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FLY ASH POND CCR GROUNDWATER MONITORING WELL NETWORK EVALUATION

Amos Plant

Winfield Road

Putnam County

Winfield, West Virginia

April 17, 2019

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ACRONYMS AND ABBREVIATIONS

AEP	American Electric Power Service Corporation
amsl	above mean sea level
Arcadis	Arcadis U.S., Inc.
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
CSM	Conceptual Site Model
EPRI	Electric Power Research Institute
FAP	fly ash pond
FGD	flue gas desulfurization
ft	feet
gpm	gallon per minute
SRF	stress relief fracturing
USGS	United States Geological Survey

1 INTRODUCTION

This report was prepared by Arcadis U.S., Inc. (Arcadis) for American Electric Power Service Corporation (AEP) to assess the adequacy of the groundwater monitoring well network included in the Coal Combustion Residual (CCR) requirements, as specified in Code of Federal Regulations (CFR) 40 CFR 257.91, for the fly ash pond (FAP, CCR Unit) located approximately 1.5 miles southwest of the AEP Generating Plant (Plant) located on Winfield Road in Winfield, West Virginia (**Figure 1**). Specifically, this Groundwater Monitoring Well Network Evaluation report is intended to address the requirements of 40 CFR 257.91 paragraphs (b), (c) and (e) regarding the adequacy of the groundwater monitoring system. 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 in the uppermost aquifer and an evaluation of whether the CCR unit meets up to 5 location restrictions. The restrictions include: 1) the base of the CCR unit is 5 feet (ft) above and isolated from the uppermost aquifer, and the CCR unit may not be located 2) in a wetland, 3) within 200 ft of the damage zone of a fault that has displacement during the Holocene, 4) within a seismic impact zone, or 5) in an unstable area. The objective of this report is to present an evaluation of the adequacy of the groundwater monitoring well network in the uppermost aquifer at the FAP (Site). The evaluation of the five location restriction criteria is not included in this report and will be completed under separate cover.

Two other regulated CCR units associated with the Plant were identified for review, which include the onsite ash pond system and the offsite flue gas desulfurization (FGD) landfill (**Figure 2**). The evaluations of the onsite ash pond system and offsite FGD landfill are not included in this report and were completed under separate cover.

An initial evaluation of the monitoring well network was completed in May 2017 and included a review of AEP-provided data associated with previously completed subsurface investigation activities in the vicinity of the FAP, as well as publicly-available geologic and hydrogeologic data. Based on this initial evaluation, gaps in the monitoring well network were identified. Additional monitoring wells were installed from November 2017 through July 2018. Drilling activities were performed by West Virginia-licensed drilling contractors (AEP and DLZ) with Arcadis personnel completing borehole logging and well installation oversight. During well installation, borehole packer testing was performed by the drilling contractor at select boreholes. Additionally, borehole geophysical logging was completed at select boreholes by Marshall Miller & Associates, Inc. The following report presents the current Conceptual Site Model (CSM) based on historical Site information including geologic and hydrogeologic data. This report also includes a description of the uppermost aquifer and the current monitoring well network. The monitoring well network was determined to adequately monitor up gradient, down gradient, and background areas adjacent to the FAP in the uppermost aquifer and hydraulically connected units; therefore, the report objective has been met.

2 BACKGROUND INFORMATION

The following section provides background information for the AEP Amos Generating Plant FAP that was used to support the groundwater monitoring well network evaluation.

2.1 Facility Location Description

The FAP is located in Putnam County approximately 1.5 miles southwest of the Plant and approximately 0.5 miles west of Winfield Road (WV 817) (**Figures 1** and **2**). The Site occupies approximately 170 total acres (Terracon, 2017a). The FAP is located in an isolated area surrounded by undeveloped wooded areas. Residential areas are located within one half mile from the Site to the north, west, and southwest; and mixed residential-industrial land use is located south of interstate 64. The FAP is approximately 0.75 miles north of the intersection of interstate 64 and the Kanawha River.

2.2 Description of Fly Ash Pond CCR Unit

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

2.2.1 Impoundment Configuration

The FAP is located in a valley at the headwaters of Little Scary Creek and is surrounded by ridges on most sides (Stantec, 2012). The southwestern corner of the FAP consists of a zoned earthen dam that is approximately 220 ft tall with a crest elevation of 875 ft above mean sea level (amsl). The dam is approximately 30 ft wide and 2,000 ft long. The upstream slope of the dam ranges from 2.5:1 to 3:1 (horizontal: vertical), while the downstream slope ranges from 2:1 to 2.5:1 (Stantec, 2012). The surface of the FAP impoundment is covered with an engineered cover consisting of subgrade fill (fly ash and onsite borrow material), flexible membrane and geotextile layers, and soil/vegetative layers. General construction of the landfill and landfill closure is further detailed in the Phase I, Phase II, and Phase III *Construction Certification Reports* (Terracon, 2016; 2017a; 2017b) and the *Design Basis Report* for the Site (Stantec, 2012).

2.2.2 Area/Volume

The total area of the Site is approximately 170 acres which includes both disposal and non-disposal areas. Prior to FAP closure, the approximate surface area of the FAP at normal pool (860 ft amsl) was 166 acres (Stantec, 2012). After closure, the final design permitted surface area of the FAP at normal pool was 120 acres. The maximum permitted reservoir volume before and after pond closure was 10,735 and 7,056 acre-ft., respectively (AEP, 2012) (**Figure 3**).

2.2.3 Construction and Operational History

The FAP began receiving fly ash in October 1971, the final of three construction stages for the unlined impoundment was completed in 1978 (Electric Power Research Institute [EPRI], 1999), and operations continued until 2010. The zoned dam was constructed in three stages via conventional downstream

construction methodology, with an inclined upstream impervious zone and downstream zones of earth and rockfill (Stantec, 2012). Since 1973, the FAP received only sluiced fly ash from Unit 3 at the Plant at an average rate of 214,300 dry tons per year. Periodically, a polymer would be added to the sluiced fly ash to facilitate settling (EPRI, 1999). A concrete principal spillway decant riser structure was constructed that included discharge piping located in an undisturbed area on the northwest end of the dam. The decant piping discharged via a tunnel into an adjacent un-named tributary to Little Scary Creek on the west side of the FAP. Since 2010, the principal pool elevation was controlled by a reclaim water pump system. The principal spillway was abandoned via in-place grouting during FAP closure. Post closure water management includes an emergency open channel spillway excavated through bedrock on the west side of the FAP (Stantec, 2012).

In 2010, the FAP reached its maximum capacity, Unit 3 had been converted to a dry system, and fly ash was being disposed at the Amos FGD Landfill. In 2012, the FAP *Design Basis Report* (Stantec, 2012) was approved by the Dam Safety Section of the West Virginia Division of Environmental Protection and closure activities (i.e. capping) of the FAP commenced. The initial closure plan is described in detail in the *Design Basis Report*, and details regarding final FAP closure are described in the Amos FAP Closure *Phase I Construction Certification Report* (Terracon, 2016), *Phase II Construction Certification Report* (Terracon, 2017a), and *Phase III Construction Certification Report* (Terracon, 2017b). In general, the FAP cap consists of the following layers:

- Subgrade preparation (in-place fly ash and onsite borrow material dewatering, excavating, grading)
- 40-mil linear low-density polyethylene flexible membrane liner
- 8 ounce geotextile cushion layer
- 18 inches of protective soil cover layer
- 6 inches of vegetative cover layer
- Drainage structures
- Seeding and mulching

The closure plan of the FAP specified the following construction phases, or activities (Stantec, 2012):

- Phase I – Initial mass grading
- Phase II – Close dredge containment areas and grade dredged areas
- Phase III – Continue closure
- Phase IV – Completion of diversion network
- Phase V – Final closure operations

These five closure construction activities were performed in three separate phases: Phase I (eastern portion of FAP), Phase II (central portion of FAP), and Phase III (western portion of FAP). In May 2015, a pilot test pad was constructed to test the integrity of geosynthetic components of the liner after placement of protective cover soils. The pilot test pad construction methods were utilized for all full-scale liner deployment.

Phase I geosynthetic construction began on June 25, 2015 and was completed on November 5, 2015. Phase I protective soil cover construction began on July 7, 2015 and was completed on November 18, 2015. A total of approximately 95 acres of geomembrane and geotextile placement with 85 acres of protective cover was placed during Phase I construction activities (Terracon, 2017a). Phase II geosynthetic construction began on May 31, 2016 and was completed on September 15, 2016. Phase II protective soil cover construction began on June 7, 2016 and was completed on October 18, 2016. A total of 60 acres of geomembrane and geotextile placement with 49 acres of protective cover was placed during Phase II construction activities (Terracon, 2017a). Phase III geosynthetic construction began on April 13, 2017 and was completed on July 15, 2017. Phase III protective soil cover construction began on April 24, 2017 and was completed on July 20, 2017. Final Phase III construction activities included construction of the final spill way (Terracon, 2017b).

2.2.4 Surface Water Control

Prior to 2010, surface water elevation control at the Site was maintained by the concrete principal spillway, which was designed to safely accommodate a 100-year storm event, that discharged to Little Scary Creek via a National Pollutant Discharge Elimination System permitted outfall (EPRI, 1999). A reclaim water pump system was installed in 2010, which then served as the primary surface water elevation control. The reclaim water pump system conveyed flow from the FAP and discharged to the bottom ash pond at the Plant, including contact water stored within the FAP footprint (Stantec, 2012). During FAP closure beginning in 2012, storm water runoff was managed through a series of sloped surfaces, drainage channels, channel cuts, and temporary contact water containment ponds. Contact water drainage channels and containment ponds were located to contain runoff water that contacted CCR materials during various phases of FAP cap construction. Permanent drainage channels were constructed as two-staged channels with a small “bankfull” channel and a broader shallow floodplain (Stantec, 2012). The banks of these channels are lined with geo-composite installed over geotextile. A protective 12-inch soil cover was placed in the channel, followed by an additional geotextile and number 3 stone (Terracon, 2017a). There has been no active surface water control at the FAP since the majority of Phase III construction activities concluded in July 2017. Additional earthwork was performed in November 2017 due to insufficient protective cover depth in some areas of the FAP.

2.3 Previous Investigations

In 1969 and into the 1970s, Acres American Incorporated and Woodward-Moorhouse & Associates, Inc. (later Woodward-Clyde Consultants) completed several geotechnical investigations of the FAP area. These investigations included extensive soil and rock boring and logging, test trench excavation and logging, borehole water pressure tests, piezometer installation and water level measurement in the dam area and overburden and bedrock laboratory geotechnical analysis (Acres American Incorporated, 1971; 1975a).

From 1995 to 1996, site investigation activities were completed including the drilling and installation of seven bedrock monitoring wells (MW-1 through MW-7), geophysical logging of three boreholes (MW-2, MW-4, and MW-5), and packer testing of three boreholes (MW-2, MW-4, and MW-5). Packer test data was qualitatively reviewed to compare relative hydraulic productivity of rock units and was used to assist

with well screen placement of these wells. Additionally, water samples were collected from both the FAP outfall and FAP surface water (EPRI, 1999).

In late 2007 and early 2008, H.C. Nutting, Inc. completed site investigation activities associated with raising the FAP dam. This included the completion of 15 soil and bedrock borings with standard penetrometer testing and Shelby tube sampling. Additionally, six pneumatic piezometers were installed in select borings for water level measurements (B-2, B-3, B-4, B-14, B-16, and B-17). Six packer tests were also conducted during this investigation at borings B-1, B-2, B-4, B-5, B-6, and B-10. One additional boring, B-17, was used for cone penetrometer testing (H.C. Nutting, 2008).

Also in 2008, AEP completed rock coring along a constructed haul road and test pit logging associated with a study of borrow sites at the FAP. Samples were also collected for unconfined compressive test analysis. In total, seven haul road boring were completed and logged, five test pits were logged, and 18 rock cores were submitted for unconfined compressive test analysis (AEP, 2008).

Throughout the lifespan of the FAP, routine visual inspection and stability analyses were completed. The most recent inspection during the FAP operational lifespan was documented in the *2011 Dam and Dike Inspection Report, John Amos Power Station, St. Albans, West Virginia* (Stantec, 2011). The results of this inspection indicated that the FAP was in good condition, although some seepage and erosion issues were noted. This inspection also included a quantitative analysis of horizontal and vertical movements of the FAP dam measured in reference to surveyed reference points or monuments. This assessment concluded that no unusual movement was observed (Stantec, 2011).

In 2012, Stantec completed design efforts for FAP closure and cap construction (Stantec, 2012). As part of the closure design, Stantec completed an evaluation of the stormwater management design, discussed above in Section 2.2.4 and below in Section 2.4.1. In addition, this 2012 investigation included a geotechnical evaluation of settlement, slope stability, and liquefaction potential. No new data was collected as part of the geotechnical evaluation, and all material properties used in geotechnical modeling were derived from review of previous site investigations (Acres American Incorporated, 1974; 1975b; 1975c; H.C. Nutting, 2008).

In 2017 and 2018, Arcadis completed a comprehensive groundwater site investigation that included well installation activities to augment the CCR monitoring well network at the FAP. This work included rock coring at locations around the FAP. Boreholes were continuously logged and advanced to at least the depth of the Morgantown sandstone. After completion of the boreholes, vertical geophysical logging was conducted at five locations (MW-1801, MW-1802, MW-1805, MW-1806, and MW-1808). Data collected during geophysical logging was used in combination with rock core logging to interpret and correlate bedrock units across the Site. Geophysical data included natural gamma, neutron porosity, temperature, delta temperature, fluid conductivity, 16-64 normal resistivity, lateral resistivity, spontaneous potential, single point resistance, and caliper width. Finally, hydraulic testing was completed at select boreholes (via straddle packer tests) and monitoring wells (via drawdown and recovery yield tests) to quantify hydraulic parameters of groundwater zones and to assist in final placement of well screen intervals. A complete description of field methodology is provided in **Appendix A**. Results of geophysical logging and hydraulic testing is discussed in Section 3.1 of this report.

2.4 Hydrogeologic Setting

The geologic setting surrounding the Site consists of ridges formed by the Pennsylvanian age Monongahela and Conemaugh Formations. The Monongahela and Conemaugh Formations consist of sandstones, shales, limestones, and coal. A generalized stratigraphic column is included on **Figure 4**. These rocks have been fractured as stress declined during erosion, leading to expansion of the rock and a system of fractures throughout the bedrock. This process is called stress relief fracturing (SRF) and is more prevalent in shallow bedrock. Groundwater is present at the Site within these fracture systems (secondary porosity), while groundwater within primary porosity components (i.e., pore spaces) is less significant. Stress relief fractures occur more abundantly in brittle lithologic units (e.g. sandstone and limestone), and less likely to occur in shaley units (EPRI, 1999). The uppermost aquifer present at the Site has been determined to be the SRF (variable thickness), which includes the Upper Connellsville sandstone (approximately 10 to 20 ft thick). Secondary groundwater-bearing zones that are not aquifers include the highly fractured and weathered shale within the Clarksburg clay-shale (approximately 10 ft thick), and upper and lower depositional contacts of the Morgantown sandstone (**Figure 4**). Despite relatively low groundwater flow rates associated with these secondary groundwater-bearing zones, there is hydraulic connection between the SRF/Upper Connellsville sandstone via open vertical fractures and horizontal bedding planes. The lines of evidence for the SRF hydraulic connection from ridge to valley is provided in Section 3.2.3.

Based on boring logs of rock cores and vertical borehole geophysics conducted during monitoring well installations in 2017 and 2018 at the FAP, the three uppermost sandstone units are found only in ridges surrounding the FAP. The Lower Pittsburgh sandstone occurs from a lower elevation of approximately 913 ft to an upper elevation of approximately 935 ft above mean sea level (amsl) and is present at MW-8 and MW-9 in ridges to the north of the FAP. This elevation is above the regional water table and the sandstone unit is not saturated. The Upper Connellsville sandstone is generally 20 to 30 ft thick and because of the general northwesterly dip and varying thickness of the Upper Connellsville sandstone, the unit elevation is variable across the Site. The lower elevation occurs as low as approximately 804 ft, and the upper elevation occurs as high as 854 ft amsl. The Upper Connellsville sandstone is discontinuous by topography, truncates at the FAP valley walls, and is connected with the SRF system. The Lower Connellsville sandstone is present; however, it is extensively interbedded with shale. Fracturing in the Lower Connellsville sandstone and interbedded shale is not prevalent. The Lower Connellsville stratigraphic interpretation was based on the presence and elevation of the Little Clarksburg Coal at boring B-0608 northeast of the FAP, which marks the base of the Connellsville sandstone group deposition (Cross, A.T and M.P. Shemel, 1956; Latimer, W.J., et al., 1911; Orsborn, N.P., 2008; Reger, D.B., et al., 1918).

The Clarksburg shale is between the Lower Connellsville sandstone and Morgantown sandstone and occurs as a thick sequence of shale interbedded with siltstone and occasional sandstone. It ranges in thickness from approximately 90 to 110 ft. There is a laterally continuous fissile shale interval observed within the Clarksburg shale that is a secondary groundwater-bearing zone. Geophysical and rock core logs suggest the fissile shale may be related to fresh water deposition and the top of the fissile shale may be characterized as a stratigraphic disconformity.

The Morgantown sandstone is laterally continuous beneath the entire FAP area and is regionally present underlying valleys. The understanding of this unit structure and continuous occurrence was used to help

guide 2017 and 2018 boring locations and monitoring well placement. It is up to 30 ft thick regionally and occurs at the Site at elevations ranging from as low as approximately 610 ft to as high as 665 ft amsl. The Morgantown sandstone pinches out south of the FAP towards the city of Teays Valley (EPRI, 1999) and truncates into the Kanawha River valley wall to the east. Secondary groundwater-bearing zones in the Morgantown sandstone occur primarily along the upper and lower erosional contacts.

Unconsolidated deposits are virtually absent in the ridges surrounding the FAP except for some minor residuum. Unconsolidated deposits are present with appreciable thicknesses in the Little Scary Creek valley southwest of the FAP and dam. The thickness of unconsolidated sediments southwest of the FAP ranges from approximately 8.5 ft at boring 2008-1 to 31 ft at MW-2. Sediments are poorly sorted and consist of gravel through sand, but generally coarsen downward. Weathered rock fragments are encountered near the soil-rock interface. The unconsolidated zone is not considered a water-bearing unit because groundwater generally occurs deeper and is associated with the SRF. During a site visit on April 19, 2017 by Arcadis, Little Scary Creek was observed to flow on top of bedrock southwest of the dam near MW-2.

These features are further illustrated on three lines of cross section through the FAP. Two lines trend from southwest to northeast and northwest to southeast through the central portion of the FAP (A-A', and B-B', respectively), and the other trends from west to east across ridges along the northern portion of the FAP (C-C'). The cross section location map is included as **Figure 5** and the cross sections are included as **Figure 6**. Boring logs and well construction diagrams are included in **Appendix B**.

2.4.1 Climate and Water Budget

The climate of Winfield, West Virginia is characterized as humid continental with an average rainfall of approximately 40 inches annually. The average maximum temperature is 66 ºF and the average minimum temperature is 44 ºF based on information from Southeast Regional Climate Center (2017).

The results of a numerical water budget analysis performed as part of the October 2012 *Design Basis Report* is described in detail in Appendix C of that report (Stantec, 2012). The primary objective of this analysis was to evaluate the adequacy of reservoir capacity under a variety of precipitation and runoff scenarios. It was determined that the reservoir capacity was not exceeded under any of the simulated scenarios (Stantec, 2012).

Numerical groundwater modeling efforts completed by Arcadis in 2019 included both steady-state and transient flow analysis. Based on model calibrations, it is estimated that approximately 11 inches of precipitation reaches the underlying aquifers in the form of recharge per year.

2.4.2 Regional and Local Geologic Setting

2.4.2.1 Unconsolidated

The Site is located in the Appalachian Plateau physiographic province, and unconsolidated soils are limited in extent and are residual and colluvial in origin. Soils consist of gravel, sand, silt, or clay. Based on review of site boring logs, the soil-rock interface is abrupt with little to no occurrence of weathered bedrock or residuum. Soil thickness ranges from nearly 0 ft in the ridges (MW-1809) to greater than 30 ft in the valleys (e.g. MW-2).

2.4.2.2 Bedrock

The primary regional bedrock units encountered are Pennsylvanian age sedimentary rocks of the Monongahela Formation and Conemaugh Formation, in descending order from youngest to oldest. The depositional environment for these formations is characterized by a gradually subsiding shallow sea with alternating marine and freshwater strata. The sedimentary package associated with the Monongahela and Conemaugh Formations consists of alternating shale and sandstone units, with occasional thin limestone and coal beds. Several coal horizons are present in the region and often serve as marker beds for unit identification. The principal regional marker bed is the Pittsburgh Coal (i.e. No. 8 Coal), which marks the transition from the Monongahela and Conemaugh Formations (EPRI, 1999). However, the Pittsburgh Coal is not represented in Site borings. The Pittsburgh Limestone has been identified in two borings at the FAP, MW-3 and 2008-26, and is used to mark the Monongahela-Conemaugh transition at the Site. Additionally, the Little Clarksburg Coal has been identified at FAP boring B-0608 to the northeast and is used to mark the base of the Connellsville sandstone deposition (Latimer, W.J., et al., 1911). Deeper bedrock units produce oil and gas. Associated active oil and gas wells are located in the vicinity of the FAP. The location of these wells is shown on **Figure 3**.

The Monongahela Formation is found capping the hills surrounding the Site. The Conemaugh Formation is also found in the hills surrounding the Site, underlying the Monongahela Formation, and extending into the valley floor beneath the FAP. Bedrock occurrence is illustrated on cross sections (**Figure 6**) and detailed in boring logs included in **Appendix B**.

The Site is situated between the Parkersburg Syncline to the northwest and the Byrnside Anticline to the southeast, with regional geologic structure characterized by very gently northwestward-dipping bedding planes toward the Parkersburg Syncline (EPRI, 1999). Bedding planes of the nearby Amos FGD landfill have been reported as striking to the east-northeast and dip to the north-northwest at approximately 20 ft per mile (GAI, 2006).

Arcadis completed additional geologic structure analysis in 2017. This analysis included a review of bedding plane attitudes measured by AEP in 1975 from test trenches surrounding the FAP (AEP drawing no. SK-3826-C-17). Arcadis also computed bedding plane attitudes via boring log correlation and multi-point gradient computations based on fence diagrams and cross sections generated during the EPRI groundwater study (EPRI, 1999). Finally, bedding plane dip as depicted in geologic cross sections of the Amos Quarrier Ash Landfill were approximated (EPRI, 1999). These analyses suggest that bedrock geologic structure at the Site consists primarily of north-northeasterly striking beds that dip very shallowly (i.e. generally less than 1 degree) to the west-northwest. Additionally, evaluation of the few fractures (joint) measurements within the sandstone units indicate near vertical fractures with a strike of 70 degrees from north.

In 2018, Arcadis developed a visual three-dimensional CSM of the Site using Earth Volumetric Studio (CTech, 2017). The CSM was constructed using lithologic data collected during well installation and sequentially producing an area-wide stratigraphic structural model. Layers were included to focus on main stratigraphic and hydrostratigraphic layers (geospatial, followed by hydrostratigraphic). The resulting three-dimensional CSM was used to interpret the lateral extent of each bedrock unit at the Site beyond the known data points.

2.4.3 Surface Water and Surface Water Groundwater Interactions

The FAP is located within the Little Scary Creek watershed, which flows from the toe of the dam southwest of the FAP. While the FAP was in operation, Little Scary Creek received impoundment discharge via a National Pollutant Discharge Elimination System permitted outfall located in an unnamed tributary west of the FAP. Little Scary Creek flows south from the FAP into Teays Valley and discharges into the Kanawha River (EPRI, 1999). Groundwater from Little Scary Creek Valley, in which the FAP is located, discharges either to Little Scary Creek and its tributaries, other unnamed tributaries of the Kanawha River, or further down-valley in the Teays Valley and Kanawha River alluvium.

Groundwater flow direction typically follows topographic relief and fracture orientation (horizontal bedding plane and stress relief) but is also influenced by stored water within the FAP. The FAP provides recharge and contributes to radial groundwater flow in the transmissive bedrock zones that are in contact with the saturated fly ash. The FAP has been completely capped and water levels are declining due to reduced recharge.

As the water in the FAP declines, water levels in higher elevation bedrock are also expected to decline. In addition, the confinement of the FAP is likely to transition from unconfined to confined or semi-confined based on the cap limiting barometric (atmospheric) pressure interaction. To evaluate these effects of FAP capping, barometric pressure data, precipitation, and water level data from January 2012 through April 2018 was compiled. Data was processed for the following wells and piezometers: STN-12-4 (multi-port well), STN-12-8, STN-12-9, MW-8, and MW-9. The STN piezometers represent the FAP hydraulics and MW-8/9 represented the Upper Connellsville sandstone-SRF outside of the cap on the northeast portion of the Site. The resulting hydrograph is shown as **Figure 7** that includes piezometer and well locations. The continuous data was collected every 12-hours from pressure transducers in STN-12-8 and STN-12-9. Data processing was completed to evaluate the barometric pressure relationship to water levels from the pre-capping to the post-capping periods. The results indicated that a transition occurred, and a correction was applied to the post-capping water levels based on estimated barometric efficiencies of 40% for STN-12-8 and 30% for STN-12-9. Water levels at STN-12-4, STN-12-8, and STN-12-9 are generally decreasing for the post-capping period. There are fluctuations post-capping within STN-12-8 and STN-12-9 that are likely related to seasonal recharge from the surrounding ridges.

2.4.4 Water Users

There are no active groundwater production wells at the Site. In 2017, a water well inventory for the Amos Plant indicated no information regarding the use of wells located within a half mile of the Site was available (Banks, 2017). However, non-production groundwater wells that were identified are registered with the United States Geological Survey (USGS) and appear to have been used for groundwater monitoring. Six of the ten well locations referenced in that report were located on or immediately adjacent to the Amos Plant, northeast of the FAP. Of those wells not obviously related to the Plant, one is located approximately 1,500 ft west of the Plant's onsite ash pond system, one mile north of the FAP. The other three well locations are located approximately 3,500 to 5,000 ft south of the Plant's onsite ash pond system, greater than 2,000 ft east of the FAP. The Banks water well report is included in **Appendix C**.

An additional off-site well survey of properties surrounding the FAP was completed by Arcadis in 2018. The purpose of this survey was to determine if surrounding properties had a connection to public water

service by the Putnam Public Service District for Putnam County or served by another potential source (cistern or groundwater). The Putnam Public Service District source water is from the Poplar Fork Creek water shed located over 4 miles to the northwest of the Site. The water is pumped to a reservoir and subsequently treated at the water treatment plant. The resulting survey results are present in **Appendix C** (Table C-1 and Figure C-1). The table is organized by parcel identification in numerical order with additional information, if available, including physical address, year constructed, land use type, owner and owner address. This parcel information was provided to the Kanawha-Charleston Health Department to verify public water supply to that parcel or if there is a known private well on the property. Of the 217 parcels identified within approximately one mile of the FAP during this survey, 144 parcels were confirmed to have a municipal potable water source. Land use at these 144 parcels includes, but is not limited to, one- and two-family residences, vacant residential lots, mixed residential/commercial lots, mobile homes, and active farms. The remaining 73 parcels with no confirmed public potable source did not have physical addresses, which likely means the parcel has not been developed and does not have a need for potable water.

Regionally, the Kanawha River alluvial aquifer is used as a source of water for public, industrial, and domestic supply. However, given its relatively lower specific capacity (11.8 gallons per minute [gpm]/ft median), it is used less frequently than the Ohio River alluvial aquifer. The Teays River Valley alluvial aquifer, which is similar in composition to the Kanawha River alluvial aquifer, is also used for potable water. Regionally, wells drilled in the Conemaugh and Monongahela Groups have median specific capacities ranging from 0.50 to 0.75 gpm/ft (USGS, 2001). In 2018, Arcadis conducted well yield testing at select wells screened within the Upper Connellsville sandstone, SRF system, Clarksburg shale, and Morgantown sandstone. The short duration yield tests had sustainable yields that were generally maintained for 30 to 60 minutes with complete testing duration of less than 4 hours and is further discussed in Section 3.1.3.2. Maximum pumping rates across all units were generally less than 1 gpm, except for stress relief fracture system wells MW-6, and MW-1809A (3.8 and 1.1 gpm, respectively). As a result, bedrock units found at the site are unlikely to be used regionally for public water supply.

3 MONITORING WELL NETWORK EVALUATION

An initial evaluation of the monitoring well network present at the Site was performed in May 2017 to determine if any of the wells were viable for continued use as part of the groundwater quality monitoring well network or retained for the purpose of water level measurement as part of a larger groundwater hydraulic monitoring well network. As part of this review, hydrogeologic conditions were evaluated to determine if the defined uppermost aquifer unit had an adequate monitoring well network. The evaluation was completed in accordance with 40 CFR 257.91 to have an established monitoring well network that effectively monitors the uppermost aquifer up gradient and down gradient of the Site. Following the initial evaluation, additional monitoring wells were installed and existing wells were re-developed. A summary table of well development activities is provided in **Appendix D**. Background groundwater quality is monitored at wells that are either hydraulically up gradient or hydraulically separated from the FAP. Down gradient wells are placed down gradient (horizontal and vertical) of the CCR unit boundary to monitor water quality.

3.1 Hydrostratigraphic Units

3.1.1 Horizontal and Vertical Position Relative to CCR Unit

The uppermost aquifer is the first encountered aquifer that is horizontally continuous across the site. The uppermost aquifer at the Site is defined by the saturated portion of the SRF system and includes the Upper Connellsville sandstone. The SRF is independent of lithologic unit and was examined to confirm hydraulic connection from ridge to valley using multiple lines of evidence that are discussed in Section 3.2.2. The Upper Connellsville sandstone and the SRF system laterally surrounds the FAP and occurs across the region. The SRF system extends vertically down ridges to the valley floors. The SRF system occurs in both the Conemaugh and Monongahela Formations and is hydraulically connected with deeper bedrock units (e.g., Clarksburg shale, Morgantown sandstone) via open fractures and horizontal bedding planes. The Clarksburg shale occurs throughout the FAP area and truncates at ridges. The Morgantown sandstone occurs below the base of the FAP and is present throughout the regional area. Vertical down gradient groundwater flow to deeper units (Clarksburg shale and Morgantown sandstone) likely occurs. However, groundwater yield in the Clarksburg shale and Morgantown sandstone are low and not sustainable, indicating that these secondary groundwater bearing zones are not aquifers at the Site. In similar SRF systems, groundwater is generally unconfined but water levels in wells can exhibit a semi-confined to confined behavior in valley floors and/or if low-transmissivity sediments (i.e. clay) are present (USGS 1981).

The upper limit of the uppermost aquifer is defined by the top of the potentiometric surface in the Upper Connellsville sandstone and SRF system, which is hydraulically connected to the saturated portion of the FAP. The potentiometric surface occurs at elevations as high as 865 ft amsl in the vicinity of the FAP. The base of the CCR unit occurs as low as 675 ft amsl. This is illustrated on cross sections A to A', B to B', and C to C' (**Figure 6**).

3.1.2 Overall Flow Conditions

To assist with understanding of overall flow conditions, Arcadis updated the original numerical groundwater flow model. A brief description of the revised groundwater flow model is provided in **Appendix E**. The primary model updates involved modification of the model structure to reflect the updated hydrostratigraphic interpretation from the visual three-dimensional CSM. The revised groundwater model was discretized vertically into ten (10) model layers to provide a vertical profile representative of the Site hydrostratigraphic framework. Additionally, a refined hydraulic conductivity zone was incorporated into the model to better represent the SRF system in all model layers and low permeable rock layers. The groundwater flow model was first re-calibrated to 2012 observed groundwater levels. Then, a transient model was built to dynamically simulate the hydraulic variation within the impoundment prior to and during the geosynthetic cap installation. A forward pathline analysis using MODPATH (Pollock, 2017) assisted in identifying the general flow patterns towards each monitoring well and surface water features. For this report, data collected during the October 22, 2018 groundwater gauging event were combined with simulated transient conditions for the corresponding time period to interpret groundwater flow patterns. The groundwater flow model also incorporates the understanding of water levels within the FAP that provides outward flow from the FAP to surrounding fractured units. Additionally, groundwater elevation contours within the Upper Connellsville sandstone and SRF were extrapolated from the modeled groundwater contours and flow directions using groundwater flow understanding based on the Appalachian conceptual site model for groundwater flow (USGS, 1981).

Vertical flow paths occur primarily within the SRF system along the ridges towards valleys, with horizontal contributions to surface water discharge and down valley groundwater flow. A multiple line of evidence approach was utilized to define the horizontal and vertical components of flow and is outlined in Section 3.2. Additional vertical flow paths also occur within the rock units, to a lesser extent.

Available groundwater elevations are summarized on **Table 1**. Simulated and extrapolated potentiometric contours for the Upper Connellsville sandstone and SRF system are depicted on **Figure 8A**. As shown, horizontal flow is outward from the pond to the Upper Connellsville sandstone in most areas except for the northwest where MW-10 currently appears to be up gradient. At lower elevations where the Upper Connellsville is absent, groundwater flow within the SRF then generally follows topography, ultimately reaching the nearest valley. Additional simulated potentiometric surfaces for deeper and hydraulically-connected secondary groundwater-bearing zones of the Clarksburg disconformity and Morgantown sandstone are provided on **Figures 8B** and **8C**, respectively. Flow contributions from shallow systems and potentially from the FAP are horizontal (radial flow from the pond) and vertical to the Clarksburg shale disconformity and vertical to the Morgantown sandstone.

3.1.3 Hydraulic Conductivity

The following subsections describe field implementation and data analysis of hydraulic testing conducted at the FAP (e.g., borehole packer tests, rock core permeability, slug tests, well yield tests). Historical hydraulic tests are briefly described and referenced. However, hydraulic conductivity estimates derived from historical test data were not generally consistent with more recent testing. Therefore, this report and evaluation products use current hydraulic conductivity estimates obtained during the 2017 and 2018 investigation.

3.1.3.1 Historical Aquifer Tests

The first six bedrock monitoring wells at the FAP (MW-1 through MW-6) were installed in 1995. Slug tests were performed at these wells and analysed to provide hydraulic conductivity estimates. Either a solid slug or a volume of water was used to induce the near instantaneous head change, depending on initial static water level. Packer tests were performed on open boreholes at three of these six wells prior to well installation (MW-2, MW-4, and MW-5). The objective of packer testing was to assess relative productivity of bedrock units. Hydraulic conductivity estimates were not generated as a result of packer tests, but packer test results were considered when selecting monitoring well screen intervals at these locations. Further details of slug test and packer test methodology and results are provided in *Groundwater Quality at the John E. Amos Power Plant* (EPRI, 1999).

3.1.3.2 Yield Testing

Well yield testing was conducted by Arcadis from March through July 2018 at select new and existing monitoring wells. Yield tests were completed by pumping each well at variable and steady state extraction rates and measuring the water level response in each well during and after pumping (recovery). Extraction rates were maintained using a submersible pump. High-resolution water level data were collected during both pumping and recovery phases via data-logging pressure transducers installed in each test well. Representative portions of drawdown and recovery data were selected for analysis and analyzed using AQTESOLV® for Windows® Version 4.50 (Duffield, 2007). The hydraulic parameter values were determined using applicable analytical solutions based on the observed response for a single (partially-penetrating) well under confined or unconfined conditions, as appropriate. Additional details on field methodology are provided in **Appendix A**.

Yield tests were completed at wells representing the uppermost aquifer (i.e., SRF and Upper Connellsville sandstone), as well as other secondary groundwater-bearing zones that are not aquifers (i.e., Clarksburg shale, Clarksburg disconformity, and Morgantown sandstone). The highest hydraulic conductivity was observed in the SRF system at MW-6 (37 ft/day). Wells MW-5, MW-8, MW-1801B, and MW-1801C did not maintain a flow rate and testing analysis was not completed. Hydraulic conductivity estimates derived from yield tests in the stress relief fracture system ranged from 0.1 to 37 ft/day. In the Upper Connellsville sandstone, hydraulic conductivity estimates ranged from 0.02 to 0.1 ft/day (the lower end of the SRF system range). A summary of yield testing results is provided on **Table 2** and solution reports with individual curve matches are provided in **Appendix F**.

3.1.3.3 Rock Core Permeability Testing

In addition to testing the hydraulic properties of all groundwater-bearing units, ex-situ permeability testing was performed to determine hydraulic properties of the lower-transmissivity units. Representative rock cores were selected from the non-fractured portions of the Morgantown sandstone, shale units underlying the Upper Connellsville sandstone and Clarksburg disconformity. Laboratory analysis included both horizontal and vertical steady-state permeability measurements via flexible wall permeameter consistent with ASTM D5084.

Average horizontal hydraulic conductivity estimates ranged from 4.08×10^{-5} ft/day to 1.36×10^{-4} ft/day. Average vertical hydraulic conductivity estimates were approximately ten times greater, ranging from 3.23

x 10^{-4} ft/day to 9.07 x 10^{-4} ft/day. These values are approximately two to four orders of magnitude lower than hydraulic conductivity estimates within the fractured units. The test results confirm that flow within the Morgantown sandstone is attributable to secondary porosity within the fracture system and not from the primary (sandstone matrix) porosity. These low values were used to help refine the numerical groundwater flow model. A summary of rock core permeability testing is included on **Table 3**.

3.1.3.4 Packer Testing

Packer testing was conducted during installation of all monitoring wells installed in 2017 and 2018 except MW-1804 and MW-1807. The intent of injection packer testing is to estimate relative bedrock permeability for various borehole depth intervals to assist with water-bearing unit identification and monitoring well installation. Upon completion of each borehole, rock cuttings were flushed from the borehole with water in preparation for packer testing. Inflatable upper and lower rubber packers were then inserted to a specified 10-ft depth interval and inflated to create a seal. A riser pipe was attached to the top of the upper packer to provide a rigid, sealed standpipe with a pressure gauge at a known distance above the ground surface. Through this riser pipe, water was injected into the packer interval while measuring the gauge injection pressure, as well as injection volumes via a totalizing flowmeter.

During the packer tests, flow rates and borehole pressure were monitored at regular intervals. Test data was analyzed using the method described in the U.S. Department of the Interior Ground Water Manual (1977).

Packer tests were designed to target the Upper Connellsville sandstone, Clarksburg shale and associated sandstone interbeds, Morgantown sandstone, Birmingham Reds, and Graffton sandstone, in order of decreasing elevation. Most of the tested intervals did not accept the injected water, indicating that those intervals have very low transmissivity. There were no transmissive zones tested at borings MW-1802 and MW-1809. However, some lithologic intervals representing the SRF, Upper Connellsville sandstone, Clarksburg weathered shale, and Morgantown sandstone were determined targets due to the lateral extent and relative fracturing. Estimated hydraulic conductivities at borings MW-1801, MW-1803, and MW-1805, representing the Clarksburg weathered shale, Upper Connellsville sandstone, and Morgantown sandstone, respectively, were relatively low, ranging from 0.015 ft/day to 0.4 ft/day. Estimated hydraulic conductivities at borings MW-1806, MW-1808, and MW-1810 were generally higher, ranging from 0.4 ft/day to 1.9 ft/day. Packer test results are summarized on **Table 2** and packer testing logs are included in **Appendix F**.

3.1.4 Stress Relief Fracture System and Upper Connellsville

As described in Section 3.1.3, several different methods were used to quantify hydraulic conductivity at the Site. Estimated hydraulic conductivity values across all methodologies within the SRF system, which constitutes part of the uppermost aquifer, ranged from 0.1 to 37 ft/day. The geometric mean hydraulic conductivity for the SRF system was 2 ft/day (**Table 2**). Estimated hydraulic conductivity values across all methodologies within the Upper Connellsville sandstone, which constitutes the rest of the uppermost aquifer, ranged from 0.015 to 0.4 ft/day. The geometric mean hydraulic conductivity for the Upper Connellsville sandstone was 0.1 ft/day (**Table 2**).

3.1.5 Borehole Geophysics

Vertical geophysical logging, including temperature, temperature gradient, fluid resistivity, natural gamma, density, neutron, lateral resistivity, spontaneous potential, calliper, and single point resistance instrumentation, was completed during well installations at MW-2, MW-4, MW-5, MW-9, and MW-10 during installation activities in 1995 and 2002. Geophysical logging was also performed at boring 2008-17 when it was installed in 2007, and at borings B-1401 and B-1402 when they were installed in 2014 including natural gamma, density, resistivity, and calliper instrumentation. Similarly, vertical geophysical logging was conducted at wells MW-1801, MW-1802, MW-1805, MW-1806, and MW-1808. The purpose of borehole geophysics was to assist with the identification of probable water-bearing units and well screen design, as well as to provide data for stratigraphic correlation of bedrock units across the site. Geophysical logs are included in **Appendix G**.

In general, the geophysical logging results were consistent with a sedimentary package of alternating shale and sandstone. **Figure 6** illustrates natural gamma logs that were critical to stratigraphic identification projected onto cross sections A-A', B-B', and C-C'. The Upper Connellsville sandstone was identified at wells MW-1801, MW-1802, MW-1805, MW-1806, and MW-1808 by a distinct left gamma shift at elevations between 800 ft amsl and 850 ft amsl. The Morgantown sandstone was identified using gamma logs at MW-6, MW-1801, MW-1802, MW-1806, and MW-1808. The gamma logs generally indicated that the Morgantown sandstone had a higher proportion of shale compared to the Upper Connellsville Sandstone.

In addition to gamma logs, the calliper logs were particularly useful for identifying and correlating the fissile, weathered shale unit within the Clarksburg shale. Wider borehole apertures were observed at wells MW-1801, MW-1802, MW-1805, MW-1806, and MW-1808 at an elevation near 700 ft amsl, which was interpreted to be caused by a high degree of weathering (**Appendix G**). Acoustic televiewer imaging systems emit an ultrasonic pulse and records the reflected acoustic signal. The transit time and amplitude of the reflected signal is recorded as a photographic-like image and allows for 360º borehole imaging. Acoustic televiewer logs at the Site were used to identify depth, orientation (i.e. dip direction and angle), aperture, and description (e.g., major open joint, filled fracture, etc) of potential groundwater-bearing fractures of planar features along the entire length of each borehole. Acoustic televiewer data confirmed the high degree of weathering associated with the Clarksburg shale at wells MW-1801, MW-1802, MW-1806, MW-1808. In addition, they contributed to identification of the SRF and upper and lower surfaces of the Morgantown sandstone. Acoustic televiewer logs are included in **Appendix G**.

3.2 Uppermost Aquifer

3.2.1 CCR Rule Definition

Per 40 CFR 257.60(a), new CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must be constructed with a base that is located no less than 1.52 meters (5 ft) above the upper limit of the uppermost aquifer, or must demonstrate that there will not be an intermittent, recurring, or sustained hydraulic connection between any portion of the base of the CCR unit and the uppermost aquifer due to normal fluctuations in groundwater elevations (including the seasonal high conditions).

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

3.2.1.1 Common Definitions

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

3.2.2 Identified Onsite Hydrostratigraphic Units

The identified shallowest Site hydrostratigraphic unit is the Upper Connellsville sandstone combined with the saturated portion of the SRF system, which are considered the uppermost aquifer at the Site. Regionally, the Upper Connellsville sandstone is not known to be the uppermost aquifer because its occurrence is variable based on elevation relative to the water table. The SRF is known to be regionally prevalent and is considered the regional uppermost aquifer system outside of primary unconsolidated fluvial valleys. The uppermost aquifer is not known to be used locally for groundwater supply or industrial water use.

Deeper secondary groundwater bearing zones are included for hydraulic water level monitoring only. While providing information about vertical hydraulic gradients and general groundwater conditions, these deeper units are not included as part of the monitoring well network and are not aquifers. The two deeper secondary groundwater-bearing zones identified during the investigation are the Clarksburg weathered shale/disconformity and the Morgantown sandstone (**Figure 6**). The Clarksburg shale is in contact with the FAP, receives outward flow, and is connected with the SRF system where the unit truncates into ridges or valleys (**Figure 8B**). The Morgantown sandstone is the first encountered secondary groundwater-bearing zone below the FAP that also extends laterally towards the main Teays and Kanawha valleys (**Figure 8C**). Both the deeper units are low in permeability. The recommended monitoring network is further explained in Section 4.

3.2.3 Hydraulic Connection – Multiple Lines of Physical Evidence Approach

A multiple lines of evidence approach was used to understand the hydraulics related to horizontal and vertical groundwater flow at the Site. The main purpose for this demonstration was to help understand the relative dynamics of the unlined FAP with respect to the surrounding water-bearing bedrock units and the SRF system. As stated above, most of the water-bearing units are low in permeability and some likely act as aquitards. The lines of evidence were explored to see if there are any indications that the low permeable units impede downward flow in relation to stratigraphic position and in relation to hydraulic connections with the SRF system.

At the Site, the Upper Connellsville sandstone and SRF system are determined to be the uppermost aquifer based on spatial occurrence and relative yield. However, the occurrence and elevation of the

Upper Connellsville sandstone relative to the groundwater table in surrounding areas is not known. The following lines of physical evidence support the understanding that the SRF system is connected from the ridgetops down to the valleys and is considered hydraulically connected with lateral units.

The physical lines of evidence that verify SRF hydraulics are:

- SRF and seeps observed at dam edges
- SRF and seeps observed in new spill way bedrock cut (near MW-1802A)
- SRF occurring independent of bedrock units at depths greater than 50 feet (MW-1809A and MW-1810A
- Fractures and seeps observed in abandoned decant tower tunnel
- Shallow shales are fractured on ridges and respond to injection packer testing completed in 2018
- Yield testing at SRF wells indicate sustainable flow rates of over 1 gpm at MW-2/MW-6 and over 0.5 gpm at MW-1809A

Based on this information and the positive correlation of these lines of evidence with the Appalachian conceptual site model for groundwater flow (USGS, 1981), the SRF system is hydraulically connected from ridges to valleys. A generalized cross section illustrating the features of an Appalachian SRF system is provided on **Figure 9**.

3.3 Review of Existing Monitoring Well Network

3.3.1 Overview

The Site was visited by Arcadis and AEP personnel on April 19, 2017 to review existing well network conditions and locations. The well network that existed at the time of that site visit was deficient, lacking both the quantity (i.e. 3 down gradient, 1 up gradient) and distribution to accurately represent background water quality and the quality of groundwater passing the waste boundary of the CCR Unit, per 40 CFR 257.91. Subsequently, installation of additional monitoring wells was completed from November 2017 through July 2018. A well construction table that summarizes the location, ground surface elevation, borehole depth, installation date, and associated well construction details of the monitoring well network is included as **Table 4**. As presented in **Table 4**, wells included in the monitoring network have been designated as up gradient, down gradient, or background. Additionally, some monitoring wells are designated for hydraulic monitoring only. Further details are provided in Section 4.1.

Spatially, the monitoring well network as illustrated on **Figure 10** is distributed across the entire Site and sufficiently monitors up gradient, down gradient, and background locations as specified in 40 CFR 257.91. The well screen intervals are located in either the SRF system and Upper Connellsville sandstone (i.e., uppermost aquifer), Clarksburg shale, or Morgantown sandstone. In general, monitoring wells are clustered so that multiple hydrostratigraphic units are screened at one location.

3.3.2 Gaps in Monitoring Network

As discussed in Section 3.3.1 of this report, gaps in the monitoring network were identified upon initial Arcadis review in April 2017. Following monitoring well installation described in this report and detailed in **Appendix A**, there are no gaps in the monitoring network. The recommended monitoring well network is described in Section 4.

4 RECOMMENDED MONITORING NETWORK

The network meets specifications stated in 40 CFR 257.91. Recommended groundwater monitoring objectives utilizing existing wells are further discussed and will provide an adequate understanding of seasonal and temporal fluctuations in groundwater quality, hydraulics, and groundwater flow at the Site.

4.1 Monitoring Well Network Distribution

The groundwater quality monitoring network at the Site consists of 16 wells as represented on **Table 4** and **Figure 10**. Additionally, all other available monitoring wells and piezometers listed on **Table 4** will be gauged, along with the 16 groundwater quality monitoring wells, for the purposes of groundwater flow analysis.

The determinations of up gradient, down gradient, and background location relative to the FAP, discussed below, is based on the most current groundwater modeling performed by Arcadis in 2018 and 2019, which is discussed in Section 3.1.2 and **Appendix E**.

4.1.1 Down Gradient Locations

Monitoring wells down gradient of the FAP in Little Scary Creek valley (MW-1, MW-2, MW-5, MW-6) and wells screened within the uppermost aquifer in the northern, eastern, and southern ridges surrounding the FAP (MW-1801A, MW-1804A, MW-1806A, MW-7, MW-8, and MW-9) constitute the down gradient groundwater quality monitoring locations (**Figure 10**).

4.1.2 Up Gradient or Background Locations

Based on recent groundwater modeling and the current understanding of groundwater flow directions, only one well (MW-10) within the uppermost aquifer immediately adjacent to the FAP is located hydraulically up gradient. Well MW-10 is not included in the groundwater quality monitoring network because it does not produce sufficient well yield for sample collection. Per 40 CFR 257.91, the owner of a CCR unit may collect background groundwater samples from wells that are not hydraulically up gradient of the CCR unit, provided that the other wells will provide an indication of background groundwater quality that is as representative or more representative than that provided by the upgradient wells.

Five wells located across Little Scary Creek valley to the southwest of the FAP constitute the background groundwater quality monitoring locations (**Figure 10**). Four of these wells are screened in the SRF portion of the uppermost aquifer (MW-1807A, MW-1808A, MW-1809A, and MW-1810A). An additional well is screened in the Clarksburg shale (MW-1807B) to provide background groundwater quality in a deeper secondary groundwater-bearing zone that is hydraulically connected to the SRF. These wells are all screened within the same hydrostratigraphic units that are present immediately surrounding the FAP and are therefore representative of background groundwater quality. Because Little Scary Creek provides a flow barrier between the background monitoring wells and the FAP, any groundwater impacts associated with the FAP are not likely to impact these five wells (**Figure 6**).

4.2 Well Construction

As discussed above in Section 3, gaps in the monitoring well network at the FAP were addressed by installation of 22 monitoring wells from November 2017 through July 2018. All monitoring wells were constructed in general accordance with West Virginia Department of Environmental Protection Title 47 Series 60 Monitoring Well Design Standards dated June 21, 2011 by a state licensed driller.

Installation details and field methods are provided in **Appendix A**. Well construction data for the monitoring well network is summarized on **Table 4**. Boring logs and the monitoring well completion diagrams are provided in **Appendix B**.

5 PROFESSIONAL ENGINEER'S CERTIFICATION

I, Todd A. Minehardt, certify that this report was prepared under my direction and supervision, and that the information contained herein is true and accurate to the best of my knowledge. Based on my experience and knowledge of the site, the proposed groundwater monitoring system will be adequate to meet the requirements of 40 CFR Part 257.91(b), (c) and (e).

TODD A. MINEHARDT

Printed Name of Registered Professional Engineer

Signature

TODD A. MINEHARDT REGISTERED 23518 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

4/17/19

23518	WV	4/17/19
Registration No.	Registration State	Date

6 REFERENCES

Acres American Incorporated – Engineers. 1971. Appalachian Power Company, John E. Amos Plant, Fly Ash Retention Dam, Contact A2, Main Dam and Appurtenances, Geotechnical Data for Bidders.

Acres American Incorporated. 1974. “Draft, Preliminary Design Report, John E. Amos Plant, Fly Ash Retention Dam, Stage 2.” Prepared for Appalachian Power Company, November.

Acres American Incorporated – Engineers. 1975a. Appalachian Power Company, John E. Amos Plant, Fly Ash Retention Dam, Stage 2, Geotechnical Data for Bidders, Phase 3 Investigation, Volume 1.

Acres American Incorporated – Engineers. 1975b. Geotechnical Data for Bidders, Volume 2 (Phases 1 and 2 Investigations), John E. Amos Plant, Fly Ash Retention Dam, Stage 2.

Acres American Incorporated – Engineers. 1975c. Various Stage 2 construction drawings, John E. Amos Plant, Fly Ash Retention Dam, Stage 2.

AEP. 2008. Amos FGD Haul Road Project, AEP Civil Engineering Laboratory, Logs of Borings.

AEP. 2012. Application for Certificate of Approval, John E. Amos Plant, Fly Ash Dam WV I.D. #07911.

Arcadis. 2016a. Ash Pond – CCR Groundwater Monitoring Well Network Evaluation, Amos Plant, Winfield Road, Putnam County, Winfield, West Virginia.

Arcadis. 2016b. FGD Landfill – CCR Groundwater Monitoring Well Network Evaluation, Amos Plant, Winfield Road, Putnam County, Winfield, West Virginia.

Banks Environmental Data, Inc. 2017. Water Well Report, AEP Water Well Inventory, Amos Plant, ES-124909.

Cross, A.T and M.P. Shemel. 1956. Geology and Economic Resources of the Ohio River Valley in West Virginia, Part I Geology. West Virginia Geological Survey Volume XXII.

CTech Development Corporation. 2017. Earth Volumetric Studio. https://www.ctech.com/

Duffield, Glenn. 2007. AQTESOLV® for Windows® Version 4.50.

EPRI. 1999. Groundwater Quality at the John E. Amos Power Plant, Putnam County, West Virginia, Prepared for American Electric Power Service Corp.

Fetter, Charles Willard, and C. W. Fetter. 2001. Applied hydrogeology. Vol. 3. No. 3. Upper Saddle River: Prentice hall.

GAI Consultants, Inc. 2006. Class F Industrial Landfill Facility Application, John E. Amos Landfill, John E. Amos Plant, Winfield, West Virginia, GAI Project Number: C040384.40.

H.C. Nutting, A Terracon Company. 2008. Geotechnical Data Collection Report, Amos U3 Fly Ash Dam Raising Study, Saint Albans, Putnam County, West Virginia, HCN/Terracon Project No. N2075307.

Latimer, W.J., et al. 1911. Jackson, Mason and Putnam Counties, Volume 1, County Reports and Maps. Wheeling News Litho. Company.

Orsborn, N.P. 2008. Deposition and Structural Features of the Basal Morgantown Sandstone of the Casselman Formation (Pennsylvanian) of the Greater Pittsburgh Region. MS Thesis.

Pollock, D.W. 2017. MODPATH v7.2.01: A particle-tracking model for MODFLOW: U.S. Geological Survey Software Release, 15 December 2017, http://dx.doi.org/10.5066/F70P0X5X.

Reger, D.B., et al. 1918. Barbour and Upshur Counties and Western Portion of Randolph, Volume 1, County Reports and Maps. Wheeling News Litho. Company.

Southeast Regional Climate Center. 2017. Historical Climate Summaries, Winfield Locks, West Virginia, http://www.sercc.com, Query conducted by Mr. Josh Roberts of Arcadis on May 10, 2017.

Stantec Consulting Services Inc. 2011. Dam and Dike Inspection Report, John Amos Power Station, St. Albans, West Virginia.

Stantec Consulting Services Inc. 2012. Design Basis Report, John E. Amos Plant, Fly Ash Pond Closure, Appalachian Power Company, Putnam County, West Virginia.

Terracon. 2016. Construction Certification Report, Amos Plant Fly Ash Pond Closure, 2015 Phase I Construction, Putnam County, West Virginia, Terracon Project Number: N4159048, DRAFT.

Terracon. 2017a. Construction Certification Report, Amos Plant Fly Ash Pond Closure, 2016 Phase II Construction, Putnam County, West Virginia, Terracon Project Number: N4159048, DRAFT.

Terracon. 2017b. Construction Certification Report, Amos Plant Fly Ash Pond Closure, 2017 Phase III Construction, Putnam County, West Virginia, Terracon Project Number: N4159048.

UGSS. 1981. Hydrologic Effects of Stress-Relief Fracturing in an Appalachian Valley. Water-Supply Paper 2177.

USGS. 2001. Aquifer-Characteristics Data for West Virginia. Water-Resources Investigations Report 01-4036

USGS. 2015. Aquifers and Groundwater. Available online at www.usgs.gov.

TABLES

Table 1
Water Level Data
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Monitoring Well ID	Location Description to CCR Unit	Hydro-stratigraphic Unit Target	Northing [a]	Easting [a]	Ground Surface Elevation [a] (ft amsl)	Top of Casing Elevation [a] (ft amsl)	Ground Surface Elevation (Installation)	Top of Casing Elevation (Installation)	Ground Surface Elevation (07/28/14)	Top of Casing Elevation (07/28/14)	Top of Casing Elevation (9/29/15)	Top of Casing Elevation (11/2/15)	11/29/17		1/2/18		1/26/18		2/28/18		4/3/18		7/18/18		8/27/18		10/1/18		10/22/18		12/17/18	
													DTW bTOC	GW Elev ft amsl	DTW bTOC	GW Elev ft amsl	DTW bTOC	GW Elev ft amsl	DTW bTOC	GW Elev ft amsl	DTW bTOC	GW Elev ft amsl	DTW bTOC	GW Elev ft amsl	DTW bTOC	GW Elev ft amsl	DTW bTOC	GW Elev ft amsl	DTW bTOC	GW Elev ft amsl	DTW bTOC	GW Elev ft amsl
Downgradient																																
MW-1801A	South	U/SRF	531398.627	1726314.531	901.12	904.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	51.00	853.17	53.49	850.68	51.36	852.81	52.50	851.67	50.22	853.95
MW-1801B	South	C	531401.126	1726316.987	901.06	903.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	221.50	682.36	219.12	684.74	216.72	687.14	215.72	688.14	212.90	690.96
MW-1801C	South	M	531413.037	1726329.094	900.39	903.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	155.51	747.68	163.25	739.94	192.98	710.21	195.74	707.45	198.57	704.62
MW-1802A	West	U/SRF	533246.455	1724119.981	887.75	890.87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	61.43	829.44	56.36	834.51	55.35	835.52	55.65	835.22	55.97	834.90
MW-1802B	West	C	533242.023	1724120.003	887.87	890.76	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	196.60	694.16	195.94	694.82	195.41	695.35	195.30	695.46	194.51	696.25
MW-1803B	Northwest	C	534006.697	1723941.610	904.25	907.06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	196.91	710.15	196.51	710.55	193.55	713.51	192.25	714.81	191.60	715.46
MW-1804A	North	U/SRF	533349.763	1725662.499	858.53	861.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	17.91	843.94	19.84	842.01	18.23	843.62	19.34	842.51	17.26	844.59
MW-1804B	North	C	533352.364	1725659.003	859.17	860.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	179.06	681.83	178.71	682.18	178.46	682.43	178.54	682.35	178.31	682.58
MW-1805B	Northeast	C	533272.299	1727730.142	883.25	885.59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	211.75	673.84	210.00	675.59	209.99	675.60	208.72	676.87	205.06	680.53
MW-1805C	Northeast	M	533273.891	1727725.724	882.32	885.91	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	262.48	623.43	260.07	625.84	257.12	628.79	255.47	630.44	249.93	635.98
MW-1806A	East	U/SRF	532750.917	1728577.239	889.63	893.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	25.59	867.54	27.01	866.12	25.57	867.56	25.82	867.31	25.12	868.01
MW-1806B	East	C	532748.326	1728573.233	889.48	892.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	210.39	681.66	208.92	683.13	206.76	685.29	206.02	686.03	203.58	688.47
MW-1806C	East	M	532745.975	1728569.060	888.96	891.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	257.40	634.34	255.06	636.68	253.05	638.69	252.05	639.69	249.38	642.36
MW-1	Southwest	SRF	531275.00	1724355.00	647.57	649.77	647.57	649.77	--	--	--	--	13.12	636.65	13.13	636.64	13.11	636.66	13.21	636.56	12.24	637.53	12.20	637.57	12.33	637.44	12.23	637.54	12.15	637.62	12.00	637.77
MW-2	Southwest	SRF	529941.00	1724235.00	645.20	647.10	645.20	647.10	--	--	--	--	55.95	591.15	55.79	591.31	55.61	591.49	55.47	591.63	54.38	592.72	55.36	591.74	56.02	591.08	55.58	591.52	55.61	591.49	54.40	592.70
MW-3	Southeast	M	530928.00	1728546.00	952.99	955.29	952.99	955.29	--	--	--	--	274.21	681.08	274.28	681.01	274.35	680.94	274.18	681.11	274.01	681.28	307.05	648.24	305.22	650.07	--	--	300.40	654.89	301.60	653.69
MW-4	Southeast	C	530922.00	1728552.00	953.20	955.10	953.20	955.10	--	--	--	--	230.87	724.23	230.85	724.25	230.82	724.28	230.75	724.35	229.21	725.89	248.66	706.44	248.25	706.85	248.29	706.81	247.98	707.12	247.67	707.43
MW-5	Southwest	SRF	531282.00	1724360.00	648.03	649.93	647.50	649.93	--	--	--	--	33.25	616.68	33.09	616.84	33.21	616.72	33.22	616.71	32.81	617.12	32.83	617.10	33.14	616.79	33.13	616.80	33.05	616.88	32.85	617.08
MW-6	Southwest	SRF	531266.00	1724352.00	647.50	649.45	648.03	649.45	--	--	--	--	12.83	636.62	12.83	636.62	12.69	636.76	12.51	636.94	11.90	637.55	11.92	637.53	12.06	637.39	11.95	637.50	11.86	637.59	11.75	637.70
MW-7	Southeast	U/SRF	530938.00	1788533.00	953.00	955.30	953.00	955.29	--	--	--	--	104.75	850.54	104.71	850.58	104.35	850.94	104.35	850.94	102.89	852.40	100.42	854.88	100.72	854.58	100.79	854.51	100.23	855.07	99.85	855.45
MW-8	Northeast	U/SRF	533742.00	1727871.70	963.01	965.43	963.01	965.43	--	--	--	--	111.85	853.58	111.57	853.86	120.81	844.62	111.74	853.69	109.41	856.02	107.39	858.04	108.00	857.43	108.08	857.35	108.14	857.29	107.48	857.95
MW-9	North	U/SRF	533589.20	1726988.10	944.66	946.81	944.66	946.81	--	--	--	--	95.41	851.40	95.42	851.39	100.03	846.78	95.45	851.36	91.93	854.88	90.56	856.25	91.20	855.61	91.84	854.97	90.63	856.18	90.44	856.37
Upgradient/Background																																
MW-1802C	West	M	533237.344	1724120.267	888.11	890.92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	274.60	616.32	264.32	626.60	266.24	624.68	262.03	628.89	247.17	643.75
MW-1803C	Northwest	M	534010.613	1723944.640	904.04	906.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	273.68	633.27	266.27	640.68	267.41	639.54	265.53	641.42	261.88	645.07
MW-1807A	Southwest	SRF	530862.801	1722479.851	861.99	864.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	106.64	758.31	107.38	757.57	107.06	757.89	107.69	757.26	105.85	759.10
MW-1807B	Southwest	C	530865.269	1722475.145	861.14	865.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	123.42	741.77	123.82	741.37	123.62	741.57	123.45	741.74	122.88	742.31
MW-1808A	Southwest	SRF	530578.048	1723313.873	857.55	860.53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	82.34	778.19	83.71	776.82	83.75	776.78	83.58	776.95	82.72	777.81
MW-1808B	Southwest	C	530575.968	1723317.305	857.58	860.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	154.36	705.69	155.72	704.33	153.59	706.46	153.16	706.89	152.40	707.65
MW-1808C	Southwest	M	530573.810	1723321.874	857.52	860.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	168.94	691.57	165.83	694.68	167.00	693.51	167.18	693.33	162.97	697.54
MW-1809A	Southwest	SRF	530459.418	1722189.267	738.09	741.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	47.88	693.24	48.10	693.02	47.40	693.72	47.08	694.04	46.91	694.21
MW-1810A	Southwest	SRF	530152.248	1723192.379	735.26	738.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	68.36	669.97	69.40	668.93	63.23	675.10	67.94	670.39	67.71	670.62
MW-10	Northwest	U/SRF	534085.80	1724114.60	903.68	905.85	903.68	905.85	--	--	--	--	59.51	846.34	58.05	847.80	57.39	848.46	59.19	846.66	55.12	850.73	57.02	848.83	59.02	846.83	57.07	848.78	57.33	848.52	56.57	849.28
Fly Ash Pond Pool																																
FAP Pool Stage	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Piezometers																																
STN-12-4 (Multi-port)	Central	Ash	531882.3	1726127.2	861.83	865.39	861.83	863.49	--	--	--	865.39																				
Port 1	--	Ash	--	--	--	--	--	--	--	--	--	865.39	16.61	848.78	16.75	848.64	16.91	848.48	16.41	848.98	16.38	849.01	20.36	845.03	13.17	852.22	11.77	853.62	11.80	853.59	11.48	853.91
Port 2	--	Ash	--	--	--	--	--	--	--	--	--	865.39	17.16	848.23	17.18	848.21	16.7	848.69	17.15	848.24	16.76	848.63	38.40	826.99	11.83	853.56	8.19	857.20	11.21	854.18	11.44	853.95
Port 3	--	Ash	--	--	--	--	--	--	--	--	--	865.39	17.07	848.32	17.12	848.27	17.22	848.17	16.75	848.64	16.23	849.16	56.42	808.97	11.10	854.29	9.90	855.49	9.30	856.09	11.69	853.70
Port 4	--	Ash	--	--	--	--	--	--	--	--	--	865.39	17.13	848.26	17.19	848.20	17.31	848.08	16.72	848.67	16.18	849.21	74.42	790.97	10.72	854.67	11.88	853.51	11.61	853.78	11.73	853.66
Port 5	--	Ash	--	--	--	--	--	--	--	--	--	865.39	17.25	848.14	17.32	848.07	17.43	847.96	16.94	848.45	16.28	849.11	92.30	773.09	13.93	851.46	12.12	853.27	11.55	853.84	11.85	853.54
Port 6	--	Ash	--	--	--	--	--	--	--	--	--	865.39	17.35	848.04	17.41	847.98	17.51	847.88	17.10	848.29	16.82	848.57	Dry	Dry	12.13	853.26	12.28	853.11	11.68	853.71	11.78	853.61
Port 7	--	Ash	--	--	--	--	--	--	--	--	--	865.39	17.45	847.94	17.55	847.84	17.62	847.77	17.25	848.14	17.01	848.38	--	--	12.38	853.01	12.17	853.22	12.41	852.98	12.01	853.38
STN-12-8	East	SRF	532214.2	1728169.3	874.26	880.49	872.66	874.51	874.26	880.76	--	880.49	21.29	859.20	21.34	859.15	21.41	859.08	19.62	860.87	11.51	868.98	13.93	866.56	16.05	864.44	14.00	866.49	15.26	865.23	--	--
STN-12-9	Northeast	SRF	532150.5	1728713.8	883.16	887.08	875.30	877.03	883.16	887.16	--	887.08	26.02	861.06	25.95	861.13	25.66	861.42	22.81	864.27	21.87	865.21	19.22	867.86	20.52	866.56	19.89	867.19	19.22	867.86	18.85	868.23
PZ-1701	--	Ash	533047.5	1724588.0	--	838.58	--	838.58	--	--	--	--	8.61	829.97	9.65	828.93	8.64	829.94	8.17	830.41	7.82	830.76	5.63	832.95	6.34	832.24	6.20	832.38	6.22	832.36	6.08	832.50
PZ-1702	--	Ash	533805.9	1724556.0	--	848.12	--	848.12	--	--	--	--	12.39	835.73	12.51	835.61	11.98	836.14	12.16	835.96	10.06	838.06	8.73	839.39	9.45	838.67	7.49	840.63	8.57	839.55	8.04	840.08

NOTES:

Monitoring wells are arranged by bedrock unit in order of increasing depth

Elevation in NAVD 88, feet above mean sea level (ft amsl)

bls = Below land surface

bTOC = Below top of casing

GW Elev = groundwater level elevation

NA = not available

-- = not measured

a = 1983 West Virginia State Planar Coordinates NAD83/NAVD88. Surveyed in July 2018

b = Source: GAI Consultants. March 2006. Class F Industrial Landfill Facility Application, John E. Amos Landfill, Volume 1, Appendix K - Monitor Well Construction Diagrams. TOC elevation was 883.0 before 10/20/94.

c = Survey data and boring log not available, coordinates estimated based on AEP DWG. No. 13-30500-11-E. TOC elevation was 882.1 before 10/20/94.

d = The April 2018 water level at DW-2 was measured on 4/6/2018, not 4/3/2018

Table 2
Summary of Hydraulic Testing Results
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

ARCADIS Design & Consultancy for natural and built assets

Test Borehole/Well Identification	Ground Surface Elevation (ft amsl)	Hydrogeologic Unit	Test Date	Boring Diameter (inches)	Casing Diameter (inches)	Top of Interval (ft-bgs)	Top of Interval (ft-amsl)	Bottom of Interval (ft-bgs)	Bottom of Interval (ft-amsl)	Interval Length (ft)	Slot Size (slot)	b (ft)	Test Pressure (psi)	Flow Rate[4] (gpm)	T (ft^2/day)	K (ft/day)	K (cm/sec)
Borehole Packer Testing[1]																	
MW-1801	900.39	Clarksburg Shale	2/2/2018	3	--	150	750.39	160	740.39	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Clarksburg Shale	2/1/2018	3	--	160	740.39	170	730.39	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Clarksburg Shale (sandstone interbed)	2/1/2018	3	--	175	725.39	185	715.39	10	--	10	30	0.4	0.6	5.7E-02	2.0E-05
												10	60	1.3	1.0	0.1	3.7E-05
		Clarksburg Shale	2/1/2018	3	--	185	715.39	195	705.39	10	--	10	30	1.3	1.7	0.2	6.1E-05
		Morgantown Sandstone	2/1/2018	3	--	247	653.39	257	643.39	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Birmingham Reds	1/31/2018	3	--	265	635.39	275	625.39	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Birmingham Reds	1/31/2018	3	--	280	620.39	290	610.39	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
MW-1802	888.11	Morgantown Sandstone	1/23/2018	3	--	253	635.11	263	625.11	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Birmingham Reds	1/23/2018	3	--	269	619.11	279	609.11	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Birmingham Reds	1/23/2018	3	--	279	609.11	289	599.11	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Birmingham Reds	1/23/2018	3	--	289	599.11	299	589.11	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
MW-1803	904.04	Upper Connellsville Sandstone	1/29/2018	3	--	60	844.04	70	834.04	10	--	10	30	0.2	0.3	2.8E-02	9.8E-06
		Upper Connellsville Sandstone	1/29/2018	3	--	70	834.04	80	824.04	10	--	10	30	2.7	3.7	0.4	1.3E-04
		Clarksburg Shale (sandstone interbed)	1/29/2018	3	--	128	776.04	138	766.04	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Morgantown Sandstone	1/29/2018	3	--	270	634.04	280	624.04	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Birmingham Reds	1/29/2018	3	--	280	624.04	290	614.04	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Birmingham Reds	1/29/2018	3	--	290	614.04	300	604.04	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Birmingham Reds	1/29/2018	3	--	300	604.04	310	594.04	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--

Table 2
Summary of Hydraulic Testing Results
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Test Borehole/Well Identification	Ground Surface Elevation (ft amsl)	Hydrogeologic Unit	Test Date	Boring Diameter (inches)	Casing Diameter (inches)	Top of Interval (ft-bgs)	Top of Interval (ft-amsl)	Bottom of Interval (ft-bgs)	Bottom of Interval (ft-amsl)	Interval Length (ft)	Slot Size (slot)	b (ft)	Test Pressure (psi)	Flow Rate[4] (gpm)	T (ft^2/day)	K (ft/day)	K (cm/sec)
MW-1805	882.32	Clarksburg Shale (sandstone interbed)	2/14/2018	3	--	180	702.32	190	692.32	10	--	--	100	0.0	--	--	--
		Clarksburg Shale (sandstone interbed)	2/14/2018	3	--	190	692.32	200	682.32	10	--	--	100	0.0	--	--	--
		Morgantown Sandstone	2/14/2018	3	--	237	645.32	247	635.32	10	--	--	100	0.0	--	--	--
		Morgantown Sandstone	2/14/2018	3	--	247	635.32	257	625.32	10	--	--	60	0.0	--	--	--
												10	100	0.3	0.1	1.5E-02	5.2E-06
		Birmingham Reds	1/23/2018	3	--	275	607.32	285	597.32	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Birmingham Reds	1/23/2018	3	--	285	597.32	295	587.32	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Graffton Sandstone	1/23/2018	3	--	295	587.32	305	577.32	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Graffton Sandstone	1/23/2018	3	--	305	577.32	315	567.32	10	--	--	60	0.0	--	--	--
												--	90	0.0	--	--	--
MW-1806	888.96	Clarksburg Shale	4/4/2018	3	--	185	703.96	195	693.96	10	--	--	30	0.0	--	--	--
		Clarksburg Shale	4/4/2018	3	--	200	688.96	210	678.96	10	--	10	30	10	19	1.9	6.7E-04
												10	60	14	14	1.4	5.0E-04
		Clarksburg Shale	4/4/2018	3	--	215	673.96	225	663.96	10	--	10	60	11	11	1.1	3.8E-04
												10	100	15	8.8	0.9	3.1E-04
		Morgantown Sandstone	4/4/2018	3	--	225	663.96	235	653.96	10	--	10	60	9.4	9.4	0.9	3.3E-04
												10	100	15	9.1	0.9	3.2E-04
		Morgantown Sandstone	4/3/2018	3	--	265	623.96	275	613.96	10	--	--	30	0.0	--	--	--
												--	100	0.0	--	--	--
MW-1808	857.52	Morgantown Sandstone	4/23/2018	3	--	215	642.52	225	632.52	10	--	10	60	5.6	3.7	0.4	1.3E-04
		Morgantown Sandstone	4/23/2018	3	--	235	622.52	245	612.52	10	--	10	60	9.4	6.0	0.6	2.1E-04
MW-1809	738.09	Clarksburg Shale (sandstone interbed) / SRF	3/2/2018	3	--	90	648.09	100	638.09	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
MW-1810	735.26	SRF	2/28/2018	3	--	70	665.26	80	655.26	10	--	10	30	4.0	6.52	0.7	2.3E-04
		Clarksburg Shale (sandstone interbed)	2/28/2018	3	--	80	655.26	90	645.26	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Clarksburg Shale (sandstone interbed)	2/28/2018	3	--	90	645.26	100	635.26	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Clarksburg Shale (sandstone interbed)	2/28/2018	3	--	98	637.26	108	627.26	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--
		Clarksburg Shale (sandstone interbed)	2/28/2018	3	--	108	627.26	118	617.26	10	--	--	60	0.0	--	--	--
												--	100	0.0	--	--	--

Table 2
Summary of Hydraulic Testing Results
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

ARCADIS Design & Consultancy for natural and built assets

Test Borehole/Well Identification	Ground Surface Elevation (ft amsl)	Hydrogeologic Unit	Test Date	Boring Diameter (inches)	Casing Diameter (inches)	Top of Interval (ft-bgs)	Top of Interval (ft-amsl)	Bottom of Interval (ft-bgs)	Bottom of Interval (ft-amsl)	Interval Length (ft)	Slot Size (slot)	b (ft)	Test Pressure (psi)	Flow Rate[4] (gpm)	T (ft^2/day)	K (ft/day)	K (cm/sec)
Yield Testing Recovery[2]																	
MW-1	647.57	SRF	4/5/2018	6	2	41.10	606.47	50.00	597.57	9	10	8.9	--	0.8	2.8	0.3	1.1E-04
MW-5	648.03	SRF	3/26/2018	6	2	101.60	546.43	111.00	537.03	9	10	Insufficient Yield					
MW-6	647.50	SRF	4/6/2018	6	2	28.50	619.00	33.50	614.00	5	10	5.0	--	3.8	183	37	1.3E-02
MW-1801A	901.12	Upper Connellsville Sandstone	7/4/2018	6	2	55.00	846.12	75.00	826.12	20	20	20	--	0.4	1.7	0.1	3.0E-05
MW-1806A	889.63	Upper Connellsville Sandstone	7/19/2018	6	2	60.40	829.23	80.40	809.23	20	20	20.00	--	0.1	0.3	0.02	5.3E-06
MW-1810A	735.26	SRF	6/18/2018	6	2	60.00	675.26	80.00	655.26	20	20	15.22	--	0.3	1.5	0.10	3.5E-05
Yield Testing Drawdown[3]																	
MW-2	645.20	SRF	3/23/2018	6	2	96.10	549.10	105.00	540.20	9	10	8.9	--	0.8	52	5.8	2.1E-03
MW-6	647.50	SRF	4/6/2018	6	2	28.50	619.00	33.50	614.00	5	10	5.0	--	3.8	181	36	1.3E-02
MW-8	963.01	Upper Connellsville Sandstone	4/10/2018	6	2	144.00	819.01	163.00	800.01	19	--	Insufficient Yield					
MW-1801A	901.12	Upper Connellsville Sandstone	7/4/2018	6	2	55.00	846.12	75.00	826.12	20	20	20	--	0.4	2.2	0.1	3.9E-05
MW-1801B	901.06	Clarksburg Shale (sandstone interbed)	7/18/2018	6	2	198.40	702.66	223.00	678.06	25	20	Insufficient Yield					
MW-1801C	900.39	Morgantown Sandstone	7/18/2018	6	2	237.00	663.39	262.00	638.39	25	20	Insufficient Yield					
MW-1806A	889.63	Upper Connellsville Sandstone	7/19/2018	6	2	60.40	829.23	80.40	809.23	20	20	20.00	--	0.1	0.5	2.3E-02	8.1E-06
MW-1808A	857.55	SRF	7/20/2018	6	2	84.20	773.35	109.20	748.35	25	20	25.00	--	0.5	42	1.7	5.9E-04
MW-1809A	738.09	SRF	6/28/2018	6	2	57.00	681.09	72.00	666.09	15	20	15.00	--	1.1	28	1.9	6.6E-04
MW-1810A	735.26	SRF	6/18/2018	6	2	60.00	675.26	80.00	655.26	20	20	15.22	--	0.3	1.7	0.1	3.9E-05

Table 2
Summary of Hydraulic Testing Results
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Test Borehole/Well Identification	Ground Surface Elevation (ft amsl)	Hydrogeologic Unit	Test Date	Boring Diameter (inches)	Casing Diameter (inches)	Top of Interval (ft-bgs)	Top of Interval (ft-amsl)	Bottom of Interval (ft-bgs)	Bottom of Interval (ft-amsl)	Interval Length (ft)	Slot Size (slot)	b (ft)	Test Pressure (psi)	Flow Rate[4] (gpm)	T (ft^2/day)	K (ft/day)	K (cm/sec)
Results Summary																	
	Unit	**Hydrogeologic Unit**	**Minimum K (ft/day)**	**Maximum K (ft/day)**	**Geomean K (ft/day)**	**Minimum K (cm/sec)**	**Maximum K (cm/sec)**	**Geomean K (cm/sec)**									
	A	SRF	0.1	37	2	3.5E-05	1.3E-02	5.5E-04									
	A	Upper Connellsville Sandstone	1.5E-02	0.4	0.1	5.3E-06	1.3E-04	2.0E-05									
	B	Clarksburg Shale	0.2	2	0.8	6.1E-05	6.7E-04	3.0E-04									
	B	Clarksburg Shale (sandstone interbed)	5.7E-02	0.1	7.7E-02	2.0E-05	3.7E-05	2.7E-05									
	C	Morgantown Sandstone	1.5E-02	0.9	0.3	5.2E-06	3.3E-04	1.1E-04									

NOTES:

[1] Packer testing analysis analyzed using U.S. Department of the Interior, Bureau of Reclamation, 1977. Ground Water Manual, A Water Resources Technical Publication, pp. 258-264

[2] Recovery results analyzed by the Theis solution; correction of drawdown data applied for unconfined conditions ($s'=s-s^2/2b$; where s is drawdown and b is aquifer thickness)

Kruseman, G.P. and Ridder, N.A., 1990. Analysis and evaluation of pumping test data. Analysis and evaluation of pumping test data., (47)

Theis, C.V., 1935. The relation between the lowering of the piezometric surface and the rate and duration of discharge of a well using groundwater storage, Am. Geophys. Union Trans., vol. 16, pp. 519-524

Birsoy, Y.K. and W.K. Summers, 1980. Determination of aquifer parameters from step tests and intermittent pumping, Ground Water, vol. 18, no. 2, pp. 137-146.

[3] Drawdown results analyzed by the Cooper-Jacob solution; storage result not reliable due to test duration

Cooper, H.H. and C.E. Jacob, 1946. A generalized graphical method for evaluating formation constants and summarizing well field history, Am. Geophys. Union Trans., vol. 27, pp. 526-534

[4] Flow rate is average flow rate for borehole packer tests and maximum sustain flow rate (yield) for yield tests

amsl = above mean sea level (NAVD88)
b = thickness of packed interval or thickness of tested zone
SS = sandstone
SRF = stress relief fracture system
N/A = not available
-- = not applicable
T = transmissivity
K = hydraulic conductivity
ft = feet
gpm - gallons per minute
psi = pounds per square inch
cm/sec = centimeters per second
bgs = below ground surface

Table 3
Summary of Rock Core Permeability Testing Results
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Sample ID	Sample Depth (ft)	Unit	Average Effective Permeability to Water (millidarcy)	Average Hydraulic Conductivity (ft/day)	Average Hydraulic Conductivity (cm/s)
Horizontal					
MW-1802 (68.0-69.9)	68.30 - 68.45	Shale below Upper Connellsville	0.0473	1.36E-04	4.80E-08
MW-1802 (218.5-220.5)	219.18 - 219.30	Shale Aquitard below Clarskburg Disconformity	0.0246	6.97E-05	2.46E-08
MW-1802 (262.0-264.5)	263.90 - 264.05	Morgantown Sandstone	0.0144	4.08E-05	1.44E-08
Vertical					
MW-1802 (68.0-69.9)	68.70 - 68.81	Shale below Upper Connellsville	0.1127	3.23E-04	1.14E-07
MW-1802 (218.5-220.5)	218.8 - 218.95	Shale Aquitard below Clarskburg Disconformity	0.3070	9.07E-04	3.20E-07
MW-1802 (262.0-264.5)	264.1 - 264.3	Morgantown Sandstone	0.1990	5.84E-04	2.06E-07

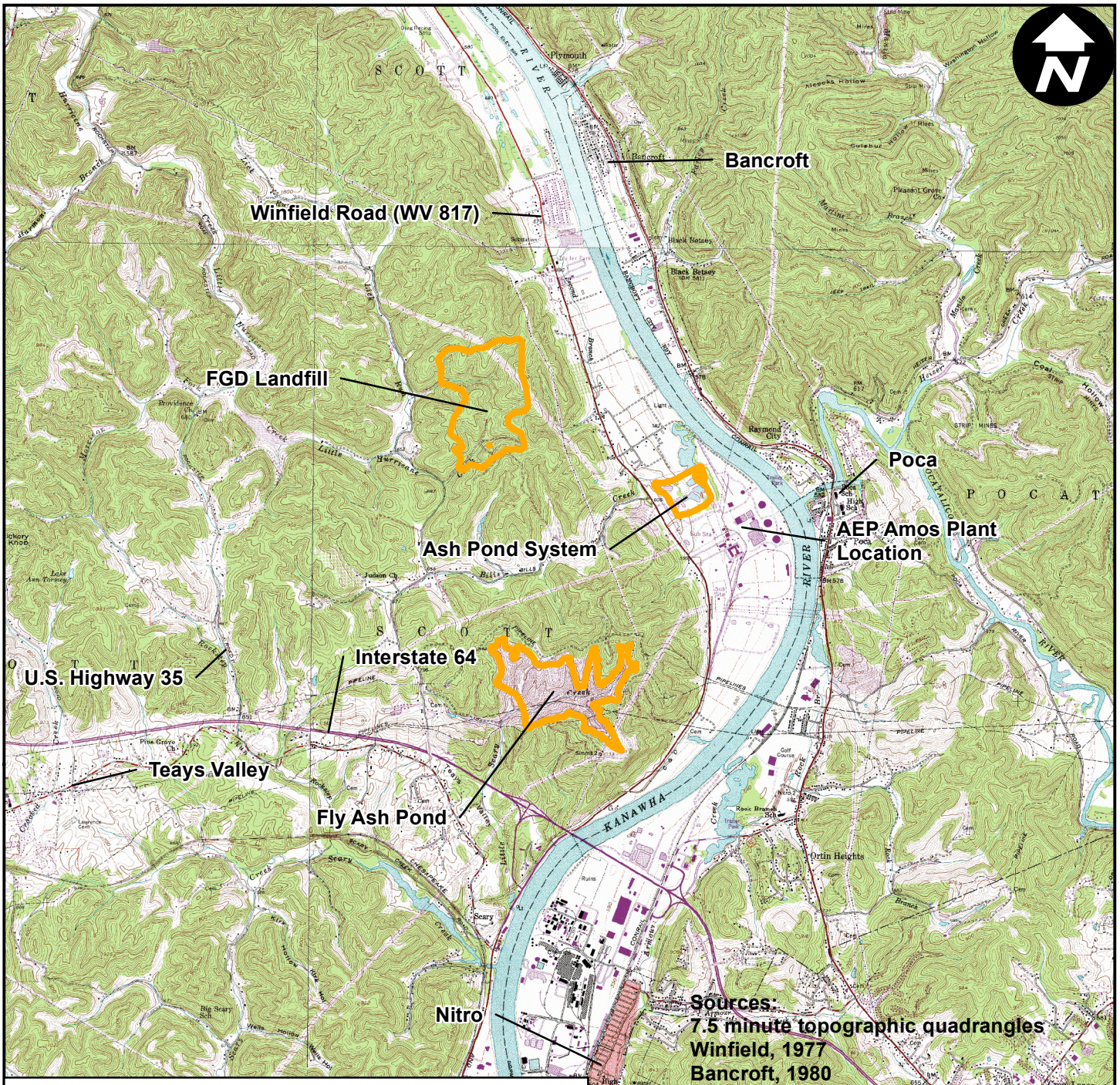
NOTES:
Horizontal and vertical permeability and hydraulic conductivity measured following ASTM D5084
Confining pressure during all tests was 25 pounds per square inch (psi)
Effective is with as-received pore fluids in place
Permeability to water and hydraulic conductivity measured ast saturated conditions
ft = feet
cm = centimeter
s = second

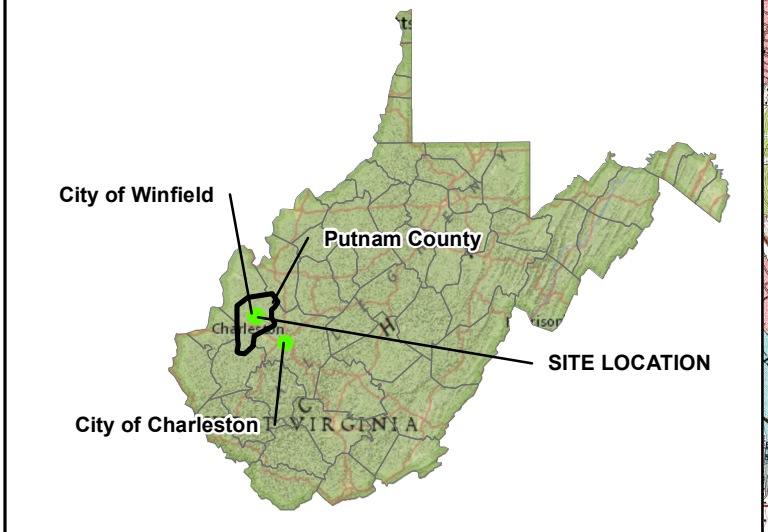
Table 4
Well Construction Details
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Monitoring Well ID	Hydraulic Monitoring Only	Location Description to CCR Unit	Hydro-stratigraphic Unit Target	Northing [a]	Easting [a]	Ground Surface Elevation [a] (ft amsl)	Top of Casing Elevation [a] (ft amsl)	Total Borehole Depth (ft bgs)	Date Installed	Screen Material	Well Diameter (inches)	Top of Bentonite Seal		Bottom of Bentonite Seal		Top of Secondary Sand Pack		Bottom of Secondary Sand Pack		Top of Primary Sand Pack		Bottom of Primary Sand Pack		Top of Screen		Bottom of screen		Screen Length (ft)
												Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	Depth (ft bgs)	Elevation (ft amsl)	
Downgradient																												
MW-1801A		South	U/SRF	531398.627	1726314.531	901.12	904.17	77.00	3/14/2018	Slotted PVC (20-slot)	2.00	45.00	856.12	50.90	850.22	50.90	850.22	52.00	849.12	52.00	849.12	77.00	824.12	55.00	846.12	75.00	826.12	20.00
MW-1801B	X	South	C	531401.126	1726316.987	901.06	903.86	225.00	3/20/2018	Slotted PVC (20-slot)	2.00	43.00	858.06	192.80	708.26	192.80	708.26	194.00	707.06	194.00	707.06	225.00	676.06	198.40	702.66	223.00	678.06	24.60
MW-1801C	X	South	M	531413.037	1726329.094	900.39	903.19	305.80	4/13/2018	Slotted PVC (20-slot)	2.00	194.00	706.39	233.00	667.39	233.00	667.39	234.00	666.39	234.00	666.39	264.00	636.39	237.00	663.39	262.00	638.39	25.00
MW-1802A	X	West	U/SRF	533246.455	1724119.981	887.75	890.87	67.00	5/1/2018	Slotted PVC (20-slot)	2.00	30.00	857.75	41.00	846.75	41.00	846.75	42.00	845.75	42.00	845.75	67.00	820.75	46.60	841.15	66.60	821.15	20.00
MW-1802B	X	West	C	533242.023	1724120.003	887.87	890.76	198.00	5/1/2018	Slotted PVC (20-slot)	2.00	159.20	728.67	170.90	716.97	170.90	716.97	172.10	715.77	172.10	715.77	198.00	689.87	176.00	711.87	196.00	691.87	20.00
MW-1803B	X	Northwest	C	534006.697	1723941.610	904.25	907.06	197.00	5/9/2018	Slotted PVC (20-slot)	2.00	164.00	740.25	167.00	737.25	167.00	737.25	168.00	736.25	168.00	736.25	198.00	706.25	171.00	733.25	196.00	708.25	25.00
MW-1804A		North	U/SRF	533349.763	1725662.499	858.53	861.85	49.00	5/31/2018	Slotted PVC (20-slot)	2.00	7.00	851.53	18.90	839.63	18.90	839.63	19.90	838.63	19.90	838.63	49.00	809.53	27.50	831.03	47.50	811.03	20.00
MW-1804B	X	North	C	533352.364	1725659.003	859.17	860.89	184.30	5/24/2018	Slotted PVC (20-slot)	2.00	134.00	725.17	147.50	711.67	147.50	711.67	148.70	710.47	148.70	710.47	180.40	678.77	152.00	707.17	177.00	682.17	25.00
MW-1805B	X	Northeast	C	533272.299	1727730.142	883.25	885.59	214.00	5/18/2018	Slotted PVC (20-slot)	2.00	174.00	709.25	188.00	695.25	188.00	695.25	189.00	694.25	189.00	694.25	214.00	669.25	192.00	691.25	212.00	671.25	20.00
MW-1805C	X	Northeast	M	533273.891	1727725.724	882.32	885.91	324.30	4/20/2018	Slotted PVC (20-slot)	2.00	225.00	657.32	228.00	654.32	228.00	654.32	229.00	653.32	229.00	653.32	264.00	618.32	232.00	650.32	262.00	620.32	30.00
MW-1806A		East	U/SRF	532750.917	1728577.239	889.63	893.13	81.00	5/16/2018	Slotted PVC (20-slot)	2.00	45.00	844.63	56.00	833.63	56.00	833.63	57.00	832.63	57.00	832.63	81.00	808.63	60.40	829.23	80.40	809.23	20.00
MW-1806B	X	East	C	532748.326	1728573.233	889.48	892.05	211.00	5/15/2018	Slotted PVC (20-slot)	2.00	178.10	711.38	190.60	698.88	190.60	698.88	191.80	697.68	191.80	697.68	211.00	678.48	195.00	694.48	210.00	679.48	15.00
MW-1806C	X	East	M	532745.975	1728569.060	888.96	891.74	290.70	4/12/2018	Slotted PVC (20-slot)	2.00	183.00	705.96	220.00	668.96	220.00	668.96	221.00	667.96	221.00	667.96	255.00	633.96	225.00	663.96	255.00	633.96	30.00
MW-1		Southwest	SRF	531275.00	1724355.00	647.57	649.77	114.80	7/27/1995	Slotted PVC (10-slot)	2.00	33.00	614.57	38.00	609.57	--	--	--	--	38.00	609.57	78.10	569.47	41.10	606.47	50.00	597.57	8.90
MW-2		Southwest	SRF	529941.00	1724235.00	645.20	647.10	129.80	7/27/1995	Slotted PVC (10-slot)	2.00	77.70	567.50	84.70	560.50	--	--	--	--	84.70	560.50	111.00	534.20	96.10	549.10	105.00	540.20	8.90
MW-3	X	Southeast	M	530928.00	1728546.00	952.99	955.29	313.80	8/10/1995	Slotted PVC (10-slot)	2.00	262.70	690.29	267.80	685.19	--	--	--	--	267.80	685.19	312.20	640.79	280.20	672.79	309.10	643.89	28.90
MW-4	X	Southeast	C	530922.00	1728552.00	953.20	955.10	310.50	7/20/1995	Slotted PVC (10-slot)	2.00	191.10	762.10	197.30	755.90	--	--	--	--	197.30	755.90	249.10	704.10	239.10	714.10	248.00	705.20	8.90
MW-5		Southwest	SRF	531282.00	1724360.00	648.03	649.93	114.80	7/26/1995	Slotted PVC (10-slot)	2.00	86.00	562.03	91.00	557.03	--	--	--	--	91.00	557.03	112.10	535.93	101.60	546.43	111.00	537.03	9.40
MW-6		Southwest	SRF	531266.00	1724352.00	647.50	649.45	114.80	8/21/1995	Slotted PVC (10-slot)	2.00	22.50	625.00	27.20	620.30	--	--	--	--	27.20	620.30	34.20	613.30	28.50	619.00	33.50	614.00	5.00
MW-7		Southeast	U/SRF	530938.00	1788533.00	953.00	955.30	132.50	3/26/1996	Slotted PVC (20-slot)	2.00	102.50	850.50	108.00	845.00	--	--	--	--	108.00	845.00	132.50	820.50	110.00	843.00	130.00	823.00	20.00
MW-8		Northeast	U/SRF	533742.00	1727871.70	963.01	965.43	168.60	1/30/2002	Slotted PVC	2.00	136.10	826.91	141.80	821.21	--	--	--	--	141.80	821.21	166.00	797.01	144.00	819.01	163.00	800.01	19.00
MW-9		North	U/SRF	533589.20	1726988.10	944.66	946.81	144.90	1/16/2002	Slotted PVC	2.00	111.20	833.46	120.10	824.56	--	--	--	--	120.10	824.56	140.10	804.56	120.10	824.56	139.10	805.56	19.00
Upgradient/Background																												
MW-1802C	X	West	M	533237.344	1724120.267	888.11	890.92	315.70	4/27/2018	Slotted PVC (20-slot)	2.00	201.00	687.11	248.00	640.11	248.00	640.11	249.00	639.11	249.00	639.11	274.50	613.61	253.00	635.11	273.00	615.11	20.00
MW-1803C	X	Northwest	M	534010.613	1723944.640	904.04	906.95	338.50	5/7/2018	Slotted PVC (20-slot)	2.00	157.00	747.04	248.90	655.14	248.90	655.14	250.00	654.04	250.00	654.04	275.00	629.04	253.00	651.04	273.40	630.64	20.40
MW-1807A		Southwest	SRF	530862.801	1722479.851	861.99	864.95	116.00	5/29/2018	Slotted PVC (20-slot)	2.00	88.00	773.99	91.00	770.99	91.00	770.99	92.00	769.99	92.00	769.99	116.00	745.99	95.00	766.99	115.00	746.99	20.00
MW-1807B		Southwest	C	530865.269	1722475.145	861.14	865.19	204.00	5/21/2018	Slotted PVC (20-slot)	2.00	126.00	735.14	129.00	732.14	129.00	732.14	130.00	731.14	130.00	731.14	155.00	706.14	133.00	728.14	153.00	708.14	20.00
MW-1808A		Southwest	SRF	530578.048	1723313.873	857.55	860.53	112.00	5/11/2018	Slotted PVC (20-slot)	2.00	70.00	787.55	80.00	777.55	80.00	777.55	81.00	776.55	81.00	776.55	111.00	746.55	84.20	773.35	109.20	748.35	25.00
MW-1808B	X	Southwest	C	530575.968	1723317.305	857.58	860.05	165.00	5/7/2018	Slotted PVC (20-slot)	2.00	131.00	726.58	134.00	723.58	134.00	723.58	135.00	722.58	135.00	722.58	165.00	692.58	138.50	719.08	158.50	699.08	20.00
MW-1808C	X	Southwest	M	530573.810	1723321.874	857.52	860.51	289.00	5/8/2018	Slotted PVC (20-slot)	2.00	208.00	649.52	211.00	646.52	211.00	646.52	212.00	645.52	212.00	645.52	242.00	615.52	215.00	642.52	240.00	617.52	25.00
MW-1809A		Southwest	SRF	530459.418	1722189.267	738.09	741.12	125.80	3/7/2018	Slotted PVC (20-slot)	2.00	48.60	689.49	52.60	685.49	52.60	685.49	54.40	683.69	54.40	683.69	74.00	664.09	57.00	681.09	72.00	666.09	15.00
MW-1810A		Southwest	SRF	530152.248	1723192.379	735.26	738.33	124.00	3/13/2018	Slotted PVC (20-slot)	2.00	50.00	685.26	53.00	682.26	53.00	682.26	54.00	681.26	54.00	681.26	82.00	653.26	60.00	675.26	80.00	655.26	20.00
MW-10	X	Northwest	U/SRF	534085.80	1724114.60	903.68	905.85	165.00	1/22/2002	Slotted PVC	2.00	53.10	850.58	58.60	845.08	--	--	--	--	58.60	845.08	82.60	821.08	60.90	842.78	78.90	824.78	18.00
Piezometers																												
STN-12-4 (Multi-port)	X																											
Port 1	X	Central	Ash	531882.3	1726127.2	861.83	865.39	127.83	3/8/2012	Solinst Multilevel System	0.25	0.33	861.50	16.73	845.10	--	--	--	--	16.73	845.10	22.73	839.10	18.83	843.00	20.83	841.00	2.00
Port 2	X	Central	Ash	531882.3	1726127.2	861.83	865.39	127.83	3/8/2012	Solinst Multilevel System	0.25	22.73	839.10	34.83	827.00	--	--	--	--	34.83	827.00	40.83	821.00	36.83	825.00	38.83	823.00	2.00
Port 3	X	Central	Ash	531882.3	1726127.2	861.83	865.39	127.83	3/8/2012	Solinst Multilevel System	0.25	40.83	821.00	52.73	809.10	--	--	--	--	152.73	709.10	58.83	803.00	54.83	807.00	56.83	805.00	2.00
Port 4	X	Central	Ash	531882.3	1726127.2	861.83	865.39	127.83	3/8/2012	Solinst Multilevel System	0.25	58.83	803.00	70.63	791.20	--	--	--	--	70.63	791.20	76.83	785.00	72.83	789.00	74.83	787.00	2.00
Port 5	X	Central	Ash	531882.3	1726127.2	861.83	865.39	127.83	3/8/2012	Solinst Multilevel System	0.25	76.83	785.00	88.63	773.20	--	--	--	--	88.63	773.20	94.63	767.20	90.83	771.00	92.83	769.00	2.00
Port 6	X	Central	Ash	531882.3	1726127.2	861.83	865.39	127.83	3/8/2012	Solinst Multilevel System	0.25	94.63	767.20	105.33	756.50	--	--	--	--	105.33	756.50	112.83	749.00	108.83	753.00	110.83	751.00	2.00
Port 7	X	Central	Ash	531882.3	1726127.2	861.83	865.39	127.83	3/8/2012	Solinst Multilevel System	0.25	112.43	749.40	124.33	737.50	--	--	--	--	124.33	737.50	127.83	734.00	126.83	735.00	127.33	734.50	0.50
STN-12-8	X	East	SRF	532214.2	1728169.3	872.66	880.49	59.46	2/24/2012	Slotted PVC (8-slot)	2.00	42.66	830.00	44.66	828.00	--	--	--	--	44.66	828.00	42.66	830.00	46.66	826.00	56.66	816.00	10.00
STN-12-9	X	Northeast	SRF	532150.5	1728713.8	875.30	887.08	41.00	2/21/2012	Slotted PVC (8-slot)	2.00	24.00	851.30	27.00	848.30	--	--	--	--	27.00	848.30	41.00	834.30	25.00	850.30	35.00	840.30	10.00
PZ-1701	X	West	Ash	533047.5	1724588.0	833.59	838.58	66.00	3/23/2017	Slotted PVC (8-slot)	2.00	51.00	782.59	53.00	780.59	--	--	--	--	53.00	780.59	66.00	767.59	55.00	778.59	65.00	768.59	10.00
PZ-1702	X	Northwest	Ash	533805.9	1724556.0	843.19	848.12	33.00	3/24/2017	Slotted PVC (8-slot)	2.00	18.00	825.19	20.00	823.19	--	--	--	--	20.00	823.19	33.00	810.19	22.00	821.19	32.00	811.19	10.00

NOTES:
a = 1983 West Virginia State Planar Coordinates NAD83/NAVD88. Surveyed in July 2018.
Piezometers pre-cap surface elevations provided.
ft = feet
bgs = below ground surface
amsl = above mean sea level
-- = not applicable
SRF = Stress Relief Fracture System
U = Upper Connellsville sandstone
C = Clarksburg
M = Morgantown sandstone and adjacent shale

FIGURES





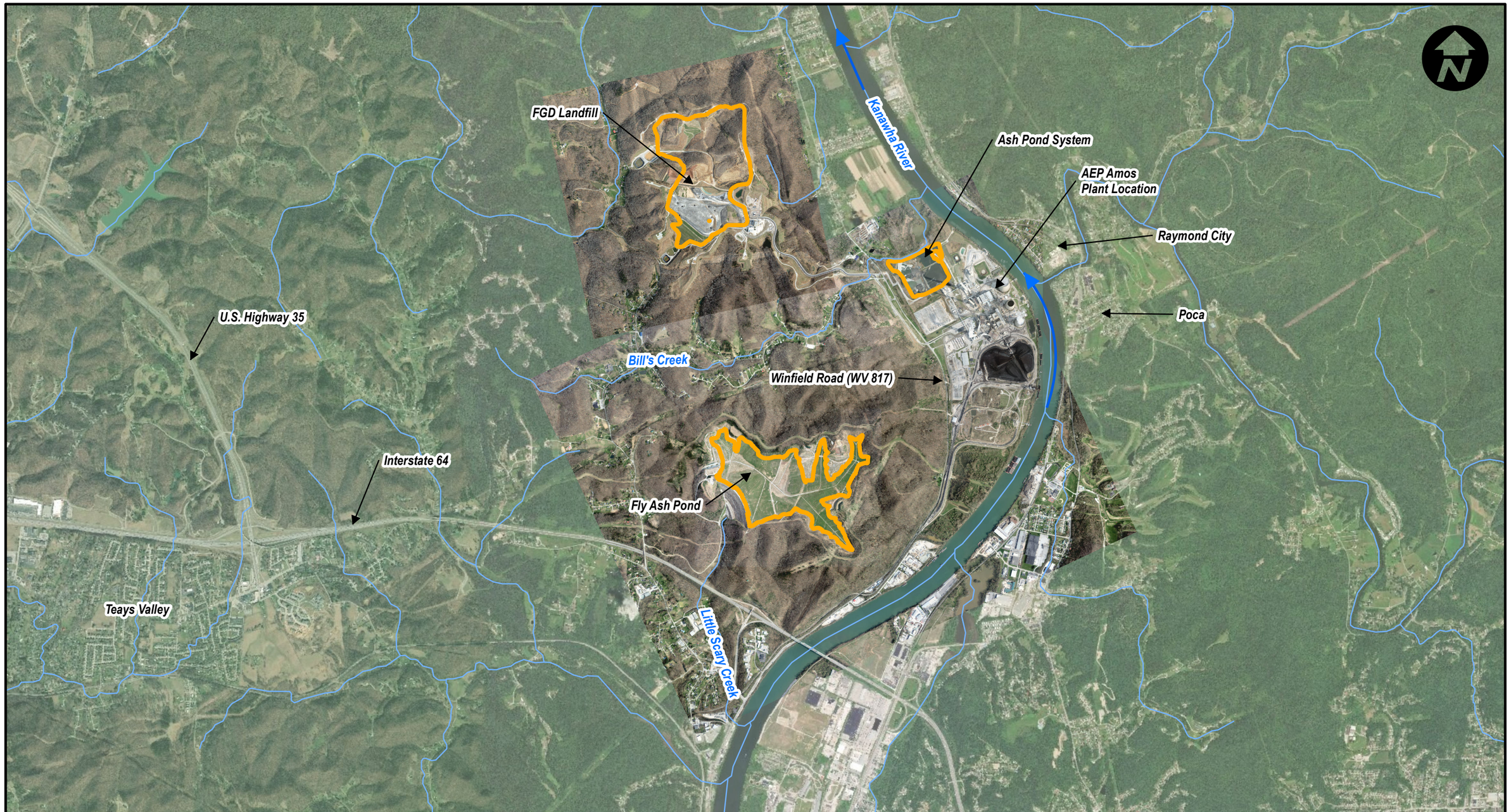
AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

SITE LOCATION MAP

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FIGURE
1

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LEGEND:

- Coal Combustion Residual (CCR) Unit
- Rivers and Streams
- Streamflow Direction

NOTES:
1. 2016 AERIAL IMAGERY OBTAINED FROM ESRI IMAGE SERVICE.
2. 2018 SITE SPECIFIC AERIAL IMAGERY OBTAINED FROM AEP.
3. WEST VIRGINIA 1983 STATE PLANAR COORDINATES

0 3,000 6,000 Feet
GRAPHIC SCALE

AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

PLANT AND CCR UNIT LOCATION MAP

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FIGURE 2

City: CITRIX Div/Group: IM/DV Created By: K.Ives Last Saved By: webb
OH015976.0009.00001 (Mountaineer Ash Pond)
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Well Identifiers
A – uppermost aquifer (Upper Connellsville sandstone/stress relief fracture system)
B – intermediate secondary groundwater-bearing zone (Clarksburg disconformity and fissile shale)
C – deep secondary groundwater-bearing zone (Morgantown sandstone – upper and basal disconformity contacts)

LEGEND:

- CCR Unit Boundary
- 2014 Soil and Rock Boring Location
- Oil & Gas Well
- 2008 Soil Boring and/or Rock Core
- Dewatering Well Converted to Piezometer
- Dewatering Well - Abandoned
- Downgradient Monitoring Well
- Upgradient or Background Monitoring Well
- 2012 Direct Push Boring with Cone Penetration Test (SCPTU)
- 2012 Direct Push Boring
- Piezometer
- 2012 Direct Push Soil Boring with Undisturbed (Shelby) Tube Samples and/or Standard Penetration Tests
- 2012 Direct Push Soil Boring with Undisturbed (Shelby) Tube Samples and/or Standard Penetration Tests and Piezometer
- 2012 Soil Boring with Standard Penetration Tests and Rock Core
- Rivers and Streams
- Stream Flow Direction
- Access Road

NOTES:
1. 2018 aerial imagery obtained from AEP.
2. FAP monitor well, STN boring, B-1401, and B-1402 coordinate source: AEP Drawing No. 13-30702-1
3. FAP piezometer and 2008 soil boring coordinate source: AEP-provided boring logs
4. Oil and gas well coordinate source: WVDEP Oil and Gas Well Database
5. West Virginia 1983 State Planar Coordinates

0 600 1,200 Feet
GRAPHIC SCALE

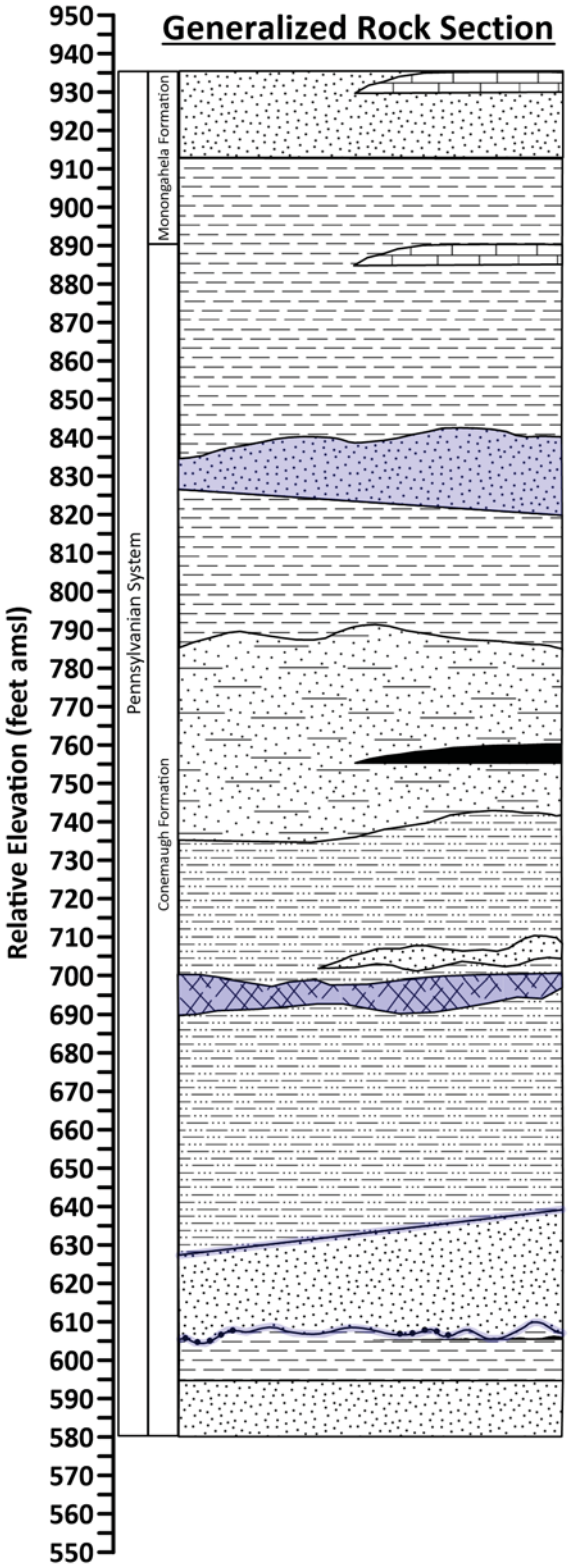
AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

FLY ASH POND LAYOUT AND WELL LOCATIONS MAP

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FIGURE 3

City: Div/Group: Created By: Last Saved By: acarlone
Project (Project #)
Z:\GIS\Projects_ENV\AEP\Amos\mxd\Impoundment\Report\F3_Layout_WellLocations_v4.mxd 4/11/2019 10:36:50 AM



Footnotes:

1- Discontinuous - only present at boring MW-3
2- Discontinuous - only present at borings MW-3 and 2008-26
3- Discontinous - interbeds of sandstone
4- Discontinuous - only present at boring B-0608
5- Generally present at borings MW-1801, MW-1802, MW-1803, and MW-1805
6- Discontinuous and thin - present at MW-1802, MW-1803, MW-1805

Blue highlighted areas designate groundwater-bearing fracture zones

References:

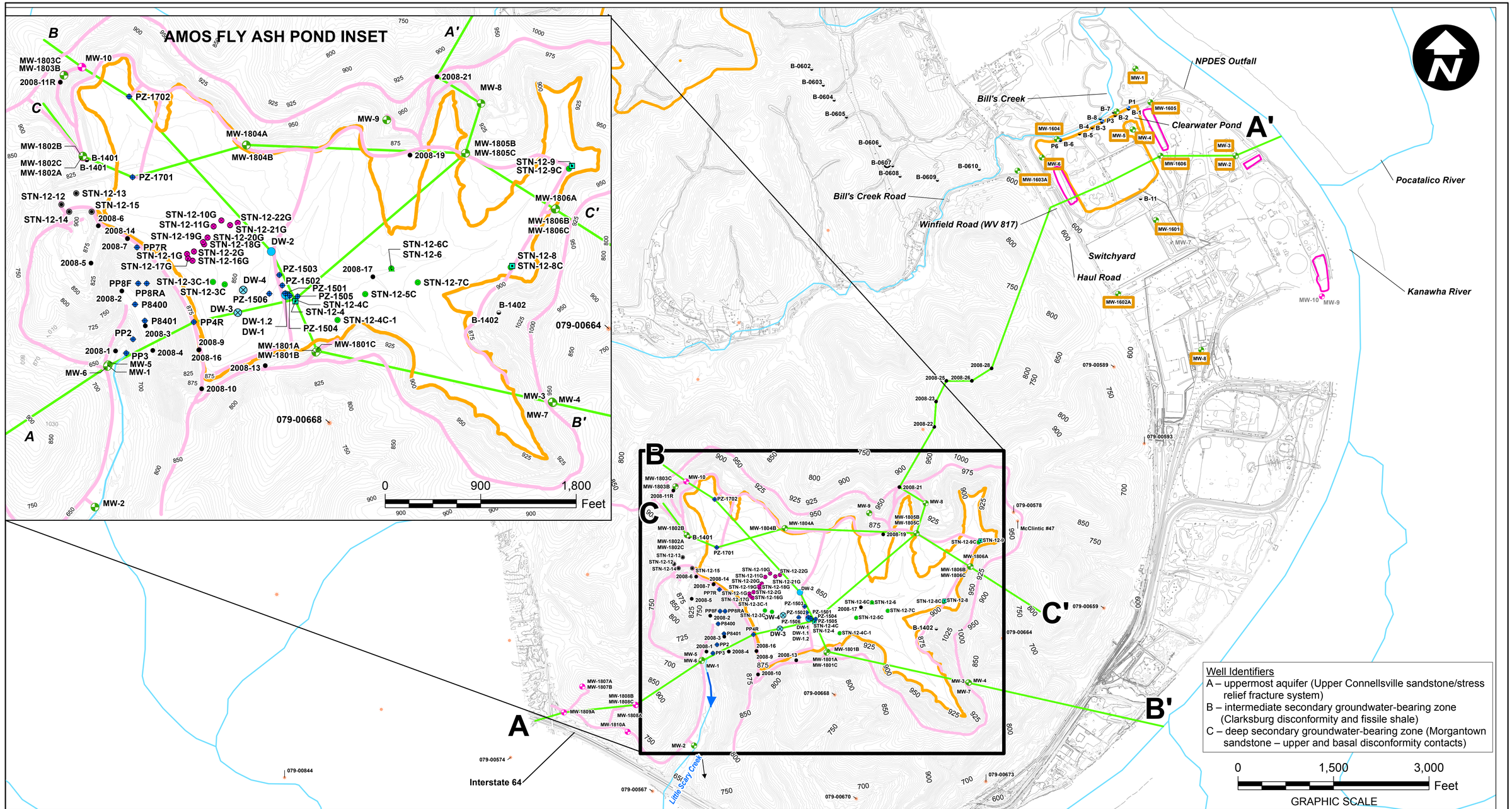
- Site stratigraphic and geophysics from current data collection and historical reports.
- Cross, A.T and M.P. Shemel. 1956. *Geology and Economic Resources of the Ohio River Valley in West Virginia, Part I Geology.* West Virginia Geological Survey Volume XXII.
- Latimer, W.J., et al. 1911. *Jackson, Mason and Putnam Counties, Volume 1, County Reports and Maps.* Wheeling News Litho. Company.
- Orsborn, N.P. 2008. *Deposition and Structural Features of the Basal Morgantown Sandstone of the Casselman Formation (Pennsylvanian) of the Greater Pittsburgh Region.* MS Thesis.
- Reger, D.B., et al. 1918. *Barbour and Upshur Counties and Western Portion of Randolph, Volume 1, County Reports and Maps.* Wheeling News Litho. Company.

AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

GENERALIZED STRATIGRAPHIC COLUMN

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FIGURE 4



Well Identifiers
A – uppermost aquifer (Upper Connellsville sandstone/stress relief fracture system)
B – intermediate secondary groundwater-bearing zone (Clarksburg disconformity and fissile shale)
C – deep secondary groundwater-bearing zone (Morgantown sandstone – upper and basal disconformity contacts)

LEGEND:

- CCR Unit Boundary
- Stormwater Pond
- 2014 Soil and Rock Boring Location
- Oil & Gas Well
- 2008 Soil Boring and/or Rock Core
- Dewatering Well Converted to Piezometer
- Dewatering Well - Abandoned
- Downgradient Monitoring Well
- Upgradient or Background Monitoring Well
- Monitoring wells for the Ash Pond CCR Unit
- 2012 Direct Push Boring with Cone Penetration Test (SCPTU)
- 2012 Direct Push Boring
- Piezometer
- 2012 Direct Push Soil Boring with Undisturbed (Shelby) Tube Samples and/or Standard Penetration Tests
- 2012 Direct Push Soil Boring with Undisturbed (Shelby) Tube Samples and/or Standard Penetration Tests and Piezometer
- 2012 Soil Boring with Standard Penetration Tests and Rock Core
- Rivers and Streams
- Stream Flow Direction
- Access Road
- Cross Section Location

NOTES:
1. Topography from AEP dwg no. 13-30705-0 and 3dAMtopo_FAP11_aerial05.dgn. Contour Interval: 10 feet (2 feet within CCR unit boundary)
2. FAP monitor well, STN boring, B-1401, and B-1402 coordinate source: AEP Drawing No. 13-30702-1
3. FAP piezometer and 2008 soil boring coordinate source: AEP-provided boring logs
4. Oil and gas well coordinate source: WVDEP Oil and Gas Well Database
5. Amos Generating Plant monitor well, piezometer, and soil boring coordinate source: June 2016 AEP survey and EPRI, April 1999, Groundwater Quality at the John E. Amos Power Plant, Putnam County, West Virginia
6. West Virginia 1983 State Planar Coordinates
7. CSM = Conceptual Site Model

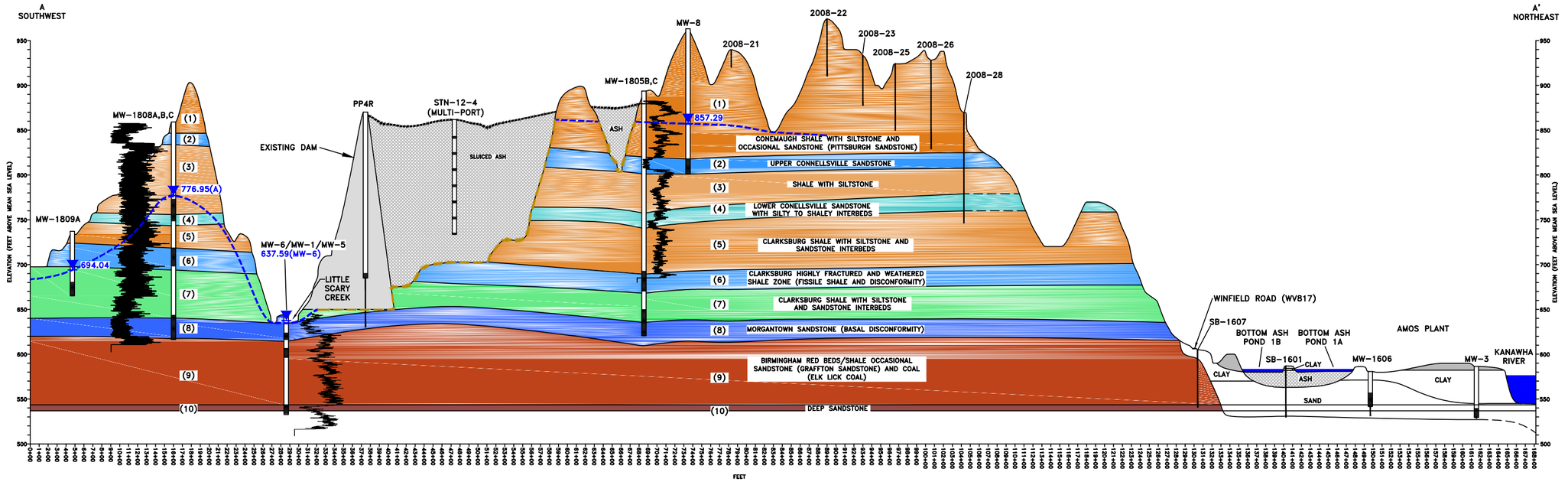
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WINFIELD ROAD
WINFIELD, WEST VIRGINIA

CROSS SECTION LOCATION MAP

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FIGURE 5

City: Div/Group: Created By: Last Saved By: akens
Project (Project #)
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MW-9 — WELL OR BORING IDENTIFICATION
WELL
WELL SCREEN
BORING

CAP CONSTRUCTION (BOTTOM TO TOP):
- SUBGRADE PREPARATION (IN-PLACE FLY ASH AND ONSITE BORROW MATERIAL DEWATERING, EXCAVATING, GRADING)
- 40-MIL LINEAR LOW-DENSITY POLYETHYLENE (LLDPE) FLEXIBLE MEMBRANE LINER
- 8oz. GEOTEXTILE CUSHION LAYER
- 18 INCHES OF PROTECTIVE SOIL COVER LAYER
- 6 INCHES OF VEGETATIVE COVER LAYER
- DRAINAGE STRUCTURES
- SEEDING AND MULCHING

LEGEND

UPPERMOST AQUIFER (UPPER CONNELLSVILLE SANDSTONE AND SRF) MONITORING WELL WATER LEVEL OCTOBER 22, 2018

UPPERMOST AQUIFER (UPPER CONNELLSVILLE SANDSTONE AND SRF) POTENTIOMETRIC SURFACE

UPPERMOST AQUIFER (UPPER CONNELLSVILLE SANDSTONE AND SRF) TOP BELOW SATURATED ASH

NATURAL GAMMA LOG

0 100 200 300 COUNTS PER SECOND

(1) CONEMAUGH SHALE WITH SILTSTONE AND OCCASIONAL SANDSTONE (PITTSBURGH SANDSTONE)
(2) UPPER CONNELLSVILLE SANDSTONE
(3) SHALE WITH SILTSTONE
(4) LOWER CONNELLSVILLE SANDSTONE WITH SILTY TO SHALEY INTERBEDS
(5) CLARKSBURG SHALE WITH SILTSTONE AND SANDSTONE INTERBEDS
(6) CLARKSBURG HIGHLY FRACTURED AND WEATHERED SHALE ZONE (FISSILE SHALE AND DISCONFORMITY)
(7) CLARKSBURG SHALE WITH SILTSTONE AND SANDSTONE INTERBEDS
(8) MORGANTOWN SANDSTONE (BASAL DISCONFORMITY)
(9) BIRMINGHAM RED BEDS/SHALE OCCASIONAL SANDSTONE (GRAFFTON SANDSTONE) AND COAL (ELK LICK COAL)
(10) DEEP SANDSTONE

VERTICAL SCALE: 1" = 100'
HORIZONTAL SCALE: 1" = 1000'

AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

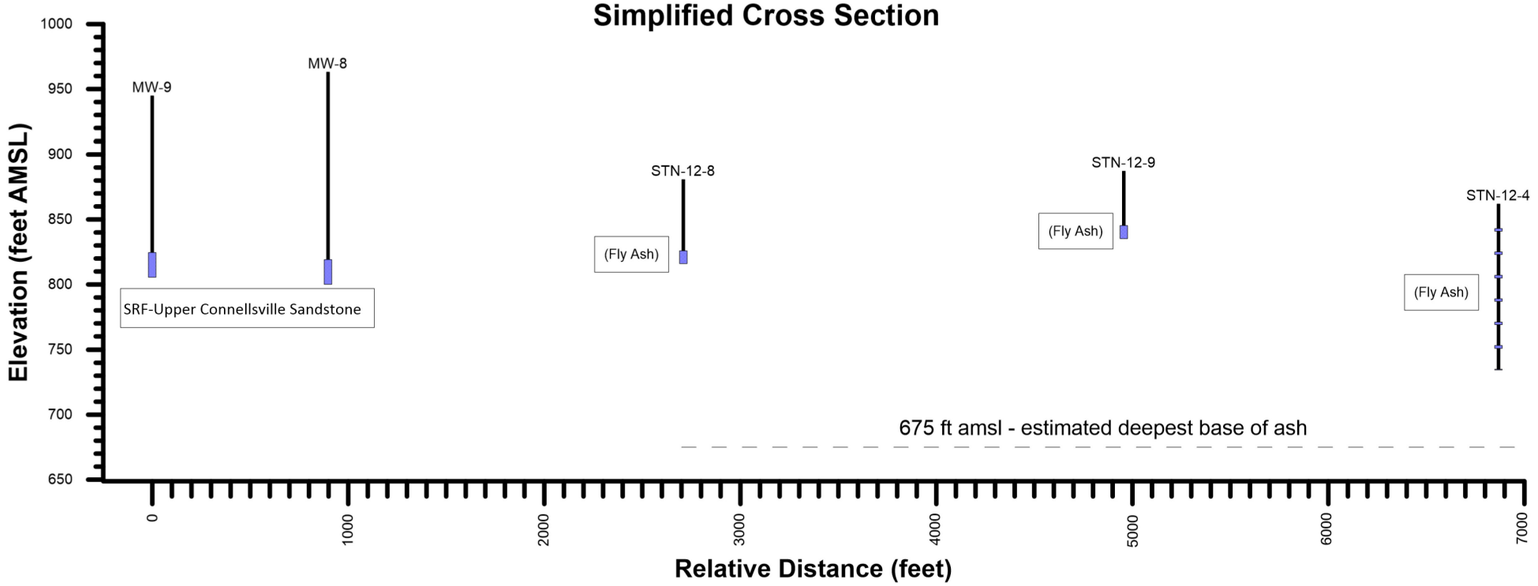
CROSS SECTIONS A-A', B-B' AND C-C'

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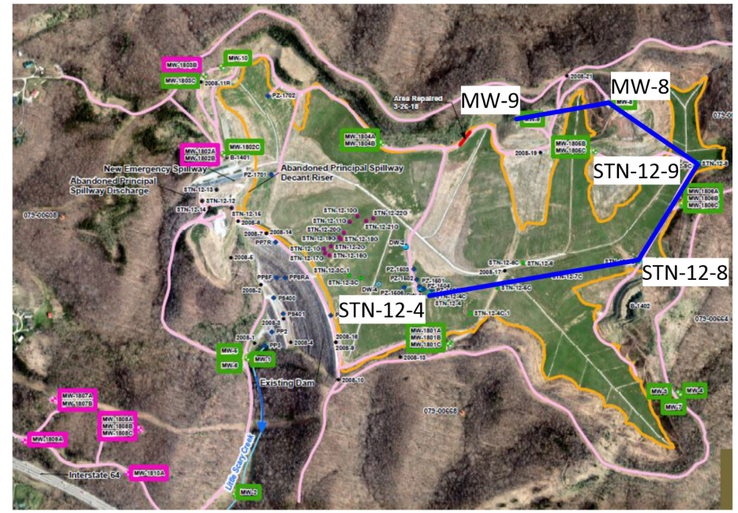
FIGURE
6

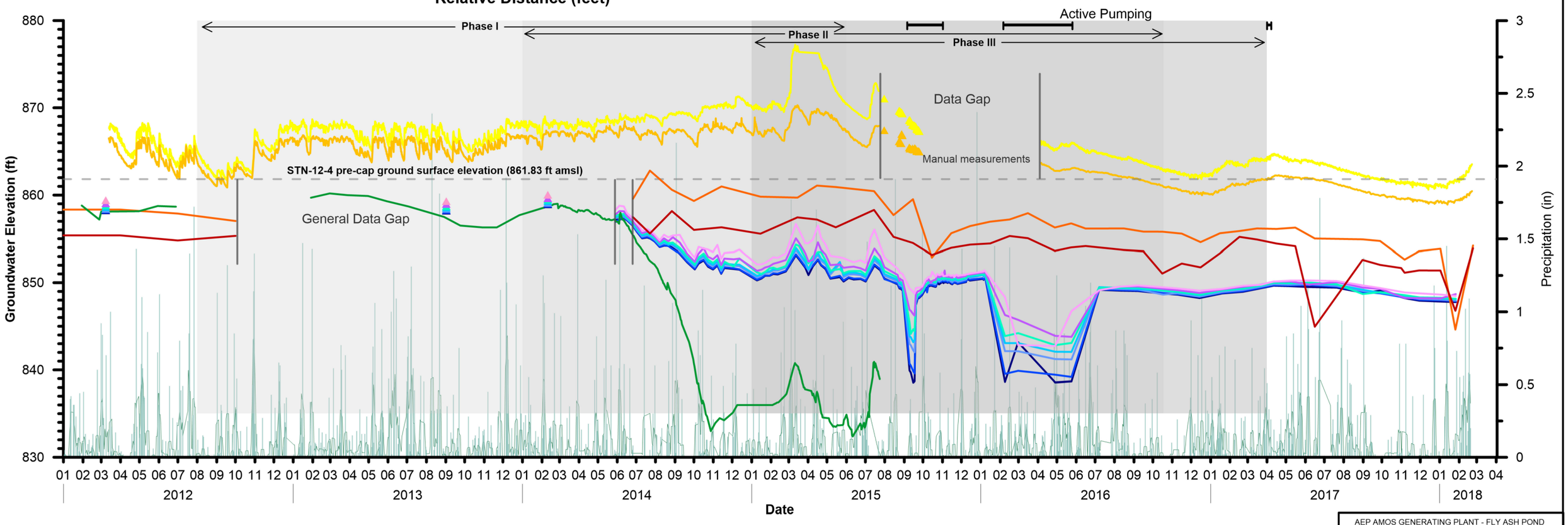
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XREFS:

Simplified Cross Section



Simplified Plan Map





- STN-12-4 Port 1 (18.8-20.8 ft bgs) (843-841 ft amsl)
- STN-12-4 Port 2 (36.8-38.8 ft bgs) (825-823 ft amsl)
- STN-12-4 Port 3 (54.8-56.8 ft bgs) (807-805 ft amsl)
- STN-12-4 Port 4 (72.8-74.8 ft bgs) (789-787 ft amsl)
- STN-12-4 Port 5 (90.8-92.8 ft bgs) (771-769 ft amsl)
- STN-12-4 Port 6 (108.8-110.8 ft bgs) (753-751 ft amsl)
- STN-12-4 Port 7 (126.8-127.3 ft bgs) (735-734.5 ft amsl)
- STN-12-8 Barometric Correction of 0.4
- STN-12-9 Barometric Correction of 0.3
- MW-8 (819.01-800.01 ft amsl)
- MW-9 (824.56-805.56 ft amsl)
- FAP Pool Stage
- Precipitation (in)
- Precipitation running average

Note: 1) Barometric efficiency (BE) applied to STN-12-8 and STN-12-9 after initiation of Phase I capping
2) Precipitation are daily summaries from the Saint Albans, WV NOAA weather station: USC00467852
3) ft = feet (vertical datum is NAVD 88)
4) amsl = above mean sea level

AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

Fly Ash Pond Comprehensive Hydrograph

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FIGURE 7

MW-10 (848.52)
PZ-1702 (839.55)
MW-1802A (835.22)
PZ-1701 (832.36)
MW-1804A (842.51)
MW-9 (856.18)
MW-8 (857.29)
STN-12-9 (867.86)
MW-1806A (867.31)
STN-12-8 (865.23)
STN-12-4 Port 1: (853.59)
MW-1801A (851.67)
MW-7 (855.07)
MW-1 (637.62)
MW-5 (616.88)
MW-6 (637.59)
MW-1807A (757.26)
MW-1808A (776.95)
MW-1809A (694.04)
MW-1810A (670.39)
MW-2 (591.49)
Interstate 64
Little Scary Creek

Well Identifiers
A = Uppermost aquifer (Upper Connellsville sandstone/stress relief fracture system)

LEGEND:

- CCR Unit Boundary
- Downgradient Monitoring Well
- Upgradient or Background Monitoring Well
- Piezometer
- 2012 Direct Push Soil Boring with Undisturbed (Shelby) Tube Samples and/or Standard Penetration Tests and Piezometer
- Rivers and Streams
- Stream Flow Direction
- Access Road
- Potentiometric Surface Contour Lines (ft amsl) 5-ft Interval
- Simulated Potentiometric Surface Contour Lines (ft amsl) 50-ft Interval
- (848.52) Observed Groundwater Elevation* - 10/22/18
- Fly Ash Pond Water Contour Lines (ft amsl) 5-ft Interval
- Groundwater Flow Direction

* Water levels in Upper Connellsville sandstone and SRF monitoring wells are displayed and designated by the A well modifier and previous installed wells (MW-1, 2, 5, 6, 7, 8, 9, 10). Simulated groundwater flow from the calibrated numerical groundwater flow model for the Upper Connellsville sandstone and SRF system for October 2018 steady state conditions was used to guide understanding of and extrapolation of overall conditions based on the complexity and interaction with the water level in the fly ash pond, recharge and utilizing the regional groundwater flow Appalachian SRF conceptual site model (USGS, 1981). The simulated conditions closely match the monitoring well network; however, actual water levels may be slightly displaced relative to the contour interval.

NOTES:
1. Topography from AEP dwg no. 13-30705-0 and 3dAMtopo_FAP11_aerial05.dgn. Contour Interval: 10 feet (2 feet within CCR unit boundary)
2. FAP monitor well coodinate source: AEP Drawing No. 13-30702-1
3. West Virginia 1983 State Planar Coordinates

REFERENCES:
United States Geological Survey (USGS), 1981.
Hydrologic Effects of Stress-Relief Fracturing in an Appalachian Valley. Water-Supply Paper 2177.

0 600 1,200 Feet
GRAPHIC SCALE

AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

POTENTIOMETRIC SURFACE MAP
UPPERMOST AQUIFER
(UPPER CONNELLSVILLE SANDSTONE AND SRF)

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FIGURE 8A

City: Div/Group: Created By: Last Saved By: acarlone
Project (Project #)
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MW-1803B
(714.81)

MW-1802B
(695.46)

MW-1804B
(682.35)

MW-1805B
(676.87)

MW-1806B
(686.03)

MW-1801B
(688.14)

MW-1807B
(741.74)

MW-1808B
(706.89)

MW-4
(707.12)

Interstate 64

Little Scary Creek

Well Identifiers
B – intermediate secondary groundwater-bearing zone
(Clarksburg disconformity and fissile shale)

LEGEND:

- CCR Unit Boundary
- Downgradient Monitoring Well
- Upgradient or Background Monitoring Well
- Rivers and Streams
- Stream Flow Direction
- Access Road
- Simulated Potentiometric Surface Contour Lines (ft amsl)
- (848.52) Observed Groundwater Elevation* - 10/22/18

* Groundwater levels at monitoring wells are still recovering from well installation and development activities and do not reflect equilibrium conditions. The simulated groundwater contours are estimated based on a calibrated transient groundwater flow model (MODFLOW).

NOTES:
1. Topography from AEP dwg no. 13-30705-0 and 3dAMtopo_FAP11_aerial05.dgn. Contour Interval: 10 feet (2 feet within CCR unit boundary)
2. FAP monitor well coodinate source: AEP Drawing No. 13-30702-1
3. West Virginia 1983 State Planar Coordinates

REFERENCES:
United States Geological Survey (USGS), 1981.
Hydrologic Effects of Stress-Relief Fracturing in an Appalachian Valley. Water-Supply Paper 2177.

0 600 1,200 Feet
GRAPHIC SCALE

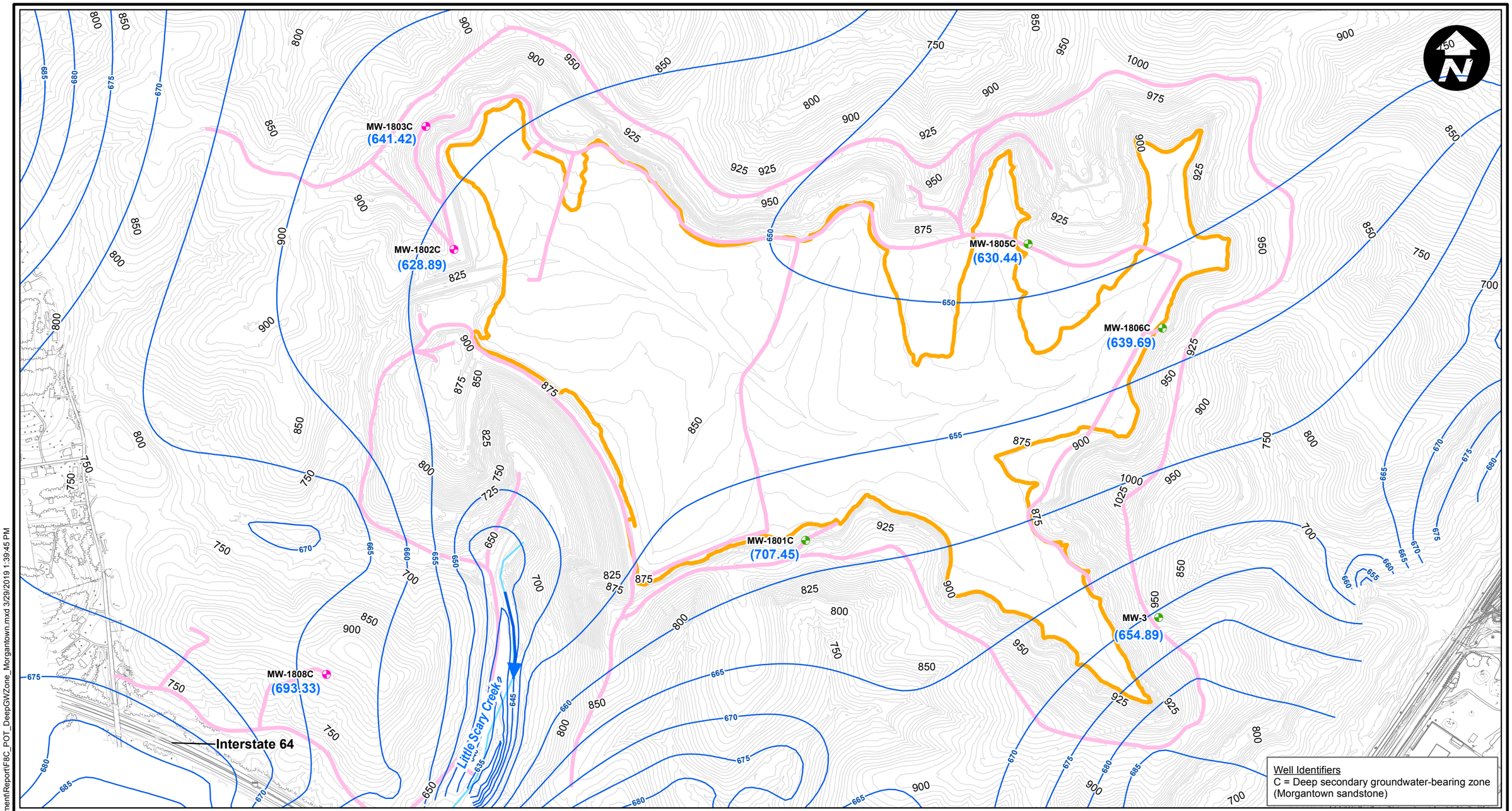
AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

SIMULATED POTENTIOMETRIC SURFACE MAP INTERMEDIATE SECONDARY GROUNDWATER-BEARING ZONE (CLARKSBURG DISCONFORMITY AND FISSILE SHALE)

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FIGURE 8B

City: Dw/Group: Created By: Last Saved By: acarlone
Project (Project #)
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LEGEND:

- CCR Unit Boundary
- Downgradient Monitoring Well
- Upgradient or Background Monitoring Well
- Rivers and Streams
- Stream Flow Direction
- Access Road
- Simulated Potentiometric Surface Contour Lines (ft amsl)
- (848.52) Observed Groundwater Elevation* - 10/22/18

* Groundwater levels at monitoring wells are still recovering from well installation and development activities and do not reflect equilibrium conditions. The simulated groundwater contours are estimated based on a calibrated transient groundwater flow model (MODFLOW)

Well Identifiers
C = Deep secondary groundwater-bearing zone (Morgantown sandstone)

NOTES:
1. Topography from AEP dwg no. 13-30705-0 and 3dAMtopo_FAP11_aerial05.dgn. Contour Interval: 10 feet (2 feet within CCR unit boundary)
2. FAP monitor well coodinate source: AEP Drawing No. 13-30702-1
3. West Virginia 1983 State Planar Coordinates

REFERENCES:
United States Geological Survey (USGS), 1981.
Hydrologic Effects of Stress-Relief Fracturing in an Appalachian Valley. Water-Supply Paper 2177.

0 600 1,200 Feet
GRAPHIC SCALE

AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

SIMULATED POTENTIOMETRIC SURFACE MAP
DEEP SECONDARY GROUNDWATER-BEARING ZONE
(MORGANTOWN SANDSTONE)

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FIGURE 8C

City: Div/Group: Created By: Last Saved By: acarlone
Project (Project #)
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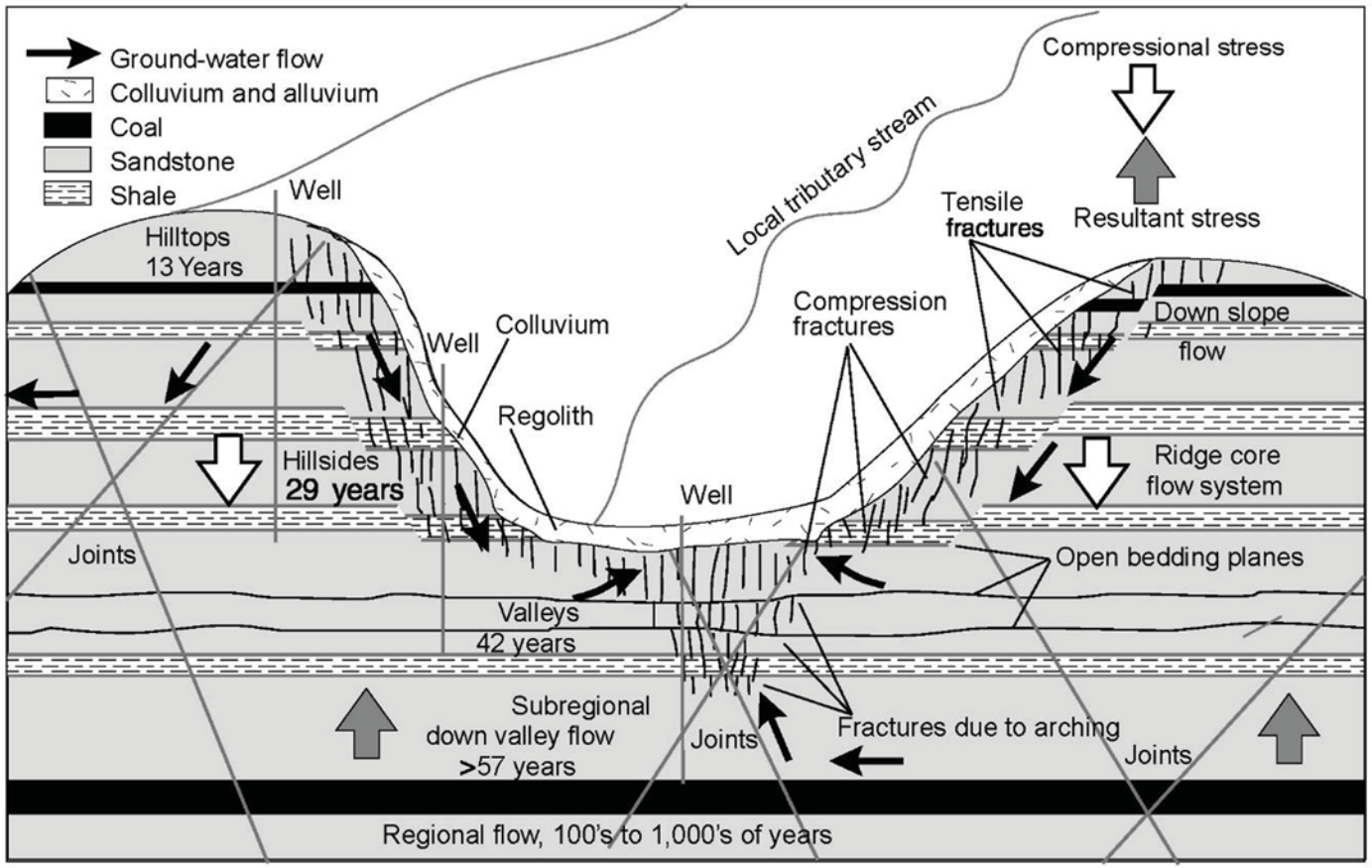


Figure 3. Revised conceptual model of ground-water flow in an Appalachian Plateaus fractured-bedrock aquifer including apparent age of ground water (Modified from Wyrick and Borchers, fig. 3.2-1, 1981 and Kozar, 1998).

References:

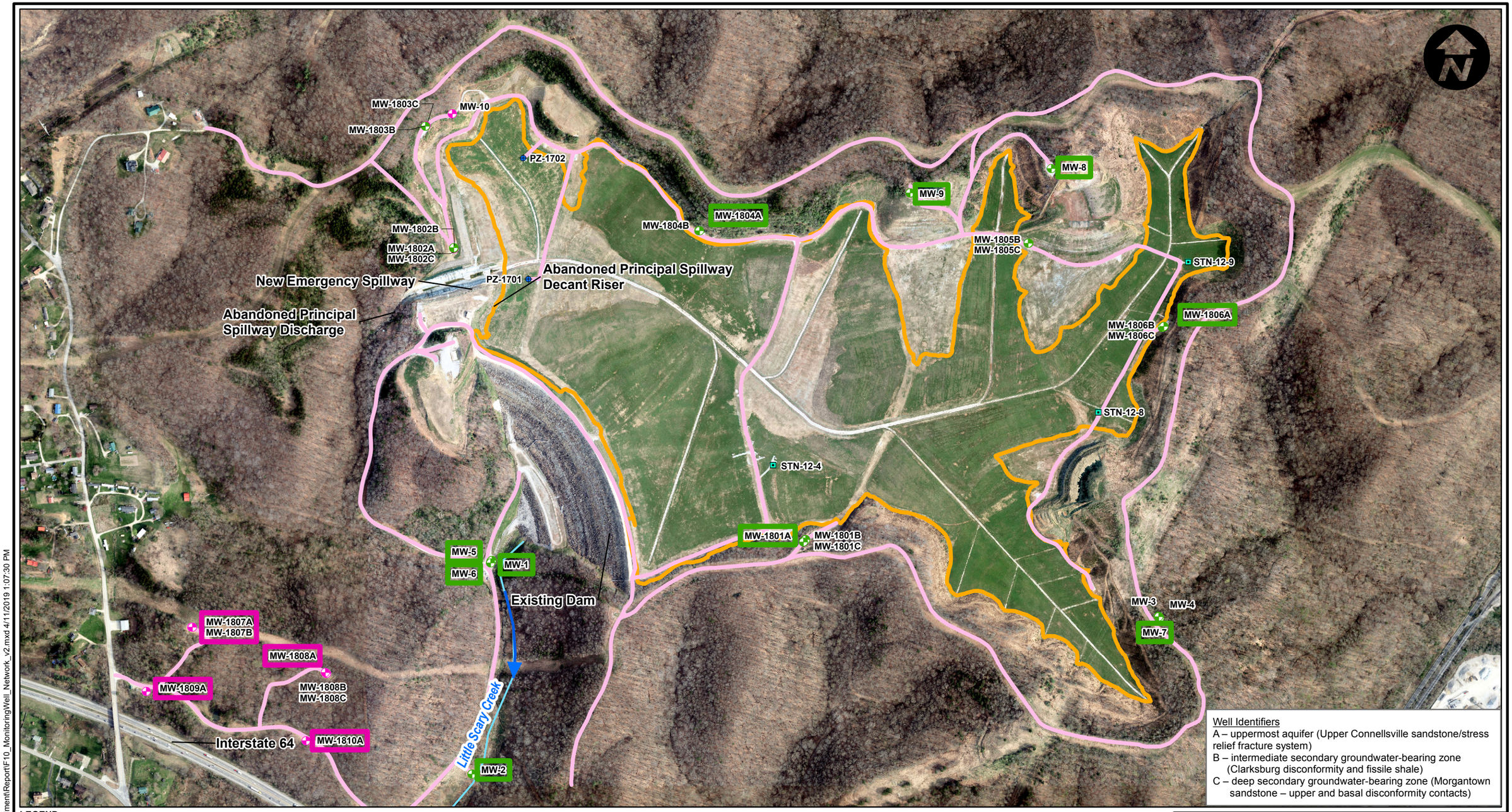
- United States Geological Survey (USGS), Wyrick, G.D. and J.W. Borchers, 1981. Hydrologic Effects of Stress-Relief Fracturing in an Appalachian Valley. Water-Supply Paper 2177.

AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

STRESS RELIEF FRACTURE SYSTEM CONCEPTUAL SITE MODEL

ARCADIS Design & Consultancy for natural and built assets

FIGURE
9



Well Identifiers
A – uppermost aquifer (Upper Connellsville sandstone/stress relief fracture system)
B – intermediate secondary groundwater-bearing zone (Clarksburg disconformity and fissile shale)
C – deep secondary groundwater-bearing zone (Morgantown sandstone – upper and basal disconformity contacts)

LEGEND:

- CCR Unit Boundary
- Downgradient Monitoring Well
- Upgradient or Background Monitoring Well
- Downgradient Monitoring Well - Hydraulic Monitoring Only
- Upgradient or Background Monitoring Well - Hydraulic Monitoring Only
- Piezometer
- 2012 Direct Push Soil Boring with Undisturbed (Shelby) Tube Samples and/or Standard Penetration Tests and Piezometer
- Rivers and Streams
- Stream Flow Direction
- Access Road

NOTES:
1. 2018 aerial imagery obtained from AEP.
2. FAP monitor well and STN boring coordinate source: AEP Drawing No. 13-30702-1
3. FAP piezometer coordinate source: AEP-provided boring logs.
4. West Virginia 1983 State Planar Coordinates

0 600 1,200 Feet
GRAPHIC SCALE

AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

MONITORING WELL NETWORK MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE 10

City: Div/Group: Created By: Last Saved By: acarlone
Project (Project #)
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APPENDIX A

Field Methodology

APPENDIX A

FIELD METHODOLOGY

Based on the recommended well network modifications, the following generalized tasks were completed:

- Installation of 22 bedrock borings
- Installation and development of 22 new monitoring wells
- The redevelopment of 9 existing monitoring wells

Arcadis provided oversight for drilling of 22 bedrock borings that resulted in installation of 22 monitoring wells by an AEP-licensed drilling crew. Implementation of the field activities began with the initial utility clearance activities beginning November 2017. Additional utility location was completed in 2018. Drilling operations began on December 4, 2017 and ended on May 31, 2018. Well development and yield testing began in April 2018 and continued to July 2018.

Staking, Surveying, and Utilities Clearance

AEP oversaw the installation of approximately 20 feet by 20 feet gravel well pads to provide a stable area and working room for the drill rig to drill and install the new monitoring wells. AEP also repaired and added access roads to allow access to each of the new well locations. All proposed new monitoring well locations were staked by an AEP subcontractor, DLZ, prior to utility clearance and commencement of drilling. DLZ surveyed the spatial northing and easting coordinates as well as the ground surface elevation of each staked monitoring well location prior to drilling. The accuracy of elevation measurements was at least to the nearest 0.01 foot. An Arcadis representative contacted 8-1-1 to assess the presence of underground utilities near the new monitoring well and boring locations prior to drilling activities. AEP completed a plant dig permit, which identified private plant utilities near the new monitoring well and borings locations. Arcadis retained the services of a utility locating subcontractor (The Underground Detective) to perform a geophysical survey (e.g. ground penetrating radar, electromagnetic survey, etc.) over an area of 25 feet by 25 to locate utilities at each new monitoring well location. The private utility locator also used an air knife/soil vacuum extraction system to pre-dig the proposed borehole locations to a diameter at least 10 percent larger than the largest diameter tooling to be used during drilling and to a depth of 8 feet below the ground surface (bgs) or to bedrock, whichever was encountered first.

Decontamination

All down-hole tools or equipment were decontaminated in accordance with ASTM D5088 prior to the start of drilling and between each borehole location. At a minimum, the tooling was washed with detergent solution followed by a potable water rinse. The use of a pressure washer was used when possible. Containerization was not required for decontamination water because all work was completed outside of the Fly Ash Pond area and not considered contaminated. Water for decontamination or drilling was potable and obtained from the AEP Amos Plant.

Borehole Advancement and Stratigraphy/Lithology

Bedrock boreholes began by using standard hollow-stem auger methods with a minimum 8.25" inner diameter auger in accordance with ASTM D5784 until the soil-rock interface was encountered. Continuous spit-spoon sampling and standard penetration testing was performed in accordance with ASTM D1586 until bedrock was encountered. A minimum 6-inch diameter PVC surface casing was temporarily set 2 feet into the competent bedrock prior to beginning rock coring. Bentonite chips were placed in the annulus between the borehole and the surface casing to ground surface, serving as a temporary seal around the surface casing during drilling operations. The chips were placed in a controlled manner to prevent contamination of the well. Chips were hydrated periodically during placement. The bentonite annulus seal was allowed to set for approximately 12 hours (overnight) before continuing with rock coring. The 6-inch PVC casing was removed upon installation of the permanent well casing.

Rock core samples were completed with NQ sized wireline system in accordance with ASTM D 2113-93. Upon completion of coring, the bore holes were enlarged to 6" diameter using rotary drilling methods in accordance with ASTM D 5783-95.

Arcadis logged all geologic samples collected during the drilling process for bedrock monitoring wells. Field logging of the soil and rock samples were performed in accordance with ASTM D5434-12. Unconsolidated soils were classified under the Unified Soil Classification System (USCS), while rock core logging was classified in accordance with the *Midwest Geosciences Group; Field Guide for Rock Core Logging and Fracture Analysis*. Boring logs and well construction details for all installations completed during this scope of work are provided in **Appendix B**. No unconsolidated soil samples were collected. Rock coring was completed continuously using a NQ wireline system that retrieved a 2-inch diameter core to the termination depth. The borehole was flushed to remove any remaining drilling debris.

Packer Testing and Downhole Geophysics

To assist in locating the discrete water-bearing units, a combination of packer testing and downhole geophysical surveys was conducted.

Prior to geophysical logging, single-straddle packer tests were conducted on select intervals of the open core holes. Final determination of intervals for packer testing was determined based on review of lithologic boring logs, and consultation between Arcadis and AEP. At a minimum, straddle packer testing was completed at the anticipated depth interval corresponding to monitoring well screen depths. Upper and lower inflatable rubber packers attached to a rigid riser pipe were inserted to the specified test interval. Once at the test interval, the rubber packers were inflated to create a seal. The riser pipe was fitted with a pressure gauge at a known and documented distance above the ground surface, as well as a totalizing flow meter. Water was injected through the riser pipe at a constant pressure, while the Arcadis representative measured and recorded totalizing flow volume and gauge pressure at specified time intervals for a total of up to 30 minutes per each pressure. At the completion of the straddle packer test, water injection ceased and gauge pressure was monitored until it returned to pre-test conditions. Once gauge pressure stabilized, the packers were deflated and either removed from the borehole or to the next specified depth interval to repeat the straddle packer test procedure. Straddle packer test data was analyzed according to the method described in U.S. Department of the Interior, Bureau of Reclamation, 1977. Ground Water Manual, A Water Resources Technical Publication, pp. 258-264. After packer testing, the core hole was reamed to 8-inch

diameter using air rotary drilling methods and water injections to remove cuttings in accordance with ASTM D 5782-95-Use of Direct Air Rotary Drilling for Geoenvironmental Exploration and the Installation of Subsurface Water Quality Monitoring Devices. The bedrock boreholes were flushed of cuttings at the completion of reaming using potable water. The final borehole depth was confirmed via tagline measurement following borehole flushing.

Geophysical logging occurred upon completion of packer testing, after the borehole was reamed to 8" diameter. These activities would typically be completed in the reverse order. However, this sequencing was necessary due to a highly weathered bedrock unit that continuously collapsed at many of the boreholes around a depth of approximately 200' bgs. Geophysical logging was performed by an AEP-selected contractor, Marshall Miller & Associates. Five boreholes were selected to undergo downhole geophysical logging. The purpose was to assist with well design and obtain more detailed information on transmissive groundwater zones of the saturated units (e.g., bedrock type, fractures, permeability and porosity). The locations were selected based on lithology, packer testing results, saturated unit and location. The following suite of instrumentation was included during geophysical logging:

- Acoustical Televiewer
- Natural gamma, density, guard resistivity, caliper
- Natural gamma, temperature, delta temperature, fluid conductivity, 16-64 normal resistivity, lateral resistivity, spontaneous potential, single point resistance.
- Natural gamma, neutron porosity, single point resistance, deviation.

Data from the geophysical testing was analyzed by Marshall Miller and Arcadis and is presented in **Appendix G**.

Monitoring Well Installation and Construction

Monitoring well installation and construction was completed in accordance with the AEP- approved work plan prepared by Arcadis following an initial review of the Site monitoring well network. The work plan was prepared using West Virginia Department of Environmental Protection Title 47 Series 60 Monitoring Well Design Standards dated June 21, 2011 and American Society of Testing Material (ASTM) standards, where referenced, as guidance. Arcadis directed the drilling and installation of the identified up and down gradient monitoring wells. AEP installed the wells with some late support from DLZ who was directly contracted through AEP. Drilling activities began on December 4, 2018. Prior to beginning work, daily health and safety meetings were held each morning, including a thorough discussion of the day's scope of work, identified hazards, hazard mitigation, and completion of the AEP Job Safety Analysis documentation in the presence of AEP staff. Health and safety documentation was retained by both Arcadis and AEP.

Based on the field conditions, Arcadis directed AEP regarding the total drilling and well completion depths, well construction configuration, and well materials to be used. Screened intervals for bedrock monitoring wells targeted the Upper Connellsville sandstone, stress relief fracture system, Clarksburg shale disconformity, and Morgantown sandstone. Final well depths and screened intervals are included in **Table 4**.

All monitoring wells were constructed in general accordance with West Virginia Department of Environmental Protection Title 47 Series 60 Monitoring Well Design Standards dated June 21, 2011.

Bedrock monitoring wells were constructed of 2-inch Schedule 40 PVC risers and screens. The well was double-cased, with a 6-inch PVC surface casing installed into the upper two feet of bedrock. The surface casing was grouted in place using a bentonite grout. Well screens were constructed of 20 slot (0.020 ft screen openings) PVC. A primary filter pack of Global® #5 sand was placed across the screened interval to approximately 2 feet above the screen, followed by approximately 1 foot of secondary (finer gradation) filter pack composed of Global® #6 sand.

Boring logs and well construction diagrams are provided in **Appendix B**. **Table 4** provides a summary of the well construction details of all wells in the current monitoring well network.

Monitoring Well Development

Well development was completed at all newly-installed wells, as well as existing wells to be retained in the monitoring well network. At existing wells, the wells were purged with a bladder pump to remove dislodged material from the well. Well development at new wells was performed a minimum of 48 hours after the completion of well construction. The static water level was measured in the well prior to initiation of development. All wells were developed through a pump and surge method in accordance with West Virginia Department of Environmental Protection Title 47 Series 60 Monitoring Well Design Standards dated June 21, 2011. The well was initially purged with a pump to remove loose material and fines from the well. Due to poor water production and quality in the new wells, all of the wells had to be developed multiple times over multiple days. Wells where visual clarity remained poor during pumping were flushed using potable water in an attempt to remove the sediment in the sand pack and well.

New wells that did achieve good visual clarity (i.e., were clear) from development and flushing underwent a final pumping cycle to meet the following criteria: 1) a minimum of 10 casing volumes were purged from the well, and 2) field water quality parameters including temperature, pH, conductivity, oxidation-reduction potential, and turbidity were stable within applicable criteria (temperature stabilizes within ±0.50C, pH stabilizes within ±0.2 units, conductivity stabilizes within ±3 percent, and turbidity is less than 100 nephelometric turbidity units). Well development data are included as **Appendix D**.

APPENDIX B

Boring/Well Construction Logs

ARCADIS

Electric Power Research Institute, 1999

Boring Logs

MW-1 to MW-10

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 531,275.0 E 1,724,355.0**

GROUND ELEVATION **647.6** SYSTEM **STATE PLANE**

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **D=MW-01** DATE **8/27/07** SHEET **1** OF **5**

BORING START BORING FINISH **7/27/95**

PIEZOMETER TYPE WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.2** DIA **2.0**

DEPTH TO TOP OF WELL SCREEN **41.1** BOTTOM **50.0**

WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**

FIELD PARTY **TJH=REB** RIG **CME-75**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										AUGERED TO 2'		
									GM	**GRAY ROCK FRAGMENTS, GRAVEL, SILT,** DRY, (FILL).		
									ML	**CLAYEY SILT AND GRAVEL**, MODERATE BROWN (5YR 3\4), Moist. AUGERED TO 7.0'		
							5					
									ML	**CLAYEY SILT AND GRAVEL**, MODERATE BROWN (5YR 4\8) LIGHT BROWN (5YR 5\6 AND MODERATE BROWN (5YR 3\4), TRACE FELDSPAR, MOIST. AUGERED TO 12.0'		
							10					
									ML	**SAME AS ABOVE**		
									CL	**SILTY CLAY**, PALE YELLOWISH BROWN (12YR 6\2) AND LIGHT OLIVE GRAY (5YR 5\2), LOW TO MEDIUM PLASTICITY, MOIST. AUGERED TO 17.0'		
							15					
									SC	**CLAYEY-SILTY FINE SAND**, DUSKY YELLOWISH BROWN (10 YR 2\2),MOIST TO WET.		
										AUGERED TO 22.0'		

Continued Next Page

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
X	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **D.BENNETT**

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-01** DATE **8/27/07** SHEET **2** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **7/27/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
									SC	**SAME AS SAMPLE No. 4**		
									SW	**MEDIUM TO COARSE SAND**, LIGHT BLUISH GRAY (5B 7\1), MOIST.		
										AUGERED TO 23.9' - AUGERED THROUGH OBSTRUCTION (ROCK?)		
							25			**MORGANTOWN SANDSTONE?**, GRAY. 24.0 - 25.0' Solid, light gray, (N-7) 25.0 - 26.0' Fractured, brown clay lined fractures, light gray (N-7). 26.0 - 27.0' Minimal fractures 27.0 - 27.7' Fractured, weathered, very fine dark gray (N-3) bedding. 27.7 - 29.8' Light gray (N-7) sandstone		
							30			29.8 - 33.8' Light gray (N-7) sandstone		33.0 Top of bentonite seal
										CLAY SHALE, MEDIUM GRAY (N4) MOIST, VERY SOFT.		
							35			**CLAY SHALE**, GRAYISH BROWN (5YR 3\2), MOIST, VERY SOFT.		
										CLAY SHALE, LIGHT OLIVE GRAY (5Y 5\2) MEDIUM LIGHT GRAY (N6), SOFT, MODERATE WEATHERING.		
										SHALE, MEDIUM BLUISH GRAY (5B 5\1), TRACE IRREGULAR BEDDING PLANES, SOFT.		38.0 Top of sand pack.
							40			**SAME AS ABOVE**		41.1 Top of screen.
										SAME, WITH MODERATE BROWN (5YR 3\4) BEDDING PLANES, MEDIUM TO HIGHLY FRACTURED, MODERATE WEATHERING.		
										SHALE, MEDIUM BLUISH GRAY 5Y 5\2), SLIGHT TO MODERATE WEATHERED		
							45			**CLAY SHALE**, PALE BROWN (5YR 5/2), TO DARK YELLOWISH BROWN (10YR 4/2) AND		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-01** DATE **8/27/07** SHEET **3** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **7/27/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										LIGHT OLIVE GRAY (5YR 4/2), SOFT, SOME IRREGULAR BEDDING PLANES		
							50					50.0 Bottom of screen.
												51.1 Bottom of sand.
							55					
										SAME EXCEPT VERY SOFT		
							60			**CLAYEY SILT**, DARK YELLOWISH BROWN (10yr 4\2), MOIST - WET		
										SAME, VERY WEATHERED, SOFT		
										CLAY SHALE, PALE BROWN (5YR 5\2), SLIGHTLY WEATHERED		
							65			**SAME**, SOME MODERATELY WEATHERED, SOFT		
										SAME, VERY WEATHERED, VERY SOFT		
										SAME, MODERATELY WEATHERED, SOFT		
										SHALE, MEDIUM GRAY (N5), SOFT.		
							70			**SAME**		
										CLAY SHALE, PALE BROWN (YR 5\2) AND		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-01** DATE **8/27/07** SHEET **4** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **7/27/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							75			MEDIUM GRAY (N5), MODERATELY WEATHERED, SOFT.		
							80			**SHALE**, PALE BROWN (5YR 5\2) AND LIGHT OLIVE GRAY (5Y 5\2), IRREGULAR BEDDING, WEATHERED, SOFT. **SAME**, SOME SEDIMENT FILLED FRACTURES		
							85			**SHALE**, GRAYISH OLIVE (10 YR 4\2) AND MODERATE BROWN (5YR 3\4), INTERBEDDED LAYERS, SOFT, SLIGHTLY WEATHERED.		
							90			**SAME**, EXCEPT WEATHERED		
										SHALE, MEDIUM BLUISH GRAY (5B 5\1), WITH SOME INTERBEDDED BROWNISH GRAY (5YR 4\1) COLOR, SLIGHTLY WEATHERED, SOFT		
							95					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-01** DATE **8/27/07** SHEET **5** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **7/27/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							100			**SAME**, EXCEPT WEATHERED		
										SHALE, MEDIUM BLUISH GRAY 5B 5\1), SLIGHTLY WEATHERED, SOFT		
										SANDSTONE, MEDIUM BLUISH GRAY (5B 5\1), SLIGHTLY WEATHERED AT 104', SOFT.		
							105					
							110			**SAME**, SOFT		
										SHALE, MEDIUM BLUISH GRAY (5B 5\1), SOFT.		
										SHALE, MEDIUM DARK GRAY, SOFT, WEATHERED, VERY FRACTURED.		
										CLAY SHALE, GRAYISH BROWN (5YB 3\2), WEATHERED, SOFT TO VERY SOFT, FRACTURED.		
										114.8 BOTTOM OF HOLE		

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 529,941.0 E 1,724,235.0**

GROUND ELEVATION **645.2** SYSTEM **STATE PLANE**

Water Level, ft			
TIME			
DATE			

BORING NO. **D=MW-02** DATE **8/27/07** SHEET **1** OF **6**

BORING START **7/12/95** BORING FINISH **7/27/95**

PIEZOMETER TYPE WELL TYPE **OW**

HGT. RISER ABOVE GROUND **1.9** DIA **2.0**

DEPTH TO TOP OF WELL SCREEN **96.1** BOTTOM **105.0**

WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**

FIELD PARTY **MCR=REY=TJH-REB** RIG **BK-81**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										AUGERED TO 1.8'		
1	SS	1.8	3.3	7-6-6	12"				SW GP	**SILT, FINE SAND AND GRAVEL**, Moderate brown (5yr 4\4), gray rock fragments to 2.3' **ROCK FRAGMENTS**, Light olive gray (5y 5\2), feldspar present, dry		
										AUGERED TO 6.3'		
2	SS	6.3	7.8	2-2-3	4"		5		ML	**CLAYEY SILT AND GRAVEL**, Moderate brown (5yr 4\4), with light olive gray (5y 5\2) rock fragments, moist-dry.		
										AUGERED TO 11.3'		
3	SS	11.3	12.8	3-3-4	12"		10		ML	**Same as sample no. 2**		
										AUGERED TO 16.3'		
4	SS	16.3	17.8	2-2-3	11"		15		CL	**SILTY CLAY AND GRAVEL**, moderate brown (5yr 4/4), with light olive gray (5y 5/2) rock fragments, moist		
										AUGERED TO 21.3'		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **D. BENNETT**

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-02** DATE **8/27/07** SHEET **2** OF **6**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/12/95** BORING FINISH **7/27/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	SS	21.3	22.8	5-7-5	10"				CL	**Same except moist wet.**		
									SM	**SILTY MEDIUM TO COARSE SAND**, Greenish olive (10 y 4\2), feldspar, rock fragments at bottom, moist to wet		
										AUGERED TO 26.3'		
6	SS	26.3	27.8	5-6-5	15"		25		CL	**SILTY CLAY**, Moderate brown (5yr 4\4) and greenish olive (10y 4\2), gravel, feldspar, rock fragments, moist.		
										AUGERED TO 31.3'		
7	SS	31.3	32.8	5-5-5	18"		30		SM	**CLAYEY SILT AND FINE SAND**, Moderate brown (5yr 4\4) and medium gray (n5), moist to wet.		
									SM	**CLAYEY SILT AND FINE SAND**, Medium bluish gray (5b 5\1), feldspar, rock fragments, moist to wet		
										AUGERED TO 36.3		
8	SS	36.3	37.8	11-8-10	18"		35		SM	**Same as sample no 7 except wet.**		WIL'S at 36.3
									SW	**MEDIUM TO COARSE SAND**, Medium bluish gray (5b 5\1), feldspar, rock fragments, moist.		
										AUGERED TO 41.3'		
9	SS	41.3	42.4	26-47-50/.1	12"		40			**CLAYEY SHALE**, Moderate brown (5yr 4\4), moist to dry, medium bluish gray (5b 1\1) clayey shale rock piece at bottom.		
										AUGERED TO 44.1'		
10	SS	44.1	44.3		1"	55				**CLAY SHALE**, Bluish gray (5B 5\1),rock pieces.		Drill notes entire overburden was fill.
1	NQ	44.3	49.8		5.5		45			**CLAYEY SHALE**, DARK YELLOWISH BROWN (10YR 4\2),very soft, weathered.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-02** DATE **8/27/07** SHEET **3** OF **6**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/12/95** BORING FINISH **7/27/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
2	NQ	49.8	54.8		4.85	76	50			**CLAYEY SHALE**, GRAYISH RED (5R 4\2) AND TRACE LIGHT OLIVE BROWN (5Y 5\6), very soft to soft, very weathered.		49.8 Getting alternating water return of brown and red.
3	NQ	54.8	59.8		2.9	48	55			**Same, except very weathered**		54.8 Red water return.
4	NQ	59.8	64.8		4.0	44	60			**Same**		
5	NQ	64.8	74.8		8.75	67	65			**Same except, except soft, fairly weathered.**		
							70					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-02** DATE **8/27/07** SHEET **4** OF **6**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/12/95** BORING FINISH **7/27/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										CLAY SHALE, GRAYISH RED (10 R 4\2), very soft, weathered.		
6	NQ	74.8	80.8		5.9	51	75			**Same, numerous sediment filled fractures.**		
												77.7 Top of seal.
							80					
7	NQ	82.2	84.8		2.6	33				**CLAY SHALE**, GRAYISH RED (1O R 4\2), soft, weathered.		
8	NQ	84.8	94.3		9.5	86	85					84.7 Top of sand.
												Brown water return 86.5.
										SHALE, MEDIUM BLUISH GRAY (5B 5\1), Some laminations, slightly weathered with exception to fractures.		
							90					Fracture at 90.5' to 91' and 92'.
9	NQ	94.3	99.8		5.5	45				**SHALE**, MEDIUM BLUISH GRAY (B 5\1), some laminations, some calcite pockets, slightly weathered.		
							95			**Same except weathered\fracture zone (97.0 to 98.0)**		96.1 Top of screen. 96.2 Lost water return.

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

BORING NO. **D=MW-02** DATE **8/27/07** SHEET **5** OF **6**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/12/95** BORING FINISH **7/27/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	NQ	99.8	109.8		10.0	58	100			**SHALE**, MEDIUM BLUISH GRAY (5B 5\1), little laminations, soft.		
							105					105.0 Bottom of screen.
										CLAY SHALE, OLIVE GRAY (5YR 4\1) AND BROWNISH GRAY (5YR 4\1) sediment filled fractures, weathered, very soft.		
										CLAY SHALE, MODERATE BROWN (5YR 4\4), weathered, soft.		
11	NQ	109.8	115.8		5.5	30	110			**Same except very soft to soft, sediment filled fractures.**		111.0 Bottom of sand.
												113.4 Bottom of seal.
							115					
12	NQ	115.8	124.8		8.9	94				**SHALE**, MEDIUM BLUISH GRAY (5YR 5\1), laminated, soft. **Same except slightly weathered.** **Same as 115.8 to 116.5**		
							120					
										120.9' - 121.0' LIGHT BLUISH GRAY SILTY CLAY FILLED FRACTURE (5b 7\1). **Same as 115.8 to 120.9**		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-02** DATE **8/27/07** SHEET **6** OF **6**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/12/95** BORING FINISH **7/27/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
~~13~~	~~NQ~~	~~124.8~~	~~129.8~~		?		125			**SHALE**, MEDIUM BLUISH GRAY (5B 5\1), Laminated, soft.		Never got back water.

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 530,928.0 E 1,728,546.0**

GROUND ELEVATION **953.0** SYSTEM **STATE PLANE**

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **D=MW-03** DATE **8/27/07** SHEET **1** OF **13**

BORING START BORING FINISH **8/10/95**

PIEZOMETER TYPE WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.3** DIA **2.0**

DEPTH TO TOP OF WELL SCREEN **280.2** BOTTOM **309.1**

WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**

FIELD PARTY **TJH-REB** RIG **CME-75**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										LIGHT OLIVE-BROWN (5Y,5/6) SILTY FINE SAND, ROCK FRAGMENTS, FELDSPAR, DRY		
							5			SAME, SHALE-LIKE, TRACE BLACK COAL SEAMS, DRY		
							10			SAME		
							15			**LIGHT OLIVE BROWN (5Y 5/6) CLAY SHALE**, WEATHERED, NUMEROUS FRACTURES, ABUNDANT FILLED FRACTURES.		
										MEDIUM LIGHT GRAY (N6) LIMESTONE, LAMINATED, SLIGHTLY WEATHERED		

TYPE OF CASING USED

	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **D. BENNETT**

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **2** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										SAME EXCEPT WEATHERED AND FRACTURED		
							25			**MODERATE BROWN (5YR4/4) CLAY SHALE**, VERY WEATHERED, FRACTURED		
										MEDIUM LIGHT GRAY (N6) SANDSTONE, MEDIUM GRAINED, SLIGHTLY WEATHERED		
							30			**MEDIUM LIGHT GRAY (N6) SANDSTONE**, MEDIUM TO COARSE GRAINED, LAMINATED, SLIGHTLY WEATHERED		
							35					
							40			**MEDIUM GRAY (N5) COARSE SANDSTONE**, BLACK LAMINATIONS, SLIGHTLY WEATHERED		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **3** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							50			**MEDIUM GRAY (N5) CLAYSHALE**, WEATHERED, FRACTURED		
										GRAYISH-RED (5R4/2) CLAY SHALE, WEATHERED, FRACTURED		
							55			**MEDIUM GRAY (N5) CLAY SHALE**, WEATHERED, FRACTURED		
										MEDIUM GRAY (N5) LIMESTONE		
							60			WEATHERED ZONE 60.5'-60.6 SHALEY 60.6'- 60.8'		
										MEDIUM GRAY (N5) SHALE, SOME LAMINATIONS, SLIGHTLY WEATHERED		
							65			**GRAYISH RED (5R4/2) CLAY SHALE**, WEATHERED, SEDIMENT FILLED FRACTURES		
							70			**INTERBEDDED MEDIUM GRAY (N5) AND GRAYISH RED (5R4/2) SHALE**, SLIGHT TO		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **4** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							75			MODERATELY FRACTURED AND WEATHERED		
										MEDIUM GRAY (N5) SHALE, SLIGHTLY WEATHERED		
							80					
										MEDIUM GRAY (N5) SANDSTONE, MEDIUM TO COARSE GRAIN, SOME INTERBEDDED CALCITE, SLIGHTLY WEATHERED		
							85					
										MEDIUM GRAY (N5) SHALE, LAMINATED, SOFT, SLIGHT TO MODERATELY WEATHERED, FRACTURED		
							90			**MEDIUM GRAY (N5) SHALE**, SOME LAMINATIONS, SLIGHTLY WEATHERED		
							95					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **5** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							100			**GRAYISH RED (5Y4/2) SHALE**, MODERATELY FRACTURED AND WEATHERED, SOFT		
										SAME EXCEPT GRAYISH RED (5R5/2) AND MEDIUM GRAY (N5) SHALE, WEATHERED FROM 100.8 TO 101.2'		
							105			**MEDIUM GRAY (N5) SHALE AND MEDIUM SANDSTONE**, INTERBEDDED, LAMINATED, SLIGHTLY WEATHERED, SOME FRACTURES		
							110			**MEDIUM GRAY (N5) SANDSTONE**, MEDIUM TO COARSE GRAIN WITH INTERBEDDED SHALE, LAMINATED, SLIGHTLY WEATHERED		
							115					
							120			120.8 - 120.9 CLAY FILLED FRACTURE, YELLOWISH GRAY (5R7/2) 120.9 - 121.8' LIGHT OLIVE GRAY (5Y6/1) MEDIUM TO COARSE SANDSTONE, SLIGHTLY WEATHERED 121.8 - 122.2' MEDIUM DARK GRAY (N4) SHALE		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **6** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							125			122.2 - 122.5' MEDIUM GRAY (N5) CLAY FILLED FRACTURE 122.5 - 124.7' MEDIUM DARK GRAY (N4) CLAY AND MEDIUM SANDSTONE INTERBEDDED, SLIGHT TO MEDIUM WEATHERED 124.7 - 125.8 MEDIUM GRAY (N5) MEDIUM TO COARSE SANDSTONE, LAMINATIONS PRESENT 125.8 - 131.8 MEDIUM GRAY (N5) MEDIUM TO COARSE SANDSTONE, SOME LAMINATIONS, SLIGHTLY WEATHERED		
							130					
							135			**MEDIUM DARK GRAY (N4) SHALE**, LAMINATED, SLIGHTLY WEATHERED 134.2 - 134.8' FRACTURED, WEATHERED		
							140			**MEDIUM DARK GRAY (N4) TO DARK GRAY (N3) SHALE**, SLIGHT TO MODERATELY WEATHERED, LAMINATIONS PRESENT. 137.5 - 137.6' FRACTURED 140.5 - 142.2' FRACTURED		
							145			**DARK GRAY (N3) TO DARK REDDISH BROWN (10R3/4) CLAY SHALE**, VERY WEATHERED, VERY SOFT		
										DARK GRAY (N3) TO DARK REDDISH BROWN (10R3/4) CLAY SHALE, LAMINATIONS, SLIGHT TO MODERATELY WEATHERED.		

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **7** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							155			**DARK REDDISH BROWN 10R3/4) AND GRAYISH GREEN (10Y4/2) CLAY SHALE**, VERY SOFT, SLIGHTLY WEATHERED, SOME CALCITE PRESENT		
							160			**DARK REDDISH BROWN 10R3/4 AND GRAYISH GREEN (10Y4/2) CLAY SHALE**, TRACE CALCITE, SOFT, MODERATELY FRACTURED AND WEATHERED		
							165			**MEDIUM DARK GRAY (N4) SHALE**, SOME CALCITE NODULES, SOME LAMINATIONS, SLIGHTLY WEATHERED		
							170			**MEDIUM DARK GRAY (N4), DARK GRAY (N3) AND TRACE GRAYISH RED (10R4/2) SHALE AND FINE TO MEDIUM SANDSTONE**, INTERBEDDED, SLIGHTLY WEATHERED		
							175			**GRAYISH BROWN (10R4/2) CLAY SHALE**, MODERATELY FRACTURED AND WEATHERED.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **8** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							180			**DARK GRAY (N3) SHALE**, MODERATELY WEATHERED **GRAYISH RED (10R4/2) AND MODERATE OLIVE BROWN (5Y4/4) CLAY SHALE**, SOME CALCITE VEINS, MODERATE WEATHERED AND FRACTURED. **MEDIUM GRAY (N5) SHALE**, WITH INTERBEDDED FINE SANDSTONE, LITTLE WEATHERING 180.5 - 190.8 SAME EXCEPT SOME CALCITE VEINS, SLIGHTLY WEATHERED		
							185					
							190			**MEDIUM GRAY (N5) SHALE**		
							195			**MEDIUM GRAY (N5) WITH DARK GRAY (N3) SEAMS OF SHALE AND CLAY SHALE**, MODERATELY WEATHERED AND FRACTURED		
							200			200.1 - 200.4 MODERATELY BROWN (5YR 3/4) **MEDIUM BLUISH GRAY (5B5/1) SHALE**, CALCITE NODULES, SOME LAMINATIONS,		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **9** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							205			SLIGHT TO MODERATELY WEATHERED		
							210			**MODERATE BROWN (5YR 3/4) CLAY SHALE**, FRACTURES, SOFT		
										MEDIUM DARK GRAY (N4) AND MODERATE BROWN (5YR 3/4) INTERBEDDED SHALE, SLIGHTLY WEATHERED, FRACTURED		
							215					
							220			**MEDIUM GRAY (N5) FINE SANDSTONE**, TRACE CALCITE PRESENT, SLIGHTLY WEATHERED		
							225			**MODERATE BROWN (5YR 3/4) CLAYEY SHALE**, SLIGHTLY WEATHERED		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **10** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							230			228.8 - 230.8 SAME EXCEPT WITH GRAYISH OLIVE (10Y 4/2), LAMINATIONS MODERATELY WEATHERED, FRACTURED		
										LIGHT BLUISH GRAY (5B 7/1) SHALE AND MEDIUM GRAIN SANDSTONE, INTERBEDDED, SLIGHTLY WEATHERED		
							235					
							240					
										MEDIUM LIGHT GRAY (N6) SANDSTONE, MEDIUM TO COARSE GRAIN, LAMINATED, CALCITE PRESENT, SLIGHTLY WEATHERED 241.8 - 242.7 SLIGHT TO MODERATE WEATHERING, FRACTURES		
							245					
										DARK GREENISH GRAY (5GY 4/1) AND MODERATE BROWN (5YR 3/4) CLAY SHALE, SOFT, MODERATELY WEATHERED, FRACTURED		
							250			250.8 - 259.8 SAME, EXCEPT SOFT TO VERY SOFT, WEATHERED, SEDIMENT FILLED FRACTURES 259.8 - 265.8 SAME, HIGHLY FRACTURED		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **11** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							255					
							260					262.7 Top of bentonite seal.
							265			265.8 - 269.0 SAME, HIGHLY FRACTURED, GRAYISH RED (10R 4/2) AND LIGHT OLIVE BROWN (5Y 5/6)		267.8 Top of sand.
							270			269.0 - 269.2 NO RECOVERY 269.2 - 271.3 DARK YELLOWISH BROWN (10YR 4/2), WEATHERED		
										GRAYISH RED (10R 4/2) AND MODERATE OLIVE BROWN (5Y 5/6) CLAY SHALE, SLIGHT TO MODERATELY WEATHERED, FRACTURED.		
							275			**BROWNISH GRAY (5YR 4/1) INTERBEDDED WITH MEDIUM GRAY (N5) CLAY SHALE/SHALE**, TRACE CALCITE, MODERATELY WEATHERED, FRACTURED		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **12** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							285			**MEDIUM GRAY (N5) SHALE**, LAMINATED		280.2 Top of screen.
							290			**MEDIUM GRAY (N5) AND GRAYISH BROWN (5YR 2/2) SHALE**, INTERBEDDED WITH CLAYEY SHALE, TRACE CALCITE, LAMINATIONS, SLIGHTLY WEATHERED		
							295			**MEDIUM GRAY (N5) FINE TO COARSE SANDSTONE**, INTERBEDDED WITH SHALE, LAMINATED, SLIGHT WEATHERING		
							300			298.2 - 300.5 SAME EXCEPT SHALE WITH MODERATE BROWN (5YR 4/4) AND GRAYISH BROWN (5YR 3/2), LAMINATIONS, SLIGHT WEATHERING		
							305					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-03** DATE **8/27/07** SHEET **13** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START _____ BORING FINISH **8/10/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							310					309.1 Bottom of screen. 312.2 Bottom of sand. 313.8 Bottom of bottom seal.

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 530,922.0 E 1,728,552.0**

GROUND ELEVATION **953.2** SYSTEM **STATE PLANE**

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **D=MW-04** DATE **8/27/07** SHEET **1** OF **13**

BORING START **7/18/95** BORING FINISH **7/20/95**

PIEZOMETER TYPE _____ WELL TYPE **OW**

HGT. RISER ABOVE GROUND **1.9** DIA **2.0**

DEPTH TO TOP OF WELL SCREEN **239.1** BOTTOM **248.0**

WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**

FIELD PARTY **MCR-REL-TJH-REB** RIG **BK-81 CME-75**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SPT	2.0	3.5	22-9-6	1.0					AUGERED TO 2.0'		
										LIGHT OLIVE-BROWN (5Y,5/6) SILTY FINE SAND, ROCK FRAGMENTS, FELDSPAR, DRY		
2	SPT	7.0	7.8	28-50/4	.83		5			SAME, SHALE-LIKE, TRACE BLACK COAL SEAMS, DRY		
3	SPT	12.0	13.3	30-45-50/4	1.33		10			SAME		
1	NQ	14.2	20.8		6.5	56	15			**LIGHT OLIVE BROWN (5Y 5/6) CLAY SHALE**, WEATHERED, NUMEROUS FRACTURES, ABUNDANT FILLED FRACTURES.		RETURN WATER WENT FROM GREEN TO GRAY IN RUN #1.
										MEDIUM LIGHT GRAY (N6) LIMESTONE, LAMINATED, SLIGHTLY WEATHERED		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **D. BENNETT**

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-04** DATE **8/27/07** SHEET **2** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
2	NQ	20.8	30.8		8.4	30				SAME EXCEPT WEATHERED AND FRACTURED		
							25			**MODERATE BROWN (5YR4/4) CLAY SHALE**, VERY WEATHERED, FRACTURED		
										MEDIUM LIGHT GRAY (N6) SANDSTONE, MEDIUM GRAINED, SLIGHTLY WEATHERED		
3	NQ	30.8	40.8		9.0	90	30			**MEDIUM LIGHT GRAY (N6) SANDSTONE**, MEDIUM TO COARSE GRAINED, LAMINATED, SLIGHTLY WEATHERED		
							35					
4	NQ	40.8	50.8		9.6	96	40			**MEDIUM GRAY (N5) COARSE SANDSTONE**, BLACK LAMINATIONS, SLIGHTLY WEATHERED		LOST WATER
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-04** DATE **8/27/07** SHEET **3** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							50					
5	NQ	50.8	60.8		10.0	64				**MEDIUM GRAY (N5) CLAYSHALE**, WEATHERED, FRACTURED		STILL NO WATER RETURN
										GRAYISH-RED (5R4/2) CLAY SHALE, WEATHERED, FRACTURED		
							55					
										MEDIUM GRAY (N5) CLAY SHALE, WEATHERED, FRACTURED		
										MEDIUM GRAY (N5) LIMESTONE		
							60					
6	NQ	60.8	70.8		9.5	72				WEATHERED ZONE 60.5'-60.6 SHALEY 60.6'- 60.8' **MEDIUM GRAY (N5) SHALE**, SOME LAMINATIONS, SLIGHTLY WEATHERED		
							65					
										GRAYISH RED (5R4/2) CLAY SHALE, WEATHERED, SEDIMENT FILLED FRACTURES		SPORADIC GRAY WATER RETURN
							70					
7	NQ	70.8	80.8		10.0	91				**INTERBEDDED MEDIUM GRAY (N5) AND GRAYISH RED (5R4/2) SHALE**, SLIGHT TO		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-04** DATE **8/27/07** SHEET **4** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							75			MODERATELY FRACTURED AND WEATHERED		
										MEDIUM GRAY (N5) SHALE, SLIGHTLY WEATHERED		
							80					
8	NQ	80.8	90.8		10.0	89						SPORADIC GRAY WATER RETURN
										MEDIUM GRAY (N5) SANDSTONE, MEDIUM TO COARSE GRAIN, SOME INTERBEDDED CALCITE, SLIGHTLY WEATHERED		
							85					
										MEDIUM GRAY (N5) SHALE, LAMINATED, SOFT, SLIGHT TO MODERATELY WEATHERED, FRACTURED		
							90					
9	NQ	90.8	100.8		10.0	80				**MEDIUM GRAY (N5) SHALE**, SOME LAMINATIONS, SLIGHTLY WEATHERED		SPORADIC WATER RETURN
							95					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-04** DATE **8/27/07** SHEET **5** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										GRAYISH RED (5Y4/2) SHALE, MODERATELY FRACTURED AND WEATHERED, SOFT		
							100					
10	NQ	100.8	110.8		9.9	89				SAME EXCEPT GRAYISH RED (5R5/2) AND MEDIUM GRAY (N5) SHALE, WEATHERED FROM 100.8 TO 101.2'		
										MEDIUM GRAY (N5) SHALE AND MEDIUM SANDSTONE, INTERBEDDED, LAMINATED, SLIGHTLY WEATHERED, SOME FRACTURES		
							105					
												SPORADIC WATER RETURN
							110					
11	NQ	110.8	120.8		10.0	95				**MEDIUM GRAY (N5) SANDSTONE**, MEDIUM TO COARSE GRAIN WITH INTERBEDDED SHALE, LAMINATED, SLIGHTLY WEATHERED		SPORADIC WATER RETURN
							115					
							120					
12	NQ	120.8	125.8		5.0	80				120.8 - 120.9 CLAY FILLED FRACTURE, YELLOWISH GRAY (5R7/2) 120.9 - 121.8' LIGHT OLIVE GRAY (5Y6/1) MEDIUM TO COARSE SANDSTONE, SLIGHTLY WEATHERED 121.8 - 122.2' MEDIUM DARK GRAY (N4) SHALE		RESUMED DRILLING 7-19-95 SPORADIC WATER RETURN

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-04** DATE **8/27/07** SHEET **6** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							125			122.2 - 122.5' MEDIUM GRAY (N5) CLAY FILLED FRACTURE 122.5 - 124.7' MEDIUM DARK GRAY (N4) CLAY AND MEDIUM SANDSTONE INTERBEDDED, SLIGHT TO MEDIUM WEATHERED 124.7 - 125.8 MEDIUM GRAY (N5) MEDIUM TO COARSE SANDSTONE, LAMINATIONS PRESENT 125.8 - 131.8 MEDIUM GRAY (N5) MEDIUM TO COARSE SANDSTONE, SOME LAMINATIONS, SLIGHTLY WEATHERED		
13	NQ	125.8	135.8		9.8	87						SLIGHT WATER RETURN
							130					
										MEDIUM DARK GRAY (N4) SHALE, LAMINATED, SLIGHTLY WEATHERED 134.2 - 134.8' FRACTURED, WEATHERED		
							135					
14	NQ	135.8	145.8		9.9	90				**MEDIUM DARK GRAY (N4) TO DARK GRAY (N3) SHALE**, SLIGHT TO MODERATELY WEATHERED, LAMINATIONS PRESENT. 137.5 - 137.6' FRACTURED 140.5 - 142.2' FRACTURED		GOT GRAY WATER RETURN
							140					
							145					
15	NQ	145.8	155.8		9.7	76				**DARK GRAY (N3) TO DARK REDDISH BROWN (10R3/4) CLAY SHALE**, VERY WEATHERED, VERY SOFT **DARK GRAY (N3) TO DARK REDDISH BROWN (10R3/4) CLAY SHALE**, LAMINATIONS, SLIGHT TO MODERATELY WEATHERED.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

BORING NO. **D=MW-04** DATE **8/27/07** SHEET **7** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										DARK REDDISH BROWN 10R3/4) AND GRAYISH GREEN (10Y4/2) CLAY SHALE, VERY SOFT, SLIGHTLY WEATHERED, SOME CALCITE PRESENT		
16	NQ	155.8	165.8		10.0	85	155			**DARK REDDISH BROWN 10R3/4 AND GRAYISH GREEN (10Y4/2) CLAY SHALE**, TRACE CALCITE, SOFT, MODERATELY FRACTURED AND WEATHERED		
							160			**MEDIUM DARK GRAY (N4) SHALE**, SOME CALCITE NODULES, SOME LAMINATIONS, SLIGHTLY WEATHERED		
17	NQ	165.8	170.8		5.0	80	165			**MEDIUM DARK GRAY (N4), DARK GRAY (N3) AND TRACE GRAYISH RED (10R4/2) SHALE AND FINE TO MEDIUM SANDSTONE**, INTERBEDDED, SLIGHTLY WEATHERED		
18	NQ	170.8	180.8		9.8	83	170			**GRAYISH BROWN (10R4/2) CLAY SHALE**, MODERATELY FRACTURED AND WEATHERED.		
							175					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-04** DATE **8/27/07** SHEET **8** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										DARK GRAY (N3) SHALE, MODERATELY WEATHERED		
										GRAYISH RED (10R4/2) AND MODERATE OLIVE BROWN (5Y4/4) CLAY SHALE, SOME CALCITE VEINS, MODERATE WEATHERED AND FRACTURED.		
							180			**MEDIUM GRAY (N5) SHALE**, WITH INTERBEDDED FINE SANDSTONE, LITTLE WEATHERING		
19	NQ	180.8	190.8		10.0	91				180.5 - 190.8 SAME EXCEPT SOME CALCITE VEINS, SLIGHTLY WEATHERED		
							185					
							190					
20	NQ	190.8	200.8		9.9	82				**MEDIUM GRAY (N5) SHALE**		191.1 Top of seal.
							195					
										MEDIUM GRAY (N5) WITH DARK GRAY (N3) SEAMS OF SHALE AND CLAY SHALE, MODERATELY WEATHERED AND FRACTURED		197.3 Top of sand.
							200			200.1 - 200.4 MODERATELY BROWN (5YR 3/4)		
21	NQ	200.8	210.8		10.0	98				**MEDIUM BLUISH GRAY (5B5/1) SHALE**, CALCITE NODULES, SOME LAMINATIONS,		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-04** DATE **8/27/07** SHEET **9** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							205			SLIGHT TO MODERATELY WEATHERED		
							210			**MODERATE BROWN (5YR 3/4) CLAY SHALE**, FRACTURES, SOFT		209.1 Top of screen.
22	NQ	210.8	220.8		9.95	94				**MEDIUM DARK GRAY (N4) AND MODERATE BROWN (5YR 3/4) INTERBEDDED SHALE**, SLIGHTLY WEATHERED, FRACTURED		
							215					
							220			**MEDIUM GRAY (N5) FINE SANDSTONE**, TRACE CALCITE PRESENT, SLIGHTLY WEATHERED		
23	NQ	220.8	230.8		10.0	95						
							225			**MODERATE BROWN (5YR 3/4) CLAYEY SHALE**, SLIGHTLY WEATHERED		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-04** DATE **8/27/07** SHEET **10** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										228.8 - 230.8 SAME EXCEPT WITH GRAYISH OLIVE (10Y 4/2), LAMINATIONS MODERATELY WEATHERED, FRACTURED		
24	NQ	230.8	240.8		10.0	91	230			**LIGHT BLUISH GRAY (5B 7/1) SHALE AND MEDIUM GRAIN SANDSTONE**, INTERBEDDED, SLIGHTLY WEATHERED		
							235					
25	NQ	240.8	250.8		10.0	80	240			**MEDIUM LIGHT GRAY (N6) SANDSTONE**, MEDIUM TO COARSE GRAIN, LAMINATED, CALCITE PRESENT, SLIGHTLY WEATHERED 241.8 - 242.7 SLIGHT TO MODERATE WEATHERING, FRACTURES		
							245			**DARK GREENISH GRAY (5GY 4/1) AND MODERATE BROWN (5YR 3/4) CLAY SHALE**, SOFT, MODERATELY WEATHERED, FRACTURED		248.0 Bottom of screen.
26	NQ	250.8	259.8		9.0	38	250			250.8 - 259.8 SAME, EXCEPT SOFT TO VERY SOFT, WEATHERED, SEDIMENT FILLED FRACTURES 259.8 - 265.8 SAME, HIGHLY FRACTURED		249.1 Bottom of sand.

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

BORING NO. **D=MW-04** DATE **8/27/07** SHEET **11** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							255					
												257.0 Bottom of seal.
~~27~~	~~NQ~~	~~259.8~~	~~265.8~~		~~3.6~~	~~25~~	260					
							265					
28	NQ	265.8	269.0		1.45	11				265.8 - 269.0 SAME, HIGHLY FRACTURED, GRAYISH RED (10R 4/2) AND LIGHT OLIVE BROWN (5Y 5/6)		WATER LEVEL PRIOR TO START 7.1'
29	NQ	269.0	269.2		0	0				269.0 - 269.2 NO RECOVERY		PULLED RODS AND CORE BARREL OUT OF HOLE - BIT MISSING. RETREIVED BIT FULL INTACT.
30	NQ	269.2	271.3		.2	0	270			269.2 - 271.3 DARK YELLOWISH BROWN (10YR 4/2), WEATHERED		
31	NQ	271.3	275.5		4.2	60				**GRAYISH RED (10R 4/2) AND MODERATE OLIVE BROWN (5Y 5/6) CLAY SHALE**, SLIGHT TO MODERATELY WEATHERED, FRACTURED.		
							275					
32	NQ	275.5	282.8		7.3	96				**BROWNISH GRAY (5YR 4/1) INTERBEDDED WITH MEDIUM GRAY (N5) CLAY SHALE/SHALE**, TRACE CALCITE, MODERATELY WEATHERED, FRACTURED		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-04** DATE **8/27/07** SHEET **12** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										MEDIUM GRAY (N5) SHALE, LAMINATED		
33	NQ	282.8	290.5		7.6	99	285			**MEDIUM GRAY (N5) AND GRAYISH BROWN (5YR 2/2) SHALE**, INTERBEDDED WITH CLAYEY SHALE, TRACE CALCITE, LAMINATIONS, SLIGHTLY WEATHERED		
34	NQ	290.5	300.5		9.9	99	290			**MEDIUM GRAY (N5) FINE TO COARSE SANDSTONE**, INTERBEDDED WITH SHALE, LAMINATED, SLIGHT WEATHERING		
							295			298.2 - 300.5 SAME EXCEPT SHALE WITH MODERATE BROWN (5YR 4/4) AND GRAYISH BROWN (5YR 3/2), LAMINATIONS, SLIGHT WEATHERING		
35	NQ	300.5	310.5		9.45	90	300			**MEDIUM DARK GRAY (N4) SHALE**, SLIGHTLY WEATHERED		
										MEDIUM GRAY (N5) SANDSTONE, MEDIUM TO COARSE GRAIN, SLIGHTLY WEATHERED, TRACE CALCITE		
							305			305.6 - 305.7 WEATHERED, FRACTURED		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-04** DATE **8/27/07** SHEET **13** OF **13**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/18/95** BORING FINISH **7/20/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							310			**MEDIUM DARK GRAY (N4) SHALE**, SLIGHTLY WEATHERED		
										BOTTOM OF BORING 310.5'		

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 531,282.0 E 1,724,360.0**

GROUND ELEVATION **648.0** SYSTEM **STATE PLANE**

Water Level, ft			
TIME			
DATE			

BORING NO. **D=MW-05** DATE **8/27/07** SHEET **1** OF **5**

BORING START **7/11/95** BORING FINISH **7/26/95**

PIEZOMETER TYPE WELL TYPE **OW**

HGT. RISER ABOVE GROUND **1.9** DIA **2.0**

DEPTH TO TOP OF WELL SCREEN **101.6** BOTTOM **111.0**

WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**

FIELD PARTY **MCR-RLY=TJH-REB** RIG **BK-81 CME-75**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										AUGERED TO 2'		
1	SS	2.0	3.5	??-28-19	15"				GM	**GRAY ROCK FRAGMENTS, GRAVEL, SILT,** DRY, (FILL).		
									ML	**CLAYEY SILT AND GRAVEL**, MODERATE BROWN (5YR 3\4), Moist. AUGERED TO 7.0'		
2	SS	7.0	22.0	10-9-9	7.5"		5		ML	**CLAYEY SILT AND GRAVEL**, MODERATE BROWN (5YR 4\8) LIGHT BROWN (5YR 5\6 AND MODERATE BROWN (5YR 3\4), TRACE FELDSPAR, MOIST. AUGERED TO 12.0'		
3	SS	12.0	13.5	13-8-5	17"		10		ML	**SAME AS ABOVE**		
									CL	**SILTY CLAY**, PALE YELLOWISH BROWN (12YR 6\2) AND LIGHT OLIVE GRAY (5YR 5\2), LOW TO MEDIUM PLASTICITY, MOIST. AUGERED TO 17.0'		
4	SS	17.0	18.5	3-3-3	18"		15		SC	**CLAYEY-SILTY FINE SAND**, DUSKY YELLOWISH BROWN (10 YR 2\2),MOIST TO WET. AUGERED TO 22.0'		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
X	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **D.BENNETT**

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-05** DATE **8/27/07** SHEET **2** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/11/95** BORING FINISH **7/26/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	SS	22.0	23.2	7-7-50/3"	13"				SC	**SAME AS SAMPLE No. 4**		
									SW	**MEDIUM TO COARSE SAND**, LIGHT BLUISH GRAY (5B 7\1), MOIST.		
1	NQ	24.0	29.8		5.0	60				AUGERED TO 23.9' - AUGERED THROUGH OBSTRUCTION (ROCK?)		
							25			**MORGANTOWN SANDSTONE?**, GRAY.		
										24.0 - 25.0' Solid, light gray, (N-7)		25.0 Fracture = 8
										25.0 - 26.0' Fractured, brown clay lined fractures, light gray (N-7).		26.0 Fracture = 3
										26.0 - 27.0' Minimal fractures		26.5 Lost water
										27.0 - 27.7' Fractured, weathered, very fine dark gray (N-3) bedding.		27.0 Fracture = 5
										27.7 - 29.8' Light gray (N-7) sandstone		
2	NQ	29.8	39.8		10.0	93	30			29.8 - 33.8' Light gray (N-7) sandstone		
										CLAY SHALE, MEDIUM GRAY (N4) MOIST, VERY SOFT.		
							35			**CLAY SHALE**, GRAYISH BROWN (5YR 3\2), MOIST, VERY SOFT.		35.2 Fracture = 3
										CLAY SHALE, LIGHT OLIVE GRAY (5Y 5\2) MEDIUM LIGHT GRAY (N6), SOFT, MODERATE WEATHERING.		36.3 Fracture = 3
										SHALE, MEDIUM BLUISH GRAY (5B 5\1), TRACE IRREGULAR BEDDING PLANES, SOFT.		37.3 Fracture = 2
3	NQ	39.8	49.8		9.8	67	40			**SAME AS ABOVE**		39.8 Fracture = 6
										SAME, WITH MODERATE BROWN (5YR 3\4) BEDDING PLANES, MEDIUM TO HIGHLY FRACTURED, MODERATE WEATHERING.		42.5 Fracture = 8
										SHALE, MEDIUM BLUISH GRAY 5Y 5\2), SLIGHT TO MODERATE WEATHERED		
							45			**CLAY SHALE**, PALE BROWN (5YR 5/2), TO DARK YELLOWISH BROWN (10YR 4/2) AND		44.6 numerous fractures.

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-05** DATE **8/27/07** SHEET **3** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/11/95** BORING FINISH **7/26/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
4	NQ	49.8	56.5		4.7	54	50			LIGHT OLIVE GRAY (5YR 4/2), SOFT, SOME IRREGULAR BEDDING PLANES		51.0 Regained drill water
5	NQ	56.5	59.8		2.55	50	55			**SAME EXCEPT VERY SOFT**		56.5 Fracture = 7
6	NQ	59.8	67.3		7.5	96	60			**CLAYEY SILT**, DARK YELLOWISH BROWN (10yr 4\2), MOIST - WET **SAME**, VERY WEATHERED, SOFT **CLAY SHALE**, PALE BROWN (5YR 5\2), SLIGHTLY WEATHERED		
7	NQ	67.3	69.8		2.5	40	65			**SAME**, SOME MODERATELY WEATHERED, SOFT **SAME**, VERY WEATHERED, VERY SOFT **SAME**, MODERATELY WEATHERED, SOFT		68.0 Fracture = 5
8	NQ	69.8	78.8		6.8	64	70			**SHALE**, MEDIUM GRAY (N5), SOFT. **SAME** **CLAY SHALE**, PALE BROWN (YR 5\2) AND		71.6 Fracture = 12

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-05** DATE **8/27/07** SHEET **4** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/11/95** BORING FINISH **7/26/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							75			MEDIUM GRAY (N5), MODERATELY WEATHERED, SOFT.		
9	NQ	78.8	79.8		1.0	40				**SHALE**, PALE BROWN (5YR 5\2) AND LIGHT OLIVE GRAY (5Y 5\2), IRREGULAR BEDDING, WEATHERED, SOFT.		78.8 numerous fracture.
10	NQ	79.8	87.8		6.3	48	80			**SAME**, SOME SEDIMENT FILLED FRACTURES		
							85					86.0 Top of seal.
11	NQ	87.8	89.8		2.0	75				**SHALE**, GRAYISH OLIVE (10 YR 4\2) AND MODERATE BROWN (5YR 3\4), INTERBEDDED LAYERS, SOFT, SLIGHTLY WEATHERED.		
12	NQ	89.8	90.8		.75	0	90			**SAME**, EXCEPT WEATHERED		
13	NQ	90.8	99.8		9.0	100				**SHALE**, MEDIUM BLUISH GRAY (5B 5\1), WITH SOME INTERBEDDED BROWNISH GRAY (5YR 4\1) COLOR, SLIGHTLY WEATHERED, SOFT		91.0 Top sand.
							95					

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-05** DATE **8/27/07** SHEET **5** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **7/11/95** BORING FINISH **7/26/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
~~14~~	~~NQ~~	~~99.8~~	~~100.3~~		~~.25~~	~~0~~	100			**SAME**, EXCEPT WEATHERED		Lost water return on run #14.
15	NQ	100.3	109.8		9.5	95				**SHALE**, MEDIUM BLUISH GRAY 5B 5\1), SLIGHTLY WEATHERED, SOFT		101.6 Top of screen.
										SANDSTONE, MEDIUM BLUISH GRAY (5B 5\1), SLIGHTLY WEATHERED AT 104', SOFT.		
							105					
~~16~~	~~NQ~~	~~109.8~~	~~114.8~~		~~4.4~~	~~40~~	110			**SAME**, SOFT		
										SHALE, MEDIUM BLUISH GRAY (5B 5\1), SOFT.		111.0 Bottom of screen.
										SHALE, MEDIUM DARK GRAY, SOFT, WEATHERED, VERY FRACTURED.		112.0 Fracture = 7 112.1 Bottom of sand.
										CLAY SHALE, GRAYISH BROWN (5YB 3\2), WEATHERED, SOFT TO VERY SOFT, FRACTURED.		
										114.8 BOTTOM OF HOLE		114.7 Bottom of seal.

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 531,266.0 E 1,724,352.0**

GROUND ELEVATION **647.5** SYSTEM **STATE PLANE**

Water Level, ft			
TIME			
DATE			

BORING NO. **D=MW-06** DATE **8/27/07** SHEET **1** OF **5**

BORING START **8/20/95** BORING FINISH **8/21/95**

PIEZOMETER TYPE WELL TYPE **OW**

HGT. RISER ABOVE GROUND **1.95** DIA **2.0**

DEPTH TO TOP OF WELL SCREEN **28.5** BOTTOM **33.5**

WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**

FIELD PARTY **TJH-REB** RIG **CME-75**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										AUGERED TO 2'		
									GM	**GRAY ROCK FRAGMENTS, GRAVEL, SILT,** DRY, (FILL).		
									ML	**CLAYEY SILT AND GRAVEL**, MODERATE BROWN (5YR 3\4), Moist. AUGERED TO 7.0'		
							5					
									ML	**CLAYEY SILT AND GRAVEL**, MODERATE BROWN (5YR 4\8) LIGHT BROWN (5YR 5\6 AND MODERATE BROWN (5YR 3\4), TRACE FELDSPAR, MOIST. AUGERED TO 12.0'		
							10					
									ML	**SAME AS ABOVE**		
									CL	**SILTY CLAY**, PALE YELLOWISH BROWN (12YR 6\2) AND LIGHT OLIVE GRAY (5YR 5\2), LOW TO MEDIUM PLASTICITY, MOIST. AUGERED TO 17.0'		
							15					
									SC	**CLAYEY-SILTY FINE SAND**, DUSKY YELLOWISH BROWN (10 YR 2\2),MOIST TO WET.		
										AUGERED TO 22.0'		

TYPE OF CASING USED

	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **D. BEMMETT**

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-06** DATE **8/27/07** SHEET **2** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **8/20/95** BORING FINISH **8/21/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
									SC	**SAME AS SAMPLE No. 4**		22.5 Top of seal.
									SW	**MEDIUM TO COARSE SAND**, LIGHT BLUISH GRAY (5B 7\1), MOIST. AUGERED TO 23.9' - AUGERED THROUGH OBSTRUCTION (ROCK?)		
							25			**MORGANTOWN SANDSTONE?**, GRAY. 24.0 - 25.0' Solid, light gray, (N-7) 25.0 - 26.0' Fractured, brown clay lined fractures, light gray (N-7). 26.0 - 27.0' Minimal fractures 27.0 - 27.7' Fractured, weathered, very fine dark gray (N-3) bedding. 27.7 - 29.8' Light gray (N-7) sandstone		27.2 Top of sand. 28.5 Top of screen.
							30			29.8 - 33.8' Light gray (N-7) sandstone		33.5 Bottom of screen. 34.2 Bottom of sand.
							35			**CLAY SHALE**, MEDIUM GRAY (N4) MOIST, VERY SOFT.		
										CLAY SHALE, GRAYISH BROWN (5YR 3\2), MOIST, VERY SOFT.		
										CLAY SHALE, LIGHT OLIVE GRAY (5Y 5\2) MEDIUM LIGHT GRAY (N6), SOFT, MODERATE WEATHERING. **SHALE**, MEDIUM BLUISH GRAY (5B 5\1), TRACE IRREGULAR BEDDING PLANES, SOFT.		
							40			**SAME AS ABOVE**		
										SAME, WITH MODERATE BROWN (5YR 3\4) BEDDING PLANES, MEDIUM TO HIGHLY FRACTURED, MODERATE WEATHERING.		
										SHALE, MEDIUM BLUISH GRAY 5Y 5\2), SLIGHT TO MODERATE WEATHERED		
							45			**CLAY SHALE**, PALE BROWN (5YR 5/2), TO DARK YELLOWISH BROWN (10YR 4/2) AND		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-06** DATE **8/27/07** SHEET **3** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **8/20/95** BORING FINISH **8/21/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							50			LIGHT OLIVE GRAY (5YR 4/2), SOFT, SOME IRREGULAR BEDDING PLANES		
							55			**SAME EXCEPT VERY SOFT**		
							60			**CLAYEY SILT**, DARK YELLOWISH BROWN (10yr 4\2), MOIST - WET **SAME**, VERY WEATHERED, SOFT **CLAY SHALE**, PALE BROWN (5YR 5\2), SLIGHTLY WEATHERED		
							65			**SAME**, SOME MODERATELY WEATHERED, SOFT **SAME**, VERY WEATHERED, VERY SOFT **SAME**, MODERATELY WEATHERED, SOFT **SHALE**, MEDIUM GRAY (N5), SOFT.		
							70			**SAME** **CLAY SHALE**, PALE BROWN (YR 5\2) AND		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-06** DATE **8/27/07** SHEET **4** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **8/20/95** BORING FINISH **8/21/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							75			MEDIUM GRAY (N5), MODERATELY WEATHERED, SOFT.		
							80			**SHALE**, PALE BROWN (5YR 5\2) AND LIGHT OLIVE GRAY (5Y 5\2), IRREGULAR BEDDING, WEATHERED, SOFT. **SAME**, SOME SEDIMENT FILLED FRACTURES		
							85			**SHALE**, GRAYISH OLIVE (10 YR 4\2) AND MODERATE BROWN (5YR 3\4), INTERBEDDED LAYERS, SOFT, SLIGHTLY WEATHERED.		
							90			**SAME**, EXCEPT WEATHERED		
										SHALE, MEDIUM BLUISH GRAY (5B 5\1), WITH SOME INTERBEDDED BROWNISH GRAY (5YR 4\1) COLOR, SLIGHTLY WEATHERED, SOFT		
							95					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-06** DATE **8/27/07** SHEET **5** OF **5**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **8/20/95** BORING FINISH **8/21/95**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							100			**SAME**, EXCEPT WEATHERED		
										SHALE, MEDIUM BLUISH GRAY 5B 5\1), SLIGHTLY WEATHERED, SOFT		
										SANDSTONE, MEDIUM BLUISH GRAY (5B 5\1), SLIGHTLY WEATHERED AT 104', SOFT.		
							105					
							110			**SAME**, SOFT		
										SHALE, MEDIUM BLUISH GRAY (5B 5\1), SOFT.		
										SHALE, MEDIUM DARK GRAY, SOFT, WEATHERED, VERY FRACTURED.		
										CLAY SHALE, GRAYISH BROWN (5YB 3\2), WEATHERED, SOFT TO VERY SOFT, FRACTURED.		
										114.8 BOTTOM OF HOLE		

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 533,742.0 E 1,727,871.7**

GROUND ELEVATION **963.0** SYSTEM **State Plane using NAD 83**

Water Level, ft	▽ 23.5	▼ 19.6	▼
TIME		16 hrs	
DATE	1/30/02	1/31/02	

BORING NO. **D=MW-08** DATE **8/27/07** SHEET **1** OF **7**

BORING START **1/23/02** BORING FINISH **1/30/02**

PIEZOMETER TYPE _____ WELL TYPE _____

HGT. RISER ABOVE GROUND **2.421** DIA _____

DEPTH TO TOP OF WELL SCREEN **144.0** BOTTOM **163.0**

WELL DEVELOPMENT _____ BACKFILL _____

FIELD PARTY **MCR / REB** RIG **BK-81**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
												Grounding procedures not in use on this boring. Drill water used - river water from fire header at Amos Plant. Drilled 4" roller bit to 9.0' and inserted 3" PVC to bedrock.
1	NQ-2	9.0	15.1		5.4	48	5 / 10			**5R 4/2 GRAYISH RED CLAYSTONE** Broken up		Started coring at 9.0'.
2	NQ-2	15.1	25.1		4.7	0	15			**5R 4/2 GRAYISH RED SHALE** (5.3' lost)	▼	SWL @ 19.6' 16 hrs

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **REB**

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-08** DATE **8/27/07** SHEET **2** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/23/02** BORING FINISH **1/30/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
											▽	after completion of boring. SWL @ 23.5' on 1/30/02 with NQ hole to 125.1' SWL - Dry on 1/29/02 with NQ hole to 25.1'
3	NQ-2	25.1	32.1		6.2	85	25			**N5 MEDIUM GRAY SHALE**		
										N5 MEDIUM GRAY SILTY SANDSTONE		
4	NQ-2	32.1	40.1		8.0	79	30			**5GY 6/1 GREENISH GRAY SANDSTONE** Medium grain		
										N5 MEDIUM GRAY SILTY SANDSTONE Fine grain		
5	NQ-2	40.1	50.1		10.0	78	35					
							40			**N5 MEDIUM GRAY SANDSTONE** Medium grain		
										N5 MEDIUM GRAY SHALE		
										5R 4/2 GRAYISH RED SHALE		
							45			**N5 MEDIUM GRAY SHALE**		
										N5 MEDIUM GRAY SILTY SANDSTONE Fine grain, hard		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-08** DATE **8/27/07** SHEET **3** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/23/02** BORING FINISH **1/30/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	NQ-2	50.1	57.1		5.5	76	50			**N5 MEDIUM GRAY SHALE**		
										5R 4/2 GRAYISH RED SHALE		
										RED & GRAY SHALE		
7	NQ-2	57.1	65.1		7.8	76	55			**N5 MEDIUM GRAY SHALE** vertical crack & iron stain @ 64.3'; iron stain @ 67.4'		
							60					
8	NQ-2	65.1	75.1		10.0	65	65					
										N5 MEDIUM GRAY SANDSTONE Medium grain, fractured @ 68.7' - 69.1', shale streaks		
							70			**N5 MEDIUM GRAY SHALE**		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-08** DATE **8/27/07** SHEET **4** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/23/02** BORING FINISH **1/30/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							75			**5R 4/2 GRAYISH RED SHALE** With greenish mixed in		
9	NQ-2	75.1	85.1		10.0	58				**N5 MEDIUM GRAY SHALE**		
										5R 4/2 GRAYISH RED SHALE		
							80					
										N5 MEDIUM GRAY SILTY SANDSTONE Fine grain, hard, calcite 83.7'-85.1'		
10	NQ-2	85.1	95.1		9.4	83	85					
							90			**5R 4/2 GRAYISH RED SHALE** Some calcite		
11	NQ-2	95.1	105.1		10.0	86	95			**N5 MEDIUM GRAY SHALE** Some calcite		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-08** DATE **8/27/07** SHEET **5** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/23/02** BORING FINISH **1/30/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							100					
										N5 MEDIUM GRAY SILTY SANDSTONE Fine to Medium grain		
										N5 MEDIUM GRAY SHALE		
12	NQ-2	105.1	115.1		10.0	100	105			**N4 MEDIUM DARK GRAY SHALE** Fractured @ 110.8'		
							110					
										N4 MEDIUM DARK GRAY SANDSTONE Medium grain, with shale streaks		
13	NQ-2	115.1	125.1		8.4	79	115			**N4 MEDIUM DARK GRAY SHALE**		
										N5 MEDIUM GRAY SANDSTONE Medium grain, shale streaks		
							120			**N5 MEDIUM GRAY SHALE**		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-08** DATE **8/27/07** SHEET **6** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/23/02** BORING FINISH **1/30/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							125					
14	NQ-2	125.1	133.6		9.4	83				**5R 4/2 GRAYISH RED SHALE** Note: 0.9 pickup from last run		
							130					
										5R 4/2 GRAYISH RED CLAYSTONE		
15	NQ-2	133.6	143.6		10.0	97				**N5 MEDIUM GRAY SILTY SANDSTONE** Fine to Medium grain		
							135			**N4 MEDIUM DARK GRAY SHALE**		
										N5 MEDIUM GRAY SANDSTONE Medium grain, shale streaks		
										N4 MEDIUM DARK GRAY SHALE		
							140					
16	NQ-2	143.6	153.6		10.0	100						
							145			**N5 MEDIUM GRAY SANDSTONE** Medium to coarse grain, shale streaks		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-08** DATE **8/27/07** SHEET **7** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/23/02** BORING FINISH **1/30/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
17	NQ-2	153.6	163.6		9.3	97	155					
							160					
18	NQ-2	163.6	168.6		5.7	95	165			**N4 MEDIUM DARK GRAY SHALE**		Stopped boring @ 168.6' on 1/30/02. Monitoring well to be installed at a later date.

