and 335 feet amsl (**Appendix A**). The base of the landfill is at an elevation of approximately 345 to 355 feet amsl. This separation distance is further illustrated on cross section B-B' (**Figure 5)** and cross section D-D' (**Figure 7)**.

3.1.2 Overall Flow Conditions

Groundwater is recharged from regional precipitation infiltration and locally from ash pond use. The uppermost aquifer (clayey and silty sand) is expected to have a hydraulic conductivity of approximately 10^{-4} centimeters per second (Fetter, 1980). Based on the hydraulic conductivity and saturated thickness (approximately 10 feet), the yield of the uppermost aquifer is anticipated to exceed the TCEQ non-useable (Class 3) limit of 150 gallons per day (TCEQ, 2010).

Available groundwater elevations are summarized on **Table 1** for 2011 through 2016. The most recent comprehensive groundwater data set from March 2016 is depicted on **Figure 9**. A hydraulic ridge is present in the uppermost aquifer in the area of monitoring well AD-12 at the west end of the landfill. The hydraulic ridge extends northerly from AD-12 toward monitoring wells AD-18 and AD-5. Shallow groundwater

flow direction at the landfill is easterly toward the Welsh Reservoir at an average hydraulic gradient of approximately 0.01 foot per foot. Shallow groundwater flow directly west of the landfill in the area of monitoring well AD-17 is westerly toward a topographically low-lying area west of monitoring well AD-17.

3.2 Uppermost Aquifer

3.2.1 CCR Rule Definition

The CCR rule definitions for an aquifer and the uppermost aquifer as specified in 40 CFR 257.53 indicates an aquifer is a geologic formation capable of yielding usable quantities of groundwater to wells or springs while an uppermost aquifer is defined as the geologic formation nearest the natural ground surface that is an aquifer, as well as lower aquifers, that are hydraulically interconnected with this aquifer within the facility's property boundary. Upper limit is measured at a point nearest to the natural groundwater surface to which the aquifer rises during the wet season.

3.2.1.1 Common Definitions

An aquifer is commonly defined as a geologic unit that stores and transmits water (readily or at sufficient flow rates) to supply wells and springs (USGS, 2015; Fetter, 2001). The uppermost aquifer is considered the first encountered aquifer below the CCR unit.

3.2.2 Identified Onsite Hydrostratigraphic Unit

The identified on-Site hydrostratigraphic unit in the area of the landfill is the very fine to fine grained clayey and silty sand stratum that is located between an elevation of approximately 325 and 335 feet amsl. This unit is not used locally for groundwater supply or industrial water use, but meets the TCEQ definition of a useable aquifer.

3.3 Review of Existing Monitoring Well Network

3.3.1 Overview

The Site was visited by ARCADIS and AEP personnel on August 20, 2015 to review existing well network conditions and locations. A well construction table that summarizes the location, ground surface elevation, borehole depth, installation date, and associated well construction details of the monitoring well network is included as

Table 2. Photo documentation of the located wells during the August 20, 2015 site visit is provided in **Appendix B**.

Monitoring wells AD-11 through AD-14 were previously installed at the Site to monitor the uppermost aquifer (very fine to fine grained clayey and silty sand stratum) associated with the landfill. As discussed above in Section 3.1.1, the uppermost aquifer below the landfill is approximately 10 feet thick and is located between an elevation of approximately 325 and 335 feet amsl. In addition to these four monitoring wells, several soil borings were installed through the landfill as part of the ETTL geotechnical investigation of the landfill embankments (ETTL, 2015). These soil borings confirmed the presence of the uppermost aquifer beneath the landfill between an average elevation of approximately 325 and 335 feet amsl.

3.3.2 Gaps in Monitoring Network

As shown on the monitoring well completion diagrams in **Appendix A** and Geologic Cross Sections B-B' (**Figure 5**) and E-E' (**Figure 8**), existing monitoring wells AD-11, AD-13, and AD-14 are screened in the uppermost aquifer down gradient (east) of the landfill. These three monitoring wells will be utilized as down gradient monitoring wells for the landfill groundwater monitoring system.

As shown on **Figure 3** and Geologic Cross Section B-B' (**Figure 5**), existing monitoring well AD-12 is located in the up gradient (west) portion of the landfill, but is located within the landfill boundaries as confirmed by the presence of ash material in the uppermost 10 feet of the boring. Therefore, due to the presence of ash material at the AD-12 location, this monitoring well will not be utilized as an up gradient monitoring well. This data gap was addressed by installation of new up gradient monitoring well AD-18 outside of the landfill boundary approximately 700 feet northwest of monitoring well AD-12. As shown on **Figure 9**, newly installed monitoring well AD-18 and existing monitoring well AD-5 are located along the hydraulic ridge in uppermost aquifer in the western portion of the Site, and these two monitoring wells will be utilized as up gradient monitoring wells for the landfill groundwater monitoring system. With the addition of monitoring well AD-18 during December 2015, there are no data gaps remaining in the groundwater monitoring system for the landfill.

4. Recommended Monitoring Network and PE Certification

The recommended modifications to the existing groundwater monitoring well network are intended to meet specifications stated in 40 CFR 257.91. Recommended wells are further discussed with respect to location to the landfill (up gradient or down gradient), well depth, and well construction. The recommended network would provide an improved understanding of groundwater quality, hydraulics, and groundwater flow at the landfill.

4.1 Recommended Monitoring Well Network Distribution

A total of three down gradient well locations (existing monitoring wells AD-11, AD-13 and AD-14) and two up gradient well locations (existing monitoring wells AD-5 and AD-18) are recommended to establish a groundwater quality monitoring well network for the landfill. In addition, existing monitoring wells AD-1 and AD-12 may be utilized as piezometers to obtain additional groundwater flow direction and gradient data for the landfill.

4.1.1 Location

The recommended monitoring well network for groundwater quality of the uppermost aquifer at the landfill is summarized on **Table 3** and illustrated on **Figure 10.**

4.1.2 Depth

The screen depths for the monitoring wells recommended for inclusion in the monitoring network are within the shallow saturated sand stratum (uppermost aquifer) that occurs beneath the landfill between an average elevation of approximately 325 and 335 feet amsl. The screen elevations are presented in **Table 3**.

4.1.3 Well Construction

As discussed above in Section 3.3.2, the gap in the monitoring well network for the uppermost aquifer beneath the landfill was addressed by installation of monitoring well AD-18 during December 2015. Monitoring well AD-18 was installed by a Texas Department of Licensing and Regulation (TDLR)-licensed water well driller. Well construction data for the monitoring well network are summarized on **Tables 2** and **3**, and the monitoring well completion diagrams are provided in **Appendix A**.

4.2 Professional Engineer's Certification

I, Kenneth J. Brandner, certify that this report was prepared under my direction and supervision, and that the information contained herein is true and accurate to the best of my knowledge. Based on my experience and knowledge of the site, the proposed groundwater monitoring system will be adequate to meet the requirements of 40 CFR Part 257.91.

Kenneth J. Brandner

Printed Name of Registered Professional Engineer

Kenneth J Brandner

Signature

69586	Texas	5-2-16
Registration No.	Registration State	Date

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Tables

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Table 1
Water Level Data
AEP J. Robert Welsh Power Plant - CCR Storage Areas
Pittsburg, Titus County, Texas

Well ID	Latitude	Longitude	Ground Surface Elevation	Top of Casing Elevation	Borehole depth ft. bls	Date Installed	Screen Material	Well diameter inches	Top of Screen		Bottom of Screen		6/7/2011	12/6/2011	5/2/2012	11/1/2012	5/14/2013	11/19/2013	5/12/2014	11/16/2014	5/12/2015	3/4/2016
									Depth ft. bls	Elevation ft. msl	Depth ft. bls	Elevation ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl	GW Elev. ft. msl
Monitoring Wells																						
AD-1 [c]	33° 02' 48"	94° 50' 47"	355.57	357.57	25.0	1/11/01	Sch. 40 PVC	2	15.0	340.57	25.0	330.57	338.46	334.92	337.88	337.18	337.43	336.73	338.03	337.64	340.82	342.83
AD-2 [c]	33° 02' 37"	94° 50' 44"	344.16	346.16	25.0	4/26/01	Sch. 40 PVC	2	15.0	329.16	25.0	319.16	330.16	329.07	330.00	329.26	329.83	329.70	330.09	329.69	332.56	332.32
AD-3 [c]	33° 02' 38"	94° 50' 37"	331.10	333.10	17.0	4/26/01	Sch. 40 PVC	2	7.0	324.10	17.0	314.10	323.81	323.19	323.99	323.29	323.77	323.98	324.12	323.28	325.58	325.12
AD-4 [c]	33° 02' 43"	94° 50' 33"	340.61	342.61	30.0	4/26/01	Sch. 40 PVC	2	19.0	321.61	29.0	311.61	324.81	324.84	324.62	324.40	324.74	325.52	325.44	325.13	327.00	326.90
AD-4a [a]	33.04527	94.84258	340.19	342.85	30.0	9/22/09	Sch. 40 PVC	2	20.0	320.19	30.0	310.19	325.01	324.19	325.24	322.90	324.86	324.68	325.64	325.34	327.19	327.12
AD-4b [a]	33.04531	94.84230	329.55	333.23	15.0	9/23/09	Sch. 40 PVC	2	5.0	324.55	15.0	314.55	324.35	324.32	324.50	324.30	324.30	325.21	325.22	324.90	326.58	326.67
AD-4c [a]	33.04507	94.84244	329.15	333.28	15.0	9/23/09	Sch. 40 PVC	2	5.0	324.15	15.0	314.15	324.18	324.50	324.64	324.37	324.11	325.06	325.01	324.71	326.50	326.19
AD-5 [c]	33° 03' 13"	94° 51' 00"	349.00	351.00	30.0	1/11/01	Sch. 40 PVC	2	20.0	329.00	30.0	319.00	336.34	336.58	336.82	336.99	336.78	336.47	336.80	336.01	339.07	338.04
AD-6 [a]	33.05235	94.84757	343.31	346.33	33.0	9/23/09	Sch. 40 PVC	2	23.0	320.31	33.0	310.31	333.04	333.02	332.83	333.02	333.11	332.81	333.11	332.81	333.38	334.00
AD-7 [a]	33.05257	94.84219	347.86	350.82	38.0	9/24/09	Sch. 40 PVC	2	28.0	319.86	38.0	309.86	334.32	334.12	334.19	334.20	334.13	334.58	333.77	333.98	334.09	333.61
AD-8 [a]	33.05187	94.84026	337.53	340.01	29.0	9/21/09	Sch. 40 PVC	2	16.0	321.53	26.0	311.53	325.41	324.09	325.69	325.15	325.79	325.75	325.98	325.77	326.05	325.70
AD-9 [a]	33.04995	94.84196	340.32	343.09	35.0	9/21/09	Sch. 40 PVC	2	20.0	320.32	35.0	305.32	328.46	328.53	328.63	328.44	328.74	329.38	NM	330.18	329.98	329.74
AD-10 [a]	33.04881	94.84047	340.23	343.01	35.0	9/22/09	Sch. 40 PVC	2	20.0	320.23	35.0	305.23	323.44	322.55	323.27	323.35	323.51	323.76	323.57	323.88	323.95	323.55
AD-11 [a]	33.04824	94.84177	339.61	342.18	20.0	9/22/09	Sch. 40 PVC	2	10.0	329.61	20.0	319.61	327.99	328.37	327.82	327.93	327.94	328.13	328.20	327.97	328.96	328.13
AD-12 [a]	33.04901	94.84977	366.27	369.33	30.0	9/24/09	Sch. 40 PVC	2	20.0	346.27	30.0	336.27	348.30	348.29	349.86	349.56	349.99	349.65	349.89	350.01	350.65	350.39
AD-13 [a]	33.04918	94.84275	344.12	347.00	20.0	9/22/09	Sch. 40 PVC	2	6.0	338.12	16.0	328.12	332.36	332.24	333.09	332.26	332.68	333.25	333.35	332.01	337.58	334.76
AD-14 [a]	33.04715	94.84256	342.32	345.43	19.0	9/22/09	Sch. 40 PVC	2	8.0	334.32	18.0	324.32	330.40	329.80	331.67	330.34	330.94	331.69	332.12	330.17	336.63	334.83
AD-15 [d]	33° 03' 04"	94° 50' 27"	340.21	343.29	46.0	12/12/15	Sch. 40 PVC	2	25.5	314.71	45.5	294.71	—	—	—	—	—	—	—	—	—	322.14
AD-16 [d]	33° 02' 49"	94° 50' 29"	350.86	353.97	21.0	12/10/15	Sch. 40 PVC	2	11.0	339.86	21.0	329.86	—	—	—	—	—	—	—	—	—	337.09
AD-17 [d]	33° 02' 57"	94° 51' 06"	353.99	357.10	40.0	12/10/15	Sch. 40 PVC	2	24.0	329.99	39.0	314.99	—	—	—	—	—	—	—	—	—	334.64
AD-18 [d]	33° 03' 03"	94° 51' 03"	346.17	349.28	29.0	12/11/15	Sch. 40 PVC	2	14.0	332.17	29.0	317.17	—	—	—	—	—	—	—	—	—	343.66
Piezometers																						
B-2 [b]	33° 03.078'	94° 50.449'	339.7	339.7	50.0	10/28/09	Sch. 40 PVC	2	10.0	329.70	20.0	319.70	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
B-4 [b]	33° 03.011'	94° 50.462'	340.6	340.6	50.0	10/27/09	Sch. 40 PVC	2	8.0	332.60	18.0	322.60	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
B-5 [b]	33° 02.964'	94° 50.428'	340.0	340.0	50.0	10/27/09	Sch. 40 PVC	2	10.0	330.00	20.0	320.00	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
B-6 [b]	33° 02.912'	94° 50.462'	340.1	340.1	50.0	10/28/09	Sch. 40 PVC	2	12.0	328.10	22.0	318.10	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM

NM - Not measured.
(a) Source: Eagle Environmental Services Well Logs (2009).
(b) Source: ETTL Engineers & Consultants Inc. (June 21, 2010).
(c) Source: Southwest Electric Power, State of Texas Well Report (2001).
(d) Source: Auckland Consulting LLC (January 26, 2016). Monitoring wells AD-15 through AD-18 installed during December 2015.
Groundwater Elevation Source: AEP, Shallow Groundwater Data Summary through March 2016.

Table 2
Well Construction Details
AEP J. Robert Welsh Power Plant - CCR Units
Pittsburg, Titus County, Texas

Well ID	Latitude	Longitude	Ground Surface Elevation	Borehole depth ft. bls	Date Installed	Screen Material	Well diameter inches	Top of Filter Pack		Bottom of Filter Pack		Top of Screen		Bottom of Screen	
								Depth ft. bls	Elevation ft. msl	Depth ft. bls	Elevation ft. msl	Depth ft. bls	Elevation ft. msl	Depth ft. bls	Elevation ft. msl
Monitoring Wells															
AD-1 [c]	33° 02' 48"	94° 50' 47"	355.57	25.0	1/11/2001	PVC	2	13	343	25	331	15.0	340.57	25.0	330.57
AD-2 [c]	33° 02' 37"	94° 50' 44"	344.16	25.0	4/26/2001	PVC	2	12	332	25	319	15.0	329.16	25.0	319.16
AD-3 [c]	33° 02' 38"	94° 50' 37"	331.10	17.0	4/26/2001	PVC	2	5	326	17	314	7.0	324.10	17.0	314.10
AD-4 [c]	33° 02' 43"	94° 50' 33"	340.61	30.0	4/26/2001	PVC	2	16	325	30	311	19.0	321.61	29.0	311.61
AD-4a [a]	33.04527	94.84258	340.19	30.0	9/22/2009	PVC	2	17	323	30	310	20.0	320.19	30.0	310.19
AD-4b [a]	33.04531	94.84230	329.55	15.0	9/23/2009	PVC	2	4	326	15	315	5.0	324.55	15.0	314.55
AD-4c [a]	33.04507	94.84244	329.15	15.0	9/23/2009	PVC	2	4	325	15	314	5.0	324.15	15.0	314.15
AD-5 [c]	33° 03' 13"	94° 51' 00"	349.00	30.0	1/11/2001	PVC	2	16	333	30	319	20.0	329.00	30.0	319.00
AD-6 [a]	33.05235	94.84757	343.31	33.0	9/23/2009	PVC	2	21	322	33	310	23.0	320.31	33.0	310.31
AD-7 [a]	33.05257	94.84219	347.86	38.0	9/24/2009	PVC	2	26	322	38	310	28.0	319.86	38.0	309.86
AD-8 [a]	33.05187	94.84026	337.53	29.0	9/21/2009	PVC	2	14	324	29	309	16.0	321.53	26.0	311.53
AD-9 [a]	33.04995	94.84196	340.32	35.0	9/21/2009	PVC	2	18	322	35	305	20.0	320.32	35.0	305.32
AD-10 [a]	33.04881	94.84047	340.23	35.0	9/22/2009	PVC	2	18	322	35	305	20.0	320.23	35.0	305.23
AD-11 [a]	33.04824	94.84177	339.61	20.0	9/22/2009	PVC	2	8	332	20	320	10.0	329.61	20.0	319.61
AD-12 [a]	33.04901	94.84977	366.27	30.0	9/24/2009	PVC	2	18	348	30	336	20.0	346.27	30.0	336.27
AD-13 [a]	33.04918	94.84275	344.12	20.0	9/22/2009	PVC	2	4	340	20	324	6.0	338.12	16.0	328.12
AD-14 [a]	33.04715	94.84256	342.32	19.0	9/22/2009	PVC	2	6	336	18	324	8.0	334.32	18.0	324.32
AD-15 [d]	33° 03' 04"	94° 50' 27"	340.21	46.0	12/12/15	PVC	2	22	318	45.5	295	25.5	314.71	45.5	294.71
AD-16 [d]	33° 02' 49"	94° 50' 29"	350.86	21.0	12/10/15	PVC	2	9	342	21	330	11.0	339.86	21.0	329.86
AD-17 [d]	33° 02' 57"	94° 51' 06"	353.99	40.0	12/10/15	PVC	2	22	332	39	315	24.0	329.99	39.0	314.99
AD-18 [d]	33° 03' 03"	94° 51' 03"	346.17	29.0	12/11/15	PVC	2	12	334	29	317	14.0	332.17	29.0	317.17
Piezometers															
B-2 [b]	33° 03.078'	94° 50.449'	339.7	50.0	10/28/2009	PVC	2	8	332	20	320	10.0	329.70	20.0	319.70
B-4 [b]	33° 03.011'	94° 50.462'	340.6	50.0	10/27/2009	PVC	2	8	333	18	323	8.0	332.60	18.0	322.60
B-5 [b]	33° 02.964'	94° 50.428'	340.0	50.0	10/27/2009	PVC	2	5	335	20	320	10.0	330.00	20.0	320.00
B-6 [b]	33° 02.912'	94° 50.462'	340.1	50.0	10/28/2009	PVC	2	4	336	22	318	12.0	328.10	22.0	318.10

General Notes:
Elevation in feet above mean sea level.

Footnotes:
(a) Source: Eagle Environmental Services Well Logs (2009).
(b) Source: ETTL Engineers & Consultants Inc. (June 21, 2010).
(c) Source: Southwest Electric Power, State of Texas Well Report (2001).
(d) Source: Auckland Consulting LLC (January 26, 2016). Monitoring wells AD-15 through AD-18 installed during December 2015.
Acronyms and Abbreviations:
NA = Data not available
ft = feet
bls = below land surface
msl = mean sea level

Table 3
Proposed Well Network
AEP J. Robert Welsh Power Plant - Landfill
Pittsburg, Titus County, Texas

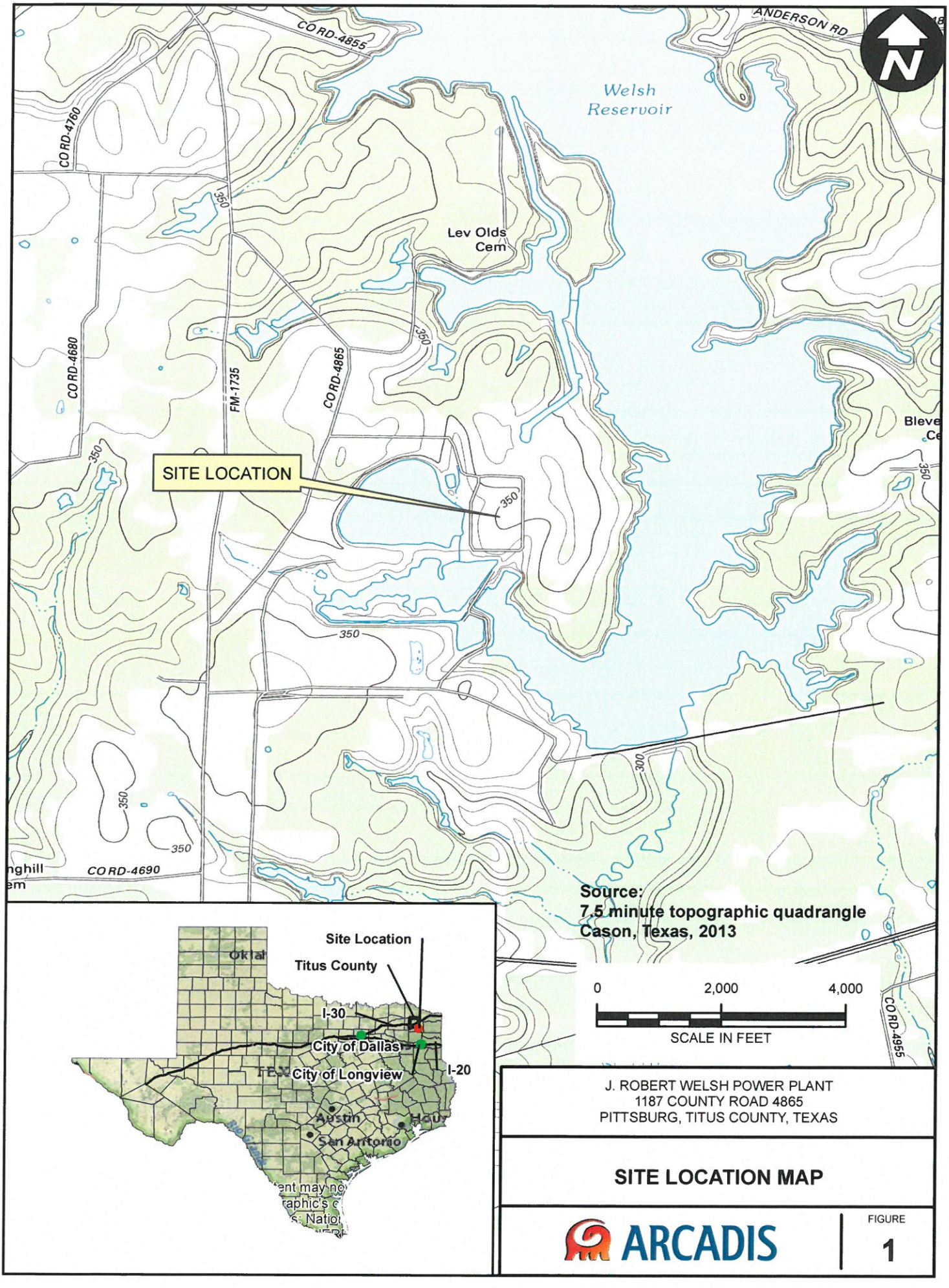
Well ID	Exisiting/ Proposed	Hydrostratigraphic Unit Target	Location Description		Screen Top Target Elevation[a] (ft amsl)	Screen Bottom Target Elevation[a] (ft amsl)	Screen Length (ft)	Comments
Upgradient								
AD-5	Existing	Uppermost Water-Bearing Unit	NW of Landfill	Upgradient	329.0	319.0	10	Existing well installed in 2001; well will be utilitzed to establish backgroud water quality
AD-18	Existing	Uppermost Water-Bearing Unit	NW of Landfill	Upgradient	332.2	317.2	15	New monitoring well installed during December 2015 in uppermost shallow aquifer northwest of Landfill - upgradient; well will be utilized to establish background water quality
Downgradient								
AD-11	Existing	Uppermost Water-Bearing Unit	East of Landfill	Down gradient	329.6	319.6	10	Existing well installed in 2009; uppermost shallow aquifer adjacent to the landfill - downgradient
AD-13	Existing	Uppermost Water-Bearing Unit	East of Landfill	Down gradient	338.1	328.1	10	Existing well installed in 2009; uppermost shallow aquifer adjacent to the landfill - downgradient
AD-14	Existing	Uppermost Water-Bearing Unit	East of Landfill	Down gradient	334.3	324.3	10	Existing well installed in 2009; uppermost shallow aquifer adjacent to the landfill - downgradient
Piezometers								
AD-1	Existing	Uppermost Water-Bearing Unit	South of Landfill	Side gradient	340.6	330.6	10	Existing well installed in 2001; and utilitzed to obtain water level data for uppermost water-bearing unit
AD-12	Existing	Uppermost Water-Bearing Unit	Within Landfill Boundary	Upgradient	346.3	336.3	10	Existing well installed in 2009; and utilitzed to obtain water level data for uppermost water-bearing unit

Footnotes:
a. Target elevations are an estimated range.

Acronyms and Abbreviations:
U=Upgradient
D=Downgradient
ft = feet
amsl = above mean sea level

ARCADIS

Figures



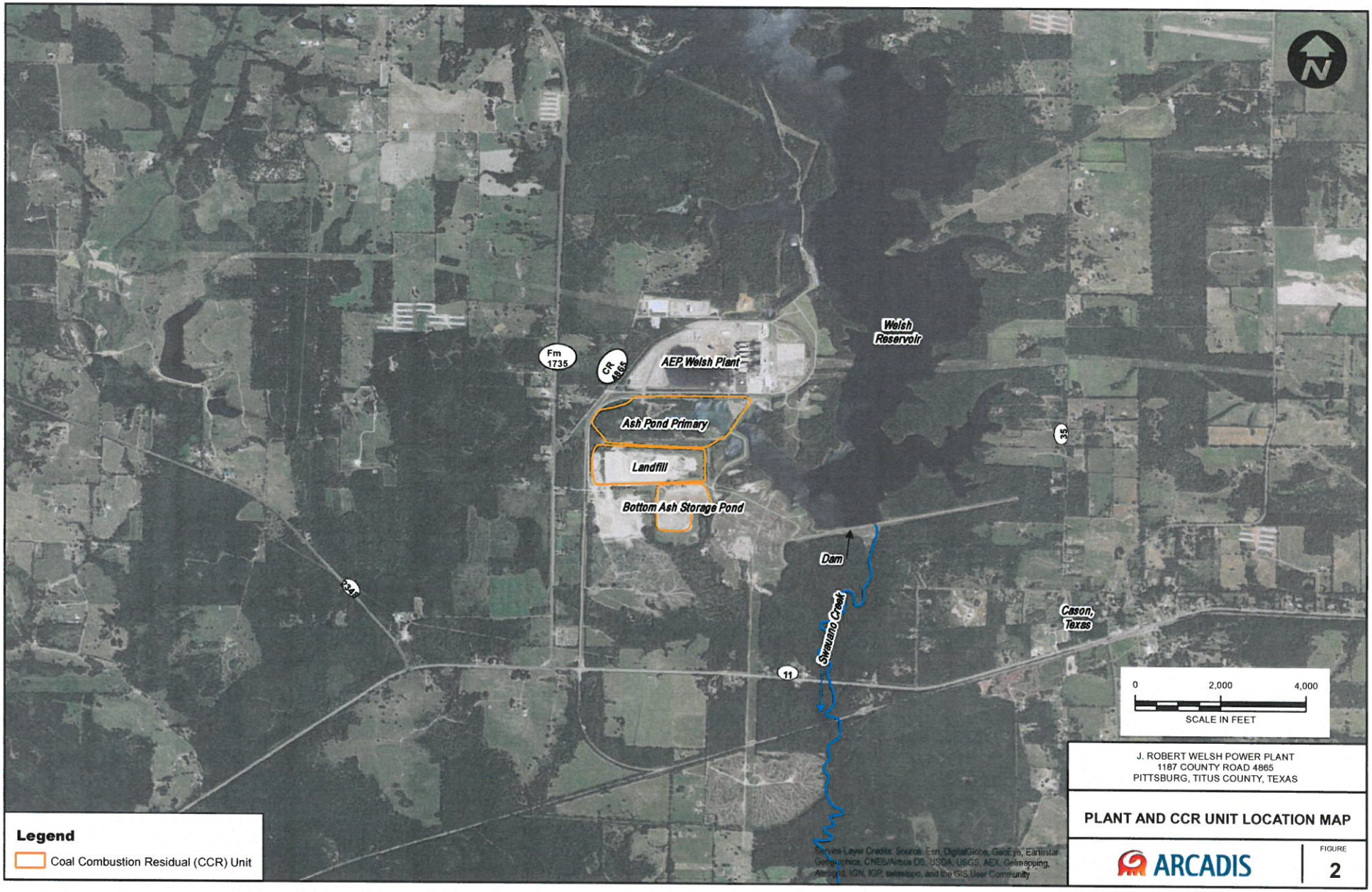
J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

SITE LOCATION MAP

ARCADIS

FIGURE
1

Document Path: Z:\GISPROJECTS_ENV\AEP\Welsh Plant\MXD\Landfill report\fig 1 - site map.mxd



J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

PLANT AND CCR UNIT LOCATION MAP

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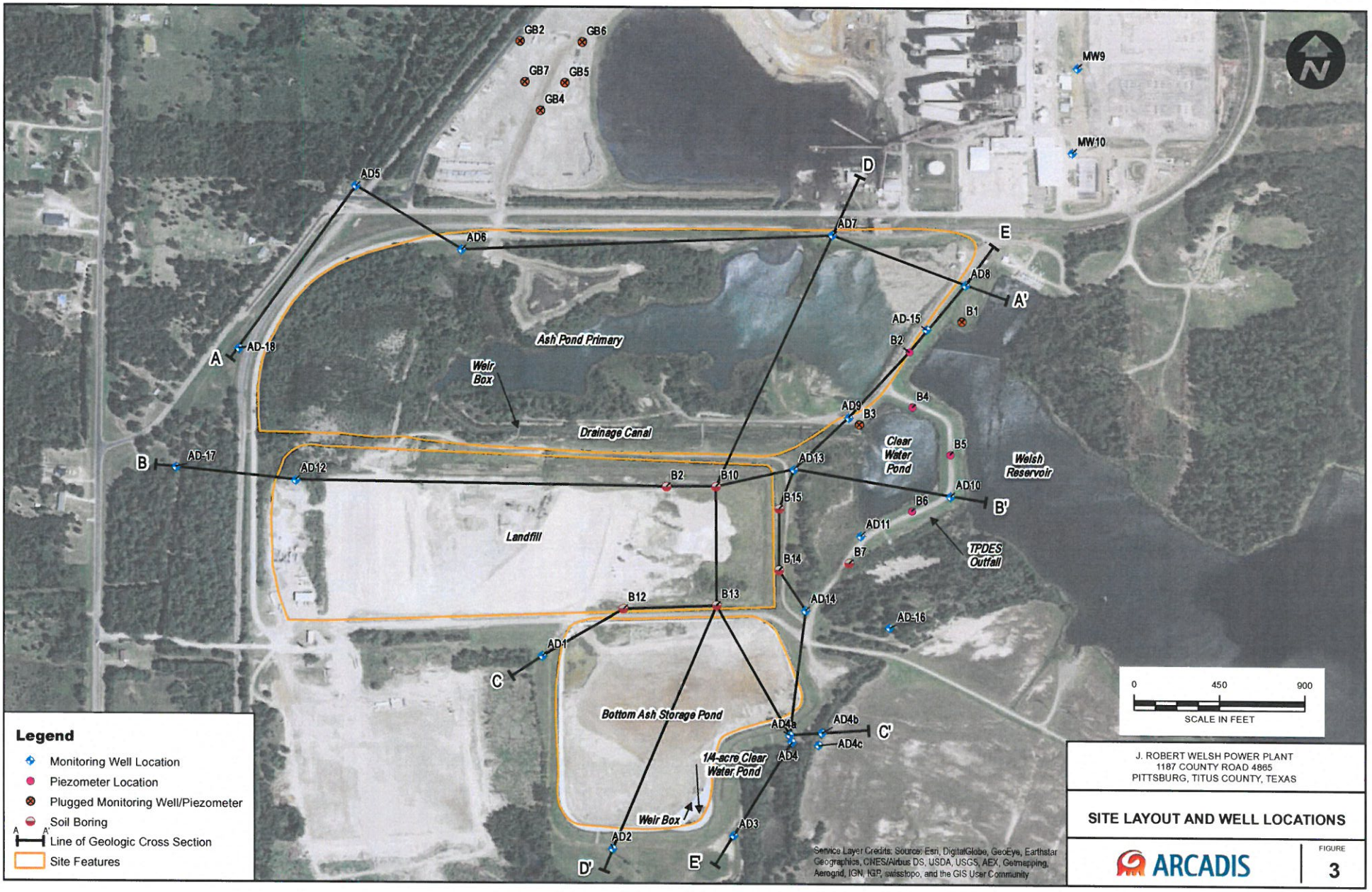
FIGURE 2

Document Path: Z:\GISPROJECTS_ENV\AEP\Welsh Plant\MXD\Landfill report\fig 2 - CCR location.mxd



