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American Electric Power Service Corporation

Primary Bottom Ash Pond - CCR Location Restriction Evaluation

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

October 3, 2018





Kennett Brandner

Kenneth Brandner, P.E., P.G. Senior Project Engineer

KA

Matthew J. Lamb Project Manager

Do

John Holm, P.E. Principal Engineer

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

Prepared for: AEP

Prepared by: ARCADIS U.S., Inc. 100 E Campus View Blvd Suite 200 Columbus Ohio 43235-1447 Tel 614 985 9100 Fax 614 985 9170 Texas Engineer Registration No. F-533

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Acronyms and Abbreviation

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

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Primary Bottom Ash Pond – CCR Location Restriction Evaluation

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

1. Objective

This report was prepared by ARCADIS U.S., Inc. (ARCADIS) for American Electric Power Service Corporation (AEP) to assess the location of the Primary Bottom Ash Pond relative to the location restrictions included in the Coal Combustion Residual (CCR) requirements, as specified in the Code of Federal Regulations (CFR) 40 CFR 257.60 to 257.64, at the AEP Generating Plant (Plant) located at 1187 County Road 4865 in Pittsburg, Titus County, Texas (**Figure 1**). The CCR requirements include an evaluation of the adequacy of the groundwater monitoring well network to characterize groundwater quality up and down gradient of the CCR unit and an evaluation of whether the CCR unit meets up to 5 location restrictions, which include: the base of the CCR unit is 5 feet (ft) above the uppermost aquifer, the CCR unit may not be located in a wetland, within 200 ft of the damage zone of a fault that has displacement during the Holocene, within a seismic impact zones, or in an unstable area.

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

This evaluation included a review of AEP-provided data associated with previously completed subsurface investigation activities in the vicinity of the Primary Bottom Ash Pond CCR unit, as well as publically-available geologic and hydrogeologic data. The following report also presents the current Conceptual Site Model based on documents reviewed and will further describe the uppermost aquifer.



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2. Background Information

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

2.1 Facility Location Description

The AEP J. Robert Welsh Plant is located in southern Titus County, approximately 8 miles northeast of Pittsburg, Texas, and approximately two miles northwest of Cason, Texas. The Primary Bottom Ash Pond CCR unit is located southwest of the Plant and directly west of the Welsh Reservoir (**Figures 1** and **2**).

2.2 Description of Primary Bottom Ash Pond CCR Unit

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

2.2.1 Embankment Configuration

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

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

2.2.2 Area/Volume

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



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

2.2.3 Construction and Operational History

The AEP J. Robert Welsh Plant began operations in 1977 with three coal-fired generating units (Units 1, 2, and 3). Throughout the life of the generating plant, CCR materials (fly ash, bottom ash, economizer ash) have been generated. All of these byproducts were stored in either the Primary Bottom Ash Pond or in the adjacent landfill that was constructed in approximately 1977. In 2000, the 22-acre bottom ash storage pond was installed south of the landfill. The bottom ash storage pond was constructed with a 60-mil high-density polyethylene (HDPE) liner, and receives bottom ash and economizer ash dredged and sluiced from the Primary Bottom Ash Pond (**Figure 3**).

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

2.2.4 Surface Water Control

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

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



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2.3 Previous Investigations

The initial soils investigation for the site was provided in a 1973 report prepared by McClelland Engineers, Inc. entitled "*Soils Investigation, Welsh Power Plant, Cason, Texas*". This investigation included advancement of soil borings in the Primary Bottom Ash Pond area, and geotechnical soil testing to characterize the area encompassed by the Primary Bottom Ash Pond.

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

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

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

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

2.4 Hydrogeologic Setting

The site area is located within the West Gulf Coastal Plain. Cretaceous formations crop out in belts that extend in a northeasterly direction parallel to the Gulf of Mexico, and dip gently southeast. The Site is located on the outcrop of the Eocene-age



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Recklaw Formation, which consists of very fine to fine grained sand and clay (Flawn, 1966).

These features are further illustrated on five lines of cross section that were prepared through the Primary Bottom Ash Pond area, with three lines trending from west to east (A-A'; B-B'; C-C'), and the other two lines trending from north to south (D-D'; E-E'). The cross section location map is included as **Figure 3** and the lines of cross section are included as **Figure 4** (A-A') through **Figure 8** (E-E').

2.4.1 Climate and Water Budget

The climate of Titus County, Texas is moist sub-humid. Average temperatures range from 45° Fahrenheit (F) in January to 82.9°F in July. The mean annual growing season is 228 days (Broom, 1965). Average annual precipitation (including liquid water equivalent from snowfall) is approximately 47 inches according to weatherdb.com.

2.4.2 Regional and Local Geologic Setting

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

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

Detailed regional and site geologic characterization can be found in the 2010 ETTL report entitled "*Geotechnical Investigation, Welsh Power Station, Existing Ash Storage Ponds Embankment Investigation, Pittsburg, Texas*" (ETTL, 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,



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following surface topography towards the Welsh Reservoir. The Welsh Reservoir is likely a gaining surface water feature, and groundwater elevations on site are higher than the normal stage elevation of the Welsh Reservoir (320 feet amsl).

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

2.4.4 Water Users

A water well inventory conducted by Banks Information Solutions showed one water well within a ½-mile radius of the Site (Banks, 2013). The water well is located on-site to the southwest (side gradient) of the Primary Bottom Ash Pond, and was installed for Southwestern Electric Company in 1974 with a screened interval from 515 to 535 ft below ground surface, and plugged at a later date.

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3. Isolation from the Uppermost Aquifer

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

3.1 Uppermost Aquifer and Piezometric Analysis

3.1.1 Piezometric Analysis

3.1.1.1 Horizontal and Vertical Position Relative to CCR Unit

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

3.1.1.2 Overall Flow Conditions

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

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



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3.1.2 Uppermost Aquifer

3.1.2.1 CCR Rule Definition

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

3.1.2.2 Common definitions

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

3.1.2.3 State regulatory definition

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

3.1.3 Identified onsite hydrostratigraphic unit

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

3.2 Compliance with Isolation Distance

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



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4. Wetlands

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

4.1 Local Wetlands

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

4.2 Compliance with Wetland Restrictions

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



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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.



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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.



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7. Unstable Areas

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

7.1 Definition of Unstable Area and local Conditions

7.1.1 CCR Rule Definition

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

7.1.2 Poor Foundation Soils

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

7.1.3 Mass Movements

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

7.1.4 Karst

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

7.1.5 Subsurface Mining

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



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7.2 Compliance with Unstable Areas Restriction

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



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8. Summary, Conclusions, and PE Certification

I, Kenneth J. Brandner, certify that this report was prepared under my direction and supervision, and that the information contained herein is true and accurate to the best of my knowledge. Based on my experience and knowledge of the site, as well as the evaluations discussed within this report, the J. Robert Welsh Power Plant Primary Bottom Ash Pond meets the CCR surface impoundment location restrictions of 40 CFR Part 257 for fault areas, seismic impact zones, and unstable areas. However, the Primary Bottom Ash Pond does NOT meet the location restrictions for separation from the uppermost aquifer and possibly wetlands.

Kenneth J. Brandner

Printed Name of Registered Professional Engineer

Signature

69586

10-3-18

Registration No.

Registration State

_____ Date



BRANDNE

69586



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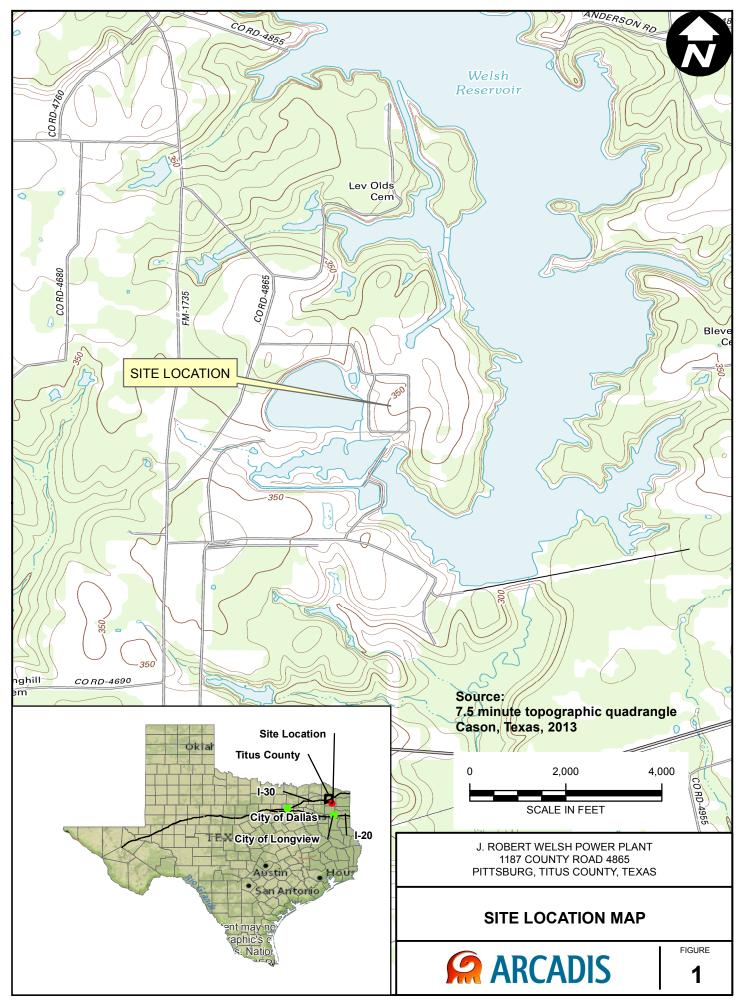
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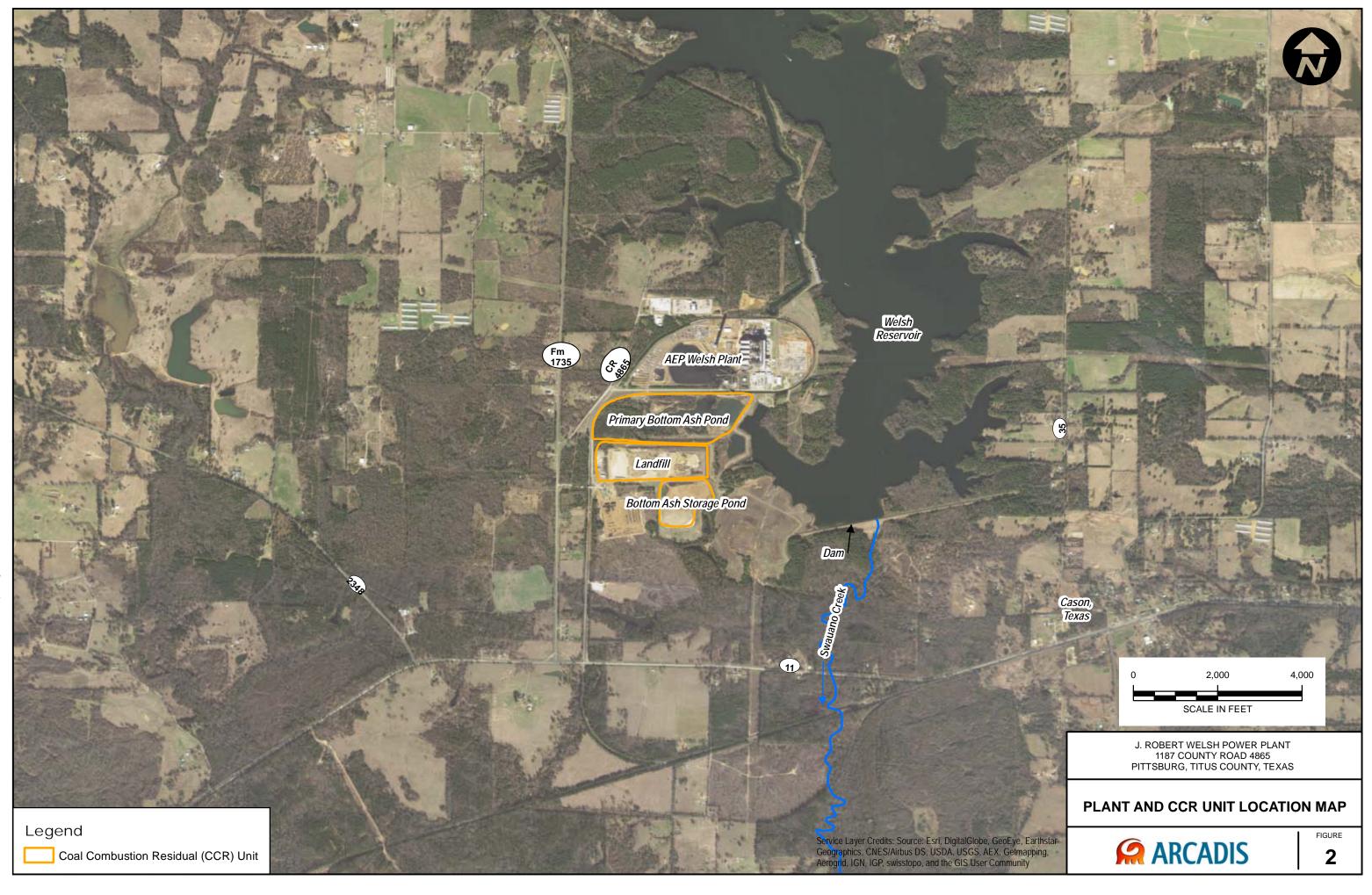
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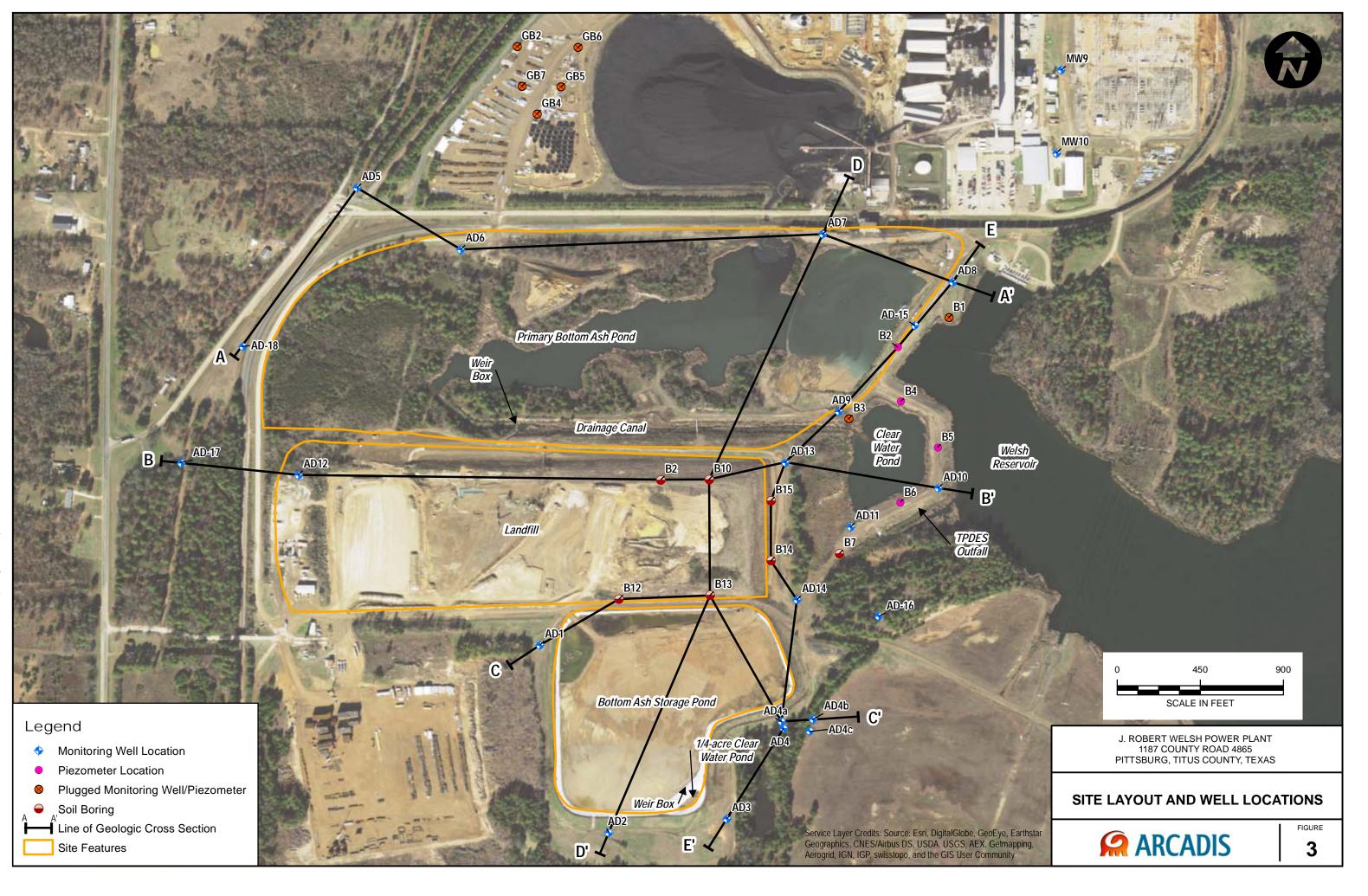
Table 1 Water Level Data AEP J. Robert Welsh Power Plant - CCR Storage Areas Pittsburg, Titus County, Texas

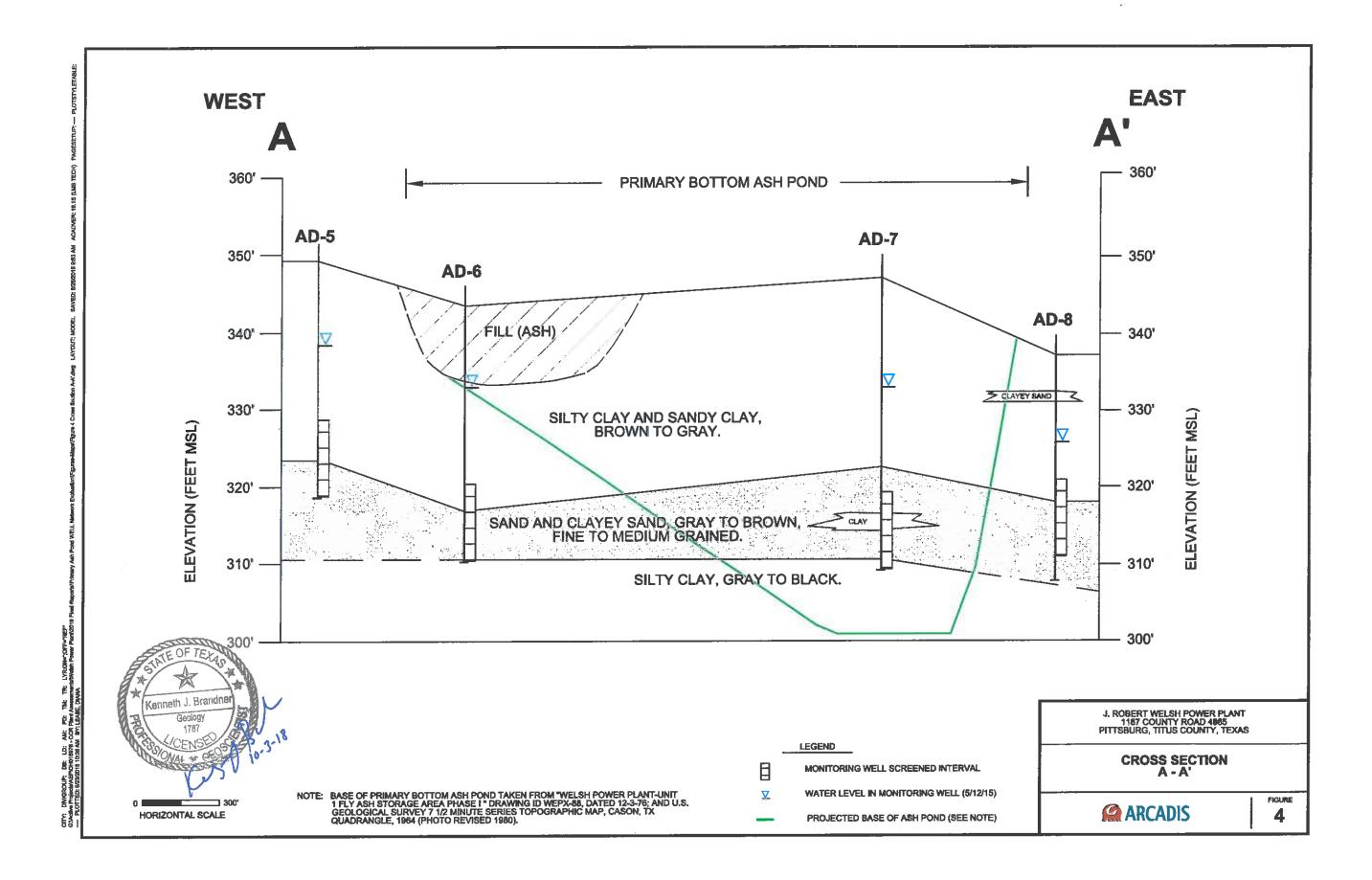
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			Surface	Casing	depth	Installed	Material	diameter	Depth	Elevation	Depth	Elevation			GW Elev.		GW Elev.			GW Elev.	GW Elev.	GW Elev.		GW Elev.			GW Elev.	
Well ID	Latitude	Longitude	Elevation	Elevation	ft. bls			inches	ft. bls	ft. msl	ft. bls	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl	ft. msl
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AD-1 ^(c)	33° 02' 48"	94° 50' 47"	355.57	357.57	25.0	1/11/01	Sch. 40 PVC	2	15.0	340.57	25.0	330.57	338.46	334.92	337.88	337.18	337.43	336.73	338.03	337.64	340.82	342.83	344.89	342.89	341.23	340.58	341.18	339.74
AD-2 (c)	33° 02' 37"	94° 50' 44"	344.16	346.16	25.0	4/26/01	Sch. 40 PVC	2	15.0	329.16	25.0	319.16	330.16	329.07	330.00	329.26	329.83	329.70	330.09	329.69	332.56	332.32	332.32	332.32	332.32	332.32	332.32	332.32
AD-3 (c)	33° 02' 38"	94° 50' 37"	331.10	333.10	17.0	4/26/01	Sch. 40 PVC	2	7.0	324.10	17.0	314.10	323.81	323.19	323.99	323.29	323.77	323.98	324.12	323.28	325.58	325.12	325.12	325.12	325.12	325.12	325.12	325.12
AD-4 (c)	33° 02' 43"	94° 50' 33"	340.61	342.61	30.0	4/26/01	Sch. 40 PVC	2	19.0	321.61	29.0	311.61	324.81	324.84	324.62	324.40	324.74	325.52	325.44	325.13	327.00	326.90	326.90	326.90	326.90	326.90	326.90	326.90
AD-4a ^(a)	33.04527	94.84258	340.19	342.85	30.0	9/22/09	Sch. 40 PVC	2	20.0	320.19	30.0	310.19	325.01	324.19	325.24	322.90	324.86	324.68	325.64	325.34	327.19	327.12	327.12	327.12	327.12	327.12	327.12	327.12
AD-4b ^(a)	33.04531	94.84230	329.55	333.23	15.0	9/23/09	Sch. 40 PVC	2	5.0	324.55	15.0	314.55	324.35	324.32	324.50	324.30	324.30	325.21	325.22	324.90	326.58	326.67	326.67	326.67	326.67	326.67	326.67	326.67
AD-4c ^(a)	33.04507	94.84244	329.15	333.28	15.0	9/23/09	Sch. 40 PVC	2	5.0	324.15	15.0	314.15	324.18	324.50	324.64	324.37	324.11	325.06	325.01	324.71	326.50	326.19	326.19	326.19	326.19	326.19	326.19	326.19
AD-5 ^(c)	33° 03' 13"	94° 51' 00"	349.00	351.00	30.0	1/11/01	Sch. 40 PVC	2	20.0	329.00	30.0	319.00	336.34	336.58	336.82	336.99	336.78	336.47	336.80	336.01	339.07	338.04	338.04	338.04	338.04	338.04	338.04	338.04
AD-6 ^(a)	33.05235	94.84757	343.31	346.33	33.0	9/23/09	Sch. 40 PVC	2	23.0	320.31	33.0	310.31	333.04	333.02	332.83	333.02	333.11	332.81	333.11	332.81	333.38	334.00	334.00	334.00	334.00	334.00	334.00	334.00
AD-7 ^(a)	33.05257	94.84219	347.86	350.82	38.0	9/24/09	Sch. 40 PVC	2	28.0	319.86	38.0	309.86	334.32	334.12	334.19	334.20	334.13	334.58	333.77	333.98	334.09	333.61	333.61	333.61	333.61	333.61	333.61	333.61
AD-8 ^(a)	33.05187	94.84026	337.53	340.01	29.0	9/21/09	Sch. 40 PVC	2	16.0	321.53	26.0	311.53	325.41	324.09	325.69	325.15	325.79	325.75	325.98	325.77	326.05	325.70	325.70	325.70	325.70	325.70	325.70	325.70
AD-9 ^(a)	33.04995	94.84196	340.32	343.09	35.0	9/21/09	Sch. 40 PVC	2	20.0	320.32	35.0	305.32	328.46	328.53	328.63	328.44	328.74	329.38	NM	330.18	329.98	329.74	329.74	329.74	329.74	329.74	329.74	329.74
AD-10 ^(a)	33.04881	94.84047	340.23	343.01	35.0	9/22/09	Sch. 40 PVC	2	20.0	320.23	35.0	305.23	323.44	322.55	323.27	323.35	323.51	323.76	323.57	323.88	323.95	323.55	323.55	323.55	323.55	323.55	323.55	323.55
AD-11 ^(a)	33.04824	94.84177	339.61	342.18	20.0	9/22/09	Sch. 40 PVC	2	10.0	329.61	20.0	319.61	327.99	328.37	327.82	327.93	327.94	328.13	328.20	327.97	328.96	328.13	328.13	328.13	328.13	328.13	328.13	328.13
AD-12 ^(a)	33.04901	94.84977	366.27	369.33	30.0	9/24/09	Sch. 40 PVC	2	20.0	346.27	30.0	336.27	348.30	348.29	349.86	349.56	349.99	349.65	349.89	350.01	350.65	350.39	350.39	350.39	350.39	350.39	350.39	350.39
AD-13 ^(a)	33.04918	94.84275	344.12	347.00	20.0	9/22/09	Sch. 40 PVC	2	6.0	338.12	16.0	328.12	332.36	332.24	333.09	332.26	332.68	333.25	333.35	332.01	337.58	334.76	334.76	334.76	334.76	334.76	334.76	334.76
AD-14 ^(a)	33.04715	94.84256	342.32	345.43	19.0	9/22/09	Sch. 40 PVC	2	8.0	334.32	18.0	324.32	330.40	329.80	331.67	330.34	330.94	331.69	332.12	330.17	336.63	334.83	334.83	334.83	334.83	334.83	334.83	334.83
AD-15 ^(d)	33° 03' 04"	94° 50' 27"	340.21	343.29	46.0	12/12/15	Sch. 40 PVC	2	25.5	314.71	45.5	294.71										322.14	322.14	322.14	322.14	322.14	322.14	322.14
AD-16 ^(d)	33° 02' 49"	94° 50' 29"	350.86	353.97	21.0	12/10/15	Sch. 40 PVC	2	11.0	339.86	21.0	329.86										337.09	337.09	337.09	337.09	337.09	337.09	337.09
AD-17 ^(d)	33° 02' 57"	94° 51' 06"	353.99	357.10	40.0	12/10/15	Sch. 40 PVC	2	24.0	329.99	39.0	314.99										334.64	334.64	334.64	334.64	334.64	334.64	334.64
AD-18 ^(d)	33° 03' 03"	94° 51' 03"	346.17	349.28	29.0	12/11/15	Sch. 40 PVC	2	14.0	332.17	29.0	317.17										343.66	343.66	343.66	343.66	343.66	343.66	343.66
								_																				
Piezometers													1	1	1			1						1				, <u> </u>
B-2 ^(b)	33° 03.078'	94° 50.449'	339.7	339.7	50.0	10/28/09	Sch. 40 PVC	2	10.0	329.70	20.0	319.70	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
B-4 ^(b)	33° 03.011'	94° 50.462'	340.6	340.6	50.0	10/27/09	Sch. 40 PVC	2	8.0	332.60	18.0	322.60	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
B-5 ^(b)	33° 02.964'	94° 50.428'	340.0	340.0	50.0	10/27/09	Sch. 40 PVC	2	10.0	330.00	20.0	320.00	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
B-6 ^(b)	33° 02.912'	94° 50.462'	340.1	340.1	50.0	10/28/09	Sch. 40 PVC	2	12.0	328.10	22.0	318.10	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM	NM
-														1														I
									•	•						•			•	•								

