

**American Electric Power Service  
Corporation**

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

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

May 2, 2016



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

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

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AEP

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## Acronyms and Abbreviation

AEP	American Electric Power Service Cooperation
amsl	above mean sea level
ARCADIS	ARCADIS U.S., Inc.
BAP	bottom ash pond
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
EPRI	Electric Power Research Institute
FAP	fly ash pond
FGD	flue gas desulfurization
ft	feet
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 Bottom Ash Storage 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 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 ash pond, landfill, and Bottom Ash Storage Pond (**Figure 2**). This report summarizes the evaluation of the location restriction criteria at the Bottom Ash Storage Pond (Site).

This evaluation included a review of AEP-provided data associated with previously completed subsurface investigation activities in the vicinity of the Bottom Ash Storage 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 Bottom Ash Storage 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 Bottom Ash Storage Pond CCR unit is located at the south end of the Plant and approximately 1,000 feet west of the Welsh Reservoir (**Figures 1 and 2**).

### **2.2 Description of Bottom Ash Storage Pond CCR Unit**

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

#### **2.2.1 Embankment Configuration**

The Bottom Ash Storage Pond was placed into operation in 2000, and is located in a topographically high area of the Plant. The Bottom Ash Storage Pond embankments are approximately 20 feet in height and are constructed of compacted clay on a 3:1 slope (3 feet horizontal, 1 foot vertical). The elevation at the base of the embankment is approximately 340 feet amsl, and the elevation at the top of the embankment around the perimeter of the Bottom Ash Storage Pond is approximately 360 feet amsl (Southwestern Electric Power Company, 2000).

#### **2.2.2 Area/Volume**

The Bottom Ash Storage Pond is 22 acres in size. Per the *Hydraulic Analysis of Welsh Power Plant Ash Ponds Report*, dated December 2010 (Freese and Nichols, 2010), the principal spillway for the Bottom Ash Storage Pond is located near the southeast corner of the pond and consists primarily of an 18 inch drain at elevation 350.5 feet amsl and also of a 40-foot-long broad-crested weir with a crest elevation of 355 feet amsl. The emergency spillway is an 8-foot-wide weir with a rock rip-rap discharge chute located along the southern embankment at an elevation of 358 feet amsl. The storage capacity of the Bottom Ash Storage Pond at elevation 358 feet amsl is 86.50 acre-ft (Freese and Nichols, 2010).

### 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 either in the primary ash pond or in the adjacent landfill that was constructed in the late 1970's. In 2000, the 22-acre Bottom Ash Storage Pond was installed south of the landfill. The Bottom Ash Storage Pond receives bottom ash and economizer ash dredged and sluiced from the primary ash pond (**Figure 3**).

The Bottom Ash Storage Pond contains a 60-mil high-density polyethylene (HDPE) liner. The liner is located at the base of the Bottom Ash Storage Pond at an elevation of 340 feet amsl. The liner also extends along the base of the Bottom Ash Storage Pond sidewalls and is keyed into the top of the Bottom Ash Storage Pond earthen embankment at an elevation of 360 feet amsl (Southwestern Electric Power Company, 2000).

The southeast corner of the Bottom Ash Storage Pond contains an approximate ¼-acre clear water pond with a base elevation of 347 feet amsl (**Figure 3**). The clear water pond receives clear water primarily through at 18 inch drain and then through an overflow structure from the main part of the Bottom Ash Storage Pond through the 40-foot-long broad-crested weir discussed above in Section 2.2.2. Water in the ¼-acre clear water pond at the southeast corner of the Bottom Ash Storage Pond discharges through a 30-inch-diameter pipe into the primary ash pond system.

### 2.2.4 Surface Water Control

Surface water flow within the Bottom Ash Storage Pond is primarily controlled by an 18 inch drain and then by a weir located on the southeast side of the pond below the embankments. The pond elevation is maintained so that surface water flows through the drain pipe at invert elevation 350.5 feet amsl or weir which has a crest elevation of 355 feet amsl. Clear water flows through the weir into the ¼-acre clear water pond at the southeast corner of the Bottom Ash Storage Pond, then discharges through a 30-inch-diameter pipe into the primary ash pond (**Figure 3**).

The emergency spillway for the Bottom Ash Storage Pond is located along the southern embankment, and is 8 feet wide with a crest elevation of 358 feet amsl. The perimeter embankments of the Bottom Ash Storage Pond are located at an elevation of 360 feet amsl. Therefore the perimeter embankments have approximately five feet of freeboard above the clear water discharge weir, and approximately two 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 ash pond area, and geotechnical soil testing to characterize the area encompassed by the primary ash pond.

In 2000, Maxim Technologies prepared a report entitled “*Subsurface Exploration for Ash Storage Area, Phase II, Welsh Power Plant, Cason, Texas*”. This report evaluated the geotechnical properties of the soils below the Bottom Ash Storage Pond.

In 2000, an HDPE liner installation report was prepared by Alliance Incorporated. This report provided details regarding installation of the 60-mil HDPE liner on the bottom of the Bottom Ash Storage Pond.

In 2001, five monitoring wells (AD-1 through AD-5) were installed in the area of the primary ash pond and Bottom Ash Storage Pond to obtain hydrologic data for the uppermost water-bearing unit. Twelve additional monitoring wells (AD-4a, AD-4b, AD-4c, AD-6 through AD-14) were installed in the area of the primary ash pond, Bottom Ash Storage Pond, and landfill by Eagle Environmental Services in 2009 to obtain more detailed hydrologic data for the uppermost water-bearing unit.

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 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 Bottom Ash Storage 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 Bottom Ash Storage 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 (approximately 320 feet amsl).



The Bottom Ash Storage Pond normal operating level is near the clear water overflow weir which has a crest elevation of 355 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 Bottom Ash Storage Pond is east-southeasterly 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 west (up gradient) of the Bottom Ash Storage 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 Bottom Ash Storage Pond is a very fine to fine grained silty sand and sandy silt stratum with an average thickness of approximately 12 feet that is located between an elevation of approximately 320 and 332 feet amsl (**Appendix A**). The base of the Bottom Ash Storage Pond is at an elevation of 340 feet amsl. Therefore the separation distance between the uppermost water-bearing unit and the base of the Bottom Ash Storage Pond is approximately 8 feet. This separation distance is further illustrated on cross section C-C' (**Figure 6**) and cross section D-D' (**Figure 7**).

###### 3.1.1.2 Overall Flow Conditions

Groundwater is recharged from regional precipitation infiltration. The uppermost water bearing unit (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 12 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).

Available groundwater elevations are summarized on **Table 1** for 2011 through 2016. The most recent comprehensive groundwater data set from March 2016 is depicted on **Figure 9**. 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 Bottom Ash Storage Pond is the very fine to fine grained silty sand and sandy silt stratum that is located between an elevation of approximately 320 and 332 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 Bottom Ash Storage Pond meets the regulatory definition of an aquifer. As shown on the cross-sections presented on **Figures 6 and 7**, the base of the Bottom Ash Storage Pond is approximately eight feet above this aquifer. Therefore, this CCR Unit meets the location restriction for separation from the uppermost aquifer. Also, the base of the Bottom Ash Storage Pond contains a 60-mil HDPE liner which also provides isolation from the uppermost water-bearing unit.



#### **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, the Bottom Ash Storage Pond is not located within an area that exhibited wetland characteristics that might be classified as a regulated wetland. Photos of the Bottom Ash Storage Pond area are included in **Appendix B**, and **Figure 10** is a map showing wetlands locations in the CCR unit area.

##### **4.2 Compliance with Wetland Restrictions**

Based on the August 20, 2015 site visit and review of available information, the Bottom Ash Storage Pond does not contain wetlands. Therefore, this CCR Unit meets the location restriction regarding wetlands.

## **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 ETTL, and no evidence of faulting was identified (ETTL, 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 geotechnical report was prepared for the Bottom Ash Storage Pond by Maxim Technologies in 2000 (Maxim Technologies, April 2000). The Bottom Ash Storage Pond was constructed during 2000 using compacted clay in accordance with specifications prepared by Southwestern Electric Power Company (Southwestern Electric Power Company, 2000). The specifications included compaction of the Bottom Ash Storage Pond embankments in loose lifts not exceeding eight inches (8"), and compaction of each lift to 90% modified proctor density at optimum moisture content.

Maxim Technologies conducted inspections and soil geotechnical testing during construction of the Bottom Ash Storage Pond embankments to confirm the compaction specifications had been met (Maxim Technologies, July 2000). Alliance Incorporated conducted inspections and testing during installation of the 60-mil HDPE liner at the base of the Bottom Ash Storage Pond. Alliance Incorporated concluded the HDPE liner was installed in accordance with the specifications (Alliance Incorporated, 2000). Also, the E TTL Geotechnical Investigation Report (E TTL, 2010) concluded the native soil types and relative low maximum ground acceleration at the site indicate a negligible risk of liquefaction.

#### **7.1.3 Mass Movements**

The Bottom Ash Storage Pond is not located within 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 Bottom Ash Storage 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.

### **7.2 Compliance with Unstable Areas Restriction**

Based on our site visit and review of available information, the Bottom Ash Storage 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 Bottom Ash Storage Pond meets the CCR surface impoundment location restrictions of 40 CFR Part 257 for separation from the uppermost aquifer, wetlands, fault areas, seismic impact zones, and unstable areas.

Kenneth J. Brandner

Printed Name of Registered Professional Engineer

Kenneth J. Brandner

Signature



69586

Registration No.

Texas

Registration State

5-2-16

Date

## 9. References

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**Tables**

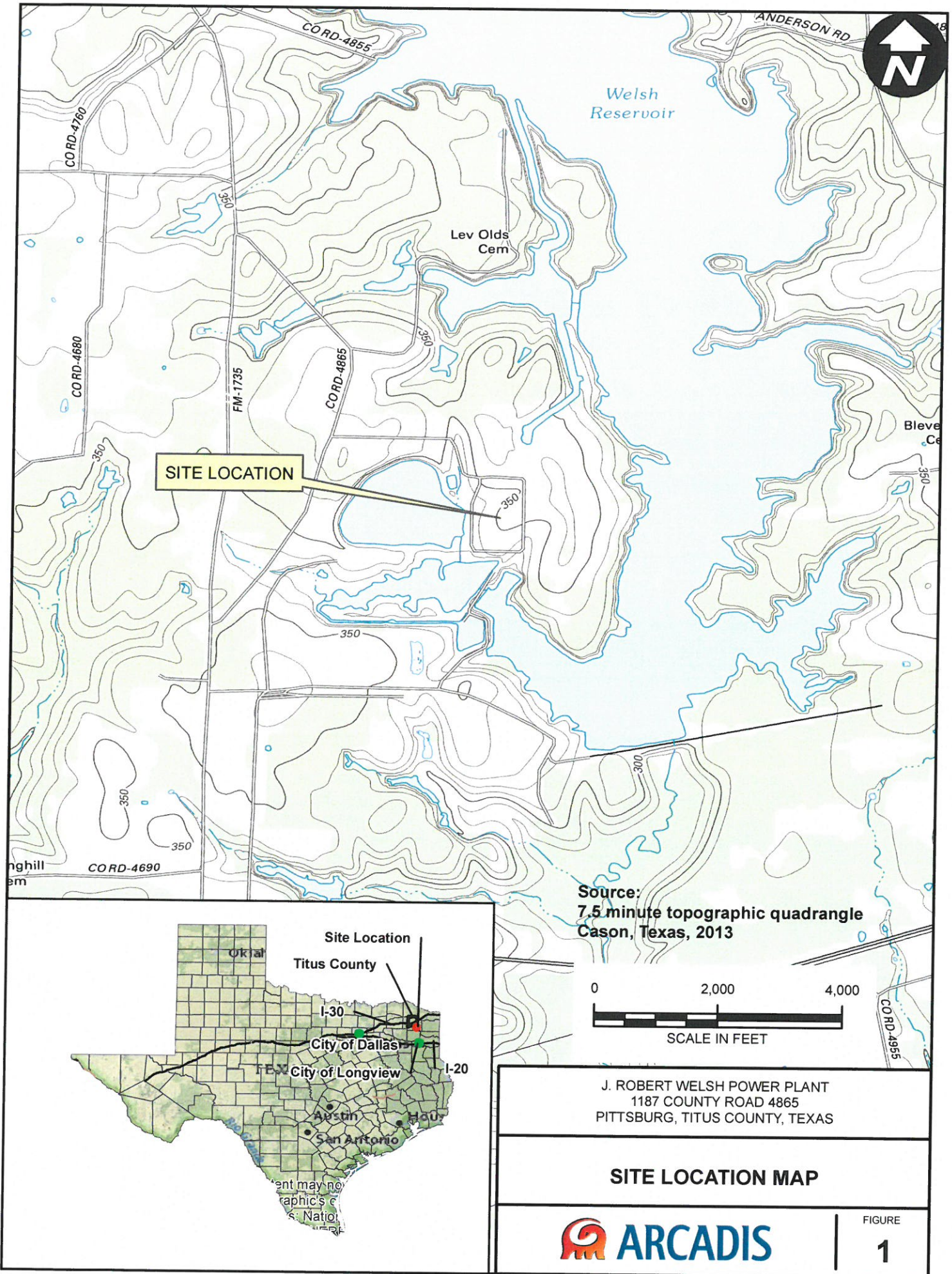




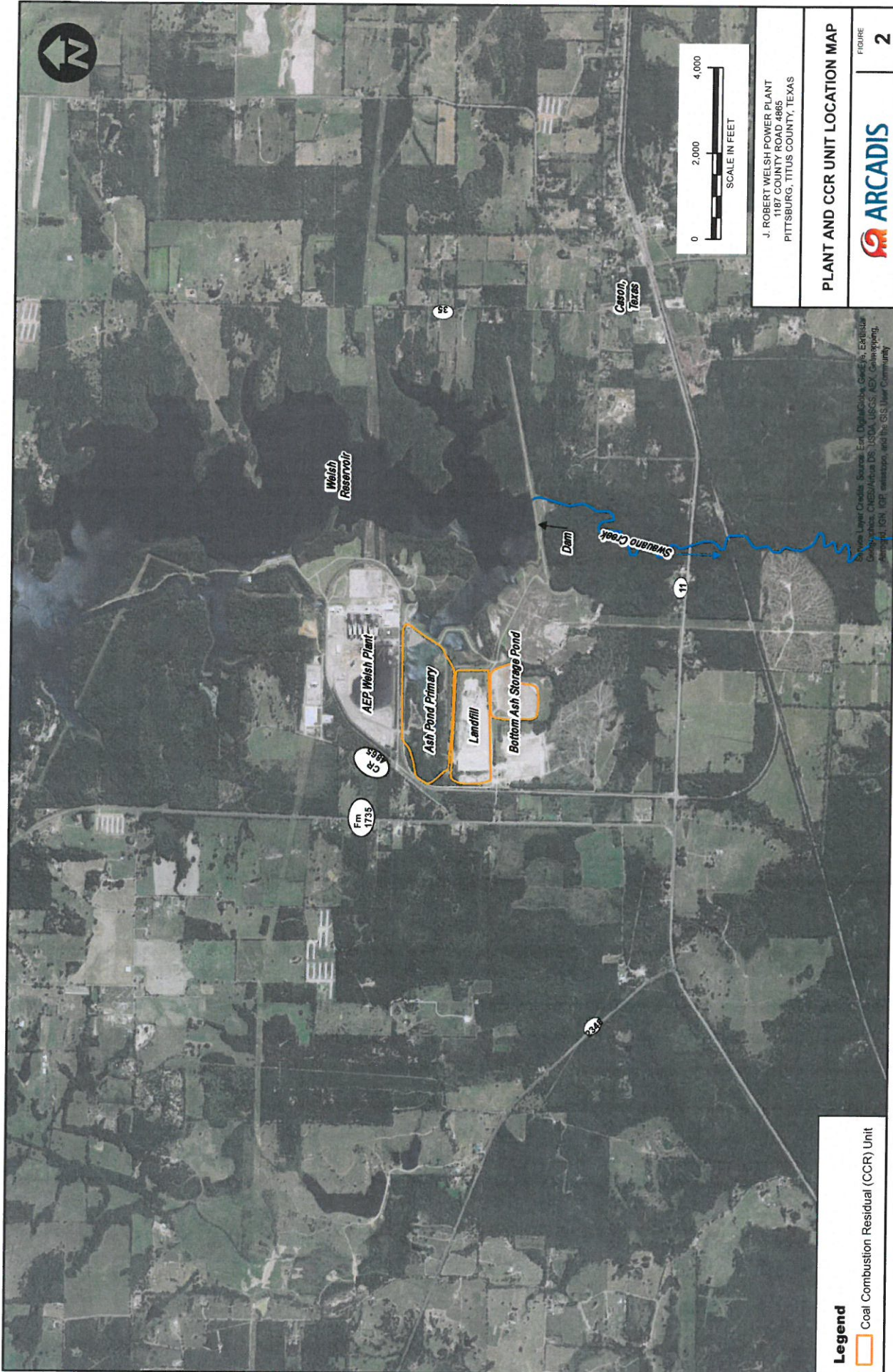


**Figures**









Service Layer Credits: Source: Earth Digital/Google, GeoEye, Earthstar  
 GeoEye, GeoEye, CNES/Airbus DS, USDA, USGS, AeroVantage,  
 AeroGRID, IGN, Esri, DeLorme, and the GIS User Community

**Legend**  
 Coal Combustion Residual (CCR) Unit

**J. ROBERT WELSH POWER PLANT**  
 1187 COUNTY ROAD 4866  
 PITTSBURG, TITUS COUNTY, TEXAS

**PLANT AND CCR UNIT LOCATION MAP**

FIGURE  
**2**

**ARCADIS**

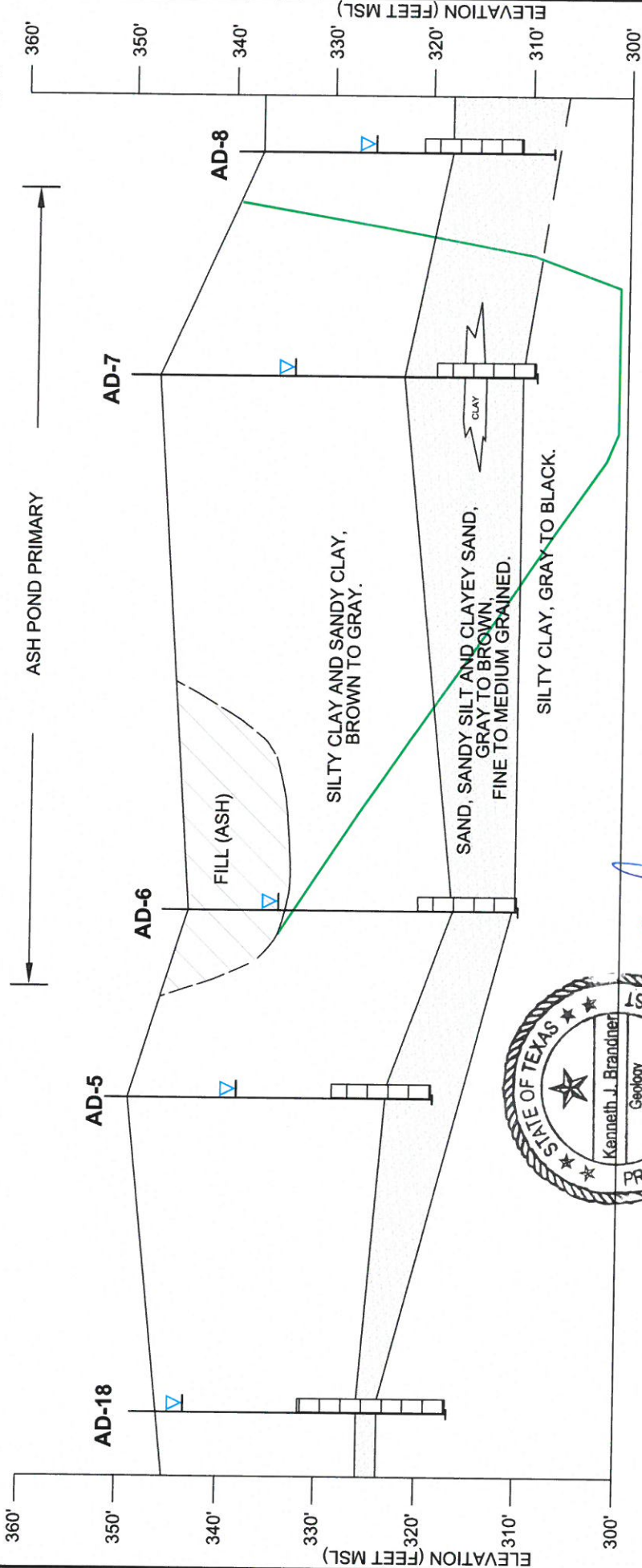






WEST  
A

EAST  
A'



ASH POND PRIMARY

AD-18

AD-5

AD-6

AD-7

AD-8

FILL (ASH)

SILTY CLAY AND SANDY CLAY,  
BROWN TO GRAY.

SAND, SANDY SILT AND CLAYEY SAND,  
GRAY TO BROWN,  
FINE TO MEDIUM GRAINED.

SILTY CLAY, GRAY TO BLACK.

CLAY

ELEVATION (FEET MSL)

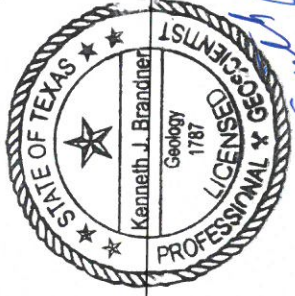
ELEVATION (FEET MSL)



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

LEGEND

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



*Kenneth J. Brandner*  
5-6-16

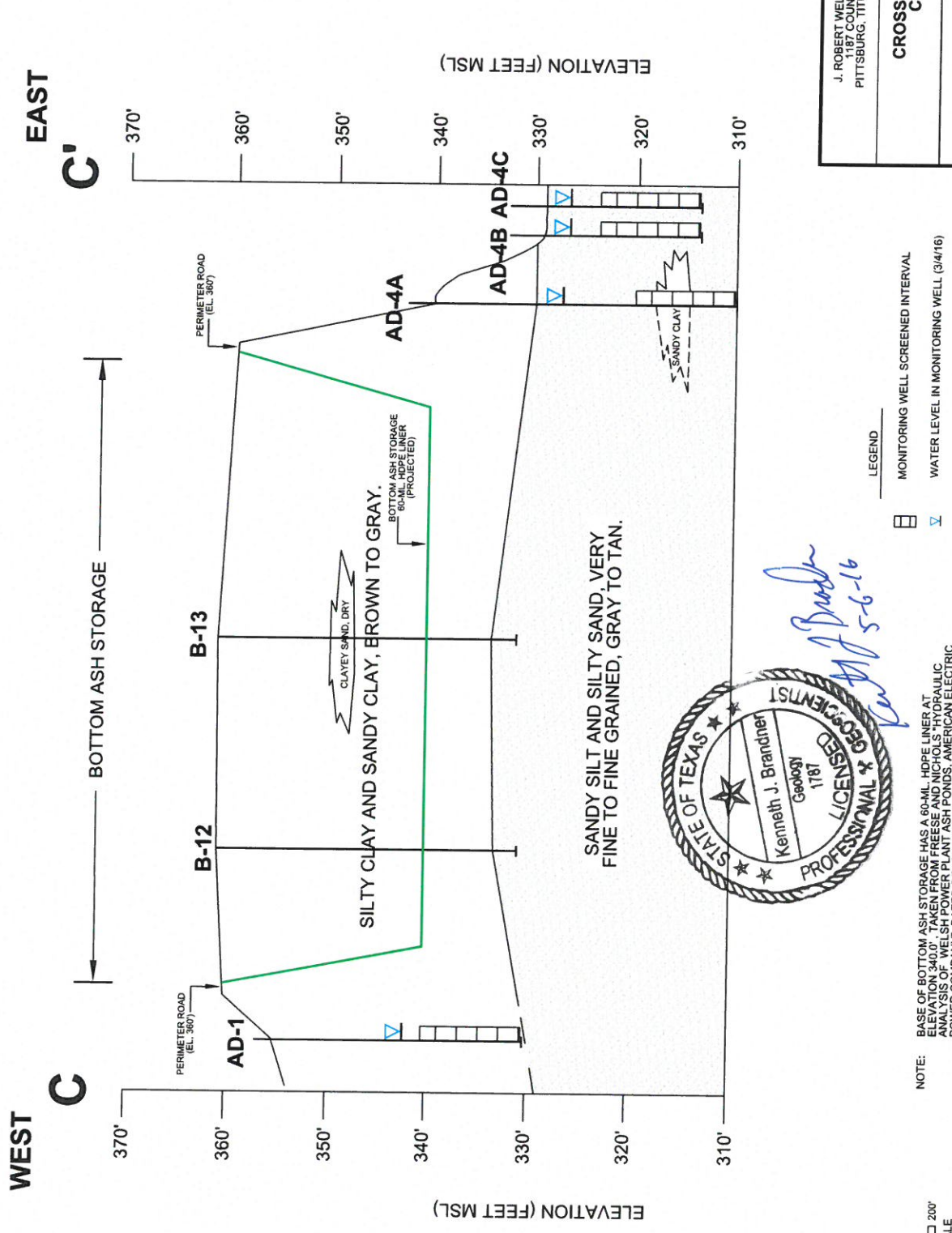
J. ROBERT WELSH POWER PLANT  
1187 COUNTY ROAD 4865  
PITTSBURG, TITUS COUNTY, TEXAS

CROSS SECTION  
A-A'



