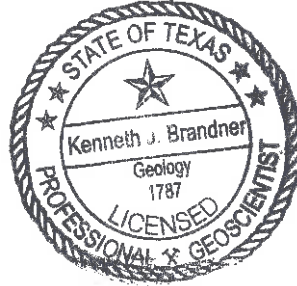


**American Electric Power Service
Corporation**

**Primary Bottom Ash Pond - CCR
Location Restriction Evaluation**

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

October 3, 2018



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**Primary Bottom Ash Pond –
CCR Location Restriction
Evaluation**

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

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1. Objective	1
2. Background Information	2
2.1 Facility Location Description	2
2.2 Description of Primary Bottom Ash Pond CCR Unit	2
2.2.1 Embankment Configuration	2
2.2.2 Area/Volume	2
2.2.3 Construction and Operational History	3
2.2.4 Surface Water Control	3
2.3 Previous Investigations	4
2.4 Hydrogeologic Setting	4
2.4.1 Climate and Water Budget	5
2.4.2 Regional and Local Geologic Setting	5
2.4.3 Surface Water and Surface Water Groundwater Interactions	5
2.4.4 Water Users	6
3. Isolation from the Uppermost Aquifer	7
3.1 Uppermost Aquifer and Piezometric Analysis	7
3.1.1 Piezometric Analysis	7
3.1.1.1 Horizontal and Vertical Position Relative to CCR Unit	7
3.1.1.2 Overall Flow Conditions	7
3.1.2 Uppermost Aquifer	8
3.1.2.1 CCR Rule Definition	8
3.1.2.2 Common definitions	8
3.1.2.3 State regulatory definition	8
3.1.3 Identified onsite hydrostratigraphic unit	8
3.2 Compliance with Isolation Distance	8
4. Wetlands	9
4.1 Local Wetlands	9

4.2	Compliance with Wetland Restrictions	9
5.	Fault Areas	10
5.1	Description of Regional Geologic Structural Features	10
5.2	Compliance with Fault Area Restrictions	10
6.	Seismic Impact Zone	11
6.1	Definition of Seismic Impact Zone	11
6.2	Compliance with Seismic Impact Zone Restriction	11
7.	Unstable Areas	12
7.1	Definition of Unstable Area and local Conditions	12
7.1.1	CCR Rule Definition	12
7.1.2	Poor Foundation Soils	12
7.1.3	Mass Movements	12
7.1.4	Karst	12
7.1.5	Subsurface Mining	12
7.2	Compliance with Unstable Areas Restriction	13
8.	Summary, Conclusions, and PE Certification	14
9.	References	15

Tables

Table 1	Water Level Data
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Figures

Figure 1	Site Location Map
Figure 2	Plant and CCR Unit Location Map
Figure 3	Site Layout and Well Locations
Figure 4	Cross Section A-A'
Figure 5	Cross Section B-B'
Figure 6	Cross Section C-C'

Figure 7	Cross Section D-D'
Figure 8	Cross Section E-E'
Figure 9	Potentiometric Surface Map, March 4, 2016
Figure 10	Potential Wetlands Locations
Figure 11	Nearby Fault Locations
Figure 12	Nearby Seismic Impact Zones

Appendices

A	Boring/Well Construction Logs
B	Photographic Log

Acronyms and Abbreviation

AEP	American Electric Power Service Cooperation
amsl	above mean sea level
ARCADIS	ARCADIS U.S., Inc.
PBAP	primary 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
PTI	Permit to Install
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality

1. Objective

This report was prepared by ARCADIS U.S., Inc. (ARCADIS) for American Electric Power Service Corporation (AEP) to assess the location of the Primary Bottom Ash Pond relative to the location restrictions included in the Coal Combustion Residual (CCR) requirements, as specified in the Code of Federal Regulations (CFR) 40 CFR 257.60 to 257.64, at the AEP 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 and an evaluation of whether the CCR unit meets up to 5 location restrictions, which include: the base of the CCR unit is 5 feet (ft) above the uppermost aquifer, the CCR unit may not be located in a wetland, within 200 ft of the damage zone of a fault that has displacement during the Holocene, within a seismic impact zones, or in an unstable area.

Three regulated CCR units associated with the Plant were identified for review, which include the Primary Bottom Ash Pond, landfill, and bottom ash storage pond (**Figure 2**). This report summarizes the evaluation of the location restriction criteria at the Primary Bottom Ash Pond (Site). The evaluation of the groundwater monitoring well network in the uppermost aquifer 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 Primary Bottom Ash Pond CCR unit, as well as publically-available geologic and hydrogeologic data. The following report also presents the current Conceptual Site Model based on documents reviewed and will further describe the uppermost aquifer.

2. Background Information

The following section provides background information for the AEP J. Robert Welsh Generating Plant Primary Bottom Ash Pond.

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 Primary Bottom Ash Pond CCR unit is located southwest of the Plant and directly west of the Welsh Reservoir (**Figures 1 and 2**).

2.2 Description of Primary Bottom Ash Pond CCR Unit

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

2.2.1 Embankment Configuration

The Primary Bottom Ash Pond was placed into operation in approximately 1977, and is located in a topographically low area that had been an unnamed intermittent tributary of Swauano Creek prior to development of the Site. The Primary Bottom Ash Pond is bounded by natural ground surface (topographically higher areas) to the north and west, and embankment dikes to the south and east. These dikes are constructed of compacted sandy clay and clayey sand. The embankment dike south of the Primary Bottom Ash Pond includes a drainage canal that receives overflow (clear) water from the Primary Bottom Ash Pond. The water level in the Primary Bottom Ash Pond is controlled by a weir box which discharges into the drainage canal. The clear water in the drainage canal flows east and discharges into the clear water pond.

The Primary Bottom Ash Pond embankment is up to approximately 40 ft in height. Discussions of embankment configuration and timeline, including cross sections through the dikes, was provided in a previous report prepared by ETTL Engineers & Consultants Inc. in 2010 (ETTL, 2010).

2.2.2 Area/Volume

Per the *Hydraulic Analysis of Welsh Power Plant Ash Ponds Report*, dated December 2010 (Freese and Nichols, 2010), the bottom elevation of the Primary Bottom Ash Pond is 300 feet above mean sea level (amsl), the high level overflow weir box bottom

elevation is 325 feet amsl, and the storage capacity of the Primary Bottom Ash Pond at elevation 325 feet amsl is 304.2 acre-ft (**Figure 3**).

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 either the Primary Bottom Ash Pond or in the adjacent landfill that was constructed in approximately 1977. In 2000, the 22-acre bottom ash storage pond was installed south of the landfill. The bottom ash storage pond was constructed with a 60-mil high-density polyethylene (HDPE) liner, and receives bottom ash and economizer ash dredged and sluiced from the Primary Bottom Ash Pond (**Figure 3**).

Presently bottom ash and economizer ash from the generating plant are sluiced to the Primary Bottom Ash Pond. Solids settle as the clear liquids flow through a drainage canal into the clear water pond (a non-CCR unit). Water in the clear water pond discharges through a weir box into a 36-inch-diameter pipe, and then into the Welsh Reservoir under Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ00018111000 (**Figure 3**).

2.2.4 Surface Water Control

Surface water flow within the Primary Bottom Ash Pond complex is controlled by a weir and emergency spillway located on the south side of the pond below the embankments. The pond elevation is maintained so that surface water flows through the weir box which has a bottom elevation of 325 feet amsl. The emergency spillway is 90 feet wide with a crest elevation of 334 feet amsl. Clear water flows through the weir (and occasionally the emergency spillway during heavy precipitation events) into a drainage canal along the south side of the pond. The drainage canal discharges into the clear water pond located directly southeast of the Primary Bottom Ash Pond (**Figure 3**).

The perimeter embankments on the south and east sides of the Primary Bottom Ash Pond are located at an approximate elevation of 340 feet amsl. Therefore the perimeter embankments have approximately six feet of freeboard above the emergency spillway.

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 Bottom Ash Pond area, and geotechnical soil testing to characterize the area encompassed by the Primary Bottom Ash Pond.

In 2001, five monitoring wells (AD-1 through AD-5) were installed in the area of the Primary Bottom 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 Bottom 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.

In 2010, E TTL prepared a report entitled “*Geotechnical Investigation, Welsh Power Station, Existing Ash Storage Ponds Embankment Investigation, Pittsburg, Texas*”. The objective of this report was to evaluate the stability of the earthen embankments for the Primary Bottom Ash Pond and non-CCR clear water pond (aka “Secondary Ash Pond”). The principal finding of this investigation was that slope stability would be acceptable following a proposed repair to the embankment of the clear water pond. The repair of the embankment of the clear water pond was completed during September 2010.

In 2010, Freese and Nichols performed a *Hydraulic Analysis of the Welsh Power Plant Ash Ponds* (Freese and Nichols, 2010). The report concluded the spillways for the Primary Bottom Ash Pond, clear water pond, and bottom ash storage pond are hydraulically adequate for the full range of storm events from the 10-year to the 100-year storm events.

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 Primary Bottom Ash Pond 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 sub-humid. Average temperatures range from 45° Fahrenheit (F) in January to 82.9°F in July. 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 underlying the Welsh Reservoir to the east of the Primary Bottom Ash Pond, Quarternary alluvial sediments associated with the 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 2010 E TTL report entitled "*Geotechnical Investigation, Welsh Power Station, Existing Ash Storage Ponds Embankment Investigation, Pittsburg, Texas*" (E TTL, 2010).

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 (320 feet amsl).

The Primary Bottom Ash Pond normal operating level is set by the weir box which has a bottom elevation of 325 feet amsl. **Figure 9** is a potentiometric surface map based on March 2016 water level data for the uppermost water bearing unit at the Site, and water level elevations in the Site monitoring wells are summarized on **Table 1**. As shown on Figure 9, shallow groundwater flow direction in the area of the Primary Bottom Ash Pond is easterly toward the Welsh Reservoir at an average hydraulic gradient of approximately 0.01 foot per foot.

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 southwest (side gradient) of the Primary Bottom Ash Pond, and was installed for Southwestern Electric Company in 1974 with a screened interval from 515 to 535 ft below ground surface, and plugged at a later date.

3. Isolation from the Uppermost Aquifer

CCR Rule 40 CFR Part 257.60 requires that the base of new and existing CCR surface impoundments be constructed such that the base of the unit is no less than 5 ft above the top of the uppermost aquifer, or that if the base is within 5 ft of the uppermost aquifer, that there will not be hydraulic connection between the base of the unit and the uppermost aquifer.

3.1 Uppermost Aquifer and Piezometric Analysis

3.1.1 Piezometric Analysis

3.1.1.1 Horizontal and Vertical Position Relative to CCR Unit

Geologic data from soil borings and monitoring wells installed at the site show the uppermost water bearing unit in the area of the Primary Bottom Ash Pond is a fine to medium grained clayey and silty sand stratum with an average thickness of approximately 10 feet that is located between an elevation of approximately 310 and 320 feet amsl (**Appendix A**). The base of the Primary Bottom Ash Pond ranges in elevation from approximately 330 feet amsl on the west to 300 feet amsl on the east. Therefore the uppermost water-bearing unit appears to be in contact with the Primary Bottom Ash Pond and is further illustrated on cross section A-A' (**Figure 4**) and cross section D-D' (**Figure 7**).

3.1.1.2 Overall Flow Conditions

Groundwater is recharged from regional precipitation infiltration and locally from ash pond use. The uppermost water bearing unit (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 water-bearing unit is anticipated to exceed the TCEQ non-useable (Class 3) limit of 150 gallons per day (TCEQ, 2010).

Groundwater elevations are summarized on **Table 1** for 2011 through 2017. The comprehensive groundwater data set from March 2016 is depicted on **Figure 9**. The groundwater flow is generally easterly towards the Welsh Reservoir.

3.1.2 Uppermost Aquifer

3.1.2.1 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.

3.1.2.2 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 nearest to the CCR unit.

3.1.2.3 State regulatory definition

According to Title 30, Texas Administrative Code (TAC) Rule 350, a useable aquifer is capable of yielding 150 gallons per day (approximately 0.1 gallons per minute) or more with a total dissolved solids concentration of 10,000 milligrams per liter (mg/L) or lower (TCEQ, 2010).

3.1.3 Identified onsite hydrostratigraphic unit

The identified on-Site hydrostratigraphic unit in the area of the Primary Bottom Ash Pond is the fine to medium grained clayey and silty sand stratum that is located between an elevation of approximately 310 and 320 feet amsl. This unit is not used locally for groundwater supply or industrial water use, but meets the TCEQ definition of a useable aquifer.

3.2 Compliance with Isolation Distance

The uppermost water-bearing unit underlying the Primary Bottom Ash Pond meets the regulatory definition of an aquifer. As shown on the cross-sections presented on **Figures 4** and **7**, the base of the Primary Bottom Ash Pond is in contact with this aquifer. Therefore, this CCR Unit does not meet the location restriction for separation from the uppermost aquifer.

4. Wetlands

CCR Rule 40 CFR Part 257.61 requires that existing and new CCR surface impoundments must not be located in wetlands.

4.1 Local Wetlands

Based on the August 20, 2015 site visit and review of available published information, a portion of the Primary Bottom Ash Pond is located within an area that exhibited wetland characteristics that might be classified as a regulated wetland. A potential wetlands location map is provided on **Figure 10**, and photos of these areas are included in **Appendix B**.

4.2 Compliance with Wetland Restrictions

Based on the August 20, 2015 site visit and review of available information, a portion of the Primary Bottom Ash Pond may be located within wetlands. Therefore, this CCR Unit may not meet the location restriction regarding wetlands. Further investigation is recommended.

5. Fault Areas

CCR Rule 40 CFR Part 257.62 requires that existing and new CCR surface impoundments must not be located within 200 ft of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates that the and alternate setback will prevent damage to the structural integrity of the CCR unit.

5.1 Description of Regional Geologic Structural Features

Regional geologic publications were reviewed to determine structural features for the Site. A regional fault map is provided on **Figure 11**. The U.S. Geological Survey Open File Report 88-450K shows the Site is located within the East Texas Basin, with faulting north of the basin (Talco Fault Zone) and south of the basin (Elkhart-Mt. Enterprise Fault Zone). No faulting was identified in the Site area (USGS, 1988). Texas Water Commission Bulletin 6517 and the University of Texas at Austin Bureau of Economic Geology Geologic Atlas of Texas – Texarkana Sheet show no faulting at the Site (Broom, 1965; Flawn, 1966).

A previous evaluation of geologic structural features at the Site was conducted by E TTL, and no evidence of faulting was identified (E TTL, 2010).

5.2 Compliance with Fault Area Restrictions

A review of available geologic reports and maps has indicated that the site is not located near any faults with displacement in the Holocene. Therefore, the CCR units at this site meet the location restriction for faults.

6. Seismic Impact Zone

CCR Rule 40 CFR Part 257.63 requires that existing and new CCR surface impoundments must not be located within a seismic impact zone unless the owner or operator demonstrates that all structural components of the CCR unit are designed to withstand the maximum horizontal acceleration in lithified earth material for the site.

6.1 Definition of Seismic Impact Zone

CCR Rule 40 CFR Part 257.53 defines a seismic impact zone as an area having a 2% or greater probability that the maximum horizontal acceleration expressed as a percentage of the earth's gravitational pull (g) will exceed 0.10 g in 50 years.

6.2 Compliance with Seismic Impact Zone Restriction

Figure 12 presents the seismic hazard map for Texas, as published by the USGS. As shown on **Figure 12**, the site falls within the zone having a maximum horizontal acceleration of 0.04 to 0.06 g. Therefore, the CCR unit meets the location restriction for seismic impact zone.

7. Unstable Areas

CCR Rule 40 CFR Part 257.64 requires that existing and new CCR surface impoundments must not be located within an unstable area unless the owner or operator demonstrates that the design of the unit will ensure the integrity of the structural components of the unit.

7.1 Definition of Unstable Area and local Conditions

7.1.1 CCR Rule Definition

CCR Rule 40 CFR Part 257.53 defines an unstable area as a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of the CCR unit. These may include poor foundation conditions, areas susceptible to mass movements (landslides), and karst terrains.

7.1.2 Poor Foundation Soils

A soil stability report has been prepared for the Primary Bottom Ash Pond by E TTL in 2010. This report concluded that the Primary Bottom Ash Pond embankments exhibit acceptable factors of safety and that the underlying foundation soils are not susceptible to liquefaction.

7.1.3 Mass Movements

The Primary Bottom Ash Pond is located within the valley floor of an unnamed intermittent tributary of Swauano Creek, and is therefore not an area subject to mass movements. This conclusion is supported by the E TTL soil stability report (E TTL, 2010).

7.1.4 Karst

The site area is located on the outcrop of unconsolidated Cretaceous Formations consisting predominantly of sand and clay (Broom, 1965; Flawn, 1966). The Primary Bottom Ash Pond is not located in a karst area.

7.1.5 Subsurface Mining

No subsurface mines are known to exist below the CCR units at the Site.



**Primary Bottom Ash
Pond – CCR Location
Restriction Evaluation**

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

7.2 Compliance with Unstable Areas Restriction

Based on our site visit and review of available information, the Primary Bottom Ash Pond is not located within unstable areas. Therefore, this CCR unit meets the location restriction requirements for unstable areas.



8. Summary, Conclusions, and PE 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, as well as the evaluations discussed within this report, the J. Robert Welsh Power Plant Primary Bottom Ash Pond meets the CCR surface impoundment location restrictions of 40 CFR Part 257 for fault areas, seismic impact zones, and unstable areas. However, the Primary Bottom Ash Pond does NOT meet the location restrictions for separation from the uppermost aquifer and possibly wetlands.

Kenneth J. Brandner

Printed Name of Registered Professional Engineer

Kenneth J. Brandner

Signature



69586

Registration No.

Texas

Registration State

10-3-18

Date

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1187 County Road 4865
Titus County
Pittsburg, Texas

USGS, "Texas Seismic Hazard Map", 2014.

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	5/26/2016	7/27/2016	10/19/2016	12/12/2016	1/17/2017	2/23/2017
									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	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	344.89	342.89	341.23	340.58	341.18	339.74
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	332.32	332.32	332.32	332.32	332.32	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	325.12	325.12	325.12	325.12	325.12	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	326.90	326.90	326.90	326.90	326.90	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	327.12	327.12	327.12	327.12	327.12	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	326.67	326.67	326.67	326.67	326.67	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	326.19	326.19	326.19	326.19	326.19	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	338.04	338.04	338.04	338.04	338.04	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	334.00	334.00	334.00	334.00	334.00	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	333.61	333.61	333.61	333.61	333.61	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	325.70	325.70	325.70	325.70	325.70	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	329.74	329.74	329.74	329.74	329.74	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	323.55	323.55	323.55	323.55	323.55	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	328.13	328.13	328.13	328.13	328.13	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	349.89	349.89	350.01	350.65	350.39	350.39	350.39	350.39	350.39	350.39	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	334.76	334.76	334.76	334.76	334.76	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	334.83	334.83	334.83	334.83	334.83	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	322.14	322.14	322.14	322.14	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	337.09	337.09	337.09	337.09	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	334.64	334.64	334.64	334.64	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	343.66	343.66	343.66	343.66	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	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	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	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	NM	NM	NM	NM	NM

NM - Not measured.

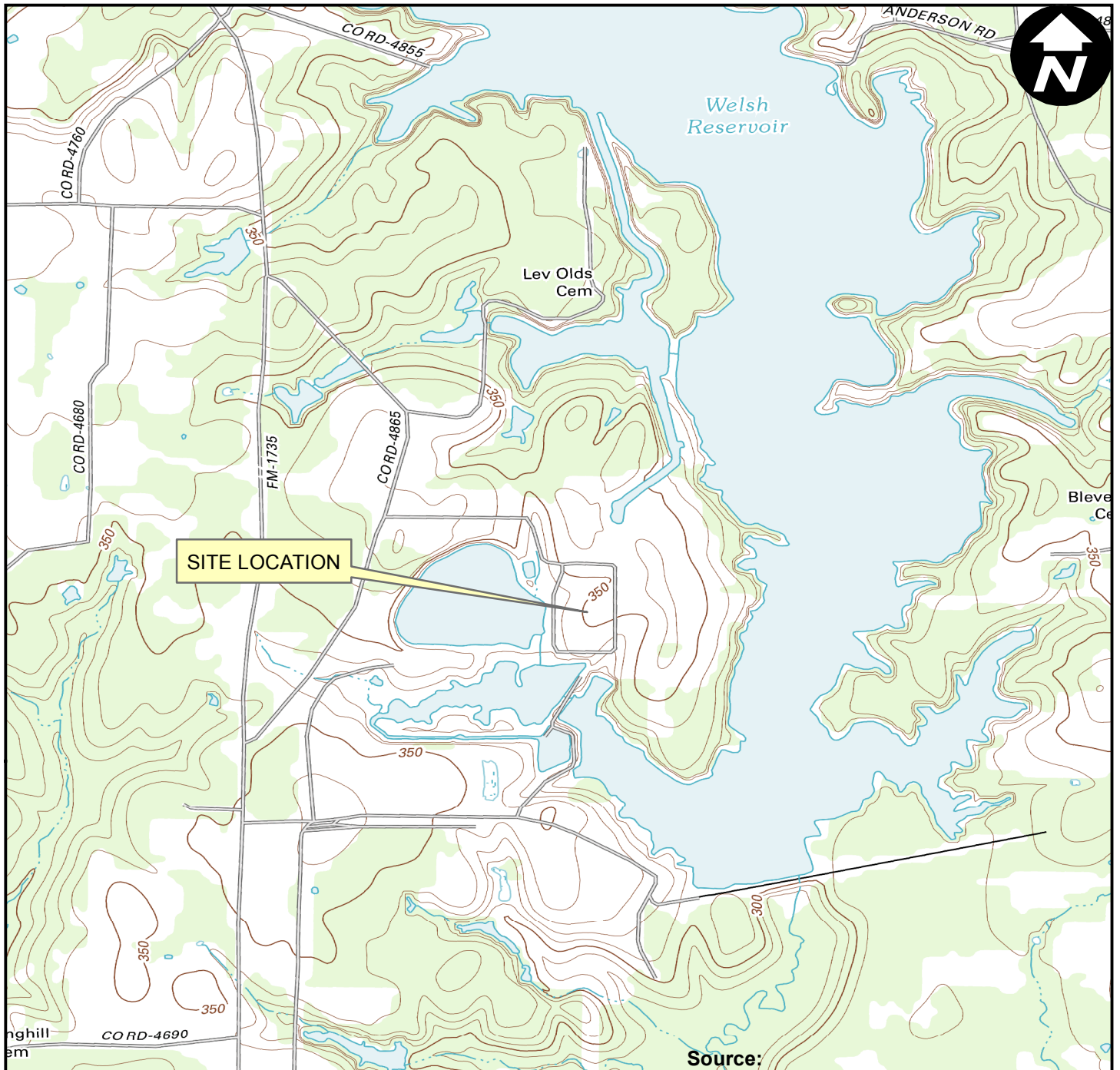
(a) Source: Eagle Environmental Services Well Logs (2009).

(b) Source: ETTL Engineers & Consultants Inc. (June 21, 2010).

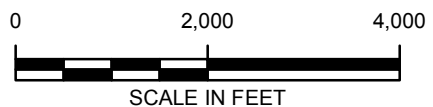
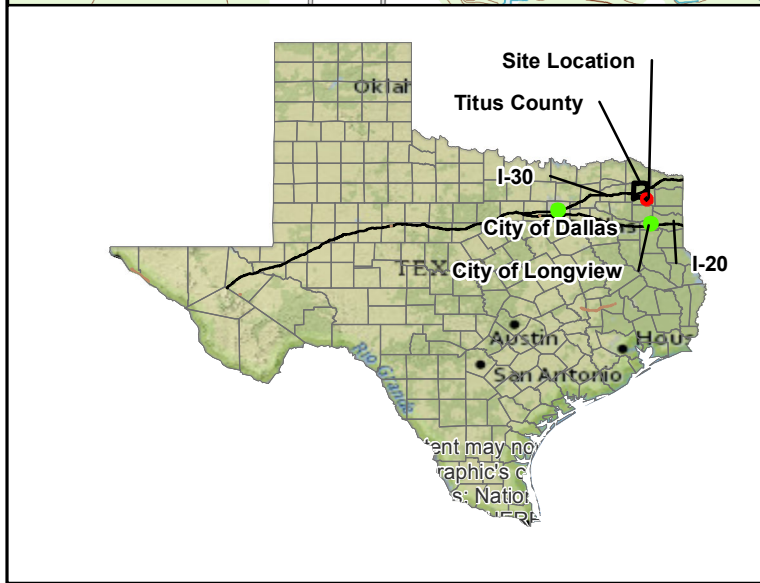
(c) Source: Southwest Electric Power, State of Texas Well Report (2001).

(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.



Source:
7.5 minute topographic quadrangle
Cason, Texas, 2013

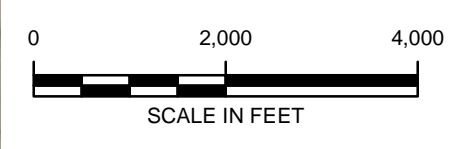
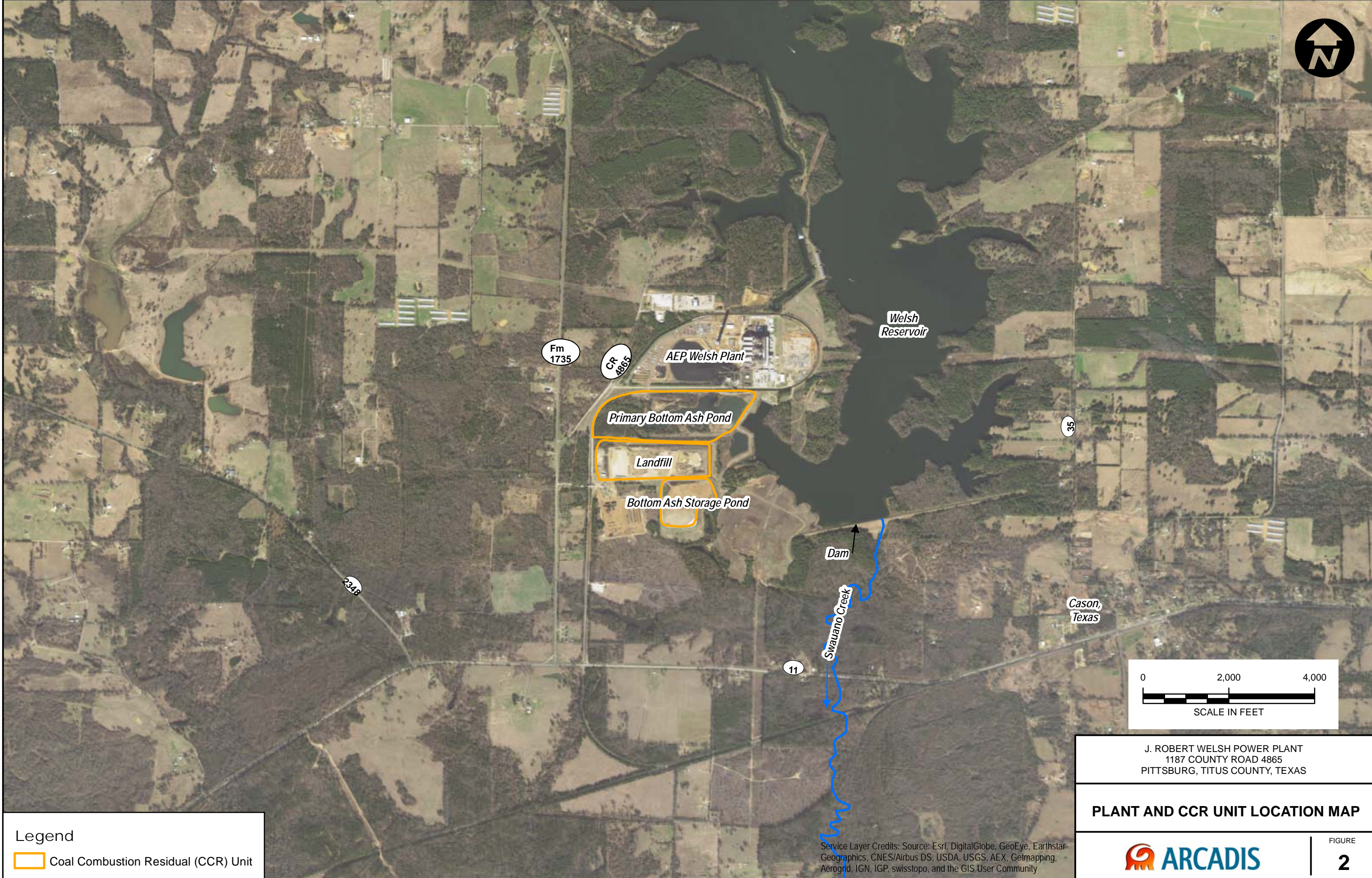