J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

SITE LAYOUT AND WELL LOCATIONS

ARCADIS

FIGURE 3

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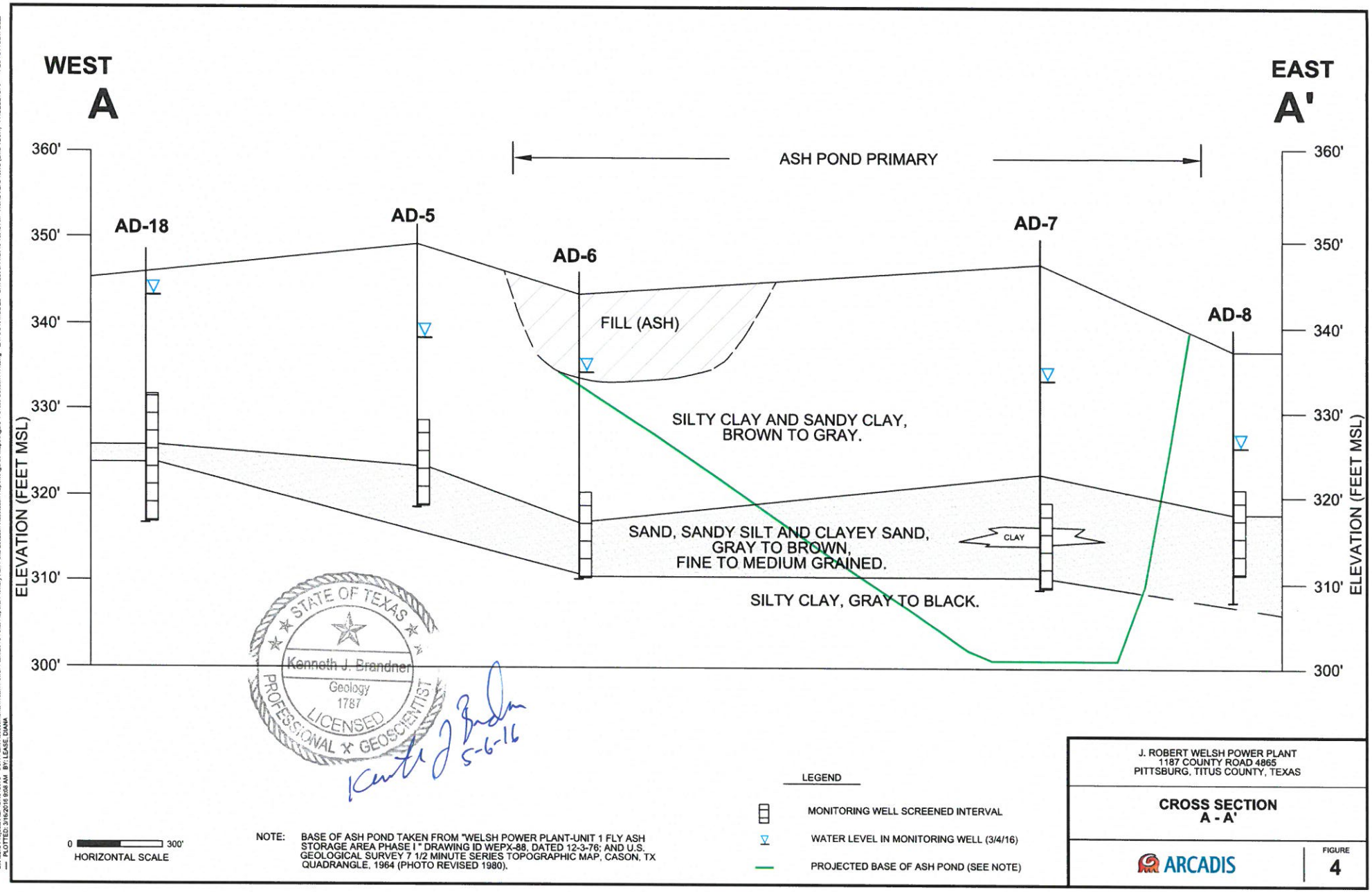
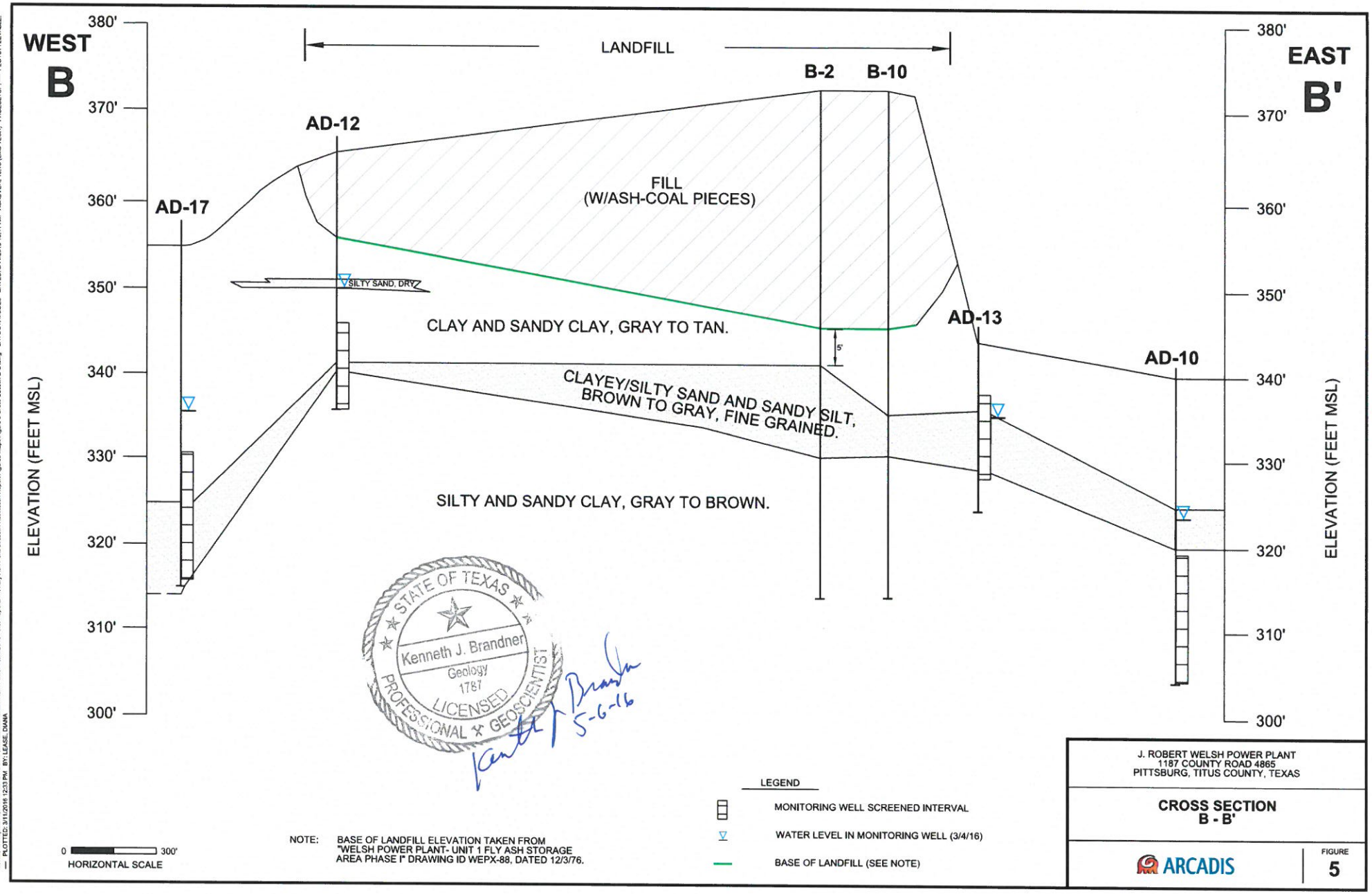


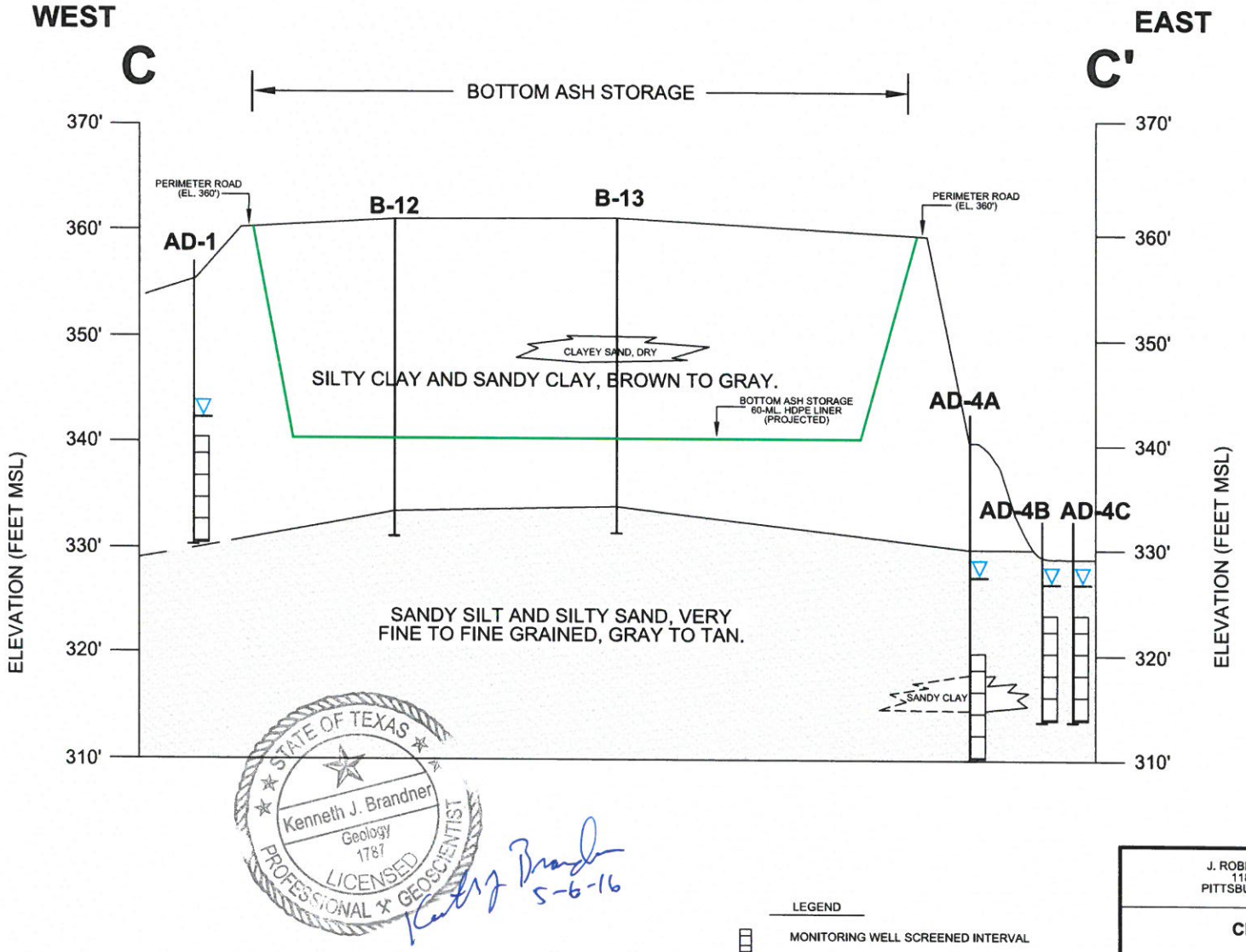


J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

CROSS SECTION
B - B'

ARCADIS

FIGURE
5



5-6-16

0 200'
HORIZONTAL SCALE

NOTE: BASE OF BOTTOM ASH STORAGE HAS A 60-ML. HDPE LINER AT ELEVATION 340.0' , TAKEN FROM FREESE AND NICHOLS "HYDRAULIC ANALYSIS OF WELSH POWER PLANT ASH PONDS, AMERICAN ELECTRIC POWER COMPANY", DATED DECEMBER 2010.

LEGEND

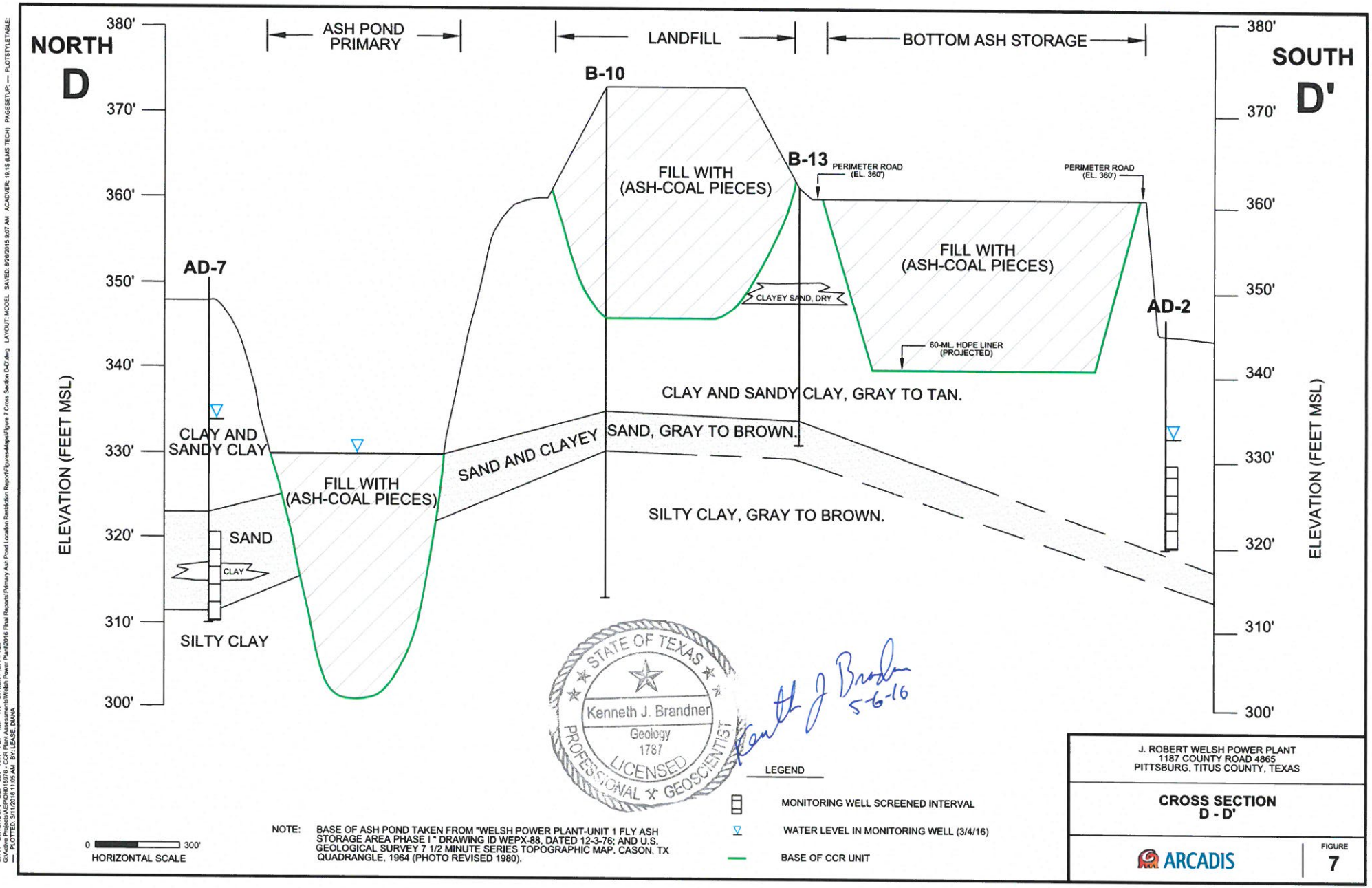
- MONITORING WELL SCREENED INTERVAL
- WATER LEVEL IN MONITORING WELL (3/4/16)
- PROJECTED BASE OF ASH STORAGE (SEE NOTE)

J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

CROSS SECTION
C - C'

ARCADIS

FIGURE 6



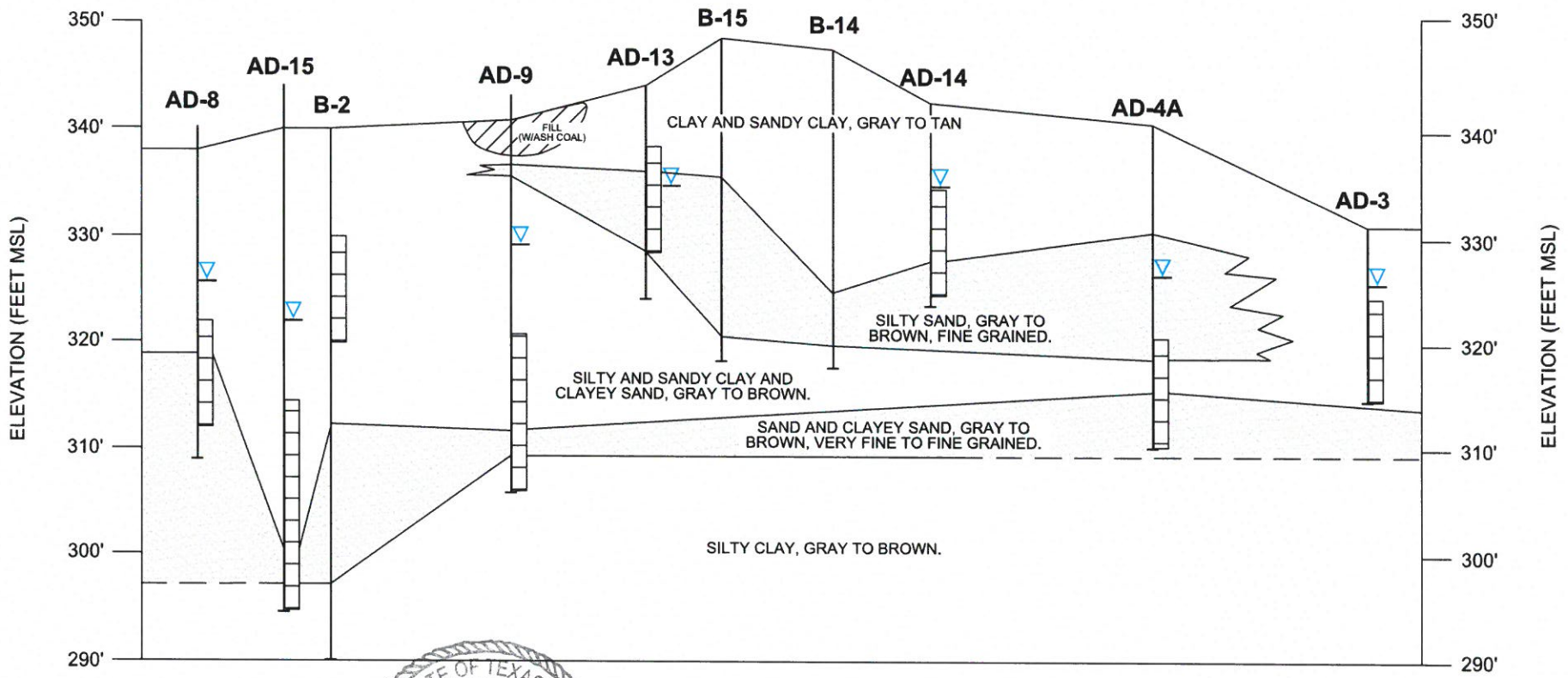
NOTE: BASE OF ASH POND TAKEN FROM "WELSH POWER PLANT-UNIT 1 FLY ASH STORAGE AREA PHASE I " DRAWING ID WEPX-88, DATED 12-3-76; AND U.S. GEOLOGICAL SURVEY 7 1/2 MINUTE SERIES TOPOGRAPHIC MAP, CASON, TX QUADRANGLE, 1964 (PHOTO REVISED 1980).

J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

CROSS SECTION
D - D'

ARCADIS

FIGURE
7



0 300'
HORIZONTAL SCALE

STATE OF TEXAS
Kenneth J. Brandner
Geology
1787
LICENSED
PROFESSIONAL GEOSCIENTIST
Kenneth J Brandner 5-6-16

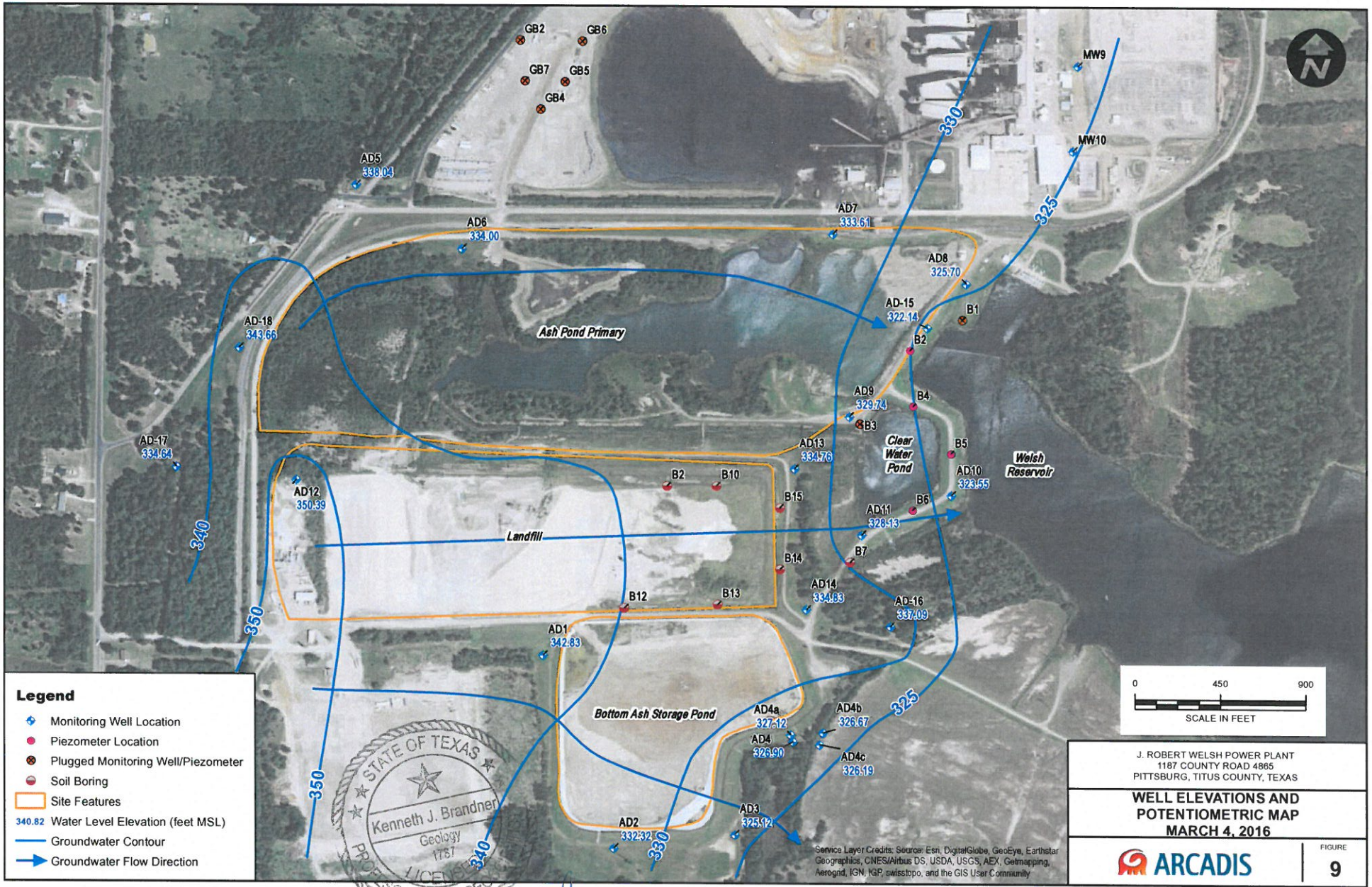
LEGEND
- MONITORING WELL SCREENED INTERVAL
- WATER LEVEL IN MONITORING WELL (3/4/16)
- PROJECTED BASE OF ASH STORAGE (SEE NOTE)

J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

CROSS SECTION
E - E'

ARCADIS

FIGURE
8



Legend

- Monitoring Well Location
- Piezometer Location
- Plugged Monitoring Well/Piezometer
- Soil Boring
- Site Features
- 340.82 Water Level Elevation (feet MSL)
- Groundwater Contour
- Groundwater Flow Direction

STATE OF TEXAS
Kenneth J. Brandner
Geology
1757
PROFESSIONAL GEOLOGIST
LICENSED

Kenneth J Brandner 5-6-16

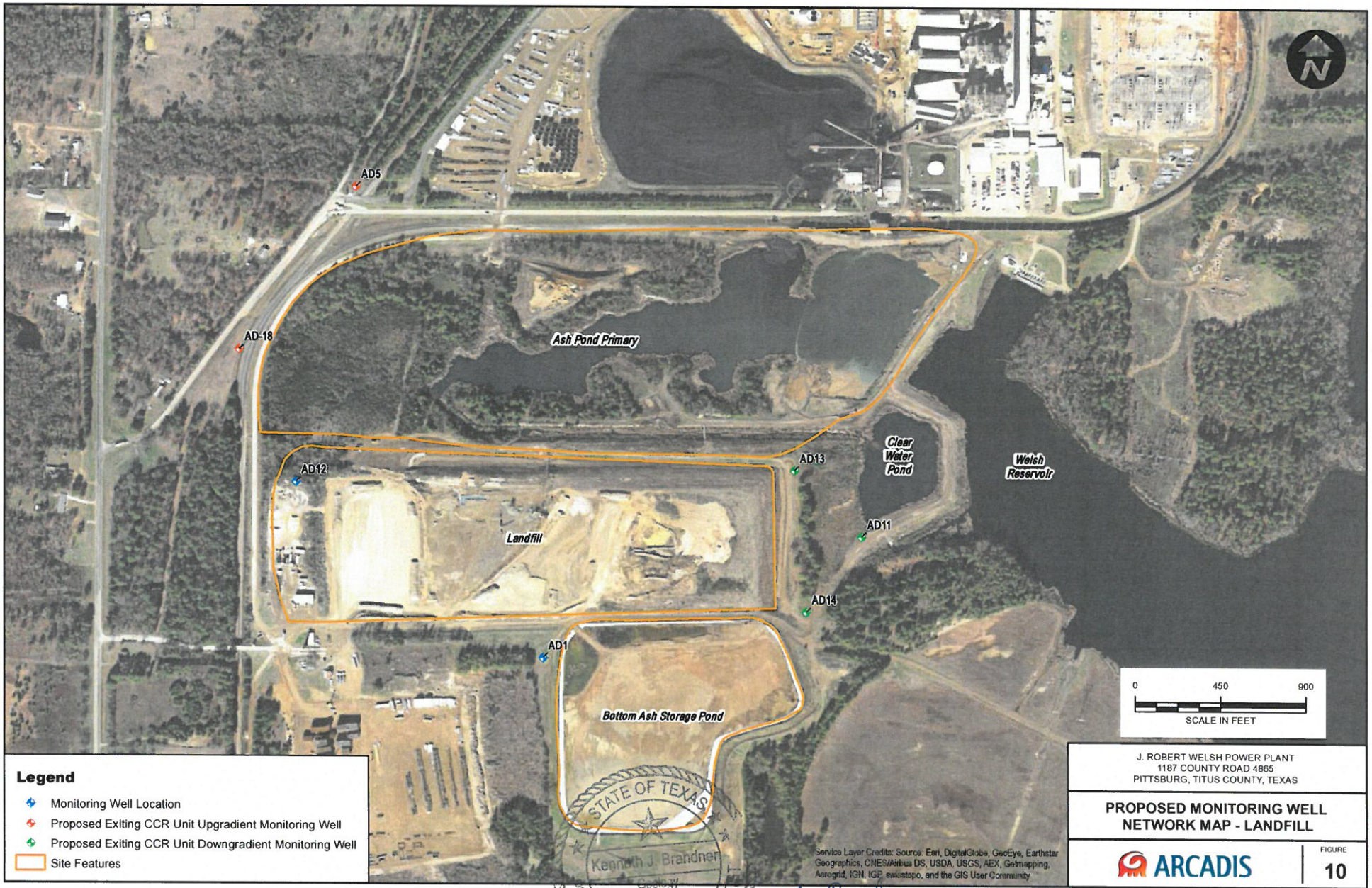
J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

WELL ELEVATIONS AND POTENTIOMETRIC MAP MARCH 4, 2016

ARCADIS

FIGURE 9

Document Path: Z:\GIS\PROJECTS_ENV\AEP\Welsh Plant\MXD\Landfill report\fig 9 - Mar2016_POT.mxd



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J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

PROPOSED MONITORING WELL NETWORK MAP - LANDFILL

ARCADIS

FIGURE 10

STATE OF TEXAS
Kenneth J. Brandner
Geology
1787
LICENSED
PROFESSIONAL GEOSCIENTIST

Kenneth J Brandner
5-6-16

ARCADIS

Appendix A

Boring/Well Construction Logs

AD-1

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Southwestern Electric Power (Name) ADDRESS Rt.4, Box 221 (Street or RFD) Pittsburg (City) TX (State) 75686 (Zip)

2) ADDRESS OF WELL: County ~~Camp~~ Titus Rt.4, Box 221 (Street, RFD or other) Pittsburg (City) TX (State) 75686 (Zip) GRID # 16-58-4

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] Monitor [ ] Environmental Soil Boring [ ] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC? [ ] Yes [ ] No

5) GPS 33° 02' 48" N 94° 50' 47" W

N

6) WELL LOG:
Date Drilling:
Started 1-11 19 2001
Completed 1-11 19 2001

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8 1/4	Surface	25

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [X] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [ ] Other

From (ft.)	To (ft.)	Description and color of formation material
0	25	gray silty clay with some hard red streaks

AP-1

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [X] Gravel Packed [ ] Other
If Gravel Packed give interval ... from 13 ft. to 25 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	To	Gage Casting Screen
2	N	riser	+2	15	Sch 40
2	N	#10 slot screen	15	25	Sch 40

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 13 ft. to 0 ft. No. of sacks used 6-50#
___ ft. to ___ ft. No. of sacks used ___
Method used bentonite
Cemented by ___
Distance to septic system field lines or other concentrated contamination ___ ft.
Method of verification of above distance ___

10) SURFACE COMPLETION
[X] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[X] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[ ] Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL:
Static level 12' 8" ft. below land surface Date 1-11-01
Artesian flow ___ gpm. Date ___

12) PACKERS: NA Type Depth

13) TYPE PUMP: NA
[ ] Turbine [ ] Jet [ ] Submersible [ ] Cylinder
[ ] Other ___
Depth to pump bowls, cylinder, jet, etc., ___ ft.

14) WELL TESTS: NA
Type test: [ ] Pump [ ] Bailer [ ] Jetted [ ] Estimated
Yield: ___ gpm with ___ ft. drawdown after ___ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ___ Depth of strata ___
Was a chemical analysis made? [ ] Yes [ ] No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete Items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME ___ (Type or print) WELL DRILLER'S LICENSE NO. TX-52694-M

ADDRESS ___ (Street or RFD) (City) (State) (Zip)

(Signed) [signature] (Licensed Well Driller) (Signed) ___ (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

Send one (1) copy each to: TNRCC, DRILLER, WELL OWNER

AD-2

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Southwestern Electric (Name) ADDRESS Rt. 4, Box 221 (Street or RFD) Pittsburg (City) Tx (State) 75686 (Zip)

2) ADDRESS OF WELL: County ~~Camp~~ Titus (Street, RFD or other) Rt. 4 Box 221 Pittsburg (City) Tx (State) 75686 (Zip) GRID # 16-58-4

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] Monitor [ ] Environmental Soil Boring [ ] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC? [ ] Yes [ ] No

5) GPS
33°02'37"N
94°50'44"W
N

6) WELL LOG:
Date Drilling: Started 4/26 19 2001 Completed 4/26 19 2001

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8 1/4	Surface	25

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [X] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [ ] Other

From (ft.)	To (ft.)	Description and color of formation material
0	2	top soil
2	5	red & gray clay w/ silt
5	10	red & gray clay w/ silt
10	25	gray silty clay w/ tan streaks

AP-2

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [X] Gravel Packed [ ] Other
If Gravel Packed give interval ... from 12 ft. to 25 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2	N	riser	+2	15	Sch 40
2	N	#10 slot screen	15	25	Sch 40

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 12 ft. to +2 ft. No. of sacks used 5-50 lb
ft. to ft. No. of sacks used
Method used bentonite pellets
Cemented by
Distance to septic system field lines or other concentrated contamination ft.
Method of verification of above distance

10) SURFACE COMPLETION
[X] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[X] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[ ] Approved Alternative Procedure Used [Rule 338.71]

13) TYPE PUMP: NA
[ ] Turbine [ ] Jet [ ] Submersible [ ] Cylinder [ ] Other
Depth to pump bowls, cylinder, jet, etc., ft.

14) WELL TESTS: NA
Type test: [ ] Pump [ ] Bailer [ ] Jetted [ ] Estimated
Yield: gpm with ft. drawdown after hrs.