FIGURE  
4





J. ROBERT WELSH POWER PLANT  
1187 COUNTY ROAD 486E  
PITTSBURG, TITUS COUNTY, TEXAS

**CROSS SECTION**  
**C - C'**

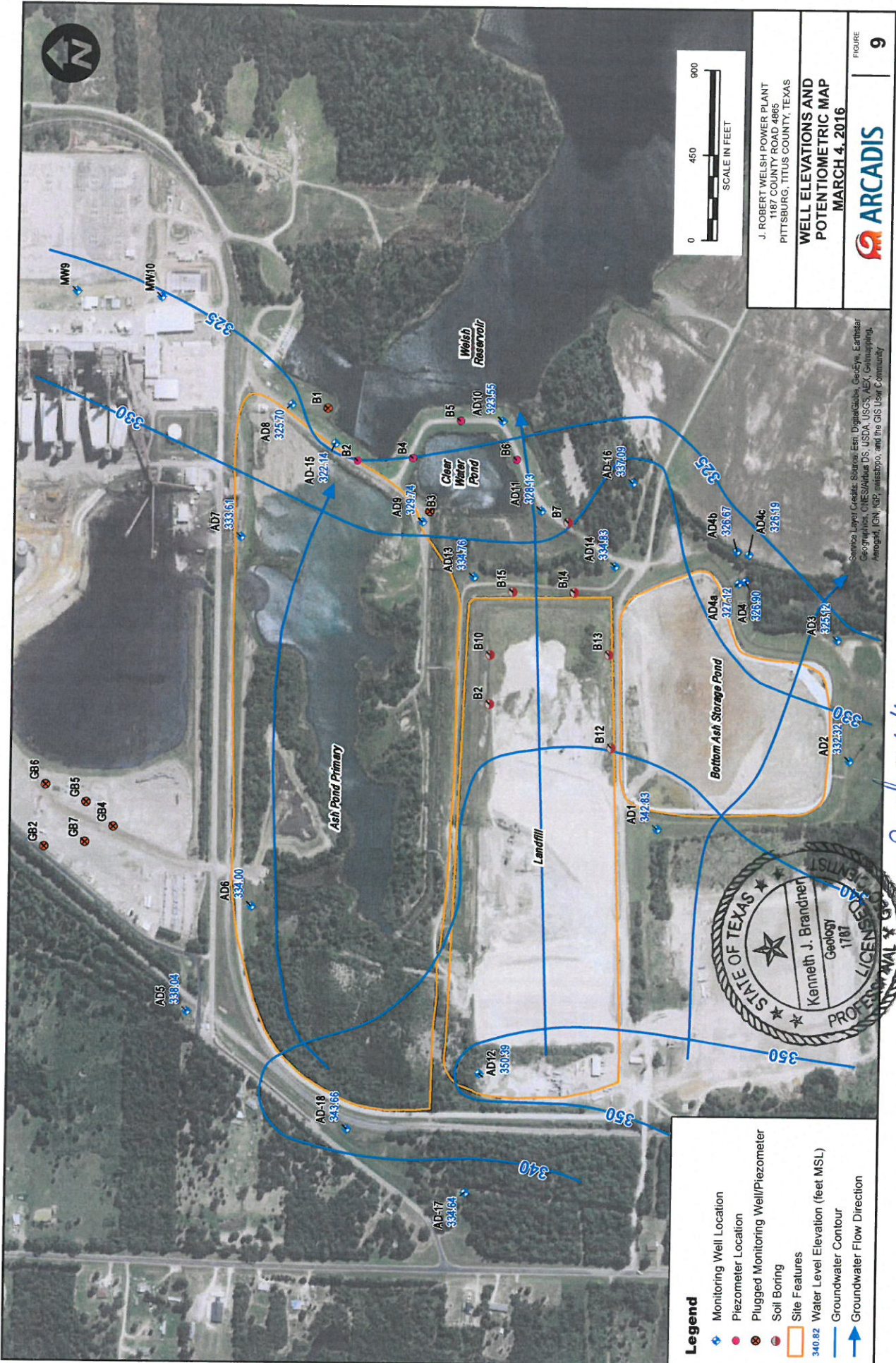












J. ROBERT WELSH POWER PLANT  
 1187 COUNTY ROAD 4865  
 PITTSBURG, TITUS COUNTY, TEXAS

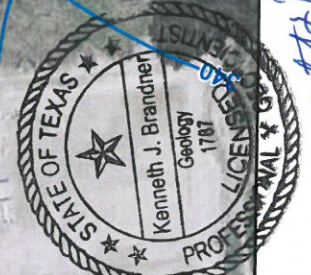
**WELL ELEVATIONS AND  
 POTENTIOMETRIC MAP**  
 MARCH 4, 2016

**ARCADIS**

FIGURE  
**9**

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

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



*Katt's Book 5-6-16*





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

**POTENTIAL WETLAND LOCATIONS**



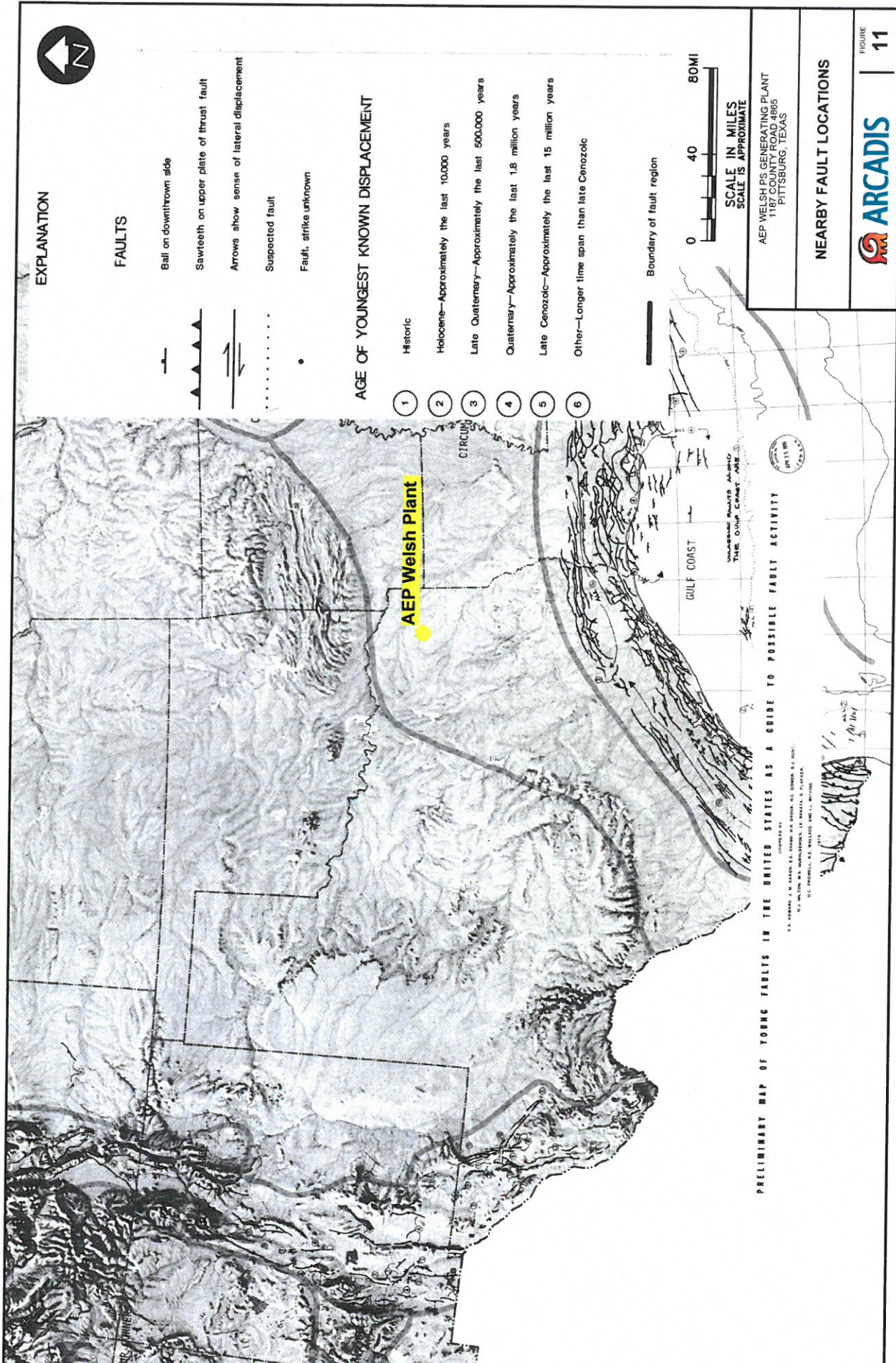
FIGURE  
10

**Legend**

 Potential Wetlands

Source: Esri, DigitalGlobe, GeoEye, Earthstar, CNES, Airphoto, IGN, Swisstopo, and the GIS User Community











**Appendix A**

**Boring/Well Construction Logs**



AD-1

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

Please use black ink.

ATTENTION OWNER: Confidentiality  
Privilege Notice on Reverse Side

**State of Texas  
WELL REPORT**

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

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

2) ADDRESS OF WELL: County Camp Titus Rt. 4, Box 221 Pittsburg Tx 75686 GRID # 16-58-4  
(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' 48" N  
94° 50' 47" W  
 N

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

DIAMETER OF HOLE		
Dia. (in.)	From (ft.)	To (ft.)
<u>8 1/4</u>	<u>Surface</u>	<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 13 ft. to 25 ft.

CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)		Cage Casing Screen
			From	To	
<u>2</u>	<u>N</u>	<u>riser</u>	<u>+2</u>	<u>15</u>	<u>Sch 40</u>
<u>2</u>	<u>N</u>	<u>#10s/67 screen</u>	<u>15</u>	<u>25</u>	<u>Sch 40</u>

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

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

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

12) PACKERS: NA Type \_\_\_\_\_ Depth \_\_\_\_\_

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

14) WELL TESTS: NA  
 Type test:  Pump  Baller  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 \_\_\_\_\_ WELL DRILLER'S LICENSE NO. TX-52694-M  
 (Type or print)

ADDRESS \_\_\_\_\_ (City) \_\_\_\_\_ (State) \_\_\_\_\_ (Zip)  
 (Signed) Arthur M. [Signature] (Signed) \_\_\_\_\_ (Registered Driller Trainee)  
 (Licensed Well Driller)

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.

ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side		<b>State of Texas</b> <b>WELL REPORT</b>		Texas Water Well Drillers Advisory Council P.O. Box 13087 Austin, TX 78711-3087 512-238-0530																					
1) OWNER <u>Southwestern Electric</u> ADDRESS <u>Rt. 4, Box 221 Pittsburg Tx 75686</u> <small>(Name) (Street or RFD) (City) (State) (Zip)</small>																									
2) ADDRESS OF WELL: County <u>Campan</u> <u>Rt. 4 Box 221 Pittsburg Tx 75686</u> GRID # <u>16-58-4</u> <small>(City) (State) (Zip)</small> <u>Titus</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		5) <u>GPS</u> <u>33° 02' 37" N</u> <u>94° 50' 44" W</u> ↑																					
6) WELL LOG: Date Drilling: _____ Started <u>4/26</u> <sup>18</sup> <u>2001</u> Completed <u>4/26</u> <sup>18</sup> <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 _____																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3" style="text-align: center;">DIAMETER OF HOLE</th> </tr> <tr> <th style="width: 33%;">Dia. (in.)</th> <th style="width: 33%;">From (ft.)</th> <th style="width: 33%;">To (ft.)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">8 1/4</td> <td style="text-align: center;">Surface</td> <td style="text-align: center;">25</td> </tr> </tbody> </table>		DIAMETER OF HOLE			Dia. (in.)	From (ft.)	To (ft.)	8 1/4	Surface	25	8) Borehole Completion (Check): <input type="checkbox"/> Open Hole <input type="checkbox"/> Straight Wall <input type="checkbox"/> Undeamed <input checked="" type="checkbox"/> Gravel Packed <input type="checkbox"/> Other _____ If Gravel Packed give interval ... from <u>12</u> ft. to <u>25</u> ft.														
DIAMETER OF HOLE																									
Dia. (in.)	From (ft.)	To (ft.)																							
8 1/4	Surface	25																							
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">From (ft.)</th> <th style="width: 15%;">To (ft.)</th> <th style="width: 70%;">Description and color of formation material</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">2</td> <td>top soil</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">5</td> <td>red &amp; gray clay w/ silt</td> </tr> <tr> <td style="text-align: center;">5</td> <td style="text-align: center;">10</td> <td>red &amp; gray clay w/ silt</td> </tr> <tr> <td style="text-align: center;">10</td> <td style="text-align: center;">25</td> <td>gray silty clay with tan streaks</td> </tr> </tbody> </table>		From (ft.)	To (ft.)	Description and color of formation material	0	2	top soil	2	5	red & gray clay w/ silt	5	10	red & gray clay w/ silt	10	25	gray silty clay with tan streaks	CASING, BLANK PIPE, AND WELL SCREEN DATA:								
From (ft.)	To (ft.)	Description and color of formation material																							
0	2	top soil																							
2	5	red & gray clay w/ silt																							
5	10	red & gray clay w/ silt																							
10	25	gray silty clay with tan streaks																							
AP-2		<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 style="text-align: center;">2</td> <td style="text-align: center;">N</td> <td style="text-align: center;">riser</td> <td style="text-align: center;">+2</td> <td style="text-align: center;">15</td> <td style="text-align: center;">Sch 40</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">N</td> <td style="text-align: center;">#10 slot screen</td> <td style="text-align: center;">15</td> <td style="text-align: center;">25</td> <td style="text-align: center;">Sch 40</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	2	N	riser	+2	15	Sch 40	2	N	#10 slot screen	15	25	Sch 40		
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	#10 slot screen	15	25	Sch 40																				
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.		9) CEMENTING DATA [Rule 338.44(1)] Cemented from <u>12</u> ft. to <u>2</u> ft. No. of sacks used <u>5-50#</u> _____ ft. to _____ ft. No. of sacks used _____ 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 _____																							
14) WELL TESTS: <u>NA</u> Type test: <input type="checkbox"/> Pump <input type="checkbox"/> Bailer <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 _____ ft. below land surface    Date _____ 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 _____ (Type or print)		WELL DRILLER'S LICENSE NO. <u>TX-52694-M</u>																							
ADDRESS _____ (Street or RFD)		(City) _____ (State) _____ (Zip) _____																							
(Signed) <u>Wilbert M. Kelly</u> (Licensed Well Driller)		(Signed) _____ (Registered Driller Trainee)																							
Please attach electric log, chemical analysis, and other pertinent information, if available.																									

# AD-3

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

Please use black ink.

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

## State of Texas WELL REPORT

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 Titus (Street, RFD or other) (City) (State) (Zip)

3) TYPE OF WORK (Check):  
 New Well  Decapring  
 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 4/26 <sup>2001</sup>  
Completed 4/26 <sup>2001</sup>

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

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

5) GPS  
33°02'38"N  
94°50'37"W  
N

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

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

CASING, BLANK PIPE, AND WELL SCREEN DATA:					
Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.)		Gage Casting Screen
			From	To	
2	N	riser	+2	7	Sec 40
2	N	#10 slot screen	7	17	Sec 40

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

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

14) WELL TESTS: NA  
Type test:  Pump  Bailor  Jetted  Estimated  
Yield: \_\_\_\_\_ gpm with \_\_\_\_\_ ft. drawdown after \_\_\_\_\_ hrs.

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]

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

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

12) PACKERS: NA Type \_\_\_\_\_ Depth \_\_\_\_\_

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

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

ADDRESS \_\_\_\_\_ (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-4

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

Please use black ink.

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		<b>State of Texas WELL REPORT</b>																							
1) OWNER <u>Southwestern Electric Power</u> ADDRESS <u>Pt. 4, Box 221 Pittsburg Tx 75686</u>		(Name) (Street or RFD) (City) (State) (Zip)																							
2) ADDRESS OF WELL: County <u>Camp</u> <u>Pt. 4 Box 221 Pittsburg Tx 75686</u> GRID # <u>16-584</u>		(Street, RFD or other) (City) (State) (Zip)																							
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) GPS <u>33° 02' 43" N</u> <u>94° 50' 33" W</u>																					
6) WELL LOG: Date Drilling: _____ Started <u>4/26</u> <u>19</u> <u>2001</u> Completed <u>4/26</u> <u>19</u> <u>2001</u>		DIAMETER OF HOLE <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;">Dia. (in.)</th> <th style="width: 25%;">From (ft.)</th> <th style="width: 25%;">To (ft.)</th> <th style="width: 25%;"></th> </tr> <tr> <td><u>8 1/4</u></td> <td>Surface</td> <td><u>30</u></td> <td></td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>		Dia. (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 _____									
Dia. (in.)	From (ft.)	To (ft.)																							
<u>8 1/4</u>	Surface	<u>30</u>																							
From (ft.) To (ft.) Description and color of formation material		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.																							
0 5 <u>red silty clay with gray streaks</u>		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">Cage 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>4</u></td> <td><u>19</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>19</u></td> <td><u>29</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.)		Cage Casting Screen	From	To	<u>2</u>	<u>N</u>	<u>riser</u>	<u>4</u>	<u>19</u>	<u>Sch 40</u>	<u>2</u>	<u>N</u>	<u>#10 slot screen</u>	<u>19</u>	<u>29</u>	<u>Sch 40</u>
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<u>2</u>	<u>N</u>	<u>#10 slot screen</u>	<u>19</u>	<u>29</u>	<u>Sch 40</u>																				
5 - 30 <u>gray silty clay with red streaks</u>		9) CEMENTING DATA [Rule 338.44(1)] Cemented from <u>16</u> ft. to <u>2</u> ft. No. of sacks used <u>8-50</u> ft. to _____ ft. No. of sacks used _____ 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 _____																							
(Use reverse side if necessary)		10) SURFACE COMPLETION <input checked="" type="checkbox"/> Specified Surface Slab Installed [Rule 338.44(2)(A)] <input checked="" type="checkbox"/> Specified Steel Sieve Installed [Rule 338.44(3)(A)] <input type="checkbox"/> Pitless Adapter Used [Rule 338.44(3)(b)] <input type="checkbox"/> Approved Alternative Procedure Used [Rule 338.71]																							
13) TYPE PUMP: <input type="checkbox"/> Turbine <input type="checkbox"/> Jet <input type="checkbox"/> Submersible <input type="checkbox"/> Cylinder <input type="checkbox"/> Other <u>NA</u> Depth to pump bowls, cylinder, jet, etc., _____ ft.		11) WATER LEVEL: Static level _____ ft. below land surface Date _____ Artesian flow _____ gpm. Date _____																							
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.		12) PACKERS: <u>NA</u> Type _____ Depth _____																							
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																									
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 _____		WELL DRILLER'S LICENSE NO. <u>TX 52694-M</u>																							
ADDRESS _____		(City)		(State) (Zip)																					
(Signed) <u>Will M. Davis</u> (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

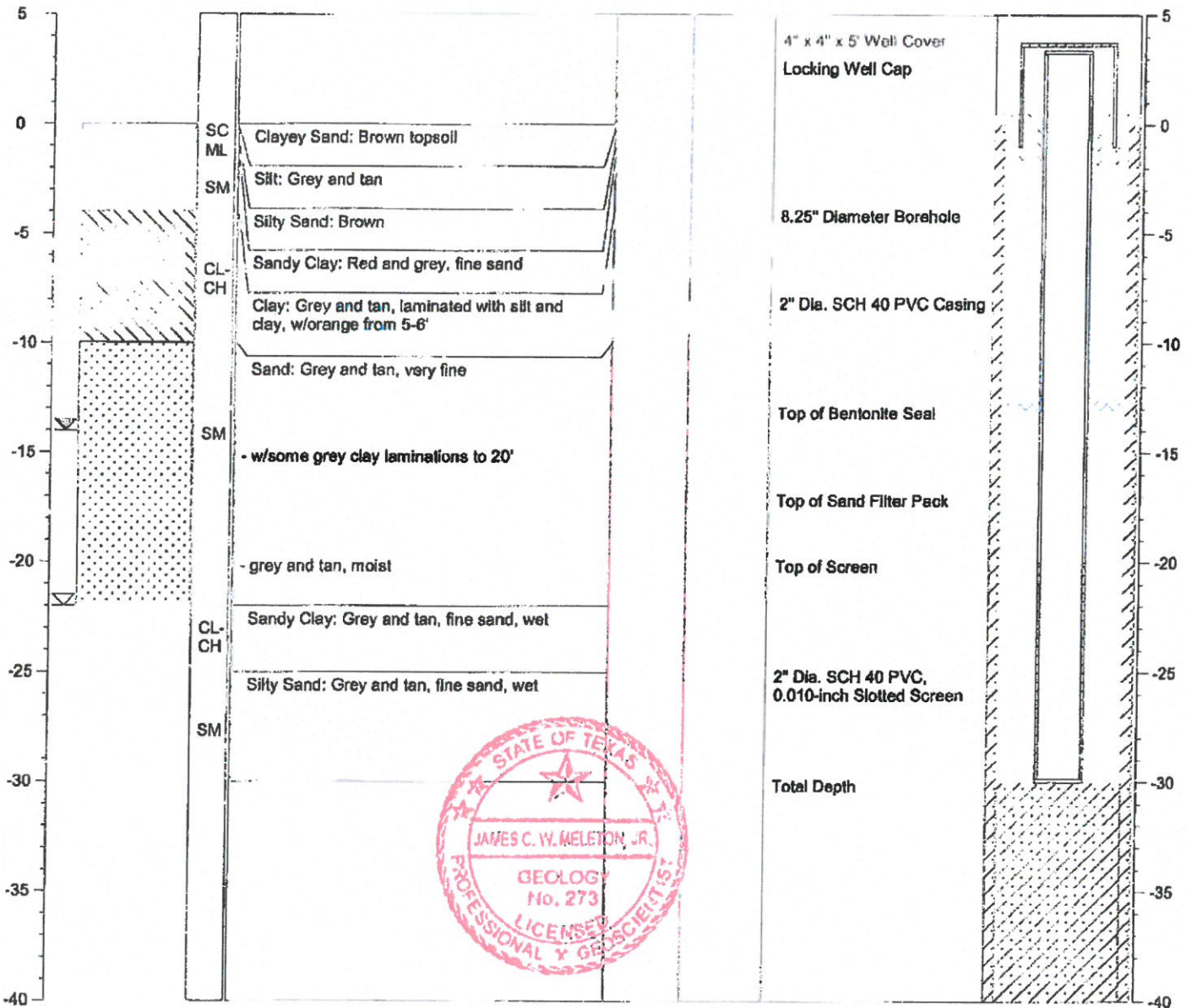
CLIENT: AEP  
 PROJECT: Ash Disposal Area  
 SITE LOCATION: Welsh Power Plant  
 PROJECT NO.: S-08-0109  
 LOGGED BY: James Meleton, Jr.

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

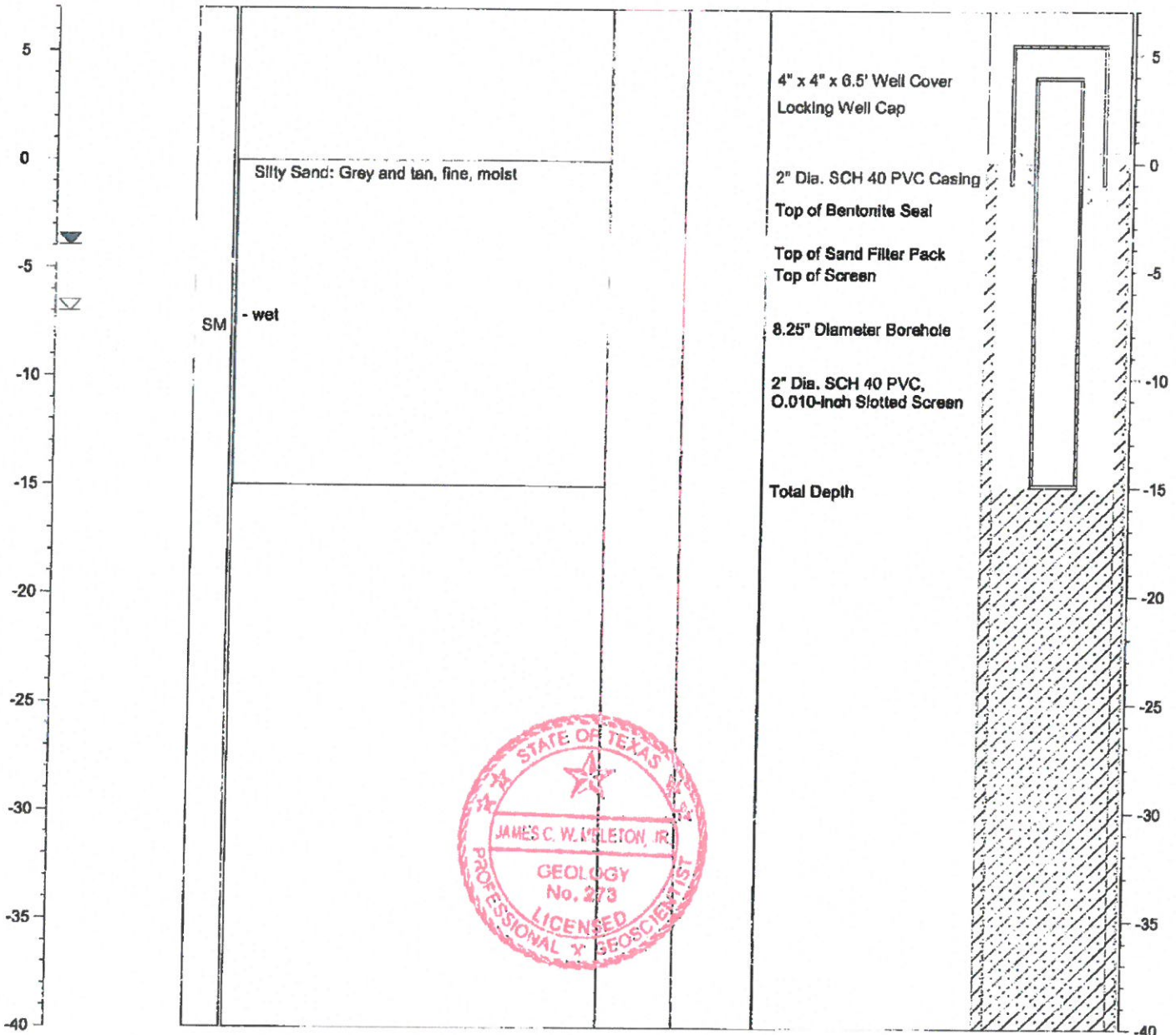
CLIENT: AEP  
 PROJECT: Ash Disposal Area  
 SITE LOCATION: Welsh Power Plant  
 PROJECT NO.: S-08-0109  
 LOGGED BY: James Meleton, Jr.