J. ROBERT WELSH POWER PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TITUS COUNTY, TEXAS

SITE LOCATION MAP




FIGURE
1



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

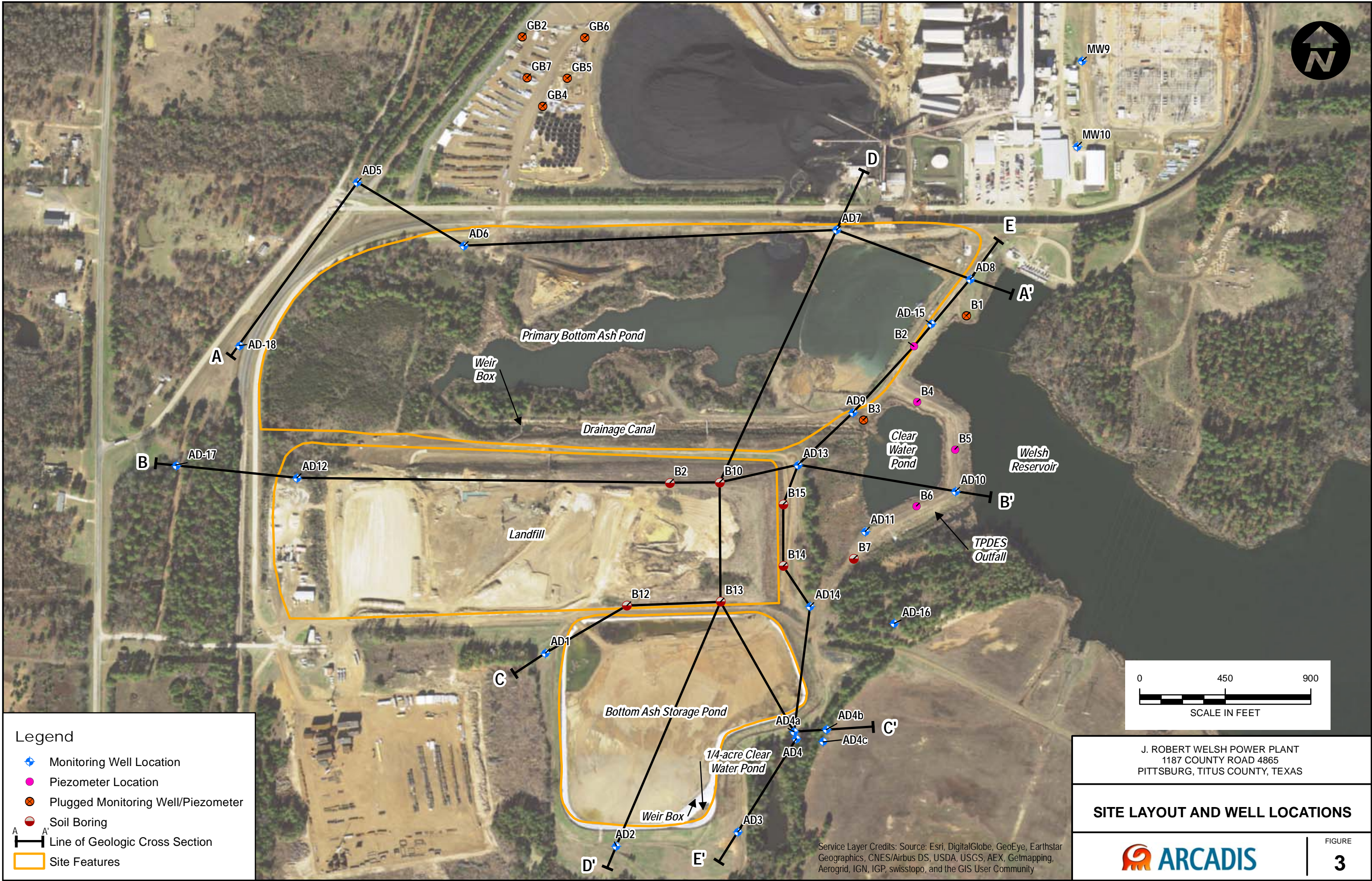
PLANT AND CCR UNIT LOCATION MAP

Legend

 Coal Combustion Residual (CCR) Unit

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community





Legend

- ◆ Monitoring Well Location
- Piezometer Location
- Plugged Monitoring Well/Piezometer
- Soil Boring
- Line of Geologic Cross Section
- Site Features

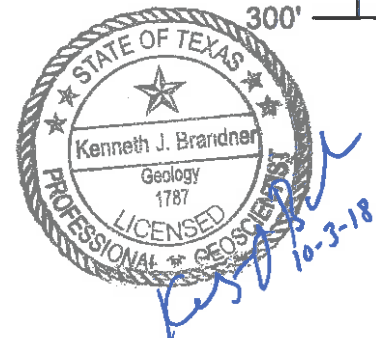
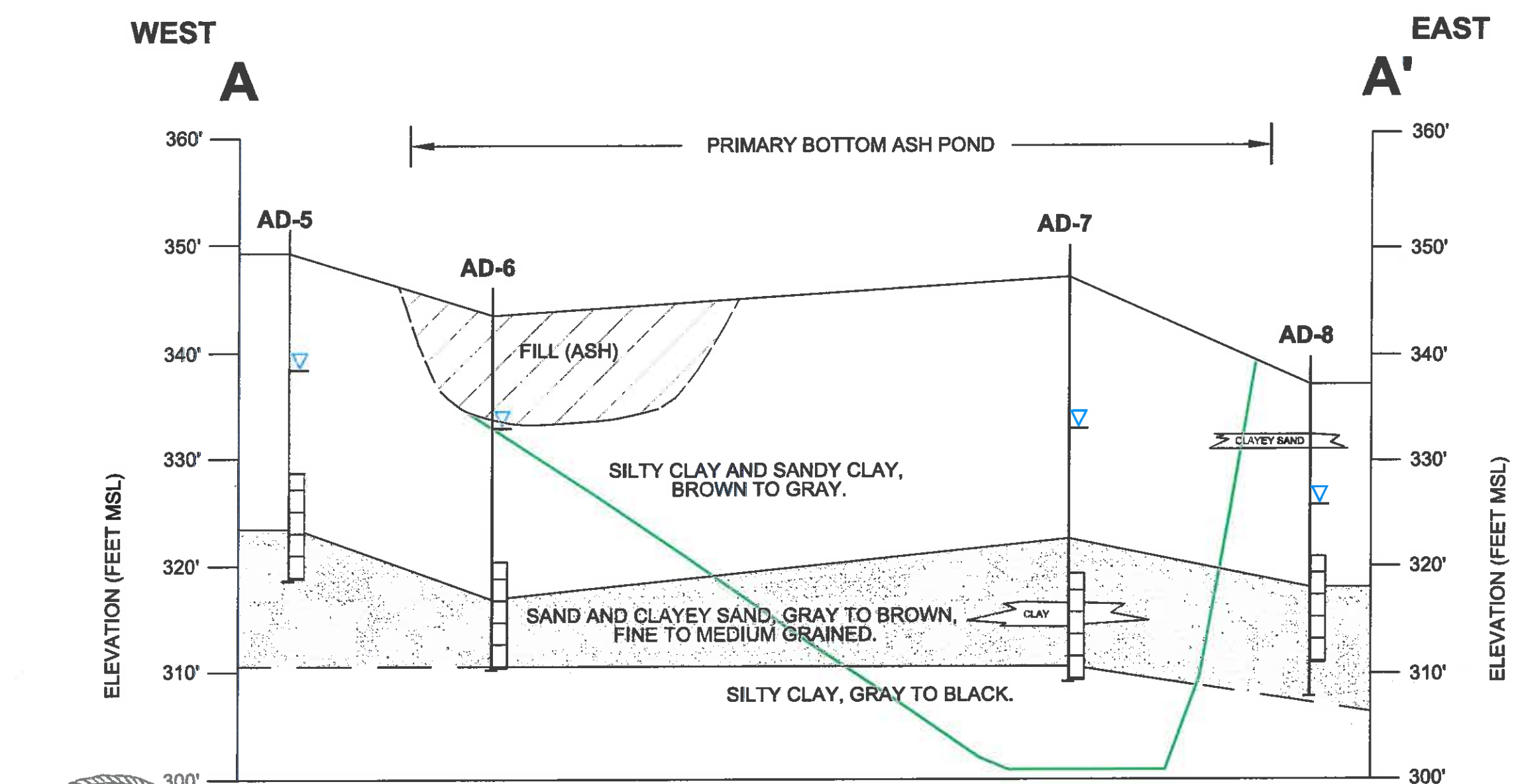
J. ROBERT WELSH POWER PLANT
 1187 COUNTY ROAD 4865
 PITTSBURG, TITUS COUNTY, TEXAS

SITE LAYOUT AND WELL LOCATIONS

ARCADIS

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

CITY: DRWG/GRP: DR: LD: AM: PD: TH: TR: LVL/DWG: OFF: REF: STATE OF TEXAS
 G:\Projects\WEPX\PHASE I\18794 - CCR Plant Assessment\Waste Power Plant\2018 Final Report\Fly Ash Pond Well Network Evaluation\Figure 4 Cross Section A-A.dwg LAYOUT: MODEL: SAVER: 02/20/18 09:53 AM ACADVER: 18.15 (LMS TECH) PAGES: 1 PLOTSTYLETABLE: PLOTTED: 02/20/18 10:36 AM BY: LEANE, DWMA



NOTE: BASE OF PRIMARY BOTTOM 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, 1984 (PHOTO REVISED 1980).

- LEGEND**
- MONITORING WELL SCREENED INTERVAL
 - WATER LEVEL IN MONITORING WELL (5/12/15)
 - PROJECTED BASE OF ASH POND (SEE NOTE)

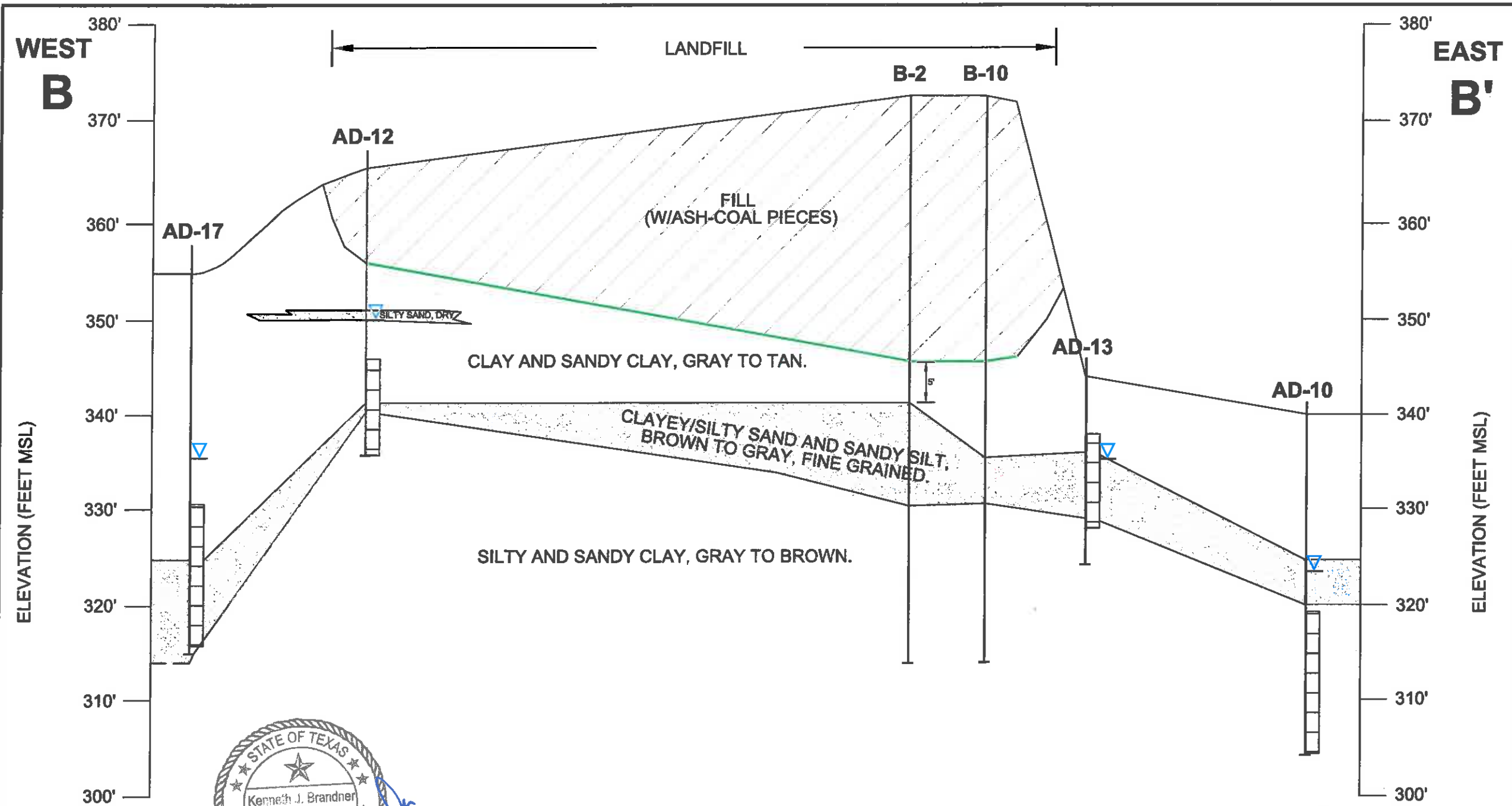
J. ROBERT WELSH POWER PLANT
 1187 COUNTY ROAD 4885
 PITTSBURG, TITUS COUNTY, TEXAS

**CROSS SECTION
 A - A'**

ARCADIS

FIGURE
4

CITY: DRUGROUP; DR: LD; AM: PZ; TR: LYSON; DR: 1827; G:\Projects\WELSH\PHASE I\WELSH - COR Plant Assessment\WELSH Power Plant\2018 Final Report\Primary Ash Pond Location\Resubmittal\Report\Figures\Map\Figure 8 Cross Section B-B'.dwg LAYOUT: MODEL; SAVED: 8/12/2016 10:41 AM; ACADVER: 18.10 (LMS TECH); PAGESETUP: - PLOTSTYLETABLE: PLOTTEP: 3/11/2016 12:53 PM; BY: LEASE, DMM



STATE OF TEXAS
 Kenneth J. Brandner
 Geology
 1787
 LICENSED PROFESSIONAL GEOLOGIST
Kenneth J. Brandner
 10-3-18

NOTE: BASE OF LANDFILL ELEVATION TAKEN FROM
 WELSH POWER PLANT - UNIT 1 FLY ASH STORAGE
 AREA PHASE I" DRAWING ID WEPX-88, DATED 12/3/76.



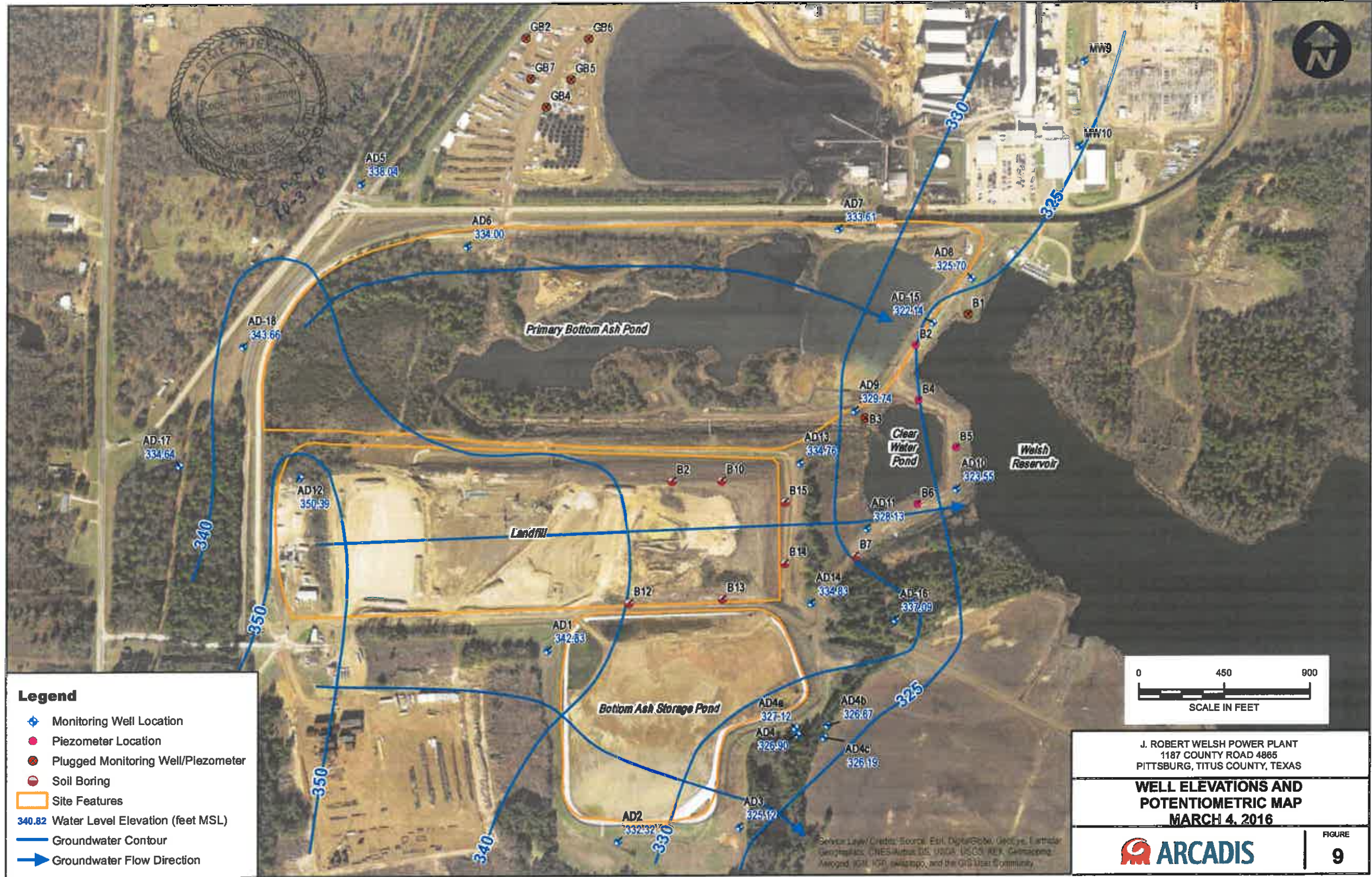
- LEGEND**
- MONITORING WELL SCREENED INTERVAL
 - WATER LEVEL IN MONITORING WELL (3/4/16)
 - BASE OF LANDFILL (SEE NOTE)

J. ROBERT WELSH POWER PLANT
 1187 COUNTY ROAD 4885
 PITTSBURG, TITUS COUNTY, TEXAS

CROSS SECTION
B - B'

FIGURE
5

Document Path: Z:\GIS\PROJECTS\ENW\WEP\Welsh Plant\XDU\Landfill\report\fig 9 - Mar2016_POT.mxd



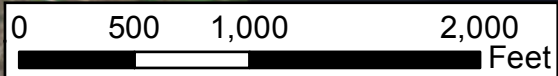


Ash Pond Primary

Landfill

Bottom Ash Storage

Welsh Reservoir



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

POTENTIAL WETLAND LOCATIONS

Legend

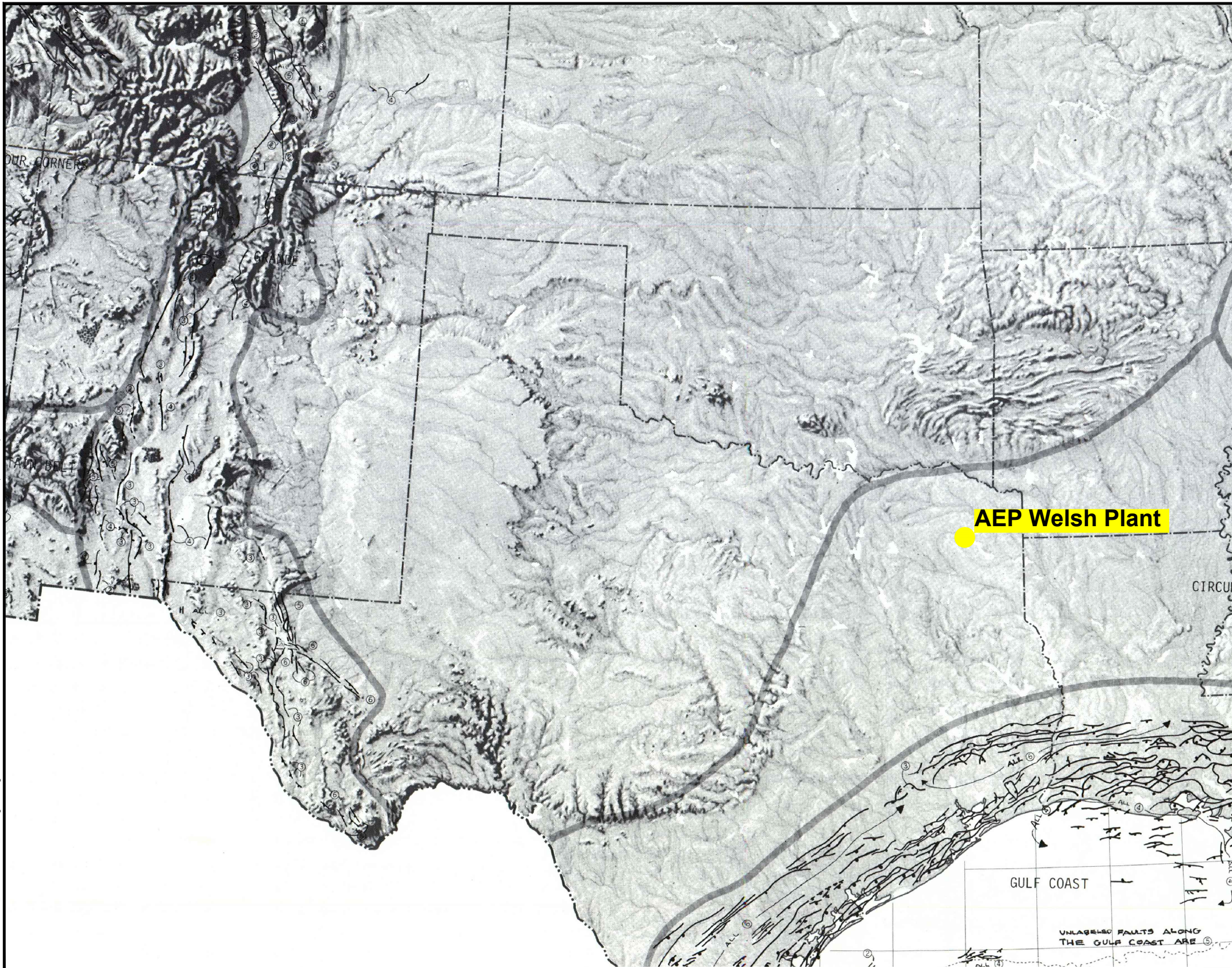
 Potential Wetlands

Source: Esri, DigitalGlobe, GeoEye, i-cu swisstopo, and the GIS User Community



FIGURE
10






G:\LFR\Projects\Non-Cinco\AEP_Location Restriction Demonstration_OH015976\AEP_Fault Figures.dwg LAYOUT: PITTSBURG TEXAS_SAVED: 9/15/2015 6:47 PM ACADVER: 19.15 (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 9/15/2015 6:48 PM BY: CALDWELL, MILES



EXPLANATION



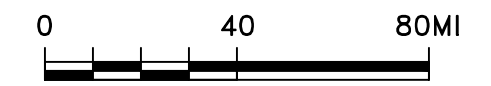
FAULTS

-  Ball on downthrown side
-  Sawteeth on upper plate of thrust fault
-  Arrows show sense of lateral displacement
-  Suspected fault
-  Fault, strike unknown

AGE OF YOUNGEST KNOWN DISPLACEMENT

- ① Historic
- ② Holocene--Approximately the last 10,000 years
- ③ Late Quaternary--Approximately the last 500,000 years
- ④ Quaternary--Approximately the last 1.8 million years
- ⑤ Late Cenozoic--Approximately the last 15 million years
- ⑥ Other--Longer time span than late Cenozoic

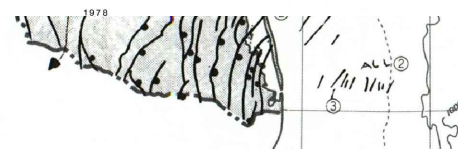
 Boundary of fault region



SCALE IN MILES
SCALE IS APPROXIMATE

PRELIMINARY MAP OF YOUNG FAULTS IN THE UNITED STATES AS A GUIDE TO POSSIBLE FAULT ACTIVITY

COMPILED BY
K.A. HOWARD, J. M. AARON, E.E. BRABB, M.R. BROCK, H.D. GOWER, S.J. HUNT,
D.J. MILTON, W.R. MUEHLBERGER, J.K. NAKATA, G. PLAFKER,
D.C. PROWELL, R.E. WALLACE, AND I.J. WITKIND



AEP WELSH PS GENERATING PLANT
1187 COUNTY ROAD 4865
PITTSBURG, TEXAS

NEARBY FAULT LOCATIONS


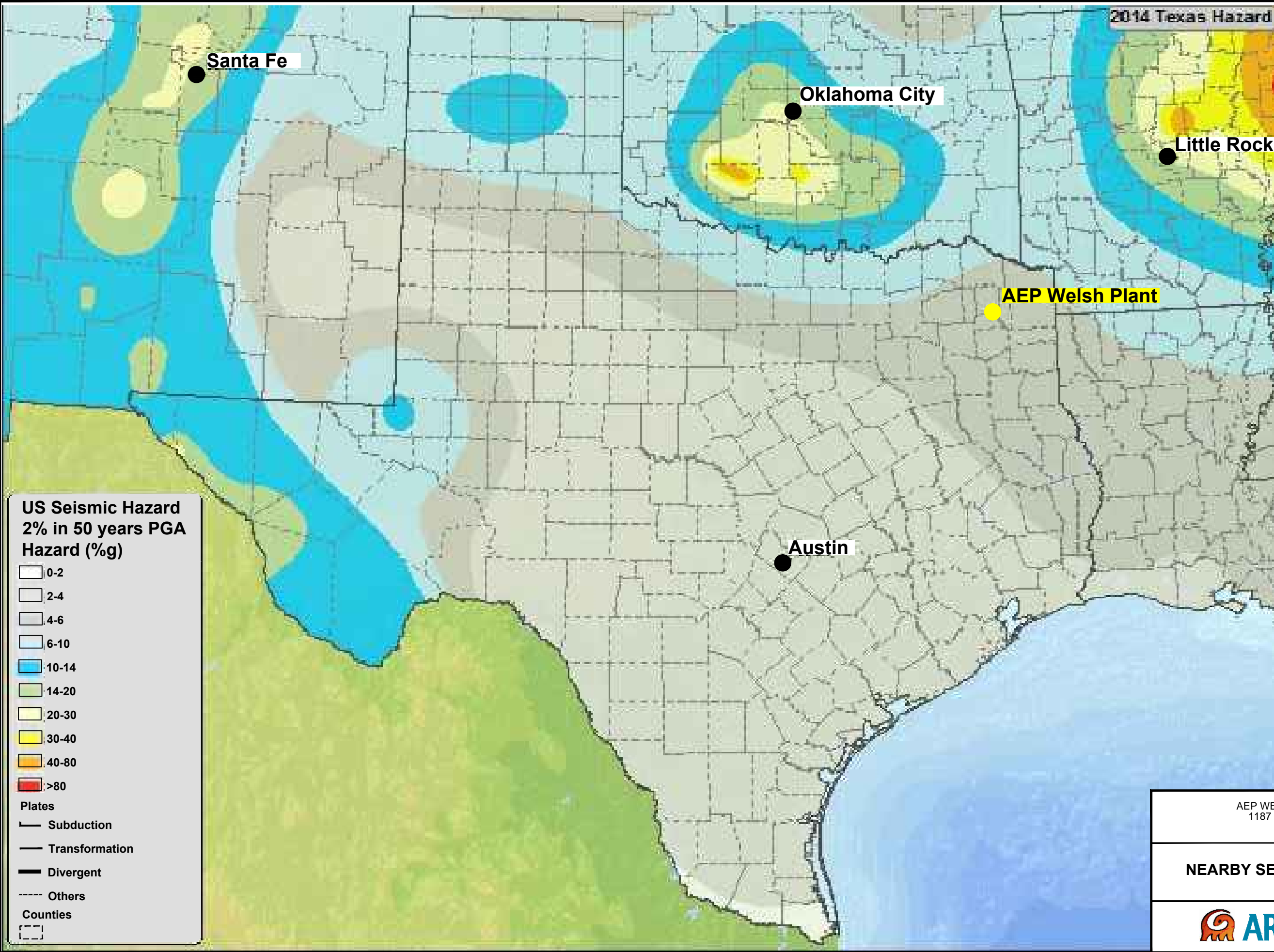


FIGURE
11

G:\LFR\Projects\Non_Cinco\AEP_Location Restriction Demonstration_Oh015976\AEP_Seismic Figures.dwg LAYOUT: PITTSBURG TX_POND_SAVED: 9/15/2015 6:41 PM ACADVER: 19.15 (LMS TECH) PAGESETUP: --- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 9/15/2015 6:43 PM BY: CALDWELL, MILES



SOURCE:
USGS Earthquake Hazards Program,
Texas: 2014 Seismic Hazard Map

AEP WELSH PLANT ASH POND
1187 COUNTY ROAD 4865
PITTSBURG, TX

NEARBY SEISMIC IMPACT ZONES




FIGURE
12



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.

**State of Texas
WELL REPORT**

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

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse Side

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

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

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

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

6) DRILLING METHOD (Check): Driven
 Air Rotary Mud Rotary Bored
 Air Hammer Cable Tool Jetted
 Other _____

7) Borehole Completion (Check): Open Hole Straight Wall
 Underreamed Gravel Packed Other _____
 If Gravel Packed give interval ... from 13 ft. to 25 ft.

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)		Gage Casting Screen
			From	To	
2	N	riser	+2	15	sch 40
2	N	#105/67 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#
 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
 Specified Surface Slab Installed [Rule 338.44(2)(A)]
 Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
 Pileless 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 Bailor Jetted Estimated
 Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

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

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) Robert M. [Signature] (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

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

AD-2

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

Please use black ink.

**State of Texas
WELL REPORT**

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

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse Side

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

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

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°02'37"N
94°50'44"W

6) WELL LOG:
 Date Drilling: _____
 Started 4/26 ¹⁸ 2001
 Completed 4/26 ¹⁸ 2001

DIAMETER OF HOLE		
Dia. (in.)	From (ft.)	To (ft.)
<u>8 1/4</u>	Surface	<u>25</u>

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

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

From (ft.)	To (ft.)	Description and color of formation material	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	
<u>0</u>	<u>2</u>	<u>top soil</u>	<u>2</u>	<u>N</u>	<u>Riser</u>	<u>+2</u>	<u>15</u>	<u>See 40</u>
<u>2</u>	<u>5</u>	<u>red & gray clay w/ silt</u>	<u>2</u>	<u>N</u>	<u>#10 slot screen</u>	<u>15</u>	<u>25</u>	<u>See 40</u>
<u>5</u>	<u>10</u>	<u>red & gray clay w/ silt</u>						
<u>10</u>	<u>25</u>	<u>gray silty clay w/ tan streaks</u>						

9) CEMENTING DATA [Rule 338.44(1)]
 Cemented from 12 ft. to 2 ft. No. of sacks used 5-50#
 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
 Specified Surface Slab Installed [Rule 338.44(2)(A)]
 Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
 Pileless 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 _____

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 Bailor Jetted Estimated
 Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

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

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) Richard M. Kelly (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

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

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

Please use black ink.