11) WATER LEVEL:
Static level ft. below land surface Date
Artesian flow gpm. Date

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Depth of strata
Was a chemical analysis made? [ ] Yes [ ] No

12) PACKERS: NA Type Depth

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME (Type or print) WELL DRILLER'S LICENSE NO. TX-52694-M

ADDRESS (Street or RFD) (City) (State) (Zip)

(Signed) (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

Send one (1) copy each to: TNRCC, DRILLER, WELL OWNER

AD-3

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Southwestern Electric (Name) ADDRESS Rt. 4, Box 221 (Street or RFD) Pittsburg (City) Tx (State) 75686 (Zip)

2) ADDRESS OF WELL: County ~~Camp~~ Titus Rt. 4 Box 221 Pittsburg Tx 75686 (Street, RFD or other) (City) (State) (Zip) GRID # 16-58-4

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] Monitor [ ] Environmental Soil Boring [ ] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC? [ ] Yes [ ] No

5) GPS
33°02'38"N
94°50'37"W
N

6) WELL LOG:
Date Drilling: Started 4/26 19 2001 Completed 4/26 19 2001

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8 1/4	Surface	17

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [X] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [ ] Other

From (ft.)	To (ft.)	Description and color of formation material
0	12	gray silty clay w/ton streaks
12	15	very stiff gray/blood red clay
15	17	Very stiff gray clay w/ red nodules and tan streaks

AP-3

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [X] Gravel Packed [ ] Other
If Gravel Packed give interval ... from 5 ft. to 17 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2	N	riser	+2	7	Sch 40
2	N	#10 slot screen	7	17	Sch 40

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 2 ft. to 5 ft. No. of sacks used 2 1/2 - 50#
ft. to ft. No. of sacks used
Method used bentonite pellets
Cemented by
Distance to septic system field lines or other concentrated contamination ft.
Method of verification of above distance

13) TYPE PUMP: NA [ ] Turbine [ ] Jet [ ] Submersible [ ] Cylinder [ ] Other
Depth to pump bowls, cylinder, jet, etc., ft.

14) WELL TESTS: NA
Type test: [ ] Pump [ ] Bailer [ ] Jetted [ ] Estimated
Yield: gpm with ft. drawdown after hrs.

10) SURFACE COMPLETION
[X] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[X] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[ ] Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL:
Static level ft. below land surface Date
Artesian flow gpm. Date

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Depth of strata
Was a chemical analysis made? [ ] Yes [ ] No

12) PACKERS: NA Type Depth

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME (Type or print) WELL DRILLER'S LICENSE NO. TX 52694-M

ADDRESS (Street or RFD) (City) (State) (Zip)

(Signed) (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

Send one (1) copy each to: TNRCC, DRILLER, WELL OWNER

AD-4

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Southwestern Electric Power (Name) ADDRESS Rt. 4, Box 221 (Street or RFD) Pittsburg (City) TX (State) 75686 (Zip)

2) ADDRESS OF WELL: County ~~Camp~~ Titus Rt. 4 Box 221 Pittsburg (Street, RFD or other) (City) TX (State) 75686 (Zip) GRID # 16-5B4

3) TYPE OF WORK (Check): ☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☒ Monitor ☐ Environmental Soil Boring ☐ Domestic ☐ Industrial ☐ Irrigation ☐ Injection ☐ Public Supply ☐ De-watering ☐ Testwell
If Public Supply well, were plans submitted to the TNRCC? ☐ Yes ☐ No

5) GPS
33° 02' 43" N
94° 50' 33" W
N

6) WELL LOG:
Date Drilling: Started 4/26 19 2001 Completed 4/26 19 2001

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8 1/4	Surface	30

7) DRILLING METHOD (Check): ☐ Driven ☐ Air Rotary ☐ Mud Rotary ☒ Bored ☐ Air Hammer ☐ Cable Tool ☐ Jetted ☐ Other

From (ft.)	To (ft.)	Description and color of formation material
0	5	red silty clay with gray streaks
5 -	30	gray silty clay with red streaks
		AP-4

(Use reverse side if necessary)

8) Borehole Completion (Check): ☐ Open Hole ☐ Straight Wall ☐ Underreamed ☒ Gravel Packed ☐ Other
If Gravel Packed give interval ... from 16 ft. to 30 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2	N	riser	+2	19	Sch 40
2	N	#10 slot screen	19	29	Sch 40

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 16 ft. to 2 ft. No. of sacks used 8-50 #
ft. to ft. No. of sacks used
Method used bentonite pellets
Cemented by
Distance to septic system field lines or other concentrated contamination ft.
Method of verification of above distance

13) TYPE PUMP: ☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder ☐ Other NA
Depth to pump bowls, cylinder, jet, etc., ft.

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 338.44(2)(A)]
☒ Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
☐ Pitless Adapter Used [Rule 338.44(3)(b)]
☐ Approved Alternative Procedure Used [Rule 338.71]

14) WELL TESTS: NA
Type test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: gpm with ft. drawdown after hrs.

11) WATER LEVEL:
Static level ft. below land surface Date
Artesian flow gpm. Date

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Depth of strata
Was a chemical analysis made? ☐ Yes ☐ No

12) PACKERS: NA Type Depth

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME (Type or print) WELL DRILLER'S LICENSE NO. TX 52694-M

ADDRESS (Street or RFD) (City) (State) (Zip)

(Signed) (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

Send one (1) copy each to: TNRCC, DRILLER, WELL OWNER

E·A·G·L·E
ENVIRONMENTAL SERVICES OF SHREVEPORT, INC.

SOIL BORING LOG

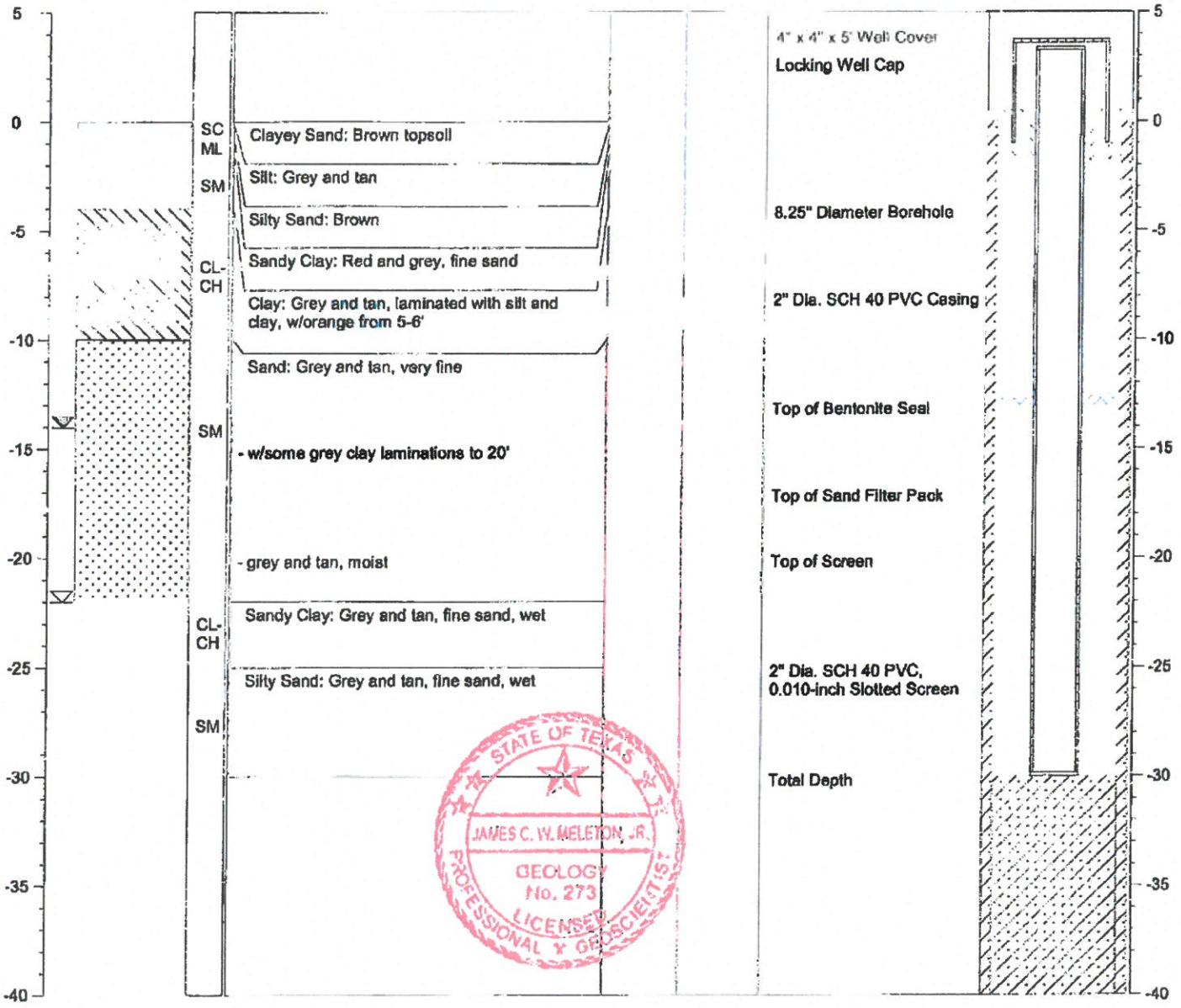
BORING/WELL NO.:	AD-4A
TOTAL DEPTH:	30'
TOP OF CASING ELEV.:	342.85 ft. NGVD
GROUND SURFACE ELEV.:	340.19 ft. NGVD

CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/22/09

NOTES: **Latitude: 33.04527**
Longitude: 94.84258

▽ Water level during drilling
▼ Water level in completed well

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



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ENVIRONMENTAL SERVICES OF SHREVEPORT, INC.

SOIL BORING LOG

BORING/WELL NO.:	AD-4B
TOTAL DEPTH:	15'
TOP OF CASING ELEV.:	333.23 ft. NGVD
GROUND SURFACE ELEV.:	329.55 ft. NGVD

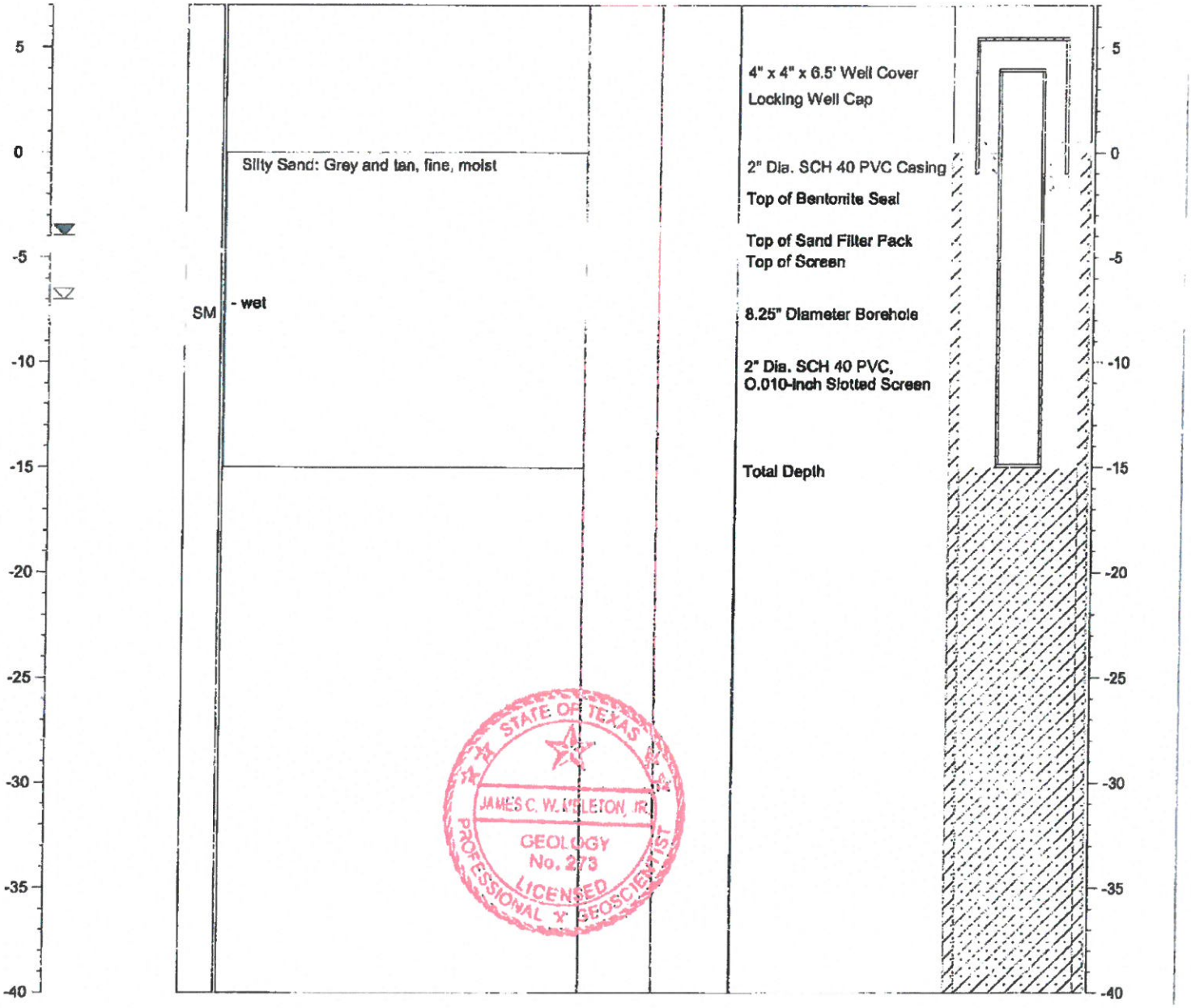
CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/23/09

NOTES: **Latitude: 33.04531**
Longitude: 94.84230

▽ Water level during drilling
▽ Water level in completed well

Page 1 of 1

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



STATE OF TEXAS
JAMES C. MELETON, JR.
GEOLOGY
No. 273
LICENSED
PROFESSIONAL GEOSCIENTIST

E·A·G·L·E
ENVIRONMENTAL SERVICES OF SHREVEPORT, INC.

SOIL BORING LOG

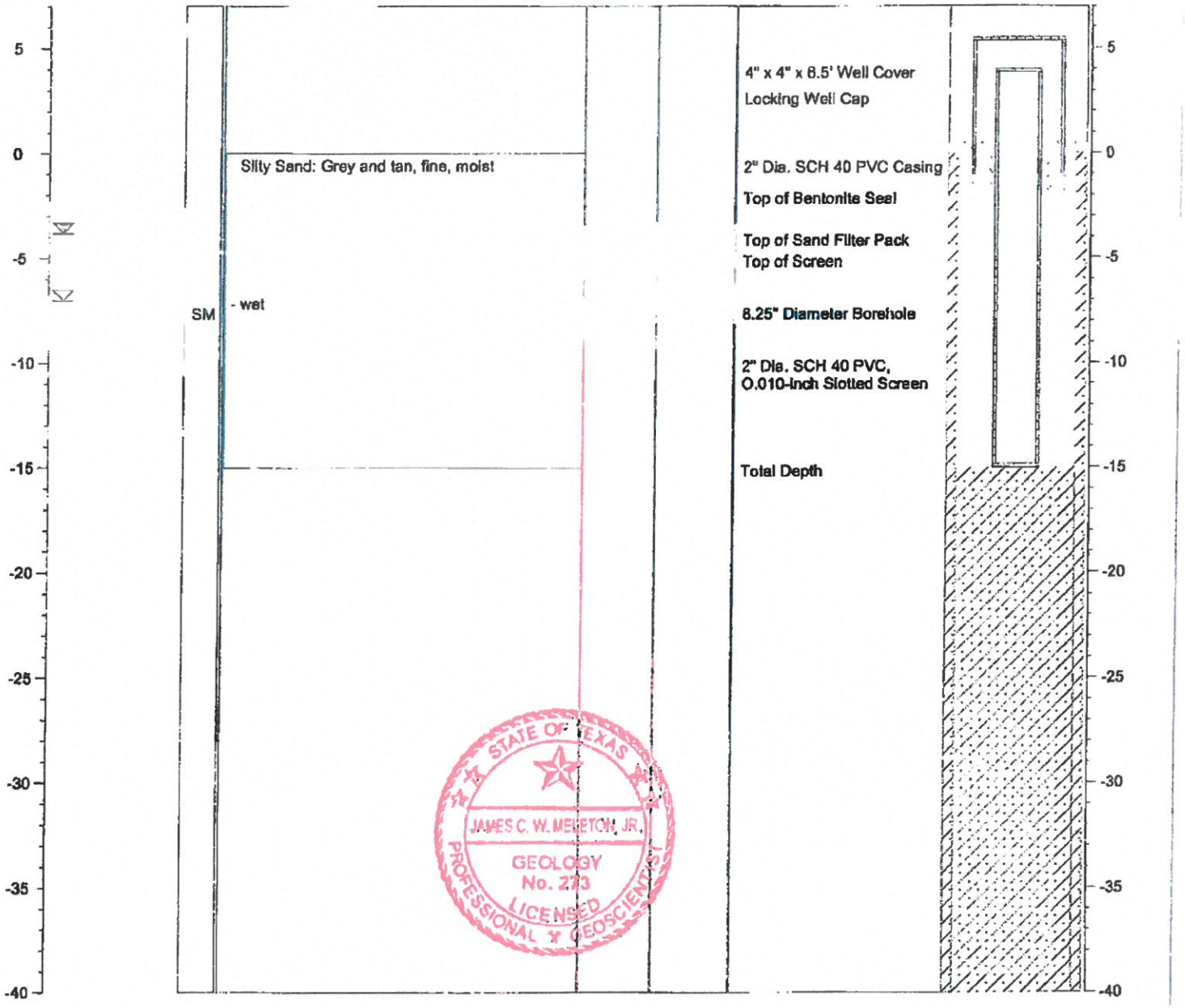
BORING/WELL NO.:	AD-4C
TOTAL DEPTH:	15'
TOP OF CASING ELEV.:	333.28 ft. NGVD
GROUND SURFACE ELEV.:	329.15 ft. NGVD

CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/23/09

NOTES: **Latitude: 33.04507**
Longitude: 94.84244

▽ Water level during drilling
▽ Water level in completed well

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



AD-5

Send original copy by certified mail to: TNRCC, P.O. Box 13087, Austin, TX 78711-3087

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Advisory Council
P.O. Box 13087
Austin, TX 78711-3087
512-239-0530

1) OWNER Southwestern Electric Power (Name) ADDRESS Rt.4, Box 221 (Street or RFD) Pittsburg (City) Tx (State) 75686 (Zip)

2) ADDRESS OF WELL: County Camp Titus Rt.4, Box 221 (Street, RFD or other) Pittsburg (City) Tx (State) 75686 (Zip) GRID # 16-58-4

3) TYPE OF WORK (Check): [X] New Well [ ] Deepening [ ] Reconditioning [ ] Plugging

4) PROPOSED USE (Check): [X] Monitor [ ] Environmental Soil Boring [ ] Domestic [ ] Industrial [ ] Irrigation [ ] Injection [ ] Public Supply [ ] De-watering [ ] Testwell
If Public Supply well, were plans submitted to the TNRCC? [ ] Yes [ ] No

5) 33°03'13"N 94°51'00"W N

6) WELL LOG:
Date Drilling: Started 1-11 19 2001 Completed 1-11 19 2001

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
8¼	Surface	30

7) DRILLING METHOD (Check): [ ] Driven [ ] Air Rotary [ ] Mud Rotary [X] Bored [ ] Air Hammer [ ] Cable Tool [ ] Jetted [ ] Other

From (ft.)	To (ft.)	Description and color of formation material
0	10	red & gray clay with orange streaks
10	20	gray/black clay with tan clay
20	25	stiff clay with lignite streak
25	30	fine gray sand

AP-5

(Use reverse side if necessary)

8) Borehole Completion (Check): [ ] Open Hole [ ] Straight Wall [ ] Underreamed [X] Gravel Packed [ ] Other
If Gravel Packed give interval ... from 16 ft. to 30 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2	N	riser	+2	20	Sch 40
2	N	#10 slot screen	20	30	Sch 40

9) CEMENTING DATA [Rule 338.44(1)]
Cemented from 16 ft. to 0 ft. No. of sacks used
ft. to ft. No. of sacks used
Method used bentonite
Cemented by
Distance to septic system field lines or other concentrated contamination ft.
Method of verification of above distance

10) SURFACE COMPLETION
[X] Specified Surface Slab Installed [Rule 338.44(2)(A)]
[X] Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
[ ] Pitless Adapter Used [Rule 338.44(3)(b)]
[ ] Approved Alternative Procedure Used [Rule 338.71]

11) WATER LEVEL:
Static level 11'9" ft. below land surface Date 1-11-01
Artesian flow gpm. Date

12) PACKERS: NA Type Depth

13) TYPE PUMP:
[ ] Turbine [ ] Jet [ ] Submersible [ ] Cylinder [ ] Other
Depth to pump bowls, cylinder, jet, etc., ft.

14) WELL TESTS:
Type test: [ ] Pump [ ] Bailer [ ] Jetted [ ] Estimated
Yield: gpm with ft. drawdown after hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
[ ] Yes [X] No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? Depth of strata
Was a chemical analysis made? [ ] Yes [ ] No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME (Type or print) WELL DRILLER'S LICENSE NO. TX 52694-M

ADDRESS (Street or RFD) (City) (State) (Zip)

(Signed) (Licensed Well Driller) (Signed) (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

TNRCC-0199 (Rev. 11-01-94)

Send one (1) copy each to: TNRCC, DRILLER, WELL OWNER

E·A·G·L·E
ENVIRONMENTAL SERVICES OF SHREVEPORT, INC.

SOIL BORING LOG

BORING/WELL NO.:	AD-6
TOTAL DEPTH:	33'
TOP OF CASING ELEV.:	346.33 ft. NGVD
GROUND SURFACE ELEV.:	343.31 ft. NGVD

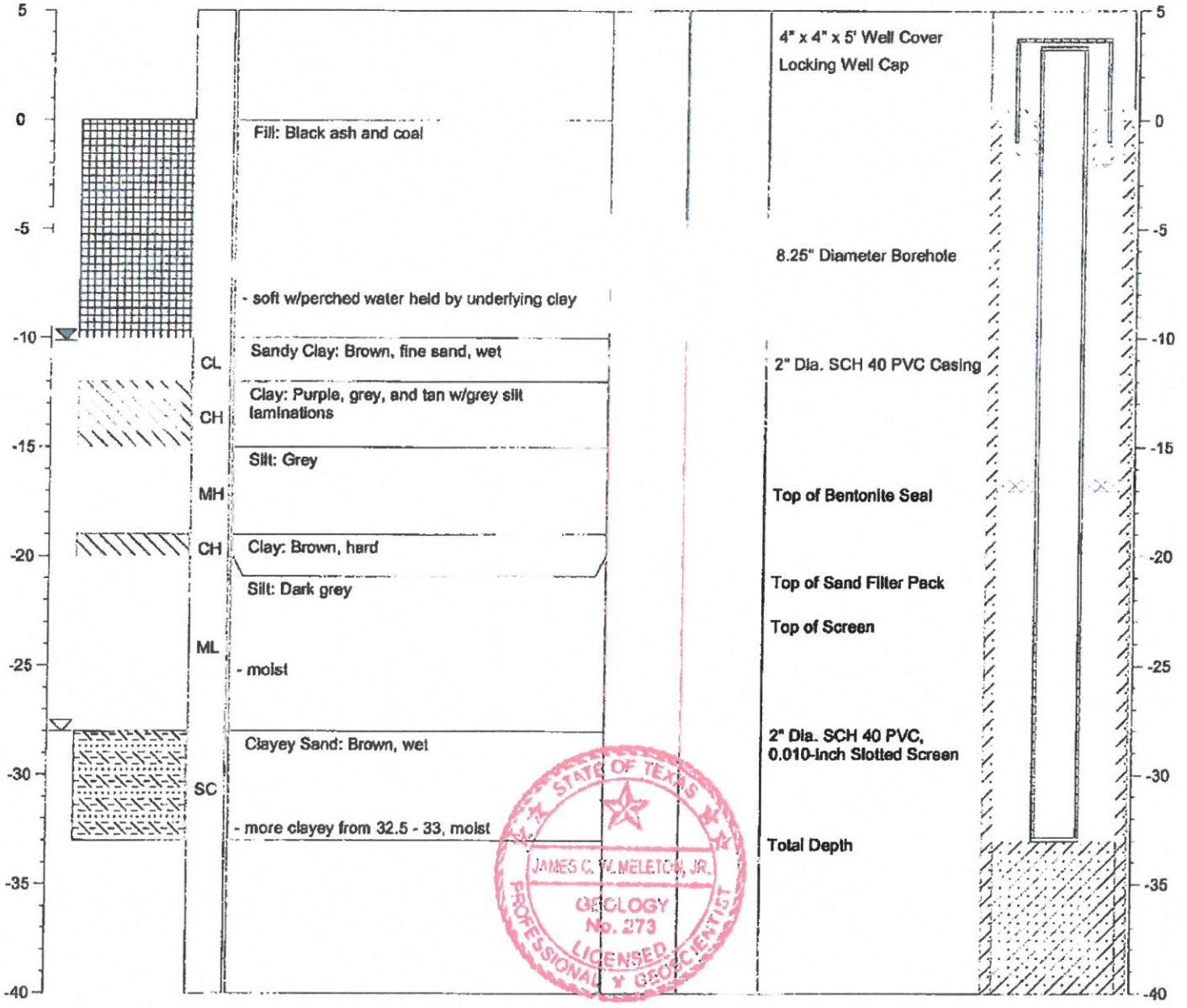
CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/23/09

NOTES: **Latitude: 33.05235**
Longitude: 94.84757

▽ Water level during drilling
▼ Water level in completed well

Page 1 of 1

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



E·A·G·L·E
ENVIRONMENTAL SERVICES OF SHREVEPORT, INC

SOIL BORING LOG

BORING/WELL NO.:	AD-7
TOTAL DEPTH:	38'
TOP OF CASING ELEV.:	350.82 ft. NGVD
GROUND SURFACE ELEV.:	347.86 ft. NGVD

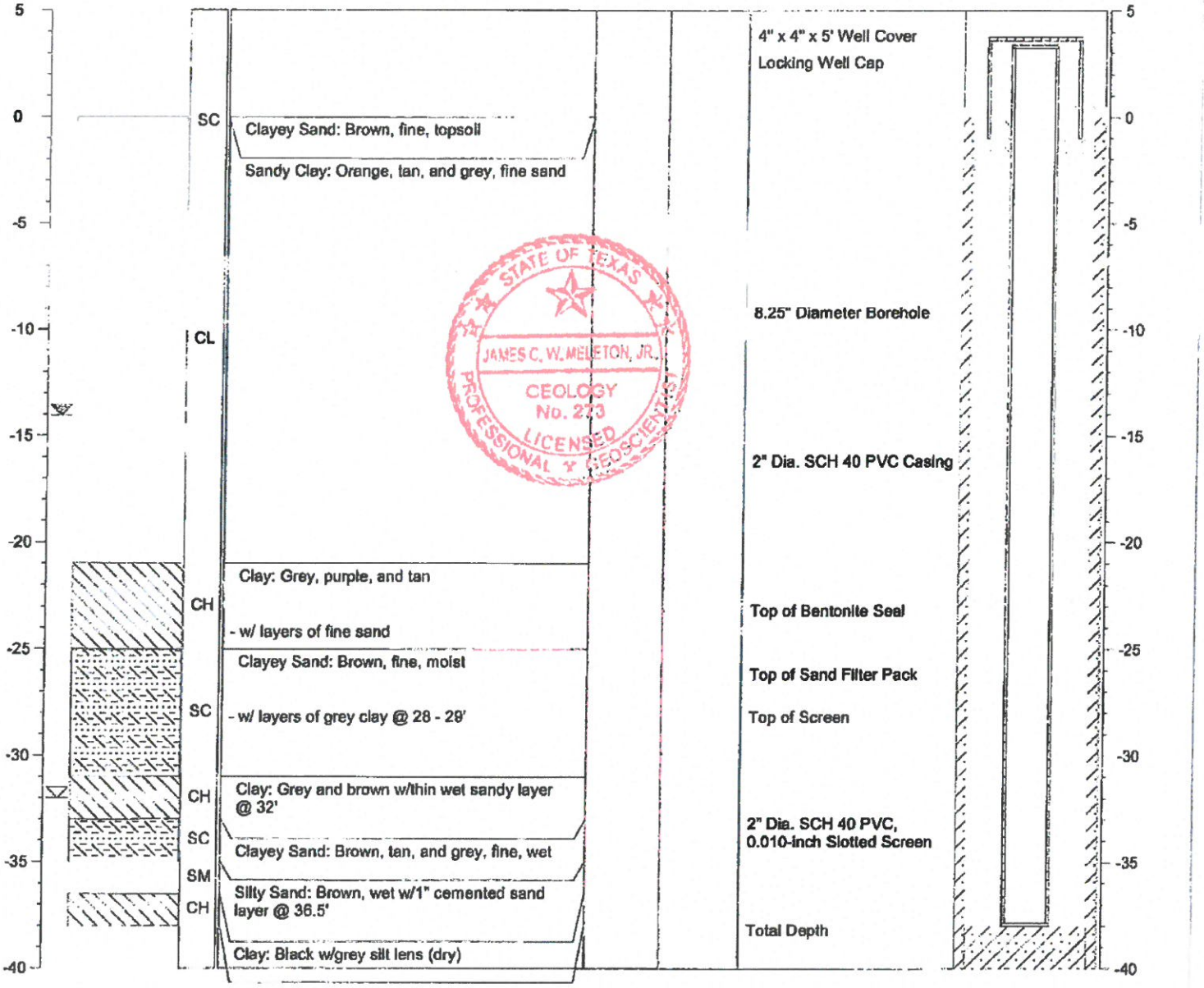
CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/24/09

NOTES: **Latitude: 33.05257**
Longitude: 94.84219

▽ Water level during drilling
▽ Water level in completed well

Page 1 of 1

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



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ENVIRONMENTAL SERVICES OF SHREVEPORT INC

SOIL BORING LOG

BORING/WELL NO.:	AD-8
TOTAL DEPTH:	29'
TOP OF CASING ELEV.:	340.01 ft. NGVD
GROUND SURFACE ELEV.:	337.53 ft. NGVD

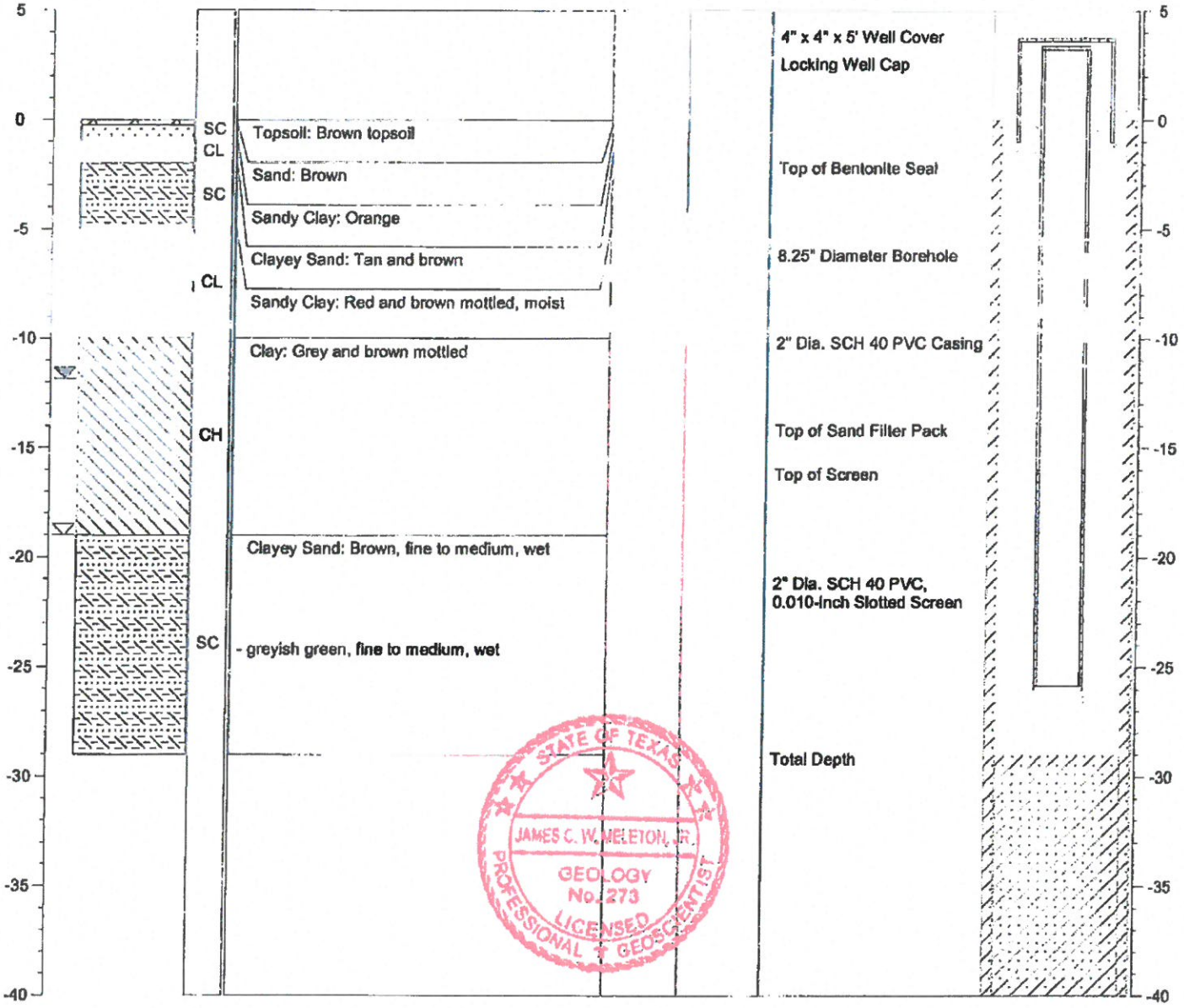
CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/21/09