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

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

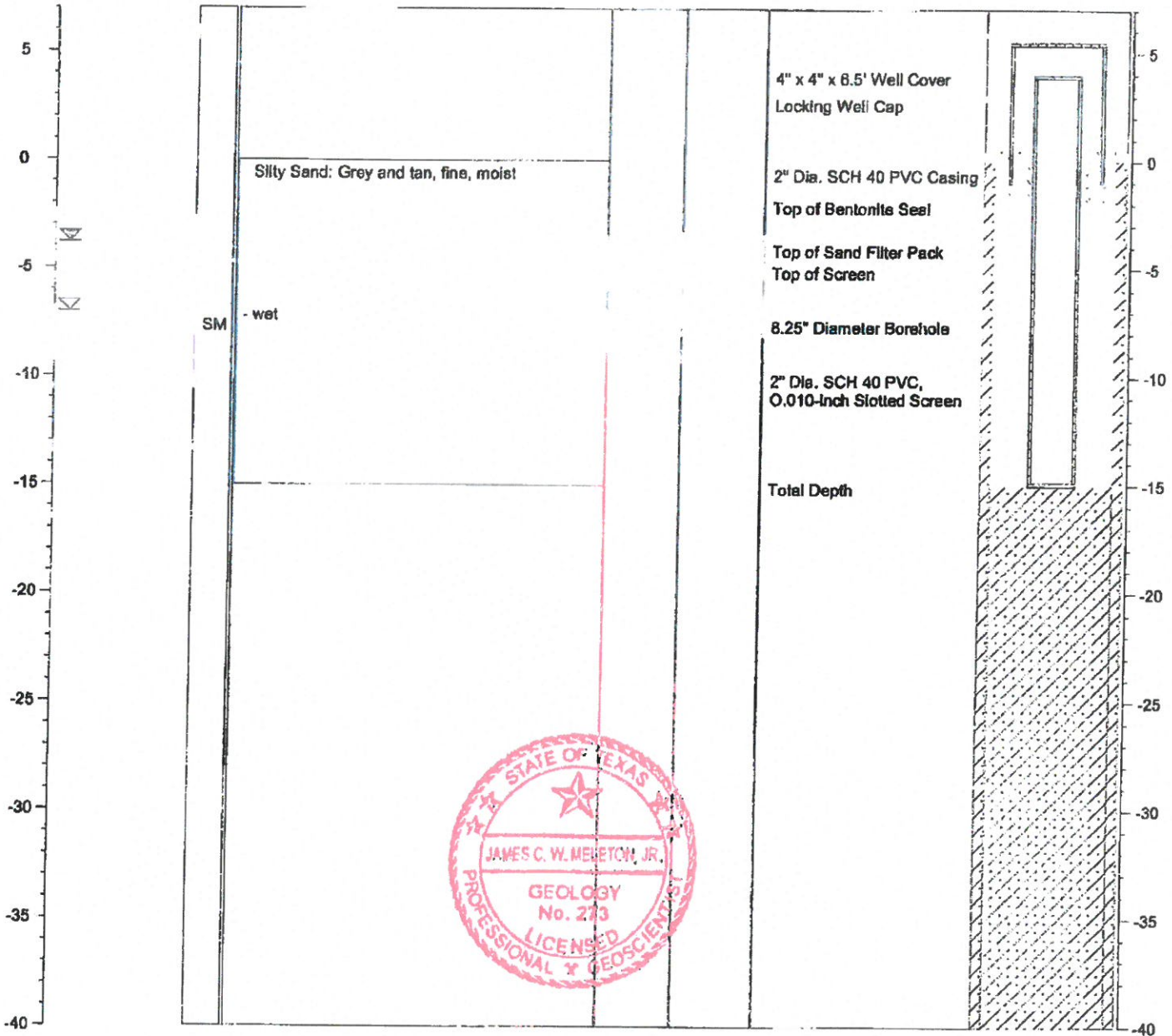
CLIENT: AEP  
 PROJECT: Ash Disposal Area  
 SITE LOCATION: Welsh Power Plant  
 PROJECT NO.: S-08-0109  
 LOGGED BY: James Meleton, Jr.

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  
 Page 1 of 1

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		<b>State of Texas</b> <b>WELL REPORT</b>		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>											
(Name) (Street or RFD) (City) (State) (Zip)											
2) ADDRESS OF WELL: County <u>Garrett</u> <u>Rt.4, Box 221 Pittsburg Tx</u> <u>75686</u> GRID # <u>16-58-4</u>											
(Street, RFD or other) (City) (State) (Zip)											
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 style="width:15%;">Dia. (in.)</th> <th style="width:15%;">From (ft.)</th> <th style="width:15%;">To (ft.)</th> </tr> <tr> <td><u>8 1/4</u></td> <td>Surface</td> <td><u>30</u></td> </tr> </table>		Dia. (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 _____	
Dia. (in.)	From (ft.)	To (ft.)									
<u>8 1/4</u>	Surface	<u>30</u>									
From (ft.)    To (ft.)    Description and color of formation material				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.							
<u>0 - 10</u> <u>red &amp; 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 streaks</u>											
<u>25 - 30</u> <u>fine gray sand</u>											
<u>AP-5</u>											
				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 _____							
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.				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: 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 <u>11'9"</u> ft. below land surface    Date <u>1-11-01</u> 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>[Signature]</u> (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-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.

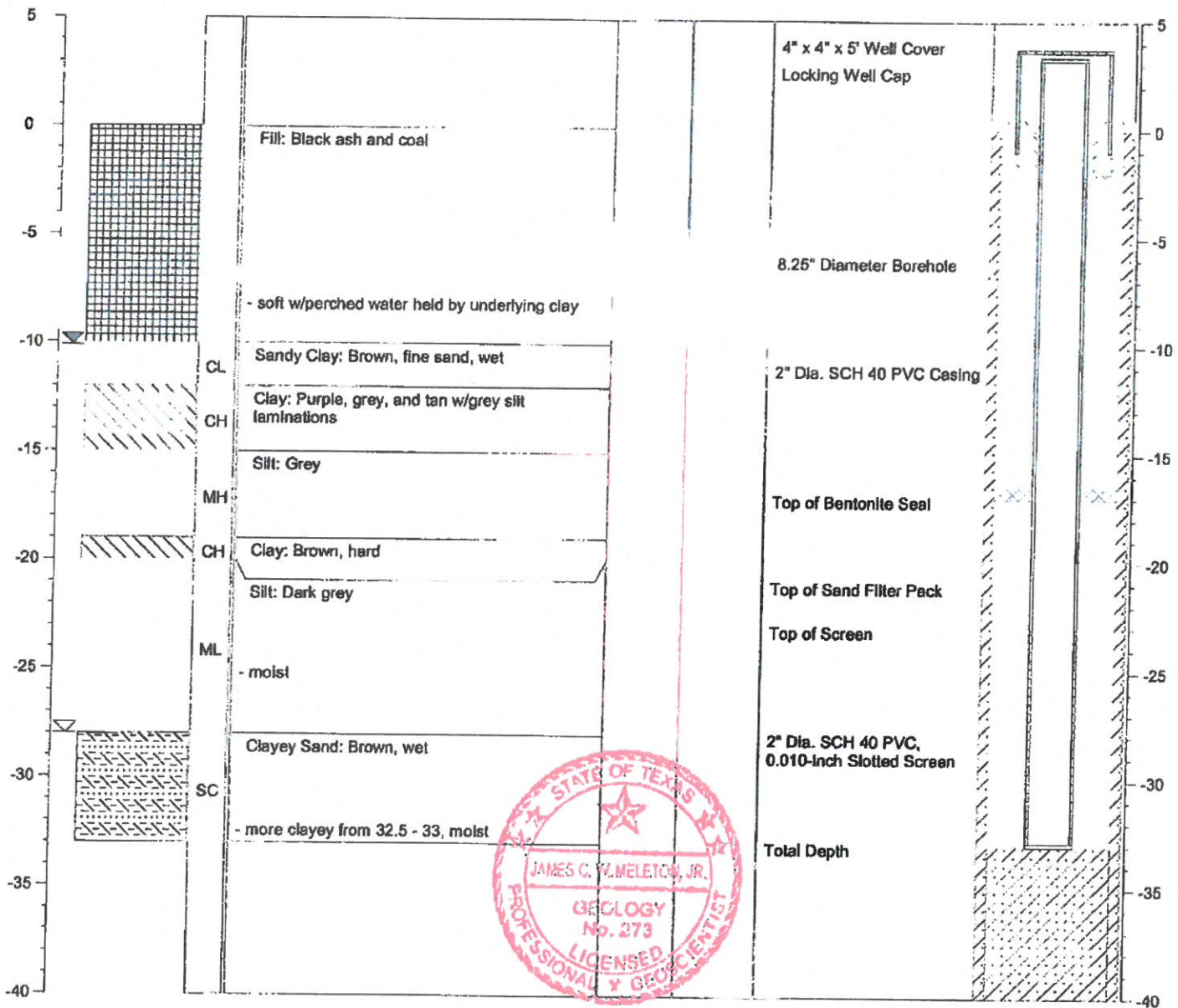
DRILLING CO.: WEST Drilling  
 DRILLER: Tom McCullough  
 METHOD OF DRILLING: Hollow-stem Auger  
 SAMPLING METHODS: Split-spoon  
 DATE DRILLED: 9/23/09

NOTES: Latitude: 33.05235  
 Longitude: 94.84757

☒ Water level during drilling  
 ☒ Water level in completed well

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-7  
 TOTAL DEPTH: 38'  
 TOP OF CASING ELEV.: 350.82 ft. NGVD  
 GROUND SURFACE ELEV.: 347.86 ft. NGVD

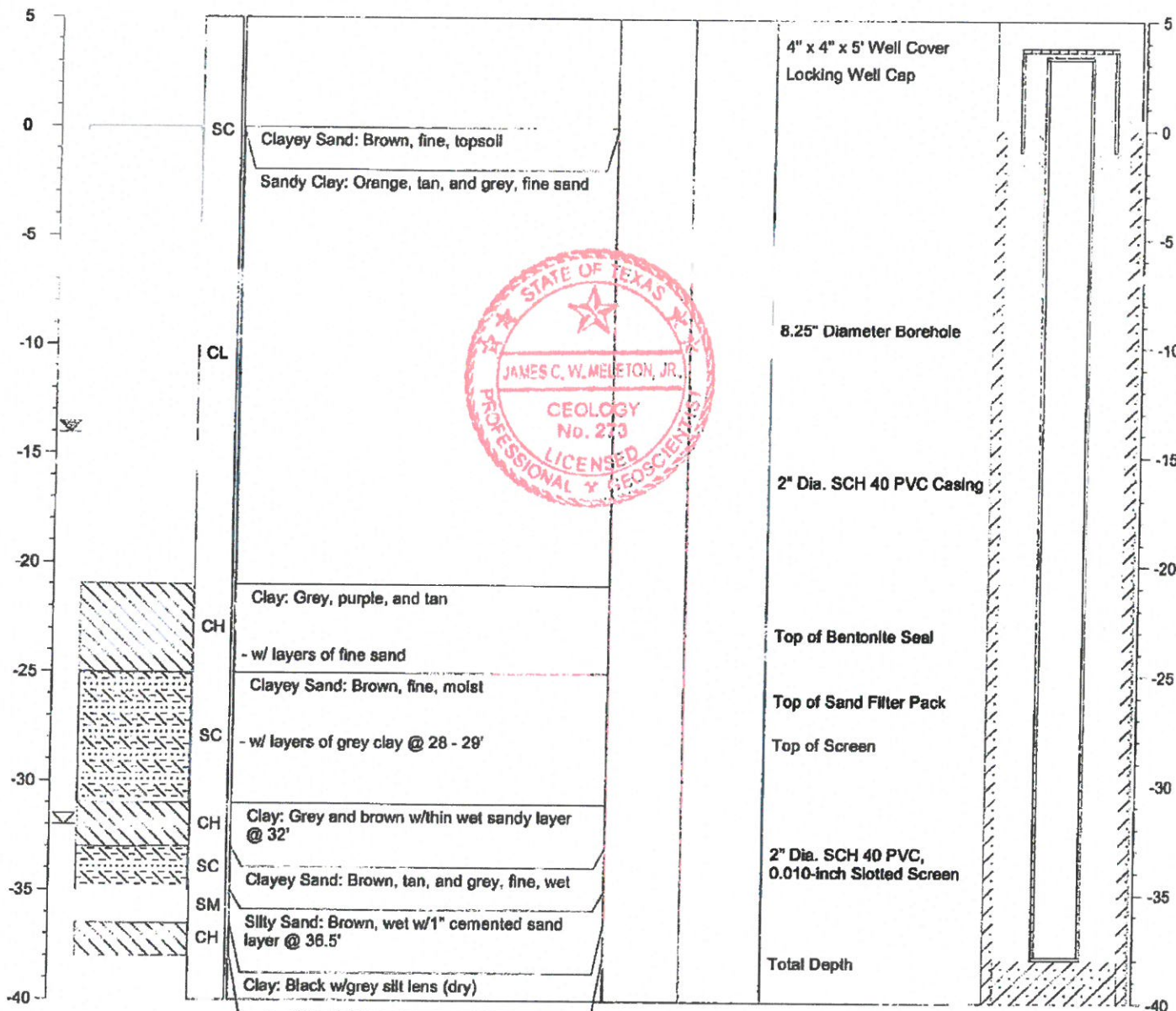
CLIENT: AEP  
 PROJECT: Ash Disposal Area  
 SITE LOCATION: Welsh Power Plant  
 PROJECT NO.: S-08-0109  
 LOGGED BY: James Meleton, Jr.

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

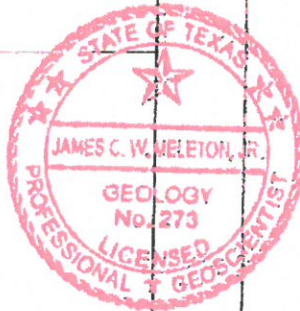
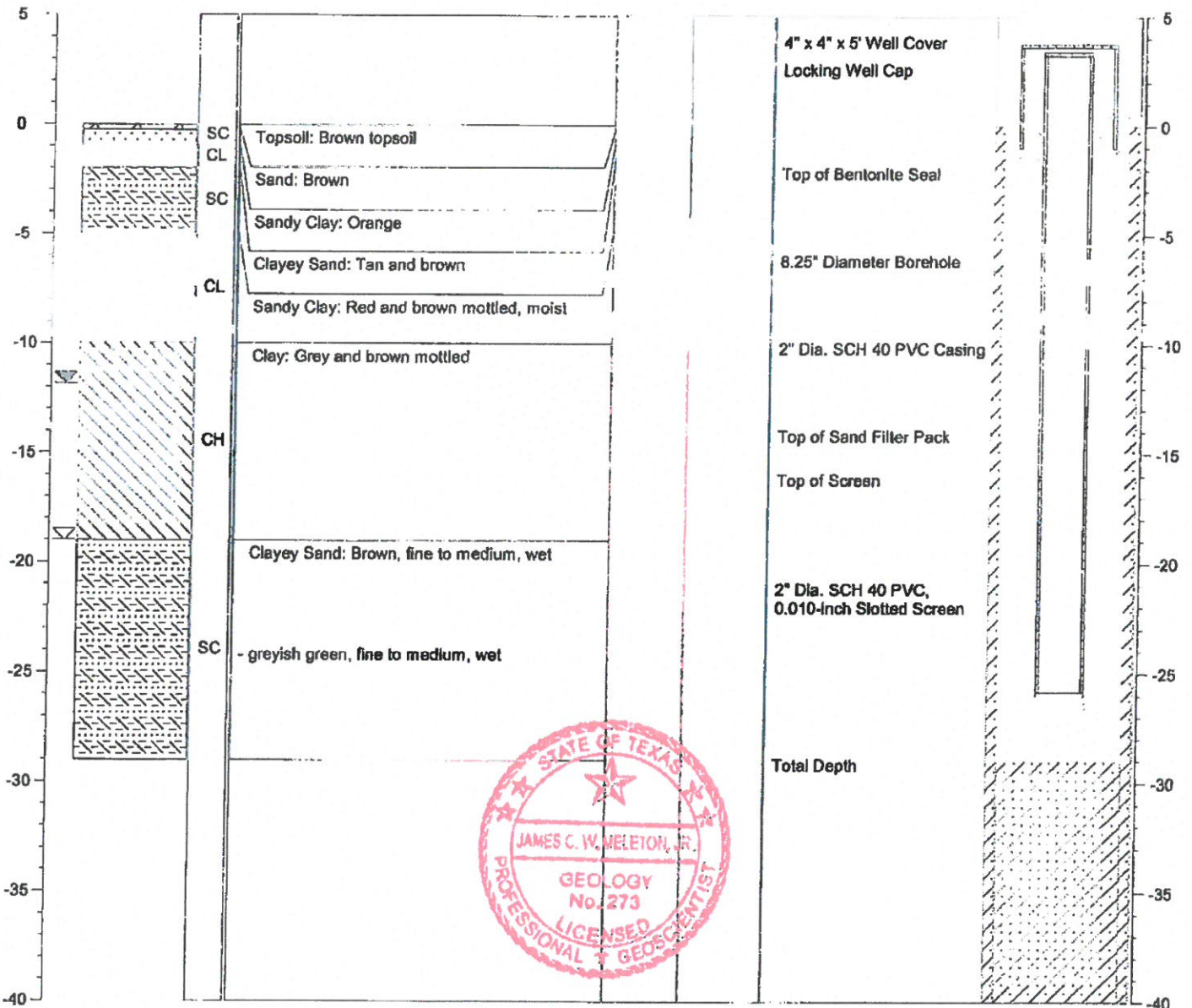
CLIENT: AEP  
 PROJECT: Ash Disposal Area  
 SITE LOCATION: Welsh Power Plant  
 PROJECT NO.: S-08-0109  
 LOGGED BY: James Meleton, Jr.

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

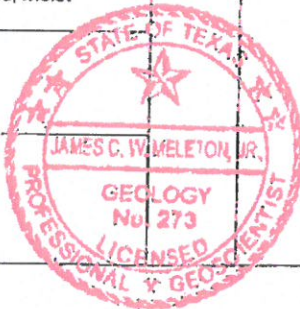
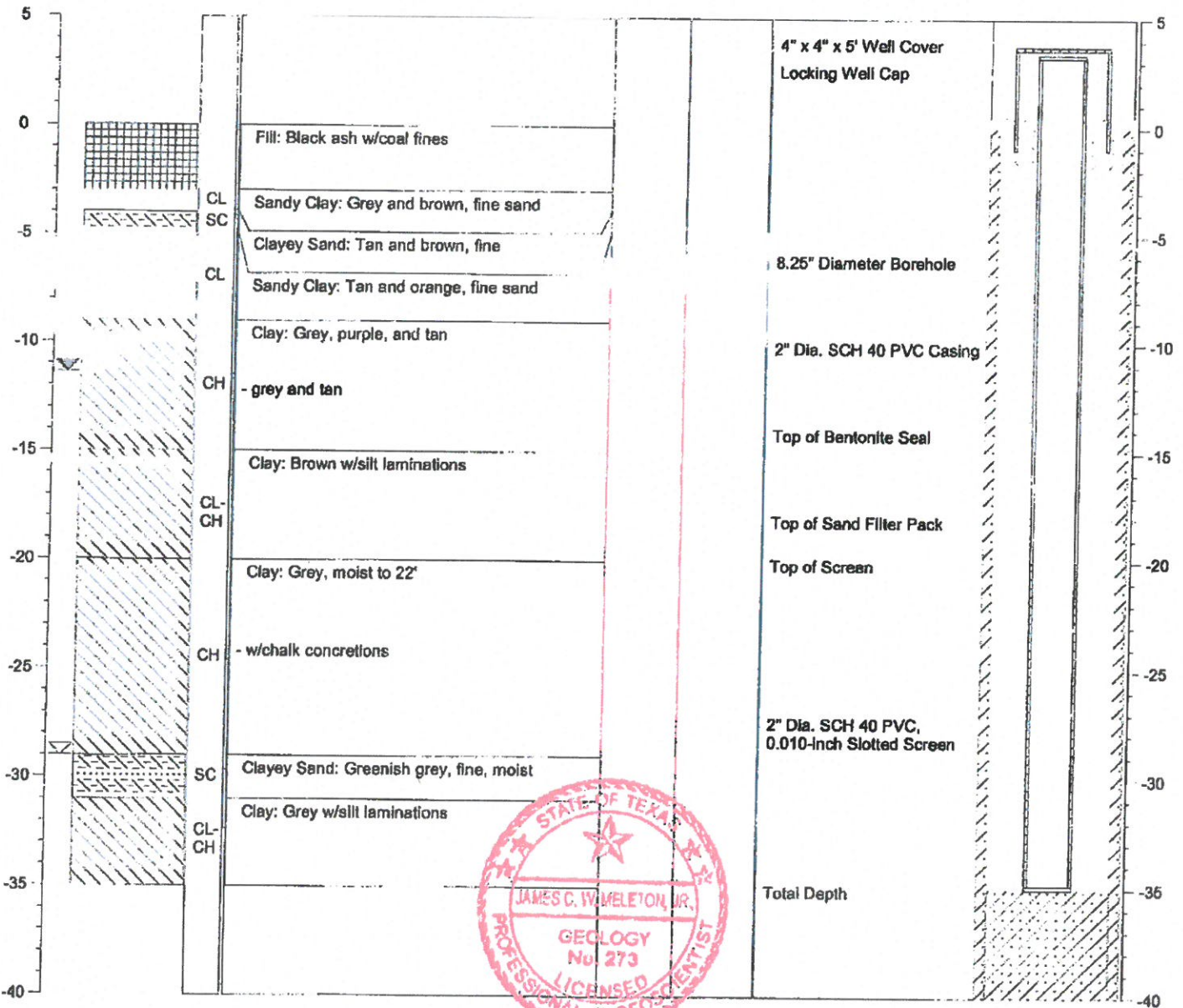
CLIENT: AEP  
 PROJECT: Ash Disposal Area  
 SITE LOCATION: Welsh Power Plant  
 PROJECT NO.: S-08-0109  
 LOGGED BY: James Meleton, Jr.

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

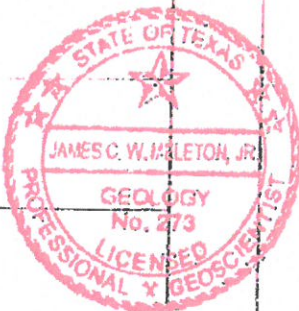
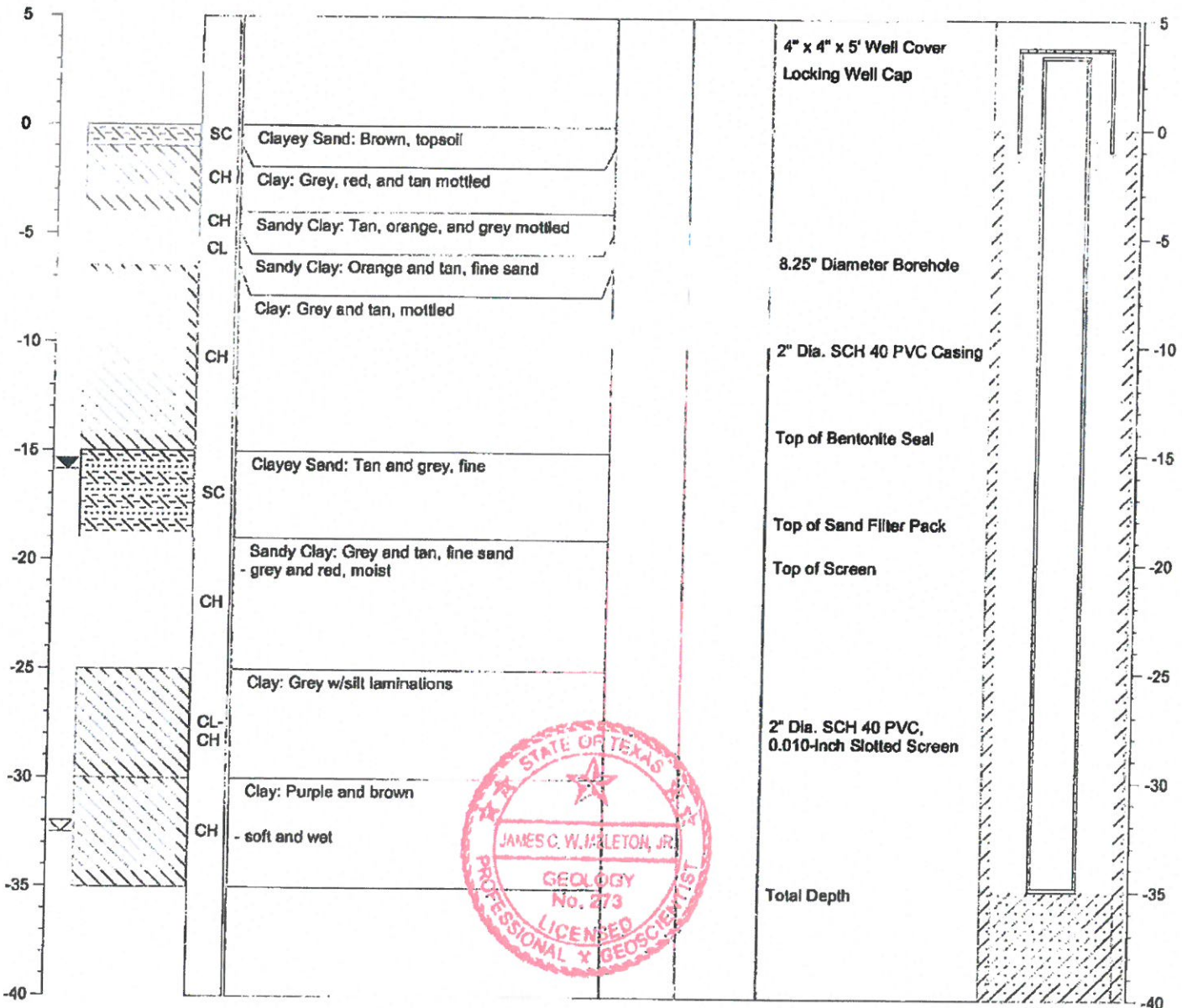
CLIENT: AEP  
 PROJECT: Ash Disposal Area  
 SITE LOCATION: Welsh Power Plant  
 PROJECT NO.: S-08-0109  
 LOGGED BY: James Meleton, Jr.