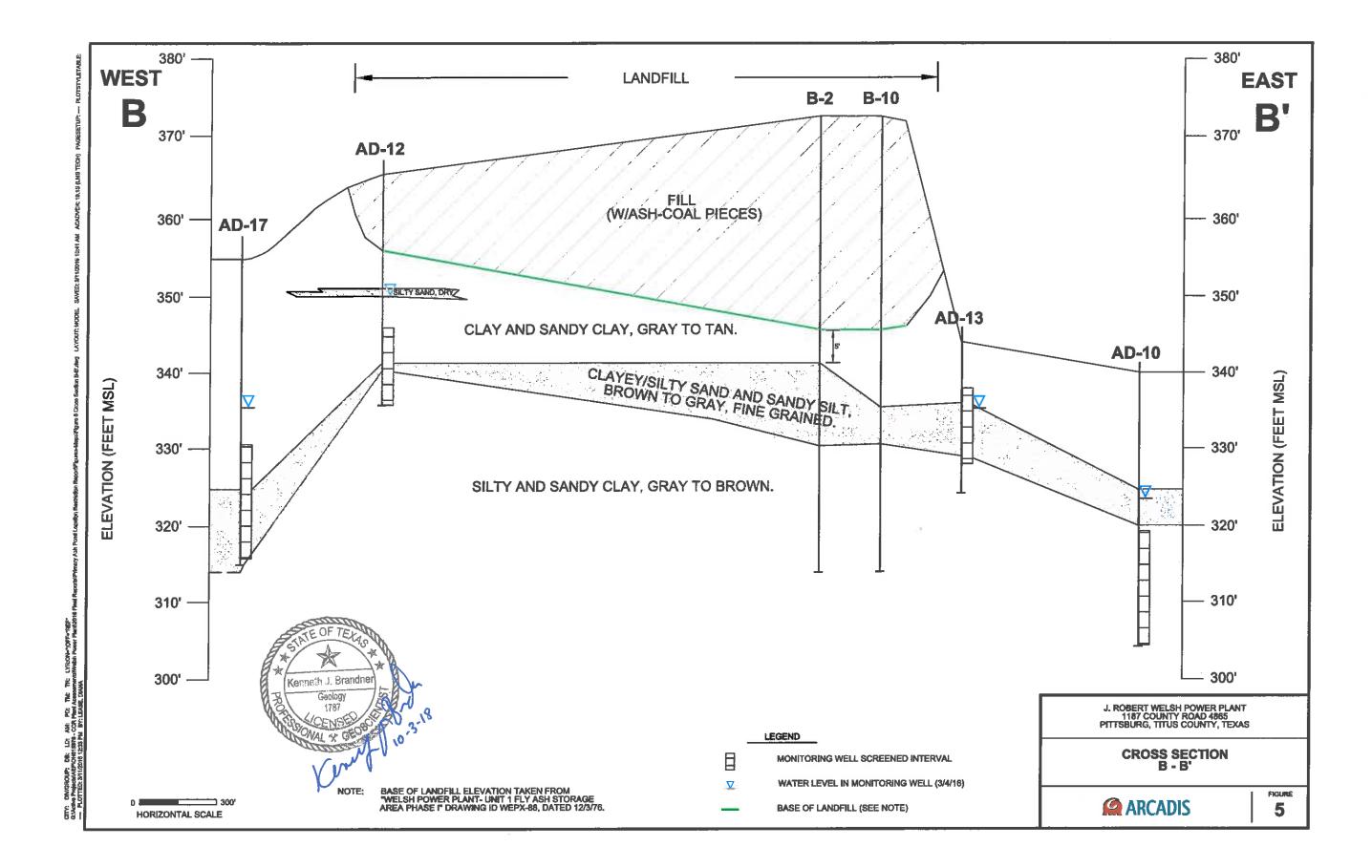
NM - Not measured.
(a) Source: Eagle Environmental Services Well Logs (2009).
(b) Source: ETTL Engineers & Consultants Inc. (June 21, 2010).
(c) Source: Southwest Electric Power, State of Texas Well Report (2001).
(d) Source: Auckland Consulting LLC (January 26, 2016). Monitoring wells AD-15 through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

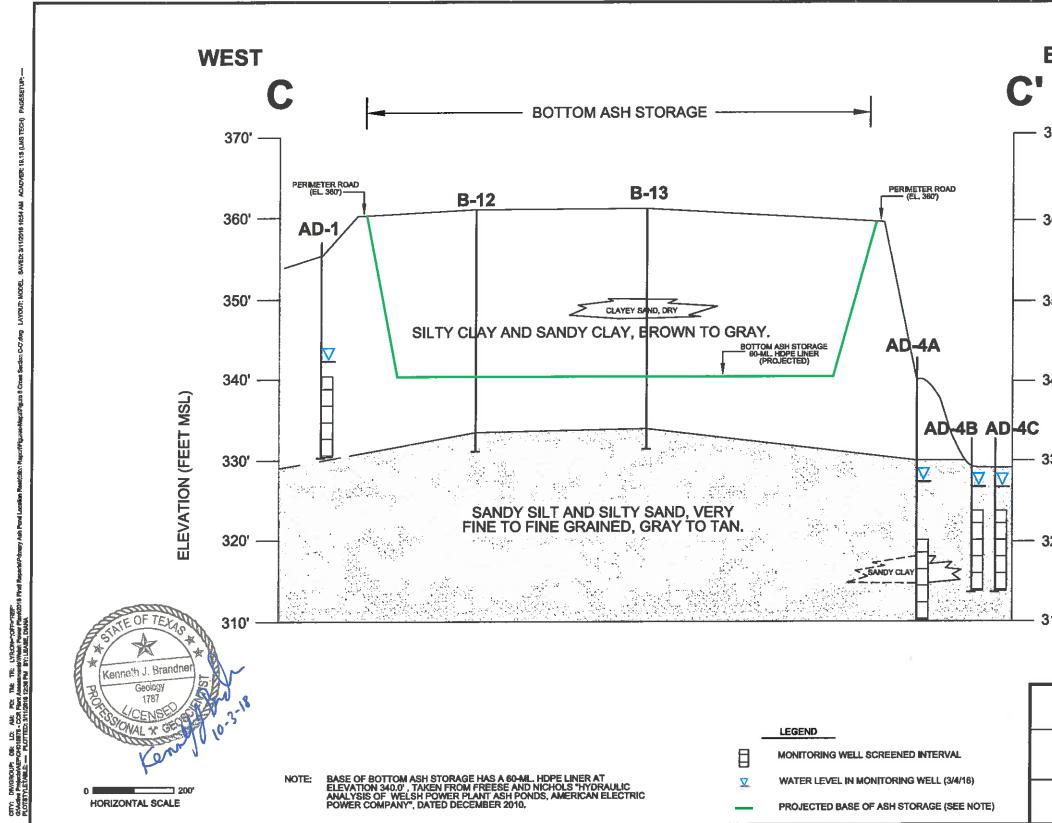




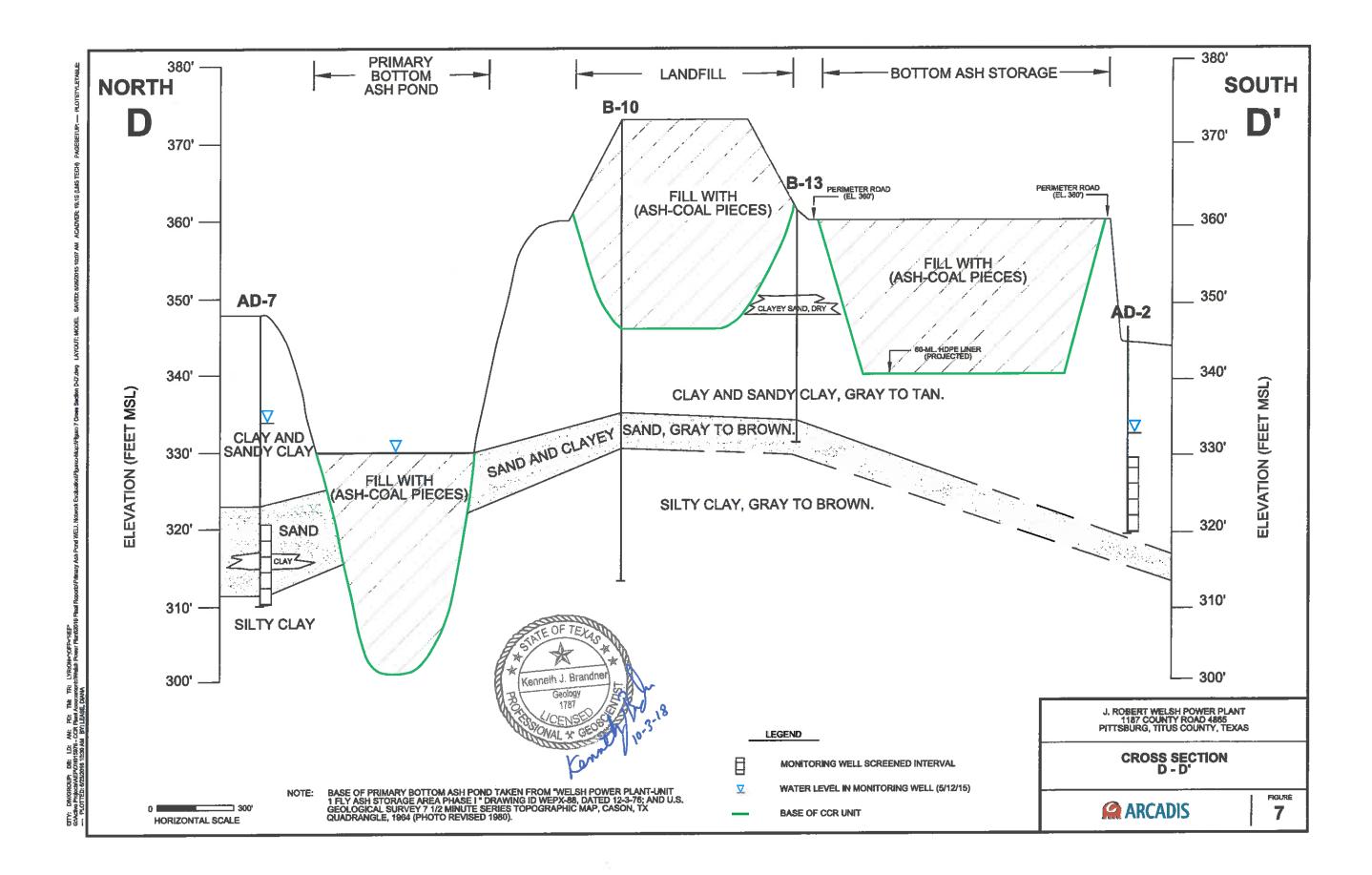


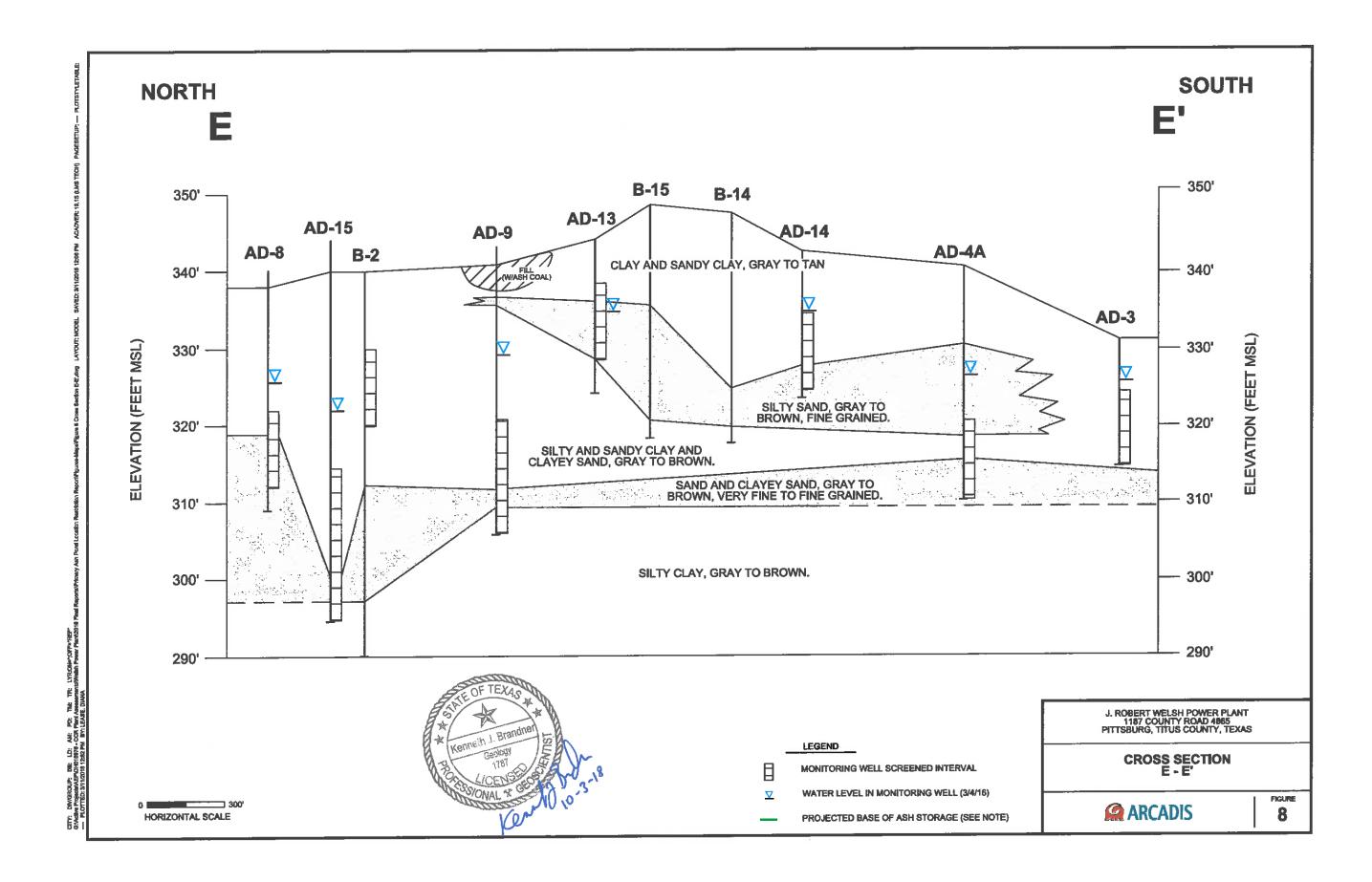


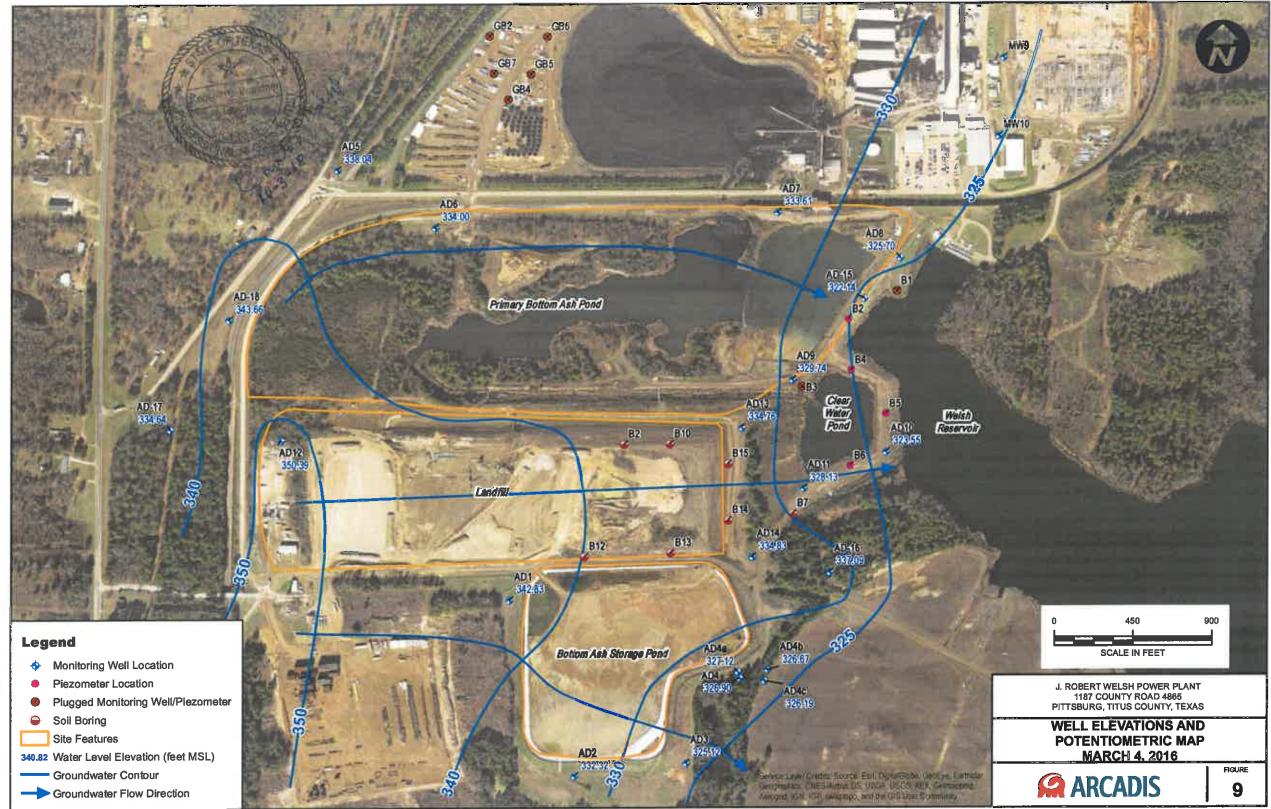




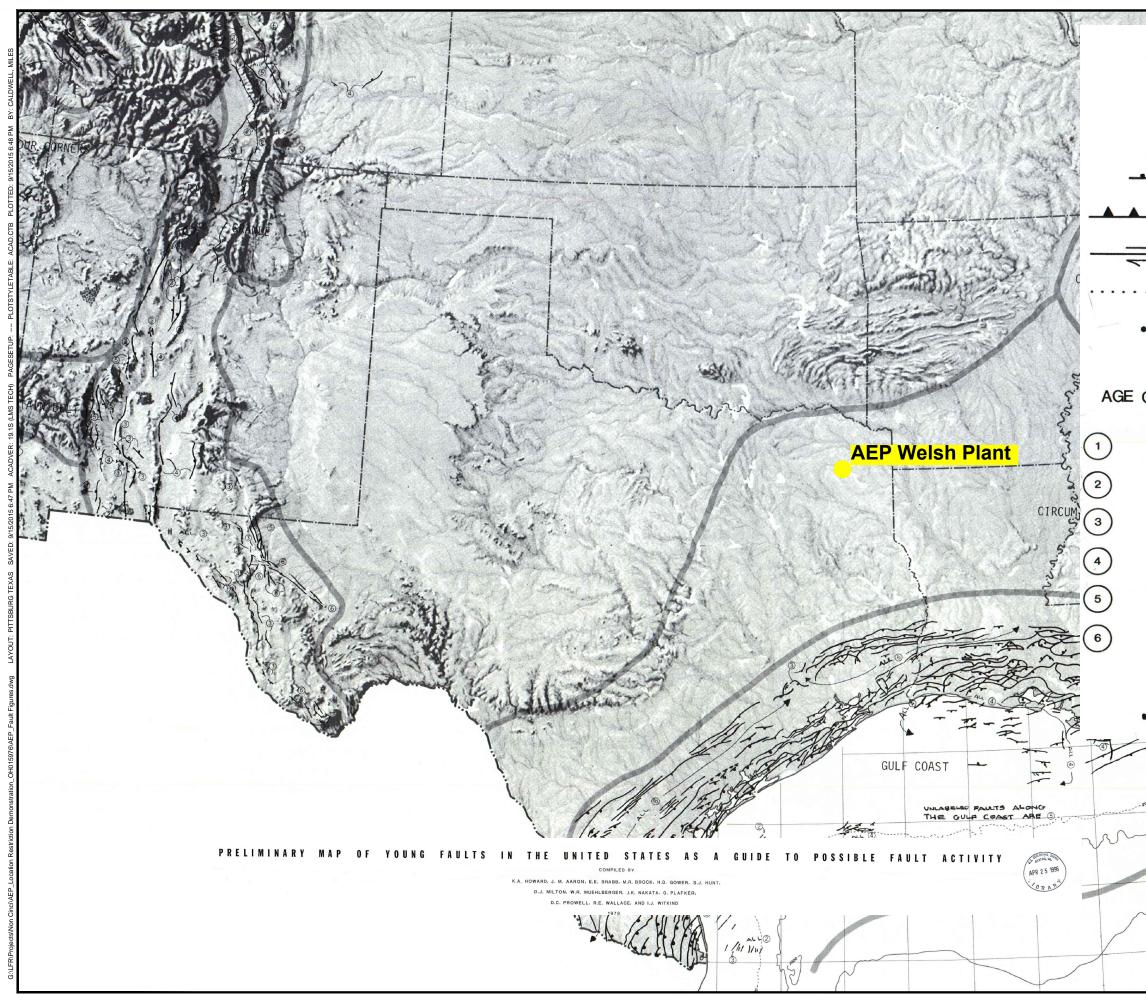
EAS	ST			
370'				
360'				
350'				
340'	T MSL)			
330'	ELEVATION (FEET MSL)			
320'	ELEVA			8
310'				
	J. RÖBER 1187 (PITTSBUR(T WELSH POWER COUNTY ROAD 48 3, TITUS COUNTY	PLANT 65 , TEXAS	
	CRO	DSS SECTIO C - C'	N	
	🙆 AR	CADIS		FIGURE 6











EXPLANATION

N.