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 533,589.2 E 1,726,988.1**

GROUND ELEVATION **944.7** SYSTEM **State Plane using NAD 83**

Water Level, ft	▽ 23.3	▼ 60.0	▼ 61.6
TIME		18 hrs	144 hrs
DATE	1/16/02	1/17/02	1/22/02

BORING NO. **D=MW-09** DATE **8/27/07** SHEET **1** OF **6**

BORING START **1/15/02** BORING FINISH **1/16/02**

PIEZOMETER TYPE WELL TYPE

HGT. RISER ABOVE GROUND **2.15** DIA

DEPTH TO TOP OF WELL SCREEN **120.1** BOTTOM **139.1**

WELL DEVELOPMENT BACKFILL

FIELD PARTY **MCR / REB** RIG **BK-81**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
												Grounding procedures not in use on this boring. Drilled 4" roller bit to 9.0' and inserted 3" PVC into overburden. Used condensate water from 0-124.9' and river water from 124.9'-144.9'
							5					
1	NQ-2	9.0	14.9		6.0	62	10			**5GY 6/1 GREENISH GRAY SILTSTONE**		Started NQ-2 coring at 9.0'.
2	NQ-2	14.9	24.9		10.0	67	15			**10YR 6/6 DARK YELLOWISH ORANGE SILTSTONE**		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **REB**

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-09** DATE **8/27/07** SHEET **2** OF **6**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/15/02** BORING FINISH **1/16/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
											▽	SWL @ 23.3' on 1/16/02 with NQ hole @ 94.9'
										10YR 6/6 DARK YELLOWISH ORANGE SANDSTONE Medium grain		
3	NQ-2	24.9	34.9		10.0	45	25			**10YR 7/4 GRAYISH ORANGE SANDSTONE** Medium grain		
										N5 MEDIUM GRAY SANDSTONE		
										N5 MEDIUM GRAY CLAY SHALE		
										RED & GRAY WEATHERED CLAY SHALE		
							30					
4	NQ-2	34.9	44.9		10.0	72	35			**5R 4/2 GRAYISH RED CLAY SHALE**		
										N5 MEDIUM GRAY CLAY SHALE		
							40					
5	NQ-2	44.9	54.9		9.8	42	45			**N5 MEDIUM GRAY SANDY CLAY SHALE**		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-09** DATE **8/27/07** SHEET **3** OF **6**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/15/02** BORING FINISH **1/16/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							50			**N5 MEDIUM GRAY CLAY SHALE**		
										RED & GRAY CLAY SHALE		
6	NQ-2	54.9	64.9		10.0	61	55					
							60			**N5 MEDIUM GRAY SANDSTONE** With limestone nodules	▼ ▽	SWL @ 60.0' on 1/17/02 18 hrs after completion of boring SWL @ 61.6' on 1/22/02 144 hrs after completion of boring
										N5 MEDIUM GRAY CLAY SHALE		
7	NQ-2	64.9	74.9		10.0	93	65			**N5 MEDIUM GRAY SANDY CLAY SHALE**		
							70			**5R 4/2 GRAYISH RED CLAYSTONE** With calcite		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-09** DATE **8/27/07** SHEET **4** OF **6**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/15/02** BORING FINISH **1/16/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										5R 4/2 GRAYISH RED CLAY SHALE		
										5R 4/2 GRAYISH RED CLAYSTONE		
8	NQ-2	74.9	84.9		10.0	90	75			With calcite **N5 MEDIUM GRAY SANDY CLAY SHALE** With calcite		
							80			**N5 MEDIUM GRAY CLAY SHALE** With calcite **N5 MEDIUM GRAY SANDY CLAY SHALE** With calcite @ 85.6', fractured @ 91.5'-92.5'		
9	NQ-2	84.9	94.9		10.0	100	85					
							90					
10	NQ-2	94.9	104.9		10.0	97	95			**N4 MEDIUM DARK GRAY CLAY SHALE**		
										N5 MEDIUM GRAY SANDSTONE Medium grain		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

BORING NO. **D=MW-09** DATE **8/27/07** SHEET **5** OF **6**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/15/02** BORING FINISH **1/16/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							100			**N5 MEDIUM GRAY CLAY SHALE**		
										5R 4/2 GRAYISH RED CLAY SHALE		
11	NQ-2	104.9	114.9		9.8	82	105					
							110			**N5 MEDIUM GRAY CLAY SHALE**		
										N5 MEDIUM GRAY CLAYEY SANDSTONE		
12	NQ-2	114.9	124.9		10.0	89	115			**N5 MEDIUM GRAY CLAY SHALE** Clay lense from 116.9'-118.2', some fractures		
							120			**N5 MEDIUM GRAY SANDSTONE** Medium grain		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-09** DATE **8/27/07** SHEET **6** OF **6**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/15/02** BORING FINISH **1/16/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
13	NQ-2	124.9	134.9		10.0	100	125			**N5 MEDIUM GRAY SANDSTONE** Medium grain, with shale streaks throughout		2000 gallons of drill water used to 124.9'
							130					
14	NQ-2	134.9	144.9		9.9	95	135					
							140			**N4 MEDIUM DARK GRAY SHALE**		Stopped boring at 144.9' on 1/16/02. Flushed boring with approx. 1000 gallons of water. Bailed boring completely dry using 20' of NQ rods and dart bailer Set well per JTM-N 120'-140' on 2/11/02

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 534,085.8 E 1,724,114.6**

GROUND ELEVATION **903.7** SYSTEM **State Plane using NAD 83**

Water Level, ft	▽ 39.2	▼ 28.1	▼ 33.5
TIME		16 hrs	120 hrs
DATE	1/22/02	1/23/02	1/28/02

BORING NO. **D=MW-10** DATE **8/27/07** SHEET **1** OF **7**

BORING START **1/17/02** BORING FINISH **1/22/02**

PIEZOMETER TYPE WELL TYPE

HGT. RISER ABOVE GROUND **2.176** DIA

DEPTH TO TOP OF WELL SCREEN **60.9** BOTTOM **78.9**

WELL DEVELOPMENT BACKFILL

FIELD PARTY **MCR / REB** RIG **BK-81**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
												Grounding procedures not in use on this boring. Drilled 4" roller bit to 9.0' and inserted 3" PVC to bedrock. Used river water from fire header at Amos Plant for drill water.
1	NQ-2	9.0	15.0		5.2	46	5			**5R 3/4 DUSKY RED CLAY SHALE**		Started NQ-2 coring at 9.0'.
							10			**10YR 6/6 DARK YELLOWISH ORANGE CLAY SHALE**		
2	NQ-2	15.0	25.0		10.0	48	15			**10YR 6/6 DARK YELLOWISH ORANGE SILTSTONE**		
										10YR 6/6 DARK YELLOWISH ORANGE CLAY		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **REB**

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-10** DATE **8/27/07** SHEET **2** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/17/02** BORING FINISH **1/22/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										SHALE		
										5R 3/4 DUSKY RED CLAY SHALE		
										10YR 6/6 DARK YELLOWISH ORANGE SILTSTONE		
3	NQ-2	25.0	35.0		9.8	23	25			**5GY 6/1 GREENISH GRAY CLAY SHALE** Fractured throughout	▼	SWL @ 28.1' on 1/23/02 16 hrs after completion of boring.
							30			**5GY 6/1 GREENISH GRAY SILTSTONE** Fractured throughout	▼	SWL @ 33.5' on 1/28/02 120 hrs after completion of boring.
										5GY 6/1 GREENISH GRAY CLAY SHALE		
4	NQ-2	35.0	45.0		10.0	51	35			**5GY 6/1 GREENISH GRAY SILTSTONE**		
										5R 4/2 GRAYISH RED SHALE		
										5GY 6/1 GREENISH GRAY CLAY SHALE		
										N5 MEDIUM GRAY SHALEY SANDSTONE Fractured @ 39.0', iron stain	▽	SWL @ 39.2' on 1/22/02 with NQ hole @ 75.0' - 96 hour reading.
							40			**N5 MEDIUM GRAY SHALE**		
										5R 4/2 GRAYISH RED SHALE Fractured from 44.0'-45.0'		
5	NQ-2	45.0	55.0		10.0	92	45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-10** DATE **8/27/07** SHEET **3** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/17/02** BORING FINISH **1/22/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										N5 MEDIUM GRAY SHALE		
							50			**N5 MEDIUM GRAY SHALEY SANDSTONE** Medium grain		
6	NQ-2	55.0	65.0		10.0	100	55			**N5 MEDIUM GRAY SANDSTONE** Medium grain, shale streaks throughout		
							60			**N5 MEDIUM GRAY SANDSTONE** Medium to Coarse grain, shale streaks throughout Note: Fractured from 69.3'-71.4'		
7	NQ-2	65.0	75.0		10.0	100	65					
							70					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-10** DATE **8/27/07** SHEET **4** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/17/02** BORING FINISH **1/22/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							75					
8	NQ-2	75.0	85.0		10.0	96				**N5 MEDIUM GRAY SANDSTONE** Medium to Coarse grain		
							80					
										N5 MEDIUM GRAY SHALE		
9	NQ-2	85.0	95.0		10.0	86	85			**N5 MEDIUM GRAY to N4 MEDIUM DARK GRAY SHALE**		
							90					
										5R 4/2 GRAYISH RED SHALE		
10	NQ-2	95.0	105.0		10.0	82	95					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

BORING NO. **D=MW-10** DATE **8/27/07** SHEET **5** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/17/02** BORING FINISH **1/22/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										N5 MEDIUM GRAY SHALE		
							100			**N5 MEDIUM GRAY FINE GRAIN SANDY SHALE**		
11	NQ-2	105.0	115.0		10.0	100	105			**N5 MEDIUM GRAY SHALEY SANDSTONE** Fine to Medium grain, limestone nodules		
							110					
12	NQ-2	115.0	125.0		9.6	86	115			**N5 MEDIUM GRAY SHALEY SANDSTONE** Fine to Medium grain		
										N5 MEDIUM GRAY SANDSTONE Coarse grain		
							120			**5R 4/2 GRAYISH RED SHALE**		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-10** DATE **8/27/07** SHEET **6** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/17/02** BORING FINISH **1/22/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							125					
13	NQ-2	125.0	135.0		9.8	63				**N5 MEDIUM GRAY SHALE**		
										RED, GRAY & BROWNISH SHALE		
							130			**N5 MEDIUM GRAY SHALEY SANDSTONE** Fine grain		
14	NQ-2	135.0	145.0		10.0	100	135			**N5 MEDIUM GRAY SHALE**		
							140			**N5 MEDIUM GRAY SHALEY SANDSTONE**		
										N5 MEDIUM GRAY SHALE		
15	NQ-2	145.0	155.0		9.8	61	145			**N4 MEDIUM DARK GRAY WEATHERED SHALE**		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **D=MW-10** DATE **8/27/07** SHEET **7** OF **7**

PROJECT **EPRI GROUND WATER STUDY - AMOS** BORING START **1/17/02** BORING FINISH **1/22/02**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										N5 MEDIUM GRAY SILTY SANDSTONE Fine grain		
										N5 MEDIUM GRAY SHALE Reddish tint		
16	NQ-2	155.0	165.0		10.0	90	155			**N5 MEDIUM GRAY SILTY SANDSTONE** Fine grain		
							160			**N5 MEDIUM GRAY SHALE**		
										5R 4/2 GRAYISH RED SHALE		
							165					Stopped boring at 165.0' on 1/22/02.

AEP EPRI_AMOS.GPJ AEP.GDT 8/27/07

ARCADIS

Electric Power Research Institute, 1999

Well Construction Diagrams

MW-1 to MW-10

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER _____

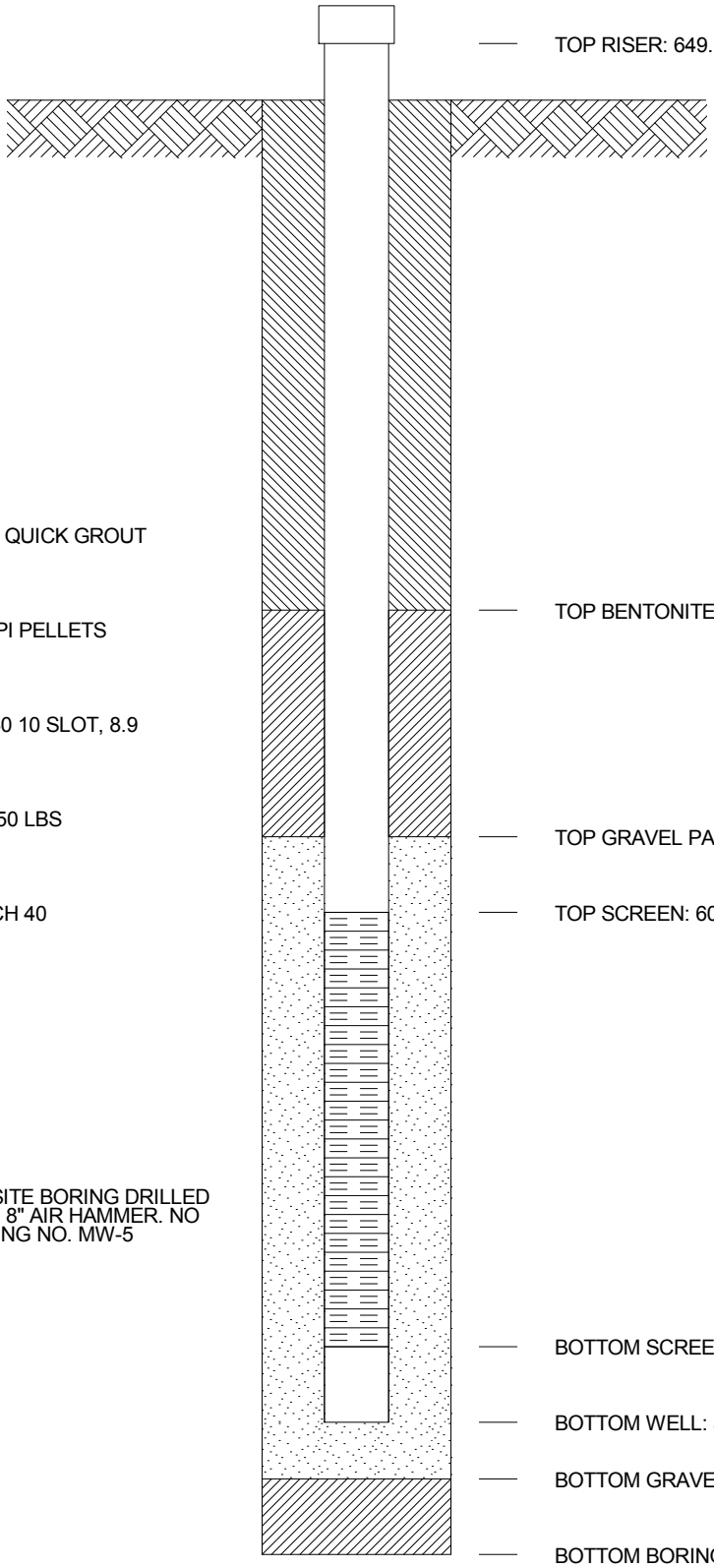
COMPANY _____ WELL No. **MW-1** BORING No. **D=MW-01** INSTALLED **7/27/95**

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 531,275.0 E 1,724,355.0**

SYSTEM **STATE PLANE**

GROUND ELEVATION 647.57 FT.



GROUT SEAL: 450 GALLONS QUICK GROUT

BENTONITE SEAL: 100 LBS. PI PELLETS

SCREEN: 2.0 dia., PVC SCH 40 10 SLOT, 8.9

GRAVEL PACK: #5 & SHOT 850 LBS

RISER PIPE: 2.0, dia., PVC SCH 40

SPACERS, DEPTH:

FLY ASH DAM CLUSTERED SITE BORING DRILLED USING 10" CASING AND 8" AIR HAMMER. NO CORE TAKEN SEE BORING NO. MW-5

GEOMCNST EPRI_AMOS.GPJ AEP.GDT 6/14/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER _____

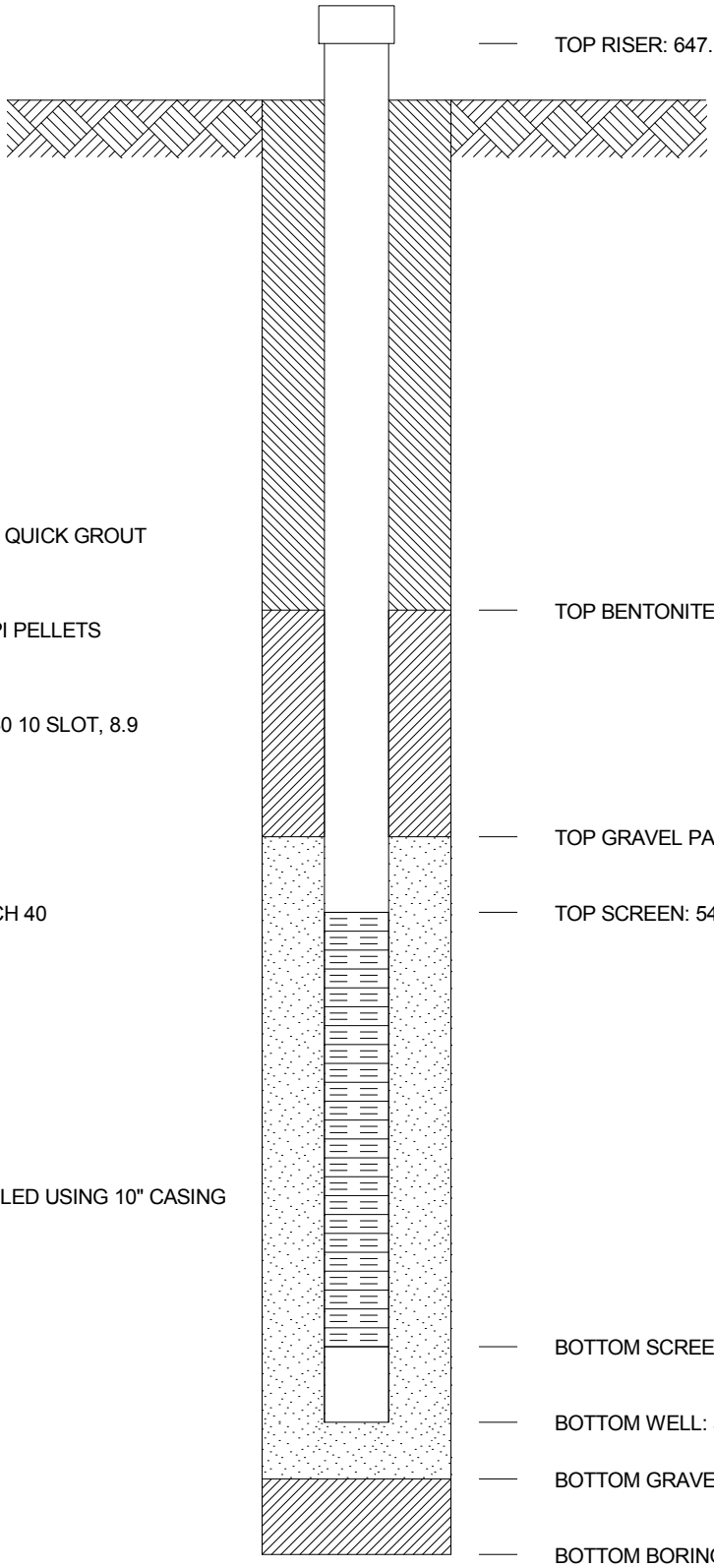
COMPANY _____ WELL No. **MW-2** BORING No. **D=MW-02** INSTALLED **7/27/95**

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 529,941.0 E 1,724,235.0**

SYSTEM **STATE PLANE**

GROUND ELEVATION 645.20 FT.



GROUT SEAL: 250 GALLONS QUICK GROUT

BENTONITE SEAL: 100 BLS PI PELLETS

SCREEN: 2.0 dia., PVC SCH 40 10 SLOT, 8.9

GRAVEL PACK: #5 & SHOT

RISER PIPE: 2.0, dia., PVC SCH 40

SPACERS, DEPTH:

FLY ASH DAM BORING DRILLED USING 10" CASING AND 8" AIR HAMMER.

GEOMCNST EPRI_AMOS.GPJ AEP.GDT 6/14/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER _____

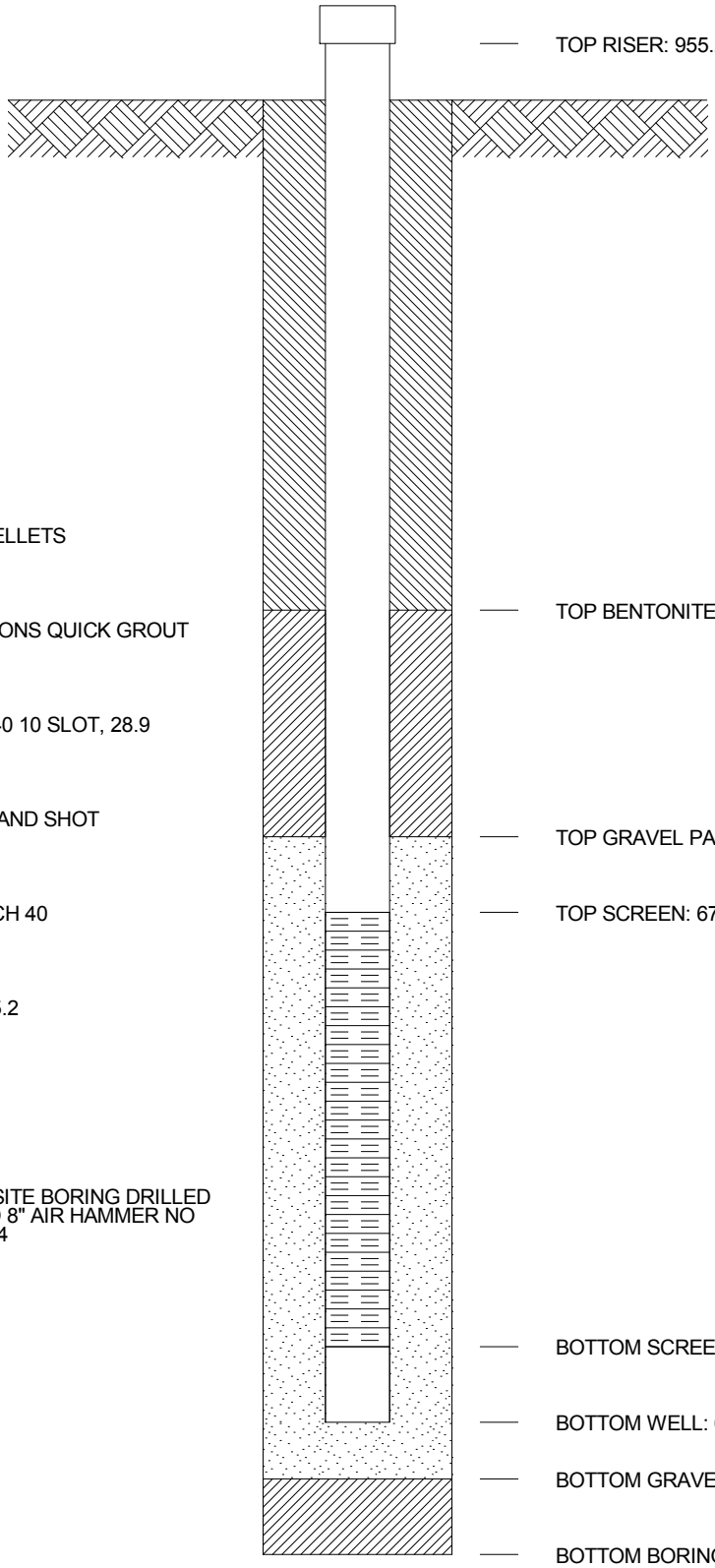
COMPANY _____ WELL No. **MW-3** BORING No. **D=MW-03** INSTALLED **8/10/95**

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 530,928.0 E 1,728,546.0**

SYSTEM **STATE PLANE**

GROUND ELEVATION 952.99 FT.



GROUT SEAL: 150 LBS. PI PELLETS

BENTONITE SEAL: 750 GALLONS QUICK GROUT

SCREEN: 2.0 dia., PVC SCH 40 10 SLOT, 28.9

GRAVEL PACK: 1150,250 #5 AND SHOT

RISER PIPE: 2.0, dia., PVC SCH 40

SPACERS, DEPTH: 305.2-295.2

FLY ASH DAM CLUSTERED SITE BORING DRILLED USING 10" CASING AND 8" AIR HAMMER NO CORE TAKEN SEE MW-4

GEOMCNST EPRI_AMOS.GPJ AEP.GDT 6/14/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER _____

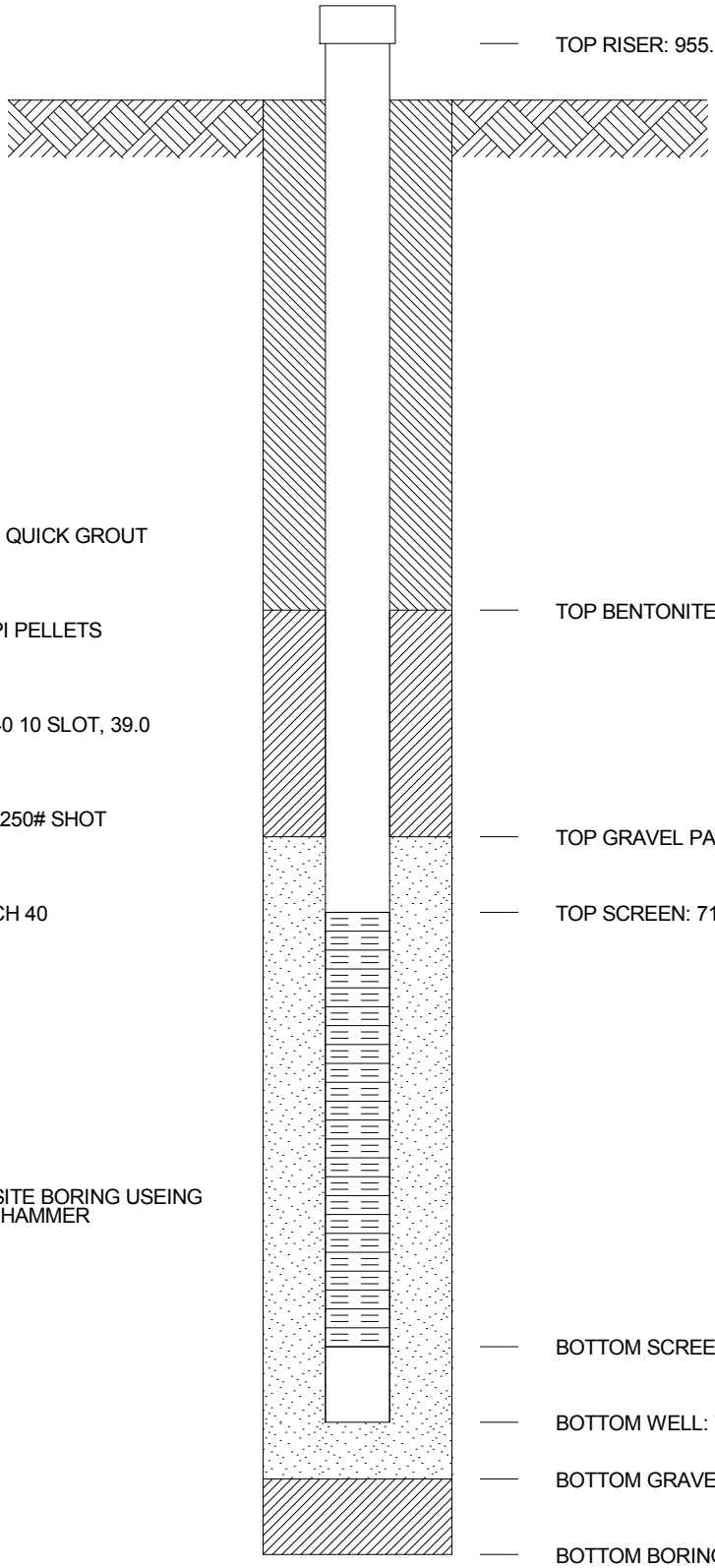
COMPANY _____ WELL No. **MW-4** BORING No. **D=MW-04** INSTALLED **7/20/95**

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 530,922.0 E 1,728,552.0**

SYSTEM **STATE PLANE**

GROUND ELEVATION 953.20 FT.



GROUT SEAL: 750 GALLONS QUICK GROUT

BENTONITE SEAL: 150 LBS PI PELLETS

SCREEN: 2.0 dia., PVC SCH 40 10 SLOT, 39.0

GRAVEL PACK: 1550 LBS #5\250# SHOT

RISER PIPE: 2.0, dia., PVC SCH 40

SPACERS, DEPTH:

FLY ASH DAM CLUSTERED SITE BORING USEING
10" CASING AND 8" AIR HAMMER

GEOMCNST EPRI_AMOS.GPJ AEP.GDT 6/14/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER _____

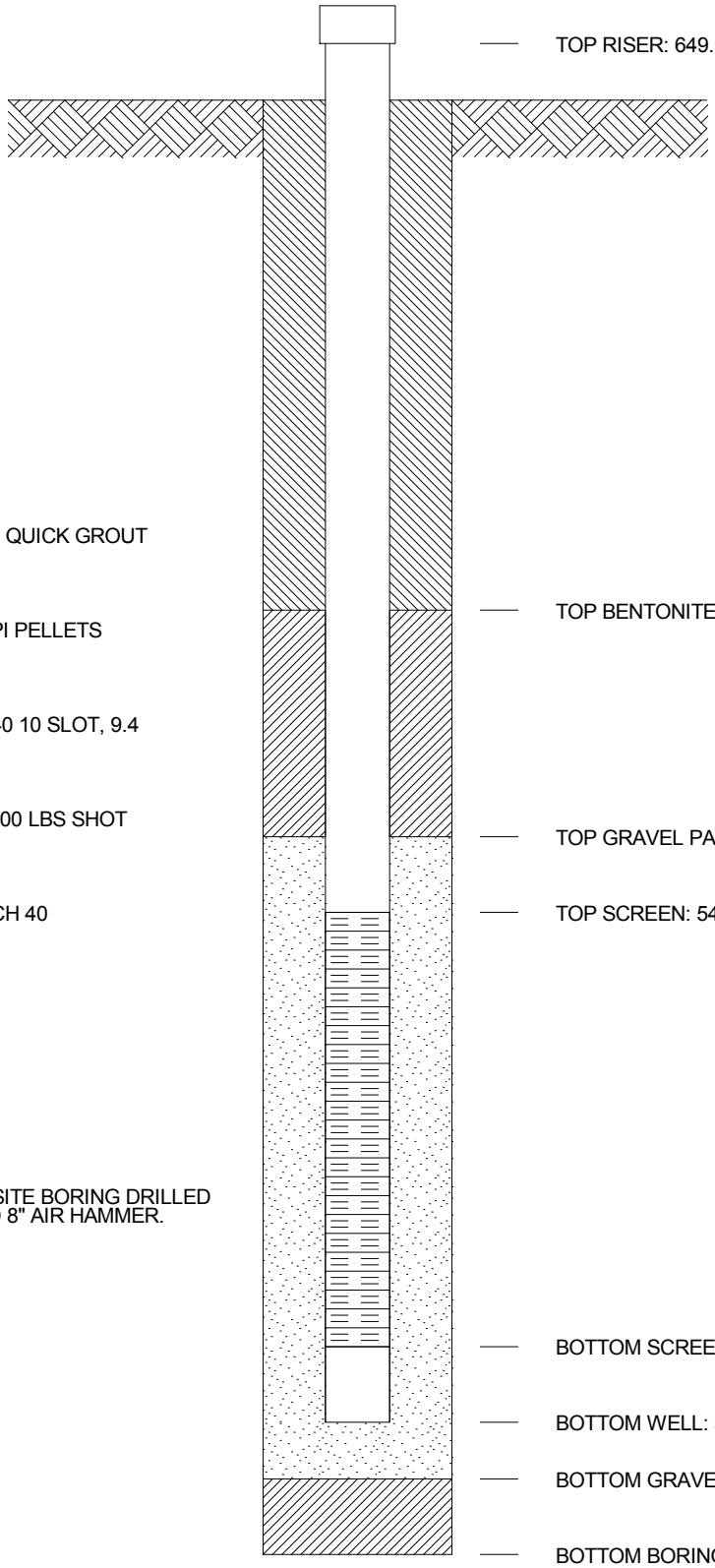
COMPANY _____ WELL No. **MW-5** BORING No. **D=MW-05** INSTALLED **7/26/95**

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 531,282.0 E 1,724,360.0**

SYSTEM **STATE PLANE**

GROUND ELEVATION 648.03 FT.



GROUT SEAL: 600 GALLONS QUICK GROUT

BENTONITE SEAL: 100 LBS PI PELLETS

SCREEN: 2.0 dia., PVC SCH 40 10 SLOT, 9.4

GRAVEL PACK: 500 LBS #5 200 LBS SHOT

RISER PIPE: 2.0, dia., PVC SCH 40

SPACERS, DEPTH:

FLY ASH DAM CLUSTERED SITE BORING DRILLED USING 10" CASING AND 8" AIR HAMMER.

GEOMCNST EPRI_AMOS.GPJ AEP.GDT 6/14/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER _____

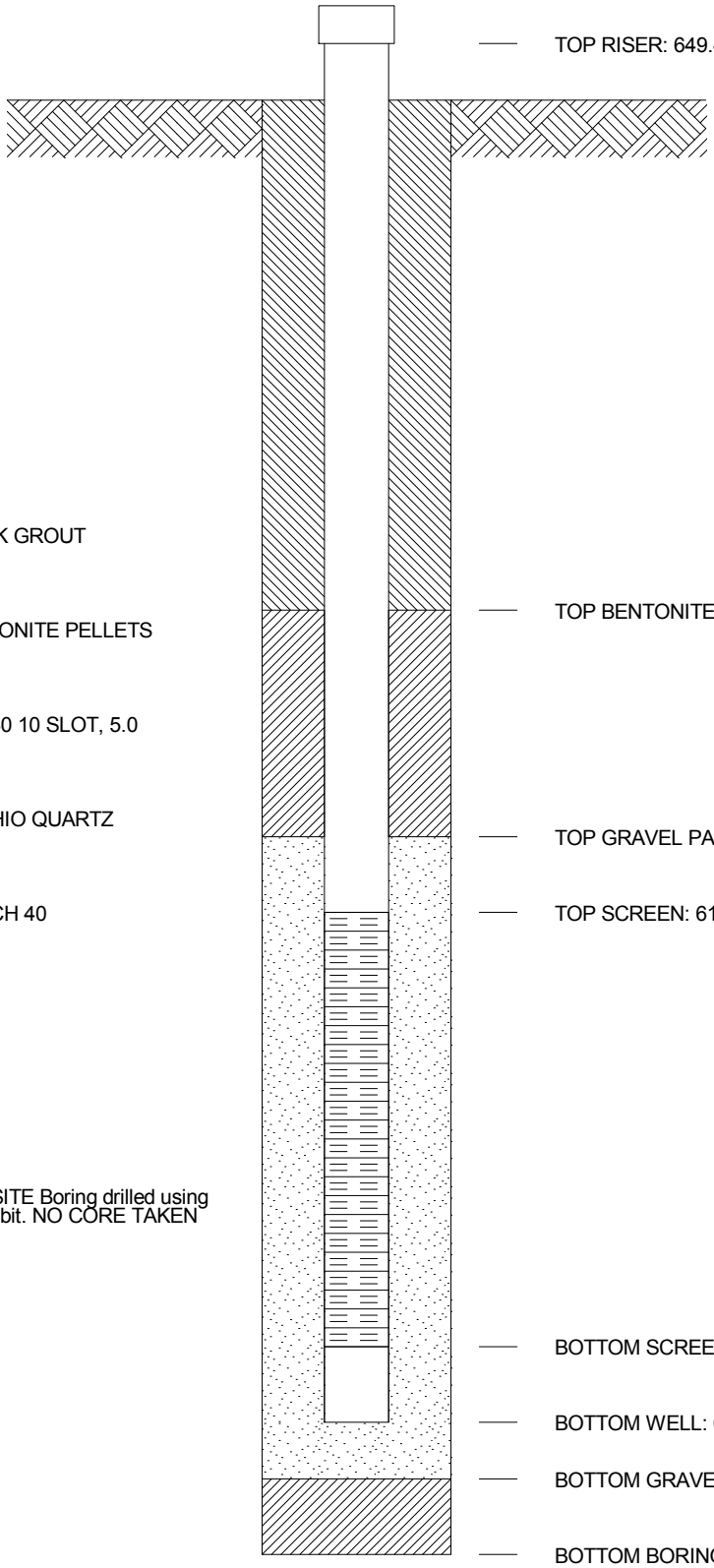
COMPANY _____ WELL No. **MW-6** BORING No. **D=MW-06** INSTALLED **8/21/95**

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 531,266.0 E 1,724,352.0**

SYSTEM **STATE PLANE**

GROUND ELEVATION 647.50 FT.



GROUT SEAL: 75 GAL. QUICK GROUT

BENTONITE SEAL: 75# BENTONITE PELLETS

SCREEN: 2.0 dia., PVC SCH 40 10 SLOT, 5.0

GRAVEL PACK: 75# NO. 5 OHIO QUARTZ

RISER PIPE: 2.0, dia., PVC SCH 40

SPACERS, DEPTH:

FLY ASH DAM CLUSTERED SITE Boring drilled using 6.25 hsa and 5 7/8" roller bit. NO CORE TAKEN SEE MW-5

GEOMCNST EPRI_AMOS.GPJ AEP.GDT 6/14/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER _____

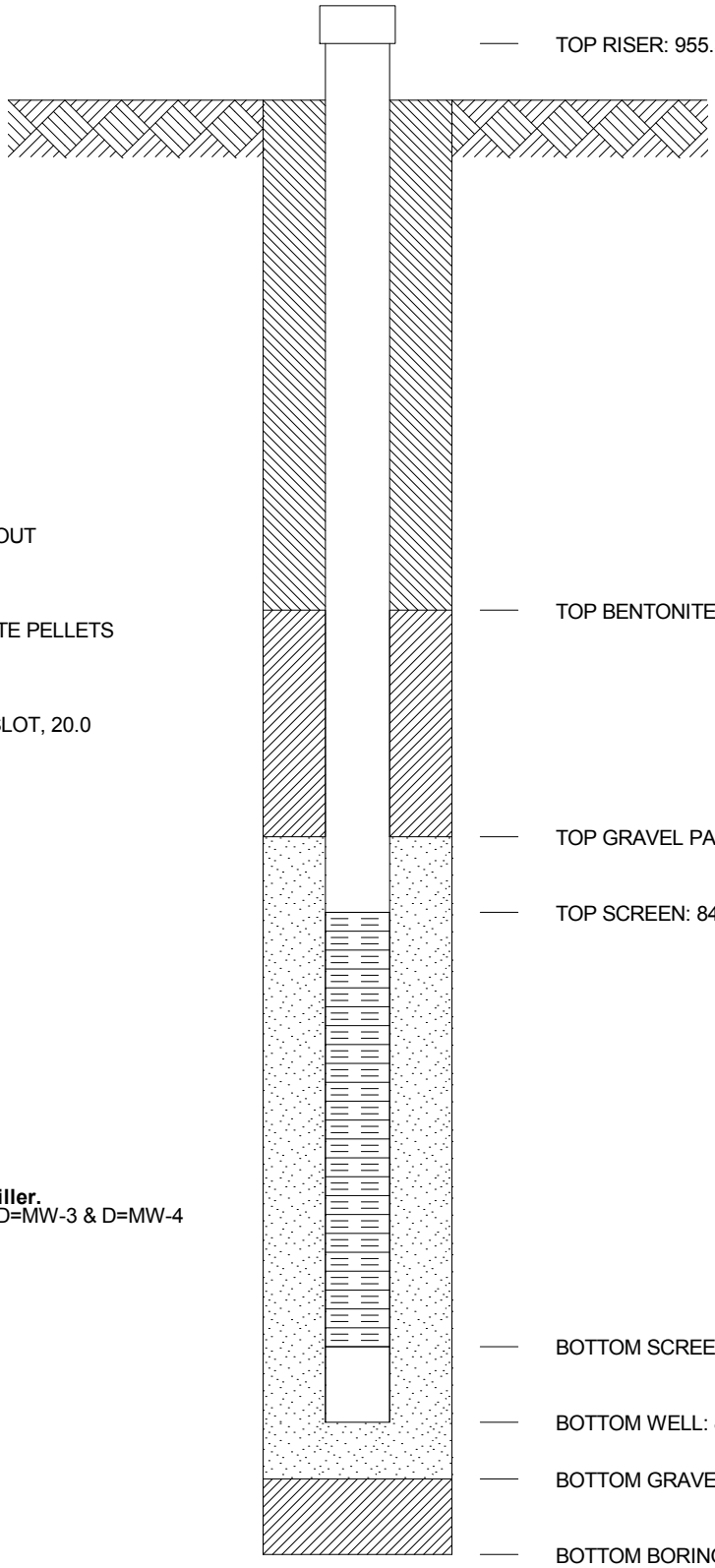
COMPANY _____ WELL No. **MW-7** BORING No. **D=MW-07** INSTALLED **3/26/96**

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 530,938.0 E 1,788,533.0**

SYSTEM _____

GROUND ELEVATION 953.00 FT.



GROUT SEAL: VOLCLAY GROUT

BENTONITE SEAL: BENTONITE PELLETS

SCREEN: 2.0 dia., PVC .020 SLOT, 20.0

GRAVEL PACK: SAND

RISER PIPE: 2.0, dia., PVC

SPACERS, DEPTH:

Well installed by contract driller.
WELL IS CLUSTERED WITH D=MW-3 & D=MW-4

Used 4 centralizers
Top 3' - Sakcrete

GEOMCNST EPRI_AMOS.GPJ AEP.GDT 6/14/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER _____

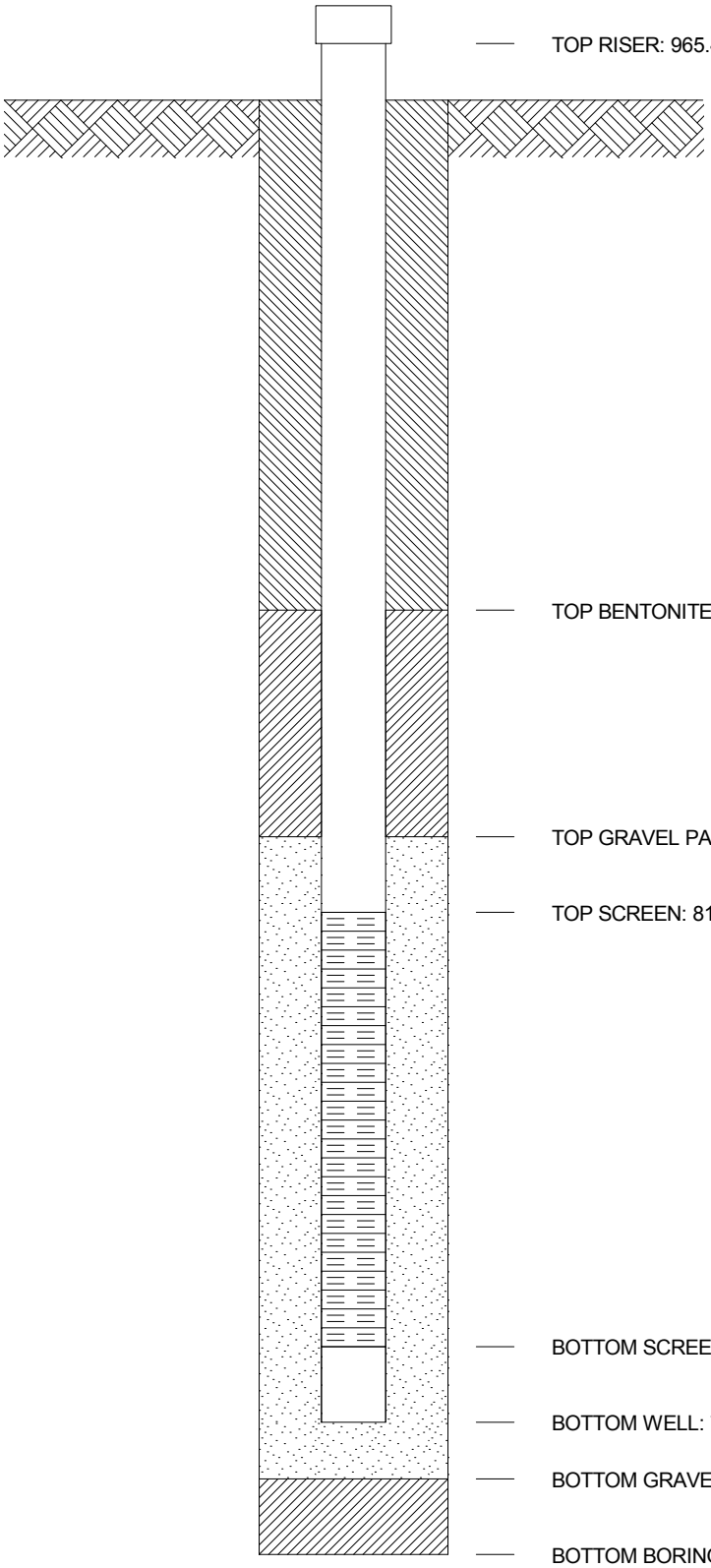
COMPANY _____ WELL No. **MW-8/001** BORING No. **D=MW-08** INSTALLED **1/30/02**

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 533,742.0 E 1,727,871.7**

SYSTEM **State Plane using NAD 83**

GROUND ELEVATION 963.01 FT.



GROUT SEAL:

BENTONITE SEAL:

SCREEN: dia., , 19.0

GRAVEL PACK:

RISER PIPE: , dia.,

SPACERS, DEPTH:

GEOMCNST EPRI_AMOS.GPJ AEP.GDT 6/14/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER _____

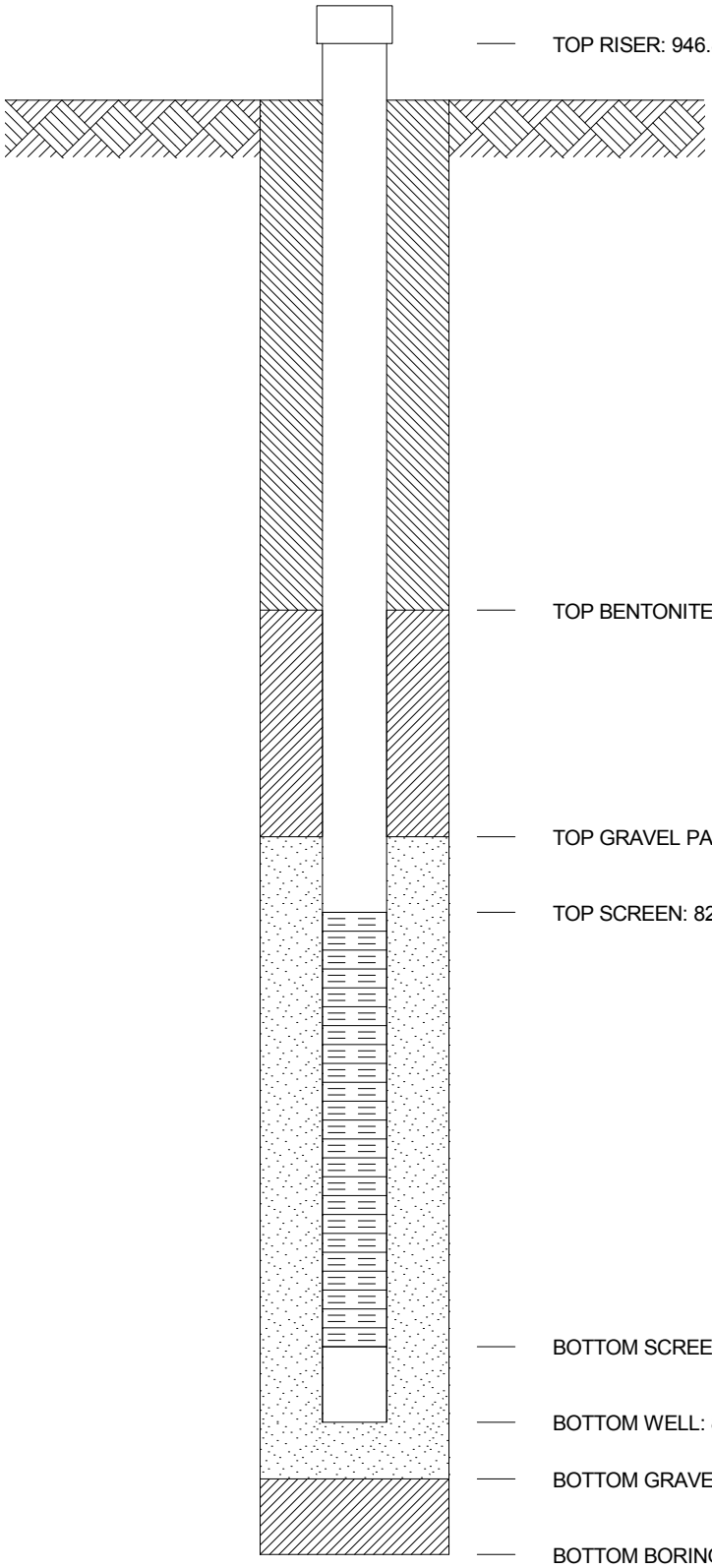
COMPANY _____ WELL No. **MW-9/001** BORING No. **D=MW-09** INSTALLED **1/16/02**

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 533,589.2 E 1,726,988.1**

SYSTEM **State Plane using NAD 83**

GROUND ELEVATION 944.66 FT.



GROUT SEAL:

BENTONITE SEAL:

SCREEN: dia., , 19.0

GRAVEL PACK:

RISER PIPE: , dia.,

SPACERS, DEPTH:

GEOMCNST EPRI_AMOS.GPJ AEP.GDT 6/14/13

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

MONITORING WELL CONSTRUCTION

JOB NUMBER _____

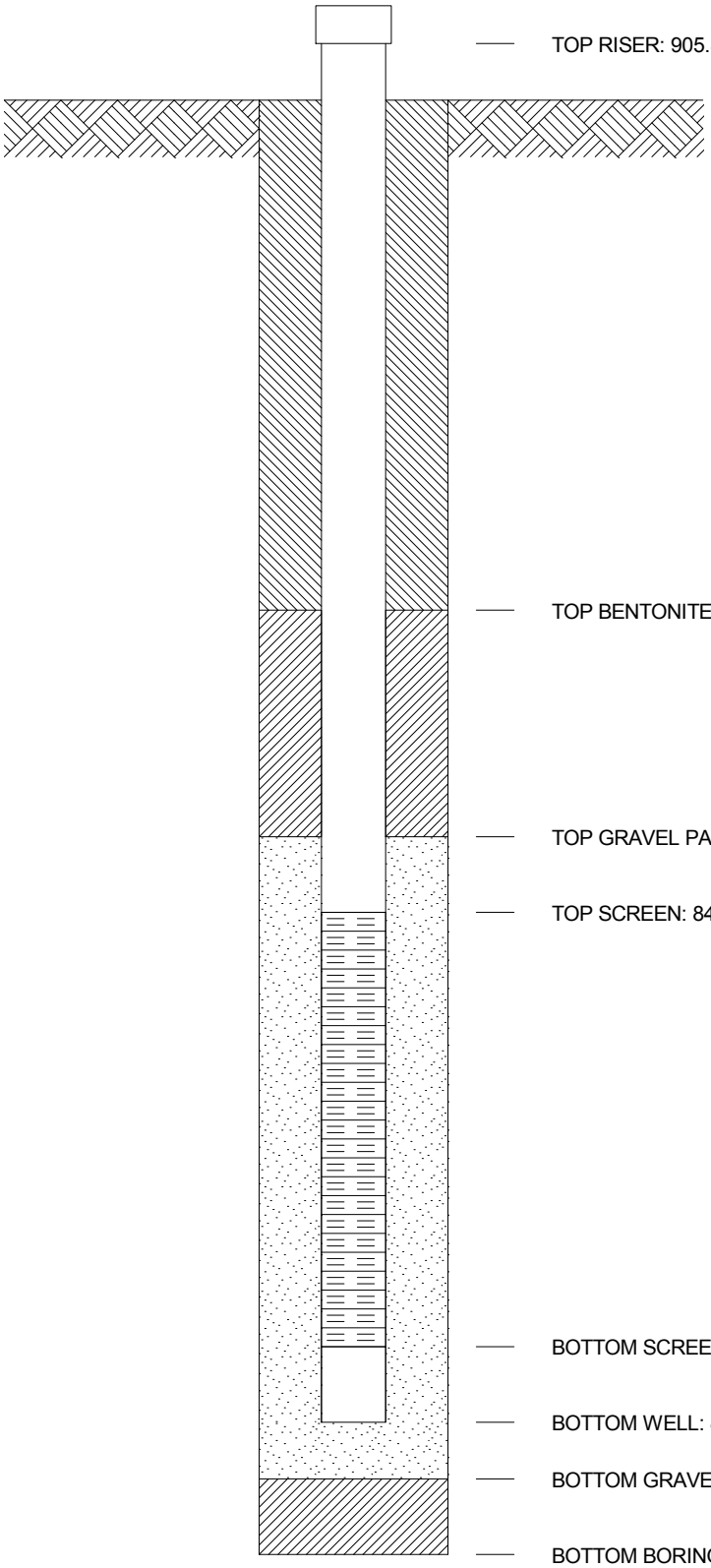
COMPANY _____ WELL No. **MW-10/002** BORING No. **D=MW-10** INSTALLED **1/22/02**

PROJECT **EPRI GROUND WATER STUDY - AMOS**

COORDINATES **N 534,085.8 E 1,724,114.6**

SYSTEM **State Plane using NAD 83**

GROUND ELEVATION 903.68 FT.



GROUT SEAL:

BENTONITE SEAL:

SCREEN: dia., , 19.0

GRAVEL PACK:

RISER PIPE: , dia.,

SPACERS, DEPTH:

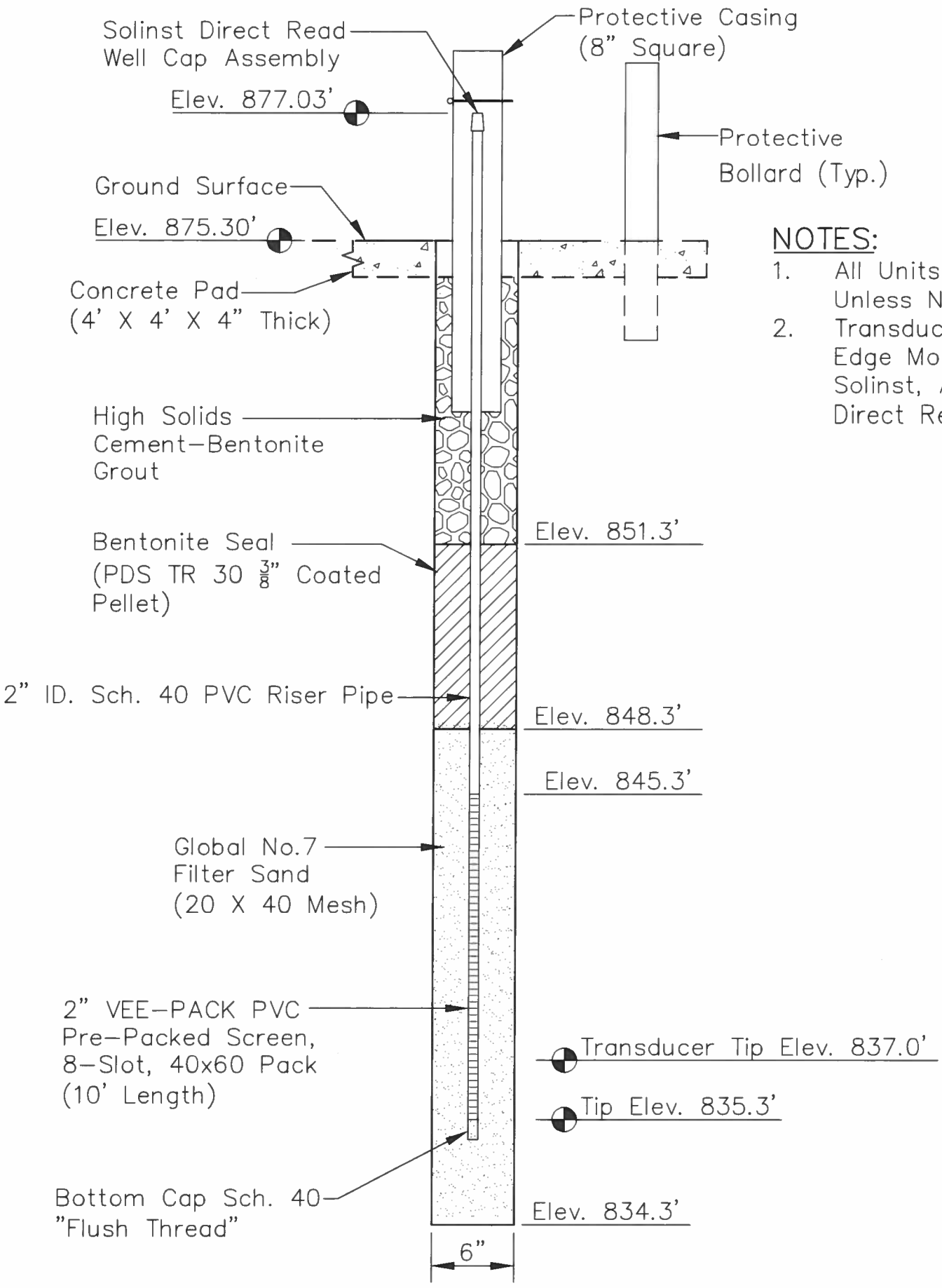
GEOMCNST EPRI_AMOS.GPJ AEP.GDT 6/14/13

ARCADIS

Stantec Consulting Services Inc., 2012

Well Construction Diagrams

STN-12-4, STN-12-8, STN-12-9



NOTES:

1. All Units Are in Feet Unless Noted Otherwise.
2. Transducer is Levelogger Edge Model 3001 by Solinst, Attached to a Direct Read Cable.

LOCATION:
Northing: 532,150.52
Easting: 1,728,713.76
Ground Elevation: 875.30'
Installation Date: 2/21/12
Horizontal Datum: NAD83
WV. South
Vertical Datum: NAVD 88

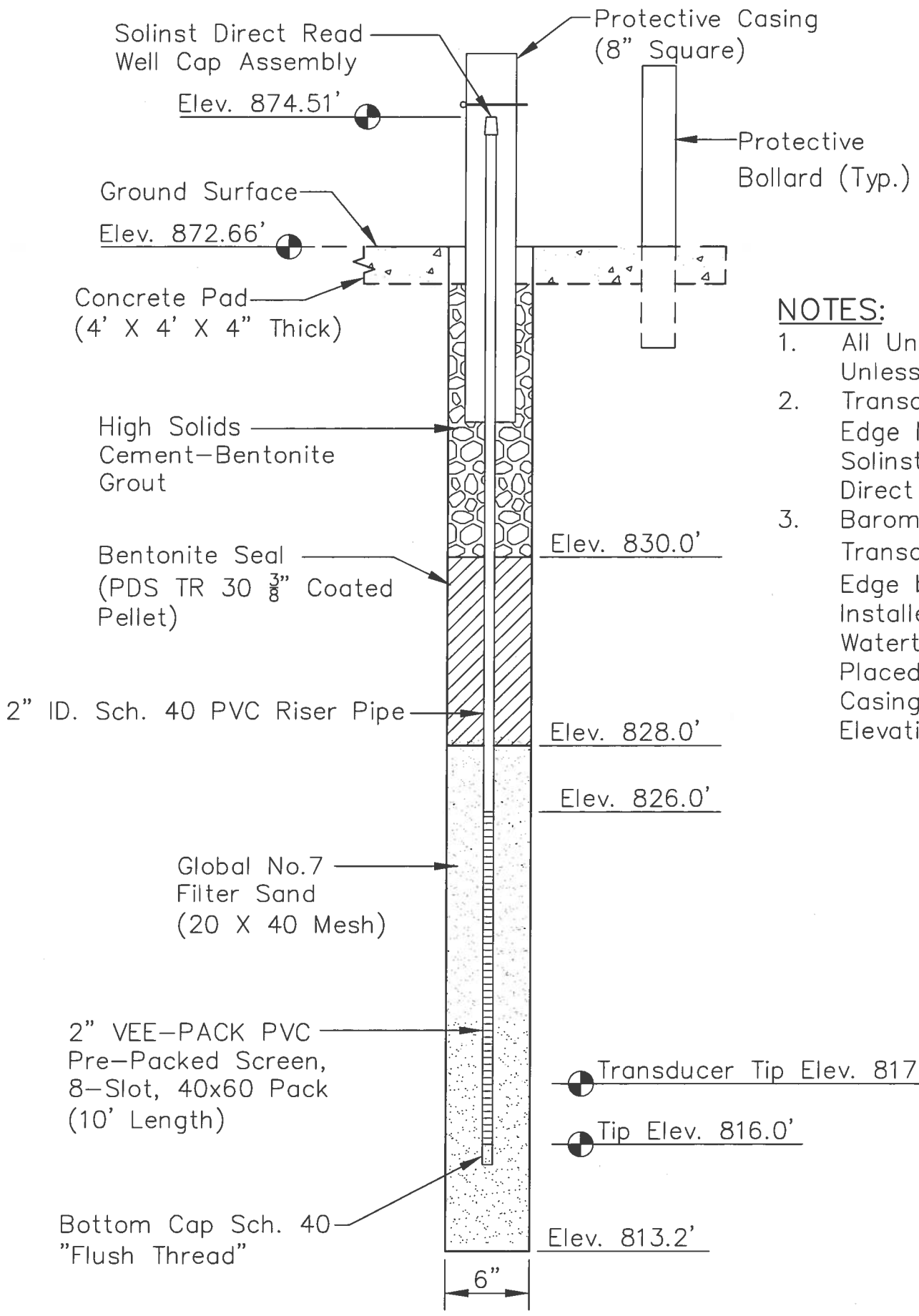
PIEZOMETER DETAIL
AEP AMOS POWER PLANT, FLY ASH DAM COMPLEX
STN-12-9, WEST VIRGINIA WELL ID WV00054-0001-12

Stantec

Stantec Consulting Services Inc.
11687 Lebanon Rd.
Cincinnati, Ohio
45241-2012
513-842-8200
www.stantec.com

				REVISED		SHEET
DRAWN BY	MSJ	DATE	4/25/12	1.	3.	1 OF 1
CHECKED BY	JMM	PROJ. NO.	175661014	2.	4.	
CHECKED BY	JSD	SCALE	NTS			

PLOT DATE: 04/27/2012 USER: JENNINGS, MATTHEW
U:\1756\175661014\ENVIRONMENTAL\DRAWING\SHEET_FILES\MONITORING WELLS\STN-12-9-WELL-LOG.DWG



NOTES:

1. All Units Are in Feet Unless Noted Otherwise.
2. Transducer is Levelogger Edge Model 3001 by Solinst, Attached to a Direct Read Cable.
3. Barometric Pressure Transducer (Baralogger Edge by Solinst) Installed in Seperate Watertight PVC Riser Placed Inside Protective Casing. Barometric Elevation = 868.00 Feet.

LOCATION:

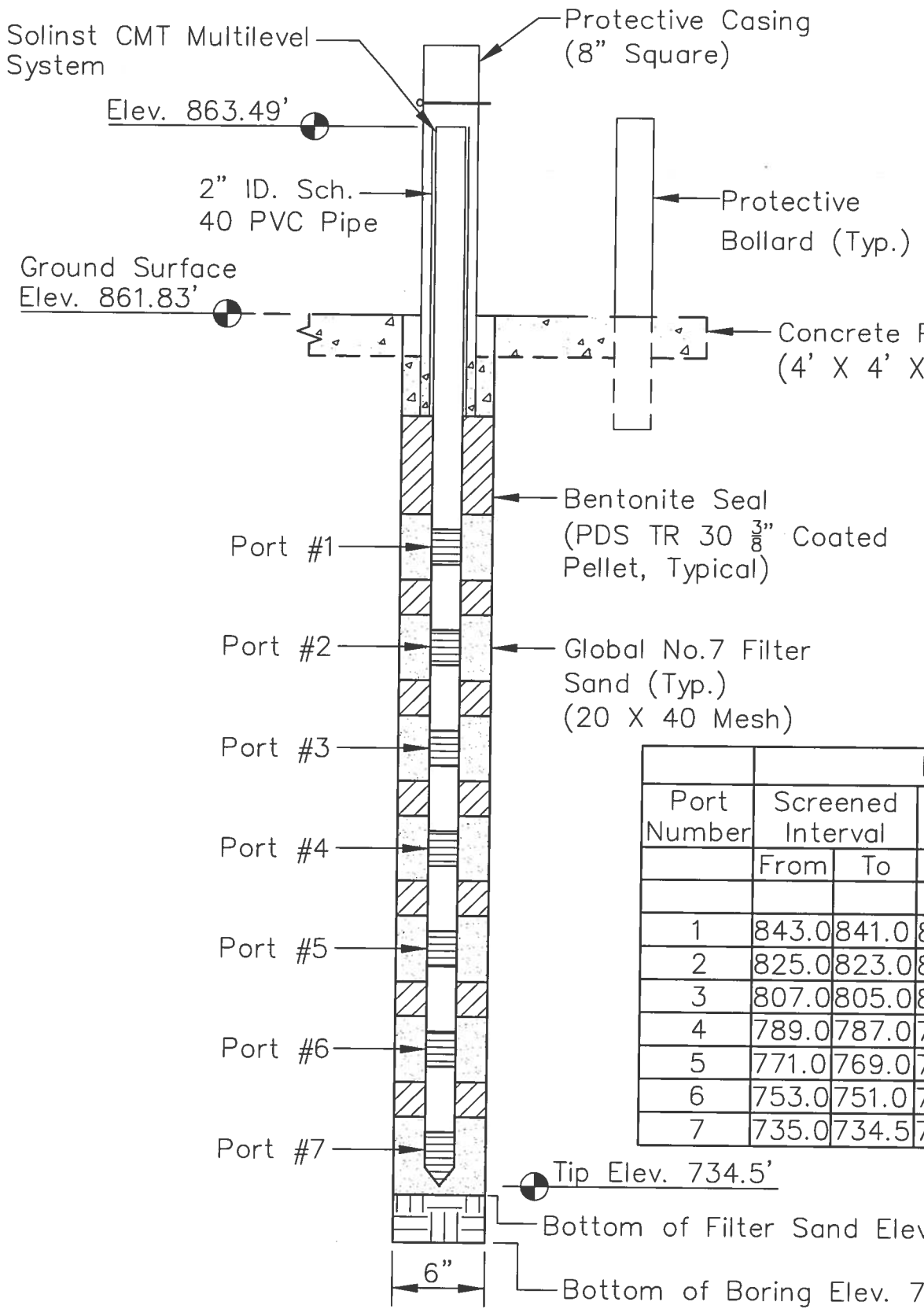
Northing: 532,214.20
Easting: 1,728,169.25
Ground Elevation: 872.66'
Installation Date: 2/24/12
Horizontal Datum: NAD83 WV. South
Vertical Datum: NAVD 88

PLOT DATE: 04/26/2012 USER: JENNINGS, MATTHEW
U:\1756\17566101 4\ENVIRONMENTAL\DRAWING\SHEET_FILES\MONITORING WELLS\STN-12-8-WELL-LOG.DWG

PIEZOMETER DETAIL
AEP AMOS POWER PLANT, FLY ASH DAM COMPLEX
STN-12-8, WEST VIRGINIA WELL ID WV00054-0002-12

Stantec Consulting Services Inc.
11687 Lebanon Rd.
Cincinnati, Ohio
45241-2012
513-842-8200
www.stantec.com

DRAWN BY	MSJ	DATE	4/25/12	REVISED		SHEET
CHECKED BY	JMM	PROJ. NO.	175661014	1.	3.	1 OF 1
CHECKED BY	JSD	SCALE	NTS	2.	4.	



NOTES:

1. All Units Are in Feet Unless Noted Otherwise.
2. Typical Port Length is 2 ft. Unless Noted Otherwise.
3. 4.4" Dia. Centralizers Placed at 10ft. Spacing Along Well Tubing (Not Shown).

Port Number	Elevation (ft.)					
	Screened Interval		Filter Pack Interval		Bentonite Seal Interval	
	From	To	From	To	From	To
					861.5	845.1
1	843.0	841.0	845.1	839.1	839.1	827.0
2	825.0	823.0	827.0	821.0	821.0	809.1
3	807.0	805.0	809.1	803.0	803.0	791.2
4	789.0	787.0	791.2	785.0	785.0	773.2
5	771.0	769.0	773.2	767.2	767.2	756.5
6	753.0	751.0	756.5	749.0	749.4	737.5
7	735.0	734.5	737.5	734.0		

LOCATION:

Northing: 531,882.29
Easting: 1,726,127.18
Ground Elevation: 861.83'
Installation Date: 3/8/12
Horizontal Datum: NAD 83 WV. South
Vertical Datum: NAVD 88

PLOT DATE: 04/27/2012 USER: JENNINGS, MATTHEW
U:\1756\175661014\ENVIRONMENTAL\DRAWING\SHEET_FILES\MONITORING WELLS\STN-12-4-WELL-LOG.DWG

PIEZOMETER DETAIL
AEP AMOS POWER PLANT, FLY ASH DAM COMPLEX
STN-12-4, WEST VIRGINIA WELL ID WV00054-0003-12

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Cincinnati, Ohio
45241-2012
513-842-8200
www.stantec.com

DRAWN BY	MSJ	DATE	4/25/12	REVISED	SHEET
CHECKED BY	JMM	PROJ. NO.	175661014	1. 3.	1 OF 1
CHECKED BY	JSD	SCALE	NTS	2. 4.	

ARCADIS

American Electric Power, 1975-1984

Piezometer Construction Information

PP2, PP3, PP4R, PP7R, PP8F, PP8RA, P8400, P8401

AMOS

PIEZOMETER PP2

FLY ASH DAM
INSTALLED - MAR76

NORTH : 531523.4
EAST : 1724596.6

TOP OF RISER ELEVATION : 679.0
TIP ELEVATION : 631.6
GROUND ELEVATION : 677.5
SCREENED INT : 631.6-636
NOTES : SCREENED IN BLANKET DRAIN

DATE	READING (FT.)	ELEVATION (FT.)
Feb-84	41.83	637.17
Sep-84	41.92	637.08
Oct-84	41.92	637.08
Dec-84	42.08	636.92
Jan-85	42.00	637.00
Mar-85	42.00	637.00
Apr-85	42.08	636.92
May-85	42.17	636.83
Jun-85	42.08	636.92
Jul-85	42.00	637.00
Oct-85	46.50	632.50
Nov-85	42.50	636.50
Dec-85	42.33	636.67
Jan-86	42.42	636.58
Feb-86	42.17	636.83
Mar-86	42.33	636.67
Apr-86	42.17	636.83
May-86	42.33	636.67
Jun-86	42.00	637.00
Jul-86	42.08	636.92
Aug-86	42.42	636.58
Sep-86	42.00	637.00
Oct-86	42.25	636.75
Nov-86	42.00	637.00
Dec-86	42.17	636.83
Jan-87	42.17	636.83
Feb-87	42.00	637.00
Mar-87	42.42	636.58
Apr-87	42.17	636.83
May-87	42.50	636.50
Jun-87	42.17	636.83
Jul-87	42.08	636.92
Aug-87	42.08	636.92
Sep-87	42.00	637.00
Nov-87	42.08	636.92
Dec-87	42.50	636.50
Jan-88	42.00	637.00
Feb-88	42.33	636.67
Mar-88	42.00	637.00
Apr-88	42.00	637.00
May-88	42.00	637.00
Jun-88	42.00	637.00
Jul-88	41.75	637.25
Aug-88	42.17	636.83
Sep-88	42.08	636.92
Oct-88	42.08	636.92
Nov-88	42.08	636.92
Dec-88	41.58	637.42
Jan-89	42.75	636.25
Feb-89	42.75	636.25
Mar-89	42.58	636.42
Apr-89	44.25	634.75
May-89	44.25	634.75
Jun-89	43.75	635.25
Jul-89	43.92	635.08
Aug-89	44.00	635.00
Sep-89	44.00	635.00
Oct-89	43.83	635.17
Nov-89	44.17	634.83
Jan-90	43.92	635.08
Feb-90	43.92	635.08
Mar-90	44.00	635.00
Apr-90	43.83	635.17
May-90	44.00	635.00
Jun-90	44.25	634.75
Jul-90	42.58	636.42
Aug-90	42.50	636.50
Sep-90	43.92	635.08
Oct-90	43.58	635.42
Nov-90	44.00	635.00
Dec-90	44.50	634.50
Jan-91	44.00	635.00
Feb-91	39.92	639.08
Mar-91	44.00	635.00
Apr-91	43.83	635.17
May-91	42.92	636.08
Jun-91	43.92	635.08
Sep-91	42.67	636.33
Dec-91	42.58	636.42
Mar-92	42.50	636.50
Jun-92	42.50	636.50
Sep-92	42.42	636.58
Dec-92	42.50	636.50
Mar-93	42.83	636.17
Jun-93	42.75	636.25
Sep-93	42.66	636.34
Dec-93	43.08	635.92
Mar-94	42.75	636.25
May-94	42.75	636.25
Sep-94	42.73	636.27
Dec-94	42.66	636.34
Mar-95	42.62	636.38
Jun-95	42.91	636.09
Sep-95	42.73	636.27
Dec-95	47.00	632.00
Mar-96	42.66	636.34
Jun-96	42.66	636.34
Sep-96	42.62	636.38
Dec-96	42.66	636.34
Mar-97	42.68	636.32
Jun-97	42.67	636.33
Sep-97	42.67	636.33
Dec-97	48.67	630.33
Mar-98	42.42	636.58
Jun-98	41.71	637.29
Sep-98	42.67	636.33
Dec-98	42.62	636.38
Mar-99	42.60	636.40
Jun-99	42.62	636.38
Sep-99	42.67	636.33
Dec-99	42.62	636.38
Mar-00	42.58	636.42
Jun-00	42.62	636.38
Sep-00	42.58	636.42
Dec-00	42.65	636.35
Mar-01	42.54	636.46
Jun-01	42.58	636.42
Sep-01	42.50	636.50
Dec-01	42.50	636.50
Mar-02	42.42	636.58
Jun-02	42.50	636.50
Sep-02	42.46	636.54
Dec-02	42.54	636.46
Mar-03	42.54	636.46
Jun-03	42.50	636.50
Sep-03	42.60	636.40
Dec-03	42.58	636.42
Mar-04	42.54	636.46
Jun-04	42.58	636.42
Sep-04	42.50	636.50
Dec-04	42.50	636.50
Mar-05	42.50	636.50
Jun-05	42.52	636.48
Sep-05	42.50	636.50
Dec-05	42.54	636.46
Mar-06	42.46	636.54
Jun-06	42.46	636.54
Sep-06	42.50	636.50
Dec-06	42.46	636.54
Mar-07	42.44	636.56
Jun-07	42.33	636.67
Sep-07	42.37	636.63
Dec-07	42.52	636.48
Mar-08	42.58	636.42
Jun-08	42.54	636.46
Sep-08	42.58	636.42
Dec-08	42.67	636.33
Mar-09	42.62	636.38
Jun-09	42.53	636.47
Sep-09	42.71	636.29
Dec-09	42.63	636.37
Mar-10	42.65	636.35
Jun-10	42.65	636.35
Sep-10	42.63	636.37
Dec-10	42.68	636.32
Mar-11	42.59	636.41
Jun-11	43.32	635.68
Sep-11	42.58	636.42
Dec-11	42.93	636.07
Mar-12	42.89	636.11
Jun-12	43.05	635.95
Sep-12	43.15	635.85
Dec-12	43.29	635.71
Mar-13	43.01	635.99
Jun-13	43.11	635.89

AMOS

PIEZOMETER PP3

FLY ASH DAM
INSTALLED - DEC75

NORTH : 531390.4
EAST : 1724532.6

TOP OF RISER ELEVATION : 653.3
TIP ELEVATION : 610.2
GROUND ELEVATION : 646.0
SCREENED INT : 610-615
NOTES : AT TOE OF DAM

DATE	READING (FT.)	ELEVATION (FT.)
Feb-84	15.92	637.38
Sep-84	16.00	637.30
Oct-84	15.92	637.38
Dec-84	16.17	637.13
Jan-85	16.00	637.30
Mar-85	16.00	637.30
Apr-85	16.00	637.30
May-85	16.08	637.22
Jun-85	16.00	637.30
Jul-85	16.00	637.30
Oct-85	23.50	629.80
Nov-85	16.33	636.97
Dec-85	16.50	636.80
Jan-86	16.42	636.88
Feb-86	16.25	637.05
Mar-86	15.83	637.47
Apr-86	16.00	637.30
May-86	16.17	637.13
Jun-86	16.00	637.30
Jul-86	15.08	638.22
Aug-86	16.67	636.63
Sep-86	16.00	637.30
Oct-86	16.00	637.30
Nov-86	16.00	637.30
Dec-86	16.08	637.22
Jan-87	16.25	637.05
Feb-87	16.08	637.22
Mar-87	16.08	637.22
Apr-87	16.00	637.30
May-87	16.00	637.30
Jun-87	16.25	637.05
Jul-87	16.17	637.13
Aug-87	16.00	637.30
Sep-87	15.92	637.38
Nov-87	15.00	638.30
Dec-87	16.17	637.13
Jan-88	15.92	637.38
Feb-88	15.58	637.72
Mar-88	15.92	637.38
Apr-88	16.08	637.22
May-88	16.17	637.13
Jun-88	16.17	637.13
Jul-88	15.67	637.63
Aug-88	15.92	637.38
Sep-88	15.92	637.38
Oct-88	16.08	637.22
Nov-88	13.92	639.38
Dec-88	15.83	637.47
Jan-89	16.92	636.38
Feb-89	16.92	636.38
Mar-89	16.92	636.38
Apr-89	17.83	635.47
May-89	17.83	635.47
Jun-89	17.83	635.47
Jul-89	18.00	635.30
Aug-89	17.92	635.38
Sep-89	18.00	635.30
Oct-89	17.67	635.63
Nov-89	18.00	635.30
Jan-90	17.75	635.55
Feb-90	17.67	635.63
Mar-90	17.92	635.38
Apr-90	17.83	635.47
May-90	17.83	635.47
Jun-90	18.00	635.30
Jul-90	16.42	636.88
Aug-90	16.25	637.05
Sep-90	18.33	634.97
Oct-90	17.75	635.55
Nov-90	18.00	635.30
Dec-90	18.25	635.05
Jan-91	17.83	635.47
Feb-91	17.75	635.55
Mar-91	17.75	635.55
Apr-91	17.92	635.38
May-91	18.25	635.05
Jun-91	18.08	635.22
Sep-91	16.75	636.55
Dec-91	16.58	636.72
Mar-92	16.42	636.88
Jun-92	16.67	636.63
Sep-92	16.42	636.88
Dec-92	16.50	636.80
Mar-93	16.50	636.80
Jun-93	16.33	636.97
Sep-93	16.58	636.72
Dec-93	16.17	637.13
Mar-94	16.66	636.64
May-94	16.69	636.61
Sep-94	15.96	637.34
Dec-94	16.63	636.67
Mar-95	16.62	636.68
Jun-95	16.79	636.51
Sep-95	15.96	637.34
Dec-95	16.34	636.96
Mar-96	16.79	636.51
Jun-96	16.88	636.42
Sep-96	16.84	636.46
Dec-96	16.25	637.05
Mar-97	16.79	636.51
Jun-97	16.67	636.63
Sep-97	16.81	636.49
Dec-97	16.75	636.55
Mar-98	16.58	636.72
Jun-98	15.79	637.51
Sep-98	16.87	636.43
Dec-98	16.83	636.47
Mar-99	16.83	636.47
Jun-99	16.83	636.47
Sep-99	16.83	636.47
Dec-99	16.75	636.55
Mar-00	16.79	636.51
Jun-00	16.67	636.63
Sep-00	16.75	636.55
Dec-00	16.67	636.63
Mar-01	16.63	636.67
Jun-01	16.67	636.63
Sep-01	16.67	636.63
Dec-01	16.65	636.65
Mar-02	16.58	636.72
Jun-02	16.67	636.63
Sep-02	16.63	636.67
Dec-02	16.58	636.72
Mar-03	16.62	636.68
Jun-03	16.67	636.63
Sep-03	16.73	636.57
Dec-03	16.71	636.59
Mar-04	16.75	636.55
Jun-04	16.79	636.51
Sep-04	16.42	636.88
Dec-04	16.71	636.59
Mar-05	16.58	636.72
Jun-05	17.19	636.11
Sep-05	16.60	636.70
Dec-05	16.83	636.47
Mar-06	16.71	636.59
Jun-06	17.25	636.05
Sep-06	16.79	636.51
Dec-06	16.67	636.63
Jan-07	16.67	636.63
Feb-07	17.25	636.05
Mar-07	16.58	636.72
Apr-07	16.54	636.76
Jun-07	16.75	636.55
Sep-07	16.64	636.66
Dec-07	16.71	636.59
Mar-08	16.73	636.57
Jun-08	16.67	636.63
Sep-08	16.75	636.55
Dec-08	16.77	636.53
Mar-09	16.70	636.60
Jun-09	16.60	636.70
Sep-09	16.74	636.56
Dec-09	16.76	636.54
Mar-10	16.73	636.57
Jun-10	16.93	636.37
Sep-10	16.78	636.52
Dec-10	16.94	636.36
Mar-11	16.81	636.49
Jun-11	17.01	636.29
Sep-11	16.74	636.56
Dec-11	16.87	636.43
Mar-12	16.52	636.78
Jun-12	16.90	636.40
Sep-12	16.71	636.59
Dec-12	16.79	636.51
Mar-13	16.92	636.38
Jun-13	16.96	636.34

AMOS

PIEZOMETER PP4R

FLY ASH DAM
INSTALLED - FEB76

NORTH : 531683.3
EAST : 1725169.6
TOP OF RISER ELEVATION : 883.0*
*ELEV. AFTER 20OCT94 : 881.2
TIP ELEVATION : 685.0
GROUND ELEVATION : 880.0
SCREENED INT : 685-690
NOTES : SCREENED IN DAM FILL

DATE	READING (FT.)	ELEVATION (FT.)
Feb-84	223.83	659.17
Sep-84	223.83	659.17
Oct-84	223.75	659.25
Jan-85	224.17	658.83
Mar-85	224.25	658.75
Apr-85	224.33	658.67
May-85	224.25	658.75
Jun-85	224.00	659.00
Jul-85	224.92	658.08
Oct-85	224.58	658.42
Nov-85	224.50	658.50
Dec-85	224.17	658.83
Jan-86	223.83	659.17
Feb-86	224.33	658.67
Mar-86	224.33	658.67
Apr-86	224.83	658.17
May-86	224.42	658.58
Jun-86	223.50	659.50
Jul-86	223.58	659.42
Aug-86	223.83	659.17
Sep-86	224.00	659.00
Oct-86	223.67	659.33
Nov-86	223.92	659.08
Dec-86	223.50	659.50
Jan-87	224.00	659.00
Feb-87	223.92	659.08
Mar-87	224.08	658.92
Apr-87	223.67	659.33
May-87	223.83	659.17
Jun-87	223.83	659.17
Jul-87	223.42	659.58
Aug-87	223.42	659.58
Sep-87	223.25	659.75
Nov-87	223.50	659.50
Dec-87	225.00	658.00
Jan-88	233.25	649.75
Feb-88	222.50	660.50
Mar-88	223.92	659.08
Apr-88	223.50	659.50
May-88	223.33	659.67
Jun-88	223.42	659.58
Jul-88	222.92	660.08
Aug-88	223.42	659.58
Sep-88	223.17	659.83
Oct-88	223.08	659.92
Nov-88	222.58	660.42
Dec-88	225.00	658.00
Jan-89	223.08	659.92
Feb-89	223.25	659.75
Mar-89	223.67	659.33
Apr-89	223.75	659.25
May-89	224.17	658.83
Jun-89	224.00	659.00
Jul-89	223.67	659.33
Aug-89	223.50	659.50
Sep-89	223.92	659.08
Oct-89	224.00	659.00
Nov-89	224.00	659.00
Jan-90	223.42	659.58
Feb-90	223.25	659.75
Mar-90	222.33	660.67
Apr-90	223.50	659.50
May-90	223.42	659.58
Jun-90	224.00	659.00
Jul-90	221.75	661.25
Aug-90	221.83	661.17
Sep-90	222.17	660.83
Oct-90	223.92	659.08
Nov-90	223.50	659.50
Dec-90	224.08	658.92
Jan-91	223.00	660.00
Feb-91	222.75	660.25
Mar-91	224.92	658.08
Apr-91	224.92	658.08
May-91	227.00	656.00
Jun-91	227.08	655.92
Sep-91	225.00	658.00
Dec-91	225.00	658.00
Mar-92	224.92	658.08
Jun-92	124.92	758.08
Sep-92	224.33	658.67
Dec-92	224.75	658.25
Mar-93	224.58	658.42
Jun-93	223.08	659.92
Sep-93	223.17	659.83
Mar-94	223.58	659.42
May-94	223.33	659.67
Sep-94	222.97	660.03
Dec-94	223.04	658.20
Mar-95	223.00	658.24
Jun-95	222.67	658.57
Sep-95	222.97	658.27
Dec-95	222.75	658.49
Mar-96	221.92	659.32
Jun-96	122.79	758.45
Sep-96	222.33	658.91
Dec-96	222.42	658.82
Mar-97	222.42	658.82
Jun-97	222.17	659.07
Sep-97	221.96	659.28
Dec-97	208.75	672.49
Mar-98	223.33	657.91
Jun-98	223.29	657.95
Sep-98	223.21	658.03
Dec-98	222.83	658.41
Mar-99	222.83	658.41
Jun-99	222.83	658.41
Sep-99	222.42	658.82
Dec-99	222.75	658.49
Mar-00	222.71	658.53
Jun-00	222.04	659.20
Sep-00	221.96	659.28
Dec-00	224.17	657.07
Mar-01	223.29	657.95
Jun-01	222.79	658.45
Sep-01	122.46	758.78
Dec-01	222.63	658.61
Mar-02	222.67	658.57
Jun-02	222.29	658.95
Sep-02	222.33	658.91
Dec-02	222.17	659.07
Mar-03	222.62	658.62
Jun-03	222.00	659.24
Sep-03	221.87	659.37
Dec-03	223.39	657.85
Mar-04	223.08	658.16
Jun-04	223.06	658.18
Sep-04	222.92	658.32
Dec-04	223.00	658.24
Mar-05	222.58	658.66
Jun-05	222.69	658.55
Sep-05	222.58	658.66
Dec-05	222.89	658.35
Mar-06	223.08	658.16
Jun-06	222.46	658.78
Sep-06	222.42	658.82
Dec-06	222.75	658.49
Mar-07	222.42	658.82
Jun-07	220.21	661.03
Sep-07	222.17	659.07
Dec-07	224.00	657.24
Mar-08	223.33	657.91
Jun-08	223.48	657.76
Sep-08	223.14	658.10
Dec-08	222.99	658.25
Mar-09	222.58	658.66
Jun-09	222.49	658.75
Sep-09	222.84	658.40
Dec-09	222.90	658.34
Mar-10	222.89	658.35
Jun-10	223.34	657.90
Sep-10	222.54	658.70
Dec-10	223.19	658.05
Mar-11	217.26	663.98
Jun-11	222.82	658.42
Sep-11	222.35	658.89
Dec-11	223.26	657.98
Mar-12	222.67	658.57
Jun-12	223.18	658.06
Sep-12	221.74	659.50
Dec-12	221.36	659.88
Mar-13	222.76	658.48
Jun-13	222.49	658.75

AMOS

PIEZOMETER PP7R

FLY ASH DAM
INSTALLED - OCT76

NORTH : 532388.3
EAST : 1724633.7
TOP OF RISER ELEVATION : 882.1*
*ELEV. AFTER 20OCT94 : 880.3
TIP ELEVATION : 636.4
GROUND ELEVATION : 880.0
SCREENED INT : 636-641
NOTES : SCREENED IN BEDROCK BELOW DAM FILL

DATE	READING (FT.)	ELEVATION (FT.)
Feb-84	198.00	684.10
Sep-84	198.00	684.10
Oct-84	197.83	684.27
Dec-84	198.33	683.77
Jan-85	198.00	684.10
Mar-85	197.92	684.18
Apr-85	197.58	684.52
May-85	197.83	684.27
Jun-85	198.67	683.43
Jul-85	197.50	684.60
Oct-85	201.00	681.10
Nov-85	198.42	683.68
Dec-85	198.08	684.02
Jan-86	198.08	684.02
Feb-86	197.83	684.27
Mar-86	197.83	684.27
Apr-86	198.00	684.10
May-86	198.82	683.28
Jun-86	197.50	684.60
Jul-86	197.83	684.27
Aug-86	198.75	683.35
Sep-86	198.08	684.02
Oct-86	198.50	683.60
Nov-86	198.00	684.10
Dec-86	197.83	684.27
Jan-87	197.83	684.27
Feb-87	197.92	684.18
Mar-87	197.08	685.02
Apr-87	197.83	684.27
May-87	197.83	684.27
Jun-87	198.17	683.93
Jul-87	197.75	684.35
Aug-87	197.67	684.43
Sep-87	197.33	684.77
Nov-87	197.67	684.43
Dec-87	197.67	684.43
Jan-88	197.75	684.35
Feb-88	194.42	687.68
Mar-88	197.75	684.35
Apr-88	197.50	684.60
May-88	197.67	684.43
Jun-88	197.50	684.60
Jul-88	197.67	684.43
Aug-88	197.75	684.35
Sep-88	197.83	684.27
Oct-88	197.83	684.27
Nov-88	198.00	684.10
Dec-88	198.83	683.27
Jan-89	198.83	683.27
Feb-89	198.25	683.85
Mar-89	198.92	683.18
Apr-89	199.33	682.77
May-89	199.67	682.43
Jun-89	199.17	682.93
Jul-89	199.25	682.85
Aug-89	199.25	682.85
Sep-89	193.25	688.85
Oct-89	195.83	686.27
Nov-89	195.58	686.52
Jan-90	196.00	686.10
Feb-90	196.00	686.10
Mar-90	194.33	687.77
Apr-90	199.33	682.77
May-90	199.00	683.10
Jun-90	199.42	682.68
Jul-90	199.00	683.10
Aug-90	199.00	683.10
Sep-90	199.00	683.10
Oct-90	199.25	682.85
Nov-90	199.17	682.93
Dec-90	200.50	681.60
Jan-91	198.83	683.27
Feb-91	198.92	683.18
Mar-91	199.00	683.10
Apr-91	199.00	683.10
May-91	198.50	683.60
Jun-91	199.00	683.10
Jul-91	199.92	682.18
Aug-91	199.25	682.85
Jun-93	196.08	686.02
Jul-93	196.50	685.60
Aug-93	195.42	686.68
Sep-93	196.33	685.77
Oct-93	196.58	685.52
Nov-93	196.50	685.60
Jan-94	196.17	685.93
Feb-94	196.25	685.85
Mar-94	196.25	685.85
Apr-94	196.42	685.68
May-94	196.17	685.93
Jun-94	196.17	685.93
Jul-94	196.00	686.10
Aug-94	196.02	686.08
Sep-94	195.96	686.14
Oct-94	195.83	684.49
Nov-94	195.46	684.86
Dec-94	196.00	684.32
Jan-95	196.19	684.13
Feb-95	196.04	684.28
Mar-95	196.16	684.16
Apr-95	196.08	684.24
May-95	196.12	684.20
Jun-95	196.02	684.30
Jul-95	196.00	684.32
Aug-95	196.02	684.30
Sep-95	195.96	684.36
Oct-95	196.92	683.40
Nov-95	195.92	684.40
Dec-95	195.92	684.40
Jan-96	195.92	684.40
Feb-96	195.92	684.40
Mar-96	195.92	684.40
Apr-96	196.00	684.32
May-96	195.83	684.49
Jun-96	195.92	684.40
Jul-96	196.17	684.15
Aug-96	196.08	684.24
Sep-96	196.12	684.20
Oct-96	196.12	684.20
Nov-96	196.08	684.24
Dec-96	196.17	684.15
Jan-97	196.21	684.11
Feb-97	196.21	684.11
Mar-97	196.08	684.24
Apr-97	196.04	684.28
May-97	196.17	684.15
Jun-97	196.17	684.15
Jul-97	196.12	684.20
Aug-97	196.17	684.15
Sep-97	196.33	683.99
Oct-97	196.58	683.74
Nov-97	196.29	684.03
Dec-97	196.25	684.07
Jan-98	196.37	683.95
Feb-98	196.17	684.15
Mar-98	196.17	684.15
Apr-98	243.08	637.24
May-98	196.17	684.15
Jun-98	196.08	684.24
Jul-98	196.12	684.20
Aug-98	196.12	684.20
Sep-98	196.08	684.24
Oct-98	196.08	684.24
Nov-98	196.25	684.07
Dec-98	196.12	684.20
Jan-99	196.00	684.32
Feb-99	196.08	684.24
Mar-99	196.08	684.24
Apr-99	196.29	684.03
May-99	196.12	684.20
Jun-99	196.17	684.15
Jul-99	196.17	684.15
Aug-99	196.17	684.15
Sep-99	196.21	684.11
Oct-99	196.21	684.11
Nov-99	196.25	684.07
Dec-99	196.25	684.07
Jan-00	196.29	684.03
Feb-00	196.17	684.15
Mar-00	196.29	684.03
Apr-00	196.29	684.03
May-00	196.17	684.15
Jun-00	196.25	684.07
Jul-00	196.12	684.20
Aug-00	196.17	684.15
Sep-00	196.17	684.15
Oct-00	196.17	684.15
Nov-00	196.12	684.20
Dec-00	196.08	684.24
Jan-01	196.12	684.20
Feb-01	196.12	684.20
Mar-01	196.21	684.11
Apr-01	196.17	684.15
May-01	196.12	684.20
Jun-01	196.12	684.20
Jul-01	196.17	684.15
Aug-01	196.08	684.24
Sep-01	196.12	684.20
Oct-01	196.08	684.24
Nov-01	196.04	684.28
Dec-01	196.92	683.40
Jan-02	196.00	684.32
Feb-02	196.00	684.32
Mar-02	196.08	684.24
Apr-02	196.04	684.28
May-02	196.04	684.28
Jun-02	196.04	684.28
Jul-02	196.00	684.32
Aug-02	196.08	684.24
Sep-02	196.04	684.28
Oct-02	196.04	684.28
Nov-02	196.04	684.28
Dec-02	196.25	684.07
Jan-03	195.94	684.38
Feb-03	195.92	684.40
Mar-03	195.94	684.38
Apr-03	195.92	684.40
May-03	195.83	684.49
Jun-03	195.96	684.36
Jul-03	195.83	684.49
Aug-03	195.77	684.55
Sep-03	195.89	684.43
Oct-03	195.79	684.53
Nov-03	195.71	684.61
Dec-03	195.71	684.61
Jan-04	195.75	684.57
Feb-04	195.79	684.53
Mar-04	195.83	684.49
Apr-04	195.64	684.68
May-04	195.62	684.70
Jun-04	195.79	684.53
Jul-04	195.67	684.65
Aug-04	195.79	684.53
Sep-04	195.81	684.51
Oct-04	195.71	684.61
Nov-04	195.58	684.74
Dec-04	195.62	684.70
Jan-05	195.58	684.74
Feb-05	195.54	684.78
Mar-05	195.54	684.78
Apr-05	195.58	684.74
May-05	195.54	684.78
Jun-05	195.52	684.80
Jul-05	195.67	684.65
Aug-05	195.50	684.82
Sep-05	195.48	684.84
Oct-05	195.50	684.82
Nov-05	195.50	684.82
Dec-05	195.46	684.86
Jan-06	195.56	684.76
Feb-06	195.67	684.65
Mar-06	195.46	684.86
Apr-06	195.54	684.78
May-06	195.58	684.74
Jun-06	195.42	684.90
Jul-06	195.54	684.78
Aug-06	195.67	684.65
Sep-06	195.67	684.65
Oct-06	195.46	684.86
Nov-06	195.50	684.82
Dec-06	195.46	684.86
Jan-07	195.46	684.86
Feb-07	195.46	684.86
Mar-07	195.33	684.99
Apr-07	195.33	684.99
May-07	195.33	684.99
Jun-07	195.33	684.99
Jul-07	195.27	685.05
Aug-07	195.37	684.95
Sep-07	195.37	684.95
Oct-07	195.54	684.78
Nov-07	195.44	684.88
Dec-07	195.46	684.86
Jan-08	195.67	684.65
Feb-08	195.75	684.57
Mar-08	195.48	684.84
Apr-08	195.85	684.47
May-08	195.67	684.65
Jun-08	195.70	684.62
Jul-08	195.73	684.59
Aug-08	195.73	684.59
Sep-08	195.71	684.61
Oct-08	195.68	684.64
Nov-08	195.73	684.59
Dec-08	195.82	684.50
Jan-09	195.77	684.55
Feb-09	195.52	684.80
Mar-09	195.64	684.68
Apr-09	195.67	684.65
May-09	195.68	684.64
Jun-09	195.62	684.70
Jul-09	195.79	684.53
Aug-09	195.67	684.65
Sep-09	195.76	684.56
Oct-09	195.64	684.68
Nov-09	195.03	685.29
Dec-09	195.58	684.74
Jan-10	195.73	684.59
Feb-10	195.68	684.64
Mar-10	195.60	684.72
Apr-10	195.67	684.65
May-10	195.78	684.54
Jun-10	195.45	684.87
Jul-10	195.93	684.39
Aug-10	195.82	684.50
Sep-10	195.69	684.63
Oct-10	195.56	684.76
Nov-10	195.55	684.77
Dec-10	195.66	684.66
Jan-11	195.63	684.69
Feb-11	195.63	684.69
Mar-11	195.93	684.39
Apr-11	195.68	684.64
May-11	195.61	684.71
Jun-11	195.41	684.91
Jul-11	196.01	684.31
Aug-11	196.01	684.31
Sep-11	195.69	684.63
Oct-11	195.61	684.71
Nov-11	195.00	685.32
Dec-11	195.42	684.90
Jan-12	195.21	685.11
Feb-12	195.36	684.96

AMOS

PIEZOMETER PP8F

FLY ASH DAM
INSTALLED - AUG76

NORTH : 532048.3
EAST : 1724644.7

TOP OF RISER ELEVATION : 752.8
TIP ELEVATION : 666.2
GROUND ELEVATION : 750.0
SCREENED INT : 666-671
NOTES : SCREENED IN BLANKET DRAIN

DATE	READING (FT.)	ELEVATION (FT.)
Feb-84	86.08	666.67
Sep-84	86.00	666.75
Oct-84	86.08	666.67
Dec-84	86.08	666.67
Jan-85	86.17	666.58
Mar-85	86.00	666.75
Apr-85	86.00	666.75
May-85	86.17	666.58
Jun-85	86.08	666.67
Jul-85	86.00	666.75
Oct-85	86.00	666.75
Nov-85	86.33	666.42
Dec-85	86.50	666.25
Jan-86	86.50	666.25
Feb-86	86.50	666.25
Mar-86	86.42	666.33
Apr-86	86.42	666.33
May-86	85.92	666.83
Jun-86	86.33	666.42
Jul-86	86.50	666.25
Aug-86	86.75	666.00
Sep-86	86.33	666.42
Oct-86	86.83	665.92
Nov-86	86.25	666.50
Dec-86	86.42	666.33
Jan-87	85.25	667.50
Feb-87	86.50	666.25
Mar-87	86.50	666.25
Apr-87	86.42	666.33
May-87	86.08	666.67
Jun-87	86.42	666.33
Jul-87	86.33	666.42
Aug-87	86.42	666.33
Sep-87	86.50	666.25
Nov-87	86.42	666.33
Dec-87	86.25	666.50
Jan-88	86.33	666.42
Feb-88	86.67	666.08
Mar-88	85.83	666.92
Apr-88	86.08	666.67
May-88	85.00	667.75
Jun-88	86.17	666.58
Jul-88	86.00	666.75
Aug-88	86.50	666.25
Sep-88	85.83	666.92
Oct-88	86.08	666.67
Nov-88	86.42	666.33
Dec-88	86.33	666.42
Jan-89	87.17	665.58
Feb-89	87.50	665.25
Mar-89	86.75	666.00
Apr-89	87.92	664.83
May-89	88.08	664.67
Jun-89	88.17	664.58
Jul-89	88.50	664.25
Aug-89	88.50	664.25
Sep-89	88.42	664.33
Oct-89	88.25	664.50
Nov-89	88.00	664.75
Jan-90	88.17	664.58
Feb-90	88.00	664.75
Mar-90	88.17	664.58
Apr-90	88.00	664.75
May-90	88.00	664.75
Jun-90	88.25	664.50
Jul-90	86.83	665.92

DATE	READING (FT.)	ELEVATION (FT.)
Aug-90	87.00	665.75
Sep-90	88.25	664.50
Oct-90	88.83	663.92
Nov-90	88.00	664.75
Dec-90	88.50	664.25
Jan-91	88.50	664.25
Feb-91	88.25	664.50
Mar-91	85.75	667.00
Apr-91	88.25	664.50
May-91	88.08	664.67
Jun-91	88.17	664.58
Aug-91	88.00	664.75
Nov-91	86.75	666.00
Dec-91	86.83	665.92
Jan-92	88.33	664.42
Feb-92	86.25	666.50
Mar-92	86.67	666.08
Apr-92	86.67	666.08
May-92	86.00	666.75
Jun-92	86.92	665.83
Jul-92	86.75	666.00
Aug-92	86.50	666.25
Sep-92	86.67	666.08
Oct-92	90.00	662.75
Nov-92	86.75	666.00
Dec-92	86.58	666.17
Jan-93	86.33	666.42
Feb-93	86.58	666.17
Mar-93	86.67	666.08
Apr-93	86.33	666.42
May-93	86.42	666.33
Jun-93	87.75	665.00
Jul-93	87.00	665.75
Aug-93	86.92	665.83
Sep-93	87.00	665.75
Oct-93	86.92	665.83
Nov-93	87.25	665.50
Dec-93	88.66	664.09
Jan-94	87.42	665.33
Feb-94	87.75	665.00
Mar-94	87.08	665.67
Apr-94	87.00	665.75
May-94	86.96	665.79
Jun-94	86.91	665.84
Jul-94	87.00	665.75
Aug-94	86.98	665.77
Sep-94	86.91	665.84
Oct-94	87.08	665.67
Nov-94	86.84	665.91
Dec-94	86.91	665.84
Jan-95	87.04	665.71
Feb-95	87.08	665.67
Mar-95	86.83	665.92
Apr-95	87.00	665.75
May-95	86.08	666.67
Jun-95	86.96	665.79
Jul-95	87.00	665.75
Aug-95	86.98	665.77
Sep-95	86.91	665.84
Oct-95	87.50	665.25
Nov-95	86.75	666.00
Dec-95	86.50	666.25
Jan-96	86.92	665.83
Feb-96	86.96	665.79
Mar-96	86.92	665.83
Apr-96	87.50	665.25
May-96	87.63	665.12
Jun-96	86.92	665.83
Jul-96	86.88	665.87
Aug-96	87.50	665.25
Sep-96	87.00	665.75
Oct-96	87.00	665.75
Nov-96	87.00	665.75
Dec-96	87.00	665.75
Jan-97	86.92	665.83
Feb-97	86.96	665.79
Mar-97	86.96	665.79
Apr-97	86.43	666.32
May-97	87.00	665.75