State of Texas WELL REPORT		Texas Water Well Drillers Advisory Council P.O. Box 13087 Austin, TX 78711-3087 512-239-0530																			
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side																					
1) OWNER <u>Southern Electric</u> (Name)		ADDRESS <u>Rt. 4, Box 221 Pittsburg Tx 75686</u> (Street or RFD) (City) (State) (Zip)																			
2) ADDRESS OF WELL: County <u>Camp</u> <u>Rt. 4 Box 221 Pittsburg Tx 75686</u> (Street, RFD or other) (City) (State) (Zip)		GRID # <u>16-58-4</u>																			
3) TYPE OF WORK (Check): <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Deepening <input type="checkbox"/> Reconditioning <input type="checkbox"/> Plugging		4) PROPOSED USE (Check): <input checked="" type="checkbox"/> Monitor <input type="checkbox"/> Environmental Soil Boring <input type="checkbox"/> Domestic <input type="checkbox"/> Industrial <input type="checkbox"/> Irrigation <input type="checkbox"/> Injection <input type="checkbox"/> Public Supply <input type="checkbox"/> De-watering <input type="checkbox"/> Testwell If Public Supply well, were plans submitted to the TNRCC? <input type="checkbox"/> Yes <input type="checkbox"/> No																			
6) WELL LOG: Date Drilling: _____ Started <u>4/26</u> <u>2001</u> Completed <u>4/26</u> <u>2001</u>		7) DRILLING METHOD (Check): <input type="checkbox"/> Driven <input type="checkbox"/> Air Rotary <input type="checkbox"/> Mud Rotary <input checked="" type="checkbox"/> Bored <input type="checkbox"/> Air Hammer <input type="checkbox"/> Cable Tool <input type="checkbox"/> Jetted <input type="checkbox"/> Other _____																			
DIAMETER OF HOLE Dia. (in.) From (ft.) To (ft.) <u>8 1/4</u> Surface <u>17</u>		5) <u>GPS</u> <u>33°02'38"N</u> <u>94°50'37"W</u>																			
From (ft.) To (ft.) Description and color of formation material <u>0 12 gray silty clay w/ tan streaks</u> <u>12 15 very stiff gray/blood red clay</u> <u>15 17 very stiff gray clay w/ red nodules and tan streaks</u>		8) Borehole Completion (Check): <input type="checkbox"/> Open Hole <input type="checkbox"/> Straight Wall <input type="checkbox"/> Underreamed <input checked="" type="checkbox"/> Gravel Packed <input type="checkbox"/> Other _____ If Gravel Packed give interval ... from <u>5</u> ft. to <u>17</u> ft.																			
		CASING, BLANK PIPE, AND WELL SCREEN DATA:																			
		<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Dia. (in.)</th> <th rowspan="2">New or Used</th> <th rowspan="2">Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial</th> <th colspan="2">Setting (ft.)</th> <th rowspan="2">Gage Casting Screen</th> </tr> <tr> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr> <td><u>2</u></td> <td><u>N</u></td> <td><u>riser</u></td> <td><u>+2</u></td> <td><u>7</u></td> <td><u>Sec 40</u></td> </tr> <tr> <td><u>2</u></td> <td><u>N</u></td> <td><u>#10 slot screen</u></td> <td><u>7</u></td> <td><u>17</u></td> <td><u>Sec 40</u></td> </tr> </tbody> </table>		Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)		Gage Casting Screen	From	To	<u>2</u>	<u>N</u>	<u>riser</u>	<u>+2</u>	<u>7</u>	<u>Sec 40</u>	<u>2</u>	<u>N</u>	<u>#10 slot screen</u>	<u>7</u>
Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)				Gage Casting Screen														
			From	To																	
<u>2</u>	<u>N</u>	<u>riser</u>	<u>+2</u>	<u>7</u>	<u>Sec 40</u>																
<u>2</u>	<u>N</u>	<u>#10 slot screen</u>	<u>7</u>	<u>17</u>	<u>Sec 40</u>																
(Use reverse side if necessary)		9) CEMENTING DATA [Rule 336.44(1)] Cemented from <u>2</u> ft. to <u>5</u> ft. No. of sacks used <u>2 1/2 - 50</u> Method used <u>bentonite pellets</u> Cemented by _____ Distance to septic system field lines or other concentrated contamination _____ ft. Method of verification of above distance _____																			
13) TYPE PUMP: <u>NA</u> <input type="checkbox"/> Turbine <input type="checkbox"/> Jet <input type="checkbox"/> Submersible <input type="checkbox"/> Cylinder <input type="checkbox"/> Other _____ Depth to pump bowls, cylinder, jet, etc., _____ ft.		10) SURFACE COMPLETION <input checked="" type="checkbox"/> Specified Surface Slab Installed [Rule 338.44(2)(A)] <input checked="" type="checkbox"/> Specified Steel Sleeve Installed [Rule 338.44(3)(A)] <input type="checkbox"/> Pileless Adapter Used [Rule 338.44(3)(b)] <input type="checkbox"/> Approved Alternative Procedure Used [Rule 338.71]																			
14) WELL TESTS: <u>NA</u> Type test <input type="checkbox"/> Pump <input type="checkbox"/> Bailor <input type="checkbox"/> Jetted <input type="checkbox"/> 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? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, submit "REPORT OF UNDESIRABLE WATER" Type of water? _____ Depth of strata _____ Was a chemical analysis made? <input type="checkbox"/> Yes <input type="checkbox"/> No		12) PACKERS: <u>NA</u> 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. <u>TX 52694-M</u>																			
ADDRESS _____ (Street or RFD)		(City) (State) (Zip)																			
(Signed) <u>Robert M. RCU</u> (Licensed Well Driller)		(Signed) _____ (Registered Driller Trainee)																			
Please attach electric log, chemical analysis, and other pertinent information, if available.																					

AD-4

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

Please use black ink.

**State of Texas
WELL REPORT**

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

ATTENTION OWNER: Confidentiality
Privilege Notice on Reverse Side

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

2) ADDRESS OF WELL: County Camp Rt. 4 Box 221 Pittsburg Tx 75686 GRID # 16-584
(City) (State) (Zip)

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

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 _____

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

From (ft.)	To (ft.)	Description and color of formation material	Setting (ft.)		Gage Casting Screen
			From	To	
0	5	red silty clay with gray streaks			
5	30	gray silty clay with red streaks			

AP-4

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)		Gage Casting Screen
			From	To	
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 _____

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]

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

12) PACKERS: NA Type _____ Depth _____

13) TYPE PUMP:
 Turbine Jet Submersible Cylinder
 Other NA
 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 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 _____ (City) _____ (State) _____ (Zip)

(Signed) Sally M. Davis (Licensed Well Driller) (Signed) _____ (Registered Driller Trainee)

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



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

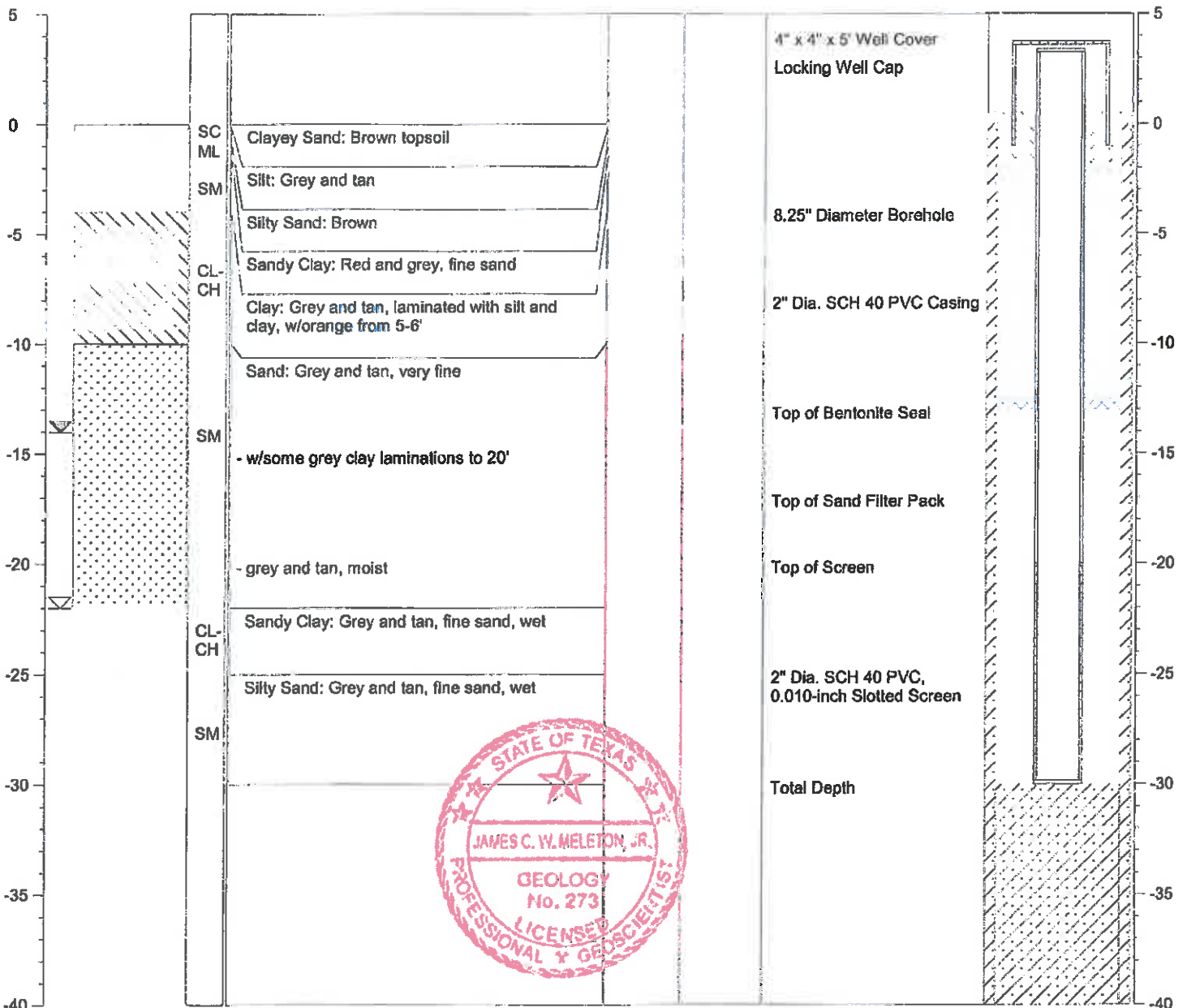
CLIENT: AEP
 PROJECT: Ash Disposal Area
 SITE LOCATION: Welsh Power Plant
 PROJECT NO.: S-08-0109
 LOGGED BY: James Meleton, Jr.

DRILLING CO.: WEST Drilling
 DRILLER: Tom McCullough
 METHOD OF DRILLING: Hollow-stem Auger
 SAMPLING METHODS: Split-spoon
 DATE DRILLED: 9/22/09

NOTES: Latitude: 33.04527
 Longitude: 94.84258

≡ 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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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
 PROJECT: Ash Disposal Area
 SITE LOCATION: Welsh Power Plant
 PROJECT NO.: S-08-0109
 LOGGED BY: James Meleton, Jr.

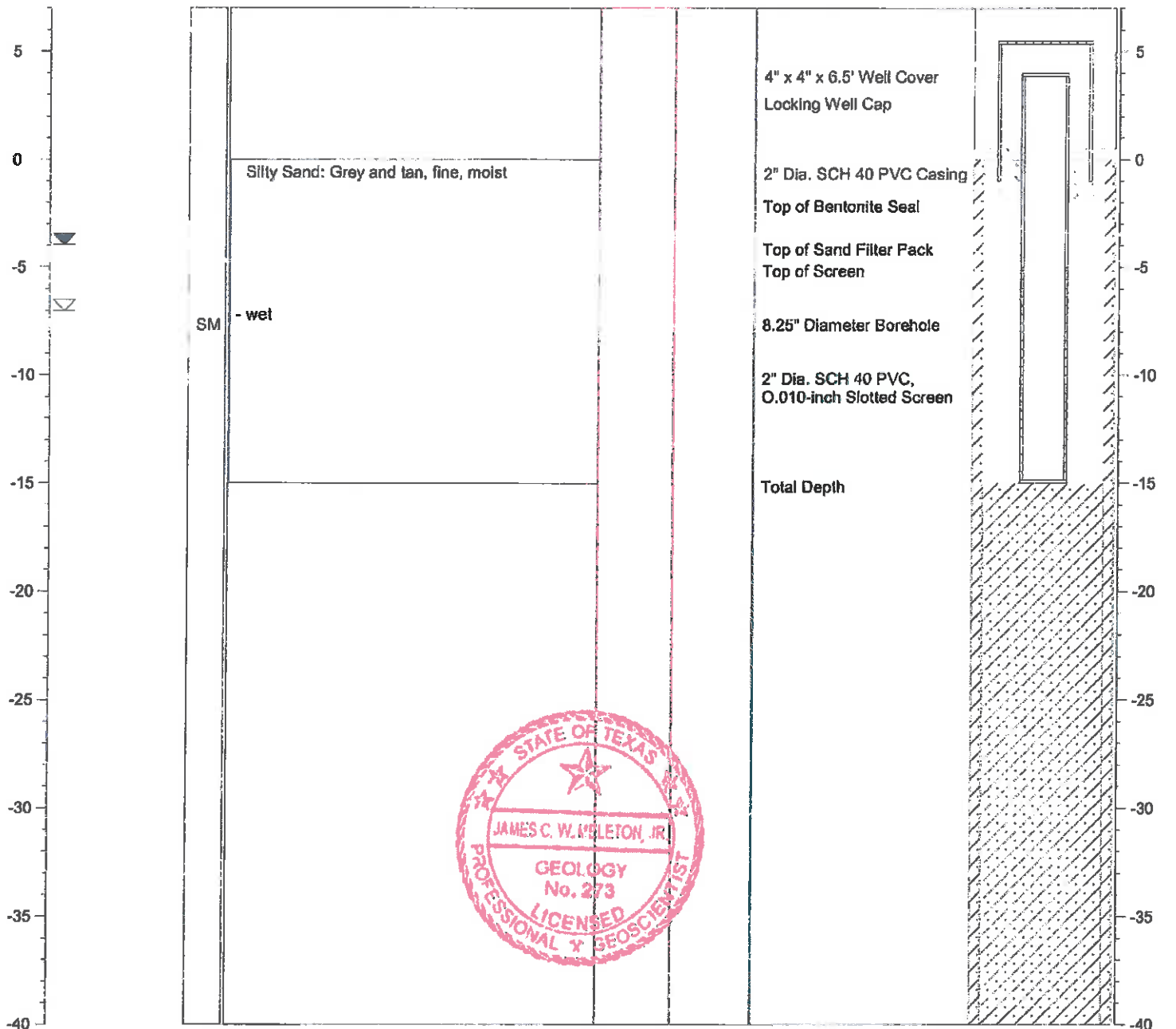
DRILLING CO.: WEST Drilling
 DRILLER: Tom McCullough
 METHOD OF DRILLING: Hollow-stem Auger
 SAMPLING METHODS: Split-spoon
 DATE DRILLED: 9/23/09

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
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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

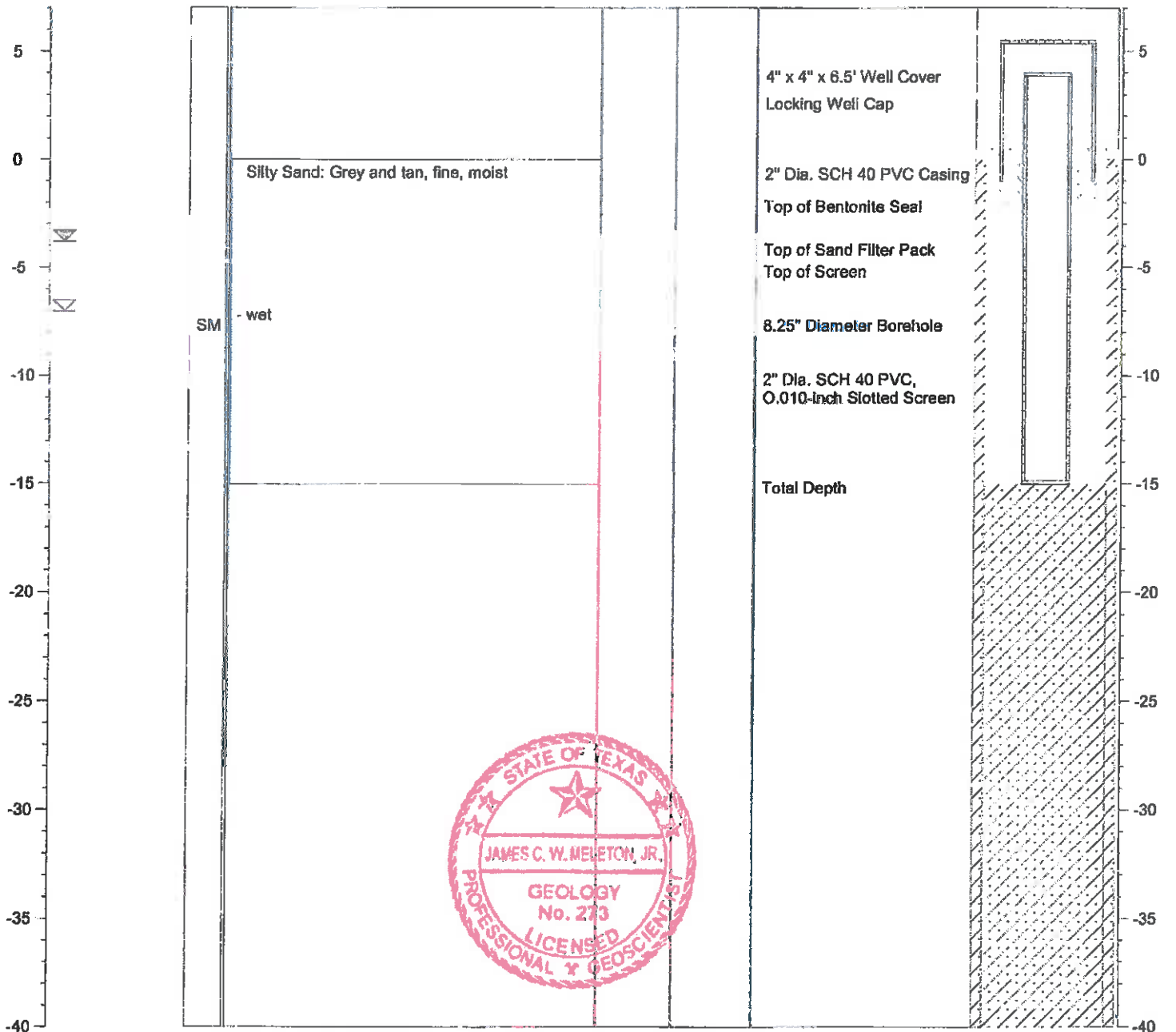
CLIENT: AEP
 PROJECT: Ash Disposal Area
 SITE LOCATION: Welsh Power Plant
 PROJECT NO.: S-08-0109
 LOGGED BY: James Meleton, Jr.

DRILLING CO.: WEST Drilling
 DRILLER: Tom McCullough
 METHOD OF DRILLING: Hollow-stem Auger
 SAMPLING METHODS: Split-spoon
 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
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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 <u>Southwestern Electric Power</u> ADDRESS <u>Rt. 4, Box 221 Pittsburg Tx</u> <u>75686</u> <small>(Name) (Street or RFD) (City) (State) (Zip)</small>		2) ADDRESS OF WELL: County <u>Camp</u> <u>Titus</u> <u>Rt. 4, Box 221 Pittsburg Tx</u> <u>75686</u> GRID # <u>16-58-4</u> <small>(Street, RFD or other) (City) (State) (Zip)</small>																							
3) TYPE OF WORK (Check): <input checked="" type="checkbox"/> New Well <input type="checkbox"/> Deepening <input type="checkbox"/> Reconditioning <input type="checkbox"/> Plugging		4) PROPOSED USE (Check): <input checked="" type="checkbox"/> Monitor <input type="checkbox"/> Environmental Soil Boring <input type="checkbox"/> Domestic <input type="checkbox"/> Industrial <input type="checkbox"/> Irrigation <input type="checkbox"/> Injection <input type="checkbox"/> Public Supply <input type="checkbox"/> De-watering <input type="checkbox"/> Testwell If Public Supply well, were plans submitted to the TNRCC? <input type="checkbox"/> Yes <input type="checkbox"/> No		5) <u>33°03'13"N</u> <u>94°51'00"W</u> ↑																					
6) WELL LOG: Date Drilling: Started <u>1-11-2001</u> Completed <u>1-11-2001</u>		DIAMETER OF HOLE <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Dis. (in.)</th> <th>From (ft.)</th> <th>To (ft.)</th> </tr> <tr> <td><u>8 1/4</u></td> <td>Surface</td> <td><u>30</u></td> </tr> </table>		Dis. (in.)	From (ft.)	To (ft.)	<u>8 1/4</u>	Surface	<u>30</u>	7) DRILLING METHOD (Check): <input type="checkbox"/> Driven <input type="checkbox"/> Air Rotary <input type="checkbox"/> Mud Rotary <input checked="" type="checkbox"/> Bored <input type="checkbox"/> Air Hammer <input type="checkbox"/> Cable Tool <input type="checkbox"/> Jetted <input type="checkbox"/> Other _____															
Dis. (in.)	From (ft.)	To (ft.)																							
<u>8 1/4</u>	Surface	<u>30</u>																							
From (ft.) To (ft.) Description and color of formation material <u>0 - 10</u> <u>red & gray clay with orange streaks</u> <u>10 - 20</u> <u>gray/black clay with tan clay</u> <u>20 - 25</u> <u>stiff clay with lignite streak</u> <u>25 - 30</u> <u>fine gray sand</u> <u>AP-5</u>		8) Borehole Completion (Check): <input type="checkbox"/> Open Hole <input type="checkbox"/> Straight Wall <input type="checkbox"/> Underreamed <input checked="" type="checkbox"/> Gravel Packed <input type="checkbox"/> Other _____ If Gravel Packed give interval ... from <u>16</u> ft. to <u>30</u> ft.		CASING, BLANK PIPE, AND WELL SCREEN DATA: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Dia. (in.)</th> <th rowspan="2">New or Used</th> <th rowspan="2">Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial</th> <th colspan="2">Setting (ft.)</th> <th rowspan="2">Gage Casting Screen</th> </tr> <tr> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr> <td><u>2</u></td> <td><u>N</u></td> <td><u>riser</u></td> <td><u>+2</u></td> <td><u>20</u></td> <td><u>sch 40</u></td> </tr> <tr> <td><u>2</u></td> <td><u>N</u></td> <td><u>#10 slot screen</u></td> <td><u>20</u></td> <td><u>30</u></td> <td><u>sch 40</u></td> </tr> </tbody> </table>		Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)		Gage Casting Screen	From	To	<u>2</u>	<u>N</u>	<u>riser</u>	<u>+2</u>	<u>20</u>	<u>sch 40</u>	<u>2</u>	<u>N</u>	<u>#10 slot screen</u>	<u>20</u>	<u>30</u>	<u>sch 40</u>
Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)		Gage Casting Screen																				
			From	To																					
<u>2</u>	<u>N</u>	<u>riser</u>	<u>+2</u>	<u>20</u>	<u>sch 40</u>																				
<u>2</u>	<u>N</u>	<u>#10 slot screen</u>	<u>20</u>	<u>30</u>	<u>sch 40</u>																				
13) TYPE PUMP: <input type="checkbox"/> Turbine <input type="checkbox"/> Jet <input type="checkbox"/> Submersible <input type="checkbox"/> Cylinder <input type="checkbox"/> Other _____ Depth to pump bowls, cylinder, jet, etc., _____ ft.		9) CEMENTING DATA [Rule 338.44(1)] Cemented from <u>16</u> ft. to <u>0</u> ft. No. of sacks used _____ _____ ft. to _____ ft. No. of sacks used _____ Method used <u>Dentonite</u> Cemented by _____ Distance to septic system field lines or other concentrated contamination _____ ft. Method of verification of above distance _____																							
14) WELL TESTS: Type test: <input type="checkbox"/> Pump <input type="checkbox"/> Bailor <input type="checkbox"/> Jetted <input type="checkbox"/> Estimated Yield: _____ gpm with _____ ft. drawdown after _____ hrs.		10) SURFACE COMPLETION <input checked="" type="checkbox"/> Specified Surface Slab Installed [Rule 338.44(2)(A)] <input checked="" type="checkbox"/> Specified Steel Sleeve Installed [Rule 338.44(3)(A)] <input type="checkbox"/> Pileless Adapter Used [Rule 338.44(3)(b)] <input type="checkbox"/> Approved Alternative Procedure Used [Rule 338.71]																							
15) WATER QUALITY: Did you knowingly penetrate any strata which contained undesirable constituents? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, submit "REPORT OF UNDESIRABLE WATER" Type of water? _____ Depth of strata _____ Was a chemical analysis made? <input type="checkbox"/> Yes <input type="checkbox"/> No		11) WATER LEVEL: Static level <u>11'9"</u> ft. below land surface Date <u>1-11-01</u> Artesian flow _____ gpm. Date _____		12) PACKERS: <u>NA</u> 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 _____ <small>(Type or print)</small>		WELL DRILLER'S LICENSE NO. <u>TX 52694-M</u>																							
ADDRESS _____ <small>(Street or RFD) (City) (State) (Zip)</small>																									
(Signed) <u>[Signature]</u> <small>(Licensed Well Driller)</small>		(Signed) _____ <small>(Registered Driller Trainee)</small>																							

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



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

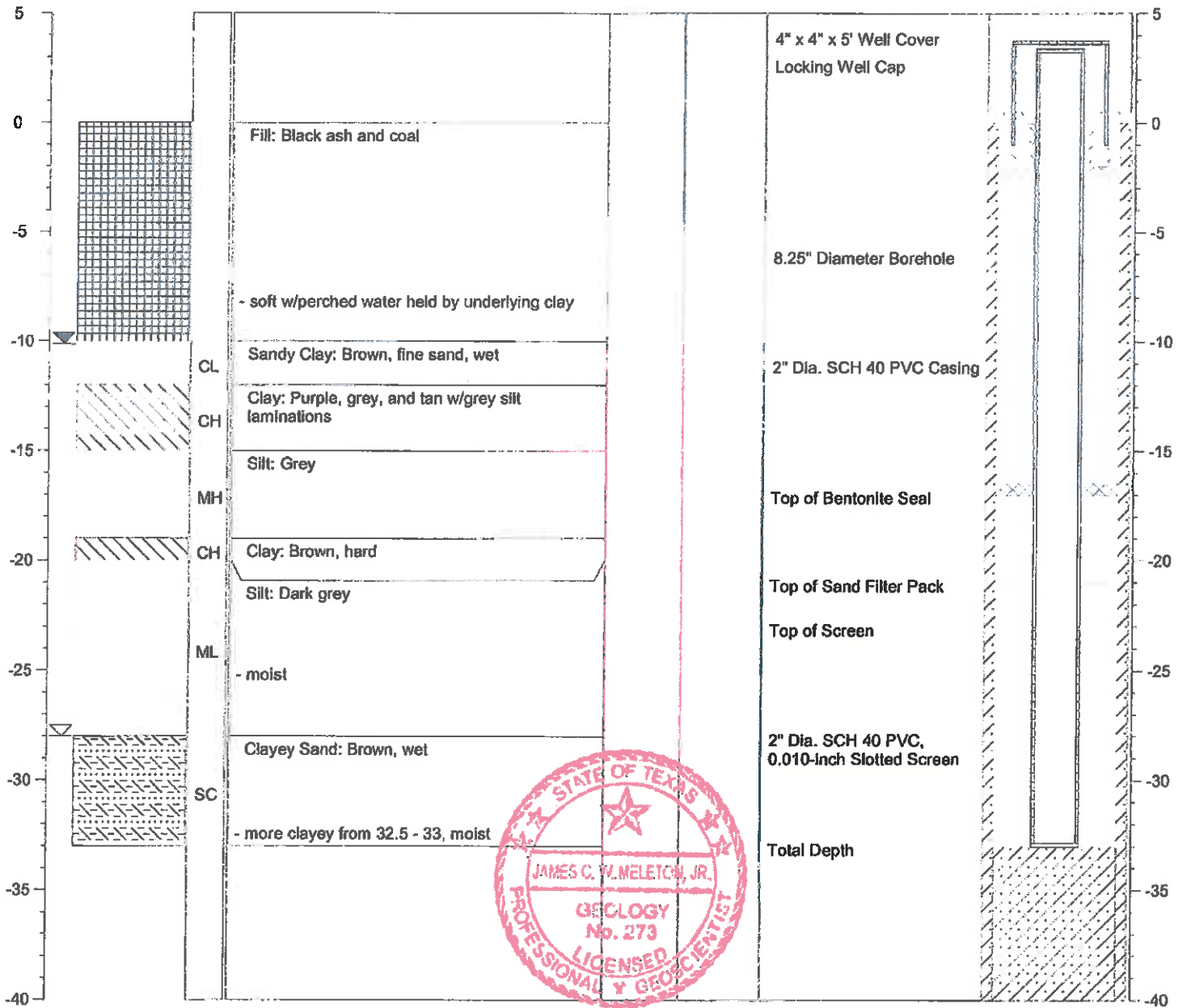
CLIENT: AEP
 PROJECT: Ash Disposal Area
 SITE LOCATION: Welsh Power Plant
 PROJECT NO.: S-08-0109
 LOGGED BY: James Meleton, Jr.