FAULTS

Ball on downthrown side

Sawteeth on upper plate of thrust fault Arrows show sense of lateral displacement Suspected fault

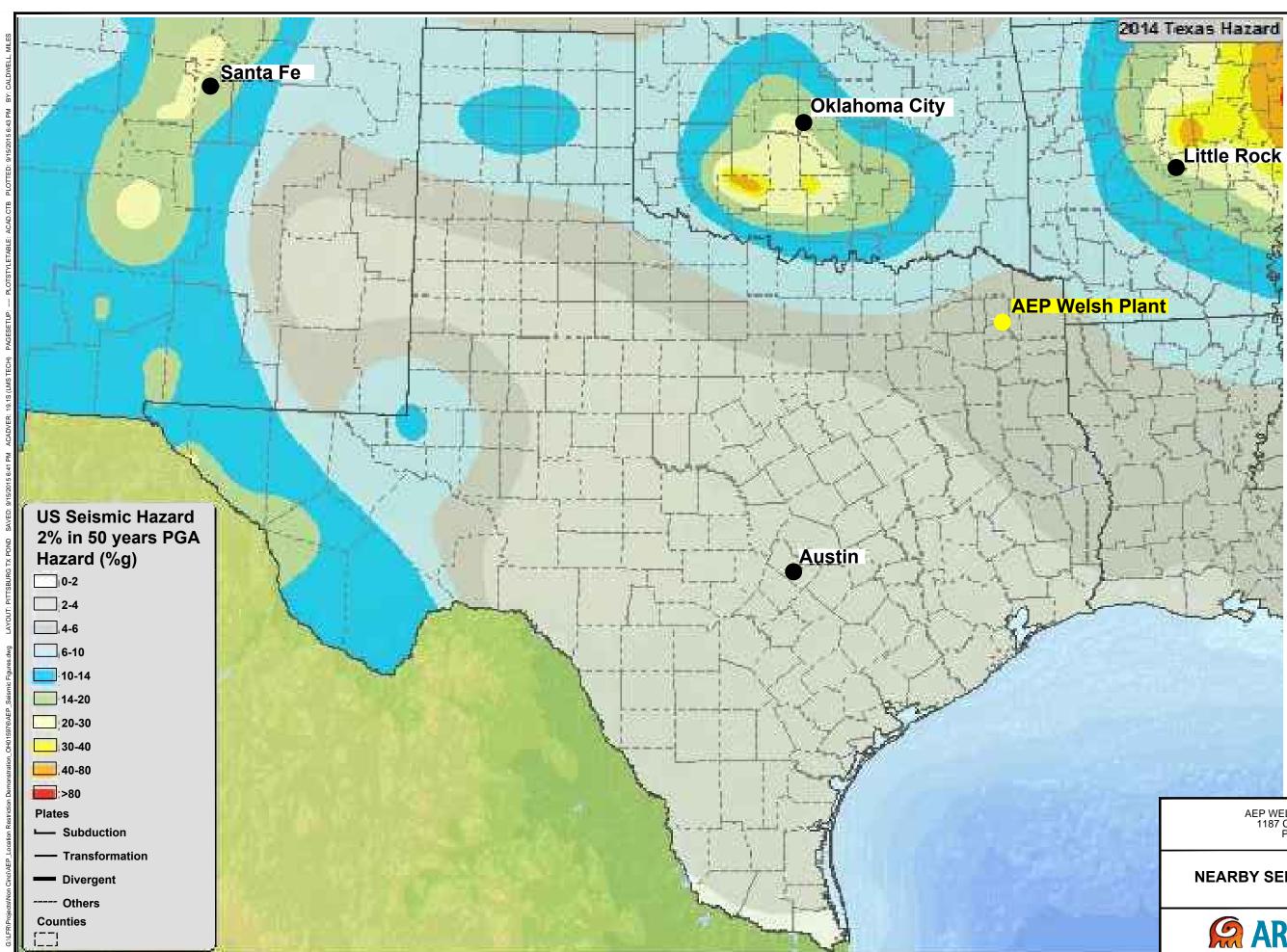
Fault, strike unknown

AGE OF YOUNGEST KNOWN DISPLACEMENT

Historic		X	-
HoloceneApproximat	tely the last	10,000 years	ـد
Late QuaternaryAp	proximately th	ne last 500,000	years
QuaternaryApproxim	ately the las	t 1.8 million ye	ears
Late Cenozoic-Appro	oximately the	last 15 million	years
Other-Longer time s	pan than late	Cenozoic	
Bour	idary of fault	region	
• 5	0	40	80MI
L'AND		ALE IN MILI le is approxim	
	1187 C	PS GENERATIN OUNTY ROAD 4 TSBURG, TEXAS	865

NEARBY FAULT LOCATIONS



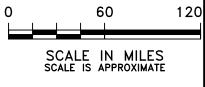




FIGURE

NEARBY SEISMIC IMPACT ZONES





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





• 65

Appendix A

Boring/Well Construction Logs

AD-	1							
	Please use black ink.							
	e of Texas Water Well Drillers Advisory Council P.O. Box 13087 L REPORT Austin, TX 78711-3087 512-239-0530							
1) OWNER Southwestern Electric Power ADE (Name)	RESS <u>Rt.4, Box 221</u> Pittsburg Tx 75686 (Street or RFD) (City) (State) (2p)							
2) ADDRESS OF WELL: County	(City) J (State) (Zip)							
3) TYPE OF WORK (Check).	Monitor Environmental Soll Boring Domestio 5) GPS Injection PublicSupply De-watering Testwath 33°02'48"N submitted to the TNRCC? I Yes No No							
bit Diameter Diameter OF HOLE Date Drilling: Dia. (in.) From (ft.) To (ft.) Started / - // 48.200 / Striace 2.5 Completed / - // 192.00 / - - -	'f) DRILLING METHOD (Check): Driven 94°50'47''W Air Rotary Mud Rotary Message 94°50'47''W Air Rotary Other Jatted 94°50'47''W Other N*							
From (PL) To (PL) Description and color of formation material 0 - 25 Gray Silty Clay with Some hard red	Borehole Completion (Check):							
	Setting (9) Game							
	Dia or Perf., Slotted, etc.							
AP-1	(in.) Used Screen Mig., if commercial From 30 Screen							
AF~ 1	2 N riser +2 15 Sel 40							
	2 N #105/07 screen 15 25 Sch40							
	9) CEMENTING DATA [Rule 338.44(1)] Cemented from							
(Use reverse side if necessary)								
13) TYPE PUMP: VA □ Turbine Jet Submersible Cyfinder □ Other								
Type test: Pump E Baller Jetted Estimated Yield:gpm withft. drawdown afterhrs.	11) WATER LEVEL: Static level 12 8 ft. below land surface Date 1-11-01							
 15) WATER QUALITY: Did you knowingly penetrate any strata which contained undestrable constituents? Yes DX No If yes, submit "REPORT OF UNDESIRABLE WATER" 	Artesian flow gpm. Date 12) PACKERS: N/A Type Depth							
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 understand that failure to complete items 1 thru 15 will result in the log(s) being re COMPANY NAME	each and all of the statements herein are true to the best of my knowledge and bellef. I urned for completion and resubmittal. WELL DRILLER'S LICENSE NO							
ADDRESS	(City) (State) (Zip)							
{Signed}	(Registered Driller Trainee)							
	nalysis, and other pertinent information, if available. 0: TNRCC, DRILLER, WELL OWNER							

£ _

	Austin, TX 78711-3087					e black ink.		
Send original copy by certified mail to: TNRCC, P.O. Box 1308	State o	f Tex	as			P.O. Box	13087	Council
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side		REPORT Austin, TX 78711-3087 512-239-0530						
1) OWNER Southwestern Elect	ADDRES	is <u>P</u>	<u>t.</u> 4	BOX 22	1 Pittsba	rg TX_	(State)	(Zip)
2) ADDRESS OF WELL: County Carmen Rt. 4	BOX 221 Pitts	: bur	rg T	X 75 (State)	<u>686</u> (Zp)	GRID #	16-58	-4
Titut	EDUSE (Check): N	Vonitor		nvironmental So	il Boring 🔲 Domi		GPS	
3) TIPE OF HORIC CONSIST	riat [] Inigation [] Inje Supply well, were plans sub	ction mitted	D Publi to the TN	Supply De RCC? L Yes	watering [] Testwo	3	3°02 !	37 W
DIAME	TER OF HOLE			G METHOD (Ch		9	4'50'	4 4 ¹¹ W
6) WELL LOG: Date Drälling: 2 0.01 Dia. (in.)	From (fL) To (fL)			atary [] Mud	Rotary 🔀 Boned ble Tool 📋 Jetted		/ 0 -	
Date Draining: 2001 81/4 Started 4/26 18 14 Completed 4/26 19 1001 14	Surface 2.5							Ń
		8)	Borcho	e Completion (C	heck): 🗌 Open	Hole I	Straight Wall	
From (ft.) To (ft.) Description and color of	f formanon materia	· ·			Crowel Parked	Other .	25	ft.
0 2 top Soil 2 5 rod 4 gray Cl	au w/silt				sival from			
E 10 red a gray cly	y wisilt	CAS	ING, BL	ANK PIPE, AND	WELL SCREEN DAT		- (1)	Gage
10 25 gray sitty Cla	y ultan_	Dia.	New or	Steel, Plastic Perf., Slotted	, etc.	Settin	ιση (τ.) Το	Casting
		(in.)			if commercial	From +2	15	Sch 40
AP-2		2	N	riser #10 shu	t screen	15	25	Sch to
								<u> </u>
			<u> </u>				1	
		1 1		TING DATA (F	a 📣 🗇	ft. No.of sa	icks used	5-50#
			Cetter		nto delles	1. No. of sa	icks used	
		1	Method	used <u>beni</u>	with perel	5		
(Use reverse side if necessary)			Distanc	ed by	m field lines or other o above distance	oncentrated	contamination	n ft.
13) TYPE PUMP: NA	inder							
Turbine Jet Submersitive		10)	SURF/	CE COMPLETI	DN ab installed [Rule 33	8.44(2)(A)]		
Depth to pump bow/s, cylinder, jet, etc.,	L	-	X Spe	cified Steel Slee	ve instalied [Rule 33	8.44(3)(A)]		
10 WELL TESTS: NA			Pitt	ss Adapter Use	j [Rule 338.44(3)(b)	1		
Typetest Pump Bailer Jetted	Estimated			roved Alternativ	e Procedure Used (Ru			
Yield: gpm with ft, drawdown	n after hrs.	11)	WATE	RILEVEL:	_ ft. below land surfa	re Date	s	
15) WATER QUALITY:					gpm.	Date	·	
Did you knowingly penetrate any strata which contain	ed undesirable	\vdash				Туре	 Der	
constituents?	ESIRABLE WATER	12	PACK	ERS:	1A	1300		
Type of water? Depth of stra	ta							
Was a chemical analysis made? [] Yes 🗍								
I hereby certify that this well was drilled by me (or under n understand that failure to complete items 1 thru 15 will res	ny supervision) and that ea ult in the log(s) being return	ch and a ned for c						
			WELL	DRILLER'S LIC	ENSE NO7	<u>-X 54</u>	<u>694-n</u>	2
(Type or print)								
ADDRESS (Strest or BP)			(City)			(State)	- ((Zip)
(Signed) Millet M Kill	2		(Signe	d)	(Register	ed Driller Trai	nee)	
(Licensed Well Driller)								
Please attach	lectric log, chemical ana	lysiz, ar	nd other	pertinent infor	nation, if available.			
					NAM (CT)			

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

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	10007 Augusta TV 78711-3087	Please use black ink.
nd original copy by certified mail to; TNRCC,	P.O. Box 13087, Austin, 1X 18711-5001	Texas Water Well Drillers Advisory Council
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side	State o WELL F	
	tilastiis appes	s <u>Pt. 4</u> , <u>Box 221</u> <u>Pittsburg Tx</u> <u>7.5686</u> (Street or RFD) (City) (State) (Zp)
1) OWNER Southusestern		
z) ADDRESS OF WELL: County		(CNV) (State) (Zp)
3) TYPE OF WORK (Check):	4) PROPOSED USE (Check):	
New Well Decpening Reconditioning Plugging	Tindustrial Tinigation Tinigation Ingention Ingention	ction Deublic Supply De-watering Testwell 33 02 38 W
	DANIETER OF HOLE	7) DRILLING METHOD (Check): Driven 94 50 37 W
6) WELL LOG:	Dia (in.) From (ft.) To (ft.)	Air Rotary [] Mud Rotary & Bored
Date Drilling: 2.001 Started 4/24 19-2.001	81/4 Surface 17	Air Hammer Cable Tool C Jetted
Started 4/26 3001		☐ Other Ň
		Borahole Completion (Check):
Lion full c. h	tion and color of formation material	Distancement W Gravel Packed Other
0 12 gray	sith clay w/ton	If Gravel Packed give interval from ft. to ft.
	stift gray/blood	CASING, BLANK PIPE, AND WELL SCREEN DATA:
mbd	Clay	New Steel, Plastic, etc. Setting (fl.) Gage
	shiff gray clay w/	Dia. or Perf., Slotted, etc. (in.) Used Screen Mfg., If commercial From To Screen
	podules and tan	42 7 Sal 6
51	trenhs	2 N FISCE 12 17 Sel
	AP-3	
		9) CEMENTING DATA [Fulle 338.44(1)] Cenvented from 2 ft to ft. No. of sacks used
		Cemented fromfL tofL No. of sacks used
		Methodused bentonite pellets
		Connected by
(Use reverse si	ide if necessary)	Distance to septic system field lines or other concentrated contamination
13) TYPE PUMP: NA		Method of verification of above distance
🖸 Turbine 🔲 Jet 🔀 Subme	ersible 🗌 Cylinder	10) SURFACE COMPLETION
[] Other		Specified Surface Slab Installed [Rule 338.44(2)(A)]
Depth to pump bowls, cylinder, jet, et	ICIC.	Specified Steel Sleeve Installed [Rule 338.44(3)(A)]
AN WELL TESTS- NA		Pitless Adapter Used (Rule 335.44(3)(b))
14) WELL TESTS: 70 H Type test Pump Baile		Approved Alternative Procedure Used [Rule 338.71]
Yield:gpm with	f. drawdown after hrs.	11) WATER LEVEL:
		Static level ft. below land surface Date
15) WATER QUALITY:	to which explored undesirable	Antasian flow gpm. Date
Did you knowingly penetrate any str constituents?		12) PACKERS: NA Type Depth
Yes XNo If yes, submit T	REPORT OF UNDESIRABLE WATER"	
Type of water?	Depth of strata	
Was a chemical analysis made?		
the main mostly they this wall was drilled	by me (or under my supervision) and that ea	ch and all of the statements herein are true to the best of my knowledge and belief. I ned for completion and resubmittat.
understand that failure to complete items	by me (or under my supervision) and that ea s 1 thru 15 will result in the log(s) being return	WELL DRILLER'S LICENSE NO
COMPANY NAME	(Type or print)	WELL DRILLER'S LICENSE RV / / / · @ // Sec
	(13be of being	(State) (Zip)
ADDRESS	et/or RED	(City) (State) (21p)
J. Mut IT	11/aus	(Signed) (Registered Driller Trainee)
(Signed) (Lice	erised Well Driller)	(Inclusion many many
		iysis, and other pertinent information, if available.
	Please attach electric log, chemical and	

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

			Plasse tr	se black ink.	
end original copy by certified mail to: TNRCC	, P.O. Box 13087, Austin, TX 78711-3087			er Well Drillers Adviso	v Council
	State o	of Texas		P.O. Box 13087	
ATTENTION OWNER: Confidentiality Privilege Notice on Reverse Side		REPORT		Austin, TX 78711-3087 512-239-0530	
					101
	Electric Power ADDRES	PLA	Pox 221 Pittshur	9 TX 15	686
1) OWNER Southwestern	ELECTIC FOLLY ADDRES	s <u>Fi</u> i	Street or RFD) (City	(State)	(Zip)
(Na	me)	/	- 75181	lla-	58-4
2) ADDRESS OF WELL:	(Street, RFD or other)	×114	1X 13686	GRID #	<u>///-</u>
County	(Street, RFD or other)	V(City)	(State) (24p)		
<u>nitus</u>	a ppoposeDitsE(Check);	Monitor 📋	Environmental Soil Boring	esuc p GP)
3) TYPE OF WORK (Check):	Industrial En Integation [] Inje	ection 🗌 Pub	licSupply De-watering Testw		1 collat
	If Public Supply well, were plans sub	bmitted to the T	NRCC7 Yes No	33°02	43"N
Reconditioning Plugging			NG METHOD (Check): Driven	e.e.r.	lo d'un
6) WELLLOG:	DIAMETER OF HOLE			194 50	' 33"W
Date Drilling: 200	Dia (in.) From (ft.) To (ft.)				
Started 4/26_ 19	81/4 Surface 30			•	.1
Completed 4/26 48 2001			er		พิ
			le Completion (Check):	Hole (Straight Wa	8
From (fL) To (fL) Descrip	ption and color of formation material	·	Constrained F	Other	
1 10-	I silts clay with		lerreamed X Gravel Packed f	6 110 30	ft_
0 5 100	gray stredes				
	1	CASING, B	LANK PIPE, AND WELL SCREEN DA	.TA:	
5-30 Grau	1 silts clay with	New	Steel, Plastic, etc.	Setting (ft.)	Gage
<u>5-30 grau</u>	nd sticklys	Dia, Or	Perf., Slotted, etc.	From To	Casting Screen
		(in.) Used	Screen Mig., If commercial		Seh 40
		2N	riser	TA	Sch 40
	nost	2 N	# 10 Slot Screen	19 29	100 7º
	HPT			<u> </u>	
		9) CEME	NTING DATA [Rule 338.44(1)]		a
			and from 16 the 2	fl. No. of sacks used	8-50-
			ft. to	TL NO. DI SACIUS USCU	
		Metho	dused bentonite pe.	llets	
		Ceme	nted by		
/Use reverse si	ide if necessary)	Distar	ce to septic system field lines or other	concentrated contaminal	ion1L
		Meth	d of verification of above distance		
13) TYPE PUNP:	ersible 🔲 Cylinder				
Turbine Det Subme		10) SURF	ACE COMPLETION		
Cther		X Sp	ecified Surface Slab Installed [Rule 3	38.44(2)(A))	
Depth to pump bowls, cylinder, jet, e		T ⊠ St	ecified Steel Sieeve Installed [Rule 3]	38.44(3)(A)]	
AD WELL TESTS: NA	1	19	less Adapter Used [Rule 338.44(3)(b)	1	
sal HELE ILOTON	·		proved Alternative Procedure Used (R	ule 338.71]	
Typetest: 🗍 Pump 🗌 Baile					
Yiekt:gpm with		11) WAT	ER LEVEL:	ice Date	
			level ft. below land surfa	Date	
15) WATER QUALITY:	addresses to an an an an an	Arbes	an flow gpm.		
Did you knowingly penetrate any str constituents?	ALS WINCE CUITAILIEU LETUCOREUM	401 010		Туре 🛙	lepth
□ Yes 1 No If yes, submit T	REPORT OF UNDESIRABLE WATER"	12) PAC	CERS: NA		
Type of water?	Depth of strata				
Was a chemical analysis made?	TYes No				
	by me (or under my supervision) and that ear	ch and all of the	statements herein are true to the best	of my knowledge and be	tief. t
I hereby certify that this well was drilled to	by me (or under my supervision) and that each s 1 thru 15 will result in the log(s) being return				
		WEL	DRILLER'S LICENSE NO.	TX 52694-1	11
COMPANY NAME	(Type or print)				
	-				(Tip)
ADDRESS	shanRFØ	(City)		(State)	(Zip)
1111 199	WI II Km	(Sign	(be		
(Signed)	ensed Well Driller	for for the	(Register	ed Driller Traines)	
(Lice					
	Please attach electric log, chemical anal	lysis, and othe	r pertinent information, if available.		

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		90	L BORING	OG
and A	2.2.1	BORING/WI		AD-4A
		TOTAL DEP		30'
	UNTAL SURVICES	TOP OF CAS	SING ELEV.:	342.85 ft. NGVD
OT SHRI	LVEPORT, INC.	GROUND SI	URFACE ELEV.:	340.19 ft. NGVD
CLAILITY.	EP	DRILLING CO .:	WEST Drilli	+
PROJECT: A SITE LOCATION: W	sh Disposal Area Valsh Power Plant	DRILLER: METHOD OF DRI	Tom McCull ILLING: Hollow-stem	-
	-08-0109	SAMPLING METH		Auger
	ames Meleton, Jr.	DATE DRILLED:	9/22/09	
NOTES: Latitude:			l during drilling	Page 1 of 1
Longitude:	94.84258	✓ Water level	I in completed well	
DEPTH SYMBOLS	SOIL DESCRIPTION	CORE PID RECOVERY (ppm (Percent)		WELL CONSTRUCTION
5			4" x 4" x 5' Well Cover	5
			Locking Well Cap	
0 SC ML	Clayey Sand: Brown topsoil	<u>/</u>		
SM	Slit: Grey and tan			
WIG	Silty Sand: Brown	/	8.25" Diameter Borehole	
-5 -1		/		/ /5
	Sandy Clay: Red and grey, fine sand			
	Clay: Grey and tan, laminated with silt clay, w/orange from 5-6'	and	2" Dia. SCH 40 PVC Cas	
-10		/	i.	10
	Sand: Grey and tan, very fine			
SM			Top of Bentonite Seal	
-15	- w/some grey clay laminations to 20'			15
			Top of Sand Filter Pack	
-20 -	- grey and tan, moist		Top of Screen	
	Sandy Clay: Grey and tan, fine sand, w	ot		
CL- CH	Sandy Glay. Grey and tan, into sand, w	ol i		
-25 -	Silty Sand: Grey and tan, fine sand, we		2" Dia. SCH 40 PVC,	25
			0.010-inch Slotted Screen	
SM	ALAI	E OF TELAN		
-30 -		MAY THE	Total Depth	-30
	[M	M.M.		
	2.3	W.MELETON, JR.		8699 <i>991</i> 9 1
-35 -		EOLOGY 29		
	A Start	CENSERES		8///8///
		L Y GE		
.40				0///////////

	SOIL POPING LOC
	SOIL BORING LOG
	BORING/WELL NO.: AD-4B
F.A.C.I.F	TOTAL DEPTH:15'TOP OF CASING ELEV.:333.23 ft. NGVD
INVIRONMENTAL SERVICES OF SHREVEPORT, INC.	
CLIENT: AEP	GROUND SURFACE ELEV.: 329.55 ft. NGVD DRILLING CO.: WEST Drilling
PROJECT: Ash Disposal Area	DRILLENG CO.: WEST Drining DRILLER: Tom McCullough
SITE LOCATION: Welsh Power Plant	METHOD OF DRILLING: Hollow-stem Auger
PROJECT NO.: S-08-0109 LOGGED BY: James Meleton, Jr.	SAMPLING METHODS: Split-spoon DATE DRILLED: 9/23/09
NOTES: Latitude: 33.04531	Sz Water level during drilling Page 1 of 1
Longitude: 94.84230	Water level in completed well
DEPTH SOIL USCS SOIL DESCRIPTION	CORE RECOVERY (Percent) PID WELL (ppm) DESCRIPTION WELL CONSTRUCTION
5 -	4" x 4" x 6.5' Welt Cover
	Locking Well Cap
0	
Silty Sand: Grey and tan, fine, moist	2" Dia. SCH 40 PVC Casing
	Top or Bentomite Seat
-5	Top of Sand Filter Pack
∽ - wet	
SM	8.25" Diameter Borehole
-10 -	2" Dia. SCH 40 PVC, O.010-inch Slotted Screen
-15 -	Total Depth
-20	20
-25 -	25
l l l	
-30 -	
	SC. W. MELETON, JR
	No. 273
-35 -	
-40 -1	-40

1111	SOIL BORING LOG
	BORING/WELL NO.: AD-4C
	TOTAL DEPTH: 15'
E·A·G·L·E	TOP OF CASING ELEV.: 333.28 ft. NGVD
INVIRONMENTAL SERVICES OF SHREVEPORT. INC.	GROUND SURFACE ELEV.: 329.15 ft. NGVD
CLIENT: AEP	DRILLING CO.: WEST Drilling
PROJECT: Ash Disposal Area SITE LOCATION: Welsh Power Plant	DRILLER: Tom McCullough
PROJECT NO.: S-08-0109	METHOD OF DRILLING: Hollow-stem Auger SAMPLING METHODS: Split-spoon
LOGGED BY: James Meleton, Jr.	DATE DRILLED: 9/23/09
NOTES: Latitude: 33.04507	✓ Water level during drilling Page 1 of 1
Longitude: 94.84244	Se Water level in completed well
DEPTH SYMBOLS USCS SOIL DESCRIPTION	CORE PID WELL WELL RECOVERY (ppm) DESCRIPTION CONSTRUCTION
5	4" x 4" x 6.5' Well Cover
	Locking Well Cap
0	
Silty Sand: Grey and tan, fine, moist	2" Dia. SCH 40 PVC Casing
	Top of Bentonite Seal
-5 - J	Top of Sand Filter Pack
	TOP OF DOFOCIT
SM - wet	8.25" Diameter Borehole
-10 -	2" Dia. SCH 40 PVC,
	O.010-Inch Slotted Screen
-15 -	Total Depth
-20 -	20
-25 -	-25
-30-	
JAMES	C. W. MELETON, JR.
la l	GEOLOGY
-35	
	AL Y GEOLA
-40 -	

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 o WELL				Texas Water Well Driller P.O. Box Austin, TX 78 512-239-			x 13087 78711-3087	
	HI. I.	D	6.4.0	104 111 D'LL	hure	TY	76	686	
1) OWNER Southwestern	<u>n Electric Power</u> addres	ss <u>K1</u>	1.4,6	Street or RFD)	(City)	(State)	(Zip)	
2) ADDRESS OF WELL: County	Rt. 4, Box 221 Pit- (Street, RFD or other)	ts bi	city) J	Tx 7.5 (State) (<u>686</u> Zip)	GRID #	16-5	8-4	
3) TYPE OF WORK (Check):	A) PROPOSED USE (Check):	Monitor	r 🖸	Environmental Solf Boring	Dom	estic	5)		
New Well Deepening Reconditioning Plugging	C Industrial C Inigation I Inje If Public Supply well, were plans sub	ection	D Pub	licSupply 📋 De-waterin	g 🛛 Testw		33° 0 3 ′		
6) WELLLOG:	DIAMETER OF HOLE Dia. (in.) From (ft.) To (ft.)			IG NETHOD (Check):	Driven	4	74°51	00"W	
Date Drilling: Started / -//_ 10.200/	814- Surface 30		_	lammer Cable Tool					
Started 10_0007 Completed 10_007			_	۳				Ń	
From (ft.) To (ft.) Descript	tion and color of formation material			le Completion (Check):			Straight Wall		
0 - 10 reddyn	ag clay with orange			erreamed 🛛 😿 Gravel F I Packed give interval f		"Other 6ft.	to) <u>ft</u> ,	
10 -20 gray/	black clay with	CAS	SING, BL	ANK PIPE, AND WELL	SCREEN DA	TA:			
- tim	CAU		New	Steel, Plastic, etc.		Setti	ng (ft.)	Gage Casting	
	lay with lighte streak	Dia. (in.)		Perf., Slotted, etc. Screen Mfg., if comm	ercial	From	То	Screen	
25-30 fine gr	ay sand	2	N	risor		+2	20	Sel 40	
		2	N	#10 slot sci	<u>een</u>	20	30	Seh 40	
				· · · · · · · · · · · · · · · · · · ·					
AP-5		67	CENE	TING DATA (Rule 338.	44(1)]				
		9)		ted from 16 ft. 1	0	ft. No. of s	acks used		
				ft, t	D	fl. No.ofs	acks used		
				used benton					
(Use reverse sid	e îf necessary)	1	Cemen	ted by ce to septic system field lin	es or other c	oncentrated	contamination	tfL	
13) TYPE PUMP:				l of verification of above di					
Turbine D Jet D Submer	sible 📋 Cylinder	101	SURFA	CE COMPLETION					
Other Depth to pump bowls, cylinder, jet, etc	ft.		🖌 Spe	cified Surface Stab Install					
Deput to puttip nowis, changer, jet, eac		1		cified Steel Sieeve Install					
14) WELL TESTS:				ess Adapter Used [Rule] moved Alternative Procede	338.44(3)(b)] une Used fitu	le 338.711			
Typetest: D Pump D Bailer		<u> </u>							
Yield;gpm with	ft. drawdown after hrs.	11)	WATE	R LEVEL: evel_11_9 ft. belo	w land ender	ye Data	1-11-0	/	
15) WATER QUALITY:	-				gpm.)		
Did you knowingly penetrate any strat	a which contained undesirable	 							
Constituents?	PORT OF UNDESIRABLE WATER"	12)	РАСК	ERS: NA		Тура	Dep	m 	
Type of water?	Depth of strata	<u> </u>							
Was a chemical analysis made? [] Yes 🗍 No								
I hereby certify that this well was drilled by	me (or under my supervision) and that each	1 and al	l of the s	tatements herein are true	to the best a	f my knowlex	dge and belic	11	
I hereby certify that this well was orned by understand that failure to complete items 1	thru 15 will result in the log(s) being returns		at tipe of the			مرسور پر 🛋	1011-M		
	ype or print)		WELL 1	DRILLER'S LICENSE NO		X SH	11 11		
1 . A .	the or humb								
ADDRESS	(REP)		(City)			(State)	(2	îp)	
(Signed)	TUS		(Signe	d)	Registere	d Driller Train	nee)		
(Licens	ed Well Driller)				1		÷		
P	lease attach electric log, chemical analy	sis, and	d other	pertinent information, if	availabie.				
the second se									