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

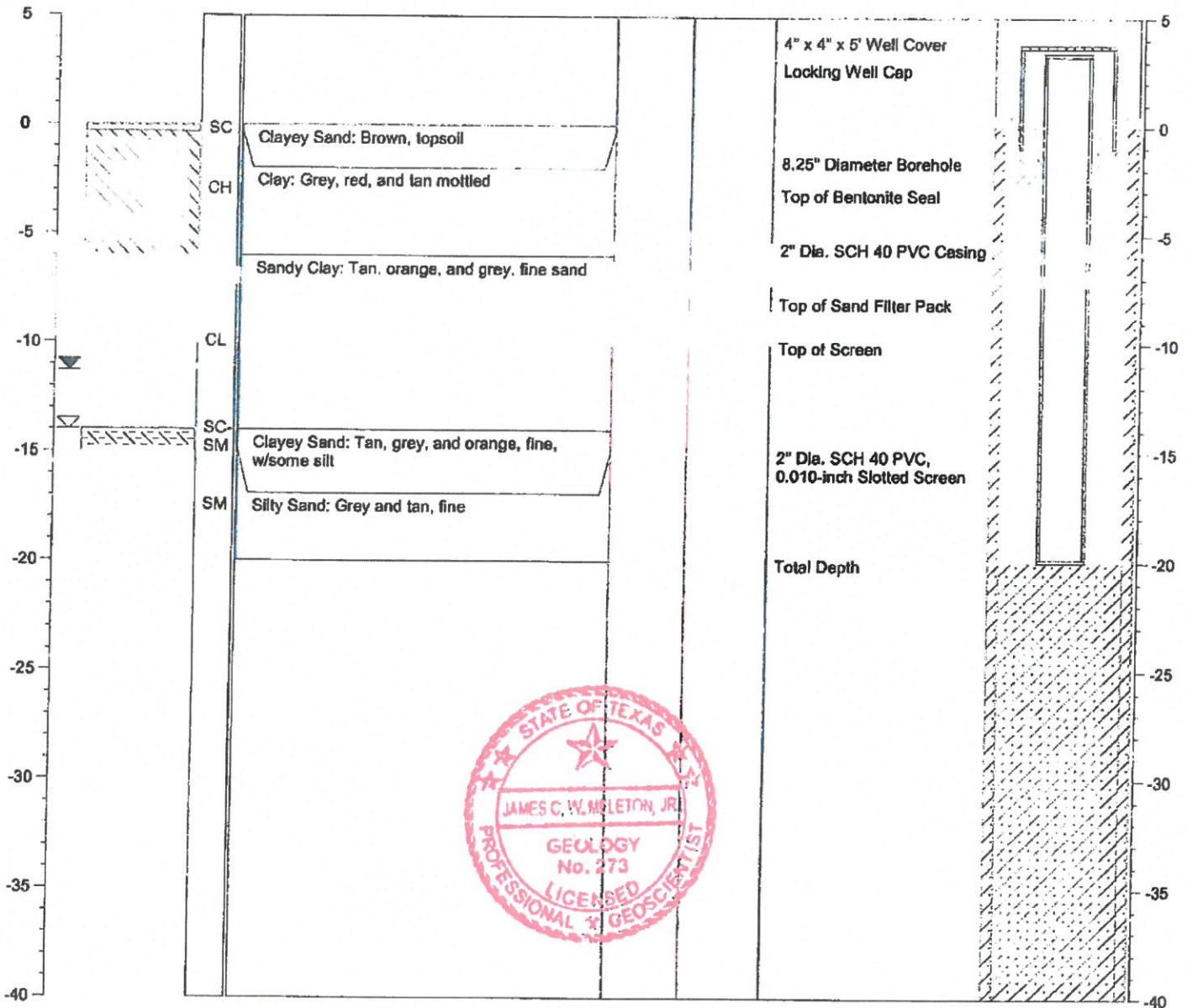
CLIENT: AEP  
 PROJECT: Ash Disposal Area  
 SITE LOCATION: Welsh Power Plant  
 PROJECT NO.: S-08-0109  
 LOGGED BY: James Meleton, Jr.

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  
 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-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.

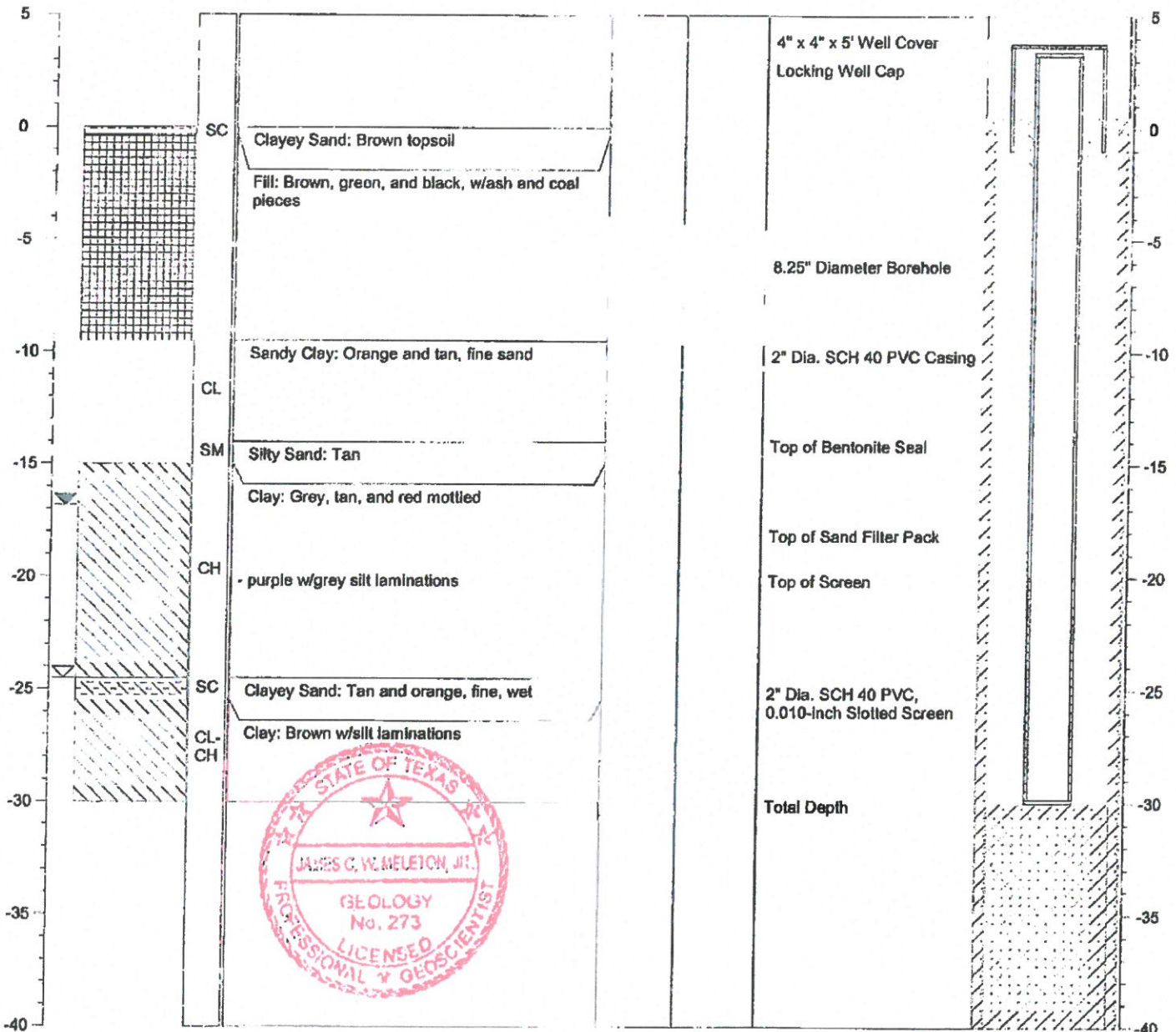
DRILLING CO.: WEST Drilling  
 DRILLER: Tom McCullough  
 METHOD OF DRILLING: Hollow-stem Auger  
 SAMPLING METHODS: Split-spoon  
 DATE DRILLED: 9/24/09

NOTES: Latitude: 33.04901  
 Longitude: 94.84977

☒ Water level during drilling  
 ☒ Water level in completed well

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-13  
 TOTAL DEPTH: 20'  
 TOP OF CASING ELEV.: 347.00 ft. NGVD  
 GROUND SURFACE ELEV.: 344.12 ft. NGVD

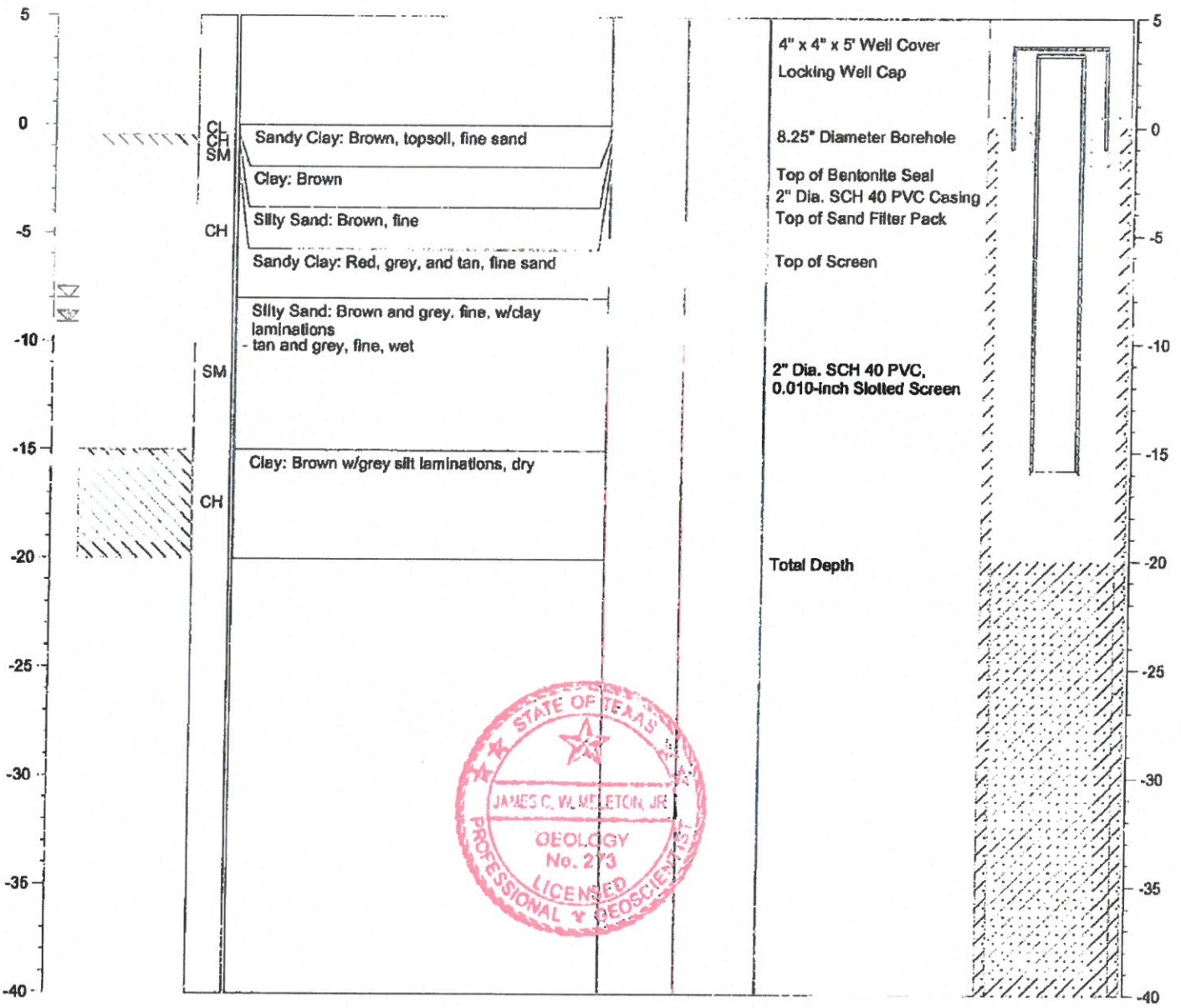
CLIENT: AEP  
 PROJECT: Ash Disposal Area  
 SITE LOCATION: Welsh Power Plant  
 PROJECT NO.: S-08-0109  
 LOGGED BY: James Meleton, Jr.

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

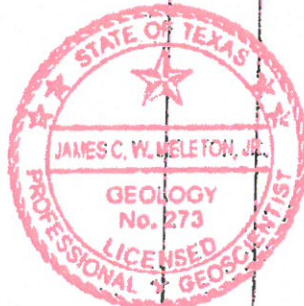
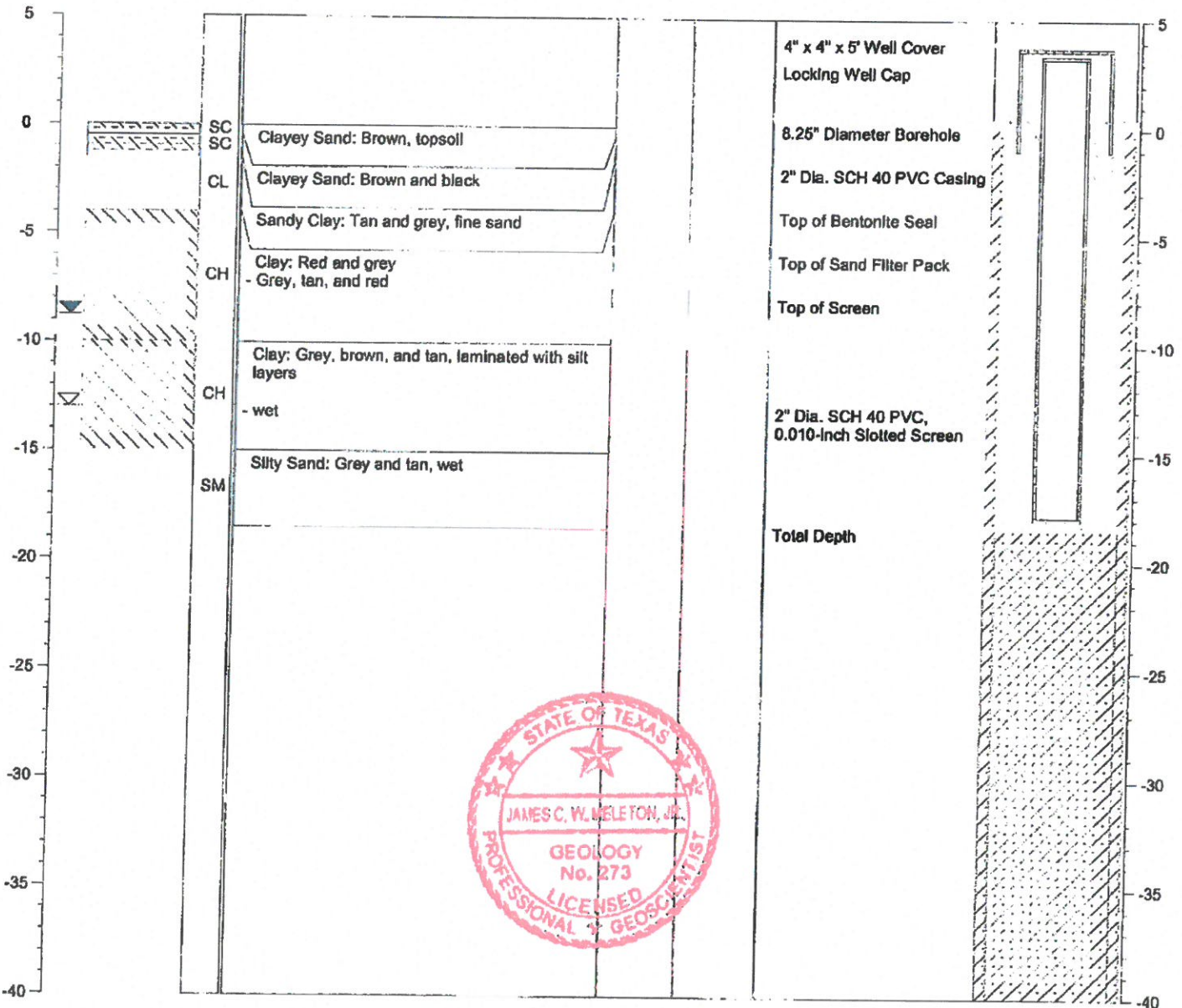
CLIENT: AEP  
 PROJECT: Ash Disposal Area  
 SITE LOCATION: Welsh Power Plant  
 PROJECT NO.: S-08-0109  
 LOGGED BY: James Meleton, Jr.

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

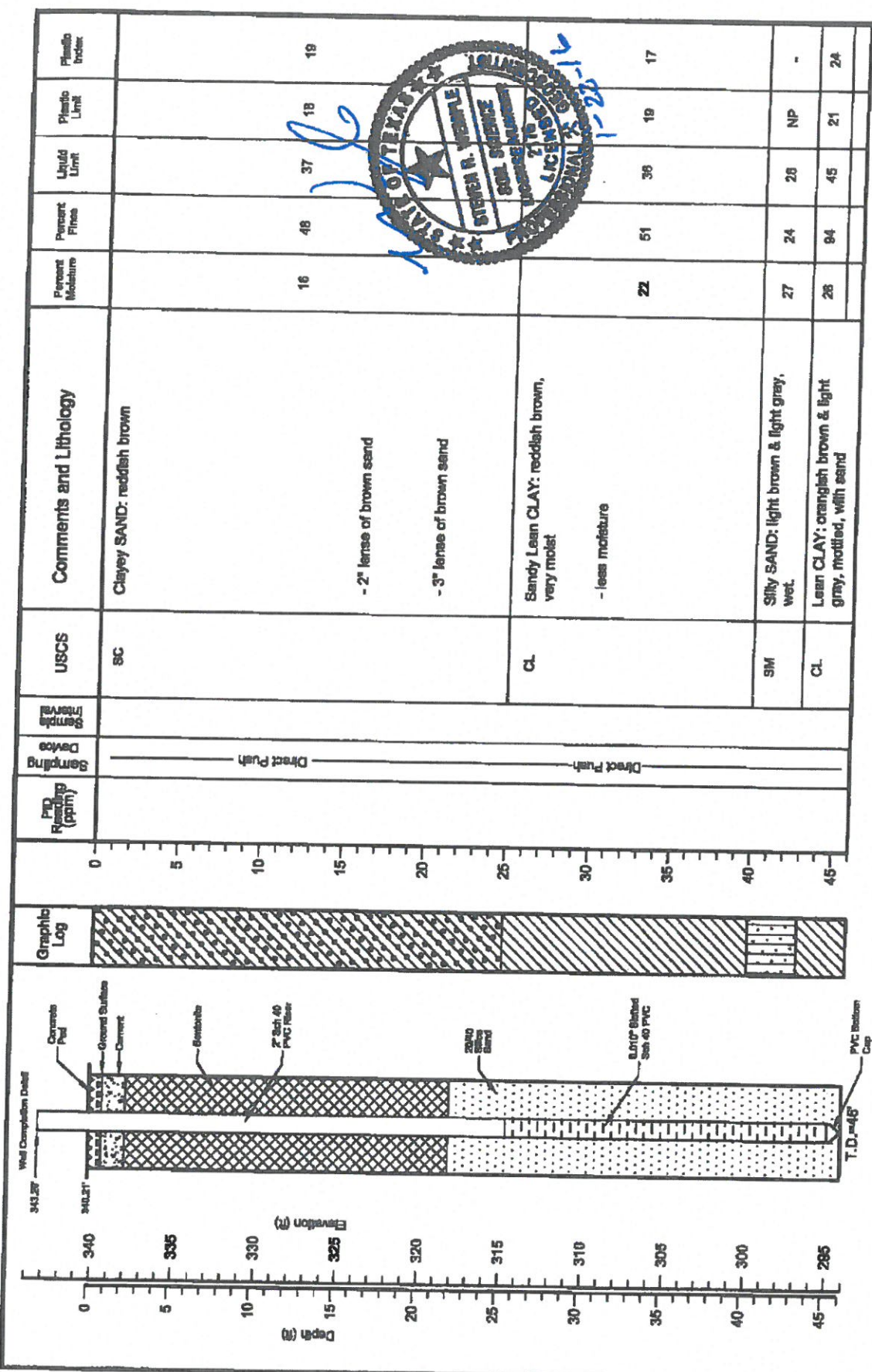
NOTES: Latitude: 33.04715  
 Longitude: 94.84256

☒ Water level during drilling  
 ☒ Water level in completed well  
 Page 1 of 1

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION
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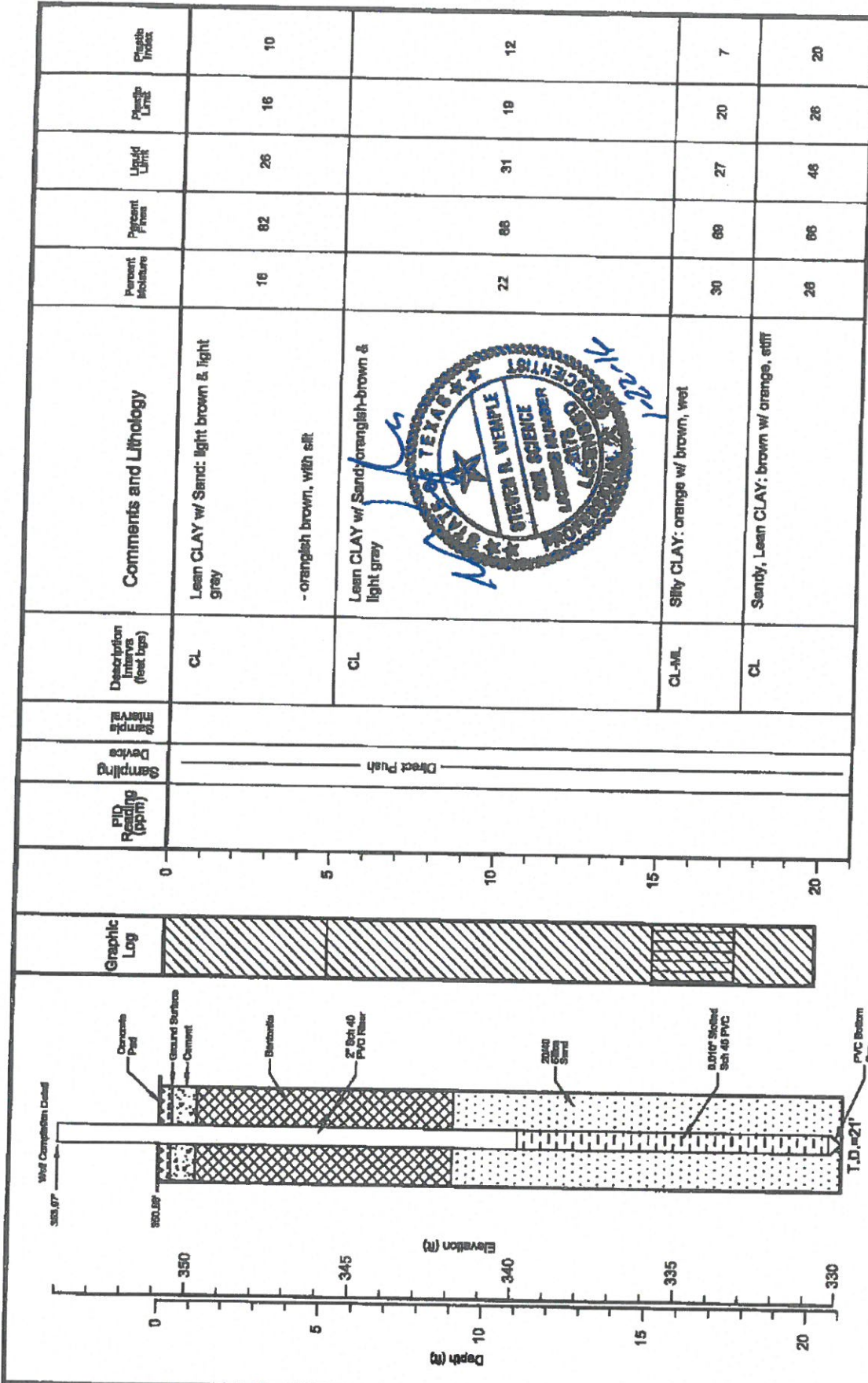
DATE: 12/12/15  
 Drilling Method: H.S.A.  
 Bit Diameter: 7.25"  
 Depth to Water: --

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

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

Log of Boring  
 AD-15

PRODUCT NO. --  
 FILE UNDER: 15101 Welsh Power Plant LOG-049



Depth (ft)	Elevation (ft)	Graphic Log	PID Reading (ppm)	Sampling Devices	Soil Sample	Description Interval (feet logs)	Comments and Lithology	Percent Moisture	Percent Firm	Liquid Limit	Plastic Limit	Plastic Index
0	350.87					CL	Lean CLAY w/ Sand: light brown & light gray	18	82	26	16	10
5	345			Direct Push		CL	- orangish brown, with silt Lean CLAY w/ Sand: orangish-brown & light gray	22	88	31	19	12
15	335					CL-ML	Silty CLAY: orange w/ brown, wet	30	69	27	20	7
20	330					CL	Sandy, Lean CLAY: brown w/ orange, stiff	28	66	46	26	20