DATE	READING (FT.)	ELEVATION (FT.)
Jun-97	87.00	665.75
Jul-97	86.96	665.79
Aug-97	86.96	665.79
Sep-97	86.94	665.81
Oct-97	86.92	665.83
Nov-97	86.95	665.80
Dec-97	86.95	665.80
Jan-98	86.96	665.79
Feb-98	86.96	665.79
Mar-98	86.92	665.83
Apr-98	86.96	665.79
May-98	86.92	665.83
Jun-98	86.92	665.83
Jul-98	87.00	665.75
Aug-98	86.96	665.79
Sep-98	86.96	665.79
Oct-98	87.00	665.75
Nov-98	86.92	665.83
Dec-98	86.96	665.79
Jan-99	86.92	665.83
Feb-99	86.94	665.81
Mar-99	87.00	665.75
Apr-99	87.06	665.69
May-99	87.00	665.75
Jun-99	86.96	665.79
Jul-99	86.96	665.79
Aug-99	86.96	665.79
Sep-99	86.96	665.79
Oct-99	98.96	653.79
Nov-99	86.92	665.83
Dec-99	86.92	665.83
Jan-00	86.96	665.79
Feb-00	86.92	665.83
Mar-00	86.92	665.83
Apr-00	86.92	665.83
May-00	86.96	665.79
Jun-00	86.83	665.92
Jul-00	86.83	665.92
Aug-00	86.83	665.92
Sep-00	86.83	665.92
Oct-00	86.83	665.92
Nov-00	86.83	665.92
Dec-00	86.79	665.96
Jan-01	86.83	665.92
Feb-01	86.79	665.96
Mar-01	86.83	665.92
Apr-01	86.83	665.92
May-01	86.79	665.96
Jun-01	86.79	665.96
Jul-01	86.79	665.96
Aug-01	85.75	667.00
Sep-01	86.71	666.04
Oct-01	86.71	666.04
Nov-01	86.73	666.02
Dec-01	86.71	666.04
Jan-02	86.71	666.04
Feb-02	86.71	666.04
Mar-02	86.71	666.04
Apr-02	96.75	656.00
May-02	86.69	666.06
Jun-02	96.67	656.08
Jul-02	86.71	666.04
Aug-02	86.67	666.08
Sep-02	86.71	666.04
Oct-02	86.67	666.08
Nov-02	86.63	666.12
Dec-02	86.63	666.12
Jan-03	86.71	666.04
Feb-03	86.62	666.13
Mar-03	86.62	666.13
Apr-03	86.58	666.17
May-03	86.58	666.17
Jun-03	86.54	666.21
Jul-03	86.58	666.17
Aug-03	86.56	666.19
Sep-03	86.52	666.23
Oct-03	86.48	666.27
Nov-03	86.46	666.29
Dec-03	86.46	666.29

DATE	READING (FT.)	ELEVATION (FT.)
Jan-04	96.50	656.25
Feb-04	86.42	666.33
Mar-04	86.42	666.33
Apr-04	86.12	666.63
May-04	86.42	666.33
Jun-04	86.46	666.29
Jul-04	86.37	666.38
Aug-04	86.37	666.38
Sep-04	86.33	666.42
Oct-04	86.37	666.38
Nov-04	86.37	666.38
Dec-04	86.37	666.38
Jan-05	86.33	666.42
Feb-05	86.33	666.42
Mar-05	86.33	666.42
Apr-05	86.27	666.48
May-05	86.31	666.44
Jun-05	86.27	666.48
Jul-05	86.25	666.50
Aug-05	86.12	666.63
Sep-05	86.12	666.63
Oct-05	86.17	666.58
Nov-05	86.10	666.65
Dec-05	86.21	666.54
Jan-06	86.17	666.58
Feb-06	86.10	666.65
Mar-06	86.04	666.71
Apr-06	86.08	666.67
May-06	86.00	666.75
Jun-06	86.00	666.75
Jul-06	96.00	656.75
Aug-06	86.00	666.75
Sep-06	85.92	666.83
Oct-06	85.83	666.92
Nov-06	86.67	666.08
Dec-06	85.79	666.96
Jan-07	85.79	666.96
Feb-07	85.71	667.04
Mar-07	85.58	667.17
Apr-07	85.50	667.25
May-07	85.44	667.31
Jun-07	85.40	667.35
Jul-07	85.42	667.33
Aug-07	85.31	667.44
Sep-07	85.31	667.44
Oct-07	86.96	665.79
Nov-07	86.92	665.83
Dec-07	86.96	665.79
Jan-08	87.00	665.75
Feb-08	87.00	665.75
Mar-08	86.96	665.79
Apr-08	86.96	665.79
May-08	86.83	665.92
Jun-08	86.98	665.77
Jul-08	87.03	665.72
Aug-08	86.96	665.79
Sep-08	86.92	665.83
Oct-08	86.94	665.81
Nov-08	86.92	665.83
Dec-08	86.98	665.77
Jan-09	86.98	665.77
Feb-09	86.94	665.81
Mar-09	86.87	665.88
Apr-09	86.84	665.91
May-09	86.94	665.81
Jun-09	86.92	665.83
Jul-09	86.92	665.83
Aug-09	87.02	665.73
Sep-09	87.04	665.71
Oct-09	87.00	665.75
Nov-09	86.72	666.03
Dec-09	86.91	665.84
Jan-10	97.41	655.34
Feb-10	86.98	665.77
Mar-10	87.12	665.63
Apr-10	87.00	665.75
May-10	86.79	665.96
Jun-10	86.88	665.87
Jul-10	87.03	665.72

AMOS

PIEZOMETER PP8RA

FLY ASH DAM
INSTALLED - APR77

NORTH : 532048.3
EAST : 1724724.7

TOP OF RISER ELEVATION : 779.2
TIP ELEVATION : 635.7
GROUND ELEVATION : 777.0
SCREENED INT : 635.7-660
NOTES : IN BEDROCK

DATE	READING (FT.)	ELEVATION (FT.)	DATE	READING (FT.)	ELEVATION (FT.)	DATE	READING (FT.)	ELEVATION (FT.)	DATE	READING (FT.)	ELEVATION (FT.)
Feb-84	100.50	678.70	Aug-90	98.92	680.28	Jul-97	98.92	680.28	Feb-04	98.29	680.91
Sep-84	100.50	678.70	Sep-90	100.42	678.78	Aug-97	99.00	680.20	Mar-04	98.25	680.95
Oct-84	100.33	678.87	Oct-90	100.42	678.78	Sep-97	98.96	680.24	Apr-04	98.17	681.03
Dec-84	100.08	679.12	Nov-90	100.42	678.78	Oct-97	99.08	680.12	May-04	98.12	681.08
Jan-85	100.25	678.95	Dec-90	100.83	678.37	Nov-97	99.00	680.20	Jun-04	98.12	681.08
Mar-85	100.17	679.03	Jan-91	100.17	679.03	Dec-97	99.04	680.16	Jul-04	98.12	681.08
Apr-85	100.00	679.20	Feb-91	99.92	679.28	Jan-98	99.08	680.12	Aug-04	98.12	681.08
May-85	100.00	679.20	Mar-91	100.17	679.03	Feb-98	98.96	680.24	Sep-04	98.12	681.08
Jun-85	100.25	678.95	Apr-91	100.25	678.95	Mar-98	99.00	680.20	Oct-04	98.00	681.20
Jul-85	100.08	679.12	May-91	100.00	679.20	Apr-98	99.00	680.20	Nov-04	98.25	680.95
Oct-85	101.17	678.03	Jun-91	100.33	678.87	May-98	99.00	680.20	Dec-04	98.00	681.20
Nov-85	101.25	677.95	Jul-91	100.42	678.78	Jun-98	98.87	680.33	Jan-05	98.92	680.28
Dec-85	100.42	678.78	Aug-91	100.67	678.53	Jul-98	98.83	680.37	Feb-05	97.83	681.37
Jan-86	100.25	678.95	Nov-91	99.25	679.95	Aug-98	98.92	680.28	Mar-05	97.83	681.37
Feb-86	100.00	679.20	Dec-91	99.33	679.87	Sep-98	98.83	680.37	Apr-05	97.92	681.28
Mar-86	100.00	679.20	Jan-92	99.08	680.12	Oct-98	98.96	680.24	May-05	97.79	681.41
Apr-86	99.83	679.37	Feb-92	99.33	679.87	Nov-98	98.83	680.37	Jun-05	97.83	681.37
May-86	100.00	679.20	Mar-92	117.50	661.70	Dec-98	99.00	680.20	Jul-05	97.83	681.37
Jun-86	99.83	679.37	Jun-92	99.42	679.78	Jan-99	98.87	680.33	Aug-05	97.71	681.49
Jul-86	99.67	679.53	Jul-92	99.58	679.62	Feb-99	98.87	680.33	Sep-05	97.57	681.63
Aug-86	99.83	679.37	Aug-92	99.17	680.03	Mar-99	98.87	680.33	Oct-05	97.77	681.43
Sep-86	99.75	679.45	Sep-92	99.92	679.28	Apr-99	99.00	680.20	Nov-05	97.75	681.45
Oct-86	99.75	679.45	Oct-92	99.58	679.62	May-99	98.96	680.24	Dec-05	97.75	681.45
Nov-86	99.67	679.53	Nov-92	99.92	679.28	Jun-99	98.96	680.24	Jan-06	97.75	681.45
Dec-86	99.75	679.45	Dec-92	98.83	680.37	Jul-99	98.87	680.33	Feb-06	97.67	681.53
Jan-87	99.58	679.62	Jan-93	98.50	680.70	Aug-99	99.00	680.20	Mar-06	97.75	681.45
Feb-87	99.67	679.53	Feb-93	98.92	680.28	Sep-99	98.96	680.24	Apr-06	97.67	681.53
Mar-87	99.50	679.70	Mar-93	99.00	680.20	Oct-99	86.92	692.28	May-06	97.79	681.41
Apr-87	99.33	679.87	Apr-93	98.92	680.28	Nov-99	99.00	680.20	Jun-06	97.62	681.58
May-87	99.50	679.70	May-93	99.17	680.03	Dec-99	98.92	680.28	Jul-06	97.58	681.62
Jun-87	99.25	679.95	Jun-93	98.92	680.28	Jan-00	99.08	680.12	Aug-06	97.62	681.58
Jul-87	99.17	680.03	Jul-93	99.00	680.20	Feb-00	98.92	680.28	Sep-06	98.38	680.82
Aug-87	99.17	680.03	Aug-93	99.08	680.12	Mar-00	99.00	680.20	Oct-06	98.50	680.70
Sep-87	99.25	679.95	Sep-93	99.00	680.20	Apr-00	98.92	680.28	Nov-06	91.02	688.18
Nov-87	99.17	680.03	Oct-93	99.00	680.20	May-00	98.87	680.33	Dec-06	97.46	681.74
Dec-87	99.33	679.87	Nov-93	99.08	680.12	Jun-00	98.83	680.37	Jan-07	97.52	681.68
Jan-88	98.92	680.28	Dec-93	99.66	679.54	Jul-00	98.79	680.41	Feb-07	97.50	681.70
Feb-88	99.33	679.87	Jan-94	99.75	679.45	Aug-00	98.83	680.37	Mar-07	97.54	681.66
Mar-88	99.00	680.20	Feb-94	99.92	679.28	Sep-00	98.79	680.41	Apr-07	97.46	681.74
Apr-88	98.58	680.62	Mar-94	99.08	680.12	Oct-00	98.83	680.37	May-07	97.46	681.74
May-88	97.50	681.70	Apr-94	99.17	680.03	Nov-00	98.79	680.41	Jun-07	97.46	681.74
Jun-88	98.00	681.20	May-94	98.79	680.41	Dec-00	98.75	680.45	Jul-07	97.46	681.74
Jul-88	99.25	679.95	Jun-94	98.74	680.46	Jan-01	98.75	680.45	Aug-07	97.46	681.74
Aug-88	99.08	680.12	Jul-94	98.70	680.50	Feb-01	98.79	680.41	Sep-07	97.21	681.99
Sep-88	99.25	679.95	Aug-94	98.74	680.46	Mar-01	98.81	680.39	Oct-07	97.54	681.66
Oct-88	99.58	679.62	Sep-94	98.70	680.50	Apr-01	98.83	680.37	Nov-07	97.54	681.66
Nov-88	99.33	679.87	Oct-94	98.75	680.45	May-01	98.75	680.45	Dec-07	97.54	681.66
Dec-88	99.33	679.87	Nov-94	98.52	680.68	Jun-01	98.83	680.37	Jan-08	97.96	681.24
Jan-89	99.67	679.53	Dec-94	98.70	680.50	Jul-01	98.75	680.45	Feb-08	97.92	681.28
Feb-89	99.67	679.53	Jan-95	99.28	679.92	Aug-01	98.71	680.49	Mar-08	97.87	681.33
Mar-89	99.42	679.78	Feb-95	98.53	680.67	Sep-01	98.62	680.58	Apr-08	95.83	683.37
Apr-89	100.67	678.53	Mar-95	99.07	680.13	Oct-01	98.67	680.53	May-08	97.75	681.45
May-89	100.67	678.53	Apr-95	98.65	680.55	Nov-01	98.67	680.53	Jun-08	97.81	681.39
Jun-89	100.58	678.62	May-95	99.50	679.70	Dec-01	98.69	680.51	Jul-08	97.71	681.49
Jul-89	101.00	678.20	Jun-95	98.61	680.59	Jan-02	98.62	680.58	Aug-08	97.62	681.58
Aug-89	100.67	678.53	Jul-95	98.70	680.50	Feb-02	98.58	680.62	Sep-08	97.68	681.52
Sep-89	100.67	678.53	Aug-95	98.74	680.46	Mar-02	98.62	680.58	Oct-08	97.65	681.55
Oct-89	100.58	678.62	Sep-95	98.70	680.50	Apr-02	98.62	680.58	Nov-08	97.58	681.62
Nov-89	100.50	678.70	Oct-96	98.96	680.24	May-03	98.58	680.62	Dec-09	97.38	681.82
Dec-89	100.67	678.53	Nov-96	99.00	680.20	Jun-03	98.54	680.66	Jan-10	98.09	681.11
Jan-90	100.67	678.53	Dec-96	99.08	680.12	Jul-03	98.44	680.76	Feb-10	97.42	681.78
Feb-90	100.67	678.53	Jan-97	99.08	680.12	Aug-03	98.42	680.78	Mar-10	97.39	681.81
Mar-90	100.50	678.70	Feb-97	99.04	680.16	Sep-03	98.46	680.74	Apr-10	97.30	681.90
Apr-90	100.42	678.78	Mar-97	98.95	680.25	Oct-03	98.44	680.76	May-10	97.19	682.01
May-90	100.50	678.70	Apr-97	98.90	680.30	Nov-03	98.37	680.83	Jun-10	97.28	681.92
Jun-90	100.50	678.70	May-97	98.96	680.24	Dec-03	98.37	680.83	Jul-10	97.20	682.00
Jul-90	99.08	680.12	Jun-97	98.96	680.24	Jan-04	98.29	680.91	Aug-10	97.26	681.94

AMOS

PIEZOMETER P8400

FLY ASH DAM
INSTALLED - DEC84

NORTH : 531854.8
EAST : 1724615.9

TOP OF RISER ELEVATION : 717.2
TIP ELEVATION : 660.9
GROUND ELEVATION : 715.5
SCREENED INT : 659.3-702
NOTES : 40 FT PVC SLOTTED SCREEN

DATE	READING (FT.)	ELEVATION (FT.)
Dec-84	44.00	673.22
Apr-85	40.50	676.72
May-85	40.50	676.72
Jun-85	41.17	676.05
Jul-85	41.00	676.22
Oct-85	46.83	670.39
Nov-85	40.92	676.30
Dec-85	40.92	676.30
Jan-86	39.17	678.05
Feb-86	40.75	676.47
Mar-86	34.83	682.39
Apr-86	40.67	676.55
May-86	40.58	676.64
Jun-86	40.25	676.97
Jul-86	40.00	677.22
Aug-86	40.00	677.22
Sep-86	39.83	677.39
Oct-86	39.83	677.39
Nov-86	39.50	677.72
Dec-86	39.83	677.39
Jan-87	32.33	684.89
Feb-87	41.00	676.22
Mar-87	23.75	693.47
Apr-87	23.17	694.05
Jun-87	23.75	693.47
Sep-87	26.17	691.05
Nov-87	28.42	688.80
Dec-87	40.83	676.39
Jan-88	40.75	676.47
Feb-88	41.92	675.30
Mar-88	40.50	676.72
Apr-88	40.75	676.47
May-88	40.75	676.47
Jun-88	24.00	693.22
Jul-88	40.33	676.89
Aug-88	57.00	660.22
Sep-88	40.58	676.64
Oct-88	40.67	676.55
Nov-88	40.58	676.64
Dec-88	40.50	676.72
Jan-89	41.50	675.72
Feb-89	41.00	676.22
Mar-89	40.00	677.22
Apr-89	29.00	688.22
May-89	29.50	687.72
Jun-89	33.25	683.97
Jul-89	33.08	684.14
Aug-89	40.33	676.89
Sep-89	40.67	676.55
Oct-89	40.08	677.14
Nov-89	40.50	676.72
Jan-90	40.00	677.22
Feb-90	40.00	677.22
Mar-90	40.50	676.72
Apr-90	39.92	677.30
May-90	39.42	677.80
Jun-90	31.50	685.72
Jul-90	37.50	679.72
Aug-90	37.50	679.72
Sep-90	40.92	676.30
Oct-90	40.58	676.64
Nov-90	34.08	683.14
Dec-90	34.50	682.72
Jan-91	34.83	682.39
Feb-91	39.92	677.30
Mar-91	39.50	677.72
Apr-91	26.67	690.55
Jun-91	30.75	686.47
Jul-91	30.83	686.39
Aug-91	33.00	684.22
Nov-91	55.50	661.72
Dec-91	56.08	661.14
Jan-92	56.08	661.14
Feb-92	56.08	661.14
Mar-92	25.00	692.22
Apr-92	56.00	661.22
May-92	56.00	661.22
Jun-92	26.17	691.05
Jul-92	52.17	665.05
Aug-92	55.50	661.72
Sep-92	26.00	691.22
Oct-92	25.75	691.47
Nov-92	56.00	661.22
Dec-92	29.17	688.05
Jan-93	29.75	687.47
Feb-93	30.33	686.89
Mar-93	30.00	687.22
Apr-93	25.50	691.72
May-93	31.00	686.22
Jun-93	31.08	686.14
Jul-93	25.00	692.22
Aug-93	26.00	691.22
Sep-93	23.58	693.64
Oct-93	37.66	679.56
Nov-93	35.17	682.05
Dec-93	23.66	693.56
Jan-94	36.84	680.38
Feb-94	37.92	679.30
Mar-94	24.25	692.97
Apr-94	24.92	692.30
May-94	25.10	692.12
Jun-94	25.58	691.64
Jul-94	36.50	680.72
Aug-94	23.63	693.59
Sep-94	23.63	693.59
Oct-94	27.58	689.64
Nov-94	28.20	689.02
Dec-94	26.79	690.43
Jan-95	26.71	690.51
Feb-95	24.96	692.26
Mar-95	25.00	692.22
Apr-95	37.17	680.05
May-95	37.08	680.14
Jun-95	24.65	692.57
Jul-95	36.50	680.72
Aug-95	23.63	693.59
Sep-95	23.63	693.59
Oct-95	25.16	692.06
Nov-95	24.17	693.05
Dec-95	37.00	680.22
Jan-96	36.84	680.38
Feb-96	36.84	680.38
Mar-96	34.00	683.22
Apr-96	35.75	681.47
May-96	36.58	680.64
Jun-96	34.08	683.14
Jul-96	35.50	681.72
Aug-96	35.42	681.80
Sep-96	35.42	681.80
Oct-96	36.04	681.18
Nov-96	35.84	681.38
Dec-96	36.75	680.47
Jan-97	36.83	680.39
Feb-97	37.08	680.14
Mar-97	36.83	680.39
Apr-97	32.62	684.60
May-97	36.62	680.60
Jun-97	37.00	680.22
Jul-97	36.67	680.55
Aug-97	35.92	681.30
Sep-97	36.17	681.05
Oct-97	38.37	678.85
Nov-97	38.83	678.39
Dec-97	39.08	678.14
Jan-98	38.58	678.64
Feb-98	37.79	679.43
Mar-98	37.83	679.39
Apr-98	37.58	679.64
May-98	37.79	679.43
Jun-98	37.21	680.01
Jul-98	37.00	680.22
Aug-98	37.00	680.22
Sep-98	36.54	680.68
Oct-98	38.37	678.85
Nov-98	38.42	678.80
Dec-98	38.67	678.55
Jan-99	37.92	679.30
Feb-99	37.46	679.76
Mar-99	36.92	680.30
Apr-99	37.50	679.72
May-99	36.96	680.26
Jun-99	37.25	679.97
Jul-99	25.58	691.64
Aug-99	36.29	680.93
Sep-99	36.21	681.01
Oct-99	36.00	681.22
Nov-99	36.83	680.39
Dec-99	37.08	680.14
Jan-00	37.42	679.80
Feb-00	37.50	679.72
Mar-00	37.79	679.43
Apr-00	38.00	679.22
May-00	37.29	679.93
Jun-00	36.83	680.39
Jul-00	35.92	681.30
Aug-00	35.92	681.30
Sep-00	35.33	681.89
Oct-00	36.19	681.03
Nov-00	36.46	680.76
Dec-00	36.42	680.80
Jan-01	37.02	680.20
Feb-01	36.33	680.89
Mar-01	37.46	679.76
Apr-01	37.29	679.93
May-01	37.25	679.97
Jun-01	37.29	679.93
Jul-01	36.46	680.76
Aug-01	36.00	681.22
Sep-01	36.58	680.64
Oct-01	36.42	680.80
Nov-01	36.50	680.72
Dec-01	37.17	680.05
Jan-02	37.21	680.01
Feb-02	36.62	680.60
Mar-02	37.08	680.14
Apr-02	36.87	680.35
May-02	36.04	681.18
Jun-02	33.67	683.55
Jul-02	35.75	681.47
Aug-02	35.25	681.97
Sep-02	35.29	681.93
Oct-02	35.25	681.97
Nov-02	35.67	681.55
Dec-02	36.08	681.14
Jan-03	36.12	681.10
Feb-03	36.50	680.72
Mar-03	35.75	681.47
Apr-03	35.88	681.34
May-03	35.67	681.55
Jun-03	35.37	681.85
Jul-03	36.00	681.22
Aug-03	35.46	681.76
Sep-03	34.87	682.35
Oct-03	35.14	682.08
Nov-03	35.00	682.22
Dec-03	34.94	682.28
Jan-04	35.08	682.14
Feb-04	34.29	682.93
Mar-04	34.92	682.30
Apr-04	34.83	682.39
May-04	35.00	682.22
Jun-04	34.83	682.39
Jul-04	35.21	682.01
Aug-04	35.08	682.14
Sep-04	30.75	686.47
Oct-04	34.79	682.43
Nov-04	35.00	682.22
Dec-04	34.87	682.35
Jan-05	34.50	682.72
Feb-05	35.00	682.22
Mar-05	33.96	683.26
Apr-05	33.25	683.97
May-05	34.00	683.22
Jun-05	34.81	682.41
Jul-05	33.83	683.39
Aug-05	33.75	683.47
Sep-05	24.19	693.03
Oct-05	33.42	683.80
Nov-05	33.69	683.53
Dec-05	34.58	682.64
Jan-06	34.12	683.10
Feb-06	33.46	683.76
Mar-06	34.92	682.30
Apr-06	33.71	683.51
May-06	26.96	690.26
Jun-06	33.00	684.22
Jul-06	32.83	684.39
Aug-06	33.79	683.43
Sep-06	33.06	684.16
Oct-06	32.67	684.55
Nov-06		
Dec-06	33.46	683.76
Jan-07	33.25	683.97
Feb-07	33.33	683.89
Mar-07	33.08	684.14
Apr-07	32.58	684.64
May-07	32.83	684.39
Jun-07	32.96	684.26
Jul-07	32.33	684.89
Aug-07	25.42	691.80
Sep-07	32.00	685.22
Oct-07	33.00	684.22
Nov-07	33.50	683.72
Dec-07	34.23	682.99
Jan-08	33.92	683.30
Feb-08	33.83	683.39
Mar-08	33.25	683.97
Apr-08	32.63	684.59
May-08	31.00	686.22
Jun-08	31.04	686.18
Jul-08	30.46	686.76
Aug-08	30.81	686.41
Sep-08	31.50	685.72
Oct-08	33.21	684.01
Nov-08	33.67	683.55
Dec-08	33.42	683.80
Jan-09	33.71	683.51
Feb-09	32.48	684.74
Jun-09	30.57	686.65
Jul-09	30.18	687.04
Aug-09	30.47	686.75
Sep-09	30.60	686.62
Oct-09	31.65	685.57
Nov-09	33.62	683.60
Dec-09	34.38	682.84
Jan-10	33.91	683.31
Feb-10	32.80	684.42
Mar-10	32.35	684.87
Apr-10	31.94	685.28
May-10	30.60	686.62
Jun-10	30.78	686.44
Jul-10	29.71	687.51
Aug-10	29.73	687.49
Sep-10	33.14	684.08
Oct-10	24.47	692.75
Nov-10	35.13	682.09
Dec-10	32.68	684.54
Jan-11	24.14	693.08
Feb-11	33.19	684.03
Mar-11	32.66	684.56
Apr-11	31.51	685.71
May-11	33.20	684.02
Jun-11	32.64	684.58

AMOS

PIEZOMETER P8401

FLY ASH DAM
INSTALLED - DEC84

NORTH : 531699.7
EAST : 1724707.7

TOP OF RISER ELEVATION : 718.1
TIP ELEVATION : 658.4
GROUND ELEVATION : 716.4
SCREENED INT : 658.4-700
NOTES : 40 FT. SLOTTED PVC SCREEN

DATE	READING (FT.)	ELEVATION (FT.)
Dec-84	57.60	660.50
Jan-85	54.75	663.35
Apr-85	50.58	667.52
May-85	49.50	668.60
Jun-85	52.42	665.68
Jul-85	56.25	661.85
Oct-85	58.00	660.10
Nov-85	57.83	660.27
Dec-85	58.00	660.10
Jan-86	58.08	660.02
Feb-86	58.00	660.10
Mar-86	58.17	659.93
Apr-86	58.25	659.85
May-86	58.25	659.85
Jun-86	57.67	660.43
Jul-86	57.50	660.60
Aug-86	52.25	665.85
Sep-86	51.83	666.27
Oct-86	52.00	666.10
Nov-86	51.83	666.27
Dec-86	51.75	666.35
Jan-87	51.83	666.27
Feb-87	51.67	666.43
Mar-87	52.00	666.10
Apr-87	52.00	666.10
May-87	51.92	666.18
Jun-87	52.33	665.77
Jul-87	52.00	666.10
Aug-87	51.92	666.18
Sep-87	51.92	666.18
Nov-87	52.08	666.02
Dec-87	51.67	666.43
Jan-88	51.50	666.60
Feb-88	52.33	665.77
Mar-88	51.92	666.18
Apr-88	52.08	666.02
May-88	51.83	666.27
Jun-88	51.17	666.93
Jul-88	52.08	666.02
Aug-88	52.67	665.43
Sep-88	52.08	666.02
Oct-88	52.08	666.02
Nov-88	52.17	665.93
Dec-88	52.17	665.93
Jan-89	53.08	665.02
Feb-89	52.75	665.35
Mar-89	52.42	665.68
Apr-89	53.75	664.35
May-89	53.67	664.43
Jun-89	53.67	664.43
Jul-89	53.58	664.52
Aug-89	53.67	664.43
Sep-89	53.58	664.52
Oct-89	53.92	664.18
Nov-89	54.17	663.93
Jan-90	53.25	664.85
Feb-90	53.08	665.02
Mar-90	53.75	664.35
Apr-90	53.75	664.35
May-90	53.75	664.35
Jun-90	53.83	664.27
Jul-90	52.33	665.77
Aug-90	52.17	665.93
Sep-90	53.83	664.27
Oct-90	53.25	664.85
Nov-90	53.67	664.43
Dec-90	53.92	664.18
Jan-91	53.50	664.60
Feb-91	52.17	665.93
Mar-91	53.75	664.35
Apr-91	53.67	664.43
May-91	47.17	670.93
Jun-91	53.75	664.35
Jul-91	54.00	664.10
Aug-91	43.25	674.85
Sep-91	52.00	666.10
Nov-91	58.67	659.43
Dec-91	52.08	666.02
Jan-92	51.75	666.35
Feb-92	51.67	666.43
Mar-92	52.17	665.93
Apr-92	51.67	666.43
May-92	51.50	666.60
Jun-92	51.17	666.93
Jul-92	51.58	666.52
Aug-92	52.17	665.93
Sep-92	50.00	668.10
Oct-92	50.00	668.10
Nov-92	49.92	668.18
Dec-92	49.92	668.18
Jan-93	50.33	667.77
Feb-93	49.83	668.27
Mar-93	49.67	668.43
Apr-93	49.33	668.77
May-93	50.08	668.02
Jun-93	49.33	668.77
Jul-93	49.00	669.10
Aug-93	30.66	687.44
Sep-93	49.50	668.60
Oct-93	49.42	668.68
Nov-93	49.33	668.77
Dec-93	49.66	668.44
Jan-94	48.84	669.26
Feb-94	49.00	669.10
Mar-94	48.42	669.68
Apr-94	48.42	669.68
May-94	48.35	669.75
Jun-94	47.00	671.10
Jul-94	48.00	670.10
Aug-94	48.23	669.87
Sep-94	48.13	669.97
Oct-94	48.25	669.85
Nov-94	44.00	674.10
Dec-94	48.21	669.89
Jan-95	48.23	669.87
Feb-95	48.00	670.10
Mar-95	48.08	670.02
Apr-95	48.33	669.77
May-95	53.25	664.85
Jun-95	48.17	669.93
Jul-95	48.00	670.10
Aug-95	48.23	669.87
Sep-95	48.13	669.97
Oct-95	48.08	670.02
Nov-95	48.17	669.93
Dec-95	48.17	669.93
Jan-96	48.33	669.77
Feb-96	48.33	669.77
Mar-96	48.00	670.10
Apr-96	48.25	669.85
May-96	48.17	669.93
Jun-96	48.25	669.85
Jul-96	48.17	669.93
Aug-96	48.25	669.85
Sep-96	48.08	670.02
Oct-96	48.08	670.02
Nov-96	48.12	669.98
Dec-96	48.12	669.98
Jan-97	48.00	670.10
Feb-97	48.12	669.98
Mar-97	48.21	669.89
Apr-97	48.04	670.06
May-97	47.83	670.27
Jun-97	48.04	670.06
Jul-97	47.92	670.18
Aug-97	47.83	670.27
Sep-97	47.85	670.25
Oct-97	47.83	670.27
Nov-97	48.08	670.02
Dec-97	48.08	670.02
Jan-98	48.17	669.93
Feb-98	48.08	670.02
Mar-98	48.00	670.10
Apr-98	48.21	669.89
May-98	48.21	669.89
Jun-98	48.08	670.02
Jul-98	48.04	670.06
Aug-98	48.10	670.00
Sep-98	48.00	670.10
Oct-98	48.00	670.10
Nov-98	47.79	670.31
Dec-98	48.17	669.93
Jan-99	48.08	670.02
Feb-99	37.96	680.14
Mar-99	47.87	670.23
Apr-99	48.21	669.89
May-99	45.79	672.31
Jun-99	48.04	670.06
Jul-99	48.08	670.02
Aug-99	48.12	669.98
Sep-99	47.92	670.18
Oct-99	48.00	670.10
Nov-99	48.00	670.10
Dec-99	48.00	670.10
Jan-00	48.12	669.98
Feb-00	48.17	669.93
Mar-00	48.08	670.02
Apr-00	48.00	670.10
May-00	48.04	670.06
Jun-00	48.00	670.10
Jul-00	48.00	670.10
Aug-00	47.92	670.18
Sep-00	47.79	670.31
Oct-00	47.88	670.22
Nov-00	47.83	670.27
Dec-00	47.88	670.22
Jan-01	47.88	670.22
Feb-01	48.00	670.10
Mar-01	47.88	670.22
Apr-01	48.00	670.10
May-01	48.04	670.06
Jun-01	47.58	670.52
Jul-01	47.79	670.31
Aug-01	47.67	670.43
Sep-01	47.58	670.52
Oct-01	47.69	670.41
Nov-01	47.62	670.48
Dec-01	47.42	670.68
Jan-02	47.75	670.35
Feb-02	47.87	670.23
Mar-02	47.96	670.14
Apr-02	47.96	670.14
May-02	47.92	670.18
Jun-02	47.83	670.27
Jul-02	47.79	670.31
Aug-02	47.79	670.31
Sep-02	47.75	670.35
Oct-02	47.58	670.52
Nov-02	47.67	670.43
Dec-02	47.83	670.27
Jan-03	47.75	670.35
Feb-03	47.92	670.18
Mar-03	47.67	670.43
Apr-03	47.75	670.35
May-03	47.92	670.18
Jun-03	47.75	670.35
Jul-03	47.75	670.35
Aug-03	47.67	670.43
Sep-03	47.58	670.52
Oct-03	47.54	670.56
Nov-03	47.29	670.81
Dec-03	47.37	670.73
Jan-04	47.58	670.52
Feb-04	47.58	670.52
Mar-04	47.50	670.60
Apr-04	47.62	670.48
May-04	47.46	670.64
Jun-04	47.46	670.64
Jul-04	47.42	670.68
Aug-04	47.50	670.60
Sep-04	47.42	670.68
Oct-04	47.46	670.64
Nov-04	47.71	670.39
Dec-04	47.58	670.52
Jan-05	47.37	670.73
Feb-05	47.58	670.52
Mar-05	47.54	670.56
Apr-05	47.50	670.60
May-05	47.73	670.37
Jun-05	47.44	670.66
Jul-05	47.46	670.64
Aug-05	47.17	670.93
Sep-05		
Oct-05	47.04	671.06
Nov-05	47.14	670.96
Dec-05	47.52	670.58
Jan-06	47.62	670.48
Feb-06	47.75	670.35
Mar-06	47.50	670.60
Apr-06	47.67	670.43
May-06	47.58	670.52
Jun-06	47.58	670.52
Jul-06	47.42	670.68
Aug-06	47.25	670.85
Sep-06	47.21	670.89
Oct-06	47.17	670.93
Nov-06	25.67	692.43
Dec-06	47.25	670.85
Jan-07	47.62	670.48
Feb-07	47.37	670.73
Mar-07	47.50	670.60
Apr-07	47.46	670.64
May-07	47.42	670.68
Jun-07	47.33	670.77
Jul-07	47.21	670.89
Aug-07	47.00	671.10
Sep-07	47.08	671.02
Oct-07	47.27	670.83
Nov-07	47.37	670.73
Dec-07	47.39	670.71
Jan-08	47.42	670.68
Feb-08	47.37	670.73
Mar-08	47.52	670.58
Apr-08	47.53	670.57
May-08	47.46	670.64
Jun-08	47.56	670.54
Jul-08	47.46	670.64
Aug-08	47.42	670.68
Sep-08	47.48	670.62
Oct-08	47.37	670.73
Nov-08	47.27	670.83
Dec-08	47.24	670.86
Jan-09	47.27	670.83
6-Feb-09	47.45	670.65
11-Feb-09	47.17	670.93
17-Feb-09	47.27	670.83
25-Feb-09	47.42	670.68
5-Mar-09	47.29	670.81
12-Mar-09	47.28	670.82
19-Mar-09	47.44	670.66
25-Mar-09	47.17	670.93
31-Mar-09	47.17	670.93
24-Apr-09	47.28	670.82
26-May-09	47.22	670.88
25-Jun-09	47.33	670.77
30-Jul-09	47.32	670.78
24-Aug-09	47.00	671.10
18-Sep-09	46.98	671.12
21-Oct-09	47.20	670.90
23-Nov-09	47.23	670.87
4-Dec-09	47.19	670.91
28-Jan-10	47.20	670.90
22-Feb-10	47.26	670.84

ARCADIS

H.C. Nutting Company, 2008

Boring Logs

2008-1 to 2008-17

H.C. NUTTING COMPANY
APPALACHIAN REGION - 912 MORRIS STREET
CHARLESTON, WV 25301 (304) 344-0821
FAX (304) 342-4711

EMPLOYEE OWNED
GEOTECHNICAL, ENVIRONMENTAL AND TESTING ENGINEERS SINCE 1921

CORPORATE CENTER
611 LUNKEN PARK DRIVE
CINCINNATI, OH 45226
(513) 321-5816
FAX (513) 321-0294

CENTRAL OHIO REGION
790 MORRISON ROAD
COLUMBUS, OH 43230
(614) 863-3113
FAX (614) 863-0475

INDIANA REGION
349 WALNUT STREET, STE 8
LAWRENCEBURG, IN 47025
(812) 539-4300
FAX (812) 539-4301

BLUEGRASS REGION
470-B CONWAY CT., STE B-8
LEXINGTON, KY 40511
(859) 455-8530
FAX (859) 455-8630

LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-1**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/16/2008
Boring Location	N 531,413.5 E 1,724,431.9	Date Completed	1/16/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))
648.10	0.0	
647.60	0.5	Gray, FILL: silty gravel, road bed, wet, medium dense
		Reddish brown, GRAVELLY LEAN CLAY with SAND, residual soil structure, moist, stiff - very stiff
	8.0	
639.60	8.5	
		Gray with light brown, SANDSTONE, fine to medium grained, slightly micaeous with few lamminations, slightly weathered, medium hard - hard
	31.5	2" tool drop at 24.5' Lost water return at 24.5' Slighly fractured zone from 24.5' to 26'

SAMPLE

NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
1	SS	0.0-1.5	9-6-4 (10)	100						
2	SS	5.0-6.5	17-9-14 (23)	100						
3	SS	10.0-10.4	50/4	100						
1	NQ2	11.5-13.5		100	100					
2	NQ2	13.5-18.5		96	96					
3	NQ2	18.5-23.5		100	100					
4	NQ2	23.5-28.5		100	92					
5	NQ2	28.5-33.5		100	100					

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion				ft.
After	24	Hrs.	10	ft. ▼
Water used in drilling	11.5			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-1**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/16/2008
Boring Location	**N** 531,413.5 **E** 1,724,431.9	Date Completed	1/16/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Gray with light brown, SANDSTONE, fine to medium grained, slightly micaeous with few lamminations, slightly weathered, medium hard - hard ***(LAYER CONTINUED DESCRIPTION REPEATED)***	6	NQ2	33.5-38.5		100	96					
608.10	40.0		7	NQ2	38.5-40.0		100	100					
		BORING COMPLETED @ 40.0'											

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW	ft.
At Completion		ft.
After	24 Hrs. 10	ft. ▼
Water used in drilling	11.5	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-2**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/2/2008
Boring Location	N 531,979.5 E 1,724,491.4	Date Completed	1/5/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
714.80	0.0	Gray to brown, FILL: clayey gravel with sand, many cobbles and boulders, moist, medium dense	1	SS	0.0-0.8	32-50/3	88						
			2	SS	5.0-6.5	10-10-7 (17)	100						
			3	SS	10.0-11.5	18-10-8 (18)	100						
699.80	15.0	15.0											
		Reddish brown mottled with gray and brown, LEAN CLAY, residual soil structure, moist - dry, very stiff	4	SS	15.0-16.5	6-10-12 (22)	67						
693.80	21.0	6.0	5	SS	20.0-21.4	15-32-50/5	100						
		Reddish brown mottled with gray and brown, CLAYSTONE, highly weathered - moderately weathered, extremely soft - soft	6	SS	25.0-25.4	50/5	100						
686.00	28.8	7.8	1	NQ2	27.0-30.0		100	80					
683.80	31.0	Gray, SILTSTONE with few thin red claystone interbeds, slightly weathered, medium hard 2.2											
		Gray, SANDSTONE, fine to medium grained, few micaceous laminations, slightly weathered, medium hard - hard	2	NQ2	30.0-35.0		98	92					

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	TAG

Remarks

Pneumatic piezometer installed at a depth of 42 feet in the middle of a 10 ft. screening section.

Water Level Observations

Immediate	NW	ft.
At Completion	1.0	ft. ▽
After 24 Hrs.	40	ft. ▼
Water used in drilling	27.0	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-2**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/2/2008
Boring Location	**N** 531,979.5 **E** 1,724,491.4	Date Completed	1/5/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	NO.	TYPE	SAMPLE DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		8.2 Gray, SANDSTONE, fine to medium grained, few micaceous laminations, slightly weathered, medium hard - hard ***(LAYER CONTINUED DESCRIPTION REPEATED)***	3	NQ2	35.0-40.0		100	94					
675.60	39.2	Reddish brown, SILTY CLAYSTONE, few gray interbeds, moderately weathered - slightly weathered, soft	4	NQ2	40.0-45.0		100	56					
			5	NQ2	45.0-50.0		100	34					
		18.2	6	NQ2	50.0-55.0		100	30					
657.40	57.4	Gray, SILTSTONE, few clayey seams, moderately weathered - slightly weathered, soft - medium hard	7	NQ2	55.0-60.0		100	92					
			8	NQ2	60.0-65.0		100	86					
			9	NQ2	65.0-70.0		100	92					

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	TAG

Remarks

Pneumatic piezometer installed at a depth of 42 feet in the middle of a 10 ft. screening section.

Water Level Observations

Immediate	NW	ft.		
At Completion	1.0	ft.	▼	
After	24 Hrs.	40 ft.	▼	
Water used in drilling	27.0	ft.		

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	2008-B-2
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/2/2008
Boring Location	N 531,979.5 E 1,724,491.4	Date Completed	1/5/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Gray, SILTSTONE, few clayey seams, moderately weathered - slightly weathered, soft - medium hard ***(LAYER CONTINUED DESCRIPTION REPEATED)***	10	NQ2	70.0-75.0		100	100					
		34.1 Sandstone interbeds at 75' to 77'	11	NQ2	75.0-80.0		100	90					
			12	NQ2	80.0-85.0		100	90					
			13	NQ2	85.0-90.0		100	90					
623.30	91.5	Gray to reddish brown, CLAYSTONE, few silty or sandy seams, slightly weathered, soft	14	NQ2	90.0-95.0		94	68					
		8.5	15	NQ2	95.0-100.0		100	42					
614.80	100.0	BORING COMPLETED @ 100.0'											

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	TAG

Remarks

Pneumatic piezometer installed at a depth of 42 feet in the middle of a 10 ft. screening section.

Water Level Observations

Immediate	NW			ft.
At Completion	1.0			ft. ▼
After	24	Hrs.	40	ft. ▼
Water used in drilling	27.0			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-3**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/7/2008
Boring Location	N 531,649.4 E 1,724,711.2	Date Completed	1/9/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
715.40	0.0												
		Brown, CLAY FILL: sandy lean clay with gravel, few cobbles, moist, very stiff	1	SS	0.0-1.5	4-12-8 (20)	100						
	5.0												
710.40	5.0	Brown and gray, FILL: clayey gravel with sand, many boulders and cobbles throughout, moist - very moist, medium dense - dense	2	SS	5.0-6.5	12-26-14 (40)	100						
			3	SS	10.0-11.5	19-20-26 (46)	100						
			4	SS	15.0-16.5	10-18-17 (35)	100						
			5	SS	20.0-21.5	6-9-17 (26)	100						
			6	SS	25.0-26.5	12-12-17 (29)	100						
			7	SS	30.0-30.2	50/2	100						

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	TAG

Remarks

Pneumatic piezometer installed at a depth of 82 feet in the middle of a 8 ft. screening section.

Water Level Observations

Immediate	NW	ft.
At Completion		ft.
After	24 Hrs. NA	ft.
Water used in drilling	60.0	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-3**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/7/2008
Boring Location	N 531,649.4 E 1,724,711.2	Date Completed	1/9/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Brown and gray, FILL: clayey gravel with sand, many boulders and cobbles throughout, moist - very moist, medium dense - dense ***(LAYER CONTINUED DESCRIPTION REPEATED)***	8	SS	35.0-36.5	10-18-25 (43)	100						
	70.0		9	SS	40.0-41.5	9-13-15 (28)	100						
			10	SS	45.0-46.5	9-14-15 (29)	100						
			11	SS	50.0-51.5	32-26-15 (41)	100						
			12	SS	55.0-56.5	6-11-19 (30)	100						
			13	SS	60.0-61.5	12-16-15 (31)	100						
			14	SS	65.0-66.5	10-15-16 (31)	100						

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	TAG

Remarks

Pneumatic piezometer installed at a depth of 82 feet in the middle of a 8 ft. screening section.

Water Level Observations

Immediate	NW		ft.
At Completion			ft.
After	24	Hrs. NA	ft.
Water used in drilling	60.0		ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-3**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/7/2008
Boring Location	**N** 531,649.4 **E** 1,724,711.2	Date Completed	1/9/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
640.40	75.0	Brown and gray, FILL: clayey gravel with sand, many boulders and cobbles throughout, moist - very moist, medium dense - dense ***(LAYER CONTINUED DESCRIPTION REPEATED)***	15	SS	70.0-71.5	8-11-13 (24)	100						
632.40	83.0	Brown, SILTY GRAVEL with SAND, apparent former stream bed, wet, very dense	16	SS	75.0-76.5	10-11-9 (20)	100						
			17	SS	80.0-81.5	11-25-47 (72)	100						
			18	SS	84.5-84.8	50/3	100						
615.40	100.0	Gray, SANDSTONE, medium to fine grained, micaceous laminations, slightly uncemented, slightly weathered - moderately weathered, medium hard - hard	1	NQ2	85.0-90.0		96	88				3	
			2	NQ2	90.0-95.0		100	98				3-4	
			3	NQ2	95.0-100.0		100	100				3-4	
		BORING COMPLETED @ 100.0'											

8.0

17.0

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	TAG

Remarks

Pneumatic piezometer installed at a depth of 82 feet in the middle of a 8 ft. screening section.

Water Level Observations

Immediate	NW			ft.
At Completion				ft.
After	24	Hrs.	NA	ft.
Water used in drilling	60.0			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	2008-B-4
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/9/2008
Boring Location	N 531,417.7 E 1,724,782.3	Date Completed	1/12/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
714.10	0.0	Reddish brown to gray, FILL: clayey gravel with sand, many boulders and cobbles, predominantly shale and claystone fragments, moist, medium dense	1	SS	0.0-1.5	2-6-8 (14)	100						
			2	SS	5.0-6.5	7-17-21 (38)	100						
			3	SS	10.0-11.5	9-13-15 (28)	100						
			4	SS	15.0-16.5	4-6-9 (15)	100						
694.10	20.0	20.0											
		Reddish brown mottled with yellow and gray, LEAN CLAY, little sand, residual soil to completely weathered claystone bedrock, moist - dry, hard	5	SS	20.0-21.5	14-24-34 (58)	100						
688.60	25.5	5.5											
		Reddish brown to gray, CLAYSTONE, many slickensided surfaces and few thin sandstone seams, highly weathered - moderately weathered, very soft - soft	6	SS	25.0-26.3	23-49-50/3	100						
			1	NQ2	26.5-29.0		100	0				1	
			2	NQ2	29.0-34.0		86	0				1	

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	TAG

Remarks

Pneumatic piezometer installed at a depth of 73 feet in the middle of a 10 ft. screening section.

Water Level Observations

Immediate	NW	ft.
At Completion		ft.
After	24 Hrs. 34	ft. ▼
Water used in drilling	27.0	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-4**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/9/2008
Boring Location	N 531,417.7 E 1,724,782.3	Date Completed	1/12/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Reddish brown to gray, CLAYSTONE, many slickensided surfaces and few thin sandstone seams, highly weathered - moderately weathered, very soft - soft ***(LAYER CONTINUED DESCRIPTION REPEATED)***	3	NQ2	34.0-39.0		100	18				1-2	
			4	NQ2	39.0-44.0		80	0				1-2	
666.60	47.5		5	NQ2	44.0-49.0		96	26				1-3	
		22.0											
663.60	50.5	Gray with olive gray, SANDSTONE, fine to very fine grained, few thin claystone and siltstone seams, slightly weathered, medium hard - hard	6	NQ2	49.0-54.0		96	76				4-3	
		3.0											
		Gray layered with reddish brown, SILTSTONE, many claystone and sandstone seams, slightly weathered, medium hard	7	NQ2	54.0-59.0		100	42				3	
655.10	59.0												
		8.5											
		Gray, SANDSTONE, fine grained with many siltstone layers, slightly weathered, medium hard - hard	8	NQ2	59.0-64.0		98	90				3-4	
			9	NQ2	64.0-69.0		100	88				3-4	
		15.0											

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	TAG

Remarks

Pneumatic piezometer installed at a depth of 73 feet in the middle of a 10 ft. screening section.

Water Level Observations

Immediate	NW			ft.
At Completion				ft.
After	24	Hrs.	34	ft. ▼
Water used in drilling	27.0			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/6/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-4**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/9/2008
Boring Location	N 531,417.7 E 1,724,782.3	Date Completed	1/12/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Gray, SANDSTONE, fine grained with many siltstone layers, slightly weathered, medium hard - hard ***(LAYER CONTINUED DESCRIPTION REPEATED)***	10	NQ2	69.0-74.0		100	88				3-4	
640.10	74.0												
		Gray to reddish brown, SILTSTONE, many sandy layers and claystone seams, slightly weathered - moderately weathered, soft - medium hard	11	NQ2	74.0-79.0		96	68				2-3	
			12	NQ2	79.0-84.0		96	40				2-3	
			13	NQ2	84.0-89.0		100	84				2-3	
			14	NQ2	89.0-94.0		100	0				2-3	
619.60	94.5												
		Gray, SANDSTONE, fine grained, slightly weathered, medium hard - hard	15	NQ2	94.0-99.0		100	88				3-4	
614.10	100.0		16	NQ2	99.0-100.0		100	100				3-4	
		BORING COMPLETED @ 100.0'											

20.5

5.5

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	TAG

Remarks

Pneumatic piezometer installed at a depth of 73 feet in the middle of a 10 ft. screening section.

Water Level Observations

Immediate	NW			ft.
At Completion				ft.
After	24	Hrs.	34	ft. ▼
Water used in drilling	27.0			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-5**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/22/2008
Boring Location	N 532,241.5 E 1,724,200.3	Date Completed	1/25/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))
864.60	0.0	
864.10	0.5	0.5 Brown to dark brown, TOPSOIL: silty clay with sand, moist, stiff
		Olive brown to gray, SANDSTONE, fine grained, abundant shale laminations, some micaceous laminations, slightly weathered, medium hard - hard
		12.1
852.00	12.6	
		Gray, SILTSTONE with many shale seams, few thin sandstone interbeds, moderately weathered, soft - medium hard
		14.4
837.60	27.0	
		Olive brown to gray, SANDSTONE, fine grained, micaceous, slightly wavy bedded, slightly weathered, medium hard - hard
		7.0
830.60	34.0	

SAMPLE

NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
1	SS	0.0-0.9	18-50/5	100						
1	NQ2	5.0-15.0		100	48					
2	NQ2	15.0-25.0		100	73					
3	NQ2	25.0-35.0		100	91					

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion				ft.
After	24	Hrs.	131	ft. ▼
Water used in drilling	5.0			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-5**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/22/2008
Boring Location	**N** 532,241.5 **E** 1,724,200.3	Date Completed	1/25/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Gray to brownish gray, CLAYSTONE, few thin siltstone interbeds, moderately weathered, very soft - soft ***(LAYER CONTINUED DESCRIPTION REPEATED)***	4	NQ2	35.0-40.0		100	0					
			5	NQ2	40.0-50.0		100	46					
811.60	53.0	19.0											
		Gray to olive brown, SANDSTONE, fine grained, abundant siltstone interbeds, moderately weathered - slightly weathered, medium hard	6	NQ2	50.0-60.0		100	26					
805.30	59.3	6.3											
		Olive brown to gray, SANDSTONE, fine to medium grained, slightly micaceous, slightly weathered, medium hard - hard Near vertical fracture from 63.2' to 64.5'	7	NQ2	60.0-70.0		100	87					
		17.7											

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion				ft.
After	24	Hrs.	131	ft. ▼
Water used in drilling	5.0			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-5**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/22/2008
Boring Location	**N** 532,241.5 **E** 1,724,200.3	Date Completed	1/25/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
787.60	77.0	Olive brown to gray, SANDSTONE, fine to medium grained, slightly micaceous, slightly weathered, medium hard - hard ***(LAYER CONTINUED DESCRIPTION REPEATED)***	8	NQ2	70.0-80.0		70	57					
		Gray, SILTSTONE, few thin sandstone and claystone interbeds, slightly weathered, medium hard	9	NQ2	80.0-90.0		100	89					
	30.0		10	NQ2	90.0-100.0		95	77					

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion				ft.
After	24	Hrs.	131	ft. ▼
Water used in drilling	5.0			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-5**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/22/2008
Boring Location	N 532,241.5 E 1,724,200.3	Date Completed	1/25/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
757.60	107.0	Gray, SILTSTONE, few thin sandstone and claystone interbeds, slightly weathered, medium hard ***(LAYER CONTINUED DESCRIPTION REPEATED)***	11	NQ2	100.0-110.0		100	57					
	5.1	Gray, SANDSTONE, fine grained, silty seams, moderately weathered - slightly weathered, medium hard - hard											
752.50	112.1												
	7.9	Reddish brown, CLAYSTONE, slickensided surfaces, moderately weathered, soft - very soft	12	NQ2	110.0-120.0		100	55					
744.60	120.0												
	4.8	Gray to brown, SANDSTONE, fine grained, many thin claystone laminations, micaceous, slightly weathered - moderately weathered, medium hard											
739.80	124.8												
	5.5	Gray to reddish brown, SILTSTONE, some fissile shale interbeds, slightly weathered, medium hard	13	NQ2	120.0-130.0		97	96					
734.30	130.3												
	5.9	Brown, SANDSTONE, fine to medium grained, some fractures, slightly weathered - moderately weathered, medium hard - hard	14	NQ2	130.0-140.0		100	47					
728.40	136.2												
		Gray to reddish brown, CLAYSTONE, few slickensided surfaces, moderately weathered, soft											

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW	ft.
At Completion		ft.
After	24 Hrs. 131	ft. ▼
Water used in drilling	5.0	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	2008-B-5
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/22/2008
Boring Location	N 532,241.5 E 1,724,200.3	Date Completed	1/25/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Gray to reddish brown, CLAYSTONE, few slickensided surfaces, moderately weathered, soft ***(LAYER CONTINUED DESCRIPTION REPEATED)***											
718.30	146.3	10.1	15	NQ2	140.0-150.0		100	47					
		Gray, SILTSTONE, many sandstone laminations, slightly weathered, medium hard											
713.60	151.0	4.7	16	NQ2	150.0-155.0		44	18					
		Gray to reddish brown, CLAYSTONE, few slickensided surfaces, completely weathered - moderately weathered, extremely soft - soft Soil-like from 151' to 155'	17	NQ2	155.0-165.0		90	66					
		19.0	18	NQ2	165.0-170.0		92	72					
694.60	170.0	BORING COMPLETED @ 170.0'											

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion				ft.
After	24	Hrs.	131	ft. ▼
Water used in drilling	5.0			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-6**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/21/2008
Boring Location	N 532,591.6 E 1,724,269.2	Date Completed	1/21/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))
874.60	0.0	
		Reddish brown to brown, FILL: sandy lean clay with gravel, some organics, moist, soft
872.10	2.5	2.5
		Reddish brown with yellow, CLAY FILL: gravelly lean clay with sand, clay core of dam, moist, stiff - very stiff
		11.0
861.10	13.5	
		Brown to olive brown, SANDSTONE, very fine to fine grained with many silty/shaley laminations, moderately weathered, medium hard
		- fracture zone 17.3 to 18.3'
		20.6
		- vertical fracture from 26.4 to 27.4'
840.50	34.1	

SAMPLE

NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
1	SS	0.0-1.5	2-2-2 (4)	100						
2	SS	5.0-6.5	8-10-11 (21)	100						
3	SS	10.0-11.5	7-8-11 (19)	100						
4	SS	15.0-15.1	50/1	0						
1	NQ2	17.0-25.4		100	75					
2	NQ2	25.4-35.4		100	82					

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW	ft.
At Completion		ft.
After	24 Hrs. 70	ft. ▼
Water used in drilling	NA	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/6/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-6**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/21/2008
Boring Location	N 532,591.6 E 1,724,269.2	Date Completed	1/21/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Gray to brown, SANDSTONE, medium to fine grained, micaceous, slightly weathered - faintly weathered, medium hard - hard ***(LAYER CONTINUED DESCRIPTION REPEATED)***											
		10.4	3	NQ2	35.4-45.4		95	87					
830.10	44.5	Gray to red, CLAYSTONE, some silty seams, becomes red at 54.5', slightly weathered, soft											
			4	NQ2	45.4-55.4		100	41					
		18.0											
812.10	62.5	Gray to olive brown, SANDSTONE, fine grained with many silty laminations, wavy bedded, slightly weathered, medium hard - hard											
			5	NQ2	55.4-65.4		100	25					

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW	ft.
At Completion		ft.
After	24 Hrs. 70	ft. ▼
Water used in drilling	NA	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-6**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/21/2008
Boring Location	N 532,591.6 E 1,724,269.2	Date Completed	1/21/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		17.5 Gray to olive brown, SANDSTONE, fine grained with many silty laminations, wavy bedded, slightly weathered, medium hard - hard ***(LAYER CONTINUED DESCRIPTION REPEATED)***	6	NQ2	65.4-75.4		100	96					
794.60	80.0												
		8.3 Olive brown, SANDSTONE, medium grained, slightly weak cementation, slightly weathered, medium hard	7	NQ2	75.4-85.4		100	98					
786.30	88.3												
		4.8 Reddish brown, CLAYSTONE, moderately weathered, very soft - soft	8	NQ2	85.4-95.4		96	48					
781.50	93.1												
		6.9 Gray, SILTSTONE, slightly weathered - faintly weathered, medium hard - hard	9	NQ2	95.4-100.0		100	100					
774.60	100.0												
		BORING COMPLETED @ 100.0'											

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW	ft.
At Completion		ft.
After	24 Hrs. 70	ft. ▼
Water used in drilling	NA	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-7**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/9/2008
Boring Location	N 532,470.2 E 1,724,543.6	Date Completed	1/15/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
878.70	0.0												
		Gray with reddish brown, FILL: clayey sand with gravel, moist, medium dense	1	SS	0.0-1.5	5-6-7 (13)	100						
876.20	2.5												
		Reddish brown with some light brown, CLAY FILL: gravelly lean clay, clay core of dam, moist - very moist, stiff - medium stiff	2	SS	5.0-6.5	5-10-14 (24)	100						0.5
			3	SS	10.0-11.5	6-9-12 (21)	100						1.0
			4	SS	15.0-16.5	3-3-4 (7)	100						1.25
858.70	20.0												
		Dark brown to black, FILL: silty sand, trace gravel, moist, medium dense -Composite Sample SS-5 & SS-6: LL = NP, PI = NP	5	SS	20.0-21.5	5-6-8 (14)	100						
			6	SS	25.0-26.5	9-11-12 (23)	100						
848.70	30.0												
		Reddish brown, CLAY FILL: gravelly lean clay with sand, moist - very moist, very stiff - stiff	7	SS	30.0-31.5	8-15-17 (32)	100						

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	NA	Hrs.	NA	ft.
Water used in drilling	NA			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/22/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-7**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/9/2008
Boring Location	N 532,470.2 E 1,724,543.6	Date Completed	1/15/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		10.0 Reddish brown, CLAY FILL: gravelly lean clay with sand, moist - very moist, very stiff - stiff ***(LAYER CONTINUED DESCRIPTION REPEATED)***	8	SS	35.0-36.5	8-8-12 (20)	100						
838.70	40.0												
		Gray to brown, FILL: clayey sand with gravel, predominantly shale fragments with some sandstone, moist - very moist, medium dense - dense	9	SS	40.0-41.2	10-15-50/2	100						
		-Composite Sample SS-10 to SS-14: LL = 27, PI = 9	10	SS	45.0-46.5	8-15-20 (35)	100						
			11	SS	50.0-51.5	10-14-15 (29)	100						
		30.0	12	SS	55.0-56.5	12-50/3	53						
			13	SS	60.0-61.5	10-19-20 (39)	100						
			14	SS	65.0-66.5	8-14-14 (28)	100						
808.70	70.0												

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	NA	Hrs.	NA	ft.
Water used in drilling			NA	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/22/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	2008-B-7
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/9/2008
Boring Location	N 532,470.2 E 1,724,543.6	Date Completed	1/15/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Gray with olive brown, FILL: clayey sand with gravel, predominantly shale fragments, some boulders, very moist, dense - very dense	15	SS	70.0-71.5	36-29-29 (58)	100						
			16	SS	75.0-76.5	24-24-21 (45)	47						
			17	SS	80.0-81.5	34-30-28 (58)	13						
			18	SS	85.0-86.5	31-24-25 (49)	100						
			19	SS	90.0-91.5	23-24-50/1	73						
		-Composite Sample SS-20 to SS-24: LL = 25, PI = 8	20	SS	95.0-96.5	9-12-13 (25)	100						
			21	SS	100.0-101.5	12-16-31 (47)	100						

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	NA	Hrs.	NA	ft.
Water used in drilling	NA			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/22/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-7**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/9/2008
Boring Location	**N** 532,470.2 **E** 1,724,543.6	Date Completed	1/15/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		70.0 Gray with olive brown, FILL: clayey sand with gravel, predominantly shale fragments, some boulders, very moist, dense - very dense ***(LAYER CONTINUED DESCRIPTION REPEATED)***	22	SS	105.0-106.5	18-18-29 (47)	100						
			23	SS	110.0-111.5	21-35-37 (72)	100						
			24	SS	115.0-116.5	16-19-25 (44)	27						
			25	SS	120.0-121.5	14-13-26 (39)	100						
			26	SS	125.0-125.8	53-50/4	100						
			27	SS	130.0-130.9	45-50/5	100						
			28	SS	135.0-136.5	18-24-32 (56)	100						
738.70	140.0												

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	NA	Hrs.	NA	ft.
Water used in drilling			NA	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/22/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-7**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/9/2008
Boring Location	**N** 532,470.2 **E** 1,724,543.6	Date Completed	1/15/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Gray, FILL: clayey sand with gravel, few boulders, very moist, dense	29	SS	140.0-141.5	40-19-27 (46)	100						
			30	SS	145.0-146.5	10-14-19 (33)	100						
		15.0	31	SS	150.0-151.5	27-20-21 (41)	100						
723.70	155.0												
		Brown, WELL GRADED SAND with GRAVEL, subrounded to rounded gravel, medium to coarse grained sand, saturated, medium dense - loose	32	SS	155.0-156.5	7-7-6 (13)	93						
			33	SS	160.0-161.5	6-7-6 (13)	100						
		15.0	34	SS	165.0-166.5	4-2-5 (7)	100						
708.70	170.0												
		Gray with brown, SANDY LEAN CLAY, residual soil to completely weathered bedrock, moist, hard	35	SS	170.0-171.2	21-51-50/2	100						
706.70	172.0	2.0											
		Reddish brown with mottled olive brown, CLAYSTONE with slickensided surfaces, moderately weathered, very soft - soft	36	SS	172.0-172.2	46-50/2	350						

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	NA	Hrs.	NA	ft.
Water used in drilling			NA	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/22/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-7**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/9/2008
Boring Location	**N** 532,470.2 **E** 1,724,543.6	Date Completed	1/15/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Reddish brown with mottled olive brown, CLAYSTONE with slickensided surfaces, moderately weathered, very soft - soft ***(LAYER CONTINUED DESCRIPTION REPEATED)***	1	NQ2	173.0-185.0		46	0					
		20.4	2	NQ2	185.0-195.0		89	26					
686.30	192.4	Gray, SANDSTONE, very fine to fine grained with many silty interbeds, micaceous, slightly weathered, medium hard - hard	3	NQ2	195.0-200.0		100	100					
		7.6											
678.70	200.0	BORING COMPLETED @ 200.0'											

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	NA	Hrs.	NA	ft.
Water used in drilling			NA	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/22/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-9**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/16/2008
Boring Location	**N** 531,423.0 **E** 1,725,216.6	Date Completed	1/19/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
878.40	0.0												
		Gray, FILL: silty gravel with sand, moist, medium dense	1	SS	0.0-1.5	4-9-10 (19)	100						
875.90	2.5	2.5											
		Reddish brown with some yellow, CLAY FILL: gravelly lean clay, some sand, clay core of dam, moist, stiff - very stiff	2	SS	5.0-6.5	6-7-8 (15)	100						
		12.5	1	ST	10.0-11.7	T-U-B-E	100			39	15		
863.40	15.0												
		Black to dark gray, FILL: silty sand, some cinders and coal fragments, moist, loose - medium dense	3	SS	15.0-16.5	4-4-7 (11)	100						
		-Composite Sample SS-4 & SS-5: LL = NP, PI = NP	4	SS	20.0-21.5	7-10-12 (22)	100						
		15.0	5	SS	25.0-26.5	12-12-15 (27)	100						
848.40	30.0												
		Reddish brown to gray, FILL: clayey sand with gravel, predominantly claystone and sandstone fragments, some boulders, moist, dense - very dense	6	SS	30.0-31.5	12-18-12 (30)	100						

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS/ST
Inspector	TAG/CF

Remarks

Water Level Observations

Immediate	NW		ft.
At Completion	144.2		ft. ▼
After	NA	Hrs. NA	ft.
Water used in drilling	NA		ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/22/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-9**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/16/2008
Boring Location	N 531,423.0 E 1,725,216.6	Date Completed	1/19/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)
		Reddish brown to gray, FILL: clayey sand with gravel, predominantly claystone and sandstone fragments, some boulders, moist, dense - very dense ***(LAYER CONTINUED DESCRIPTION REPEATED)***
		-Composite Sample SS-7 to SS-11: LL = 28, PI = 10
	55.0	

SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
7	SS	35.0-36.5	11-15-15 (30)	100						
8	SS	40.0-41.5	12-12-18 (30)	100						
9	SS	45.0-46.5	15-12-28 (40)	100						
10	SS	50.0-51.5	12-16-20 (36)	100						
11	SS	55.0-56.5	13-14-21 (35)	100						
12	SS	60.0-61.5	13-18-24 (42)	100						
13	SS	65.0-66.5	15-20-46 (66)	100						

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS/ST
Inspector	TAG/CF

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion	144.2			ft. ▼
After	NA	Hrs.	NA	ft.
Water used in drilling	NA			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-9**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/16/2008
Boring Location	**N** 531,423.0 **E** 1,725,216.6	Date Completed	1/19/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Reddish brown to gray, FILL: clayey sand with gravel, predominantly claystone and sandstone fragments, some boulders, moist, dense - very dense ***(LAYER CONTINUED DESCRIPTION REPEATED)***	14	SS	70.0-71.5	11-23-35 (58)	100						
			15	SS	75.0-76.5	11-16-13 (29)	100						
			16	SS	80.0-80.8	15-50/3	188						
793.40	85.0	Reddish brown to gray, FILL: silty sand with gravel, predominantly claystone and sandstone fragments, some boulders	17	SS	85.0-86.5	19-19-25 (44)	100						
		-Composite Sample SS-17 to SS-21: LL = NP, PI = NP	18	SS	90.0-91.5	14-40-38 (78)	100						
			19	SS	95.0-96.5	16-17-27 (44)	100						
			20	SS	100.0-101.5	19-19-21 (40)	100						

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS/ST
Inspector	TAG/CF

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion	144.2			ft. ▼
After	NA	Hrs.	NA	ft.
Water used in drilling	NA			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/22/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-9**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/16/2008
Boring Location	N 531,423.0 E 1,725,216.6	Date Completed	1/19/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Reddish brown to gray, FILL: silty sand with gravel, predominantly claystone and sandstone fragments, some boulders ***(LAYER CONTINUED DESCRIPTION REPEATED)***	21	SS	105.0-106.5	13-22-28 (50)	100						
			22	SS	110.0-111.5	7-12-26 (38)	100						
			23	SS	115.0-116.5	9-38-20 (58)	100						
			24	SS	120.0-121.5	22-17-22 (39)	100						
			25	SS	125.0-126.5	12-19-21 (40)	100						
748.40	130.0	45.0											
		Reddish brown, FILL: silty gravel with sand, moist, dense	26	SS	130.0-131.5	18-22-26 (48)	100						
			27	SS	135.0-136.5	16-19-27 (46)	0						
738.40	140.0	10.0											

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS/ST
Inspector	TAG/CF

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion	144.2			ft. ▼
After	NA	Hrs.	NA	ft.
Water used in drilling	NA			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/22/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-9**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/16/2008
Boring Location	**N** 531,423.0 **E** 1,725,216.6	Date Completed	1/19/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Reddish brown to gray, CLAY FILL: clayey sand with gravel, moist, very stiff - hard	28	SS	140.0-140.6	9-50/1	100						
	10.0	-Composite Sample SS-28 to SS-30: LL = 25, PI = 9	29	SS	145.0-146.5	4-12-39 (51)	100						
728.40	150.0												
	3.1	Reddish brown, CLAY FILL: lean clay with gravel, predominantly claystone and sandstone fragments, moist, hard	30	SS	150.0-151.5	17-18-23 (41)	100						
725.30	153.1												
		Gray, SANDY SHALE, laminated, fine grained sand, moderately weathered - highly weathered, soft - very soft Highly weathered, extremely soft zone at 156.6' to 156.9'	1	NQ2	153.1-160.7		88	46					
	10.6												
714.70	163.7												
		Gray to brown, CLAYSTONE, moderately weathered - highly weathered, very soft	2	NQ2	160.7-170.7		79	57					

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS/ST
Inspector	TAG/CF

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion	144.2			ft. ▼
After	NA	Hrs.	NA	ft.
Water used in drilling	NA			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/22/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-9**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/16/2008
Boring Location	**N** 531,423.0 **E** 1,725,216.6	Date Completed	1/19/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Gray to brown, CLAYSTONE, moderately weathered - highly weathered, very soft ***(LAYER CONTINUED DESCRIPTION REPEATED)***	3	NQ2	170.7-185.7		44	32					
	37.0		4	NQ2	185.7-195.7		48	32					
		Sandy zone at 195.7' to 196.8'	5	NQ2	195.7-200.7		86	42					
677.70	200.7	BORING COMPLETED @ 200.7'											

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS/ST
Inspector	TAG/CF

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion	144.2			ft. ▼
After	NA	Hrs.	NA	ft.
Water used in drilling	NA			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/22/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-10**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/18/2008
Boring Location	**N** 531,057.3 **E** 1,725,242.6	Date Completed	1/21/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	NO.	TYPE	SAMPLE DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
884.20	0.0												
		Brown, FILL: silty gravel with sand, some boulders, moist, very dense	1	SS	0.0-1.5	16-17-49 (66)	100						
879.20	5.0	5.0											
		Gray, SHALE, highly weathered, very soft	2	SS	5.0-6.5	5-6-5 (11)	100						
874.00	10.2	5.2											
872.50	11.7	Gray, SANDSTONE, laminated, highly fractured, highly weathered, soft 1.5											
		Gray, SANDY SHALE, laminated, abundant clay filled fractures, moderately weathered, soft - very soft	3	NQ2	10.0-15.0		96	30					
866.30	17.9	6.2	4	NQ2	15.0-20.0		100	70					
		Gray to reddish brown, CLAYSTONE, moderately weathered, very soft											
861.20	23.0	5.1	5	NQ2	20.0-25.0		100	82					
858.70	25.5	Gray, SANDSTONE, fine grained, thinly laminated, micaceous, slightly weathered, soft 2.5											
		Gray, SANDY SILTSTONE, thinly laminated, fine grained sand, slightly weathered, soft	6	NQ2	25.0-30.0		100	62					
853.50	30.7	5.2											
		Gray, SANDSTONE, fine grained, thinly laminated, slightly weathered, soft - medium hard	7	NQ2	30.0-35.0		100	78					
		5.8 From 34.3 to 35.2 vertical fracture											

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	CJF/TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	24	Hrs.	120	ft. ▼
Water used in drilling			10.0	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-10**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/18/2008
Boring Location	N 531,057.3 E 1,725,242.6	Date Completed	1/21/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
847.70	36.5	filled with calcite											
838.70	45.5	Gray, SANDSTONE, medium grained, micaceous, thinly laminated, fresh, medium hard	8	NQ2	35.0-40.0		100	92					
			9	NQ2	40.0-45.0		100	100					
828.80	55.4	Gray, SANDSTONE, medium grained, thinly laminated, slightly weathered, soft	10	NQ2	45.0-50.0		100	94					
			11	NQ2	50.0-55.0		100	96					
824.00	60.2	Gray, SILTSTONE, pitted texure, slightly weathered, soft - very soft	12	NQ2	55.0-60.0		96	80					
818.30	65.9	Gray, SILTSTONE, fresh, soft	13	NQ2	60.0-65.0		98	90					
		Gray to Brown, CLAYSTONE, pitted texure, highly fractured, slightly weathered - moderately weathered, soft - very soft	14	NQ2	65.0-70.0		100	58					

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	CJF/TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	24	Hrs.	120	ft. ▼
Water used in drilling	10.0			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/6/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-10**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/18/2008
Boring Location	N 531,057.3 E 1,725,242.6	Date Completed	1/21/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
810.20	74.0	8.1 Gray to Brown, CLAYSTONE, pitted texure, highly fractured, slightly weathered - moderately weathered, soft - very soft ***(LAYER CONTINUED DESCRIPTION REPEATED)***	15	NQ2	70.0-75.0		100	72					
799.00	85.2	Gray, SILTSTONE, slightly weathered, soft - very soft 11.2 From 83.5 to 84.0' vertical fracture filled with calcite From 85.6 to 85.8 inclined fracture	16	NQ2	75.0-80.0		98	98					
			17	NQ2	80.0-85.0		100	92					
792.40	91.8	Gray, SILTSTONE, laminated, faintly weathered, soft From 87.7 to 88.0 highly fractured 6.6	18	NQ2	85.0-90.0		100	78					
789.50	94.7	2.9 Gray, SANDSTONE, fine to medium grained, laminated, micaceous, faintly weathered, soft - medium hard	19	NQ2	90.0-95.0		100	64					
787.20	97.0	2.3 Gray, SILTY CLAYSTONE, highly fractured, moderately weathered, soft - very soft											
784.20	100.0	3.0 Gray to reddish brown, CLAYSTONE, pitted texture, moderately weathered, soft - very soft	20	NQ2	95.0-100.0		96	48					
		Gray, SANDY SILTSTONE, fine grained sand, fresh - faintly weathered, soft - medium hard	21	NQ2	100.0-105.0		96	96					

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	CJF/TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	24	Hrs.	120	ft. ▼
Water used in drilling			10.0	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-10**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/18/2008
Boring Location	N 531,057.3 E 1,725,242.6	Date Completed	1/21/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		11.3 Gray, SANDY SILTSTONE, fine grained sand, fresh - faintly weathered, soft - medium hard ***(LAYER CONTINUED DESCRIPTION REPEATED)*** From 109.2 to 109.9' vertical fracture	22	NQ2	105.0-110.0		100	84					
772.90	111.3												
		2.6 Gray, SILTY CLAYSTONE, slightly weathered, soft	23	NQ2	110.0-115.0		100	70					
770.30	113.9												
		2.7 Gray, SANDSTONE, very fine grained, thinly laminated, fresh, soft - medium hard	24	NQ2	115.0-120.0		100	78					
767.60	116.6												
		10.8 Gray, SILTSTONE, slightly weathered, soft From 118.5 to 120.0' highly fractured From 121.9 to 122.5 it is reddish brown From 125.4 to 127.4 it is gray and reddish brown stained	25	NQ2	120.0-125.0		96	66					
756.80	127.4		26	NQ2	125.0-130.0		100	92					
		4.9 Gray, SANDSTONE, fine grained, micaceous, fresh, soft - medium hard From 129.7 to 130.1 inclined fracture with oxidation on the surface of the fracture Lost water at 130.0' From 131.8 to 132.3 silty sandstone	27	NQ2	130.0-135.0		96	40					
751.90	132.3												
		4.6 Reddish brown, CLAYSTONE, highly fractured, moderately weathered - highly weathered, very soft - soft											
747.30	136.9												
		1.1 Gray, SANDSTONE, fine grained, micaceous, slightly weathered, soft	28	NQ2	135.0-140.0		98	78					
746.20	138.0	Gray to reddish brown, SILTSTONE, highly fractured, slightly weathered,											

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	CJF/TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	24	Hrs.	120	ft. ▼
Water used in drilling			10.0	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-10**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/18/2008
Boring Location	N 531,057.3 E 1,725,242.6	Date Completed	1/21/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
742.20	142.0	4.0 soft - very soft Gray to reddish brown, SILTSTONE, highly fractured, slightly weathered, soft - very soft ***(LAYER CONTINUED DESCRIPTION REPEATED)***	29	NQ2	140.0-145.0		100	60					
739.20	145.0	3.0 Gray, SANDSTONE, fine grained, micaceous laminations, some silty seams, slightly weathered, medium hard - hard											
		Reddish brown to gray, SILTY CLAYSTONE, few sandy seams, moderately weathered, very soft - soft	30	NQ2	145.0-150.0		100	12					
		10.2	31	NQ2	150.0-155.0		92	16					
729.00	155.2	Gray, SILTSTONE, few sandy seams, slightly weathered - faintly weathered, medium hard	32	NQ2	155.0-160.0		100	84					
		Claystone interbed at 157.5' to 159.5'											
		12.9	33	NQ2	160.0-165.0		100	76					
716.10	168.1		34	NQ2	165.0-170.0		100	56					
		Reddish brown, CLAYSTONE, moderately weathered - slightly weathered, soft - very soft	35	NQ2	170.0-175.0		96	0					

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	CJF/TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	24	Hrs.	120	ft. ▼
Water used in drilling			10.0	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-10**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/18/2008
Boring Location	N 531,057.3 E 1,725,242.6	Date Completed	1/21/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Reddish brown, CLAYSTONE, moderately weathered - slightly weathered, soft - very soft ***(LAYER CONTINUED DESCRIPTION REPEATED)***	36	NQ2	175.0-180.0		78	0					
	21.9		37	NQ2	180.0-185.0		96	0					
			38	NQ2	185.0-190.0		92	0					
694.20	190.0	BORING COMPLETED @ 190.0'											

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2/SS
Inspector	CJF/TAG

Remarks

Water Level Observations

Immediate				ft.
At Completion				ft.
After	24	Hrs.	120	ft. ▼
Water used in drilling			10.0	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-11**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/26/2008
Boring Location	N 533,944.8 E 1,723,909.5	Date Completed	1/26/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
904.30	0.0												
901.80	2.5	Gray, FILL: silty gravel with sand, existing road bed, dry, medium dense - dense											
899.30	5.0	Black to dark gray, FILL: silty sand, some fly ash, moist, medium dense											
		Brown to red, CLAYEY GRAVEL with SAND, completely weathered bedrock, residual structure, moist, very dense	1	SS	5.0-5.4	50/5	100						
889.30	15.0		2	SS	10.0-10.9	38-50/5	100						
		Brown to reddish brown, CLAYSTONE, moderately weathered, very soft	3	SS	15.0-15.4	50/5	100						
880.40	23.9		4	SS	20.0-20.1	50/1	0						
		Gray, SILTSTONE, few sandstone and red claystone interbeds, slightly weathered, medium hard	1	NQ2	20.1-25.1		100	30					
			2	NQ2	25.1-30.1		100	84					
869.20	35.1		3	NQ2	30.1-35.1		100	54					

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW	ft.
At Completion		ft.
After	NA Hrs. NA	ft.
Water used in drilling	20.1	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-11**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/26/2008
Boring Location	N 533,944.8 E 1,723,909.5	Date Completed	1/26/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		BORING COMPLETED @ 35.1'											

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion				ft.
After	NA	Hrs.	NA	ft.
Water used in drilling	20.1			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-11R**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/29/2008
Boring Location	N 533,944.8 E 1,723,911.5	Date Completed	1/30/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
904.30	0.0												
		Gray, FILL: silty gravel with sand, existing road bed, dry, medium dense - dense											
901.80	2.5	2.5											
		Black to dark gray, FILL: silty sand, some fly ash, moist, medium dense											
899.30	5.0	2.5											
		Brown to red, CLAYEY GRAVEL with SAND, completely weathered bedrock, residual structure, moist, very dense											
889.30	15.0	10.0											
		Brown to reddish brown, CLAYSTONE, highly weathered, very soft											
885.30	19.0	4.0											
884.50	19.8	0.8 Brownish gray, SANDSTONE, fine grained, moderately weathered, medium hard											
		3.1 Brownish gray, CLAYSTONE, soil-like, highly weathered, very soft	1	NQ2	19.0-24.0		100	28					
881.40	22.9	Sharp contact at 22.9'											
		Gray, SILTSTONE, thinly bedded to laminated, thin to medium shale interbeds throughout, moderately weathered - slightly weathered, soft - medium hard											
		5.2 Claystone interbed at 24.1' to 24.4'	2	NQ2	24.0-29.0		100	78					
876.20	28.1												
		Gray, SHALE, fissile, few clay seams, slightly weathered, soft											
		Sandstone interbed at 30.4' to 31.4'	3	NQ2	29.0-34.0		100	96					
		8.3											

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2
Inspector	TAG/JRB

Remarks

Boring redrilled adjacent to original 2008-B-11 location. No SPT samples obtained; boring augered to refusal and began coring to 75 ft.

Water Level Observations

Immediate	NW		ft.
At Completion			ft.
After	24	Hrs. BF	ft.
Water used in drilling	19.0		ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-11R**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/29/2008
Boring Location	N 533,944.8 E 1,723,911.5	Date Completed	1/30/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted))	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
867.90	36.4	Gray, SHALE, fissile, few clay seams, slightly weathered, soft ***(LAYER CONTINUED DESCRIPTION REPEATED)***	4	NQ2	34.0-39.0		100	64					
		3.3 Gray, SANDSTONE, very fine grained, thinly bedded, micaceous, slightly weathered, medium hard											
864.60	39.7	Gray to reddish brown, SILTY SHALE, weakly laminated, slightly weathered, soft	5	NQ2	39.0-44.0		100	80					
		6.5											
		Siltstone interbed at 44.5' to 45.0'											
858.10	46.2												
856.30	48.0	Brown, CLAYSTONE, highly weathered, very soft	6	NQ2	44.0-49.0		100	72					
855.90	48.4	0.4 Dark gray and black, CARBONACEOUS SHALE with coal streaks, moderately weathered, soft											
854.70	49.6	1.2 Gray, SILTSTONE, thinly bedded, slightly weathered, soft - medium hard	7	NQ2	49.0-54.0		100	100					
		5.0 Gray, SANDSTONE, very fine to fine grained, thinly bedded, thin shale interbeds throughout, slightly weathered, medium hard											
849.70	54.6												
848.00	56.3	1.7 Gray, SILTSTONE, thinly bedded, fractured, moderately weathered, soft	8	NQ2	54.0-59.0		100	78					
		2.7 Gray, SANDSTONE, very fine grained, thinly bedded, few shale and clay laminations, slightly weathered, medium hard											
845.30	59.0	Gray, SANDSTONE, fine to medium grained, medium to thickly bedded, micaceous laminations, 100% RQD, faintly weathered, hard	9	NQ2	59.0-64.0		100	100					
			10	NQ2	64.0-69.0		100	100					
		16.0											

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2
Inspector	TAG/JRB

Remarks

Boring redrilled adjacent to original 2008-B-11 location. No SPT samples obtained; boring augered to refusal and began coring to 75 ft.

Water Level Observations

Immediate	NW		ft.
At Completion			ft.
After	24	Hrs. BF	ft.
Water used in drilling	19.0		ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/6/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-11R**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/29/2008
Boring Location	N 533,944.8 E 1,723,911.5	Date Completed	1/30/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Gray, SANDSTONE, fine to medium grained, medium to thickly bedded, micaceous laminations, 100% RQD, faintly weathered, hard ***(LAYER CONTINUED DESCRIPTION REPEATED)***	11	NQ2	69.0-74.0		100	100					
829.30	75.0		12	NQ2	74.0-75.0		100	100					
		BORING COMPLETED @ 75.0'											

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	NQ2
Inspector	TAG/JRB

Remarks

Boring redrilled adjacent to original 2008-B-11 location. No SPT samples obtained; boring augered to refusal and began coring to 75 ft.

Water Level Observations

Immediate	NW	ft.
At Completion		ft.
After	24 Hrs. BF	ft.
Water used in drilling	19.0	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-13**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/25/2008
Boring Location	N 531,276.2 E 1,725,843.5	Date Completed	1/25/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS (color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
906.00	0.0												
		TOPSOIL	1	SS	0.0-1.5	2-2-3 (5)	100						
904.00	2.0	2.0											
		Brown to reddish brown, SANDY LEAN CLAY, residual soil structure to completely weathered bedrock, moist, very stiff - hard	2	SS	5.0-6.5	46-24-34 (58)	100						
		13.0	3	SS	10.0-10.8	26-50/4	100						
891.00	15.0												
		Olive brown, SILTSTONE, many wavy bedded sandstone interbeds, moderately weathered, soft - medium hard	4	SS	15.0-15.1	50/1	0						
			1	NQ2	15.1-20.0		100	82					
		15.0	2	NQ2	20.0-25.0		90	78					
			3	NQ2	25.0-30.0		100	68					
876.00	30.0												
		BORING COMPLETED @ 30.0'											

General Notes

Driller	Williams
Rig No.	
Rig Type	Track
Method	NQ2/SS
Inspector	TAG

Remarks

Water Level Observations

Immediate	NW			ft.
At Completion	NW			ft.
After	NA	Hrs.	NA	ft.
Water used in drilling	15.0			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

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LOG OF TEST BORING

Client	American Electric Power	Boring No.	2008-B-14
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/5/2008
Boring Location	N 532,472.1 E 1,724,544.4	Date Completed	1/7/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
879.00	0.0												
		Gray to brown, FILL: silty gravel with sand, few cobbles, moist, dense											
877.28	3.0	3.0											
		Reddish brown mottled with gray and brown, CLAY FILL: sandy lean clay, little gravel (subangular siltstone and sandstone), very moist, stiff – very stiff	1	ST	4.5-6.5	T-U-B-E	65		19	38	16		0.2
			2	ST	14.5-16.5	T-U-B-E	90		20	37	16		0.3
			3	ST	24.5-26.5	T-U-B-E	100		19	38	16		
		61.5											

General Notes

Driller	Williams
Rig No.	45C
Rig Type	Track
Method	ST
Inspector	TAG/JRB

Remarks

Boring drilled at 35° from the horizontal. Elevation values presented on boring log are corrected for angle of inclination. The depths shown are inclined distances. Pneumatic piezometer installed at an inclined distance of 88 feet in the middle of a 10 ft. screening section. Boring drilled at approximate bearing N 30° E.

Water Level Observations

Immediate		ft.
At Completion	20.0	ft. ▽
After	24 Hrs. NA	ft.
Water used in drilling	NW	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 1/31/08

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BLUEGRASS REGION
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LOG OF TEST BORING

Client	American Electric Power	Boring No.	2008-B-14
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/5/2008
Boring Location	N 532,472.1 E 1,724,544.4	Date Completed	1/7/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Reddish brown mottled with gray and brown, CLAY FILL: sandy lean clay, little gravel (subangular siltstone and sandstone), very moist, stiff – very stiff (LAYER CONTINUED DESCRIPTION REPEATED)	4	ST	34.5-36.5	T-U-B-E	100						0.3
			5	ST	44.5-46.5	T-U-B-E	100		16	37	16		
			6	ST	49.5-51.5	T-U-B-E	0						
			7	ST	54.5-56.5	T-U-B-E	100		17	37	16		0.25
			8	ST	59.5-61.5	T-U-B-E	75		17	36	14		0.5
842.00	64.5												
		Light brown with gray, CLAY FILL: sandy lean clay with gravel, moist, stiff – very stiff	9	ST	64.5-66.5	T-U-B-E	50		17	34	14		0.5

General Notes

Driller	Williams
Rig No.	45C
Rig Type	Track
Method	ST
Inspector	TAG/JRB

Remarks

Boring drilled at 35° from the horizontal. Elevation values presented on boring log are corrected for angle of inclination. The depths shown are inclined distances. Pneumatic piezometer installed at an inclined distance of 88 feet in the middle of a 10 ft. screening section. Boring drilled at approximate bearing N 30° E.

Water Level Observations

Immediate				ft.
At Completion	20.0			ft. ▽
After	24	Hrs.	NA	ft.
Water used in drilling			NW	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 1/31/08

H.C. NUTTING COMPANY
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LOG OF TEST BORING

Client	American Electric Power	Boring No.	2008-B-14
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/5/2008
Boring Location	N 532,472.1 E 1,724,544.4	Date Completed	1/7/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Light brown with gray, CLAY FILL: sandy lean clay with gravel, moist, stiff – very stiff (LAYER CONTINUED DESCRIPTION REPEATED)	10	ST	69.5–71.5	T–U–B–E	75		19	32	10		0.5
		17.0											
			11	ST	74.5–76.5	T–U–B–E	0						
832.25	81.5		12	ST	79.5–81.5	T–U–B–E	0						
		Reddish brown, brown with gray, CLAY FILL: sandy lean clay with gravel, moist – very moist, stiff	13	ST	81.5–83.5	T–U–B–E	75		20	39	18		0.25
			14	ST	84.5–86.5	T–U–B–E	100		17	36	15		0.3
			15	ST	89.5–91.5	T–U–B–E	100		20	40	18		0.3
		20.0											
			16	ST	94.5–96.5	T–U–B–E	20						
820.78	101.5		17	ST	99.5–101.5	T–U–B–E	100		19	40	17		0.5
		BORING COMPLETED @ 101.5'											

General Notes

Driller	Williams
Rig No.	45C
Rig Type	Track
Method	ST
Inspector	TAG/JRB

Remarks

Boring drilled at 35° from the horizontal. Elevation values presented on boring log are corrected for angle of inclination. The depths shown are inclined distances. Pneumatic piezometer installed at an inclined distance of 88 feet in the middle of a 10 ft. screening section. Boring drilled at approximate bearing N 30° E.

Water Level Observations

Immediate				ft.
At Completion	20.0			ft. ▽
After	24	Hrs.	NA	ft.
Water used in drilling	NW			ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 1/31/08

H.C. NUTTING COMPANY
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LOG OF TEST BORING

Client	American Electric Power	Boring No.	2008-B-16
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	12/18/2007
Boring Location	N 531,423.3 E 1,725,218.6	Date Completed	12/26/2007
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)
878.80	0.0	
		Gray to brown, FILL: silty gravel with sand, few cobbles, moist, dense
	3.5	
876.33	3.5	
		Reddish brown mottled with gray and brown, CLAY FILL: sandy lean clay, little gravel (subangular siltstone and sandstone), moist, stiff – very stiff
	56.5	

SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
1	ST	5.0–7.0	T-U-B-E	100		21	40	18		N/A
2	ST	15.0–17.0	T-U-B-E	75		16	37	16		4.0
3	ST	25.0–27.0	T-U-B-E	75		18	39	17		4.5

General Notes

Driller	Davis
Rig No.	550
Rig Type	ATV
Method	ST
Inspector	TAG/JRB

Remarks

Boring drilled at 45° from the horizontal. Elevation values presented on boring log are corrected for angle of inclination. The depths shown are inclined distances. Pneumatic piezometer installed at an inclined distance of 29 feet in the middle of a 10 ft. screening section. Boring drilled at approximate bearing N 30° E.

Water Level Observations

Immediate				ft.
At Completion				ft.
After	NA	Hrs.	NA	ft.
Water used in drilling		NA		ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC_NUTTING.GDT 1/31/08

H.C. NUTTING COMPANY
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LOG OF TEST BORING

Client	American Electric Power	Boring No.	2008-B-16
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	12/18/2007
Boring Location	N 531,423.3 E 1,725,218.6	Date Completed	12/26/2007
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Reddish brown mottled with gray and brown, CLAY FILL: sandy lean clay, little gravel (subangular siltstone and sandstone), moist, stiff – very stiff (LAYER CONTINUED DESCRIPTION REPEATED)	4	ST	35.0–37.0	T–U–B–E	0						N/A
			5	ST	40.0–42.0	T–U–B–E	90			36	15		3.0
			6	ST	45.0–47.0	T–U–B–E	0						N/A
			7	ST	50.0–52.0	T–U–B–E	0						N/A
			8	ST	52.0–54.0	T–U–B–E	100		17	37	15		2.5
			9	ST	55.0–57.0	T–U–B–E	100			35	14		1.5
836.37	60.0												
		ROCK FILL (no samples obtained)	10	ST	60.0–60.0	T–U–B–E							N/A
832.84	65.0	5.0											
		BORING COMPLETED @ 65.0'	11	ST	65.0–65.0	T–U–B–E							N/A

General Notes	
Driller	Davis
Rig No.	550
Rig Type	ATV
Method	ST
Inspector	TAG/JRB

Remarks

Boring drilled at 45° from the horizontal. Elevation values presented on boring log are corrected for angle of inclination. The depths shown are inclined distances. Pneumatic piezometer installed at an inclined distance of 29 feet in the middle of a 10 ft. screening section. Boring drilled at approximate bearing N 30° E.

Water Level Observations

Immediate				ft.
At Completion				ft.
After	NA	Hrs.	NA	ft.
Water used in drilling		NA		ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 1/31/08

H.C. NUTTING COMPANY
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EMPLOYEE OWNED
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LOG OF TEST BORING

Client	American Electric Power	Boring No.	**2008-B-17**
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/28/2008
Boring Location	**N** 532,112.8 **E** 1,726,856.8	Date Completed	1/28/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
875.00	0.0	Gray, FILL: silty gravel, moist, dense											
		5.0											
870.00	5.0	Gray, FLY ASH (sandy silt), saturated, medium stiff											
		35.0											

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	
Inspector	TAG

Remarks

No SPT samples obtained. Augered to 40 ft and installed pneumatic piezometer at 35 ft.

Water Level Observations

Immediate	7.0	ft. ▽
At Completion	7.0	ft. ▼
After	24 Hrs. BF	ft.
Water used in drilling	NW	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

H.C. NUTTING COMPANY
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LOG OF TEST BORING

Client	American Electric Power	Boring No.	2008-B-17
Project	Amos U3 Fly Ash Dam Raising Study	Date Started	1/28/2008
Boring Location	N 532,112.8 E 1,726,856.8	Date Completed	1/28/2008
Elevation Ref.	American Electric Power	Work Order No.	N2075307

ELEV. ft.	DEPTH ft.	DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	SAMPLE NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC. %	RQD %	W %	LL %	PI %	HCSI	PPR tsf
		Gray, FLY ASH (sandy silt), saturated, medium stiff ***(LAYER CONTINUED DESCRIPTION REPEATED)***											
835.00	40.0	BORING COMPLETED @ 40.0'											

General Notes

Driller	Mathis
Rig No.	
Rig Type	Truck
Method	
Inspector	TAG

Remarks

No SPT samples obtained. Augered to 40 ft and installed pneumatic piezometer at 35 ft.

Water Level Observations

Immediate	7.0			ft. ▽
At Completion	7.0			ft. ▼
After	24	Hrs.	BF	ft.
Water used in drilling			NW	ft.