NOTES: **Latitude: 33.05187**
Longitude: 94.84026

▽ Water level during drilling
▼ Water level in completed well

Page 1 of 1

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



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ENVIRONMENTAL SERVICES OF SHREVEPORT, INC

SOIL BORING LOG

BORING/WELL NO.:	AD-9
TOTAL DEPTH:	35'
TOP OF CASING ELEV.:	343.09 ft. NGVD
GROUND SURFACE ELEV.:	340.32 ft. NGVD

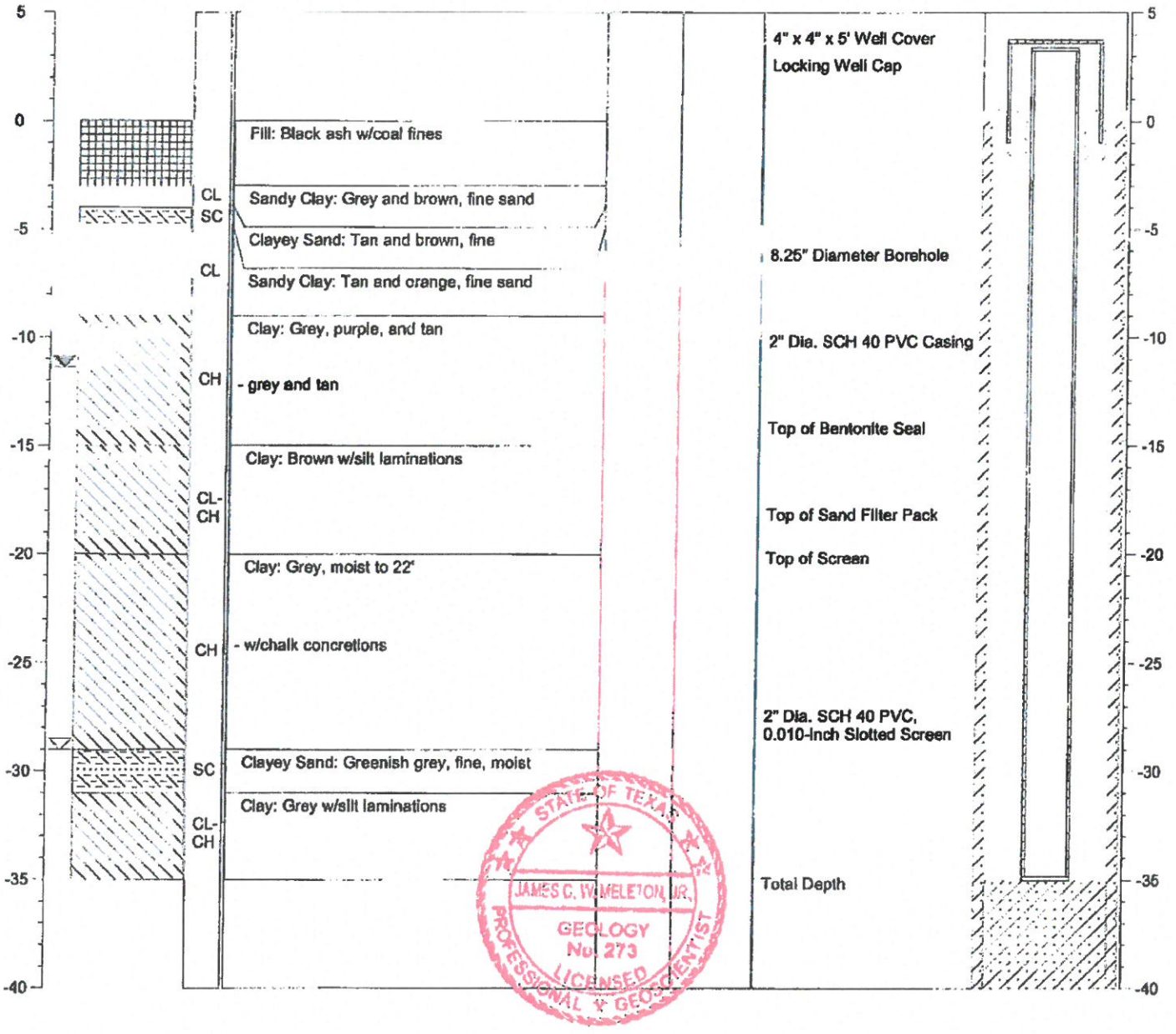
CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/21/09

NOTES: **Latitude: 33.04995**
Longitude: 94.84196

▽ Water level during drilling
▼ Water level in completed well

Page 1 of 1

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



E·A·G·L·E
ENVIRONMENTAL SERVICES OF SHREVEPORT INC

SOIL BORING LOG

BORING/WELL NO.:	AD-10
TOTAL DEPTH:	35'
TOP OF CASING ELEV.:	343.01 ft. NGVD
GROUND SURFACE ELEV.:	340.23 ft. NGVD

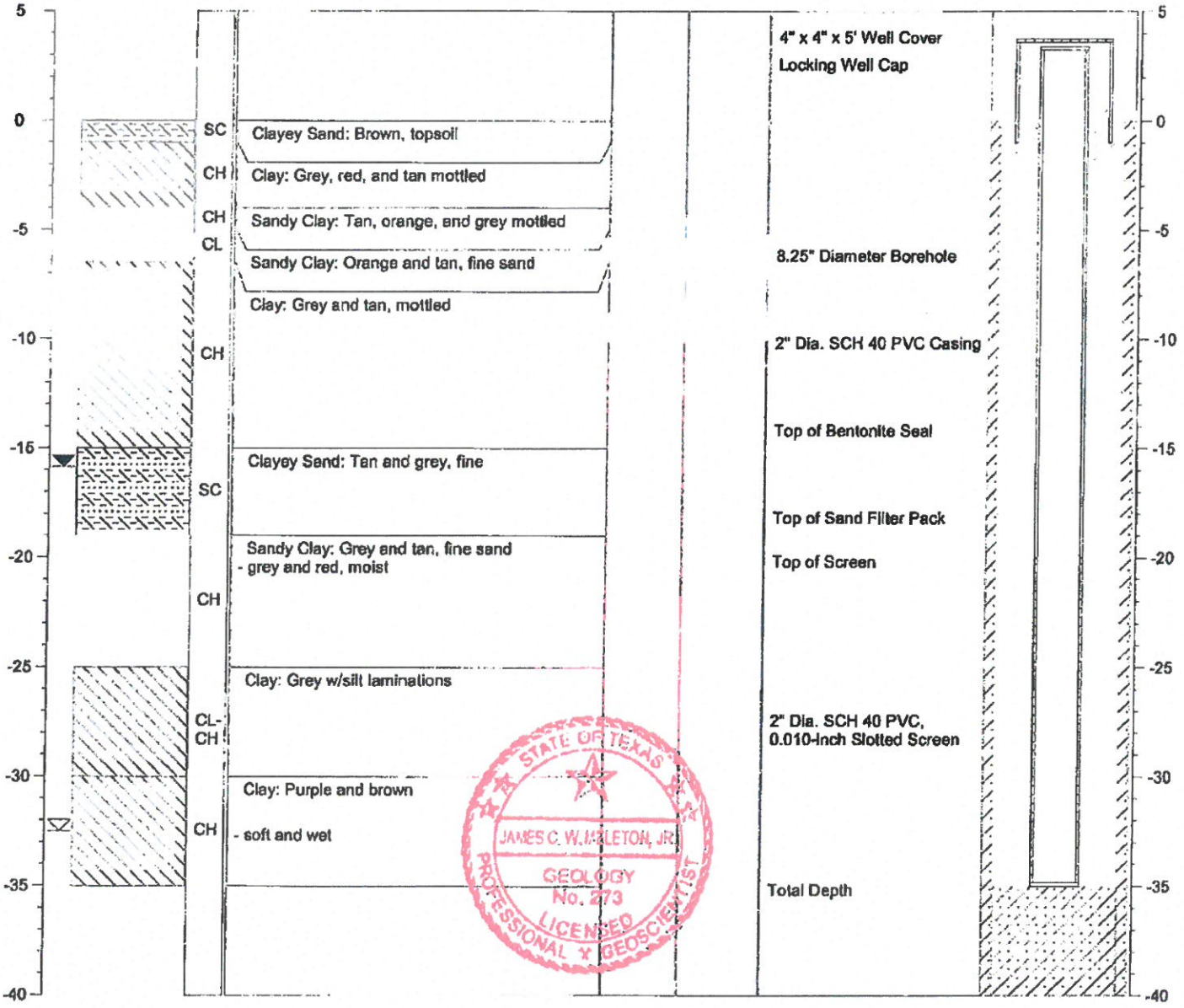
CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/22/09

NOTES: **Latitude: 33.04881**
Longitude: 94.84047

▽ Water level during drilling
▼ Water level in completed well

Page 1 of 1

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



E·A·G·L·E
ENVIRONMENTAL SERVICES OF SHREVEPORT, INC

SOIL BORING LOG

BORING/WELL NO.:	AD-11
TOTAL DEPTH:	20'
TOP OF CASING ELEV.:	342.18 ft. NGVD
GROUND SURFACE ELEV.:	339.61 ft. NGVD

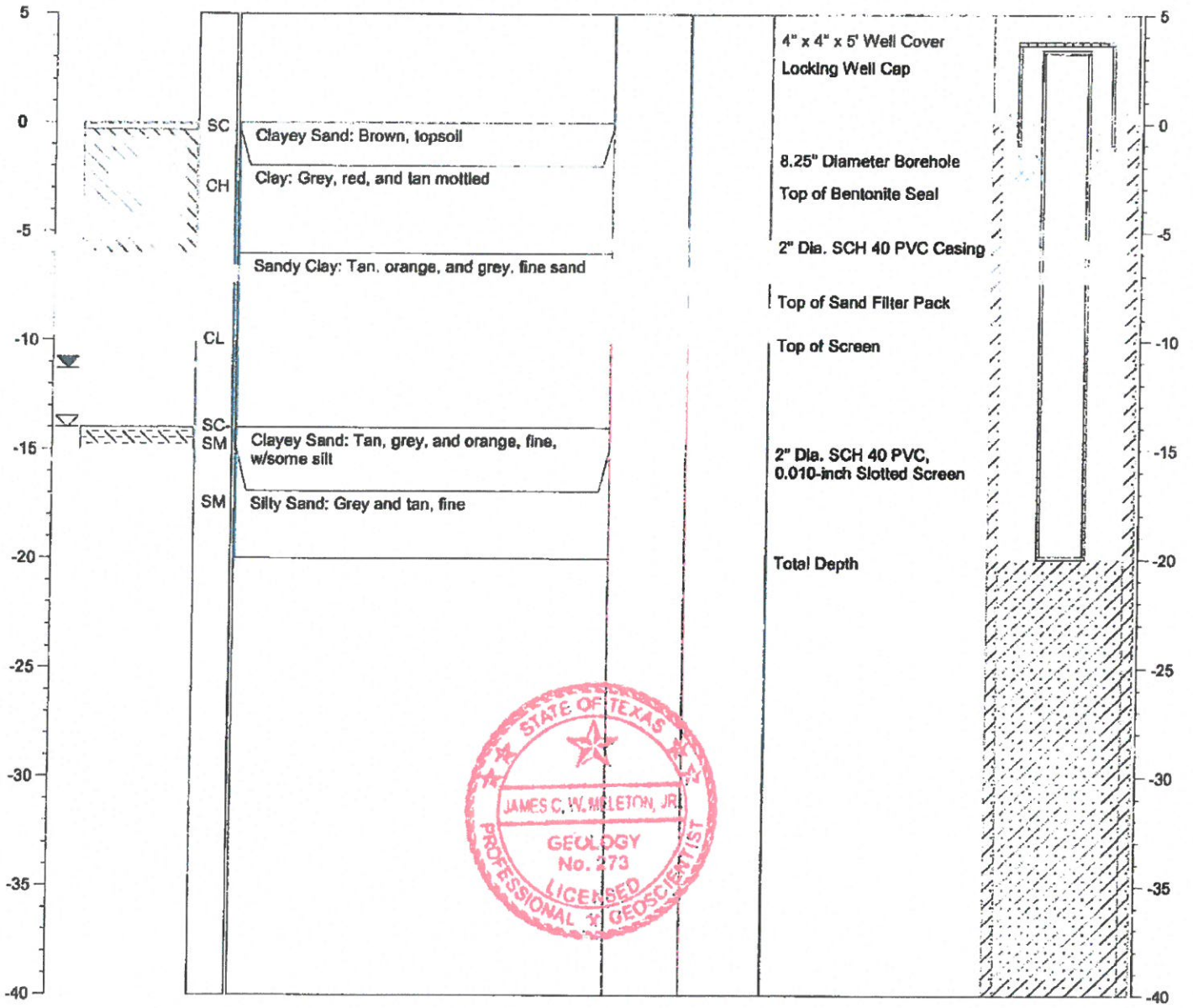
CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/22/09

NOTES: **Latitude: 33.04824**
Longitude: 94.84177

▽ Water level during drilling
▼ Water level in completed well

Page 1 of 1

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



E·A·G·L·E
ENVIRONMENTAL SERVICES OF SHREVEPORT, INC.

SOIL BORING LOG

BORING/WELL NO.:	AD-12
TOTAL DEPTH:	30'
TOP OF CASING ELEV.:	369.33 ft. NGVD
GROUND SURFACE ELEV.:	366.27 ft. NGVD

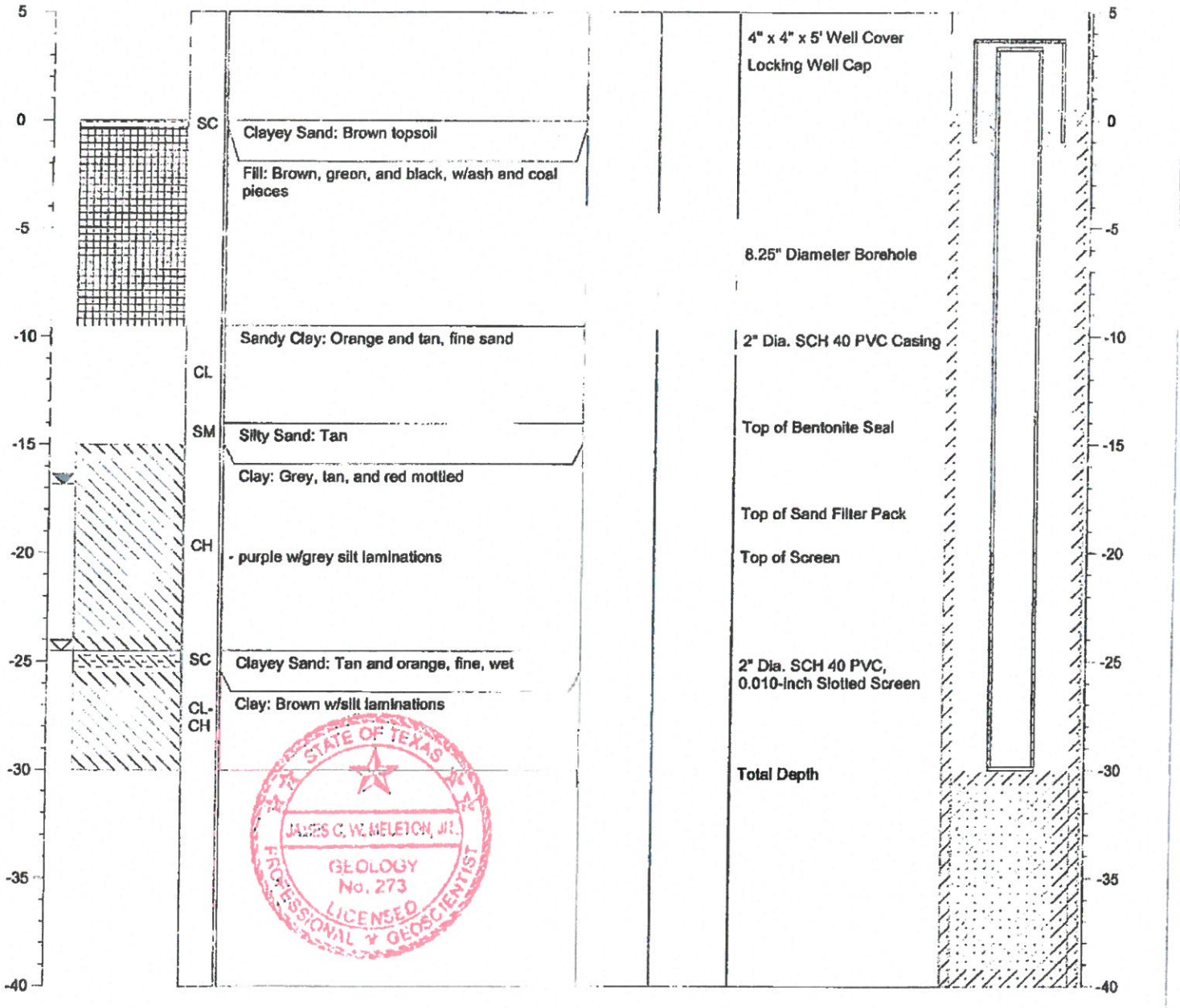
CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/24/09

NOTES: **Latitude: 33.04901**
Longitude: 94.84977

▽ Water level during drilling
▼ Water level in completed well

Page 1 of 1

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



SOIL BORING LOG

E·A·G·L·E
ENVIRONMENTAL SERVICES OF SHREVEPORT INC

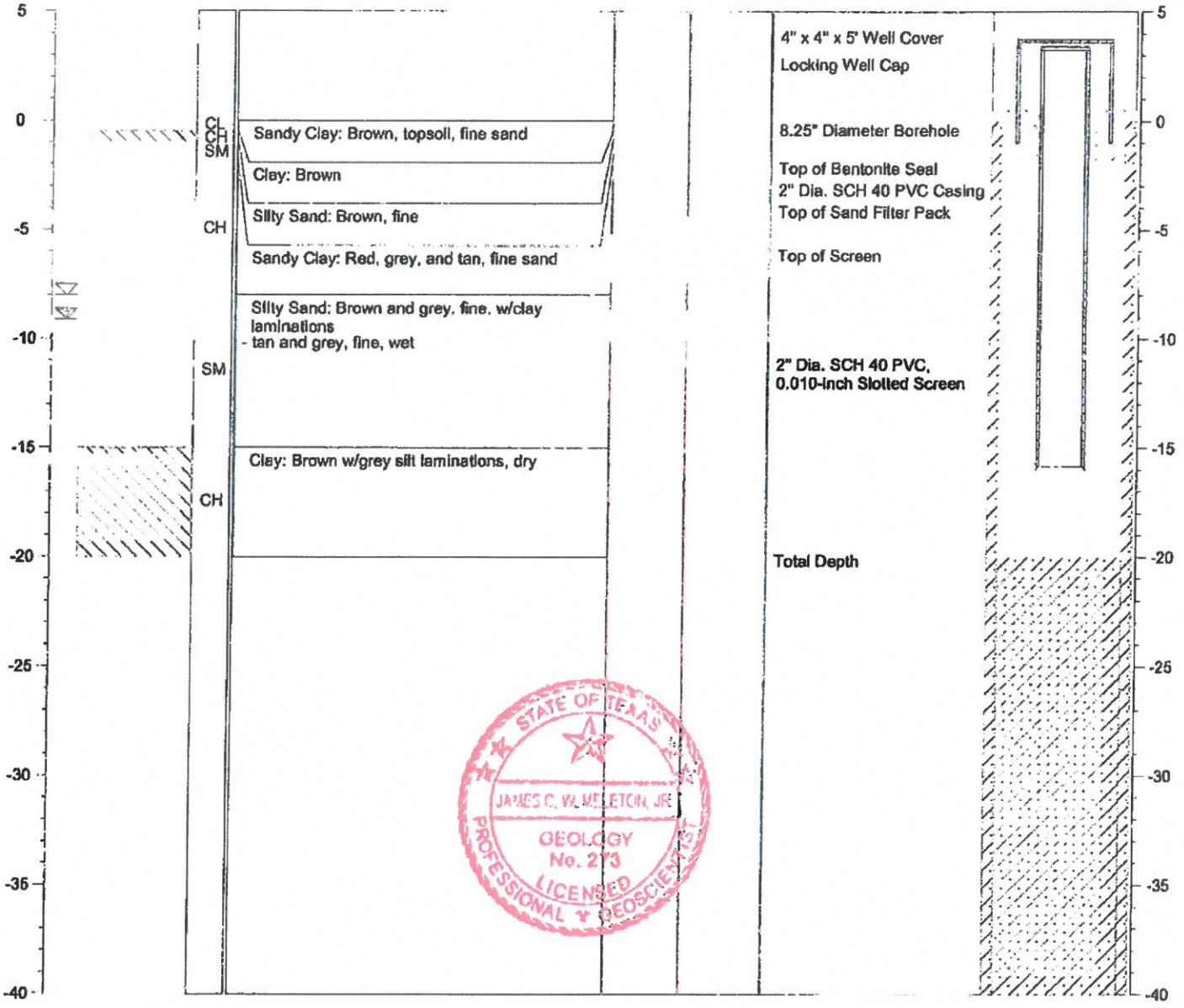
BORING/WELL NO.:	AD-13
TOTAL DEPTH:	20'
TOP OF CASING ELEV.:	347.00 ft. NGVD
GROUND SURFACE ELEV.:	344.12 ft. NGVD

CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/22/09

NOTES: **Latitude: 33.04918**
Longitude: 94.84275

▽ Water level during drilling
▽ Water level in completed well

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



E·A·G·L·E
ENVIRONMENTAL SERVICES OF SHREVEPORT, INC

SOIL BORING LOG

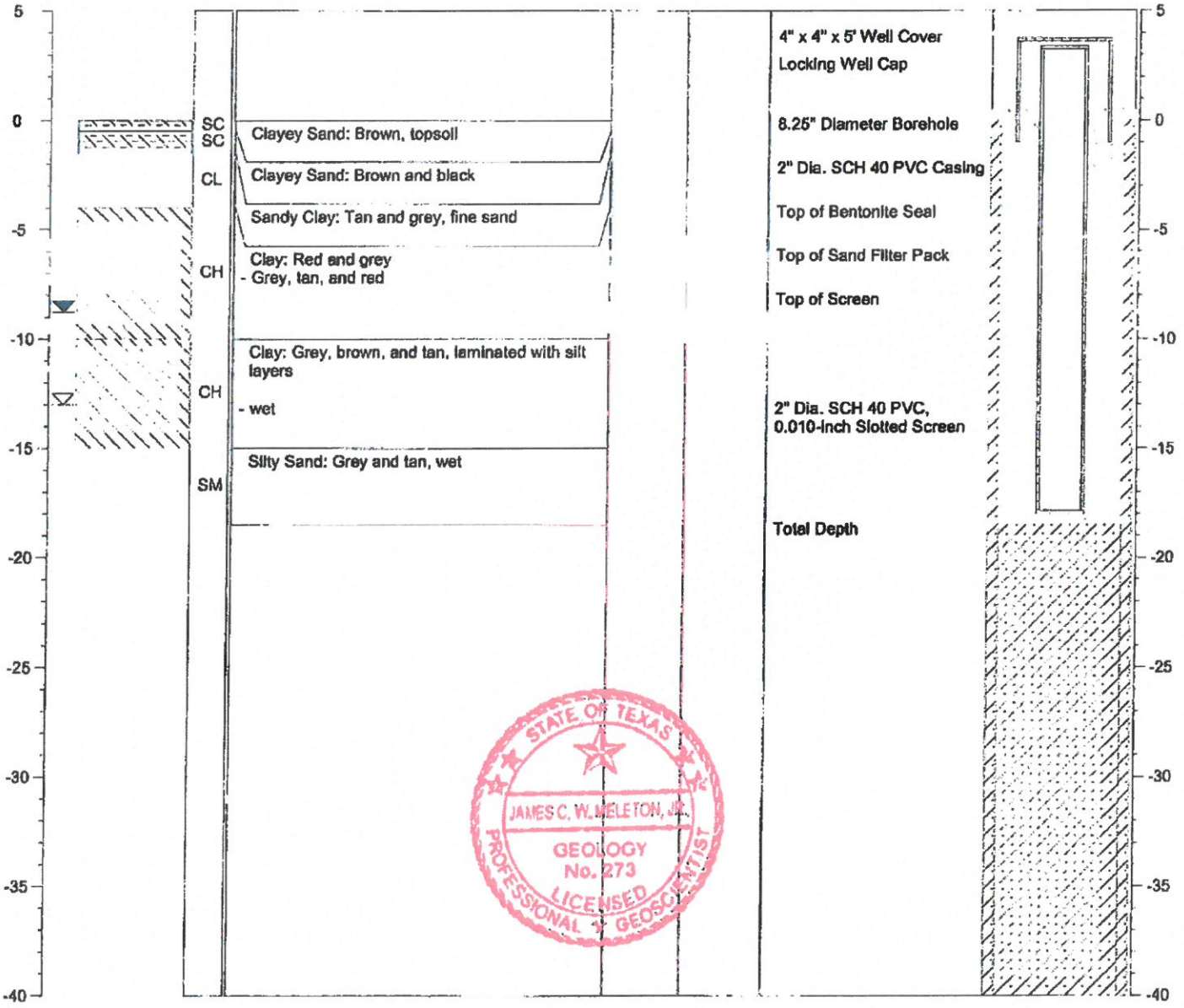
BORING/WELL NO.:	AD-14
TOTAL DEPTH:	18.5'
TOP OF CASING ELEV.:	345.43 ft. NGVD
GROUND SURFACE ELEV.:	342.32 ft. NGVD

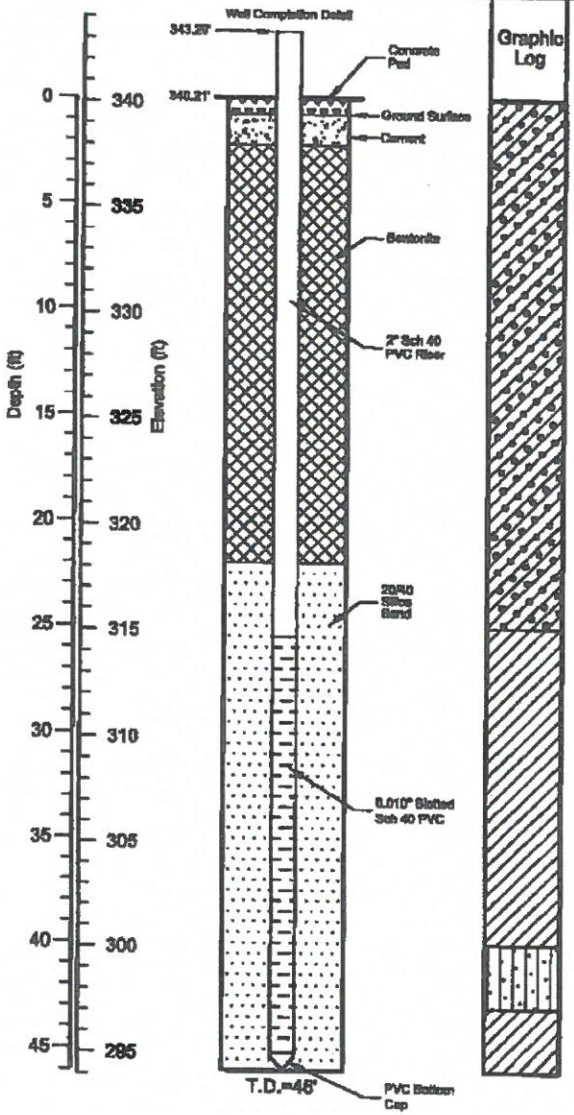
CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Ash Disposal Area	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0109	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	9/22/09

NOTES: **Latitude: 33.04715**
Longitude: 94.84256

▽ Water level during drilling
▼ Water level in completed well

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION





Graphic Log

PID Reading (ppm)	Sampling Device	Sample Interval	USCS	Comments and Lithology	Percent Moisture	Percent Fines	Liquid Limit	Plastic Limit	Plastic Index
	Direct Push		SC	Clayey SAND: reddish brown - 2" lense of brown sand - 3" lense of brown sand	16	48	37	18	19
			CL	Sandy Lean CLAY: reddish brown, very moist - less moisture	22	51	36	19	17
			SM	Silty SAND: light brown & light gray, wet.	27	24	26	NP	-
			CL	Lean CLAY: orangish brown & light gray, mottled, with sand	28	94	45	21	24

STATE OF TEXAS
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1-22-16

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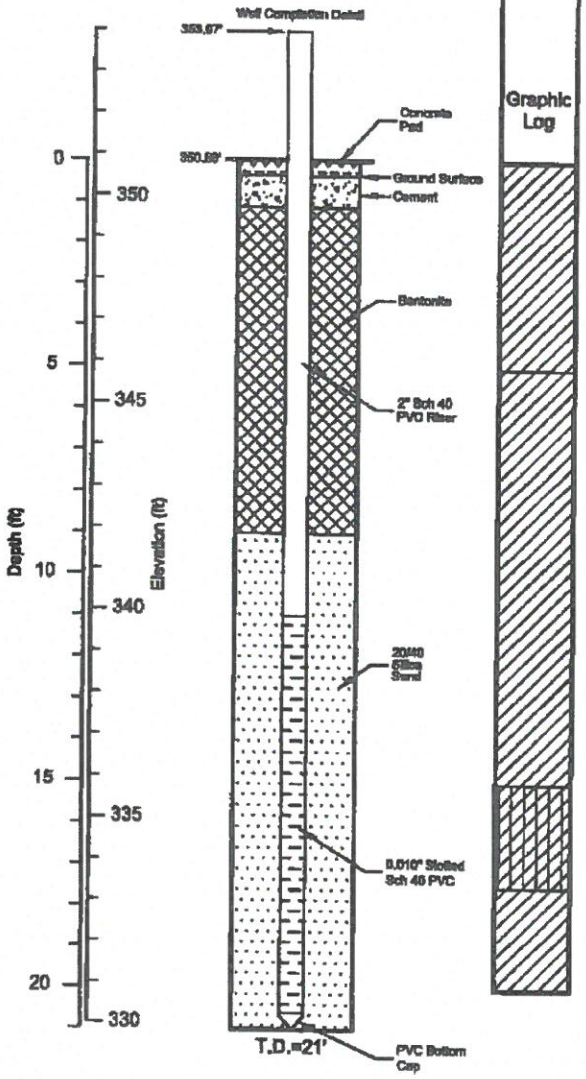
WEST Drilling, Inc.
101 Industrial Drive
Waxahachie, Texas 75165

DATE: 12/12/15	Logged by: Robert Williams, PE	Welsh Power Station Pittsburg, Texas	Log of Boring AD-15
Drilling Method: H.S.A.	Driller: Robert Williams		
Bit Diameter: 7.25"	Date Completed: 12/12/15	DRAWN BY: HDS	PROJECT NO.: — / SCALE: AS SHOWN
Depth to Water: —	Depth to Product: NA	CHECKED BY: SRW	FILE NAME: dR Welsh Power Plant LOGS.dwg



Graphic Log

Depth (ft)	PID Reading (ppm)	Sampling Device	Sample Interval	Description Interval (feet bgs)	Comments and Lithology	Percent Moisture	Percent Fines	Liquid Limit	Plastic Limit	Plastic Index
0		Direct Push		CL	Lean CLAY w/ Sand: light brown & light gray	16	82	26	16	10
					- orangish brown, with silt					
5				CL	Lean CLAY w/ Sand: orangish-brown & light gray	22	88	31	19	12
10				CL-ML	Silty CLAY: orange w/ brown, wet	30	69	27	20	7
15				CL	Sandy, Lean CLAY: brown w/ orange, stiff	26	66	46	26	20
20										