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

······································	1211		Ç		BORING	106	
and the second se							
(Buy	A- AR		BORIN			AD-6	
E.A.	C.I.F		TOTAL			33'	
	AFNTAL SERVICES EVEPORT, INC.				NG ELEV.:	346.33 ft.	
ու ու ուլութու էր՝ մեծ, ներելունում է ու ու ու ու					RFACE ELEV.:	343.31 ft.	NGVD
	EP sh Disposal Area		L <mark>LING C</mark> LLER:	0.:	WEST Dril Tom McCu		
SITE LOCATION: V	-		HOD OI	7 DRILI			
PROJECT NO.: S	-08-0109	SAM	IPLING	METHO			
	ames Meleton, Jr.	DAT	'E DRILI		9/23/09		<u></u>
NOTES: Latitude: Longitude:					uring drilling	Page 1 of 1	
			SE VVate	er level in	completed well		
DEPTH SYMBOLS	SOIL DESCRIPTION		RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION	CONS	VELL TRUCTION
5							5
-					4" x 4" x 5' Well Cover		
					Locking Well Cap		
0							
	Fill: Black ash and coal						2.2
	r je Je Je				The observation of the second s	2	
-5 -1							
					8.25" Diameter Borehole		
	- soft w/perched water held by underlying	velov				1.	
-10 -		g 010 y				1	1
CL	Sandy Clay: Brown, fine sand, wet				2" Dia. SCH 40 PVC Ca		
COMPS -	Clay: Purple, grey, and tan w/grey silt					4	1
-15	laminations	_				1.	2
-15	Silt: Grey					1.	15
MH	7 7				Top of Bentonite Seal	1.20	
-20 CH	Clay: Brown, hard	·					
-20 -	Silt: Dark grey	/			Top of Sand Filter Pack	1.	
	Sitt. Dark grey					1.	
ML					Top of Screen	~~~~	
-25	- moist					1.	/25
						1.1.	
72-72-72-72-72	Clayey Sand: Brown, wet		OF TEX		2" Dia. SCH 40 PVC, 0.010-inch Slotted Scree	an /	
-30	to a second s	SINI	7.4			1.1.	/30
7:-7:-7:-7:-7:-7:- 7:-7:-7:-7:-7:-7:-	- more clayey from 32.5 - 33, moist	7	XX	K.Y	m . 1 m	/. /	
	[7	INNES C. M	LMELETCH,	JR.	Total Depth		
-35 -	因		CLOGY	151		5.66	35
		No	. 273				
		SONAT	NSED	1		2.1.1.1.	
-40 -				l			///40

(2)	4		001	DODINIC			
		-		BORING			
ALL ALL			NG/WEI		AD	-7	
			AL DEPT		38'		
INVIRONMENTAL SER				NG ELEV.:).82 ft. NG	
				RFACE ELEV.:		.86 ft. NG	VD
CLIENT: AEP PROJECT: Ash Disposal	Area	DRILLING	CO.:	WEST D Tom McG	-	k	
SITE LOCATION: Welsh Power		METHOD	OF DRILI		-		
PROJECT NO.: S-08-0109		SAMPLIN			on		
LOGGED BY: James Meleto NOTES: Latitude: 33.05257	n, Jr.	DATE DR		9/24/09 uring drilling	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		<u> </u>
Longitude: 94.84219				a completed well	Pa	ge 1 of 1	
SOIL		CORE	I PIN	WELL		WEL	L
DEPTH SYMBOLS USCS	SOIL DESCRIPTION	RECOVE (Percer	RY (ppm)	DESCRIPTIO	N	CONSTRU	
5				4" x 4" x 5' Well Cove	r		5
				Locking Well Cap			
0 SC Clayey Sand	d: Brown, fine, topsoil	/					
Sandy Clay:	Orange, tan, and grey, fine	sand					
-5 -						:	/-
	and the second se	E OF TEL				N N	1
	13	A ar	X		1		1.
-10 - I CL	6m7			8.25" Diameter Boreh	1		
	JAMES	C. W. MELETON, JF	1.7				1
		CEOLOGY No. 273	81				1
-15	Sec.	CENSED		ni de la constante de la consta			15
		AL Y GEORES		2" Dia. SCH 40 PVC (Casing 🖉		1.
-20 -							20
	purpte, and tan						1
- w/ layers of	fine sand		, s	Top of Bentonite Seal			
-25	: Brown, fine, moist			Top of Sand Filter Pad	*		-25
SC - w/ lavers of							
7-7-7-7-7-7	grey clay @ 28 - 29'			Top of Screen	(. .		
-30	nd brown w/thin wet sandy k	aver					-30
Clay: Grey al	no provin within wat sallay i			2" Dia. SCH 40 PVC,			
-35	: Brown, tan, and grey, fine,	wet		0.010-inch Slotted Scr	een .		
SM Silty Sand: B	rown, wet w/1" cemented sa	and					2
CH layer @ 36.5	•	/		Total Depth			
-40	v/grey silt lens (dry)	<u> </u>				1. M.M.M.	40
		/					

-444	
	SOIL BORING LOG
AND A CONTRACT	BORING/WELL NO.: AD-8
E A C L E	TOTAL DEPTH: 29'
INVIRONMENTAL SERVICES OF SURVEYORT INC	TOP OF CASING ELEV.: 340.01 ft. NGVD
4 7375	GROUND SURFACE ELEV.: 337.53 ft. NGVD
CLIENT: AEP PROJECT: Ash Disposal Area	DRILLING CO.: WEST Drilling DRILLER: Tom McCullough
SITE LOCATION: Welsh Power Plant	METHOD OF DRILLING: Hollow-stem Auger
PROJECT NO.: S-08-0109	SAMPLING METHODS: Split-spoon
LOGGED BY: James Meleton, Jr. NOTES: Latitude: 33.05187	DATE DRILLED: 9/21/09
Longitude: 94.84026	 ✓ Water level during drilling ✓ Water level in completed well
SOIL	
DEPTH SYMBOLS USCS SOIL DESCRIPTION	RECOVERY PID WELL WELL WELL (ppm) DESCRIPTION CONSTRUCTION
5 •)	
	4" x 4" x 5' Well Cover
	Locking Well Cap
0 SC Topsoil: Brown topsoil	
-X-X-X-X-X-X-	Top of Bentonite Seat
-5 - Clayey Sand: Tan and brown	8.25" Diameter Borehole
CL Sandy Clay: Red and brown mottled, m	
Clay: Grey and brown mottled	2" Dia. SCH 40 PVC Casing
-15-	Top of Sand Filter Pack
	Top of Scresn
-20 Clayey Sand: Brown, fine to medium, w	vet
	2" Dia. SCH 40 PVC, 2 0.010-inch Slotted Screen
222222	
-25 - SC - greyish green, fine to medium, wet	-25
-30-	Total Depth
fat fat	
	MESC. W. WELETON, R.
-35-	GEOLOGY No. 273
	CENSE C
-40	

an a	
	SOIL BORING LOG
	BORING/WELL NO.: AD-9
	TOTAL DEPTH: 35'
	TOP OF CASING ELEV.: 343.09 ft. NGVD
OT SHRIVTPORT, INC	GROUND SURFACE ELEV.: 340.32 ft. NGVD
CLIENT: AEP PROJECT: Ash Disposal Area	DRILLING CO.: WEST Drilling
SITE LOCATION: Welsh Power Plant	DRILLER: Tom McCullough METHOD OF DRILLING: Hollow-stem Auger
PROJECT NO.: S-08-0109	SAMPLING METHODS: Split-spoon
LOGGED BY: James Meleton, Jr. NOTES: Latitude: 33.04995	DATE DRILLED: 9/21/09 Water level during drilling
Longitude: 94.84196	 Water level during drilling Page 1 of 1 Water level in completed well
SOIL	
DEPTH SYMBOLS USCS SOIL DESCRIPTION	(Percent) (ppm) DESCRIPTION CONSTRUCTION
5	4" x 4" x 5' Well Cover
	Locking Well Cap
0	
Fill: Black ash w/coat fines	
CL Sandy Clay: Grey and brown, fine sand	d A A A A A A A A A A A A A A A A A A A
-5 Clayey Sand: Tan and brown, fine	5
CL Sandy Clay: Tan and orange, fine sand	d 8.25" Diameter Borehole
-10	2" Dia. SCH 40 PVC Casing
CH - grey and tan	
-15-	Top of Bentonite Seal
Clay: Brown w/silt laminations	
CL-	Top of Sand Filter Pack
-20	Top of Screen
Clay: Grey, moist to 22'	
-25 - CH - w/chalk concretions	
	2" Dia. SCH 40 PVC,
	0.010-inch Slotted Screen
-30 - Clayey Sand: Greenish grey, fine, mois	at -30
Clay: Grey w/sllt laminations	Start A
а Сн	
-35	AMES C. WIMELETON, UR. Total Depth
	GEOLOGY No 273
-40-	CONSESSOR
	AL Y GEO

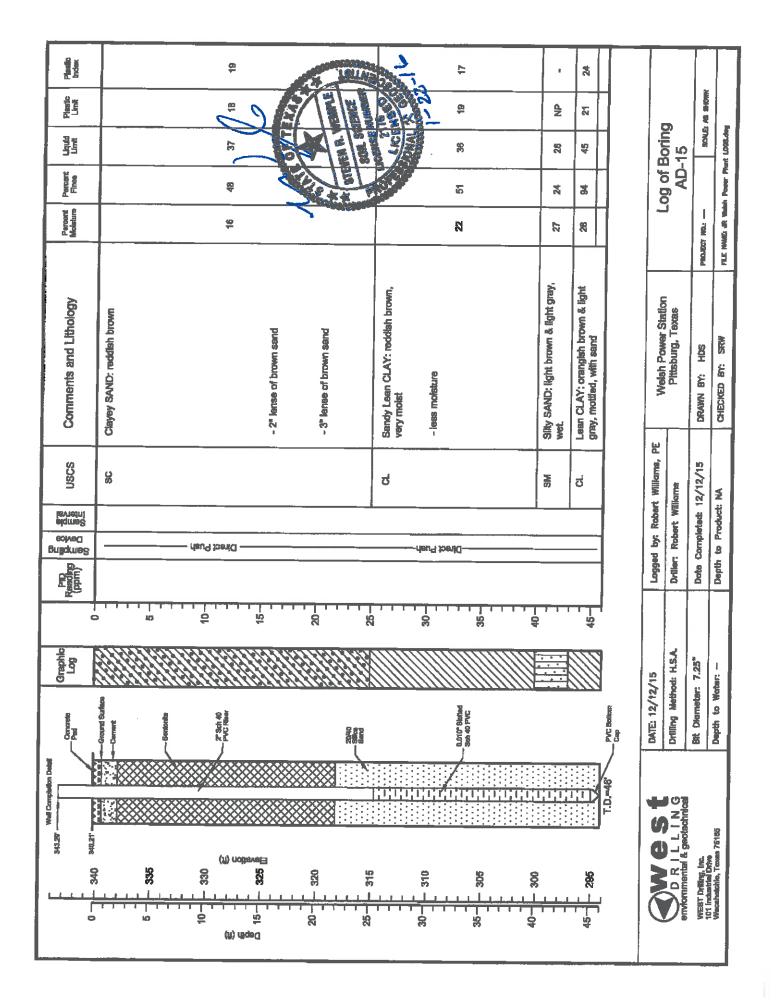
	SOIL BORING LOG
	BORING/WELL NO.: AD-10
	TOTAL DEPTH: 35'
	TOP OF CASING ELEV.: 343.01 ft. NGVD
OT SHRIVEPORT INC	GROUND SURFACE ELEV.: 340.23 ft. NGVD
CLIENT: AEP	DRILLING CO.: WEST Drilling
PROJECT: Ash Disposal Area SITE LOCATION: Welsh Power Plant	DRILLER: Tom McCullough METHOD OF DRILLING: Hollow-stem Auger
PROJECT NO.: S-08-0109	SAMPLING METHODS: Split-spoon
LOGGED BY: James Meleton, Jr.	DATE DRILLED: 9/22/69
NOTES: Latitude: 33.04881 Longitude: 94.84047	Water level during drilling Page 1 of 1
	Water level in completed well
DEPTH SYMBOLS USCS SOIL DESCRIPTION	
5 7	£
	4" x 4" x 5' Well Cover
	Locking Well Cap
SC Clayey Sand: Brown, topsoil	
CH Clay: Grey, red, and tan mottled	
-5 - CH Sandy Clay: Tan, orange, and grey mo	
Sandy Clay: Orange and tan, fine san	d 8.25" Diameter Borehole
Clay: Grey and tan, mottled	
-10 - X CH	2" Dia. SCH 40 PVC Casing
	Top of Bentonite Seal
-15 Clayey Sand: Tan and grey, fine	1. 110
Sandy Clay: Grey and tan, fine sand	Top of Sand Filter Pack
-20 - grey and red, moist	Top of Screen
СН	
-25 Clay: Grey w/silt laminations	· · · ·
CL-	2" Dia. SCH 40 PVC, 0.010-Inch Slotted Screen
-30-	
Clay: Purple and brown	
CH - soft and wet	ESC, W. HELETON, JR
-35-	GEOLOGY 5
	No. 273 Viona 100
-40 -j	

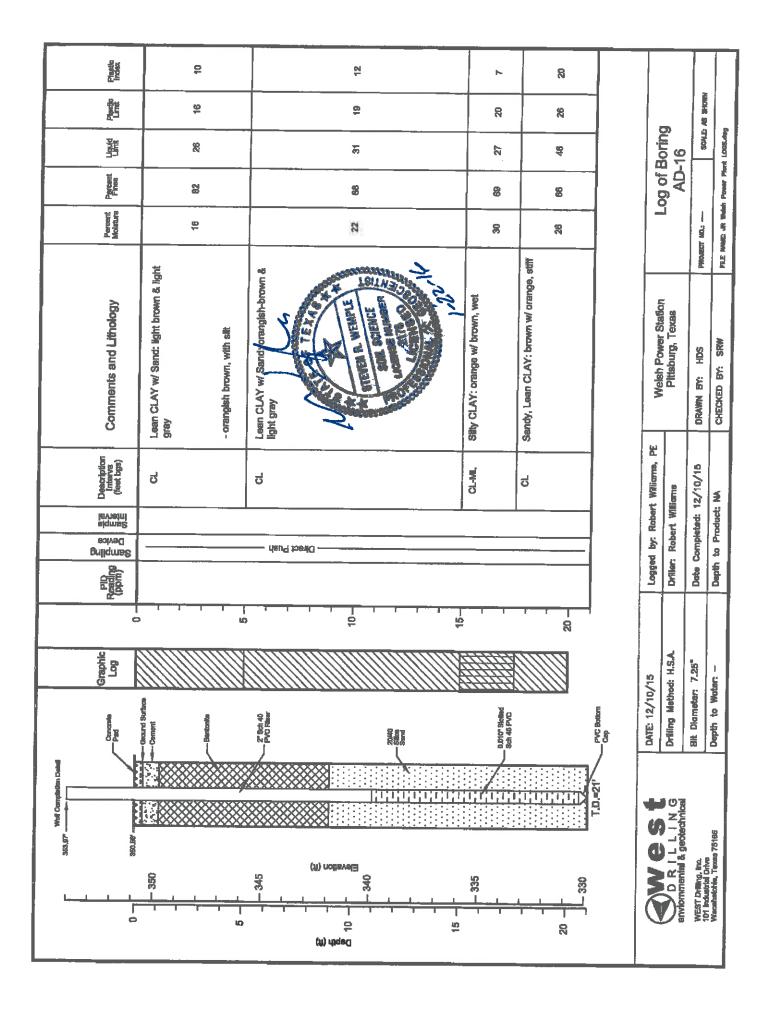
	SOIL BORING LOG
	BORING/WELL NO.: AD-11
A State A Stat	TOTAL DEPTH: 20'
	TOP OF CASING ELEV.: 342.18 ft. NGVD
OF SURIVEPORT, INC	GROUND SURFACE ELEV.: 339.61 ft. NGVD
CLIENT: AEP PROJECT: Ash Disposal Area	DRILLING CO.: WEST Drilling
PROJECT: Ash Disposal Area SITE LOCATION: Welsh Power Plant	DRILLER: Tom McCullough METHOD OF DRILLING: Hollow-stem Auger
PROJECT NO.: 5-08-0109	SAMPLING METHODS: Split-spoon
LOGGED BY: James Meleton, Jr. NOTES: Latitude: 33.04824	DATE DRILLED: 9/22/09
Longitude: 94.84177	 ✓ Water level during drilling Page 1 of 1 ✓ Water level in completed well
SOUL	
DEPTH SYMBOLS USCS SOIL DESCRIPTION	(Percent) PID WELL WELL (ppm) DESCRIPTION CONSTRUCTION
5	4" x 4" x 5' Well Cover
	Locking Weil Cap
0 SC Clayey Sand: Brown, topsoil	
Clay: Grey, red, and tan mottled	8.25" Diameter Borehole
-5	top or Bentonite Seal
Sandy Clay: Tan. orange, and grey, fin	2" Dia, SCH 40 PVC Casing
	Top of Sand Filter Pack
-10 - , CL	Top of Screen
∇	
-15 - SC - SM Clayey Sand: Tan, grey, and orange, fill w/some silt	2" Dia. SCH 40 PVC,
] \	0.010-inch Slotted Screen
SM Silty Sand: Grey and tan, fine	
-20	Total Depth
-25 -	25
	The of th
-30	ESC, W. WELETON, JR
	GEOLOGY 2
25	No. 273
-35-	CENSE -35
-40	
TV	

			2011	PODINC	100	
				BORING		
ALL A	1.200		ING/WE		AD-12	
			AL DEPI		30'	
	INTAL STRVICTS	TOP	OF CASI	NG ELEV.:	369.33 ft. NG	SVD
OI SHRLY	VEPORT. INC.	GRO	UND SU	RFACE ELEV.:	366.27 ft. NG	VD
CLIENT: AF		DRILLIN		WEST Dril		
PROJECT: Asi SITE LOCATION: We	h Disposal Area Ish Power Plant	DRILLER	: OF DRIL	Tom McCu LING: Hollow-ster	_	
	18-0109		G METH		-	
	nes Meleton, Jr.	DATE DI		9/24/09		
NOTES: Latitude: 33 Longitude:				uring drifling n completed well	Page 1 of 1	
DEPTH SOIL SYMBOLS USCS	SOIL DESCRIPTION	COF RECO\ (Perce	ERY (ppm)	WELL DESCRIPTION	WEL CONSTR	
				······································		
		Ì		4" x 4" x 5' Well Cover		-
-				Locking Well Cap		
		Į				
0 sc	Clayey Sand: Brown topsoil	/			21	
	Fill: Brown, green, and black, w/ash an	d coal				1
	pieces	100 time	ł			
-5				8.25" Diameter Borehole		-5
						1
			1			1
-	Sandy Clay: Orange and tan, fine sand			2" Dia. SCH 40 PVC Ca	sing /	/10
CL					1.	1.1.
SM	Silty Sand: Tan			Top of Bentonite Seal	1.7000	
-15- 17/11/1	-	/			1.	-15
	Clay: Grey, tan, and red mottled				1.1.	1.
				Top of Sand Filter Pack		1
-20 - CH .	purple w/grey silt laminations			Top of Screen		20
						3
						2
-25	Clayey Sand: Tan and orange, fine, wet			2" Dia. SCH 40 PVC,		-25
	Clay: Brown w/silt laminations			0.010-inch Stotted Scree	n ()	4
CH CH	THE OF TEL	i				2
-30				Total Depth	(1.1. J	-30
-	AN MA					
-	JALSES C. W. MELETON, JR.					11-
-35	72 GEOLOGY 2 No. 273 5					-35
	CONSERVER OF					
	Will y GEODE					
-40	The second se				11.1.1.1.1.1	AL -40
						-10

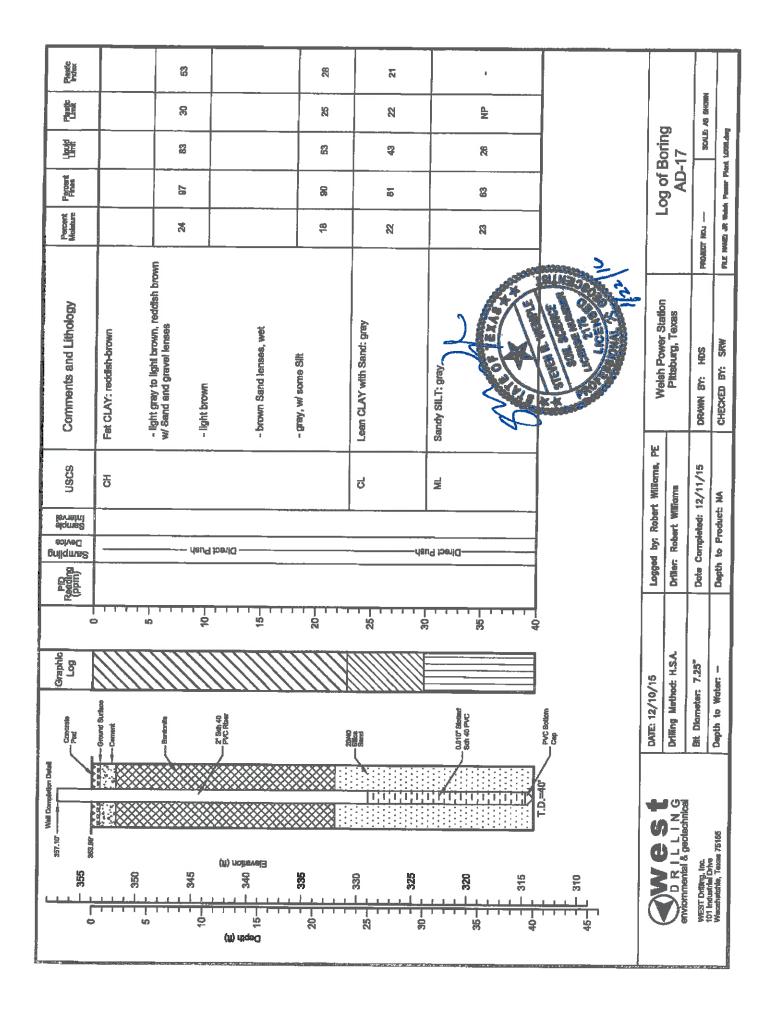
	SOIL BORING LOG
	BORING/WELL NO.: AD-13
	TOTAL DEPTH: 20'
	TOP OF CASING ELEV.: 347.00 ft. NGVD
OF SHRIVEPORT INC	GROUND SURFACE ELEV.: 344.12 ft. NGVD
CLIENT: AEP	DRILLING CO.: WEST Drilling
PROJECT: Ash Disposal Area SITE LOCATION: Welsh Power Plant	DRILLER: Tom McCullough METHOD OF DRILLING: Hollow-stem Auger
PROJECT NO.: S-08-0109	SAMPLING METHODS: Split-spoon
LOGGED BY: James Meleton, Jr.	DATE DRILLED: 9/22/09
NOTES: Latitude: 33.04918 Longitude: 94.84275	Water level during drilling Water level in completed well
SOIL	
DEPTH SYMBOLS USCS SOIL DESCRIPTION	I RECOVERY (Percent) PID WELL WELL CONSTRUCTION
5	4" x 4" x 5' Well Cover
	Locking Well Cap
0	
CH Sandy Clay: Brown, topsoll, fine sand	
Clay: Brown	Top of Bentonite Seal 2" Dia. SCH 40 PVC Casing
-5 -t CH Silty Sand: Brown, fine	Top of Sand Filter Pack
Sandy Clay: Red, grey, and tan, fine sa	
Silty Sand: Brown and grey, fine, w/cla	ay / / /
-10	10
SM	2" Dia. SCH 40 PVC, 2010 0.010-inch Slotted Screen 2010
-15 - Clay: Brown w/grey silt laminations, dry	ry15
СН	
-20 ~	Total Depth
-25 -	25
	CF OF IS N
-30	
JANE	ES C. W. MELETON, JR
	GEOLOGY No. 273
-36 -	-35
-40 - ! íl(//./././././././.40