BF = BACKFILLED NW = NO WATER
(Measured from ground surface)

TEST BORING FLY ASH DAM RAISING.GPJ HC NUTTING.GDT 2/8/08

ARCADIS

American Electric Power, 2008

Boring Logs

2008-19 to 2008-28

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____

PROJECT **Amos FGD Haul Road**

COORDINATES **N 533,257.1 E 1,727,206.5**

GROUND ELEVATION _____ SYSTEM _____

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **2008-19** DATE **5/13/08** SHEET **1** OF **2**

BORING START **3/11/08** BORING FINISH **3/11/08**

PIEZOMETER TYPE **NA** WELL TYPE **NA**

HGT. RISER ABOVE GROUND **NA** DIA **NA**

DEPTH TO TOP OF WELL SCREEN **NA** BOTTOM **NA**

WELL DEVELOPMENT **NA** BACKFILL **Quick Grout**

FIELD PARTY **ZLR/RMP** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SPT	1.8	3.3	3-3-6	1.1					**N5 MEDIUM GRAY BOTTOM ASH** tsf 0.25, wet		GROUNDING PROCEDURES NOT IN USE ON THIS BORING / DRILLED IN ROAD BED
										10R 6/6 MODERATE REDDISH ORANGE SILTY CLAY tsf 2.5, moist		
							5			**NO RECOVERY**		
2	SPT	6.8	6.8	50/0	0					**HARD 5Y 5/2 LIGHT OLIVE GRAY SILTSTONE** w/fine grain sandstone		
3	NQ	8.8	9.6		.8	0						AUGER REFUSAL @ 8.8'; BEGAN CORING @ 8.8'
4	NQ	9.6	19.6		9.9	81	10			**10Y 6/6 DARK GREENISH YELLOW SILTY FINE GRAIN SANDSTONE**		
							15					
5	NQ	19.6	24.6		5.0	88				**5Y 5/2 LIGHT OLIVE GRAY SILTY CLAYSHALE** vertical fracture @ 13.1'		
										5YR 5/2 PALE BROWN SILTY CLAYSHALE		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP AMOS FGD HAUL ROAD.GPJ AEP.GDT 5/13/08

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-19** DATE **5/13/08** SHEET **2** OF **2**

PROJECT **Amos FGD Haul Road** BORING START **3/11/08** BORING FINISH **3/11/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
												STOPPED BORING @ 24.6'; TREMIE GROUTED FROM 24.6' TO GRADE; TOP OFF BOREHOLE W/~50 LBS OF QUICK CRETE CEMENT MIX; DISCARDED BOTTOM 24.1' - 24.6' OF CORE AS CORE BOX WAS FULL; 27 GAL OF QUICK GROUT TO TOP OF HOLE, PLACED 1 BAG OF CONCRETE IN HOLE 2' TO TOP OF GROUND

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____

PROJECT **Amos FGD Haul Road**

COORDINATES **N 533,997.2 E 1,727,462.1**

GROUND ELEVATION _____ SYSTEM _____

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **2008-21** DATE **5/13/08** SHEET **1** OF **2**

BORING START **3/10/08** BORING FINISH **3/11/08**

PIEZOMETER TYPE **NA** WELL TYPE **NA**

HGT. RISER ABOVE GROUND **NA** DIA **NA**

DEPTH TO TOP OF WELL SCREEN **NA** BOTTOM **NA**

WELL DEVELOPMENT **NA** BACKFILL **Quick Grout**

FIELD PARTY **ZLR/RMP** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SPT	2.5	4.0	32-15-34	.7					**HARD 5Y 7/6 MODERATE YELLOW BROKEN WEATHERED FINE GRAIN SANDSTONE** dry		GROUNDING PROCEDURES NOT IN USE ON THIS BORING; DRILLED BORING IN ROAD BED
							5					
2	SPT	7.5	7.5	50/0	0					**NO RECOVERY**		
3	NQ	8.8	10.1		1.3	0				**HARD 10Y 6/6 DARK GREENISH YELLOW SILTY FINE GRAIN CLAYSHALE** w/high angle fracture @ 9.4'		AUGER REFUSAL @ 8.8'; REPLACED NQ BIT; STARTED CORING @ 8.8'
							10					
4	NQ	10.1	20.1		9.0	61				**HARD 10Y 6/6 DARK GREENISH YELLOW SILTY FINE GRAIN CLAYSHALE** w/vertical fracture @ 11.4' - 11.8'		
										HARD 5R 4/2 GRAYISH RED CLAYSHALE w/vertical fracture @ 14.1', high angle fracture @ 15.6' - 15.8', and soft area @ 16.6'		
							15					
										HARD 10Y 6/6 DARK GREENISH YELLOW SILTY FINE GRAIN CLAYSHALE w/soft area @ 17.3'		
										5GY 6/1 GREENISH GRAY SILTSTONE w/fine grain sandstone		
										5Y 7/2 YELOWISH GRAY SILTY CLAYSHALE		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP AMOS FGD HAUL ROAD.GPJ AEP.GDT 5/13/08

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-21** DATE **5/13/08** SHEET **2** OF **2**

PROJECT **Amos FGD Haul Road** BORING START **3/10/08** BORING FINISH **3/11/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										w/vertical fracture @ 18.9'		STOPPED BORING @ 20.1'; TREMIE GROUTED FROM 20.1' TO GRADE; TOP OFF BOREHOLE W/~50 LBS OF QUICK CRETE CEMENT MIX

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____

PROJECT **Amos FGD Haul Road**

COORDINATES **N 534,941.6 E 1,728,009.5**

GROUND ELEVATION _____ SYSTEM _____

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **2008-22** DATE **5/13/08** SHEET **1** OF **3**

BORING START **3/12/08** BORING FINISH **3/12/08**

PIEZOMETER TYPE **NA** WELL TYPE **NA**

HGT. RISER ABOVE GROUND **NA** DIA **NA**

DEPTH TO TOP OF WELL SCREEN **NA** BOTTOM **NA**

WELL DEVELOPMENT **NA** BACKFILL **Quick Grout**

FIELD PARTY **ZLR/RMP** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SPT	1.3	2.1	48-50/2						**HARD 5Y 8/4 GRAYISH YELLOW BROKEN FINE GRAIN SANDSTONE**		GROUNDING PROCEDURES NOT IN USE ON THIS BORING
2	NQ	3.6	9.0		5.0	48	5			**10Y 6/2 PALE OLIVE MEDIUM COARSE SANDSTONE**		AUGER REFUSAL @ 3.6'; BEGAN CORING @ 3.6'
3	NQ	9.0	19.0		9.9	51	10			**10Y 6/2 PALE OLIVE SILTY CLAYSHALE** w/vertical fracture @ 8.0' **HARD 5Y 5/2 LIGHT OLIVE GRAY SILTY LIGHT CLAYSHALE** w/some fine grain sandstone		
4	NQ	19.0	25.4		4.2	40	15			**SOFT 10Y 6/2 PALE OLIVE CLAYSHALE** **5YR 5/2 PALE BROWN SILTY CLAYSHALE**		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP AMOS FGD HAUL ROAD.GPJ AEP.GDT 5/13/08

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-22** DATE **5/13/08** SHEET **2** OF **3**

PROJECT **Amos FGD Haul Road** BORING START **3/12/08** BORING FINISH **3/12/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	NQ	25.4	29.0		4.1	51	25			**5Y 5/6 DUSKY YELLOW CLAYSHALE**		SWL @ 16.3 (15 HR READING); NQ HOLE TO 25.4'
										MEDIUM SOFT 5YR 5/2 PALE BROWN CLAYSHALE		
6	NQ	29.0	34.0		5.0	44	30					
7	NQ	34.0	41.9		6.0	67	35					
										N5 MEDIUM GRAY FINE GRAIN SANDSTONE broken @ 39.0' - 39.3'		
8	NQ	41.9	44.0		2.8	96	40			**HARD N5 MEDIUM GRAY WELL CEMENTED FINE GRAIN SANDSTONE**		
9	NQ	44.0	54.0		9.8	97	45			**HARD N5 MEDIUM GRAY WELL CEMENTED SILTSTONE**		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-22** DATE **5/13/08** SHEET **3** OF **3**

PROJECT **Amos FGD Haul Road** BORING START **3/12/08** BORING FINISH **3/12/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							50					
										HARD N5 MEDIUM GRAY WELL CEMENTED MEDIUM COARSE SANDSTONE		
							55			**N6 MEDIUM LIGHT GRAY SILTSTONE**		
10	NQ	59.0	64.0		10	90						
							60					TREMIED GROUT IN HOLE TO GROUND LEVEL USING ~35 GAL; PLACED 2' OF CONCRETE TO TOP OF GROUND

AEP AMOS FGD HAUL ROAD.GPJ AEP.GDT 5/13/08

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____

PROJECT **Amos FGD Haul Road**

COORDINATES **N 535,340.2 E 1,728,037.6**

GROUND ELEVATION _____ SYSTEM _____

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **2008-23** DATE **5/13/08** SHEET **1** OF **3**

BORING START **3/18/08** BORING FINISH **3/18/08**

PIEZOMETER TYPE **NA** WELL TYPE **NA**

HGT. RISER ABOVE GROUND **NA** DIA **NA**

DEPTH TO TOP OF WELL SCREEN **NA** BOTTOM **NA**

WELL DEVELOPMENT **NA** BACKFILL **Quick Grout**

FIELD PARTY **ZLR/RMP** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SPT	2.0	3.5	4-5-8	1.4					**HARD 5YR 7/2 GRAYISH ORANGE PINK SILTY CLAYSHALE** tsf 2.0		GROUNDING PROCEDURES NOT IN USE ON THIS BORING; UNDERCUT ORIGINAL GRADE +/-2.0' FOR DRILL PAD
2	SPT	7.0	8.5	7-5-9	.7		5			**5Y 8/4 GRAYISH YELLOW WEATHERED BADLY BROKEN SANDSTONE** tsf 3.0		
										HARD RED CLAY		
3	SPT	12.0	13.5	28-50/3	.8		10			**5Y 8/4 GRAYISH YELLOW WEATHERED SILTY CLAYSHALE** dry		
4	NQ	14.6	20.4		5.3	70	15			**5YR 5/2 PALE BROWN SILTY CLAYSHALE**		
										10Y 6/6 DARK GREENISH WEATHERED SANDSTONE		
										HARD N5 MEDIUM GRAY WELL CEMENTED SILTSTONE		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP AMOS FGD HAUL ROAD.GPJ AEP.GDT 5/13/08

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-23** DATE **5/13/08** SHEET **2** OF **3**

PROJECT **Amos FGD Haul Road** BORING START **3/18/08** BORING FINISH **3/18/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	NQ	20.4	30.4		8.8	67	25			**HARD N5 MEDIUM GRAY FINE GRAIN WELL CEMENTED SILTSTONE** high angle fracture w/iron staining @ 25.3'		
							30			**MEDIUM SOFT N5 PALE BROWN CLAY SILTSTONE**		
6	NQ	30.4	34.9		5.7	54				**HARD N5 MEDIUM GRAY SILTSTONE** soft area badly broken @ 33.4'		SWL @ GRADE LEVEL
7	NQ	34.9	40.4		5.5	87	35			**HARD N5 MEDIUM GRAY SILTSTONE**		
										MEDIUM HARD 5YR 5/2 PALE BROWN SILTY CLAYSHALE		
8	NQ	40.4	50.4		10.1	92	40			**MEDIUM SOFT 5YR 5/2 PALE BROWN SILTY CLAYSHALE**		
										HARD N5 MEDIUM GRAY SILTSTONE		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-23** DATE **5/13/08** SHEET **3** OF **3**

PROJECT **Amos FGD Haul Road** BORING START **3/18/08** BORING FINISH **3/18/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							50			**HARD N5 MEDIUM GRAY WELL CEMENTED FINE GRAIN SANDSTONE**		
9	NQ	50.4	55.4		5.0	100				**HARD N6 MEDIUM LIGHT GRAY WELL CEMENTED MEDIUM COURSE SANDSTONE**		
							55					

AEP AMOS FGD HAUL ROAD.GPJ AEP.GDT 5/13/08

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____

PROJECT **Amos FGD Haul Road**

COORDINATES **N 535,663.5 E 1,728,199.2**

GROUND ELEVATION _____ SYSTEM _____

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **2008-25** DATE **5/13/08** SHEET **1** OF **4**

BORING START **3/18/08** BORING FINISH **3/18/08**

PIEZOMETER TYPE **NA** WELL TYPE **NA**

HGT. RISER ABOVE GROUND **NA** DIA **NA**

DEPTH TO TOP OF WELL SCREEN **NA** BOTTOM **NA**

WELL DEVELOPMENT **NA** BACKFILL **Quick Grout**

FIELD PARTY **ZLR/RMP** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	NQ	3.8	9.9		3.85	26				**10Y 7/4 MODERATE GREENISH YELLOW WEATHERED SANDSTONE**		GROUNDING PROCEDURES NOT IN USE ON THIS BORING; CUT 3' TO 4' BELOW GRADE FOR DRILL PAD; WEATHERED SHALEY FINE GRAIN SANDSTONE; BLIND DRILLED NW CASING TO 3.8'
							5			**10YR 7/4 GRAYISH ORANGE SILTY CLAYSHALE**		
										10Y 7/4 MODERATE GREENISH YELLOW BADLY BROKEN CLAY SILTSTONE		
2	NQ	9.9	19.9		9.8	70	10			**5Y 5/2 LIGHT OLIVE GRAY CLAYSHALE**		
										10Y 6/6 DARK GREENISH YELLOW SILTSTONE		
										5Y 5/2 LIGHT OLIVE GRAY CLAYSHALE		
							15			**HARD N6 MEDIUM LIGHT GRAY WELL CEMENTED FINE GRAIN SANDSTONE**		
										10Y 6/6 DARK GREENISH YELLOW CLAY SILTSTONE		
										5YR 5/2 PALE BROWN SILTY CLAYSHALE		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP AMOS FGD HAUL ROAD.GPJ AEP.GDT 5/13/08

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

BORING NO. **2008-25** DATE **5/13/08** SHEET **2** OF **4**

PROJECT **Amos FGD Haul Road** BORING START **3/18/08** BORING FINISH **3/18/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	NQ	19.9	29.9		10	60						
										N5 MODERATE GRAY SILTY CLAYSHALE		
							25			**N7 LIGHT GRAY FINE GRAIN SANDSTONE**		
4	NQ	29.9	39.9		10.2	96	30			**HARD 10Y 6/6 DARK GREENISH YELLOW WELL CEMENTED FINE GRAIN SANDSTONE**		
							35					
										HARD N7 LIGHT GRAY WELL CEMENTED MEDIUM COARSE SANDSTONE		
5	NQ	39.9	49.9		10.1	62	40			**HARD N7 LIGHT GRAY WELL CEMENTED MEDIUM COARSE SANDSTONE**		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-25** DATE **5/13/08** SHEET **3** OF **4**

PROJECT **Amos FGD Haul Road** BORING START **3/18/08** BORING FINISH **3/18/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										MEDIUM HARD N5 MEDIUM GRAY SILTY CLAYSHALE		
										MEDIUM HARD 5YR 5/2 PALE BROWN SILTY CLAYSHALE		
6	NQ	49.9	59.9		10.0	86	50			**5RP 6/2 PALE RED PURPLE SILTY CLAYSHALE**		SWL 3.9 @ 14 HRS
										HARD N6 MEDIUM LIGHT GRAY WELL CEMENTED SILTSTONE		
							55					
										5RP 4/2 GRAYISH RED PURPLE SILTY CLAYSHALE high angle fracture @ 55.7'		
7	NQ	59.9	69.9		10.0	85	60			**HARD N6 MEDIUM LIGHT GRAY WELL CEMENTED CLAY SILTSTONE** high angle fractures @ 61.9' & 65.9'		
							65					
										HARD N6 MEDIUM LIGHT GRAY WELL CEMENTED SILTSTONE		
8	NQ	69.9	74.9		5.0	100	70					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-25** DATE **5/13/08** SHEET **4** OF **4**

PROJECT **Amos FGD Haul Road** BORING START **3/18/08** BORING FINISH **3/18/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
												TREMIED GROUT BACK TO GROUND LEVEL USING ~40 GALS; PLACED 2' OF CONCRETE TO TOP OF GROUND

AEP AMOS FGD HAUL ROAD.GPJ AEP.GDT 5/13/08

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____

PROJECT **Amos FGD Haul Road**

COORDINATES **N 535,666.0 E 1,728,598.9**

GROUND ELEVATION _____ SYSTEM _____

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **2008-26** DATE **5/13/08** SHEET **1** OF **5**

BORING START **3/24/08** BORING FINISH **3/25/08**

PIEZOMETER TYPE **NA** WELL TYPE **NA**

HGT. RISER ABOVE GROUND **NA** DIA **NA**

DEPTH TO TOP OF WELL SCREEN **NA** BOTTOM **NA**

WELL DEVELOPMENT **NA** BACKFILL **Quick Grout**

FIELD PARTY **ZLR/RMP** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SPT	1.2	2.7	7-16-27	1.3					**HARD 5Y 7/2 YELLOWISH GRAY SILT** tsf 4.25; w/trace of clay; dry		GROUNDING PROCEDURES NOT IN USE ON THIS BORING; UNDERCUT +/-2' OF ORIGINAL GRADE TO MAKE DRILL PAD
2	SPT	6.2	7.7	50/0	0		5			**NO RECOVERY**		
3	NQ	8.5	9.0		.5	100				**HARD 5Y 5/2 LIGHT OLIVE GRAY WELL CEMENTED SILTSTONE**		
4	NQ	9.0	19.0		7.8	32	10			**MEDIUM HARD 5Y 5/2 LIGHT OLIVE GRAY CLAYSHALE** w/silt		
5	NQ	19.0	29.0		9.4	79	15			**MEDIUM HARD 5YR 5/2 PALE BROWN SILTY CLAYSHALE** **MEDIUM HARD 5Y 6/4 DARK YELLOW SILTY**		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP AMOS FGD HAUL ROAD.GPJ AEP.GDT 5/13/08

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

BORING NO. **2008-26** DATE **5/13/08** SHEET **2** OF **5**

PROJECT **Amos FGD Haul Road** BORING START **3/24/08** BORING FINISH **3/25/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										CLAYSHALE		
										MEDIUM HARD 5Y 6/4 DARK YELLOW FINE GRAIN SILTY CLAYSHALE		
										MEDIUM SOFT N6 MEDIUM LIGHT GRAY CLAY SILTY SHALE		
							25					
										MEDIUM SOFT 5Y 4/2 GRAYISH RED CLAY SILTY SHALE		
6	NQ	29.0	39.0		10.3	81				**5R 4/2 GRAYISH RED SILTY CLAYSHALE**		
							30					
										MEDIUM HARD N6 MEDIUM LIGHT GRAY SILTY CLAYSHALE		
										HARD 5Y 7/2 YELLOWISH GRAY WELL CEMENTED CLAY SILTSTONE		
							35					
7	NQ	39.0	44.0		5.0	100				**HARD 10Y 6/6 DARK GREENISH YELLOW WELL CEMENTED FINE GRAIN SANDSTONE** high angle fracture @ 43.1'		SWL @ 16.0 AFTER 13.5 HRS
							40					
8	NQ	44.0	54.0		10.0	85				**HARD 10Y 6/6 DARK GREENISH YELLOW WELL CEMENTED FINE GRAIN SANDSTONE**		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-26** DATE **5/13/08** SHEET **3** OF **5**

PROJECT **Amos FGD Haul Road** BORING START **3/24/08** BORING FINISH **3/25/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							50			**HARD N8 VERY LIGHT GRAY WELL CEMENTED MEDIUM COARSE SANDSTONE**		
										HARD N7 LIGHT GRAY WELL CEMENTED LIMESTONE		
										HARD N5 MEDIUM GRAY SILTSTONE w/very little clay		
9	NQ	54.0	61.7		5.2	40	55			**N5 MEDIUM LIGHT GRAY SILTY CLAYSHALE**		
										5R 4/2 GRAYISH RED SILTY CLAYSHALE		
							60					
10	NQ	61.7	64.0		3.4	85				**N5 MEDIUM LIGHT GRAY SILTY CLAYSHALE**		
										HARD N5 MEDIUM GRAY WELL CEMENTED CLAY SILTSTONE		
11	NQ	64.0	74.0		10.0	79				**HARD 5YR 3/2 GRAYISH BROWN CLAYSHALE**		
							65			**HARD N5 MEDIUM GRAY CLAYSHALE**		
										HARD N5 MEDIUM GRAY SILTSTONE		
										HARD 5YR 3/2 GRAYISH BROWN SILTY CLAYSHALE		
							70					
										HARD 5Y 5/2 LIGHT OLIVE SILTY CLAYSHALE w/fractures @ 70.0' & 70.7'		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

BORING NO. **2008-26** DATE **5/13/08** SHEET **4** OF **5**

PROJECT **Amos FGD Haul Road** BORING START **3/24/08** BORING FINISH **3/25/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
12	NQ	74.0	84.0		10.0	87	75			**HARD N5 MEDIUM GRAY WELL CEMENTED SILTSTONE** w/ little fine grain sandstone		
										HARD 5Y 7/2 YELLOWISH GRAY FINE GRAIN SANDSTONE		
							80			**N6 MEDIUM LIGHT GRAY SILTY CLAYSHALE**		
										HARD 5Y 7/2 YELLOWISH GRAY WELL CEMENTED SILTSTONE		
13	NQ	84.0	94.0		10.3	38	85			**HARD N6 MEDIUM LIGHT GRAY WELL CEMENTED SILTSTONE** high angle fracture @ 78.0' - 79.0' w/iron staining		
										HARD N6 MEDIUM LIGHT GRAY WELL CEMENTED SILTSTONE w/iron staining		
										5Y 7/2 YELLOWISH FINE GRAIN SANDSTONE		
							90			**HARD N5 MEDIUM GRAY WELL CEMENTED CLAY SILTSTONE** w/soft area 86.2' - 86.3'		
14	NQ	94.0	99.0		5.0	90				**HARD 5R 4/2 GRAYISH RED WELL CEMENTED CLAY SILTSTONE**		
							95			**HARD N4 MEDIUM DARK GRAY WELL CEMENTED SILTSTONE** w/very little clay		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-26** DATE **5/13/08** SHEET **5** OF **5**

PROJECT **Amos FGD Haul Road** BORING START **3/24/08** BORING FINISH **3/25/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
								× × × × × × × × ×				STOPPED BORING @ 99.0'; TREMIE GROUTED FROM 99.0' TO GRADE USING ~45 GAL OF GROUT CEMENT TO 18" BELOW GROUND TO TOP OF GROUND

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____

PROJECT **Amos FGD Haul Road**

COORDINATES **N 535,863.0 E 1,728,908.9**

GROUND ELEVATION _____ SYSTEM _____

Water Level, ft	▽	▼	▼
TIME			
DATE			

BORING NO. **2008-28** DATE **5/13/08** SHEET **1** OF **6**

BORING START **3/25/08** BORING FINISH **3/26/08**

PIEZOMETER TYPE **NA** WELL TYPE **NA**

HGT. RISER ABOVE GROUND **NA** DIA **NA**

DEPTH TO TOP OF WELL SCREEN **NA** BOTTOM **NA**

WELL DEVELOPMENT **NA** BACKFILL **Quick Grout**

FIELD PARTY **ZLR/RMP** RIG **D-120**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	SPT	1.1	2.6	3-4-5						**STIFF 5R 4/2 GRAYISH RED CLAYSHALE** tsf 1.75; w/trace of silt		GROUNDING PROCEDURES NOT IN USE ON THIS BORING
2	SPT	6.1	13.7	3/50			5			**STIFF 5R 4/2 GRAYISH RED CLAYSHALE** tsf 1.5; w/trace of silt		
										5Y 8/4 GRAYISH YELLOW WEATHERED FINE GRAIN SANDSTONE		
3	NQ	8.4	13.9		5.5	82	10			**HARD 10Y 6/6 DARK GREENISH YELLOW WELL CEMENTED WEATHERED FINE GRAIN SANDSTONE** vertical fracture @ 8.7'		AUGER REFUSAL @ 8.4'; STARTED CORING @ 8.4
4	NQ	13.9	23.9		10.0	72	15			**HARD 10Y 6/6 DARK GREENISH YELLOW WELL CEMENTED FINE GRAIN SANDSTONE**		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
	6" x 3.25 HSA	
	9" x 6.25 HSA	
	HW CASING ADVANCER	4"
	NW CASING	3"
	SW CASING	6"
	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER _____

AEP AMOS FGD HAUL ROAD.GPJ AEP.GDT 5/13/08

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

BORING NO. **2008-28** DATE **5/13/08** SHEET **2** OF **6**

PROJECT **Amos FGD Haul Road** BORING START **3/25/08** BORING FINISH **3/26/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	NQ	23.9	33.9		10.0	31	25			**HARD 5Y 6/4 DUSKY YELLOW WELL CEMENTED MEDIUM TO COARSE GRAIN SANDSTONE**		
										5R 3/4 DUSKY RED CLAYSHALE		
6	NQ	33.9	43.9		8.5	59	30			**MEDIUM HARD 5R 4/2 GRAYISH RED SILTY CLAYSHALE**		
							35			**MEDIUM HARD N5 MEDIUM GRAY SILTY CLAYSHALE** high angle fracture @ 38.0'		
							40			**MEDIUM HARD 5R 4/2 GRAYISH RED SILTY CLAYSHALE**		
7	NQ	43.9	53.9		9.8	76				**HARD N5 MEDIUM GRAY WELL CEMENTED SILTY CLAYSHALE**		
							45			**HARD N5 MEDIUM GRAY SILTSTONE**		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER

COMPANY

BORING NO. **2008-28** DATE **5/13/08** SHEET **3** OF **6**

PROJECT **Amos FGD Haul Road**

BORING START **3/25/08** BORING FINISH **3/26/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										MEDIUM SOFT N5 MEDIUM GRAY SILTY CLAYSHALE		
							50			**HARD 5Y 5/2 LIGHT OLIVE GRAY WELL CEMENTED SILTSTONE** w/little fine grain sandstone; verticle fracture @ 51.5'		
8	NQ	53.9	63.9		10.2	70				**MEDIUM HARD 10Y 6/6 DARK GREENISH YELLOW SILTY CLAYSHALE**		
							55			**HARD 10Y 6/6 DARK GREENISH YELLOW WELL CEMENTED SILTSTONE** w/trace of fine grain sandstone; vertical fracture @ 55.3'		LOST 70% OF DRILL WATER @ 55.0'
							60			**HARD 10Y 6/6 DARK GREENISH YELLOW SILTY CLAYSHALE** w/trace of fine grain sandstone w/limestone nodules; red silty clay (mud seams) throughout 62.0' - 63.0'; badly broken @ 62.5' - 63.9'; high angle fracture @ 59.7'		
9	NQ	63.9	73.9		9.9	79				**HARD N5 MEDIUM GRAY WELL CEMENTED SILTY CLAYSHALE** w/trace of fine grain sandstone; high angle fracture @ 64.2'; soft area 68.2' - 68.8'		
							65					
							70					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-28** DATE **5/13/08** SHEET **4** OF **6**

PROJECT **Amos FGD Haul Road** BORING START **3/25/08** BORING FINISH **3/26/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	NQ	73.9	83.9		10.1	69	75			**HARD 5B 5/1 MEDIUM BLUISH GRAY WELL CEMENTED SILTSTONE** w/trace of fine grain sandstone		
										MEDIUM HARD 5YR 4/4 MODERATE BROWN SILTY CLAYSHALE soft @ 78.4' - 82.3'		
11	NQ	83.9	93.9		9.9	77	80			**HARD N6 MEDIUM LIGHT GRAY WELL CEMENTED CLAYEY SILTSTONE**		
							85			**HARD N6 MEDIUM LIGHT GRAY WELL CEMENTED SILTY CLAYSHALE**		
							90			**HARD N6 MEDIUM LIGHT GRAY WELL CEMENTED FINE GRAIN SANDSTONE** w/trace of silt		
12	NQ	93.9	103.9		10.0	100	95			**HARD 10YR 6/6 DARK GREENISH YELLOW AND 10YR 6/2 PALE OLIVE WELL CEMENTED MEDIUM TO COARSE GRAIN SANDSTONE** some small amount of crossbedding		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-28** DATE **5/13/08** SHEET **5** OF **6**

PROJECT **Amos FGD Haul Road** BORING START **3/25/08** BORING FINISH **3/26/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							100					
13	NQ	103.9	113.9		10.0	100	105			**HARD 10Y 5/4 LIGHT OLIVE WELL CEMENTED MEDIUM TO COARSE GRAIN SANDSTONE**		
							110			**HARD N6 MEDIUM LIGHT GRAY SILTY CLAYSHALE**		
14	NQ	113.9	123.9		10	83	115			**HARD N5 MEDIUM GRAY CLAYEY SILTSTONE** very soft area 120.3' - 120.5'		
							120			**MEDIUM HARD 5R 4/2 GRAYISH RED CLAYSHALE**		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER _____

COMPANY _____ BORING NO. **2008-28** DATE **5/13/08** SHEET **6** OF **6**

PROJECT **Amos FGD Haul Road** BORING START **3/25/08** BORING FINISH **3/26/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
												STOPPED BORING @ 123.9'; TREMIE GROUTED FROM 123.9' TO GRADE; USED ~50 GALS; TOPPED BOREHOLE W/50 LBS OF QUICKCRETE

ARCADIS

Arcadis, 2017-2018

Boring Logs and Well Construction Diagrams

MW-1801A/B/C to MW-1810A

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 531,398.6 E 1,726,314.5**

GROUND ELEVATION **901.1** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ **51.0**	▼	▼
TIME			
DATE	**7/18/2018**		

BORING NO. **MW-1801A** DATE **1/11/19** SHEET **1** OF **4**

BORING START **12/18/17** BORING FINISH **12/21/17**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.05** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **55** BOTTOM **75**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	2.8		0				CL ML	0-2.8': No recovery - Silty CLAY overburden.		0-55': Riser
1	RC	2.8	7.7		38	14	5			2.8-7.1': SANDSTONE; strong to very strong field strength; 5Y 4/3 (Olive) with 5YR 5/6 (Yellowish Red); fine-grained texture; massive structure; moderately decomposed; slightly disintegrated; intensely fractured (mechanical breaks).		
2	RC	7.7	15.8		57	30	10		ML	7.1-7.2': SANDSTONE; very strong field strength; 5YR 5/6 (Yellowish Red); fine grained texture; massive structure; moderately decomposed; slightly disintegrated; intensely fractured. 7.2-7.7': SILT, unconsolidated; weak field strength; 5Y 4/3 (Olive); fine grained texture; massive structure; highly decomposed. 7.7-15.8': SILTSTONE to Silty SHALE; strong field strength; 5Y 4/3 (Olive) to 10R 3/2 (Dusky Red); fine-grained texture; massive structure; slightly to moderately decomposed; slightly disintegrated; intensely fractured (mechanical breaks).		
3	RC	15.8	25.8		120	64	15			15.8-16.2': Silty SHALE; strong field strength; 10R 3/2 (Dusky Red); fine-grained texture; massive structure; slightly decomposed; slightly disintegrated; intensely fractured (mechanical breaks). 16.2-25.8'; Silty SHALE; very strong field strength; 5Y 4/3 (Olive); fine-grained texture; massive structure; slightly decomposed (moderately decomposed in intervals from		

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TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

AEP - AEP.GDT - 1/11/19 13:55 - C:\USERS\LWOODS\DESKTOP\FOR NICOLE BORING LOGS GINT FILES\AEP MOUNTAINEER.GPJ

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801A** DATE **1/11/19** SHEET **2** OF **4**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	RC	15.8	25.8		120	64	25			20.8-21.6' bgs and 22.8-24.5' bgs); slightly disintegrated; intensely fractured (mechanical breaks).		
4	RC	25.8	35.8		120	29	30			25.8-35.8': Silty SHALE; strong to very strong field strength; 5Y 2/3 (Brown); fine-grained texture; massive structure with thin shaley sandstone beds with trace mica; slightly decomposed; slightly disintegrated; bedding plane iron bearing minerals and calcite at 28.1' bgs fracture (HCl reactive).		Significant amount of lost water
5	RC	35.8	45.8		120	27	35			35.8-37.5': Silty SHALE; strong field strength; 5Y 2/3 (Brown); fine-grained texture; massive structure; slightly decomposed; slightly disintegrated; moderately fractured (mechanical breaks).		
							40			37.5-40.8': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with laminations; slightly decomposed; slightly disintegrated; slightly fractured (mechanical breaks).		
							45			40.8-45.8': Silty SHALE; strong field strength; 5Y 2/3 (Brown); fine-grained texture; massive structure; slightly decomposed (4" of clay at 44.9' bgs); moderately to slightly disintegrated; intensely fractured (mechanical breaks).		45-50.90': Bentonite Seal

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801A** DATE **1/11/19** SHEET **3** OF **4**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	45.8	55.8		120	100	50			45.8-55.8': SHALE; strong to very strong field strength; 10R 3/2 (Dusky Red) to GLEY1 4/N (Dark Gray); fine-grained texture; massive structure with laminations; moderately to highly decomposed; gradationally with depth slightly to moderately disintegrated with interbedding; gradationally with depth highly to slightly fractured (mechanical breaks).		50.90-52': Secondary Sand Pack (Global #6) 52-77': Primary Sand Pack (Global #5) 55-75': Slotted PVC (20-slot) Screen
7	RC	55.8	65.8		120	84	55			55.8-61.7': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with thin beds of shale; fresh; competent with slight disintegration at 61.7' bgs; moderately fractured (mechanical breaks).		
8	RC	65.8	75.8		120	81	60			61.7-63': SANDSTONE; very strong field strength; 5Y 4/2 (Olive Gray); fine-grained texture; massive structure; fresh; competent with slight disintegration at 61.7' bgs; moderately fractured (mechanical breaks). 63-65.8': Shaley SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure; fresh; competent; moderately fractured (mechanical breaks). 65.8-69.2': Shaley SANDSTONE; strong field strength; GLEY 1 5/N (Gray); very fine-grained texture; massive structure; slightly to moderately decomposed with iron staining across beds; moderate disintegration; moderately fractured (mechanical breaks).		
							65					
							70			69.2-71': SANDSTONE; very strong field strength; 5Y 5/3 (Olive); fine-grained texture; massive structure; fresh; slight disintegration; unfractured. 71-75.8': SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801A** DATE **1/11/19** SHEET **4** OF **4**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
8	RC	65.8	75.8		120	81	75			texture; massive structure; fresh; competent; unfractured.		
										75.8-77': Micaceous SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thinly bedded mica; fresh; competent; moderately fractured (mechanical breaks).		
							80					
							85					
							90					
							95					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 531,401.1 E 1,726,317.0**

GROUND ELEVATION **901.1** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 221.5	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1801B** DATE **1/11/19** SHEET **1** OF **9**

BORING START **12/18/17** BORING FINISH **12/21/17**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.8** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **198.4** BOTTOM **223**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	2.8		0				CL ML	0-2.8': No recovery - Silty CLAY overburden.		0-198.40': Riser
1	RC	2.8	7.7		38	14	5			2.8-7.1': SANDSTONE; strong to very strong field strength; 5Y 4/3 (Olive) with 5YR 5/6 (Yellowish Red); fine-grained texture; massive structure; moderately decomposed; slightly disintegrated; intensely fractured (mechanical breaks).		
2	RC	7.7	15.8		57	30	10		ML	7.1-7.2': SANDSTONE; very strong field strength; 5YR 5/6 (Yellowish Red); fine grained texture; massive structure; moderately decomposed; slightly disintegrated; intensely fractured.		
										7.2-7.7': SILT, unconsolidated; weak field strength; 5Y 4/3 (Olive); fine grained texture; massive structure; highly decomposed.		
										7.7-15.8': SILTSTONE to Silty SHALE; strong field strength; 5Y 4/3 (Olive) to 10R 3/2 (Dusky Red); fine-grained texture; massive structure; slightly to moderately decomposed; slightly disintegrated; intensely fractured (mechanical breaks).		
3	RC	15.8	25.8		120	64	15			15.8-16.2': Silty SHALE; strong field strength; 10R 3/2 (Dusky Red); fine-grained texture; massive structure; slightly decomposed; slightly disintegrated; intensely fractured (mechanical breaks).		
										16.2-25.8'; Silty SHALE; very strong field strength; 5Y 4/3 (Olive); fine-grained texture; massive structure; slightly decomposed (moderately decomposed in intervals from		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801B** DATE **1/11/19** SHEET **2** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	RC	15.8	25.8		120	64				20.8-21.6' bgs and 22.8-24.5' bgs); slightly disintegrated; intensely fractured (mechanical breaks).		
4	RC	25.8	35.8		120	29	25			25.8-35.8': Silty SHALE; strong to very strong field strength; 5Y 2/3 (Brown); fine-grained texture; massive structure with thin shaley sandstone beds with trace mica; slightly decomposed; slightly disintegrated; bedding plane iron bearing minerals and calcite at 28.1' bgs fracture (HCl reactive).		Significant amount of lost water
5	RC	35.8	45.8		120	27	30			35.8-37.5': Silty SHALE; strong field strength; 5Y 2/3 (Brown); fine-grained texture; massive structure; slightly decomposed; slightly disintegrated; moderately fractured (mechanical breaks).		
							35			37.5-40.8': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with laminations; slightly decomposed; slightly disintegrated; slightly fractured (mechanical breaks).		
							40			40.8-45.8': Silty SHALE; strong field strength; 5Y 2/3 (Brown); fine-grained texture; massive structure; slightly decomposed (4" of clay at 44.9' bgs); moderately to slightly disintegrated; intensely fractured (mechanical breaks).		43-192.8': Bentonite Seal
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801B** DATE **1/11/19** SHEET **3** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	45.8	55.8		120	100	50			45.8-55.8': SHALE; strong to very strong field strength; 10R 3/2 (Dusky Red) to GLEY1 4/N (Dark Gray); fine-grained texture; massive structure with laminations; moderately to highly decomposed; gradationally with depth slightly to moderately disintegrated with interbedding; gradationally highly to slightly fractured (mechanical breaks).		
7	RC	55.8	65.8		120	84	55 60			55.8-61.7': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with thin beds of shale; fresh; competent with slight disintegration at 61.7' bgs; moderately fractured (mechanical breaks). 61.7-63': SANDSTONE; very strong field strength; 5Y 4/2 (Olive Gray); fine-grained texture; massive structure; fresh; competent with slight disintegration at 61.7' bgs; moderately fractured (mechanical breaks). 63-65.8': Shaley SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure; fresh; competent; moderately fractured (mechanical breaks).		
8	RC	65.8	75.8		120	81	65 70			65.8-69.2': Shaley SANDSTONE; strong field strength; GLEY 1 5/N (Gray); very fine-grained texture; massive structure; slightly to moderately decomposed with iron staining across beds; moderate disintegration; moderately fractured (mechanical breaks). 69.2-71': SANDSTONE; very strong field strength; 5Y 5/3 (Olive); fine-grained texture; massive structure; fresh; slight disintegration; unfractured. 71-75.8': SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801B** DATE **1/11/19** SHEET **4** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
8	RC	65.8	75.8		120	81	75			texture; massive structure; fresh; competent; unfractured.		
9	RC	75.8	85.8		120	98	80			75.8-83.7': Micaceous SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thinly bedded mica; fresh; competent; moderately fractured (mechanical breaks).		
							85			83.7-85.8': Silty SHALE; strong field strength; GLEY 1 4/N (Dark Gray); very fine-grained texture; massive structure; fresh; competent; moderately fractured (mechanical breaks).		
10	RC	85.8	95.8		120	86	90			85.8-95.8': Silty SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with thinly bedded intervals; fresh; competent; moderately fractured (mechanical breaks).		
11	RC	95.8	105.8		120	48	95			95.8-98.2': Silty SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure; fresh; slightly disintegrated; moderately fractured (mechanical breaks).		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801B** DATE **1/11/19** SHEET **5** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
11	RC	95.8	105.8		120	48	100			98.2-101.3': Clayey SHALE; strong field strength; 10R3/4 (Dusky Red); fine-grained texture; massive structure; fresh; moderately disintegrated; slightly fractured (mechanical breaks).		
										101.3-105.8': Silty SHALE; strong field strength; GLEY 1 4/N (Dark Gray) mottling; fine-grained texture; massive structure; fresh; moderately disintegrated; intensely fractured (mechanical breaks).		
12	RC	105.8	115.8		120	70	105			105.8-108.5': SHALE; strong field strength; 10R 3/4 (Dusky Red) mottled GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with thin beds; fresh; slightly disintegrated; moderately fractured (mechanical breaks).		
							110			108.5-111': Silty and Clayey SHALE; strong field strength; GLEY 1 4/N (Dark Gray) mottled whitish gray; fine-grained texture with chunky mottling/clay; massive structure with mottling; moderately to highly decomposed; moderately disintegrated; intensely fractured (mechanical breaks).		
										111-115.8': Fine Sandy SHALE; strong field strength; 10R 3/4 (Dusky Red) mottled GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with thin beds; fresh; slightly disintegrated; moderately fractured (mechanical breaks).		
13	RC	115.8	125.8		120	79	115			115.8-123.6': Fine Sandy SHALE; strong field strength; GLEY 1 4/N (Dark Gray) with 10R 3/4 (Dusky Red) mottling (30% in coarse fragments); very fine-grained texture; medium bedded with coarse fragments; fresh; slightly disintegrated; slightly fractured (mechanical breaks).		
							120					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801B** DATE **1/11/19** SHEET **6** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
13	RC	115.8	125.8		120	79	125			123.6-125.8': Clayey and Silty SHALE; moderate field strength; 10R 3/2 (Dusky Red) with GLEY 1 4/N (Dark Gray) mottling (10% in coarse fragments; very fine-grained texture; medium bedded with coarse fragments; moderately decomposed; slightly disintegrated; moderately fractured (mechanical breaks).		
14	RC	125.8	135.8		120	71	130			125.8-126.5': Silty and Sandy SHALE; moderate field strength; 10R 3/2 (Dusky Red) with GLEY 1 4/N (Dark Gray) mottling (10% in coarse fragments; fine-grained texture; medium bedded with coarse fragments; moderately decomposed; slightly disintegrated; moderately fractured (mechanical breaks).		
							135			126.5-135.8': SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with thin beds; fresh; slightly disintegrated; slightly fractured (mechanical breaks).		
15	RC	135.8	145.8		120	75	140			135.8-138.5': SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thin beds; fresh; competent; slightly fractured (mechanical breaks).		
										138.5-141.2': Silty SHALE, with 0.2' to 0.8' thick weathered bands; moderate to weak field strength; 5Y 5/3 (Olive) with GLEY 1 5/N (Gray) and 5Y 5/3 (Olive) bands; fine-grained texture; medium bedded; moderately decomposed with highly decomposed bands; moderately disintegrated, HCl reactivity in a weathered band at 136.9' bgs; moderately fractured (mechanical breaks).		
							145			141.2-148': SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thin beds; fresh; competent; slightly fractured (mechanical breaks).		
16	RC	145.8	155.8		120	67				148-150.4': Silty SHALE; moderate field strength; 10R 4/3 (Weak Red) with GLEY 1 5/N (Gray) mottling; fine-grained texture; massive structure with mottling (30% in coarse		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801B** DATE **1/11/19** SHEET **7** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
16	RC	145.8	155.8		120	67				fragments); moderately decomposed; slightly disintegrated; moderately fractured (mechanical breaks).		
										150.4-152.8': SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thin beds; fresh; competent; slightly fractured (mechanical breaks).		
							155			152.4-155.8': Silty SHALE; moderate to weak field strength; 10R 3/4 (Dusky Red); fine-grained texture; massive structure with thin bedding; moderately weathered, highly decomposed; moderately disintegrated; moderately to intensely fractured (mechanical breaks).		
17	RC	155.8	165.8		120	33						
										155.8-157.1': Silty SHALE; moderate field strength; 10R 4/3 (Weak Red); fine-grained texture; massive structure with trace thin beds; moderately to highly decomposed; moderately disintegrated; moderately to intensely fractured (mechanical breaks).		
							160			157.1-160.3': SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thin beds; slightly decomposed; slightly disintegrated; slightly fractured (mechanical breaks).		
										160.3-165.8': Silty SHALE; moderate field strength; 10R 3/4 (Dusky Red); fine-grained texture; massive structure with trace beds; moderately decomposed; moderately disintegrated; moderately fractured (mechanical breaks).		
							165					
18	RC	165.8	175.8			86				165.8-168.8': Silty SHALE; moderate field strength; 10R 3/4 (Dusky Red); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated; unfractured (mechanical breaks only).		
										168.8-175.8'; SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thin bedding; slightly decomposed; slightly disintegrated; unfractured (mechanical breaks only).		
							170					
							175					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801B** DATE **1/11/19** SHEET **8** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	RC	175.8	185.8		120	100				175.8-176.9': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated; unfractured (mechanical breaks only).		
							180			176.9-180.9': Silty SHALE; moderate field strength; 10R 3/4 (Dusky Red); very fine-grained; massive structure; moderately to highly (180-180.9' bgs) decomposed; moderately disintegrated; unfractured (mechanical breaks only).		
										180.9-185.8': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure, no bedding visible; fresh; slightly disintegrated; unfractured (mechanical breaks only).		
							185					
20	RC	185.8	195.8		120	100				185.8-188.7': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks only).		
										188.7-189.4': SHALE; strong field strength; GLEY 1 4/N (Dark Gray); very fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks only).		
							190			189.4-190.9': Sandy SHALE, gradually less sandy with depth; strong to very strong field strength; GLEY 1 4/N (Dark Gray); very fine-grained texture; thinly bedded; fresh; moderately disintegrated (iron bearing mineral layer); unfractured (mechanical breaks only).		192.80-194': Secondary Sand Pack (Global #6)
										190.9-195.8': SHALE; strong field strength; GLEY 1 2.5/N (Black); very fine-grained texture; massive structure; fresh; competent; unfractured (mechanical breaks only).		194-225': Primary Sand Pack (Global #5)
							195					
21	RC	195.8	205.8		104	100				195.8-197': SHALE; strong to moderate field strength; 10R 3/4 (Dusky Red); very fine-grained texture; thinly bedded, 1 to 3 cm thick gravel beds, angular at 197.1' bgs; moderately to highly (at base) decomposed; slightly disintegrated; unfractured (mechanical breaks only).		198.40-223': Slotted PVC (20-slot) Screen
										197-205.3': SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded with limestone at 197.3' bgs, fragments 1-8 cm (20%); slightly to moderately decomposed; slightly disintegrated; unfractured (mechanical breaks only).		
							200					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801B** DATE **1/11/19** SHEET **9** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
21	RC	195.8	205.8		104	100	205			205.3-205.8': SHALE; weak field strength, crumbly; 10R 3/4 (Dusky Red) with mottled fragments; fine-grained texture; thinly bedded; highly decomposed, crumbly; moderately disintegrated; unfractured (mechanical breaks only).		
22	RC	205.8	215.8		78	100	210			205.8-215.8': Clayey SHALE; weak to moderate field strength; 10R 3/4 (Dusky Red), mottled; fine-grained texture with coarse fragments of shale, 1-2 cm 10%; massive structure with mottling; moderately to highly decomposed; slightly disintegrated; unfractured (mechanical breaks only).		
23	RC	215.8	225.8		110	100	215			215.8-216.4': Clayey SHALE; weak to moderate field strength; 10R 3/4 (Dusky Red), mottled gray/tan; fine-grained texture; massive structure with mottling; moderately to highly decomposed; moderately to intensely disintegrated; unfractured (mechanical breaks only).		
							220			216.4-223.3': Silty SHALE; moderate to strong field strength; 10R 3/4 (Dusky Red), mottled; fine-grained texture; massive structure with mottling; moderately decomposed; moderately disintegrated; unfractured (mechanical breaks only).		
							225			223.3-225': Sandy SHALE; strong field strength; 10R 3/4 (Dusky Red); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks only).		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 531,413.0 E 1,726,329.1**

GROUND ELEVATION **900.4** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 155.5	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1801C** DATE **1/11/19** SHEET **1** OF **13**

BORING START **12/18/17** BORING FINISH **12/21/17**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.8** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **237** BOTTOM **262**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	2.8		0				CL ML	0-2.8': No recovery - Silty CLAY overburden.		0-237': Riser
1	RC	2.8	7.7		38	14	5			2.8-7.1': SANDSTONE; strong to very strong field strength; 5Y 4/3 (Olive) with 5YR 5/6 (Yellowish Red); fine-grained texture; massive structure; moderately decomposed; slightly disintegrated; intensely fractured (mechanical breaks).		
2	RC	7.7	15.8		57	30	10		ML	7.1-7.2': SANDSTONE; very strong field strength; 5YR 5/6 (Yellowish Red); fine grained texture; massive structure; moderately decomposed; slightly disintegrated; intensely fractured.		
										7.2-7.7': SILT, unconsolidated; weak field strength; 5Y 4/3 (Olive); fine grained texture; massive structure; highly decomposed.		
							15			7.7-15.8': SILTSTONE to Silty SHALE; strong field strength; 5Y 4/3 (Olive) to 10R 3/2 (Dusky Red); fine-grained texture; massive structure; slightly to moderately decomposed; slightly disintegrated; intensely fractured (mechanical breaks).		
3	RC	15.8	25.8		120	64				15.8-16.2': Silty SHALE; strong field strength; 10R 3/2 (Dusky Red); fine-grained texture; massive structure; slightly decomposed; slightly disintegrated; intensely fractured (mechanical breaks).		
										16.2-25.8'; Silty SHALE; very strong field strength; 5Y 4/3 (Olive); fine-grained texture; massive structure; slightly decomposed (moderately decomposed in intervals from		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **2** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	RC	15.8	25.8		120	64				20.8-21.6' bgs and 22.8-24.5' bgs); slightly disintegrated; intensely fractured (mechanical breaks).		
4	RC	25.8	35.8		120	29	25			25.8-35.8': Silty SHALE; strong to very strong field strength; 5Y 2/3 (Brown); fine-grained texture; massive structure with thin shaley sandstone beds with trace mica; slightly decomposed; slightly disintegrated; bedding plane iron bearing minerals and calcite at 28.1' bgs fracture (HCl reactive).		Significant amount of lost water
5	RC	35.8	45.8		120	27	30			35.8-37.5': Silty SHALE; strong field strength; 5Y 2/3 (Brown); fine-grained texture; massive structure; slightly decomposed; slightly disintegrated; moderately fractured (mechanical breaks).		
							35			37.5-40.8': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with laminations; slightly decomposed; slightly disintegrated; slightly fractured (mechanical breaks).		
							40			40.8-45.8': Silty SHALE; strong field strength; 5Y 2/3 (Brown); fine-grained texture; massive structure; slightly decomposed (4" of clay at 44.9' bgs); moderately to slightly disintegrated; intensely fractured (mechanical breaks).		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **3** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	45.8	55.8		120	100	50			45.8-55.8': SHALE; strong to very strong field strength; 10R 3/2 (Dusky Red) to GLEY1 4/N (Dark Gray); fine-grained texture; massive structure with laminations; moderately to highly decomposed; gradationally with depth slightly to moderately disintegrated with interbedding; gradationally with depth highly to slightly fractured (mechanical breaks).		
7	RC	55.8	65.8		120	84	55 60			55.8-61.7': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with thin beds of shale; fresh; competent with slight disintegration at 61.7' bgs; moderately fractured (mechanical breaks).		
										61.7-63': SANDSTONE; very strong field strength; 5Y 4/2 (Olive Gray); fine-grained texture; massive structure; fresh; competent with slight disintegration at 61.7' bgs; moderately fractured (mechanical breaks).		
							65			63-65.8': Shaley SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure; fresh; competent; moderately fractured (mechanical breaks).		
8	RC	65.8	75.8		120	81				65.8-69.2': Shaley SANDSTONE; strong field strength; GLEY 1 5/N (Gray); very fine-grained texture; massive structure; slightly to moderately decomposed with iron staining across beds; moderate disintegration; moderately fractured (mechanical breaks).		
							70			69.2-71': SANDSTONE; very strong field strength; 5Y 5/3 (Olive); fine-grained texture; massive structure; fresh; slight disintegration; unfractured.		
										71-75.8': SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **4** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
8	RC	65.8	75.8		120	81	75			texture; massive structure; fresh; competent; unfractured.		
9	RC	75.8	85.8		120	98	80			75.8-83.7': Micaceous SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thinly bedded mica; fresh; competent; moderately fractured (mechanical breaks).		
							85			83.7-85.8': Silty SHALE; strong field strength; GLEY 1 4/N (Dark Gray); very fine-grained texture; massive structure; fresh; competent; moderately fractured (mechanical breaks).		
10	RC	85.8	95.8		120	86	90			85.8-95.8': Silty SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with thinly bedded intervals; fresh; competent; moderately fractured (mechanical breaks).		
11	RC	95.8	105.8		120	48	95			95.8-98.2': Silty SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure; fresh; slightly disintegrated; moderately fractured (mechanical breaks).		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **5** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
11	RC	95.8	105.8		120	48	100			98.2-101.3': Clayey SHALE; strong field strength; 10R3/4 (Dusky Red); fine-grained texture; massive structure; fresh; moderately disintegrated; slightly fractured (mechanical breaks).		
										101.3-105.8': Silty SHALE; strong field strength; GLEY 1 4/N (Dark Gray) mottling; fine-grained texture; massive structure; fresh; moderately disintegrated; intensely fractured (mechanical breaks).		
12	RC	105.8	115.8		120	70	105			105.8-108.5': SHALE; strong field strength; 10R 3/4 (Dusky Red) mottled GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with thin beds; fresh; slightly disintegrated; moderately fractured (mechanical breaks).		
							110			108.5-111': Silty and Clayey SHALE; strong field strength; GLEY 1 4/N (Dark Gray) mottled whitish gray; fine-grained texture with chunky mottling/clay; massive structure with mottling; moderately to highly decomposed; moderately disintegrated; intensely fractured (mechanical breaks).		
										111-115.8': Fine Sandy SHALE; strong field strength; 10R 3/4 (Dusky Red) mottled GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with thin beds; fresh; slightly disintegrated; moderately fractured (mechanical breaks).		
13	RC	115.8	125.8		120	79	115			115.8-123.6': Fine Sandy SHALE; strong field strength; GLEY 1 4/N (Dark Gray) with 10R 3/4 (Dusky Red) mottling (30% in coarse fragments); very fine-grained texture; medium bedded with coarse fragments; fresh; slightly disintegrated; slightly fractured (mechanical breaks).		
							120					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **6** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
13	RC	115.8	125.8		120	79	125			123.6-125.8': Clayey and Silty SHALE; moderate field strength; 10R 3/2 (Dusky Red) with GLEY 1 4/N (Dark Gray) mottling (10% in coarse fragments; very fine-grained texture; medium bedded with coarse fragments; moderately decomposed; slightly disintegrated; moderately fractured (mechanical breaks).		
14	RC	125.8	135.8		120	71	130			125.8-126.5': Silty and Sandy SHALE; moderate field strength; 10R 3/2 (Dusky Red) with GLEY 1 4/N (Dark Gray) mottling (10% in coarse fragments; fine-grained texture; medium bedded with coarse fragments; moderately decomposed; slightly disintegrated; moderately fractured (mechanical breaks).		
							135			126.5-135.8': SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with thin beds; fresh; slightly disintegrated; slightly fractured (mechanical breaks).		
15	RC	135.8	145.8		120	75	140			135.8-138.5': SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thin beds; fresh; competent; slightly fractured (mechanical breaks).		
										138.5-141.2': Silty SHALE, with 0.2' to 0.8' thick weathered bands; moderate to weak field strength; 5Y 5/3 (Olive) with GLEY 1 5/N (Gray) and 5Y 5/3 (Olive) bands; fine-grained texture; medium bedded; moderately decomposed with highly decomposed bands; moderately disintegrated, HCl reactivity in a weathered band at 136.9' bgs; moderately fractured (mechanical breaks).		
							145			141.2-148': SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thin beds; fresh; competent; slightly fractured (mechanical breaks).		
16	RC	145.8	155.8		120	67				148-150.4': Silty SHALE; moderate field strength; 10R 4/3 (Weak Red) with GLEY 1 5/N (Gray) mottling; fine-grained texture; massive structure with mottling (30% in coarse		

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AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **7** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
16	RC	145.8	155.8		120	67				fragments); moderately decomposed; slightly disintegrated; moderately fractured (mechanical breaks).		
										150.4-152.8': SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thin beds; fresh; competent; slightly fractured (mechanical breaks).		
							155			152.4-155.8': Silty SHALE; moderate to weak field strength; 10R 3/4 (Dusky Red); fine-grained texture; massive structure with thin bedding; moderately weathered, highly decomposed; moderately disintegrated; moderately to intensely fractured (mechanical breaks).		
17	RC	155.8	165.8		120	33						
										155.8-157.1': Silty SHALE; moderate field strength; 10R 4/3 (Weak Red); fine-grained texture; massive structure with trace thin beds; moderately to highly decomposed; moderately disintegrated; moderately to intensely fractured (mechanical breaks).		
							160			157.1-160.3': SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thin beds; slightly decomposed; slightly disintegrated; slightly fractured (mechanical breaks).		
										160.3-165.8': Silty SHALE; moderate field strength; 10R 3/4 (Dusky Red); fine-grained texture; massive structure with trace beds; moderately decomposed; moderately disintegrated; moderately fractured (mechanical breaks).		
							165					
18	RC	165.8	175.8			86				165.8-168.8': Silty SHALE; moderate field strength; 10R 3/4 (Dusky Red); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated; unfractured (mechanical breaks only).		
										168.8-175.8'; SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; massive structure with thin bedding; slightly decomposed; slightly disintegrated; unfractured (mechanical breaks only).		
							170					
							175					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **8** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	RC	175.8	185.8		120	100	180			175.8-176.9': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated; unfractured (mechanical breaks only). 176.9-180.9': Silty SHALE; moderate field strength; 10R 3/4 (Dusky Red); very fine-grained; massive structure; moderately to highly (180-180.9' bgs) decomposed; moderately disintegrated; unfractured (mechanical breaks only). 180.9-185.8': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure, no bedding visible; fresh; slightly disintegrated; unfractured (mechanical breaks only).		
20	RC	185.8	195.8		120	100	190			185.8-188.7': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks only). 188.7-189.4': SHALE; strong field strength; GLEY 1 4/N (Dark Gray); very fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks only). 189.4-190.9': Sandy SHALE, gradually less sandy with depth; strong to very strong field strength; GLEY 1 4/N (Dark Gray); very fine-grained texture; thinly bedded; fresh; moderately disintegrated (iron bearing mineral layer); unfractured (mechanical breaks only). 190.9-195.8': SHALE; strong field strength; GLEY 1 2.5/N (Black); very fine-grained texture; massive structure; fresh; competent; unfractured (mechanical breaks only).		194-233': Bentonite Seal
21	RC	195.8	205.8		104	100	200			195.8-197': SHALE; strong to moderate field strength; 10R 3/4 (Dusky Red); very fine-grained texture; thinly bedded, 1 to 3 cm thick gravel beds, angular at 197.1' bgs; moderately to highly (at base) decomposed; slightly disintegrated; unfractured (mechanical breaks only). 197-205.3': SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded with limestone at 197.3' bgs, fragments 1-8 cm (20%); slightly to moderately decomposed; slightly disintegrated; unfractured (mechanical breaks only).		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **9** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
21	RC	195.8	205.8		104	100	205					
										205.3-205.8': SHALE; weak field strength, crumbly; 10R 3/4 (Dusky Red) with mottled fragments; fine-grained texture; thinly bedded; highly decomposed, crumbly; moderately disintegrated; unfractured (mechanical breaks only).		
22	RC	205.8	215.8		78	100	210			205.8-215.8': Clayey SHALE; weak to moderate field strength; 10R 3/4 (Dusky Red), mottled; fine-grained texture with coarse fragments of shale, 1-2 cm 10%; massive structure with mottling; moderately to highly decomposed; slightly disintegrated; unfractured (mechanical breaks only).		
23	RC	215.8	225.8		110	100	215			215.8-216.4': Clayey SHALE; weak to moderate field strength; 10R 3/4 (Dusky Red), mottled gray/tan; fine-grained texture; massive structure with mottling; moderately to highly decomposed; moderately to intensely disintegrated; unfractured (mechanical breaks only).		
							220			216.4-223.3': Silty SHALE; moderate to strong field strength; 10R 3/4 (Dusky Red), mottled; fine-grained texture; massive structure with mottling; moderately decomposed; moderately disintegrated; unfractured (mechanical breaks only).		
							225			223.3-225.8': Sandy SHALE; strong field strength; 10R 3/4 (Dusky Red); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks only).		
24	RC	225.8	235.8		120	100				225.8-230.3': Silty SHALE; strong field strength; 10R 3/4 (Dusky Red); fine-grained texture; thinly bedded; fresh; slightly disintegrated; unfractured (mechanical breaks only).		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **10** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
24	RC	225.8	235.8		120	100	230			230.3-235.8'; Sandy SHALE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks only).		233-234': Secondary Sand Pack (Global #6) 234-264': Primary Sand Pack (Global #5)
25	RC	235.8	245.8		120	100	235			235.8-236.4': SHALE; strong field strength; 10YR 3/4 (Dark Yellowish Brown); fine-grained texture; massive structure; fresh; competent; unfractured (mechanical breaks only). 236.4-245.8': SANDSTONE; very strong field strength; GLEY 1 5/10GY (Greenish Gray); medium-grained texture, micaceous; thinly bedded; fresh; moderately disintegrated, calcite mineralization (HCl reactive) in the lower 2.2' of the interval; unfractured (mechanical breaks only).		237-262': Slotted PVC (20-slot) Screen
26	RC	245.8	255.8		120	100	240 245 250			245.8-255.8': SANDSTONE; very strong field strength; GLEY 1 5/10GY (Greenish Gray); medium-grained sandy texture; thinly bedded; fresh; moderately disintegrated, calcite mineralization in light colored bedded intervals at 253.4-255.8' bgs; unfractured (mechanical breaks only).		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **11** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
26	RC	245.8	255.8		120	100	255					
27	RC	255.8	265.8		120	100	260			255.8-256.4': CONGLOMERATE; very strong field strength; GLEY 1 6/N (Gray); fine-grained texture; conglomerate with angular fragments 1-8 cm 30-40%; moderately decomposed at upper contact; moderately to intensely disintegrated, calcite mineralization (effervescent to acid); unfractured (mechanical breaks only). 256.4-258.8': Sandy SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured (mechanical breaks only). 258.8-261.4': SANDSTONE; very strong field strength; GLEY 1 4/5G4 (Dark Greenish Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks only). 261.4-265.8': SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured (mechanical breaks only).		
28	RC	265.8	275.8		120	100	265 270			265.8-271.7': Clayey SHALE; strong field strength; 10YR 4/3 (Brown); fine-grained texture; massive structure; fresh; competent; unfractured (mechanical breaks only). 271.7-273.1': SHALE; strong to moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured (mechanical breaks only). 273.1-275.8': Clayey SHALE; strong field strength; 10YR 4/3 (Brown); fine-grained texture; massive structure; fresh; competent; unfractured (mechanical breaks only).		
29	RC	275.8	285.8		120	100	275			275.8-276.8': Sandy SHALE; very strong field strength; GLEY 1 5/10GY (Greenish Gray); fine-grained texture; massive structure; fresh; competent; unfractured (mechanical breaks only). 276.8-285.8': Sandy SHALE; very strong field strength; GLEY 1 5/N (Gray); fine to medium-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks		

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JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **12** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
29	RC	275.8	285.8		120	100				only).		
30	RC	285.8	295.8		120	100	285			285.8-295.8': Micaceous SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); fine grading to medium-grained (at 282.1' bgs) texture; thinly bedded; fresh; competent; unfractured (mechanical breaks only).		
31	RC	295.8	305.8		120	100	290			295-303.7': Micaceous SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); medium to coarse-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks only).		
							295					
							300			303.7-304.7': SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks only).		
							305					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1801C** DATE **1/11/19** SHEET **13** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/18/17** BORING FINISH **12/21/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										304.7-305.8': SHALE; moderate field strength; GLEY 1 5/10GY (Greenish Gray); very fine-grained texture; massive structure; fresh; competent; unfractured (mechanical breaks only).		
							310					
							315					
							320					
							325					
							330					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 533,246.5 E 1,724,120.0**

GROUND ELEVATION **887.8** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 61.4	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1802A** DATE **1/11/19** SHEET **1** OF **3**

BORING START **12/6/17** BORING FINISH **12/8/17**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.12** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **46.6** BOTTOM **66.6**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	5.7		0					NO RECOVERY.		0-201': Riser
1	RC	5.7	15.7		117	59	5			SHALE; strong field strength; 10R 3/2; fine-grained texture.		
										SANDSTONE; strong field strength; 10YR 3/2 (dusky red), 10Y5GY 3/2 (v. dark greyish olive), 5Y 4/1 (dark gray); micaceous; massive; occasional thin to medium bedding; slightly decomposed; slightly disintegrated; moderately fractured.		
							10			SHALE; strong field strength; 10R 3/2; fine-grained texture.		
										SANDSTONE; strong field strength; 10YR 3/2 (dusky red), 10Y5GY 3/2 (v. dark greyish olive), 5Y 4/1 (dark gray); micaceous; massive; occasional thin to medium bedding; slightly decomposed; slightly disintegrated; moderately fractured.		
2	RC	15.7	25.7		117	41	15			SANDSTONE; strong field strength; 5Y 3/2 (dark olive gray); fine-grained texture; massive; occasional thin to medium bedding; slightly decomposed; slightly disintegrated; moderately fractured. Note: Interbedded shale present.		
										SANDSTONE; strong field strength; 5Y 3/2 (dark olive gray); fine-grained texture; massive; micaceous; occasional thin to medium bedding; slightly decomposed; slightly		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **M. McCann**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802A** DATE **1/11/19** SHEET **2** OF **3**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
2	RC	15.7	25.7		117	41				disintegrated; moderately fractured. Note: Interbedded shaly siltstone present. SHALE; strong field strength; 10R 3/2, 5Y 3/2; fine-grained texture.		
										SHALE; very weak to strong field strength; 10R 3/2, 5Y 3/2; micaceous; slightly decomposed; slightly desintegrated; moderately fratured. Note: Siltstone laminations. Blackmineralization from 21.4 - 21.7' bgs. Interbedded sandstone at 18.5 - 18. 7' bgs.		
							25			Highly decomposed claystone/mudstone (silty clay, blocky) from 29-29.5 ft.		
3	RC	25.7	35.7		117	50				SILTSTONE; strong field strength; 5YR 4/1 (dark gray), GLEY1 3/N, GLEY1 6/N, GLEY1 2.5/N; massive. SHALE; moderate field strength; 10R 3/2 (dusky red); massive; slightly decomposed; very intensely fractured. Note: Transition to siltstone at 31.6' bgs.		
							30					201-248': Bentonite Seal
										SILTSTONE; strong to very strong field strength; 5YR 4/1 (dark gray), GLEY1 3/N, GLEY1 6/N, GLEY1 2.5/N; fine to medium grained; laminated; slightly decomposed; slightly to moderately fractured along bedding plane.		
							35			SHALE; strong to very strong field strength; 5YR 4/1 (dark gray), GLEY1 3/N, GLEY1 6/N, GLEY1 2.5/N; massive; slightly decomposed; slightly to moderately fractured along bedding plane.		
4	RC	35.7	45.7		120	71						
							40			SANDSTONE; very strong field strength; GLEY1 3/N to GLEY1 6/N; fine to medium grained; massive with laminations; fresh decomposition; competent disintegration; slight to moderate fractures along bedding plane. Note: Shale laminations from 47.2 - 52.3'. Reacts to HCl 47.2 - 64.0'. Medium to coarse grained from 55.7 - 64.0'.		248-249': Secondary Sand Pack (Global #6) 249-274.5': Primary Sand Pack (Global #5)
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802A** DATE **1/11/19** SHEET **3** OF **3**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	RC	45.7	55.7		120	78						253-273': Slotted PVC (20-slot) Screen
6	RC	55.7	65.7		119.5	88	50					
							55					
							60					
							65			SHALE; very strong field strength; GLEY1 3/N, GLEY 10R 3/2; fine to medium grained; massive; fresh to slightly decomposed; slightly disintegrated; very intensely fractured.		
							70					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 533,242.0 E 1,724,120.0**

GROUND ELEVATION **887.9** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ **196.6**	▼	▼
TIME			
DATE	**7/18/2018**		

BORING NO. **MW-1802B** DATE **1/11/19** SHEET **1** OF **8**

BORING START **12/6/17** BORING FINISH **12/8/17**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.89** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **176** BOTTOM **196**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	5.7		0					NO RECOVERY.		0-159.2': Riser
1	RC	5.7	15.7		117	59	5			SHALE; strong field strength; 10R 3/2; fine-grained texture.		
										SANDSTONE; strong field strength; 10YR 3/2 (dusky red), 10Y5GY 3/2 (v. dark greyish olive), 5Y 4/1 (dark gray); micaceous; massive; occasional thin to medium bedding; slightly decomposed; slightly disintegrated; moderately fractured.		
							10			SHALE; strong field strength; 10R 3/2; fine-grained texture.		
										SANDSTONE; strong field strength; 10YR 3/2 (dusky red), 10Y5GY 3/2 (v. dark greyish olive), 5Y 4/1 (dark gray); micaceous; massive; occasional thin to medium bedding; slightly decomposed; slightly disintegrated; moderately fractured.		
2	RC	15.7	25.7		117	41	15			SANDSTONE; strong field strength; 5Y 3/2 (dark olive gray); fine-grained texture; massive; occasional thin to medium bedding; slightly decomposed; slightly disintegrated; moderately fractured. Note: Interbedded shale present.		
										SANDSTONE; strong field strength; 5Y 3/2 (dark olive gray); fine-grained texture; massive; micaceous; occasional thin to medium bedding; slightly decomposed; slightly		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **M. McCann**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802B** DATE **1/11/19** SHEET **2** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
2	RC	15.7	25.7		117	41				disintegrated; moderately fractured. Note: Interbedded shaly siltstone present. SHALE; strong field strength; 10R 3/2, 5Y 3/2; fine-grained texture. SHALE; very weak to strong field strength; 10R 3/2, 5Y 3/2; micaceous; slightly decomposed; slightly desintegrated; moderately fratured. Note: Siltstone laminations. Blackmineralization from 21.4 - 21.7' bgs. Interbedded sandstone at 18.5 - 18. 7' bgs.		
3	RC	25.7	35.7		117	50	25			Highly decomposed claystone/mudstone (silty clay, blocky) from 29-29.5 ft. SILTSTONE; strong field strength; 5YR 4/1 (dark gray), GLEY1 3/N, GLEY1 6/N, GLEY1 2.5/N; massive. SHALE; moderate field strength; 10R 3/2 (dusky red); massive; slightly decomposed; very intensely fractured. Note: Transition to siltstone at 31.6' bgs.		
4	RC	35.7	45.7		120	71	30			SILTSTONE; strong to very strong field strength; 5YR 4/1 (dark gray), GLEY1 3/N, GLEY1 6/N, GLEY1 2.5/N; fine to medium grained; laminated; slightly decomposed; slightly to moderately fractured along bedding plane. SHALE; strong to very strong field strength; 5YR 4/1 (dark gray), GLEY1 3/N, GLEY1 6/N, GLEY1 2.5/N; massive; slightly decomposed; slightly to moderately fractured along bedding plane.		
							35					
							40			SANDSTONE; very strong field strength; GLEY1 3/N to GLEY1 6/N; fine to medium grained; massive with laminations; fresh decomposition; competent disintegration; slight to moderate fractures along bedding plane. Note: Shale laminations from 47.2 - 52.3' bgs react with HCl. Medium to coarse grained from 55.7 - 64.0'.		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802B** DATE **1/11/19** SHEET **3** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	RC	45.7	55.7		120	78						
6	RC	55.7	65.7		119.5	88						
7	RC	65.7	75.7		117	55						

50

55

60

65

70

SHALE; very strong field strength; GLEY1 3/N, GLEY 10R 3/2; fine to medium grained; massive; fresh to slightly decomposed; slightly disintegrated; very intensely fractured.

SANDSTONE; very strong field strength; GLEY1 3/N, GLEY1 3/10GY, GLEY1 3/10Y; massive; fresh decomposition; slightly fractured.

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802B** DATE **1/11/19** SHEET **4** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
7	RC	65.7	75.7		117	55	75			SHALE; weak to very strong field strength; GLEY 10R 3/2, massive; slight to moderate decomposition; competent to slightly disintegrated; slightly fractured at bed plane joints.		
8	RC	75.7	85.7		118	57	80			SANDSTONE; very strong field strength; GLEY3 10/Y; massive with laminations; fresh decomposition; slightly to moderate disintegration; slightly fractured. Note: Mechanical fractures and 80', possible natural fractures at 82.1', horizontal fracture at 85'. No mineralization at fractures, fractures are natural to smooth.		
9	RC	85.7	95.7		120	92	85					
							90			SANDSTONE; very strong field strength; GLEY1 3/N to GLEY1 5/N; fine to medium grained; massive with thin laminations; fresh to slight decomposition; moderate disintegration; slightly to moderately fractured. Note: Possible natural fractures (joints, horizontal) at 87.0', 88.7', 89.8', 90.2', 91.3', 92.7'. Very narrow to narrow other mechanical/bed plane no mineralization joints and possible natural fractures (joint) at 96.4' (10 degree, very narrow, smooth to rough), 97.5' (15 degree), 98.8' (horizontal joint), 99.5' (40 degree), 105' (25 degree, smooth to very narrow), 102.5' (horizontal joint), 103' (healed vertical joint/unconformity).		
10	RC	95.7	105.7		120	88	95					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802B** DATE **1/11/19** SHEET **5** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	RC	95.7	105.7		120	88	100					
11	RC	105.7	115.7		120	85	105			SHALE; moderate to strong field strength; GLEY1 3N, GLEY1 10R 3/2, 5Y 2.5/1; massive; moderately to highly decomposed; slightly disintegrated (Fe staining); moderate to intensely mechanically fractured.		
							110			SANDSTONE; very strong field strength; GLEY1 3/N; fine to medium grained; massive; fresh decomposition; competent disintegration; slightly fractured. Note: Slightly fractured at 114.1' (possible natural fracture, no mineralization due to core deterioration.		
12	RC	115.7	125.7		118	92	115			SHALE; very strong field strength; GLEY1 3/N, GLEY1 4/5G1; fine grained; micaceous interbedded; fresh to highly decomposed; competent disintegration; slightly fractured. Note: Moderate to strong field strength in shale beds from 116.2 - 116.4' bgs. Fe staining from 115.9 - 116.2' bgs. Possible natural fracture (joint, smooth, very narrow, Fe stained) at 8.3' bgs.		
							120			SANDSTONE; very strong field strength; GLEY1 4/5G1, GLEY1 3/N, GLEY1 5/N; fine to medium grained; micaceous; massive with laminations; fresh decomposition; slightly to moderately disintegrated; slightly fractured.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802B** DATE **1/11/19** SHEET **6** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
12	RC	115.7	125.7		118	92	125					
13	RC	125.7	135.7		112.8	66				SANDSTONE; very strong field strength; GLEY1 5/N, fine to medium grained; massive with laminations; fresh decomposition; slightly disintegrated; unfractured.		
										SHALE; moderate to strong field strength; GLEY1 4/5G1, GLEY1 3/N, GLEY1 3/2; massive with thin laminations; slightly to moderately decomposed; slightly disintegrated; slightly fractured.		
							130			Note: Transition to siltstone and clay with increasing depth. Intensely fractured at base of bed plane. HCl reaction at some fractures 29.3 to 131 .6' bgs (horizontal).		
										SANDSTONE; very strong field strength; GLEY1 3/N, fine grained; massive with laminations; fresh decomposition; competent disintegration.		
							135			Note: Possible horizontal fracture (natural) at 132.2' (no mineralization), other mechanical breaks. Possible natural fracture at 135.8' bgs (horizontal).		
14	RC	135.7	145.7		120	78				SANDSTONE; very strong field strength; GLEY1 3/N; fine grained; massive; freshly decomposed; competent disintegration.		
							140			SHALE; very strong field strength; GLEY1 3/N; micaceous; massive with laminations; freshly decomposed; slightly disintegrated.		
										Note: Possible natural horizontal fracture at 140.1', 140.7', and 141.5'. No mineralization, slightly to moderately fractured due to drilling/mechanics.		
										SHALE; strong to very strong field strength; 10R 3/2, GLEY1 5/N mottling; massive; slightly to moderately decomposed; slightly disintegrated.		
							145			Note: 20 degree fracture at 142.8-145.2' (possible natural fracture).		
15	RC	145.7	155.7		120	84						

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802B** DATE **1/11/19** SHEET **7** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	RC	145.7	155.7		120	84				SANDSTONE; strong to very strong field strength; 10YR 3/2 to GLEY1 3/N; fine grained; micaceous; massive with laminations; slightly decomposed; slightly disintegrated.		
										Note: Horizontal fracture (clay/silt, bed plane joint, other mechanical breaks from drilling (slight to moderate)) from 151.8-151 .9' bgs.		
										SANDSTONE; GLEY1 3/N; fine to medium grained, micaceous; massive with laminations; fresh decomposition; competent disintegration.		
							155			SHALE; GLEY1 3/N; fine grained in laminated thin beds; miceceous; massive with laminations; fresh decomposition; slightly disintegrated.		
16	RC	155.7	165.7		112	58						
										SHALE; very strong field strength; GLEY1 3/10CY to 10R 3/2; massive with laminations; fresh to moderate decomposition; slightly to moderately disintegrated with depth.		159.2-170.9': Bentonite Seal
							160			Note: Pitted/lenses at 155.7-158.4' and 161.8-165.0' bgs. Bed plane joints/breaks due to mechanical/drilling.		
										SILSTONE; very strong field strength; GLEY1 3/N; massive with laminations; micaceous; freshly decomposed; competent disintegration.		
							165					
17	RC	165.7	175.7		120	24						
							170					170.9-172.1': Secondary Sand Pack (Global #6) 172.1-198': Primary Sand Pack (Global #5)
							175					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802B** DATE **1/11/19** SHEET **8** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
18	RC	175.7	185.7		119	19	180			SILTSTONE; very strong field strength; GLEY1 3/10GY; 10R 3/2; 10YR 4/6 (mottling with depth); massive with laminations; massive clay shale; freshly decomposed; highly decomposed in laminations; competent disintegration. Note: Possible transformation to limestone at 183.6-183.8' bgs. Intensely fractured due to drilling, difficult to determine presence of natural joints.		176-196': Slotted PVC (20-slot) Screen
19	RC	185.7	195.7		115	18	185 190 195			SHALE; very weak to moderate field strength; 10R 3/2; massive; moderately to highly decomposed; slightly to moderately disintegrated; intensely fractured. Note: Intensely fractured from 185.7-186.7. All breaks likely due to drilling/mechanism. 10YR 4/6 mottling to GLEY1 8/N mottling increasing with depth. Slightly decomposed; slightly disintegrated; partly healed joints from 195.7-198'. 40 degree joint at 196.3. Other mechanical breaks present.		
							200					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 533,237.3 E 1,724,120.3**

GROUND ELEVATION **888.1** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 274.6	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1802C** DATE **1/11/19** SHEET **1** OF **13**

BORING START **12/6/17** BORING FINISH **12/8/17**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.81** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **253** BOTTOM **273**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	5.7		0					NO RECOVERY.		0-201': Riser
1	RC	5.7	15.7		117	59	5			SHALE; strong field strength; 10R 3/2; fine-grained texture.		
										SANDSTONE; strong field strength; 10YR 3/2 (dusky red), 10Y5GY 3/2 (v. dark greyish olive), 5Y 4/1 (dark gray); micaceous; massive; occasional thin to medium bedding; slightly decomposed; slightly disintegrated; moderately fractured.		
							10			SHALE; strong field strength; 10R 3/2; fine-grained texture.		
										SANDSTONE; strong field strength; 10YR 3/2 (dusky red), 10Y5GY 3/2 (v. dark greyish olive), 5Y 4/1 (dark gray); micaceous; massive; occasional thin to medium bedding; slightly decomposed; slightly disintegrated; moderately fractured.		
2	RC	15.7	25.7		117	41	15			SANDSTONE; strong field strength; 5Y 3/2 (dark olive gray); fine-grained texture; massive; occasional thin to medium bedding; slightly decomposed; slightly disintegrated; moderately fractured. Note: Interbedded shale present.		
										SANDSTONE; strong field strength; 5Y 3/2 (dark olive gray); fine-grained texture; massive; micaceous; occasional thin to medium bedding; slightly decomposed; slightly		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **M. McCann**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **2** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
2	RC	15.7	25.7		117	41				disintegrated; moderately fractured. Note: Interbedded shaly siltstone present. SHALE; strong field strength; 10R 3/2, 5Y 3/2; fine-grained texture. SHALE; very weak to strong field strength; 10R 3/2, 5Y 3/2; micaceous; slightly decomposed; slightly desintegrated; moderately fratured. Note: Siltstone laminations. Black mineralization from 21.4 - 21.7' bgs. Interbedded sandstone at 18.5 - 18. 7' bgs.		
3	RC	25.7	35.7		117	50	25			Highly decomposed claystone/mudstone (silty clay, blocky) from 29-29.5 ft. SILTSTONE; strong field strength; 5YR 4/1 (dark gray), GLEY1 3/N, GLEY1 6/N, GLEY1 2.5/N; massive. SHALE; moderate field strength; 10R 3/2 (dusky red); massive; slightly decomposed; very intensely fractured. Note: Transition to siltstone at 31.6' bgs.		
4	RC	35.7	45.7		120	71	30			SILTSTONE; strong to very strong field strength; 5YR 4/1 (dark gray), GLEY1 3/N, GLEY1 6/N, GLEY1 2.5/N; fine to medium grained; laminated; slightly decomposed; slightly to moderately fractured along bedding plane. SHALE; strong to very strong field strength; 5YR 4/1 (dark gray), GLEY1 3/N, GLEY1 6/N, GLEY1 2.5/N; massive; slightly decomposed; slightly to moderately fractured along bedding plane.		
							35					
							40			SANDSTONE; very strong field strength; GLEY1 3/N to GLEY1 6/N; fine to medium grained; massive with laminations; fresh decomposition; competent disintegration; slight to moderate fractures along bedding plane. Note: Shale laminations from 47.2 - 52.3' bgs react with HCl. Medium to coarse grained from 55.7 - 64.0'.		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **3** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	RC	45.7	55.7		120	78						
6	RC	55.7	65.7		119.5	88						
7	RC	65.7	75.7		117	55				SHALE; very strong field strength; GLEY1 3/N, GLEY 10R 3/2; fine to medium grained; massive; fresh to slightly decomposed; slightly disintegrated; very intensely fractured.		
										SANDSTONE; very strong field strength; GLEY1 3/N, GLEY1 3/10GY, GLEY1 3/10Y; massive; fresh decomposition; slightly fractured.		

50 55 60 65 70

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **4** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
7	RC	65.7	75.7		117	55	75			SHALE; weak to very strong field strength; GLEY 10R 3/2, massive; slight to moderate decomposition; competent to slightly disintegrated; slightly fractured at bed plane joints.		
8	RC	75.7	85.7		118	57	80			SANDSTONE; very strong field strength; GLEY3 10/Y; massive with laminations; fresh decomposition; slightly to moderate disintegration; slightly fractured. Note: Mechanical fractures and 80', possible natural fractures at 82.1', horizontal fracture at 85'. No mineralization at fractures, fractures are natural to smooth.		
9	RC	85.7	95.7		120	92	85					
							90			SANDSTONE; very strong field strength; GLEY1 3/N to GLEY1 5/N; fine to medium grained; massive with thin laminations; fresh to slight decomposition; moderate disintegration; slightly to moderately fractured. Note: Possible natural fractures (joints, horizontal) at 87.0', 88.7', 89.8', 90.2', 91.3', 92.7'. Very narrow to narrow other mechanical/bed plane no mineralization joints and possible natural fractures (joint) at 96.4' (10 degree, very narrow, smooth to rough), 97.5' (15 degree), 98.8' (horizontal joint), 99.5' (40 degree), 105' (25 degree, smooth to very narrow), 102.5' (horizontal joint), 103' (healed vertical joint/unconformity).		
10	RC	95.7	105.7		120	88	95					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **5** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	RC	95.7	105.7		120	88	100					
11	RC	105.7	115.7		120	85	105			SHALE; moderate to strong field strength; GLEY1 3N, GLEY1 10R 3/2, 5Y 2.5/1; massive; moderately to highly decomposed; slightly disintegrated (Fe staining); moderate to intensely mechanically fractured.		
							110			SANDSTONE; very strong field strength; GLEY1 3/N; fine to medium grained; massive; fresh decomposition; competent disintegration; slightly fractured. Note: Slightly fractured at 114.1' (possible natural fracture, no mineralization due to core deterioration.		
12	RC	115.7	125.7		118	92	115			SHALE; very strong field strength; GLEY1 3/N, GLEY1 4/5G1; fine grained; micaceous interbedded; fresh to highly decomposed; competent disintegration; slightly fractured. Note: Moderate to strong field strength in shale beds from 116.2 - 116.4' bgs. Fe staining from 115.9 - 116.2' bgs. Possible natural fracture (joint, smooth, very narrow, Fe stained) at 8.3' bgs.		
							120			SANDSTONE; very strong field strength; GLEY1 4/5G1, GLEY1 3/N, GLEY1 5/N; fine to medium grained; micaceous; massive with laminations; fresh decomposition; slightly to moderately disintegrated; slightly fractured.		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **6** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
12	RC	115.7	125.7		118	92	125					
13	RC	125.7	135.7		112.8	66				SANDSTONE; very strong field strength; GLEY1 5/N, fine to medium grained; massive with laminations; fresh decomposition; slightly disintegrated; unfractured.		
										SHALE; moderate to strong field strength; GLEY1 4/5G1, GLEY1 3/N, GLEY1 3/2; massive with thin laminations; slightly to moderately decomposed; slightly disintegrated; slightly fractured.		
							130			Note: Transition to siltstone and clay with increasing depth. Intensely fractured at base of bed plane. HCl reaction at some fractures 29.3 to 131 .6' bgs (horizontal).		
										SANDSTONE; very strong field strength; GLEY1 3/N, fine grained; massive with laminations; fresh decomposition; competent disintegration.		
							135			Note: Possible horizontal fracture (natural) at 132.2' (no mineralization), other mechanical breaks. Possible natural fracture at 135.8' bgs (horizontal).		
14	RC	135.7	145.7		120	78				SANDSTONE; very strong field strength; GLEY1 3/N; fine grained; massive; freshly decomposed; competent disintegration.		
							140			SHALE; very strong field strength; GLEY1 3/N; micaceous; massive with laminations; freshly decomposed; slightly disintegrated.		
										Note: Possible natural horizontal fracture at 140.1', 140.7', and 141.5'. No mineralization, slightly to moderately fractured due to drilling/mechanics.		
										SHALE; strong to very strong field strength; 10R 3/2, GLEY1 5/N mottling; massive; slightly to moderately decomposed; slightly disintegrated.		
							145			Note: 20 degree fracture at 142.8-145.2' (possible natural fracture).		
15	RC	145.7	155.7		120	84						

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **7** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	RC	145.7	155.7		120	84				SANDSTONE; strong to very strong field strength; 10YR 3/2 to GLEY1 3/N; fine grained; micaceous; massive with laminations; slightly decomposed; slightly disintegrated.		
										Note: Horizontal fracture (clay/silt, bed plane joint, other mechanical breaks from drilling (slight to moderate)) from 151.8-151 .9' bgs.		
										SANDSTONE; GLEY1 3/N; fine to medium grained, micaceous; massive with laminations; fresh decomposition; competent disintegration.		
							155			SHALE; GLEY1 3/N; fine grained in laminated thin beds; miceceous; massive with laminations; fresh decomposition; slightly disintegrated.		
16	RC	155.7	165.7		112	58						
										SHALE; very strong field strength; GLEY1 3/10CY to 10R 3/2; massive with laminations; fresh to moderate decomposition; slightly to moderately disintegrated with depth.		
							160			Note: Pitted/lenses at 155.7-158.4' and 161.8-165.0' bgs. Bed plane joints/breaks due to mechanical/drilling.		
										SILSTONE; very strong field strength; GLEY1 3/N; massive with laminations; micaceous; freshly decomposed; competent disintegration.		
							165					
17	RC	165.7	175.7		120	24						
							170					
							175					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **8** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
18	RC	175.7	185.7		119	19	180			SILTSTONE; very strong field strength; GLEY1 3/10GY; 10R 3/2; 10YR 4/6 (mottling with depth}; massive with laminations; massive clay shale; freshly decomposed; highly decomposed in laminations; competent disintegration. Note: Possible transformation to limestone at 183.6-183.8' bgs. Intensely fractured due to drilling, difficult to determine presence of natural joints.		
19	RC	185.7	195.7		115	18	190			SHALE; very weak to moderate field strength; 10R 3/2; massive; moderately to highly decomposed; slightly to moderately disintegrated; intensely fractured. Note: Intensely fractured from 185.7-186.7. All breaks likely due to drilling/mechanism. 10YR 4/6 mottling to GLEY1 8/N mottling increasing with depth. Slightly decomposed; slightly disintegrated; partly healed joints from 195.7-205.7'. 40 degree joint at 196.3', vertical joint at 201-201.4', possible natural fractures (35-40 degrees) at 199.2, 200.4-201 .0' (extremely narrow). Other mechanical breaks present.		
20	RC	195.7	205.7		118.5	47	195					
							200					201-248': Bentonite Seal

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **9** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
20	RC	195.7	205.7		118.5	47	205					
21	RC	205.7	215.7		120	91	210			SHALE; very strong field strength; GLEY1 4/N to GLEY1 3/5G1; massive with thin to medium bedded siltstone; fresh decomposition; competent to slight disintegration; mechanical fractures. Note: Very weak to moderate field strength at 216.2-216.5' bgs.		
22	RC	215.7	225.7		118.8	43	215			SHALE; strong to very strong; 10R 3/2; massive; slightly decomposed; slightly to moderately disintegrated; mechanical fractures.		
23	RC	225.7	235.7		120	82	220					
							225					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **10** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
23	RC	225.7	235.7		120	82						
							230			SHALE; very strong field strength; GLEY1 3/5 G1, 10R 3/2, fine grained; massive with thin to medium beds of shaley sandstone to siltstone; freshly decomposed; slight disintegrated; mechanical fractures. Note: Interbedded with shale, micaceous sandstone, and siltstone. Mottling from 229.4-229.9' and 232.8-233.8' bgs. Horizontal fracture filled with soft clay at 233.4' bgs.		
							235					
24	RC	235.7	245.7		120	88				SANDSTONE; very strong field strength; GLEY1 5/N, 10R 3/2 (thin beds); very fine to fine grained shales; medium to coarse grained sandstone; micaceous; massive with laminations; freshly decomposed; competent to slightly disintegrated. Note: Primarily mechanical, possible horizontal smooth fracture at 235.9'. Transition to GLEY1 3/N to 5/N with mechanical breaks at 245.7 to 255.7' bgs.		
							240					
							245					
25	RC	245.7	255.7		120	100						
							250					248-249': Secondary Sand Pack (Global #6) 249-274.5': Primary Sand Pack (Global #5) 253-273': Slotted PVC (20-slot)

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **11** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
25	RC	245.7	255.7		120	100	255					Screen
26	RC	255.7	265.7		120	87	260			SANDSTONE; very strong field strength; GLEY1 5/N; fine to medium grained; massive with laminations and thinly bedded/foliated/banded; freshly decomposed; slightly disintegrated; slightly fractured. Note: Mechanical bedding plane fractures. Healed unconformity (30 degree upper, 20 degree lower) at 257.7-258.5' bgs. GLEY1 3/N with 10R 3/2 mottling at 265.7-275.7. Highly decomposed at 270.0-270.3' bgs (clay with very fine sand). Very weak decomposition at 275.2' bgs. Slightly fractured at 265.7-275.7' bgs.		
27	RC	265.7	275.7		120	68	265					
28	RC	275.7	285.7		117.6	41	270			SHALE; strong to very strong field strength; GLEY1 3/N to 2.5/N; massive with laminations; moderately decomposed; slightly disintegrated; moderately fractured. Note: Coat at 279.8-280.8' bgs with pyrite lenses and laminations. Thin beds of highly decomposed shale to silty clay throughout to 279.8' bgs. Moderate to intensely fractured		
							275					

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COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **12** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
28	RC	275.7	285.7		117.6	41				(mechanical) with depth.		
										SANDSTONE; very strong field strength; GLEY1 3/N; massive with laminations to thin beds of very fine sand; freshly decomposed; slightly disintegrated; slightly fractured. Note: Micaceous trace pyrite lenses, fine grained.		
							285					
29	RC	285.7	295.7		120	83						
										SANDSTONE; fine to medium grained; micaceous; little pyrite lenses; very strong field strength; GLEY1 6/N; massive with laminations; freshly decomposed; competent disintegration; slightly fractured. Note: Transition to 5Y 2.5/1 at 293.4-293.5' bgs, transition to GLEY1 5/N at 293.5-295.7' bgs. Transition to slightly decomposed, slightly disintegrated; and slightly to moderately fractured with depth (mechanical).		
							290					
							295					
30	RC	295.7	305.7		115.2	62				SANDSTONE; fine grained; trace pyrite lenses (30 degree); strong to very strong field strength; GLEY2 4/586 to 10R 3/2 with depth; massive with laminations; moderately decomposed; moderately disintegrated.		
							300			SHALE; strong to very strong field strength; GLEY2 4/5B6 to 10R 3/2; massive with laminations; slightly to moderately decomposed; slightly disintegrated; slightly to moderately fractured. Note: HCl reactive lenses. Tight, 45 degree smooth fracture at 298.3' bgs. Slightly to moderately fractured joints at 311.7' bgs.		
							305					

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JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1802C** DATE **1/11/19** SHEET **13** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **12/6/17** BORING FINISH **12/8/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
31	RC	305.7	315.7		97.2	65	310 315 320 325 330					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 534,006.7 E 1,723,941.6**

GROUND ELEVATION **904.3** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 196.9	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1803B** DATE **1/11/19** SHEET **1** OF **8**

BORING START **12/12/17** BORING FINISH **12/15/17**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.81** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **171** BOTTOM **196**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	4.0		0				CL ML	0-4': No recovery - Silty CLAY overburden.		0-171': Riser
1	RC	4.0	9.5		25	NR	5			4-9.4': SILTSTONE; strong field strength; 5Y 4/3 (Olive) with 5YR 5/8 (Yellowish Red) mottling; massive structure; moderately decomposed; slightly disintegrated; intensely to moderately fractured (mechanical breaks).		
2	RC	9.5	14.5		58.5	28	10			9.4-9.5': Clayey SHALE; weak field strength; 10R 3/2 (Dusky Red); massive structure; highly decomposed; slightly disintegrated; intensely to moderately fractured (mechanical breaks). 9.5-13.6': Clayey SHALE; very weak to moderate field strength; 10R 3/2 (Dusky Red) to 5Y 4/3 (Olive) with 7.5 YR 5/8 (Strong Brown) mottling; massive structure; slightly decomposed with highly to moderately decomposed thin beds; slightly to moderately disintegrated; intensely to moderately fractured (mechanical breaks).		
3	RC	14.5	24.5		120	50	15			13.6-14.5': SILTSTONE; very strong field strength; 5Y 4/3 (Olive); massive structure; slightly decomposed; slightly disintegrated; intensely to moderately fractured (mechanical breaks). 14.5-19.5': SILTSTONE grading to Shaley Sandstone; very strong field strength; 10R 3/2 (Dusky Red) and 5Y 4/3 (Olive); fine-grained texture; massive structure; slightly decomposed; slightly to moderately disintegrated, reactive to HCl from 18.5-19.3'		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **M. McCann**

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803B** DATE **1/11/19** SHEET **2** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	RC	14.5	24.5		120	50				bgs; moderately fractured, primarily due to mechanical breaks but very narrow horizontal fractures at 18.6', 19.2', and 19.4' bgs, with iron staining, smooth to rough.		Significant loss of water
										19.5-21.9': Clayey SHALE; very weak to moderate field strength; 10R 3/2 (Dusky Red) to 5Y 4/3 (Olive) with 7.5 YR 5/8 (Strong Brown) mottling; massive structure; moderately fractured (mechanical breaks).		
4	RC	24.5	34.5		116	64	25			21.9-23.6': SILTSTONE; strong field strength; 10R 3/2 (Dusky Red) to 5Y 4/3 (Olive) with 7.5 YR 5/8 (Strong Brown) mottling; massive structure; slightly decomposed; slightly disintegrated; moderately fractured, with a fracture zone from 22-22.3' bgs.		
										23.6-24.7': Clayey SHALE; moderate field strength; GLEY 1 4/N (Gray); massive structure; slightly decomposed; competent; moderately fractured (mechanical breaks).		
							30			24.7-38.6': Interbedded SHALE with Siltstone and Shaley Sandstone, micaceous at depth; very strong field strength with strong field strength in laminations; GLEY 1 5/N (Dark Gray) and 10R 3/2 (Dusky Red) to GLEY 2 3/5BG (Very Dark Greenish Gray); Sandstone has a fine-grained texture; massive structure with laminations; fresh with moderate decomposition in some bedded intervals; slight disintegration, reacts to HCl (lenses, pitted) from 29.4-35.2' bgs; moderately fractured (mechanical breaks), possible natural fracture at 25.2' bgs - iron stained, very narrow.		
5	RC	34.5	44.5		120	70	35					
							40			38.6-48.3': SHALE; strong to very strong field strength, with moderately strong thin beds; GLEY 1 5/N (Dark Gray) and 10R 3/2 (Dusky Red) to GLEY 2 3/5BG (Very Dark Greenish Gray); massive structure; fresh, slightly to highly decomposed thin beds; slightly to moderately decomposed; slightly to moderately fractured (mechanical breaks).		
6	RC	44.5	54.5		120	63	45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803B** DATE **1/11/19** SHEET **3** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	44.5	54.5		120	63						
							50			48-3-54.5': Interbedded SHALE, Siltstone, and Shaley Sandstone; very strong field strength with weak to very weak field strength in laminations (52.4-52.5' bgs and 53.8-54.3' bgs); GLEY 1 5/N (Dark Gray) and 10R 3/2 (Dusky Red) to GLEY 2 3/5BG (Very Dark Greenish Gray); Sandstone has a fine-grained texture; massive structure with laminations and thin beds; fresh with moderate to high decomposition in medium bedded intervals; slight to moderate disintegration, (clay); moderately fractured (mechanical breaks).		
7	RC	54.5	64.5		118	87	55			54.5-55.5': Shaley SANDSTONE; very strong field strength; GLEY 1 5/N (Dark Gray); fine to medium-grained texture; massive structure with Shaley laminations, micaceous; fresh; competent; moderately fractured (mechanical breaks).		
										55.5-80': SANDSTONE; very strong field strength; GLEY 1 5/N (Dark Gray); fine/medium to medium/coarse-grained texture; massive structure with Shaley laminations, especially 75.5-75.7' and 79.6-80' bgs, micaceous; fresh; competent; moderately fractured (mechanical breaks), possible horizontal natural fracture at 58.6' bgs.		
							60					
8	RC	64.5	74.5		120	99	65					
							70					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803B** DATE **1/11/19** SHEET **4** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
8	RC	64.5	74.5		120	99						
9	RC	74.5	84.5		107.5	87	75					
							80			80-84.5': SHALE; strong field strength, moderate field strength in thin beds; GLEY 1 3/N (Very Dark Gray); massive structure; fresh with moderately decomposed from 80.1-80.5' bgs; slightly disintegrated, pitted upper interval; moderately fractured, horizontal very narrow fracture at 80.1' bgs.		
10	RC	84.5	94.5		120	60	85			84.5-94.5': SHALE; strong to very strong field strength, soft Clay at 91.9' bgs, moderate field strength 94-94.5' bgs; GLEY 1 3/N (Very Dark Gray) with 10R 3/2 (Dusky Red) mottling at base; massive structure; fresh, moderately decomposed from 94-94.5' bgs; moderately disintegrated; moderately fractured (mechanical breaks), possible horizontal natural fracture at 91-94' bgs, very narrow, trace clay.		
							90					
11	RC	94.5	104.5		114	70	95			94.5-97.5': Shaley SANDSTONE; strong to moderate field strength, very weak at 96.8-96.9' bgs; 10R 3/2 (Dusky Red) with GLEY 1 3/N (Very Dark Gray); massive structure; moderately decomposed, highly from 96.8-96.9' bgs; slightly to moderately disintegrated,		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803B** DATE **1/11/19** SHEET **5** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
11	RC	94.5	104.5		114	70				97.5-123.4': Shaley SANDSTONE, micaceous; very strong field strength; GLEY 2 4/10G (Dark Greenish Gray) with 10R3/2 (Dusky Red) mottling in upper 1.2'; fine to medium-grained texture; massive structure with Shaley laminations; slightly decomposed to fresh		
12	RC	104.5	114.5		120	98	100 105 110					
13	RC	114.5	124.5		119	98	115 120					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803B** DATE **1/11/19** SHEET **6** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										123.4-124.5': SANDSTONE; very strong field strength; GLEY 2 4/10G (Dark Greenish Gray); coarse-grained texture; massive structure; fresh; slightly disintegrated (cementations/grains are HCl reactive); moderately fractured (mechanical breaks), possible horizontal natural fracture at 123.9' bgs - clayey, infilled, rough.		
14	RC	124.5	134.5		117.5	63	125			124.5-127': SHALE; moderate to strong field strength; GLEY 1 3/N (Very Dark Gray) with 5Y 5/4 (Olive) and 10R 3/2 (Dusky Red); massive structure; slightly decomposed; competent; moderately to intensely fractured with depth (mechanical and horizontal breaks), very narrow 55 degree joint at 125.3' bgs.		
							130			127-135.5': Shaley SANDSTONE with laminated Shales and clayey Shales; very strong field strength, thin beds of very stiff clay, laminated shales have weak field strength at 128.8-128.9', 131.2-131.3', 131.8-132.6, 134.1', and 134.8-135.5' bgs; GLEY 2 3/10G (Very Dark Greenish Gray) with 10R 3/2 (Dusky Red) at top, 5Y 5/4 (Olive) and 10R 3/2 (Dusky Red) at 128.2-129.9' bgs; fine-grained texture; massive structure with laminated, thin bedding of shale and clayey shale; fresh to moderately decomposed; competent to moderately and intensely disintegrated in intervals noted in field strength; moderately to intensely fractured (mechanical breaks), possible horizontal natural fracture at 128.5' bgs, discolored.		
15	RC	134.5	144.5		120	90	135			135.5-145': Shaley SANDSTONE, micaceous; very strong field strength; GLEY 2 3/10G (Very Dark Greenish Gray) with GLEY 1 5/N (Gray) at 139.5' bgs; fine-grained to fine/medium-grained texture with depth; massive structure with shaley laminations; fresh; slightly disintegrated with HCl reactivity; moderately fractured (mechanical breaks).		
							140					
16	RC	144.5	154.5		112.5	65	145			145-147': SHALE grading to clayey Shale with depth; very strong field strength, thin beds of soft clay, weak shale; GLEY 1 4/N (Dark Gray) with 10R 3/2 (Dusky Red); massive structure; fresh, highly decomposed in thin beds; competent, moderately to intensely disintegrated in thin beds; moderately fractured (mechanical breaks).		
										147-154.5': Interbedded Shaley SANDSTONE and SHALE; very strong field strength; GLEY 2 4/10G (Dark Greenish Gray) with 10R 3/2		

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AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803B** DATE **1/11/19** SHEET **7** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
16	RC	144.5	154.5		112.5	65				(Dusky Red) mottling; fine-grained texture; massive structure; slightly decomposed; slightly disintegrated, lenses and grains in Sandstone reactive to HCl, little euhedral pyrite pitting; moderately fractured (mechanical breaks).		
17	RC	154.5	164.5		120	62	155			154.5-158.3': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained, micaceous texture; massive structure; fresh; competent, laminations slightly reactive to HCl; moderately fractured (mechanical breaks).		
										158.3-159': Shaley SANDSTONE; very strong field strength, with a very weak thin bed at 158.8' bgs; GLEY 2 4/10G (Dark Greenish Gray); fine-grained, micaceous texture; massive structure with Shale laminations; fresh to slightly decomposed; competent, laminations slightly reactive to HCl, moderately disintegrated at 158.3' bgs (clay); intensely fractured (mechanical breaks).		
							160			159-166': SHALE; very strong field strength with thin to medium beds of medium stiff clay to weak Shale; 10R 3/2 (Dusky Red); massive structure; fresh, with moderately to highly decomposed beds; competent, with moderately to intensely disintegrated in beds; intensely fractured (mechanical breaks).		164-167': Bentonite Seal
18	RC	164.5	174.5		120	88	165					
										166-169': Interbedded Shaley SANDSTONE, Clayey SHALE, and CLAYSTONE/MUDSTONE; very strong (Sandstone) to weak (Shale) field strength; GLEY 2 4/10G (Dark Greenish Gray) Sandstone and 10R 3/2 (Dusky Red) Shale; fine to medium grained texture (Sandstone); thin to medium bedded with massive structure; fresh Sandstone, with highly decomposed Shale; competent Sandstone, with moderately to intensely disintegrated Shale, HCl reactive laminations; slightly fractured (mechanical breaks).		167-168': Secondary Sand Pack (Global #6) 168-198': Primary Sand Pack (Global #5) 171-196': Slotted PVC (20-slot) Screen
							170					
										169-172.2': SANDSTONE; very strong field strength; GLEY 2 4/10G (Dark Greenish Gray); fine/medium-grained, micaceous texture; massive structure with micaceous laminations; fresh; slightly disintegrated, laminations slightly reactive to HCl; slightly fractured (mechanical breaks).		
19	RC	174.5	184.5		120	67	175			172.2-174.5': SHALE with highly weathered Claystone/Mudstone; very strong field strength		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803B** DATE **1/11/19** SHEET **8** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	RC	174.5	184.5		120	67				with very weak beds; 10R 3/2 (Dusky Red); massive structure; fresh to highly decomposed in beds; slightly disintegrated, with moderately to intensely disintegrated beds; slightly fractured (mechanical breaks).		
										174.5-189.3': SHALE; very strong field strength with very weak to moderately strong beds at 179.8-183.3', 183.8-183.9', 184.1', 184.2-184.5', 184.8-184.9', 185-185.1', 186-186.2', 186.5-186.8', 187.2-187.5', and 188.6 bgs; 10R 3/2 (Dusky Red) with GLEY 2 4/10G (Dark Greenish Gray), GLEY 1 3/N (Very Dark Gray), and 5Y 4/2 (Olive Gray) mottling; massive structure; fresh, with moderately to highly decomposed beds in weak zones (above); competent, with slightly to intensely (clayey) disintegrated beds in very weak to moderate zones (above); intensely fractured (mechanical breaks), especially 176.9-179' bgs.		
20	RC	184.5	194.5		120	35	180					
							185					
							190			189.3-195.8': SHALE; very strong field strength with weak beds at 190-190.8', 192.6', 193', and 193.2' bgs; GLEY 1 4/N (Dark Gray) and GLEY 1 3/N (Very Dark Gray), with 10R 3/2 (Dusky Red) and GLEY 2 4/10G (Dark Greenish Gray); massive structure; fresh, with slightly to highly decomposed beds in weak zones (above); slightly disintegrated, HCl reactive in beds at 191.9-192' bgs, and moderately to intensely disintegrated in weak beds (above); mechanical breaks at bedding plane joints throughout.		
							195					
										195.8-197': Clayey SHALE to Claystone/Mudstone; moderate to strong field strength; GLEY 1 4/N (Dark Gray) and 5Y 4/4 (Olive), with 10R 3/2 (Dusky Red) laminations and mottling - reverses with depth; massive structure; moderately decomposed (medium to thin beds of very soft clay to weak to very weak Claystone/Mudstone); slightly disintegrated, HCl reactive in beds with depth; very intensely fractured (mechanical breaks), possible horizontal natural fracture at 196.5' bgs, fully healed.		
							200					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 534,010.6 E 1,723,944.6**

GROUND ELEVATION **904.0** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 273.7	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1803C** DATE **1/11/19** SHEET **1** OF **14**

BORING START **12/12/17** BORING FINISH **12/15/17**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.91** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **253** BOTTOM **273.4**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	4.0		0				CL ML	0-4': No recovery - Silty CLAY overburden.		0-253': Riser
1	RC	4.0	9.5		25	NR	5			4-9.4': SILTSTONE; strong field strength; 5Y 4/3 (Olive) with 5YR 5/8 (Yellowish Red) mottling; massive structure; moderately decomposed; slightly disintegrated; intensely to moderately fractured (mechanical breaks).		
2	RC	9.5	14.5		58.5	28	10			9.4-9.5': Clayey SHALE; weak field strength; 10R 3/2 (Dusky Red); massive structure; highly decomposed; slightly disintegrated; intensely to moderately fractured (mechanical breaks). 9.5-13.6': Clayey SHALE; very weak to moderate field strength; 10R 3/2 (Dusky Red) to 5Y 4/3 (Olive) with 7.5 YR 5/8 (Strong Brown) mottling; massive structure; slightly decomposed with highly to moderately decomposed thin beds; slightly to moderately disintegrated; intensely to moderately fractured (mechanical breaks).		
3	RC	14.5	24.5		120	50	15			13.6-14.5': SILTSTONE; very strong field strength; 5Y 4/3 (Olive); massive structure; slightly decomposed; slightly disintegrated; intensely to moderately fractured (mechanical breaks). 14.5-19.5': SILTSTONE grading to Shaley Sandstone; very strong field strength; 10R 3/2 (Dusky Red) and 5Y 4/3 (Olive); fine-grained texture; massive structure; slightly decomposed; slightly to moderately disintegrated, reactive to HCl from 18.5-19.3'		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **M. McCann**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **2** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	RC	14.5	24.5		120	50				bgs; moderately fractured, primarily due to mechanical breaks but very narrow horizontal fractures at 18.6', 19.2', and 19.4' bgs, with iron staining, smooth to rough.		Significant loss of water
										19.5-21.9': Clayey SHALE; very weak to moderate field strength; 10R 3/2 (Dusky Red) to 5Y 4/3 (Olive) with 7.5 YR 5/8 (Strong Brown) mottling; massive structure; moderately fractured (mechanical breaks).		
4	RC	24.5	34.5		116	64	25			21.9-23.6': SILTSTONE; strong field strength; 10R 3/2 (Dusky Red) to 5Y 4/3 (Olive) with 7.5 YR 5/8 (Strong Brown) mottling; massive structure; slightly decomposed; slightly disintegrated; moderately fractured, with a fracture zone from 22-22.3' bgs.		
										23.6-24.7': Clayey SHALE; moderate field strength; GLEY 1 4/N (Gray); massive structure; slightly decomposed; competent; moderately fractured (mechanical breaks).		
							30			24.7-38.6': Interbedded SHALE with Siltstone and Shaley Sandstone, micaceous at depth; very strong field strength with strong field strength in laminations; GLEY 1 5/N (Dark Gray) and 10R 3/2 (Dusky Red) to GLEY 2 3/5BG (Very Dark Greenish Gray); Sandstone has a fine-grained texture; massive structure with laminations; fresh with moderate decomposition in some bedded intervals; slight disintegration, reacts to HCl (lenses, pitted) from 29.4-35.2' bgs; moderately fractured (mechanical breaks), possible natural fracture at 25.2' bgs - iron stained, very narrow.		
5	RC	34.5	44.5		120	70	35					
							40			38.6-48.3': SHALE; strong to very strong field strength, with moderately strong thin beds; GLEY 1 5/N (Dark Gray) and 10R 3/2 (Dusky Red) to GLEY 2 3/5BG (Very Dark Greenish Gray); massive structure; fresh, slightly to highly decomposed thin beds; slightly to moderately decomposed; slightly to moderately fractured (mechanical breaks).		
6	RC	44.5	54.5		120	63	45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **3** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	44.5	54.5		120	63						
							50			48-3-54.5': Interbedded SHALE, Siltstone, and Shaley Sandstone; very strong field strength with weak to very weak field strength in laminations (52.4-52.5' bgs and 53.8-54.3' bgs); GLEY 1 5/N (Dark Gray) and 10R 3/2 (Dusky Red) to GLEY 2 3/5BG (Very Dark Greenish Gray); Sandstone has a fine-grained texture; massive structure with laminations and thin beds; fresh with moderate to high decomposition in medium bedded intervals; slight to moderate disintegration, (clay); moderately fractured (mechanical breaks).		
7	RC	54.5	64.5		118	87	55			54.5-55.5': Shaley SANDSTONE; very strong field strength; GLEY 1 5/N (Dark Gray); fine to medium-grained texture; massive structure with Shaley laminations, micaceous; fresh; competent; moderately fractured (mechanical breaks).		
										55.5-80': SANDSTONE; very strong field strength; GLEY 1 5/N (Dark Gray); fine/medium to medium/coarse-grained texture; massive structure with Shaley laminations, especially 75.5-75.7' and 79.6-80' bgs, micaceous; fresh; competent; moderately fractured (mechanical breaks), possible horizontal natural fracture at 58.6' bgs.		
							60					
8	RC	64.5	74.5		120	99	65					
							70					

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COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **4** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
8	RC	64.5	74.5		120	99						
9	RC	74.5	84.5		107.5	87	75					
							80			80-84.5': SHALE; strong field strength, moderate field strength in thin beds; GLEY 1 3/N (Very Dark Gray); massive structure; fresh with moderately decomposed from 80.1-80.5' bgs; slightly disintegrated, pitted upper interval; moderately fractured, horizontal very narrow fracture at 80.1' bgs.		
10	RC	84.5	94.5		120	60	85			84.5-94.5': SHALE; strong to very strong field strength, soft Clay at 91.9' bgs, moderate field strength 94-94.5' bgs; GLEY 1 3/N (Very Dark Gray) with 10R 3/2 (Dusky Red) mottling at base; massive structure; fresh, moderately decomposed from 94-94.5' bgs; moderately disintegrated; moderately fractured (mechanical breaks), possible horizontal natural fracture at 91-94' bgs, very narrow, trace clay.		
							90					
11	RC	94.5	104.5		114	70	95			94.5-97.5': Shaley SANDSTONE; strong to moderate field strength, very weak at 96.8-96.9' bgs; 10R 3/2 (Dusky Red) with GLEY 1 3/N (Very Dark Gray); massive structure; moderately decomposed, highly from 96.8-96.9' bgs; slightly to moderately disintegrated, HCl reactive lenses; intensely fractured (mechanical and horizontal breaks),		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **5** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
11	RC	94.5	104.5		114	70				very narrow to narrow with high decomposition and clay - possible mechanical exaggeration.		
							100			97.5-123.4': Shaley SANDSTONE, micaceous; very strong field strength; GLEY 2 4/10G (Dark Greenish Gray) with 10R3/2 (Dusky Red) mottling in upper 1.2'; fine to medium-grained texture; massive structure with Shaley laminations; slightly decomposed to fresh at depth; slightly to moderately disintegrated (HCl reactive in lenses and laminations); moderately to slightly fractured (mechanical breaks), possible horizontal natural fracture at 98.8' bgs (very narrow, clayey) possible natural horizontal fracture at 114' bgs (very narrow, smooth, clayey).		
12	RC	104.5	114.5		120	98	105					
							110					
13	RC	114.5	124.5		119	98	115					
							120					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **6** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										123.4-124.5': SANDSTONE; very strong field strength; GLEY 2 4/10G (Dark Greenish Gray); coarse-grained texture; massive structure; fresh; slightly disintegrated (cementations/grains are HCl reactive); moderately fractured (mechanical breaks), possible horizontal natural fracture at 123.9' bgs - clayey, infilled, rough.		
14	RC	124.5	134.5		117.5	63	125			124.5-127': SHALE; moderate to strong field strength; GLEY 1 3/N (Very Dark Gray) with 5Y 5/4 (Olive) and 10R 3/2 (Dusky Red); massive structure; slightly decomposed; competent; moderately to intensely fractured with depth (mechanical and horizontal breaks), very narrow 55 degree joint at 125.3' bgs.		
							130			127-135.5': Shaley SANDSTONE with laminated Shales and clayey Shales; very strong field strength, thin beds of very stiff clay, laminated shales have weak field strength at 128.8-128.9', 131.2-131.3', 131.8-132.6, 134.1', and 134.8-135.5' bgs; GLEY 2 3/10G (Very Dark Greenish Gray) with 10R 3/2 (Dusky Red) at top, 5Y 5/4 (Olive) and 10R 3/2 (Dusky Red) at 128.2-129.9' bgs; fine-grained texture; massive structure with laminated, thin bedding of shale and clayey shale; fresh to moderately decomposed; competent to moderately and intensely disintegrated in intervals noted in field strength; moderately to intensely fractured (mechanical breaks), possible horizontal natural fracture at 128.5' bgs, discolored.		
15	RC	134.5	144.5		120	90	135			135.5-145': Shaley SANDSTONE, micaceous; very strong field strength; GLEY 2 3/10G (Very Dark Greenish Gray) with GLEY 1 5/N (Gray) at 139.5' bgs; fine-grained to fine/medium-grained texture with depth; massive structure with shaley laminations; fresh; slightly disintegrated with HCl reactivity; moderately fractured (mechanical breaks).		
							140					
16	RC	144.5	154.5		112.5	65	145			145-147': SHALE grading to clayey Shale with depth; very strong field strength, thin beds of soft clay, weak shale; GLEY 1 4/N (Dark Gray) with 10R 3/2 (Dusky Red); massive structure; fresh, highly decomposed in thin beds; competent, moderately to intensely disintegrated in thin beds; moderately fractured (mechanical breaks).		
										147-154.5': Interbedded Shaley SANDSTONE and SHALE; very strong field strength; GLEY 2 4/10G (Dark Greenish Gray) with 10R 3/2		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **7** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
16	RC	144.5	154.5		112.5	65				(Dusky Red) mottling; fine-grained texture; massive structure; slightly decomposed; slightly disintegrated, lenses and grains in Sandstone reactive to HCl, little euhedral pyrite pitting; moderately fractured (mechanical breaks).		
17	RC	154.5	164.5		120	62	155			154.5-158.3': SANDSTONE; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained, micaceous texture; massive structure; fresh; competent, laminations slightly reactive to HCl; moderately fractured (mechanical breaks).		157-248.90': Bentonite Seal
										158.3-159': Shaley SANDSTONE; very strong field strength, with a very weak thin bed at 158.8' bgs; GLEY 2 4/10G (Dark Greenish Gray); fine-grained, micaceous texture; massive structure with Shale laminations; fresh to slightly decomposed; competent, laminations slightly reactive to HCl, moderately disintegrated at 158.3' bgs (clay); intensely fractured (mechanical breaks).		
							160			159-166': SHALE; very strong field strength with thin to medium beds of medium stiff clay to weak Shale; 10R 3/2 (Dusky Red); massive structure; fresh, with moderately to highly decomposed beds; competent, with moderately to intensely disintegrated in beds; intensely fractured (mechanical breaks).		
18	RC	164.5	174.5		120	88	165					
										166-169': Interbedded Shaley SANDSTONE, Clayey SHALE, and CLAYSTONE/MUDSTONE; very strong (Sandstone) to weak (Shale) field strength; GLEY 2 4/10G (Dark Greenish Gray) Sandstone and 10R 3/2 (Dusky Red) Shale; fine to medium grained texture (Sandstone); thin to medium bedded with massive structure; fresh Sandstone, with highly decomposed Shale; competent Sandstone, with moderately to intensely disintegrated Shale, HCl reactive laminations; slightly fractured (mechanical breaks).		
							170			169-172.2': SANDSTONE; very strong field strength; GLEY 2 4/10G (Dark Greenish Gray); fine/medium-grained, micaceous texture; massive structure with micaceous laminations; fresh; slightly disintegrated, laminations slightly reactive to HCl; slightly fractured (mechanical breaks).		
19	RC	174.5	184.5		120	67	175			172.2-174.5': SHALE with highly weathered Claystone/Mudstone; very strong field strength		