**WEST DRILLING**  
Environmental & Geotechnical  
WEST Drilling, Inc.  
101 Industrial Drive  
Waukegan, Illinois 60087

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

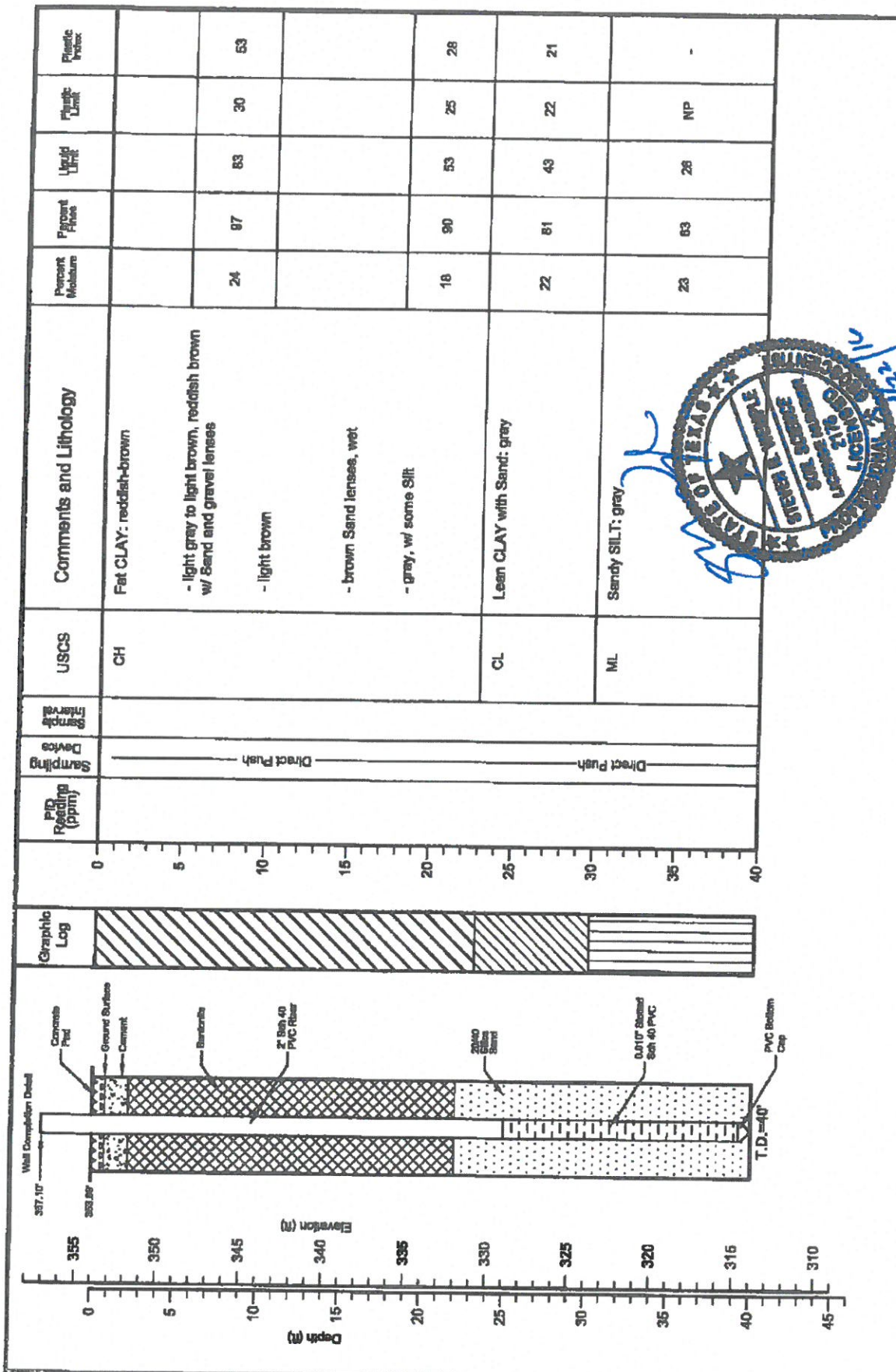
WELSH POWER STATION  
Pittsburg, Texas

Log of Boring  
AD-16

PROJECT NO.: ---  
SCALE: AS SHOWN  
CHECKED BY: SRW  
DRAWN BY: HDS

FILE NAME: J:\Boring Power Plant Logs\log



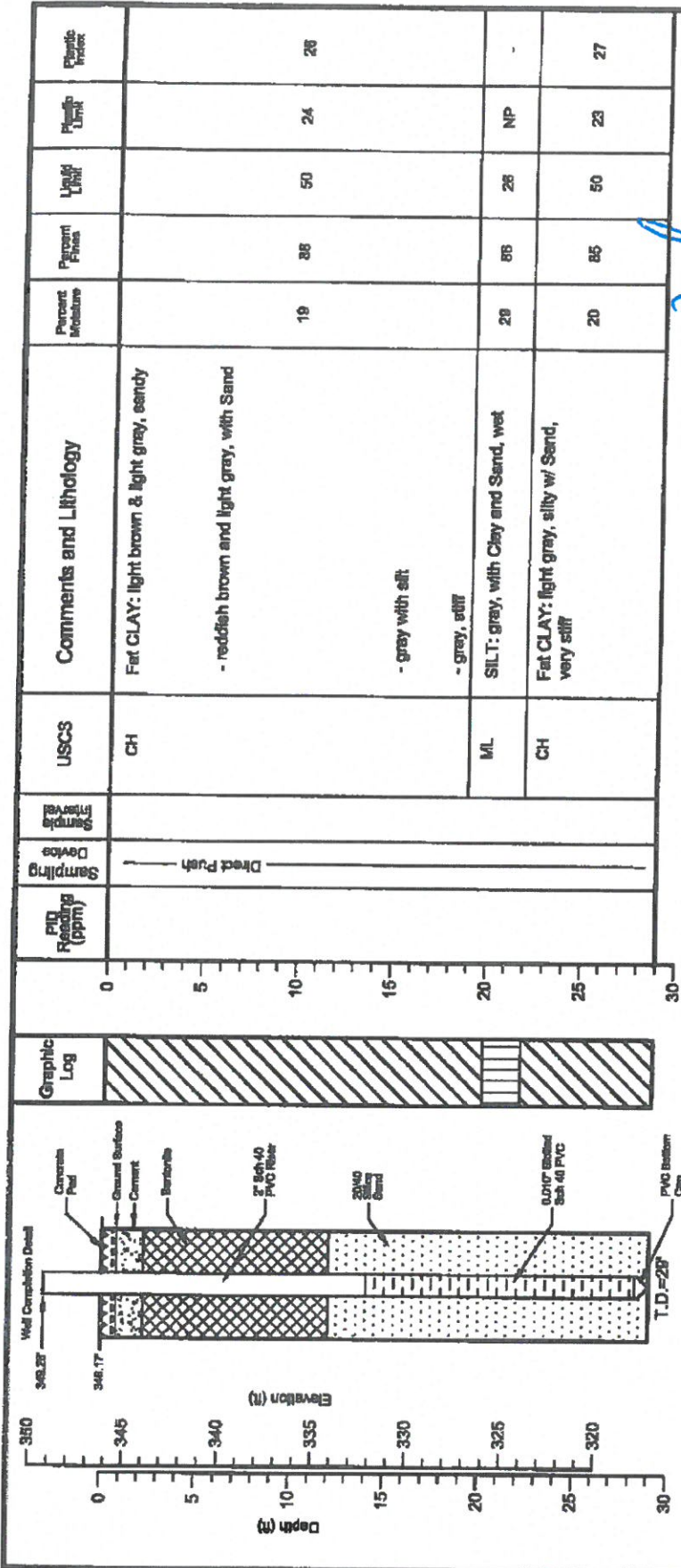


**west**  
**DRILLING**  
 environmental & geotechnical  
 WEST Drilling, Inc.  
 101 Industrial Drive  
 Waco, Texas 76768

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: 12/11/15  
 Depth to Product: NA

Welsh Power Station  
 Pittsburg, Texas  
 DRAWN BY: HDS  
 CHECKED BY: SRW  
 PROJECT NO. ---  
 SCALE: AS SHOWN  
 FILE NUMBER: Welsh Power Plant LogAD-17



WEST DRILLING, Inc.  
104 Federal Drive  
Waco, Texas 76706

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.: ---  
SHEET NO. 2/02/01

FILE NAME: J:\Welsh Power Plant\LOGS\log

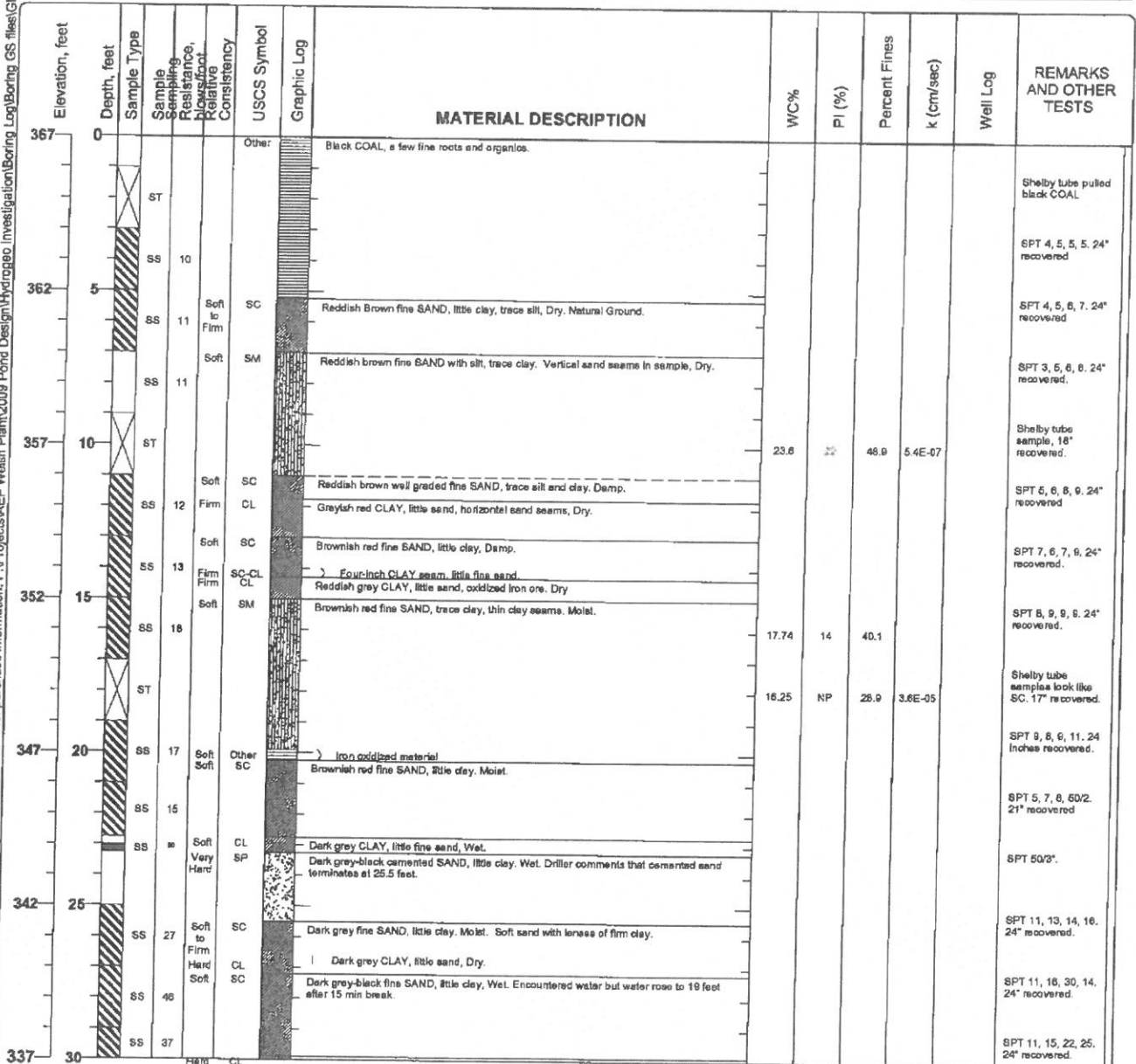


Project: AEP Welsh Power Plant  
 Project Location: Cason, TX  
 Project Number: TXL0064

Log of Boring GB-1  
 Sheet 1 of 2

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

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

Figure

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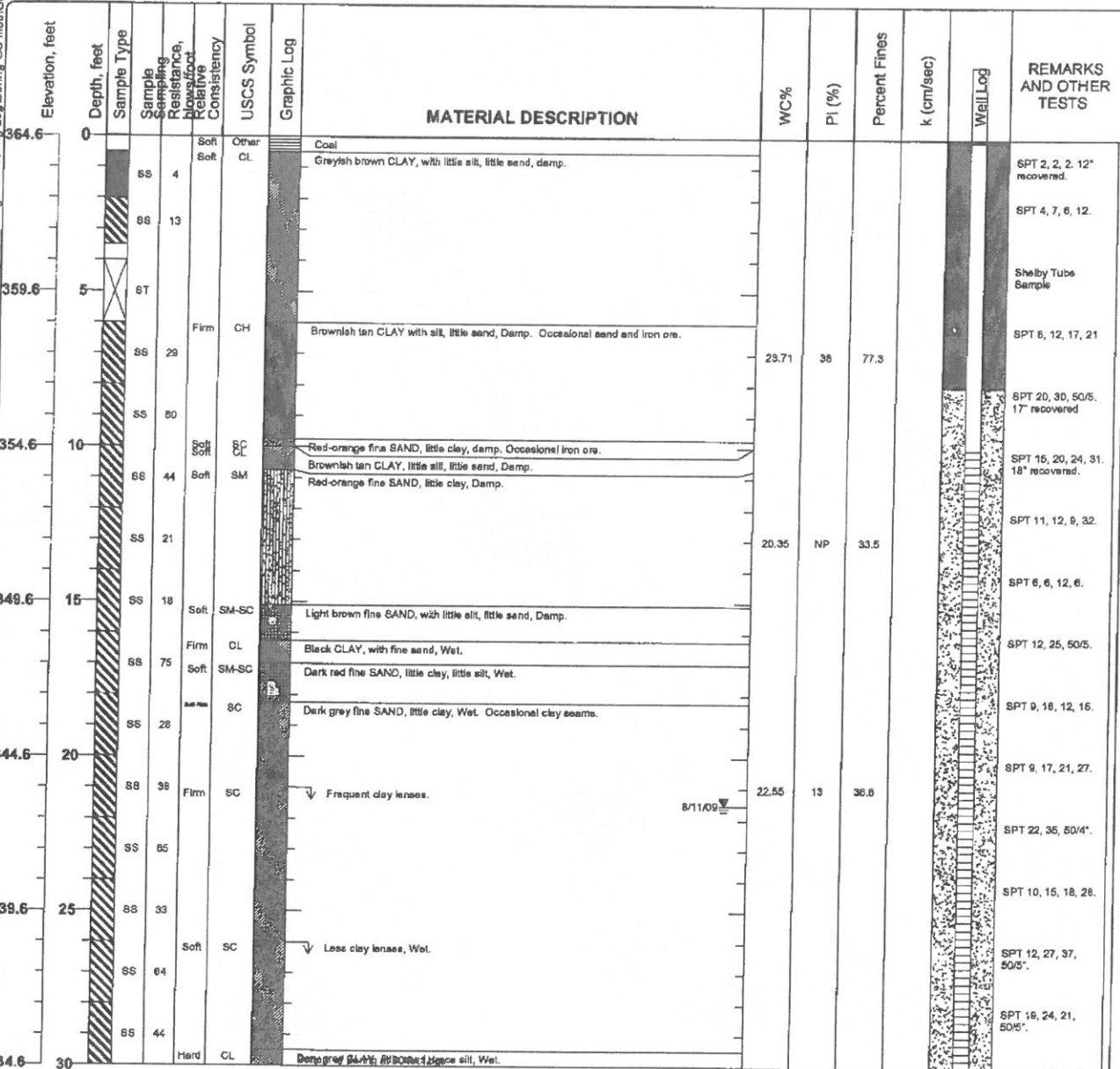


Project: AEP Welsh Power Plant  
 Project Location: Cason, Texas  
 Project Number: TXL0064

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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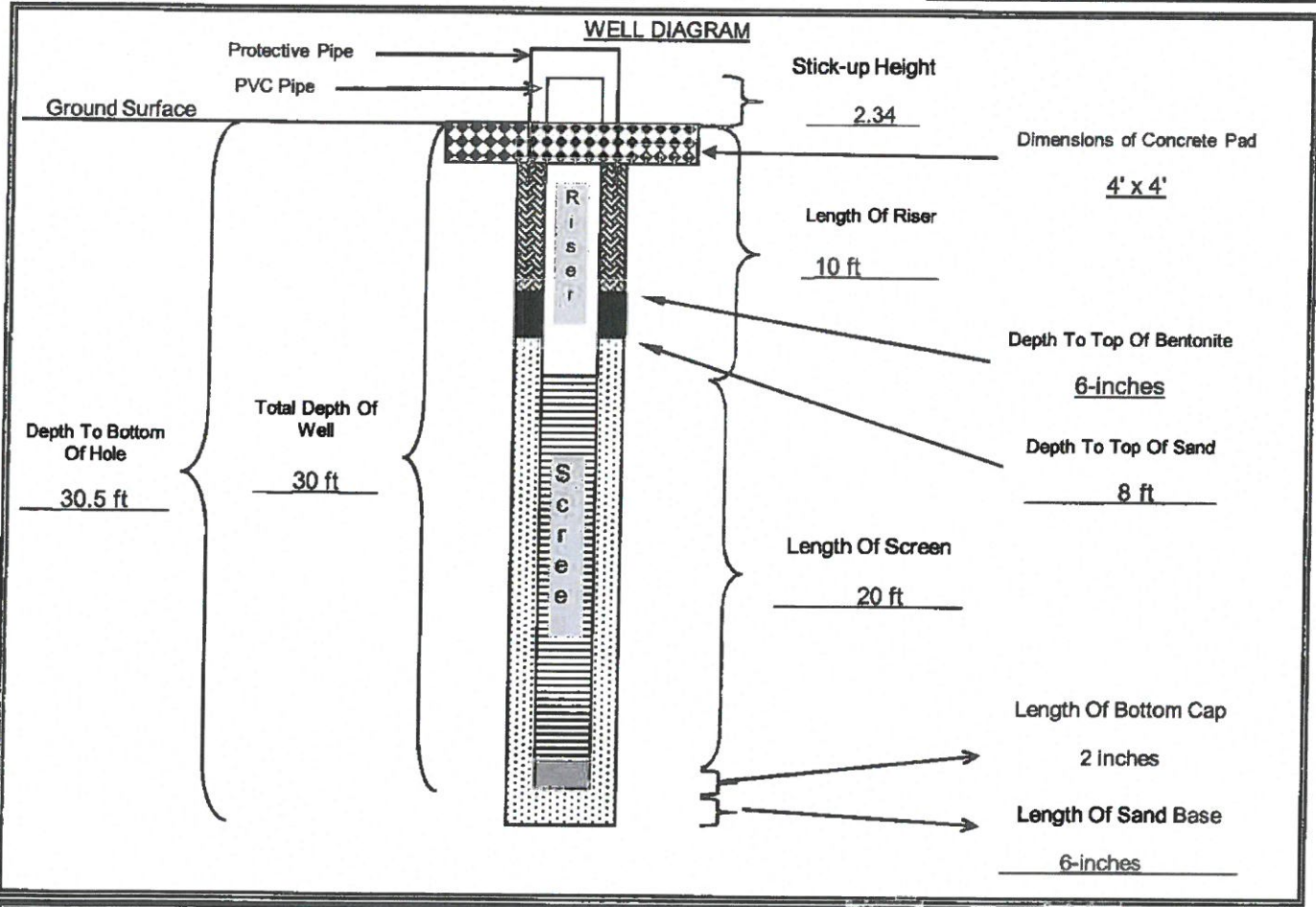
Figure

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



JOB NAME: <u>AEP Welsh Power Plant</u>	<b>GB-02</b>
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>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: _____

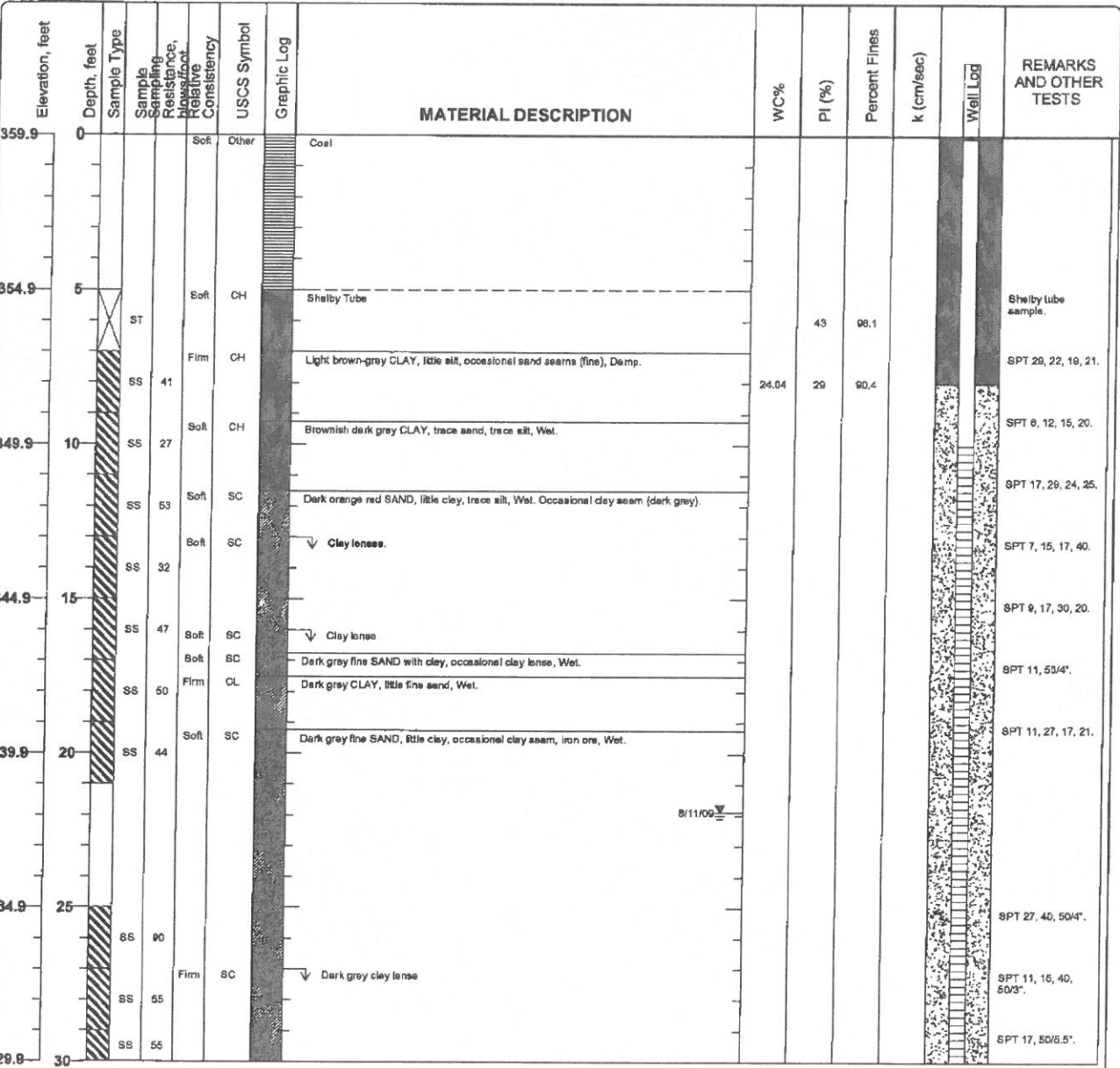


**Project: AEP Welsh Power Plant**  
**Project Location: Cason, Texas**  
**Project Number: TXL0064**

**Log of Boring GB-03**  
 Sheet 1 of 2

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

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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 Sampling Resistance, lb/sq. ft.	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 gray 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

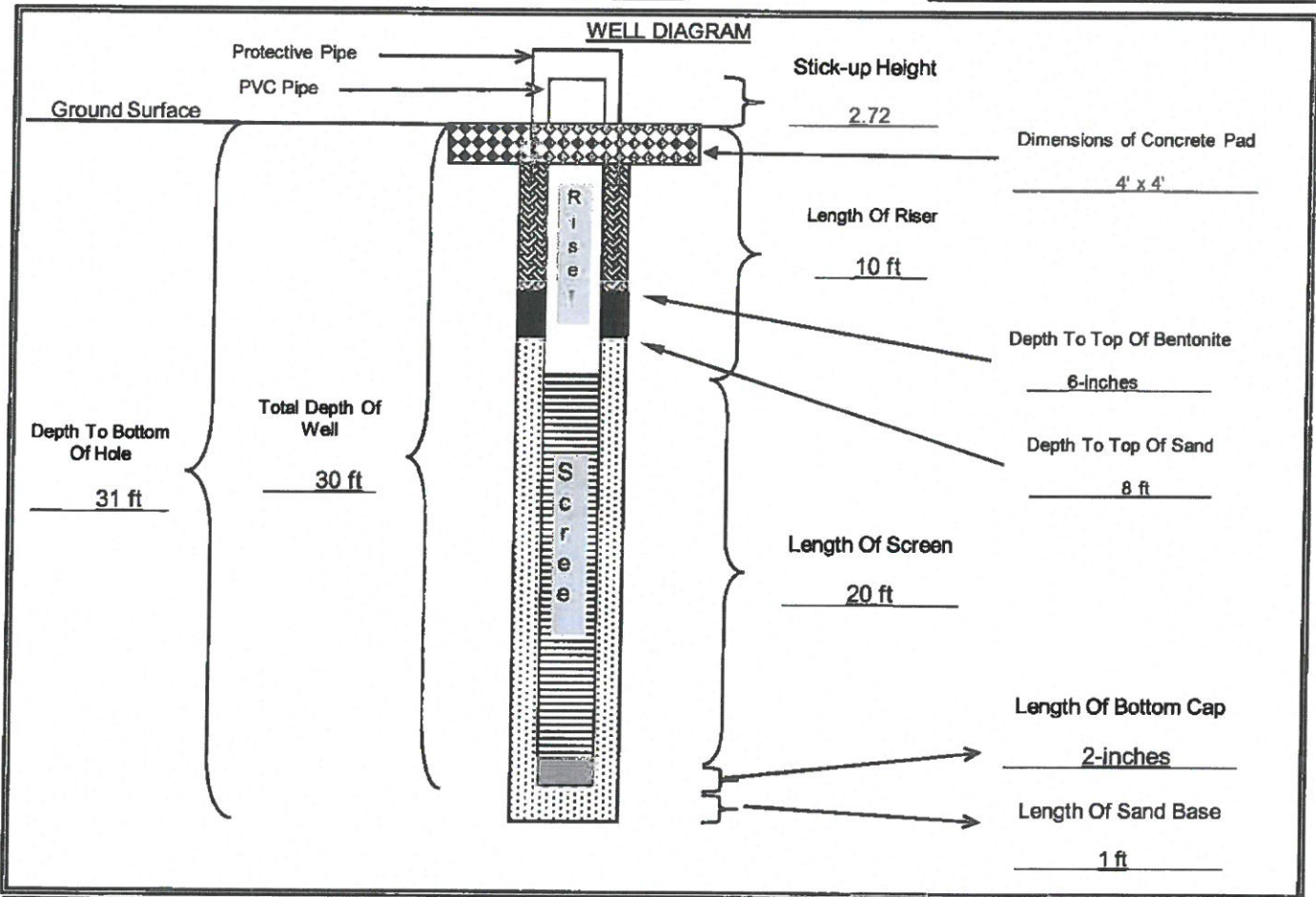


## WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)



JOB NAME: <u>AEP Welsh Power Plant</u>		<b>GB-03</b>
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 <u>lbs</u>
RISER DIAMETER: <u>2</u> (in)    Length: <u>10</u> (ft)	AMOUNT CEMENT USED: _____ bags <u>lbs</u>
SCREEN DIAMETER: <u>2</u> (in)    Length: <u>20</u> (ft)	AMOUNT SAND USED: <u>12</u> bags <u>lbs</u>
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