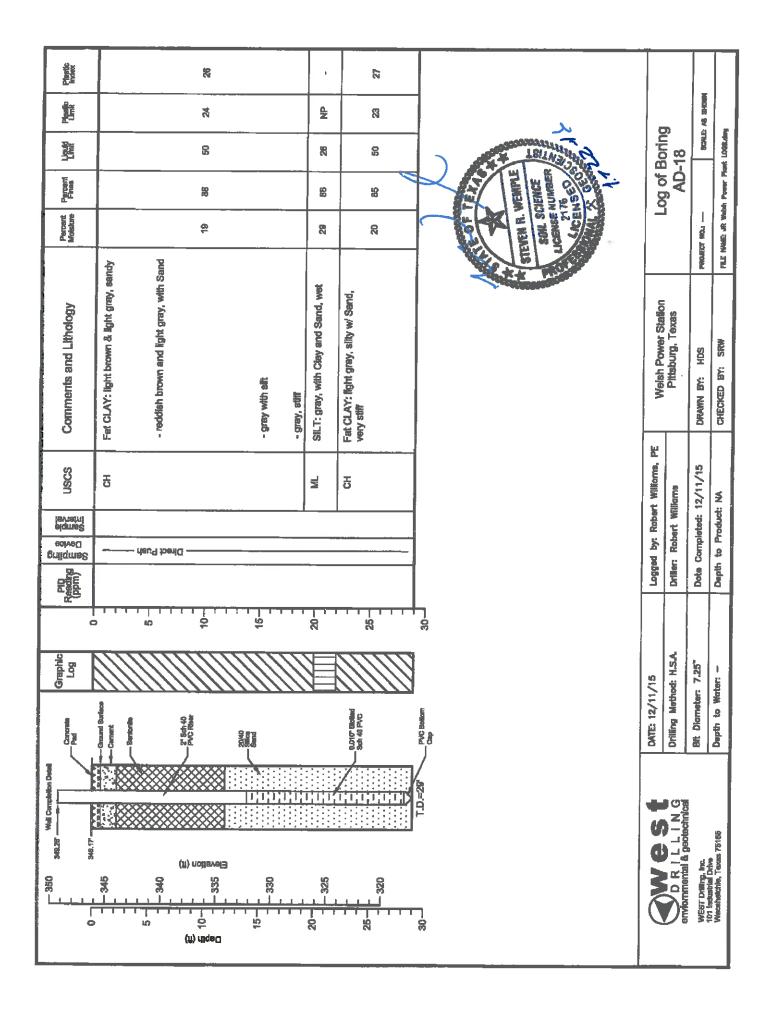
	SOIL BORING LOG
	BORING/WELL NO.: AD-14
	TOTAL DEPTH: 18.5'
	TOP OF CASING ELEV.: 345.43 ft. NGVD
OI SHREVEPORT. INC.	GROUND SURFACE ELEV.: 342.32 ft. NGVD
CLIENT: AEP	DRILLING CO.: WEST Drilling
PROJECT: Ash Disposal Area SITE LOCATION: Welsh Power Plant	DRILLER: Tom McCullough METHOD OF DRILLING: Hollow-stem Auger
PROJECT NO.: S-08-0109	SAMPLING METHODS: Split-spoon
LOGGED BY: James Meleton, Jr.	DATE DRILLED: 9/22/09
NOTES: Latitude: 33.04715 Longitude: 94.84256	Set Water level during drilling Page 1 of 1
	water level in completed well
DEPTH SYMBOLS USCS SOIL DESCRIPTION	CORE PID WELL WELL WELL (ppm) DESCRIPTION CONSTRUCTION
5 7	5
	4" x 4" x 5' Well Cover
	Locking Well Cap
Clayey Sand: Brown, topsoll	8.25" Diameter Borehole
CL Clayey Sand: Brown and black	2" Dia. SCH 40 PVC Casing
	Top of Bentonite Seal
-5 -1	/ / -5
CH Clay: Red and grey - Grey, tan, and red	Top of Sand Filter Pack
	Top of Screen
-10 - Clay: Grey, brown, and tan, laminated w	
CH layers	
15 wet	2" Dia. SCH 40 PVC, 0.010-inch Slotted Screen
Silty Sand: Grey and tan, wet	
SM	
-20 -	Total Depth
-25 -	
-30-	
A TAN	NES C. W. NELETON, JR.
Ka	GEOLOGY
-35-	No. 273
	OVAL CONTRACTOR
-40	





AD-16R Weld	COMPLETION AEP COMPLETION CLIENT	BOTTOM ASH STORAGE POND	WELSH POWER PLANT	4/12/17	HSA	2" PVC, 2' AGL-12' BGL	2" PVC, 12'-27' BGS	SCREEN 0-2' BGS	CEMENT 2-10' BGS	BENTONITE	and Pack	350.55' / 353.49' GROUND ELEV. / TOP OF CASING ELEV.	CT - CUTTINGS				FINISH:	A ARADIS Brinding Conditions 711 N. CARANCAUA, #1080 CORPUS CHRISTI, TEXAS 78401
										$\frac{1}{1}$								PAGE 1 OF 1
	SYMBOL								$\overline{}$	22		30	35		40	•••• <u>†</u>		PAGE
MELL LOG	(BE) SAMPLE DESCRIPTION	(0-15') SILTY CLAY (CL), BROWN TO ORANGE-BROWN, STIFF, DRY.				(15-18) SILTY CLAY AND SANDY CLAY, ORANGE-BROWN TO LIGHT GRAY, MOIST.	(18-27) SILTY CLAY AND SANDY CLAY, DARK BROWN TO GRAY, MOIST TO WET.			TOTAL DEPTH = 27' BCS		AFE OF TEL	A A A A A A A A A A A A A A A A A A A		TRAINER CONTRACTOR		(on () 1	
-	NNADRO ROGAV	0	0 10	6	0 10	10												4
4		8 111	5 S	8		8 8	3 %	S S	3 8	S		III				1111	TTT	
			the second s		and the second second													-





Log of Boring GB-1

Drille Drillin		ily 23						Logged By Kush S. Chohan	Takel	Decili				
Metho	od H	ollow	/ St	em .	Aug	9r		Drill Bit Size/Type	of Bo			et bgs		
Drill F Type	LAI	obil						Drilling Contractor Total Support Services	Appro Surfa	oximate ce Elev	ation 4	367 fee	t MSL	
	ndwate Date M							Sampling Method(s) SPT, Tube	Hamr Data	201				to-hammer
Boreh Backf		Bento	onit	e Cl	nips			Location On the Northern edge of propose		ical p	ond a	long th	e scree	ning berm
Elevation. feet		Depth, feet Sample Type	Sample	eenpling Resistance,	Relative Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARK AND OTHI TESTS
			ST			Crtriet		Black COAL, a few fine roots and organics.					5 	Shelby tube pul black COAL
-			ss	10				-						SPT 4, 5, 5, 5, ; recovered
362— -	- 5-		88	11	Soft to Firm	SC		Reddish Brown fine SAND, little clay, trace silt, Dry. Natural Ground.						SPT 4, 5, 6, 7. 2 recovered
-	- -		88	11	Soft	SM		Reddish brown fine SAND with slit, trace clay. Vertical sand seams in sample, Dry.		1				SPT 3, 5, 6, 8. 2 recovered,
- 357—	10-		ST					-	23.6	(#	48,9	5.4E-07		Shelby tube sample, 18" recovered.
-			88	12	Soft Firm	SC CL		Reddish brown wei/ graded fine SAND, trace sill and clay. Damp. — Greylsh red CLAY, little send, horizontal sand seams, Dry.	-					SPT 5, 6, 6, 9, 2 recovered
-			55	13	Soft Firm Firm	SC SC-CL		Brownish red fine SAND, little clay, Damp.	_					SPT 7, 6, 7, 9, 2 recovered.
352— -	15-		88	18	Soft	SM		Reddleh grey CLAY, little sand, oxidized Iron ore. Dry Brownish red fine SAND, trace clay, thin clay seams. Moist.	- 17.74	14	40.1			SPT 8, 9, 9, 9, 9. 2 recovered.
-	-		ST					-	- 16.25	NP	28.9	3.6E-05		Shelby tube samplas look like SC. 17" recover
- 347—	20-		SS	17	Şoft Soft	Other SC			-					SPT 9, 8, 9, 11. Inches recovered
-			88	15				- -	-					SPT 5, 7, 8, 50/2 21" racovared
-			SS	50	Soft Very Hard	CL SP		 Dark grey-black carriented SAND, little clay. Wet. Driller comments that carriented cand terminates at 25.5 feet. 						SPT 50/3".
342	25		ss	27	Soft to Firm	sc		 Dark grey fine SAND, little clay. Moist. Soft sand with lenses of firm clay. I Dark grey CLAY, little sand, Drv.						SPT 11, 13, 14, 1 24" recoverad.
-	-		ss	46	Hard Soft	CL SC		I Dark grey-CLAY, little send, Dry. Dark grey-black fine SAND, little day, Wet. Encountered water but water rose to 19 feet efter 15 min break.						SPT 11, 16, 30, 1 24" recovered.
37_	30-	Ü	ss	37	HAP	- ci		· · · · · · · · · · · · · · · · · · ·						SPT 11, 15, 22, 2 24" recovered.
													Fig	

Log of Boring GB-1

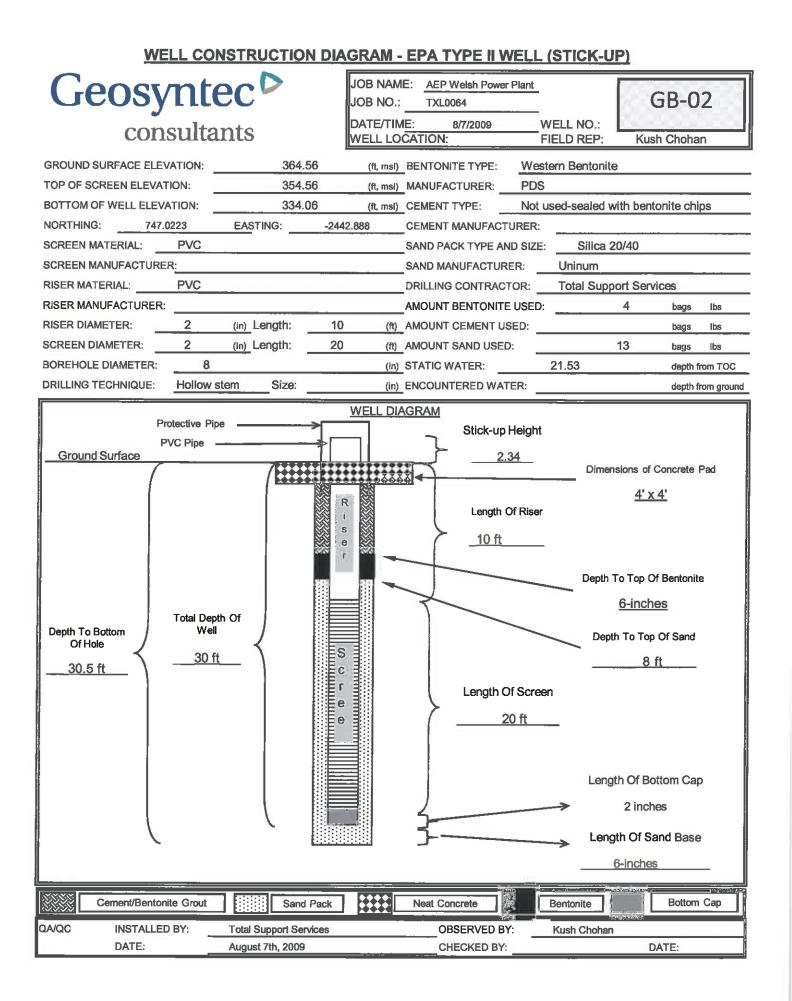
Sheet 2 of 2

	cievarion, reet	Depth, feet	Sample Type	Tiple	sistance,	Relative Consistency	USCS Symbol	Graphic Log		%	(%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHER TESTS
337-				55		Hard Soft	CL ML	Ga	MATERIAL DESCRIPTION Dark grey CLAY, little fine sand, occansional horizontal sand seams. Wet. (cont.) Dark grey-black fine SAND, with day, frequent hard clay lanses (1-3"), Wet.	%OM 26.37	(%) Id (%)	57.5	k (c	Wel	SPT 11, 15, 22, 25. 24" recovered. SFT 6, 11, 18, 24. 24 recovered.
332-	- 35 - 35 			55	34	Hard	CL		Black CLAY, trace to little fine sand, trace silt. Dry Bottom of Boring at 37 faet bgs						SPT 9, 16, 18, 23. 24" recovered.
327-	- 40 							-							
322-	45	-						-							
317-	50-								·						
312-	- - 55 -									1		,			
307-	- - - -								- - - -						
307- - - - -	65-	-						-						Figu	ure

Printed with a trial version of BorinGS - visit www.gookinsoftware.com for purchase Information: P:\Projects\AEP Welsh Plant2009 Pond Design\Hydrogeo Investigation\Boring Log\Boring

Log of Boring GB-02

Date(s Drilled	Au	gus	t 14	, 20	09				Logged By Kush S. Chohan		Check	-				
Drilling Metho	d HO	llow	Ste	em /	Aug	er			Drill Bit Size/Type		Total I of Bor	ehole	30 f ee	t bgs		
Drill Ri Type	^{ig} Mc	bil	B61						Drilling Contractor Total Support Se	rvices	Appro: Surfac	ximate :e Eleva	ation 3	64.56	feet MS	iL
Ground Date	dwate ate Me	r Lev easui	/el red	21.5 <u>8/</u> 11	i3 fe <u>/0</u> 9	et me	asur	ed on	Sampling Method(s) SPT, Tube	-	Hamm Data					e & cathead
Boreho Backfil	ole 🛺				tion				Location Western edge of p	oposed chemic	al pon	d neai	r perin	neter	fence.	
Elevation, feet	Denth faot	Sample Type	Sample	Sampling Resistance,	Relative Consistency	USCS Symbol	Graphic Log		MATERIAL DESCRIPTIO	N	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHE TESTS
	0-				Soft Soft	Other CL		Coal Greyish brown C	CLAY, with little silt, little send, damp.		-					SPT 2, 2, 2, 12" recovered.
-			88	4				_			-			ļ		SPT 4, 7, 6, 12.
-			88	13				_			-					
	5	\mathbb{N}	ST					_			-	[Shelby Tube Sample
		M			Firm	сн		Brownish ian Ci	AY with sill, little sand, Damp. Occasional sand	end inn om						SPT 8, 12, 17, 21
-			SS	29				_	or waron, nuo eena, barry. Ooceatonar eeno	and non-oro.	23.71	38	77.3			
_											-					SPT 20, 30, 50/5 17" recovered
- 54. 6 -	10-		SS	80	Soft	sc.		- Red-orange fins	SAND, little clay, damp. Occasional iron ore.							
-			88	44	Soft	SM		Brownish tan CL	AY, little slit, little sand, Damp. SAND, little clay, Damp.						SPT 15, 20, 24, 3 18" recovered.	
-	-				ĺ			_			-					SPT 11, 12, 9, 32
-	-		85	21				-			20.35	NP	33.5			
49.6-	15-		\$5	18												SPT 6, 6, 12, 6.
-	-				Soft	SM-SC	e	_	SAND, with little slit, little sand, Damp.							8PT 12, 25, 50/5.
-	-		88	75	Soft	SM-SC		Black CLAY, with Dark red fine SAI	n tine sand, Wet. ND, little clay, little silt, Wet.		$\left \right $					
	-		55	29	Sal-Nes	sc	B	Dark grey fine SA	AND, little clay, Wet. Occasional clay seams.	-						SPT 9, 16, 12, 15
44.6-	20-		90	28						_			Í			SPT 9, 17, 21, 27
4	-		88	38	Firm	SC		Fraquent de	ay lanses.	******	22.55	13	36.6			ariv, Ir, ∡i, ∡f
-	-		ĺ					-		8/11/09			ļ			SPT 22, 35, 50/4"
_	-		5\$	85				-		-						
39.6	25-		88	33				_		_						SPT 10, 15, 18, 2
-	-		1		Soft	sc		V Less clay les	nasa, Wei.	-	$\left \right $					SPT 12, 27, 37, 50/5".
-	-		88	64				-		-				-		waller v
	_		SS	44				•		-						SPT 19, 24, 21, 50/5".
34.6	30—				Hard	CL		Benogray Bantig	ältiloonavat Lägeca silt, Wet.]					



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

Project Number: TXL0064

Log of Boring GB-03

	<u>``</u>								_					1				-		
Date(s	Aug	jus	t 7,	200	9				+	Logged By M	(ush S. Ch	iohan		Check						
Drilling Metho	d HOI	low	Ste	em /	Auge	e r				Drill Bit Size/Type				Total 0 of Bor	Depth ; ehole 1	31 fee	t bgs			
Drill Ri	^{ig} Mo	bil	B6 1							Drilling Contractor	otal Supp	ort Service	s	Appro: Surfac	kimate e Eleva	ation 3	- 59.91	feet M	SL	
2 Ground 2 and Da	dwater ate Me	Lev	/el red	21.8 8/11	39 fe	ət me	asur	ed on	S N	Sampling Vethod(s) SF	PT, Tube								pe & catl	head
Boreho Backfil	ole 🔐				tion				1			orner of pro	posed che							
		_	<u> </u>	1			1							1	1	1	1	1	1	
Elevation, feet	Depth, feet	Sample Type	Sample	Resistance,	powstroot Relative Consistency	USCS Symbol	Graphic Log			MATERI	AL DESCF	RIPTION		WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMA AND O TES	THER
≥359.9— 5] 0-				Soft	Other		Cosl												
Boreho Backfill 359.9 	 			F				-												
354.9	5	V	ST		Soft	СН		Shalby Tube						1	43	96.1			Shelby tube sample.	•
	- 1	\mathbb{A}			Firm	СН		Linht brown-gray			sionel cand sean	ns (fine) Demo		-					SPT 29, 22	2, 19, 21,
	- 1		ss	41				-	,			no (moy, camp.		24.04	29	90,4		1932 13	2	
349.9	- 10—		ss	27	Soft	сн		- Brownish dark gr 	rey (CLAY, trace sand,	, trace silt, Wet.								SPT 6, 12,	15, 20.
	_		55	53	Soft	SC		Dark orange rad	SAN	ND, little cley, trac	a silt, Wet. Occa	sional clay seam (d	· lerk grey}.	-					SPT 17, 29), 24, 25.
	_		ss	32	Soft	SC		V Clay lenses	1,										SPT 7, 15,	17, 40.
344.9	15							_					_			ĺ			. SPT 9, 17, 3	30, 20.
	_		SS	47	Soft	80		√ Clay lonse					-						d n	
	-			_	Soft Firm	SC CL		Dark grey fine SA		D with cley, occasion of the sand. Wet.	onel clay lense, V	Vet.							SPT 11, 50	/4".
			88	50									-							
339. 9	20—		ss	44	Soft	SC		Dark grey fine SA	ND), little clay, occasi	ional clay seam, i	iron ora, Wet.							SPT 11, 27,	, 17, 21.
	_												8/11/09 <u>¥</u>		ĺ					
-	-												-							
-	-		ĺ										-						- -	
334.9	25							_					_						SPT 27, 40,	, 50/4".
-			\$8	90																
			ss	55	Firm	SÇ		√ Dark greyck	løy le	lense			-						SPT 11, 15, 50/3".	40,
329 9	30-		ss	55															SPT 17, 50/	6.5".
20.0	30																		gure	
\square																				

Log of Boring GB-03

Sheet 2 of 2

USCS Symbol Elevation, feet Percent Fines Sample Type Sample Sampling Resistance, blows/foot Relative Consistency Graphic Log Depth, feet k (cm/sec) REMARKS AND OTHER TESTS Well Log PI (%) WC% **MATERIAL DESCRIPTION** 30-329.9 Hard CL SPT 17, 50/5.5". Dark gray CLAY, trace silt, trace fine sand. ss 65 Bottom of Boring at 31 feet bgs 324.9 35 319.9-40-45-309.9-50-55 60-65 Figure

WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP) Geosyntec^D JOB NAME: AEP Welsh Power Plant **GB-03** JOB NO .: TXL0064 DATE/TIME: 8/7/2009 WELL NO .: consultants WELL LOCATION: FIELD REP: Kush Chohan GROUND SURFACE ELEVATION: 359.57 (ft, msl) BENTONITE TYPE: Western Bentonite TOP OF SCREEN ELEVATION: 349.57 PDS (ft, msl) MANUFACTURER: 328.57 BOTTOM OF WELL ELEVATION: (ft, msl) CEMENT TYPE: None used-sealed with bentonite chips EASTING: -2507.6332 NORTHING: 460.5803 CEMENT MANUFACTURER: SCREEN MATERIAL: PVC Silica 20/40 SAND PACK TYPE AND SIZE: SCREEN MANUFACTURER: SAND MANUFACTURER: Uninum **PVC** RISER MATERIAL: DRILLING CONTRACTOR: **Total Support Services** RISER MANUFACTURER: AMOUNT BENTONITE USED: 4 bags lbs 2 10 (ft) AMOUNT CEMENT USED: RISER DIAMETER: (in) Length: bags lbs SCREEN DIAMETER: 2 (in) Length: 20 12 (ft) AMOUNT SAND USED: bags íbs BOREHOLE DIAMETER: 8 (in) STATIC WATER: 21.89 depth from TOC DRILLING TECHNIQUE: Hollow Stem Size: 8 (in) ENCOUNTERED WATER: depth from ground WELL DIAGRAM Protective Pipe Stick-up Height PVC Pipe -Ground Surface <u>2.</u>72 **Dimensions of Concrete Pad** 4' x 4' R Length Of Riser 1 S 10 ft e Depth To Top Of Bentonite 6-inches Total Depth Of Well Depth To Bottom Depth To Top Of Sand Of Hole S 30 ft 8 ft 31 ft C Length Of Screen e e 20 ft Length Of Bottom Cap 2-inches Length Of Sand Base 1 ft 18 Mar Cement/Bentonite Grout Sand Pack Neat Concrete Bottom Cap Bentonite QA/QC INSTALLED BY: **Total Support Services OBSERVED BY:** Kush S. Chohan DATE: 7-Aug-09 CHECKED BY: DATE:

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

Project Number: TXL0064

Log of Boring GB-04

Date(s) Drilled	July	y 24	, 20	09					Logged By Kush S. Chohan	Che	cked By	/			
Method Hollow Stern Adger Size/Type of B B Drilling Type Drilling Contractor App										al Depth orehole	34 fe	et bgs			
Туре	MO								Contractor I otal Support Services		roximat face Ele		357.22	feet MS	ŝL
Ground and Da	dwater Ite Me	· Lev asur	el ed a	20.5 3/11	4 fee /09	et mea	asur	ed on	Sampling Method(s) SPT, Tube	Har Dat	a ^{mer} 1	40 lb, :	30 in d	rop, Au	to-hammer
Boreho	le 🔐	ell C							Location Southeast corner of proposed grassy field.	chemica	l evap	ortatio	n pon	d. Locat	ted in a
									- <u> </u>						1
Elevation, feet	Depth, feet	Sample Type	Sample	Resistance, blowe/fnot	Relative Consistency	USCS Symbol	Graphic Log		MATERIAL DESCRIPTION	20M	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHE TESTS
157.2	0-		55	9	Soft	SM-SC		Reddish brown f	fine SAND, little silt, trace clay, damp.	_					SPT 1, 3, 6, 6, 24 recovered.
-	-				Firm (Other CL		_	AND, little clay, trace slit. Damp. AY, some fine send, Dry.						SPT 4, 4, 4, 4, 4. 24
-	-		ss	8				-	na i Fensitini ilitei deri ket Ar	- 24.	19 47	90.2			recovered.
52.2	2.2 5 SS 14 Soft Other CH Light redd								AND and clay with Iron ore. wm CLAY and sand mixture, Dry.						SPT 5, 6, 8, 4. 10 recovered.
-	Soft SC - Reddish brown							-	SAND, little clay, Dry.	- 28.	4 38	61.1	7.7E-09		12" Shelby tube. recovered,
-	-				Firm	сн		Light brownish te	an CLAY, little sand, occasional sand seams, Dry.	-					SPT 3, 4, 13, 15. 27" recovered.
	_		SS	17											
47.2	10—							_		_					12 2 <i>3</i> 4
42.2 447.2	- - - 15		88	10	Soft Firm	SC SC		- - Red/yellowish bro - ✓ Occeaione!	own SAND, some clay, Wet.	- - - - - - - - - - - - - - - - - - -	5 14	47	*		SPT 3, 7, 3, 15, 2 recovered.
37.2-	- 20 - -		ST SS	19	Soft to Firm	тэй.		Black to dark gre	8/11/0 y fine/med SAND, little clay, occasional clay lenses, Wet.)9 					Shelby tube. 12" driven 0" pulled. gravel meteral socorneral 13. 24 recovered.
32.2— - -			S 5	74	Soft	SM SM-SC		-	gray fine/med SAND, trace silt, Wat. lay lansa, Wat. gray fine/med SAND, trace silt, Wet.	- 22.2	9 NP	13.5			SPT 17, 24, 50/5.5". 19" recovered.
27.2	- - 30—				ŀ		jini P St	-		_	-				
														Fig	jure

Log of Boring GB-04

Sheet 2 of 2

1009 1015 101 101 101 101 101 101 101 101 10	Death fort	Sample Type	Sample	Resistance, blows/foot	Relative Consistency		Graphic Log	MATERIAL DESCRIPTION	WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHE TESTS
J21,2	-		ST ST SS	38	Hard Hard	CL		Dark grey CLAY, little sand, Wet.	21.3 25,44	NP 18	84.2 92.5	2.0E-08		12" Shelby tube. Bent shelby tube. 12" Shelby tube. SPT 15, 19, 19, 24" recovered.
322.2-	- 35 -	-					-	Bottom of Boring at 34 feet bgs					2 - P. 29 - 44	
317.2-	- 40 -													
3322.2- 317.2- 312.2- 	- - - - - - - - - - - - - - - - - - -						-	·						
1 07.2 —	- - 50-						-							
- - - - -	 - 55-					,		- - -		ĺ				
- 	60			ĺ				- - -						
- - 92.2—	 						-							