DRILLING CO.: WEST Drilling
 DRILLER: Tom McCullough
 METHOD OF DRILLING: Hollow-stem Auger
 SAMPLING METHODS: Split-spoon
 DATE DRILLED: 9/23/09

NOTES: Latitude: 33.05235
 Longitude: 94.84757

☒ 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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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**
 PROJECT: **Ash Disposal Area**
 SITE LOCATION: **Welsh Power Plant**
 PROJECT NO.: **S-08-0109**
 LOGGED BY: **James Meleton, Jr.**

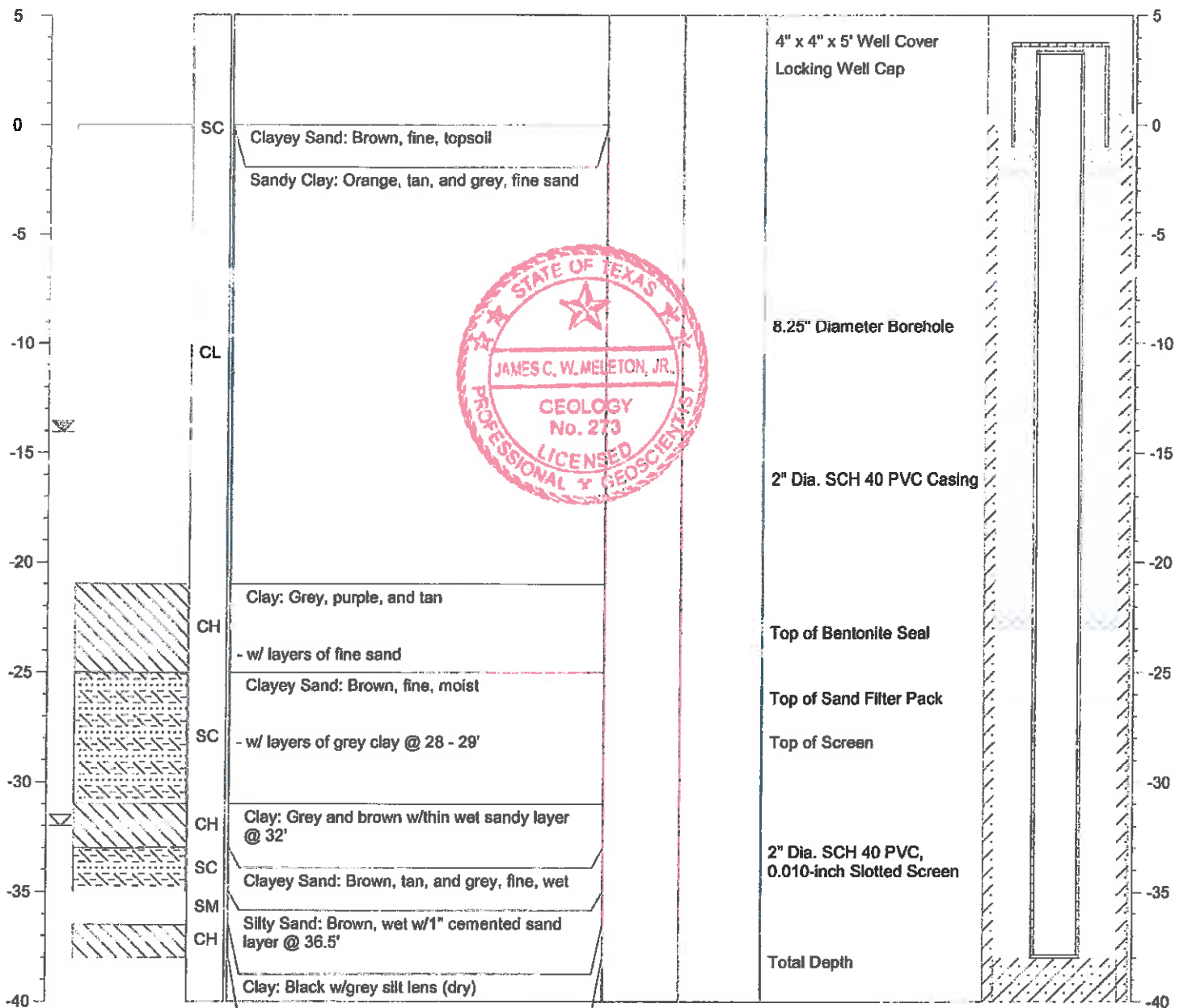
DRILLING CO.: **WEST Drilling**
 DRILLER: **Tom McCullough**
 METHOD OF DRILLING: **Hollow-stem Auger**
 SAMPLING METHODS: **Split-spoon**
 DATE DRILLED: **9/24/09**

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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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
 PROJECT: Ash Disposal Area
 SITE LOCATION: Welsh Power Plant
 PROJECT NO.: S-08-0109
 LOGGED BY: James Meleton, Jr.

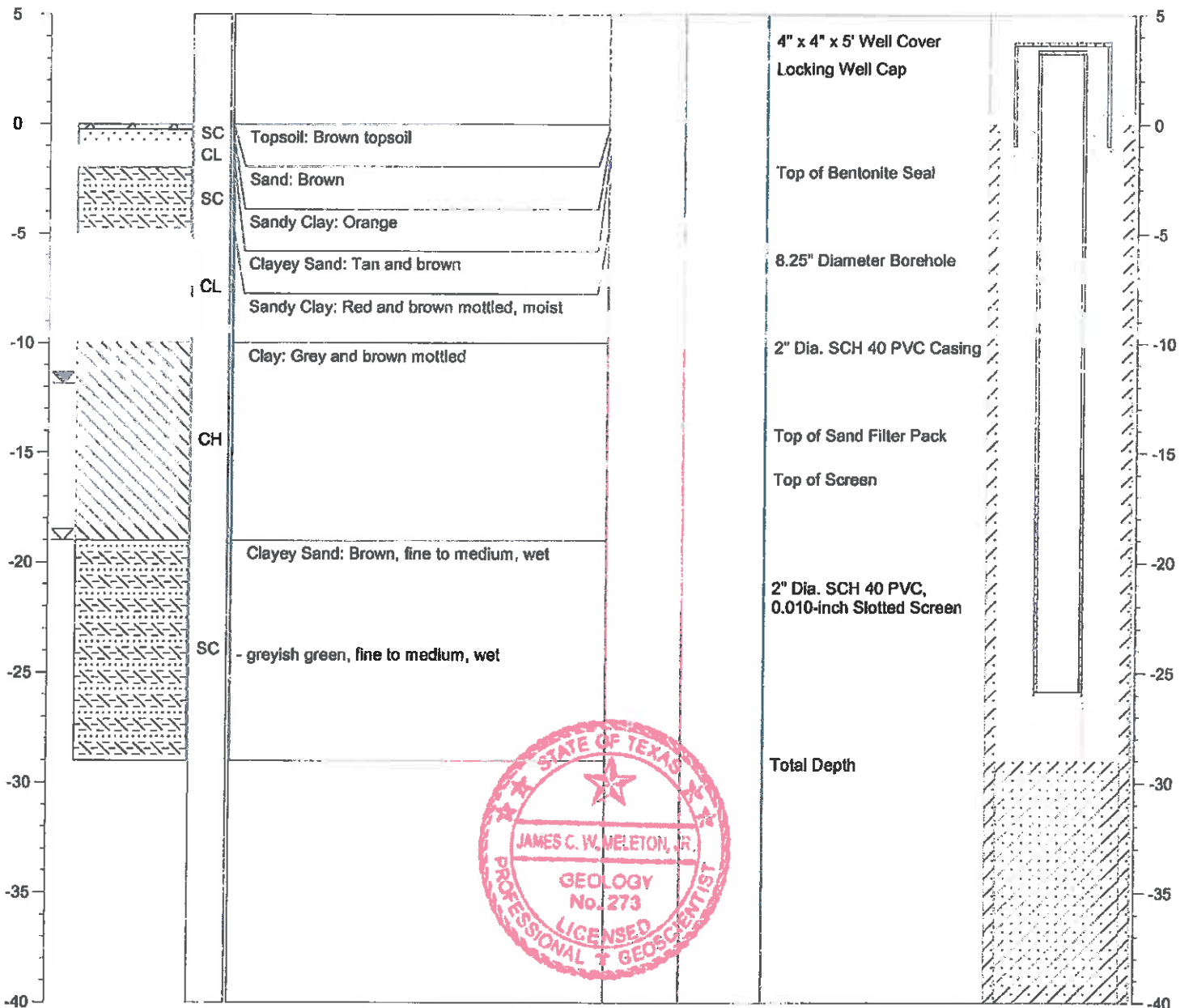
DRILLING CO.: WEST Drilling
 DRILLER: Tom McCullough
 METHOD OF DRILLING: Hollow-stem Auger
 SAMPLING METHODS: Split-spoon
 DATE DRILLED: 9/21/09

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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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
 PROJECT: Ash Disposal Area
 SITE LOCATION: Welsh Power Plant
 PROJECT NO.: S-08-0109
 LOGGED BY: James Meleton, Jr.

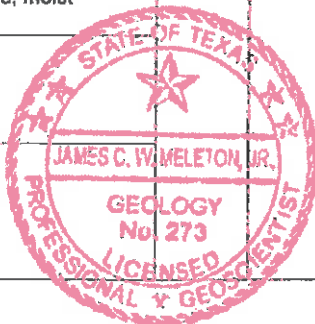
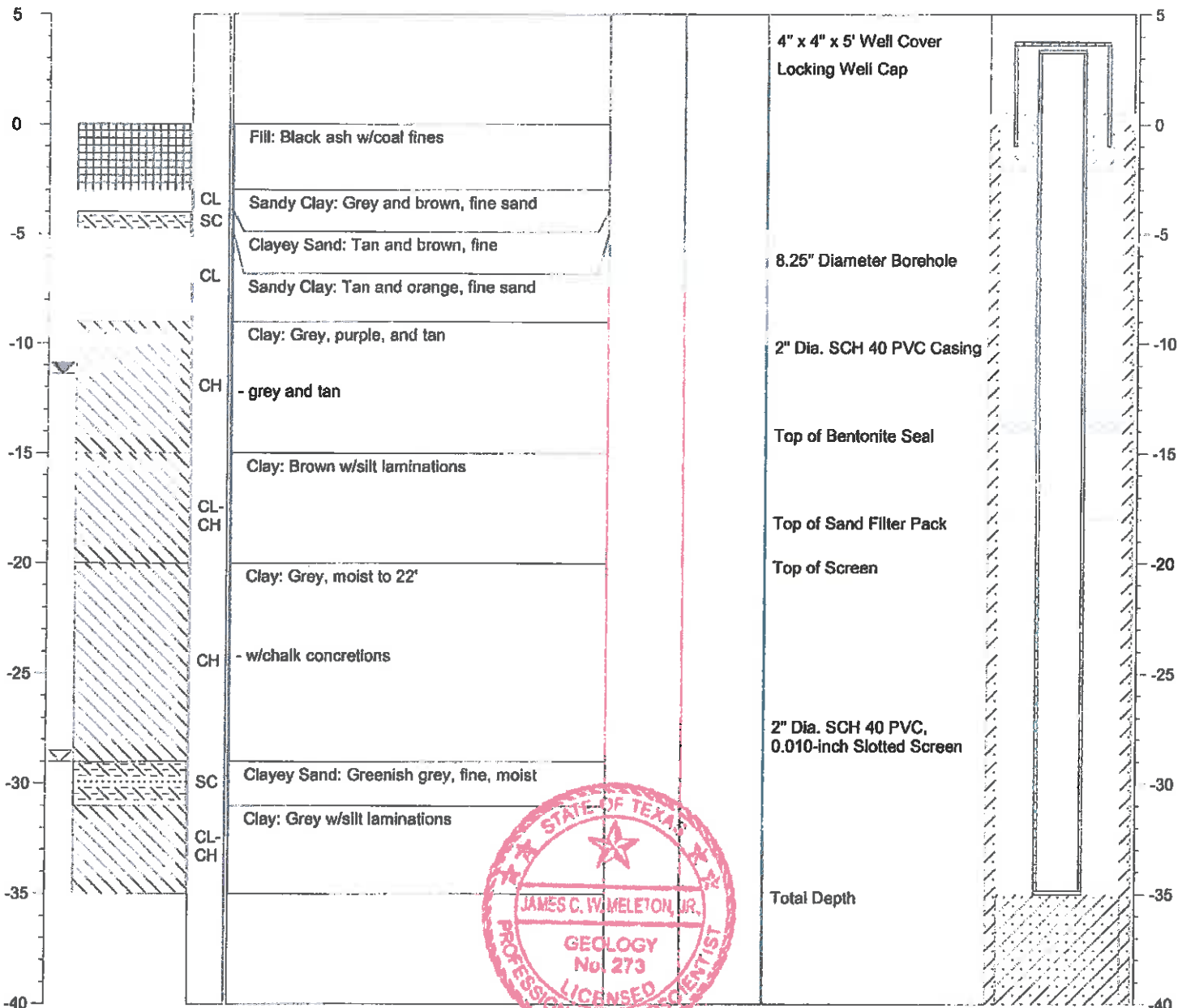
DRILLING CO.: WEST Drilling
 DRILLER: Tom McCullough
 METHOD OF DRILLING: Hollow-stem Auger
 SAMPLING METHODS: Split-spoon
 DATE DRILLED: 9/21/09

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
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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
 PROJECT: Ash Disposal Area
 SITE LOCATION: Welsh Power Plant
 PROJECT NO.: S-08-0109
 LOGGED BY: James Meleton, Jr.

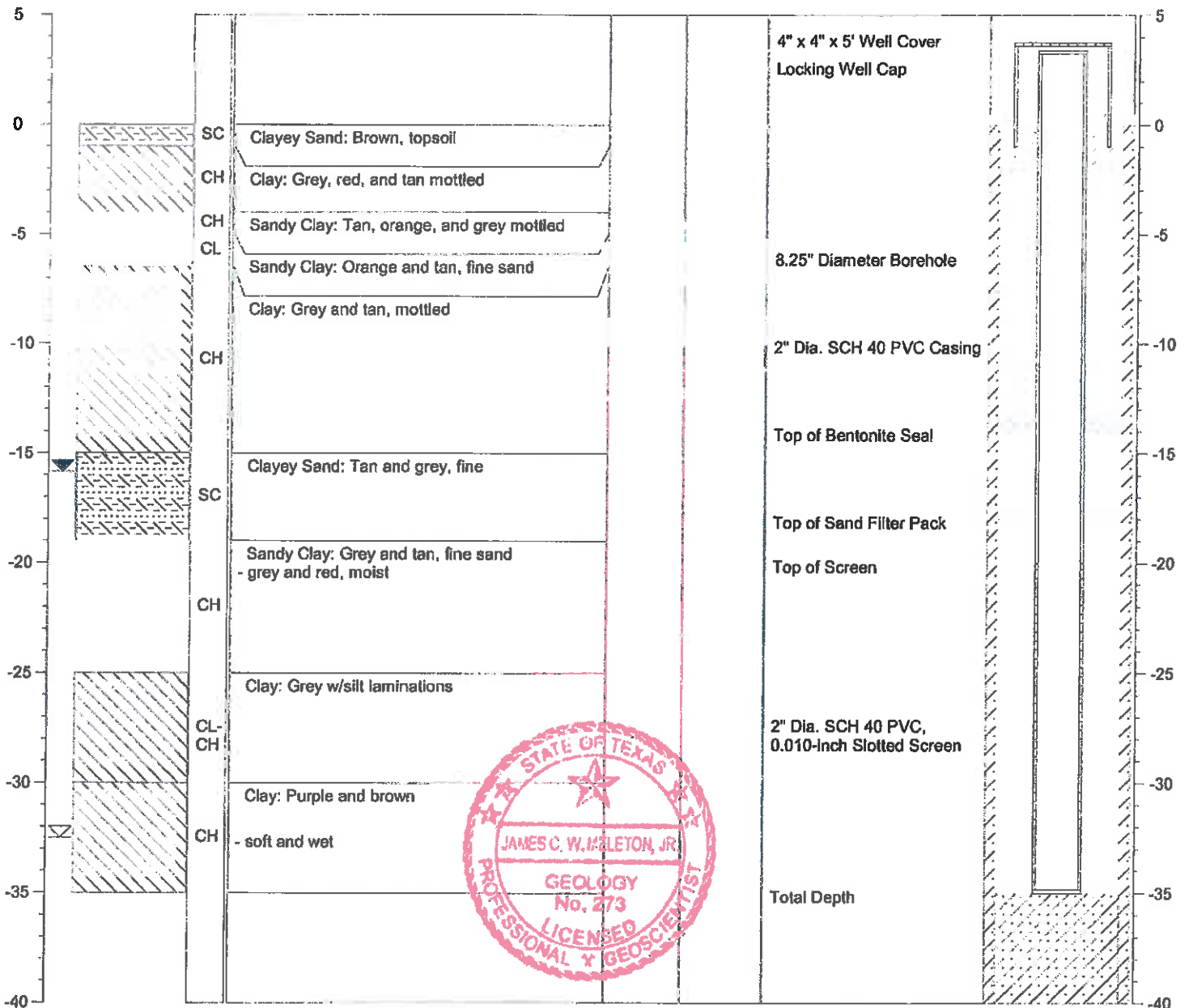
DRILLING CO.: WEST Drilling
 DRILLER: Tom McCullough
 METHOD OF DRILLING: Hollow-stem Auger
 SAMPLING METHODS: Split-spoon
 DATE DRILLED: 9/22/09

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
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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

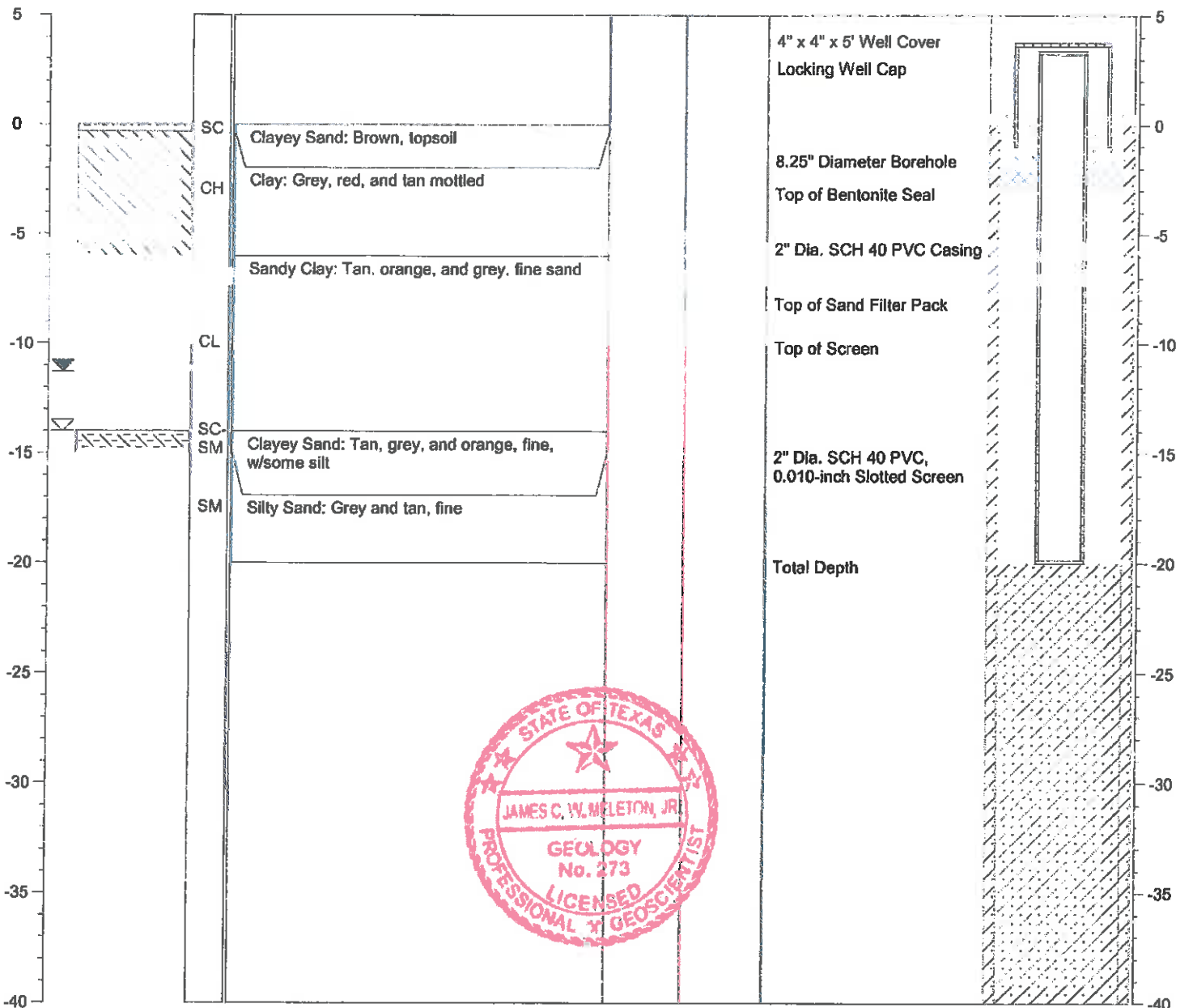
CLIENT: AEP
 PROJECT: Ash Disposal Area
 SITE LOCATION: Welsh Power Plant
 PROJECT NO.: S-08-0109
 LOGGED BY: James Meleton, Jr.

DRILLING CO.: WEST Drilling
 DRILLER: Tom McCullough
 METHOD OF DRILLING: Hollow-stem Auger
 SAMPLING METHODS: Split-spoon
 DATE DRILLED: 9/22/09

NOTES: Latitude: 33.04824
 Longitude: 94.84177

☒ 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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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

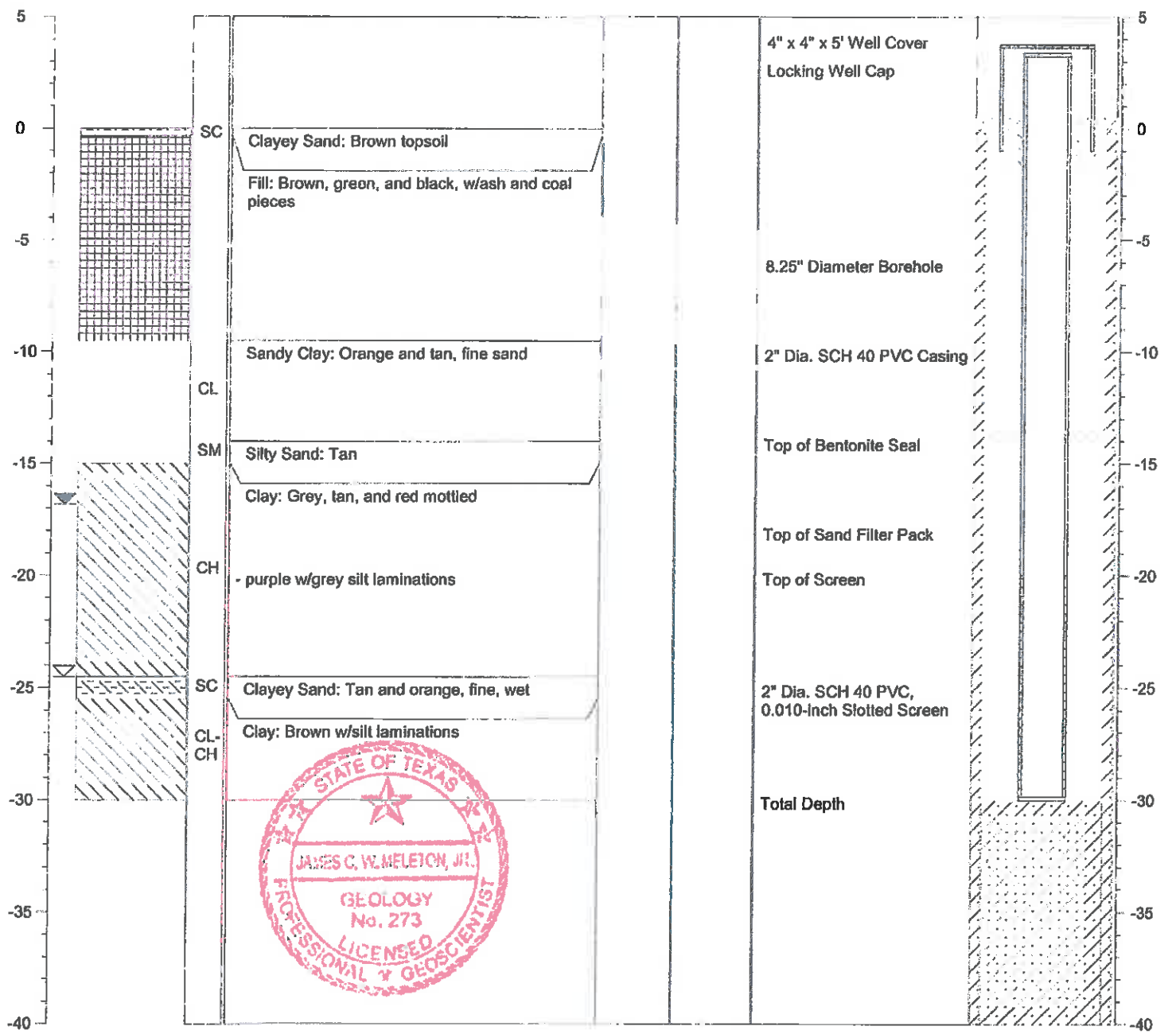
CLIENT: AEP
 PROJECT: Ash Disposal Area
 SITE LOCATION: Welsh Power Plant
 PROJECT NO.: S-08-0109
 LOGGED BY: James Meleton, Jr.

DRILLING CO.: WEST Drilling
 DRILLER: Tom McCullough
 METHOD OF DRILLING: Hollow-stem Auger
 SAMPLING METHODS: Split-spoon
 DATE DRILLED: 9/24/09

NOTES: Latitude: 33.04901
 Longitude: 94.84977

- ☒ 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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SOIL BORING LOG

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
 PROJECT: Ash Disposal Area
 SITE LOCATION: Welsh Power Plant
 PROJECT NO.: S-08-0109
 LOGGED BY: James Meleton, Jr.

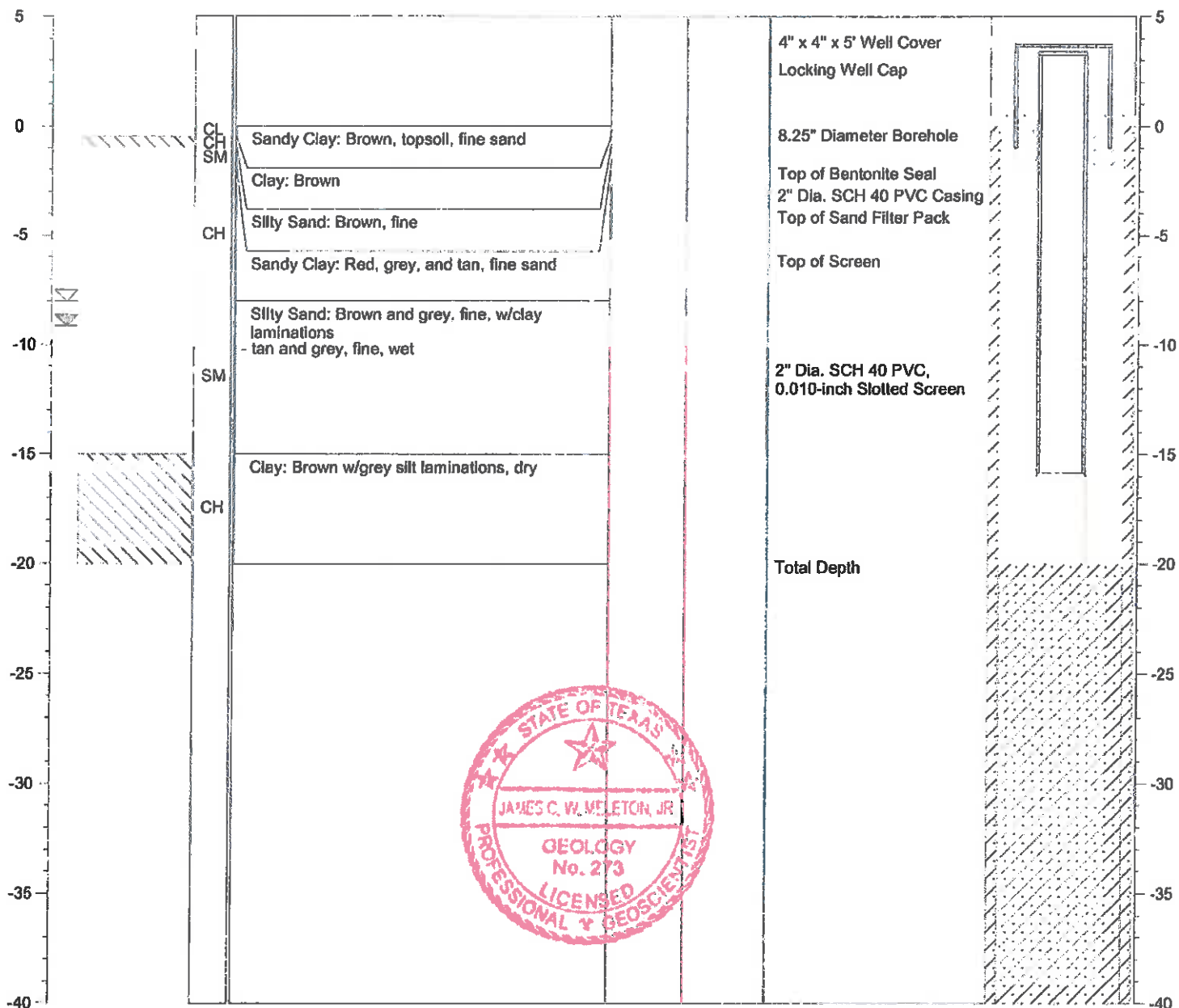
DRILLING CO.: WEST Drilling
 DRILLER: Tom McCullough
 METHOD OF DRILLING: Hollow-stem Auger
 SAMPLING METHODS: Split-spoon
 DATE DRILLED: 9/22/09

NOTES: Latitude: 33.04918
 Longitude: 94.84275

☒ 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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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

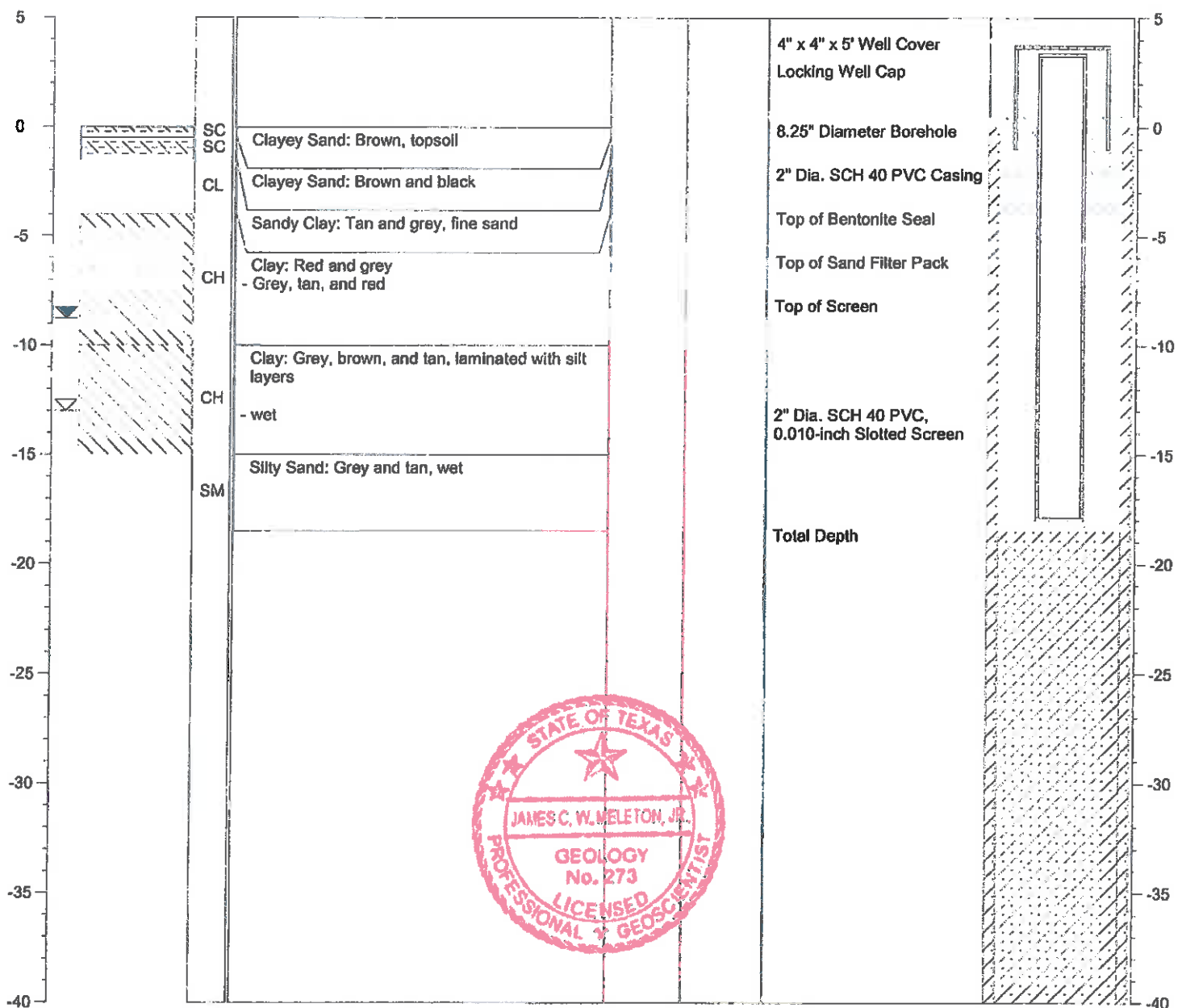
CLIENT: AEP
 PROJECT: Ash Disposal Area
 SITE LOCATION: Welsh Power Plant
 PROJECT NO.: S-08-0109
 LOGGED BY: James Meleton, Jr.