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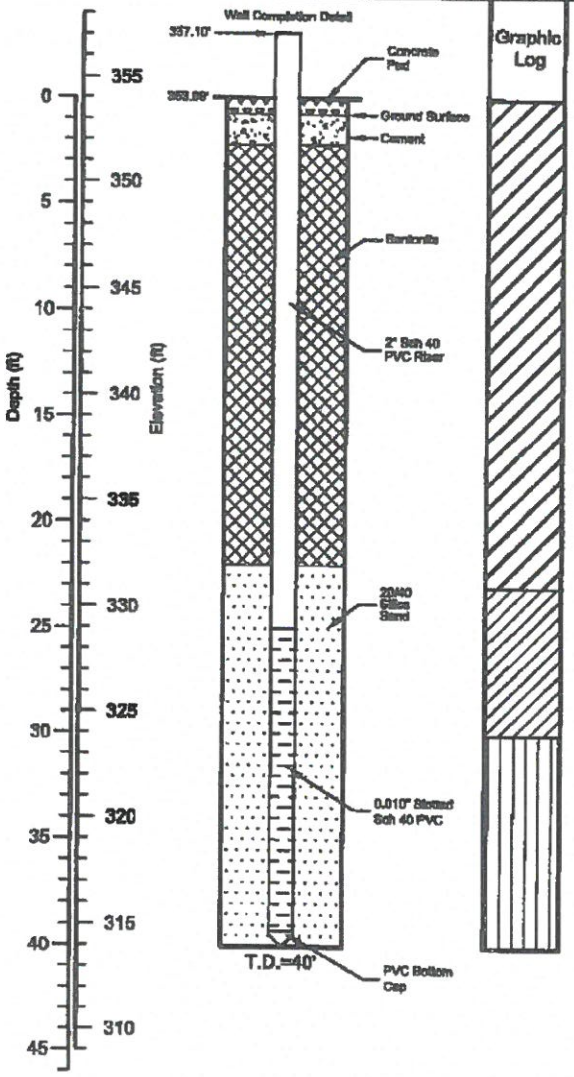
WEST Drilling, Inc.
101 Industrial Drive
Waxahachie, Texas 75165

DATE: 12/10/15	Logged by: Robert Williams, PE	Welsh Power Station Pittsburg, Texas	Log of Boring AD-16
Drilling Method: H.S.A.	Driller: Robert Williams		
Bit Diameter: 7.25"	Date Completed: 12/10/15	DRAWN BY: HDS	PROJECT NO.: — / SCALE: AS SHOWN
Depth to Water: –	Depth to Product: NA	CHECKED BY: SRW	FILE NAME: JR Welsh Power Plant LOGS.dwg



Graphic Log

PID Reading (ppm)	Sampling Device	Sample Interval	USCS	Comments and Lithology	Percent Moisture	Percent Fines	Liquid Limit	Plastic Limit	Plastic Index
	Direct Push		CH	Fat CLAY: reddish-brown					
				- light gray to light brown, reddish brown w/ Sand and gravel lenses	24	97	83	30	53
				- light brown					
				- brown Sand lenses, wet					
				- gray, w/ some Silt	18	90	53	25	28
			CL	Lean CLAY with Sand: gray	22	81	43	22	21
			ML	Sandy SILT: gray	23	63	28	NP	-

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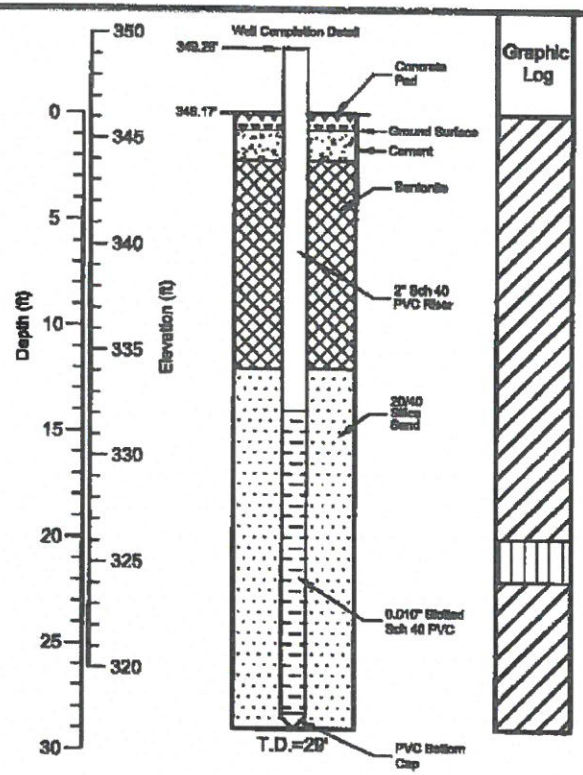
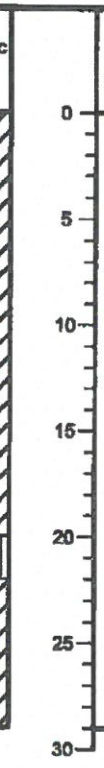
WEST Drilling, Inc.
101 Industrial Drive
Waxahatchie, Texas 75165

DATE: 12/10/15	Logged by: Robert Williams, PE	Welsh Power Station Pittsburg, Texas	Log of Boring AD-17
Drilling Method: H.S.A.	Driller: Robert Williams		
Bit Diameter: 7.25"	Date Completed: 12/11/15	DRAWN BY: HDS	PROJECT NO.: — / SCALE: AS SHOWN
Depth to Water: —	Depth to Product: NA	CHECKED BY: SRW	FILE NAME: JR Welsh Power Plant LOGS.dwg





PID Reading (ppm)	Sampling Device	Sample Interval	USCS	Comments and Lithology	Percent Moisture	Percent Fines	Liquid Limit	Plastic Limit	Plastic Index
	Direct Push		CH	Fat CLAY: light brown & light gray, sandy - reddish brown and light gray, with Sand - gray with silt - gray, stiff	19	88	50	24	26
			ML	SILT: gray, with Clay and Sand, wet	29	86	26	NP	-
			CH	Fat CLAY: light gray, silty w/ Sand, very stiff	20	85	50	23	27

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WEST Drilling, Inc.
101 Industrial Drive
Waxahachie, Texas 75165

DATE: 12/11/15	Logged by: Robert Williams, PE	Welsh Power Station Pittsburg, Texas	Log of Boring AD-18		
Drilling Method: H.S.A.	Driller: Robert Williams				
Bit Diameter: 7.25"	Date Completed: 12/11/15	DRAWN BY: HDS	PROJECT NO.: —	SCALE: AS SHOWN	
Depth to Water: —	Depth to Product: NA	CHECKED BY: SRW	FILE NAME: JR Welsh Power Plant LOGS.dwg		

Project: AEP Welsh Power Plant
Project Location: Cason, TX
Project Number: TXL0064

Log of Boring GB-1

Sheet 1 of 2

Date(s) Drilled: **July 23, 2009**	Logged By: **Kush S. Chohan**	Checked By:
Drilling Method: **Hollow Stem Auger**	Drill Bit Size/Type:	Total Depth of Borehole: **37 feet bgs**
Drill Rig Type: **Mobil B61**	Drilling Contractor: **Total Support Services**	Approximate Surface Elevation: **367 feet MSL**
Groundwater Level and Date Measured:	Sampling Method(s): **SPT, Tube**	Hammer Data: **140 lb, 30 in drop, Auto-hammer**
Borehole Backfill: **Bentonite Chips**	Location: **On the Northern edge of proposed chemical pond along the screening berm.**	

Elevation, feet	Depth, feet	Sample Type	Sample Sampling Resistance, blows/foot	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHER TESTS
367	0				Other		Black COAL, a few fine roots and organics.						
		ST											Shelby tube pulled black COAL
		SS	10										SPT 4, 5, 5, 5. 24" recovered
362	5												
		SS	11	Soft to Firm	SC		Reddish Brown fine SAND, little clay, trace silt, Dry. Natural Ground.						SPT 4, 5, 6, 7. 24" recovered
				Soft	SM		Reddish brown fine SAND with silt, trace clay. Vertical sand seams in sample, Dry.						
		SS	11										SPT 3, 5, 6, 6. 24" recovered.
													Shelby tube sample, 18" recovered.
357	10	ST						23.6	22	48.9	5.4E-07		
				Soft	SC		Reddish brown well graded fine SAND, trace silt and clay. Damp.						
		SS	12	Firm	CL		Greyish red CLAY, little sand, horizontal sand seams, Dry.						SPT 5, 6, 8, 9. 24" recovered
				Soft	SC		Brownish red fine SAND, little clay, Damp.						
		SS	13	Firm	SC-CL		) Four-inch CLAY seam, little fine sand.						SPT 7, 6, 7, 9. 24" recovered.
352	15			Firm	CL		Reddish grey CLAY, little sand, oxidized iron ore. Dry						
				Soft	SM		Brownish red fine SAND, trace clay, thin clay seams. Moist.						SPT 8, 9, 9, 9. 24" recovered.
		SS	18					17.74	14	40.1			
		ST						16.25	NP	28.9	3.6E-05		Shelby tube samples look like SC. 17" recovered.
													SPT 9, 8, 9, 11. 24 inches recovered.
347	20	SS	17	Soft	Other		) Iron oxidized material						
				Soft	SC		Brownish red fine SAND, little clay. Moist.						SPT 5, 7, 6, 50/2. 21" recovered
		SS	15										
		SS	∞	Soft	CL		Dark grey CLAY, little fine sand, Wet.						SPT 50/3".
				Very Hard	SP		Dark grey-black cemented SAND, little clay. Wet. Driller comments that cemented sand terminates at 25.5 feet.						
342	25												
		SS	27	Soft to Firm	SC		Dark grey fine SAND, little clay. Moist. Soft sand with lenses of firm clay.						SPT 11, 13, 14, 16. 24" recovered.
				Hard	CL		Dark grey CLAY, little sand, Dry.						
		SS	46	Soft	SC		Dark grey-black fine SAND, little clay, Wet. Encountered water but water rose to 19 feet after 15 min break.						SPT 11, 18, 30, 14. 24" recovered.
		SS	37										SPT 11, 15, 22, 25. 24" recovered.
337	30			Hard	CL								

Figure

Project: AEP Welsh Power Plant
Project Location: Cason, TX
Project Number: TXL0064

Log of Boring GB-1

Sheet 2 of 2

Elevation, feet	Depth, feet	Sample Type	Sample Number	Sampling Resistance, Blows/foot	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHER TESTS
337	30		SS	37	Hard	CL		Dark gray CLAY, little fine sand, occasional horizontal sand seams. Wet. (cont.)						SPT 11, 15, 22, 25. 24" recovered.
					Soft	ML		Dark grey-black fine SAND, with clay, frequent hard clay lenses (1-3"). Wet.						SPT 6, 11, 18, 24. 24 recovered.
			SS	29					26.37	NP	57.5			
332	35				Hard	CL		Black CLAY, trace to little fine sand, trace silt. Dry						SPT 9, 16, 18, 23. 24" recovered.
			SS	34										
								Bottom of Boring at 37 feet bgs						
327	40													
322	45													
317	50													
312	55													
307	60													
302	65													

Figure

Project: AEP Welsh Power Plant Project Location: Cason, Texas Project Number: TXL0064	**Log of Boring GB-02** Sheet 1 of 1

Date(s) Drilled **August 14, 2009**	Logged By **Kush S. Chohan**	Checked By
Drilling Method **Hollow Stem Auger**	Drill Bit Size/Type	Total Depth of Borehole **30 feet bgs**
Drill Rig Type **Mobil B61**	Drilling Contractor **Total Support Services**	Approximate Surface Elevation **364.56 feet MSL**
Groundwater Level and Date Measured **21.53 feet measured on 8/11/09**	Sampling Method(s) **SPT, Tube**	Hammer Data **140 lb, 30 in drop, rope & cathead**
Borehole Backfill **Well Completion**	Location **Western edge of proposed chemical pond near perimeter fence.**	

Elevation, feet	Depth, feet	Sample Type	Sample Number	Sampling Resistance, blows/foot	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHER TESTS
364.6	0				Soft	Other		Coal						
					Soft	CL		Greyish brown CLAY, with little silt, little sand, damp.						
		SS	4											SPT 2, 2, 2. 12" recovered.
		SS	13											SPT 4, 7, 6, 12.
359.6	5	ST												Shelby Tube Sample
					Firm	CH		Brownish tan CLAY with silt, little sand, Damp. Occasional sand and iron ore.						
		SS	29						23.71	38	77.3			SPT 8, 12, 17, 21
		SS	50											SPT 20, 30, 50/5. 17" recovered
354.6	10				Soft	SC		Red-orange fine SAND, little clay, damp. Occasional iron ore.						
					Soft	CL		Brownish tan CLAY, little silt, little sand, Damp.						
		SS	44		Soft	SM		Red-orange fine SAND, little clay, Damp.						SPT 15, 20, 24, 31. 18" recovered.
		SS	21						20.35	NP	33.5			SPT 11, 12, 9, 32.
349.6	15	SS	18		Soft	SM-SC		Light brown fine SAND, with little silt, little sand, Damp.						SPT 6, 6, 12, 6.
					Firm	CL		Black CLAY, with fine sand, Wet.						
		SS	75		Soft	SM-SC		Dark red fine SAND, little clay, little silt, Wet.						SPT 12, 25, 50/5.
		SS	26			SC		Dark grey fine SAND, little clay, Wet. Occasional clay seams.						SPT 9, 18, 12, 15.
344.6	20	SS	38		Firm	SC		Frequent clay lenses. 8/11/09	22.55	13	36.6			SPT 9, 17, 21, 27.
		SS	65											SPT 22, 35, 50/4".
339.6	25	SS	33											SPT 10, 15, 18, 28.
		SS	64		Soft	SC		Less clay lenses, Wet.						SPT 12, 27, 37, 50/5".
		SS	44											SPT 19, 24, 21, 50/5".
334.6	30				Hard	CL		Dark grey SAND, little fine silt, Wet.						

Figure

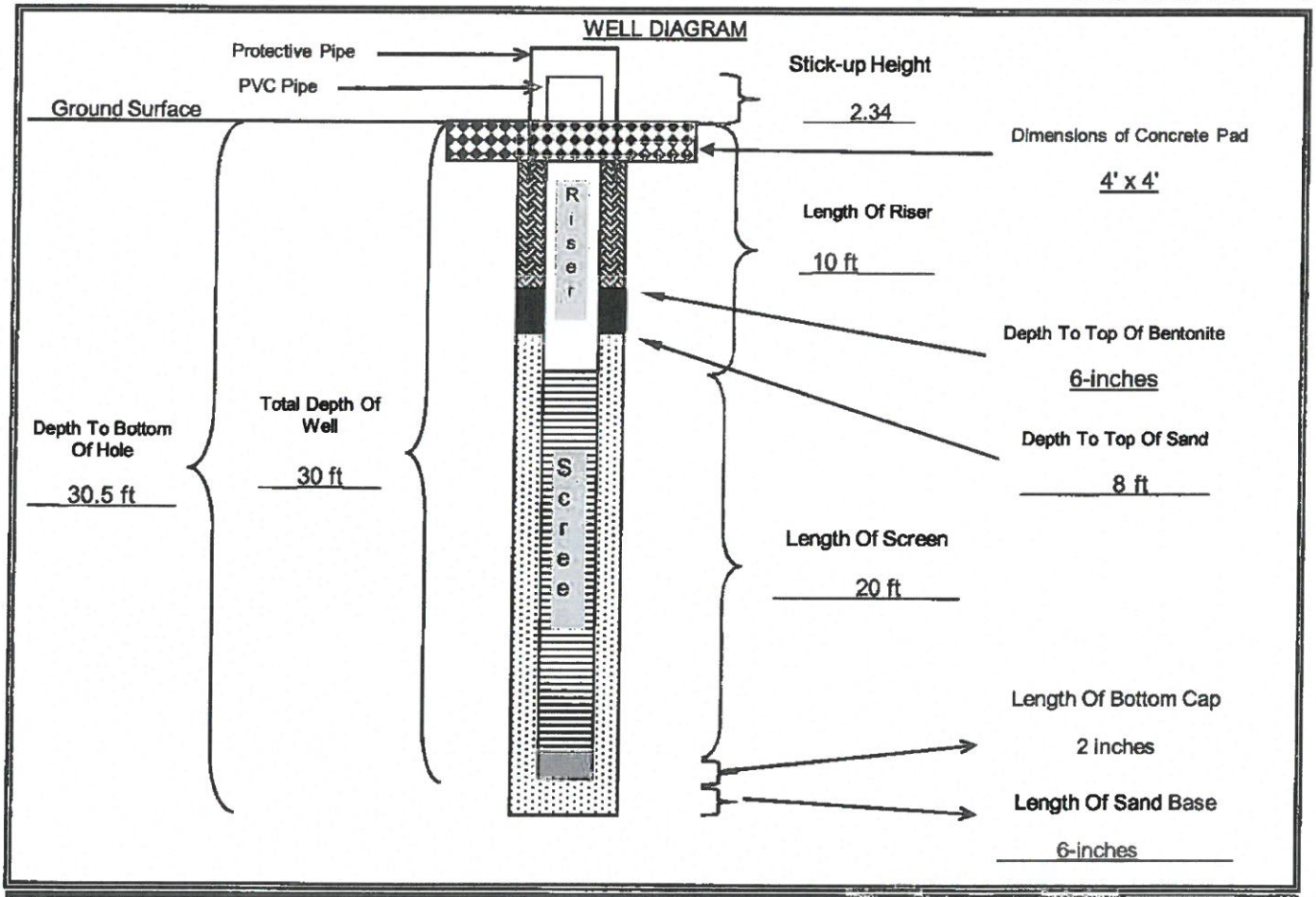
WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)

Geosyntec consultants

JOB NAME:	AEP Welsh Power Plant		GB-02
JOB NO.:	TXL0064		
DATE/TIME:	8/7/2009	WELL NO.:	
WELL LOCATION:		FIELD REP:	Kush Chohan

GROUND SURFACE ELEVATION:	364.56	(ft, msl)	BENTONITE TYPE:	Western Bentonite	
TOP OF SCREEN ELEVATION:	354.56	(ft, msl)	MANUFACTURER:	PDS	
BOTTOM OF WELL ELEVATION:	334.06	(ft, msl)	CEMENT TYPE:	Not used-sealed with bentonite chips	
NORTHING:	747.0223	EASTING: -2442.888	CEMENT MANUFACTURER:		
SCREEN MATERIAL:	PVC		SAND PACK TYPE AND SIZE:	Silica 20/40	
SCREEN MANUFACTURER:			SAND MANUFACTURER:	Uninum	
RISER MATERIAL:	PVC		DRILLING CONTRACTOR:	Total Support Services	
RISER MANUFACTURER:			AMOUNT BENTONITE USED:	4	bags lbs
RISER DIAMETER:	2 (in)	Length: 10 (ft)	AMOUNT CEMENT USED:		bags lbs
SCREEN DIAMETER:	2 (in)	Length: 20 (ft)	AMOUNT SAND USED:	13	bags lbs
BOREHOLE DIAMETER:	8 (in)		STATIC WATER:	21.53	depth from TOC
DRILLING TECHNIQUE:	Hollow stem	Size: (in)	ENCOUNTERED WATER:		depth from ground

WELL DIAGRAM



QA/QC	INSTALLED BY:	Total Support Services	OBSERVED BY:	Kush Chohan	
	DATE:	August 7th, 2009	CHECKED BY:		DATE:

Project: AEP Welsh Power Plant
Project Location: Cason, Texas
Project Number: TXL0064

Log of Boring GB-03

Sheet 1 of 2

Date(s) Drilled: **August 7, 2009**	Logged By: **Kush S. Chohan**	Checked By:
Drilling Method: **Hollow Stem Auger**	Drill Bit Size/Type:	Total Depth of Borehole: **31 feet bgs**
Drill Rig Type: **Mobil B61**	Drilling Contractor: **Total Support Services**	Approximate Surface Elevation: **359.91 feet MSL**
Groundwater Level and Date Measured: **21.89 feet measured on 8/11/09**	Sampling Method(s): **SPT, Tube**	Hammer Data: **140 lb, 30 in drop, rope & cathead**
Borehole Backfill: **Well Completion**	Location: **Southwest corner of proposed chemical pond near screening pile.**	

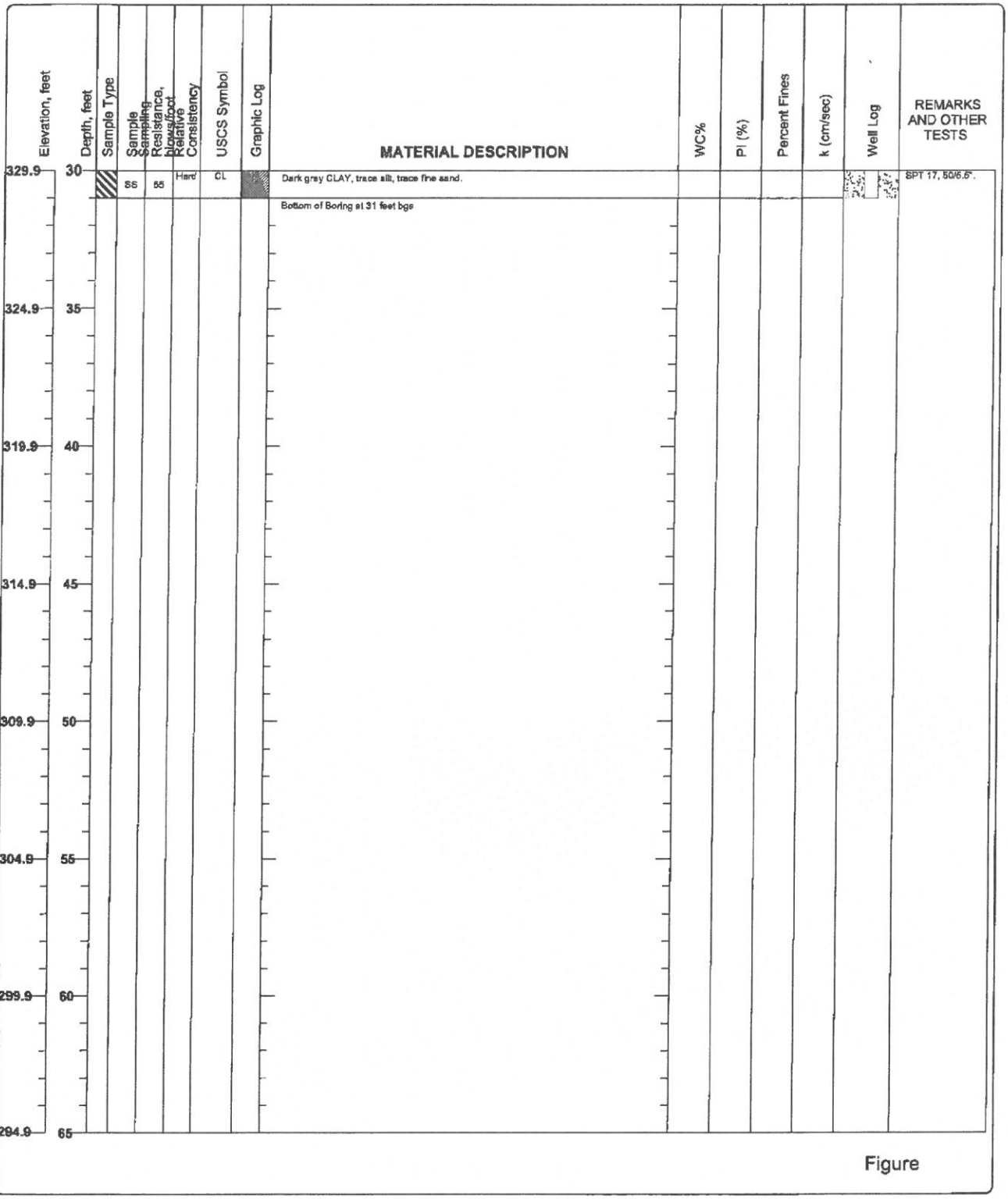
Elevation, feet	Depth, feet	Sample Type	Sample Sampling Resistance, blows/foot	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHER TESTS
359.9	0			Soft	Other		Coal						
354.9	5	ST		Soft	CH		Shelby Tube		43	98.1			Shelby tube sample.
		SS	41	Firm	CH		Light brown-grey CLAY, little silt, occasional sand seams (fine), Damp.	24.04	29	90.4			SPT 29, 22, 19, 21.
349.9	10	SS	27	Soft	CH		Brownish dark grey CLAY, trace sand, trace silt, Wet.						SPT 8, 12, 15, 20.
		SS	53	Soft	SC		Dark orange red SAND, little clay, trace silt, Wet. Occasional clay seam (dark grey).						SPT 17, 29, 24, 25.
		SS	32	Soft	SC		Clay lenses.						SPT 7, 15, 17, 40.
344.9	15	SS	47	Soft	SC		Clay lense						SPT 9, 17, 30, 20.
				Soft	SC		Dark grey fine SAND with clay, occasional clay lense, Wet.						SPT 11, 50/4".
		SS	50	Firm	CL		Dark grey CLAY, little fine sand, Wet.						
339.9	20	SS	44	Soft	SC		Dark grey fine SAND, little clay, occasional clay seam, iron ore, Wet.						SPT 11, 27, 17, 21.
							8/11/09 ▼						
334.9	25	SS	90										SPT 27, 40, 50/4".
				Firm	SC		Dark grey clay lense						
		SS	55										SPT 11, 15, 40, 50/3".
329.9	30	SS	55										SPT 17, 50/5.5".

Figure

Project: AEP Welsh Power Plant
Project Location: Cason, Texas
Project Number: TXL0064

Log of Boring GB-03

Sheet 2 of 2



Figure

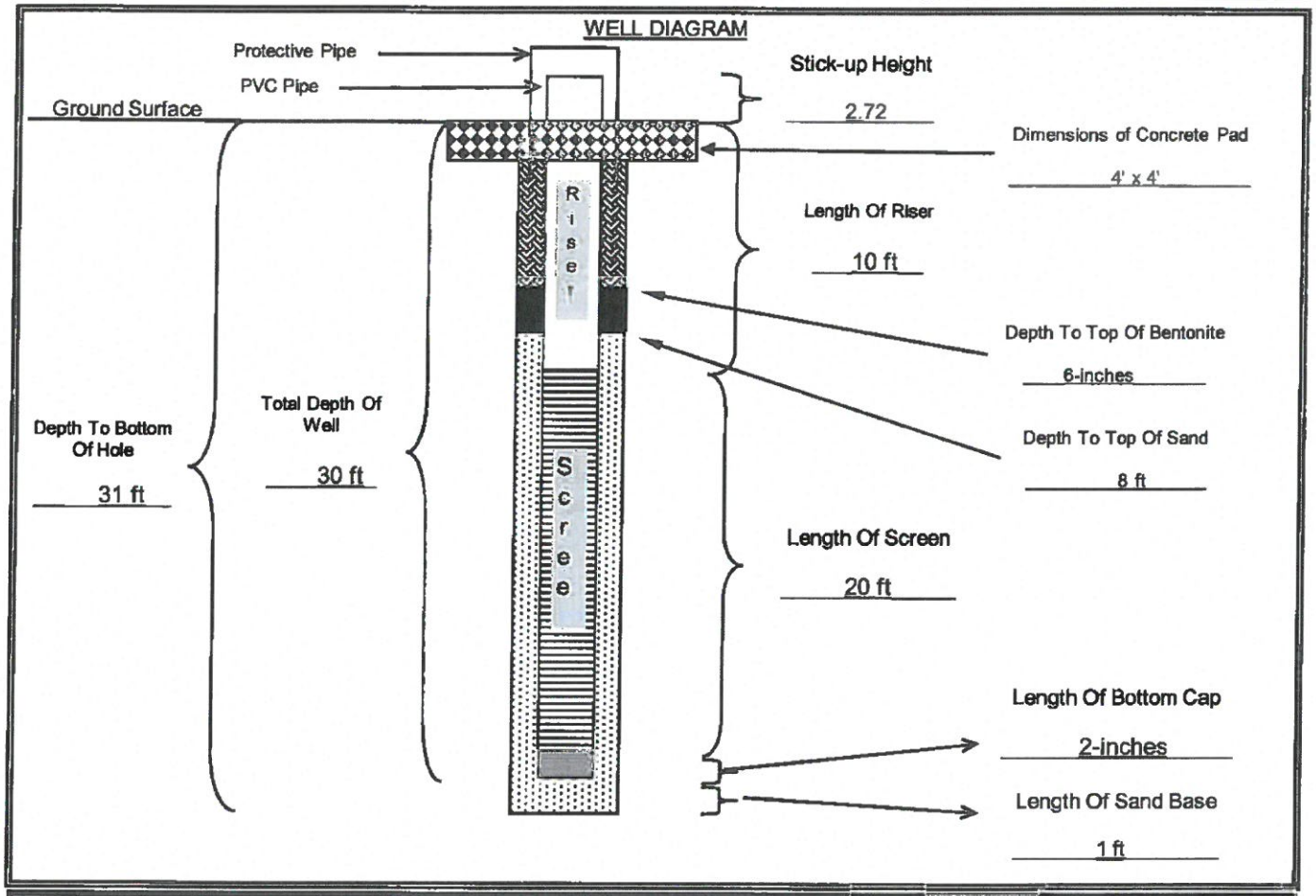
WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)

Geosyntec consultants

JOB NAME:	AEP Welsh Power Plant		GB-03
JOB NO.:	TXL0064		
DATE/TIME:	8/7/2009	WELL NO.:	
WELL LOCATION:		FIELD REP:	Kush Chohan

GROUND SURFACE ELEVATION:	359.57 (ft, msl)	BENTONITE TYPE:	Western Bentonite
TOP OF SCREEN ELEVATION:	349.57 (ft, msl)	MANUFACTURER:	PDS
BOTTOM OF WELL ELEVATION:	328.57 (ft, msl)	CEMENT TYPE:	None used-sealed with bentonite chips
NORTHING: 460.5803 EASTING:	-2507.6332	CEMENT MANUFACTURER:	
SCREEN MATERIAL:	PVC	SAND PACK TYPE AND SIZE:	Silica 20/40
SCREEN MANUFACTURER:		SAND MANUFACTURER:	Unimum
RISER MATERIAL:	PVC	DRILLING CONTRACTOR:	Total Support Services
RISER MANUFACTURER:		AMOUNT BENTONITE USED:	4 bags lbs
RISER DIAMETER: 2 (in) Length:	10 (ft)	AMOUNT CEMENT USED:	bags lbs
SCREEN DIAMETER: 2 (in) Length:	20 (ft)	AMOUNT SAND USED:	12 bags lbs
BOREHOLE DIAMETER:	8 (in)	STATIC WATER:	21.89 depth from TOC
DRILLING TECHNIQUE: Hollow Stem Size:	8 (in)	ENCOUNTERED WATER:	depth from ground

WELL DIAGRAM



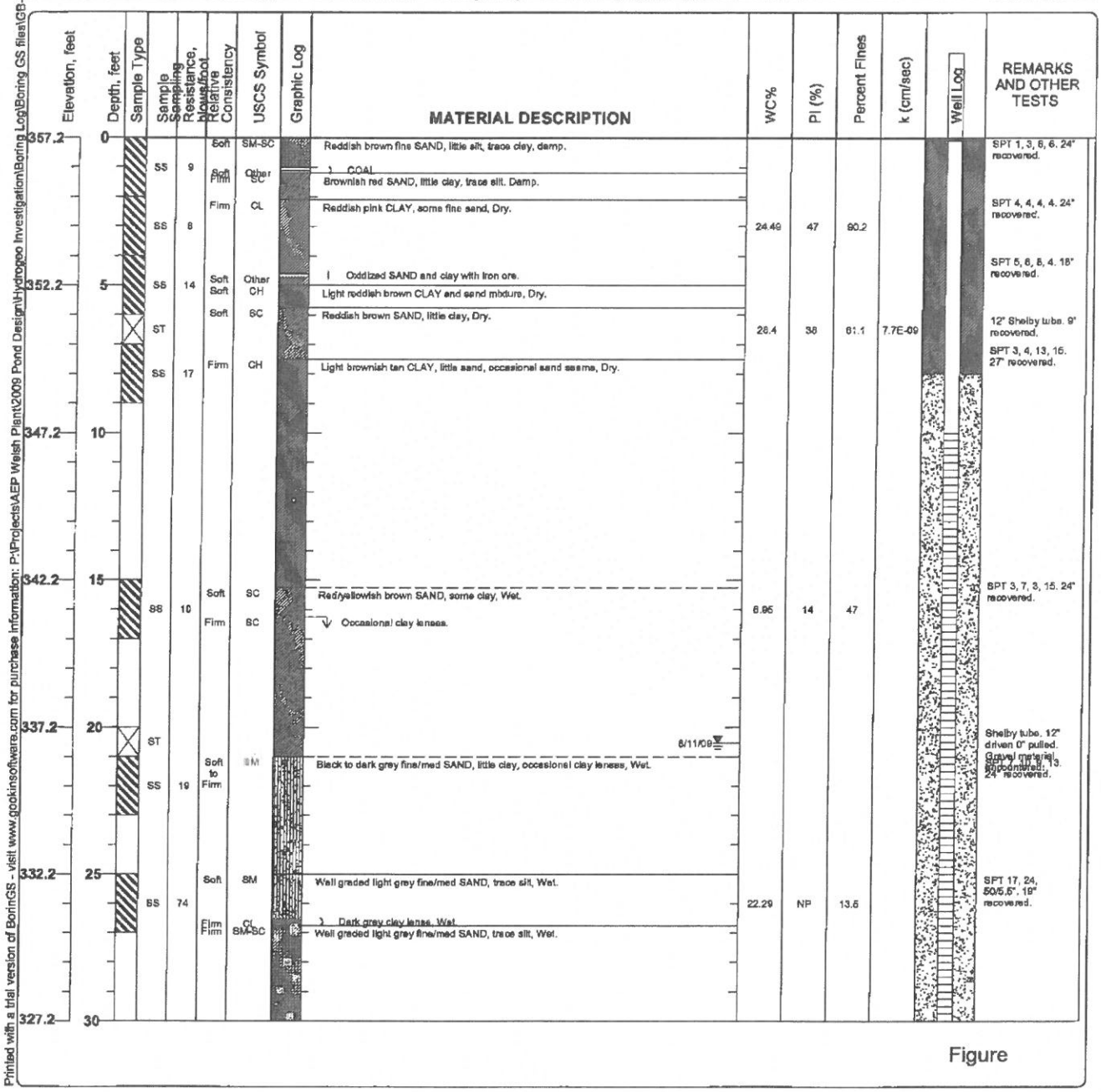
QA/QC	INSTALLED BY:	Total Support Services	OBSERVED BY:	Kush S. Chohan	
	DATE:	7-Aug-09	CHECKED BY:		DATE:

Project: AEP Welsh Power Plant
Project Location: Cason, Texas
Project Number: TXL0064

Log of Boring GB-04

Sheet 1 of 2

Date(s) Drilled: **July 24, 2009**	Logged By: **Kush S. Chohan**	Checked By:
Drilling Method: **Hollow Stem Auger**	Drill Bit Size/Type:	Total Depth of Borehole: **34 feet bgs**
Drill Rig Type: **Mobil B61**	Drilling Contractor: **Total Support Services**	Approximate Surface Elevation: **357.22 feet MSL**
Groundwater Level and Date Measured: **20.54 feet measured on 8/11/09**	Sampling Method(s): **SPT, Tube**	Hammer Data: **140 lb, 30 in drop, Auto-hammer**
Borehole Backfill: **Well Completion**	Location: **Southeast corner of proposed chemical evaportation pond. Located in a grassy field.**	

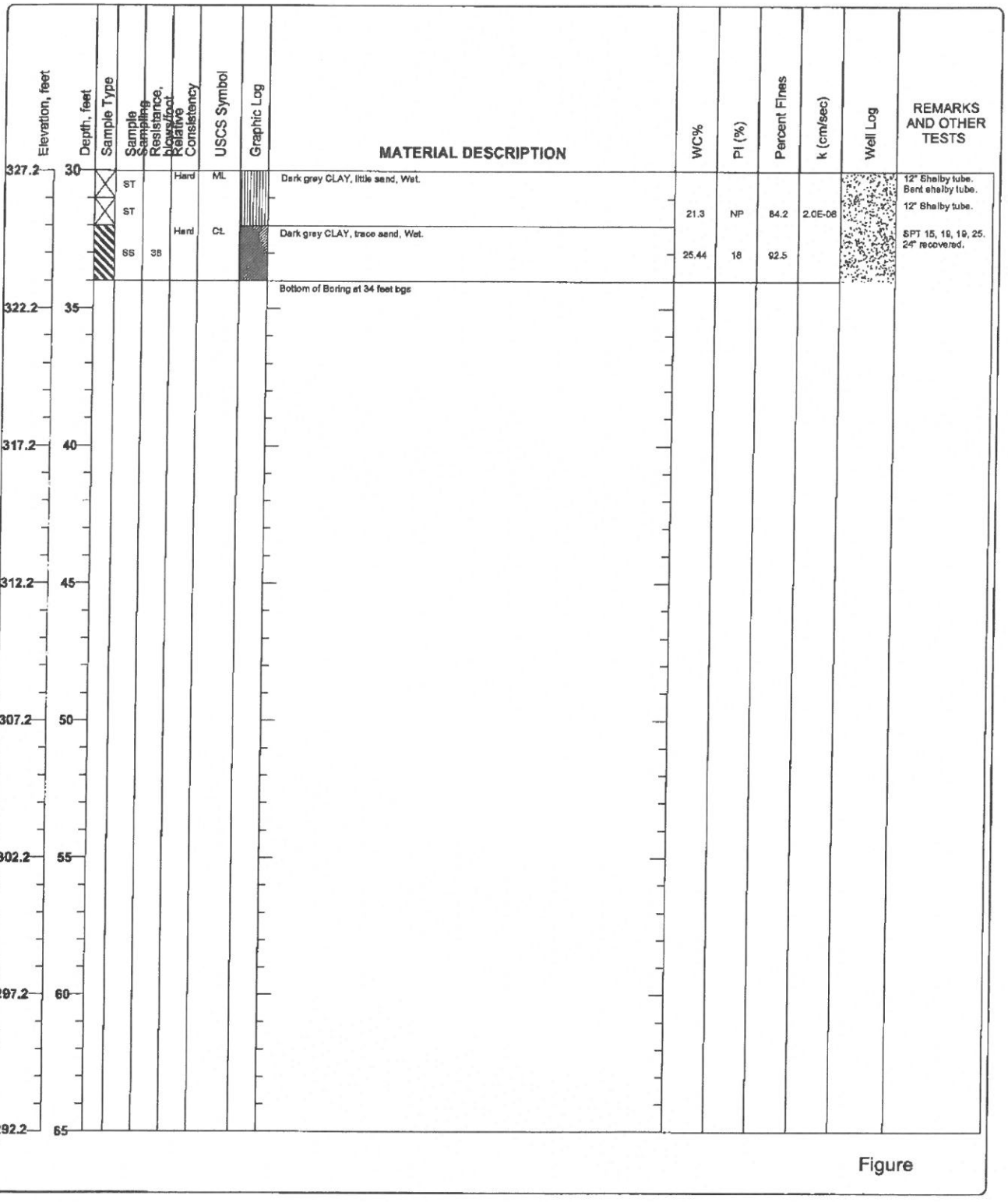


Figure

Project: AEP Welsh Power Plant
Project Location: Cason, Texas
Project Number: TXL0064

Log of Boring GB-04

Sheet 2 of 2



Figure

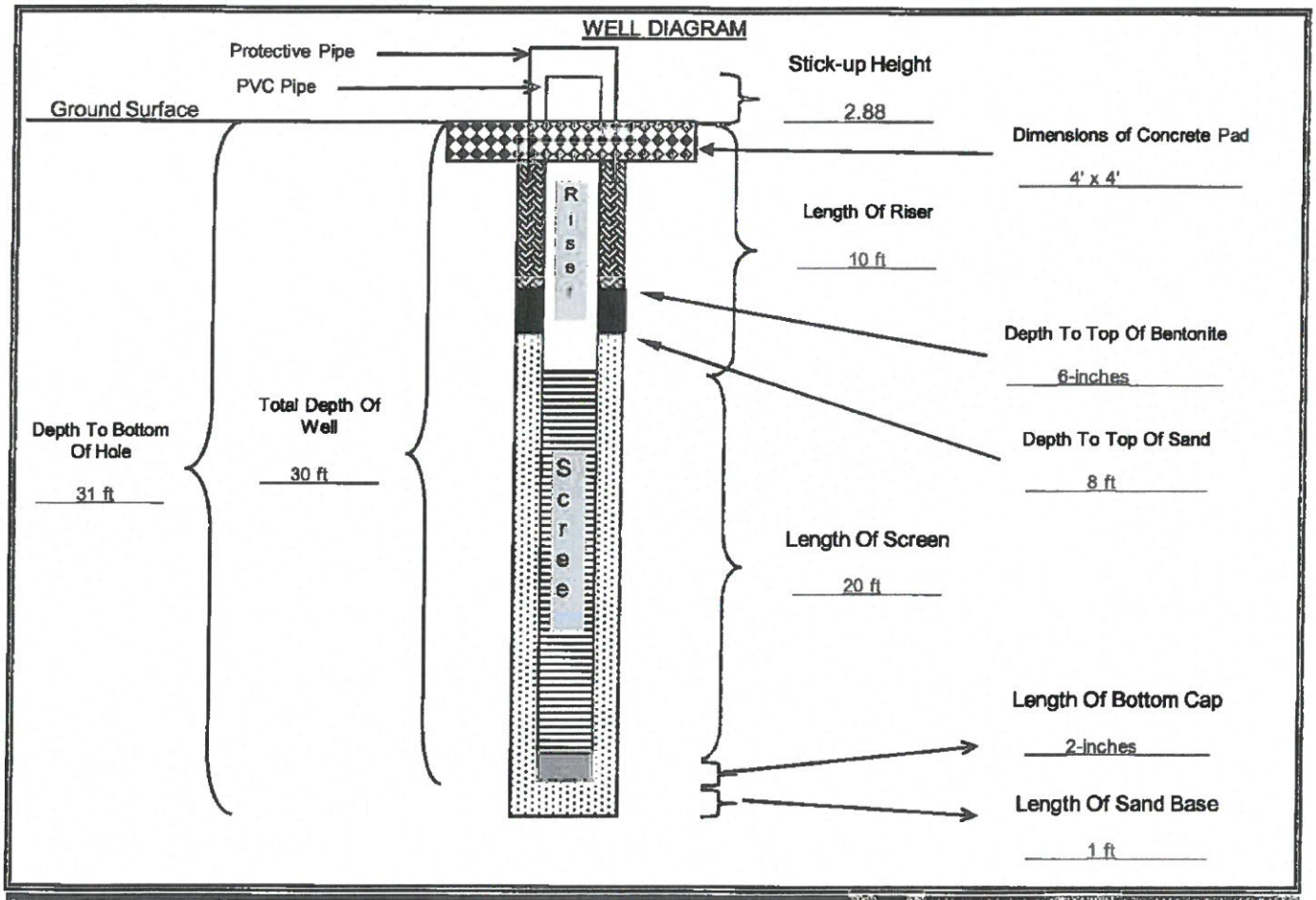
WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)

Geosyntec consultants

JOB NAME:	AEP Welsh Power Plant		GB-04
JOB NO.:	TXL0064		
DATE/TIME:	24-Jul-09	WELL NO.:	
WELL LOCATION:		FIELD REP:	Kush Chohan

GROUND SURFACE ELEVATION:	357.22 (ft, msl)	BENTONITE TYPE:	Western Bentonite
TOP OF SCREEN ELEVATION:	347.22 (ft, msl)	MANUFACTURER:	PDS
BOTTOM OF WELL ELEVATION:	326.22 (ft, msl)	CEMENT TYPE:	
NORTHING: -384.9666	EASTING: -2353.7375	CEMENT MANUFACTURER:	
SCREEN MATERIAL:	PVC	SAND PACK TYPE AND SIZE:	Silica 20/40
SCREEN MANUFACTURER:		SAND MANUFACTURER:	Uninum
RISER MATERIAL:	PVC	DRILLING CONTRACTOR:	Total Support Services
RISER MANUFACTURER:		AMOUNT BENTONITE USED:	3 bags lbs
RISER DIAMETER:	2 (in) Length: 10 (ft)	AMOUNT CEMENT USED:	bags lbs
SCREEN DIAMETER:	2 (in) Length: 20 (ft)	AMOUNT SAND USED:	7 bags lbs
BOREHOLE DIAMETER:	6.75 (in)	STATIC WATER:	20.54 depth from TOC
DRILLING TECHNIQUE:	Hollow Stem Size: 6.75 (in)	ENCOUNTERED WATER:	depth from ground

WELL DIAGRAM



Cement/Bentonite Grout | Sand Pack | Neat Concrete | Bentonite | Bottom Cap

QA/QC	INSTALLED BY:	Total Support Services	OBSERVED BY:	Kush S. Chohan	
	DATE:	24-Jul-09	CHECKED BY:		DATE:

Project: AEP Welsh Power Plant
Project Location: Cason, Texas
Project Number: TXL0064

Log of Boring GB-05

Sheet 1 of 2

Date(s) Drilled: **July 24, 2009**	Logged By: **Kush S. Chohan**	Checked By:
Drilling Method: **Hollow Stem Auger**	Drill Bit Size/Type:	Total Depth of Borehole: **30.5 feet bgs**
Drill Rig Type: **Mobil B61**	Drilling Contractor: **Total Support Services**	Approximate Surface Elevation: **357.49 feet MSL**
Groundwater Level and Date Measured: **15.3 feet measured on 8-11-09**	Sampling Method(s): **SPT, Tube**	Hammer Data: **140 lb, 30 in drop, Auto-hammer**
Borehole Backfill: **Well Completion**	Location: **Eastern edge of proposed chemical evaporation pond.**	

Elevation, feet	Depth, feet	Sample Type	Sample Number	Sampling Resistance, Blows/foot	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHER TESTS
357.5	0				Soft	SW-SM		Dark fine SAND with brown organic material and roots.						SPT 2, 2, 5, 5. 24" recovered
		SS		7	Firm	CH		Dark red/grey CLAY, trace silt. Dry.	23.97	44	68.8			
		SS		11								7E-07		SPT 4, 4, 7, 9. 24" recovered.
352.5	5	SS		14										SPT 5, 6, 8, 13. 24 recovered
						CH		▽ Trace of sand						
		ST			Soft	CH		Dark red fine SAND, trace clay, Damp.	16.5	41	73.8	3.2E-08		Shelby tube. Pushed 12 recovered 8".
		SS		18	Firm	CH		Light tan CLAY, trace sand, Dry.						SPT 5, 7, 11, 11. 24" recovered.
					Soft	SC		Dark red SAND, trace of CLAY, Damp.						
					Firm	CL		Light tan CLAY, trace fine sand, Dry.						
					Soft	SC		Dark red SAND, little clay, frequent clay seams, Damp						SPT 6, 7, 11, 14. 24" recovered.
347.5	10	SS		18										
						SC		▽ Frequent clay seams						
		SS		35	Soft	SC		Red/orange fine SAND, trace clay, trace coarse sand, poorly sorted, Moist.						SPT 11, 22, 13, 14. 24" recovered.
		SS		77	Firm	CL		Brownish grey CLAY, trace sand, Moist.						SPT 17, 27, 50/5". 17" recovered.
					Soft	SC		Tanish grey fine SAND, some clay, Wet.						
342.5	15	ST						8-11-08 ▼	19.9	13	35.7	9.6E-07		Shelby tube. Pushed 12" recovered 9".
		SS		23					27.98	NP	32.3			SPT 11, 15, 10, 14. 24" recovered.
					Soft	SM		Dark grey coarse SAND/GRAVEL mix, some fine sand, trace clay, Wet.						
					Soft	SM-SC		Red fine SAND, trace clay, Moist. cemented. Moist.						SPT 7, 8, 11, 13. 24" recovered.
		SS		19										
					Firm	SC		Black fine SAND, occasional clay, Wet.						
337.5	20				Firm	CL		▽ Dark grey CLAY, little sand, Wet.						
		SS		22	Firm	SM		Black fine SAND, some medium sand, some clay, Wet.	32.23	NP	36.5			SPT 6, 10, 12, 16. 24" recovered.
					Firm	CL		▽ Dark grey CLAY, little sand, Wet.						
					Firm	SM		Black fine SAND, some medium sand, some clay, Wet.						
		SS		28	Firm	SM		▽ Frequent clay seams						SPT 6, 11, 17, 21. 24" recovered.
					Firm	SM		▽ Frequent clay seams.						
		ST												Shelby tube. 12" driven 0 recovered.
332.5	25													SPT 15, 19, 21, 27. 24" recovered.
		SS		40	Hard	CL		Dark grey CLAY, trace of sand, Dry.						
		SS		22										SPT 10, 11, 11, 50/5". 23" recovered.
					Very Hard	CL		▽ Dark grey CLAY, frequent iron stone/ore. Rig chatter driller comments						
327.5	30	ST							24.9	15	75.0	1.0E-07		Shelby tube. 12" driven 9" recovered.

Figure

Project: AEP Welsh Power Plant
Project Location: Cason, Texas
Project Number: TXL0064

Log of Boring GB-05

Sheet 2 of 2

Elevation, feet	Depth, feet	Sample Type	Sample Number	Sampling Resistance, blows/foot	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHER TESTS
327.5	30	ST		Hard	CL			Dark grey CLAY, trace of sand, Dry. (cont.)	24.9	15	75.0	1.0E-07		Shelby tube. 12" driven 9" recovered.
								Bottom of Boring at 30.5 feet bgs						
322.5	35													
317.5	40													
312.5	45													
307.5	50													
302.5	55													
297.5	60													
292.5	65													

Figure

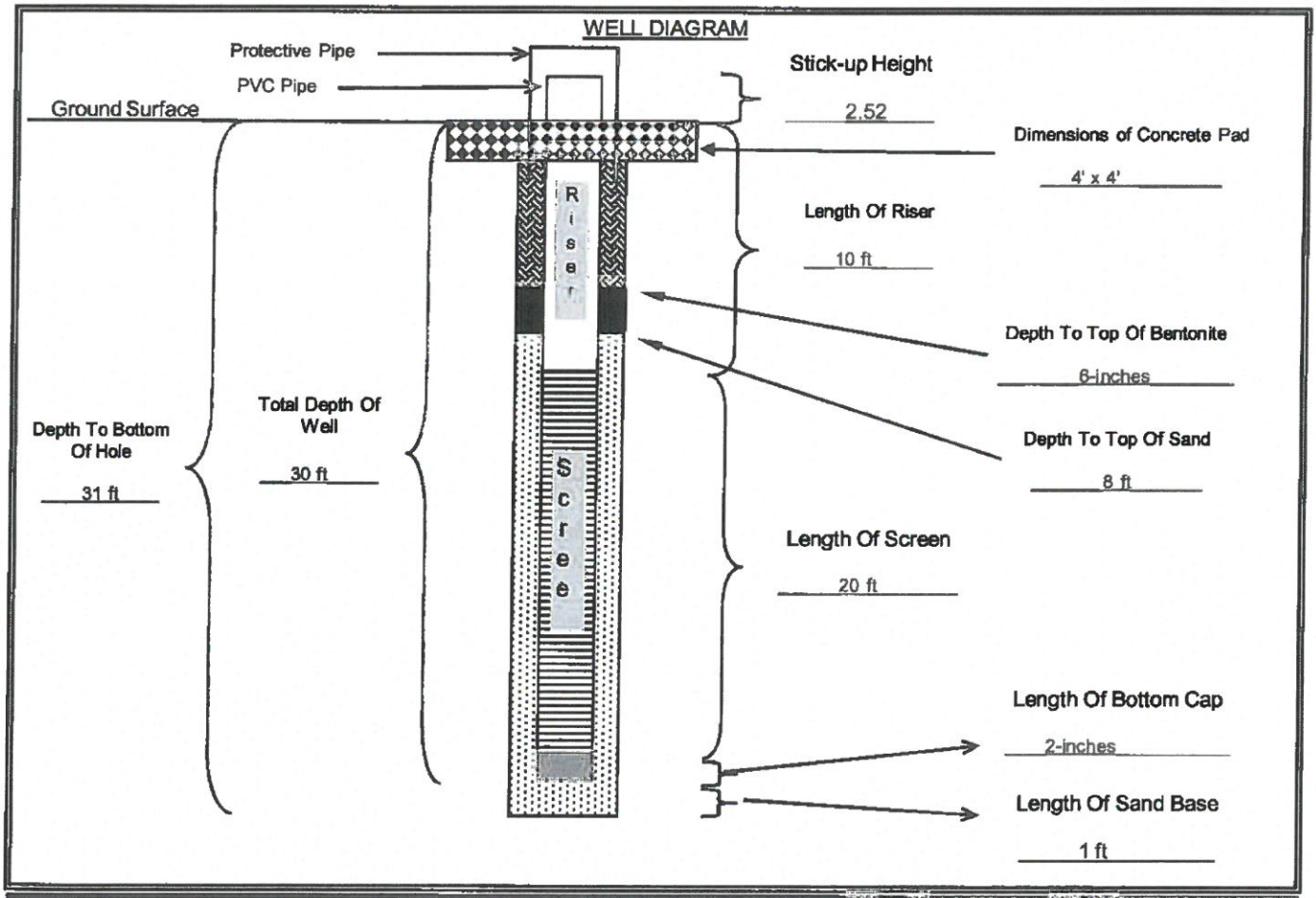
WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)

Geosyntec consultants

JOB NAME:	AEP Welsh Power Plant		GB-05
JOB NO.:	TXL0064		
DATE/TIME:	August 6 2009	WELL NO.:	
WELL LOCATION:		FIELD REP:	Kush Chohan

GROUND SURFACE ELEVATION:	357.49	(ft, msl)	BENTONITE TYPE:	Western Bentonite	
TOP OF SCREEN ELEVATION:	347.49	(ft, msl)	MANUFACTURER:	PDS	
BOTTOM OF WELL ELEVATION:	326.49	(ft, msl)	CEMENT TYPE:		
NORTHING: 529.1865	EASTING: -2243.9973		CEMENT MANUFACTURER:		
SCREEN MATERIAL:	PVC		SAND PACK TYPE AND SIZE:	Silica 20/40	
SCREEN MANUFACTURER:			SAND MANUFACTURER:	Unimum	
RISER MATERIAL:	PVC		DRILLING CONTRACTOR:	Total Support Services	
RISER MANUFACTURER:			AMOUNT BENTONITE USED:	3 bags	lbs
RISER DIAMETER:	2 (in) Length: 10 (ft)		AMOUNT CEMENT USED:	bags	lbs
SCREEN DIAMETER:	2 (in) Length: 20 (ft)		AMOUNT SAND USED:	7 bags	lbs
BOREHOLE DIAMETER:	8 (in)		STATIC WATER:	17.33 depth from TOC	
DRILLING TECHNIQUE:	Hollow Stem Size: 8 (in)		ENCOUNTERED WATER:	depth from ground	

WELL DIAGRAM



Cement/Bentonite Grout | Sand Pack | Neat Concrete | Bentonite | Bottom Cap

QA/QC	INSTALLED BY:	Total Support Services	OBSERVED BY:	Kush Chohan	
	DATE:	6-Aug-09	CHECKED BY:		DATE:

Project: AEP Welsh Power Plant
Project Location: Cason, Texas
Project Number: TXL0064

Log of Boring GB-06

Sheet 1 of 1

Date(s) Drilled: 7/23/2009	Logged By: Kush S. Chohan	Checked By:
Drilling Method: Hollow Stem Auger	Drill Bit Size/Type:	Total Depth of Borehole: 30 feet bgs
Drill Rig Type: Mobil B61	Drilling Contractor: Total Support Services	Approximate Surface Elevation: 357.41 feet MSL
Groundwater Level and Date Measured: 15.3 feet measured on 8/11/09	Sampling Method(s): SPT, Tube, Other	Hammer Data: 140 lb, 30 in drop, auto hammer
Borehole Backfill: Well Completion	Location: Northeast corner of proposed chemical pond in the middle of open grass field.	

Elevation, feet	Depth, feet	Sample Type	Sample Sampling Resistance, blows/foot	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHER TESTS
357.4	0	HA		Soft	SP		Greyish brown fine SAND with trace fines. Organic material (roots).						Hand Auger
				Soft	SP-SM		Greyish red fine SAND, little silt. Poorly sorted, less organic material.						
				Soft	SM		Greyish red fine SAND, with little silt and clay. Dry.						
		SS	14	Soft			Tanish grey fine SAND, trace silt and clay, frequent iron oxide, frequent discoloration.	12.74	34	67.9			SPT 4, 7, 7. 16" recovered
352.4	5			Firm	CL		Red light brown CLAY, little sand, trace silt, Dry.						
		SS	11	Soft	SC		Dark reddish brown fine SAND, little clay.						SPT 3, 5, 6, 8. 20" recovered
				Soft	CL		Light grey CLAY, little sand, trace silt. Dry.						
		SS	12	Soft	SC		Reddish brown fine SAND, trace clay, trace silt. Occasional clay seams. Damp.	17.66	NP	43.2			SPT 3, 5, 7, 7. 24" recovered
				Soft	CL		Light grey CLAY, little fine sand.						
		SS		Soft to Firm	SC		Brownish red fine SAND, little to some clay, some cementation, Damp.						24" driven, 15" recovered.
347.4	10	SS	19										SPT 8, 9, 10, 10. 24" recovered.
				Soft to Firm	CL		Brown CLAY, little fine sand, frequent brown sand-clay mixture with iron ore oxide.						
		ST						22.9	21	43.2	6.0e-07		Shelby Tube. 24" driven/16" recovered
342.4	15			Firm	CL		Dark reddish brown CLAY, little fine sand, Damp. 8/11/09						
		SS	40	Firm	SC		Dark reddish brown SAND, little to some clay, Moist.						SPT 15, 10, 22, 30. 24" recovered
				Firm	CL		Black CLAY, little fine sand, Wet.						
		SS	22	Firm	SW		Black fine SAND, trace clay, trace med sand, Wet.						SPT 2, 8, 14, 10. 24" recovered
				Firm	CL SC		Black CLAY, trace fine sand, trace silt, Wet. Black fine SAND, little clay, Wet.						
337.4	20	SS	30	Firm	CL		Black CLAY, trace sand, trace silt. Wet.						SPT 5, 6, 22, 50/4". 22 recovered.
				Firm	SC		Black fine SAND, trace to little clay, Wet. Occasional black clay seams.						
		SS	34	Firm	SP-SC		Black fine SAND, with little clay, trace med sand, Wet.						SPT 10, 11, 23, 33. 24" recovered
					SW-SC		Grading to med SAND, Wet.						
		SS	36										SPT 11, 16, 16, 24. 24" recovered.
332.4	25												SPT 9, 11, 12, 22. 24" recovered.
		SS	23	Firm	SW-SC		Occasional CLAY lenses, Wet.						
				Firm	SC		Black fine SAND, little med sand and clay, Wet.						
		SS	40	Hard	CL		Dark grey CLAY, little sand, little silt, Dry.						SPT 7, 15, 25, 50/3". 21 recovered.
327.4	30	ST					Bottom of Boring at 30 feet bgs		19	45.1			Shelby tube. 12" driven-6" recovered.

Figure

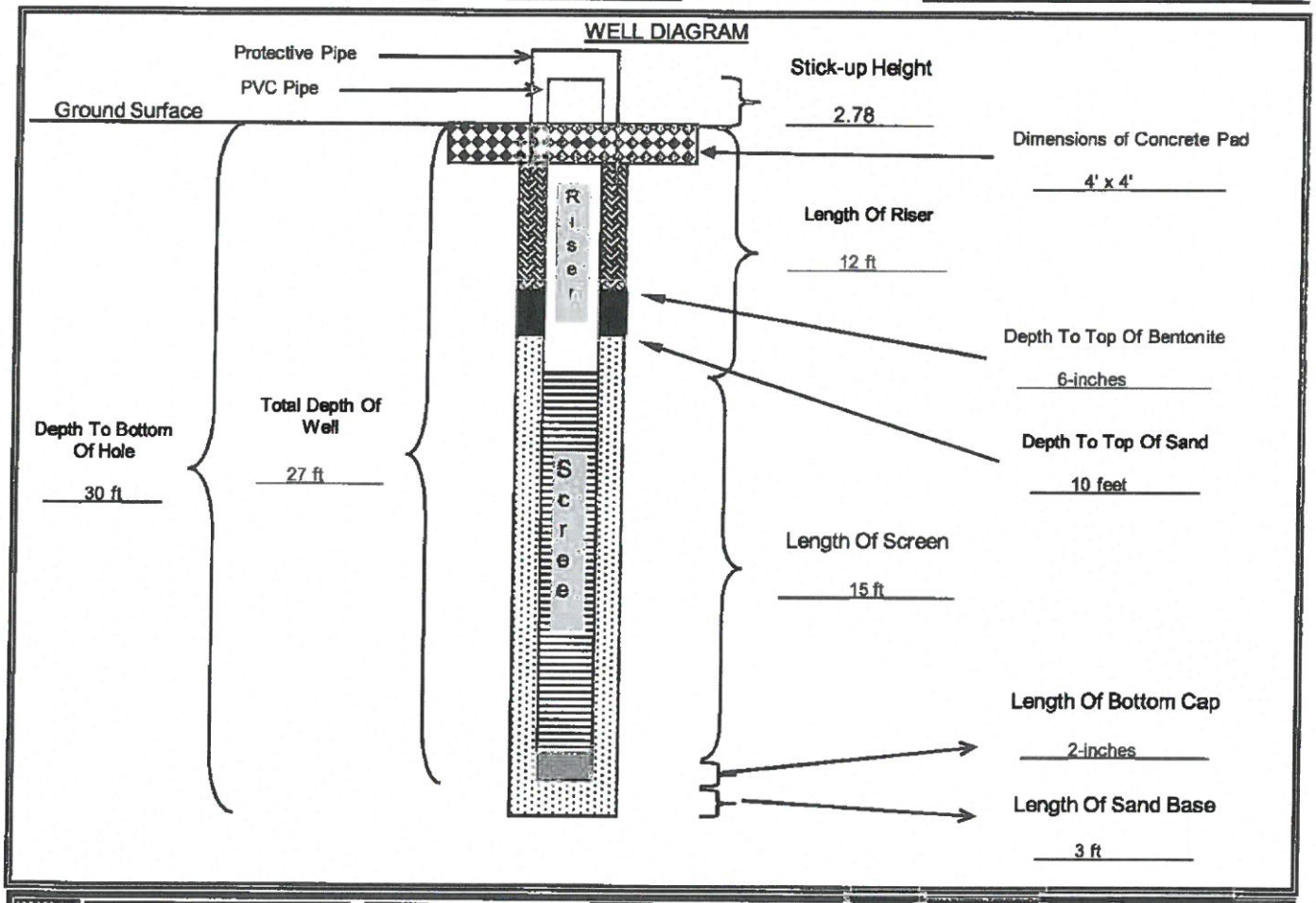
WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)

Geosyntec consultants

JOB NAME: AEP Welsh Power Plant
JOB NO.: TXL0064
DATE/TIME: 23-Jul-09
WELL LOCATION:
WELL NO.: GB-06
FIELD REP: Kush Chohan

GROUND SURFACE ELEVATION:	357.41 (ft, msl)	BENTONITE TYPE:	Western Bentonite
TOP OF SCREEN ELEVATION:	345.41 (ft, msl)	MANUFACTURER:	PDS
BOTTOM OF WELL ELEVATION:	327.41 (ft, msl)	CEMENT TYPE:	
NORTHING: 740.4893 EASTING: -2166.134		CEMENT MANUFACTURER:	
SCREEN MATERIAL:	PVC	SAND PACK TYPE AND SIZE:	Silica 20/40
SCREEN MANUFACTURER:		SAND MANUFACTURER:	Uninum
RISER MATERIAL:	PVC	DRILLING CONTRACTOR:	Total Support Services
RISER MANUFACTURER:		AMOUNT BENTONITE USED:	2.5 bags lbs
RISER DIAMETER: 2 (in) Length:	12 (ft)	AMOUNT CEMENT USED:	bags lbs
SCREEN DIAMETER: 2 (in) Length:	15 (ft)	AMOUNT SAND USED:	7 bags lbs
BOREHOLE DIAMETER:	6.75 (in)	STATIC WATER:	15.3 depth from TOC
DRILLING TECHNIQUE: Hollow Stem Size:	6.75 (in)	ENCOUNTERED WATER:	depth from ground

WELL DIAGRAM



Cement/Bentonite Grout | Sand Pack | Neat Concrete | Bentonite | Bottom Cap

QA/QC
INSTALLED BY: Total Support Services
DATE: 23-Jul-09
OBSERVED BY: Kush Chohan
CHECKED BY:
DATE:

E·A·G·L·E
ENVIRONMENTAL SERVICES OF SHREVEPORT, INC.