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

Geosy	ntec	JOB N	AME: AEP Welsh Power Pla D.: TXL0064	nt	GB-04
	ultants		TIME: 24-Jul-09 LOCATION:	WELL NO.: FIELD REP:	Kush Chohan
GROUND SURFACE ELEVA			BENTONITE TYPE:		nite
TOP OF SCREEN ELEVATION	-			PDS	
BOTTOM OF WELL ELEVAT					
NORTHING:		-2353.7375			
SCREEN MATERIAL:			SAND PACK TYPE AND S		
SCREEN MANUFACTURER			SAND MANUFACTURER:		
			DRILLING CONTRACTOR		
RISER MANUFACTURER:			AMOUNT BENTONITE US		
RISER DIAMETER:	2 (in) Length:		(ft) AMOUNT CEMENT USED	:	bags lbs
SCREEN DIAMETER:	<u>2 (in)</u> Length:		(ft) AMOUNT SAND USED:		7 bags lbs
BOREHOLE DIAMETER:			(In) STATIC WATER:		.54 depth from TOC
DRILLING TECHNIQUE:	Hollow Stem Size:	6.75 (in) ENCOUNTERED WATER:		depth from ground
Deut	- Nor	WELL	DIAGRAM		
	ective Pipe		Stick-up Heig	ght	
Ground Surface	C Pipe		2.88		
		R 1 5 0 1	Length Of R		ions of Concrete Pad 4' x 4' o Top Of Bentonite
Depth To Bottom Of Hole 31_ft	Total Depth Of Well 30 ft	S c r	Length Of So	Depth	inches To Top Of Sand <u>8 ft</u>
			20 ft	-	n Of Bottom Cap 2-inches
			5	> Lengt	h Of Sand Base
					<u>1.ft</u>
Cement/Bentonite	Grout Sand	Pack	Neat Concrete	Bentonite	Bottom Cap
QA/QC INSTALLED E		vices	OBSERVED BY:	Kush S. Choha	
DATE:	24-Jul-09	<u> </u>	CHECKED BY:	<u></u>	DATE:

Log of Boring GB-05

									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 I						feet MS	SL		
Groundwater Level 15.3 feet measured on and Date Measured 8-11-09									Sampling Method(s) SPT, Tube Hammer Data 140 lb, 30 in drop,						op, Au	to-hammer		
Boreho		ell (Con	ple	tion				Location Eastern edge of propo	sed chemica	ical evaporation pond.							
1999 1997 1997 1997 1997 1997 1997 1997	Denth feat	Sample Type	Sample	esistance,	Relative Consistency	USCS Symbol	Graphic Log		MATERIAL DESCRIPTION		WC%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHE TESTS		
357.5-] 0 -				Soft	SW-SM	÷	Dark fine SAND	with brown organic material and roots,							SPT 2, 2, 5, 5. 2 recovered		
_			88	7	Firm	СН		Dark red/grey Cl,	AY, trace silt. Dry.		23.37	44	68.6					
-			88	11	ļ			_			-	ļ		7E-07		SPT 4, 4, 7, 9.2 recovered.		
-								-			-					SPT 5, 6, 8, 13. recovered		
52.5 5			8\$	14		сн		Trace of sand	nd	-								
-		\mathbb{X}	S7		Soft	сн		Dark red fine SAI	ND, trace clay, Damp.		- 16.5	41	73.8	3.2E-08		Shelby tube. Pushed 12 mccovered 8". SPT 5, 7, 11, 11		
-			88	18	Firm Soft Firm	сн SC		Dark red SAND, t	AY, trace sand, Dry. Irace of CLAY, Damp.							24" recovered.		
- 47.5-	40		55	18	Soft	sc			race fine sand, Dry. little clay, frequent clay seams, Damp							SPT 6, 7, 11, 14 24" recovered.		
-1.0			55		Soft	SC SC		V Frequent cla Red/orange fine 5	ly seams SAND, trace clay, trace coatse send, poonly sorted, Mo	, ,						SPT 11, 22, 13, 24" racovarad.		
			00	35				-		-] [SPT 17, 27, 50/5		
-	-		SS	77	Firm Soft	CL SC			AY, trace send, Moist.							17" recovered.		
42.5	1 5	\square	ST					ianish grey 106 5 —	SAND, some clay, Wet.	8-11-09	19.9	13	35.7	8.6E-07		Shelby tube. Pushed 12"		
			88	23							27.98	NP	32.3			Recovered 9" SP1 11, 13, 10, 1 24" recovered.		
-	-				Soft Soft	SM SM-SC			SAND/GRAVEL mix, some fine sand, trace clay, Wet.							SPT 7, 8, 11, 13.		
37.5	-		88	19	Firm	sc	<i></i>		occasional clay, Wet.							24" recovered.		
37.5	20		88	22	Firm	CL SM) Dark grey CL	occasional casy, ivet. <u>AY, little send, Wet.</u> soma madium sand, some clay, Wet.		32.23	MP	95 5			SPT 8, 10, 12, 16 24" recovered.		
_	_				Firm	CL SM			AY. little sand. Wat. some madium sand, some clay, Wet.		V2.23	NP	30.5			SPT 6, 11, 17, 21		
4	-		ss	28	Firm	SM SM		Frequent clay		-						24" recovered.		
32.5-	- 25		sт		C1111	aw		√ Frequent cley	т оталия.	-				ų įį		Shelby tube. 12" driven 0 recovere		
_	-		88	40	Hard	CL		 Dark gray CLAY, t	race of sand, Dry.					ii ii		SPT 15, 19, 21, 2 24" recovered.		
-	_		ss	22						-						SPT 10, 11, 11, 50/5". 23" recovered.		
27.5	- 30		ST		Very Hard	CL		· ↓ Dark gray CL	AY, frequent iron stone/ore. Rig chetter driller commen	is —	24.9	15	75.0	1.0E-07		Shelby tube. 12" driven 9"		
															Fig	recovered.		

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

Log of Boring GB-05

Project Number: TXL0064

Sheet 2 of 2

30 <u>- </u>	≤ জা	- 11	Consistency	USCS Symbol	Graphic Log	MATERIAL DESCRIPTION	WC%	(%) id	Percent Fines	k (cm/sec)	Well Log	REMARKS AND OTHE TESTS
-			Hard	ČL.		Dark grey CLAY, trace of sand, Dry. (cont.) Bottom of Boring at 30.5 feet bgs	24.9	15	75.0	1.0E-07		Shelby tube. 12" driven 9" recovered.
-									İ		ĺ	
-												
-					-				í			
-												
40												
-												
15												
-					-							
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50												
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i0-												
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WELL CONSTRUCTION DIAGRAM - EPA TYPE II WELL (STICK-UP) Geosyntec^D JOB NAME: AEP Welsh Power Plant **GB-05** JOB NO.: TXL0064 DATE/TIME: August 6 2009 WELL NO .: consultants WELL LOCATION: FIELD REP: Kush Chohan GROUND SURFACE ELEVATION: 357,49 (ft, msl) BENTONITE TYPE: Western Bentonite 347.49 PDS TOP OF SCREEN ELEVATION: (ft, msl) MANUFACTURER: BOTTOM OF WELL ELEVATION: 326.49 (ft, msl) CEMENT TYPE: 529.1865 NORTHING: EASTING: -2243.9973 CEMENT MANUFACTURER: PVC SAND PACK TYPE AND SIZE: Silica 20/40 SCREEN MATERIAL: SCREEN MANUFACTURER: SAND MANUFACTURER: Uninum **PVC** RISER MATERIAL: DRILLING CONTRACTOR: Total Support Services RISER MANUFACTURER: 3 AMOUNT BENTONITE USED: bags lbs 2 (in) Length: RISER DIAMETER: 10 (ft) AMOUNT CEMENT USED: bags lbs 2 (in) Length: 7 20 SCREEN DIAMETER: (ft) AMOUNT SAND USED: bags lbs 17.33 depth from TOC BOREHOLE DIAMETER: 8 (in) STATIC WATER: 8 DRILLING TECHNIQUE: Hollow Stem Size: (in) ENCOUNTERED WATER: depth from ground WELL DIAGRAM Protective Pipe -Stick-up Height PVC Pipe -**Ground Surface** <u>2.52</u> Dimensions of Concrete Pad 4' x 4' R Length Of Riser s <u>___10 ft__</u> Depth To Top Of Bentonite 6-inches Total Depth Of Well Depth To Bottom Depth To Top Of Sand Of Hole S 30 ft 8 ft 31 ft C Length Of Screen e 20 ft è Length Of Bottom Cap 2-inches Length Of Sand Base 1 ft Cement/Bentonite Grout Sand Pack Neat Concrete Bentonite Bottom Cap QA/QC **Total Support Services INSTALLED BY: OBSERVED BY:** Kush Chohan DATE: 6-Aug-09 CHECKED BY: DATE:

Project: AEP Welsh Power Plant

Project Location: Cason, Texas

Project Number: TXL0064

Log of Boring GB-06

o o									60										
Elevation, feet	Danth foot	Sample Type	Sample	Resistance,	Relative Consistency	USCS Symbol	Graphic Log		MATERIAL DESCRIPTION		wc%	PI (%)	Percent Fines	k (cm/sec)	Well Log	REMARK AND OTHE TESTS			
] 0-				Soft	SP		Greyish brown fi	ne SAND with trace fines. Organic material (roots).							Hand Auger			
_			HA		Soft Soft	SP-SM		-	SAND, little silt. Poorly sorted, less organic materia	l.]								
-					Soft			- V Tanish gray	SAND, with little silt and clay, Dry. / fine SAND, trace silt and clay, frequent Iron oxide,	frequent -						SPT 4, 7, 7. 18"			
tiee, iucitization in the second seco		-	88		Firm	CL		discoloratio	n. CLAY, little sand, trace slit, Dry.		12.74	34	67.9			recovered			
			88											_					
			00		Soft Soft Soft	SC CL SC) Light grey C	wn fine SAND, little clay. 2LAY, little sand, trace silt. Dry.							SPT 3, 5, 7, 7, 2			
-			ss	12				- Heddish prown 1	ne SAND, trace clay, trace silt. Occansionet clay as	ams. Damp. -	17.65	NP	43.2			recovered			
- 47.4-	10-		SS		Soft Soft to Firm	SP		<u>) Light gray C</u> Brownish red fine —	2 AY, little floe send SAND, little to some clay, some cementation, Darr	р					1022 C.36	24" drīven, 15" recovered.			
-								-		-		ĺ				SPT 8, 9, 10, 10 24" recovered.			
_			85	19	Soft	CL		Brown CLAY, littl	e fine send, frequent brown sand-clay mixture with i	– onione oxide.									
		M	ST		to Firm	ĺ		-		-	22.9	21	43.2	6.0e-07		Shelby Tube. 2 driven/16" recovered			
42.4-	15-				Fina	CL			brown CLAY, little fine sand, Damp.	8/11/09						SPT 15, 10, 22,			
-			SS	40	Firm	sc		Dark raddish brov -	wn SAND, little to some clay, Moist.	-						24" recovered			
	-		SS	22	Firm Firm	CL SW		Black CLAY Black fine SAND,	little fine sand. Wet. trace clay, trace med sand, Wat.							SPT 2, 8, 14, 10 24" recovered			
-					Firm	CL		Black CLAY	, trace fine sand, trace silt, Wet.	-						SPT 5, 8, 22, 50			
37.4	20		s s	30	Firm Firm	CL SC		-> Black CLAY	AND, little clay, Wet, , trace aand, trace silt. Wet. trace to little clay, Wet. Occansional black clay eea.				ĺ			22 recovered.			
-	-		ss	34								ĺ				SPT 10, 11, 23, 24" recovered			
-	-				Firm	SP-SC			with little clay, trace med sand, Wet. ned SAND, Wet.							SPT 11, 16, 18, 1			
-			ss	36				<i></i>		-					目	24" recovered.			
32.4-	25-		ss	23				_		_						SPT 9, 11, 12, 2 24" recovered.			
_	-			ļ	Firm	sw-sc		-	CLAY lenses, Wet.					1		SPT 7, 15, 25,			
-	-		ss		Hard	CL			little med sand and clay, Wet							50/3", 15, 25, 50/3", 21 recovered.			
-	-	\mathbb{H}	sт			U.				-		19	45.1			Shelby tube. 12" driven-8"			

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

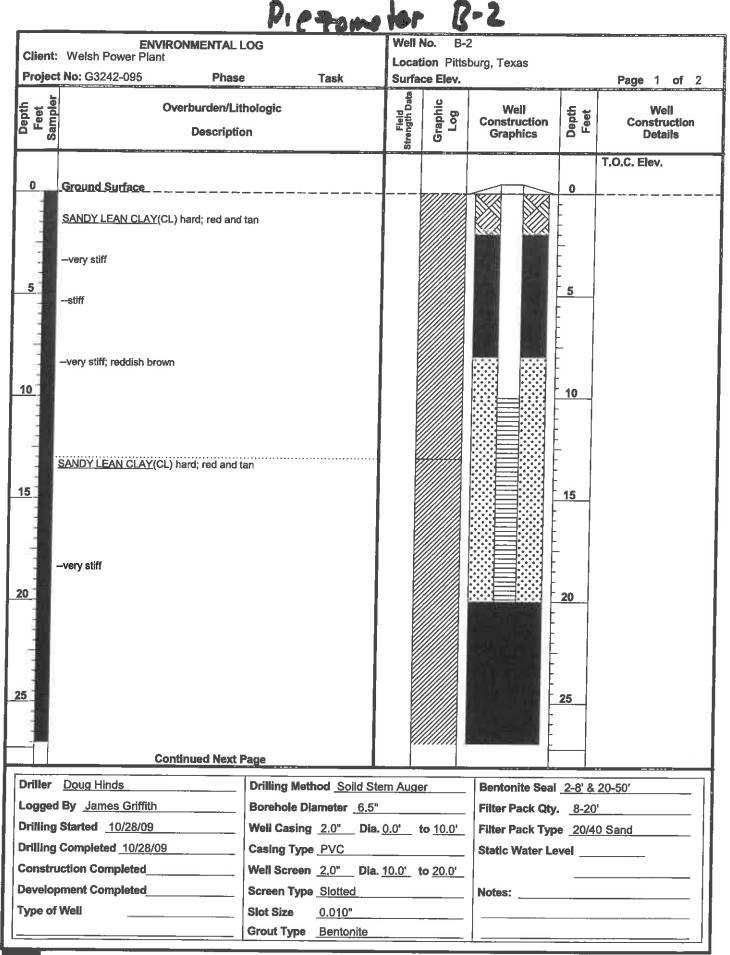
Geosynt	ec⊳	JOB NAME: <u>AEP Welsh</u> JOB NO.: <u>TXL0064</u>		GB-06
consulta	ints	DATE/TIME: 23-Jul WELL LOCATION:		Kush Chohan
	345.41 327.41 EASTING:	(ft, msi) MANUFACTUR (ft, msi) CEMENT TYPE	ER: PDS : : : : : : : : : : : : : : : : : : :	
SCREEN MANUFACTURER:			CTURER: Uninun	
RISER MATERIAL:		DRILLING CONT		
	(in) Length:		INT USED:	
SCREEN DIAMETER: 2				
BOREHOLE DIAMETER:			<u></u>	
DRILLING TECHNIQUE: Hollow	Stem Size: 6.		D WATER:	
		WELL DIAGRAM		
Protective Pi PVC Pipe Ground Surface Depth To Bottom Of Hole 	th Of		ength Of Riser	isions of Concrete Pad <u>4' x 4'</u> To Top Of Bentonite <u>6-inches</u> h To Top Of Sand <u>10 feet</u>
			>	th Of Bottom Cap 2-inches th Of Sand Base 3 ft
Cement/Bentonite Grout	Sand Pack	Neat Concrete	Bentonite	Bottorn Cap
QA/QC INSTALLED BY:	Total Support Services	OBSERV		
DATE:	23-Jul-09	CHECKE	UBY:	DATE:

tgotoni <mark>minantalana</mark> in tanan ana ana ana ana ana ana ana ana	<u> </u>	1111.		C		BORING	16	
								-
	M	ALL BALL				LL NO.:		-07/MW-7
	.Δ.	C.I.F		TOTAL			34'	
TN.		AFNTAL SERVICES EVEPORT, INC.				NG ELEV.:		.75 ft. NGVD
CLIENT:		EP				RFACE ELEV.:		20 ft. NGVD
PROJECT:		fetal Cleaning Waste Pond		LLING (LLER:	:0.:	WEST Dri Tom McCı	-	h
r		Velsh Power Plant	ME	THOD O		LING: Hollow-ste	m Aug	
PROJECT NO		-08-0120 ames Meleton, Jr.		APLING : TE DRIL)DS: Split-spoon 12/1/09	1	
NOTES: Lat						uring drilling		
Lon	gitude:	94.84674				completed well	Pag	ge 1 of 1
DEPTH SOIL	s ^{uscs}	SOIL DESCRIPTION	99 Pri , a go (Pri an	CORE RECOVERY (Percent)	PID (ppm)	WELL DESCRIPTION		
<u> </u>			•.	<u></u>				
5						4" x 4" x 5' Well Cover		5
-						Locking Well Cap		
0								
		Fill: Black ash and coal						
		Clay: Grey, red, and tan				8.25" Diameter Borehold	e /	
-5 -		- brown and grey w/trace of silt				2" Dia. SCH 40 PVC Ca	sing	-5
	Сн							
						Top of Bentonite Seal		
-10-	\mathcal{N}							
	\mathbb{R}					Top of Sand Filter Pack		
	-2-	Clayey Sand: Brown, wet				Top of Screen		
-15-2-15-2-15-2-15-2-15-2-15-2-15-2-15-								15
				ĺ				
-20		- grey, wet						
	ž.							20
	SC SC							
-25	2					2" Dia. SCH 40 PVC, 0.010-inch Slotted Scree		-25
2-2-2-2-2								1-20
		STATE	OF TE	1.00				
-30	ž		穷	AN .				
-2-2-2-2-2-		(n/	4 105 1 - 74	H JR H				
	CL	Clay: Dark grey	01.061	5			K	
-35 -		Tel N	0.273			Total Depth		
-		SONA	ENSEY Y GEP	50				
-			أعتيدته					
-40 _						h Ph	J.	<u>//////</u> L_40

E			L0G 0	LUG OF BORING B-1	<u>ы</u>	-	DATE				
			CT: Welsh Paris Diana								10/27/09
-	ENGINEEKS & CONSULTANTS		Pittsburgh, Texas				SUR	SURFACE ELEVATION 324.1	ELEY	ATIC 3	0N 24.1
		PROJEC	G3242-09	BORING	INPE: F	BORING TYPE: Filght Auger	(%	ATTERBERG LIMITS(%)	BERG S(%)		
	MAIN OFFICE 1717 East Erwin Tyler, Texes 75702	н	BLOW COUNT BLOW COUNT C	INE	(%) NIAF	Nettural Moisture Content and Attention Linite	ONTENT ((%) 3/3	5
<u>eeoroe</u>	1 AJTAN	eld Trengti Ata	1.0 2.0 3.0 4.0	r densit Nekessi Densith (SNING	1-		QUID LIN	TIOITEA	S 002# S	R TESTS ORMED Ref. #)
	MALERIAL DESCRIPTION	s	1.0 2.0 3.0 4.0	CO	COV			-	-+-		ERF
	SANDY LEAN CLAY(CL) very stiff; brownish orange SILTY SAND(SM) tannish orange SANDY FAT CLAY(CH) medium ettiff townish	P=4.0 SF N=7				}	<u> </u>	러 25 도 또	<u> </u>	N 8	а
	orange stiff	P=1.5								3	+4 Sieve=1%
 т с 2	CLAVEY SAND(SC) medium dense; tannish orange; with clay seams SANDY LEAN CLAY(CL) stiff; orange	P=1.75			<u> </u>			34 17	17	32	+40 Sieve=7%, +4 Sieve=3%
8 11/1/1/1	CLAYEY SAND(SC) medium dense; orange; saturated: with iron oxide comented sandstone rock	N=15	•				5	24 15	o	19	+40Sieve=35%, +4 Sieve=22%
รั เ	LEAN CLAY WITH SAND(CL) hard; dark gray, with clay seams	N=35	-				21	41 21	50	75	+40 Sieve=2%, +4 Sieve=2%,
д Т	SANDY LEAN CLAY(CL) herd; dark brown	P=4.5+					15	33 17	é	52	+40 Sleve=1%, +4 Sleve=0%
	-grayish brown; lamineted with silt Bottom of Boring @ 30'	P=4.5+									
Water Level E Kernel	Est: 立 Measured: 掌 Perched: 享 Seepage @ 5' while drilling. Water level	Key to Abbrevetions: N - SPT Data (Blowa/Ft)	one: a (Blowe/F1)	Notes: GPS Coord	linates:	otes: GPS Coordinates: N 33°03.090'. W 94°50.417'		_			
n uper rc	e 4 and open to 30' upon completion.	P - Pocket Penetrometer T - Torvane (tsf)	Penetrometer (1sf) s (1sf)								

- 8-2	-2	SURFACE ELEVATION 339.7	BORING TYPE: Flight Auger	A INDEX A INDEX MILL NALENT (%) MILL NALENT (NALENT (NAL) (NALENT (NALE	Automatic Contents Co		13 28 14 14 61 +40 Sieve		14 40 16 24 65 +40 Sleve=0%,	13 30 14 16 58 440 Slove=00	3		14 34 15 19 54 +40 Sieve=0%			15 37 16 21 47 +40 Sleve=5%, +4 Sieve=3%	Notes: Res: GPS Coordinates: N 33°03.078', W 94°50.449'	
PLEZowskr 8-3		PROJECT: Welsh Power Plant Pittsburgh, Texas	G3242-09	■ BLOW COUNT 20 40 60 8 △ Qu (tsf) ▲	ENGTH	A ↑ Torvane (tsf) 1.0 2.0 3.0	₽ Ţ	1 3.5	4 4	P=2.75			P=3.5	P440		P±4.5	Kay to Abbrevations: N - SPT Data (Blowa/Ft) P - Pootet Penetrometer (taf)	T - Torvane (tsr) L - Lab Verre Sheer (tsr)
	ETTL	ENGINEERS & CONSTIL TANTS		MAIN OFFICE 1717 East Erwin O IV Tudes Taxons 25200		MATERIAL DESCRIPTION	SANDY LEAN CLAY(CL) hard; red and tan	-very stiff	stiff	-very stiff; reddish brown	SANDY LEAN CLAY(CL) hand and tan		-very stiff			CLAYEY SAND(SC) medium dense; tan, red, and gray	Eet: 후 Messured: 후 Perched: 후 K	
	Lin .					VS			~~		9 6 6	15	8		3	20 - 30 	Water Level E Water Observations: COmpletion,	

10/28/00		339.7			STESTS		3d .0			.07 7			
!	TAX	ł		(%) <u>E</u> AE (%)								 	
	E		AL 1 ERBERG LIMITS(%)									 	
	ACE		ALINITS(%)	· · · · ·	NID OIL		러					 	
DATE	SUR	F										 	
LUG UF BURING B-2			BORING TYPE: Flight Auger	Natural Moisture Content (%) 31) 31) 310	RESS (Molecular Contrast Contr		20 20 20 20 20 20 20 20 20 20 20 20 20 2					Notes	GPS Coordinates: N 33*03.078', W 94*50.449'
	PROJECT: Welsh Power Plant	Pritsburgh, Texas	G3242-09	.► 8	ENGTH				24 25	%			N - SPT Data (Biowa/Ft) P - Pocket Penetrometer (tsf) T - Torverne (tsf) 3 - 1 ab Vinne Stear And
ETTL	ENGINEERS &	CONSULTANTS		1717 East Envir		MATERIAL DESCRIPTION	-red and tan	SILTY CLAYEY SAND(SM-SC) red, tan, and gray; saturated	EAT 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'	A Messured: T Perched: T	Water level @ 19' and open to 24' upon
			-			M¥ BB	7:111.1						
E				0	2		[]:{][]	So So So So So So So So So So So So So S	 Е	S	1	 	Bons:
G					- Mbrea	VS /				0	I	 leva	Water Observations: completion.
				(a) HT9	DE	8	4	45		2 27	Watter Level	ž 100



ETTL Engineers & Consultants Inc.

- 1 0 1 k

	ENVIRONMENTAL LOG Welsh Power Plant t No: G3242-095 Phase Task	Surfa	tion Pitts ce Elev.	burg, Texas		Page 2 of 2
Feet Sampler	Overburden/Lithologic Description	Field Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Well Construction Details
1911	Continued from previous page			¹ α − σ × 1 στα - Lutrania μαριώ - 5 × 17 + 5		n na
5	CLAYEY SAND(SC) medium dense; tan, red, and gray -red and tan SILTY CLAYEY SAND(SM-SC) red, tan, and gray; saturated EAT CLAY(CH) hard; brown, tan, and gray; with ferric joints; with fignite and sand seams SILTY SAND(SM) black and gray Bottom of Boring @ 50'				30 35 35 40 40	
	Bottom of Boring @ 50.					