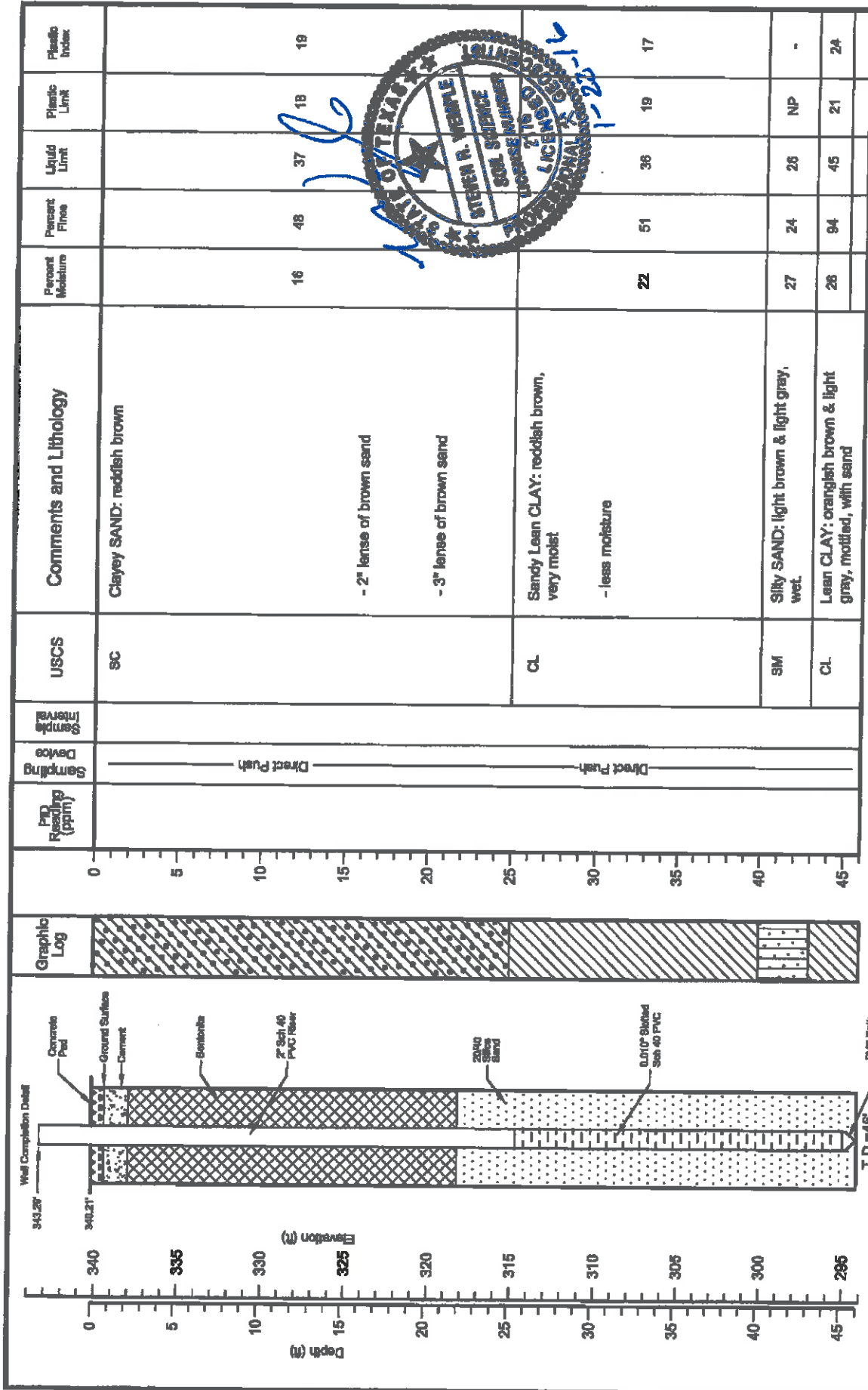
DRILLING CO.: WEST Drilling
 DRILLER: Tom McCullough
 METHOD OF DRILLING: Hollow-stem Auger
 SAMPLING METHODS: Split-spoon
 DATE DRILLED: 9/22/09

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
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WEST Drilling, Inc.
101 Industrial Drive
Waco, Texas 76715

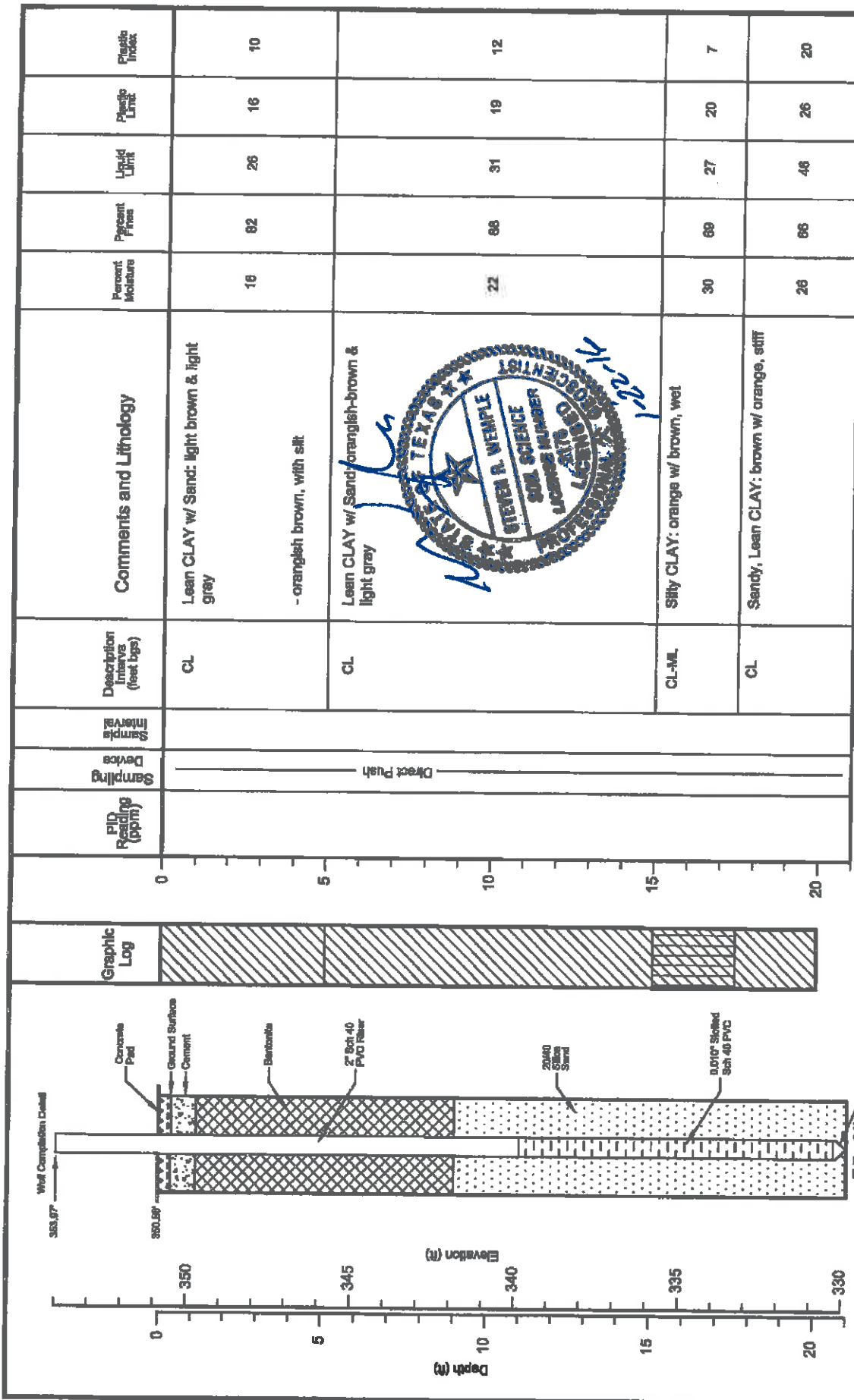
DATE: 12/12/15
Drilling Method: H.S.A.
Bt Diameter: 7.25"
Depth to Water: -

Logged by: Robert Williams, PE
Driller: Robert Williams
Date Completed: 12/12/15
Depth to Product: NA

Welsh Power Station
Pittsburg, Texas

Log of Boring
AD-15

PROJECT NO.: -
SCALE: AS SHOWN
DRAWN BY: HDS
CHECKED BY: SRW
FILE NAME: JR Main Power Plant LOGS.dwg



Depth (m)	Elevation (m)	PID Reading (ppm)	Sampling Device	Sample Interval	Description Intervals (feet bags)	Comments and Lithology	Percent Moisture	Percent Fine	Liquid Limit	Plastic Limit	Plastic Index
0 - 5	350.50' - 345.00'		Direct Push		CL	Lean CLAY w/ Sand: light brown & light gray - orangish brown, with silt	16	82	26	16	10
5 - 15	345.00' - 335.00'				CL	Lean CLAY w/ Sand: orangish-brown & light gray	22	68	31	19	12
15 - 17	335.00' - 334.00'				CL-ML	Silty CLAY: orange w/ brown, wet	30	69	27	20	7
17 - 20	334.00' - 330.00'				CL	Sandy, Lean CLAY: brown w/ orange, stiff	26	66	46	26	20

west
D R I L L I N G
 environmental & geotechnical
 WEST Drilling, Inc.
 101 Industrial Drive
 Waco, Texas 76768

DATE: 12/10/15
 Drilling Method: H.S.A.
 Bit Diameter: 7.25"
 Depth to Water: --

Logged by: Robert Williams, PE
 Driller: Robert Williams
 Date Completed: 12/10/15
 Depth to Product: NA

Welsh Power Station
 Pittsburg, Texas
 DRAWN BY: HDS
 CHECKED BY: SRW

Log of Boring
 AD-16
 PRODUCT NO. --
 SCALE AS SHOWN
 FILE NAME: \\R\Welsh Power Plant LOGS.dwg



WELL LOG

AD-16R

WELL

AEP CLIENT

BOTTOM ASH STORAGE POND

PROJECT

WELSH POWER PLANT

LOCATION

4/12/17

DATE

HSA

DRILLING METHOD

2" PVC, 2' AGL-12' BGL

CASING

2" PVC, 12'-27' BGS

SCREEN

0-2' BGS

CEMENT

2-10' BGS

BENTONITE

10-27' BGS

SAND PACK

350.55' / 353.49'

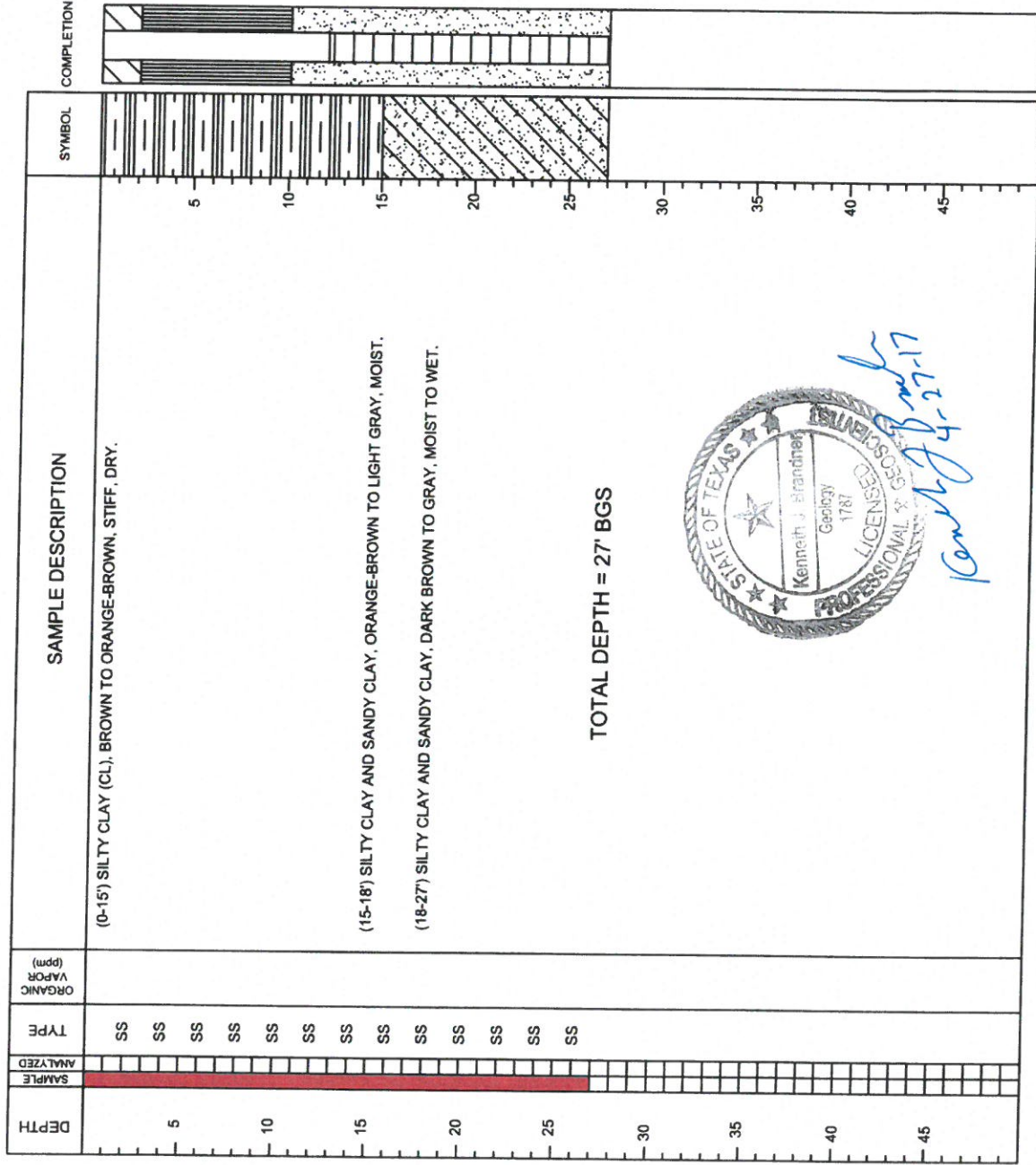
GROUND ELEV. / TOP OF CASING ELEV.

CT - CUTTINGS
 SB - SPLIT BARREL(5')
 SS - SPLIT SPOON(2')

HC LEVEL
 WATER LEVEL

SAND
 SILT
 CLAY
 FILL/CONCRETE
 BENTONITE
 GRAVEL

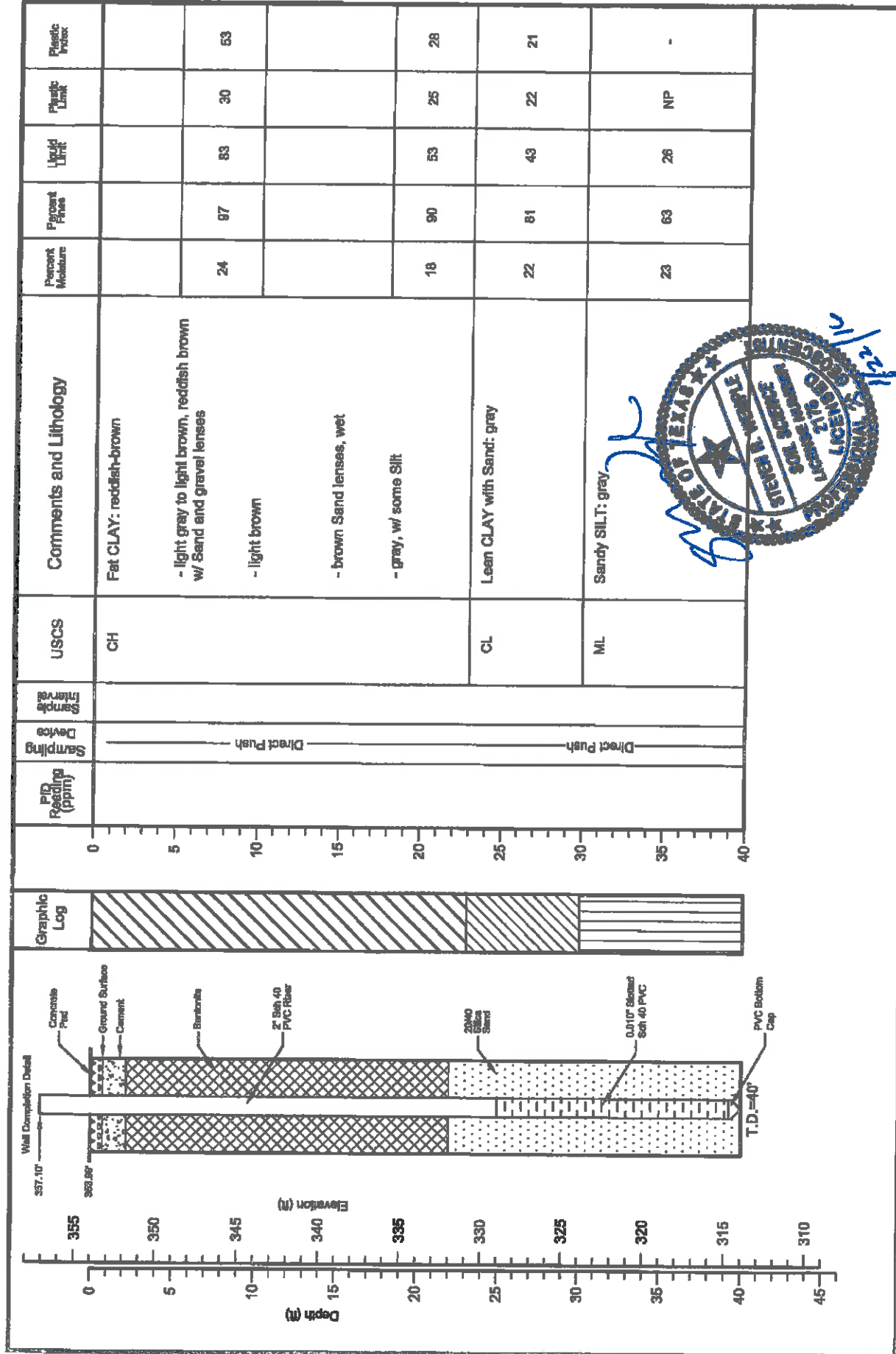
START: FINISH:



TOTAL DEPTH = 27' BGS



ARCADIS
 Design & Consultancy
 for transport and built assets
 711 N. CARANCAHUA, #1080
 CORPUS CHRISTI, TEXAS 78401
 TEL: (361) 883-1353 FAX: (361) 883-7565



Depth (m)	Elevation (m)	Graphical Log	PID Reading (ppm)	Sampling Device	USCS	Comments and Lithology	Percent Moisture	Percent fines	Liquid Limit	Plastic Limit	Plastic Index
0-25	355.00	Ground Surface		Direct Push		- light gray to light brown, reddish brown w/ Sand and gravel lenses	24	97	83	30	63
25-30	345	Bentonite				- light brown					
30-35	340	2" Blk 40 PVC Filter				- brown Sand lenses, wet					
35-40	335	20#40 Screen Slotted			CL	- gray, w/ some Silt	18	90	53	25	28
40-45	330	0.010" Blk 40 PVC		Direct Push		Lean CLAY with Sand: gray	22	81	43	22	21
	325	PVC Bottom Cap			ML	Sandy SILT: gray					
	320						23	63	26	NP	-
	315										
	310										



west
D R I L L I N G
 environmental & geotechnical

WEST Drilling, Inc.
 101 Industrial Drive
 Waco, Texas 76765

DATE: 12/10/15
 Drilling Method: H.S.A.
 Bit Diameter: 7.25"
 Depth to Water: -

Logged by: Robert Williams, PE
 Driller: Robert Williams
 Date Completed: 12/11/15
 Depth to Product: MA

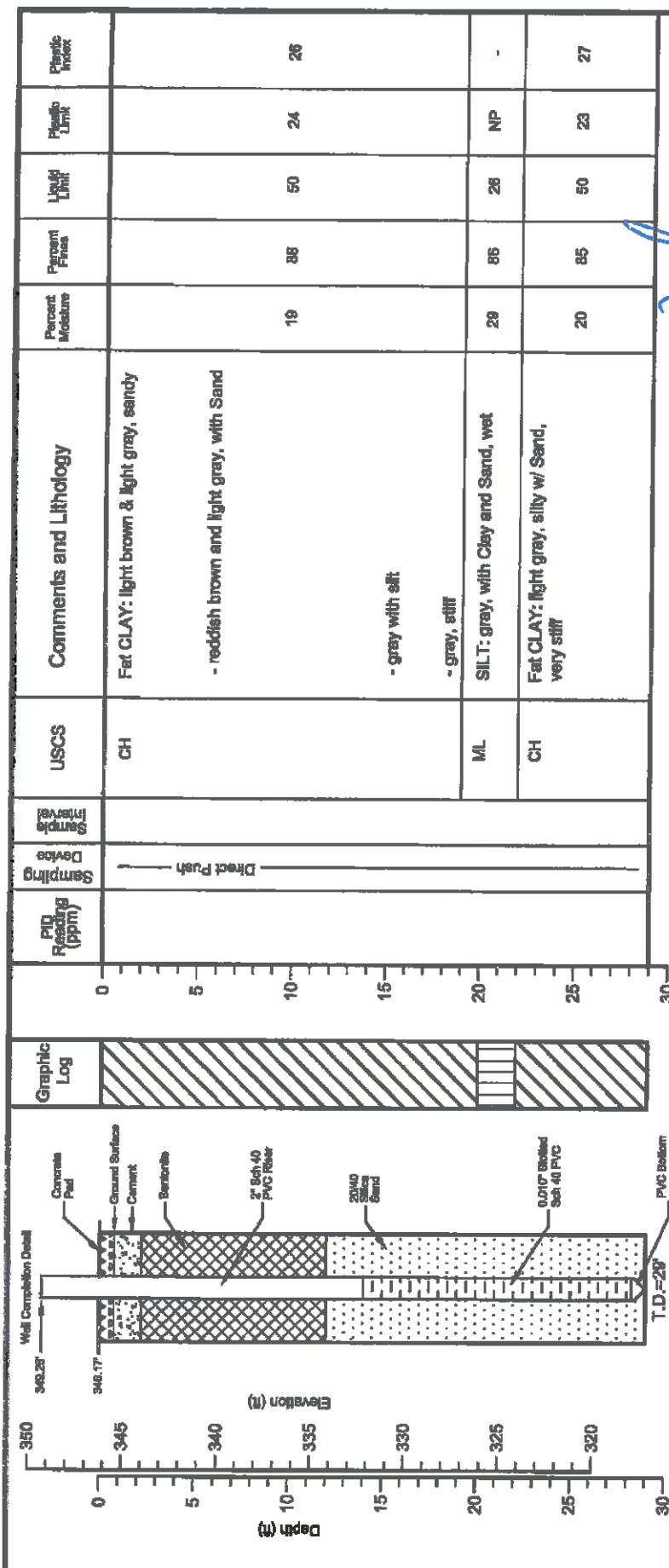
WELSH Power Station
 Pittsburg, Texas

Log of Boring
 AD-17

PROJECT NO.: ---
 SCALE: AS SHOWN

DRAWN BY: HDS
 CHECKED BY: SRW

FILE NAME: J:\Wish Power Plant LOGS.dwg



Depth (ft)	USCS	Comments and Lithology	Percent Moisture	Percent Fines	Liquid Limit	Plastic Limit	Plastic Index
0 - 19	CH	Fat CLAY: light brown & light gray, sandy - reddish brown and light gray, with Sand	19	88	50	24	26
19 - 20		- gray with silt					
20 - 23	ML	SILT: gray, with Clay and Sand, wet - gray, stiff	29	86	28	NP	-
23 - 27	CH	Fat CLAY: light gray, silty w/ Sand, very stiff	20	85	50	23	27



west DRILLING environmental & geotechnical WEST Drilling, Inc. 101 Industrial Drive Waco, Texas 76766		DATE: 12/11/15 Drilling Method: H.S.A. Bit Diameter: 7.25" Depth to Water: -	Logged by: Robert Williams, PE Driller: Robert Williams Date Completed: 12/11/15 Depth to Product: NA	Welsh Power Station Pittsburg, Texas	Log of Boring AD-18
		DRAWN BY: HDS CHECKED BY: SRW	PROJECT NO. --- SCALE: AS SHOWN		
		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.	

Printed with a trial version of BorinGS - visit www.gookinsoftware.com for purchase information: P:\Projects\AEP Welsh Plant\2009 Pond Design\Hydrogeo Investigation\Boring Log\Boring_CS_files\GB-1_logs [KSC AEP].log

Elevation, feet	Depth, feet	Sample Type	Sample Description 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.						Shelby tube pulled black COAL
		ST										SPT 4, 5, 5, 5, 24" recovered
	5	SS	10	Soft to Firm	SC	Reddish Brown fine SAND, little clay, trace silt, Dry. Natural Ground.						SPT 4, 5, 6, 7, 24" recovered
		SS	11	Soft	SM	Reddish brown fine SAND with silt, trace clay. Vertical sand seams in sample, Dry.						SPT 3, 5, 6, 8, 24" recovered.
		SS	11									Shelby tube sample, 18" recovered.
357	10	ST					23.6	22	48.9	5.4E-07		SPT 5, 6, 8, 9, 24" recovered
		SS	12	Soft	SC	Reddish brown well graded fine SAND, trace silt and clay. Damp.						SPT 7, 6, 7, 9, 24" recovered.
		SS	13	Firm	CL	Greyish red CLAY, little sand, horizontal sand seams, Dry.						SPT 6, 9, 9, 9, 24" recovered.
		SS	13	Soft	SC	Brownish red fine SAND, little clay, Damp.						SPT 8, 9, 9, 24" recovered.
		SS	16	Firm	SC-CL	Four-inch CLAY seam, little fine sand.						SPT 8, 9, 9, 24" recovered.
352	15	SS	16	Firm	CL	Reddish grey CLAY, little sand, oxidized iron ore. Dry	17.74	14	40.1			Shelby tube samples look like SC. 17" recovered.
		SS	16	Soft	SM	Brownish red fine SAND, trace clay, thin clay seams. Moist.						SPT 9, 8, 9, 11, 24 inches recovered.
		ST					16.25	NP	28.9	3.6E-05		SPT 5, 7, 8, 50/2, 21" recovered
347	20	SS	17	Soft	Other	Iron oxidized material						SPT 50/3"
		SS	15	Soft	SC	Brownish red fine SAND, little clay. Moist.						SPT 11, 13, 14, 16, 24" recovered.
		SS	20	Soft	CL	Dark grey CLAY, little fine sand, Wet.						SPT 11, 16, 30, 14, 24" recovered.
		SS	20	Very Hard	SP	Dark grey-black cemented SAND, little clay. Wet. Driller comments that cemented sand terminates at 25.5 feet.						SPT 11, 15, 22, 25, 24" recovered.
342	25	SS	27	Soft to Firm	SC	Dark grey fine SAND, little clay. Moist. Soft sand with lenses of firm clay.						
		SS	46	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.						
337	30	SS	37	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	Soil Resistance, lb/sq. in.	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. SPT 6, 11, 18, 24. 24' recovered.
		SS	29		Soft	ML		Dark grey-black fine SAND, with clay, frequent hard clay lenses (1-3"). Wet.	26.37	NP	57.5			
		SS	34		Hard	CL		Black CLAY, trace to little fine sand, trace silt. Dry						
332	35							Bottom of Boring at 37 feet bgs						
327	40													
322	45													
317	50													
312	55													
307	60													
302	65													

Figure

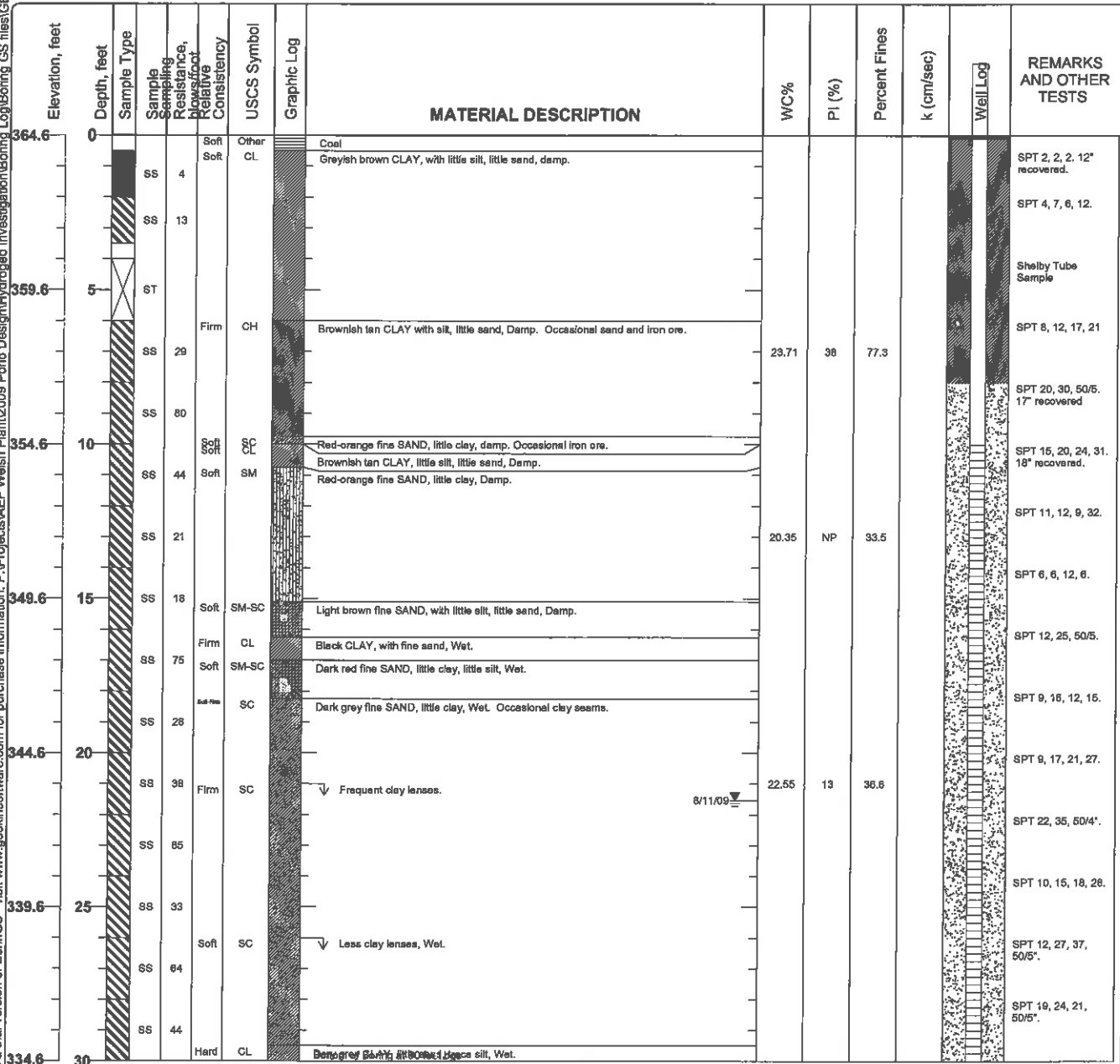
Project: AEP Welsh Power Plant
 Project Location: Cason, Texas
 Project Number: TXL0064

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.	