SOIL BORING LOG

BORING/WELL NO.:	GB-07/MW-7
TOTAL DEPTH:	34'
TOP OF CASING ELEV.:	362.75 ft. NGVD
GROUND SURFACE ELEV.:	360.20 ft. NGVD

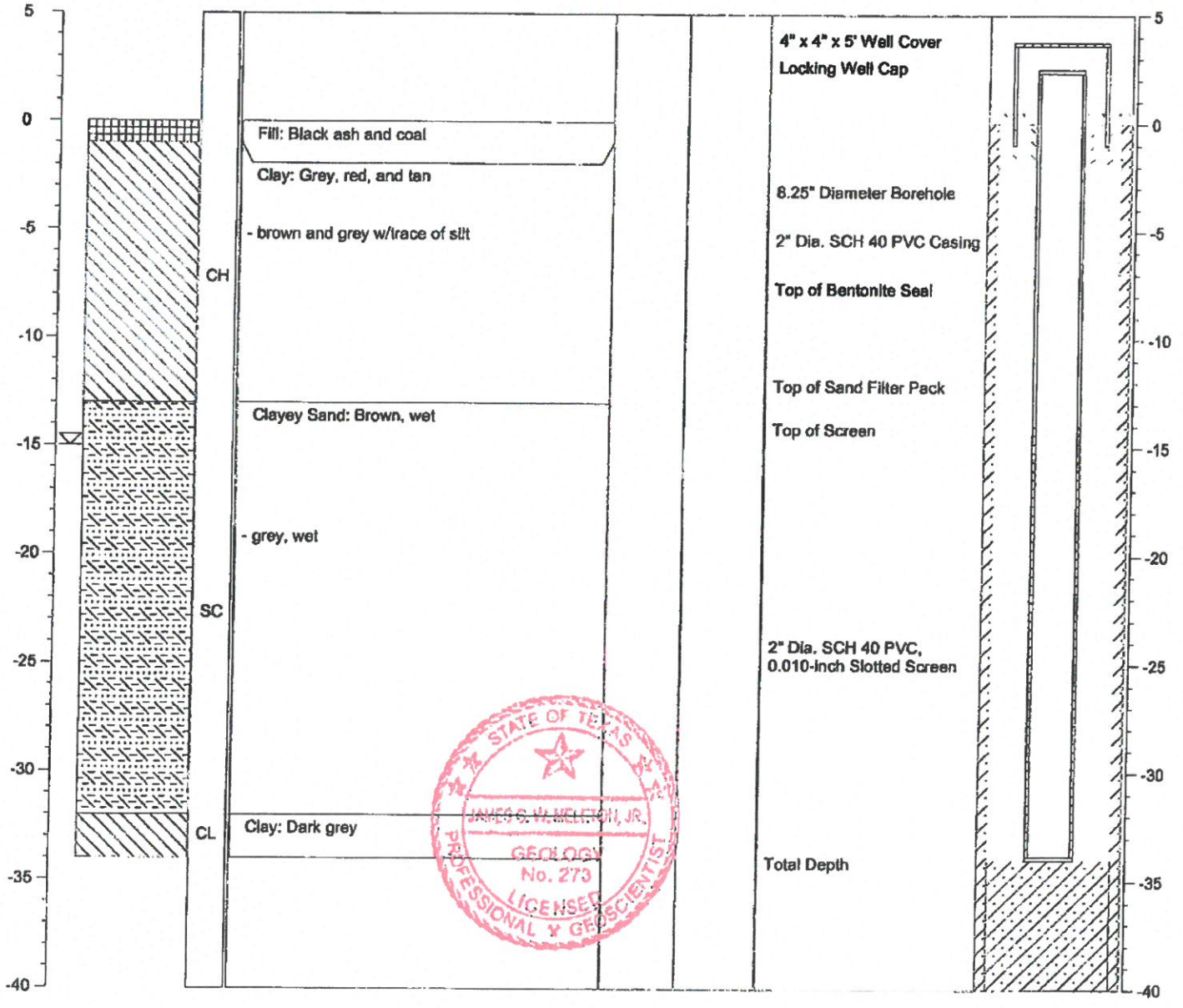
CLIENT:	AEP	DRILLING CO.:	WEST Drilling
PROJECT:	Metal Cleaning Waste Pond	DRILLER:	Tom McCullough
SITE LOCATION:	Welsh Power Plant	METHOD OF DRILLING:	Hollow-stem Auger
PROJECT NO.:	S-08-0120	SAMPLING METHODS:	Split-spoon
LOGGED BY:	James Meleton, Jr.	DATE DRILLED:	12/1/09

NOTES: Latitude: 33.05455
Longitude: 94.84674

▽ Water level during drilling
▼ Water level in completed well

Page 1 of 1

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION



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1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

LOG OF BORING B-1

PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09 **BORING TYPE:** Flight Auger

DATE 10/27/09

SURFACE ELEVATION 324.1

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		CL			SANDY LEAN CLAY(CL) very stiff; brownish orange	P=4.0 SF										
		SM			SILTY SAND(SM) tannish orange	N=7					20	54	16	38	63	+40Sieve=10%, +4 Sieve=1%
5		CH			SANDY FAT CLAY(CH) medium stiff; tannish orange	P=1.5										
					–stiff											
		SC			CLAYEY SAND(SC) medium dense; tannish orange; with clay seams	P=1.75										
10		CL			SANDY LEAN CLAY(CL) stiff; orange						19	34	17	17	32	+40 Sieve=7%, +4 Sieve=3%
		SC			CLAYEY SAND(SC) medium dense; orange; saturated; with iron oxide cemented sandstone rock	N=15										
15											22	24	15	9	19	+40Sieve=35%, +4 Sieve=22%
		CL			LEAN CLAY WITH SAND(CL) hard; dark gray; with clay seams	N=35										
20											21	41	21	20	75	+40 Sieve=2%, +4 Sieve=0%
		CL			SANDY LEAN CLAY(CL) hard; dark brown	P=4.5+										
25											15	33	17	16	52	+40 Sieve=1%, +4 Sieve=0%
					–grayish brown; laminated with silt	P=4.5+										
30					Bottom of Boring @ 30'											

BLOW COUNT 20 40 60 80 · Qu (tsf) 1 2 3 4 · PPR (tsf) 1.0 2.0 3.0 4.0 · Torvane (tsf) 1.0 2.0 3.0 4.0

Natural Moisture Content and Atterberg Limits — Plastic Limit · Moisture Content · Liquid Limit — 20 40 60 80

Water Level — Est.: ▽ Measured: ▼ Perched: ▽

Water Observations: Seepage @ 5' while drilling. Water level @ 4' and open to 30' upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°03.090', W 94°50.417'

Piezometer B-2

LOG OF BORING B-2

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PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09 **BORING TYPE:** Flight Auger

DATE 10/28/09

SURFACE ELEVATION 339.7

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		CL			SANDY LEAN CLAY(CL) hard; red and tan	P=4.5+										
					--very stiff	P=3.5					13	28	14	14	61	+40 Sieve=3%, +4 Sieve=0%
5					--stiff	N=14										
					--very stiff; reddish brown	P=2.75					14	40	16	24	65	+40 Sieve=0%, +4 Sieve=0%
10											13	30	14	16	58	+40 Sieve=0%, +4 Sieve=0%
		CL			SANDY LEAN CLAY(CL) hard; red and tan	P=4.5+										
15																
				▽	--very stiff	P=3.5					14	34	15	19	54	+40 Sieve=0%, +4 Sieve=0%
20																
						P=4.0										
25																
		SC			CLAYEY SAND(SC) medium dense; tan, red, and gray	P=4.5					15	37	16	21	47	+40 Sieve=5%, +4 Sieve=3%
30																

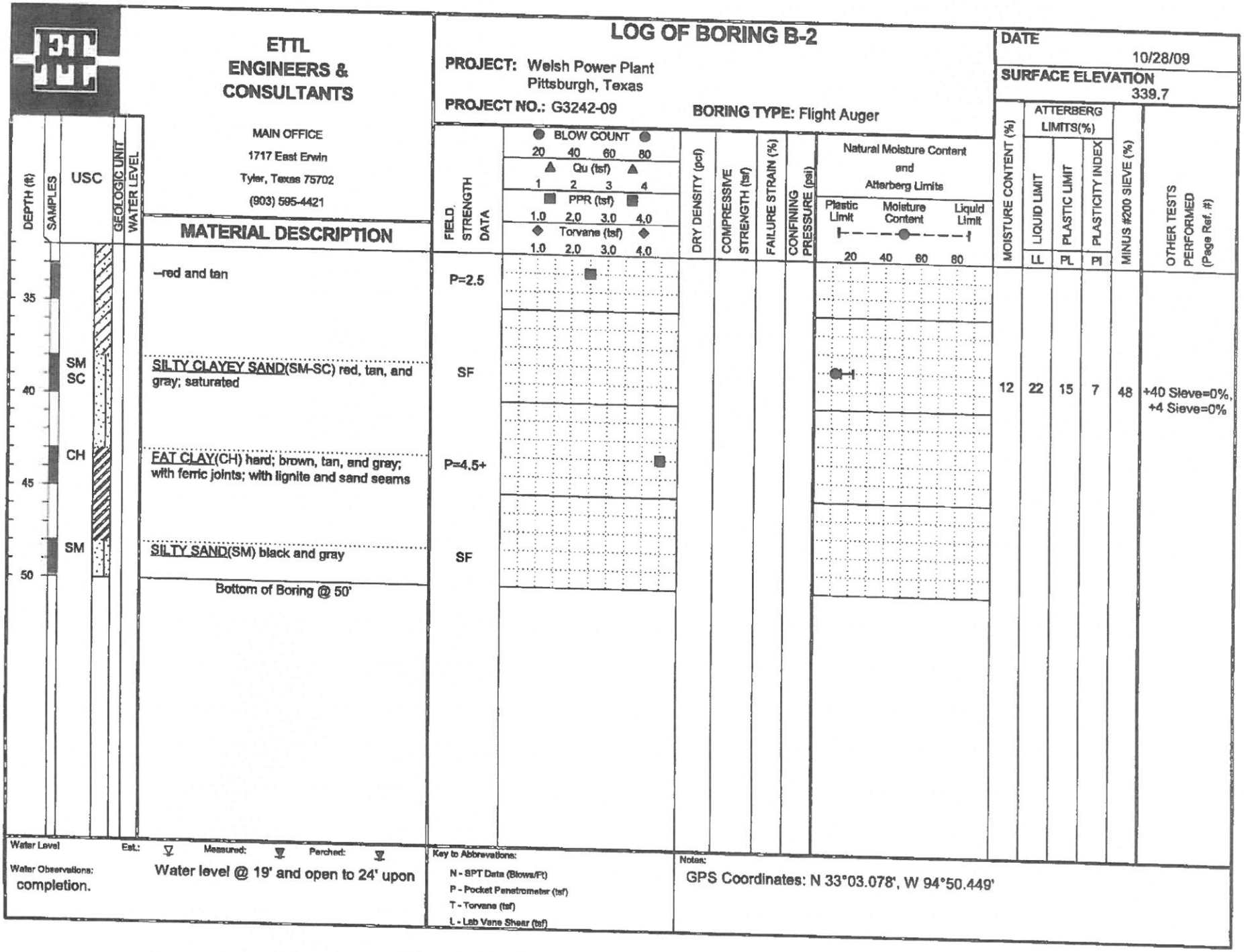
Natural Moisture Content and Atterberg Limits: Plastic Limit — Moisture Content — Liquid Limit (20 40 60 80)

Water Level Est.: ▽ Measured: ▽ Perched: ▽

Water Observations: Water level @ 19' and open to 24' upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°03.078', W 94°50.449'



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LOG OF BORING B-2

PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

DATE 10/28/09

SURFACE ELEVATION 339.7

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
35					--red and tan	P=2.5										
40		SM SC			SILTY CLAYEY SAND(SM-SC) red, tan, and gray; saturated	SF					12	22	15	7	48	+40 Sieve=0%, +4 Sieve=0%
45		CH			FAT CLAY(CH) hard; brown, tan, and gray; with ferric joints; with lignite and sand seams	P=4.5+										
50		SM			SILTY SAND(SM) black and gray	SF										
					Bottom of Boring @ 50'											

BLOW COUNT: 20 40 60 80
Qu (tsf): 1 2 3 4
PPR (tsf): 1.0 2.0 3.0 4.0
Torvane (tsf): 1.0 2.0 3.0 4.0

Natural Moisture Content and Atterberg Limits
Plastic Limit — Moisture Content — Liquid Limit
20 40 60 80

Water Level — Est.: ▽ Measured: ▼ Perched: ▼

Water Observations:
Water level @ 19' and open to 24' upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°03.078', W 94°50.449'

Piezometer B-2

ENVIRONMENTAL LOG

Client: Welsh Power Plant

Project No: G3242-095 **Phase** **Task**

Well No. B-2

Location Pittsburg, Texas

Surface Elev.

Depth Feet	Sampler	Overburden/Lithologic Description
0		Ground Surface
		SANDY LEAN CLAY(CL) hard; red and tan
		--very stiff
5		--stiff
		--very stiff; reddish brown
10		
		SANDY LEAN CLAY(CL) hard; red and tan
15		
		--very stiff
20		
25		

Field Strength Data | Graphic Log | Well Construction Graphics

Depth Feet	Well Construction Details
	T.O.C. Elev.
0	
5	
10	
15	
20	
25	

Continued Next Page

Driller Doug Hinds

Logged By James Griffith

Drilling Started 10/28/09

Drilling Completed 10/28/09

Construction Completed

Development Completed

Type of Well

Drilling Method Solid Stem Auger

Borehole Diameter 6.5"

Well Casing 2.0" **Dia.** 0.0' **to** 10.0'

Casing Type PVC

Well Screen 2.0" **Dia.** 10.0' **to** 20.0'

Screen Type Slotted

Slot Size 0.010"

Grout Type Bentonite

Bentonite Seal 2-8' & 20-50'

Filter Pack Qty. 8-20'

Filter Pack Type 20/40 Sand

Static Water Level

Notes:

ENVIRONMENTAL LOG

Client: Welsh Power Plant

Project No: G3242-095 **Phase** **Task**

Well No. B-2

Location Pittsburg, Texas

Surface Elev.

Depth Feet Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
	Continued from previous page					
30	CLAYEY SAND(SC) medium dense; tan, red, and gray				30	
35	–red and tan				35	
40	SILTY CLAYEY SAND(SM-SC) red, tan, and gray; saturated				40	
45	FAT CLAY(CH) hard; brown, tan, and gray; with ferric joints; with lignite and sand seams				45	
50	SILTY SAND(SM) black and gray				50	
	Bottom of Boring @ 50'					
55						
60						

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1717 East Erwin
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LOG OF BORING B-3

PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09 **BORING TYPE:** Flight Auger

DATE 10/27/09

SURFACE ELEVATION 339.6

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		SC			CLAYEY SAND(SC) medium dense; gray and red	N=11										
		CH			FAT CLAY(CH) stiff; red and tan; with sand seams	P=1.0					23	52	18	34	87	+40 Sieve=3%, +4 Sieve=0%
5																
					–very stiff	P=3.5					21	51	19	32	86	+40 Sieve=3%, +4 Sieve=0%
10																
		CH			FAT CLAY WITH SAND(CH) very stiff; brown; with ferric joints	P=3.75					21	54	20	34	85	+40Sieve=10%, +4 Sieve=1%
15																
				▼	–red and tan; layered; with ferric seams	P=2.5					23	61	24	37	81	+40Sieve=11%, +4 Sieve=0%
20																
		CH			FAT CLAY(CH) hard; gray; with sand seams	P=4.5+										
25																
		SC			CLAYEY SAND(SC) very dense; gray; with sand seams	N=58					22	42	22	20	35	+40 Sieve=1%, +4 Sieve=0%
30																

FIELD STRENGTH DATA: BLOW COUNT (20 40 60 80); Qu (tsf) (1 2 3 4); PPR (tsf) (1.0 2.0 3.0 4.0); Torvane (tsf) (1.0 2.0 3.0 4.0)

Natural Moisture Content and Atterberg Limits: Plastic Limit – Moisture Content – Liquid Limit (20 40 60 80)

Water Level Est.: ▽ Measured: ▼ Perched: ▼

Water Observations: Seepage @ 13' while drilling. Water level @ 19' and open to 24' upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°02.998', W 94°50.514'

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1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

LOG OF BORING B-3

PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09 **BORING TYPE:** Flight Auger

DATE 10/27/09

SURFACE ELEVATION 339.6

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
35		CH			FAT CLAY(CH) hard; brown; layered and with sand seams	P=4.5+					21	60	24	36	95	+40 Sieve=1%, +4 Sieve=0%
40					–gray and green	P=4.5+										
45		CL			SANDY LEAN CLAY(CL) very stiff; gray and dark green; layered; with sand seams	P=3.5										
50		CH			FAT CLAY(CH) hard; gray and dark green; layered; with silt seams	P=4.5+										
					Bottom of Boring @ 50'											

BLOW COUNT: 20 40 60 80
Qu (tsf): 1 2 3 4
PPR (tsf): 1.0 2.0 3.0 4.0
Torvane (tsf): 1.0 2.0 3.0 4.0

Natural Moisture Content and Atterberg Limits
Plastic Limit — Moisture Content — Liquid Limit
20 40 60 80

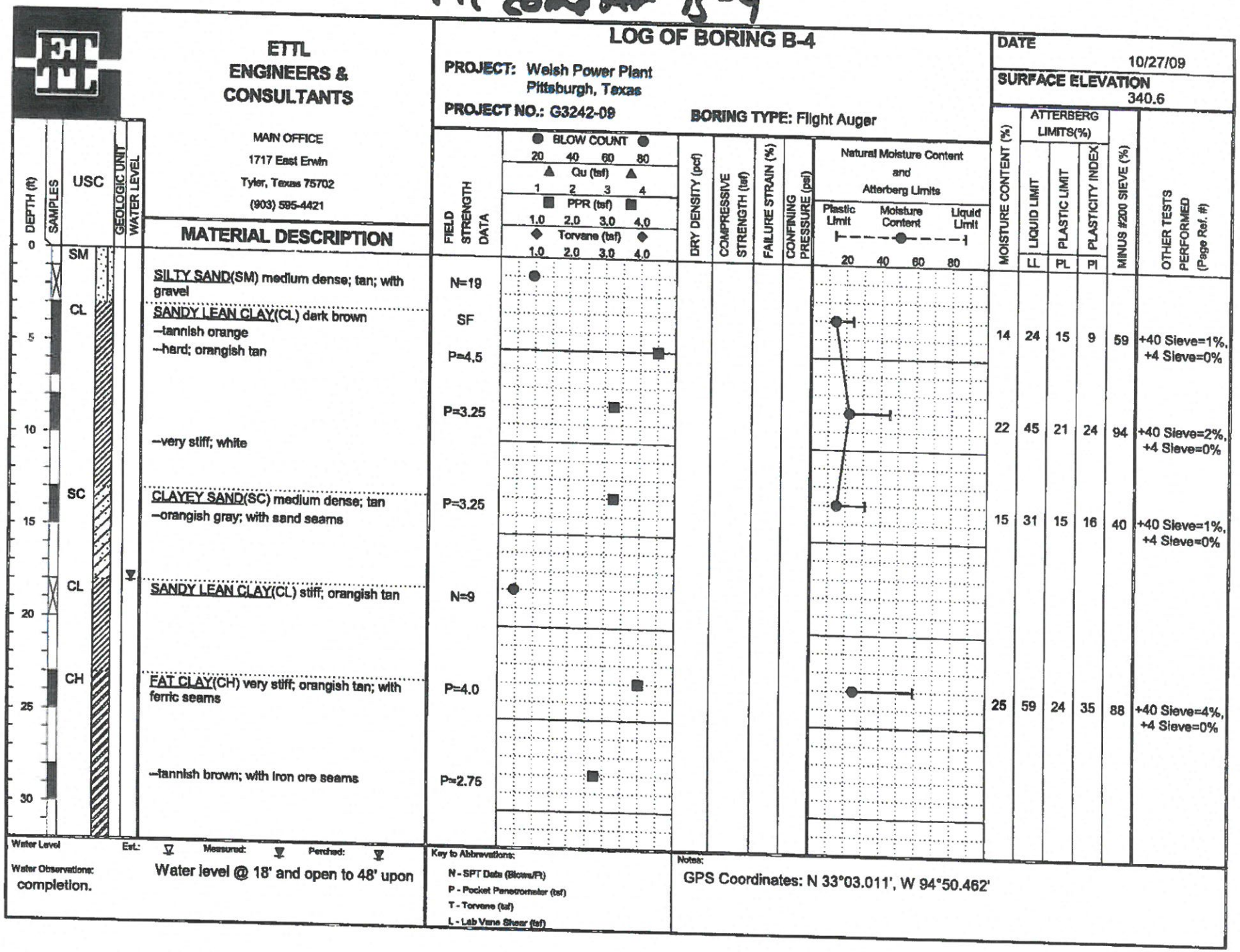
Water Level Est.: Measured: Perched:

Water Observations: Seepage @ 13' while drilling. Water level @ 19' and open to 24' upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°02.998', W 94°50.514'

Piezometer B-4



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(903) 595-4421

LOG OF BORING B-4

PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

DATE 10/27/09

SURFACE ELEVATION 340.6

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		SM			SILTY SAND(SM) medium dense; tan; with gravel	N=19						
		CL			SANDY LEAN CLAY(CL) dark brown	SF						
5					--tannish orange --hard; orangish tan	P=4.5	14	24	15	9	59	+40 Sieve=1%, +4 Sieve=0%
						P=3.25						
10					--very stiff; white		22	45	21	24	94	+40 Sieve=2%, +4 Sieve=0%
		SC			CLAYEY SAND(SC) medium dense; tan --orangish gray; with sand seams	P=3.25						
15							15	31	15	16	40	+40 Sieve=1%, +4 Sieve=0%
		CL			SANDY LEAN CLAY(CL) stiff; orangish tan	N=9						
20												
		CH			FAT CLAY(CH) very stiff; orangish tan; with ferric seams	P=4.0						
25							25	59	24	35	88	+40 Sieve=4%, +4 Sieve=0%
					--tannish brown; with iron ore seams	P=2.75						
30												

FIELD STRENGTH DATA: BLOW COUNT (20, 40, 60, 80); Qu (tsf) (1, 2, 3, 4); PPR (tsf) (1.0, 2.0, 3.0, 4.0); Torvane (tsf) (1.0, 2.0, 3.0, 4.0)

DRY DENSITY (pcf) | COMPRESSIVE STRENGTH (tsf) | FAILURE STRAIN (%) | CONFINING PRESSURE (psi)

Natural Moisture Content and Atterberg Limits: Plastic Limit | Moisture Content | Liquid Limit (20, 40, 60, 80)

Water Level — Est.: ▽ Measured: ▽ Perched: ▽

Water Observations: Water level @ 18' and open to 48' upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°03.011', W 94°50.462'

LOG OF BORING B-4

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(903) 595-4421

PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09 **BORING TYPE:** Flight Auger

DATE 10/27/09

SURFACE ELEVATION 340.6

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
35					–hard; light gray; layered and with silt seams	N=30										
40		CL			LEAN CLAY(CL) hard; light gray; layered and with silt seams	N=50/5.75"					21	44	25	19	93	+40 Sieve=1%, +4 Sieve=0%
45					–light gray	N=41										
50					–layered and with sand seams; with lignite	N=43										
					Bottom of Boring @ 50'											

BLOW COUNT 20 40 60 80
Qu (tsf) 1 2 3 4
PPR (tsf) 1.0 2.0 3.0 4.0
Torvane (tsf) 1.0 2.0 3.0 4.0

Natural Moisture Content and Atterberg Limits
Plastic Limit — Moisture Content — Liquid Limit
20 40 60 80

Water Level Est.: Measured: Perched:

Water Observations:
Water level @ 18' and open to 48' upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°03.011', W 94°50.462'

Piezometer B-4

ENVIRONMENTAL LOG

Client: Welsh Power Plant

Project No: G3242-095 **Phase** **Task**

Well No. B-4

Location Pittsburg, Texas

Surface Elev.

Depth Feet	Sampler	Overburden/Lithologic Description
0		Ground Surface
		SILTY SAND(SM) medium dense; tan; with gravel
		SANDY LEAN CLAY(CL) dark brown
5		–tannish orange
		–hard; orangish tan
10		–very stiff; white
		CLAYEY SAND(SC) medium dense; tan
15		–orangish gray; with sand seams
		SANDY LEAN CLAY(CL) stiff; orangish tan
20		
		FAT CLAY(CH) very stiff; orangish tan; with ferric seams
25		

Continued Next Page

Field Strength Data | Graphic Log | Well Construction Graphics | Depth Feet | Well Construction Details

T.O.C. Elev.

0 5 10 15 20 25

Driller Doug Hinds

Logged By James Griffith

Drilling Started 10/27/09

Drilling Completed 10/27/09

Construction Completed

Development Completed

Type of Well

Drilling Method Soild Stem Auger

Borehole Diameter 6.5"

Well Casing 2.0" **Dia.** 0.0' **to** 8.0'

Casing Type PVC

Well Screen 2.0" **Dia.** 8.0' **to** 18.0'

Screen Type Slotted

Slot Size 0.010"

Grout Type Bentonite

Bentonite Seal 2-8' & 18-50'

Filter Pack Qty. 6-18'

Filter Pack Type 20/40 Sand

Static Water Level

Notes:

ENVIRONMENTAL LOG

Client: Welsh Power Plant

Project No: G3242-095 **Phase** **Task**

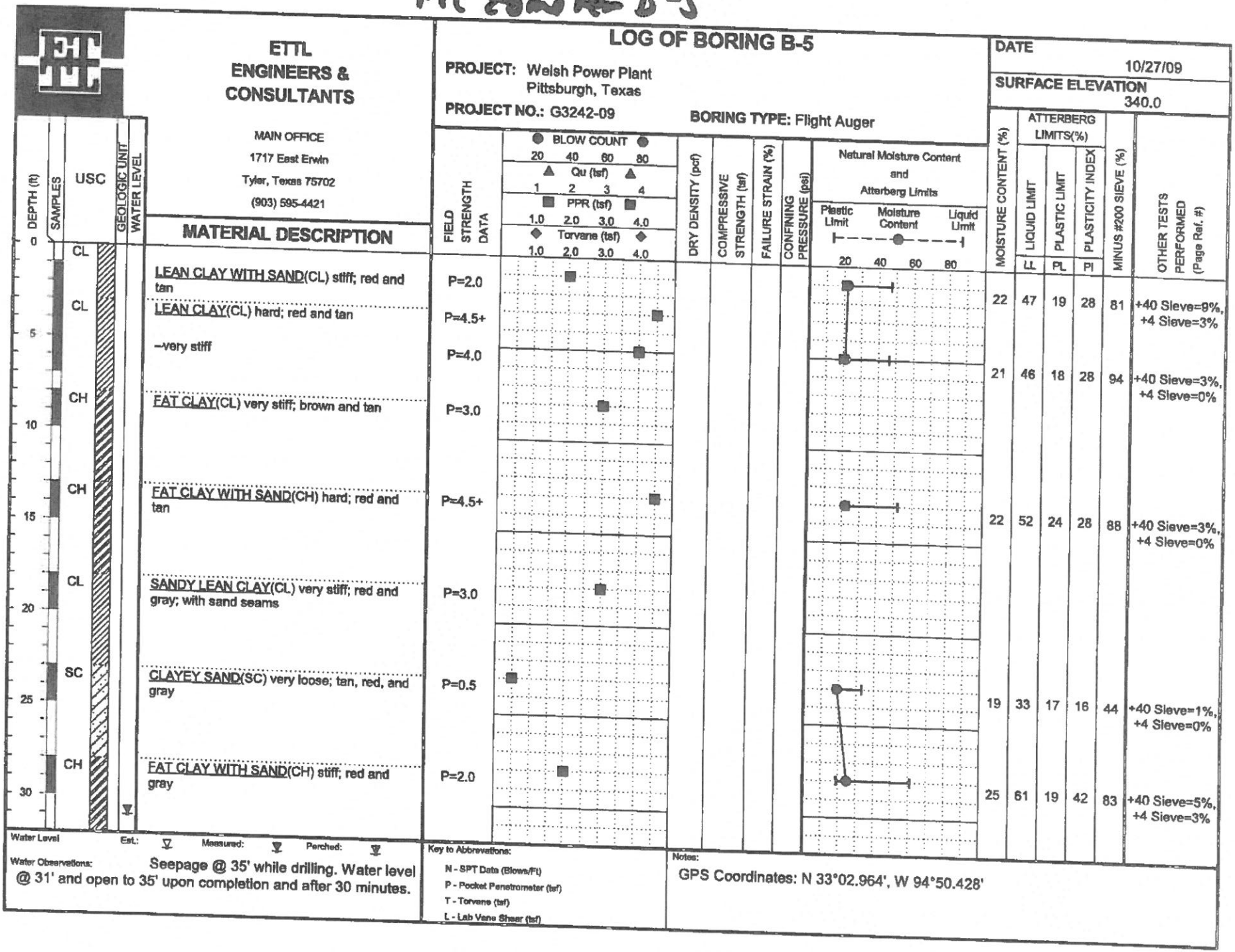
Well No. B-4

Location Pittsburg, Texas

Surface Elev.

Depth Feet Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
	Continued from previous page					
30	–tannish brown; with iron ore seams				30	
35	–hard; light gray; layered and with silt seams				35	
40	LEAN CLAY(CL) hard; light gray; layered and with silt seams				40	
45	–light gray				45	
50	–layered and with sand seams; with lignite				50	
	Bottom of Boring @ 50'					
55						
60						

Piezometer B-5



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MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

LOG OF BORING B-5

PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

DATE 10/27/09

SURFACE ELEVATION 340.0

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		CL			LEAN CLAY WITH SAND(CL) stiff; red and tan	P=2.0						
		CL			LEAN CLAY(CL) hard; red and tan	P=4.5+	22	47	19	28	81	+40 Sieve=9%, +4 Sieve=3%
5					–very stiff	P=4.0						
		CH			FAT CLAY(CL) very stiff; brown and tan	P=3.0	21	46	18	28	94	+40 Sieve=3%, +4 Sieve=0%
10												
		CH			FAT CLAY WITH SAND(CH) hard; red and tan	P=4.5+						
15							22	52	24	28	88	+40 Sieve=3%, +4 Sieve=0%
		CL			SANDY LEAN CLAY(CL) very stiff; red and gray; with sand seams	P=3.0						
20												
		SC			CLAYEY SAND(SC) very loose; tan, red, and gray	P=0.5	19	33	17	16	44	+40 Sieve=1%, +4 Sieve=0%
25												
		CH			FAT CLAY WITH SAND(CH) stiff; red and gray	P=2.0	25	61	19	42	83	+40 Sieve=5%, +4 Sieve=3%
30												

FIELD STRENGTH DATA: BLOW COUNT (20 40 60 80); Qu (tsf) (1 2 3 4); PPR (tsf) (1.0 2.0 3.0 4.0); Torvane (tsf) (1.0 2.0 3.0 4.0)

DRY DENSITY (pcf) | COMPRESSIVE STRENGTH (tsf) | FAILURE STRAIN (%) | CONFINING PRESSURE (psi)

Natural Moisture Content and Atterberg Limits: Plastic Limit | Moisture Content | Liquid Limit (20 40 60 80)

Water Level — Est.: ▽ Measured: ▽ Perched: ▽

Water Observations: Seepage @ 35' while drilling. Water level @ 31' and open to 35' upon completion and after 30 minutes.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°02.964', W 94°50.428'

LOG OF BORING B-5

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Tyler, Texas 75702
(903) 595-4421

PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09 **BORING TYPE:** Flight Auger

DATE 10/27/09

SURFACE ELEVATION 340.0

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
35		SC			SILTY CLAYEY SAND(SC) gray and red; saturated	SF										
40		CH			FAT CLAY(CH) hard; red and gray; with sand seams	P=4.5+					25	51	31	20	87	+40 Sieve=6%, +4 Sieve=0%
45					–gray, tan, and red; with sand seams	P=4.5+										
50		SM SC			SILTY SAND(SM-SC) red and gray	SF										
					Bottom of Boring @ 50'											

BLOW COUNT 20 40 60 80
Qu (tsf) 1 2 3 4
PPR (tsf) 1.0 2.0 3.0 4.0
Torvane (tsf) 1.0 2.0 3.0 4.0

Natural Moisture Content and Atterberg Limits
Plastic Limit — Moisture Content — Liquid Limit
20 40 60 80

Water Level Est.: ▽ Measured: ▼ Perched: ▼

Water Observations: Seepage @ 35' while drilling. Water level @ 31' and open to 35' upon completion and after 30 minutes.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°02.964', W 94°50.428'

Appendix B-5

ENVIRONMENTAL LOG

Client: Welsh Power Plant

Project No: G3242-095 **Phase** **Task**

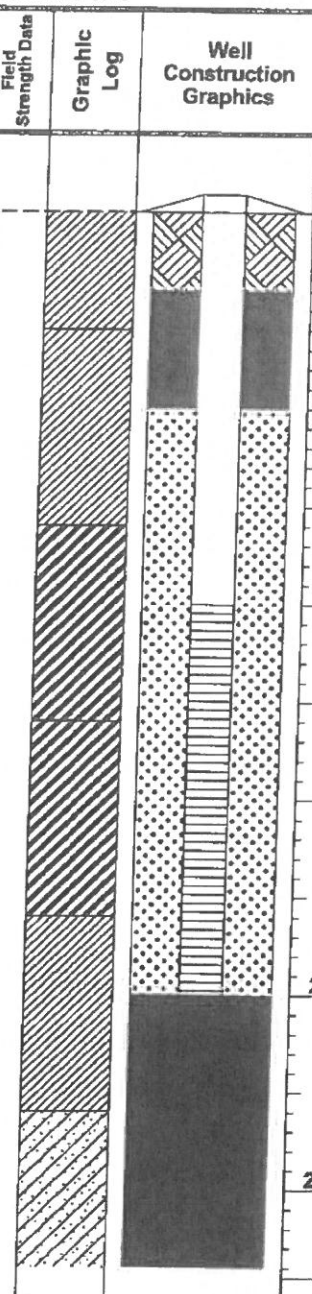
Well No. B-5

Location Pittsburg, Texas

Surface Elev.

Depth Feet	Sampler	Overburden/Lithologic Description
0		Ground Surface
		LEAN CLAY WITH SAND(CL) stiff; red and tan
		LEAN CLAY(CL) hard; red and tan
5		--very stiff
		FAT CLAY(CL) very stiff; brown and tan
10		
		FAT CLAY WITH SAND(CH) hard; red and tan
15		
		SANDY LEAN CLAY(CL) very stiff; red and gray; with sand seams
20		
		CLAYEY SAND(SC) very loose; tan, red, and gray
25		

Continued Next Page



Well Construction Details

T.O.C. Elev.

Driller Doug Hinds	**Drilling Method** Solid Stem Auger	**Bentonite Seal** 2-5' & 20-50'
Logged By James Griffith	**Borehole Diameter** 6.5"	**Filter Pack Qty.** 5-20'
Drilling Started 10/27/09	**Well Casing** 2.0" **Dia.** 0.0' **to** 10.0'	**Filter Pack Type** 20/40 Sand
Drilling Completed 10/27/09	**Casing Type** PVC	**Static Water Level**
Construction Completed	**Well Screen** 2.0" **Dia.** 10.0' **to** 20.0'	
Development Completed	**Screen Type** Slotted	**Notes:**
Type of Well	**Slot Size** 0.010"	
	Grout Type Bentonite	

ENVIRONMENTAL LOG

Client: Welsh Power Plant

Project No: G3242-095 **Phase** **Task**

Well No. B-5

Location Pittsburg, Texas

Surface Elev.