0012610	10/2/109 339.6			TESTS RMED (#.#)		a	+40 Sieve=3%, +4 Sieve=0%		+40 Sieve=3%, +4 Sieve=0%		+40Sieve=10%, +4 Sieve=1%		+40Sieve=11%, +4 Sieve=0%		+40 Sieve=1%, +4 Sieve=0%	
-	SURFACE ELEVATION 339		(%) 3A3	IS 007#	SONI	N	87		86		85		81		35	
	<u>E</u>	S E	X INDEX	TICITE		≖	3		32		8		37		50	4
	UE E	ATTERBERG LIMITS(%)	TIM	IJ OITS		<u>حا</u>	18		13		50		24		8	4 1
DATE	IRFA	۲ <u>۲</u>	Ц	Miji qin	רוסו	비	25		Ω,		2		6		42	4
ľa l	ns	(%) TNETHO			V	53	.	31		3	; 	S.	, <u>, , , , , , , , , , , , , , , , , , </u>	53	- 7-
		BORING TYPE: Flight Auger	Natu	Attenberg Limits Plastic Moisture Liquid Limit Content Limit		2					•					^{btes:} GPS Coordinates: N 33°02.998', W 94°50.514'
3			(ist	NING	SES											
5		IVPE	(%) NIA			-										dina
RIN		L DNI		Nesan I) htov												C S
B		BORI				+	<u> </u>									GPS GPS
Ы		_			1		: : -		:		: 1		; [ž –
LOG OF BORING B-3	T: Welsh Power Plant Pittsburgh, Texas	ECT NO.: G3242-09	● BLOW COUNT ● 20 40 60 80 ▲ Qu (1st) ▲	1 2 3 4	Torvane (Isf)										•	to Abbrevetions: N - SPT Date (BlowaRt) P - Pocket Penetionneter (tst) T - Torvane (tst) L - Lab Vane Shear (tst)
	PROJECT:	PROJEC		ENGTH	HEL STR TAO	N=11	P=1.0		1-0.0	0 	C. ?	P=2.5		P=4.5+	N≂56	Key to Abbrevations: N - SPT Date (B) P - Pocket Penel T - Torverve (tat) L - Lab Verre Sh
Ē	ENGINEERS &		AEL	법 법 (903) 595-4421	MATERIAL DESCRIPTION	CLAYEY SAND(SC) medium dense; gray	EAT CLAY(CH) stift, red and tan; with sand seams			FAT CLAY WITH SANDICH) VARV 6414-	brown; with ferric joints	 -red and tan; layered; with ferric seams 		<u>EAT CLAY</u> (CH) hard; gray, with sand seams	<u>CLAYEY SAND</u> (SC) very dense; gray; with sand seams	vater Level Est: 文 Measured: 文 Penched: 文 Penched: 文 Vater Conservations: Seepage @ 13' while drilling. Water level @ 19' and open to 24' upon completion.
1	L			DIDOTO	<u>ee</u> c	141		<u>uuni</u>	1111				111		HINI FINI	open
				nsc		S	£			ъ				ы	S	and
F	4			NPLES (f) HTC		, ,	- N	- 1 P	9 9		ц. Т	1 1. 1.1	3	11111 Ki	, 11 ,	Water Level Water Observations: @ 19° and o
				and a fabric	1			<u> </u>	 مراجعاً م	<u></u>	<u> </u>					ă ă

LOG OF BORING B-3 DATE TOTAL	nt SURFACE ELEVATI	BORING TYPE: Flight Auger	MED Solo SIEVE (%) The Link Attenberg Limits Attenberg Limits Re CONTENT (%) Restice Molature Liquid Re CONTENT Content		21 60 24 36 95 +40 Sieve				Motees: GPS Coordinates: N 33°02.998', W 94°50.514'
ŋ		Flight /	(isd) 크린	PRESSI					 s: N 33
Ū U		LYPE:				· · · ·			 dinate
ORIN		RING 1							 S Cool
E E		BC	(bd) Alisne	DKA DE					 Notes C
rog (CT: Welsh Power Plant Pittsburgh, Texas	- 1	BLOW COUNT 40 60 2 3 2 3 PPR (tst)	1.0 2.0 3.0 4.0 Torvane (tsf) 1.0 2.0 3.0 4.0					 to Abbrevations: N - SPT Deta (BlowerPt) P - Pocket Penetronneter (tar) T - Torrane (tar)
	PROJEC	PROJEC	HLON	FIELD STRE ATAO	P=4.5+	P=4.5+	P≖3.5	P=4.5+	Key to Abbrevations: N - SPT Deta (Bi P - Pocket Penet T - Torvane (tst) L - I on Viens Suv
i Li	ENGINEERS &		MAIN OFFICE 1717 East Erwin Tyler, Taxas 75702 (903) 555-4421	MATERI	FAT CLAY(CH) hard; brown; layered and with sand seams	gray and green	SANDY LEAN CLAY(CL) very stift, gray and dark green; layered; with sand seams	EAT CLAY(CH) hard; gray and dark green; layered; with silt seams Bothom of Boring @ 50'	⊈ ^{Messured:} T ^{Penchod:} T Seepage @ 13' while drilling. Water level 24' upon completion.
_				<u>GEOI</u>	1111115				Est: open to
	E		C C Brea	IMA2	문		ל , היייייייי	<u></u>	 Watter Level Watter Observations: @ 19' and o
			(J) HJ		33	4	42	3	Water Level Water Obse @ 19' a

		10/27/09	JUNE CLEVAIION				SMED			140 Signa-10			+	+4 Sieve=0%	<u>-</u> .	<u>+</u>	+4 Sieve=0%					+4 Sieve=0%						
							IS 00Z#		N.	ů.	5		94			40					8					_		
				ATTERBERG LIMITS(%)			TICIT		Σ 	đ			24			16					35							
				NTTERBER(%)			U OITS		리 				21			15					24							
	DATE					_				4 24			2 45			31					20					_		
	P	0		(%			ואב כמ קרבי			4		: :	5		: :	15				:	5 2	- 1	: :	; :		_	82	
				BORING TYPE: Flight Auger	Natural Moisture Content		Plastic Motsture Liquid 1 mit Content Liquid		2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Ţ			Ī								•					· · · · · · · · · · · · · · · · · · ·	GPS Coordinates: N 33°03.011', W 94°50.462'	
	B			Ë	L	(isd	NING (PRESS CONFI																			ites:	
- K. S. S.				Ĩ	(%		TTS 35		<u> </u>		·							_									rdina	
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\sim	M			BO	6	Y (bet	LISNE	ם אאם																		Notes:	GP	
so and	LOG OF BORING	T: Weish Power Plant		PROJECT NO.: G3242-09	/ COUNT		1 2 3 4 PPR (1st) 1 4 10 20 20 20	Torvane (tsf) 2.0 3.0																		tors:	N - SFT Date (Bioneuff) P - Pociet Persenonneler (arl) T - Torvane (as) L - Lab Vane Steen fred)	e chear (all)
Pre		PROJECT:		PROJEC		ŀ	ITONS	jaia Ate Tao	N=19	SF	P=4,5		P=3.25			P=3.25		6=N			P=4.0			P=2.75		Key to Abbrevetions:	N - SPT Data (8) P - Pocket Pane T - Torvana (tat) L - Lab Vana Sh	A THREE TO
			CONSUL TANTS			1717 East Erwin CUE	(903) 585-4421		<u>SILTY SAND</u> (SM) medium dense; tan; with dravel	SANDY LEAN CLAY(CL) dark brown				-very stiff; white		CLAYEY SAND(SC) medium dense; tan -orangish gray; with sand seams		SANDY LEAN CLAY(CL) stiff, orangish tan			EAT CLAY(CH) very stiff, orangish tan; with ferrits seams			-tannish brown; with Iron ore seams		Est: 🛛 Messured: 🗶 Pendred: 🕎 🖡	Water level @ 18' and open to 48' upon	
	-		-7						2	<u>.</u> ಬ						S S	1:1 <u>]</u>				1 <i>1111</i>		1111		1111		DD.	
			-				APLES		" 		τ Y		-	N.	, ,	o I		ק	٩		장			i i i i i i i i i i i i i i i i i i i		ave	Water Observations: completion.	
		Ū				(1	R) HT9	30 o		1 1	80	N 20	Ş	2	il) Lenne	 م لـــــــــــــــــــــــــــــــــــ	· '	, ,	8	· ·		<u>ال</u> ا	-2 18 	8		Water Level	Water C	

10/27/09	N. 10.6		WED	Page Re PCRFOR	a	+40 Sieve=1%, +4 Sieve=0%					
۲ ۲	SURFACE ELEVATION 340.6		500 SIEVE (%)	# SUNI	N N N N N N N N N N N N N N N N N N N	ß					
	LEV	S B B B B B B B B B B B B B B B B B B B		SAJ9 5	E	19					
	U U U U	ATTERBERG LIMITS(%)		SAJ9 1	ť	55					
DATE	RFA	₹ ⊐		דוסח	<u>+</u>	4		_			
M	S	(%	RE CONTENT (UTSION		54					<u>.</u>
		BORING TYPE: Flight Auger	Natural Moisture Contant and Attenberg Limits Plastic Molsture Liquid		₿					N 99903 7441 W 04950 494	GF3 COOLDINALES: N 33-03.011', W 94"50.462'
M		Ē	NKE (bai)	BRESSI CONFIN						ie	in a second s
U U		Ĩ	(%) NIAATS E	RAILUR							
NN NN		SNI	GTH (tat)								ŝ
BO		BOR	(jod) ALISNE							Notes:	
LOG OF BORING B-4	ECT: Welsh Power Plant Pittsburgh, Texas	ECT NO.: G3242-09	BLOW C BLOW C A0 A0 A0 A	0; ● 1		5		•		to Abbreveitions: N • SPT Data (Blows/Pt)	P - Pocket Panetrometer (tsf)
÷	PROJE	PROJE	HLON	FIELC BATS ATAD	0E=N	N=50/5.75*	N=41	N=43		Key to Abbrevations: No SPT Data (B)	P - Pocki T - Tone
ETTL	ENGINEERS &		MAIN OFFICE 1717 East Erwin Tyler, Taxas 75702 (903) 565.4421	MATERIAL DESCRIPTION	-hard; light gray; layered and with slit seams	LEAN CLAY(CL) hard; light gray; layered and with sift seams	-Light gray		Bottom of Boring @ 50'	文 Messured: 文 Perchect: 文 Water level @ 18' and oben to 48' incon	
			EK LEVEL LOGIC UNIT	TAW 080					. <u></u>	ä	
2		r I	UNIT SISO I			ಸೆಗೆಗೆಗೆಗೆಗೆ ರ					Ч
Ì	t	ł		MAR -						Water Level	completion.
ALL DOUGLE	100	12	(#) HT		ະ ເ	9	45	5			E

	<u> </u>		RP	<u>R-A</u>		
ENVIRONMENTAL I Client: Welsh Power Plant	.0G	Well				
Project No: G3242-095 Phase	Taak			burg, Texas		
Overburden/Lit	hologic	Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Page 1 of 2 Well Construction Details
	and the state of the second					T.O.C. Elev.
0 Ground Surface					0	
SILTY SAND(SM) medium dense; tan;	with gravel				-	
SANDY LEAN CLAY(CL) dark brown					-	
-tannish orange					.	
5hard; orangish tan					5	
<u>10</u> -very stiff; white					10	
CLAYEY SAND(SC) medium dense; tan					-	
-Orangish grav: with sand seams						
15 SANDY LEAN CLAY(CL) stiff; orangish ta 20 EAT CLAY(CH) very stiff; orangish tan; wi 25 EAT CLAY(CH) very stiff; orangish tan; wi					<u>20</u> 25	
Continued Next F	age					
Driller Doug Hinds	Drilling Method Soild Ste	m Auge	r	Bentonite Seal	<u>2-8' &</u>	18-50'
Logged By James Griffith	Borehole Diameter 6.5"			Filter Pack Qty.	6-18	·
Drilling Started 10/27/09	Well Casing 2.0" Dia.	<u>0.0'</u> t	o <u>8,0'</u>	Filter Pack Type	20/40	0 Sand
Drilling Completed 10/27/09	Casing Type PVC			Static Water Lev	vel	
Construction Completed	Well Screen 2.0" Dia.	<u>8.0'</u> t	o <u>18.0'</u>			
Development Completed	Screen Type Slotted			Notes:		
Type of Well	Slot Size 0.010"		<u>-</u>			
	Grout Type Bentonite			[

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	ENVIRONMENTAL LOG Welsh Power Plant No: G3242-095 Phase Task			4 burg, Texas		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	
<u>40</u>	EAN CLAY(CL) hard; light gray; layered and with silt seams				40	
45	ight gray				45	
la	ayered and with sand seams; with lignite Bottom of Boring @ 50'				50	
55						
60						
016 16 F	ETTL Engineers & Co	neulto				

	DATE	10/27/09	SURFACE ELEVATION 340.0	BORING TYPE: Flight Auger	Natural Molsture Contant	RAIN Atterber Atterb				F		2 2 2		22 52 24 28 88 +40 Sieve=3%,		19 33 17 16 44 +40 Sieve=1%,	25 61 19 42 83 +40 Siavo==50	 ^{coles:} GPS Coordinates: N 33°02.964', W 94°50.428'
P.P. Zow de B-5	LOG OF BORING B-5	PROJECT: Weish Power Plant	Pittsburgh, Texas	G3242-09					P=2.0		P.4.0	P=3.0		ţ,	6	P=0.5	P=2.0	Key to Abbrevettorne: N - SPT Data (Blows/Ft) P - Pocket Panetrometer (taf) T - Torvene (taf) L - Lab Verre Shear (taf)
4		ENCINEEDS •	CONSULTANTS			UI I CLASK ETWIN UI Tyler, Texas 75702	0000 (903) 595-4421	MATERIAL DESCRIPTION	LEAN CLAY WITH SAND(CL) stiff; red and tan	LEAN CLAY(CL) hard; red and tan	-very stiff	<u>FAT CLAY</u> (CL) very stiff; brown and tan		tan tan willin solvic) hard; red and	SANDY LEAN CLAY(CL) very stiff, red and gray; with sand seams	CLAYEY SAND(SC) very loose; tan, red, and gray	EAT CLAY WITH SAND(CH) stiff, red and gray	¥ meanwee: ▼ Perched: ↓ Seepage @ 35' while drilling. Water level 35' upon completion and after 30 minutes.
						ß, USC		AS _		с с		e GH	5	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ठ , , , , , , , , , , , , , , , , , , ,	3 3 3 3 3 3	З	Water Observetions: 21' and open to

	SURFACE ELEVATION	340,0	ATTERBERG LIMITS(%)	XƏQNI	STICLIN STICITY #200 SIE #200 SIE	AJ9 RINUS RER	d D	31 20 87 +40 Sieve=6%, +4 Sieve=0%				;; 0)56+4	••••••••••••••••••••••••••••••••••••••	
μ	FACI			<u> </u>	נואוח סור	-+	- -	2						1 1
DATE	SUR	-	(%)	TNET	NOD ERIC	LSIO	u l	25						1.
ş			BORING TYPE: Flight Auger	Natural Moisture Content	Content of timits Attendeng Limits Attendeng Limits Content Limit Content Limits		8	•						оюк. GPS Coordinates: N 33°02.964', W 94°50.428'
			ü			COME			<u> </u>					lates
INC			<u>ר</u> ט		NGT2 75							<u></u>		oordii
NO.			NNO NNO	;	RESSIVE	COMP	ļ					,		U V V
			ă	(bci)	<u>АЦSNЭ</u>	ם אאם		····						Notes: GP
LOG OF BORING B-5	-	Pittsburgh, Texas	G3242-09	BLOW COUNT BLOW COUNT Count Count Count	1 2 3 4 PPR (tst)	Torvane (tsf)								ia Abbravattora: N - SPT Data (Bicwe/P) P - Poctet Penetormotar (ta1) T - Torvane (ta1) L - Lab Vane Steerr (ta1)
	PROJECT:		PROJEC		HTONE	Jəif Ats Taq	R	P=4.5+	P=4.5+	SF				Key to Abbravationa: N - SPT Data (Bi P - Pocket Penel T - Torvana (tst) L - Lab Vana Siv
E	ENGINEERS &	CONSULTANTS		MAIN OFFICE 1717 East Erwin	Tyler, Texas 75702 (903) 585-4421	MATERIAL DESCRIPTION	SILTY CLAYEY SAND(SC) gray and red; saturated	<u>FAT CLAY</u> (CH) hard; red and gray; with sand seams	-gray, tan, and red; with sand seems	SILTY SAND(SM-SC) red and gray	Bottom of Boring @ 50'		La Mariana de La Maria	Seepage @ 35' while drilling. Water level 35' upon completion and after 30 minutes.
				EC NALL	LEK LEV	MN GE		. 1. 7. 5 . 11 B 11 & M. W.					ġ	en to
F		5			nsc		0 <u>1///</u> 0 8	.////////////////////////////////////	11088111811	N CO				tions:
	5 -				Saura	IVS /	0		, Marganik	ن ق الم				Water Observations: @ 31' and o
L.		-			(#) HTS		ີ ເຂ	ę	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5	3		Mathematical Anti-	Water C
									and the state of the state					

	Resample		25			
ENVIRONMENTAL Client: Welsh Power Plant		Well		-		
Project No: G3242-095 Phas				burg, Texas		
E a Overburden/Li a a b b a b b a b b b b b b b b b b b b b c c b	thologic	Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Page 1 of 2 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					5	
<u>FAT CLAY(</u> CL) very stiff; brown and tar					10	
EAT CLAY WITH SAND(CH) hard; red a	ind tan				15	
SANDY LEAN CLAY(CL) very stiff; red a	nd gray; with sand seams				20	
<u>CLAYEY SAND</u> (SC) very loose; tan, red, 25	and gray				25	
Continued Next	Page			_		
Driller Doug Hinds				Dentry It . C	0.010	00.50
Logged By James Griffith	Drilling Method Soild Ste		<u>ər</u>	Bentonite Seal		
Drilling Started 10/27/09	Borehole Diameter <u>6.5"</u>		- 40.01	Filter Pack Qty.		
Drilling Completed _10/27/09	Well Casing <u>2.0"</u> Dia.			Filter Pack Type		
	Casing Type PVC			Static Water Le	vel	i l
Construction Completed	Well Screen 2.0" Dia.					
Development Completed	Screen Type Slotted			Notes:		
Type of Well	Slot Size 0.010"					
	Grout Type Bentonite					

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Client: Wels Project No: G	ENVIRONMENTAL LOG sh Power Plant 3242-095 Phase	Task			5 burg, Texas		Dana D. 1 5
Depth Feet Sampler	Overburden/Lithologic Description		Strength Data	Graphic Log	Well Construction Graphics	Depth Feet	Page 2 of 2 Well Construction Details
	Continued from previous page				<u></u>		1999 (* 1997 - 1997 (* 1999 (* 1997 (*
FAT C	LAY WITH SAND(CH) stiff; red and gray						
<u>SILTY</u>	CLAYEY SAND(SC) gray and red; saturated					35	
FAT CL	AY(CH) hard; red and gray; with sand seams					40	
—gray, t	an, and red; with sand seams					45	
SILTY S	AND(SM-SC) red and gray Bottom of Boring @ 50'					50	
5							
0							
	ETTL Engi						

Pictum da B-6	LOG OF BORING B-6	: Welsh Power Plant Pittsburgh, Texas 340 1	BORING TYPE: Flight Auger	NT Natural Motsture Content (%) Natural Motsture Content	Attention (1991) Attention (1					20	21 49 20 29 93 +40 Sieve=2%,			14 49 18 31 65 +40 Sieve=0%,				20 18 +40 Sleve=0%					NoverF1) GPS Coordinates: N 33°02.912', W 94°50.462'	verite screen (55)
		PROJECT:	PROJEC		H.	LONA	ijia Ate Taq	P=4.0	P=4.5+		P≕3.0	P=3.0	-/`	2 Î	 P=3.0	<u> </u>	N=50/5.25	·	<u> </u>	ц. Ко	· · ·	Key to Abbrevetions:	N - SPT Data (Blows/Pt) P - Pocket Penatrometar (Ist) T - Torvane (Ist)	n of the state of
	ETTL	ENGINEERS &		MAIN OFFICE	F		MATERIAL DESCRIPTION	EAT CLAY(CH) very stiff; red and gray; with	SANDY LEAN CLAY(CL) hard; red and tan		-very stiff; red, gray, and brown; with gravel	-with sand seams			SIL TY SAND(SM) gray; saturated		-very dense; gray and red					<u> </u>	@ 13' and open to 15' upon completion and after 30 minutes.	
	N HE			T NL	nsc is	ATER AMPLE			ਹ ਹ	μ μ μ				- 15	SM SM			- 25	· · · · · · · · · · · · · · · · · · ·		· · · ·		@ 13' and open to	

00/26/01	NN 101		OE	HER TE SPEORMI Sige Ref. #	Bd	+40 Sieve=0%, +4 Sieve=0%	
Ŧ	SURFACE ELEVATION		(%) 3/3/5 (%)	07# SUN	IM .	ß	
		ERG		ITSAJ9	<u>a</u>	4	
	UUU	ATTERBERG		ITEAJ9		24	
UAIE	IRFA		רואוב	רוסחום	<u> </u>	8	
ò	S	(9			W	53	ò
		BORING TYPE: Flight Auger	ural Moisture Conte and Atterberg Limits		20 40 60 80		^{botes:} GPS Coordinates: N 33°02.912', W 94°50.462'
P		Flig	(isd) 3)	RESSU	1		
ы 9		ΥÞΕ	(%) NIAATS				
		NG T		STRENG			P
5		IN CRI	ISTIVE	BAAMOC			v
	Welsh Power Plant Pittsburgh, Texas	3242-09	BLOW COUNT 40 60 80 Qu (tst) 2 3 4 PPR fran	0.4			2
	PROJECT: Wels Pittsb	PROJECT NO.: G3242-09	• 8 -		P=4.5+	P=4.5+ P=4.5+ P=4.5+	Key to Abbrevations: N - SPT Date (Blows/Pt) P - Pocket Penetrometer (st)
ETTL	ENGINEERS &		MAIN OFFICE 1717 East Erwin Tyler, Taxas 75702		EAT CLAY(CH) hand; brown; with sand seams	-dark green LEAN CLAY(CL) hard; dark green; laminated with lignite Bottom of Boring @ 50'	Vater Level Est: 又 Measured: 某 Pendred: 文 Measured: 文 Measured: 文 Measured: 文 Measured: 文 Measured: 文 Mater Level Kater Level Contract: 文 Measured: 文 Measured: 文 Measured: 文 Mater Level Kater Level Contract: 文 Measured: X Measured: X Measured: X Measured: X Measured: X Measured: X
			R LEVEL		EAT CL seams	-dark gree with lignite	n to 15° upo
2	11.5		usc		T IIIII		edo edo
1	F			dwas /	5	ರ ರ	Weiter Level Water Cheenvalters: @ 13' and o
	and the second second	100	N E6		1 1 10	8 8 8	Weter Level

	P	10300	atea	R-1	3			
	ENVIRONMENTAL L			weii i	No. B-6	3		n na an an an Arthur Statistic an Arbailtean an
	Welsh Power Plant					ourg, Texas		
	t No: G3242-095 Phase		Task		ce Elev.			Page 1 of 2
Depth Feet Sampler	Overburden/Liti Descriptio	-		Field Strength Data	Graphic Log	Well Construction	Depth Feet	Well Construction
ů –	Descriptio	n 		Stre	ō	Graphics		Details
0	Ground Surface						0	T.O.C. Elev.
					/////		-	
-	FAT CLAY(CH) very stiff; red and gray;	with ferric seams	\$				-	
	SANDY LEAN CLAY(CL) hard; red and	lan						
							5	
	-very stiff; red, gray, and brown; with gra	ivel						
	-with sand seams						-	
10								
10							10	
12							_]	
15							15	
							-	
	SILTY SAND(SM) gray; saturated							
20							20	
1								
1								
1	very dense, and and and							
	-very dense; gray and red							1
25							25	
	Continued Next F	age						
Driller	Doug Hinds	Drilling Meth	od Soild St	em Auge	er	Bentonite Seal	1.5-4'	& 22-50'
Logged	By James Griffith	Borehole Dia	meter <u>6.5</u> "	•		Filter Pack Qty	4-22	2'
Drilling	Started 10/28/09	Well Casing	<u>2.0"</u> Dia	. <u>0.0'</u>	to <u>12.0'</u>	Filter Pack Typ	e <u>20/4</u>	0 Sand
Drilling	Completed 10/28/09	Casing Type	PVC			Static Water Le	vel	
Constru	uction Completed	Well Screen	<u>2.0"</u> Dia.	. <u>12.0'</u>	to <u>22.0'</u>			
Develo	pment Completed	Screen Type	Slotted			Notes:		
Type of	Well	Slot Size	0.010"					
		Grout Type	Bentonite					

ETTL Engineers & Consultants Inc.

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	ENVIRONMENTAL LOG Welsh Power Plant t No: G3242-095 Phase Task			6 burg, Texas		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			<u>, , , , , , , , , , , , , , , , , , , </u>		
<u>30</u> <u>35</u>	EAT CLAY(CH) hard; brown; with sand seams				30	
45	dark green				40	
50	LEAN CLAY(CL) hard; dark green; larninated with lignite				50	
55	Bottom of Boring @ 50'					
) i i j	ETTL Engineers & Co					

DATE	10/27/09	SURFACE ELEVATION 340.4		X		Atterberg Limits 00 Mill Et 7 S	Plastic Moterta		20 40 60 80 MC		z 740 SREVE=0%	· - ·	15 +4U SIEVE=0%			14 58 22 36 98 +40 Sieve=0%,	+4 Sieve=0%										Gro Coordinates: N 33"02.898", W 94"50.519"	
LOG OF BORING B-7	PROJECT: Walsh Power Diant	Pittsburgh, Texas	_	BLOW COUNT	ли (. u Э	1 2 3 4 11(18)		Torvana	1.0 2.0 3.0 4.0 D C V V L C	N=31	N=36	88=1		N=59		N=26				Part, 54			5,7			Kay to Abbrevations: N - SPT Date (Bhrueste)	r (terf)	L - Lab Vane Shear (tar)
Ē						Tyler, Texas 75702	(903) 595-4421	MATERIAL DESCRIPTION		<u>SILTY SAND(</u> SM) dense; tan		gray; saturated		-very dense		LAL VLAT (CH) very sun; dark gray, with silt and ferric seams				-hard; gray and black; with trace of lignite	,	-Siay		Bottom of Boring @ 30'	T Manusch = Product	The related:	upon completion.	
L'AND				1	_		Пам								E E	+ + + + + + + + + + + + + + + + + + +			1		- 25 -			ļ	Watter Level	Wetter Observetions;	@ 2' and open to 7' upon completion.	