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Figure

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



JOB NAME: AEP Welsh Power Plant

JOB NO.: TXL0064

DATE/TIME: 8/7/2009

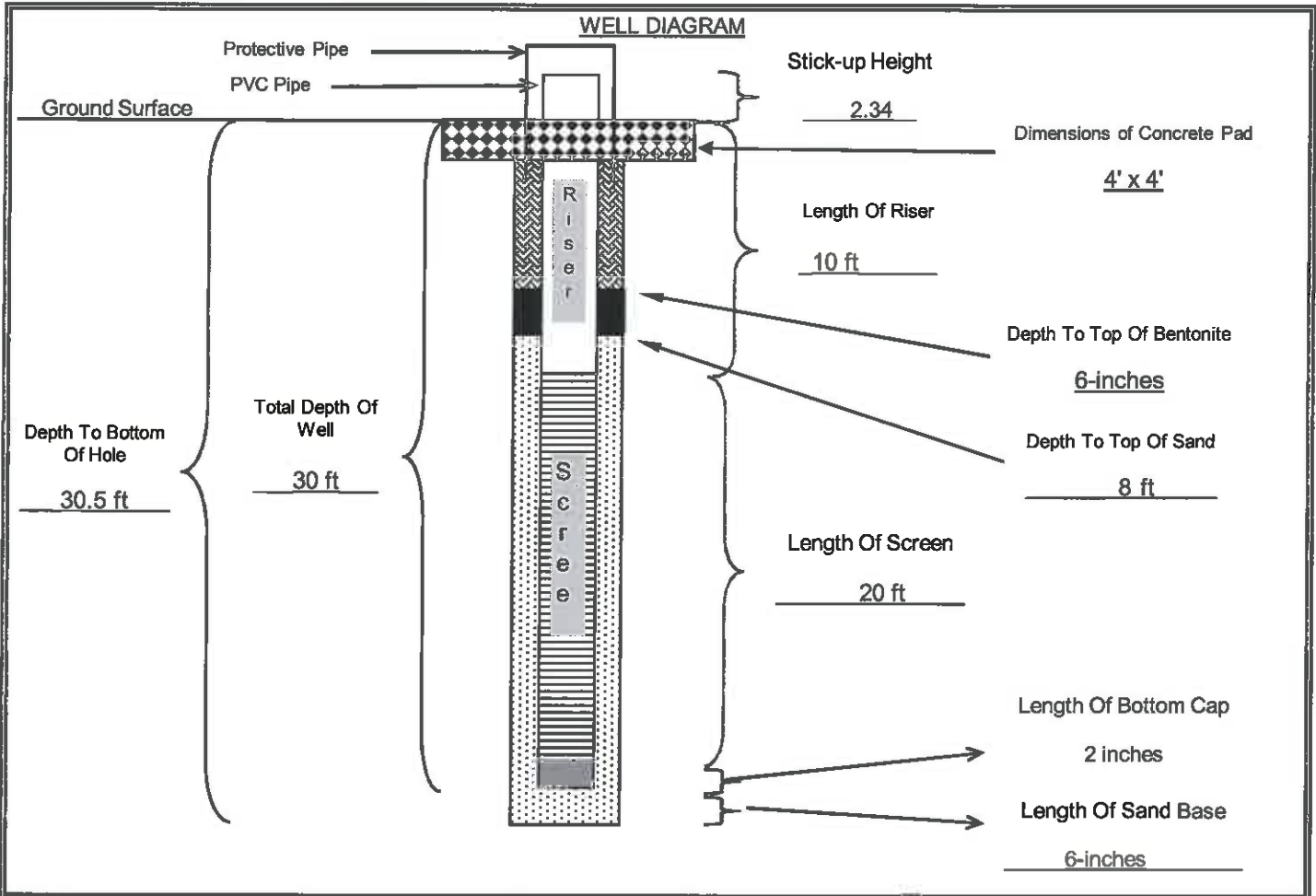
WELL LOCATION: _____

WELL NO.: _____

FIELD REP: Kush Chohan

GB-02

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



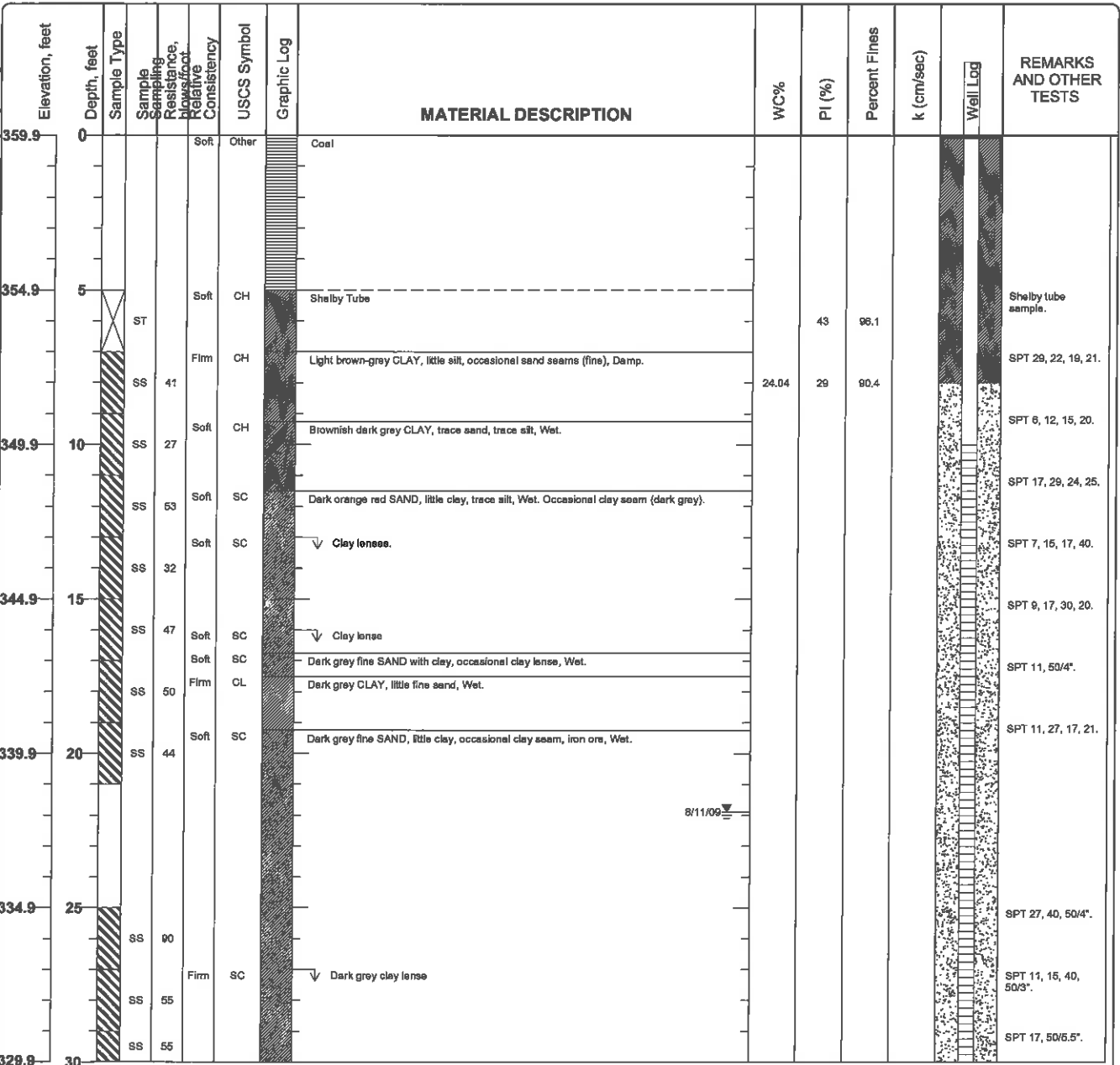
	Cement/Bentonite Grout		Sand Pack		Neat Concrete		Bentonite		Bottom Cap
QA/QC	INSTALLED BY: <u>Total Support Services</u>	OBSERVED BY: <u>Kush Chohan</u>	DATE: <u>August 7th, 2009</u>	CHECKED BY: _____	DATE: _____				

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.		

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Figure

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

Log of Boring GB-03
 Sheet 2 of 2

Elevation, feet	Depth, feet	Sample Type	Sample Description	Resistance, lb/sq ft	Moisture Content, %	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHER TESTS
329.9	30	SS	65	Hard	CL			Dark grey CLAY, trace silt, trace fine sand.						SPT 17, 50/6.5".	
								Bottom of Boring at 31 feet bgs							
324.9	35														
319.9	40														
314.9	45														
309.9	50														
304.9	55														
299.9	60														
294.9	65														

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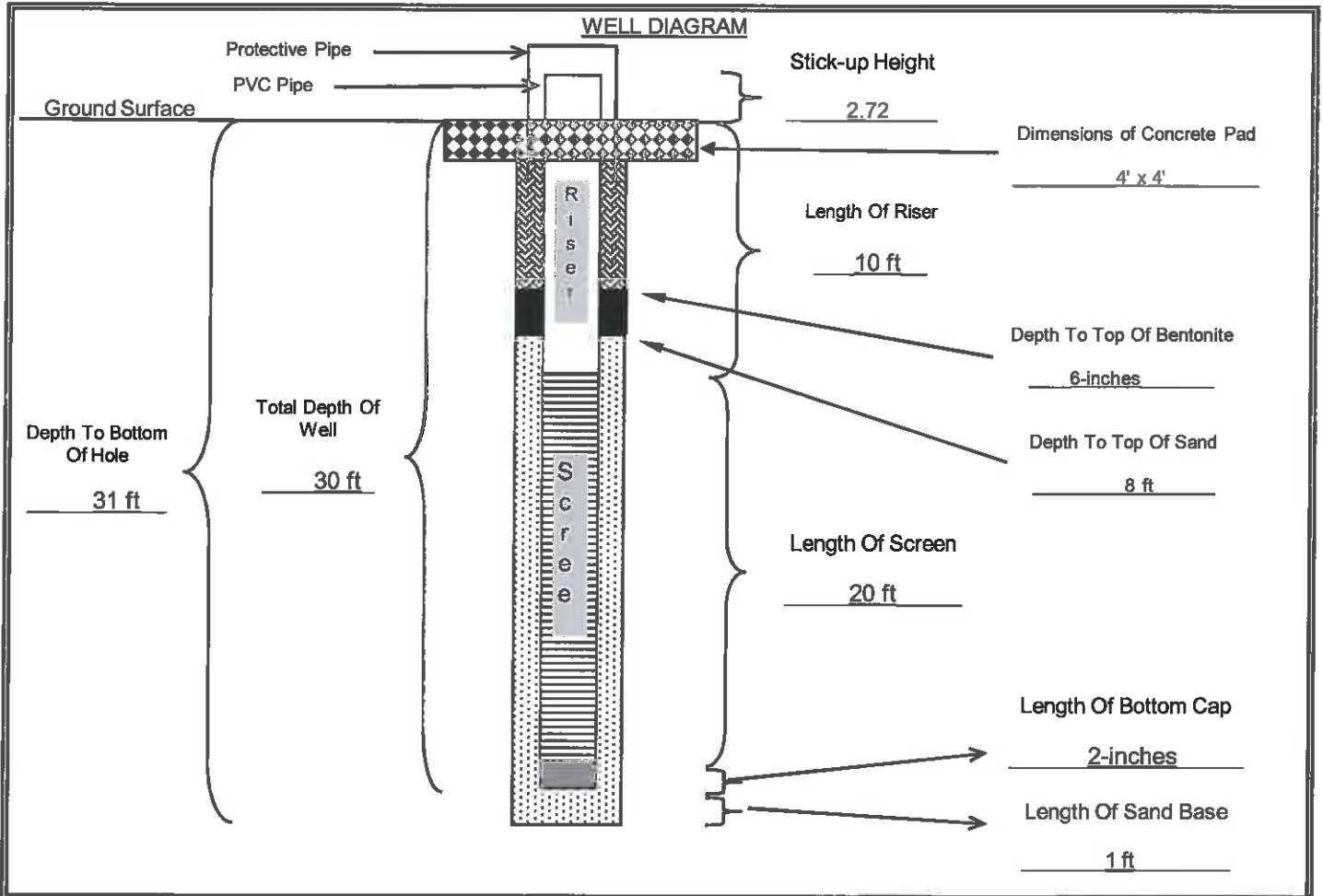
Figure

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



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

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



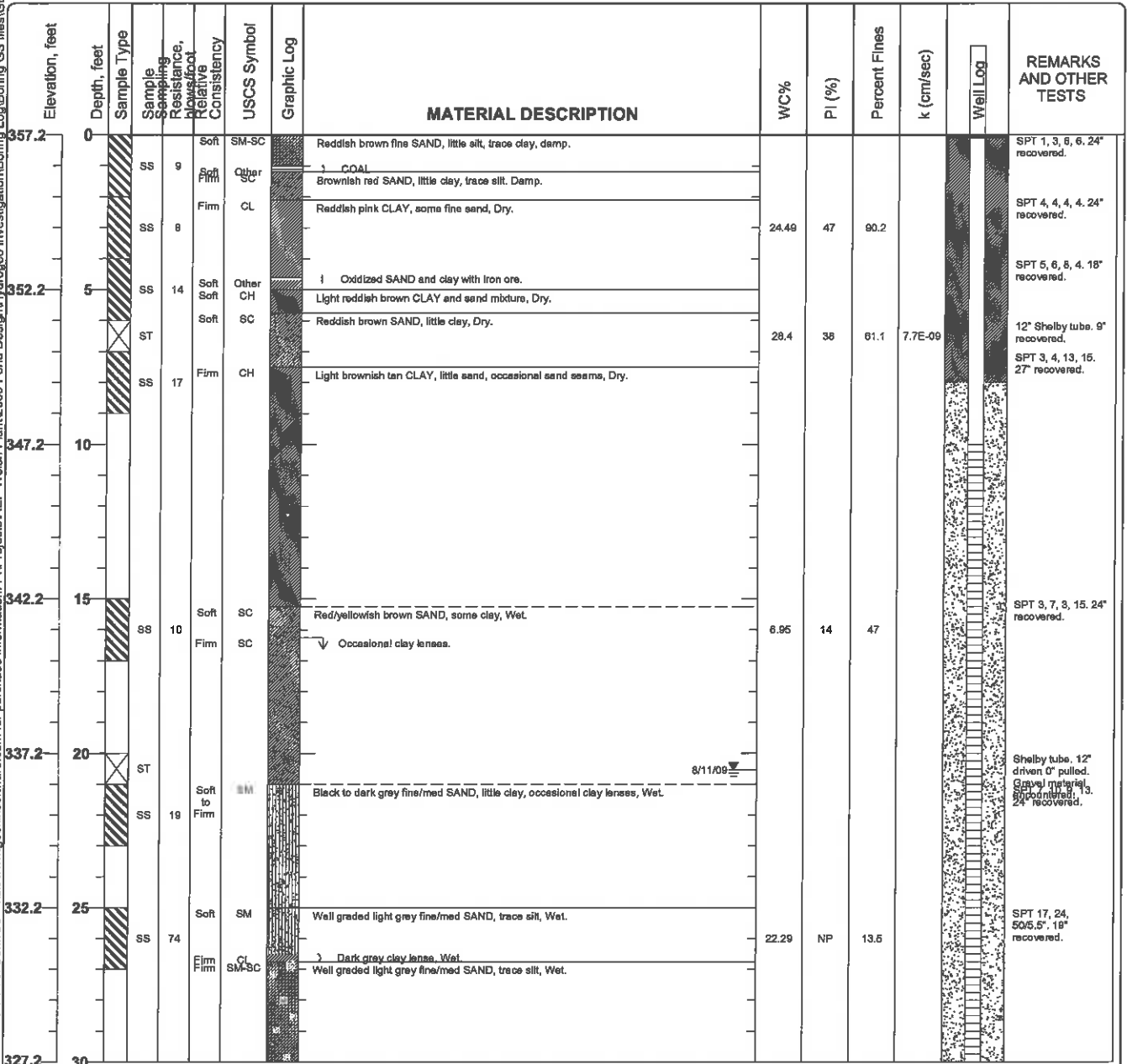
QA/QC	INSTALLED BY: <u>Total Support Services</u>	OBSERVED BY: <u>Kush S. Chohan</u>			
	DATE: <u>7-Aug-09</u>	CHECKED BY: _____	DATE: _____		

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 evaporation pond. Located in a grassy field.		

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Figure

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

Log of Boring GB-04
 Sheet 2 of 2

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Elevation, feet	Depth, feet	Sample Type	Sample Description	Resistance, Blows/foot	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHER TESTS
327.2	30	ST		Hard		ML		Dark grey CLAY, little sand, Wet.						12" Shelby tube. Bent shelly tube.
		ST							21.3	NP	84.2	2.0E-08		12" Shelby tube.
		SS	38	Hard		CL		Dark grey CLAY, trace sand, Wet.	25.44	18	92.5			SPT 15, 18, 19, 25, 24" recovered.
								Bottom of Boring at 34 feet bgs						
322.2	35													
317.2	40													
312.2	45													
307.2	50													
302.2	55													
297.2	60													
292.2	65													

Figure

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



JOB NAME: AEP Welsh Power Plant

JOB NO.: TXL0064

DATE/TIME: 24-Jul-09

WELL LOCATION: _____

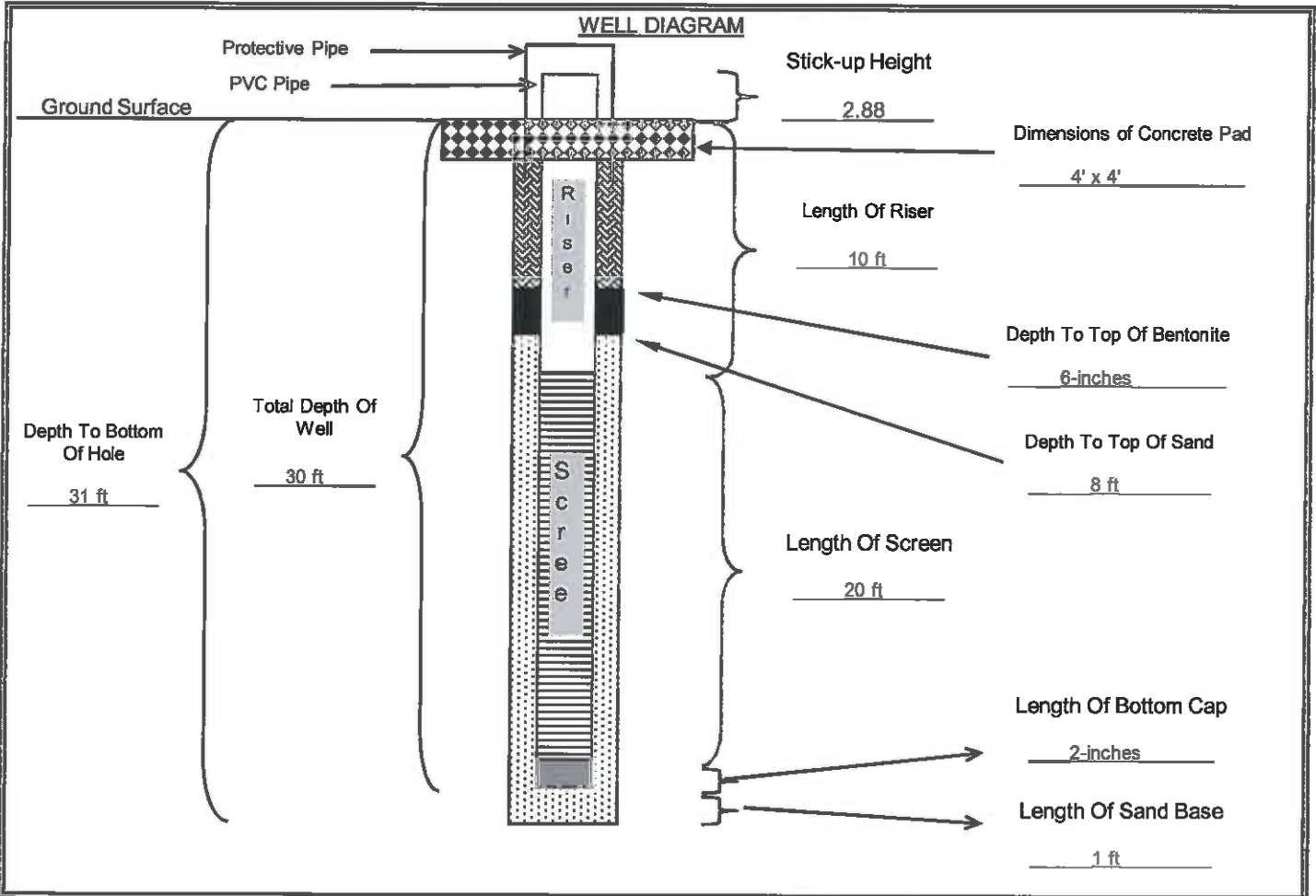
WELL NO.: _____

FIELD REP: _____

GB-04

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



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

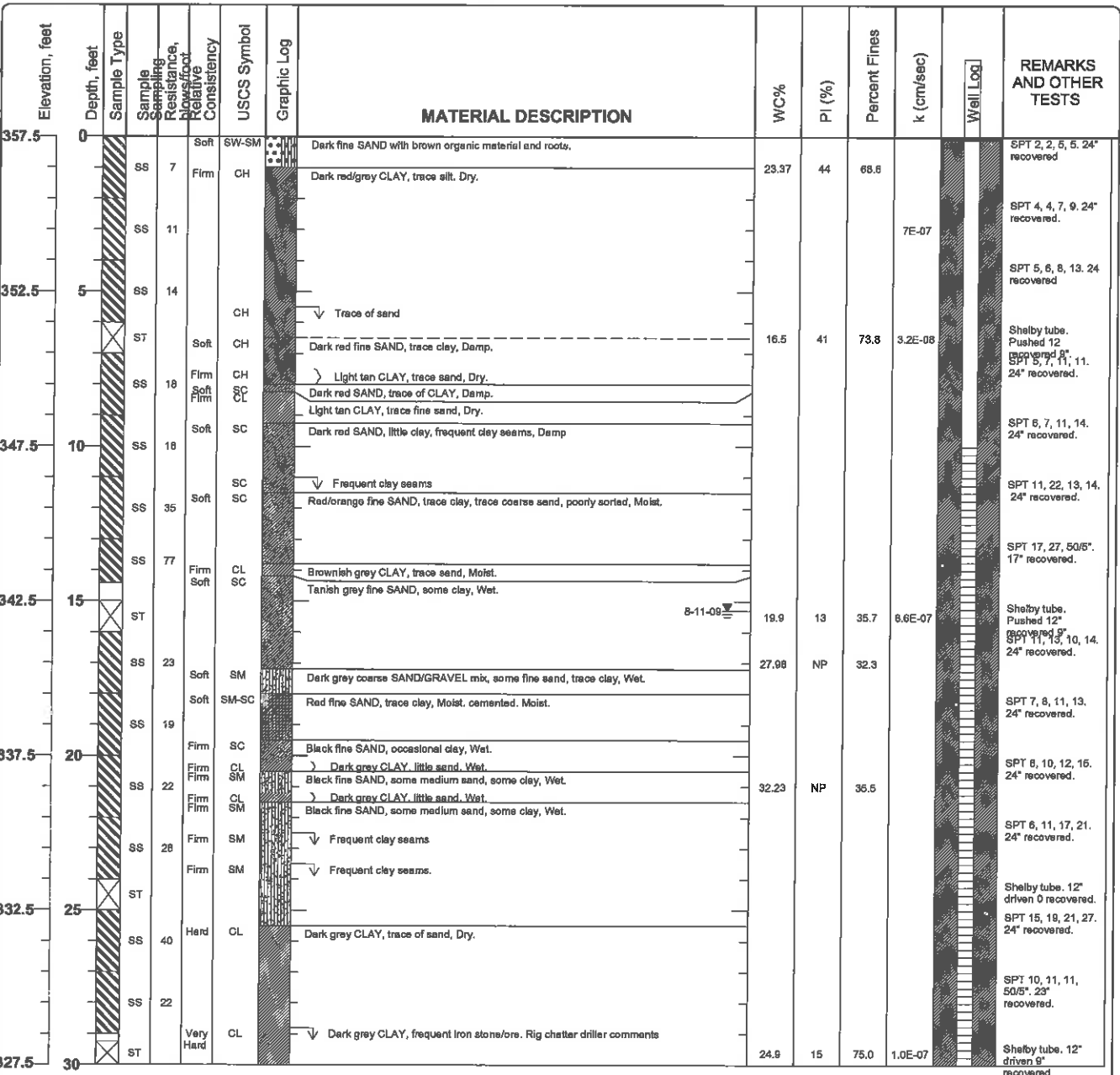
QA/QC	INSTALLED BY: <u>Total Support Services</u>	OBSERVED BY: <u>Kush S. Chohan</u>	
	DATE: <u>24-Jul-09</u>	CHECKED BY: _____	DATE: _____

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.	