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JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **8** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	RC	174.5	184.5		120	67				with very weak beds; 10R 3/2 (Dusky Red); massive structure; fresh to highly decomposed in beds; slightly disintegrated, with moderately to intensely disintegrated beds; slightly fractured (mechanical breaks).		
										174.5-189.3': SHALE; very strong field strength with very weak to moderately strong beds at 179.8-183.3', 183.8-183.9', 184.1', 184.2-184.5', 184.8-184.9', 185-185.1', 186-186.2', 186.5-186.8', 187.2-187.5', and 188.6 bgs; 10R 3/2 (Dusky Red) with GLEY 2 4/10G (Dark Greenish Gray), GLEY 1 3/N (Very Dark Gray), and 5Y 4/2 (Olive Gray) mottling; massive structure; fresh, with moderately to highly decomposed beds in weak zones (above); competent, with slightly to intensely (clayey) disintegrated beds in very weak to moderate zones (above); intensely fractured (mechanical breaks), especially 176.9-179' bgs.		
20	RC	184.5	194.5		120	35	180					
							185					
										189.3-195.8': SHALE; very strong field strength with weak beds at 190-190.8', 192.6', 193', and 193.2' bgs; GLEY 1 4/N (Dark Gray) and GLEY 1 3/N (Very Dark Gray), with 10R 3/2 (Dusky Red) and GLEY 2 4/10G (Dark Greenish Gray); massive structure; fresh, with slightly to highly decomposed beds in weak zones (above); slightly disintegrated, HCl reactive in beds at 191.9-192' bgs, and moderately to intensely disintegrated in weak beds (above); mechanical breaks at bedding plane joints throughout.		
21	RC	194.5	204.5		93.5	22	190					
							195					
										195.8-204.5': Clayey SHALE to Claystone/Mudstone; weak to moderate to strong field strength, weakest in beds at 199.6-204.5' bgs; GLEY 1 4/N (Dark Gray) and 5Y 4/4 (Olive), with 10R 3/2 (Dusky Red) laminations and mottling - reverses with depth; massive structure; moderately decomposed, and highly decomposed at 199.6-204.5' bgs (medium to thin beds of very soft clay to weak to very weak Claystone/Mudstone); slightly disintegrated, HCl reactive in beds with depth, and intensely disintegrated in weak beds (199.6-204.5' bgs); very intensely fractured (mechanical breaks), possible horizontal		
							200					

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COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **9** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
21	RC	194.5	204.5		93.5	22				natural fracture at 196.5' bgs, fully healed, tight fractures, 10-40 degrees at 197.7-199.1' bgs.		
22	RC	204.5	214.5		77.2	25	205			204.5-214.5': Clayey SHALE to Claystone/Mudstone; weak to moderate to strong field strength; 10R 3/2 (Dusky Red), with GLEY 1 4/N (Dark Gray), GLEY 1 7/N (Light Gray), and 5Y 4/4 (Olive) mottling; massive structure; moderately decomposed, and highly decomposed in weak beds throughout; moderately to slightly disintegrated; very intensely fractured (mechanical breaks), due to decomposition throughout.		
							210					
23	RC	214.5	224.5		114	47	215			214.5-221.6': SHALE; moderate to strong field strength; 10R 3/2 (Dusky Red), with GLEY 1 4/N (Dark Gray), GLEY 1 7/N (Light Gray), and 5Y 4/4 (Olive) mottling; massive structure; moderately decomposed, and highly decomposed in laminations and beds at 219-221.5' bgs; moderately disintegrated, and intensely disintegrated in at 219-221.5' bgs; very intensely to moderately fractured (mechanical breaks), fully healed, tight fractures, very narrow bedded intervals, 20-40 degrees at 214.5-219' and 220.4' bgs with clay and HCl reactive calcite infilling.		
							220			221.6-224.5': SILTSTONE to Sandstone; very strong field strength and very weak to weak beds at 222.3' bgs; GLEY 2 4/10G (Dark Greenish Gray) with 10R 3/2 (Dusky Red) mottling; fine-grained texture; massive structure; slightly decomposed, and moderately to highly decomposed in weak laminations and beds at 222.3' bgs; slightly disintegrated, Sandstone is HCl reactive, trace micaceousness; very intensely to moderately fractured, mechanical breaks at bedding plane joints of weaker material.		
24	RC	224.5	234.5		120	70	225			224.5-232': SILTSTONE to micaceous Sandstone; very strong field strength with weak		

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COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **10** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
24	RC	224.5	234.5		120	70	230			bedding; GLEY 2 4/10G (Dark Greenish Gray) with 10R 3/2 (Dusky Red) mottling in bedding; fine-grained texture; massive structure with Shale laminations; slightly decomposed to fresh; slightly disintegrated, HCl reactive in Sandstone units, veining; slightly fractured (mechanical breaks).		
										232-234.5': SHALE to Clayey Shale; very strong field strength with weak Shale bedding; GLEY 2 4/10G (Dark Greenish Gray) and 10R 3/2 (Dusky Red); massive structure; fresh, with slightly decomposed weak shale bedding; slightly to moderately/intensely disintegrated, in thin bedding; moderately fractured (mechanical breaks).		
25	RC	234.5	244.5		119	49	235			234.5-244.5': SHALE to Clayey Shale; very strong field strength with very weak to weak clayey Shale bedding at 234.8-235', 235.4-235.5', 240.1-240.3', 242.2-242.4', and 243.8-243.9' bgs; 10R 3/2 (Dusky Red) with GLEY 2 4/10G (Dark Greenish Gray); massive structure; slightly decomposed with highly decomposed clayey Shale bedding (see above intervals); slightly disintegrated with moderately disintegrated and HCl reactive clayey Shale bedding (see above intervals); intensely to moderately fractured (mechanical breaks), fully healed tight to very narrow fractures at 237.2-237.4' bgs (0-40 degrees) and 241.1' bgs (20 degrees).		
26	RC	244.5	254.5		120	78	240					
							245			244.5-247.6': Clayey SHALE grading to SHALE with depth; very strong field strength with weak clayey bedding at 246-246.2' and 247.4' bgs; 10R 3/2 (Dusky Red) with GLEY 2 4/10G (Dark Greenish Gray) and 5Y 4/4 (Olive) mottling; massive structure; slightly decomposed with highly decomposed weak clayey bedding (see above intervals); slightly disintegrated with HCl reactive clayey veins, clasts at 244.5-245.2' bgs; moderately fractured (mechanical breaks), possible fully healed fracture at 246-246.2' bgs (20 degrees).		
							250			247.6-254.5': SANDSTONE and Shaley SANDSTONE with interbedded Shale; very strong field strength with medium stiff to stiff clay and weak Shale bedding at 247.6-247.9' and 250.3-250.7' bgs; GLEY 2 4/10G (Dark Greenish Gray) Sandstone and 10R 3/2 (Dusky Red) Shale; massive structure with Shaley Sandstone and Shale laminations and medium bedding; fresh with moderately to highly		248.90-250': Secondary Sand Pack (Global #6) 250-275': Primary Sand Pack (Global #5) 253-273.40': Slotted PVC (20-slot)

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JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **11** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										decomposed weak clayey bedding (see above intervals); competent with moderate to intensely disintegrated clayey bedding; slightly fractured (mechanical breaks).		Screen
27	RC	254.5	264.5		120	99	255			254.5-256.4': SHALE, some Sandstone lenses with depth; very strong field strength with very stiff clay and weak Shale bedding at 256-256.4' bgs; GLEY 2 4/10G (Dark Greenish Gray) with 10R 3/2 (Dusky Red) mottling at 254.5-255.3' bgs; massive structure with laminations; slightly decomposed with moderately to highly decomposed thin bedding at 256-256.4' bgs; competent with moderate to intensely disintegrated bedding at 256-256.4' bgs; slightly fractured (mechanical breaks at weakest rock interfaces).		
							260			256.4-270.2': SANDSTONE with Shaley Sandstone (256.4-257.5' bgs), micaceous; very strong field strength; GLEY 1 5/5G-1 (Greenish Gray); fine-grained (Shaley Sandstone) and medium to coarse-grained (Sandstone) texture; massive structure with laminations and trace thin to medium (0.2') bedding of fine-grained Sandstone; fresh; competent, HCl reactivity (cementation) with depth; slightly fractured (mechanical breaks at weakest rock interfaces), 1" void at 256.5' bgs - no mineralization, likely due to drilling.		
28	RC	264.5	274.5		119	92	265					
							270			270.2-272': SANDSTONE with lenses of Shale throughout; very strong field strength; GLEY 1 5/5G-1 (Greenish Gray) Sandstone, GLEY 2 4/10G (Dark Greenish Gray) Shale; medium to coarse-grained texture; massive structure with approximately 50% lenses; fresh; slightly disintegrated, HCl reactivity, cementation; slightly fractured (mechanical breaks at weakest rock intervals).		
29	RC	274.5	284.5		114	85	275			272-274.5': Interbedded SHALE, Shaley SANDSTONE, and SANDSTONE; very strong field strength with weak 0.5 cm laminations at 273.8' bgs; GLEY 1 3/N (Very Dark Gray) and GLEY 2 4/10G (Dark Greenish Gray); fine-grained to fine/medium-grained texture; massive structure with laminations, interbedded units vary from thin to medium bedding; fresh; slightly disintegrated; slightly fractured (mechanical breaks), possible natural horizontal fractures at 271.6', 271.7', 272', and 272.6', all smooth, very narrow, clayey - may be altered by drilling, breaks at bedding plane		

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JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **12** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
29	RC	274.5	284.5		114	85				joints. 274.5-275.6': SANDSTONE, micaceous; very strong field strength; GLEY 2 4/10G (Dark Greenish Gray); medium-grained texture with fine-grained laminations; massive structure with laminations; fresh; slightly disintegrated, cementation reactive to HCl; slightly fractured (mechanical breaks). 275.6-284.5': SHALE; very strong field strength with weak clayey Shale bedding at 280.1' and 281.1' bgs; GLEY 2 3/10G (Very Dark Greenish Gray) with 10R 3/2 (Dusky Red) 0.4" bedding; fine-grained texture; massive structure with some thinly bedded Siltstone and Sandstone; fresh with moderate to highly decomposed thin clayey bedding (see weak intervals above); slightly disintegrated, with thin bedding and lenses of HCl reactive material, little laminations and lenses of pyrite at 280.6-284' bgs; moderately fractured (mechanical breaks at weaker bedding planes).		
30	RC	284.5	294.5		120	89	285			284.5-294.5': SHALE, little interbedded sandy Shale throughout with varying degrees of weathering; very strong field strength with weak to moderate strength clayey Shale bedding in highly weathered zones at 286.1-286.2', 286.25-286.3', 286.3-286.6', 286.9-287.6', 287.7-288', 288.2-291.9', 292.5-292.8', 293', 293.3-293.5', 293.6-293.7', and 293.9-294.5' bgs; GLEY 1 4/N (Dark Gray) with 10R 3/2 (Dusky Red) and 5Y 3/1 (Very Dark Gray) bedding; massive structure with laminations and thin bedding; slightly to highly decomposed; competent to moderately disintegrated; moderately fractured (mechanical breaks along bedding plane joints).		
31	RC	294.5	304.5		120	78	290 295			294.5-296.7': SHALE, clayey Shale; very strong field strength with weak clayey Shale bedding; GLEY 1 3/N (Very Dark Gray); massive structure; fresh with moderately decomposed bedding; competent with moderately disintegrated bedding; intensely to very intensely fractured (mechanical breaks). 296.7-297': COAL; strong field strength; GLEY 1 2.5/N (Black); massive structure; fresh; slightly disintegrated with lenses/laminations of HCl reactive material, possibly dissolution around framboidal pyrite - crystallization; mechanical breaks. 297-304.5': Interbedded SHALE and Shaley Sandstone; very strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; massive structure with laminated thin to medium bedded Sandstone; fresh; competent; mechanical breaks.		
32	RC	304.5	314.5		120	92	300 305					

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COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **13** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
32	RC	304.5	314.5		120	92				304.5-309.3': Shaley SANDSTONE with Sandstone bedding; very strong field strength; GLEY 1 4/N (Dark Gray) to GLEY 1 6/N (Gray); fine-grained texture with some medium grains, micaceous; massive structure with laminated to thin bedding; fresh; competent; mechanical breaks.		
							310			309.3-316.2': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); medium to coarse-grained texture with depth, some fine-grained laminations, trace Coal laminations, micaceous; massive structure with some Shale laminations; fresh; competent, coarse-grained Sandstone cementation and trace Coal lenses are reactive to HCl; mechanical breaks, possible natural fracture at 316.1' bgs (very narrow, rough to smooth).		
33	RC	314.5	324.5		120	88	315					
										316.2-324.5': SHALE some Shaley Sandstone bedding; very strong field strength; GLEY 1 4/N (Dark Gray); very fine to fine-grained texture; massive structure with Coal laminations and thin fine-grained Shaley Sandstone; fresh; little laminations of Coal with little to trace euhedral pyrite mineralization - trace pyrite lenses; mechanical breaks, possible natural fracture at 320' bgs (30 degrees, very narrow, trace clay), intensely fractured 317.3-317.8' bgs (smooth, clayey, very narrow).		
							320					
34	RC	324.5	334.5		22.8	14	325			324.5-334.5': Clayey and Sandy SHALE; very strong (sandy Shale), and moderate to strong (clay Shale) field strength; GLEY 1 4/N (Dark Gray) to GLEY 2 3/10G (Very Dark Greenish Gray) with 10R 3/2 (Dusky Red) and little 5Y 5/4 (Olive) mottling; very fine-grained (sandy Shale) texture; massive structure; fresh to slightly decomposed; slightly disintegrated, trace HCl reactive lenses; sandy Shale is unfractured, clayey Shale is intensely fractured (mechanical breaks).		
							330					324.5-334.5' bgs run drilled without NQ rod. Attempted to capture core in NQ rod during second

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1803C** DATE **1/11/19** SHEET **14** OF **14**

PROJECT **Amos Fly Ash Pond** BORING START **12/12/17** BORING FINISH **12/15/17**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
34	RC	324.5	334.5		22.8	14						run, but only recovered 1.9 ft. Next run was overdrilled 5' to capture 329.5-334.5' bgs.
35	RC	334.5	339.5		59	47	335			334.5-338.5': Shaley SANDSTONE to Shale with depth; very strong to strong field strength; GLEY 2 4/10G (Dark Greenish Gray) to 10R 3/2 (Dusky Red); massive structure; fresh; competent to slightly disintegrated, trace HCl reactive lenses; intensely fractured (mechanical breaks - unable to determine if natural fractures are present).		
							340					
							345					
							350					
							355					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 533,349.8 E 1,725,662.5**

GROUND ELEVATION **858.5** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 17.9	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1804A** DATE **1/11/19** SHEET **1** OF **3**

BORING START **5/21/18** BORING FINISH **5/23/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.32** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **27.5** BOTTOM **47.5**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	14.3		0		5		CL ML	0-14.3': No recovery - Silty CLAY overburden.		0-27.50': Riser
1	RC	14.3	24.3		120	14	10			14.3-17.1': SHALE; weak field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; highly decomposed; moderately disintegrated, mottling; intensely fractured.		7-18.90': Bentonite Seal
							15			17.1-19.2': SANDSTONE; moderate to strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly fractured.	▽	18.90-19.90': Secondary Sand
										19.2-26.5': SHALE; weak field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly		

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TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1804A** DATE **1/11/19** SHEET **2** OF **3**

PROJECT **Amos Fly Ash Pond** BORING START **5/21/18** BORING FINISH **5/23/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	RC	14.3	24.3		120	14				bedded; moderately decomposed; moderately disintegrated, iron staining in bedded intervals and vertical fractures; moderately fractured with iron-stained vertical fractures.		Pack (Global #6) 19.90-49': Primary Sand Pack (Global #5)
2	RC	24.3	34.3		120	7	25			26.5-29.7': Interbedded SHALE and SANDSTONE; moderate field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed in some bedded intervals in the top 3' of the interval; slightly disintegrated; slightly to moderately fractured.		27.50-47.50': Slotted PVC (20-slot) Screen
							30			29.7-34.3': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
3	RC	34.3	44.3			NR	35			34.3-45.3': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
							40					
4	RC	44.4	54.4			NR	45					

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AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1804A** DATE **1/11/19** SHEET **3** OF **3**

PROJECT **Amos Fly Ash Pond** BORING START **5/21/18** BORING FINISH **5/23/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
4	RC	44.4	54.4			NR				45.3-49': SHALE; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; moderately decomposed; slightly to moderately disintegrated, calcite layer from 46.8-46.9' bgs; moderately fractured.		
							50					
							55					
							60					
							65					
							70					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 533,352.4 E 1,725,659.0**

GROUND ELEVATION **859.2** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 179.1	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1804B** DATE **1/11/19** SHEET **1** OF **8**

BORING START **5/21/18** BORING FINISH **5/23/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **1.72** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **152** BOTTOM **177**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	14.3		0		5		CL ML	0-14.3': No recovery - Silty CLAY overburden.		0-152': Riser
1	RC	14.3	24.3		120	14	10			14.3-17.1': SHALE; weak field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; highly decomposed; moderately disintegrated, mottling; intensely fractured.		
							15			17.1-19.2': SANDSTONE; moderate to strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly fractured.		
										19.2-26.5': SHALE; weak field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1804B** DATE **1/11/19** SHEET **2** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **5/21/18** BORING FINISH **5/23/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	RC	14.3	24.3		120	14				bedded; moderately decomposed; moderately disintegrated, iron staining in bedded intervals and vertical fractures; moderately fractured with iron-stained vertical fractures.		
2	RC	24.3	34.3		120	7	25			26.5-29.7': Interbedded SHALE and SANDSTONE; moderate field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed in some bedded intervals in the top 3' of the interval; slightly disintegrated; slightly to moderately fractured.		
							30			29.7-34.3': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
3	RC	34.3	44.3			NR	35			34.3-45.3': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
							40					
4	RC	44.4	54.4			NR	45					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1804B** DATE **1/11/19** SHEET **3** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **5/21/18** BORING FINISH **5/23/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
4	RC	44.4	54.4			NR				45.3-55.2': SHALE; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; moderately decomposed; slightly to moderately disintegrated, calcite layer from 46.8-46.9' bgs; moderately fractured, and moderately to intensely fractured from 53.4-54.3' bgs.		
							50					
5	RC	54.3	64.3		63	23						
							55			55.2-64.3': SHALE, weathered; very weak field strength; 2.5YR 4/3 (Reddish Brown); fine-grained texture; massive structure; highly decomposed; moderately disintegrated with mottling, intensely disintegrated in the top 2' of the interval with calcite nodules; moderately fractured.		
							60					
6	RC	64.3	74.3		90	25				64.3-74.6': SHALE, weathered; weak field strength; 2.5YR 4/3 (Reddish Brown); fine-grained texture; massive structure; highly decomposed; moderately disintegrated; moderately fractured.		
							65					
							70					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1804B** DATE **1/11/19** SHEET **4** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **5/21/18** BORING FINISH **5/23/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	64.3	74.3		90	25						
7	RC	74.3	84.3		106	29	75			74.6-75.5': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated, calcite reactive to HCl; unfractured. 75.5-84.3': SHALE with Sandy Shale; weak to very weak field strength; GLEY 4/5GY (Dark Greenish Gray); fine-grained texture; massive structure; moderately to highly decomposed; moderately to intensely disintegrated, clay-filled fractures and mottling; moderately to intensely fractured.		
							80					
8	RC	84.3	94.3			NR	85			84.3-86': SHALE; very weak field strength; GLEY 4/5GY (Dark Greenish Gray); fine-grained texture; massive structure; moderately to highly decomposed; moderately to intensely disintegrated, clay-filled fractures and mottling; moderately to intensely fractured. 86-94.3': Interbedded Shale and Sandstone, grading to SANDSTONE with depth; very strong grading to strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed grading to fresh; slightly disintegrated, calcite deposits in Sandstone, iron staining where Interbedded Shale/Sandstone grades to Sandstone, top of Sandstone interval has large calcite deposits and veining; slightly fractured.		
							90					
9	RC	94.3	104.3		120	62	95			94.3-97.9': SANDSTONE; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; slightly fractured.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1804B** DATE **1/11/19** SHEET **5** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **5/21/18** BORING FINISH **5/23/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	RC	94.3	104.3		120	62	100			97.9-107.4': Interbedded SHALE and SANDSTONE; strong field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed in bedded intervals; slightly disintegrated, iron staining and calcite deposits at top and bottom of interval; slightly to moderately fractured.		
10	RC	104.3	114.3		109	12	105			107.4-110.7': SHALE; weak field strength; GLEY 5/N (Gray) and 2.5YR 4/3 (Reddish Brown) mottled; fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated with mottling; intensely fractured.		
							110			110.7-114.3': Interbedded SHALE and SANDSTONE; strong field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated; slightly fractured.		
11	RC	114.3	121.0		56.4	NR	115			114.3-119.2': Interbedded SHALE and SANDSTONE; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated, thin calcite deposits in bedded intervals.		
12	RC	120.0	124.3			NR	120			119.2-120': SHALE; weak field strength; 10R 3/2 (Dusky Red); fine-grained texture; massive structure; highly decomposed; moderately disintegrated with mottling; moderately fractured with slickenslides.		
										120-124.3': SHALE; weak field strength; 10R 3/2 (Dusky Red); fine-grained texture; massive structure; highly decomposed; moderately disintegrated with mottling; intensely fractured with clay-filled slickenslides.		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1804B** DATE **1/11/19** SHEET **6** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **5/21/18** BORING FINISH **5/23/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
13	RC	124.3	134.3		120	44	125			124.3-124.8': SHALE; weak field strength; 10R 3/2 (Dusky Red); fine-grained texture; massive structure; highly decomposed; slightly disintegrated; moderately to highly fractured.		
										124.8-127.6': Interbedded SHALE and SANDSTONE; moderate field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; moderately decomposed between bedded intervals; slightly disintegrated, thin, reactive calcite beds; moderately fractured.		
							130			127.6-129.7': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; moderately disintegrated, acid-reactive calcite deposits throughout interval; slightly fractured.		
										129.7-133.8': Interbedded SHALE and SANDSTONE; moderate to strong field strength; 10R 3/2 (Dusky Red) and GLEY 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed and moderately decomposed in some bedded intervals; slightly disintegrated; moderately fractured.		
14	RC	134.3	144.3		114	38	135			133.8-134.3': SHALE; moderate field strength; 10R 3/2 (Dusky Red); fine-grained texture; thinly bedded; moderately decomposed; moderately disintegrated with mottling; moderately fractured.		134-147.50': Bentonite Seal
										134.3-140.9': SHALE; moderate field strength; 10R 3/2 (Dusky Red); fine-grained texture; thinly bedded, massive structure from 138.6-140.9' bgs; moderately decomposed in bedded intervals; moderately disintegrated with mottling, intense mottling from 138.6-140.9' bgs; moderately fractured.		
							140			140.9-143.2': SANDSTONE; strong field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
										143.2-144.8': SHALE; moderate field strength; 10R 3/2 (Dusky Red); fine-grained texture; thinly bedded; moderately decomposed; moderately disintegrated with mottling; moderately fractured.		
15	RC	144.3	154.3		120	28	145			144.8-153.9': Interbedded SHALE and SANDSTONE; strong field strength, becomes moderate at 153.1' bgs; GLEY 5/N (Gray) with red Shale beds; fine-grained texture; thinly bedded; moderately decomposed, becomes highly decomposed at 153.1' bgs; slightly disintegrated, 0.1" calcite deposits at 150.3' and 153.1' bgs; slightly fractured, moderately fractured at the bottom of the interval.		147.50-148.70': Secondary Sand Pack (Global #6) 148.70-180.40': Primary Sand Pack

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1804B** DATE **1/11/19** SHEET **7** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **5/21/18** BORING FINISH **5/23/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	RC	144.3	154.3		120	28						(Global #5) 152-177': Slotted PVC (20-slot) Screen
										153.9-154.3': SHALE; weak field strength; GLEY 7/N (Light Gray); fine-grained texture.		
16	RC	154.3	164.3		116	41	155			154.3-164.3': SHALE, weathered; weak field strength; 10R 3/2 (Dusky Red) mottled with GLEY 4/N (Dark Gray); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated with mottling and 10% and 3-5 mm calcite nodules; moderately fractured with clay-filled fractures.		
							160					
17	RC	164.3	174.3		118	53	165			164.3-174.3': SHALE, weathered; weak field strength; 10R 3/2 (Dusky Red) mottled with GLEY 4/N (Dark Gray); fine-grained texture; massive structure; highly decomposed; slightly disintegrated with calcite deposits in vertical fractures; moderately fractured with vertical fractures.		
							170					
18	RC	174.3	184.3		120	53	175			174.3-179.2': SHALE, weathered; weak field strength; red; fine-grained texture; intensely disintegrated with mottling, clay-filled fractures, and calcite; moderately fractured with clay-filled		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1804B** DATE **1/11/19** SHEET **8** OF **8**

PROJECT **Amos Fly Ash Pond** BORING START **5/21/18** BORING FINISH **5/23/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
18	RC	174.3	184.3		120	53				fractures.		
							180			179.2-180.2': Sandy SHALE; moderate field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded.		
										180.2-184.3': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture, micaceous; thinly bedded; fresh; moderately disintegrated, caclite deposits throughout; slightly fractured, two fractures from 180.2-181.2' bgs.		
							185					
							190					
							195					
							200					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 533,272.3 E 1,727,730.1**

GROUND ELEVATION **883.3** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 211.8	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1805B** DATE **1/11/19** SHEET **1** OF **9**

BORING START **1/9/18** BORING FINISH **1/18/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.34** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **192** BOTTOM **212**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	3.0		0				CL ML	0-3': No recovery - Silty CLAY overburden.		0-192': Riser
1	RC	3.0	9.3		75.5	100	5			3-6.9': SANDSTONE; very strong field strength; GLEY 1 4/5GY (Greenish Gray); very fine-grained texture; thinly bedded; moderately decomposed; competent; all mechanical breaks.		
										6.9-9,5': Sandy SHALE; moderate field strength; GLEY 1 4/5GY (Greenish Gray) with red mottling; very fine-grained texture; thinly bedded; slightly decomposed; moderately disintegrated; all mechanical breaks.		
2	RC	9.3	14.3		60	100	10			9.5-15.1': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); very fine-grained texture; thinly bedded; fresh; competent; all mechanical breaks.		
3	RC	14.3	24.3		120	100	15			15.1-32': SANDSTONE; strong field strength; 10 YR 5/2 (Grayish Brown); fine to medium-grained texture, grading; thinly bedded; slightly decomposed; slightly disintegrated; all mechanical breaks.		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillsepie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805B** DATE **1/11/19** SHEET **2** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	RC	14.3	24.3		120	100						
4	RC	24.3	34.3		120	100	25					
							30			32-34.8': SHALE; moderate field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; all mechanical breaks.		
5	RC	34.3	44.3		120	100	35			34.8-39.4': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; all mechanical breaks.		
							40			39.4-44.3': SHALE; moderate field strength; 2.5YR 3/6 (Dark Red); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; all mechanical breaks.		
6	RC	44.3	54.3			NR	45			44.3-62.1': Clayey SHALE; moderate to weak field strength; 2.5YR 3/3 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately decomposed, three 5 cm highly		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805B** DATE **1/11/19** SHEET **3** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	44.3	54.3			NR				decomposed layers at 55.3-55.5' bgs; slightly disintegrated; all mechanical breaks.		
7	RC	54.3	64.3		120	100	50 55 60			62.1-64.3': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; all mechanical breaks.		
8	RC	64.3	74.3		120	100	65 70			64.3-80.8': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture grading to medium/fine-grained, with sandy Shale at 76.1-76.5' bgs; thinly bedded, micaceous; fresh; competent; all mechanical breaks.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805B** DATE **1/11/19** SHEET **4** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
8	RC	64.3	74.3		120	100						
9	RC	74.3	84.3		120	100	75					
							80					
										80.8-90.3': SHALE; moderate field strength; GLEY 1 2.5/N (Black); fine-grained shaley texture; thinly bedded; slightly decomposed; slightly disintegrated; all mechanical breaks.		
10	RC	84.3	94.3		120	100	85					
							90			90.3-93.3': Clayey SHALE; moderate to strong field strength; 2.5YR 3/2 (Dusky Red); fine-grained texture; thinly bedded; fresh; competent; all mechanical breaks.		
										93.3-95.1': SHALE; moderate field strength; GLEY 1 2.5/N (Black); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; all mechanical breaks.		
11	RC	94.3	104.3		61	51	95			95.1-106.4': SHALE, highly weathered; weak field strength; 2.5YR 3/2 (Dusky Red) with 5-10 cm gray and gray-green fragments; fine-grained texture; thinly bedded; highly decomposed; moderately disintegrated; all mechanical breaks; note that the 68" of		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805B** DATE **1/11/19** SHEET **5** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
11	RC	94.3	104.3		61	51				unrecovered material between sample runs 11 and 12 are assumed to be from 99.5-105.1' bgs in this interval.		
12	RC	104.3	114.3		110	92	100 105 110			106.4-107.2': SANDSTONE; strong field strength; GLEY 1 2.5/N (Black); fine-grained texture; thinly bedded; fresh; competent; all mechanical breaks. 107.2-114.3': SHALE with high diameter fragments; moderate field strength; 2.5YR 3/2 (Dusky Red); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; all mechanical breaks.		
13	RC	114.3	124.3		100	83	115 120			114.3-124.9': SHALE with large fragments; moderate field strength; 2.5YR 3/2 (Dusky Red) with GLEY 1 3/4 (Dark Reddish Brown) fragments; fine-grained texture; thinly bedded; moderately to highly decomposed; slightly disintegrated; all mechanical breaks.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805B** DATE **1/11/19** SHEET **6** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
14	RC	124.3	134.3		120	100	125			124.9-142.4': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
15	RC	134.3	144.3		120	100	130					
16	RC	144.3	154.3		120	100	135					
							140					
							145			142.4-146.6': SHALE with 2-3 mm clay layers; moderate field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; moderately decomposed with highly decomposed zone at 143.8-144' bgs; moderately disintegrated; unfractured.		
										146.6-156.9': Clayey SANDSTONE; moderate to strong field strength; GLEY 1 4/N (Dark Gray) to GLEY 1 3/N (Very Dark Gray); very fine-grained to fine-grained texture; thinly bedded; slightly to moderately decomposed, 3-5 mm 10% highly decomposed layers; moderately to slightly disintegrated;		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805B** DATE **1/11/19** SHEET **7** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
16	RC	144.3	154.3		120	100				unfractured.		
17	RC	154.3	164.3		120	100	155			156.9-160.7': Clayey SHALE; weak field strength; 2.5 YR 3/4 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately to highly decomposed; moderately disintegrated; unfractured.		
							160			160.7-164.3': SANDSTONE; strong field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; moderately to slightly decomposed; slightly disintegrated; unfractured.		
18	RC	164.3	174.3		120	100	165			164.3-165.8': Clayey SHALE; moderate to weak field strength; 2.5 YR 3/4 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately decomposed; moderately disintegrated; unfractured.		
										165.8-172.3': SANDSTONE; strong field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured.		
							170					
										172.3-177.9': Clayey SHALE; moderate field strength; 2.5 YR 3/2 (Dusky Red) with gray and tan mottling at depth; fine-grained texture; thinly bedded; moderately decomposed; moderately disintegrated; unfractured.		
19	RC	174.3	184.3		120	100	175					174-188': Bentonite Seal

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805B** DATE **1/11/19** SHEET **8** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	RC	174.3	184.3		120	100						
							180			177.9-193.4': SANDSTONE; strong field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; fresh, highly decomposed clayey Shale bedding at 180.9-181.4' bgs; competent; unfractured.		
20	RC	184.3	194.3		120	100	185					
							190					188-189': Secondary Sand Pack (Global #6) 189-214': Primary Sand Pack (Global #5) 192-212': Slotted PVC (20-slot) Screen
21	RC	194.3	204.3		114	95	195			193.4-194.3': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; moderately to slightly decomposed; slightly disintegrated; unfractured. 194.3-199.9': SHALE; moderate to strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture with 3-5 mm angular 10% limestone fragments at 196.5-199.9; thinly bedded; slightly decomposed; slightly disintegrated; unfractured.		
							200			199.9-204.3': SHALE, highly weathered; weak field strength; 10R 4/3 (Weak Red) with gray mottling; fine-grained texture; thinly bedded; highly decomposed; moderately disintegrated;		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805B** DATE **1/11/19** SHEET **9** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
21	RC	194.3	204.3		114	95				unfractured.		
22	RC	204.3	214.3		106.8	89	205			204.3-214': Clayey SHALE; moderate field strength; 10R 4/3 (Weak Red) with larger gray mottling; fine-grained texture; massive structure with 5-10 mm fragments; moderately decomposed; moderately disintegrated; unfractured.		
							210					
							215					
							220					
							225					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 533,273.9 E 1,727,725.7**

GROUND ELEVATION **882.3** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 262.5	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1805C** DATE **1/11/19** SHEET **1** OF **13**

BORING START **1/9/18** BORING FINISH **1/18/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.59** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **232** BOTTOM **262**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	3.0		0				CL ML	0-3': No recovery - Silty CLAY overburden.		0-232': Riser
1	RC	3.0	9.3		75.5	100	5			3-6.9': SANDSTONE; very strong field strength; GLEY 1 4/5GY (Greenish Gray); very fine-grained texture; thinly bedded; moderately decomposed; competent; all mechanical breaks.		
										6.9-9,5': Sandy SHALE; moderate field strength; GLEY 1 4/5GY (Greenish Gray) with red mottling; very fine-grained texture; thinly bedded; slightly decomposed; moderately disintegrated; all mechanical breaks.		
2	RC	9.3	14.3		60	100	10			9.5-15.1': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); very fine-grained texture; thinly bedded; fresh; competent; all mechanical breaks.		
3	RC	14.3	24.3		120	100	15			15.1-32': SANDSTONE; strong field strength; 10 YR 5/2 (Grayish Brown); fine to medium-grained texture, grading; thinly bedded; slightly decomposed; slightly disintegrated; all mechanical breaks.		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillsepie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **2** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	RC	14.3	24.3		120	100						
4	RC	24.3	34.3		120	100	25					
							30			32-34.8': SHALE; moderate field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; all mechanical breaks.		
5	RC	34.3	44.3		120	100	35			34.8-39.4': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; all mechanical breaks.		
							40			39.4-44.3': SHALE; moderate field strength; 2.5YR 3/6 (Dark Red); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; all mechanical breaks.		
6	RC	44.3	54.3			NR	45			44.3-62.1': Clayey SHALE; moderate to weak field strength; 2.5YR 3/3 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately decomposed, three 5 cm highly		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **3** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	44.3	54.3			NR				decomposed layers at 55.3-55.5' bgs; slightly disintegrated; all mechanical breaks.		
7	RC	54.3	64.3		120	100				62.1-64.3': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; all mechanical breaks.		
8	RC	64.3	74.3		120	100				64.3-80.8': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture grading to medium/fine-grained, with sandy Shale at 76.1-76.5' bgs; thinly bedded, micaceous; fresh; competent; all mechanical breaks.		

50 55 60 65 70

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **4** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
8	RC	64.3	74.3		120	100						
9	RC	74.3	84.3		120	100	75					
							80					
										80.8-90.3': SHALE; moderate field strength; GLEY 1 2.5/N (Black); fine-grained shaley texture; thinly bedded; slightly decomposed; slightly disintegrated; all mechanical breaks.		
10	RC	84.3	94.3		120	100	85					
							90			90.3-93.3': Clayey SHALE; moderate to strong field strength; 2.5YR 3/2 (Dusky Red); fine-grained texture; thinly bedded; fresh; competent; all mechanical breaks.		
										93.3-95.1': SHALE; moderate field strength; GLEY 1 2.5/N (Black); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; all mechanical breaks.		
11	RC	94.3	104.3		61	51	95			95.1-106.4': SHALE, highly weathered; weak field strength; 2.5YR 3/2 (Dusky Red) with 5-10 cm gray and gray-green fragments; fine-grained texture; thinly bedded; highly decomposed; moderately disintegrated; all mechanical breaks; note that the 68" of		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **5** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
11	RC	94.3	104.3		61	51				unrecovered material between sample runs 11 and 12 are assumed to be from 99.5-105.1' bgs in this interval.		
12	RC	104.3	114.3		110	92	100 105			106.4-107.2': SANDSTONE; strong field strength; GLEY 1 2.5/N (Black); fine-grained texture; thinly bedded; fresh; competent; all mechanical breaks. 107.2-114.3': SHALE with high diameter fragments; moderate field strength; 2.5YR 3/2 (Dusky Red); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; all mechanical breaks.		
13	RC	114.3	124.3		100	83	110 115 120			114.3-124.9': SHALE with large fragments; moderate field strength; 2.5YR 3/2 (Dusky Red) with GLEY 1 3/4 (Dark Reddish Brown) fragments; fine-grained texture; thinly bedded; moderately to highly decomposed; slightly disintegrated; all mechanical breaks.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **6** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
14	RC	124.3	134.3		120	100	125			124.9-142.4': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
15	RC	134.3	144.3		120	100	130					
16	RC	144.3	154.3		120	100	135					
							140					
							145			142.4-146.6': SHALE with 2-3 mm clay layers; moderate field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; moderately decomposed with highly decomposed zone at 143.8-144' bgs; moderately disintegrated; unfractured.		
										146.6-156.9': Clayey SANDSTONE; moderate to strong field strength; GLEY 1 4/N (Dark Gray) to GLEY 1 3/N (Very Dark Gray); very fine-grained to fine-grained texture; thinly bedded; slightly to moderately decomposed, 3-5 mm 10% highly decomposed layers; moderately to slightly disintegrated;		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **7** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
16	RC	144.3	154.3		120	100				unfractured.		
17	RC	154.3	164.3		120	100	155			156.9-160.7': Clayey SHALE; weak field strength; 2.5 YR 3/4 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately to highly decomposed; moderately disintegrated; unfractured.		
							160			160.7-164.3': SANDSTONE; strong field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; moderately to slightly decomposed; slightly disintegrated; unfractured.		
18	RC	164.3	174.3		120	100	165			164.3-165.8': Clayey SHALE; moderate to weak field strength; 2.5 YR 3/4 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately decomposed; moderately disintegrated; unfractured.		
										165.8-172.3': SANDSTONE; strong field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured.		
							170					
										172.3-177.9': Clayey SHALE; moderate field strength; 2.5 YR 3/2 (Dusky Red) with gray and tan mottling at depth; fine-grained texture; thinly bedded; moderately decomposed; moderately disintegrated; unfractured.		
19	RC	174.3	184.3		120	100	175					

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AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **8** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	RC	174.3	184.3		120	100						
										177.9-193.4': SANDSTONE; strong field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; fresh, highly decomposed clayey Shale bedding at 180.9-181.4' bgs; competent; unfractured.		
							180					
20	RC	184.3	194.3		120	100						
							185					
							190					
										193.4-194.3': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; moderately to slightly decomposed; slightly disintegrated; unfractured.		
21	RC	194.3	204.3		114	95	195			194.3-199.9': SHALE; moderate to strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture with 3-5 mm angular 10% limestone fragments at 196.5-199.9; thinly bedded; slightly decomposed; slightly disintegrated; unfractured.		
							200			199.9-204.3': SHALE, highly weathered; weak field strength; 10R 4/3 (Weak Red) with gray mottling; fine-grained texture; thinly bedded; highly decomposed; moderately disintegrated;		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **9** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
21	RC	194.3	204.3		114	95				unfractured.		
22	RC	204.3	214.3		106.8	89	205			204.3-221.3': Clayey SHALE; moderate field strength; 10R 4/3 (Weak Red) with larger gray mottling; fine-grained texture; massive structure with 5-10 mm fragments; moderately decomposed; moderately disintegrated; unfractured.		
							210					
23	RC	214.2	224.2		120	100	215					
							220			221.3-232.3': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
24	RC	224.3	234.3		120	100	225					225-228': Bentonite Seal

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **10** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
24	RC	224.3	234.3		120	100	230					228-229': Secondary Sand Pack (Global #6) 229-264': Primary Sand Pack (Global #5) 232-262': Slotted PVC (20-slot) Screen
25	RC	234.3	244.3		120	100	235			232.3-247.1': SHALE; moderate field strength; 2.5 YR 3/2 (Dusky Red) with gray mottling with depth; fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; unfractured.		
26	RC	244.3	254.3		120	100	240 245			247.1-264.3': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured - all mechanical breaks.		
							250					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **11** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
27	RC	254.3	264.3		120	100	255					
28	RC	264.3	274.3		120	100	260			264.3-268': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained grading to medium-grained texture with depth; thinly bedded; fresh; competent; unfractured.		
29	RC	274.3	284.3		120	100	265			268-273.7': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); medium-grained texture; thinly bedded; fresh; competent; unfractured.		
							270			273.7-274.6': SHALE; strong field strength; GLEY 1 4/N (Dark Gray) grading to GLEY 1 5/N (Gray) with depth; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured.		
							275			274.6-276.4': SANDSTONE; strong field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
										276.4-277.4': SHALE; strong to moderate field strength; GLEY 1 3/N (Very Dark Gray); very fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated;		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **12** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
29	RC	274.3	284.3		120	100				unfractured. 277.4-285': SANDSTONE; strong field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
30	RC	284.3	294.3		120	100	285			285-290.4': SHALE; moderate field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured.		
							290			290.4-294.3': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); medium-grained texture, micaceous; thinly bedded; fresh; competent; unfractured.		
31	RC	294.3	304.3		120	100	295			294.3-297': SHALE; moderate field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured.		
										297-299.6': COAL with Shale; weak field strength; GLEY 2 3/5 (Very Dark Bluish Gray); fine-grained texture; medium bedded; slightly decomposed; slightly disintegrated; unfractured.		
							300			299.6-306.1': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
32	RC	304.3	314.3			NR	305					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1805C** DATE **1/11/19** SHEET **13** OF **13**

PROJECT **Amos Fly Ash Pond** BORING START **1/9/18** BORING FINISH **1/18/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
32	RC	304.3	314.3			NR				306.1-313.1': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); fine to medium-grained texture with 5-10 mm framboidal pyrite nodule layers; thinly bedded; fresh; slightly disintegrated; unfractured.		
							310					
										313.1-314.3': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
33	RC	314.3	324.3			NR						
							315			314.3-322.7': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded with 2-5 cm angular Limestone fragments at base/contact; fresh; competent; unfractured.		
							320					
										322.7-324.3': SHALE; moderate field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; slightly to moderately decomposed; slightly disintegrated; unfractured.		
							325					
							330					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 532,750.9 E 1,728,577.2**

GROUND ELEVATION **889.6** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 25.6	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1806A** DATE **1/11/19** SHEET **1** OF **4**

BORING START **3/28/18** BORING FINISH **4/3/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.5** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **60.4** BOTTOM **80.4**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	24.0		0		5 10 15		CL ML	0-24': No recovery - Silty CLAY overburden.		0-60.40': Riser

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806A** DATE **1/11/19** SHEET **2** OF **4**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	24.0		0							
1	RC	24.0	30.7		72	90	25			24-30.7': SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded with unconformities from 25.7-26.2' bgs, cross-bedding; fresh; competent; unfractured (mechanical breaks).		
							30					
2	RC	30.7	40.7		120	NR				30.7-33.2': SHALE; moderate to weak field strength; 10R 3/2 (Dusky Red); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; unfractured (mechanical breaks).		
										33.2-34.7': SHALE with sand; moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured (mechanical breaks).		
							35			34.7-35.2': SHALE, weathered; weak field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; highly decomposed; moderately disintegrated; unfractured (mechanical breaks).		
										35.2-40.7': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); fine-grained texture with medium-grained texture from 36.7-37' bgs; thinly bedded; fresh; competent to slightly disintegrated; slightly fractured, vertical fracture at 40.1' bgs with iron staining.		
							40					
3	RC	40.7	50.7		120	100				40.7-44.2': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; unfractured (mechanical breaks).		
							45			44.2-45.1': SHALE, weathered; weak field strength; GLEY 1 7/N (Light Gray) with 2.5YR 3/6 (Dark Red); fine-grained texture; massive structure; highly decomposed; moderately		45-56': Bentonite Seal

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806A** DATE **1/11/19** SHEET **3** OF **4**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	RC	40.7	50.7		120	100				disintegrated; unfractured (mechanical breaks).		
										45.1-48.4': SHALE; moderate field strength; 2.5YR 3/6 (Dark Red); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured (mechanical breaks).		
										48.4-50.3': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks).		
							50					
4	RC	50.7	60.7		120	100				50.3-50.7': SHALE; weak field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; moderately to highly decomposed; slightly disintegrated; unfractured (mechanical breaks).		
										50.7-55.9': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks).		
							55					
										55.9-61': SHALE; moderate field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured (mechanical breaks).		56-57': Secondary Sand Pack (Global #6) 57-81': Primary Sand Pack (Global #5)
							60					
5	RC	60.7	70.7			NR				61-70.7': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); medium-grained texture with fine-grained texture from 62.6-63.2' bgs and 66-66.3' bgs; thinly bedded; fresh; competent; unfractured (mechanical breaks).		60.40-80.40': Slotted PVC (20-slot) Screen
							65					
							70					
6	RC	70.7	80.7		120	100				70.7-74.6': SANDSTONE; strong to moderate field strength; GLEY 1 6/N (Gray); medium-grained texture; thinly bedded; fresh;		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806A** DATE **1/11/19** SHEET **4** OF **4**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	70.7	80.7		120	100	75			competent with calcite mineralization from 71.5-72.1' bgs, grades to moderately disintegrated from 74.1-74.6' bgs; unfractured (mechanical breaks).		
										74.6-75.7': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated along bedded intervals; unfractured (mechanical breaks).		
							80			75.7-77': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; two vertical fractures from 75.9-76.4' bgs, no mineralization or staining.		
										77-81': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray) to gray-green; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated along bedded intervals; unfractured (mechanical breaks).		
							85					
							90					
							95					

AEP - AEP.GDT - 1/11/19 13:55 - C:\USERS\LWOODS\DESKTOP\FOR NICOLE BORING LOGS GINT FILES\AEP MOUNTAINEER.GPJ

AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 532,748.3 E 1,728,573.2**

GROUND ELEVATION **889.5** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ **210.4**	▼	▼
TIME			
DATE	**7/18/2018**		

BORING NO. **MW-1806B** DATE **1/11/19** SHEET **1** OF **9**

BORING START **3/28/18** BORING FINISH **4/3/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.57** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **195** BOTTOM **210**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	24.0		0		5 10 15		CL ML	0-24': No recovery - Silty CLAY overburden.		0-195': Riser

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806B** DATE **1/11/19** SHEET **2** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	24.0		0							
1	RC	24.0	30.7		72	90	25			24-30.7': SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded with unconformities from 25.7-26.2' bgs, cross-bedding; fresh; competent; unfractured (mechanical breaks).		
							30					
2	RC	30.7	40.7		120	NR				30.7-33.2': SHALE; moderate to weak field strength; 10R 3/2 (Dusky Red); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; unfractured (mechanical breaks).		
										33.2-34.7': SHALE with sand; moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured (mechanical breaks).		
							35			34.7-35.2': SHALE, weathered; weak field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; highly decomposed; moderately disintegrated; unfractured (mechanical breaks).		
										35.2-40.7': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); fine-grained texture with medium-grained texture from 36.7-37' bgs; thinly bedded; fresh; competent to slightly disintegrated; slightly fractured, vertical fracture at 40.1' bgs with iron staining.		
							40					
3	RC	40.7	50.7		120	100				40.7-44.2': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; unfractured (mechanical breaks).		
							45			44.2-45.1': SHALE, weathered; weak field strength; GLEY 1 7/N (Light Gray) with 2.5YR 3/6 (Dark Red); fine-grained texture; massive structure; highly decomposed; moderately		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806B** DATE **1/11/19** SHEET **3** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	RC	40.7	50.7		120	100				disintegrated; unfractured (mechanical breaks). 45.1-48.4': SHALE; moderate field strength; 2.5YR 3/6 (Dark Red); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured (mechanical breaks). 48.4-50.3': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks).		
							50					
4	RC	50.7	60.7		120	100				50.3-50.7': SHALE; weak field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; moderately to highly decomposed; slightly disintegrated; unfractured (mechanical breaks). 50.7-55.9': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks).		
							55					
										55.9-61': SHALE; moderate field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured (mechanical breaks).		
							60					
5	RC	60.7	70.7			NR				61-70.7': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); medium-grained texture with fine-grained texture from 62.6-63.2' bgs and 66-66.3' bgs; thinly bedded; fresh; competent; unfractured (mechanical breaks).		Set mud-trough to re-circulate drilling water.
							65					
							70					
6	RC	70.7	80.7		120	100				70.7-74.6': SANDSTONE; strong to moderate field strength; GLEY 1 6/N (Gray); medium-grained texture; thinly bedded; fresh;		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806B** DATE **1/11/19** SHEET **4** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	70.7	80.7		120	100				competent with calcite mineralization from 71.5-72.1' bgs, grades to moderately disintegrated from 74.1-74.6' bgs; unfractured (mechanical breaks).		
							75			74.6-75.7': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated along bedding planes; unfractured (mechanical breaks).		
										75.7-77': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; two vertical fractures from 75.9-76.4' bgs, no mineralization or staining.		
							80			77-89.3': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray) to gray-green; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated along bedded intervals; unfractured (mechanical breaks).		
7	RC	80.7	90.7		120	100						
							85					
							90			89.3-90.7': SHALE; moderate field strength; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; slightly decomposed; moderately disintegrated, mottling noted; moderately fractured, two vertical fractures at top contact (89.3-89.6' bgs), no mineralization.		
8	RC	90.7	100.7		115	96				90.7-95.2': SHALE; strong field strength; GLEY 1 4/N (Dark Gray) with gray-green; fine-grained texture; thinly bedded; slightly decomposed between bedding; competent; unfractured.		
							95			95.2-100.7': SHALE, weathered; weak field strength; 2.5YR 3/4 (Dark Reddish Brown) mottled; fine-grained texture; massive structure; slightly decomposed; moderately disintegrated, mottling noted; unfractured.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806B** DATE **1/11/19** SHEET **5** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
8	RC	90.7	100.7		115	96	100					
9	RC	100.7	110.7		88	10	105			100.7-108': SHALE, weathered; weak field strength; 2.5YR 4/2 (Weak Red) mottled gray-green; fine-grained texture; massive structure; highly decomposed; moderately disintegrated, mottling noted; unfractured.		
										108-109.1': SANDSTONE; moderate field strength, weathered at upper contact; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; intensely disintegrated, calcite mineralization in fracture; vertical fracture from 108-108.1' bgs.		
10	RC	110.7	120.7		120	100	110			109.1-110.7': SHALE; strong field strength; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
										110.7-120.7': SHALE; strong to moderate field strength; 2.5YR 3/4 (Dark Reddish Brown) with GLEY 1 4/N (Dark Gray) from 116.4-118.3' bgs; fine-grained texture; massive structure with thin bedding from 116.4-118.3' bgs; slightly decomposed; moderate disintegration, gray shale filled vertical fractures; slightly fractured, vertical fracture with iron staining and no calcite reaction at 116.8' bgs.		
11	RC	120.7	130.7		120	16	115			120.7-123.8': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray) with 2.5YR 3/4 (Dark Reddish Brown) mottling; fine-grained texture; massive structure; moderately decomposed with high decomposition between bedded intervals; moderate disintegration, mottling noted; slightly fractured, vertical fracture		
							120					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806B** DATE **1/11/19** SHEET **6** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
11	RC	120.7	130.7		120	16	125			121.1-121.4' bgs, and vertical and horizontal fractures from 123-123.6' bgs filled with clays and shale sediments. 123.8-126.4': SANDSTONE; strong field strength; GLEY 1 4/5 (Dark Gray-Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured. 126.4-128.1': SHALE; moderate field strength; GLEY 1 4/5GY (Dark Greenish Gray); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated, mottling noted; unfractured. 128.1-130.7': SANDSTONE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
12	RC	130.7	140.7		120	NR	130 135 140			130.7-140.7': SANDSTONE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; moderately disintegrated, iron staining noted in bedded intervals at 132', 132.6', 134.7', 134.9', 135.3', 135.7', 136.1', 136.4', and 136.6' bgs, calcite mineralization noted in light colored bedded intervals at 131', 131.4', 136.7', 137.8', and 139', bgs; unfractured.		
13	RC	140.7	150.7		120	26	145			140.7-141': SANDSTONE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated; unfractured. 141-144.1': SHALE; moderate field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated with iron staining in the 141.6-141.8' bgs bedding plane; filled vertical fracture from 141.8-142.1. 144.1-146.4': SHALE; moderate field strength; 2.5YR 3/4 (Dark Reddish Brown) with GLEY 1 4/5 (Dark Gray-Gray) mottling; fine-grained texture; massive structure; slightly decomposed; slightly disintegrated; vertical fracture at 146.4' bgs, no mineralization. 146.4-150.7': SHALE; moderate to strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806B** DATE **1/11/19** SHEET **7** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
13	RC	140.7	150.7		120	26						
14	RC	150.7	160.7		120	NR				150.7-151.2': SHALE; moderate to strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured.		
							155			151.2-157': SHALE; moderate field strength; 2.5YR 3/4 (Dark Reddish Brown) with gray mottling; fine-grained texture; thinly bedded with limestone fragments 2-3 cm from 154-154.6' bgs; moderately decomposed; slightly to moderately disintegrated; filled vertical fracture at 155.5' bgs bedding plane, no mineralization or calcite.		
										157-159.3': SHALE; weak field strength; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; highly decomposed; moderately disintegrated, mottling noted; unfractured.		
							160			159.3-160.7': SHALE; moderate to strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured.		
15	RC	160.7	170.7			NR				160.7-162.7': Sandy SHALE grading to Sandstone; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured.		
										162.7-166.1': SANDSTONE; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated; unfractured.		
							165					
										166.1-167.3': SHALE, weathered; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated; unfractured.		
										167.3-170.7': SANDSTONE; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded with cross bedding from 169.7-170.7' bgs; fresh; competent; unfractured.		
							170					
16	RC	170.7	180.7		120	100				170.7-180.7': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
							175					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806B** DATE **1/11/19** SHEET **8** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
16	RC	170.7	180.7		120	100	180					178.10-190.60': Bentonite Seal
17	RC	180.7	190.7			NR	185			180.7-181.4': SANDSTONE grading to Shale at base; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured. 181.4-190.7': SHALE with Sandstone lenses with mud from 182.3-182.5' bgs; moderate field strength; GLEY 1 5/N (Gray) grading to 2.5YR 3/4 (Dark Reddish Brown) at 182.7' bgs; fine-grained texture; thinly bedded; slightly to moderately decomposed with layers of high decomposition between beds in the top 1.5' bgs; slightly to moderately disintegrated with mottling, iron staining, and calcite in the 184.5-184.9' bgs Sandstone lens; vertical fracture filled with clay at 188.8' bgs.		
18	RC	190.7	195.7		60	100	190			190.7-196.5': SHALE; moderate field strength; GLEY 1 5/N (Gray) with red mottling; fine-grained texture; thinly bedded; slightly decomposed; moderately disintegrated with red mottling; slicken-slides at 192.3', 192.5', 195.1', and 195.4' bgs, no mineralization.		190.60-191.80': Secondary Sand Pack (Global #6) 191.80-211': Primary Sand Pack (Global #5)
19	RC	195.7	205.7		120	100	195			196.5-205.9': SHALE, weathered; weak field strength; GLEY 1 5/N (Gray), becomes 2.5YR 3/4 (Dark Reddish Brown) with gray mottling at 202.6' bgs; fine-grained texture with 2-3 cm limestone fragments from 196.5-202.6' bgs; massive structure; moderately decomposed with layers of high decomposition; moderately disintegrated with mottling; slicken-slides at 196.2', 196.5', 202.6', 205.5', and 205.6' bgs.		195-211': Slotted PVC (20-slot) Screen
							200					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806B** DATE **1/11/19** SHEET **9** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	RC	195.7	205.7		120	100	205					
20	RC	205.7	210.7		60	100	210			205.9-210.7': SHALE, slightly weathered; moderate field strength; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; moderately to highly decomposed between weathered bedded intervals; moderately disintegrated with mottling, clay filled fractures; unfractured.		
										210.7-211': SHALE, weathered; very weak field strength; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; highly decomposed; moderately disintegrated with mottling; unfractured.		
							215					
							220					
							225					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 532,746.0 E 1,728,569.1**

GROUND ELEVATION **889.0** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 257.4	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1806C** DATE **1/11/19** SHEET **1** OF **12**

BORING START **3/28/18** BORING FINISH **4/3/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.78** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **225** BOTTOM **255**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	24.0		0		5 10 15		CL ML	0-24': No recovery - Silty CLAY overburden.		0-225': Riser

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806C** DATE **1/11/19** SHEET **2** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	24.0		0							
1	RC	24.0	30.7		72	90	25			24-30.7': SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded with unconformities from 25.7-26.2' bgs, cross-bedding; fresh; competent; unfractured (mechanical breaks).		
							30					
2	RC	30.7	40.7		120	NR				30.7-33.2': SHALE; moderate to weak field strength; 10R 3/2 (Dusky Red); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; unfractured (mechanical breaks).		
										33.2-34.7': SHALE with sand; moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured (mechanical breaks).		
							35			34.7-35.2': SHALE, weathered; weak field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; highly decomposed; moderately disintegrated; unfractured (mechanical breaks).		
										35.2-40.7': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); fine-grained texture with medium-grained texture from 36.7-37' bgs; thinly bedded; fresh; competent to slightly disintegrated; slightly fractured, vertical fracture at 40.1' bgs with iron staining.		
							40					
3	RC	40.7	50.7		120	100				40.7-44.2': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; unfractured (mechanical breaks).		
							45			44.2-45.1': SHALE, weathered; weak field strength; GLEY 1 7/N (Light Gray) with 2.5YR 3/6 (Dark Red); fine-grained texture; massive structure; highly decomposed; moderately		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806C** DATE **1/11/19** SHEET **3** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	RC	40.7	50.7		120	100				disintegrated; unfractured (mechanical breaks).		
										45.1-48.4': SHALE; moderate field strength; 2.5YR 3/6 (Dark Red); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured (mechanical breaks).		
										48.4-50.3': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks).		
							50					
										50.3-50.7': SHALE; weak field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; moderately to highly decomposed; slightly disintegrated; unfractured (mechanical breaks).		
4	RC	50.7	60.7		120	100				50.7-55.9': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured (mechanical breaks).		
							55					
										55.9-61': SHALE; moderate field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured (mechanical breaks).		
							60					
5	RC	60.7	70.7			NR				61-70.7': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); medium-grained texture with fine-grained texture from 62.6-63.2' bgs and 66-66.3' bgs; thinly bedded; fresh; competent; unfractured (mechanical breaks).		Set mud-trough to re-circulate drilling water.
							65					
							70					
6	RC	70.7	80.7		120	100				70.7-74.6': SANDSTONE; strong to moderate field strength; GLEY 1 6/N (Gray); medium-grained texture; thinly bedded; fresh;		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806C** DATE **1/11/19** SHEET **4** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	70.7	80.7		120	100				competent with calcite mineralization from 71.5-72.1' bgs, grades to moderately disintegrated from 74.1-74.6' bgs; unfractured (mechanical breaks).		
							75			74.6-75.7': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated along bedded intervals; unfractured (mechanical breaks).		
										75.7-77': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; two vertical fractures from 75.9-76.4' bgs, no mineralization or staining.		
							80			77-89.3': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray) to gray-green; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated along bedded intervals; unfractured (mechanical breaks).		
7	RC	80.7	90.7		120	100						
							85					
							90			89.3-90.7': SHALE; moderate field strength; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; slightly decomposed; moderately disintegrated, mottling noted; moderately fractured, two vertical fractures at top contact (89.3-89.6' bgs), no mineralization.		
8	RC	90.7	100.7		115	96				90.7-95.2': SHALE; strong field strength; GLEY 1 4/N (Dark Gray) with gray-green; fine-grained texture; thinly bedded; slightly decomposed between bedding; competent; unfractured.		
							95			95.2-100.7': SHALE, weathered; weak field strength; 2.5YR 3/4 (Dark Reddish Brown) mottled; fine-grained texture; massive structure; slightly decomposed; moderately disintegrated, mottling noted; unfractured.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806C** DATE **1/11/19** SHEET **5** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
8	RC	90.7	100.7		115	96	100					
9	RC	100.7	110.7		88	10	105			100.7-108': SHALE, weathered; weak field strength; 2.5YR 4/2 (Weak Red) mottled gray-green; fine-grained texture; massive structure; highly decomposed; moderately disintegrated, mottling noted; unfractured.		
										108-109.1': SANDSTONE; moderate field strength, weathered at upper contact; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; intensely disintegrated, calcite mineralization in fracture; vertical fracture from 108-108.1' bgs.		
10	RC	110.7	120.7		120	100	110			109.1-110.7': SHALE; strong field strength; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
										110.7-120.7': SHALE; strong to moderate field strength; 2.5YR 3/4 (Dark Reddish Brown) with GLEY 1 4/N (Dark Gray) from 116.4-118.3' bgs; fine-grained texture; massive structure with thin bedding from 116.4-118.3' bgs; slightly decomposed; moderate disintegration, gray shale filled vertical fractures; slightly fractured, vertical fracture with iron staining and no calcite reaction at 116.8' bgs.		
11	RC	120.7	130.7		120	16	115			120.7-123.8': SHALE; moderate field strength; GLEY 1 4/N (Dark Gray) with 2.5YR 3/4 (Dark Reddish Brown) mottling; fine-grained texture; massive structure; moderately decomposed with high decomposition between bedded intervals; moderate disintegration, mottling noted; slightly fractured, vertical fracture		
							120					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806C** DATE **1/11/19** SHEET **6** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
11	RC	120.7	130.7		120	16	125			121.1-121.4' bgs, and vertical and horizontal fractures from 123-123.6' bgs filled with clays and shale sediments. 123.8-126.4': SANDSTONE; strong field strength; GLEY 1 4/5 (Dark Gray-Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured. 126.4-128.1': SHALE; moderate field strength; GLEY 1 4/5GY (Dark Greenish Gray); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated, mottling noted; unfractured. 128.1-130.7': SANDSTONE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
12	RC	130.7	140.7		120	NR	130 135 140			130.7-140.7': SANDSTONE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; moderately disintegrated, iron staining noted in bedded intervals at 132', 132.6', 134.7', 134.9', 135.3', 135.7', 136.1', 136.4', and 136.6' bgs, calcite mineralization noted in light colored bedded intervals at 131', 131.4', 136.7', 137.8', and 139', bgs; unfractured.		
13	RC	140.7	150.7		120	26	145			140.7-141': SANDSTONE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated; unfractured. 141-144.1': SHALE; moderate field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated with iron staining in the 141.6-141.8' bgs bedding plane; filled vertical fracture from 141.8-142.1. 144.1-146.4': SHALE; moderate field strength; 2.5YR 3/4 (Dark Reddish Brown) with GLEY 1 4/5 (Dark Gray-Gray) mottling; fine-grained texture; massive structure; slightly decomposed; slightly disintegrated; vertical fracture at 146.4' bgs, no mineralization. 146.4-150.7': SHALE; moderate to strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		

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JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806C** DATE **1/11/19** SHEET **7** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
13	RC	140.7	150.7		120	26						
14	RC	150.7	160.7		120	NR				150.7-151.2': SHALE; moderate to strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured.		
							155			151.2-157': SHALE; moderate field strength; 2.5YR 3/4 (Dark Reddish Brown) with gray mottling; fine-grained texture; thinly bedded with limestone fragments 2-3 cm from 154-154.6' bgs; moderately decomposed; slightly to moderately disintegrated; filled vertical fracture at 155.5' bgs bedding plane, no mineralization or calcite.		
										157-159.3': SHALE; weak field strength; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; highly decomposed; moderately disintegrated, mottling noted; unfractured.		
							160			159.3-160.7': SHALE; moderate to strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured.		
15	RC	160.7	170.7			NR				160.7-162.7': Sandy SHALE grading to Sandstone; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured.		
										162.7-166.1': SANDSTONE; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated; unfractured.		
							165					
										166.1-167.3': SHALE, weathered; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated; unfractured.		
										167.3-170.7': SANDSTONE; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded with cross bedding from 169.7-170.7' bgs; fresh; competent; unfractured.		
							170					
16	RC	170.7	180.7		120	100				170.7-180.7': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
							175					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806C** DATE **1/11/19** SHEET **8** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
16	RC	170.7	180.7		120	100	180					
17	RC	180.7	190.7			NR	185			180.7-181.4': SANDSTONE grading to Shale at base; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured. 181.4-190.7': SHALE with Sandstone lenses with mud from 182.3-182.5' bgs; moderate field strength; GLEY 1 5/N (Gray) grading to 2.5YR 3/4 (Dark Reddish Brown) at 182.7' bgs; fine-grained texture; thinly bedded; slightly to moderately decomposed with layers of high decomposition between beds in the top 1.5' bgs; slightly to moderately disintegrated with mottling, iron staining, and calcite in the 184.5-184.9' bgs Sandstone lens; vertical fracture filled with clay at 188.8' bgs.		183-220': Bentonite Seal
18	RC	190.7	195.7		60	100	190			190.7-196.5': SHALE; moderate field strength; GLEY 1 5/N (Gray) with red mottling; fine-grained texture; thinly bedded; slightly decomposed; moderately disintegrated with red mottling; slicken-slides at 192.3', 192.5', 195.1', and 195.4' bgs, no mineralization.		
19	RC	195.7	205.7		120	100	195			196.5-205.9': SHALE, weathered; weak field strength; GLEY 1 5/N (Gray), becomes 2.5YR 3/4 (Dark Reddish Brown) with gray mottling at 202.6' bgs; fine-grained texture with 2-3 cm limestone fragments from 196.5-202.6' bgs; massive structure; moderately decomposed with layers of high decomposition; moderately disintegrated with mottling; slicken-slides at 196.2', 196.5', 202.6', 205.5', and 205.6' bgs.		
							200					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806C** DATE **1/11/19** SHEET **9** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	RC	195.7	205.7		120	100	205					
20	RC	205.7	210.7		60	100	210			205.9-210.7': SHALE, slightly weathered; moderate field strength; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; moderately to highly decomposed between weathered bedded intervals; moderately disintegrated with mottling, clay filled fractures; unfractured.		
21	RC	210.7	220.7		70	58	215			210.7-215.6': SHALE, weathered; very weak field strength; 2.5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; highly decomposed; moderately disintegrated with mottling; unfractured.		
										215.6-220.7': SHALE, moderately weathered; moderate field strength; 2.5YR 3/4 (Dark Reddish Brown) with tan mottling; fine-grained texture; massive structure; moderately decomposed; moderately disintegrated with mottling and clay filled fractures; unfractured, slicken-slide at 209.5' bgs.		
22	RC	220.7	230.7		120	NR	220			220.7-221.9': SHALE; strong field strength; 10YR 4/2 (Dark Grayish Brown); fine-grained texture; thinly bedded; slightly to moderately decomposed; moderately disintegrated, calcite reacts to HCl in fractures; moderately fractured, fractures filled with calcite.		220-221': Secondary Sand Pack (Global #6) 221-255': Primary Sand Pack (Global #5)
							225			221.9-223.7': Sandy SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly to moderately decomposed; moderately disintegrated, calcite reacts to HCl in light colored lenses at 223' bgs; unfractured.		225-255': Slotted PVC (20-slot) Screen
										223.7-225.8': SHALE; strong field strength; 2.5YR 3/2 (Dusky Red); fine-grained texture; thinly bedded; slightly to moderately decomposed; moderately disintegrated;		

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AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806C** DATE **1/11/19** SHEET **10** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
22	RC	220.7	230.7		120	NR				unfractured. 225.8-229.6': Interbedded SHALE; strong field strength; GLEY 1 4/N (Dark Gray) and 2.5YR 3/2 (Dusky Red); fine-grained texture; thinly bedded; slightly to moderately decomposed; moderately disintegrated; unfractured.		
							230					
23	RC	230.7	240.7		120	100				229.6-230.7': SHALE; strong field strength; 2.5YR 3/2 (Dusky Red); fine-grained texture; thinly bedded; slightly to moderately decomposed; moderately disintegrated; unfractured. 230.7-240.7': SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained texture, micaceous; thinly bedded; fresh; competent; unfractured.		
							235					
							240					
24	RC	240.7	250.7		120	100				240.7-250.7': SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine to medium-grained texture; thinly bedded; fresh; slightly disintegrated, very thin HCl-reactive calcite deposits from 246.3-247.6' bgs, iron staining and calcite band (5 mm thick) at 249.7' bgs; unfractured.		
							245					
							250					
25	RC	250.7	260.7		120	100				250.7-260.7': SANDSTONE; very strong field strength; GLEY 1 5/N (Gray) to GLEY 1 6/N (Gray); fine to medium-grained texture grading to medium-grained texture; thinly bedded with 3-5 mm limestone fragments at 253.4-253.6' bgs; fresh; slightly disintegrated, calcite deposits in light colored beds; unfractured.		

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JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806C** DATE **1/11/19** SHEET **11** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
25	RC	250.7	260.7		120	100	255					
							260					
26	RC	260.7	270.7		120	100				260.7-263.1': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); medium-grained texture grading to fine-grained texture with depth; thinly bedded; fresh; competent; unfractured.		
										263.1-265.7': Interbedded SHALE and SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
							265			265.7-269.7': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); medium-grained texture grading to fine-grained texture with depth; thinly bedded; fresh; slightly disintegrated, calcite at 267.8-269' bgs; unfractured.		
							270			269.7-270.7': SHALE; red-gray/green mottled; fine-grained texture; thinly bedded; slightly to moderately decomposed in bedding at 269.8-270.7' bgs; moderately disintegrated, mottling noted; unfractured.		
27	RC	270.7	280.7		120	100				270.7-271': SHALE; moderate field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly to moderately decomposed; slightly disintegrated; unfractured.		
							275			271-273.6': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
										273.6-280.7': Sandy SHALE grading to Shale at base; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly to moderately disintegrated, large calcite deposit/nodule at 275' bgs, pyrite nodules from 278.5-280.7' bgs with calcite deposits in bedding plane top contact from 278.5-278.3' bgs, coal fragments from 286.7-287.3' bgs; unfractured.		

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JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1806C** DATE **1/11/19** SHEET **12** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **3/28/18** BORING FINISH **4/3/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
27	RC	270.7	280.7		120	100						
28	RC	280.7	290.7		120	100				280.7-284.6': SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; competent; unfractured.		
							285			284.6-288.9': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); fine to medium-grained texture, micaceous; thinly bedded; fresh; competent to slightly disintegrated, slight calcite mineralization - reactive to acid - in light colored Sandstone from 287.7-288.9' bgs; unfractured.		
							290			288.9-290.7': SHALE, weathered; weak field strength; GLEY 2 2.5/10B (Blueish Black); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated; unfractured.		
							295					
							300					
							305					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 530,862.8 E 1,722,479.9**

GROUND ELEVATION **862.0** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 106.6	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1807A** DATE **1/11/19** SHEET **1** OF **5**

BORING START **5/15/18** BORING FINISH **5/16/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.96** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **95** BOTTOM **115**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	19.0		0		5 10 15		CL ML	0-19': No recovery - Silty CLAY overburden.		0-95': Riser
1	RC	19.0	24.0		22	20				19-24': SHALE with thin beds of Sandy Shale, grading to Shale; strong field strength; GLEY		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807A** DATE **1/11/19** SHEET **2** OF **5**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	RC	19.0	24.0		22	20				6/4R (Greenish Gray); fine-grained texture; thinly bedded; moderately decomposed at fractures; moderately disintegrated at fractures, iron staining in fracture from 23.8-24' bgs; moderately fractured.		
2	RC	24.0	34.0		120	33	25			24-34': Silty SHALE; moderate field strength; 10YR 4/3 (Brown); fine-grained texture; massive structure; moderately decomposed with gray and tan mottling; slightly to moderately disintegrated in fractures; moderately fractured.		
							30					
3	RC	34.0	44.0		52	15	35			34-44': Clayey SHALE, weathered; weak field strength; 10YR 3/3 (Dark Brown); fine-grained, clayey texture; massive structure; highly decomposed with low recovery; moderately disintegrated, mottling; moderately to intensely fractured, slickenslides.		
							40					
4	RC	44.0	54.0		76	16	45			44-54': SHALE, highly weathered at 46.9' bgs; moderate field strength, becomes very weak at 46.9' bgs; 10YR 3/3 (Dark Brown); fine-grained texture, clayey at 46.9' bgs; massive structure;		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807A** DATE **1/11/19** SHEET **3** OF **5**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
4	RC	44.0	54.0		76	16				moderately decomposed, becomes highly decomposed at 46.9' bgs; moderately disintegrated, with intense mottling; moderately fractured, clay-filled slickenslides.		
							50					
5	RC	54.0	64.0		108	59				54-57.5': SHALE; moderate field strength; 2.5Y 6/3 (Light Yellowish Brown); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated, with mottling and iron staining in fractures; moderately fractured, silt and clay-filled.		
							55					
										57.5-61.4': Sandy SHALE interbedded with Sand lenses; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded, interbedded with sand lenses, sand lens from 60.1-60.3' bgs; slightly decomposed; moderately disintegrated, with iron staining in fractures and sand lenses at 60.1-60.3' bgs; moderately fractured, large fracture from 57.6-58.5' bgs.		
							60					
										61.4-64': SHALE, weathered; very weak field strength; GLEY 3/N (Very Dark Gray); fine-grained texture; massive structure; highly decomposed; slightly disintegrated; unfractured.		
6	RC	64.0	74.0		120	33				64-70.3': SHALE; moderate field strength; GLEY 4/N (Dark Gray); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated, large calcite nodules and large vein-filled fractures; moderately fractured.		
							65					
							70					
										70.3-74': Sandy SHALE with Sandy lenses; strong field strength; GLEY 6/N (Gray); fine-grained texture; fresh; slightly disintegrated, reactive calcite in sandy lenses,		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807A** DATE **1/11/19** SHEET **4** OF **5**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	64.0	74.0		120	33				iron staining at top of lens contact, 73.3-73.5' bgs; unfractured.		
7	RC	74.0	84.0		120	54	75			74-76.1': Sandy SHALE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated; slightly to moderately fractured.		
										76.1-84': Interbedded SHALE and SANDSTONE; strong field strength; GLEY 4/N (Dark Gray); thinly bedded, base Sandstone 81.2-83.2' bgs; fresh; moderately disintegrated, iron staining in fractures and sand lense, no calcite reactivity; moderately fractured, vertical oval fracture at 76.1-76.4' bgs, iron staiing at 81.7' and 82.2' bgs.		
							80					81-82': Lost circulation fluid.
8	RC	84.0	94.0		54	15	85			84-94.3': SHALE, weathered; weak field strength; GLEY 4/N (Dark Gray); fine-grained texture with 3-5 and 5-10 cm calcite nodules; thinly bedded to massively structured; highly decomposed - weathered; moderately disintegrated, large small calcite nodules with iron staining around edges; moderately fractured.		88-91': Bentonite Seal 89': Circulation fluid returned.
							90					91-92': Secondary Sand Pack (Global #6) 92-116': Primary Sand Pack (Global #5)
9	RC	94.0	104.0			NR	95			94.3-102.5': Interbedded SHALE and SANDSTONE; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated, slight calcite reactivity in sandy lenses; slightly fractured, large vertical fracture at 100.4-101.2' bgs, no iron staining or calcite in fractures.		95-115': Slotted PVC (20-slot) Screen

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807A** DATE **1/11/19** SHEET **5** OF **5**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	RC	94.0	104.0			NR						
							100			102.5-104': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; moderately disintegrated, significant iron staining in fractures; moderately fractured, large vertical fracture with iron staining from 103.3-104' bgs, no calcite.		103-104': Loss of water circulation.
10	RC	104.0	114.0		120	20	105			104-113': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; moderately disintegrated from 104-105.8' bgs, significant iron staining; slightly fractured.		
							110					109': Return of water.
11	RC	114.0	124.0			84	115			113-115.2': SHALE; moderate field strength; GLEY 3/N (Very Dark Gray), lightens with depth; fine-grained texture; massive structure; slightly to moderately decomposed; slightly disintegrated; moderately fractured.		
										115.2-116': SHALE; moderate to weak field strength; 10R 4/3 (Brown); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated, mottled clay-filled fractures; moderately fractured.		
							120					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 530,865.3 E 1,722,475.1**

GROUND ELEVATION **861.1** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 123.4	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1807B** DATE **1/11/19** SHEET **1** OF **9**

BORING START **5/15/18** BORING FINISH **5/16/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **4.05** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **133** BOTTOM **153**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	19.0		0		5, 10, 15		CL ML	0-19': No recovery - Silty CLAY overburden.		0-133': Riser
1	RC	19.0	24.0		22	20				19-24': SHALE with thin beds of Sandy Shale, grading to Shale; strong field strength; GLEY		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807B** DATE **1/11/19** SHEET **2** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1	RC	19.0	24.0		22	20				6/4R (Greenish Gray); fine-grained texture; thinly bedded; moderately decomposed at fractures; moderately disintegrated at fractures, iron staining in fracture from 23.8-24' bgs; moderately fractured.		
2	RC	24.0	34.0		120	33	25			24-34': Silty SHALE; moderate field strength; 10YR 4/3 (Brown); fine-grained texture; massive structure; moderately decomposed with gray and tan mottling; slightly to moderately disintegrated in fractures; moderately fractured.		
							30					
3	RC	34.0	44.0		52	15	35			34-44': Clayey SHALE, weathered; weak field strength; 10YR 3/3 (Dark Brown); fine-grained, clayey texture; massive structure; highly decomposed with low recovery; moderately disintegrated, mottling; moderately to intensely fractured, slickenslides.		
							40					
4	RC	44.0	54.0		76	16	45			44-54': SHALE, highly weathered at 46.9' bgs; moderate field strength, becomes very weak at 46.9' bgs; 10YR 3/3 (Dark Brown); fine-grained texture, clayey at 46.9' bgs; massive structure;		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807B** DATE **1/11/19** SHEET **3** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
4	RC	44.0	54.0		76	16				moderately decomposed, becomes highly decomposed at 46.9' bgs; moderately disintegrated, with intense mottling; moderately fractured, clay-filled slickenslides.		
							50					
5	RC	54.0	64.0		108	59				54-57.5': SHALE; moderate field strength; 2.5Y 6/3 (Light Yellowish Brown); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated, with mottling and iron staining in fractures; moderately fractured, silt and clay-filled.		
							55					
										57.5-61.4': Sandy SHALE interbedded with Sand lenses; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded, interbedded with sand lenses, sand lens from 60.1-60.3' bgs; slightly decomposed; moderately disintegrated, with iron staining in fractures and sand lenses at 60.1-60.3' bgs; moderately fractured, large fracture from 57.6-58.5' bgs.		
							60					
										61.4-64': SHALE, weathered; very weak field strength; GLEY 3/N (Very Dark Gray); fine-grained texture; massive structure; highly decomposed; slightly disintegrated; unfractured.		
6	RC	64.0	74.0		120	33				64-70.3': SHALE; moderate field strength; GLEY 4/N (Dark Gray); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated, large calcite nodules and large vein-filled fractures; moderately fractured.		
							65					
							70					
										70.3-74': Sandy SHALE with Sandy lenses; strong field strength; GLEY 6/N (Gray); fine-grained texture; fresh; slightly disintegrated, reactive calcite in sandy lenses,		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807B** DATE **1/11/19** SHEET **4** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	RC	64.0	74.0		120	33				iron staining at top of lens contact, 73.3-73.5' bgs; unfractured.		
7	RC	74.0	84.0		120	54	75			74-76.1': Sandy SHALE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated; slightly to moderately fractured.		
										76.1-84': Interbedded SHALE and SANDSTONE; strong field strength; GLEY 4/N (Dark Gray); thinly bedded, base Sandstone 81.2-83.2' bgs; fresh; moderately disintegrated, iron staining in fractures and sand lense, no calcite reactivity; moderately fractured, vertical oval fracture at 76.1-76.4' bgs, iron staiing at 81.7' and 82.2' bgs.		
							80					81-82': Lost circulation fluid.
8	RC	84.0	94.0		54	15	85			84-94.3': SHALE, weathered; weak field strength; GLEY 4/N (Dark Gray); fine-grained texture with 3-5 and 5-10 cm calcite nodules; thinly bedded to massively structured; highly decomposed - weathered; moderately disintegrated, large small calcite nodules with iron staining around edges; moderately fractured.		
							90					89': Circulation fluid returned.
9	RC	94.0	104.0			NR	95			94.3-102.5': Interbedded SHALE and SANDSTONE; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated, slight calcite reactivity in sandy lenses; slightly fractured, large vertical fracture at 100.4-101.2' bgs, no iron staining or calcite in fractures.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807B** DATE **1/11/19** SHEET **5** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	RC	94.0	104.0			NR	100			102.5-104': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; moderately disintegrated, significant iron staining in fractures; moderately fractured, large vertical fracture with iron staining from 103.3-104' bgs, no calcite.		103-104': Loss of water circulation.
10	RC	104.0	114.0		120	20	105			104-113': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture; thinly bedded; fresh; moderately disintegrated from 104-105.8' bgs, significant iron staining; slightly fractured.		109': Return of water.
							110					
11	RC	114.0	124.0			84	115			113-115.2': SHALE; moderate field strength; GLEY 3/N (Very Dark Gray), lightens with depth; fine-grained texture; massive structure; slightly to moderately decomposed; slightly disintegrated; moderately fractured.		
										115.2-120.3': SHALE; moderate to weak field strength; 10R 4/3 (Brown); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated, mottled clay-filled fractures; moderately fractured.		
							120			120.3-122.8': SHALE; moderate to strong field strength; fine-grained texture; thinly bedded; slightly decomposed; moderately disintegrated, iron staining between bedded intervals; slightly fractured, calcite reactivity bewtten beds in top 0.4'.		
										122.8-131.4': SHALE; moderate field strength; 10R 3/3 (Dark Brown); fine-grained texture;		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807B** DATE **1/11/19** SHEET **6** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
12	RC	124.0	134.0		120	27	125			thinly bedded; slightly decomposed; slightly disintegrated between bedded intervals; slightly fractured, calcite-filled.		126-129': Bentonite Seal
							130			131.4-133.7': SHALE with thin Sandstone lenses; strong field strength, moderate at bedding contact with red Shale; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed, moderately decomposed at bedding plane contact; slightly disintegrated; slightly fractured.		129-130': Secondary Sand Pack (Global #6) 130-155': Primary Sand Pack (Global #5)
13	RC	134.0	139.0		60	48	135			133.7-134': SHALE, weathered; weak field strength; GLEY 4/10Y (Dark Greenish Gray); fine-grained texture; massive structure; highly decomposed; slightly disintegrated; moderately fractured.		133-153': Slotted PVC (20-slot) Screen
										134-136.7': SHALE; moderate field strength, weak at weathered bedding plane; GLEY 5/10Y (Greenish Gray); fine-grained texture; thinly bedded; slightly decomposed, moderately decomposed at bedded intervals; slightly disintegrated, moderately desintegrated at bedded intervals, iron staining; slightly fractured.		
14	RC	139.0	144.0		45	NR	140			136.7-139': SHALE, weathered; weak field strength; 5YR 3/3 (Dark Reddish Brown); fine-grained texture; massive structure; highly decomposed; moderately to intensely disintegrated with mottling, iron staining, and 20% 3-5 mm calcite nodules; moderately fractured.		
15	RC	144.0	154.0		120	NR	145			139-144': SHALE, weathered; weak field strength; 5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; highly decomposed; intensely disintegrated with calcite nodules (10% from 139-139.5' bgs, 2% from 139.5-144' bgs); moderately to intensely fractured, clay and silt-filled, mechanical breaks.		
										144-154': SHALE, weathered; weak field strength; 5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; highly decomposed; intensely disintegrated with 2 cm-thick calcite veins at 152.4', 152.6', and		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807B** DATE **1/11/19** SHEET **7** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	RC	144.0	154.0		120	NR				153.6' bgs; moderately to intensely fractured, slickenslides, mechanical breaks.		
16	RC	154.0	164.0		120	NR	155			154-160.7': SHALE, weathered; weak field strength; 5YR 3/4 (Dark Reddish Brown); fine-grained texture; massive structure; highly decomposed; moderately disintegrated, mottled, clay-fileld fractures; moderately fractured, mechanical breaks.		
							160			160.7-164': SANDSTONE; strong field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated, no calcite reactivity; slightly fractured, clay-filled vertical fractures from 162.1-162.5' bgs.		
17	RC	164.0	174.0		118	NR	165			164-169.1': SANDSTONE; strong field strength; 5YR 3/4 (Dark Reddish Brown); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
							170			169.1-174': SHALE; moderate field strength; GLEY 4/N (Dark Gray); fine-grained texture; massive structure; slightly decomposed, moderately decomposed at bedded intervals; moderately disintegrated, mottling, calcite deposits in bedded intervals and fractures, 3%3-5 mm calcite nodules below 1 foot; moderately fractured, clay-filled, slickenslides from 169.1-170.1' bgs.		
18	RC	174.0	184.0		120	NR	175			174-184': SHALE; moderate field strength; GLEY 4/N (Dark Gray); fine-grained texture; massive structure; slightly decomposed, moderately decomposed at bedded intervals;		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807B** DATE **1/11/19** SHEET **8** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
18	RC	174.0	184.0		120	NR				intensely disintegrated, mottling and intense calcite deposits within mottling at 182.6' bgs; moderately fractured, clay-filled, slickenslides, mechanical breaks.		
19	RC	184.0	194.0		120	48	180			184-186.7': SHALE; moderate field strength, becoming strong towards 186.7' bgs; GLEY 4/N (Dark Gray); fine-grained texture, becoming sandy; massive structure grading to thin beds; slightly decomposed; slightly disintegrated; slightly fractured, clay-filled.		
							185			186.7-189.3': SANDSTONE; strong field strength; GLEY 4/N (Dark Gray); fine-grained texture; thinly bedded; slightly decomposed; moderately disintegrated with calcite deposits in light colored layers; moderately fractured, large vertical fracture from 186.7-189.3' bgs.		
							190			189.3-191.7': Interbedded SHALE and SANDSTONE; strong to moderate field strength; 5YR 3/4 (Dark Reddish Brown) and GLEY 4/N (Dark Gray); fine-grained texture; massive structure grading to thin beds; moderately decomposed; moderately disintegrated, 5% 3-5 mm calcite nodules in Shale and bedding contacts; moderately fractured, clay-filled.		
20	RC	194.0	204.0		112	NR	195			191.7-194': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine-grained texture, micaceous; thinly bedded; fresh; slightly disintegrated, slight acid reaction to HCl starting at 192.7' bgs; unfractured.		
										194-200.2': SANDSTONE; strong field strength; GLEY 6/N (Gray); fine- to medium-grained texture interbedded; thinly bedded; fresh; slightly to moderately disintegrated, light colored medium-grained layers contain calcite deposits, cross-bedding calcite deposits; unfractured.		
							200			200.2-204': Interbedded SHALE; strong field strength in sandy gray Shale, moderate field strength in red Shale bedding planes; GLEY 4/N (Dark Gray) and 5YR 3/4 (Dark Reddish		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1807B** DATE **1/11/19** SHEET **9** OF **9**

PROJECT **Amos Fly Ash Pond** BORING START **5/15/18** BORING FINISH **5/16/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
20	RC	194.0	204.0		112	NR				Brown); fine-grained texture; thinly bedded; moderately decomposed within red Shale bedded intervals; slightly disintegrated, calcite in thin layers and small nodules; unfractured.		
							205					
							210					
							215					
							220					
							225					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 530,578.0 E 1,723,313.9**

GROUND ELEVATION **857.6** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 82.3	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1808A** DATE **1/11/19** SHEET **1** OF **5**

BORING START **4/17/18** BORING FINISH **4/19/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.98** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **84.2** BOTTOM **109.2**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	14.0		0				CL ML	0-14': No recovery - Silty CLAY overburden.		0-84.20': Riser
1	RC	14.0	19.0			NR	15			14-18.5': Interbedded gray SANDSTONE and SHALE; thinly bedded; weathered.		
										18.5-19': Gray, weathered SANDSTONE.		
2	RC	19.0	29.0		120	100				19-23.3': SANDSTONE; moderate to strong field strength; 10YR 4/4 (Dark Yellowish		

5 10

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808A** DATE **1/11/19** SHEET **2** OF **5**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
2	RC	19.0	29.0		120	100				Brown) from 19-20.5' bgs, 10YR 2/2 (Very Dark Brown) from 20.5-21.1' bgs, and GLEY 1 7/N (Light Gray) from 21.1-23.3' bgs; medium-grained texture; thinly bedded; moderately decomposed at color change contacts, fresh elsewhere; slightly disintegrated, iron staining at 23.3' bgs, strong calcite reaction to HCl at 21.1-23.3' bgs in light colored Sandstone; unfractured - all breaks mechanical.		
							25			23.3-36.9': SHALE with interbedded Sandstone; moderate field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh with zones of high decomposition at 26.9' bgs and slight to moderate decomposition at 27.4' bgs; slightly disintegrated; unfractured - all breaks mechanical.		
3	RC	29.0	39.0		120	25	30					98% drilling water return to surface
							35					
										36.9-43.9': Clayey SHALE; moderate field strength with weak field stength in some bedded intervals; 10R 4/3 (Weak Red); fine-grained texture; massive structure; moderately to highly decomposed, clayey; moderately disintegrated, high clacite reaction to HCl in light colored fragments and veins; unfractured, slicken slides at 30.3' and 30.6' bgs.		
4	RC	39.0	49.0			NR	40					
										43.9-51.8': SHALE; moderate field strength; 10R 4/3 (Weak Red) and GLEY 1 5/N (Gray) mottled; fine-grained texture; massive structure; moderately decomposed; moderately		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808A** DATE **1/11/19** SHEET **3** OF **5**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
4	RC	39.0	49.0			NR				disintegrated; unfractured.		
5	RC	49.0	59.0		120	NR	50			51.8-56.5': SHALE, Sandy Calcite beds; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly to moderately disintegrated, two large calcite channels; moderately fractured at 56.5' bgs.		
6	RC	59.0	69.0			NR	55			56.5-62.1': SHALE; moderate field strength; 10YR 4/2 (Weak Red) with gray and red mottling; fine-grained texture; massive structure; moderately decomposed; moderately disintegrated, mottled; moderately to intensely fractured, large vertical fracture from 56.5-58.5' bgs.		
							60			62.1-65.8': SHALE; moderate to weak field strength; 10YR 4/2 (Weak Red); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated; unfractured.		
							65			65.8-76.2': SHALE; strong to moderate field strength; GLEY 1 5/N (Gray); fine-grained texture with 3-5 cm calcite fragments; thinly bedded; slightly decomposed; moderately disintegrated, numerous calcite veins which react to HCl, iron staining; unfractured.		
7	RC	69.0	79.0			NR	70					70-80': Bentonite Seal

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808A** DATE **1/11/19** SHEET **4** OF **5**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
7	RC	69.0	79.0			NR	75			76.2-79': SANDSTONE; strong field strength; 10YR 7/2 (Pale Red); fine-grained texture; thinly bedded; fresh; competent with calcite mineralization at 76.2' bgs; moderately fractured, oval fracture with iron staining at 77.8' bgs, vertical fracture at 78.3' bgs.		
8	RC	79.0	89.0			NR	80			79-84.8': Interbedded SHALE and SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh to slightly decomposed; moderately disintegrated, calcite deposits in sandy beds; unfractured.		80-81': Secondary Sand Pack (Global #6) 81-111': Primary Sand Pack (Global #5)
							85			84.8-88.6': SHALE; moderate field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; moderately decomposed and moderately to highly decomposed from 87.2-88.6' bgs; slightly disintegrated, becoming moderately disintegrated at 87.2' bgs with mottling; slightly fractured, two vertical fractures at 86.8' bgs and 87' bgs.		84.20-109.20': Slotted PVC (20-slot) Screen
9	RC	89.0	99.0		120	100	90			88.6-101.5': SHALE; strong field strength; GLEY 1 3/10GY (Very Dark Greenish Gray); fine-grained texture; thinly bedded; slightly decomposed; moderately disintegrated, numerous calcite-filled veins; unfractured.		
							95					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808A** DATE **1/11/19** SHEET **5** OF **5**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	RC	89.0	99.0		120	100	100					
10	RC	99.0	109.0		120	NR	105			101.5-109.9': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent to slightly disintegrated with numerous calcite veins and deposits noted in lighter colored bedded intervals; fractured, four parallel vertical fractures with iron staining from 104.2-104.9' bgs.		
11	RC	109.0	119.0		120	20	110			109.9-112': SHALE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; slightly to moderately disintegrated, calcite veins; unfractured.		
							115					
							120					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 530,576.0 E 1,723,317.3**

GROUND ELEVATION **857.6** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 154.4	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1808B** DATE **1/11/19** SHEET **1** OF **7**

BORING START **4/17/18** BORING FINISH **4/19/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.47** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **138.5** BOTTOM **158.5**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	14.0		0				CL ML	0-14': No recovery - Silty CLAY overburden.		0-138.50': Riser
1	RC	14.0	19.0			NR				14-18.5': Interbedded gray SANDSTONE and SHALE; thinly bedded; weathered.		
										18.5-19': Gray, weathered SANDSTONE.		
2	RC	19.0	29.0		120	100				19-23.3': SANDSTONE; moderate to strong field strength; 10YR 4/4 (Dark Yellowish		

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10

15

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808B** DATE **1/11/19** SHEET **2** OF **7**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
2	RC	19.0	29.0		120	100				Brown) from 19-20.5' bgs, 10YR 2/2 (Very Dark Brown) from 20.5-21.1' bgs, and GLEY 1 7/N (Light Gray) from 21.1-23.3' bgs; medium-grained texture; thinly bedded; moderately decomposed at color change contacts, fresh elsewhere; slightly disintegrated, iron staining at 23.3' bgs, strong calcite reaction to HCl at 21.1-23.3' bgs in light colored Sandstone; unfractured - all breaks mechanical.		
							25			23.3-36.9': SHALE with interbedded Sandstone; moderate field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh with zones of high decomposition at 26.9' bgs and slight to moderate decomposition at 27.4' bgs; slightly disintegrated; unfractured - all breaks mechanical.		
3	RC	29.0	39.0		120	25	30					98% drilling water return to surface
							35					
										36.9-43.9': Clayey SHALE; moderate field strength with weak field stength in some bedded intervals; 10R 4/3 (Weak Red); fine-grained texture; massive structure; moderately to highly decomposed, clayey; moderately disintegrated, high clacite reaction to HCl in light colored fragments and veins; unfractured, slicken slides at 30.3' and 30.6' bgs.		
4	RC	39.0	49.0			NR	40					
										43.9-51.8': SHALE; moderate field strength; 10R 4/3 (Weak Red) and GLEY 1 5/N (Gray) mottled; fine-grained texture; massive structure; moderately decomposed; moderately		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808B** DATE **1/11/19** SHEET **3** OF **7**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
4	RC	39.0	49.0			NR				disintegrated; unfractured.		
5	RC	49.0	59.0		120	NR	50			51.8-56.5': SHALE, Sandy Calcite beds; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly to moderately disintegrated, two large calcite channels; moderately fractured at 56.5' bgs.		
6	RC	59.0	69.0			NR	55			56.5-62.1': SHALE; moderate field strength; 10YR 4/2 (Weak Red) with gray and red mottling; fine-grained texture; massive structure; moderately decomposed; moderately disintegrated, mottled; moderately to intensely fractured, large vertical fracture from 56.5-58.5' bgs.		
							60			62.1-65.8': SHALE; moderate to weak field strength; 10YR 4/2 (Weak Red); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated; unfractured.		
7	RC	69.0	79.0			NR	65			65.8-76.2': SHALE; strong to moderate field strength; GLEY 1 5/N (Gray); fine-grained texture with 3-5 cm calcite fragments; thinly bedded; slightly decomposed; moderately disintegrated, numerous calcite veins which react to HCl, iron staining; unfractured.		
							70					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808B** DATE **1/11/19** SHEET **4** OF **7**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
7	RC	69.0	79.0			NR	75			76.2-79': SANDSTONE; strong field strength; 10YR 7/2 (Pale Red); fine-grained texture; thinly bedded; fresh; competent with calcite mineralization at 76.2' bgs; moderately fractured, oval fracture with iron staining at 77.8' bgs, vertical fracture at 78.3' bgs.		
8	RC	79.0	89.0			NR	80			79-84.8': Interbedded SHALE and SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh to slightly decomposed; moderately disintegrated, calcite deposits in sandy beds; unfractured.		
							85			84.8-88.6': SHALE; moderate field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; moderately decomposed and moderately to highly decomposed from 87.2-88.6' bgs; slightly disintegrated, becoming moderately disintegrated at 87.2' bgs with mottling; slightly fractured, two vertical fractures at 86.8' bgs and 87' bgs.		
9	RC	89.0	99.0		120	100	90			88.6-101.5': SHALE; strong field strength; GLEY 1 3/10GY (Very Dark Greenish Gray); fine-grained texture; thinly bedded; slightly decomposed; moderately disintegrated, numerous calcite-filled veins; unfractured.		
							95					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808B** DATE **1/11/19** SHEET **5** OF **7**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	RC	89.0	99.0		120	100						
10	RC	99.0	109.0		120	NR	100					
										101.5-109.9': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent to slightly disintegrated with numerous calcite veins and deposits noted in lighter colored bedded intervals; fractured, four parallel vertical fractures with iron staining from 104.2-104.9' bgs.		
11	RC	109.0	119.0		120	20	105					
							110			109.9-112.1': SHALE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; slightly to moderately disintegrated, calcite veins; unfractured.		
										112.1-113.9': SANDSTONE; moderately field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated with calcite veins from 115.4-116.8' bgs; fractured, large vertical fracture from 112.1-113.9' bgs through the Sandstone.		
							115			113.9-119': SHALE; moderate to weak field strength; 2.5YR 4/3 (Reddish Brown); fine-grained texture; massive structure; moderately decomposed at bedded intervals; moderately disintegrated, mottling from 116.8-119' bgs, calcite veins from 119-120.8' bgs; slightly fractured, vertical fracture at 115.4' bgs.		
12	RC	119.0	129.0		120	NR						
							120			113.9-120.8': SHALE; strong field strength; 2.5YR 4/3 (Reddish Brown); fine-grained texture; massive structure; moderately decomposed, mottling; moderately disintegrated, calcite veins; slightly fractured.		
										120.8-123.5': SHALE with Sandstone beds; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; slightly fractured, vertical fractures at 120.9' and 121.2' bgs.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808B** DATE **1/11/19** SHEET **6** OF **7**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
12	RC	119.0	129.0		120	NR	125			123.5-127.4': SHALE; strong field strength; 2.5YR 3/3 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated, mottling; unfractured.		
										127.4-129': Sandy SHALE; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded; fresh; sightly disintegrated; unfractured.		
13	RC	129.0	139.0		120	23	130			129-130.8': Sandy SHALE; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
										130.8-137.2': SHALE; strong field strength; interbedded GLEY 5/N (Gray) and 2.5YR 3/3 (Dark Reddish Brown); fine-grained texture; thinly bedded; fresh; slightly disintegrated; slightly to moderately fractured at 137.2' bgs.		131-134': Bentonite Seal
							135					134-135': Secondary Sand Pack (Global #6) 135-165': Primary Sand Pack (Global #5)
										137.2-139.9': SHALE with Limestone fragments; moderate field strength; GLEY 1 3/10GY (Very Dark Greenish Gray); fine-grained texture; thinly bedded; moderately decomposed; slightly to moderately disintegrated; moderately fractured, several fractures from 136.3-137.2' bgs.		138.50-158.50': Slotted PVC (20-slot) Screen
14	RC	139.0	149.0		120	33	140			139.9-163.2': SHALE; moderate field strength; 2.5YR 3/6 (Dark Red); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated, mottling, clay/silt-filled fractures; moderately fractured.		
							145					
15	RC	149.0	159.0		120	74						

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808B** DATE **1/11/19** SHEET **7** OF **7**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	RC	149.0	159.0		120	74						
16	RC	159.0	169.0		120	20						
							155					
							160					
							165			163.2-165': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated, calcite in light colored bedded intervals; moderately fractured.		
							170					
							175					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 530,573.8 E 1,723,321.9**

GROUND ELEVATION **857.5** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 168.9	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1808C** DATE **1/11/19** SHEET **1** OF **12**

BORING START **4/17/18** BORING FINISH **4/19/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.99** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **215** BOTTOM **240**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	14.0		0		5 10		CL ML	0-14': No recovery - Silty CLAY overburden.		0-215': Riser
1	RC	14.0	19.0			NR	15			14-18.5': Interbedded gray SANDSTONE and SHALE; thinly bedded; weathered.		
										18.5-19': Gray, weathered SANDSTONE.		
2	RC	19.0	29.0		120	100				19-23.3': SANDSTONE; moderate to strong field strength; 10YR 4/4 (Dark Yellowish		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808C** DATE **1/11/19** SHEET **2** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
2	RC	19.0	29.0		120	100				Brown) from 19-20.5' bgs, 10YR 2/2 (Very Dark Brown) from 20.5-21.1' bgs, and GLEY 1 7/N (Light Gray) from 21.1-23.3' bgs; medium-grained texture; thinly bedded; moderately decomposed at color change contacts, fresh elsewhere; slightly disintegrated, iron staining at 23.3' bgs, strong calcite reaction to HCl at 21.1-23.3' bgs in light colored Sandstone; unfractured - all breaks mechanical.		
							25			23.3-36.9': SHALE with interbedded Sandstone; moderate field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh with zones of high decomposition at 26.9' bgs and slight to moderate decomposition at 27.4' bgs; slightly disintegrated; unfractured - all breaks mechanical.		
3	RC	29.0	39.0		120	25	30					98% drilling water return to surface
							35					
										36.9-43.9': Clayey SHALE; moderate field strength with weak field stength in some bedded intervals; 10R 4/3 (Weak Red); fine-grained texture; massive structure; moderately to highly decomposed, clayey; moderately disintegrated, high clacite reaction to HCl in light colored fragments and veins; unfractured, slicken slides at 30.3' and 30.6' bgs.		
4	RC	39.0	49.0			NR	40					
										43.9-51.8': SHALE; moderate field strength; 10R 4/3 (Weak Red) and GLEY 1 5/N (Gray) mottled; fine-grained texture; massive structure; moderately decomposed; moderately		
							45					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808C** DATE **1/11/19** SHEET **3** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
4	RC	39.0	49.0			NR				disintegrated; unfractured.		
5	RC	49.0	59.0		120	NR	50			51.8-56.5': SHALE, Sandy Calcite beds; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly to moderately disintegrated, two large calcite channels; moderately fractured at 56.5' bgs.		
6	RC	59.0	69.0			NR	55			56.5-62.1': SHALE; moderate field strength; 10YR 4/2 (Weak Red) with gray and red mottling; fine-grained texture; massive structure; moderately decomposed; moderately disintegrated, mottled; moderately to intensely fractured, large vertical fracture from 56.5-58.5' bgs.		
							60			62.1-65.8': SHALE; moderate to weak field strength; 10YR 4/2 (Weak Red); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated; unfractured.		
7	RC	69.0	79.0			NR	65			65.8-76.2': SHALE; strong to moderate field strength; GLEY 1 5/N (Gray); fine-grained texture with 3-5 cm calcite fragments; thinly bedded; slightly decomposed; moderately disintegrated, numerous calcite veins which react to HCl, iron staining; unfractured.		
							70					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808C** DATE **1/11/19** SHEET **4** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
7	RC	69.0	79.0			NR	75			76.2-79': SANDSTONE; strong field strength; 10YR 7/2 (Pale Red); fine-grained texture; thinly bedded; fresh; competent with calcite mineralization at 76.2' bgs; moderately fractured, oval fracture with iron staining at 77.8' bgs, vertical fracture at 78.3' bgs.		
8	RC	79.0	89.0			NR	80			79-84.8': Interbedded SHALE and SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh to slightly decomposed; moderately disintegrated, calcite deposits in sandy beds; unfractured.		
							85			84.8-88.6': SHALE; moderate field strength; GLEY 1 3/N (Very Dark Gray); fine-grained texture; thinly bedded; moderately decomposed and moderately to highly decomposed from 87.2-88.6' bgs; slightly disintegrated, becoming moderately disintegrated at 87.2' bgs with mottling; slightly fractured, two vertical fractures at 86.8' bgs and 87' bgs.		
9	RC	89.0	99.0		120	100	90			88.6-101.5': SHALE; strong field strength; GLEY 1 3/10GY (Very Dark Greenish Gray); fine-grained texture; thinly bedded; slightly decomposed; moderately disintegrated, numerous calcite-filled veins; unfractured.		
							95					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808C** DATE **1/11/19** SHEET **5** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	RC	89.0	99.0		120	100						
10	RC	99.0	109.0		120	NR	100					
										101.5-109.9': SANDSTONE; very strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent to slightly disintegrated with numerous calcite veins and deposits noted in lighter colored bedded intervals; fractured, four parallel vertical fractures with iron staining from 104.2-104.9' bgs.		
11	RC	109.0	119.0		120	20	105					
							110			109.9-112.1': SHALE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; slightly to moderately disintegrated, calcite veins; unfractured.		
										112.1-113.9': SANDSTONE; moderately field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated with calcite veins from 115.4-116.8' bgs; fractured, large vertical fracture from 112.1-113.9' bgs through the Sandstone.		
							115			113.9-119': SHALE; moderate to weak field strength; 2.5YR 4/3 (Reddish Brown); fine-grained texture; massive structure; moderately decomposed at bedded intervals; moderately disintegrated, mottling from 116.8-119' bgs, calcite veins from 119-120.8' bgs; slightly fractured, vertical fracture at 115.4' bgs.		
12	RC	119.0	129.0		120	NR				113.9-120.8': SHALE; strong field strength; 2.5YR 4/3 (Reddish Brown); fine-grained texture; massive structure; moderately decomposed, mottling; moderately disintegrated, calcite veins; slightly fractured.		
							120			120.8-123.5': SHALE with Sandstone beds; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; slightly fractured, vertical fractures at 120.9' and 121.2' bgs.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808C** DATE **1/11/19** SHEET **6** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
12	RC	119.0	129.0		120	NR	125			123.5-127.4': SHALE; strong field strength; 2.5YR 3/3 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately decomposed; slightly disintegrated, mottling; unfractured.		
										127.4-129': Sandy SHALE; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded; fresh; sightly disintegrated; unfractured.		
13	RC	129.0	139.0		120	23	130			129-130.8': Sandy SHALE; strong field strength; GLEY 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
										130.8-137.2': SHALE; strong field strength; interbedded GLEY 5/N (Gray) and 2.5YR 3/3 (Dark Reddish Brown); fine-grained texture; thinly bedded; fresh; slightly disintegrated; slightly to moderately fractured at 137.2' bgs.		
							135					
										137.2-139.9': SHALE with Limestone fragments; moderate field strength; GLEY 1 3/10GY (Very Dark Greenish Gray); fine-grained texture; thinly bedded; moderately decomposed; slightly to moderately disintegrated; moderately fractured, several fractures from 136.3-137.2' bgs.		
14	RC	139.0	149.0		120	33	140			139.9-163.2': SHALE; moderate field strength; 2.5YR 3/6 (Dark Red); fine-grained texture; massive structure; moderately to highly decomposed; moderately disintegrated, mottling, clay/silt-filled fractures; moderately fractured.		
							145					
15	RC	149.0	159.0		120	74						

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808C** DATE **1/11/19** SHEET **7** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	RC	149.0	159.0		120	74	155					
16	RC	159.0	169.0		120	20	160					
							165			163.2-171.1': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated, calcite in light colored bedded intervals from 165.7-167.1' bgs; moderately fractured.		
17	RC	169.0	179.0		120	36	170					
							175			171.4-179': SHALE; moderate field strength; 2.5YR 3/6 (Dark Red); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated; moderately fractured.		