Depth Feet Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
	Continued from previous page					
30	FAT CLAY WITH SAND(CH) stiff; red and gray				30	
35	SILTY CLAYEY SAND(SC) gray and red; saturated				35	
40	FAT CLAY(CH) hard; red and gray; with sand seams				40	
45	–gray, tan, and red; with sand seams				45	
50	SILTY SAND(SM-SC) red and gray				50	
	Bottom of Boring @ 50'					
55						
60						

Piezometer B-6

LOG OF BORING B-6

ETTL ENGINEERS & CONSULTANTS

MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09 **BORING TYPE:** Flight Auger

DATE 10/27/09

SURFACE ELEVATION 340.1

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		CH			FAT CLAY(CH) very stiff; red and gray; with ferric seams	P=4.0										
		CL			SANDY LEAN CLAY(CL) hard; red and tan	P=4.5+					12	32	14	18	60	+40 Sieve=0%, +4 Sieve=0%
5						P=3.0					21	49	20	29	93	+40 Sieve=2%, +4 Sieve=0%
					–very stiff; red, gray, and brown; with gravel –with sand seams	P=3.0										
10																
						P=4.0					14	49	18	31	65	+40 Sieve=0%, +4 Sieve=0%
15																
		SM			SILTY SAND(SM) gray; saturated	P=3.0										
20																
					–very dense; gray and red	N=50/5.25"					20				18	+40 Sieve=0%, +4 Sieve=0%
25																
						SF										
30																

BLOW COUNT 20 40 60 80 · Qu (tsf) 1 2 3 4 · PPR (tsf) 1.0 2.0 3.0 4.0 · Torvane (tsf) 1.0 2.0 3.0 4.0

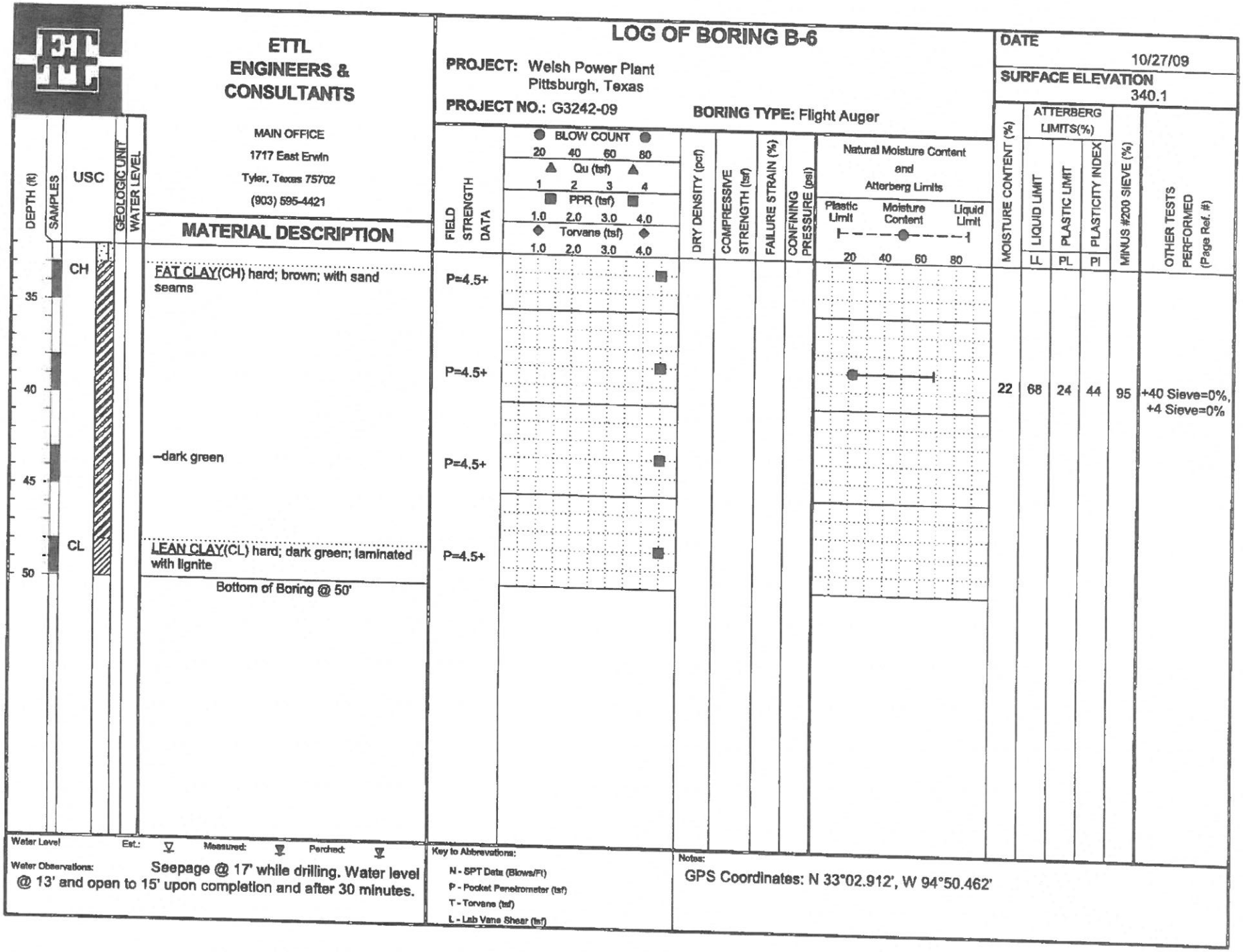
Natural Moisture Content and Atterberg Limits — Plastic Limit · Moisture Content · Liquid Limit — 20 40 60 80

Water Level — Est: ▽ Measured: ▼ Perched: ▽

Water Observations: Seepage @ 17' while drilling. Water level @ 13' and open to 15' upon completion and after 30 minutes.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°02.912', W 94°50.462'



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LOG OF BORING B-6

PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

DATE 10/27/09

SURFACE ELEVATION 340.1

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
35		CH			FAT CLAY(CH) hard; brown; with sand seams	P=4.5+										
40						P=4.5+					22	68	24	44	95	+40 Sieve=0%, +4 Sieve=0%
45					–dark green	P=4.5+										
50		CL			LEAN CLAY(CL) hard; dark green; laminated with lignite	P=4.5+										
					Bottom of Boring @ 50'											

FIELD STRENGTH DATA: BLOW COUNT (20 40 60 80); Qu (tsf) (1 2 3 4); PPR (tsf) (1.0 2.0 3.0 4.0); Torvane (tsf) (1.0 2.0 3.0 4.0)

Natural Moisture Content and Atterberg Limits: Plastic Limit — Moisture Content — Liquid Limit (20 40 60 80)

Water Level — Est.: ▽ Measured: ▽ Perched: ▽

Water Observations: Seepage @ 17' while drilling. Water level @ 13' and open to 15' upon completion and after 30 minutes.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°02.912', W 94°50.462'

Piezometer B-6

ENVIRONMENTAL LOG

Client: Welsh Power Plant

Project No: G3242-095 **Phase** **Task**

Well No. B-6

Location Pittsburg, Texas

Surface Elev.

Depth Feet	Sampler	Overburden/Lithologic Description
0		**Ground Surface**
		FAT CLAY(CH) very stiff; red and gray; with ferric seams
		SANDY LEAN CLAY(CL) hard; red and tan
5		
		–very stiff; red, gray, and brown; with gravel
		–with sand seams
10		
15		
		SILTY SAND(SM) gray; saturated
20		
		–very dense; gray and red
25		

Field Strength Data | Graphic Log | Well Construction Graphics | Depth Feet | Well Construction Details

T.O.C. Elev.

Continued Next Page

Driller Doug Hinds	**Drilling Method** Solid Stem Auger	**Bentonite Seal** 1.5-4' & 22-50'
Logged By James Griffith	**Borehole Diameter** 6.5"	**Filter Pack Qty.** 4-22'
Drilling Started 10/28/09	**Well Casing** 2.0" **Dia.** 0.0' **to** 12.0'	**Filter Pack Type** 20/40 Sand
Drilling Completed 10/28/09	**Casing Type** PVC	**Static Water Level**
Construction Completed	**Well Screen** 2.0" **Dia.** 12.0' **to** 22.0'	
Development Completed	**Screen Type** Slotted	**Notes:**
Type of Well	**Slot Size** 0.010"	
	Grout Type Bentonite	

ENVIRONMENTAL LOG

Client: Welsh Power Plant

Project No: G3242-095 **Phase** **Task**

Well No. B-6

Location Pittsburg, Texas

Surface Elev.

Depth Feet Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
	Continued from previous page					
30	FAT CLAY(CH) hard; brown; with sand seams				30	
35					35	
40	–dark green				40	
45					45	
50	LEAN CLAY(CL) hard; dark green; laminated with lignite				50	
	Bottom of Boring @ 50'					
55						
60						

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MAIN OFFICE
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LOG OF BORING B-7

PROJECT: Welsh Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

DATE 10/27/09

SURFACE ELEVATION 340.4

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		SM			SILTY SAND(SM) dense; tan	N=31					21				21	+40 Sieve=0%, +4 Sieve=0%
5					–gray; saturated	N=36										
						N=38					23				15	+40 Sieve=0%, +4 Sieve=0%
10					–very dense	N=59										
15		CH			FAT CLAY(CH) very stiff; dark gray; with silt and ferric seams	N=26					14	58	22	36	98	+40 Sieve=0%, +4 Sieve=0%
20																
25					–hard; gray and black; with trace of lignite	P=4.5+										
					–gray											
30						P=4.5+										
					Bottom of Boring @ 30'											

FIELD STRENGTH DATA: BLOW COUNT (20 40 60 80); Qu (tsf) (1 2 3 4); PPR (tsf) (1.0 2.0 3.0 4.0); Torvane (tsf) (1.0 2.0 3.0 4.0)

Natural Moisture Content and Atterberg Limits: Plastic Limit — Moisture Content — Liquid Limit (20 40 60 80)

Water Level — Est.: ▽ Measured: ▽ Perched: ▽

Water Observations: Seepage @ 4' while drilling. Water level @ 2' and open to 7' upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:
GPS Coordinates: N 33°02.898', W 94°50.519'

Landfill Boring B-2

LOG OF BORING B-2

ETTL ENGINEERS & CONSULTANTS

MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest.
Welsh Power Station - Cason, Texas
PROJECT NO.: G4207-146
DRILL RIG: B-61 HDX
BORING TYPE: Rotary Wash/Flight Auger

DATE 10/8/14
SURFACE ELEVATION 373.8

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA (BLOW COUNT / Qu (tsf) / PPR (tsf) / Torvane (tsf))	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits (Plastic Limit / Moisture Content / Liquid Limit)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		ML			ASH (SILT WITH GRAVEL(ML)) medium dense; light grayish brown; with coarse-grained sand and lightly cemented gravel pieces; dry	N=13						46				59	+40 Sieve=27% +4 Sieve=16%
5		SM			ASH (SILTY SAND(SM)) medium dense; dark brown and light brown; with coarse-grained sand and lightly cemented gravel pieces --loose; moist	N=29 N=18 N=9											
10												40				40	+40 Sieve=19% +4 Sieve=2%
15		MH	Egc @ 28-43' & Er @ 43-60'		ASH (ELASTIC SILT(MH)) very loose; black; with fine-grained sand and lightly cemented gravel pieces; saturated	N=0						200	134	92	42	100	+40 Sieve=0% +4 Sieve=0%
20		SM			ASH (SILTY SAND(SM)) very loose; dark brown; with coarse-grained sand and lightly cemented gravel pieces; moist	N=1											
25					--loose; dark brown and light brown; with coarse-grained sand and lightly cemented gravel pieces; moist	N=7						91				61	+40 Sieve=11% +4 Sieve=1%
30		CL			SANDY LEAN CLAY(CL) medium stiff; dark brown and black; with fine-grained sand and cemented gravel pieces; saturated	N=6						18	30	15	15	63	+40 Sieve=1% +4 Sieve=0%

Water Level Est.: ▽ Measured: ▼ Perched: ▼

Water Observations: Water level @ 13'.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:

GPS Coordinates: N33.04890°, W94.84451°

Driller: Tommy Cook

Logger: B.Hobbs/O.Sanderson

LOG OF BORING B-2 (cont.)

ETTL ENGINEERS & CONSULTANTS

MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest.
Welsh Power Station - Cason, Texas

PROJECT NO.: G4207-146

DRILL RIG: B-61 HDX

BORING TYPE: Rotary Wash/Flight Auger

DATE 10/8/14

SURFACE ELEVATION 373.8

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
35		SC			CLAYEY SAND(SC) dense; light brown, light gray and reddish brown; moist; with fine-grained sand; mottled	P=3.5 P=2.75	110	1.39	4.3	21	18 16	30	15	15	39	+40 Sieve=0% +4 Sieve=0%
40		SM			SILTY SAND(SM) very dense; light brown, yellowish brown and light gray; moist; mottled; with fine-grained sand	N=78					21				24	+40 Sieve=0% +4 Sieve=0%
45		CH	Epc @ 28-43' & Er @ 43-60'		FAT CLAY(CH) very stiff; dark brown and light brown; moist; with sand seams; laminated	N=27					25	62	26	36	96	+40 Sieve=2% +4 Sieve=0%
50					--dark brown with light gray; moist; with silt seams	P=4.0	98				24					
55																
60					--hard; dark brown; moist	N=37										
					Bottom of Boring @ 60'											

Natural Moisture Content and Atterberg Limits: Plastic Limit — Moisture Content — Liquid Limit (20 40 60 80)

Water Level Est.: Measured: Perched:

Water Observations: Water level @ 13'.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

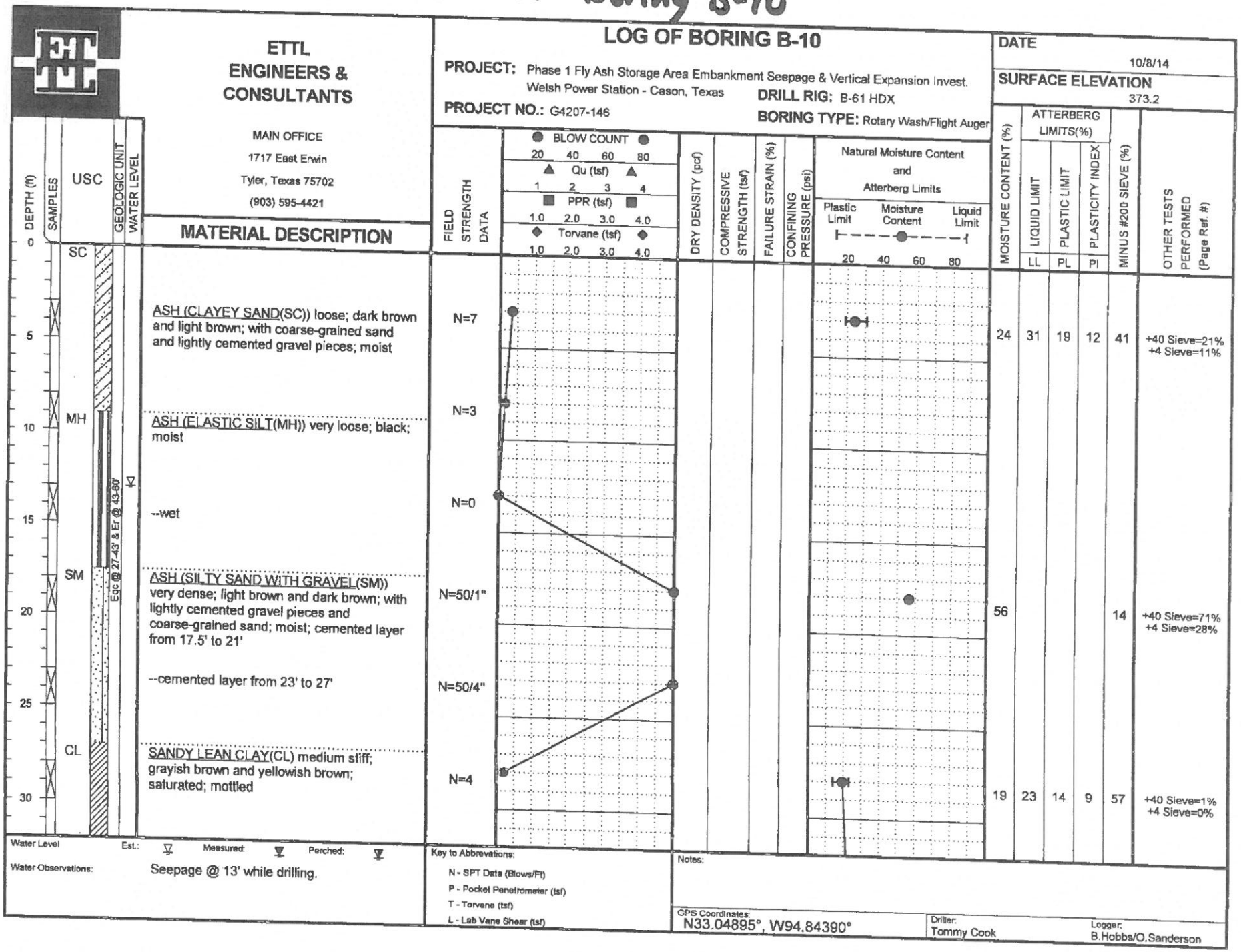
Notes:

GPS Coordinates: N33.04890°, W94.84451°

Driller: Tommy Cook

Logger: B.Hobbs/O.Sanderson

Landfill boring B-10



ETTL
ENGINEERS &
CONSULTANTS

MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

LOG OF BORING B-10

PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest.
Welsh Power Station - Cason, Texas
PROJECT NO.: G4207-146
DRILL RIG: B-61 HDX
BORING TYPE: Rotary Wash/Flight Auger

DATE 10/8/14
SURFACE ELEVATION 373.2

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		SC			ASH (CLAYEY SAND(SC)) loose; dark brown and light brown; with coarse-grained sand and lightly cemented gravel pieces; moist	N=7					24	31	19	12	41	+40 Sieve=21% +4 Sieve=11%
5																
10		MH			ASH (ELASTIC SILT(MH)) very loose; black; moist	N=3										
15					--wet	N=0										
20		SM	Edc @ 27-43' & Er @ 43-60'		ASH (SILTY SAND WITH GRAVEL(SM)) very dense; light brown and dark brown; with lightly cemented gravel pieces and coarse-grained sand; moist; cemented layer from 17.5' to 21'	N=50/1"					56				14	+40 Sieve=71% +4 Sieve=28%
25					--cemented layer from 23' to 27'	N=50/4"										
30		CL			SANDY LEAN CLAY(CL) medium stiff; grayish brown and yellowish brown; saturated; mottled	N=4					19	23	14	9	57	+40 Sieve=1% +4 Sieve=0%

FIELD STRENGTH DATA: BLOW COUNT (20, 40, 60, 80); Qu (tsf) (1, 2, 3, 4); PPR (tsf) (1.0, 2.0, 3.0, 4.0); Torvane (tsf) (1.0, 2.0, 3.0, 4.0)

Natural Moisture Content and Atterberg Limits: Plastic Limit — Moisture Content — Liquid Limit (20, 40, 60, 80)

Water Level — Est.: ▽ Measured: ▼ Perched: ▼

Water Observations: Seepage @ 13' while drilling.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:

GPS Coordinates: N33.04895°, W94.84390°

Driller: Tommy Cook

Logger: B.Hobbs/O.Sanderson

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CONSULTANTS

MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

LOG OF BORING B-10 (cont.)

PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest.
Welsh Power Station - Cason, Texas
DRILL RIG: B-61 HDX
PROJECT NO.: G4207-146
BORING TYPE: Rotary Wash/Flight Auger

DATE 10/8/14
SURFACE ELEVATION 373.2

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
35						P=1.25 P=1.0	107	2.10	6.1	21	22					
40		SC			CLAYEY SAND(SC) medium dense; reddish brown and grayish brown; moist; mottled	N=23					22	25	17	8	27	+40 Sieve=3% +4 Sieve=0%
45		CH	Eqc @ 27-43' & Er @ 43-60'		FAT CLAY(CH) very stiff; dark brown with light gray; with silt seams; moist --hard	N=18 P=4.5+					25	64	24	40	90	+40 Sieve=7% +4 Sieve=0%
50																
55						P=4.5+										
60					Bottom of Boring @ 60'											

Natural Moisture Content and Atterberg Limits: Plastic Limit — Moisture Content — Liquid Limit (20 40 60 80)

Water Level Est.: ▽ Measured: ▼ Parched: ▼

Water Observations: Seepage @ 13' while drilling.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:

GPS Coordinates: N33.04895°, W94.84390°
Driller: Tommy Cook
Logger: B.Hobbs/O.Sanderson

Landfill Boring B-12

ETTL ENGINEERS & CONSULTANTS

MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

LOG OF BORING B-12

PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest.
Welsh Power Station - Cason, Texas
DRILL RIG:
PROJECT NO.: G4207-146
BORING TYPE: Flight Auger

DATE 10/15/14
SURFACE ELEVATION 361.7

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	BLOW COUNT / Qu (tsf) / PPR (tsf) / Torvane (tsf)	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		CL			LEAN CLAY WITH SAND(CL) stiff; light gray and reddish brown; moist; mottled	P=3.75												
5		CL			SANDY LEAN CLAY(CL) stiff; light brown, light gray and reddish brown; moist; mottled	N=15							16	33	19	14	58	+40 Sieve=1% +4 Sieve=0%
10					--grayish brown and brown; moist	N=11												
15		CH	Eqc		FAT CLAY WITH SAND(CH) stiff; light gray and reddish brown; moist; mottled; with ferric seams	P=3.75												
20																		
25		CL			LEAN CLAY(CL) stiff; light gray and brownish gray; moist; layered with silt	N=14							24	39	19	20	93	+40 Sieve=1% +4 Sieve=0%
30		ML			SILT WITH SAND(ML) very dense; light brown and yellowish brown; moist; with clay seams	N=53												
					Bottom of Boring @ 30'													

Water Level Est.: ▽ Measured: ▼ Perched: ▼

Water Observations: Water level @ 27' and open upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:

GPS Coordinates: N33.04713°, W94.84486°

Driller: Lewis Drilling, Inc.

Logger: O.Sanderson

Land RV Boring B-13

LOG OF BORING B-13

ETTL ENGINEERS & CONSULTANTS

MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest.
Welsh Power Station - Cason, Texas

PROJECT NO.: G4207-146

DRILL RIG:

BORING TYPE: Flight Auger

DATE 10/15/14

SURFACE ELEVATION 361.4

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		CL	Eqc		LEAN CLAY WITH SAND(CL) medium stiff; reddish brown with light gray; moist	N=7					20	45	17	28	76	+40 Sieve=1% +4 Sieve=0%
5		CL			SANDY LEAN CLAY(CL) very stiff; light brown, gray and reddish brown; moist; mottled	P=4.0										
10		SC			CLAYEY SAND(SC) medium dense; grayish brown; moist	N=11										
		CH			FAT CLAY WITH SAND(CH) medium stiff; reddish brown and light gray; moist; mottled											
15						N=8					22	54	20	34	79	+40 Sieve=1% +4 Sieve=0%
20		CL			LEAN CLAY(CL) very stiff; light gray and grayish brown; moist; layered with silt	N=21										
25		ML			SILT WITH SAND(ML) very dense; light gray and yellowish brown; wet; with clay seams	N=50/5"					24				80	+40 Sieve=0% +4 Sieve=0%
30					Bottom of Boring @ 30'											

FIELD STRENGTH DATA: BLOW COUNT (20, 40, 60, 80); Qu (tsf) (1, 2, 3, 4); PPR (tsf) (1.0, 2.0, 3.0, 4.0); Torvane (tsf) (1.0, 2.0, 3.0, 4.0)

Natural Moisture Content and Atterberg Limits: Plastic Limit, Moisture Content, Liquid Limit (20, 40, 60, 80)

Water Level — Est.: ▽ Measured: ▼ Perched: ▼

Water Observations: Water level @ 28' and open upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

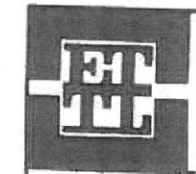
Notes:

GPS Coordinates: N33.047160°, W94.84384°

Driller: Lewis Drilling, Inc.

Logger: O.Sanderson

Landfill Boring B-14



ETTL ENGINEERS & CONSULTANTS

MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

LOG OF BORING B-14

PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest.
Welsh Power Station - Cason, Texas

PROJECT NO.: G4207-146

DRILL RIG:

BORING TYPE: Flight Auger

DATE 10/14/14

SURFACE ELEVATION 347.2

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LL	PL	PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
0		CL			SANDY LEAN CLAY(CL) medium stiff; yellowish brown with reddish brown; dry; with clay seams	N=9										
5																
10		ML			SANDY SILT(ML) medium dense; grayish brown; moist; with clay seams	N=11					108	17	17	NP	68	+40 Sieve=1% +4 Sieve=1%
15		CL	Edc @ 0-28' & Er @ 28-30'		SANDY LEAN CLAY(CL) very stiff; light gray and gray; moist	P=4.0										
20					–light gray and grayish brown; moist; layered with silt	N=34					26	40	16	24	67	+40 Sieve=1% +4 Sieve=0%
25		SP SM			POORLY GRADED SAND WITH SILT(SP-SM) medium dense; yellowish brown, light gray and reddish brown; wet	N=27					25				10	+40 Sieve=0% +4 Sieve=0%
30		CL			LEAN CLAY(CL) very stiff; dark brown; moist; with silt partings	N=26										
					Bottom of Boring @ 30'											

FIELD STRENGTH DATA: BLOW COUNT (20 40 60 80); Qu (tsf) (1 2 3 4); PPR (tsf) (1.0 2.0 3.0 4.0); Torvane (tsf) (1.0 2.0 3.0 4.0)

Natural Moisture Content and Atterberg Limits: Plastic Limit — Moisture Content — Liquid Limit (20 40 60 80)

Water Level — Est.: ▽ Measured: ▼ Perched: ▼

Water Observations: Water level @ 17' and caved to 23' upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:

GPS Coordinates: N33.04774°, W94.84290°

Driller: Lewis Drilling, Inc.

Logger: O.Sanderson

Landfill Boring B-15

ETTL
ENGINEERS &
CONSULTANTS

MAIN OFFICE
1717 East Erwin
Tyler, Texas 75702
(903) 595-4421

LOG OF BORING B-15

PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest.
Welsh Power Station - Cason, Texas
PROJECT NO.: G4207-146
DRILL RIG:
BORING TYPE: Flight Auger

DATE 10/14/14
SURFACE ELEVATION 348.2

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA
0		CH			FAT CLAY(CH) stiff; reddish brown and light gray; moist; mottled	N=10
5						
10					--very stiff; light gray, grayish brown and reddish brown; moist; layered	P=3.75
		SM			SILTY SAND(SM) very dense; light brown; dry	N=59
15			Enc @ 0-28' & Er @ 28-30'	▽		
20					--medium dense; wet	N=21
25					--very dense	N=56
		CL			LEAN CLAY(CL) hard; dark brown; moist; with silt partings	P=4.5
30					Bottom of Boring @ 30'	

FIELD STRENGTH DATA: BLOW COUNT (20 40 60 80); Qu (tsf) (1 2 3 4); PPR (tsf) (1.0 2.0 3.0 4.0); Torvane (tsf) (1.0 2.0 3.0 4.0)

DRY DENSITY (pcf) | COMPRESSIVE STRENGTH (tsf) | FAILURE STRAIN (%) | CONFINING PRESSURE (psi)

Natural Moisture Content and Atterberg Limits (Plastic Limit — Moisture Content — Liquid Limit; 20 40 60 80)

MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
24	59	21	38	85	+40 Sieve=0% +4 Sieve=0%
7				12	+40 Sieve=0% +4 Sieve=0%
25	45	22	23	92	+40 Sieve=0% +4 Sieve=0%

Water Level — Est.: ▽ Measured: ▼ Perched: ▼

Water Observations: Water level @ 17' and caved to 19' upon completion.

Key to Abbreviations:
N - SPT Data (Blows/Ft)
P - Pocket Penetrometer (tsf)
T - Torvane (tsf)
L - Lab Vane Shear (tsf)

Notes:

GPS Coordinates: N33.04857°, W94.84286°
Driller: Lewis Drilling, Inc.
Logger: O.Sanderson

ARCADIS

Appendix B

Photographic Log

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
1	8/20/2015

Direction Photo Taken:

North

Description:
Staging area west of landfill.

P8200493

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
2	8/20/2015

Direction Photo Taken:

South Southeast

Description:

Potential wetland on the top (west) end of the Primary Ash Pond.

P8200495

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
3	8/20/2015

Direction Photo Taken:

West Northwest

Description:

Ditch between road and railway west of landfill, this ditch would be non-jurisdictional.

P8200497

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
4	8/20/2015

Direction Photo Taken:

Northeast

Description:

Ground Water Monitoring Well AD-12 near northwest end of landfill.

P8200501

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
5	8/20/2015

Direction Photo Taken:

East Northeast

Description:

View of plant from top of landfill. Primary ash pond is within the wooded area on left.

P8200506

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
6	8/20/2015

Direction Photo Taken:

East Northeast

Description:

Drainage canal that drains from primary ash pond to clear water pond.

P8200510

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
7	8/20/2015

Direction Photo Taken:

West Northwest

Description:

Vegetated strip between landfill and road. This would be isolated due to lack of connectivity.

P8200521

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
8	8/20/2015

Direction Photo Taken:

North

Description:

Dike between landfill and primary ash pond. Facility in the background.

P8200522

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
9	8/20/2015

Direction Photo Taken:

West

Description:

Vegetated strip between landfill and road. This area would be isolated due to lack of connectivity.

P8200527

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
10	8/20/2015

Direction Photo Taken:

North Northeast

Description:

Road east of landfill running toward facility and clear water pond.

P8200530

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
11	8/20/2015

Direction Photo Taken:

South

Description:

Top of landfill.

P8200534

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
12	8/20/2015

Direction Photo Taken:

Southeast

Description:

View of lined bottom ash storage pond.

P8200538

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
13	8/20/2015

Direction Photo Taken:

Southeast

Description:

Lined bottom ash storage pond.

P8200545

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
14	8/20/2015

Direction Photo Taken:

South

Description:

Southside of lined bottom ash storage pond.

P8200547

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
15	8/20/2015

Direction Photo Taken:

West

Description:

East side of lined bottom ash storage pond.

P8200560

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
16	8/20/2015

Direction Photo Taken:

North

Description:

Upland with pine and ground water monitoring well AD-2 south of lined bottom ash storage pond.

P8200563

ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

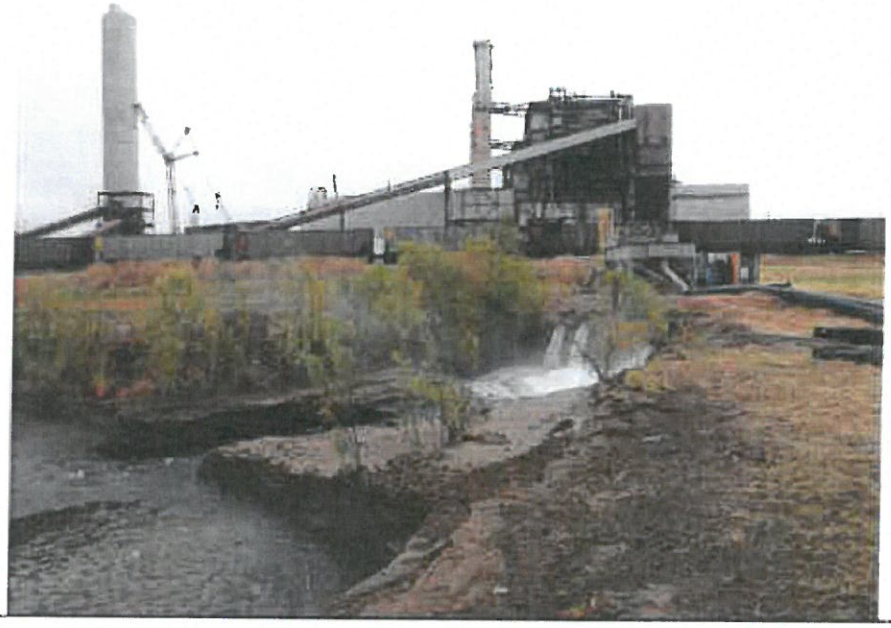
Photo No.	Date:
17	8/20/2015

Direction Photo Taken:

Description:

Outflow of water from plant into the northeast portion of the Primary Ash Pond.

P8200577



ARCADIS

PHOTOGRAPHIC LOG

Project Name:	Location:	Project No.
AEP – J. ROBERT WELSH POWER PLANT	PITTSBURG, TITUS COUNTY, TEXAS	OK001625.0001

Photo No.	Date:
18	8/20/2015

Direction Photo Taken:

South Southwest

Description:

Northeast portion of primary ash pond, view facing south-southwest.

P8200578