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Figure

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

Log of Boring GB-05
 Sheet 2 of 2

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Elevation, feet	Depth, feet	Sample Type	Sample Description	Resistance, Blowfoot	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHER TESTS
327.5	30	SI		Hard		CL		Dark gray CLAY, trace of sand, Dry. (cont.) Bottom of Boring at 30.5 feet bgs	24.0	15	75.0	1.0E-07		Shelby tube, 12' driven 9' recovered.
322.5	35													
317.5	40													
312.5	45													
307.5	50													
302.5	55													
297.5	60													
292.5	65													

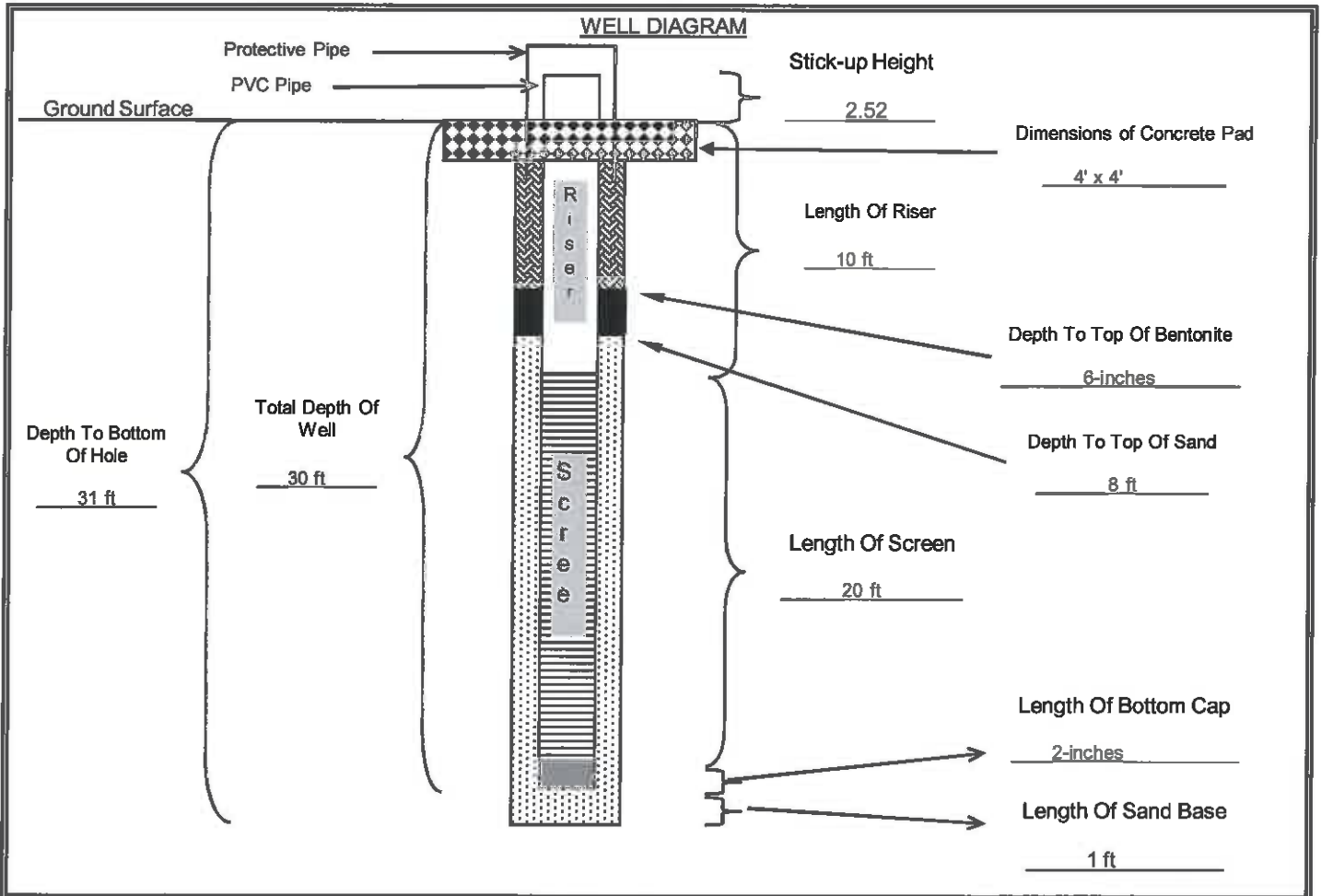
Figure

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



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

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



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

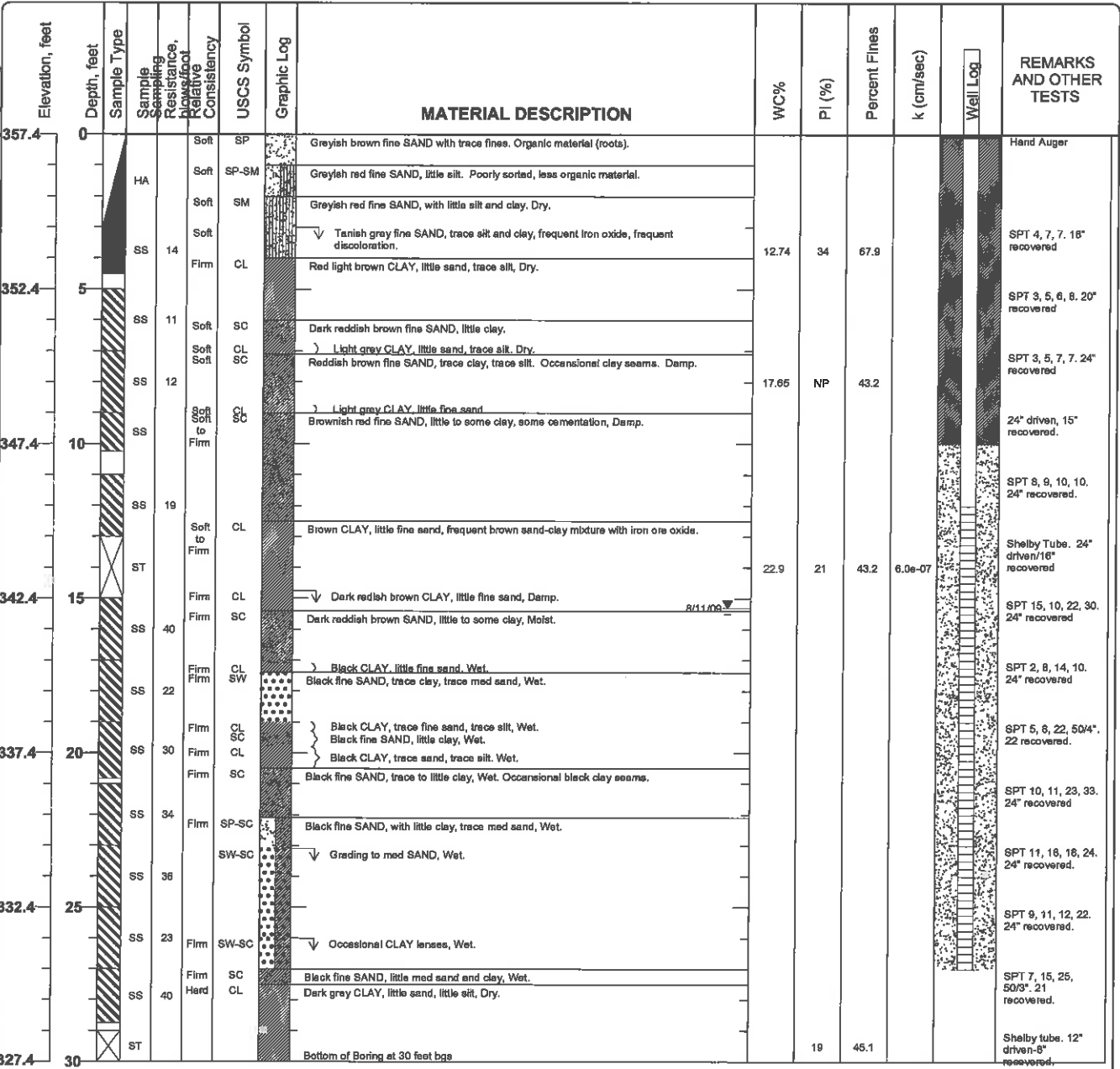
Project: AEP Welsh Power Plant
 Project Location: Cason, Texas
 Project Number: TXL0064

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.	

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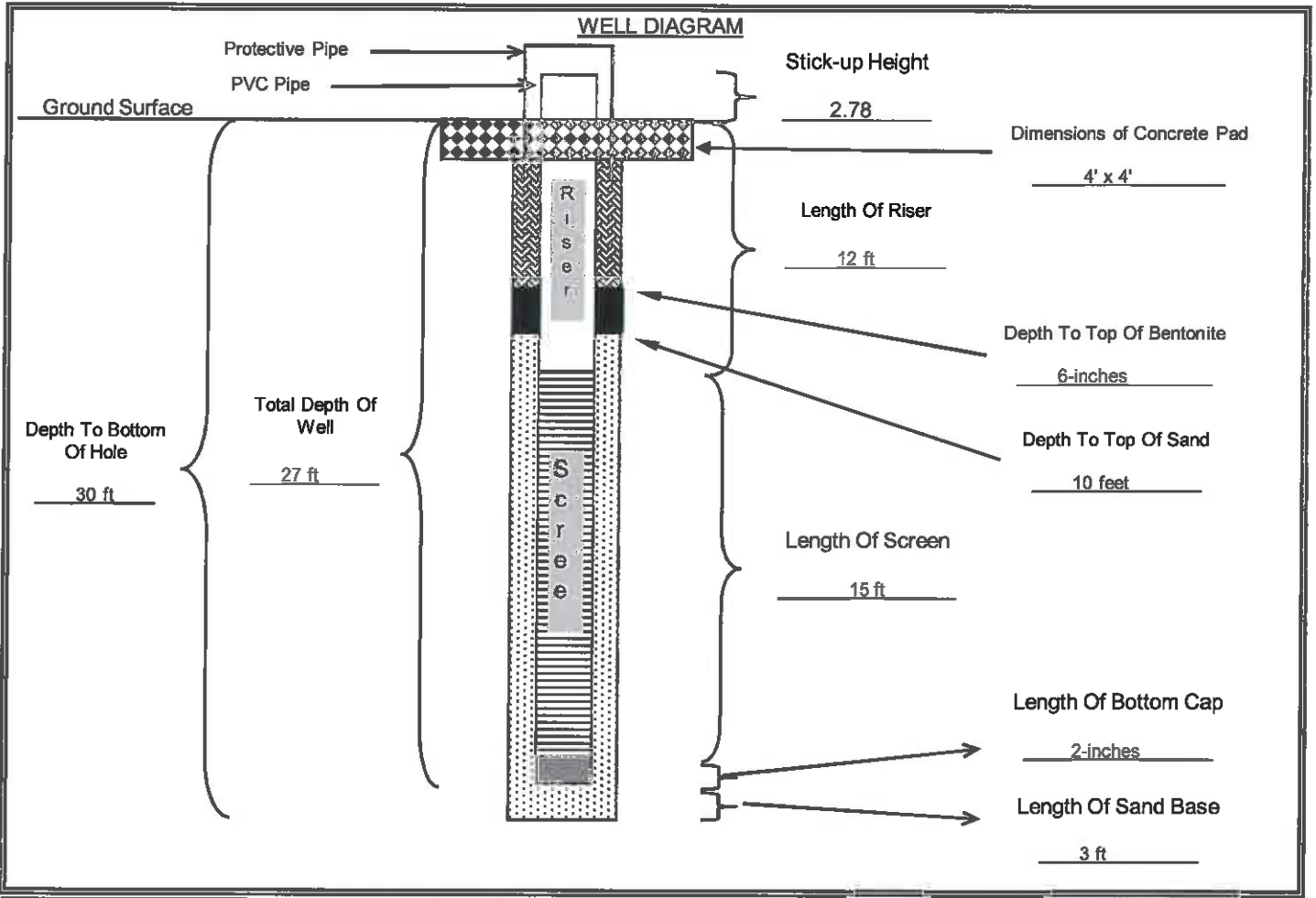
Figure

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



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

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



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



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**
 PROJECT: **Metal Cleaning Waste Pond**
 SITE LOCATION: **Welsh Power Plant**
 PROJECT NO.: **S-08-0120**
 LOGGED BY: **James Meleton, Jr.**

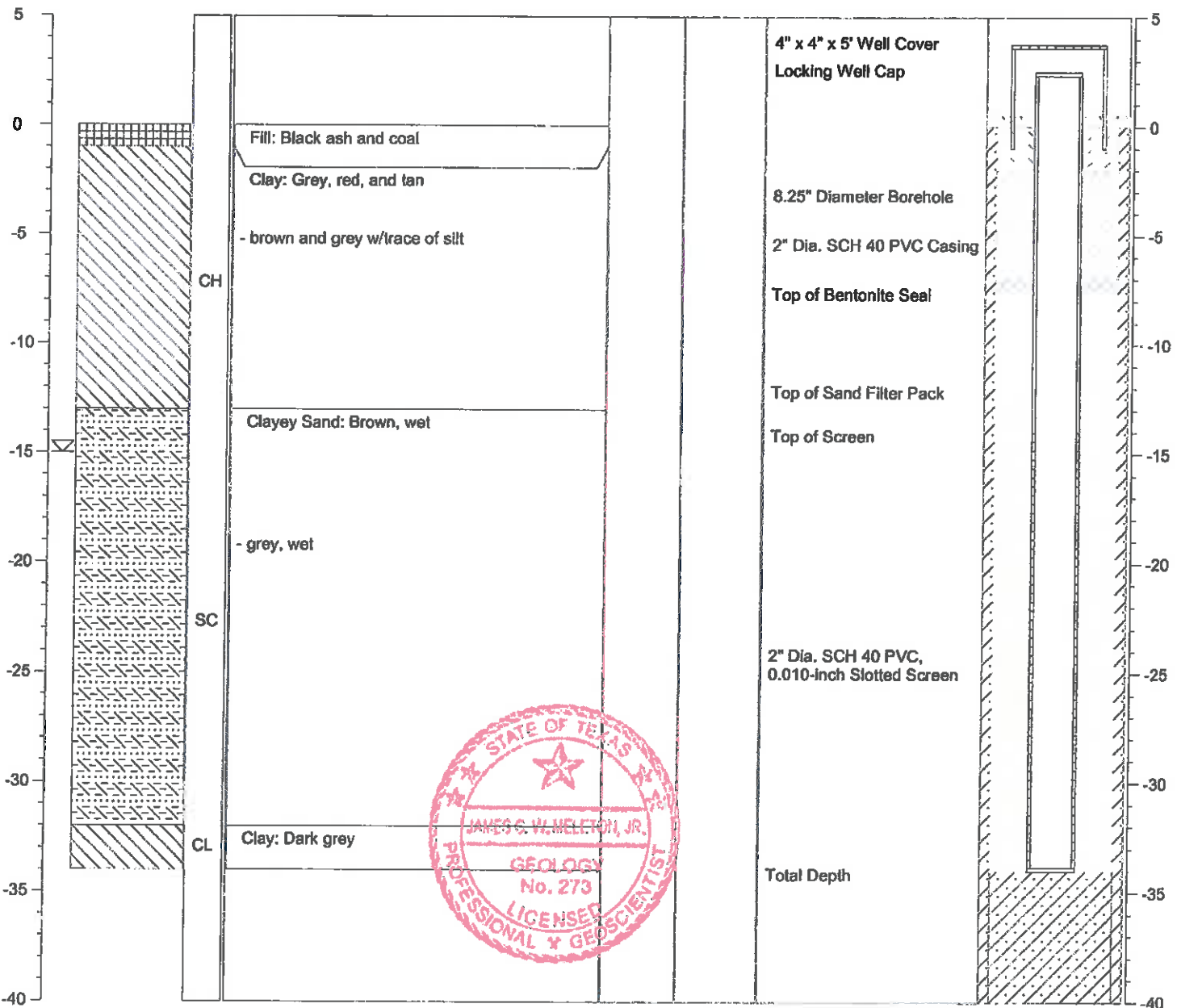
DRILLING CO.: **WEST Drilling**
 DRILLER: **Tom McCullough**
 METHOD OF DRILLING: **Hollow-stem Auger**
 SAMPLING METHODS: **Split-spoon**
 DATE DRILLED: **12/1/09**

NOTES: **Latitude: 33.05455**
Longitude: 94.84674

≡ Water level during drilling
 ≡ Water level in completed well

Page 1 of 1

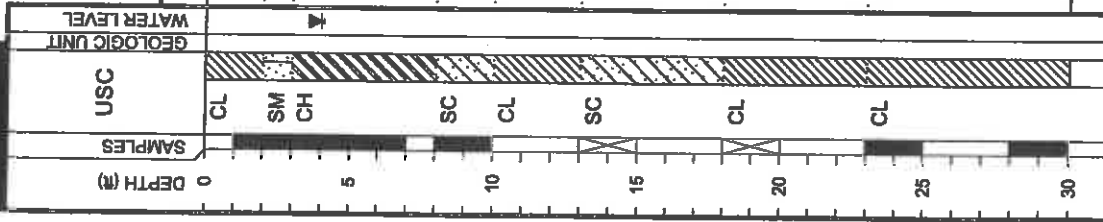
DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION
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LOG OF BORING B-1

PROJECT: Welsh Power Plant
Pittsburgh, Texas
PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

DATE: 10/27/09
SURFACE ELEVATION: 324.1

FIELD STRENGTH DATA	BLOW COUNT ● 20 40 60 80 ▲ Cu (tsf) ▲ 4 1 2 3 4	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits		MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
						Plastic Limit	Liquid Limit				
P=4.0 SF	● 20	■ 4.0				20	38	63	PL 16 TL 54		+40 Sieve=10% +4 Sieve=1%
N=7	● 20	■ 4.0				20	38	63	PL 16 TL 54		
P=1.5	● 20	■ 4.0				20	38	63	PL 16 TL 54		
P=1.75	● 20	■ 4.0				20	38	63	PL 16 TL 54		
N=15	● 20	■ 4.0				20	38	63	PL 16 TL 54		
N=35	● 20	■ 4.0				20	38	63	PL 16 TL 54		
P=4.5+	● 20	■ 4.0				20	38	63	PL 16 TL 54		
P=4.5+	● 20	■ 4.0				20	38	63	PL 16 TL 54		

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'

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

Piezo Bender B-2



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WATER LEVEL
GEOLOGIC UNIT
USC
SAMPLES
DEPTH (ft)

MATERIAL DESCRIPTION

SANDY LEAN CLAY (CL) hard; red and tan
 --very stiff
 --stiff
 --very stiff; reddish brown

SANDY LEAN CLAY (CL) hard; red and tan

--very stiff

CLAYEY SAND (SC) medium dense; tan, red, and gray

Water Level
 Est.:
 Measured: Perched:
 Water Observations:
 Water level @ 19' and open to 24' upon completion.

DATE		SURFACE ELEVATION		MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	OTHER TESTS
10/28/09		339.7				
FIELD STRENGTH DATA	BLOW COUNT	COMPRESSION STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psf)	Natural Moisture Content and Atterberg Limits	OTHER TESTS
P=4.5+	● 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				Plastic Limit Moisture Content Liquid Limit	
P=3.5						+40 Sieve=3%, +4 Sieve=0%
N=14						+40 Sieve=0%, +4 Sieve=0%
P=2.75						+40 Sieve=0%, +4 Sieve=0%
P=4.5+						+40 Sieve=0%, +4 Sieve=0%
P=3.5						+40 Sieve=0%, +4 Sieve=0%
P=4.0						+40 Sieve=0%, +4 Sieve=0%
P=4.5						+40 Sieve=5%, +4 Sieve=3%

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			Well No. B-2		Location Pittsburg, Texas		Page 1 of 2	
Client: Welsh Power Plant		Phase	Task	Surface Elev.				
Project No: G3242-095								
Depth Feet	Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details	
0		Ground Surface				0	T.O.C. Elev.	
5		SANDY LEAN CLAY(CL) hard; red and tan -very stiff				5		
10		-stiff -very stiff; reddish brown				10		
15		SANDY LEAN CLAY(CL) hard; red and tan				15		
20		-very stiff				20		
25						25		

Continued Next Page

Driller <u>Doug Hinds</u>	Drilling Method <u>Solid Stem Auger</u>	Bentonite Seal <u>2-8' & 20-50'</u>
Logged By <u>James Griffith</u>	Borehole Diameter <u>6.5"</u>	Filter Pack Qty. <u>8-20'</u>
Drilling Started <u>10/28/09</u>	Well Casing <u>2.0" Dia. 0.0' to 10.0'</u>	Filter Pack Type <u>20/40 Sand</u>
Drilling Completed <u>10/28/09</u>	Casing Type <u>PVC</u>	Static Water Level _____
Construction Completed _____	Well Screen <u>2.0" Dia. 10.0' to 20.0'</u>	Notes: _____
Development Completed _____	Screen Type <u>Slotted</u>	_____
Type of Well _____	Slot Size <u>0.010"</u>	_____
	Grout Type <u>Bentonite</u>	_____



ENVIRONMENTAL LOG

Client: Welsh Power Plant

Well No. B-2

Location Pittsburg, Texas

Project No: G3242-095

Phase

Task

Surface Elev.

Page 2 of 2

Depth Feet Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
--------------------------	--------------------------------------	------------------------	----------------	----------------------------------	---------------	---------------------------------

Continued from previous page

CLAYEY SAND(SC) medium dense; tan, red, and gray

30

30

--red and tan

35

35

SILTY CLAYEY SAND(SM-SC) red, tan, and gray; saturated

40

40

FAT CLAY(CH) hard; brown, tan, and gray; with ferric joints; with lignite and sand seams

45

45

SILTY SAND(SM) black and gray

50

50

Bottom of Boring @ 50'

55

60





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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)	USC	GEOLOGIC UNIT	WATER LEVEL	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			MOISTURE CONTENT (%)	ATTERBERG LIMITS(%) LIQUID LIMIT (L) PLASTIC LIMIT (PL) PLASTICITY INDEX (I _p)	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
										Plastic Limit	Moisture Content	Liquid Limit				
0	SC			N=11	●						23	52	18	34	87	+40 Sieve=3%, +4 Sieve=0%
5	CH			P=1.0	■						21	51	19	32	86	+40 Sieve=3%, +4 Sieve=0%
10				P=3.5	■						21	54	20	34	85	+40 Sieve=10%, +4 Sieve=1%
15	CH			P=3.75	■						23	61	24	37	81	+40 Sieve=11%, +4 Sieve=0%
20				P=2.5	■						22	42	22	20	35	+40 Sieve=1%, +4 Sieve=0%
25	CH			P=4.5+	■											
30	SC			N=56	●											

MATERIAL DESCRIPTION

CLAYEY SAND(SC) medium dense; gray and red
EAT CLAY(CH) stiff; red and tan; with sand seams
-very stiff
EAT CLAY WITH SAND(CH) very stiff; brown; with ferric joints
-red and tan; layered; with ferric seams
EAT CLAY(CH) hard; gray; with sand seams
CLAYEY SAND(SC) very dense; gray; with sand seams

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

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

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



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MATERIAL DESCRIPTION

FAT CLAY(CH) hard; brown; layered and with sand seams

--gray and green

SANDY LEAN CLAY(CL) very silty; gray and dark green; layered; with sand seams

FAT CLAY(CH) hard; gray and dark green; layered; with silt seams

Bottom of Boring @ 50'

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL
35		CH		
40				
45		CL		
50		CH		

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

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

MOISTURE CONTENT (%)	21
ATTERBERG LIMITS(%)	
LIQUID LIMIT	TL 60
PLASTIC LIMIT	PL 24
PLASTICITY INDEX	PI 36
MINUS #200 SIEVE (%)	95
OTHER TESTS	+40 Sieve=1%, +4 Sieve=0%

FIELD STRENGTH DATA	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits
	1 2 3 4					Plastic Limit Moisture Content Liquid Limit
P=4.5+	1.0 2.0 3.0 4.0					20 40 60 80
P=4.5+						
P=3.5						
P=4.5+						

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'

(Page Ref. #)
PERFORMED
OTHER TESTS

Pipe 200m dia B-4

DATE 10/27/09
SURFACE ELEVATION 340.6

LOG OF BORING B-4
PROJECT: Welsh Power Plant
 Pittsburgh, Texas
PROJECT NO.: G3242-08
BORING TYPE: Flight Auger

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DEPTH (ft)	USC SAMPLES	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	BLOW COUNT				DRY DENSITY (pcf)	COMPRESSION STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits		MOISTURE CONTENT (%)			OTHER TESTS PERFORMED (Page Ref. #)	
				1	2	3	4					PL	PI	LIQUID LIMIT	PLASTIC LIMIT	MINUS #200 SIEVE (%)		
0																		
1	SM	SILTY SAND(SM) medium dense; tan; with gravel	N=19															
2	CL	SANDY LEAN CLAY(CL) dark brown -tannish orange -hard; orangish tan	SF															
3			P=4.5															
4			P=3.25															
5			P=3.25															
6	SC	CLAYEY SAND(SC) medium dense; tan -orangish gray; with sand seams																
7																		
8	CL	SANDY LEAN CLAY(CL) stiff; orangish tan	N=9															
9																		
10																		
11	CH	FAT CLAY(CH) very stiff; orangish tan; with ferric seams	P=4.0															
12																		
13																		
14																		
15																		
16																		
17																		
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36																		
37																		
38																		
39																		
40																		

Notes:
 GPS Coordinates: N 33°03.011', W 94°50.462'
 Key to Abbreviations:
 N - SPT Data (Blows/Ft)
 P - Pocket Penetrometer (tsf)
 T - Torvane (tsf)
 L - Lab Vane Shear (tsf)

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



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MATERIAL DESCRIPTION

-hard; light gray; layered and with silt seams

LEAN CLAY(CL) hard; light gray; layered and with silt seams

-light gray

-layered and with sand seams; with lignite

Bottom of Boring @ 50'

DEPTH (ft)	
SAMPLES	
USC	
GEOLOGIC UNIT	
WATER LEVEL	

35
40
45
50

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

MOISTURE CONTENT (%)		21	44	25	19	93	OTHER TESTS PERFORMED (Page Ref. #)
ATTERBERG LIMITS(%)							
	LIQUID LIMIT		TL				
	PLASTIC LIMIT		PL				
	PLASTICITY INDEX		PI				
MINUS #200 SIEVE (%)							

NATURAL MOISTURE CONTENT and ATTERBERG LIMITS



COMPRESSION STRENGTH (tsf)

FAILURE STRAIN (%)

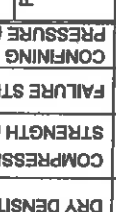
CONFINING PRESSURE (psf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FIELD STRENGTH DATA

● BLOW COUNT
▲ Cu (tsf)
■ PPR (tsf)
◆ Torvane (tsf)



N=30
N=50/5.75"
N=41
N=43

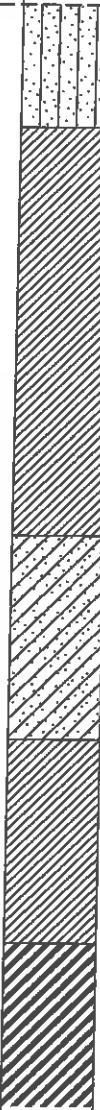
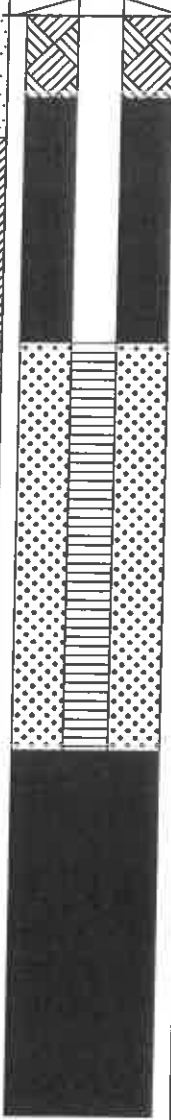
Water Level
Water Observations:
completion.

Edt.: Measured: Perched:
Water level @ 18' and open to 48' upon completion.

Key to Abbreviations:
N - SPT Data (Blow/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			Well No. B-4		Location Pittsburg, Texas		Page 1 of 2	
Client: Welsh Power Plant		Phase	Task	Surface Elev.				
Project No: G3242-095								
Depth Feet Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details		
0	Ground Surface				0	T.O.C. Elev.		
5	SILTY SAND(SM) medium dense; tan; with gravel SANDY LEAN CLAY(CL) dark brown -fannish orange -hard; orangish tan				5			
10	-very stiff; white				10			
15	CLAYEY SAND(SC) medium dense; tan -orangish gray; with sand seams				15			
20	SANDY LEAN CLAY(CL) stiff; orangish tan				20			
25	FAT CLAY(CH) very stiff; orangish tan; with ferric seams				25			

Continued Next Page

Driller <u>Doug Hinds</u> Logged By <u>James Griffith</u> Drilling Started <u>10/27/09</u> Drilling Completed <u>10/27/09</u> Construction Completed _____ Development Completed _____ Type of Well _____	Drilling Method <u>Soild Stem Auger</u> Borehole Diameter <u>6.5"</u> Well Casing <u>2.0"</u> Dia. <u>0.0'</u> to <u>8.0'</u> Casing Type <u>PVC</u> Well Screen <u>2.0"</u> Dia. <u>8.0'</u> to <u>18.0'</u> Screen Type <u>Slotted</u> Slot Size <u>0.010"</u> Grout Type <u>Bentonite</u>	Bentonite Seal <u>2-8' & 18-50'</u> Filter Pack Qty. <u>6-18'</u> Filter Pack Type <u>20/40 Sand</u> 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.

Page 2 of 2

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	<u>LEAN CLAY (CL)</u> 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						



P.E. Zouker B-5

DATE: 10/27/09

SURFACE ELEVATION: 340.0

OTHER TESTS PERFORMED (Page Ref. #)

LOG OF BORING B-5

PROJECT: Weish Power Plant
Pittsburgh, Texas

PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

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FIELD STRENGTH DATA

● BLOW COUNT
▲ Cu (tsf)
■ PPR (tsf)
◆ Torvane (tsf)

1 2 3 4
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

LL PL LI

MOISTURE CONTENT (%)

MINUS #200 SIEVE (%)

ATTEBERG LIMITS (%)

PLASTIC LIMIT

LIQUID LIMIT

PLASTICITY INDEX

OTHER TESTS PERFORMED (Page Ref. #)

MATERIAL DESCRIPTION

LEAN CLAY WITH SAND (CL) stiff; red and tan

LEAN CLAY (CL) hard; red and tan

--very stiff

FAT CLAY (CL) very stiff; brown and tan

FAT CLAY WITH SAND (CH) hard; red and tan

SANDY LEAN CLAY (CL) very stiff; red and gray; with sand seams

CLAYEY SAND (SC) very loose; tan, red, and gray

FAT CLAY WITH SAND (CH) stiff; red and gray

Water Level

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

Est. Measured: Perched:

Water Observations:

@ 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)

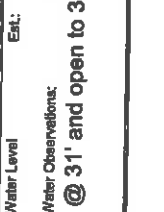
Notes:

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

USC

SAMPLES

DEPTH (ft)





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MATERIAL DESCRIPTION

SILTY CLAYEY SAND(SC) gray and red;
saturated

FAT CLAY(CH) hard; red and gray, with sand
seams

-gray, tan, and red; with sand seams

SILTY SAND(SM-SC) red and gray

Bottom of Boring @ 50'

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL
35		SC		
40		CH		
45				
50		SM SC		

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

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 (ks)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits		MOISTURE CONTENT (%)			OTHER TESTS PERFORMED (Page Ref. #)
						Plastic Limit	Liquid Limit	TT	PL	PI	
SF						25	51	31	20	87	+40 Sieve=6%, +4 Sieve=0%
P=4.5+											
P=4.5+											
SF											

Key to Abbreviations:

- N - SPT Data (Blow/ft)
- P - Pocket Penetrometer (tsf)
- T - Torvane (tsf)
- L - Lab Vane Shear (tsf)

Notes:

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

Water Level

Water Observations:

@ 31' and open to 35' upon completion and after 30 minutes.

Est: Measured: Perched:

Seepage @ 35' while drilling, Water level

Appendix P-5

ENVIRONMENTAL LOG			Well No. B-5			
Client: Welsh Power Plant			Location Pittsburg, Texas			
Project No: G3242-095	Phase	Task	Surface Elev.	Page 1 of 2		
Depth Feet Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface				0	T.O.C. Elev.
5	LEAN CLAY WITH SAND(CL) stiff; red and tan		[Diagonal Hatching]	[Well Construction Diagram]	5	
10	LEAN CLAY(CL) hard; red and tan -very stiff		[Diagonal Hatching]	[Well Construction Diagram]	10	
15	FAT CLAY(CL) very stiff; brown and tan		[Diagonal Hatching]	[Well Construction Diagram]	15	
20	FAT CLAY WITH SAND(CH) hard; red and tan		[Diagonal Hatching]	[Well Construction Diagram]	20	
25	SANDY LEAN CLAY(CL) very stiff; red and gray; with sand seams		[Diagonal Hatching]	[Well Construction Diagram]	25	
	CLAYEY SAND(SC) very loose; tan, red, and gray		[Diagonal Hatching]	[Well Construction Diagram]		

Continued Next Page

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



ENVIRONMENTAL LOG

Client: Welsh Power Plant

Well No. B-5

Location Pittsburg, Texas











Project No: G3242-095

Phase

Task

Surface Elev.