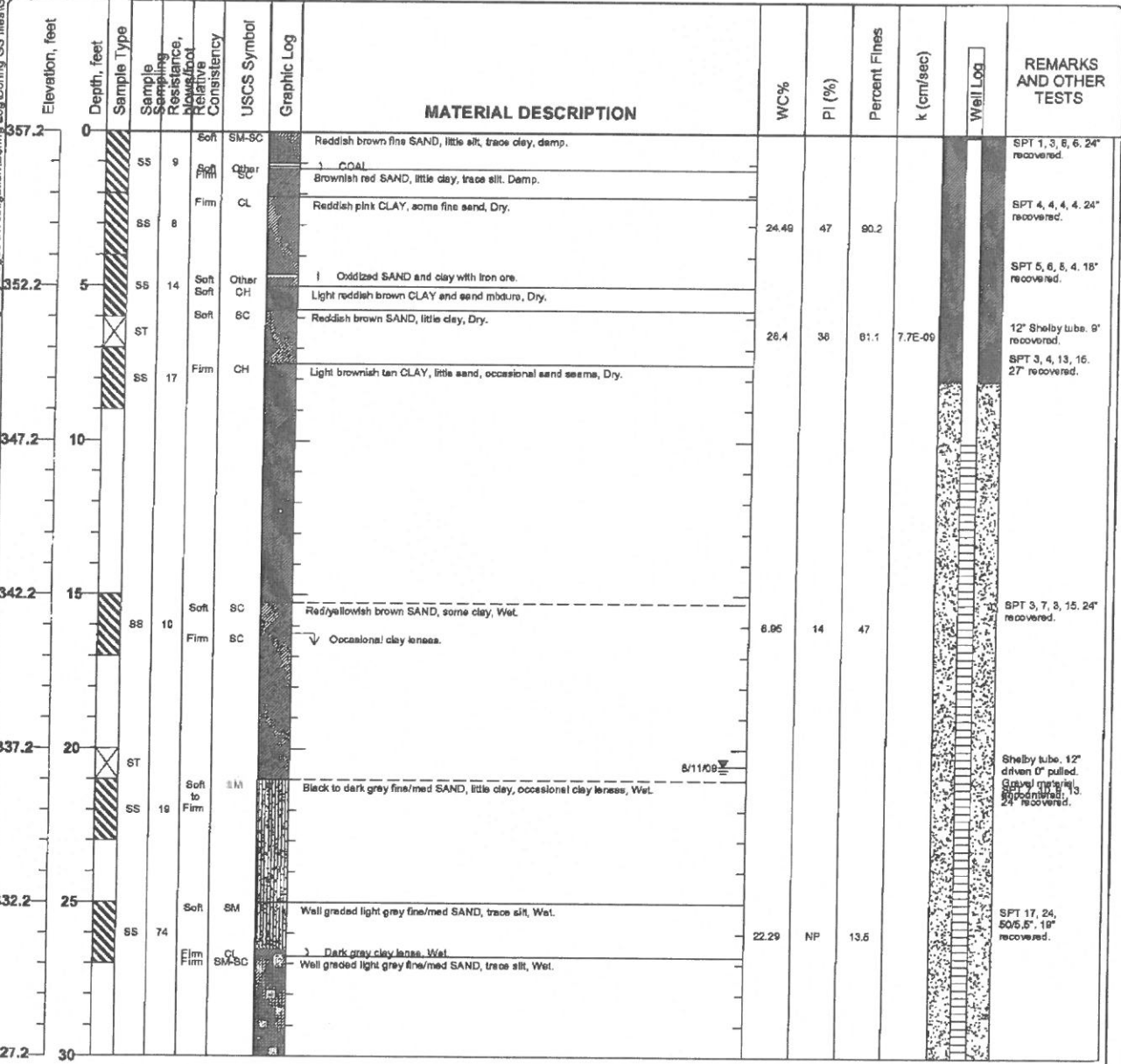


QA/QC	INSTALLED BY: <u>Total Support Services</u>	OBSERVED BY: <u>Kush S. Chohan</u>			
	DATE: <u>7-Aug-09</u>	CHECKED BY: _____	DATE: _____		

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

Log of Boring GB-04  
 Sheet 1 of 2

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



Figure

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Project: AEP Welsh Power Plant

Project Location: Cason, Texas

Project Number: TXL0064

# Log of Boring GB-04

Sheet 2 of 2

Elevation, feet	Depth, feet	Sample Type	Sample Resistance, Blow/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 gray CLAY, little sand, Wet.						12" Shelby tube. Bent shaly tube.
		ST						21.3	NP	84.2	2.0E-08		12" Shelby tube.
		SS	38	Hard	CL		Dark gray CLAY, trace sand, Wet.	25.44	18	82.5			SPT 15, 16, 19, 25. 24" recovered.
322.2	35						Bottom of Boring at 34 feet bgs						
317.2	40												
312.2	45												
307.2	50												
302.2	55												
297.2	60												
292.2	65												

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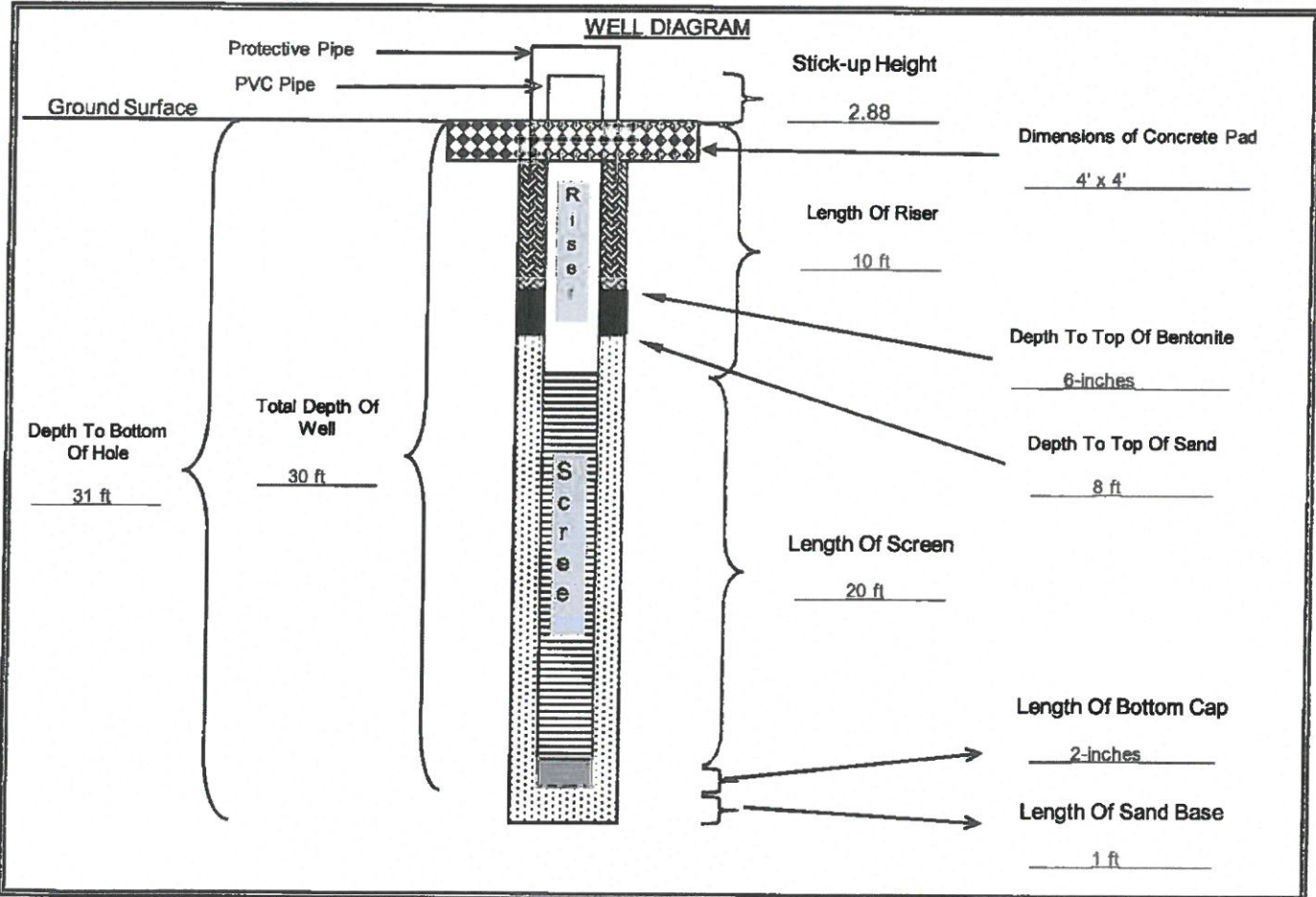
Figure

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



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

GROUND SURFACE ELEVATION: <u>357.22</u> (ft, msl)	BENTONITE TYPE: <u>Western Bentonite</u>
TOP OF SCREEN ELEVATION: <u>347.22</u> (ft, msl)	MANUFACTURER: <u>PDS</u>
BOTTOM OF WELL ELEVATION: <u>326.22</u> (ft, msl)	CEMENT TYPE: _____
NORTHING: <u>-384.9666</u> EASTING: <u>-2353.7375</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: _____ (in)	STATIC WATER: <u>20.54</u> depth from TOC
DRILLING TECHNIQUE: <u>Hollow Stem</u> Size: <u>6.75</u> (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: _____

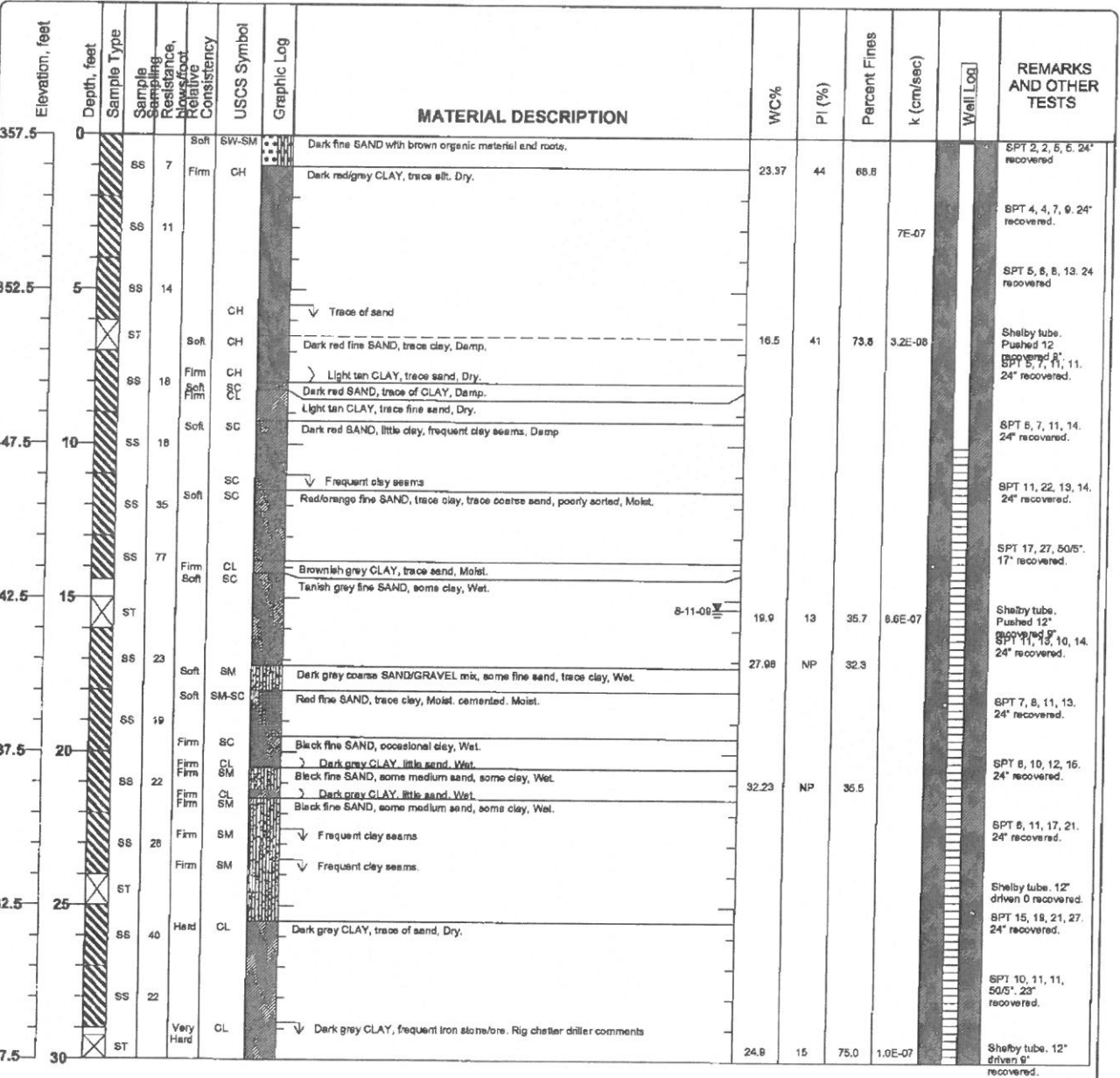


Project: AEP Welsh Power Plant  
 Project Location: Cason, Texas  
 Project Number: TXL0064

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

Elevation, feet	Depth, feet	Sample Type	Sample Sampling 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	ST	Hard	CL		Dark grey 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

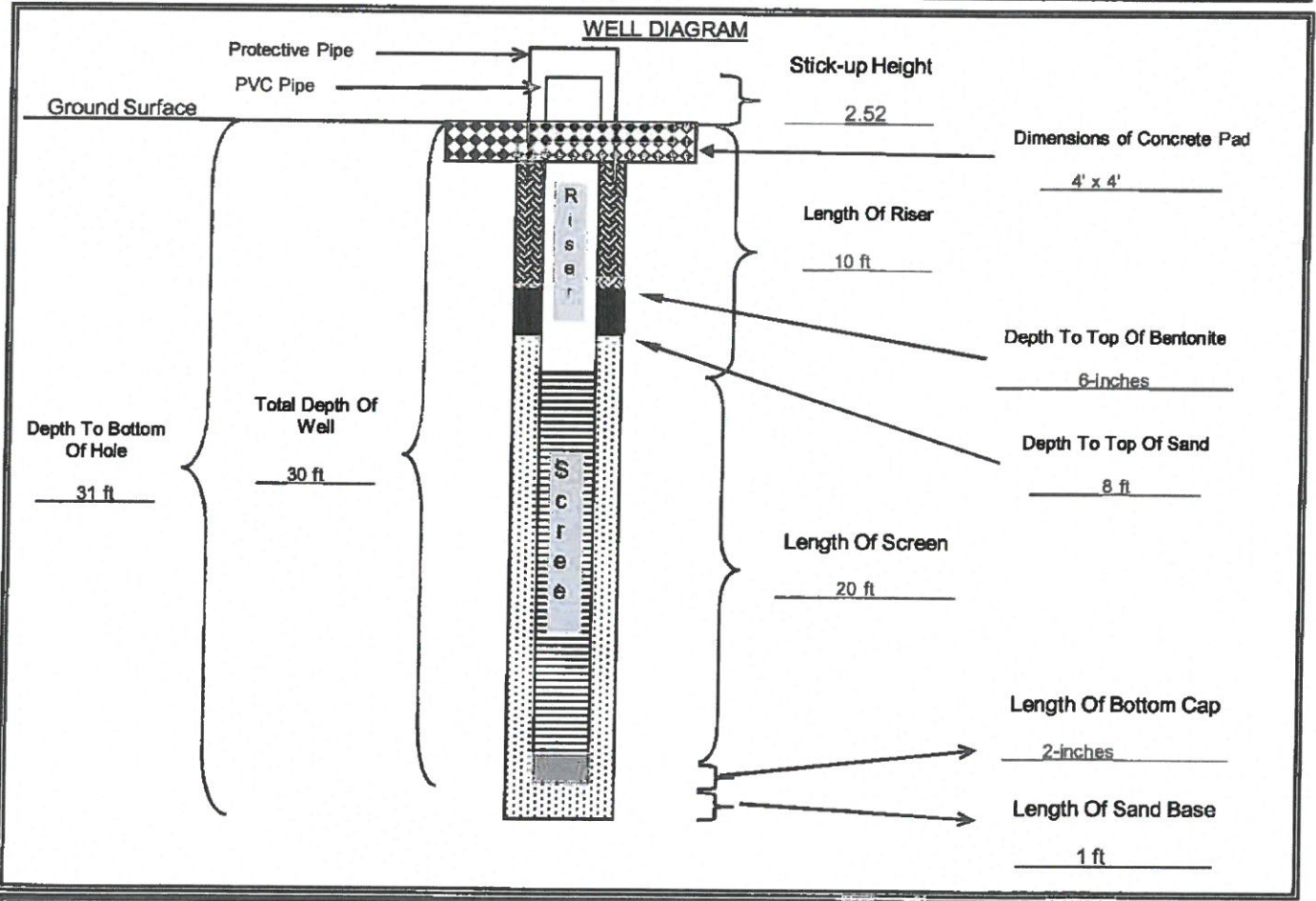


## WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP)



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



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

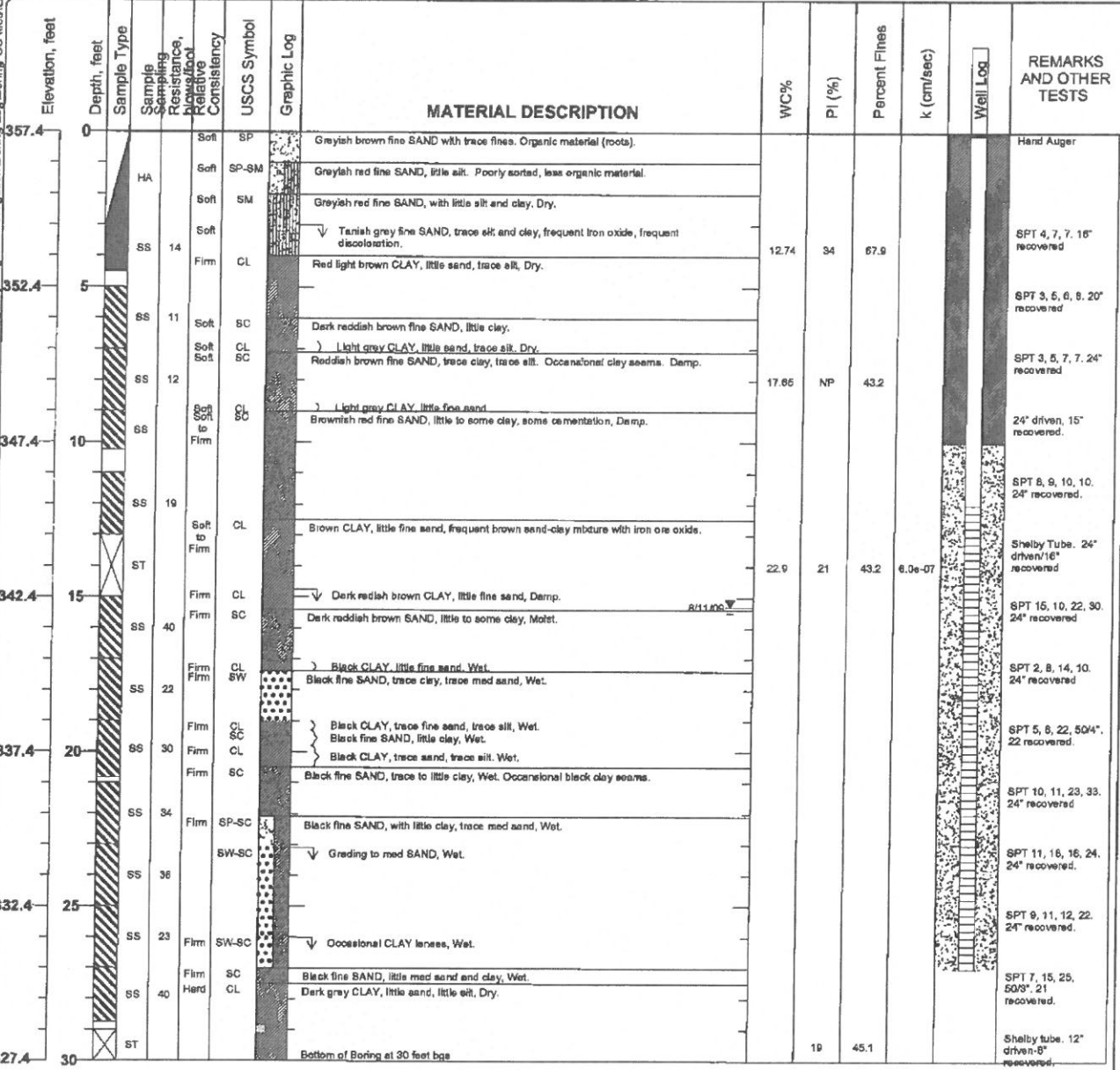
QA/QC	INSTALLED BY: <u>Total Support Services</u>	OBSERVED BY: <u>Kush Chohan</u>
	DATE: <u>6-Aug-09</u>	CHECKED BY: _____ DATE: _____

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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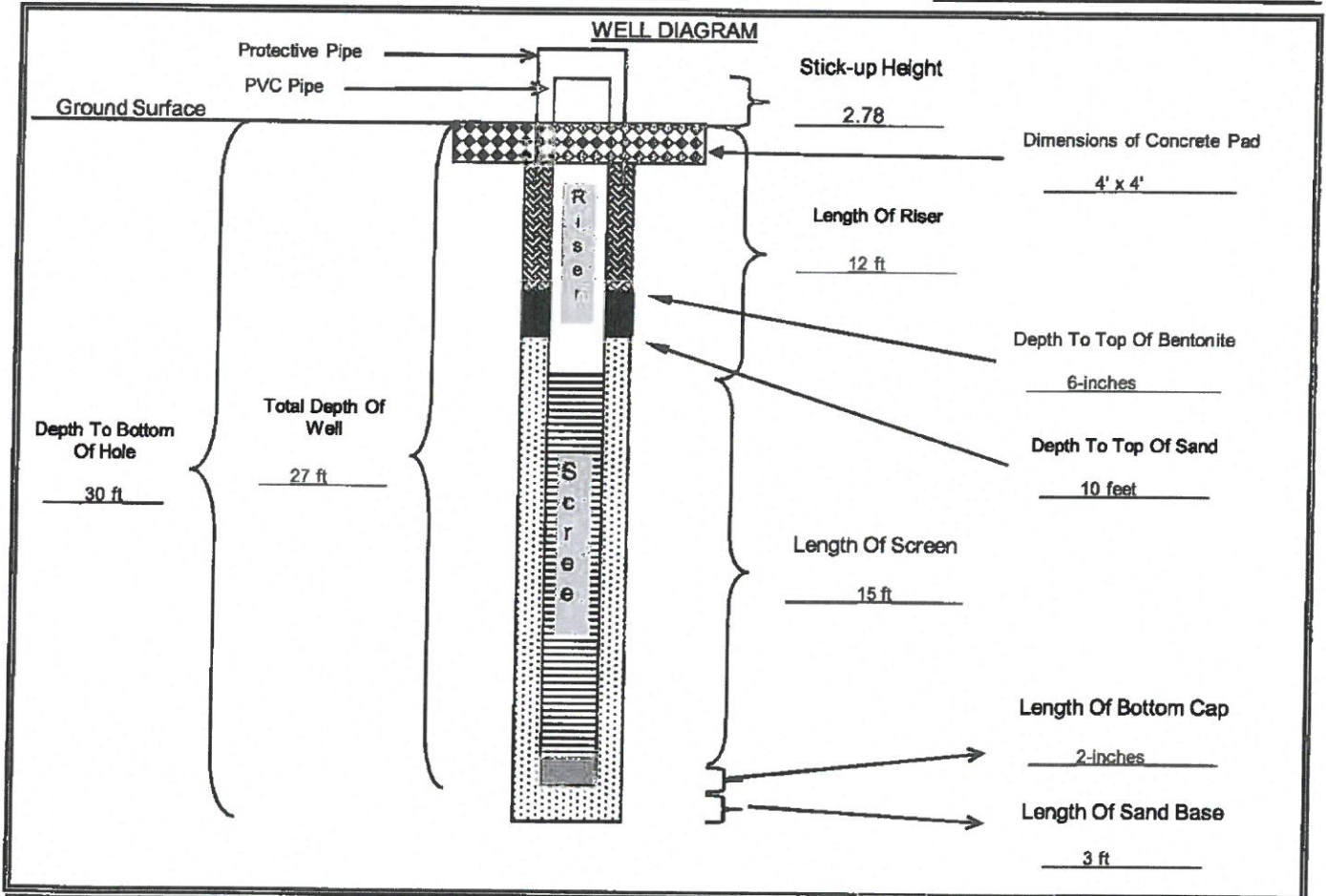
Figure

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



JOB NAME: <u>AEP Welsh Power Plant</u>		<b>GB-06</b>
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



Cement/Bentonite Grout	Sand Pack	Neat Concrete	Bentonite

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**

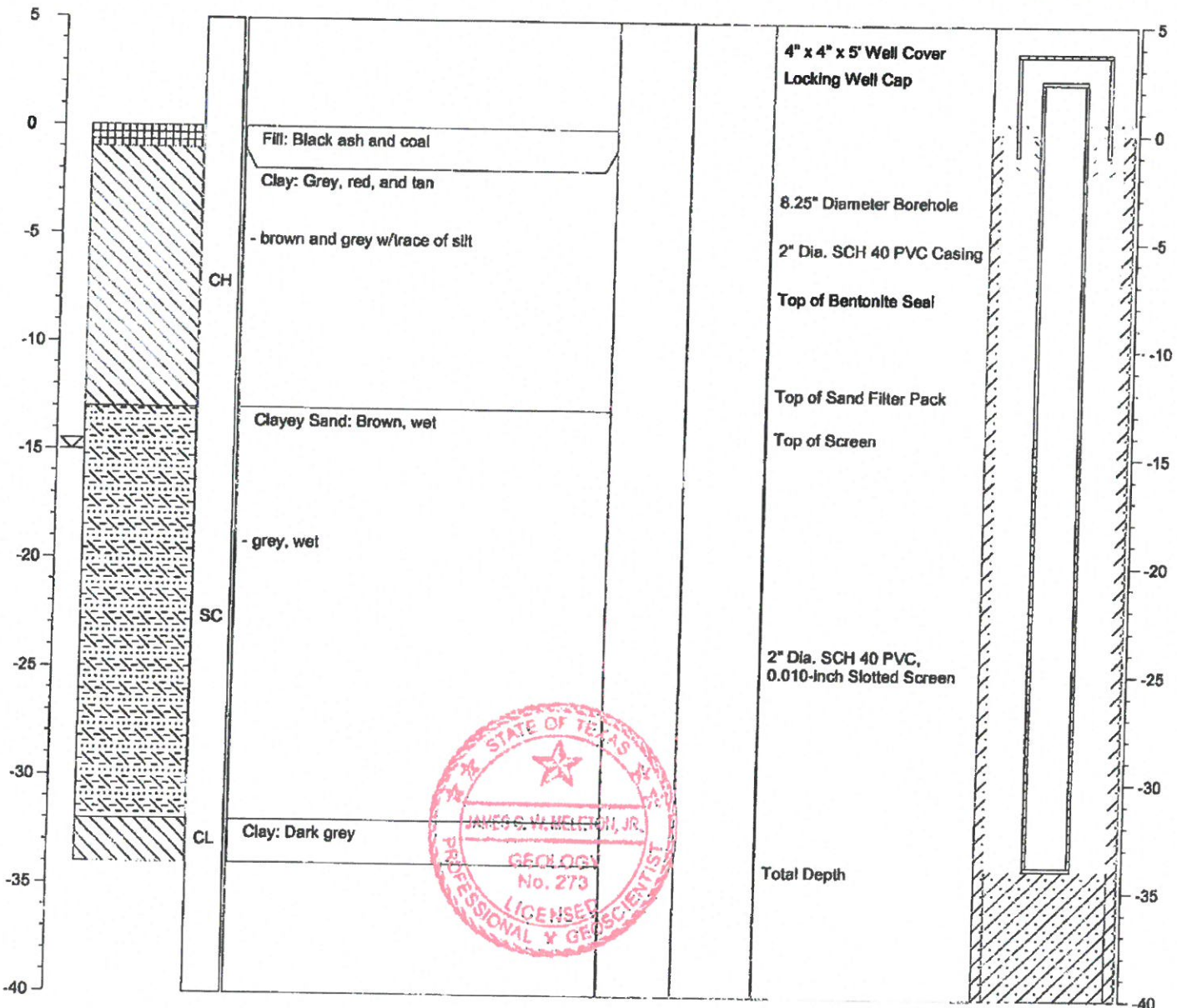
CLIENT: **AEP**  
 PROJECT: **Metal Cleaning Waste Pond**  
 SITE LOCATION: **Welsh Power Plant**  
 PROJECT NO.: **S-08-0120**  
 LOGGED BY: **James Meleton, Jr.**