		SURFACE ELEVATION	373.8 ATTERERC		\е (%) NDEX	נובא 1515 1121 1121	RME	AJ9 !	59 +40 Sieve	<u>.</u>	40 +40 Sieve=19%	+4 Sieve=2%	2 42 100 +40 Sieve=0% +4 Sieve=0%		_	61 +40 Sieve=17% +4 Sieve=7%		5 15 63 +40 Sleve=1% +4 Sleve=0%	_	Logger. B.Hobbs/O.Sanderson
	DATE	SURFACE	ATTER			TIMI	i ain	: 10	1 95 1		40		200 134 92	_				8 30 15		
			XQ	BORING TYPE: Rotary Wash/Fiight Auger	Natural Moisture Content and	its	Moisture Liquid Content Limit	T :	8		4	/				<u> </u>		<u>6</u>	······································	Driller. Tommy Cook
~	B-2	eepage & Vertical	DRILL RIG: B-61 HDX	DRING TYPE: Ro		sd) 3 S	NINI:	з Бие́г Соиг	·····											GPS Coordinates: N33.04890°, W94.84451°
8	BORING	Embankment S				Ist) H	S399 TON	DRY I COMF STRE FAILU									<u>.</u>			33.04890°, \
addil Boing B2	LOG OF	ECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest.	Weish Power Station - Cason, Texas FCT NO - CAPPT 446	Ŀ	8	4	4.0	ane (tsf) 🔶 3.0 4.0											lows/F1) iromater (isf)	ear (tst)
7		PROJEC	PROJEC			HT	SNE	aia ats rag	N=13 N≕29	N=18	6≍N		N=0		2 2 2	Z=N			Key to Abbrevations: Key to Abbrevations: N - SPT Data (B P - Pocket Pene T - Tonvare (#5)	L - Leb Vane
	Ē	ENGINEERS &	CONSULTANTS			F	(903) 595-4421 K	MATERIAL DESCRIPTION	ASH (SILT WITH GRAVEL(ML)) medium dense; light grayish brown, with coarse-grained sand and lightly cemented oravel biorces. dov	ASH (SIL TY SAND(SM)) medium dense; dark brown and light brown; with coarse-grained sand and lighthromoded	gravel pieces loose; moist		ASH (ELASTIC SILT(MH)) very loose; black; with fine-grained sand and lightly cemented gravel pieces; saturated		brown; with coarse-grained sand and lightly cemented gravel pieces; moist	 Hoose; 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	ti: ⊉ Measured: ▼ Perchad: ⊉ Water level @ 13'.	
						CSC USC USC		19		м м						52 52 	ь С	- 30	Water Level Est: Water Observations:	

DATE	10/8/14 SURFACE ELEVATION 373.8	ATTERBERG LIMITS(%)	ISTURE CONTENT (15 15 39 +40 Sieve	21 24 +40 Sieve=0% +4 Sieve=0%	25 62 26 36 96 +40 Sieve=2%	24					·	Logger, B.Hobbs/O.Sanderson
	Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest Welsh Power Station - Cason, Texas מארו אוסי איז איזיא		MAPRESSIVE RENGTH (1sr) Atterberg Limits and Moisture Content Moisture (1sr) Moisture Limit Content Limit Content Limit Content Limit Limit Content Limit Limit Content Limit Content Limit Content Limit Content Limit Content Limit Limit Content Limit Content Limit Content Limit Content Limit Content Limit	ST FA CC										GPS Coordinates: N33.04890°, W94.84451° Tommy Cook
LOG OF BORING B-2 (cont.)	PROJECT: Phase 1 Fly Ash Storage Area Embar Welsh Power Station - Cason, Texas	PROJECT NO.: G4207-146	TATA 20 40 60 80 20 40 60 80 2 41 2 2 3 4 1.0 2.0 3.0 4.0 1.0 2 0.0 2.0 4.0 1.0 2 0.0 2.0 4.0 1.0 2 0.0 4.0 1.0 2 0.0 2.0 2.0 4.0 1.0 2 0.0 2.0 2.0 2.0 4.0 1.0 2 0.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	1.0 2.0 3.0 4.0	P=3.5	8/=N	N=27	0.11		€		Key to Abbrevations: Notes:	N - SPT Data (Blows/F!) P - Pocket Penetrometer (tst) T - Tronsone Aren	ear (tst)
Ē	SS &	!	MAIN OFFICE 1717 East Erwin Tyler, Texas 75702 (903) 595-4421 MATFRIAL DESCEDIDTION		CLAYEY SAND(SC) dense; light brown, light gray and reddish brown; moist; with fine-grained sand; mottled	SILTY SAND(SM) very dense; light brown, yellowish brown and light gray; moist; mottled; with fine-grained sand	EAT CLAY(CH) very stiff, dark brown and Night brown; moist; with sand seams; laminated	dark brown with light gray; moist; with silt P= seams	77	hard; dark brown; moist	Bottom of Boring @ 60'	Perchad: V	Water level @ 13'.	
			WATER LEVEL GEOLOGIC UNIT C C C C C C C C C C C C C C C C C C C		8 8 8	A0 MS		Eqc (0.284)			3	Water Level Est.:	Water Observations:	

+40 Sieve=71% +4 Sieve=28% +40 Sieve=21% +4 Sieve=11% +40 Sieve=1% +4 Sieve≡0% (Fage Ref. #) Logger. B.Hobbs/O.Sanderson РЕВЕОВМЕР STEET ABHTO 10/8/14 373.2 SURFACE ELEVATION 4 (%) 3A3IS 002# SONIW 4 5 4 PLASTICITY INDEX ō σ ATTERBERG LIMITS(%) 19 4 PLASTIC LIMIT Ц <u>છ</u> 23 LIQUID LIMIT DATE و 24 MOISTURE CONTENT (%) 56 Driller. Tommy Cook BORING TYPE: Rotary Wash/Flight Auger Liquid PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest. Natural Moisture Content Atterberg Limits Moisture Content DRILL RIG: B-61 HDX I Ş Plastic Limit GPS Coordinates: N33.04895°, W94.84390° S 1 LOG OF BORING B-10 (iad) 3RUSS3R9 CONFINING Landtill boring 8-10 FAILURE STRAIN (%) (Is) HIGNERR COMPRESSIVE Welsh Power Station - Cason, Texas lotes; (bd) YTISNED YAD 8 40 ٠ BLOW COUNT Torvane (tsf) PPR (tsf) 60 Qu (tsf) 2.0 3.0 PROJECT NO.: G4207-146 \$ 00 P - Pocket Penatrometar (tsf) 4 0 N - SPT Data (Blows/Ft) L - Lab Vane Shear (Ist) 2 ٠ T - Torvane (tsf) Key to Abbrevations ATAG N=50/1" N=50/4" £≓N Ĩ N=7 STRENGTH 2<u>1</u> רוברס ASH (CLAYEY SAND(SC)) loose; dark brown ASH (ELASTIC SILT(MH)) very loose; black; moist very dense; light brown and dark brown; with lightly cemented gravel pieces and coarse-grained sand; moist; cemented layer and light brown; with coarse-grained sand and lightly cemented gravel pieces; moist MATERIAL DESCRIPTION ASH (SILTY SAND WITH GRAVEL(SM)) Þ SANDY LEAN CLAY(CL) medium stiff, grayish brown and yellowish brown; CONSULTANTS **ENGINEERS &** Perched: Fyler, Texas 75702 --cemented layer from 23' to 27' 1717 East Erwin MAIN OFFICE (903) 595-4421 Seepage @ 13' while drilling. ETL M saturated; mottled Measured: from 17.5' to 21' --wet Þ WATER LEVEL Est.: Þ CEOFOCIC NN Eqc @ 27-43' & Er @ 43-60' USC Water Observations: Η S ЯS Ы SAMPLES Water Level 9 5 (#) HIGED O ю 8 33 8

ETTL ETTL ROUECT: ProuECT: MAIN OFFICE MAIN OFFICE TYNE, Teaser 5702 MAIERIAL DESCRIPTION MATERIAL DESCRIPTION MELE Material Mele Mat	·LOG OF BORIN Phase 1 Fly Ash Storage Area Emb Welsh Power Station - Cason, Texa Vol: G4207-146 ● BLOW COUNT 20 40 20 40 10 2.0 30 40 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0 10 2.0		-10 (Cont.) It Seepage & Vertical Expansion Invest. DRILL RIG: B-61 HDX BORING TYPE: Rotary WashFlight Auger Contention Atterberg Limits 21 21 0 60 80 1 21
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	DATE	SURFACE ELEVATI	PE: Flight Auger	T Content	TIMI Vais Vais	ASTIC ASTIC ASTIC ASTIC ASTIC	/Td a /Td a のIT =	16 33 19 14 58 440 Sieve			24 39 19 20 93 +40 Sieve=1%			4486° Driller: Lewis Dritting, Inc. O.Sanderson
Land All Baring 8-12	LOG OF BORING B-12	PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest. Welsh Power Station - Cason, Texas DRILL RIG:		M (%)			Torvane (tsf) ← Torvane (tsf) ← 1.0 2.0 3.0 4.0 COM			S ²			y to Abbrevations: N - SPT Data (Blows/Ft) P - Pocket Penetrometer (tst)	T - Torvane (ts) L - Lab Vane Shear (ts) 6 N33.04713°, W94.84486°
			0	MAIN OFFICE	20 20 20 20 20 Tyter, Texas 75702	(903) 595-4421 (903) 595-4421		 CL IS 	10 - 	CH FAT CLAY WITH SAND(CH) stiff, light gray P=3.75 and reddish brown; moist; mottled; with ferric seams	CL CL CL CL CL Net CLAY(CL) stiff, light gray and brownish Drawnish gray, moist; layered with silt	ML ML N=53 brown and yellowish brown; moist; with clay seams Bottom of Boring @ 30'	Water Level Est: 文 Measured: 및 Perchad: 및 Key to Abb Water Observations: Water level @ 27" and open upon completion. P - Poo	T-Tor

		10/15/14 ON	361.4			ST. O	Sat . RME	даде С	+40 Sieve +4 Sieve		+40 Sieve=1%	44 Slever0%	+40 Sieve=0% +4 Sieve=0%		LISON
		10/1 SURFACE ELEVATION	"	(%) 3A	SIS	007#	รกมเ	76		62		80		Logger. O.Sanderson
		ELEV	ERG	(%)	INDEX	XII:	OITE				a de la dela de la dela dela dela dela d				οĒ
		CEE	ATTERBERG	LIMITS(%)	Τl	, ГIW	OITS/	5 PL∧			20				
	DATE	RFA	<u> </u>				nin r		ł		54				
	M	SU		(%).		col	39U	TSION	50		22		24		0 2
~		Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest. Watsh Power Station - Comm Taxoo	UKILL KIG: RORING TVDE: EIL-LI A		Natural Moisture Content and	Att	Plastic Moisture Liquid Limit Content Limit	į	T						PES Coordinates: N33.047160°, W94.84384° Drilling, Inc
	13	age &	DRILL RIG: BORING TV		(ia	sd) 3	มียกร	SER						-	94.84
5		Seep			%) NIX									-	Ň
- č	Ň	kment		'				аята							7160
	Ю	mban	SPYD	╞				сом: DBX I							33.04
	Ē	Area E	5	-										Notes:	μ
Land RV B.	LOG OF BORING B-13		Ž	BLOW COUNT	20 40 60 80	1 2 3 4	PPR (tsr)	◆ Torvane (tsf) ◆ 1.0 2.0 3.0 4.0					2	to Abbrevations: N - SPT Data (Blows/Fl) P - Pocket Penetionieler (jsf) T - Torvane (jsf)	L - Lab Vane Shear (lef)
		PROJECT:	PROJECT		_	HT	SENG	aia ats rad	N=7 P=4.0	N=11	8= <u></u>	N=21	N=50/5"	Key to Abbrevations: N - SPT Data (Blows/Ft) P - Focket Penetromete T - Torvane (tsr)	L - Lab Van
	211	ENGINEERS &	CONSULTANTS	MAIN OFFICE			01EF (903) 595-4421	MATERIAL DESCRIPTION	LEAN CLAY WITH SAND(CL) medium stiff; reddish brown with light gray; moist SANDY LEAN CLAY(CL) very stiff; light	CLAYEY SAND(SC) medium dense; grayish brown; moist		LEAN CLAY(CL) very stiff, light gray and grayish brown; moist; layered with silt	SILT WIT and yellor	Est: ⊈ Measured: ⊈ Parched: ⊈ Water level @ 28' and open upon completion.	
	P	ļ.	7			USC CSC					Eqc				
	2	÷		_			JAMA		5 	CH SC		c	لع الم	Water Level Water Observations:	
	L		1				EPTH				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 	·····································	8	Vater Level Water Obser	

			347.2	ATTERBERG	Y=	NIT NINDI NIT	MED ESTS 500 SI LICL	PLAS NUS # NUS # REAR Ref Ref Ref Ref	d 0	17 17 NP 68 +40 Sieve=1%		40 16 24 67 +40 Sieve=1%	10 +40 Sieve=0% +4 Sieve=0%			Logger: O.Sanderson
	DATE		Ś	{%	2) TV	ISTNO	SO ES	UTRIO	v	108			25		-	b Li C
	4	e & Vertical Evanation (m. 174		BORING TYPE: Flight Auger	Natural Moisture Content		Autenberg Limits Plastic Moisture Liquid		8			- 1				GPS Continues: N33.04774°, W94.84290° Drilling, Inc.
>	H	Geenan	DRILL RIG:	ORING	104		ÐNI	AULIA SONFIA SSERS]	W94.8
ī	SING	kment 5	Ξ	ŏ	(70	(Js)) HTƏ	NJATZ						<u>.</u>	_	774°,
	log log	i Emban	Texas		(Notes:	s coordin V33.04
and till Baring 2-14	LOG OF BORING B-14	CT: Phase 1 Fly Ash Storage Area Embankment Seenane & Vertical Examples (2004)	Welsh Power Station - Cason, Texas	G4207-146		🔺 Qu (tsf) 🔺	PPR (tsf)	◆ Torvane (tsf) ◆							lowalFt) tromater (tst)	ear (tst)
70		PROJECT:		PROJE		ł	ILONE	FIELI 1972 1972	0=0	N=11	P=4.0	N=34	N=27	N=26	Key to Abbrevations: N - SPT Data (B P - Pocket Pene T - Trousso (ed)	L - Lab Van
	ETTI	ENGINEERS &	CONSULTANTS			1717 East Erwin Tvier: Texas 75702		MATERIAL DESCRIPTION	SANDY LEAN CLAY(CL) medium stiff; yellowish brown with reddish brown; dry; with clay seams	SANDY SILT(ML) medium dense; grayish brown; moist; with clay seams	SANDY LEAN CLAY(CL) very stiff, light gray and gray; moist	-light gray and grayish brown; moist; layered with silt	POORLY GRADED SAND WITH SILT(SP-SM) medium dense; yellowish brown, light gray and reddish brown; wet	LEAN CLAY(CL) very stiff, dark brown; moist; with silt partings Bottom of Boring @ 30'	오 Massured: 및 Perchad: 및 Water level @ 17' and caved to 23' upon	
	-	U			11						0-58, 8 Et @ 58-30.				ц Ц	ľ
	2	ŧ					APLES		5	W	- - -		en Singer Al Sin	J	el Jetions: Betion.	
	-		1		_							╷╶┝╤╲┥╌╷ ᅇ	, <u> </u> ;; 	30	Water Level Weter Observations: Completion.	

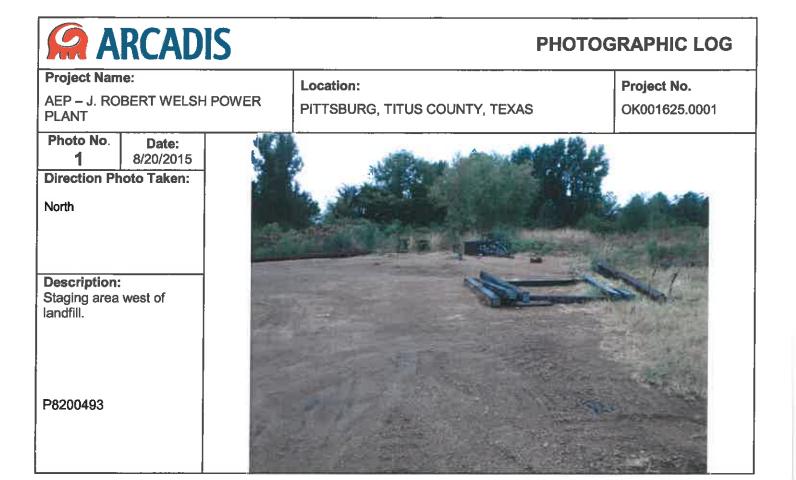
Landall Boing B-15	DATE	ENGINEERS & PROJECT: Phase 1 Fly Ash Storage Area Embankment Seepage & Vertical Expansion Invest. SURFACE ELEVATION Welsh Power Station - Cason, Texas DRI I RIG. 348.2	PROJECT NO.: G4207-146 BORING TYPE: Flight Auger	MAIN OFFICE BLOW COUNT BLOW COUNT MAIN OFFICE	TV(er, Texas 75702 TV(er, Texas 75702 TV(er		very stiff light gray, grayish brown and P=3.75very stiff light gray, grayish brown and reddish brown; moist; layered 24 59 21 38 85 +40 Sieve=0%	N=59 12 +40 Sieve=0% 12 +45 Sieve=0% 12 +45 Sieve=0% 14 Sieve=0% 12 14 Sieve=0% 14 Sieve=0% 14 Sieve=0% 14 Sieve=0% 15 Sieve=0% 16 Sieve=0% 17 Sieve=0% 18 Sieve=0% 18 Sieve=0% 18 Sieve=0% 18 Sieve=0% 18 Sieve=0% 18 Sieve=0% 18 Sieve=0% 18 Sie		LEAN CLAY(CL) hard; dark brown; moist; P=4.5 Vith slit partings 25 45 23 Pettorn of Borting @ 30' 25 23 92	Eat: 2 Massured: 2 Parchod: 9 Key to Abbreviations: Notes: Notes: Water level @ 17" and caved to 19" upon P - Podket Panetrometer (tst) T - Truvane (tst)	L-Lab Vane Shear (ts) GPS coordinates: N33.04857°, W94.84286° Driller: Logger: O.Sanderson
				TIN	» USC	AS GE AW	very 10		,	ਰ ਹ		



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Appendix B

Photographic Log



ARCADIS PHOTOGRAPHIC LOG Project Name: Location: Project No. AEP - J. ROBERT WELSH POWER PITTSBURG, TITUS COUNTY, TEXAS OK001625.0001 PLANT Photo No. Date: 2 8/20/2015 **Direction Photo Taken:** South Southeast **Description:** Potential wetland on the top (west) end of the Primary Ash Pond. P8200495



Project Name:

AEP – J. ROBERT WELSH POWER PLANT

 Photo No.
 Date:

 3
 8/20/2015

 Direction Photo Taken:

 West Northwest

Ditch between road and railway west of landfill, this ditch would be nonjurisdictional.

P8200497

Description:

Location:

PITTSBURG, TITUS COUNTY, TEXAS

Project No. OK001625.0001



	RCAD	IS	PHOTOGRAPHIC LOG				
Project Nam AEP – J. RO PLANT	IE: BERT WELSH	POWER	Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001			
Photo No. 4 Direction Ph Northeast	Date: 8/20/2015 noto Taken:						
Description: Ground Wate Well AD-12 n northwest en	er Monitoring lear						
P8200501							



Project Name:

AEP – J. ROBERT WELSH POWER PLANT

 Photo No.
 Date:

 5
 8/20/2015

 Direction Photo Taken:

 East Northeast

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

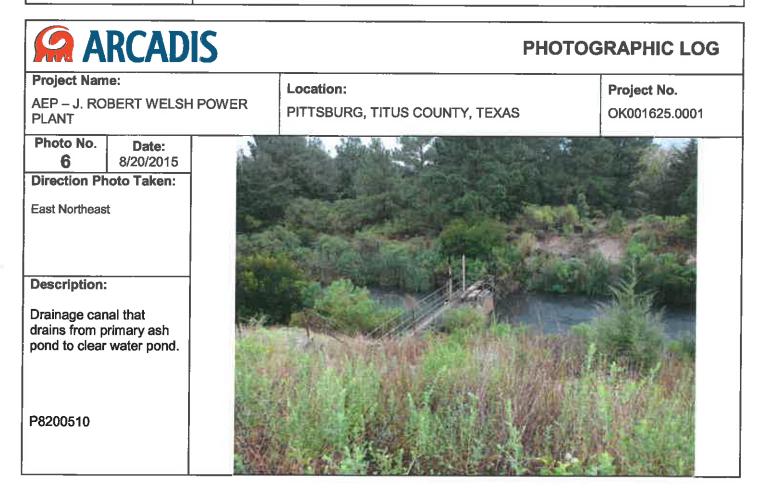
PITTSBURG, TITUS COUNTY, TEXAS

Project No. OK001625.0001

PHOTOGRAPHIC LOG



P8200506





Project Name:

AEP – J. ROBERT WELSH POWER PLANT

 Photo No.
 Date: 8/20/2015

 Direction Photo Taken:

 West Northwest

 Description:

 Vegetated strip between

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

P8200521



PITTSBURG, TITUS COUNTY, TEXAS

Project No. OK001625.0001



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



Project Name:

AEP – J. ROBERT WELSH POWER PLANT

Photo No.Date:98/20/2015Direction Photo Taken:

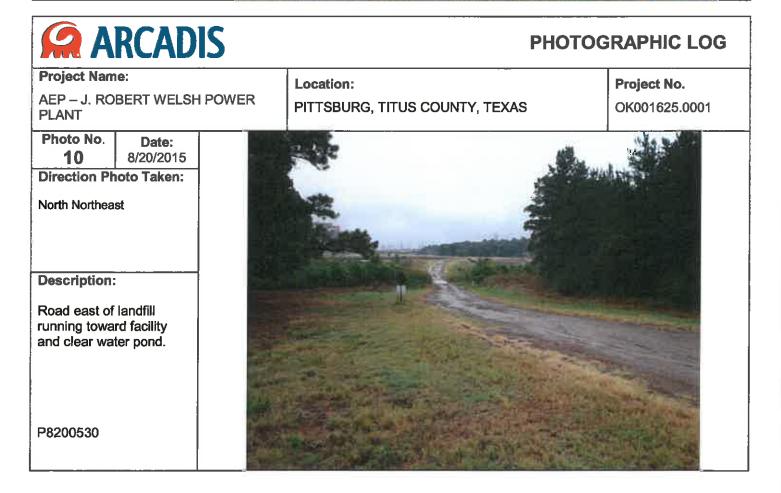
West

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

Photo No. Date: 11 8/20/2015 Direction Photo Taken: South Description: Top of landfill.

Location:

PITTSBURG, TITUS COUNTY, TEXAS

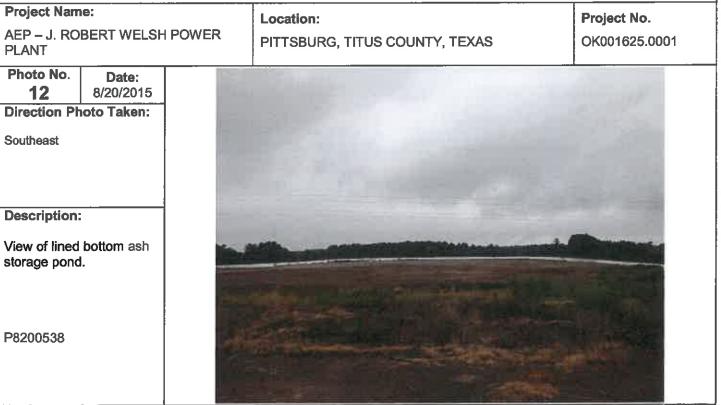
Project No. OK001625.0001



P8200534

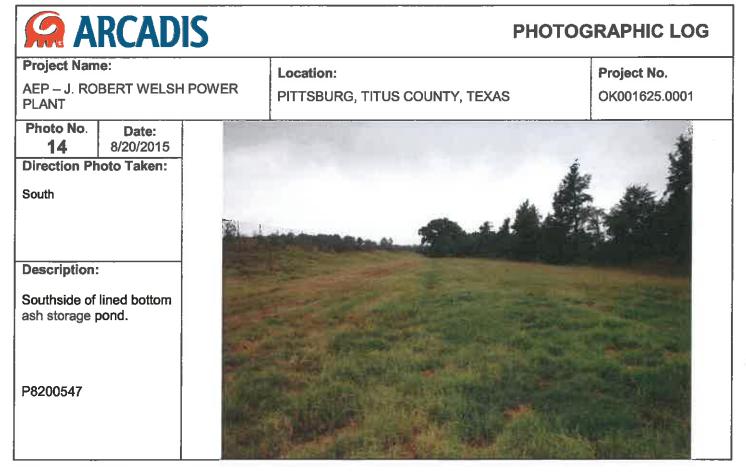
ARCADIS

PHOTOGRAPHIC LOG



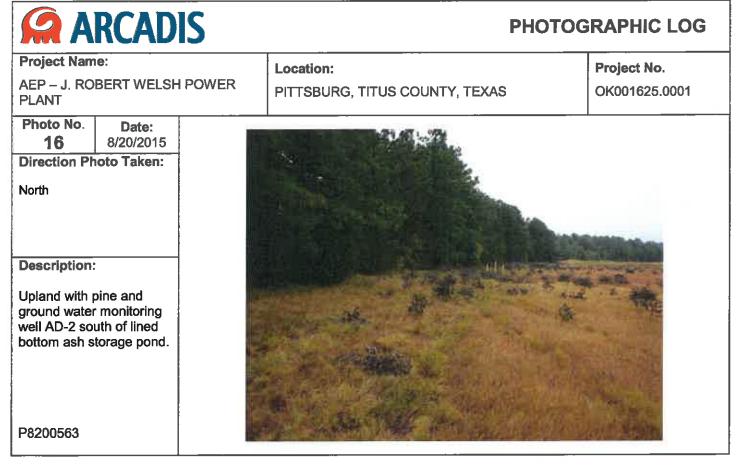


Project Name: Project No. Location: AEP - J. ROBERT WELSH POWER PITTSBURG, TITUS COUNTY, TEXAS OK001625.0001 PLANT Photo No. Date: 13 8/20/2015 **Direction Photo Taken:** Southeast **Description:** AT LEAST Lined bottom ash storage pond. P8200545





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





Project Nam AEP – J. RO PLANT	IE: BERT WELSH F	POWER	Location: PITTSBURG, TITUS COUNTY, TEXAS	Project No. OK001625.0001	
Photo No. 17 Direction Ph	Date: 8/20/2015	14	i	l	
			NA TOTAL		
Description:					
Outflow of wa plant into the portion of the Ash Pond.	northeast				
P8200577					