Page 2 of 2

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						



Pic 7000 B-6

LOG OF BORING B-6

DATE: 10/27/09
 SURFACE ELEVATION: 340.1

PROJECT: Welsh Power Plant
 Pittsburgh, Texas
 PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

FIELD STRENGTH DATA	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIONIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Atterberg Limits			MOISTURE CONTENT (%)	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
						Plastic Limit	Moisture Content	Liquid Limit			
P=4.0	1	3.0				18	32	12	60	+40 Sieve=0%, +4 Sieve=0%	
P=4.5+	2	3.0				29	49	21	93	+40 Sieve=0%, +4 Sieve=0%	
P=3.0	3	3.0				31	49	14	65	+40 Sieve=0%, +4 Sieve=0%	
P=3.0	4	3.0				31	49	14	65	+40 Sieve=0%, +4 Sieve=0%	
P=4.0	1	3.0				31	49	14	65	+40 Sieve=0%, +4 Sieve=0%	
P=3.0	1	3.0				31	49	14	65	+40 Sieve=0%, +4 Sieve=0%	
N=50/5.25"								20	18	+40 Sieve=0%, +4 Sieve=0%	
SF											

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MATERIAL DESCRIPTION

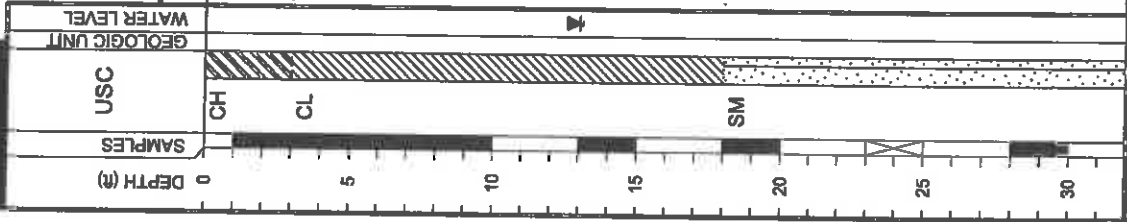
FAT CLAY(CH) very stiff; red and gray; with ferric seams

SANDY LEAN CLAY(CL) hard; red and tan

very stiff; red, gray, and brown; with gravel -with sand seams

SILTY SAND(SM) gray; saturated

very dense; gray and red



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

Notes:
 GPS Coordinates: N 33°02.912', W 94°50.462'
 Water Observations:
 Seepage @ 17' while drilling. Water level @ 13' and open to 15' upon completion and after 30 minutes.



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DEPTH (')	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL
35		CH		
40				
45				
50		CL		

MATERIAL DESCRIPTION

FAT CLAY(CH) hard; brown; with sand seams

-dark green

LEAN CLAY(CL) hard; dark green; laminated with lignite

Bottom of Boring @ 50'

LOG OF BORING B-6

PROJECT: Welsh Power Plant
Pittsburgh, Texas
PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

FIELD STRENGTH DATA	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%)	OTHER TESTS PERFORMED (Page Ref. #)
	● BLOW COUNT ▲ Cu (tsf) ■ PPR (tsf) ◆ Torvane (tsf)					Plastic Limit Moisture Content Liquid Limit		LIQUID LIMIT PLASTIC LIMIT PLASTICITY INDEX	
P=4.5+	1.0 2.0 3.0 4.0					20 40 60 80	22	TI 68 PL 24 PI 44	+40 Sieve=0% +4 Sieve=0%
P=4.5+	1.0 2.0 3.0 4.0								
P=4.5+	1.0 2.0 3.0 4.0								
P=4.5+	1.0 2.0 3.0 4.0								

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'

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

DATE 10/27/09
SURFACE ELEVATION 340.1

Pipe 2000 B-6

ENVIRONMENTAL LOG

Client: Welsh Power Plant

Well No. B-6

Location Pittsburg, Texas

Project No: G3242-095

Phase

Task

Surface Elev.

Page 1 of 2

Depth Feet Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	Ground Surface				0	T.O.C. Elev.
0 - 5	FAT CLAY(CH) very stiff; red and gray; with ferric seams		[Diagonal Hatching]	[Diagonal Hatching]	0 - 5	
5 - 20	SANDY LEAN CLAY(CL) hard; red and tan -very stiff; red, gray, and brown; with gravel -with sand seams		[Diagonal Hatching]	[Diagonal Hatching]	5 - 20	
20 - 25	SILTY SAND(SM) gray; saturated -very dense; gray and red		[Vertical Lines]	[Vertical Lines]	20 - 25	

Continued Next Page

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



ENVIRONMENTAL LOG

Client: Welsh Power Plant

Project No: G3242-095

Phase



Task

Well No. B-6

Location Pittsburg, Texas

Surface Elev.

Page 2 of 2

Depth Feet Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
Continued from previous page						
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">30</div> <div style="margin-bottom: 10px;">35</div> <div style="margin-bottom: 10px;">40</div> <div style="margin-bottom: 10px;">45</div> <div style="margin-bottom: 10px;">50</div> </div>	<p style="text-align: center;">FAT CLAY(CH) hard; brown; with sand seams</p> <p style="text-align: center;">—dark green</p> <p style="text-align: center;">LEAN CLAY(CL) hard; dark green; laminated with lignite</p>				<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">30</div> <div style="margin-bottom: 10px;">35</div> <div style="margin-bottom: 10px;">40</div> <div style="margin-bottom: 10px;">45</div> <div style="margin-bottom: 10px;">50</div> </div>	
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;">55</div> <div style="margin-bottom: 10px;">60</div> </div>	<p style="text-align: center;">Bottom of Boring @ 50'</p>					





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MATERIAL DESCRIPTION

SM
SILTY SAND(SM) dense; tan

-gray; saturated

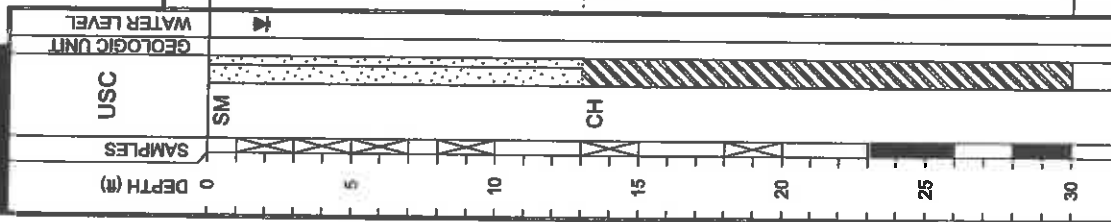
-very dense

CH
EAT CLAY(CH) very stiff; dark gray; with silt and ferric seams

-hard; gray and black; with trace of lignite

-gray

Bottom of Boring @ 30'

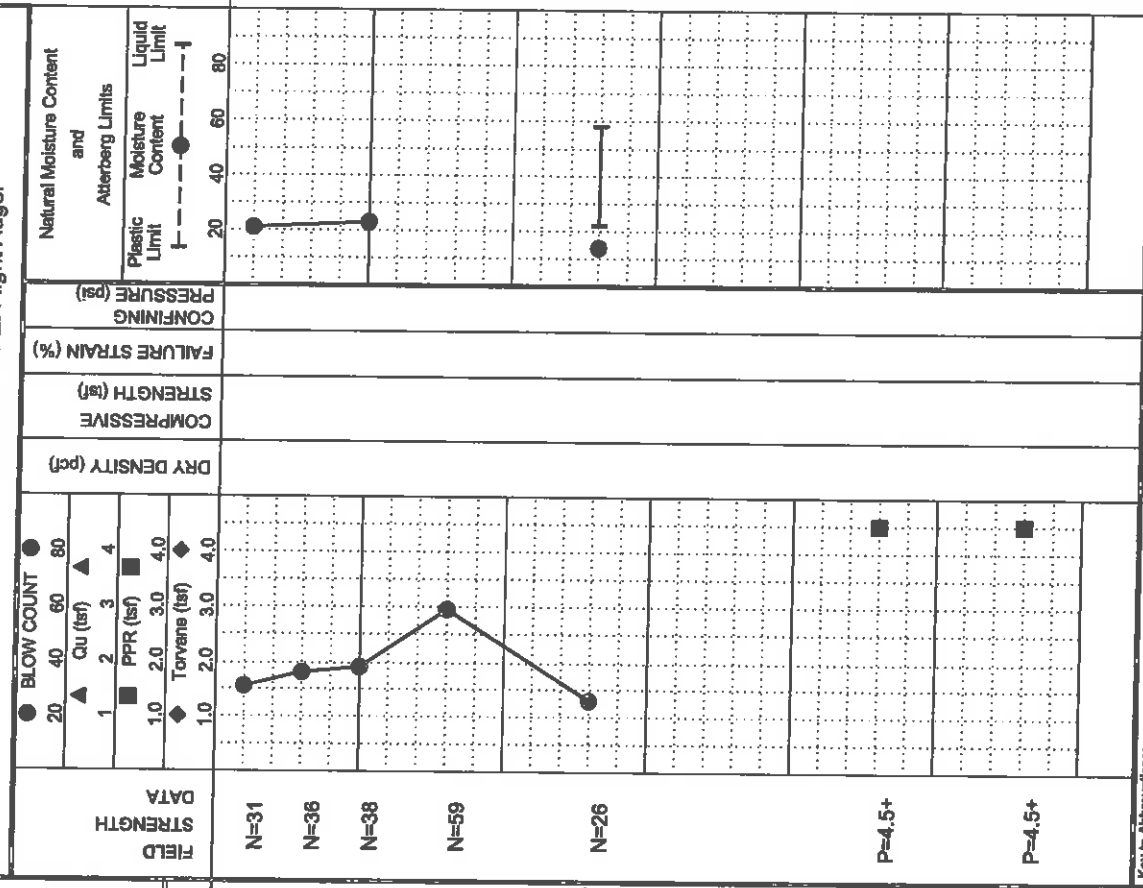


Ent: Measured: Punched:
Water Observations:
Seepage @ 4' while drilling. Water level @ 2' and open to 7' upon completion.

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



FIELD STRENGTH DATA
N=31
N=36
N=38
N=59
N=26
P=4.5+
P=4.5+

DRY DENSITY (pcf)
COMPRESSION STRENGTH (tsf)
FAILURE STRAIN (%)
CONFINING PRESSURE (psi)
Natural Moisture Content and Atterberg Limits
Plastic Limit
Moisture Content
Liquid Limit

MOISTURE CONTENT (%)
21
23
14

ATTERBERG LIMITS (%)
LI
PL
PI

MINUS #200 SIEVE (%)
21
15
98

OTHER TESTS PERFORMED (Page Ref. #)
+40 Sieve=0%, +4 Sieve=0%
+40 Sieve=0%, +4 Sieve=0%
+40 Sieve=0%, +4 Sieve=0%

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

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

Landfill Boring B-2

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MATERIAL DESCRIPTION

ASH (SILT WITH GRAVEL (ML)) medium dense; light grayish brown; with coarse-grained sand and lightly cemented gravel pieces; dry

ASH (SILTY SAND (SM)) medium dense; dark brown and light brown; with coarse-grained sand and lightly cemented gravel pieces
--loose; moist

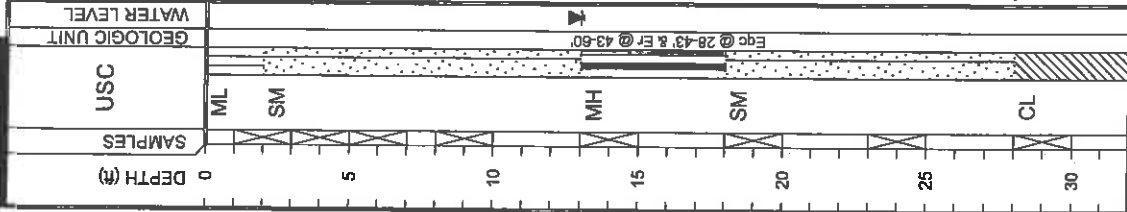
ASH (ELASTIC SILT (MH)) very loose; black; with fine-grained sand and lightly cemented gravel pieces; saturated

ASH (SILTY SAND (SM)) very loose; dark brown; with coarse-grained sand and lightly cemented gravel pieces; moist

--loose; dark brown and light brown; with coarse-grained sand and lightly cemented gravel pieces; moist

SANDY LEAN CLAY (CL) medium stiff; dark brown and black; with fine-grained sand and cemented gravel pieces; saturated

Est.: Measured: Perched:
Water level @ 13'



LOG OF BORING B-2

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

DATE: 10/8/14

SURFACE ELEVATION: 373.8

FIELD DATA STRENGTH	BLOW COUNT	Qu (tsf)	PPR (tsf)	Tonvane (tsf)	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits		MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)			MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
									Plastic Limit	Moisture Content		Liquid Limit	TI	PL		
N=13	20	1.5	1.0	1.0	115				46	59				+40 Sieve=27% +4 Sieve=16%		
N=29	20	1.5	1.0	1.0	115				40	40				+40 Sieve=19% +4 Sieve=2%		
N=18	20	1.5	1.0	1.0	115				40	40				+40 Sieve=0% +4 Sieve=0%		
N=9	20	1.5	1.0	1.0	115				40	40				+40 Sieve=0% +4 Sieve=0%		
N=0	20	1.5	1.0	1.0	115				200	134	92	42	100	+40 Sieve=0% +4 Sieve=0%		
N=1	20	1.5	1.0	1.0	115				91	61				+40 Sieve=11% +4 Sieve=1%		
N=7	20	1.5	1.0	1.0	115				91	61				+40 Sieve=11% +4 Sieve=1%		
N=6	20	1.5	1.0	1.0	115				18	30	15	15	63	+40 Sieve=1% +4 Sieve=0%		

Notes:

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

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

Driller: Tommy Cook

Logger: B.Hobbs/O.Sanderson



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CONSULTANTS**

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

MATERIAL DESCRIPTION

CLAYEY SAND(SC) dense; light brown, light gray and reddish brown; moist; with fine-grained sand; mottled

SILTY SAND(SM) very dense; light brown, yellowish brown and light gray; moist; mottled; with fine-grained sand

EAT CLAY(CH) very stiff; dark brown and light brown; moist; with sand seams; laminated

-dark brown with light gray; moist; with silt seams

-hard; dark brown; moist

Bottom of Boring @ 60'

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL
35		SC		
40		SM		
45		CH		
50				
55				
60				

Water Level
Water Observations:
Est.: Measured: Perched:
Water level @ 13'

LOG OF BORING B-2 (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

FIELD STRENGTH DATA	BLOW COUNT				DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits	
	●	▲	■	◆					Plastic Limit	Liquid Limit
P=3.5 P=2.75	1	2	3	4	110	1.39	4.3	21	15	30
N=78									21	15
N=27									25	62
P=4.0					98				24	26
N=37									24	36

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

DATE

10/8/14

SURFACE ELEVATION

373.8

MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)			MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
	LL	PL	PI		
18	30	15	15	39	+40 Sieve=0% +4 Sieve=0%
16					
21				24	+40 Sieve=0% +4 Sieve=0%
25	62	26	36	96	+40 Sieve=2% +4 Sieve=0%
24					

GPS Coordinates: N33.04890°, W94.84451°
Driller: Tommy Cook
Logger: B.Hobbs/O.Sanderson

Landfill Boring B-10



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(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
DRILL RIG: B-61 HDX
BORING TYPE: Rotary Wash/Flight Auger

PROJECT NO.: G4207-146

DATE: 10/8/14

SURFACE ELEVATION: 373.2

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	FIELD STRENGTH DATA	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits		ATTERBERG LIMITS (%)			MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
											Moisture Content	Plastic Limit	Liquid Limit	LL	PL		
0																	
3					N=7	1					24	31	19	12	41		+40 Sieve=21% +4 Sieve=11%
10					N=3	2											
13					N=0	3											
18					N=50/1"	4					56				14		+40 Sieve=71% +4 Sieve=28%
23					N=50/4"	1											
27					N=4	2											+40 Sieve=1% +4 Sieve=0%
30																	

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

Notes:
 Seepage @ 13' while drilling.

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



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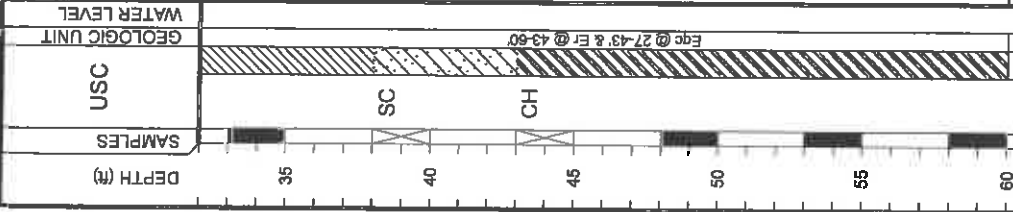
MATERIAL DESCRIPTION

CLAYEY SAND(SC) medium dense; reddish brown and grayish brown; moist; mottled

EAT CLAY(CH) very stiff; dark brown with light gray; with silt seams; moist

--hard

Bottom of Boring @ 60'



Water Level
Water Observations:
Est. Measured: Paunched:
Seepage @ 13' while drilling.

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

FIELD DATA	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits	MOISTURE CONTENT (%)	ATTERBERG LIMITS(%)	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
STRENGTH	Qu (tsf) / PPR (tsf) / Torvane (tsf)					Plastic Limit / Moisture Content / Liquid Limit		LIQUID LIMIT (LL) / PLASTIC LIMIT (PL) / PLASTICITY INDEX (PI)		
P=1.25 P=1.0	1.0, 2.0, 3.0, 4.0	107	2.10	6.1	21	20, 40, 60, 80	22	LL, PL, PI		
N=23	1.0, 2.0, 3.0, 4.0						22		27	+40 Sieve=3% +4 Sieve=0%
N=18	1.0, 2.0, 3.0, 4.0						25		90	+40 Sieve=7% +4 Sieve=0%
P=4.5+	1.0, 2.0, 3.0, 4.0									
P=4.5+	1.0, 2.0, 3.0, 4.0									

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°

Diller: Tommy Cook
Logger: B. Hobbs/O. Sanderson

DATE: 10/8/14
SURFACE ELEVATION: 373.2

Landfill Boring B-12



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

MATERIAL DESCRIPTION

LEAN CLAY WITH SAND (CL) stiff; light gray and reddish brown; moist; mottled

SANDY LEAN CLAY (CL) stiff; light brown, light gray and reddish brown; moist; mottled

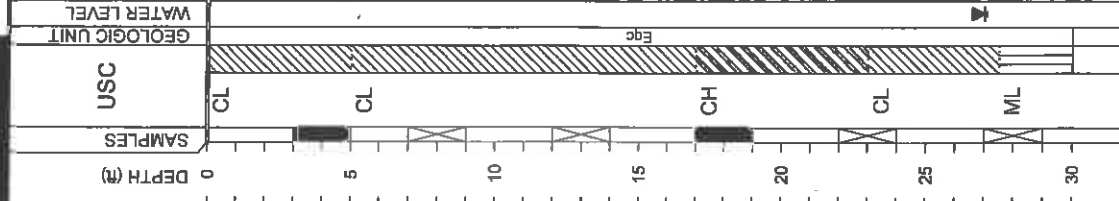
--grayish brown and brown; moist

EAT CLAY WITH SAND (CH) stiff; light gray and reddish brown; moist; mottled; with ferric seams

LEAN CLAY (CL) stiff; light gray and brownish gray; moist; layered with silt

SILT WITH SAND (ML) very dense; light brown and yellowish brown; moist; with clay seams

Bottom of Boring @ 30'



LOG OF BORING B-12

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

DRILL RIG: BORING TYPE: Flight Auger

PROJECT NO.: G4207-146

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) ◆	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits		MOISTURE CONTENT (%)	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
						Plastic Limit	Liquid Limit			
P=3.75	■					20	33	16	58	+40 Sieve=1% +4 Sieve=0%
N=15	●					20	19			
N=11	●					20	14			
P=3.75	■					20	39	24	93	+40 Sieve=1% +4 Sieve=0%
N=14	●					20	20			
N=53	●					20	19			

DATE: 10/15/14

SURFACE ELEVATION: 361.7

Notes:

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

GPS Coordinates: N33.04713° W94.84486°

Driller: Lewis Drilling, Inc.

Logger: O. Sanderson

Landfill Boring B-13

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 1717 East Erwin
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MATERIAL DESCRIPTION

LEAN CLAY WITH SAND(CL) medium stiff; reddish brown with light gray; moist

SANDY LEAN CLAY(CL) very stiff; light brown, gray and reddish brown; moist; mottled

CLAYEY SAND(SC) medium dense; grayish brown; moist

FAT CLAY WITH SAND(CH) medium stiff; reddish brown and light gray; moist; mottled

LEAN CLAY(CL) very stiff; light gray and grayish brown; moist; layered with silt

SILT WITH SAND(ML) very dense; light gray and yellowish brown; wet; with clay seams

Bottom of Boring @ 30'

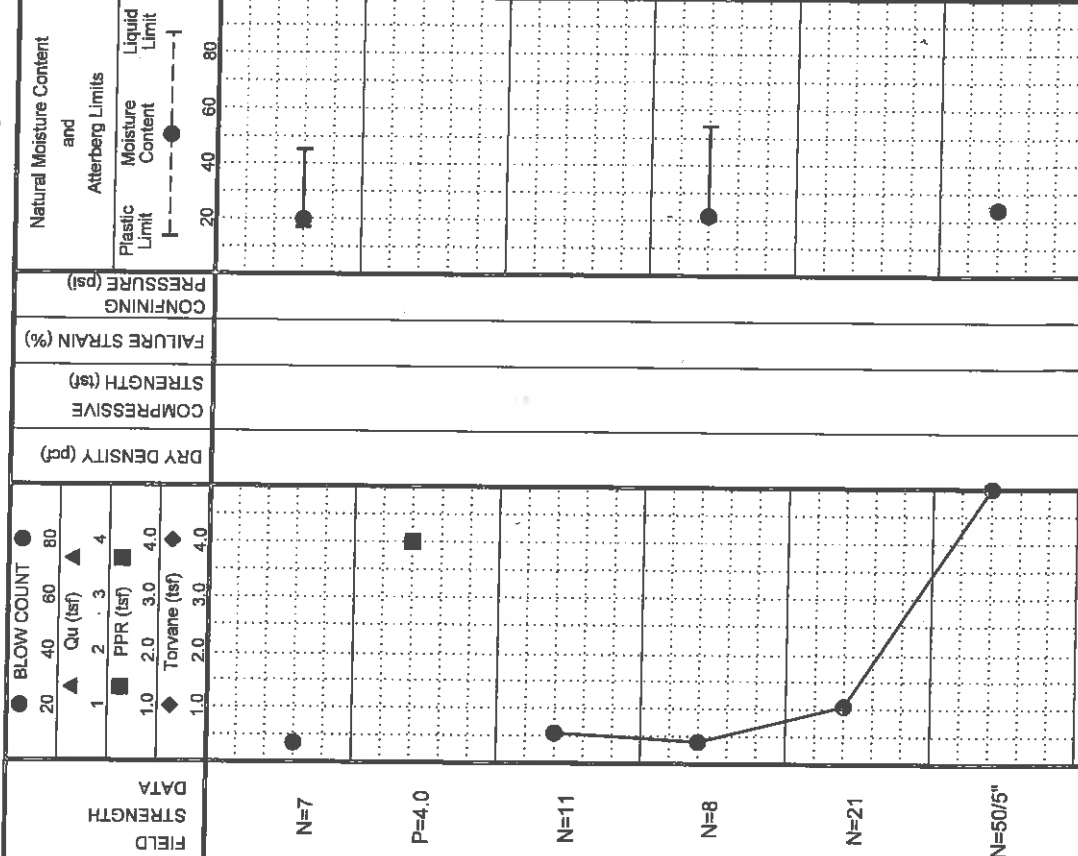
Water Observations: Water level @ 28' and open upon completion.

Est.: Measured: Perched:

LOG OF BORING B-13

PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest. Welsh Power Station - Cason, Texas
DRILL RIG:
BORING TYPE: Flight Auger

PROJECT NO.: G4207-146



FIELD STRENGTH DATA

- BLOW COUNT
- ▲ Gu (tsf)
- PPR (tsf)
- ◆ Torvane (tsf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

Plastic Limit ———— Moisture Content ———— Liquid Limit ————

MOISTURE CONTENT (%)		20	45	20	22	24
LIQUID LIMIT		45	54	79	34	80
PLASTIC LIMIT		17	20	34	20	34
PLASTICITY INDEX		28	34	79	34	80
MINUS #200 SIEVE (%)		76	76	79	79	80

OTHER TESTS PERFORMED

+40 Sieve=1%
 +4 Sieve=0%

DATE 10/15/14
SURFACE ELEVATION 361.4

GPS Coordinates: N33.047160°, W94.84384°
Driller: Lewis Drilling, Inc.
Logger: O. Sanderson

Notes:

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



DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL
0				
5		CL		
10		CL		
15		SC		
15		CH		
20				
25		CL		
28		ML		
30				

Landfill Boring B-14

LOG OF BORING B-14

ETTL ENGINEERS & CONSULTANTS

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PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest.
Welsh Power Station - Cason, Texas
DRILL RIG:
BORING TYPE: Flight Auger

PROJECT NO.: G4207-146

DATE

10/14/14

SURFACE ELEVATION
347.2

OTHER TESTS PERFORMED
(Page Ref. #)

DEPTH (ft)	USC	GEOLOGIC UNIT	WATER LEVEL	FIELD STRENGTH	DATA	SOIL TESTS				DRY DENSITY (pcf)	COMPRESSIONIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits		ATTERBERG LIMITS (%)			MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)					
						BLOW COUNT	Qu (tsf)	PPR (tsf)	Torvane (tsf)					Moisture Content	Plastic Limit	Liquid Limit	LL	PL			PI				
0																									
5	CL			N=9		1	2	3	4																
10	ML			N=11																					
15	CL			P=4.0																					
20				N=34																					
25	SP SM			N=27																					
30	CL			N=26																					
30																									

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

Notes:
Water level @ 17' and caved to 23' upon completion.
Bottom of Boring @ 30'

GPS Coordinates: N33.04774°, W94.84290°
Driller: Lewis Drilling, Inc.
Logger: O. Sanderson

Landfill Boring B-15

LOG OF BORING B-15

DATE: 10/14/14
 SURFACE ELEVATION: 348.2

PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest.
 Welsh Power Station - Cason, Texas
 DRILL RIG: BORING TYPE: Flight Auger

PROJECT NO.: G4207-146

ETTL ENGINEERS & CONSULTANTS
 MAIN OFFICE
 1717 East Erwin
 Tyler, Texas 75702
 (903) 595-4421

DEPTH (ft)	USC	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psf)	Natural Moisture Content and Atterberg Limits	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
				● BLOW COUNT ▲ Cu (tsf) ■ PPR (tsf) ◆ Torvane (tsf)					Plastic Limit Moisture Content Liquid Limit		LIQUID LIMIT PLASTIC LIMIT		
0 - 5	CH	FAT CLAY(CH) stiff; reddish brown and light gray; moist; mottled	N=10	1.0					20 40 60 80	24	59 21	85	+40 Sieve=0% +4 Sieve=0%
5 - 10		--very stiff, light gray, grayish brown and reddish brown; moist; layered	P=3.75	2.0						7	38	12	+40 Sieve=0% +4 Sieve=0%
10 - 15	SM	SILTY SAND(SM) very dense; light brown; dry	N=59	3.0									
15 - 25		--medium dense; wet	N=21	4.0									
25 - 30	CL	--very dense	N=56	4.0									
30 - 30'		LEAN CLAY(CL) hard; dark brown; moist; with silt partings Bottom of Boring @ 30'	P=4.5	4.0						25	45 22	92	+40 Sieve=0% +4 Sieve=0%

Water Level: 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



Appendix B

Photographic Log

Project Name:

AEP – J. ROBERT WELSH POWER PLANT

Location:

PITTSBURG, TITUS COUNTY, TEXAS

Project No.

OK001625.0001

Photo No.
1
Date:

8/20/2015

Direction Photo Taken:

North

Description:

Staging area west of landfill.

P8200493


Project Name:

AEP – J. ROBERT WELSH POWER PLANT

Location:

PITTSBURG, TITUS COUNTY, TEXAS

Project No.

OK001625.0001

Photo No.
2
Date:

8/20/2015

Direction Photo Taken:


South Southeast



Description:


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



P8200495





Project Name: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 3	Date: 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: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 4	Date: 8/20/2015		
Direction Photo Taken: Northeast			
Description: Ground Water Monitoring Well AD-12 near northwest end of landfill.			
P8200501			



Project Name: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 5	Date: 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: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 6	Date: 8/20/2015		
Direction Photo Taken: East Northeast			
Description: Drainage canal that drains from primary ash pond to clear water pond.			
P8200510			



Project Name: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 7	Date: 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			

Project Name: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 8	Date: 8/20/2015		
Direction Photo Taken: North			
Description: Dike between landfill and primary ash pond. Facility in the background. P8200522			

Project Name: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 9	Date: 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: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 10	Date: 8/20/2015		
Direction Photo Taken: North Northeast			
Description: Road east of landfill running toward facility and clear water pond. P8200530			

Project Name: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 11	Date: 8/20/2015		
Direction Photo Taken: South			
Description: Top of landfill. P8200534			

 ARCADIS		PHOTOGRAPHIC LOG	
Project Name: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 12	Date: 8/20/2015		
Direction Photo Taken: Southeast			
Description: View of lined bottom ash storage pond. P8200538			

Project Name:
AEP – J. ROBERT WELSH POWER PLANT

Location:
PITTSBURG, TITUS COUNTY, TEXAS

Project No.
OK001625.0001

Photo No.
13

Date:
8/20/2015

Direction Photo Taken:
Southeast

Description:
Lined bottom ash storage pond.

P8200545



Project Name:
AEP – J. ROBERT WELSH POWER PLANT

Location:
PITTSBURG, TITUS COUNTY, TEXAS

Project No.
OK001625.0001

Photo No.
14


Date:
8/20/2015



Direction Photo Taken:
South


Description:
Southside of lined bottom ash storage pond.



P8200547



Project Name: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 15	Date: 8/20/2015		
Direction Photo Taken: West			
Description: East side of lined bottom ash storage pond.			
P8200560			

 ARCADIS		PHOTOGRAPHIC LOG	
Project Name: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 16	Date: 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			

Project Name: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 17	Date: 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: AEP – J. ROBERT WELSH POWER PLANT		Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001
Photo No. 18	Date: 8/20/2015		
Direction Photo Taken: South Southwest			
Description: Northeast portion of primary ash pond, view facing south-southwest. P8200578			