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

DEPTH	SOIL SYMBOLS	USCS	SOIL DESCRIPTION	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	WELL CONSTRUCTION
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1717 East Erwin  
Tyler, Texas 75702  
(903) 595-4421

**LOG OF BORING B-1**

PROJECT: Welsh Power Plant  
Pittsburgh, Texas

PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

DATE

10/27/09

SURFACE ELEVATION  
324.1

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (ksf)	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 (%)	PL	PL		
0												20	54	16	38	63	+40 Sieve=10% +4 Sieve=1%	
5					SANDY LEAN CLAY (CL) very stiff; brownish orange SILTY SAND (SM) tannish orange SANDY FAT CLAY (CH) medium stiff; tannish orange -stiff	P=4.0 SF N=7						19	34	17	17	32	+40 Sieve=7% +4 Sieve=3%	
10					CLAYEY SAND (SC) medium dense; tannish orange; with clay seams SANDY LEAN CLAY (CL) stiff; orange	P=1.5 N=15						22	24	15	9	19	+40 Sieve=35% +4 Sieve=22%	
15					CLAYEY SAND (SC) medium dense; orange; saturated; with iron oxide cemented sandstone rock	N=35						21	41	21	20	75	+40 Sieve=2% +4 Sieve=0%	
20					LEAN CLAY WITH SAND (CL) hard; dark gray; with clay seams	P=4.5+						15	33	17	16	52	+40 Sieve=1% +4 Sieve=0%	
25					SANDY LEAN CLAY (CL) hard; dark brown													
30					-grayish brown; laminated with silt Bottom of Boring @ 30'													

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

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

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

Piezo B-2

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**LOG OF BORING B-2**

PROJECT: Welsh Power Plant  
Pittsburgh, Texas

PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

DATE

10/28/09

SURFACE ELEVATION  
339.7

DEPTH (ft)	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	BLOW COUNT				DRY DENSITY (pcf)	COMPRESSION STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psf)	Natural Moisture Content and Atterberg Limits		ATTERBERG LIMITS (%)			MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
						BLOW COUNT	Cu (tsf)	PPR (tsf)	Torsion (tsf)					Moisture Content	Liquid Limit	LL	PL	PI		
0																				
5	CL			SANDY LEAN CLAY (CL) hard; red and tan -very stiff	P=4.5+	1	2	3	4					13	28	14	14	61	+40 Sieve=3%, +4 Sieve=0%	
10	CL			-stiff -very stiff; reddish brown	P=3.5 N=14	1	2	3	4					14	40	16	24	65	+40 Sieve=0%, +4 Sieve=0%	
15	CL			SANDY LEAN CLAY (CL) hard; red and tan	P=2.75	1	2	3	4					13	30	14	16	58	+40 Sieve=0%, +4 Sieve=0%	
20				-very stiff	P=4.5+	1	2	3	4					14	34	15	19	54	+40 Sieve=0%, +4 Sieve=0%	
25					P=3.5	1	2	3	4					15	37	16	21	47	+40 Sieve=5%, +4 Sieve=3%	
30	SC			CLAYEY SAND (SC) medium dense; tan, red, and gray	P=4.0 P=4.5	1	2	3	4					15	37	16	21	47	+40 Sieve=5%, +4 Sieve=3%	

Water Level

Water Observations: completion.

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

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





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**LOG OF BORING B-2**

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

BORING TYPE: Flight Auger

DATE: 10/28/09  
SURFACE ELEVATION: 339.7

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	FIELD STRENGTH DATA	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. #)
										Plastic Limit	Moisture Content		Liquid Limit	LI	PL	
35																
40	SM SC				P=2.5							12	22	15	7	+40 Sieve=0%, +4 Sieve=0%
45	CH				SF											
50	SM				P=4,5+											
					SF											

**MATERIAL DESCRIPTION**

-red and tan

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

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

SILTY SAND(SM) black and gray

Bottom of Boring @ 50'

Water Level

Water Observations: completion.

Exc:  Measured:  Perched:

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

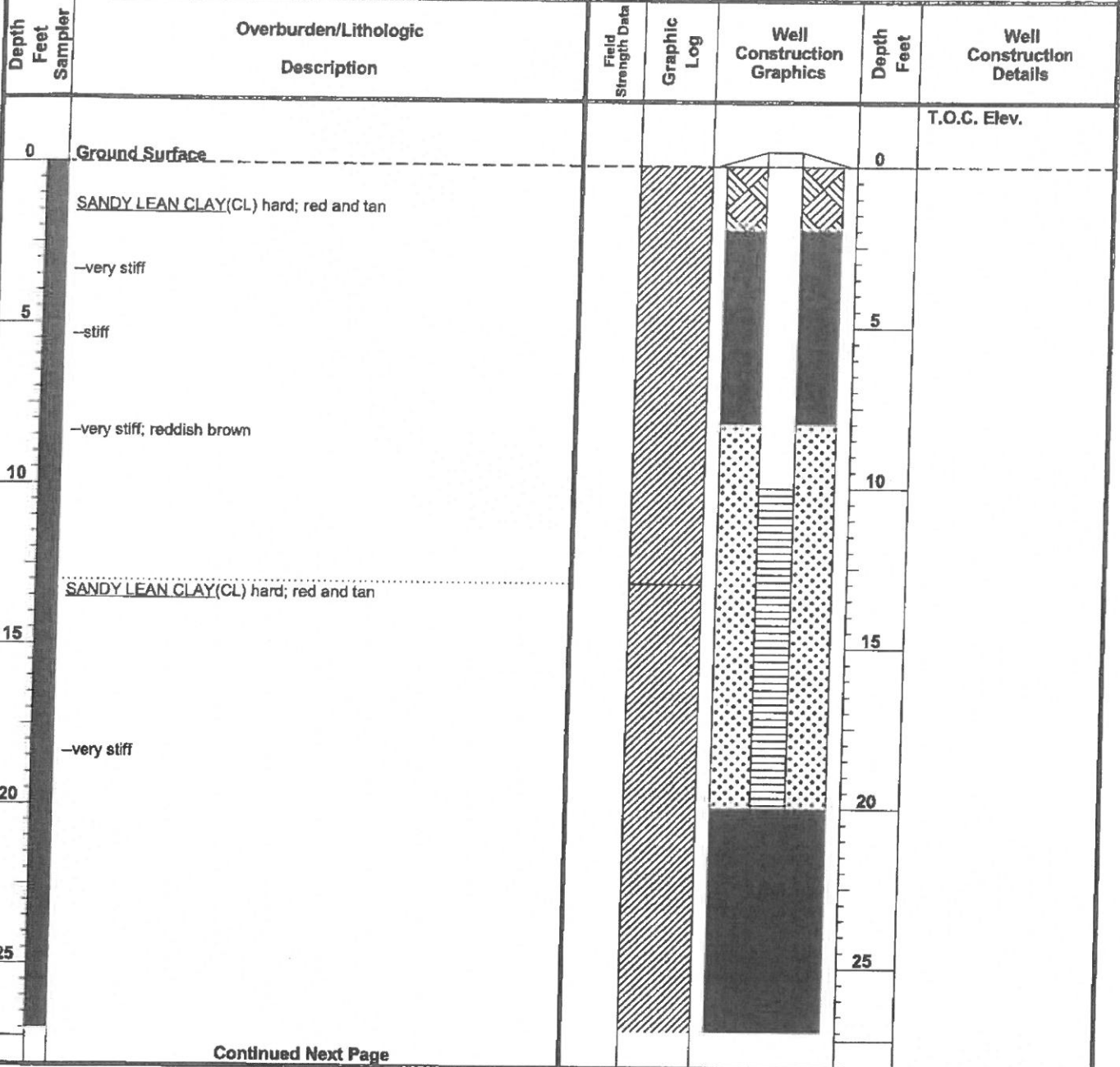
Key to Abbreviations:  
N - SPT Data (Blows/Ft)  
P - Pocket Penetrometer (tsf)  
T - Torvans (tsf)  
L - Lab Vane Shear (tsf)

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

# Piezometer B-2

**ENVIRONMENTAL LOG**

Client: Welsh Power Plant      Well No. B-2  
 Project No: G3242-095      Location Pittsburg, Texas  
 Phase      Task      Surface Elev.      Page 1 of 2



Continued Next Page

Driller <u>Doug Hinds</u>	Drilling Method <u>Solid Stem Auger</u>	Bentonite Seal <u>2-8' &amp; 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





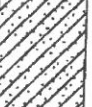



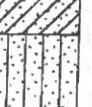

Project No: G3242-095

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						
30	CLAYEY SAND(SC) medium dense; tan, red, and gray				30	
35	-red and tan				35	
40	SILTY CLAYEY SAND(SM-SC) red, tan, and gray; saturated				40	
45	FAT CLAY(CH) hard; brown, tan, and gray; with ferric joints; with lignite and sand seams				45	
50	SILTY SAND(SM) black and gray				50	
	Bottom of Boring @ 50'					
55						
60						









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**MATERIAL DESCRIPTION**

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

-gray and green

SANDY, LEAN CLAY(CL) very stiff; 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  
 Ent:  Measured:  Perched:   
 Water Observations:  
 @ 19' and open to 24' upon completion.

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

**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

FIELD STRENGTH DATA	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psf)	Natural Moisture Content and Atterberg Limits		MOISTURE CONTENT (%)	ATTEMBERG LIMITS (%)	OTHER TESTS
						Plastic Limit	Liquid Limit			
P=4.5+	20 40 60 80 ▲ Ou (tsf) ▲ 1 2 3 4 ■ PPR (tsf) 1.0 2.0 3.0 4.0 ◆ Torvane (tsf) ◆					20 40 60 80		21	60 24 36 95	+40 Sieve=1%, +4 Sieve=0%
P=4.5+										
P=3.5										
P=4.5+										

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

(Page Ref. #)

PERFORMED





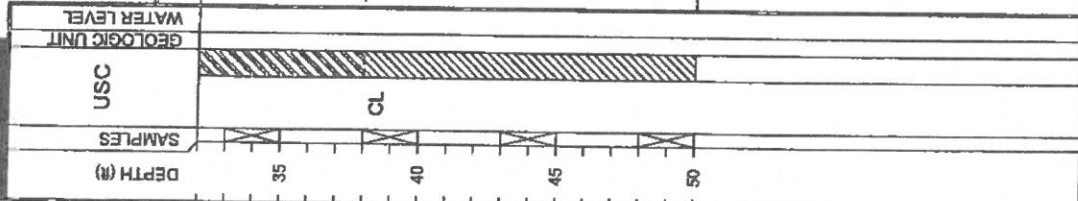


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**MATERIAL DESCRIPTION**

-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'



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

**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

FIELD STRENGTH DATA	BLOW COUNT	Cu (tsf)	PPR (tsf)	Torvane (tsf)	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psf)	Natural Moisture Content and Atterberg Limits		MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	OTHER TESTS
									Plastic Limit	Liquid Limit			
N=30	1	1.0	2.0	3.0	4.0				20	40	21	PL 25 LI 44	+40 Sieve=1% +4 Sieve=0%
N=50/5.75"	2	2.0	3.0	4.0					20	40		PL 19 LI 44	
N=41	3	3.0	4.0						20	40		PL 19 LI 44	
N=43	4	4.0							20	40		PL 19 LI 44	

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

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

Water Level

Exc:

Measured:

Perched:

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

Water Observations:

Notes:

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

OTHER TESTS

(Page Ref. #)

PERFORMED

MINUS #200 SIEVE (%)

ATTERBERG LIMITS (%)

LIQUID LIMIT

PLASTIC LIMIT

PLASTICITY INDEX

MOISTURE CONTENT (%)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

CONFINING PRESSURE (psf)

NATURAL MOISTURE CONTENT AND ATTERBERG LIMITS

FIELD STRENGTH DATA

BLOW COUNT

Cu (tsf)

PPR (tsf)

Torvane (tsf)

DRY DENSITY (pcf)

COMPRESSIVE STRENGTH (tsf)

FAILURE STRAIN (%)

# Piezometer B-4

**ENVIRONMENTAL LOG**  
 Client: Welsh Power Plant      Well No. B-4  
 Project No: G3242-095      Phase      Task      Location Pittsburg, Texas  
 Surface Elev.      Page 1 of 2

Depth Feet	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
0	<b>Ground Surface</b>				0	T.O.C. Elev.
5	<b>SILTY SAND(SM)</b> medium dense; tan; with gravel -tannish orange -hard; orangish tan				5	
10	<b>SANDY LEAN CLAY(CL)</b> dark brown -very stiff; white				10	
15	<b>CLAYEY SAND(SC)</b> medium dense; tan -orangish gray; with sand seams				15	
20	<b>SANDY LEAN CLAY(CL)</b> stiff; orangish tan				20	
25	<b>FAT CLAY(CH)</b> 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' &amp; 18-50'</u> Filter Pack Qty. <u>6-18'</u> Filter Pack Type <u>20/40 Sand</u> Static Water Level _____ Notes: _____ _____ _____
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**ENVIRONMENTAL LOG**

Client: Welsh Power Plant

Project No: G3242-095

Phase








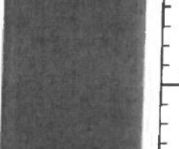


Task

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	
55	Bottom of Boring @ 50'					
60						





P.C. Zander B-5



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

**LOG OF BORING B-5**

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

BORING TYPE: Flight Auger

DATE

10/27/09

SURFACE ELEVATION  
340.0

DEPTH (ft)	USC	GEOLOGIC UNIT	WATER LEVEL	FIELD STRENGTH DATA	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (ksf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)			MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
												LIQUID LIMIT	PLASTIC LIMIT	PL		
0												TL	PL	LI		
2.0	CL	LEAN CLAY WITH SAND (CL) stiff, red and tan		P=2.0	20					22	22	47	19	28	81	+40 Sieve=9%, +4 Sieve=3%
3.0	CL	LEAN CLAY (CL) hard; red and tan		P=4.5+	2					21	21	46	18	28	94	+40 Sieve=3%, +4 Sieve=0%
4.0		-very stiff		P=4.0	3											
10.0	CH	FAT CLAY (CL) very stiff; brown and tan		P=3.0	3											
15.0	CH	FAT CLAY WITH SAND (CH) hard; red and tan		P=4.5+	3											
20.0	CL	SANDY LEAN CLAY (CL) very stiff; red and gray; with sand seams		P=3.0	3											
25.0	SC	CLAYEY SAND (SC) very loose; tan, red, and gray		P=0.5	1											
30.0	CH	FAT CLAY WITH SAND (CH) stiff; red and gray		P=2.0	3											

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

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

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



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**MATERIAL DESCRIPTION**

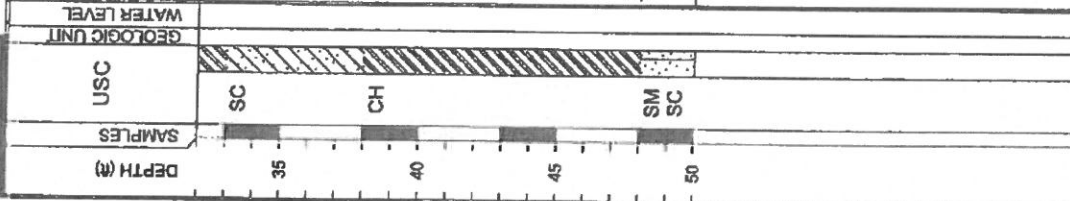
SILTY CLAYEY SAND(SC) gray and red;  
saturated

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'



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

**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


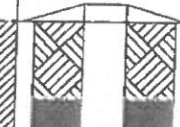

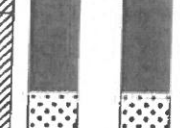

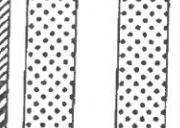

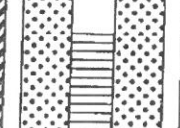

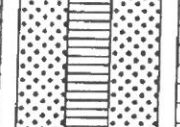

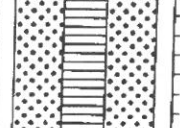

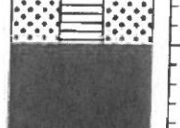
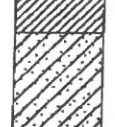

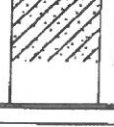
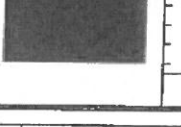
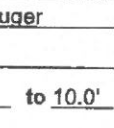

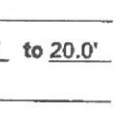
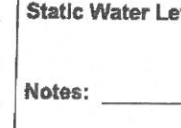
FIELD STRENGTH DATA	BLOW COUNT 20 40 60 80 ▲ Qu (tsf) ▲ 1 2 3 4 ■ PPR (tsf) ■ 1.0 2.0 3.0 4.0 ◆ Torvare (tsf) ◆	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits		MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
						Plastic Limit	Liquid Limit				
SF								25	TL 51 PL 31	87	+40 Sieve=6%, +4 Sieve=0%
P=4.5+											
P=4.5+											
SF											

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

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

AP 2000/09 P-5

<b>ENVIRONMENTAL LOG</b>			Well No. B-5
Client: Welsh Power Plant		Location Pittsburg, Texas	
Project No: G3242-095	Phase	Task	Surface Elev. <span style="float: right;">Page 1 of 2</span>

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.
	LEAN CLAY WITH SAND(CL) stiff; red and tan					
	LEAN CLAY(CL) hard; red and tan					
5	-very stiff				5	
	FAT CLAY(CL) very stiff; brown and tan					
10					10	
	FAT CLAY WITH SAND(CH) hard; red and tan					
15					15	
	SANDY LEAN CLAY(CL) very stiff; red and gray; with sand seams					
20					20	
	CLAYEY SAND(SC) very loose; tan, red, and gray					
25					25	

Continued Next Page

Driller <u>Doug Hinds</u>	Drilling Method <u>Soild Stem Auger</u>	Bentonite Seal <u>2-5' &amp; 20-50'</u>
Logged By <u>James Griffith</u>	Borehole Diameter <u>6.5"</u>	Filter Pack Qty. <u>5-20'</u>
Drilling Started <u>10/27/09</u>	Well Casing <u>2.0" Dia. 0.0' to 10.0'</u>	Filter Pack Type <u>20/40 Sand</u>
Drilling Completed <u>10/27/09</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>	_____





Client: Welsh Power Plant

**ENVIRONMENTAL LOG**

Well No. B-5

Project No: G3242-095

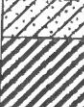
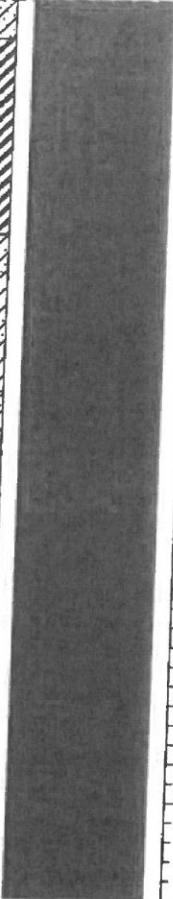



Phase

Task

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	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						



Pittsburgh B-6



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**MATERIAL DESCRIPTION**

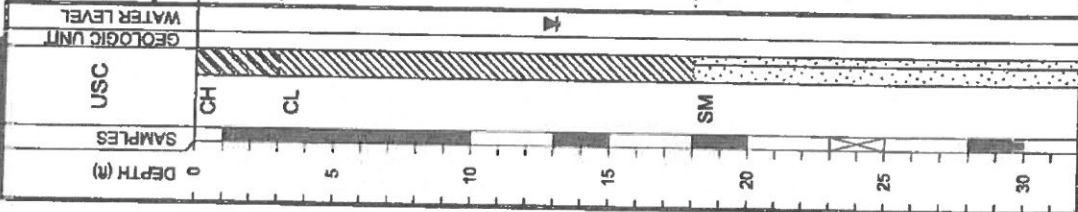
FAT CLAY(CH) very stiff; red and gray; with  
ferric seams

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



Water Level

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

Est.  Measured:  Penched:

**LOG OF BORING B-6**  
PROJECT: Welsh Power Plant  
Pittsburgh, Texas  
PROJECT NO.: G3242-09  
BORING TYPE: Flight Auger  
DATE: 10/27/09  
SURFACE ELEVATION: 340.1

FIELD STRENGTH	DATA	BLOW COUNT				DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (ksf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psf)	Natural Moisture Content and Atterberg Limits			MOISTURE CONTENT (%)	ATTERBERG LIMITS(%)			MINUS #200 SIEVE (%)	OTHER TESTS PERFORMED (Page Ref. #)
		1	2	3	4					PL	LL	PI		LI	PL	PI		
P=4.0												12	32	14	18	60	+40 Sieve=0%, +4 Sieve=0%	
P=4.5+												21	48	20	29	93	+40 Sieve=2%, +4 Sieve=0%	
P=3.0												14	49	18	31	65	+40 Sieve=0%, +4 Sieve=0%	
P=3.0												20				18	+40 Sieve=0%, +4 Sieve=0%	
P=4.0																		
P=3.0																		
N=50/5.25'																		
SF																		

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

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



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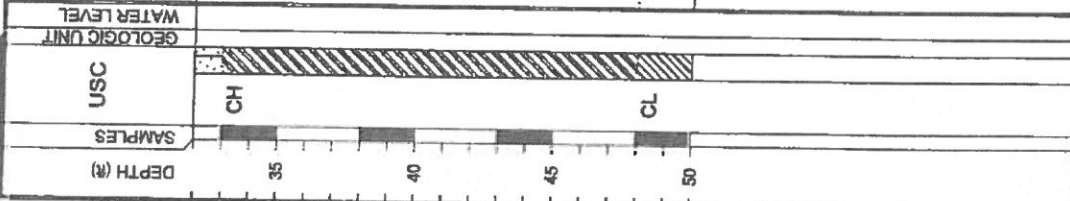
**MATERIAL DESCRIPTION**

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

-dark green

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

Bottom of Boring @ 50'



Water Level

Water Observations:  
@ 13' and open to 15' upon completion and after 30 minutes.

Err:  Measured:  Predict:

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

**LOG OF BORING B-6**

PROJECT: Welsh Power Plant  
Pittsburgh, Texas

PROJECT NO.: G3242-09

BORING TYPE: Flight Auger

DATE

10/27/09

SURFACE ELEVATION  
340.1

FIELD STRENGTH DATA	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (ksf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psf)	Natural Moisture Content and Atterberg Limits		MOISTURE CONTENT (%)	ATTEMBERG LIMITS (%)	OTHER TESTS PERFORMED (Page Ref. #)
						Plastic Limit	Liquid Limit			
P=4,5+	1 2 3 4 ▲ Qu (tsf) ▲ ■ PPR (tsf) ■ ◆ Torvane (tsf) ◆					20 40 60 80		22	PL 24 PI 44	+40 Sieve=0% +4 Sieve=0%
P=4,5+										
P=4,5+										
P=4,5+										

Key to Abbreviations:

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

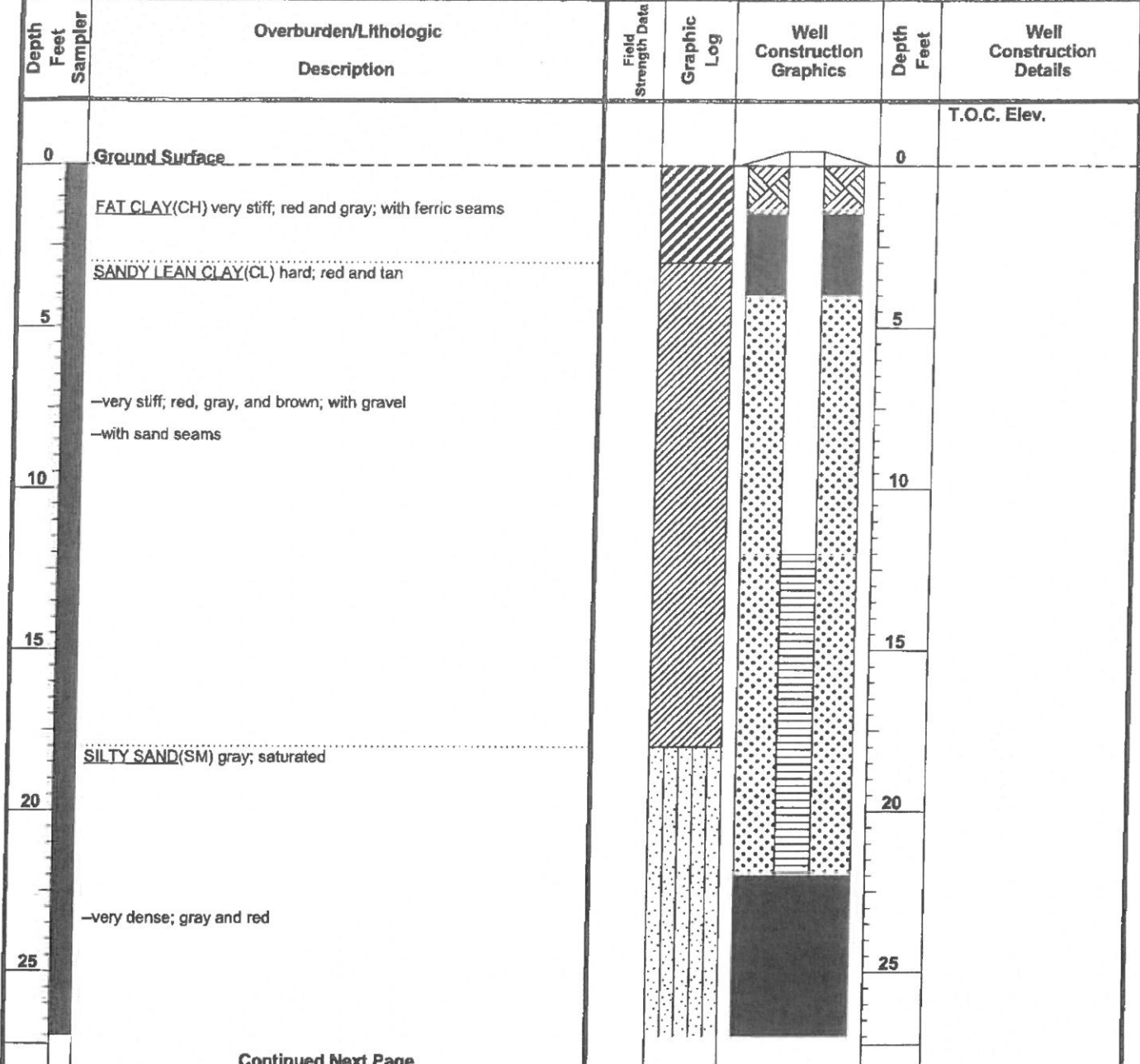
Notes:

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



# Pittsburgh B-6

<b>ENVIRONMENTAL LOG</b>			Well No. <b>B-6</b>
Client: <b>Welsh Power Plant</b>		Location <b>Pittsburg, Texas</b>	
Project No: <b>G3242-095</b>	Phase	Task	Surface Elev.



Continued Next Page

Driller <u>Doug Hinds</u>	Drilling Method <u>Solid Stem Auger</u>	Bentonite Seal <u>1.5-4' &amp; 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>	_____

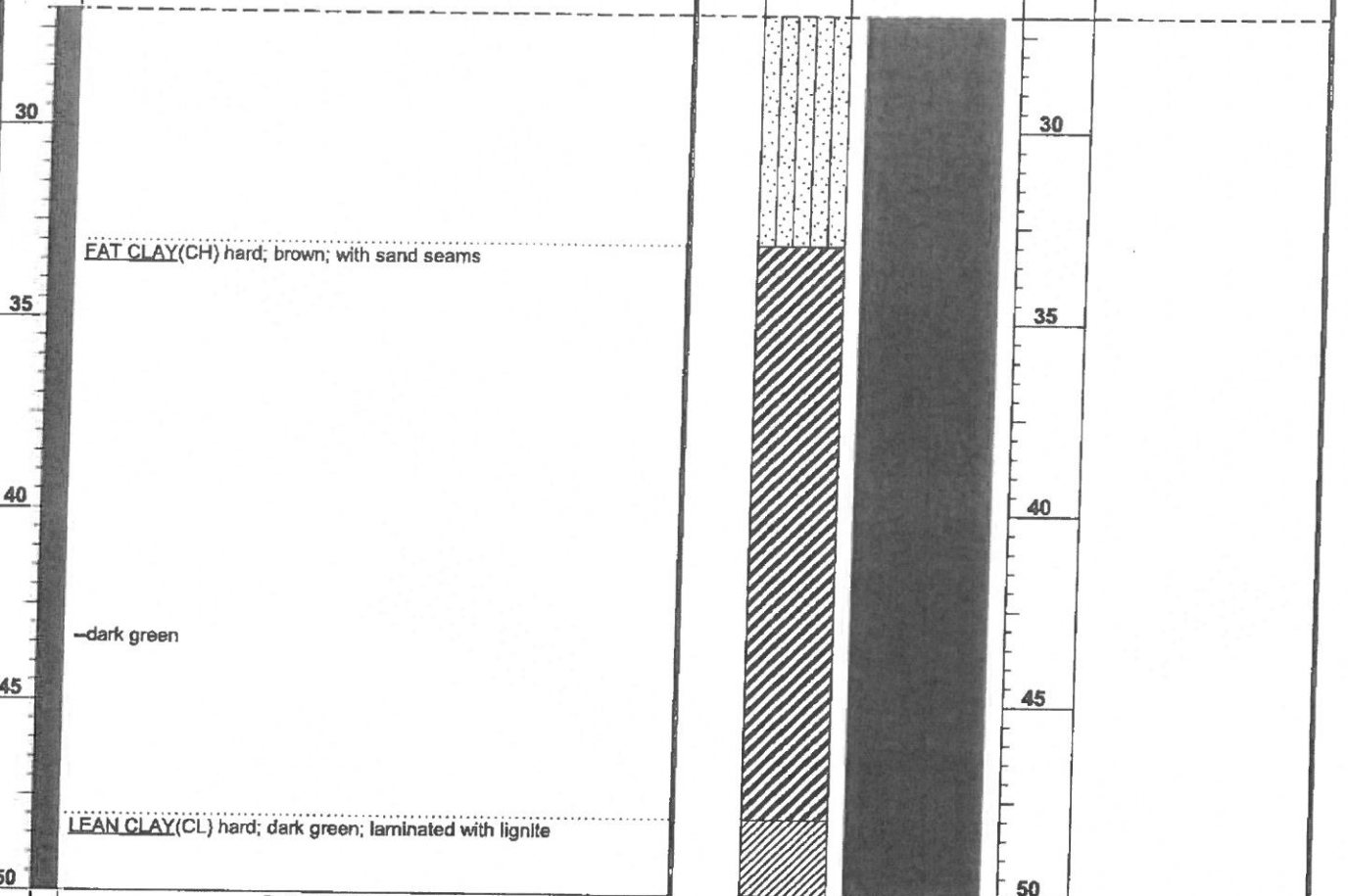


**ENVIRONMENTAL LOG**  
 Client: Welsh Power Plant  
 Project No: G3242-095

Well No. B-6  
 Location Pittsburg, Texas  
 Surface Elev.

Depth Feet Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
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Continued from previous page



Bottom of Boring @ 50'





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DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION
0					
5		SM			SILTY SAND(SM) dense; tan
10					-gray; saturated
15			CH		-very dense EAT CLAY(CH) very stiff; dark gray; with silt and ferric seams
20					-hard; gray and black; with traces of lignite
25					-gray
30					Bottom of Boring @ 30'

Water Level  
Est. Measured:  Perched:   
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	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIVE STRENGTH (ksf)	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				
N=31	1.0	3.0				20	20	21	Td	21	+40 Sieve=0%, +4 Sieve=0%
N=38	2.0	3.0				20	20	23	Ld	15	+40 Sieve=0%, +4 Sieve=0%
N=38	2.0	3.0				20	20	23	Ld	15	+40 Sieve=0%, +4 Sieve=0%
N=59	3.0	3.0				20	20	23	Ld	15	+40 Sieve=0%, +4 Sieve=0%
N=26	4.0	3.0				20	20	14	Td	98	+40 Sieve=0%, +4 Sieve=0%
P=4,5+	4.0	3.0				20	20	14	Td	98	+40 Sieve=0%, +4 Sieve=0%
P=4,5+	4.0	3.0				20	20	14	Td	98	+40 Sieve=0%, +4 Sieve=0%

Notes:

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

Key to Abbreviations:

- N - SPT Data (Blows/Ft)
- P - Pocket Penetrometer (ksf)
- T - Torvane (ksf)
- L - Lab Vane Shear (ksf)



# Ladell Boring B-2

## LOG OF BORING B-2

DATE: 10/8/14  
 SURFACE ELEVATION: 373.8

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

DEPTH (#)	USC	SAMPLES	WATER LEVEL	GEOLOGIC UNIT	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. #)
											Plastic Limit	Moisture Content	Liquid Limit		LL	PL	IP	
0					N=13	1					46							
5	SM				N=29	2					40							+40 Sieve=27% +4 Sieve=16%
10	MH				N=18	3					40							+40 Sieve=19% +4 Sieve=2%
15	SM				N=9	4					200							+40 Sieve=0% +4 Sieve=0%
20	SM				N=0						134							
25	SM				N=1						91							+40 Sieve=11% +4 Sieve=1%
30	CL				N=7						18							+40 Sieve=1% +4 Sieve=0%
30					N=6													

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

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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

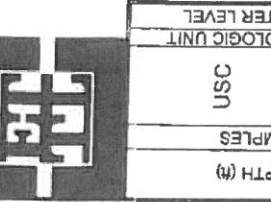
ASH (ELASTIC SILT (MH)) very loose; black; with fine-grained sand and lightly cemented gravel pieces; saturated

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

Water Level: Measured  Perched   
 Water level @ 13'



Water Observations:  
 Water level @ 13'



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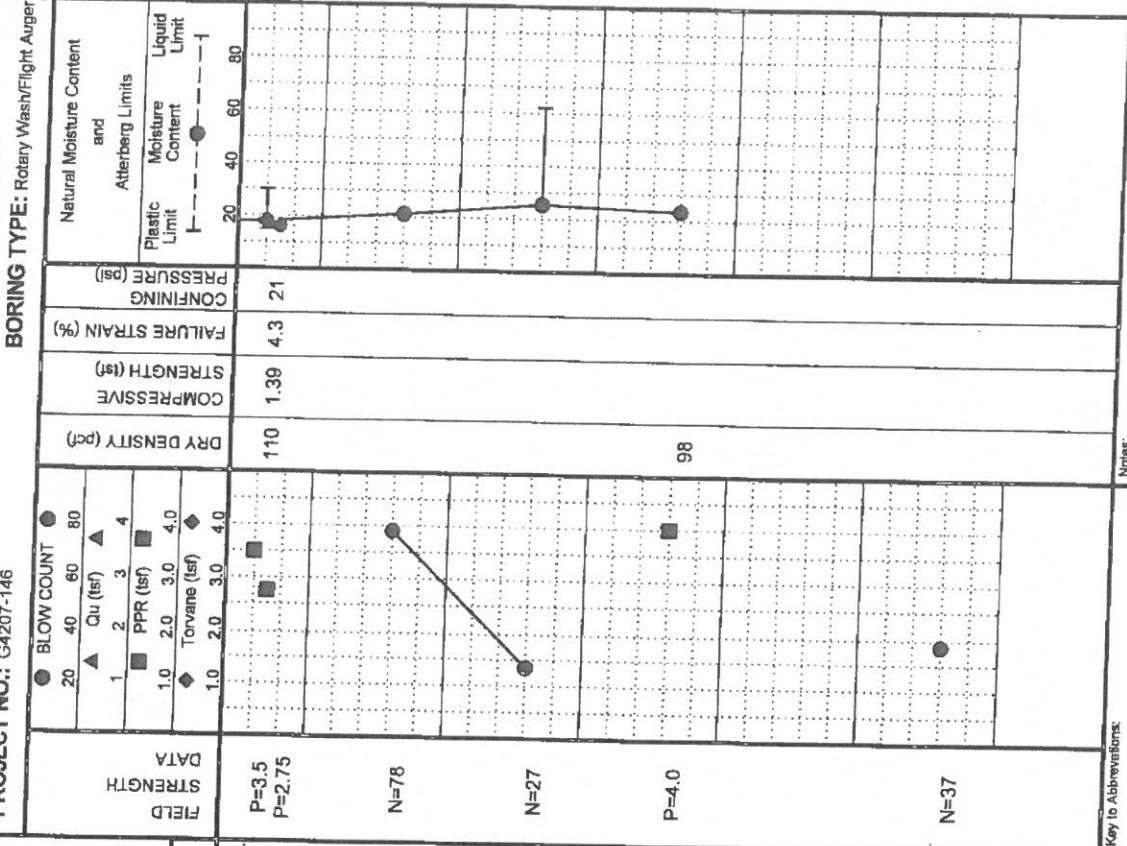
**LOG OF BORING B-2 (cont.)**

**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

**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					



DEPTH (ft)	MATERIAL DESCRIPTION	FIELD STRENGTH DATA
35	CLAYEY SAND(SC) dense; light brown, light gray and reddish brown; moist; with fine-grained sand; mottled	P=3.5 P=2.75
40	SILTY SAND(SM) very dense; light brown, yellowish brown and light gray; moist; mottled; with fine-grained sand	N=78
45	FAT CLAY(CH) very stiff; dark brown and light brown; moist; with sand seams; laminated	N=27
50	-dark brown with light gray; moist; with silt seams	P=4.0, N=37
55	-hard; dark brown; moist	
60	Bottom of Boring @ 60'	

**Water Level**  
Water Observations:  Measured;  Perched;  Water level @ 13'.  
Elev: \_\_\_\_\_

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

**Notes:**

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

# Landfill Boring B-10

**LOG OF BORING B-10**

**ETTIL ENGINEERS & CONSULTANTS**

MAIN OFFICE  
1717 East Erwin  
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**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

**DATE:** 10/8/14  
**SURFACE ELEVATION:** 373.2

**OTHER TESTS PERFORMED**  
(Page Ref. #)

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	FIELD STRENGTH	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. #)
												LL	PL	PI		
0																
5		SC			N=7						24	31	19	12	41	+40 Sieve=21% +4 Sieve=11%
10		MH			N=3											
15					N=0											
20		SM			N=50/1"						56				14	+40 Sieve=71% +4 Sieve=28%
25					N=50/4"											
30		CL			N=4						19	23	14	9	57	+40 Sieve=1% +4 Sieve=0%

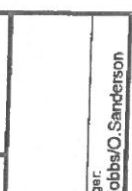
**Key to Abbreviations:**  
 N - SPT Data (Blows/Ft)  
 P - Pocket Penetrometer (tsf)  
 T - Torvans (tsf)  
 L - Lab Vane Shear (tsf)

**Notes:**

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

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

Water Level: Esc:  Measured  Perched:   
 Seepage @ 13' while drilling.







**ETTL  
ENGINEERS &  
CONSULTANTS**

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

**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'

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

Water Level

Water Observations:

Est.:  Measured:  Perched:

Seepage @ 13' white 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.: G4207-148  
BORING TYPE: Rotary Wash/Flight Auger

FIELD STRENGTH DATA	BLOW COUNT				Natural Moisture Content and Atterberg Limits			
	1	2	3	4	Plastic Limit	Moisture Content	Liquid Limit	
P=1.25 P=1.0	1.0	2.0	3.0	4.0	20	40	60	80
N=23	1.0	2.0	3.0	4.0				
N=18	1.0	2.0	3.0	4.0				
P=4.5+								
P=4.5+								

DRY DENSITY (pcf)	107
COMPRESSIVE STRENGTH (tsf)	2.10
FAILURE STRAIN (%)	6.1
CONFINING PRESSURE (psi)	21
MOISTURE CONTENT (%)	22
LIQUID LIMIT	25
PLASTIC LIMIT	17
PLASTICITY INDEX	8
MINUS #200 SIEVE (%)	27
OTHER TESTS PERFORMED	+40 Sieve=3% +4 Sieve=0%

Notes:

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

GPS Coordinates:  
N33.04895° W94.84390°

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

DATE: 10/8/14  
SURFACE ELEVATION: 373.2

# Landfill Boring B-12

**ETTL ENGINEERS & CONSULTANTS**

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

FAT 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'

Est.  Measured  Perched

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

Water Level

Eqc

USC

SAMPLES

DEPTH (ft)

0

5

10

15

20

25

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:

PROJECT NO.: G4207-146

BORING TYPE: Flight Auger

DATE

10/15/14

SURFACE ELEVATION

361.7

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. #)
							Qu (tsf)	PPR (tsf)	Torvane (tsf)	LL	PL	P	
P=3.75	1	1.0	1.0	1.0	1.0	20	16	33	19	14	58	+40 Sieve=1% +4 Sieve=0%	
N=15	2	2.0	2.0	2.0	2.0	40							
N=11	3	3.0	3.0	3.0	3.0	60							
P=3.75	4	4.0	4.0	4.0	4.0	80	24	39	19	20	93	+40 Sieve=1% +4 Sieve=0%	
N=14													
N=53													

Notes:

Key to Abbreviations:

- N - SPT Data (Blow/FF)
- 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

# Lead Hill Boring B-13

## LOG OF BORING B-13

**ETTL ENGINEERS & CONSULTANTS**

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

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

**PROJECT NO.:** G4207-146

**BORING TYPE:** Flight Auger

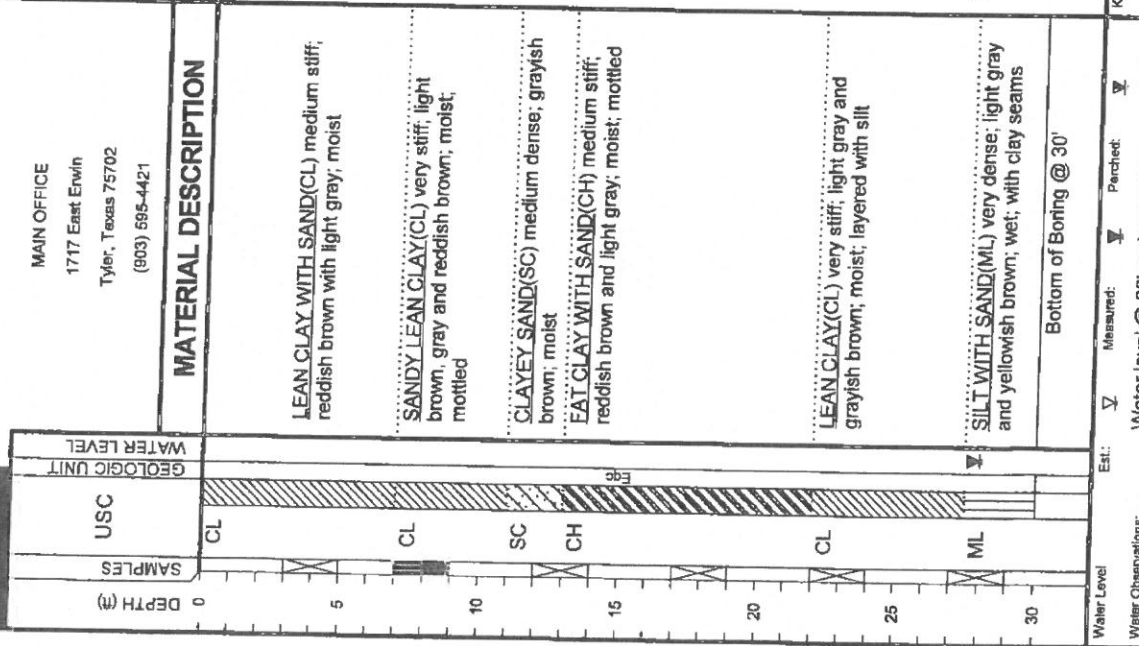
**DATE**

10/15/14

**SURFACE ELEVATION**

361.4

DEPTH (ft)	SAMPLES	USC	GEOLOGIC UNIT	WATER LEVEL	FIELD STRENGTH DATA	BLOW COUNT	DRY DENSITY (pcf)	COMPRESSIONIVE STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits	MOISTURE CONTENT (%)			ATTERBERG LIMITS (%)			OTHER TESTS PERFORMED (Page Ref. #)	
												Moisture Content	Liquid Limit	Plastic Limit	LL	PL	PI		MINUS #200 SIEVE (%)
0																			
5			CL		N=7	1.0					20	45	17	28	76	+40 Sieve=1% +4 Sieve=0%			
10			CL		P=4.0	2.0													
15			SC		N=11	3.0													
15			CH		N=8	3.0													
20					N=21	4.0													
25					N=50/5"	4.0													
30																			



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

**Water Observations:**  
 Est:  Measured:  Parched:   
 Water level @ 28' and open upon completion.

**Notes:**

GFS Coordinates: N33.047 160° W94.84384°  
 Driller: Lewis Drilling, Inc  
 Logger: O. Sanderson



# Landfill Boring B-14

**ETTL ENGINEERS & CONSULTANTS**

MAIN OFFICE  
1717 East Erwin  
Tyler, Texas 75702  
(903) 565-4421

## LOG OF BORING B-14

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

DATE: 10/14/14  
SURFACE ELEVATION: 347.2

DEPTH (ft)	USC	GEOLOGIC UNIT	WATER LEVEL	MATERIAL DESCRIPTION	FIELD STRENGTH DATA	SOIL TESTS				DRY DENSITY (pcf)	COMPRESSION STRENGTH (tsf)	FAILURE STRAIN (%)	CONFINING PRESSURE (psi)	Natural Moisture Content and Atterberg Limits		MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)			OTHER TESTS PERFORMED (Page Ref. #)		
						BLOW COUNT	Qu (tsf)	PPR (tsf)	Torvane (tsf)					Plastic Limit	Liquid Limit		TL	PL	PD		MINUS #200 SIEVE (%)	
0																						
5				SANDY LEAN CLAY (CL) medium stiff; yellowish brown with reddish brown; dry; with clay seams	N=9																	
10				SANDY SILT (ML) medium dense; grayish brown; moist; with clay seams	N=11											108		17	NP	68	+40 Sieve=1% +4 Sieve=1%	
15				SANDY LEAN CLAY (CL) very stiff; light gray and gray; moist	P=4.0																	
20				light gray and grayish brown; moist; layered with silt	N=34																+40 Sieve=1% +4 Sieve=0%	
25				POORLY GRADED SAND WITH SILT (SP-SM) medium dense; yellowish brown; light gray and reddish brown; wet	N=27																+40 Sieve=0% +4 Sieve=0%	
30				LEAN CLAY (CL) very stiff; dark brown; moist; with silt partings	N=26																	
				Bottom of Boring @ 30'																		

Water Level:  Measured;  Penetrate

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

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

Notes:

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

# Landfill Boring B-15

ETTL ENGINEERS & CONSULTANTS		LOG OF BORING B-15		DATE 10/14/14					
PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest. Welsh Power Station - Cason, Texas		BORING TYPE: Flight Auger		SURFACE ELEVATION 348.2					
PROJECT NO.: G4207-146		DRILL RIG:		OTHER TESTS PERFORMED (Page Ref. #)					
MATERIAL DESCRIPTION		FIELD STRENGTH DATA		MOISTURE CONTENT (%)					
USC		BLOW COUNT		ATTEBERG LIMITS(%)					
GEOLOGIC UNIT		QU (tsf)		LIQUID LIMIT					
WATER LEVEL		PPR (tsf)		PLASTIC LIMIT					
SAMPLES		Torsions (tsf)		PLASTICITY INDEX					
DEPTH (ft)		1.0 2.0 3.0 4.0		L					
0		1 2 3 4		PL					
5		1.0 2.0 3.0 4.0		PI					
10		1.0 2.0 3.0 4.0		PL					
15		1.0 2.0 3.0 4.0		PL					
20		1.0 2.0 3.0 4.0		PL					
25		1.0 2.0 3.0 4.0		PL					
30		1.0 2.0 3.0 4.0		PL					
CH	EAT CLAY(CH) stiff; reddish brown and light gray; moist; mottled	N=10	P=3.75	24	59	21	38	85	+40 Sieve=0% +4 Sieve=0%
SM	--very stiff, light gray, grayish brown and reddish brown; moist; layered  SILTY SAND(SM) very dense; light brown; dry	N=59	N=21	7					+40 Sieve=0% +4 Sieve=0%
CL	--medium dense; wet  --very dense  LEAN CLAY(CL) hard; dark brown; moist; with silt partings  Bottom of Boring @ 30'	N=56	P=4.5	25	45	22	23	92	+40 Sieve=0% +4 Sieve=0%

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

**PROJECT NO.:** G4207-146

**BORING TYPE:** Flight Auger

**DRILL RIG:**

**DATE:** 10/14/14

**SURFACE ELEVATION:** 348.2

**OTHER TESTS PERFORMED (Page Ref. #):**

**FIELD STRENGTH DATA:**

- BLOW COUNT
- ▲ QU (tsf)
- PPR (tsf)
- ◆ Torsions (tsf)

**Key to Abbreviations:**

- N - SPT Data (Blows/Ft)
- P - Pocket Penetrometer (tsf)
- T - Torsions (tsf)
- L - Lab Vane Shear (tsf)

**Notes:**

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

Water Level: Measured:  Perched:

**GPS Coordinates:** N33.04857°, W94.84286°

**Driller:** Lewis Drilling, Inc.     **Logger:** O. Sanderson



**Appendix B**

**Photographic Log**





# 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



# PHOTOGRAPHIC LOG

**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





<b>Project Name:</b> AEP – J. ROBERT WELSH POWER PLANT		<b>Location:</b> PITTSBURG, TITUS COUNTY, TEXAS	<b>Project No.</b> OK001625.0001
<b>Photo No.</b> 3	<b>Date:</b> 8/20/2015		
<b>Direction Photo Taken:</b> West Northwest			
<b>Description:</b> Ditch between road and railway west of landfill, this ditch would be non-jurisdictional.			
P8200497			

<b>Project Name:</b> AEP – J. ROBERT WELSH POWER PLANT		<b>Location:</b> PITTSBURG, TITUS COUNTY, TEXAS	<b>Project No.</b> OK001625.0001
<b>Photo No.</b> 4	<b>Date:</b> 8/20/2015		
<b>Direction Photo Taken:</b> Northeast			
<b>Description:</b> 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



**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





<b>Project Name:</b> AEP – J. ROBERT WELSH POWER PLANT		<b>Location:</b> PITTSBURG, TITUS COUNTY, TEXAS	<b>Project No.</b> OK001625.0001
<b>Photo No.</b> 7	<b>Date:</b> 8/20/2015		
<b>Direction Photo Taken:</b> West Northwest			
<b>Description:</b> Vegetated strip between landfill and road. This would be isolated due to lack of connectivity.  P8200521			

 <b>ARCADIS</b>		<b>PHOTOGRAPHIC LOG</b>	
<b>Project Name:</b> AEP – J. ROBERT WELSH POWER PLANT		<b>Location:</b> PITTSBURG, TITUS COUNTY, TEXAS	<b>Project No.</b> OK001625.0001
<b>Photo No.</b> 8	<b>Date:</b> 8/20/2015		
<b>Direction Photo Taken:</b> North			
<b>Description:</b> 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


**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





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

 <b>ARCADIS</b>		<b>PHOTOGRAPHIC LOG</b>	
<b>Project Name:</b> AEP – J. ROBERT WELSH POWER PLANT		<b>Location:</b> PITTSBURG, TITUS COUNTY, TEXAS	<b>Project No.</b> OK001625.0001
<b>Photo No.</b> 12	<b>Date:</b> 8/20/2015		
<b>Direction Photo Taken:</b> Southeast			
<b>Description:</b> 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



**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


**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