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808C** DATE **1/11/19** SHEET **8** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
17	RC	169.0	179.0		120	36						
18	RC	179.0	189.0		120	33	180			179-185': SHALE; strong to moderate field strength; 2.5YR 3/6 (Dark Red); fine-grained texture; massive structure; slightly decomposed; moderately disintegrated with mottling; moderately fractured.		
							185			185-186.3': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
										186.3-189': SHALE; strong to moderate field strength; 2.5YR 3/6 (Dark Red); fine-grained texture; massive structure; slightly decomposed; moderately disintegrated with mottling; moderately fractured.		
19	RC	189.0	199.0			NR	190			189-191.5': SHALE; strong field strength; 2.5YR 3/6 (Dark Red), grades to gray; fine-grained texture; massive structure; slightly decomposed; competent; unfractured.		
										191.5-199': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture, micaceous; thinly bedded; fresh; competent; unfractured.		
							195					
20	RC	199.0	209.0		120	100	200			199-210.3': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808C** DATE **1/11/19** SHEET **9** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
20	RC	199.0	209.0		120	100	205					208-211': Bentonite Seal
21	RC	209.0	219.0		120	100	210			210.3-216.9': Interbedded SHALE and SANDSTONE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		211-212': Secondary Sand Pack (Global #6) 212-242': Primary Sand Pack (Global #5)
							215			216.9-219': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); medium-grained texture; thinly bedded; fresh; competent; unfractured.		215-240': Slotted PVC (20-slot) Screen
22	RC	219.0	229.0		120	19	220			219-229': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); medium-grained texture; thinly bedded; fresh; competent; slightly fractured, one vertical fracture from 221-221.4' bgs.		
							225					

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LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808C** DATE **1/11/19** SHEET **10** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
22	RC	219.0	229.0		120	19						
23	RC	229.0	239.0			NR	230			229-239': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); medium-grained texture; thinly bedded; fresh; competent grading to moderately disintegrated, reactive calcite lenses from 237-239' bgs; unfractured.		
							235					
24	RC	239.0	249.0		120	34	240			239-241.9': Sandy SHALE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded; fresh; slightly disintegrated, calcite veins; unfractured.		
										241.9-244.2': SHALE; moderate field strength; 2.5YR 3/2 (Dusky Red); fine-grained texture; massive structure; moderately decomposed; moderately disintegrated; unfractured.		
							245			244.2-248.3': SHALE; moderate field strength; GLEY 1 3/5GY (Very Dark Greenish Gray); fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured.		
										248.3-249': SANDSTONE with Shale fragments; strong field strength; GLEY 1 8/N (White); fine-grained texture; thinly bedded with Shale fragments; fresh; competent; unfractured.		
25	RC	249.0	259.0		120	40	250			249-251.2': SHALE; strong field strength; GLEY 1 5/N (Gray); fine-grained texture; thinly bedded; fresh; competent; unfractured.		
										251.2-254.8': SHALE; moderate field strength with weak field strength in some bedding planes; 2.5YR 3/3 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808C** DATE **1/11/19** SHEET **11** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
25	RC	249.0	259.0		120	40	255			decomposed in bedded intervals; slightly disintegrated; unfractured. 254.8-259': SHALE; strong field strength; 10YR 3/3 (Dark Brown) mottled dark tan, red, and gray; fine-grained texture; massive structure with 2-3 cm calcite-limestone fragments and silt filled fractures; slightly decomposed; moderately disintegrated, mottled with calcite deposits around fractures; moderately fractured.		
26	RC	259.0	269.0		120	69	260			259-269': SHALE; moderate field strength; 10YR 3/3 (Dark Brown) mottled tan and gray changing to 2.5YR 3/3 (Dark Reddish Brown) mottled red at 262.1' bgs; fine-grained texture with trace 3-5 cm angular limestone fragments; massive structure; slightly to moderately decomposed; moderately disintegrated, mottled with silt/clay filled fractures and slicken slides; moderately fractured.		
27	RC	269.0	279.0		120	60	265			269-272.6': SHALE; moderate field strength; 2.5YR 3/3 (Dark Reddish Brown) mottled tan and gray; fine-grained texture; massive structure; slightly to moderately decomposed; moderately disintegrated, mottled with silt/clay filled fractures and slicken slides; moderately fractured.		
							270			272.6-279': SHALE; moderate to strong field strength, becomes less mottled and more sandy towards 279' bgs; GLEY 1 3/5GY (Very Dark Greenish Gray) with red mottling; fine-grained texture becoming sandy from 277.5-279' bgs; thinly bedded; slightly decomposed in some bedded intervals; slightly disintegrated; moderately fractured.		
28	RC	279.0	289.0		0	0	275			279-289': No return of drilling fluid.		Lost circulation fluid

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1808C** DATE **1/11/19** SHEET **12** OF **12**

PROJECT **Amos Fly Ash Pond** BORING START **4/17/18** BORING FINISH **4/19/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
28	RC	279.0	289.0		0	0	285					
							290					
							295					
							300					
							305					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 530,459.4 E 1,722,189.3**

GROUND ELEVATION **738.1** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 47.9	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1809A** DATE **1/11/19** SHEET **1** OF **6**

BORING START **3/1/18** BORING FINISH **3/2/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.03** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **57** BOTTOM **72**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	25.8		0		5 10 15		CL ML	0-25.8': No recovery - Silty CLAY overburden.		0-57': Riser

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1809A** DATE **1/11/19** SHEET **2** OF **6**

PROJECT **Amos Fly Ash Pond** BORING START **3/1/18** BORING FINISH **3/2/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	25.8		0							
							25					
1	RC	25.8	35.8		108	NR			CL	25.8-30.8': Unconsolidated CLAY; very weak field strength; 5YR 4/2 (Dark Reddish Gray); fine-grained texture; massive structure; highly decomposed; intensely disintegrated; very intensely fractured.		
							30			30.8-32.4': SHALE; moderate field strength; 5YR 5/2 (Reddish Gray); fine-grained texture; laminated structure; slightly decomposed; slightly disintegrated; unfractured.		
										32.4-33.8': SANDSTONE; strong field strength; GLEY 1 5/10GY (Greenish Gray); fine-grained texture; laminated structure; fresh; competent; unfractured.		
							35			33.8-38.3': SHALE; weak field strength; 5YR 3/2 (Dark Reddish Brown); fine-grained texture; laminated structure; moderately decomposed; moderately disintegrated; unfractured.		
2	RC	35.8	45.8		114	95						
							40			38.3-43.8': SANDSTONE; strong field strength; GLEY 1 4/5G_/1 (Grayish Green); fine-grained texture; thinly cross-bedded; fresh; competent; unfractured.		
										43.8-45.8': SHALE; weak field strength; 5YR 3/2 (Dark Reddish Brown); fine-grained texture; laminated structure; moderately decomposed; moderately disintegrated; unfractured.		
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1809A** DATE **1/11/19** SHEET **3** OF **6**

PROJECT **Amos Fly Ash Pond** BORING START **3/1/18** BORING FINISH **3/2/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	RC	45.8	55.8		84	NR				45.8-59.2': SHALE; weak field strength; 5YR 3/2 (Dark Reddish Brown); fine-grained texture; massive structure; highly decomposed; intensely disintegrated; slightly fractured.		
							50					48.60-52.60': Bentonite Seal
												56.60-54.40': Secondary Sand Pack (Global #6)
							55					54.40-74': Primary Sand Pack (Global #5)
4	RC	55.8	65.8		120	NR						57-72': Slotted PVC (20-slot) Screen
										59.2-65.8': SANDSTONE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; laminated structure with massive structure at 64' bgs; fresh; slightly disintegrated; slightly fractured - fracture at 64' bgs.		
							60					
							65					
5	RC	65.8	75.8		120	100				65.8-67': SANDSTONE; moderate field strength; GLEY 1 4/5G_/1 (Grayish Green); fine-grained texture; laminated structure; moderately decomposed; moderately disintegrated; unfractured.		
										67-69.5': SHALE; weak field strength; 5YR 3/4 (Dark Reddish Brown); fine-grained texture; laminated structure; highly decomposed; intensely disintegrated; unfractured.		
							70			69.5-75.8': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); fine-grained texture; thinly bedded with massive structure at 70.2-72.4' bgs; fresh; competent; unfractured.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1809A** DATE **1/11/19** SHEET **4** OF **6**

PROJECT **Amos Fly Ash Pond** BORING START **3/1/18** BORING FINISH **3/2/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	RC	65.8	75.8		120	100	75					
6	RC	75.8	85.8		120	100	80			75.8-77': SHALE; strong field strength; GLEY 1 4/N (Dark Gray); fine-grained texture; laminated structure - cross-bedded at contact; fresh; slightly disintegrated; unfractured. 77-85.8': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); interbedded medium and fine-grained texture; thinly bedded with both planar and cross-bedding; fresh; competent; unfractured.		
7	RC	85.8	95.8		120	100	85 90 95			85.8-93.5': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); interbedded medium and fine-grained texture with rare clasts; thinly bedded with both planar and cross-bedding; fresh; competent; unfractured. 93.5-93.8': SHALE; weak field strength; GLEY 1 4/10GY (Dark Greenish Gray); fine-grained texture; laminated structure; moderately decomposed; moderately disintegrated; unfractured.		
8	RC	95.8	105.8		120	100				93.8-95.8': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); interbedded medium and fine-grained texture with rare clasts; thinly bedded with both planar and cross-bedding; fresh; competent; unfractured.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1809A** DATE **1/11/19** SHEET **5** OF **6**

PROJECT **Amos Fly Ash Pond** BORING START **3/1/18** BORING FINISH **3/2/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
8	RC	95.8	105.8		120	100	100			95.8-100.8': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); interbedded medium and fine-grained texture; thinly bedded with both planar and cross-bedding; fresh; slightly decomposed with framboidal pyrite mineralization; unfractured.		
										100.8-105.8': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); medium-grained texture; massive structure to thinly bedded, uneven beds at 105' bgs; fresh; slightly decomposed with euhedral pyrite mineralization; unfractured.		
9	RC	105.8	115.8		120	100	105			105.8-115.8': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); medium-grained texture with fine-grained mud interbedded sparsely; thinly bedded with medium bedded mud at 105.8-107.8' bgs; fresh; competent; unfractured.		
10	RC	115.8	125.8			NR	110			115.8-123.3': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); medium-grained texture with fine-grained mud interbedded sparsely; medium bedded with thinly bedded mud at 117.8-118.8' bgs; fresh; slightly disintegrated with euhedral pyrite mineralization; unfractured.		
							115					
							120					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1809A** DATE **1/11/19** SHEET **6** OF **6**

PROJECT **Amos Fly Ash Pond** BORING START **3/1/18** BORING FINISH **3/2/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	RC	115.8	125.8			NR	125			123.3-125.8': SHALE; weak field strength; GLEY 1 4/5G_/2 (Grayish Green); fine-grained texture; laminated structure; moderately decomposed; moderately disintegrated; unfractured.		
							130					
							135					
							140					
							145					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power**

PROJECT **Amos Fly Ash Pond**

COORDINATES **N 530,152.2 E 1,723,192.4**

GROUND ELEVATION **735.3** SYSTEM **NAD83/NAVD88**

Water Level, ft	▽ 68.4	▼	▼
TIME			
DATE	7/18/2018		

BORING NO. **MW-1810A** DATE **1/11/19** SHEET **1** OF **6**

BORING START **2/26/18** BORING FINISH **2/27/18**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **3.07** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **60** BOTTOM **80**

WELL DEVELOPMENT **Surge/Purge** BACKFILL **Bentonite Grout**

FIELD PARTY **Zachary Racer (AEP)** RIG **Direct Circulation - Wireline Core**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
0	NR	0.0	8.2		0				CL ML	0-8.2': No recovery - Silty CLAY overburden.		0-60': Riser
1	RC	8.2	14.0		14	NR	5 10			8.2-8.6': WOOD 8.6-14': SANDSTONE; moderate field strength; GLEY 1 4/10Y (Dark Greenish Gray); fine-grained texture; thinly bedded; slightly decomposed; moderately disintegrated; unfractured (mechanical breaks).		
2	RC	14.0	24.0		12	NR	15		CL ML	14-18': Silty CLAY, unconsolidated; light brown with gray mottling.		
									CL ML	18-24': Silty CLAY, unconsolidated; red with tan mottling.		

TYPE OF CASING USED

X	NQ-2 ROCK CORE	
NA	6" x 3.25 HSA	
NA	9" x 6.25 HSA	
NA	HW CASING ADVANCER	4"
NA	NW CASING	3"
NA	SW CASING	6"
NA	AIR HAMMER	8"

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER **A. Gillespie**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1810A** DATE **1/11/19** SHEET **2** OF **6**

PROJECT **Amos Fly Ash Pond** BORING START **2/26/18** BORING FINISH **2/27/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
2	RC	14.0	24.0		12	NR						
0	NR	24.0	28.0		0		25			24-28': No recovery.		
3	RC	28.0	34.0		72	NR			CL ML	28-35.8': Silty CLAY, unconsolidated; weak field strength; red with tan and gray mottling.		
4	RC	34.0	44.0		120	83	30 35 40			35.8-40.6': SHALE; moderate field strength; 5YR 3/4 (Reddish Brown), red and gray-green; fine-grained texture; thinly bedded; slightly decomposed; slightly disintegrated; unfractured. 40.6-42.8': Shaley SANDSTONE; moderate field strength; GLEY 1 5/5GY (Greenish Gray); very fine-grained texture; thinly bedded at fracture; slightly decomposed; slightly disintegrated with mineralization in fracture; slightly fractured, fracture at 41.3' bgs. 42.8-44': SANDSTONE; moderate field strength; 5Y 4/2 (Olive Gray); fine-grained texture; thinly bedded at fracture; slightly decomposed; slightly disintegrated with mineralization in fracture; slightly fractured, fracture at 43.1' bgs.		
5	RC	44.0	54.0		120	NR	45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1810A** DATE **1/11/19** SHEET **3** OF **6**

PROJECT **Amos Fly Ash Pond** BORING START **2/26/18** BORING FINISH **2/27/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	RC	44.0	54.0		120	NR				44-46.7': SHALE; moderate field strength; 5Y 4/2 (Olive Gray); fine-grained texture; thinly bedded; moderately decomposed; moderately disintegrated; slightly fractured, possible high vertical fractures at 44.4-45.8' bgs. 46.7-54': SHALE; moderate to weak field strength; 5YR 3/2 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately to highly decomposed, highly decomposed zone at 51.6-52.8' bgs; moderately disintegrated; unfractured.		50-53': Bentonite Seal
							50					53-54': Secondary Sand Pack (Global #6)
6	RC	54.0	64.0		120	100				54-64': SHALE; moderate field strength; 5YR 3/2 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately decomposed, 5-10 mm thin bedding of moderate decomposition; moderately disintegrated in decomposition zones; unfractured.		54-82': Primary Sand Pack (Global #5)
							55					
							60					60-80': Slotted PVC (20-slot) Screen
7	RC	64.0	74.0		110.4	92				64-65': SHALE; moderate field strength; 5YR 3/2 (Dark Reddish Brown); fine-grained texture; thinly bedded; moderately decomposed; competent; unfractured. 65-74': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); fine-grained grading to medium-grained texture; thinly bedded; fresh; competent; unfractured.		
							65					
							70					

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AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1810A** DATE **1/11/19** SHEET **4** OF **6**

PROJECT **Amos Fly Ash Pond** BORING START **2/26/18** BORING FINISH **2/27/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
7	RC	64.0	74.0		110.4	92						
8	RC	74.0	84.0		120	100	75			74-89': SANDSTONE; very strong field strength; GLEY 1 5/N (Gray); medium-grained texture; thinly bedded with non-linear uneven bedded intervals at 83-84' and 87.5' bgs; fresh; competent; unfractured.		
9	RC	84.0	89.0		60	100	80					
10	RC	89.0	94.0		60	100	85			89-94': SANDSTONE; very strong to strong field strength; GLEY 1 6/N (Gray); medium-grained texture; thinly bedded (89-93' bgs) grading to massive structure at 93' bgs; fresh; competent; unfractured.		
11	RC	94.0	104.0		120	NR	90			94-104': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); medium-grained texture; massive structure 94-96' bgs with randomly aligned grains, thinly bedded at 96-104' bgs; fresh; competent; unfractured.		
							95					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1810A** DATE **1/11/19** SHEET **5** OF **6**

PROJECT **Amos Fly Ash Pond** BORING START **2/26/18** BORING FINISH **2/27/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
11	RC	94.0	104.0		120	NR	100					
12	RC	104.0	114.0		120	100	105			104-114': SANDSTONE; strong field strength; GLEY 1 5/N (Gray); medium-grained texture with fine-grained texture (1" clay bed) at 110' bgs; thinly bedded at 104-113' bgs (uneven bedding at 108' bgs, randomly oriented grains) and massive structure at 113-114' bgs; fresh; slightly disintegrated, iron mineralization at 113' bgs; unfractured.		
							110					
13	RC	114.0	124.0		120	100	115			114-117.8': SANDSTONE; strong field strength; GLEY 1 6/N (Gray); medium-grained texture; massive structure; fresh; competent; unfractured.		
							120			117.8-123': MUDSTONE; weak field strength; GLEY 1 2.5/N (Black) to 5YR 3/4 (Dark Reddish Brown) in iron oxidized zones; fine-grained texture; massive structure; moderately to highly decomposed; moderately to intensely disintegrated with iron oxidation; unfractured.		
										123-124': SHALE; strong field strength; GLEY 1 7/5GY (Light Greenish Gray); fine-grained		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

JOB NUMBER **WV015976.0005**

COMPANY **American Electric Power** BORING NO. **MW-1810A** DATE **1/11/19** SHEET **6** OF **6**

PROJECT **Amos Fly Ash Pond** BORING START **2/26/18** BORING FINISH **2/27/18**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET FROM	SAMPLE DEPTH IN FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	U S C S	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							125			texture; laminated structure; fresh; slightly disintegrated; unfractured.		
							130					
							135					
							140					
							145					

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ARCADIS

West Virginia Department of Environmental Protection, 2018

Monitoring Well Construction Approvals

MW-1801A/B/C to MW-1810

State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0001-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0001-18
Grid Location:
a. Latitude: 38 27 23 .0
b. Longitude: 81 50 45 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1801A

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

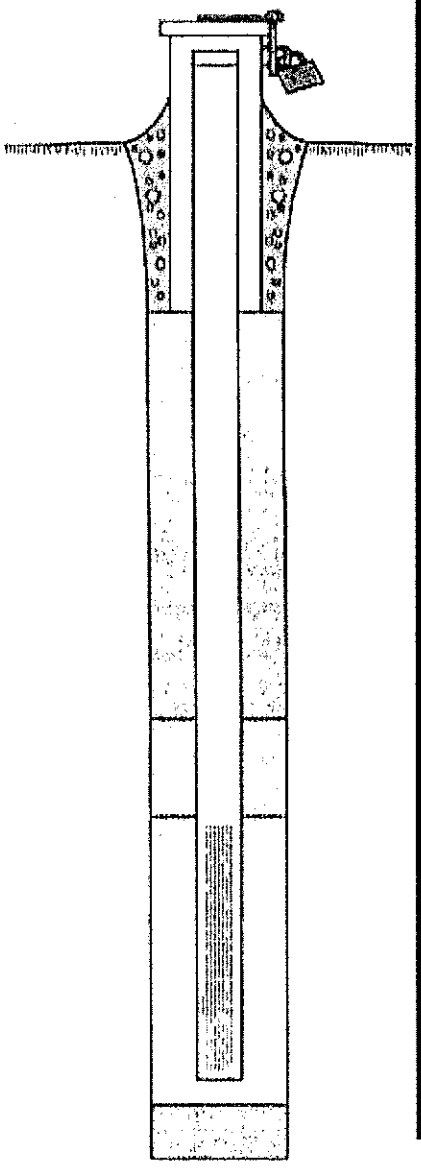
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 45 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 100 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 52 ft.
15.Depth to Top of Screen: 55.4 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 19.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 75 ft.
19.Bottom of Filter Pack: 77.1 ft.
20.Bottom of Borehole: 77.1 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



<< Return

Home | Log Out

State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0002-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0002-18
Grid Location:
a. Latitude: 38 27 23 .0
b. Longitude: 81 50 45 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1801B

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

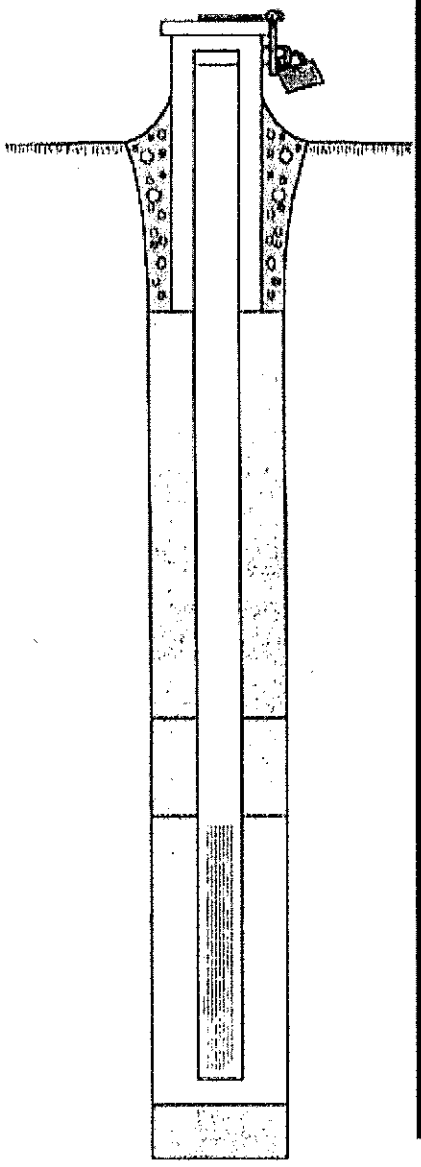
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 53 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 1250 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 194 ft.
15.Depth to Top of Screen: 198.4 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 24.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 223 ft.
19.Bottom of Filter Pack: 225 ft.
20.Bottom of Borehole: 225 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



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State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0003-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0003-18
Grid Location:
a. Latitude: 38 27 23 .0
b. Longitude: 81 50 45 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1801C

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

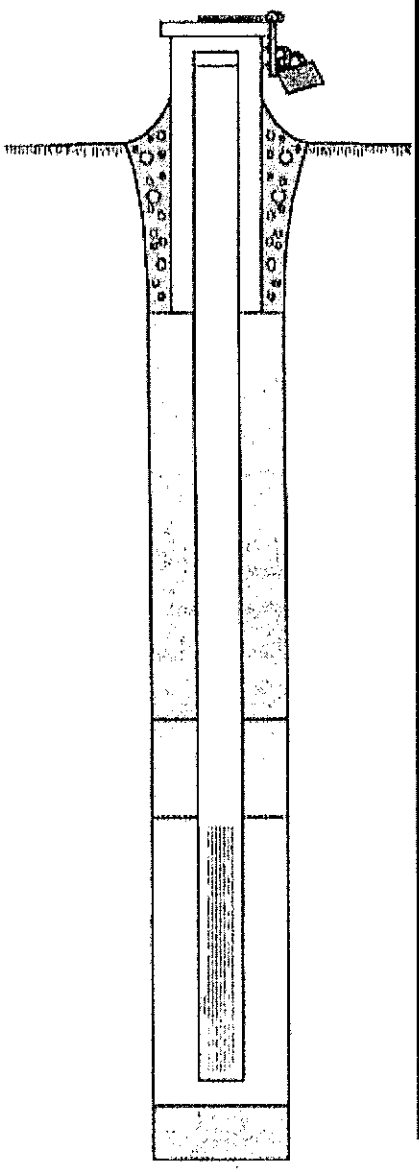
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1. Cap and Lock: YES
2. Protective Cover: Protective Cover Pipe
3. Monitoring Well Reference Point: 0 ft.
4. Borehole Diameter: 6 inches.
5. Ground Surface Seal:
   a. Material: bentonite-cement grout
   b. Installation Procedure: gravity
6. Surface Seal Bottom/Annular Space Top: 2 ft.
7. Well Riser: a. OD Well Riser: 2 inches. b. ID Well Riser: 1.98 inches.
   c. Material: PVC
   d. Installation Procedure: hand set
8. Annular Space Seal:
   a. Material: high solids grout -
   b. Installation Procedure: tremie pipe-pumped
9. Well Development Procedure: airlift -
10. Drilling Method Used: air rotary -
11. Annular Space Seal Bottom/Filter Seal Top: 194 ft.
12. Drilling Fluid Used: Yes Source: Water
13. Filter Pack Seal:
    a. Material: bentonite pellet
    b. Installation Procedure: Gravity Fed
    c. Volume Added: 550 pounds
14. Bottom of Bentonite Seal/Filter Pack Top: 234 ft.
15. Depth to Top of Screen: 237.4 ft.
16. Screen:
    a. Material: PVC
    b. Installation Procedure: hand set
    c. Slot Size: 0.02 inches. d. Screen Length: 24.6 ft.
17. Filter Pack:
    a. Material: fine sand
    b. Installation Procedure: gravity
18. Well Depth: 262 ft.
19. Bottom of Filter Pack: 264 ft.
20. Bottom of Borehole: 264 ft.
21. Backfill Material (below filter pack): N/A
22. Decontamination Procedures: Liqui-Nox w/high pressure water pump
23. Special Circumstances and Exceptions: No Variance Number:
24. WV Contractor License No



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State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0004-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0004-18
Grid Location:
a. Latitude: 38 27 41 .0
b. Longitude: 81 51 13 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1802A

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

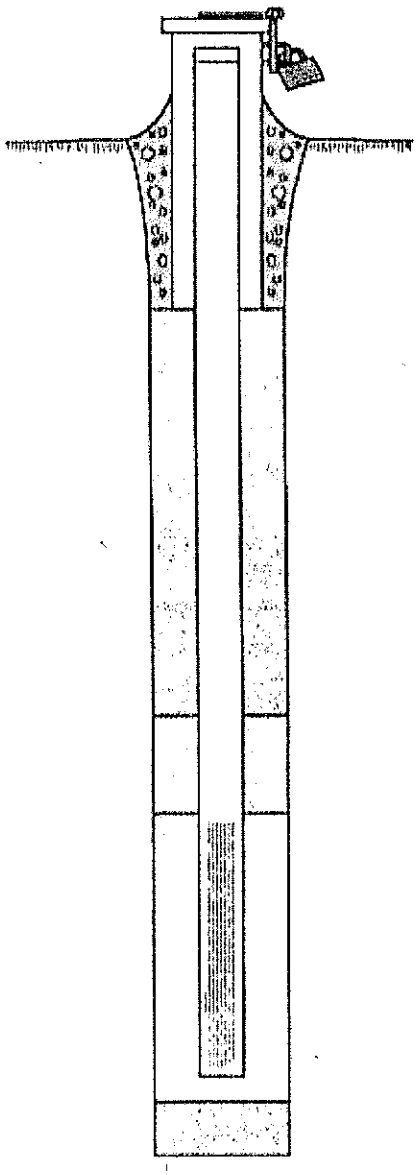
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 30 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 42 ft.
15.Depth to Top of Screen: 46.6 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 19.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 66 ft.
19.Bottom of Filter Pack: 67 ft.
20.Bottom of Borehole: 67 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0005-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0005-18
Grid Location:
a. Latitude: 38 27 41 .0
b. Longitude: 81 51 13 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1802B

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

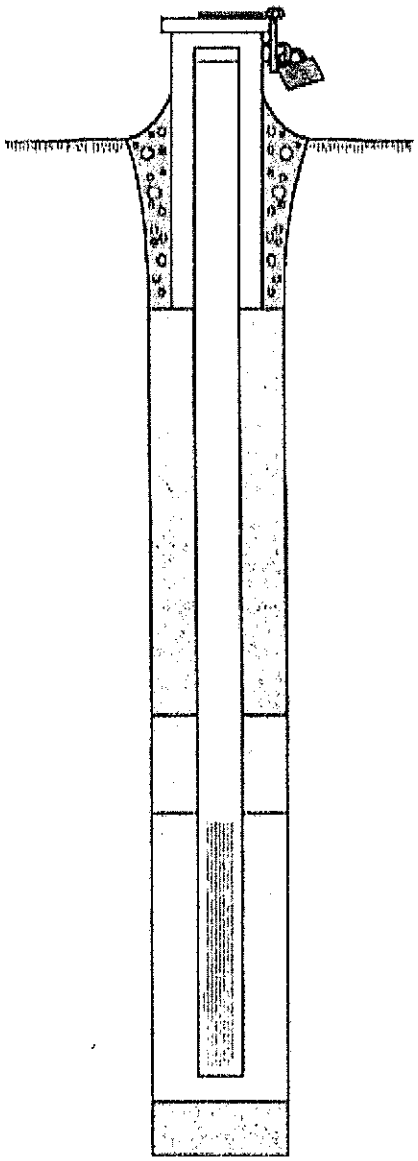
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 159.2 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 172.1 ft.
15.Depth to Top of Screen: 176.6 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 19.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 196 ft.
19.Bottom of Filter Pack: 198 ft.
20.Bottom of Borehole: 198 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0006-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0006-18
Grid Location:
a. Latitude: 38 27 41 .0
b. Longitude: 81 51 13 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1802C

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

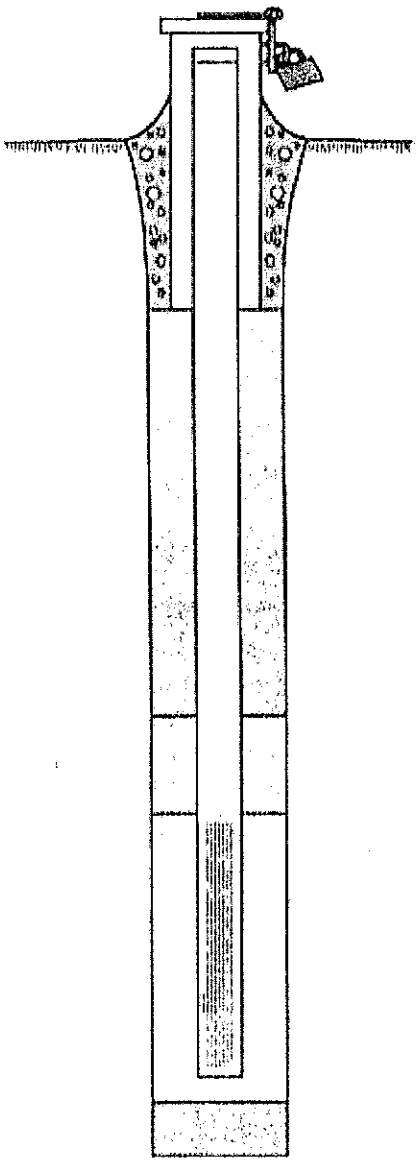
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 201 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 1000 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 249 ft.
15.Depth to Top of Screen: 253.6 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 19.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 273 ft.
19.Bottom of Filter Pack: 274.5 ft.
20.Bottom of Borehole: 274.5 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0007-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0007-18
Grid Location:
a. Latitude: 38 27 48 .0
b. Longitude: 81 51 15 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1803B

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

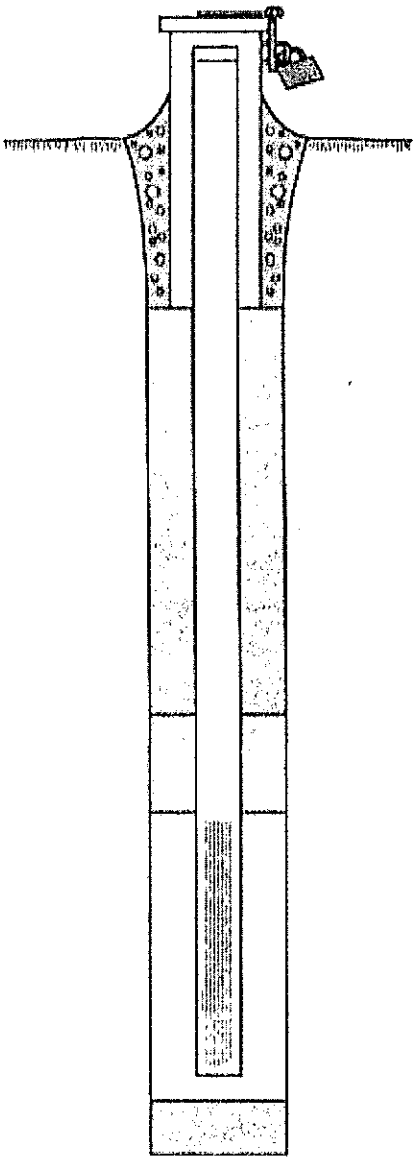
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 153 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 168 ft.
15.Depth to Top of Screen: 171.4 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 24.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 196 ft.
19.Bottom of Filter Pack: 197 ft.
20.Bottom of Borehole: 197 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0008-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0008-18
Grid Location:
a. Latitude: 38 27 48 .0
b. Longitude: 81 51 15 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1803C

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

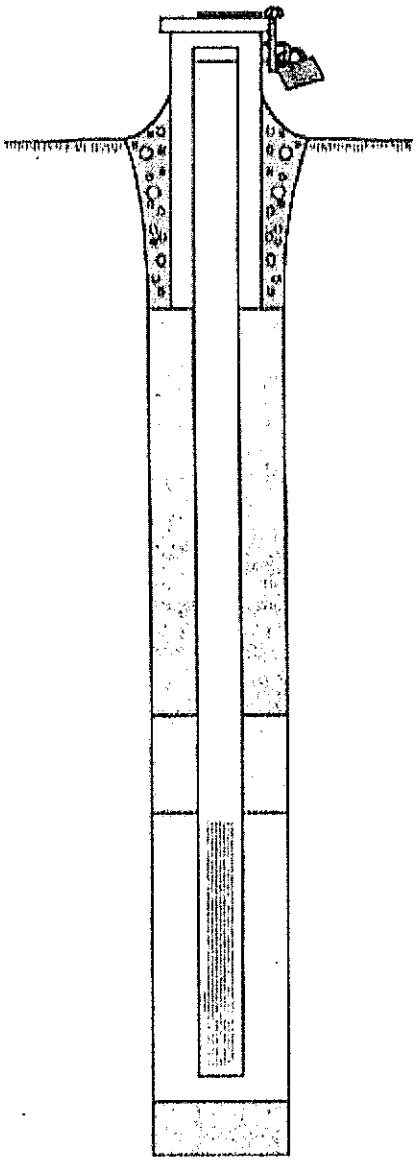
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 157 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 1200 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 250 ft.
15.Depth to Top of Screen: 253.6 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 19.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 273 ft.
19.Bottom of Filter Pack: 275 ft.
20.Bottom of Borehole: 275 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction

Well Number: WV00528-0001-19
Approved

Site Name/Physical Address:

Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0001-19
Grid Location:
a. Latitude: 38 27 42 .0
b. Longitude: 81 50 53 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1804A

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):

Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

Installed By (Name, Firm, Address):

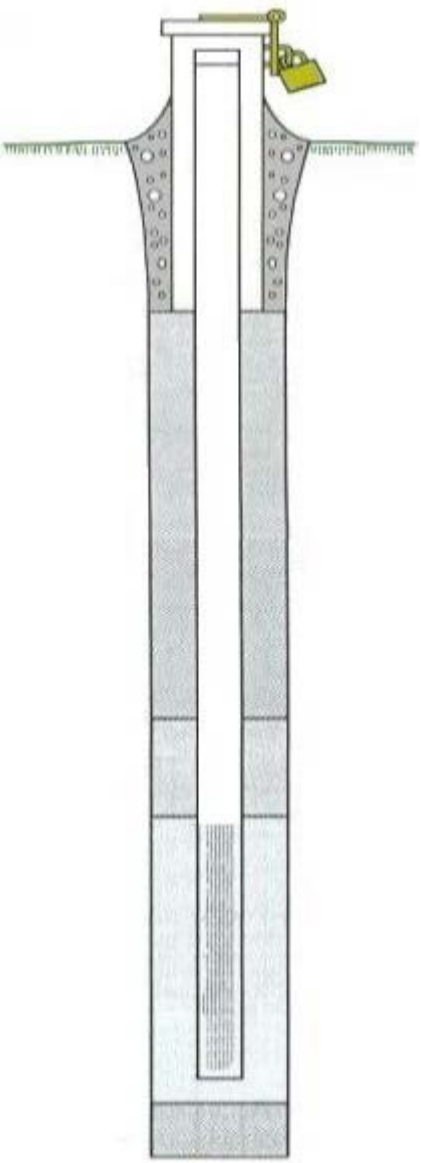
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
05/31/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock:	YES
2.Protective Cover:	Protective Cover Pipe
3.Monitoring Well Reference Point:	0 ft.
4.Borehole Diameter:	6 inches.
5.Ground Surface Seal:	
a.Material: bentonite-cement grout	
b.Installation Procedure: gravity	
6.Surface Seal Bottom/Annular Space Top:	2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.	
c.Material: PVC	
d.Installation Procedure: hand set	
8.Annular Space Seal:	
a.Material: high solids grout -	
b.Installation Procedure: tremie pipe-pumped	
9.Well Development Procedure: airlift -	
10.Drilling Method Used: air rotary -	
11.Annular Space Seal Bottom/Filter Seal Top:	7 ft.
12.Drilling Fluid Used: Yes Source: Water	
13.Filter Pack Seal:	
a.Material: bentonite pellet	
b.Installation Procedure: Gravity Fed	
c.Volume Added: 150 pounds	
14.Bottom of Bentonite Seal/Filter Pack Top:	18.9 ft.
15.Depth to Top of Screen:	27.9 ft.
16.Screen:	
a.Material: PVC	
b.Installation Procedure: hand set	
c.Slot Size: 0.02 inches. d.Screen Length: 19.6 ft.	
17.Filter Pack:	
a.Material: fine sand	
b.Installation Procedure: gravity	
18.Well Depth:	47.9 ft.
19.Bottom of Filter Pack:	49 ft.
20.Bottom of Borehole:	49 ft.
21.Backfill Material (below filter pack): N/A	
22.Decontamination Procedures: Liquid-Nox w/high pressure water pump	
23.Special Circumstances and Exceptions: No Variance Number:	
24.WV Contractor License No.	



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0009-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0009-18
Grid Location:
a. Latitude: 38 27 42 .0
b. Longitude: 81 50 53 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1804B

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

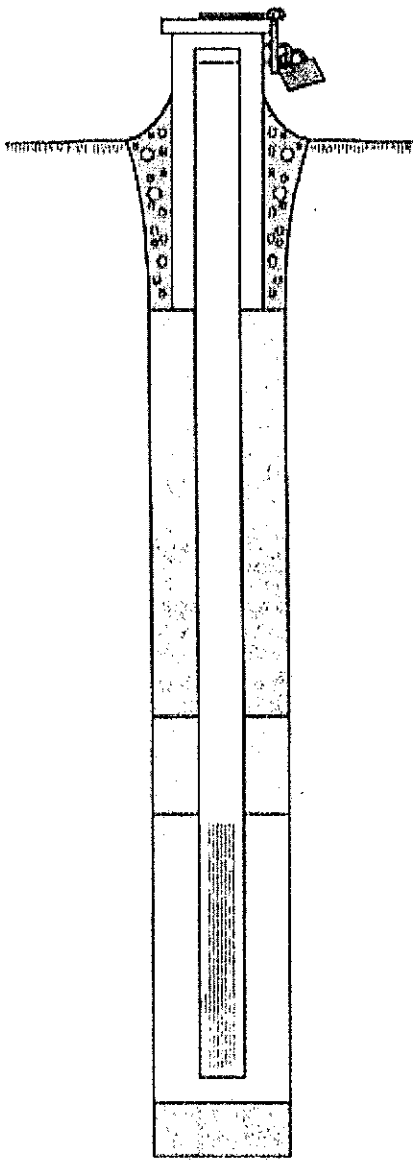
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 134 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 148.7 ft.
15.Depth to Top of Screen: 152.6 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 24.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 177 ft.
19.Bottom of Filter Pack: 180.4 ft.
20.Bottom of Borehole: 194.3 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0010-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0010-18
Grid Location:
a. Latitude: 38 27 41 .0
b. Longitude: 81 50 27 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1805B

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

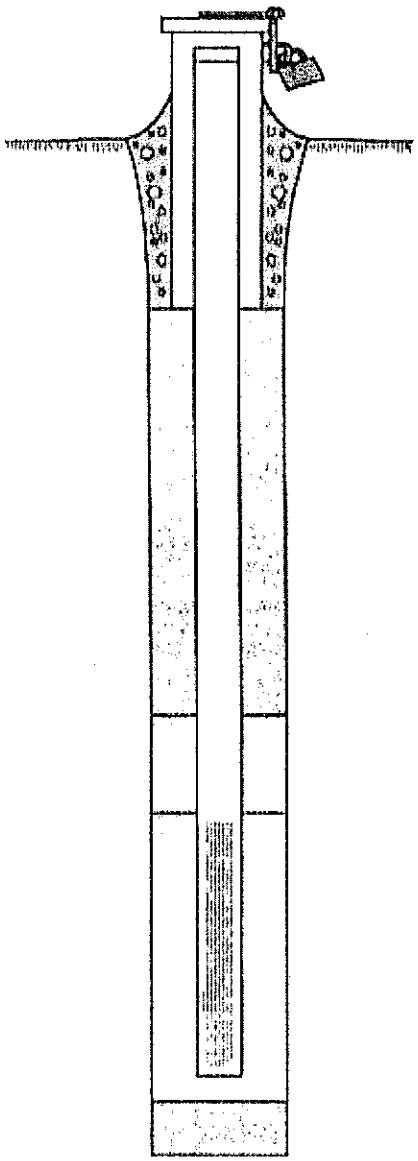
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 174 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 189 ft.
15.Depth to Top of Screen: 192.4 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 19.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 212 ft.
19.Bottom of Filter Pack: 214 ft.
20.Bottom of Borehole: 214 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0011-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0011-18
Grid Location:
a. Latitude: 38 27 41 .0
b. Longitude: 81 50 27 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1805C

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

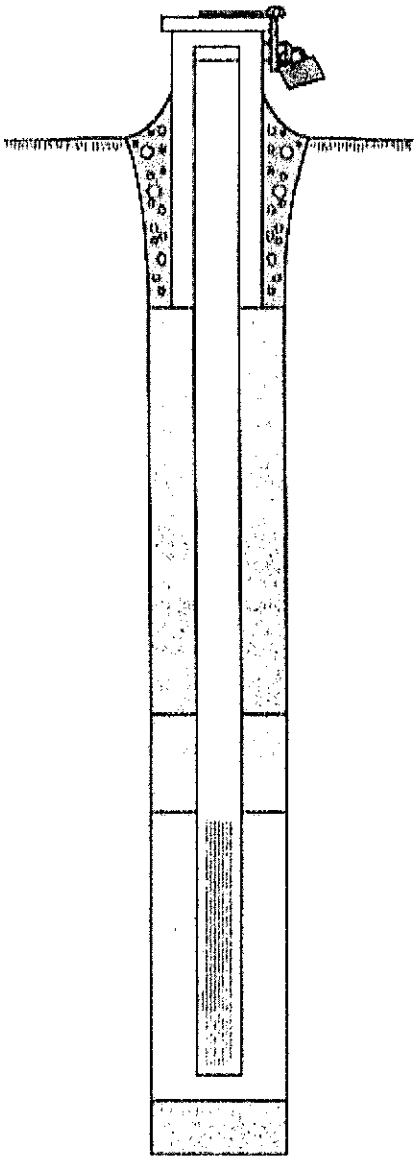
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 200 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 350 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 229 ft.
15.Depth to Top of Screen: 232.4 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 29.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 262 ft.
19.Bottom of Filter Pack: 264.5 ft.
20.Bottom of Borehole: 264.5 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0012-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0012-18
Grid Location:
a. Latitude: 38 27 36 .0
b. Longitude: 81 50 17 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1806A

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

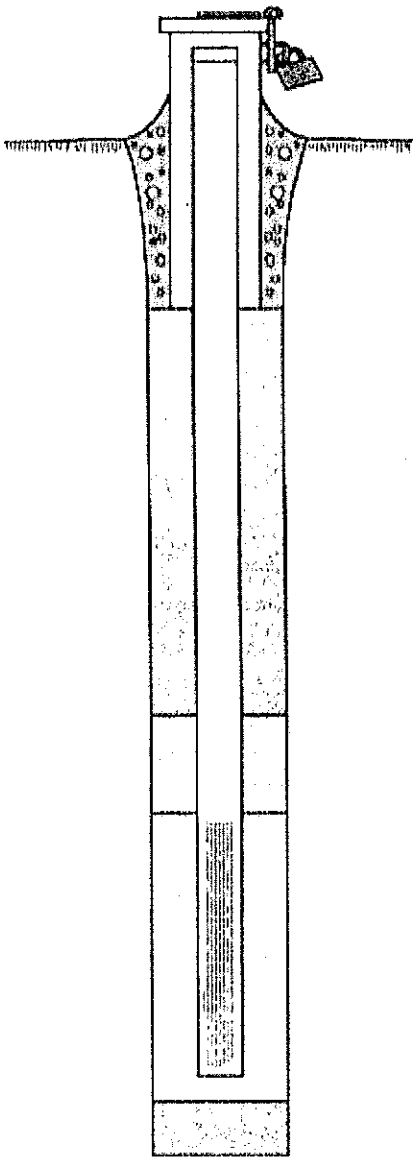
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 45 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 57 ft.
15.Depth to Top of Screen: 60.4 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 19.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 80 ft.
19.Bottom of Filter Pack: 81 ft.
20.Bottom of Borehole: 81 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0013-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0013-18
Grid Location:
a. Latitude: 38 27 36 .0
b. Longitude: 81 50 17 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1806B

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

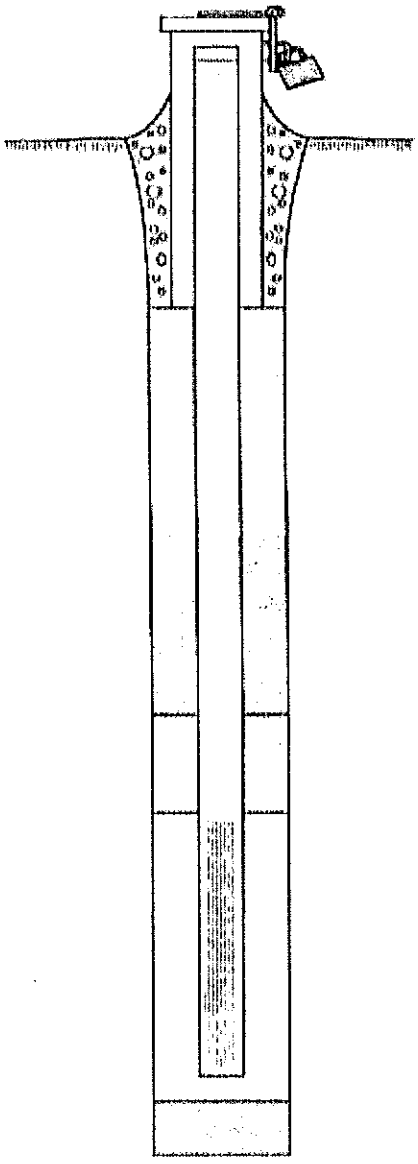
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 178.1 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 191.8 ft.
15.Depth to Top of Screen: 195.4 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 14.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 210 ft.
19.Bottom of Filter Pack: 211 ft.
20.Bottom of Borehole: 211 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction

Well Number: WV00629-1806-18

Site Name/Physical Address:

Site: American Electric Ash Pond
Line 1: Bills Creek Pond Road
Line 2: Bills Creek Pond Road
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00629-1806-18
Grid Location:
a. Latitude: 38 27 36 .0
b. Longitude: 81 50 17 .0
c. Method Used: Computer Mapped/Generated Coordinates

Company/Project Well No.:
MW-1806-C

Purpose of Monitoring Well:
DEP requirement for background monitoring

Well Owner (Name, Firm, Address):

Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

Installed By (Name, Firm, Address):

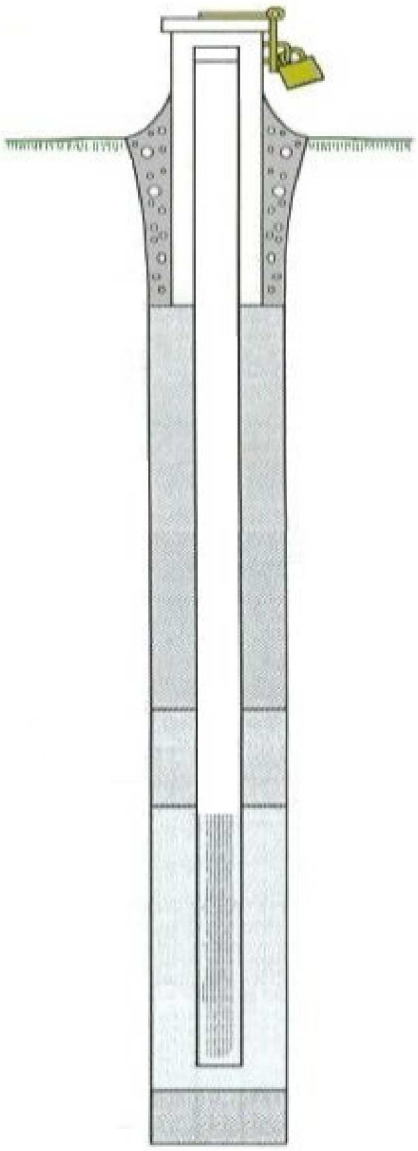
Installer: Larry Bartlett, DLZ Corp.
Line 1: 6121 Huntley Road
Line 2:
City: Columbus
State: OH
Zip: 43229-
Phone: 614-888-0040

Date Well Installed:
05/06/2018

Driller's WV Cert No.
WV00629

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: concrete
b.Installation Procedure: Hand Placed
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2.38 inches. b.ID Well Riser: 2 inches.
c.Material: PVC
d.Installation Procedure: Hand Set
8.Annular Space Seal:
a.Material: cement grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: mud rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 197 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 100 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 220 ft.
15.Depth to Top of Screen: 225 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: set by hand
c.Slot Size: 0.01 inches. d.Screen Length: 30 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: Gravity
18.Well Depth: 255 ft.
19.Bottom of Filter Pack: 255 ft.
20.Bottom of Borehole: 290.7 ft.
21.Backfill Material (below filter pack): #5 Sand
22.Decontamination Procedures: None
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction

Well Number: WV00629-1807-18
Approved

Site Name/Physical Address:
Site: American Electric Power Amos Ash Pond
Line 1: Bills Creek Pond Road
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00629-1807-18
Grid Location:
a. Latitude: 38 27 17 .0
b. Longitude: 81 51 33 .0
c. Method Used: Survey

Company/Project Well No.:
MW-1807A

Purpose of Monitoring Well:
Monitoring background conditions

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: WV
Zip: 25213-
Phone: 614-836-4200

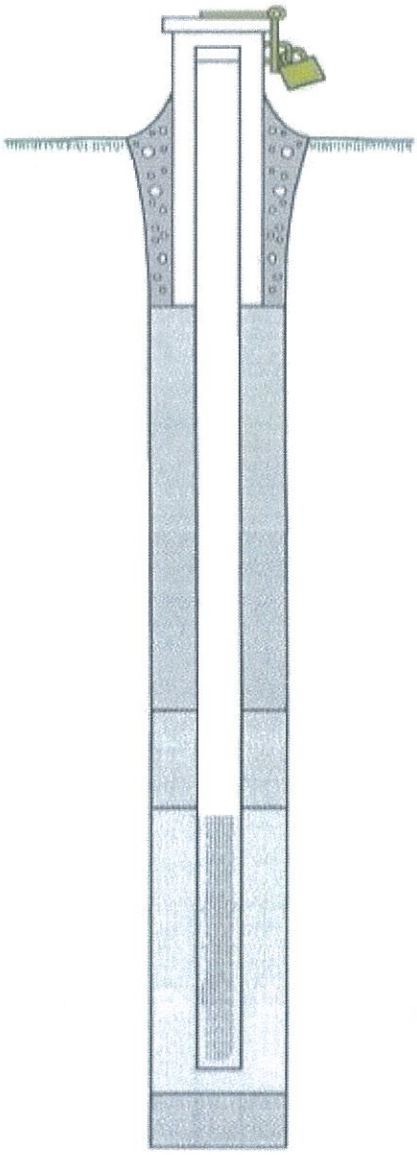
Installed By (Name, Firm, Address):
Installer: Larry Bartlett
Line 1: 6121 Huntley Road
Line 2:
City: Columbus
State: OH
Zip: 43229-
Phone: 614-888-0040

Date Well Installed:
05/29/2018

Driller's WV Cert No.
WV00629

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: concrete
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 3 ft.
7.Well Riser: a.OD Well Riser: 2.38 inches. b.ID Well Riser: 2 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: surge/purge -
10.Drilling Method Used: mud rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 88 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 50 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 91 ft.
15.Depth to Top of Screen: 95 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 20 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: Gravity
18.Well Depth: 115 ft.
19.Bottom of Filter Pack: 116 ft.
20.Bottom of Borehole: 116 ft.
21.Backfill Material (below filter pack): NA
22.Decontamination Procedures: High Pressure hot water
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction

Well Number: WV00629-0002-18
Approved

Site Name/Physical Address:
Site: American Electric Power Amos Ash Pond
Line 1: Bills Creek Pond Road
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00629-0002-18
Grid Location:
a. Latitude: 38 27 17 .0
b. Longitude: 81 51 32 .0
c. Method Used: Survey

Company/Project Well No.:
MW-1807B

Purpose of Monitoring Well:
Monitoring Background Conditions

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

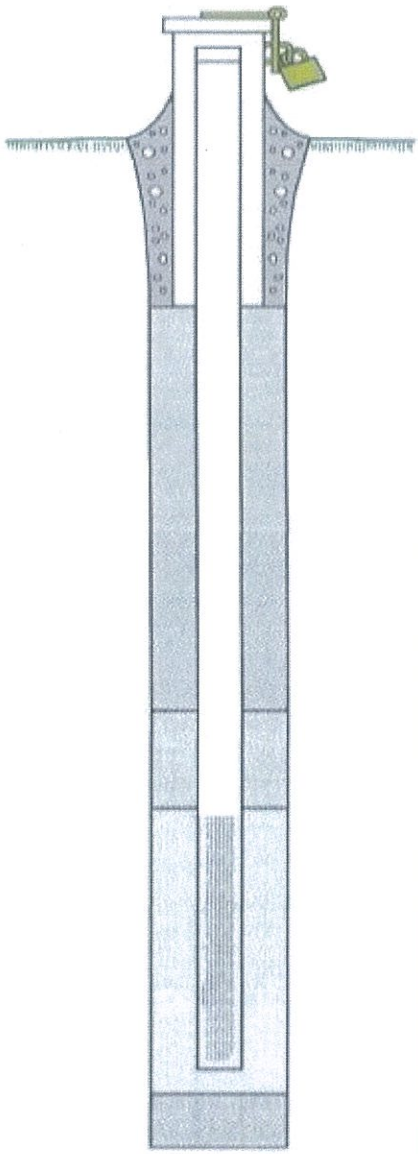
Installed By (Name, Firm, Address):
Installer: Larry Bartlett
Line 1: DLZ Corp.
Line 2:
City: Columbus
State: OH
Zip: 43229-
Phone: 614-888-0400

Date Well Installed:
06/01/2018

Driller's WV Cert No.
WV00629

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: concrete
b.Installation Procedure: tremie pipe pumped
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2.38 inches. b.ID Well Riser: 2 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: cement grout -
b.Installation Procedure: tremie pipe-gravity
9.Well Development Procedure: surge/purge -
10.Drilling Method Used: mud rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 126 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 50 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 129 ft.
15.Depth to Top of Screen: 133 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 20 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: Gravity
18.Well Depth: 153 ft.
19.Bottom of Filter Pack: 155.7 ft.
20.Bottom of Borehole: 155.7 ft.
21.Backfill Material (below filter pack): NA
22.Decontamination Procedures: High Pressure hot water
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction

Well Number: WV00629-0003-18
Approved

Site Name/Physical Address:
Site: American Electric Power Amos Ash Pond
Line 1: Bills Creek Pond Road
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00629-0003-18
Grid Location:
a. Latitude: 38 27 14 .0
b. Longitude: 81 51 22 .0
c. Method Used: Survey

Company/Project Well No.:
MW-1808A

Purpose of Monitoring Well:
monitoring background conditions

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

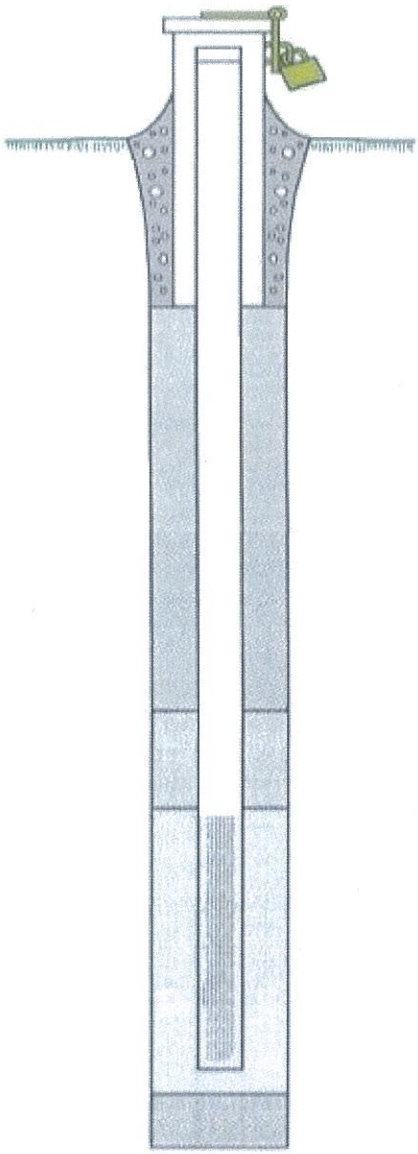
Installed By (Name, Firm, Address):
Installer: Larry Bartlett
Line 1: DLZ Corp
Line 2:
City: Columbus
State: OH
Zip: 43229-
Phone: 614-888-0400

Date Well Installed:
05/07/2018

Driller's WV Cert No.
WV00629

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: concrete
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 3 ft.
7.Well Riser: a.OD Well Riser: 2.38 inches. b.ID Well Riser: 2 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: cement grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: surge/purge -
10.Drilling Method Used: mud rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 70 ft.
12.Drilling Fluid Used: Yes Source: Air
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 150 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 80 ft.
15.Depth to Top of Screen: 84.2 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 25 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: Gravity
18.Well Depth: 109.2 ft.
19.Bottom of Filter Pack: 112.7 ft.
20.Bottom of Borehole: 112.7 ft.
21.Backfill Material (below filter pack): NA
22.Decontamination Procedures: High Pressure hot water
23.Special Circumstances and Exceptions: No Variance Number:



<< Return

Home | Log Out

State of West Virginia
Department of Environmental Protection

Monitoring Well Construction

Well Number: WV00629-0004-18
Approved

Site Name/Physical Address:
Site: American Electric Power Amos Ash Pond
Line 1: Bills Creek Pond Road
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00629-0004-18
Grid Location:
a. Latitude: 38 27 14 .0
b. Longitude: 81 51 22 .0
c. Method Used: Survey

Company/Project Well No.:
MW-1808B

Purpose of Monitoring Well:
Monitoring background conditions

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

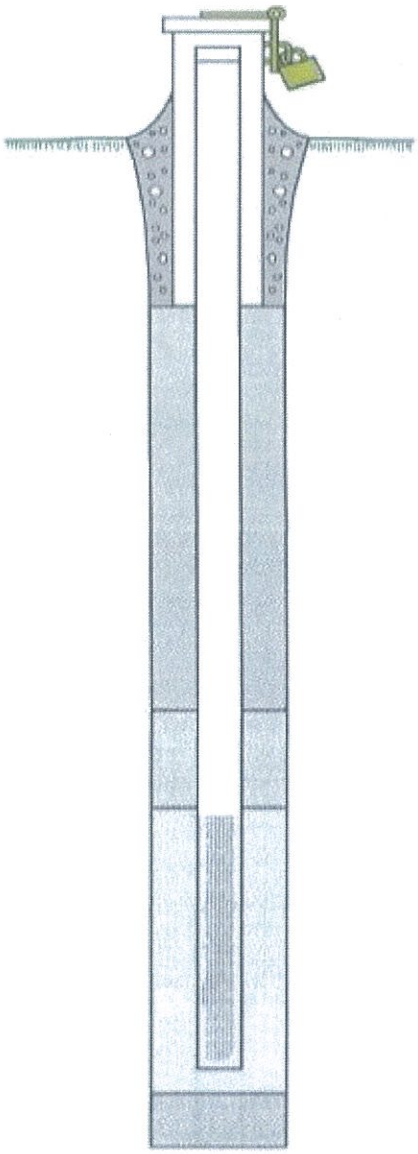
Installed By (Name, Firm, Address):
Installer: Larry Bartlett
Line 1: DLZ Corp
Line 2:
City: Columbus
State: OH
Zip: 43229-
Phone: 614-888-0400

Date Well Installed:
05/07/2018

Driller's WV Cert No.
WV00629

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: concrete
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 3 ft.
7.Well Riser: a.OD Well Riser: 2.38 inches. b.ID Well Riser: 2 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: cement grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: surge/purge -
10.Drilling Method Used: mud rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 131 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 100 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 134 ft.
15.Depth to Top of Screen: 138.5 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 20 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: Gravity
18.Well Depth: 158.5 ft.
19.Bottom of Filter Pack: 165 ft.
20.Bottom of Borehole: 165 ft.
21.Backfill Material (below filter pack): NA
22.Decontamination Procedures: High Pressure hot water
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction

Well Number: WV00629-0005-18
Approved

Site Name/Physical Address:
Site: American Electric Power Amos Ash Pond
Line 1: Bills Creek Pond Road
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00629-0005-18
Grid Location:
a. Latitude: 38 27 14 .0
b. Longitude: 81 51 22 .0
c. Method Used: Survey

Company/Project Well No.:
MW-1808C

Purpose of Monitoring Well:
Monitoring background conditions

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

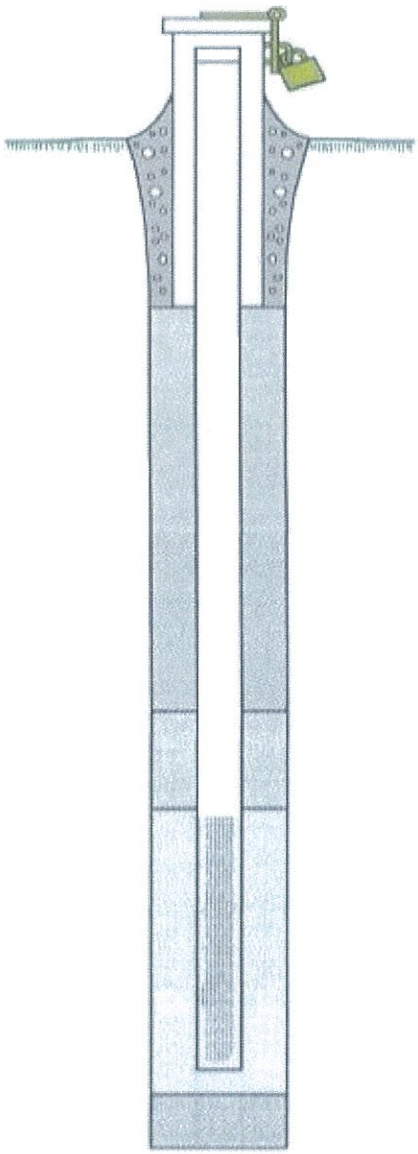
Installed By (Name, Firm, Address):
Installer: Larry Bartlett
Line 1: DLZ Corp
Line 2:
City: Columbus
State: OH
Zip: 43229-
Phone: 614-888-0400

Date Well Installed:
05/08/2018

Driller's WV Cert No.
WV00629

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: concrete
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 3 ft.
7.Well Riser: a.OD Well Riser: 2.38 inches. b.ID Well Riser: 2 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: cement grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: surge/purge -
10.Drilling Method Used: mud rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 208 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 100 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 211 ft.
15.Depth to Top of Screen: 215 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 25 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: Gravity
18.Well Depth: 240 ft.
19.Bottom of Filter Pack: 242 ft.
20.Bottom of Borehole: 242 ft.
21.Backfill Material (below filter pack): NA
22.Decontamination Procedures: High Pressure hot water
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0014-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0014-18
Grid Location:
a. Latitude: 38 27 13 .0
b. Longitude: 81 51 37 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1809

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

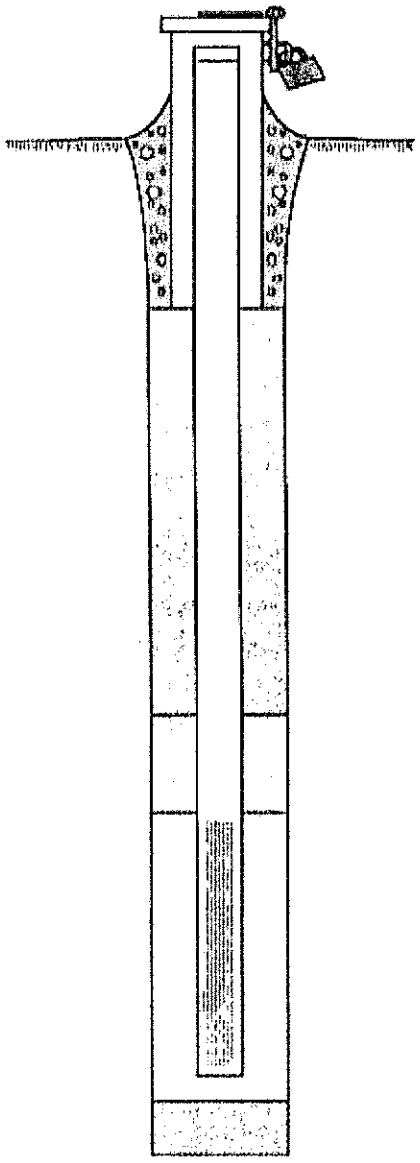
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 48 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 100 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 54 ft.
15.Depth to Top of Screen: 57.4 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 14.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 72 ft.
19.Bottom of Filter Pack: 74 ft.
20.Bottom of Borehole: 125.8 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



State of West Virginia
Department of Environmental Protection

Monitoring Well Construction
Well Number: WV00528-0015-18
Approved

Site Name/Physical Address:
Site: John E. Amos Plant
Line 1: 1530 Winfield Rd.
Line 2:
City: Winfield
State: WV
Zip: 25213-
County: Putnam

Well Registration No. WV00528-0015-18
Grid Location:
a. Latitude: 38 27 10 .0
b. Longitude: 81 51 24 .0
c. Method Used: GPS

Company/Project Well No.:
MW-1810

Purpose of Monitoring Well:
Assessment

Well Owner (Name, Firm, Address):
Owner: American Electric Power
Line 1: 1 Riverside Plaza
Line 2:
City: Columbus
State: OH
Zip: 43215-
Phone: 614-836-4200

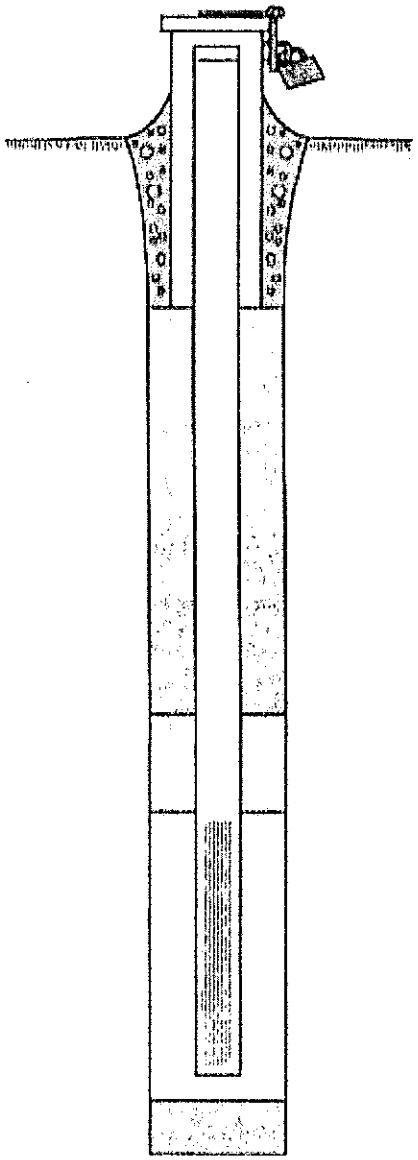
Installed By (Name, Firm, Address):
Installer: AEP Dolan Lab
Line 1: 4001 Bixby Rd.
Line 2:
City: Groveport
State: OH
Zip: 43125-
Phone: 614-836-4200

Date Well Installed:
08/09/2018

Driller's WV Cert No.
WV00528

Section B: (all number fields must be in decimal format)

1.Cap and Lock: YES
2.Protective Cover: Protective Cover Pipe
3.Monitoring Well Reference Point: 0 ft.
4.Borehole Diameter: 6 inches.
5.Ground Surface Seal:
a.Material: bentonite-cement grout
b.Installation Procedure: gravity
6.Surface Seal Bottom/Annular Space Top: 2 ft.
7.Well Riser: a.OD Well Riser: 2 inches. b.ID Well Riser: 1.98 inches.
c.Material: PVC
d.Installation Procedure: hand set
8.Annular Space Seal:
a.Material: high solids grout -
b.Installation Procedure: tremie pipe-pumped
9.Well Development Procedure: airlift -
10.Drilling Method Used: air rotary -
11.Annular Space Seal Bottom/Filter Seal Top: 47 ft.
12.Drilling Fluid Used: Yes Source: Water
13.Filter Pack Seal:
a.Material: bentonite pellet
b.Installation Procedure: Gravity Fed
c.Volume Added: 100 pounds
14.Bottom of Bentonite Seal/Filter Pack Top: 54 ft.
15.Depth to Top of Screen: 60.4 ft.
16.Screen:
a.Material: PVC
b.Installation Procedure: hand set
c.Slot Size: 0.02 inches. d.Screen Length: 19.6 ft.
17.Filter Pack:
a.Material: fine sand
b.Installation Procedure: gravity
18.Well Depth: 80 ft.
19.Bottom of Filter Pack: 82 ft.
20.Bottom of Borehole: 125.8 ft.
21.Backfill Material (below filter pack): N/A
22.Decontamination Procedures: Liqui-Nox w/high pressure water pump
23.Special Circumstances and Exceptions: No Variance Number:
24.WV Contractor License No.



APPENDIX C

Well Survey

ARCADIS

Banks Well Report

Prepared for:

ARCADIS U.S., INC.-Columbus
630 Plaza Drive, Suite 600
Highlands Ranch, CO 80129

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP

Water Well Report

AMOS PLANT

WV

PO #: WV015976.0004

ES-124909

Thursday, July 20, 2017

Banks Environmental Data, Inc. - 1601 Rio Grande, Ste. 331 - Austin, TX 78701 - 800.531.5255 P - 512.478.1433 F
www.banksenvdata.com

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Banks Environmental Data, Inc. - 1601 Rio Grande, Ste. 331 - Austin, TX 78701 - 800.531.5255 P - 512.478.1433 F
www.banksenvdata.com

Geographic Summary

Location
WV
Target location is 0.316 square miles and has a 6.52 mile perimeter

Coordinates	
Longitude & Latitude in Degrees Minutes Seconds	NA
Longitude & Latitude in Decimal Degrees	NA
X and Y in UTM	NA

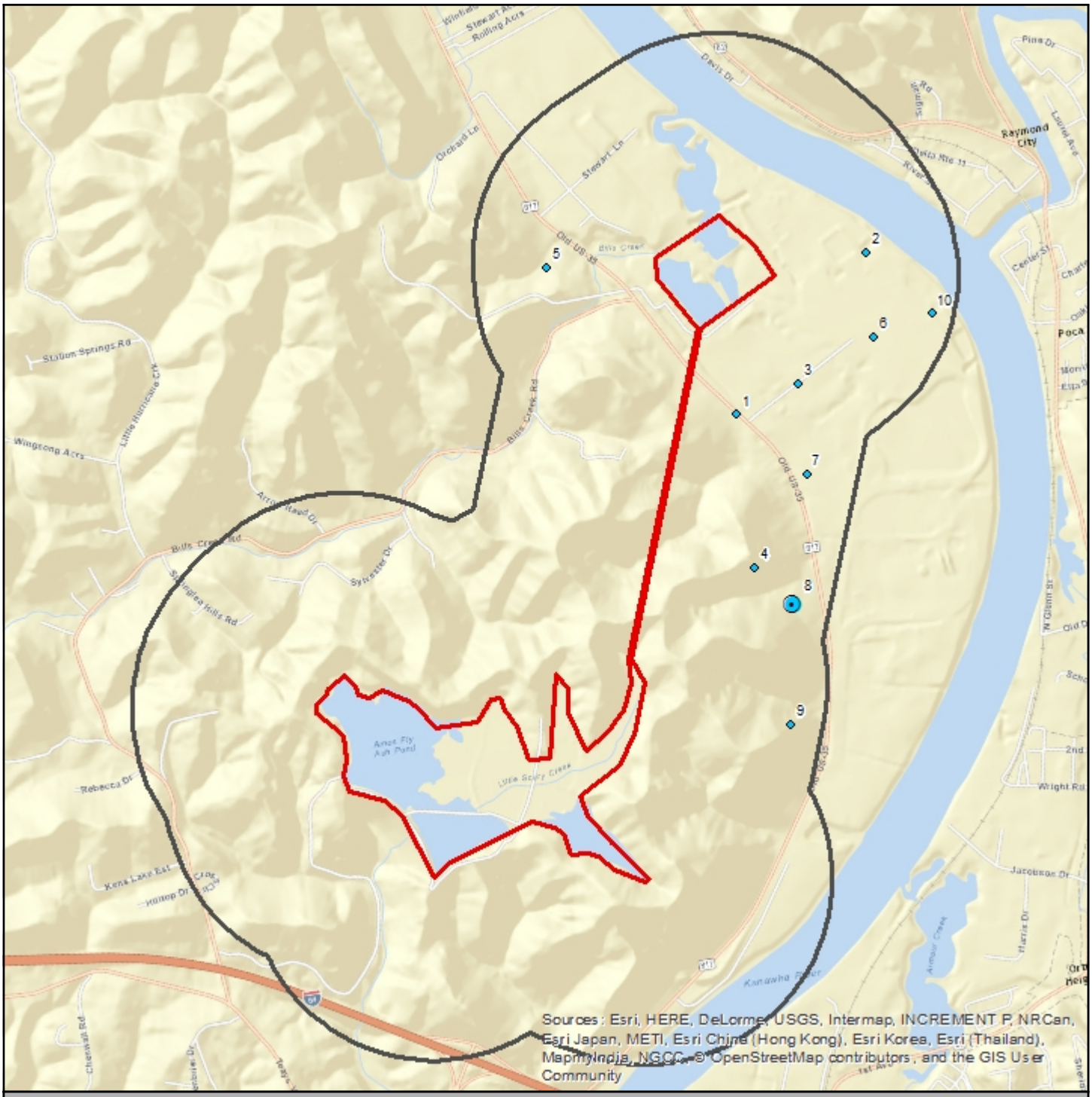
Elevation
NA

Zip Codes Searched	
Search Distance	**Zip Codes (historical zip codes included)**
Target Property	25213, 25070, 25109, 25124
0.5 miles	25143, 25159, 25213, 25070, 25109, 25124, 25560

Topos Searched	
Search Distance	**Topo Name**
Target Property	Saint Albans (1980)
0.5 miles	Saint Albans (1980)

Banks Environmental Data, Inc. - 1601 Rio Grande, Ste. 331 - Austin, TX 78701 - 800.531.5255 P - 512.478.1433 F
www.banksenvdata.com

Summary Map - 0.5 Mile Buffer



AMOS PLANT

Well

Well Cluster

Target Property

Search Buffer

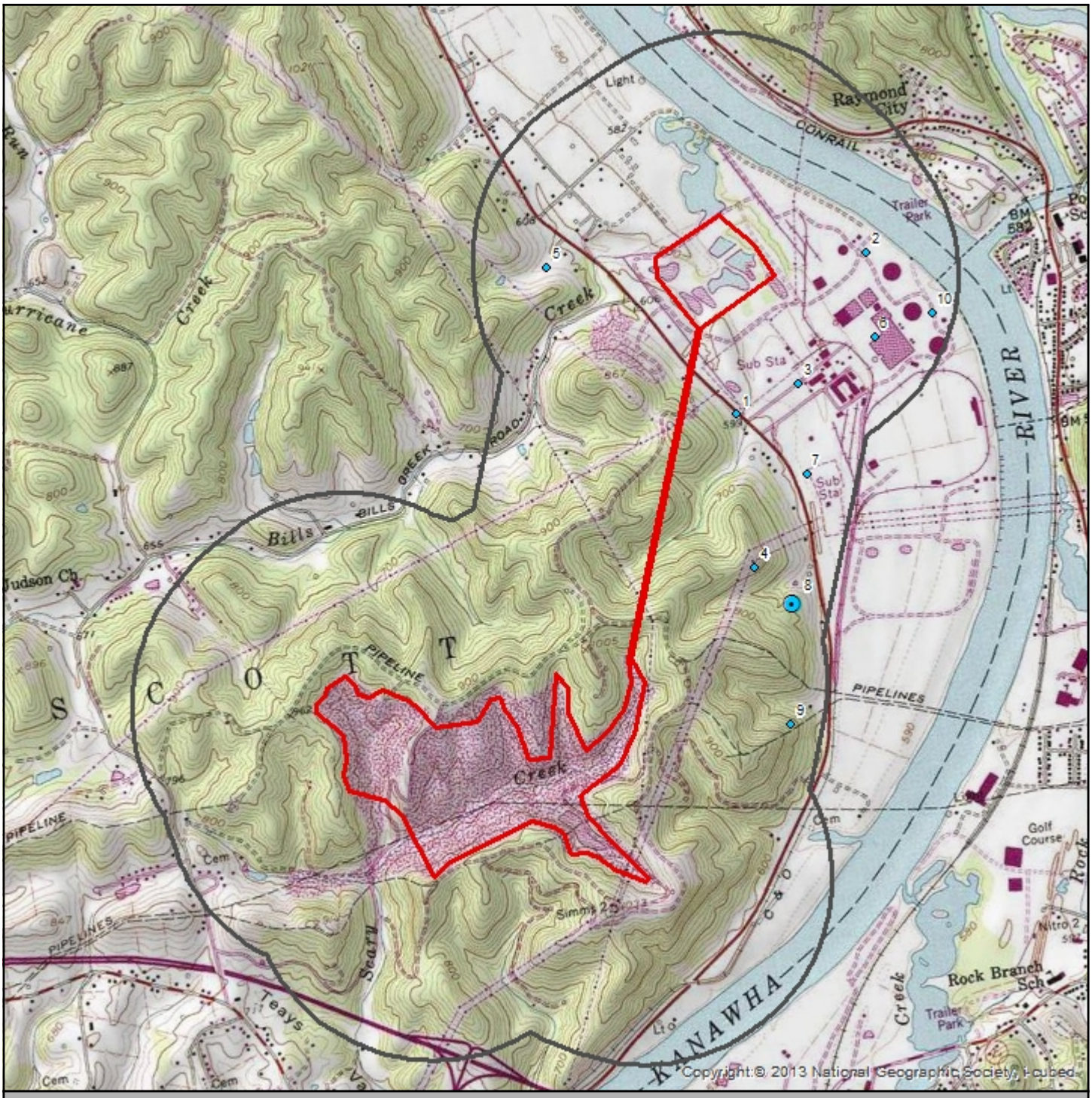
1 : 25,000
1 inch = 0.395 miles
1 inch = 2083 feet
1 centimeter = 0.250 kilometers
1 centimeter = 250 meters

N

Lambert Conformal Conic Projection
1983 North American Datum
First Standard Parallel: 33 0' 00" North
Second Standard Parallel: 45 0' 00" North
Central Meridian: 96 0' 00" West
Latitude of Origin: 39 0' 00" North

Topographic Overlay Map - 0.5 Mile Buffer

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



AMOS PLANT

- Well
- Well Cluster
- Target Property
- Search Buffer

Target Property Quad Name(s)
Saint Albans (1980)

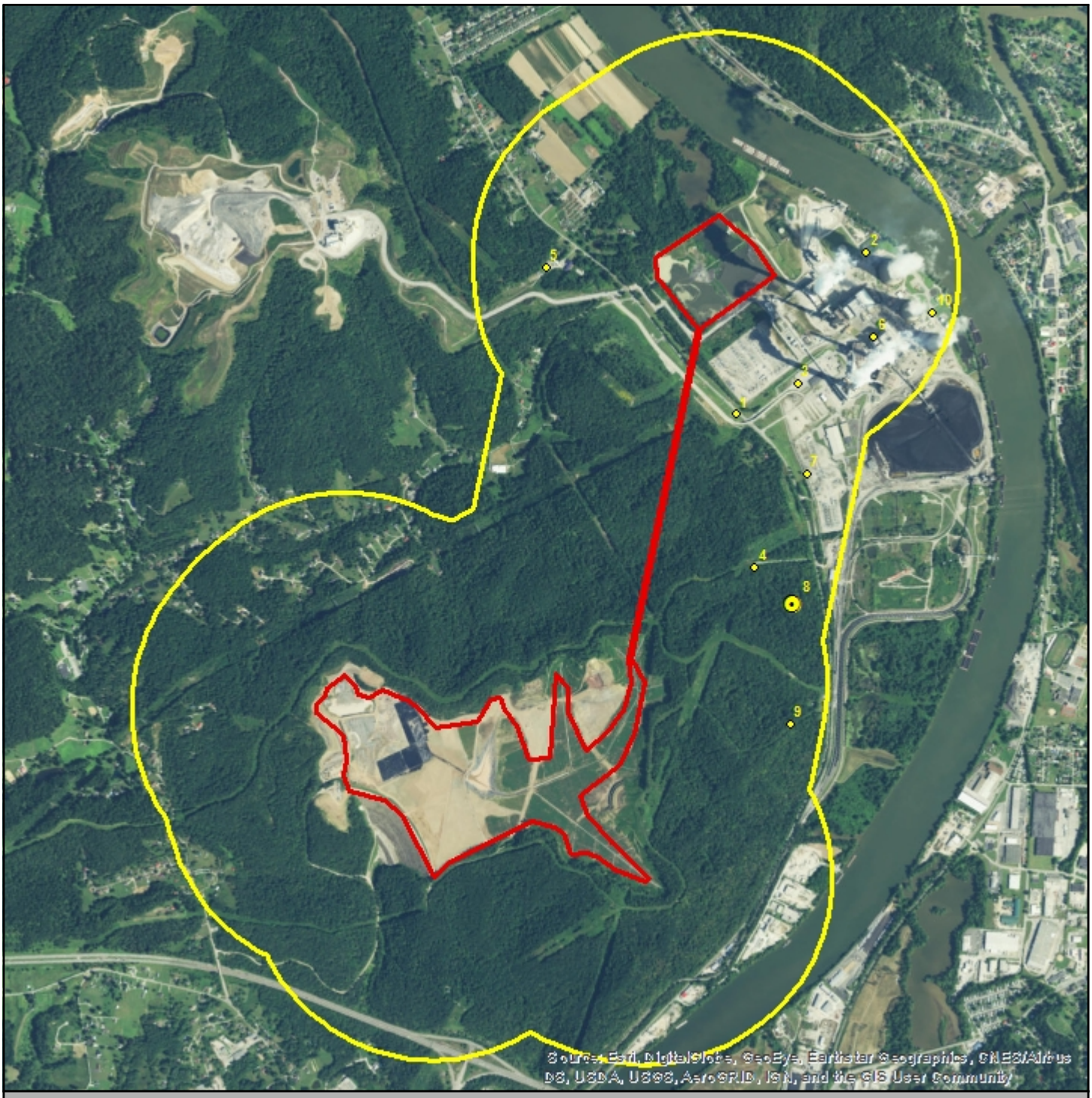
1 : 25,000
1 inch = 0.395 miles
1 inch = 2083 feet

Lambert Conformal Conic Projection
1983 North American Datum
First Standard Parallel: 33 0' 00" North
Second Standard Parallel: 45 0' 00" North
Central Meridian: 96 0' 00" West
Latitude of Origin: 39 0' 00" North

N

Current Imagery Overlay Map - 0.5 Mile Buffer

BANKS ENVIRONMENTAL DATA
A DIVISION OF THE BANKS GROUP



AMOS PLANT

- Well
- Well Cluster
- Target Property
- Search Buffer

1 : 25,000
1 inch = 0.395 miles
1 inch = 2083 feet
1 centimeter = 0.250 kilometers
1 centimeter = 250 meters

N

Lambert Conformal Conic Projection
1983 North American Datum
First Standard Parallel: 33 0' 00" North
Second Standard Parallel: 45 0' 00" North
Central Meridian: 96 0' 00" West
Latitude of Origin: 39 0' 00" North

Water Well Details

Map ID	Source ID	Dataset	Owner of Well	Type of Well	Depth Drilled	Completion Date	Longitude	Latitude	Elevation	Driller's Logs
1	USGS-382818081495101	WW USGS	USGS	Not Reported	15	01/01/1960	-81.830687	38.471758	603 ft	N/A
2	USGS-382838081492301	WW USGS	USGS	Not Reported	20	01/01/1960	-81.822909	38.477314	587 ft	N/A
3	USGS-382821081493901	WW USGS	USGS	Not Reported	25	01/01/1960	-81.827354	38.472591	587 ft	N/A
4	USGS-382756081495201	WW USGS	USGS	Not Reported	15	01/01/1960	-81.830965	38.465647	828 ft	N/A
5	USGS-382843081502101	WW USGS	USGS	Not Reported	128	01/01/1938	-81.839021	38.478702	616 ft	N/A
6	USGS-382826081492401	WW USGS	USGS	Not Reported	56	01/01/1960	-81.823187	38.47398	591 ft	N/A
7	USGS-382808081494001	WW USGS	USGS	Not Reported	25	01/01/1960	-81.827631	38.46898	587 ft	N/A
8	USGS-382750081494601	WW USGS	USGS	Not Reported	57	01/01/1930	-81.829298	38.46398	703 ft	N/A
8	USGS-382750081494602	WW USGS	USGS	Not Reported	28	01/01/1915	-81.829298	38.46398	703 ft	N/A
9	USGS-382733081495001	WW USGS	USGS	Not Reported	37	01/01/1920	-81.830409	38.459258	748 ft	N/A
10	USGS-382828081491301	WW USGS	USGS	Not Reported	20	01/01/1960	-81.820131	38.474536	589 ft	N/A

Well Summary

Water Well Dataset	# of Wells
WW USGS	11
Total Count	**11**

Dataset Descriptions and Sources

Dataset	Source	Dataset Description	Update Schedule	Data Requested	Data Obtained	Data Updated	Source Updated
WV WW - West Virginia Water Wells	West Virginia Department of Health and Human Resources	This dataset contains groundwater well information provided by West Virginia Department of Health and Human Resources.	As requested	N/A	N/A	N/A	N/A
WW USGS - USGS Water Wells	U.S. Geological Survey	This dataset contains groundwater well records from the U.S. Geological Survey.	Semi-annually	04/18/2017	04/18/2017	05/07/2017	04/18/2017

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www.banksenvdata.com

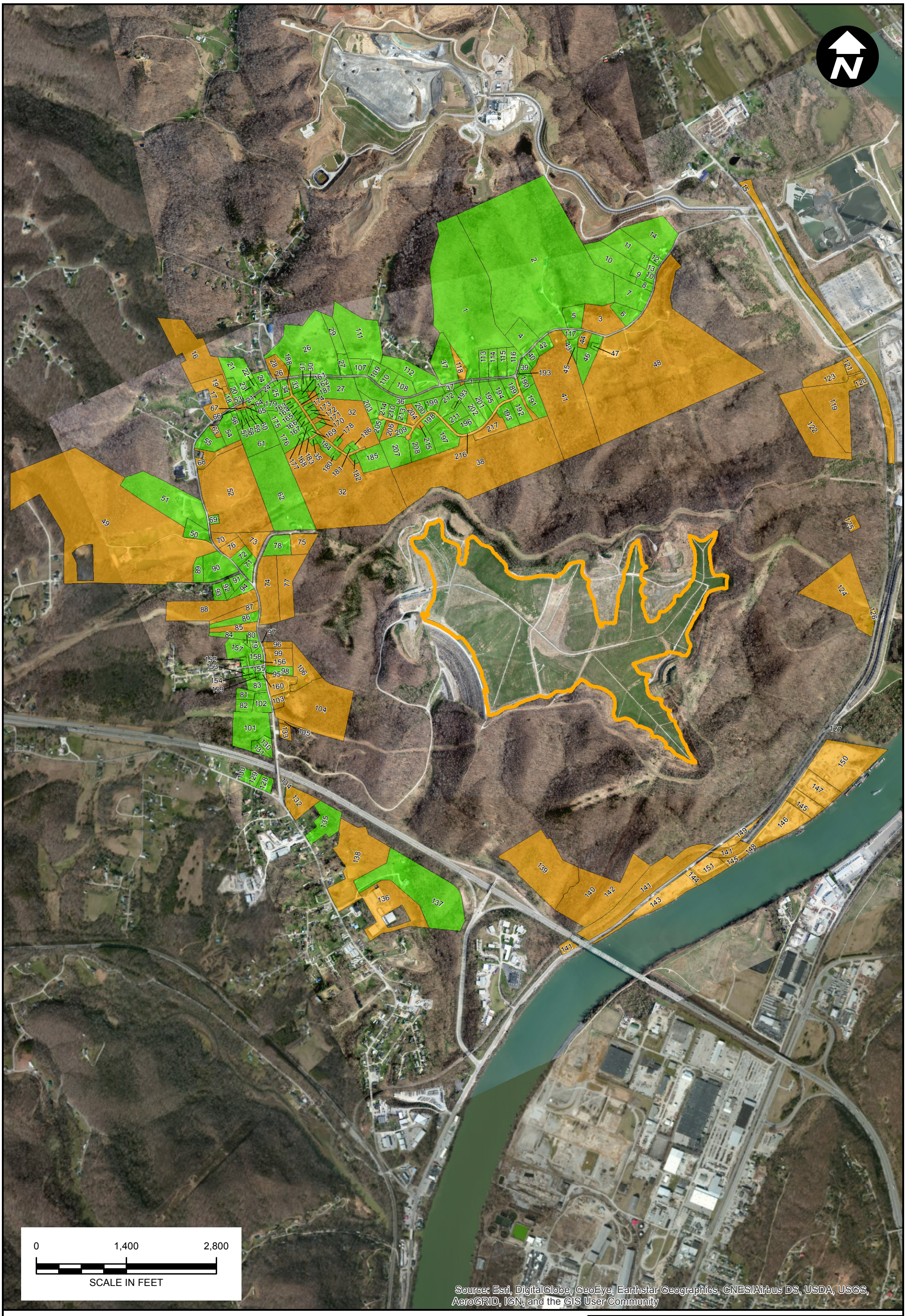
Disclaimer

The Banks Environmental Data Water Well Report was prepared from existing state water well databases and/or additional file data/records research conducted at the state agency and the U.S. Geological Survey. Banks Environmental Data has performed a thorough and diligent search of all groundwater well information provided and recorded. All mapped locations are based on information obtained from the source. Although Banks performs quality assurance and quality control on all research projects, we recognize that any inaccuracies of the records and mapped well locations could possibly be traced to the appropriate regulatory authority or the actual driller. It may be possible that some water well schedules and logs have never been submitted to the regulatory authority by the water driller and, thus, may explain the possible unaccountability of privately drilled wells. It is uncertain if the above listing provides 100% of the existing wells within the area of review. Therefore, Banks Environmental Data cannot fully guarantee the accuracy of the data or well location(s) of those maps and records maintained by the regulatory authorities.

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ARCADIS

Putnam County Public Services District Potable Water Survey



LEGEND

- Database And Public Record Review Indicate Parcel Is Serviced By The Public Potable Water Supply
- Database And Public Record Review Were Unable To Determine The Source For Potable Water For This Parcel, If Present
- CCR Unit Boundary

NOTES:

1. 2016 AERIAL IMAGERY OBTAINED FROM ESRI IMAGE SERVICE.
2. 2018 SITE SPECIFIC AERIAL IMAGERY OBTAINED FROM AEP.
3. PARCEL LOCATIONS FROM WVU GIS CLEARINGHOUSE.
4. WEST VIRGINIA 1983 STATE PLANAR COORDINATES
5. INFORMATION PROVIDED BY PUTNAM COUNTY PUBLIC SERVICES DISTRICT.

AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

POTABLE WELL SEARCH REGIONAL MAP

ARCADIS Design & Consultancy for natural and built assets

FIGURE
C-1

CITY: Novi DIV: ENV DB: TRY PIC: PM: TM: TR: PROJECT NUMBER: COORDINATE SYSTEM: NAD 1983 StatePlane West Virginia South FIPS 4702 Feet
Z:\GISProjects_ENV\AEP\Amos\mxd\Potable Well Search Appendix\AmosRegionalMapParcelsPortrait.mxd PLOTTED: 1/18/2019 11:23:35 AM BY: akens

Table C-1
Potable Well Search Summary
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Potable Source Confirmation	Parcel ID	Map ID	Parcel Size	Physical address	Year Constructed	Land Use	Owner	Owner Address
Yes	40-10- 205-0053-0001	12	0.51787	356 BILLS CRK RD, WINFIELD WV	1900	101 - Residential 1 Family	STANLEY TERESSA L & RICKEY A	356 BILLS CRK RD, WINFIELD WV
Yes	40-10- 215-0011-0000	24	1.540583	1734 BILLS CRK RD, WINFIELD WV	1953	101 - Residential 1 Family	SHAFER DANIEL O	1070 BILLS CREEK RD, WINFIELD WV
Yes	40-10- 215-0029-0003	72	1.260765	2391 BILLS CRK RD, WINFIELD WV	1998	101 - Residential 1 Family	TAYLOR THOMAS D III &	PO BOX 298, SCOTT DEPOT WV
Yes	40-10- 215-0029-0009	78	2.703695	147 COUGAR MOUNTAIN RD, WINFIELD WV	2012	101 - Residential 1 Family	SWEENEY PHILIP D II &	147 COUGAR MOUNTAIN RD, WINFIELD WV
Yes	40-10- 215-0033-0003	80	0.184	46 KENS LAKE EST RD, WINFIELD WV	1976	100 - Residential Vacant	MOLLOHAN WHITNEY L	46 KENS LAKE EST RD, WINFIELD WV
Yes	40-10- 215-0042-0003	98	1.163599	2145 BILLS CRK RD, WINFIELD WV	1962	100 - Residential Vacant	SNYDER WILLIAM R ET UX	2145 BILLS CREEK RD, WINFIELD WV
Yes	40-10- 215-0075-0000	111	10.554821	1450 BILLS CRK RD, WINFIELD WV	2013	101 - Residential 1 Family	WHEELER MICHAEL S & TERESA R	1450 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0205-0048-0000	1	39.641702	1090 BILLS CRK RD, WINFIELD WV	1900	112 - Active Farm	BUZZARD LLOYD DANIEL	1090 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0205-0049-0000	2	79.456499	440 BILLS CRK RD, WINFIELD WV	2007	112 - Active Farm	MCB FARMS LLC	440 BILLS CRK RD, WINFIELD WV
Yes	40-10-0205-0049-0002	4	3.693111	500 BILLS CRK RD, WINFIELD WV	1963	101 - Residential 1 Family	FAIRCHILD LANCE C & MELANIE	500 BILLS CRK RD, WINFIELD WV
Yes	40-10-0205-0049-0003	5	2.326726	750 BILLS CRK RD, WINFIELD WV	1980	101 - Residential 1 Family	GUY CHARLES W ET UX	380 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0205-0050-0000	6	2.061352	260 BILLS CRK RD, WINFIELD WV	1960	101 - Residential 1 Family	FOSTER M STEPHEN	1721 WINFIELD RD, WINFIELD WV
Yes	40-10-0205-0051-0000	7	4.738801	240 BILLS CREEK RD, WINFIELD WV	1997	101 - Residential 1 Family	COLEMAN BRIAN ET UX	240 BILLS CREEK, WINFIELD WV
Yes	40-10-0205-0052-0000	8	0.75605	230 BILLS CRK RD, WINFIELD WV	1947	110 - Salvage Value Building	WYMER JANET GAIL ET CON	398 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0205-0052-0001	9	1.061665	398 BILLS CRK RD, WINFIELD WV	1966	101 - Residential 1 Family	WYMER PAUL E ET UX	398 BILLS CRK RD, WINFIELD WV
Yes	40-10-0205-0052-0002	10	6.263197			100 - Residential Vacant	WYMER PAUL E ET UX	398 BILLS CRK RD, WINFIELD WV
Yes	40-10-0205-0053-0000	11	5.166967			109 - Auxiliary Improvement	WYMER PAUL E ET UX	398 BILLS CRK RD, WINFIELD WV
Yes	40-10-0205-0053-0002	13	0.55599	190 BILLS CRK RD, WINFIELD WV	NA	108 - Mobile Home	SNYDER JOYCE K	PO BOX 373, NITRO WV
Yes	40-10-0205-0054-0000	14	7.302649	312 BILLS CRK RD, WINFIELD WV	1964	101 - Residential 1 Family	ALLISON THERESA	312 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0006-0002	18	0.388266	1166 BILLS CRK RD, WINFIELD WV	1988	101 - Residential 1 Family	PARSONS RAYMOND E ET UX	1836 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0008-0000	20	1.248307	1160 BILLS CRK RD, WINFIELD WV	2002	101 - Residential 1 Family	HARPOLD RANDALL CLARK ET UX	1818 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0009-0000	21	4.945652	1130 BILLS CRK RD, WINFIELD WV	1963	101 - Residential 1 Family	SMITH DAVID B	1798 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0009-0001	22	0.490998	1770 BILLS CRK RD, WINFIELD WV	1975	101 - Residential 1 Family	PAYNE JOHN R	1770 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0009-0003	23	0.108919	1770 BILLS CRK RD, WINFIELD WV	1975	100 - Residential Vacant	PAYNE JOHN R & JUDITH YVONNE	1770 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0012-0000	25	0.990225	1725 BILLS CRK RD, WINFIELD WV	1957	101 - Residential 1 Family	TERRY NELLIE Y	1725 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0013-0000	26	16.571687	1506 BILLS CRK RD, WINFIELD WV	1956	101 - Residential 1 Family	NEARY FRANK D ET UX	1506 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0013-0001	27	6.190993	1506 BILLS CRK RD, WINFIELD WV	1964	101 - Residential 1 Family	NEARY FRANK & PATRICIA G	1506 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0013-0006	29	2.398821	955 BILLS CRK RD, WINFIELD WV	1991	102 - Residential 2 Family	NEARY FRANK D ET UX	1506 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0014-0000	30	0.630041	1605 BILLS CRK RD, WINFIELD WV	1956	101 - Residential 1 Family	FORD MARK S II & JESSICA	1605 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0014-0001	31	0.364756	983 BILLS CREEK RD, WINFIELD WV	1986	101 - Residential 1 Family	LEWIS MARY ANN	1627 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0015-0001	33	0.8167	23 SPRINGLEA DR, WINFIELD WV	1967	101 - Residential 1 Family	ROLLYSON STEPHEN E ET UX	103 SPRINGLEA DR, WINFIELD WV
Yes	40-10-0215-0015-0006	34	0.705335	1011 BILLS CRK RD, WINFIELD WV	1967	101 - Residential 1 Family	CHILDRESS DOROTHY J	1687 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0015-0008	35	0.24334	120 SPRINGLEA HILLS , WINFIELD WV	1980	101 - Residential 1 Family	BRAGG NANCY RUTH ET AL	107 BRAGG FARM RD, CHARLESTON WV
Yes	40-10-0215-0016-0000	36	5.126583	1409 BILLS CREEK RD, WINFIELD WV	1946	101 - Residential 1 Family	CURRY WILLIAM J ET UX	1409 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0018-0000	37	5.476825	1182 BILLS CRK RD, WINFIELD WV	1958	101 - Residential 1 Family	HUNTER LORRAINE M	17 THORNHILL ESTS, POCA WV
Yes	40-10-0215-0019-0002	39	0.979611	475 BILLS CRK RD, WINFIELD WV	1997	101 - Residential 1 Family	BURDETTE LESLIE L & MARY M	945 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0020-0000	40	0.967697	473 BILLS CRK RD, WINFIELD WV	1996	101 - Residential 1 Family	GRIGSBY DAVID E ET UX	895 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0021-0001	42	1.199409	471 BILLS CRK RD, WINFIELD WV	1994	101 - Residential 1 Family	DUNLAP RONALD I ET UX	471 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0021-0002	43	0.227472	701 BILLS CRK RD, WINFIELD WV	NA	100 - Residential Vacant	BUSH LINDA MCCORMICK	701 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0022-0001	45	0.84929	701 BILLS CRK RD, WINFIELD WV	NA	108 - Mobile Home	BUSH LINDA MCCORMICK	701 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0023-0000	46	3.252579	351 BILLS CRK RD, WINFIELD WV		100 - Residential Vacant	HAULDREN RUSSELL D & MARK E	351 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0023-0001	47	0.368875	689 BILLS CREEK RD, WINFIELD WV	1958	108 - Mobile Home	JUSTICE PHYLLIS M ET AL	659 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0025-0001	50	2.050981	2286 BILLS CRK RD, WINFIELD WV	1955	101 - Residential 1 Family	HARTLEY EDSEL L ET UX	2286 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0026-0003	51	12.947141	1632 BILLS CREEK RD, WINFIELD WV	2006	101 - Residential 1 Family	DYER BENJAMIN W ET UX	1632 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0028-0002	54	2.593486	1341 BILLS CREEK RD, WINFIELD WV	1954	101 - Residential 1 Family	COVERT MARY K	1891 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0028-0003	55	2.488699	1491 BILLS CRK RD, WINFIELD WV	1993	101 - Residential 1 Family	WARNER NATHANIEL G ET AL	2003 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0028-0004	56	0.570345	1311 BILLS CREEK RD, WINFIELD WV	1969	101 - Residential 1 Family	SABER CHARLES R ET UX	12 MAGPIE DR, WINFIELD WV

Table C-1
Potable Well Search Summary
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Potable Source Confirmation	Parcel ID	Map ID	Parcel Size	Physical address	Year Constructed	Land Use	Owner	Owner Address
Yes	40-10-0215-0028-0005	57	0.428144	1281 BILLS CRK RD, WINFIELD WV	1969	101 - Residential 1 Family	GOWMAN DAVID R & DONNA R	18 MAGPIE DR, WINFIELD WV
Yes	40-10-0215-0028-0006	58	0.363414	1251 BILLS CRK RD, WINFIELD WV	1969	101 - Residential 1 Family	FLEMING KEITH W ET UX	1251 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0028-0007	59	0.326813	46 MAGPIE RD, WINFIELD WV	1969	101 - Residential 1 Family	DENNISON WALTER L	46 MAGPIE RD, WINFIELD WV
Yes	40-10-0215-0028-0008	60	0.335488	1191 BILLS CRK RD, WINFIELD WV	1969	101 - Residential 1 Family	ISNER GARY W ET UX	1191 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0028-0010	61	7.053467	1175 BILLS CRK RD, WINFIELD WV	2001	101 - Residential 1 Family	BROWNING BILLY S JR	PO BOX 542, TEAYS WV
Yes	40-10-0215-0028-0011	62	17.953175	233 BILLS CRK RD, WINFIELD AL	NA	109 - Auxiliary Improvement	KAPP KENNETH M ET UX	14368 DOE RUN, HARVEST AL
Yes	40-10-0215-0028-0013	64	0.031674	1191 BILLS CRK RD, WINFIELD WV	1969	100 - Residential Vacant	ISNER GARY W ET UX	1191 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0028-0020	69	0.505742	1641 BILLS CRK , WINFIELD WV	1966	101 - Residential 1 Family	BIAS MELISSA	2247 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0029-0002	71	1.362386	1803 BILLS CRK RD, WINFIELD WV	2007	101 - Residential 1 Family	SELBE JAMES RAY	2481 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0033-0002	79	0.476285	2142 BILLS CRK RD, WINFIELD WV	1999	101 - Residential 1 Family	WOODALL ANGELA J	2142 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0033-0006	81	1.169064	2350 BILLS CREEK RD, WINFIELD WV	1969	112 - Active Farm	SLATER CRAIG S ET UX	2350 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0033-0008	82	1.180655	2350 BILLS CREEK RD, WINFIELD WV	1969	112 - Active Farm	SLATER CRAIG S ET UX	2350 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0033-0009	83	1.305471	2270 BILLS CRK, WINFIELD WV	NA	112 - Active Farm	SLATER CRAIG SCOTT ET UX	2350 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0034-0000	84	1.899564	2118 BILLS CRK RD, WINFIELD WV	1959	101 - Residential 1 Family	DAVIS MATTHEW L	2140 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0036-0000	86	1.99251	2588 BILLS CRK RD, WINFIELD WV	1962	101 - Residential 1 Family	MURPHY DANIEL	RT 4 BOX 9, HURRICANE WV
Yes	40-10-0215-0039-0000	89	1.333315	1720 BILLS CRK RD, WINFIELD WV	NA	100 - Residential Vacant	CONNER EDWIN T	2362 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0040-0000	90	4.178862	1720 BILLS CREEK RD, WINFIELD WV	1958	101 - Residential 1 Family	CONNER EDWIN T ET UX	2362 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0040-0001	91	0.891494	1800 BILLS CRK (REBECCA DR) RD, WINFIELD WV	1974	101 - Residential 1 Family	RUCKER DONALD GAY ET UX	2452 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0040-0002	92	0.930995	5 REBECCA DR, WINFIELD WV	1969	101 - Residential 1 Family	ALLEY DAVID G	5 REBECCA DR, WINFIELD WV
Yes	40-10-0215-0040-0003	93	1.075798	9 REBECCA DR, WINFIELD WV	1972	101 - Residential 1 Family	CRAWFORD CLINTON H ET AL	79 REBECCA DR, WINFIELD WV
Yes	40-10-0215-0041-0000	94	1.014125	2000 BILLS CREEK RD, WINFIELD WV	1989	101 - Residential 1 Family	CRACE RANDY B II	2484 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0066-0000	100	0.724083	4826 TEAYS VALLEY RD, WINFIELD WV	1963	101 - Residential 1 Family	STOWERS PHYLLIS JEAN	4826 TEAYS VALLEY RD, SCOTT DEPOT WV
Yes	40-10-0215-0067-0000	101	6.581074	2440 BILLS CRK RD, WINFIELD WV	1962	101 - Residential 1 Family	VELEAIR C SMITH MANAGEMENT LLC	112 BROOKS ST, CHARLESTON WV
Yes	40-10-0215-0068-0000	102	1.839382	2410 BILLS CRK RD, WINFIELD WV	NA	100 - Residential Vacant	HALSTEAD JASON ET AL	RR 1 BOX 28-10, RED HOUSE WV
Yes	40-10-0215-0073-0000	107	1.570166	1466 BILLS CREEK RD, WINFIELD WV	1963	101 - Residential 1 Family	THOMPSON LEONARD F JR ET UX	1466 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0074-0000	108	2.19403	1392 BILLS CRK RD, WINFIELD WV	1980	109 - Auxiliary Improvement	WELCH GREGORY L ET UX	1392 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0074-0001	109	1.323028	1430 BILLS CRK RD, WINFIELD WV	1980	101 - Residential 1 Family	BOWLING JAMES B	880 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0074-0002	110	1.414863	1392 BILLS CRK RD, WINFIELD WV	1980	101 - Residential 1 Family	WELCH GREGORY L ET UX	1392 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0075-0001	112	5.143059	714 BILLS CRK RD, WINFIELD WV	1994	101 - Residential 1 Family	CARNEFIX TIMOTHY ET UX	714 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0077-0000	113	1.548338	1060 BILLS CRK RD, WINFIELD WV	1974	101 - Residential 1 Family	COLE JOHN ROBERT ET UX	650 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0078-0000	114	1.533095	1036 BILLS CRK RD, WINFIELD WV	1975	101 - Residential 1 Family	BENNETT BETTY D	620 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0079-0000	115	1.516558	1008 BILLS CRK RD, WINFIELD WV	1970	101 - Residential 1 Family	WILLIAMS FRANK D	1008 BILLS CRK RD, WINFIELD WV
Yes	40-10-0215-0080-0000	116	1.762246	982 BILLS CRK RD, WINFIELD WV	1974	101 - Residential 1 Family	SMITHSON JASON T ET UX	560 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0215-0081-0000	117	0.734412	749 BILLS CRK RD, WINFIELD WV	NA	108 - Mobile Home	DUFFIELD GRETA M	98 SUNSET DR, SCOTT DEPOT WV
Yes	40-10-0225-0009-0000	128	1.152622	4832 TEAYS VALLEY RD, WINFIELD WV	1930	105 - Mixed Residential/Commercial	HAZELETT PATRICK	313 SUNSET DR, HURRICANE WV
Yes	40-10-0225-0009-0001	129	0.722299	4830 TEAYS VALLEY RD, WINFIELD WV	1991	101 - Residential 1 Family	CI REALTY LLC	209 1ST AVE S, NITRO WV
Yes	40-10-0225-0009-0002	130	0.978086	2500 BILLS CREEK RD, WINFIELD WV	NA	108 - Mobile Home	SHIVLEY REBECCA A	2500 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0225-0009-0003	131	0.869937	2530 BILLS CREEK RD, WINFIELD WV	1977	101 - Residential 1 Family	WOODS JAMES F JR ET UX	2960 BILLS CREEK RD, WINFIELD WV
Yes	40-10-0225-0024-0000	135	4.69236	4852 TEAYS VALLEY RD, WINFIELD WV	1960	101 - Residential 1 Family	LACKEY MARY LOU	9407 TEAYS VALLEY RD, SCOTT DEPOT WV
Yes	40-10-0225-0058-0002	137	20.778296	3761 TEAYS VALLEY RD, WINFIELD WV	2006	112 - Active Farm	VANSCOY EDDIE ET UX	3761 TEAYS VALLEY RD, HURRICANE WV
Yes	40-10-215A-0013-0000	152	0.344175	62 KENS LAKE EST RD, WINFIELD WV	1997	101 - Residential 1 Family	WILLIAMS DANIER L &	62 KENS LAKE EST RD, WINFIELD WV
Yes	40-10-215A-0024-0000	153	0.344175	63 KENS LAKE EST RD, WINFIELD WV	1994	101 - Residential 1 Family	ARMENTROUT DAVID B	63 KENS LAKE EST, WINFIELD WV
Yes	40-10-215A-0025-0000	154	0.344153	43 KENS LAKE EST DR, WINFIELD WV	1979	101 - Residential 1 Family	BOGGESS GARY R ET AL	414 CIRCLE DR, HURRICANE WV
Yes	40-10-215A-0026-0000	155	0.312271	2749 BILLS CRK RD, WINFIELD WV	1970	101 - Residential 1 Family	PAYTON LORETTA	2749 BILLS CREEK RD, WINFIELD WV
Yes	40-10-215A-0027-0000	156	0.227152	18 KENS LAKE EST RD, WINFIELD WV	1972	101 - Residential 1 Family	MILES DOUGLAS L ET UX	18 KENS LAKE EST RD, WINFIELD WV
Yes	40-10-215A-0031-0000	157	2.397207	46 KENS LAKE EST RD, WINFIELD WV	1976	101 - Residential 1 Family	MOLLOHAN WHITNEY L	46 KENS LAKE EST RD, WINFIELD WV
Yes	40-10-215A-0035-0000	158	0.918433	18 KENS LAKE EST RD, WINFIELD WV	1972	100 - Residential Vacant	MILES DOUGLAS L ET UX	18 KENS LAKE EST RD, WINFIELD WV

Table C-1
Potable Well Search Summary
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Potable Source Confirmation	Parcel ID	Map ID	Parcel Size	Physical address	Year Constructed	Land Use	Owner	Owner Address
Yes	40-10-215A-0037-0000	159	0.077639	2766 BILLS CRK RD, WINFIELD WV	2002	100 - Residential Vacant	POLLEY PAUL J	2766 BILLS CREEK RD, WINFIELD WV
Yes	40-10-215A-0038-0000	160	0.229409	2766 BILLS CRK RD, WINFIELD WV	2002	101 - Residential 1 Family	POLLEY PAUL J	2766 BILLS CREEK RD, WINFIELD WV
Yes	40-10-215B-0002-0000	161	0.457522	107 SPRINGLEA DR, WINFIELD WV	1969	101 - Residential 1 Family	ERWIN DAVID A ET UX	107 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0003-0000	162	0.282437	109 SPRINGLEA DR, WINFIELD WV	1967	101 - Residential 1 Family	GRIFFIN BILLY R & PAULA P	109 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0004-0000	163	0.305324	82 SPRINGLEA DR, WINFIELD WV	NA	100 - Residential Vacant	LAMBERT JOHN P ET UX	82 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0005-0000	164	0.294275	108 SPRINGLEA DR, WINFIELD WV	1975	101 - Residential 1 Family	LAMBERT JOHN P ET UX	108 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0006-0000	165	0.335789	110 SPRINGLEA DR, WINFIELD WV	1972	101 - Residential 1 Family	HUTCHINS WILLIAM J ET UX	98 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0008-0000	166	0.321789	112 SPRINGLEA DR, WINFIELD WV	1978	101 - Residential 1 Family	ROBERTS MICHAEL SCOTT	122 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0009-0000	167	0.307855	114 SPRINGLEA DR, WINFIELD WV	1974	101 - Residential 1 Family	WORKMAN LEOTA JANE	11342 W LITTLE KANAWHA HWY, CRESTON WV
Yes	40-10-215B-0010-0000	168	0.296019	116 SPRINGLEA DR, WINFIELD WV	1975	101 - Residential 1 Family	COOK HARRY J	116 SPRINGLEA, WINFIELD WV
Yes	40-10-215B-0011-0000	169	0.297176	172 SPRINGLEA DR, WINFIELD WV	1975	101 - Residential 1 Family	BOWMAN JACK LEE ET UX	172 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0012-0000	170	0.369121	151 SPRINGLEA DR, WINFIELD WV	1976	100 - Residential Vacant	LOVE SCOTT P ET UX	151 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0014-0000	172	0.293271	115 SPRINGLEA DR, WINFIELD WV	1973	101 - Residential 1 Family	WEBSTER BRETT D ET UX	115 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0015-0000	173	0.309064	113 SPRINGLEA DR, WINFIELD WV	1973	101 - Residential 1 Family	LEWIS RAD K ET UX	113 SPRINGLEA EST, WINFIELD WV
Yes	40-10-215B-0016-0000	174	0.307709	111 SPRINGLEA DR, WINFIELD WV	1971	101 - Residential 1 Family	MCMASTER ERIC & SHAWN	111 SPRINGLEA HILLS, WINFIELD WV
Yes	40-10-215B-0017-0000	175	2.265675	98 SPRINGLEA DR, WINFIELD WV	NA	100 - Residential Vacant	HUTCHINS WILLIAM J ET UX	98 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0018-0000	176	3.127917	2 SORRENTO PL, WINFIELD WV	1994	101 - Residential 1 Family	THOMAS CHRISTOPHER &	2 SORRENTO PL, WINFIELD WV
Yes	40-10-215B-0018-0001	177	0.282655	49 SORRENTO PL, WINFIELD WV	1993	101 - Residential 1 Family	SHREWSBURY TODD H ET UX	49 SORRENTO PL, WINFIELD WV
Yes	40-10-215B-0019-0000	178	0.341475	127 SPRINGLEA DR, WINFIELD WV	1981	101 - Residential 1 Family	CONLEY GABRIEL S ET UX	245 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0020-0000	179	1.511128	120 SPRINGLEA DR, WINFIELD WV	NA	100 - Residential Vacant	SPRINGLEA HILLS PROPERTY OWNER	PO BOX 723, SCOTT DEPOT WV
Yes	40-10-215B-0021-0000	180	0.344506	126 SPRINGLEA DR, WINFIELD WV	1992	101 - Residential 1 Family	CRAFT CHARLES EARNEST	270 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0022-0000	181	0.314877	305 SPRINGLEA DR, WINFIELD WV	1992	101 - Residential 1 Family	BROWN DAVID FRANKLIN &	305 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0023-0000	182	0.29095	134 SPRINGLEA DR, WINFIELD WV	1992	101 - Residential 1 Family	MOORE DANIEL E	134 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0025-0000	184	1.102127	120 SPRINGLEA DR, WINFIELD WV	1976	101 - Residential 1 Family	BROWN WILLIAM F JR	120 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0026-0000	185	3.436233	330 SPRINGLEA DR, WINFIELD WV	1992	101 - Residential 1 Family	BURGROFF ROBERT P ET UX	330 SPRINGLEA DR, WINFIELD WV
Yes	40-10-215B-0027-0000	186	0.282838	135 SPRINGLEA DR, WINFIELD WV	1994	101 - Residential 1 Family	WITHROW JAMES E JR ET UX	135 SPRINGLEA HILLS, WINFIELD WV
Yes	40-10-215C-0001-0000	189	1.277111	2 SYLVESTER DR, WINFIELD WV	1997	101 - Residential 1 Family	CHILDERS STEPHEN R ET UX	2 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0002-0000	190	1.083025	1 SYLVESTER DR, WINFIELD WV	2005	101 - Residential 1 Family	RIPPETOE RONALD L ET UX	1 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0003-0000	191	2.521485	1 JUNEBUG LN, WINFIELD WV	1997	101 - Residential 1 Family	SERGENT TONY A ET UX	1 JUNEBUG LN, WINFIELD WV
Yes	40-10-215C-0004-0000	192	1.834651	3 SYLVESTER DR, WINFIELD WV	1996	101 - Residential 1 Family	RAWLINGS RENEE & ANDREW	3 SLVESTER DR, WINFIELD WV
Yes	40-10-215C-0005-0000	193	2.217772	5 SYLVESTER DR, WINFIELD WV	1998	101 - Residential 1 Family	MINIGH MARK & SARA	5 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0006-0000	194	1.467691	4 SYLVESTER DR, WINFIELD WV	1996	101 - Residential 1 Family	OQUINN ROBERT O ET UX	4 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0007-0000	195	1.926352	6 SYLVESTER DR, WINFIELD WV	1999	101 - Residential 1 Family	JANEY SARAH M	6 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0008-0000	196	1.75422	12 SYLVESTER DR, WINFIELD WV	1999	101 - Residential 1 Family	CHANEY SHANNON JAMES ET UX	12 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0009-0000	197	3.359674	13 SYLVESTER DR, WINFIELD WV	1999	101 - Residential 1 Family	LEGG MICHAEL T ET UX	13 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0010-0000	198	1.064107	15 SYLVESTER DR, WINFIELD WV	2002	101 - Residential 1 Family	WELLS THOMAS E	15 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0011-0000	199	1.090153	18 SYLVESTER DR, WINFIELD WV	2000	101 - Residential 1 Family	CARTER BRANDON S ET UX	18 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0012-0000	200	0.827506	20 SYLVESTER DR, WINFIELD WV	2000	101 - Residential 1 Family	CUNNINGHAM EDWARD CHARLES II	20 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0013-0000	201	2.10977	8 SYLVESTER DR, WINFIELD WV	2005	101 - Residential 1 Family	FRYE ROBERT B ET UX	8 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0014-0000	202	2.713143	10 SYLVESTER DR, WINFIELD WV	2003	101 - Residential 1 Family	WHITE TODD R ET UX	10 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0015-0000	203	1.597337	29 PINSON DR, WINFIELD WV	2015	101 - Residential 1 Family	HARLEY STEPHEN & SARA	29 PINSON DR, WINFIELD WV
Yes	40-10-215C-0017-0000	205	1.027984	27 PINSON DR, WINFIELD WV	2001	101 - Residential 1 Family	LEWIS MICHAEL A & AMANDA K	27 PINSON DR, WINFIELD WV
Yes	40-10-215C-0019-0000	207	4.043762	17 SYLVESTER DR, WINFIELD WV	2002	109 - Auxiliary Improvement	STEPHENSON MONICA ET AL	17 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0020-0000	208	3.688172	17 SYLVESTER DR, WINFIELD WV	2002	101 - Residential 1 Family	STEPHENSON MONICA ET AL	17 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0021-0000	209	0.791561	23 PINSON DR, WINFIELD WV	2002	101 - Residential 1 Family	HALSTEAD JOHN	23 PINSON DR, WINFIELD WV
Yes	40-10-215C-0022-0000	210	0.711455	26 PINSON DR, WINFIELD WV	2003	101 - Residential 1 Family	BURGY GEORGE & JANE	26 PINSON DR, WINFIELD WV
Yes	40-10-215C-0023-0000	211	1.510577	14 SYLVESTER DR, WINFIELD WV	2012	101 - Residential 1 Family	ADKINS JASON M & JODI D	14 SYLVESTER DR, WINFIELD WV

Table C-1
Potable Well Search Summary
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Potable Source Confirmation	Parcel ID	Map ID	Parcel Size	Physical address	Year Constructed	Land Use	Owner	Owner Address
Yes	40-10-215C-0024-0000	212	1.88733	14 SYLVESTER DR, WINFIELD WV	2012	100 - Residential Vacant	ADKINS JASON M & JODI D	14 SYLVESTER DR, WINFIELD WV
Yes	40-10-215C-0025-0000	213	0.865668	24 PINSON DR, WINFIELD WV	2006	101 - Residential 1 Family	CRINER MICHAEL E ET UX	24 PINSON RD, WINFIELD WV
Yes	40-10-215C-0026-0000	214	0.753799	22 SYLVESTER DR, WINFIELD WV	2002	100 - Residential Vacant	LEGG GARY B SR ET UX	22 SYLVESTER DR, WINFIELD WV
No	40-10-0205-0049-0001	3	5.376392	NA	NA	100 - Residential Vacant	GUY CHARLES W ET UX	380 BILLS CRK RD, WINFIELD WV
No	40-10-0206-0092-0000	15	13.043455	NA	NA	700 - Utility Vacant Land	C & O RAILROAD COMPANY (CSXT)	500 WATER ST C910, JACKSONVILLE FL
No	40-10-0215-0006-0000	16	11.349637	NA	NA	100 - Residential Vacant	MORRISON C O	115 1ST ST, ELKVIEW WV
No	40-10-0215-0006-0001	17	4.782128	NA	NA	620 - Religious	JUDSON BAPTIST CHURCH	PUT CO TAX DEPT, WINFIELD WV
No	40-10-0215-0006-0003	19	0.223347	NA	NA	109 - Auxiliary Improvement	PARSONS RAYMOND E ET UX	1836 BILLS CREEK RD, WINFIELD WV
No	40-10-0215-0013-0005	28	2.079162	NA	NA	100 - Residential Vacant	NEARY FRANK D ET UX	920 BILLS CREEK RD, WINFIELD WV
No	40-10-0215-0015-0000	32	50.155329	NA	NA	109 - Auxiliary Improvement	BRAGG NANCY RUTH ET AL	107 BRAGG FARM RD, CHARLESTON WV
No	40-10-0215-0019-0001	38	42.593284	NA	NA	101 - Residential 1 Family	BIRD LEONARD R ET UX	2 JUNE BUG LN, WINFIELD WV
No	40-10-0215-0021-0000	41	25.943994	NA	NA	100 - Residential Vacant	DUNLAP RONALD I ET UX	863 BILLS CREEK RD, WINFIELD WV
No	40-10-0215-0022-0000	44	0.893286	NA	NA	101 - Residential 1 Family	HAULDREN RUSSELL D & MARK E	689 BILLS CREEK RD, WINFIELD WV
No	40-10-0215-0024-0000	48	80.272259	NA	NA	112 - Active Farm	SELBY DANIEL L	23 CHASE DR, HURRICANE WV
No	40-10-0215-0025-0000	49	80.592094	NA	NA	NA	NA	NA
No	40-10-0215-0028-0000	52	24.156532	NA	NA	100 - Residential Vacant	BIAS ROGER A	1625 BILLS CREEK RD, WINFIELD WV
No	40-10-0215-0028-0001	53	0.360258	NA	NA	100 - Residential Vacant	KELLEY L T	PO BOX 761, ST ALBANS WV
No	40-10-0215-0028-0012	63	0.488213	NA	NA	100 - Residential Vacant	GAYLOR J R	3958 TEAYS VALLEY RD, HURRICANE WV
No	40-10-0215-0028-0014	65	0.027706	NA	NA	100 - Residential Vacant	DENNISON WALTER L	1221 BILLS CREEK RD, WINFIELD WV
No	40-10-0215-0028-0015	66	0.027707	NA	NA	100 - Residential Vacant	FLEMING KEITH W ET UX	34 MAGPIE DR, WINFIELD WV
No	40-10-0215-0028-0016	67	0.027892	NA	NA	100 - Residential Vacant	GOWMAN DAVID R & DONNA R	18 MAGPIE DR, WINFIELD WV
No	40-10-0215-0028-0019	68	2.106102	NA	NA	109 - Auxiliary Improvement	BIAS ROGER A ET UX	1625 BILLS CREEK RD, WINFIELD WV
No	40-10-0215-0029-0001	70	1.497084	NA	NA	100 - Residential Vacant	BIAS ROGER ALLEN	1625 BILLS CREEK RD, WINFIELD WV
No	40-10-0215-0029-0004	73	2.542302	NA	NA	100 - Residential Vacant	SELBE JAMES RAY	2481 BILLS CRK RD, WINFIELD WV
No	40-10-0215-0029-0005	74	7.411019	NA	NA	100 - Residential Vacant	WENTZ DANNY RYAN	78 COUGAR MOUNTAIN DR, WINFIELD WV
No	40-10-0215-0029-0006	75	2.574924	NA	NA	101 - Residential 1 Family	MCKINNEY KEVIN DALE & RACHEL L	238 COUGAR MT DR, WINFIELD WV
No	40-10-0215-0029-0007	76	1.571892	NA	NA	100 - Residential Vacant	TAYLOR THOMAS D III &	PO BOX 298, SCOTT DEPOT WV
No	40-10-0215-0029-0008	77	6.368596	NA	NA	101 - Residential 1 Family	WENTZ DANNY RYAN	78 COUGAR MOUNTAIN DR, WINFIELD WV
No	40-10-0215-0035-0000	85	1.750607	NA	NA	100 - Residential Vacant	LAND RECOVERY MANAGEMENT	2414 YATES CROSSING RD, MILTON WV
No	40-10-0215-0037-0000	87	1.890292	NA	NA	100 - Residential Vacant	MURPHY DANIEL	RT 4 BOX 9, HURRICANE WV
No	40-10-0215-0038-0000	88	8.563272	NA	NA	109 - Auxiliary Improvement	CRACE RANDY B II	2484 BILLS CREEK RD, WINFIELD WV
No	40-10-0215-0042-0000	95	0.096894	NA	NA	100 - Residential Vacant	CROSS LUANA L	604 EVEREST CIR, SAINT ALBANS WV
No	40-10-0215-0042-0001	96	1.019887	NA	NA	101 - Residential 1 Family	THORNTON DAVID P ET AL	2677 BILLS CRK RD, WINFIELD WV
No	40-10-0215-0042-0002	97	0.047175	NA	NA	100 - Residential Vacant	THORNTON DAVID P ET AL	2141 BILLS CRK RD, WINFIELD WV
No	40-10-0215-0042-0004	99	2.759185	NA	NA	101 - Residential 1 Family	SNYDER WILLIAM R ET UX	2145 BILLS CREEK RD, WINFIELD WV
No	40-10-0215-0069-0000	103	0.927907	NA	NA	100 - Residential Vacant	CROSS LUANA L	604 EVEREST CIR, SAINT ALBANS WV
No	40-10-0215-0070-0000	104	20.226538	NA	NA	213 - Mobile Home Park	CROSS LUANA L	604 EVEREST CIR, SAINT ALBANS WV
No	40-10-0215-0070-0001	105	0.406846	NA	NA	100 - Residential Vacant	CROSS LUANA L	604 EVEREST CIR, SAINT ALBANS WV
No	40-10-0215-0070-0004	106	3.953464	NA	NA	101 - Residential 1 Family	BENNETT JOHN H ET AL	2381 BILLS CREEK RD, WINFIELD WV
No	40-10-0215-0082-0000	118	1.40012	NA	NA	112 - Active Farm	BUZZARD LLOYD DANIEL	1090 BILLS CREEK RD, WINFIELD WV
No	40-10-0216-0001-0000	119	11.726415	NA	NA	101 - Residential 1 Family	MORGAN BRANDT T	5725 WINFIELD RD, WINFIELD WV
No	40-10-0216-0001-0001	120	0.54019	NA	NA	101 - Residential 1 Family	MORGAN BRANDT T	5725 WINFIELD RD, WINFIELD WV
No	40-10-0216-0001-0002	121	1.067548	NA	NA	100 - Residential Vacant	MORGAN SARAH G ET AL	12331 DOE CROSSING LN, GLEN ALLEN VA
No	40-10-0216-0001-0003	122	11.044789	NA	NA	100 - Residential Vacant	MORGAN SARAH G ET AL	10731 COAL RIVER RD, SAINT ALBANS WV
No	40-10-0216-0001-0004	123	4.110473	NA	NA	101 - Residential 1 Family	MORGAN BRANDT T	5725 WINFIELD RD, WINFIELD WV
No	40-10-0216-0034-0000	124	14.98031	NA	NA	108 - Mobile Home	NEWMAN FRED D ET UX	603 SIXTH ST, NITRO WV
No	40-10-0216-0035-0001	125	0.917174	NA	NA	601 - Cemetery	MORGAN CEMETARY	WINFIELD WV

Table C-1
Potable Well Search Summary
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Potable Source Confirmation	Parcel ID	Map ID	Parcel Size	Physical address	Year Constructed	Land Use	Owner	Owner Address
No	40-10-0216-0035-0003	126	0.296189	NA	NA	700 - Utility Vacant Land	UNITED FUEL GAS COMPANY	WINFIELD WV
No	40-10-0216-0035-0005	127	0.031386	NA	NA	601 - Cemetery	ROBERT G SIMMS HEIRS	3389 WINFIELD RD, WINFIELD WV
No	40-10-0225-0010-0000	132	3.781726	NA	NA	101 - Residential 1 Family	CASTO LOIS F	277 CHES WAL RD, SCOTT DEPOT WV
No	40-10-0225-0010-0002	133	0.945983	NA	NA	660 - Police or Fire Station	TEAYS VALLEY VOLUNTEER FIRE	POPLAR FORK, SCOTT DEPOT WV
No	40-10-0225-0010-0003	134	0.013784	NA	NA	700 - Utility Vacant Land	BELL ATLANTIC WEST VIRGINIA	816 LEE ST FL 8, CHARLESTON WV
No	40-10-0225-0057-0000	136	10.922998	NA	NA	105 - Mixed Residential/Commercial	PUTNAM FARM & LAND COMPANY	PO BOX 1440, ST ALBANS WV
No	40-10-0225-0058-0003	138	15.255786	NA	NA	101 - Residential 1 Family	HOYLMAN LARRY R	PO BOX 1440, ST ALBANS WV
No	40-10-0225-0060-0001	139	17.108005	NA	NA	100 - Residential Vacant	SOLCO INC	PO BOX 429, NITRO WV
No	40-10-0225-0061-0000	140	16.160621	NA	NA	100 - Residential Vacant	SOLCO INC	PO BOX 429, NITRO WV
No	40-10-0225-0061-0001	141	16.746358	NA	NA	700 - Utility Vacant Land	C & O RAILROAD COMPANY (CSXT)	500 WATER ST C910, JACKSONVILLE FL
No	40-10-0225-0061-0002	142	0.016061	NA	NA	601 - Cemetery	S D CRAFT	GENERAL DELIVERY, WINFIELD WV
No	40-10-0225-0062-0000	143	5.894353	NA	NA	420 - Concrete Mfg	AMHERST INDUSTRIES INC	2 PORT AMHERST DR, CHARLESTON WV
No	40-10-0225-0063-0000	144	0.676163	NA	NA	400 - Vacant Industrial Land	AMHERST INDUSTRIES INC	2 PORT AMHERST DR, CHARLESTON WV
No	40-10-0226-0107-0001	145	4.316127	NA	NA	398 - Warehouse	ORDERS CONST CO INC ET AL	PO BOX 1448, ST ALBANS WV
No	40-10-0226-0107-0002	146	6.762313	NA	NA	420 - Concrete Mfg	ESSROC READY MIX CORP	2517 HIGHWAY 35 BLDG B STE 202, MANASQUAN NJ
No	40-10-0226-0107-0003	147	5.054888	NA	NA	420 - Concrete Mfg	FAST CAST INC	PO BOX 645, SCOTT DEPOT WV
No	40-10-0226-0107-0004	148	0.053673	NA	NA	600 - Vacant Exempt Land	SOUTH PUTNAM PUBLIC	PO BOX 147, SCOTT DEPOT WV
No	40-10-0226-0107-0005	149	1.365988	NA	NA	393 - Comm Auxiliary Improvement	TRINITY REBAR & CONCRETE	PO BOX 86, WINFIELD WV
No	40-10-0226-0107-0006	150	12.747322	NA	NA	393 - Comm Auxiliary Improvement	CENTRAL PROPERTIES LLC	515 SIXTH AVE, SAINT ALBANS WV
No	40-10-0226-0107-0007	151	3.153297	NA	NA	397 - Office/Warehouse	CENTRAL PROPERTIES LLC	515 6TH AVE, SAINT ALBANS WV
No	40-10-215B-0013-0000	171	0.294059	NA	NA	101 - Residential 1 Family	LOVE SCOTT P	151 SPRINGLEA DRIVE, WINFIELD WV
No	40-10-215B-0024-0000	183	1.111454	NA	NA	600 - Vacant Exempt Land	SPRINGLEA HILLS PROPERTY	PUTNAM CO TAX DEPT, WINFIELD WV
No	40-10-215B-0028-0000	187	1.146761	NA	NA	600 - Vacant Exempt Land	SPRINGLEA HILLS PROPERTY	3389 WINFIELD RD, WINFIELD WV
No	40-10-215B-0028-0001	188	0.003219	NA	NA	700 - Utility Vacant Land	PUTNAM PSD	PO BOX 147, SCOTT DEPOT WV
No	40-10-215C-0016-0000	204	1.124861	NA	NA	101 - Residential 1 Family	LEGG GARRY B SR ET UX	PO BOX 43, WINFIELD WV
No	40-10-215C-0018-0000	206	1.258213	NA	NA	100 - Residential Vacant	YOUNG WILLIAM C & CYNTHIA D	4022 FARMINGTON DR, HURRICANE WV
No	40-10-215C-0027-0000	215	0.208708	NA	NA	100 - Residential Vacant	SHADE EDWARD J	PO BOX 65, HURRICANE WV
No	40-10-215C-0028-0000	216	3.602693	NA	NA	600 - Vacant Exempt Land	HOLLY CREEK MEADOWS HOME	PO BOX 65, HURRICANE WV
No	40-10-215C-0029-0000	217	2.225441	NA	NA	600 - Vacant Exempt Land	HOLLY CREEK MEADOWS HOME	PO BOX 65, HURRICANE WV

NOTES:
Yes = Database and public record review indicate parcel is serviced by the public potable water supply confirmed by the Putnam County Public Service District.
No = Database and public record review were unable to determine the source for potable water for the parcel, if present.

APPENDIX D

Well Development Summary Table

Table D-1
Well Development Summary Table
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Monitoring Well ID	Development Event Date	Depth to Bottom (ft below TOC)	Depth to Water (ft below TOC)	Method	Water Volume Summary (gallons)	Purged Dry?	Turbidity (NTU)	Clarity	Well Flush Date	Volume Jetted (Gallons)	Volume Recovered/ Pumped (Gallons)	Turbidity/ Clarity	Well Stable (Y/N)	Well Dry (Y/N)
Downgradient														
MW-1801A	6/11/2018	78.5	50.04	Surge with/ Pump	76	No	NM	Clear					Y	
	6/28/2018		49.89	Surge with/ Pump	37	No	14.8	Clear						
				Total Removed	**113**									
MW-1801B	6/7/2018	226.1	79.2	Surge with/ Pump	40	Yes	NM	Silty - Red					N	
	6/28/2018		223.8	Surge with/ Pump	1	Yes	NM	Silty - Red						
				Total Removed	**41**									
MW-1801C	6/6/2018	264.2	70.93	Surge with/ Pump	90	No	NM	Silty					N	
	6/7/2018		171.9	Surge with/ Pump	82	No	NM	Silty						
	6/18/2018		95.05	Surge with/ Pump	22	No	NM	Cloudy						
	6/19/2018		194.4	Surge with/ Pump	39	No	NM	Cloudy						
	6/28/2018		82.14	Surge with/ Pump	75	No	NM	Cloudy						
	6/29/2018		119.94	Surge with/ Pump	55	No	NM	Cloudy						
				Total Removed	**363**									
MW-1802A	5/31/2018	69.52	55.59	Surge with/ Pump	5	Yes	NM	Heavy Silt	7/3/2018	100	97	<1000	N	N
	6/20/2018		56.15	Surge with/ Pump	5	Yes	NM	Cloudy						
	7/13/2018		56.6	Surge with/ Pump	6	Yes	NM	Cloudy						
	7/14/2018		Top of Pump	Surge with/ Pump	2	Yes	NM	Cloudy						
	7/16/2018		63	Surge with/ Pump	4	Yes	NM	Cloudy						
	7/17/2018		Top of Pump	Surge with/ Pump	3	Yes	NM	Cloudy						
	7/19/2018		Top of Pump	Surge with/ Pump	2.5	Yes	78.8	Cloudy						
				Total Removed	**27.5**									
MW-1802B	5/30/2018	199.7	113.6	Surge with/ Pump	15	Yes	NM	Heavy Silt	7/3/2018	100	97	<1000	N	Y
	6/20/2018		182.7	Surge with/ Pump	10.3	Yes	NM	Cloudy-Red						
				Total Removed	**25.3**									
MW-1803B	5/30/2018	199.4	127.58	Surge with/ Pump	16	Yes	NM	Silty	7/3/2018	100	60	<1000	N	Y
	6/20/2018		187.7	Surge with/ Pump	10.8	Yes	NM	Cloudy-Red						
	7/2/2018		196.04	Surge with/ Pump	38	yes	NM	Cloudy-Red						
				Total Removed	**64.8**									
MW-1804A	6/1/2018	50.85	16.76	Surge with/ Pump	65	No	NM	Clear	6/27/2018	--	33	CLEARING	N	N
	7/3/2018		15.6	Surge with/ Pump	50	No	NM	Clear						
				Total Removed	**115**									
MW-1804B	6/1/2018	180.45	19.58	Surge with/ Pump	35	Yes	NM	Cloudy	6/27/2018	100	85	>1000 NTU	N	Y
	6/21/2018		147.45	Surge with/ Pump	5	Yes	NM	Heavy Silt						
				Total Removed	**40**									

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Well Development Summary Table
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Monitoring Well ID	Development Event Date	Depth to Bottom (ft below TOC)	Depth to Water (ft below TOC)	Method	Water Volume Summary (gallons)	Purged Dry?	Turbidity (NTU)	Clarity	Well Flush Date	Volume Jetted (Gallons)	Volume Recovered/ Pumped (Gallons)	Turbidity/ Clarity	Well Stable (Y/N)	Well Dry (Y/N)
MW-1805B	6/4/2018	215.5	41.35	Surge with/ Pump	35	Yes	NM	Cloudy	6/26/2018	150	97	>1000 NTU	N	Y
	6/21/2018		199.92	Surge with/ Pump	5	Yes	NM	Heavy Silt						
	6/22/2018		Top of Pump	Surge with/ Pump	4	Yes	NM	Cloudy						
	7/3/2018		Dry	**Total Removed**	**44**	NA	NM	NA						
MW-1805C	6/4/2018	265.55	210	Surge with/ Pump	25	Yes	NM	Heavy Silt	6/26/2018	100	100	>1000 NTU	N	Y
	6/21/2018		261	Surge with/ Pump	5	Yes	NM	Heavy Silt						
	6/22/2018		Top of Pump	Surge with/ Pump	2	Yes	NM	Heavy Silt						
				Total Removed	**32**									
MW-1806A	6/5/2018	83.5	22.61	Surge with/ Pump	45	No	NM	Cloudy	6/27/2018	150	270	27 NTU	Y	N
	6/21/2018		26.6	Surge with/ Pump	70	No	NM	Cloudy						
	6/22/2018		26.55	Surge with/ Pump	138	No	NM	Cloudy						
	6/25/2018		26.32	Surge with/ Pump	0	No	NM	Cloudy						
	6/27/2018		26.27	Surge with/ Pump	50	No	27	Clear						
				Total Removed	**303**									
MW-1806B	6/5/2018	213.75	155	Surge with/ Pump	14	Yes	NM	Heavy Silt	6/26/2018	150	150	>1000 NTU	N	Y
				Total Removed	**14**									
MW-1806C	6/5/2018	258.47	27.8	Surge with/ Pump	60	Yes	NM	Cloudy	6/26/2018	150	152.5	>1000 NTU	N	Y
	6/21/2018		241.01	Surge with/ Pump	8	Yes	NM	Cloudy						
	6/22/2018		253.25	Surge with/ Pump	0.5	Yes	NM	Cloudy						
	7/3/2018		255	Surge with/ Pump	2.5	Yes	NM	Cloudy						
				Total Removed	**71**									
MW-3	7/12/2018	312.2	273	Surge with/ Pump	29	Yes	NM	Cloudy						
				Total Removed	**29**									
MW-4	7/12/2018	249.1	232	Surge with/ Pump	15	Yes	NM	Cloudy						
				Total Removed	**15**									
MW-5	7/12/2018	112.1	32.9	Surge with/ Pump	35	Yes	5.4	Cloudy to clear						
				Total Removed	**35**									
Upgradient/Background														
MW-1802C	5/30/2018	276.4	110.6	Surge with/ Pump	25	Yes	NM	Cloudy	7/3/2018	100	100	<1000	N	N
	6/20/2018		214	Surge with/ Pump	50	Yes	NM	Cloudy						
	7/3/2018		252.35	Surge with/ Pump	3.5	Yes	NM	Cloudy						
	7/13/2018		Top of Pump	Surge with/ Pump	2.5	Yes	NM	Cloudy						
	7/14/2018		Top of Pump	Surge with/ Pump	2	Yes	NM	Cloudy						
	7/16/2018		Top of Pump	Surge with/ Pump	0.5	Yes	NM	Cloudy						
	7/19/2018		Top of Pump	Pump	0.5	Yes	250	Cloudy						
				Total Removed	**89**									

Table D-1
Well Development Summary Table
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Monitoring Well ID	Development Event Date	Depth to Bottom (ft below TOC)	Depth to Water (ft below TOC)	Method	Water Volume Summary (gallons)	Purged Dry?	Turbidity (NTU)	Clarity	Well Flush Date	Volume Jetted (Gallons)	Volume Recovered/ Pumped (Gallons)	Turbidity/ Clarity	Well Stable (Y/N)	Well Dry (Y/N)
MW-1803C	5/30/2018	276	252.25	Surge with/ Pump	3	Pump Clogged	NM	Heavy Silt	7/3/2018	100	100	>1000	N	Y
	6/20/2018		266.9	Surge with/ Pump	5	Yes	NM	Heavy Silt						
	7/2/2018		269.15	Surge with/ Pump	45	Yes	NM	Heavy Silt						
	7/13/2018		270.84	Surge with/ Pump	2	Yes	NM	Heavy Silt						
				Total Removed	**55**									
MW-1807A	6/12/2018	118.1	96.66	Surge with/ Pump	34	No	NM	Heavy Silt	7/10/2018	NA	NA	4.3	Y	N
	6/13/2018		105.67	Surge with/ Pump	18.5	No	NM	Heavy Silt						
	6/15/2018		106.8	Surge with/ Pump	52	No	NM	Heavy Silt						
	7/4/2018		106	Surge with/ Pump	20	No	NM	Clear						
	7/9/2018		107.9	Pump	50	No	>500	Clear						
	7/10/2018		107.5	Pump	40	No	4.3	Clear						
				Total Removed	**215**									
MW-1807B	6/12/2018	155.7	88.41	Surge with/ Pump	65	No	NM	Heavy Silt	7/10/2018	NA	NA	7.2	Y	N
	6/13/2018		123.4	Surge with/ Pump	59	No	NM	Turbid red-br						
	6/15/2018		124.3	Surge with/ Pump	119	No	NM	Heavy Silt						
	7/4/2018		123.5	Surge with/ Pump	20	No	NM	Slightly Cloudy						
	7/9/2018		124.64	Pump	35	No	>1000	Slightly Cloudy						
	7/10/2018		124.25	Pump	72.5	No	7.2	Clear						
				Total Removed	**371**									
MW-1808A	6/18/2018	112.71	81.51	Surge with/ Pump	16.5	No	NM	Silty				23.3	Y	
	6/19/2018		83.08	Surge with/ Pump	115.5	No	NM	Silty						
	6/20/2018		82.8	Surge with/ Pump	126	No	23.3	Clear						
				Total Removed	**258**									
MW-1808B	6/14/2018	161	21.5	Surge with/ Pump	20	Yes	NM	Heavy Silt	6/26/2018	150	145	>1000	N	Y
	6/15/2018		135.35	Surge with/ Pump	3.5	Yes	NM	Heavy Silt						
	6/18/2018		141.15	Surge with/ Pump	0	Yes	NM	Heavy Silt						
	6/22/2018		141.8	Surge with/ Pump	2	Yes	NM	Heavy Silt						
	7/4/2018		140.33	Surge with/ Pump	2	Yes	>1000	Cloudy						
	7/11/2018		154.36	Surge with/ Pump	5	Yes	>1000	Cloudy						
				Total Removed	**33**									

Table D-1
Well Development Summary Table
AEP Amos Generating Plant - Fly Ash Pond
Winfield, West Virginia

Monitoring Well ID	Development Event Date	Depth to Bottom (ft below TOC)	Depth to Water (ft below TOC)	Method	Water Volume Summary (gallons)	Purged Dry?	Turbidity (NTU)	Clarity	Well Flush Date	Volume Jetted (Gallons)	Volume Recovered/ Pumped (Gallons)	Turbidity/ Clarity	Well Stable (Y/N)	Well Dry (Y/N)
MW-1808C	6/14/2018	243	125.35	Surge with/ Pump	52.5	No	NM	Heavy Silt					N	
	6/15/2018		190.91	Surge with/ Pump	15	No	NM	Heavy Silt						
	6/18/2018		169.24	Surge with/ Pump	23.5	Yes	NM	Heavy Silt						
	6/19/2018		194.82	Surge with/ Pump	15.5	Yes	NM	Heavy Silt						
	7/3/2018		161.1	Surge with/ Pump	18.5	Yes	NM	Heavy Silt						
	7/4/2018		197.31	Surge with/ Pump	14	Yes	NM	Heavy Silt						
	7/11/2018		169.95	Surge with/ Pump	23	Yes	NM	Cloudy						
	7/12/2018			Pump			<50							
				Total Removed	**162**									
MW-1809A	4/25/2018	75.12	48.95	Surge with/ Pump	30	No	NM	Cloudy					N	
	4/26/2018		50.4	Surge with/ Pump	40	No	NM	Clear						
				Total Removed	**70**									
MW-1810A	4/4/2018	83.71	67.9	Surge with/ Pump	68	No	NM	Cloudy					N	
				Total Removed	**68**									

NOTES:
Minimum purge volume is whichever is greater; 2x the volume of water introduced during drilling or 3x/10x the calculated well volume
If the well can be purged dry, 3x the well volume is the minimum target volume (unless 2x the volume of water introduced is greater)
If the well cannot be purged dry, 10x the well volume is the required minimum volume under west virginia law (unless 2x the volume of water introduced is greater)
ft = feet
bgs = below ground surface
amsl = above mean sea level
-- = not applicable
SRF = Stress Relief Fracture System
U = Upper Connellsville sandstone
C = Clarksburg disconformity (fissile shale and adjacent shale/sandstone
M = Morgantown sandstone and adjacent shale

APPENDIX E

Groundwater Model Details

APPENDIX E

GROUNDWATER FLOW MODEL SUMMARY

Introduction

Arcadis U.S., Inc. (Arcadis) developed a three-dimensional groundwater numerical flow model for the American Electric Power Service Corporation (AEP) Generating Plant (Plant) located on Winfield Road in Winfield, West Virginia to understand current hydrogeologic conditions and post-closure conditions after liner installation at the fly ash pond (FAP, CCR Unit). The groundwater flow model was constructed using the USGS MODFLOW code (McDonald and Harbaugh 1988) and utilized all available groundwater level data, aquifer testing data and lithologic data collected at the FAP (Site). The modeling discussed herein represents an update to the existing model developed for the Site (Arcadis, 2013). The primary objectives of the model updates are:

- Assess migration potential of site-related constituents of concern (COCs) under FAP closure condition; and
- Provide analytical parameters (i.e., groundwater flow directions and dilution factor) for geochemical evaluation and risk assessment to appraise potential changes in groundwater quality as well as possible impact to receptors from offsite migration and discharge of site-related COCs to adjacent surface water bodies.

Conceptual Site Model Updates

To assist with the update of the numerical model, a visual three-dimensional conceptual site model (CSM) of the Site was developed using Earth Volumetric Studio (EVS [Ctech, 2017]). The model was generated by sequential creation of various hydrostratigraphic model layers (geospatial, followed by hydrostratigraphic modeling) as well as other Site components as part of the CSM development. This visual model was created in a systematic fashion as follows:

- The topographical layer in the model was generated using the site geospatial and survey data (where available) as well as the digital elevation model (DEM) for the area from the geospatial database. The aerial and the various site features were imported from the geospatial database.
- The hydrostratigraphic model layers were developed by importing all site lithological logs from gINT format files, whereby the contacts of each geologic unit were identified based on the thorough review of each lithology boring and were then correlated to generate the geological surface. The hydrostratigraphic model was developed based on interpolation of the geological surfaces. These surfaces served as input to the updated numerical groundwater flow model.
- The onsite monitoring wells were also imported within the model based on well construction information.

- The ash volume was also represented by intruding between the ground surface that is prior to ash filling into the valley and the final construction surface of the fly ash pond.
- The other hydrologic features (i.e., surface water bodies) and dam structures were also incorporated into the visual three-dimensional CSM.

Numerical Groundwater Flow Model Development and Update

Model Discretization

The groundwater model grid covers an area of approximately 6.3 square miles. The horizontal finite-difference grid remains composed of 474 columns and 373 rows with grid spacing ranging from 10 ft by 10 ft in the vicinity of the Site to 90 ft by 90 ft along the most distant model boundaries. The model domain was designed to reflect all relevant hydraulic features within the surrounding area (i.e., Kanawha River and Bills Creek) and were located a sufficient distance from the Site to reduce the potential for boundary effects on simulated results. The model was rotated approximately 20 degrees counterclockwise to align with the prevailing groundwater flow directions at the Site and natural hydrologic boundaries.

The primary model updates involved modification of the model structure to reflect the updated hydrostratigraphic interpretation from the visual three-dimensional CSM. The revised groundwater model was discretized vertically into ten (10) model layers to provide a vertical profile representative of the Site hydrostratigraphic framework. Model layers 1 through 4 correspond to alternating sandstone and shale units including the Upper Connellsville sandstone and Lower Connellsville sandstone with silty to shaley interbeds. Model layers 5, 6, 7 and 8 correspond to the Clarksburg shale with siltstone and sandstone interbeds, Clarksburg highly fractured and weathered shale zone, Clarksburg shale with siltstone and sandstone interbeds and the Morgantown sandstone, respectively. Model layers 9 and 10 represent Birmingham red beds/shale with occasional sandstone (Graffton sandstone) and deep sandstone units, respectively.

Hydraulic Parameters

In the existing 2013 groundwater flow model, a background hydraulic conductivity value was assigned to each layer, with additional zones representing the fly ash pond (open water), upper fly ash, compacted fly ash, the fly ash impoundment dam, and alluvial material in the vicinity of the Kanawha River. Values of horizontal and vertical hydraulic conductivity for each of the model zones and layers are generally based upon hydraulic conductivity estimates for the appropriate material types and were varied during model calibration and sensitivity analysis. During the model updates, a new hydraulic conductivity zone was incorporated into the model to represent stress relief fracturing (SRF) discussed in Section 2.4 of this report. The hydraulic conductivity parameter values of the SRF and other zones representing the various hydrostratigraphic units were further adjusted in the model calibration process within a reasonable range as dictated by additional hydraulic testing results and regional hydrogeologic information. Given the importance of the SRF as a conduit for flow, the values of hydraulic conductivity for the SRF zones are generally much higher than values used to represent the less fractured portions of the units within each model layer.

Boundary Conditions

Similar to the existing 2013 model, the updated flow model includes six types of boundary conditions: no flow, river (head dependent flow) to represent Kanawha River, drains (head dependent flow) to represent localized streams (i.e., Bills Creek), well (constant flux) for pumping wells, and groundwater recharge (constant flux). No changes were made to any boundary conditions from the existing 2013 model during the steady-state recalibration process except for the estimated rate of recharge and the drain cell configuration. The drain boundaries were re-assigned in each layer based on updated model structure.

Groundwater Flow Model Calibration

Steady State Calibration

After the model structural updates were completed, the groundwater flow model was re-calibrated to 2012 observed groundwater levels. The model was calibrated to water level data from monitoring wells across the Site. The use of point data eliminates the potential for interpretive bias that may result from attempting to match a contoured potentiometric surface (Konikow 1978; Anderson and Woessner 1992). During the steady-state model revision, flow calibration was performed to satisfy the following equations within pre-determined acceptance criteria (Arcadis 2013):

$$RSTD = \sqrt{\frac{RSS}{n - p}} \qquad \text{(Eq.3-1)}$$

and

$$\bar{e} = \frac{1}{n} \sum_{i=1}^{n} e_i \qquad \text{(Eq.3-2)}$$

where RSTD is the residual standard deviation, RSS is the residual sum of squares, and e is the mean of all residuals. The residual is simply defined as the difference between the observed and simulated water level elevation measured at a target location.

Model recalibration was achieved by adjusting relevant hydraulic parameters and zone extents until simulated conditions closely matched the observed conditions. The simulated groundwater flow condition of the re-calibrated steady-state model was then used as the starting condition for the transient model calibration for the FAP closure period.

Transient Model Development

The transient or time-variant model was built to dynamically simulate the hydraulic variation within the impoundment prior to and during the geosynthetic cap installation.

For the transient model setup, the reclaimed water well was removed from the steady-state model as it was no longer operated during the liner installation based on communication with AEP staff. In addition, a dewatering well (DW-1) was introduced within the impoundment area near multi-port well STN-4-1 and was operated periodically during the construction phases.

Additionally, recharge zones were added within the FAP area and recharge values were adjusted to simulate the effect of liner installation processes from 2014 to 2017. The deployment of the geomembrane liner during Phase I construction began on June 25, 2015 and was completed on November 5, 2015 with 455 geomembrane panels installed. During Phase II construction, installation of the geomembrane began on May 31, 2016 and was completed on September 15, 2016 with 300 panels installed. During phase III construction, installation of the geomembrane began on April 13, 2017 was completed on July 15, 2017 with 81 panels installed. Based on this information, the simulation period was divided into 52 monthly stress periods to represent the temporal variations in precipitation recharge, aquifer storage, and groundwater levels.

Transient Model Calibration

The transient model was calibrated to time-varying groundwater levels collected from monitoring wells and piezometers between April 2014 and October 2018 by adjusting relevant storage parameters, dewatering well (DW-1) pumping rate, and the precipitation recharge distribution. **Figures 7A**, **7B** and **7C** illustrates the simulated groundwater elevation contours that represent October 2018 hydrologic conditions in the primary groundwater aquifer units at the Site (i.e. model layers 2, 6 and 8 representing Upper Connellsville sandstone, Clarksburg highly fractured and weathered shale zone, and Morgantown sandstone, respectively). As shown on **Figure 7A**, groundwater flows towards the Fly Ash Pond in the Upper Connellsville sandstone (model layer 2) from surrounding mountainous areas to the northwest and northeast and moves vertically downward to the lower layers. In model layer 6 (**Figure 7B**), outward radial flow patterns are maintained at the base of the impoundment, and groundwater discharges to the nearby surface water features (e.g., Bills Creek and Little Scary Creek) and migrates through SRF zones along the edge of the mountain to the deeper hydrogeologic units. In model layer 8 (i.e. Morgantown sandstone; **Figure 7C**), groundwater transmitted through SRF zones from the upper hydrogeologic units either discharges towards the Little Scary Creek and unnamed creek southwest of the dam, or continues to migrate vertically downward to Birmingham red beds and deep sandstone units and eventually discharges to the Kanawha River to the southeast. Overall, transient modeling results indicate that the simulated groundwater elevations have decreased up to approximately 10 feet from pre-closure conditions within the FAP area.

Pathline Analysis

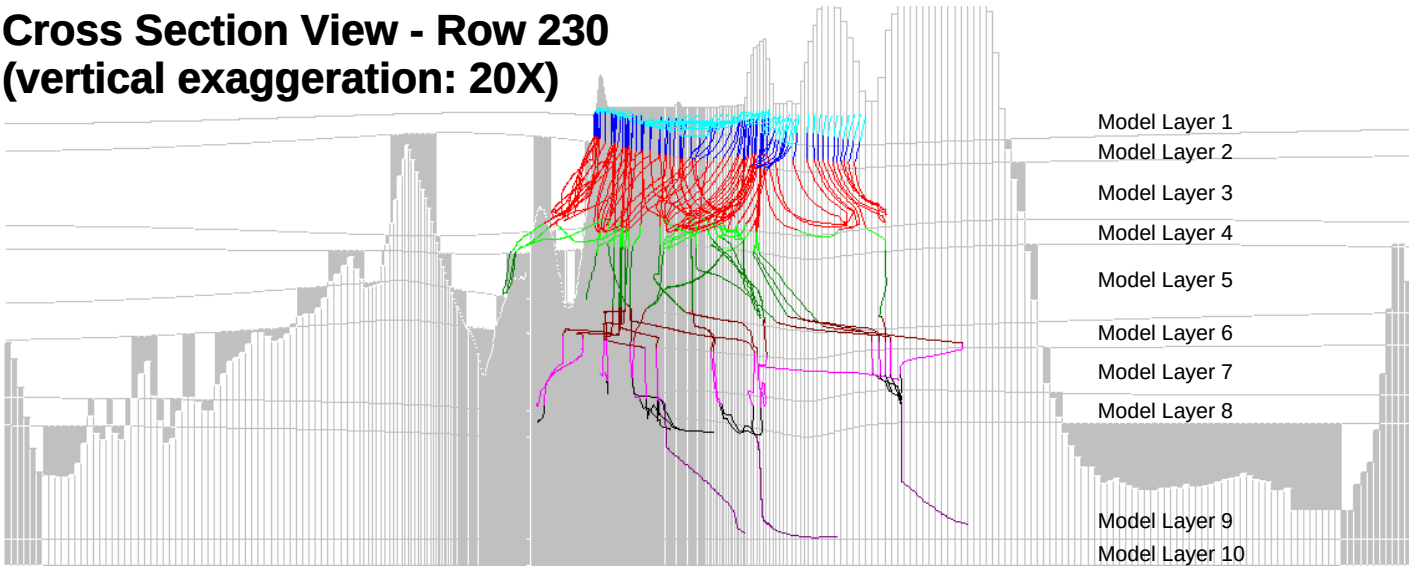
A forward pathline analysis conducted using MODPATH (Pollock 1989) assisted in identifying the general flow patterns towards each monitoring well and surface water features. Particles were started in model layer 1 along the perimeter of the saturated fly ash deposit. Pathline analysis (**Figure E-1**) indicated that particles move laterally in model layer 1 within the FAP and then downward to model layers 2 to 9 with a simultaneous horizontal and downward trajectory. Particles generally show flow towards surface water features in model layers 2 through 8 with some of particles migrating to deeper layers where they ultimately discharge to the Kanawha River in model layer 9.

References

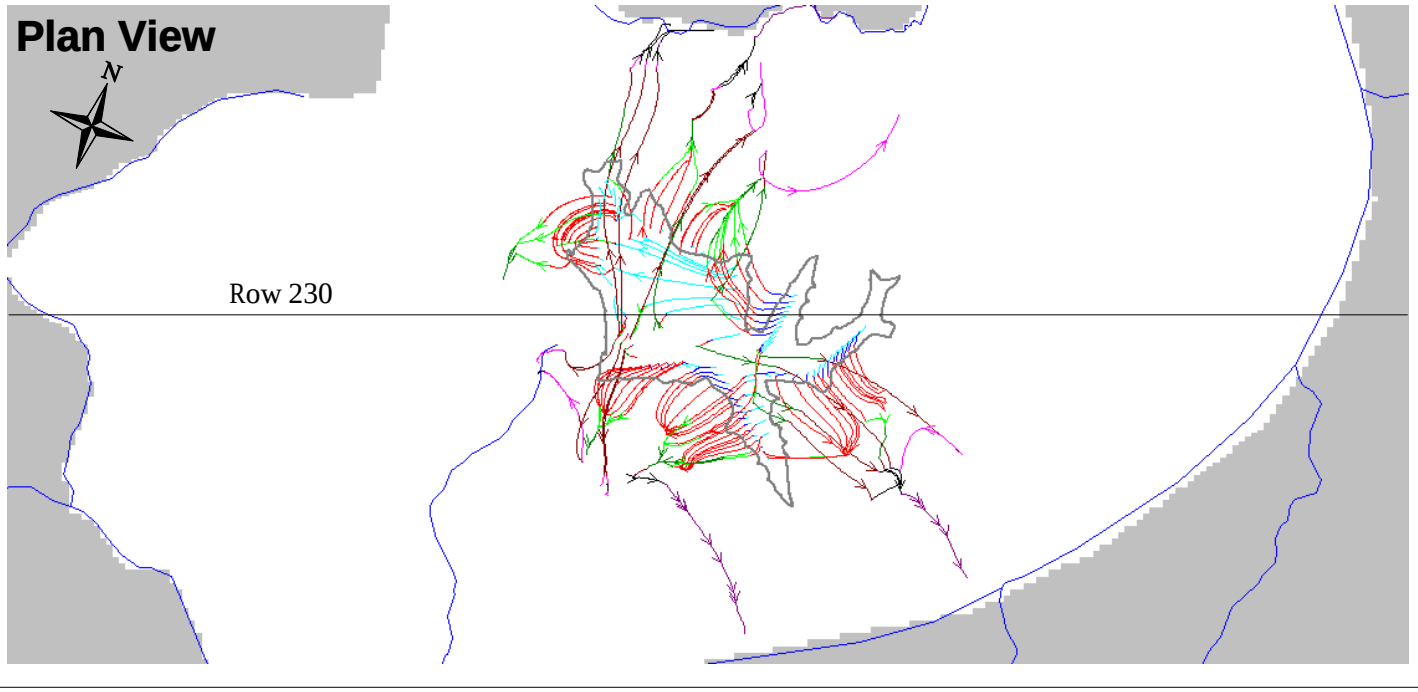
McDonald, M.G. and Harbaugh, A.W. 1988. A modular three-dimensional finite difference groundwater flow model: U.S. Geological Survey Techniques of Water Resources Investigations Book 6, Chapter A1.

Pollock, D.W. 1989. Documentation of computer programs to compute and display pathlines using results from the U.S. Geological Survey modular three-dimensional finite-difference ground-water flow model. U.S. Geological Survey Open-File Report 89-381.

Cross Section View - Row 230 (vertical exaggeration: 20X)



Plan View



Model Grid

Inactive Area (model no-flow boundary)

CCR Unit Boundary

Rivers and Streams

L1 Pathline (Conemaugh shale)

L2 Pathline (Upper Connellsville sandstone)

L3 Pathline (Shale with siltstone)

L4 Pathline (Lower Connellsville sandstone)

L5 Pathline (Clarksburg shale)

L6 Pathline (Clarksburg fractured shale)

L7 Pathline (Clarksburg shale with siltstone)

L8 Pathline (Morgantown sandstone)

L9 Pathline (Birmingham Red Beds)

Simulated Particle Pathline
(each arrow represents 5-year travel time)

AEP AMOS GENERATING PLANT - FLY ASH POND
WINFIELD ROAD
WINFIELD, WEST VIRGINIA

SIMULATED GROUNDWATER PATHLINES
TRANSIENT MODEL - OCTOBER 2018

ARCADIS

FIGURE
E-1

APPENDIX F

Hydraulic Testing Results

ARCADIS

Packer Test Logs

BEDROCK INJECTION PACKER TESTING LOG

Boring No.	MW-1801	Contractor	AEP	Page	1	of	1
Project	Amos FAP	Project No.	WV015976.0005	Arcadis Staff	Allan Gillespie		
Site Location	Winfield, WV			Date	2/1/2018		

Base of Top Packer (ft bgs/ft amsl)	175.0	725.39	Surface Elevation (ft amsl)	900.39
Top of Bottom Packer (ft bgs/ft amsl)	185.0	715.39	Distance from Gauge to Ground Surface (ft)	6.2
Depth to Water Prior to Install (ft bgs/ft amsl)	28.9	871.49	Diameter of Boring (inches)	3.0
Depth to Water After Install (ft bgs/ft amsl)	28.9	871.49		

Test 1

Constant Pressure (psi) 30

Elapsed Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0	62.40	0.0	N/A
1	62.90	0.5	N/A
2	63.40	0.5	N/A
3	63.90	0.5	N/A
4	64.40	0.5	N/A
5	65.00	0.5	N/A
10	67.70	0.5	N/A
15	68.70	0.4	N/A
20			
25			
30			

Test 2

Constant Pressure (psi) 60

Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0	70.00	0.0	N/A
1	71.30	1.3	N/A
2	72.60	1.3	N/A
3	74.00	1.3	N/A
4	75.10	1.3	N/A
5	76.50	1.3	N/A
10	83.70	1.4	N/A
15	90.20	1.3	N/A
20	96.90	1.3	N/A
25	103.30	1.3	N/A
30	108.40	1.3	N/A

Pre-Test 1

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Pre-Test 2

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Notes:
ft bgs- feet below ground surface
gpm - gallons per minute
cm/s - centimeters per second
psi - pounds per square inch
ft amls - feet above mean sea level
NA - not available
N/A - not applicable
NR - not recorded

Test 1

Q =	9.4E-04	ft^3/s
h1 =	35.1	ft
h2 =	69.21	ft
H =	104.3	ft
r =	0.12	ft
A =	10.0	ft
A/r =	80.5	unitless
Cs =~	110	unitless
K =	2.0E-05	cm/s

Zone 3
Method 2

$$K = \frac{Q}{C_s r H}$$

Test 2

Q =	2.9E-03	ft^3/s
h1 =	35.1	ft
h2 =	138.4	ft
H =	173.5	ft
r =	0.1	ft
A =	10.0	ft
A/r =	80.5	unitless
Cs =~	110	unitless
K =	3.7E-05	cm/s

Q= flow rate
h1 = distance between gage and water table
h2 = applied pressure at gage
H = h1+h2 = effective head
r = radius of test hole
A = length of test section
Cs = conductivity coefficient

Reference

US Department of Interior, Ground Water Manual, 1977, Packer Test Solution

BEDROCK INJECTION PACKER TESTING LOG

Boring No.	MW-1803	Contractor	AEP	Page	1	of	1
Project	Amos FAP	Project No.	WV015976.0005	Arcadis Staff	Allan Gillespie		
Site Location	Winfield, WV			Date	1/29/2018		

Base of Top Packer (ft bgs/ft amsl)	60.0	844.04	Surface Elevation (ft amsl)	904.04
Top of Bottom Packer (ft bgs/ft amsl)	70.0	834.04	Distance from Gauge to Ground Surface (ft)	6.2
Depth to Water Prior to Install (ft bgs/ft amsl)	24.0	880.04	Diameter of Boring (inches)	3.0
Depth to Water After Install (ft bgs/ft amsl)	24.0	880.04		

Test 1

Constant Pressure (psi) 30

Elapsed Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0	109.40	0.0	N/A
1	109.90	0.5	N/A
2	110.20	0.4	N/A
3	110.50	0.4	N/A
4	110.70	0.3	N/A
5	111.00	0.3	N/A
10	112.20	0.3	N/A
15	112.60	0.2	N/A
20	113.30	0.2	N/A
25			
30			

Test 2

Constant Pressure (psi)

Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0			
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			

Pre-Test 1

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Pre-Test 2

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Notes:
ft bgs- feet below ground surface
gpm - gallons per minute
cm/s - centimeters per second
psi - pounds per square inch
ft amls - feet above mean sea level
NA - not available
N/A - not applicable
NR - not recorded

Test 1

Q =	4.3E-04	ft^3/s
h1 =	30.2	ft
h2 =	69.21	ft
H =	99.4	ft
r =	0.12	ft
A =	10.0	ft
A/r =	80.5	unitless
Cs =~	110	unitless
K =	9.8E-06	cm/s

Zone 3
Method 2

$$K = \frac{Q}{C_s r H}$$

Test 2

Q =	ft^3/s
h1 =	ft
h2 =	ft
H =	ft
r =	ft
A =	ft
A/r =	unitless
Cs =~	unitless
K =	cm/s

Q= flow rate
h1 = distance between gage and water table
h2 = applied pressure at gage
H = h1+h2 = effective head
r = radius of test hole
A = length of test section
Cs = conductivity coefficient

Reference
US Department of Interior, Ground Water Manual, 1977, Packer Test Solution

BEDROCK INJECTION PACKER TESTING LOG

Boring No.	MW-1805	Contractor	AEP	Page	1	of	1
Project	Amos FAP	Project No.	WV015976.0005	Arcadis Staff	Allan Gillespie		
Site Location	Winfield, WV			Date	2/14/2018		

Base of Top Packer (ft bgs/ft amsl)	247.0	635.32	Surface Elevation (ft amsl)	882.32
Top of Bottom Packer (ft bgs/ft amsl)	257.0	625.32	Distance from Gauge to Ground Surface (ft)	4.2
Depth to Water Prior to Install (ft bgs/ft amsl)	19.1	863.22	Diameter of Boring (inches)	3.0
Depth to Water After Install (ft bgs/ft amsl)	19.1	863.22		

Test 1

Constant Pressure (psi) 60

Elapsed Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0		0.0	N/A
1		0.0	N/A
2		0.0	N/A
3		0.0	N/A
4		0.0	N/A
5		0.0	N/A
10		0.0	N/A
15		0.0	N/A
20		0.0	N/A
25			
30			

Test 2

Constant Pressure (psi) 100

Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0	83.40	0.0	N/A
1	83.80	0.4	N/A
2	84.00	0.3	N/A
3	84.20	0.3	N/A
4	84.50	0.3	N/A
5	84.80	0.3	N/A
10	86.30	0.3	N/A
15	87.60	0.3	N/A
20	88.80	0.3	N/A
25	90.10	0.3	N/A
30	91.30	0.3	N/A

Pre-Test 1

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Pre-Test 2

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Notes:
ft bgs- feet below ground surface
gpm - gallons per minute
cm/s - centimeters per second
psi - pounds per square inch
ft amls - feet above mean sea level
NA - not available
N/A - not applicable
NR - not recorded

Test 1

Q =		ft^3/s
h1 =		ft
h2 =		ft
H =		ft
r =		ft
A =		ft
A/r =		unitless
Cs =~		unitless
K =		cm/s

Zone 3
Method 2

$$K = \frac{Q}{C_s r H}$$

Test 2

Q =	5.9E-04	ft^3/s
h1 =	23.3	ft
h2 =	230.7	ft
H =	254.0	ft
r =	0.1	ft
A =	10.0	ft
A/r =	80.5	unitless
Cs =~	110	unitless
K =	5.2E-06	cm/s

Q= flow rate
h1 = distance between gage and water table
h2 = applied pressure at gage
H = h1+h2 = effective head
r = radius of test hole
A = length of test section
Cs = conductivity coefficient

Reference

US Department of Interior, Ground Water Manual, 1977, Packer Test Solution

BEDROCK INJECTION PACKER TESTING LOG

Boring No.	MW-1806	Contractor	AEP	Page	1 of 1
Project	Amos FAP	Project No.	WV015976.0005	Arcadis Staff	Allan Gillespie
Site Location	Winfield, WV			Date	4/4/2018

Base of Top Packer (ft bgs/ft amsl)	225.0	663.96	Surface Elevation (ft amsl)	888.96
Top of Bottom Packer (ft bgs/ft amsl)	235.0	653.96	Distance from Gauge to Ground Surface (ft)	3.3
Depth to Water Prior to Install (ft bgs/ft amsl)	10.0	878.96	Diameter of Boring (inches)	3.0
Depth to Water After Install (ft bgs/ft amsl)	1.0	887.96		

Test 1

Constant Pressure (psi) 60

Elapsed Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0	0.00	0.0	N/A
1	10.10	10.1	N/A
2	22.50	11.3	N/A
3	30.40	10.1	N/A
4	41.40	10.4	N/A
5	51.80	10.4	N/A
10	96.80	9.7	N/A
15	141.00	9.4	N/A
20			
25			
30			

Test 2

Constant Pressure (psi) 100

Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0	0.00	0.0	N/A
1	14.50	14.5	N/A
2	29.20	14.6	N/A
3	43.60	14.5	N/A
4	57.10	14.3	N/A
5	75.90	15.2	N/A
10	147.60	14.8	N/A
15	225.20	15.0	N/A
20			
25			
30			

Pre-Test 1

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Pre-Test 2

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Notes:
ft bgs- feet below ground surface
gpm - gallons per minute
cm/s - centimeters per second
psi - pounds per square inch
ft amls - feet above mean sea level
NA - not available
N/A - not applicable
NR - not recorded

Test 1

Q =	2.1E-02	ft^3/s
h1 =	4.3	ft
h2 =	138.42	ft
H =	142.7	ft
r =	0.12	ft
A =	10.0	ft
A/r =	80.5	unitless
Cs =~	110	unitless
K =	3.3E-04	cm/s

Zone 3
Method 2

$$K = \frac{Q}{C_s r H}$$

Test 2

Q =	3.3E-02	ft^3/s
h1 =	4.3	ft
h2 =	230.7	ft
H =	235.0	ft
r =	0.1	ft
A =	10.0	ft
A/r =	80.5	unitless
Cs =~	110	unitless
K =	3.2E-04	cm/s

Q= flow rate
h1 = distance between gage and water table
h2 = applied pressure at gage
H = h1+h2 = effective head
r = radius of test hole
A = length of test section
Cs = conductivity coefficient

Reference
US Department of Interior, Ground Water Manual, 1977, Packer Test Solution

BEDROCK INJECTION PACKER TESTING LOG

Boring No.	MW-1808	Contractor	AEP	Page	1	of	1
Project	Amos FAP	Project No.	WV015976.0005	Arcadis Staff	Allan Gillespie		
Site Location	Winfield, WV			Date	4/23/2018		

Base of Top Packer (ft bgs/ft amsl)	215.0	642.52	Surface Elevation (ft amsl)	857.52
Top of Bottom Packer (ft bgs/ft amsl)	225.0	632.52	Distance from Gauge to Ground Surface (ft)	1.8
Depth to Water Prior to Install (ft bgs/ft amsl)	82.0	775.52	Diameter of Boring (inches)	3.0
Depth to Water After Install (ft bgs/ft amsl)	82.0	775.52		

Test 1

Constant Pressure (psi) 60

Elapsed Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0	10090	0.0	N/A
1	10091	1.0	N/A
2	10093	1.5	N/A
3	10095	1.7	N/A
4	10097	1.8	N/A
5	10101	2.2	N/A
10	10128	3.8	N/A
15	10156	4.4	N/A
20	10189	5.0	N/A
25	10228	5.5	N/A
30	10259	5.6	N/A

Test 2

Constant Pressure (psi)

Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0			
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			

Pre-Test 1

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Pre-Test 2

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Notes:
ft bgs- feet below ground surface
gpm - gallons per minute
cm/s - centimeters per second
psi - pounds per square inch
ft amls - feet above mean sea level
NA - not available
N/A - not applicable
NR - not recorded

Test 1

Q =	1.3E-02	ft^3/s
h1 =	83.8	ft
h2 =	138.42	ft
H =	222.2	ft
r =	0.12	ft
A =	10.0	ft
A/r =	80.5	unitless
Cs =~	110	unitless
K =	1.3E-04	cm/s

Zone 3
Method 2

$$K = \frac{Q}{C_s r H}$$

Test 2

Q =	ft^3/s
h1 =	ft
h2 =	ft
H =	ft
r =	ft
A =	ft
A/r =	unitless
Cs =~	unitless
K =	cm/s

Q= flow rate
h1 = distance between gage and water table
h2 = applied pressure at gage
H = h1+h2 = effective head
r = radius of test hole
A = length of test section
Cs = conductivity coefficient

Reference
US Department of Interior, Ground Water Manual, 1977, Packer Test Solution

BEDROCK INJECTION PACKER TESTING LOG

Boring No.	MW-1810	Contractor	AEP	Page	1	of	1
Project	Amos FAP	Project No.	WV015976.0005	Arcadis Staff	Allan Gillespie		
Site Location	Winfield, WV			Date	2/28/2018		

Base of Top Packer (ft bgs/ft amsl)	70.0	665.26	Surface Elevation (ft amsl)	735.26
Top of Bottom Packer (ft bgs/ft amsl)	80.0	655.26	Distance from Gauge to Ground Surface (ft)	6.2
Depth to Water Prior to Install (ft bgs/ft amsl)	10.0	725.26	Diameter of Boring (inches)	3.0
Depth to Water After Install (ft bgs/ft amsl)	10.0	725.26		

Test 1

Constant Pressure (psi) 30

Elapsed Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0	21.0	0.0	N/A
1	25.0	4.0	N/A
2	29.0	4.0	N/A
3	33.0	4.0	N/A
4	37.0	4.0	N/A
5	41.5	4.1	N/A
10	64.0	4.3	N/A
15	81.0	4.0	N/A
20	103.0	4.1	N/A
25	120.0	4.0	N/A
30	139.5	4.0	N/A

Test 2

Constant Pressure (psi)

Time (mins)	Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)
0			
1			
2			
3			
4			
5			
10			
15			
20			
25			
30			

Pre-Test 1

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Pre-Test 2

Duration _____ (mins) Pressure _____ (psi)

Flow Totalizer Readings (gallons)	Flow Rate (gpm)	Borehole Water Level (ft)

Notes:
ft bgs- feet below ground surface
gpm - gallons per minute
cm/s - centimeters per second
psi - pounds per square inch
ft amls - feet above mean sea level
NA - not available
N/A - not applicable
NR - not recorded

Test 1

Q =	8.8E-03	ft^3/s
h1 =	16.2	ft
h2 =	69.21	ft
H =	85.4	ft
r =	0.12	ft
A =	10.0	ft
A/r =	80.5	unitless
Cs =~	110	unitless
K =	2.3E-04	cm/s

Zone 3
Method 2

$$K = \frac{Q}{C_s r H}$$

Test 2

Q =	ft^3/s
h1 =	ft
h2 =	ft
H =	ft
r =	ft
A =	ft
A/r =	unitless
Cs =~	unitless
K =	cm/s

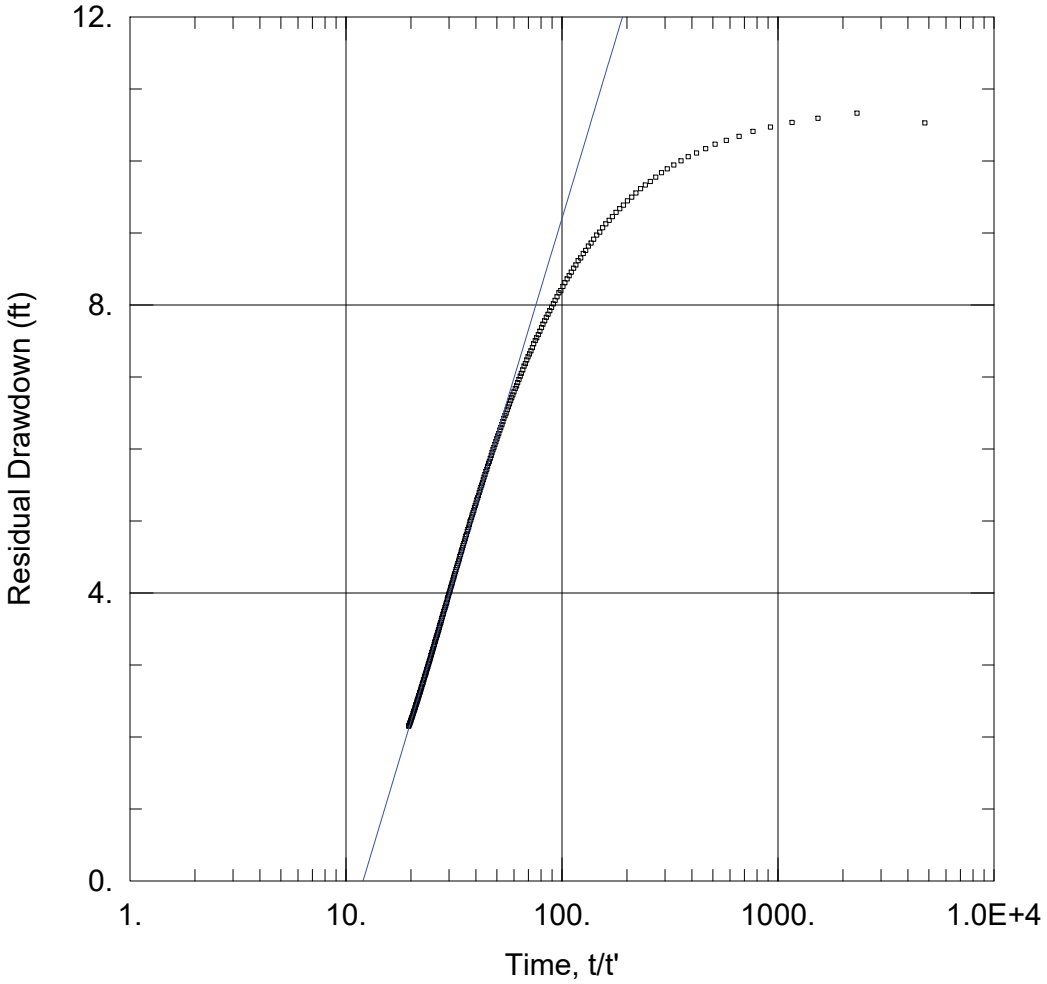
Q= flow rate
h1 = distance between gage and water table
h2 = applied pressure at gage
H = h1+h2 = effective head
r = radius of test hole
A = length of test section
Cs = conductivity coefficient

Reference
US Department of Interior, Ground Water Manual, 1977, Packer Test Solution

ARCADIS

Well Yield Tests

AQTESOLV Plots



MW-1 RECOVERY

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-1
Test Date: 4-5-2018

AQUIFER DATA

Saturated Thickness: 8.9 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-1	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
MW-1	0	0

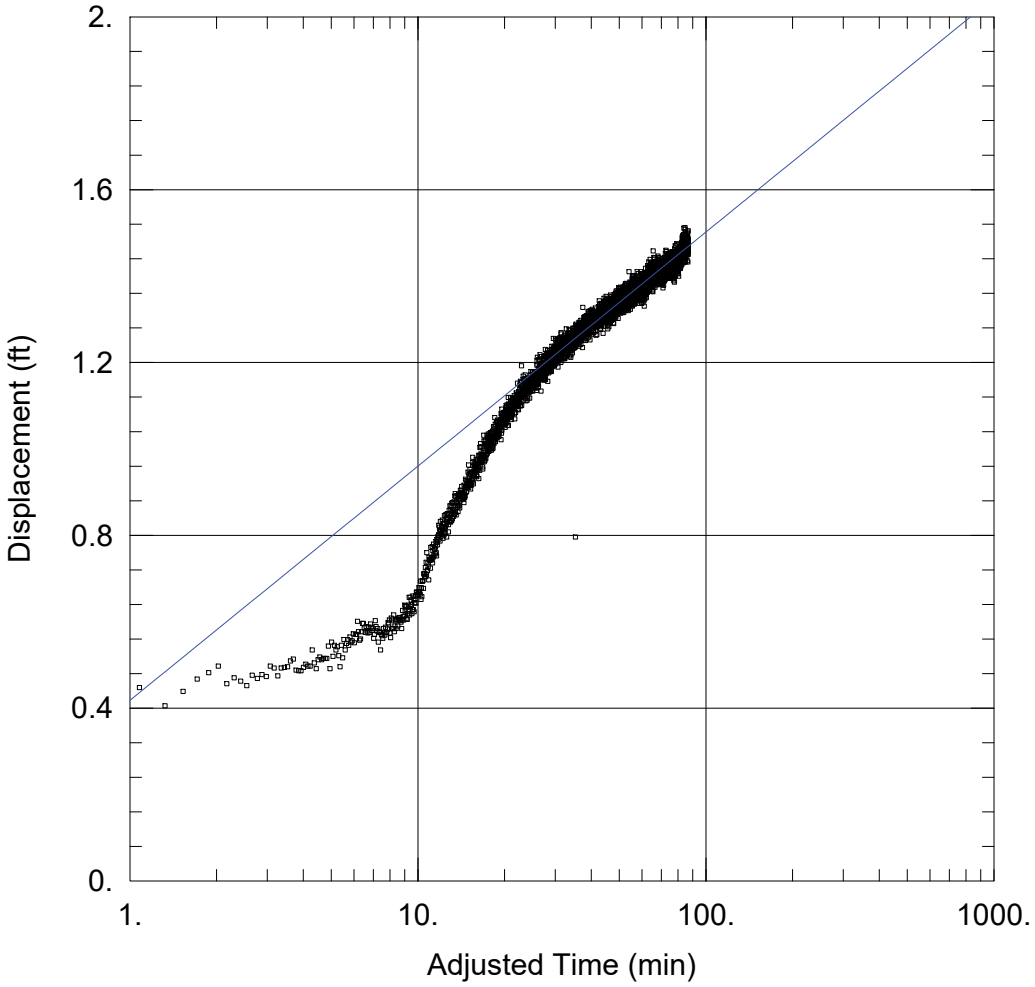
SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

T = 2.8 ft^2/day

S/S' = 12.



MW-2

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-2
Test Date: 3-23-2018

AQUIFER DATA

Saturated Thickness: 8.9 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-2	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
MW-2	0	0

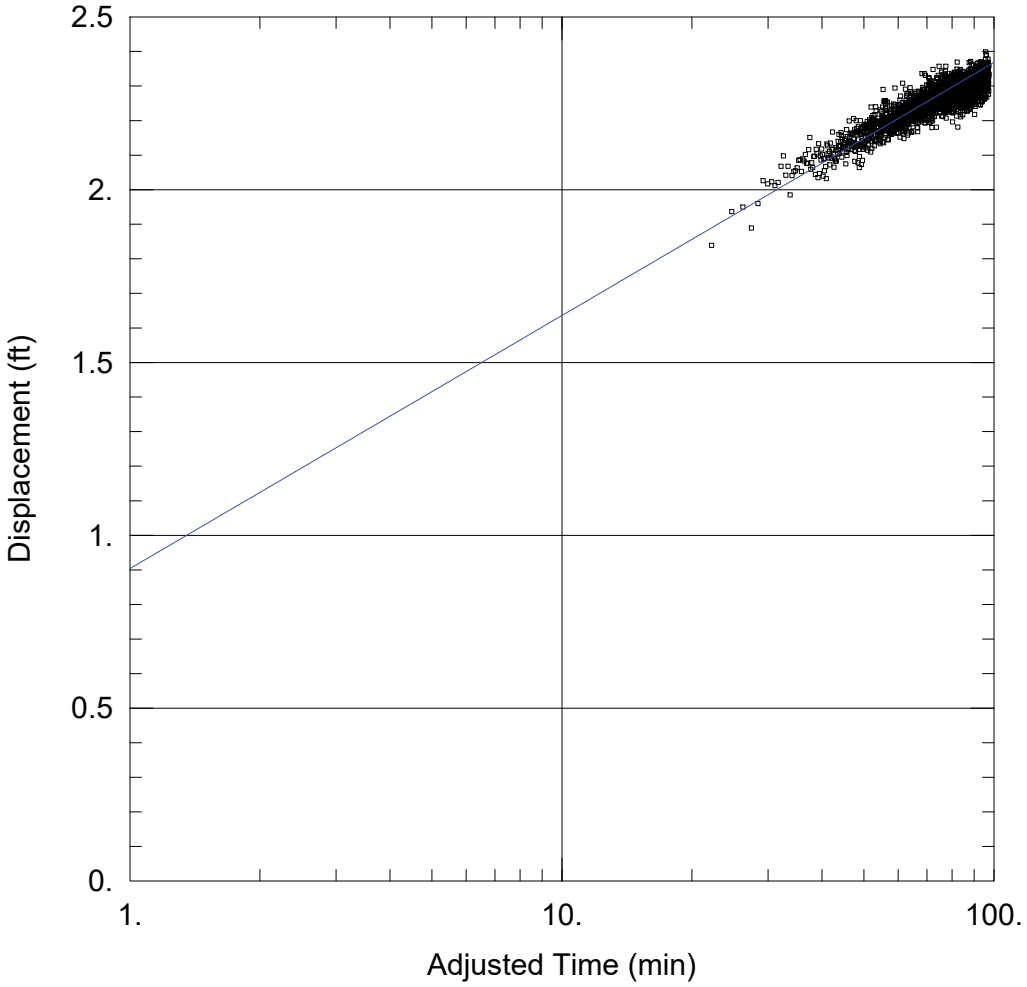
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 51.6 ft^2/day

S = 1.964



MW-6 STEP 7

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-6
Test Date: 4-6-2018

AQUIFER DATA

Saturated Thickness: 5. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-6	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
MW-6	0	0

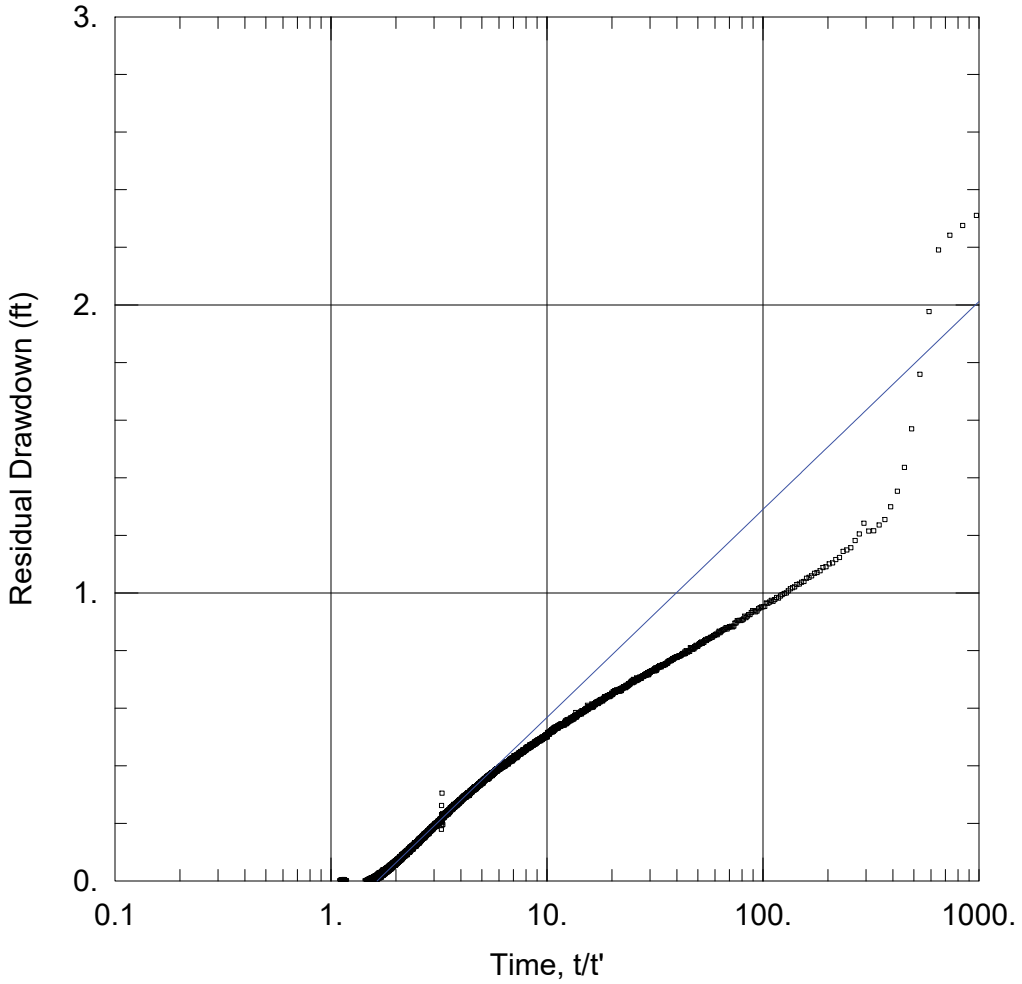
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 180.7 ft^2/day

S = 2.367



MW-6 RECOVERY

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-6
Test Date: 4-6-2018

AQUIFER DATA

Saturated Thickness: 5. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-6	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
MW-6	0	0

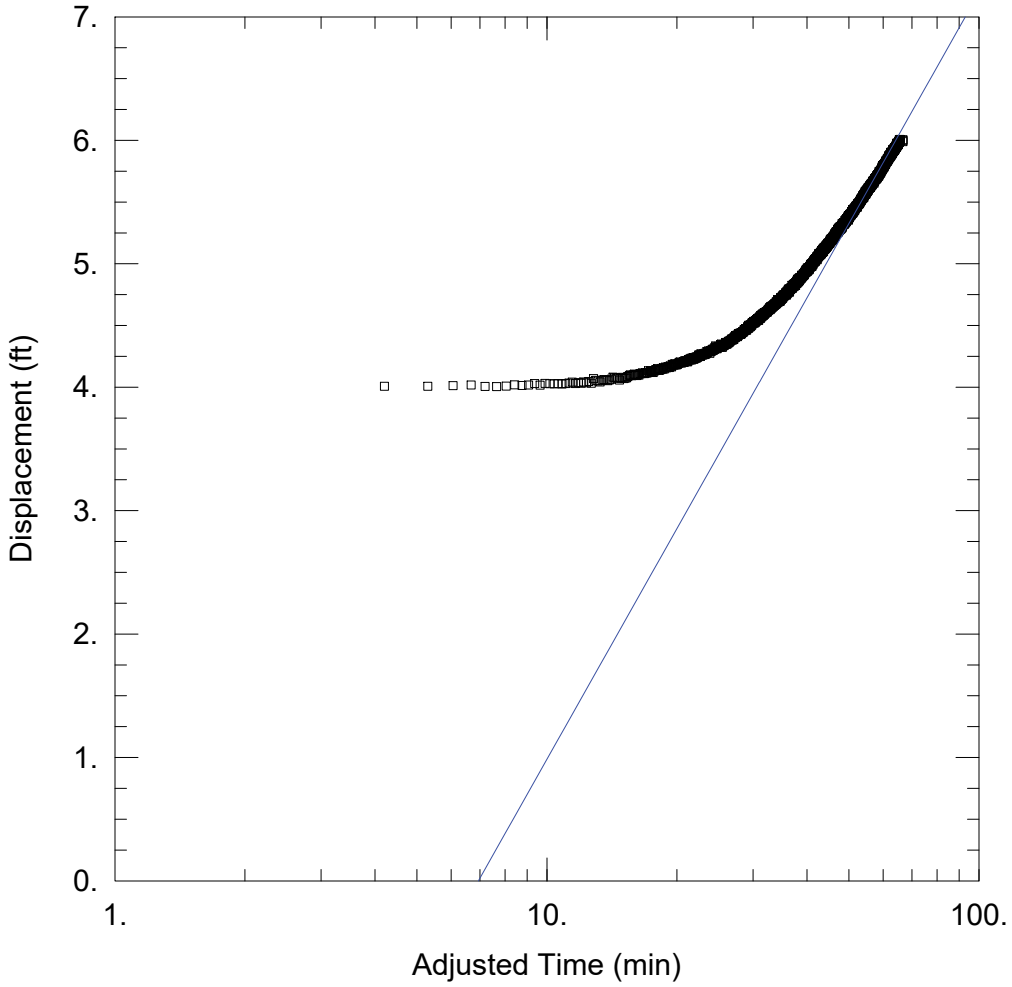
SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

T = 183.2 ft^2/day

S/S' = 1.636



MW-1801A

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-1801A
Test Date: 7-4-2018

AQUIFER DATA

Saturated Thickness: 20. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-1801A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW-1801A	0	0

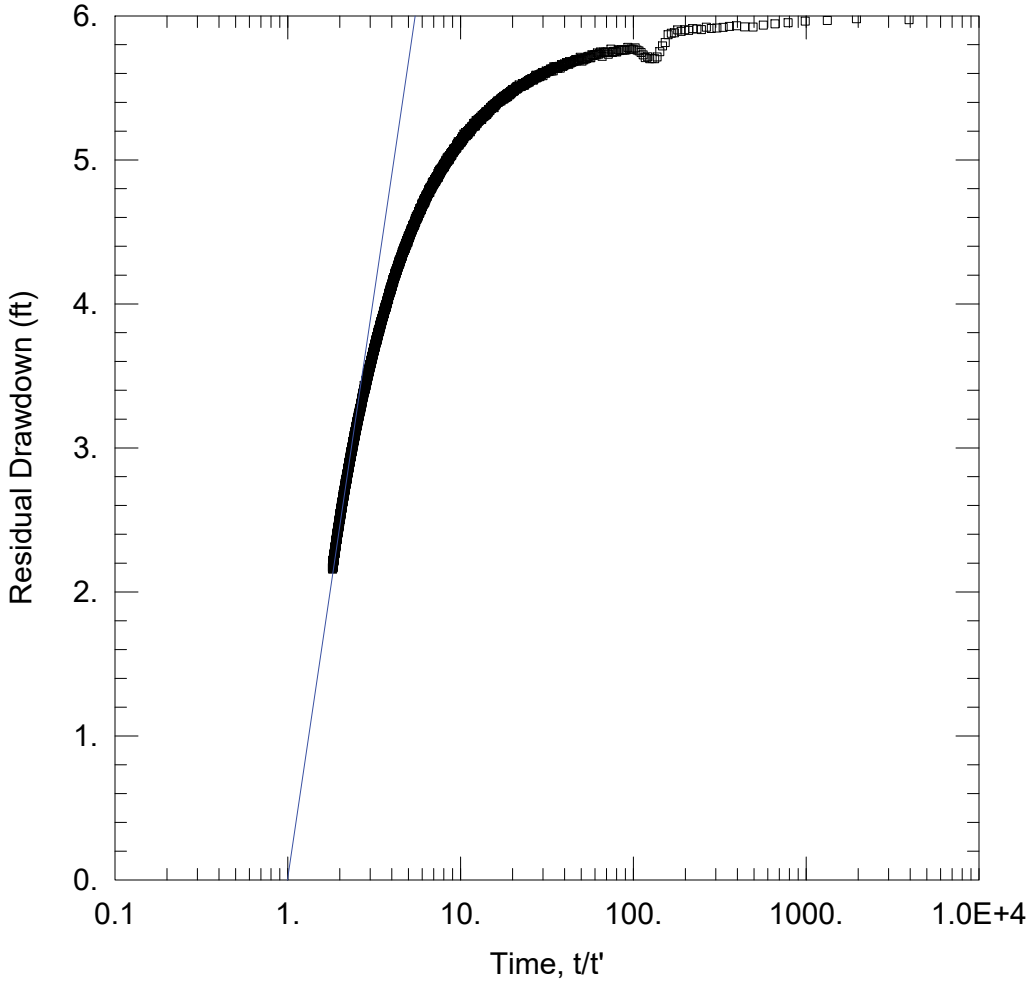
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 2.249 ft^2/day

S = 3.505



MW-1801A RECOVERY

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-1801A
Test Date: 7-4-2018

AQUIFER DATA

Saturated Thickness: 20. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-1801A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW-1801A	0	0

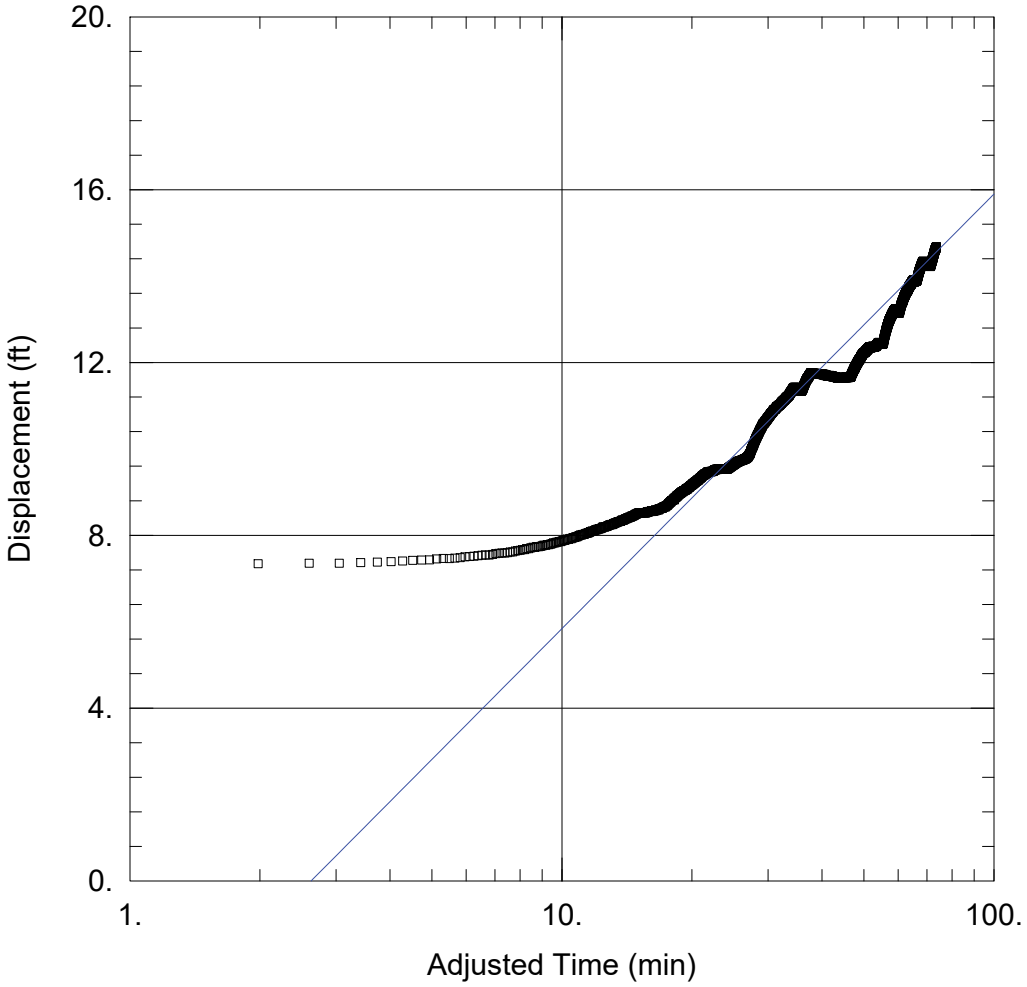
SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

T = 1.722 ft^2/day

S/S' = 0.9966



MW-1806A

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-1806A
Test Date: 7-19-2018

AQUIFER DATA

Saturated Thickness: 20. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
1806A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ 1806A	0	0

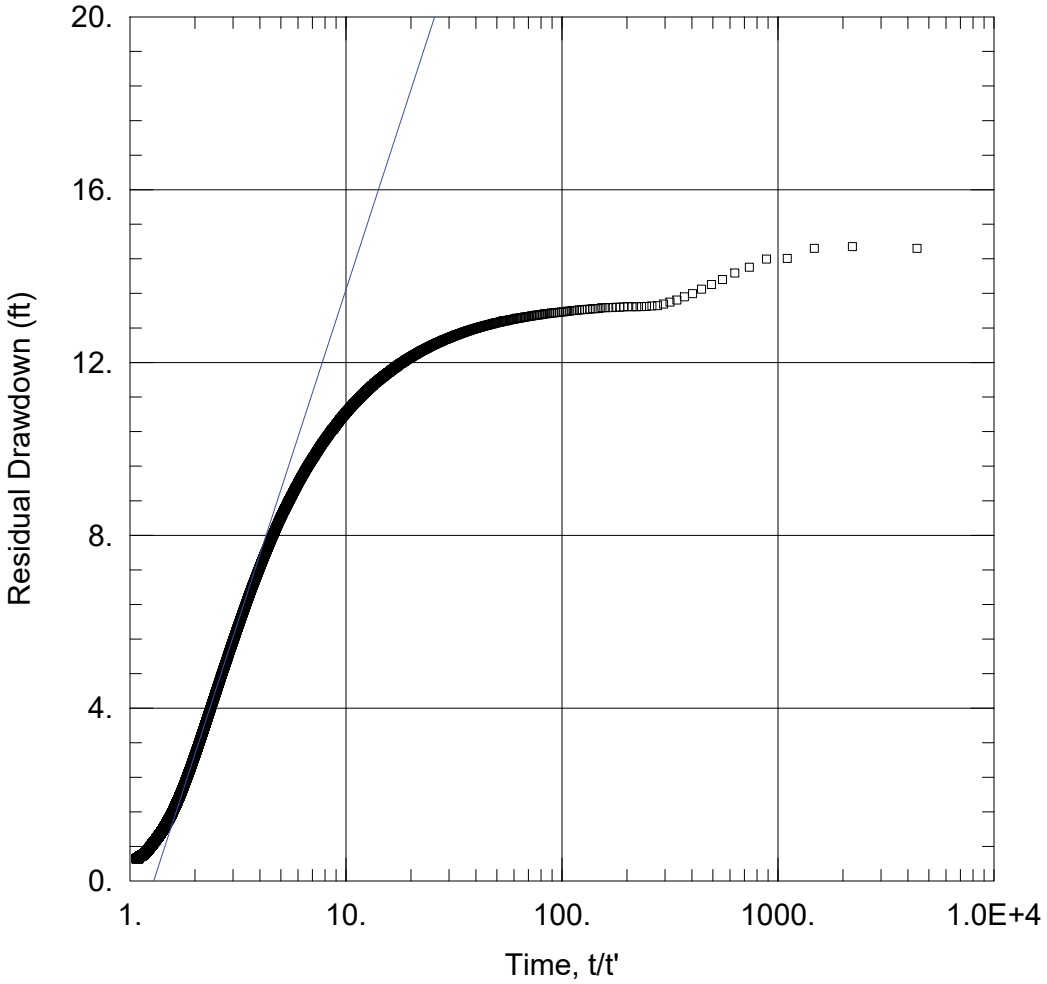
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 0.4629 ft^2/day

S = 0.2753



MW-1806A RECOVERY

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-1806A
Test Date: 7-19-2018

AQUIFER DATA

Saturated Thickness: 20. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
1806A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ 1806A	0	0

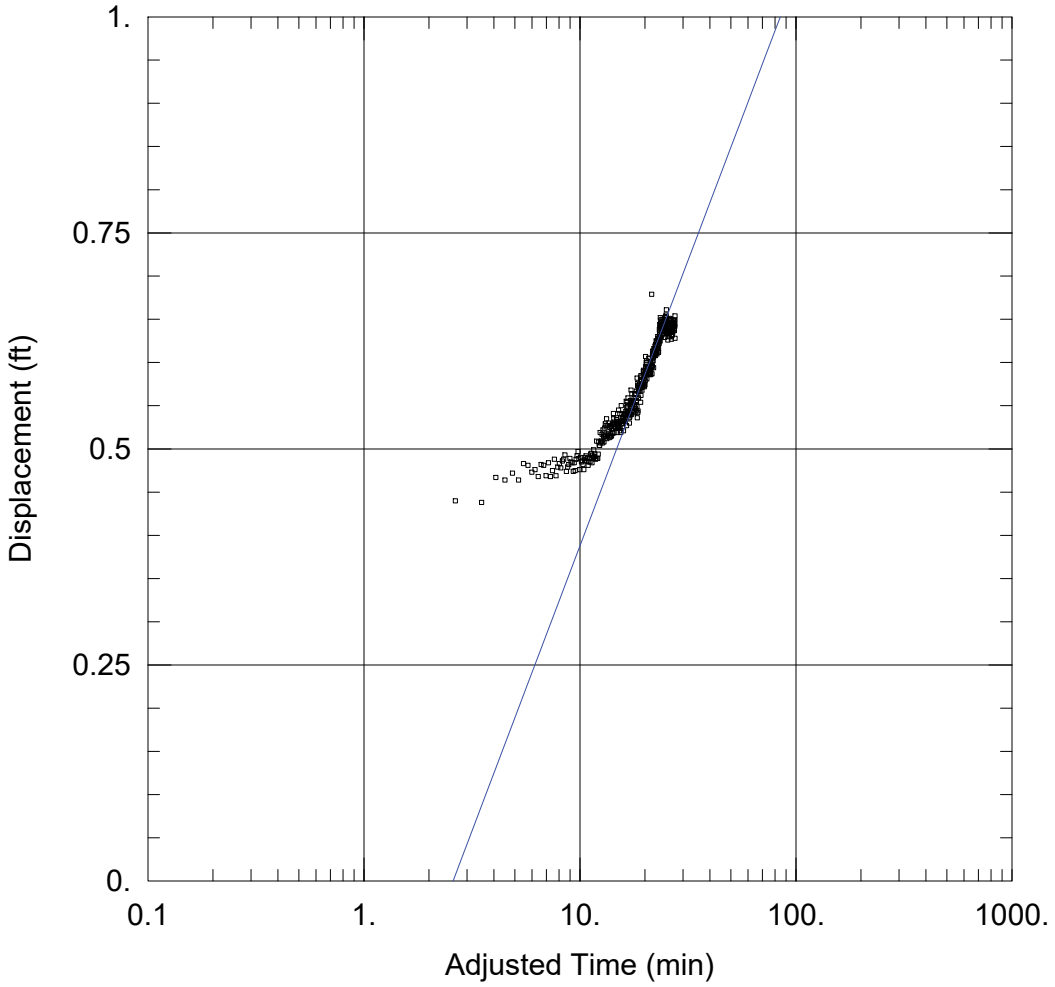
SOLUTION

Aquifer Model: Confined

Solution Method: Theis (Recovery)

T = 0.3028 ft^2/day

S/S' = 1.289



MW-1808A

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-1808A
Test Date: 7-20-2018

AQUIFER DATA

Saturated Thickness: 25. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW1808A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
MW1808A	0	0

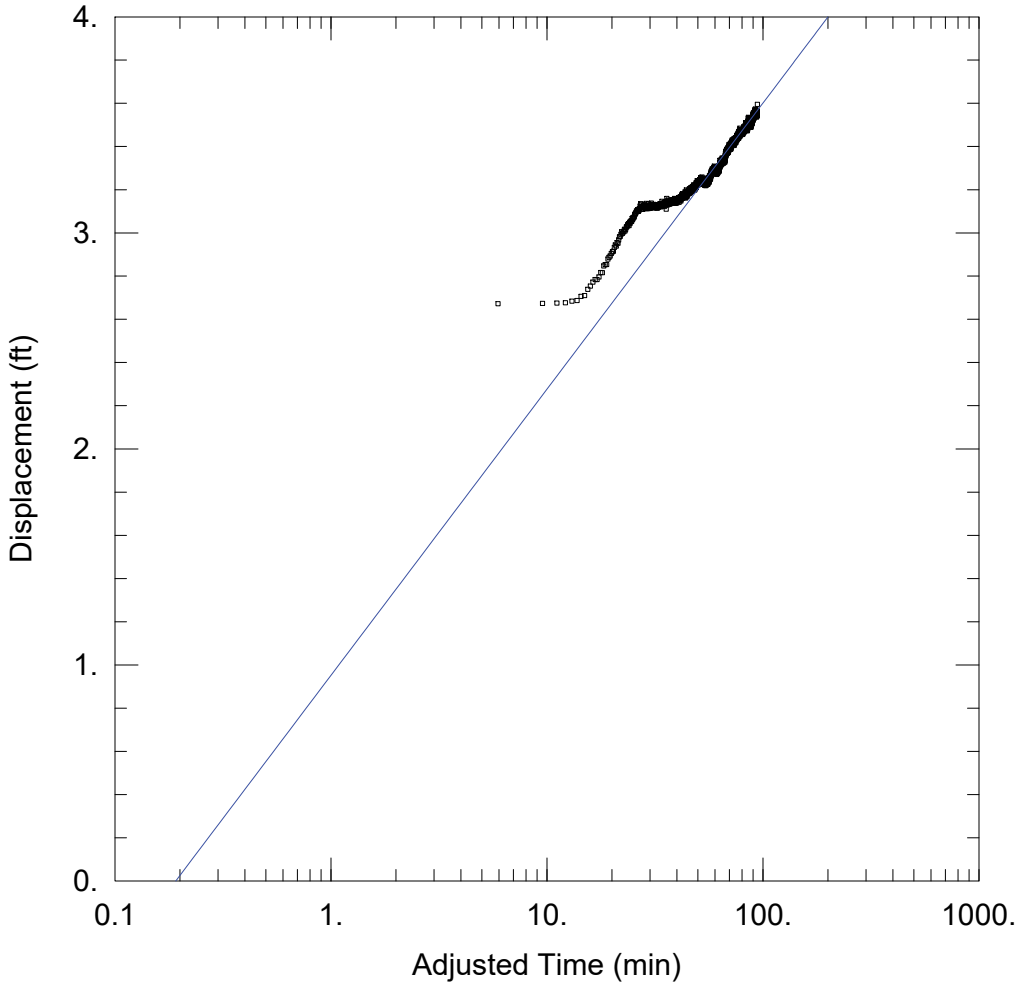
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 42.36 ft^2/day

S = 24.64



MW-1809A

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-1809A
Test Date: 6-28-2018

AQUIFER DATA

Saturated Thickness: 15. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-1809A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW-1809A	0	0

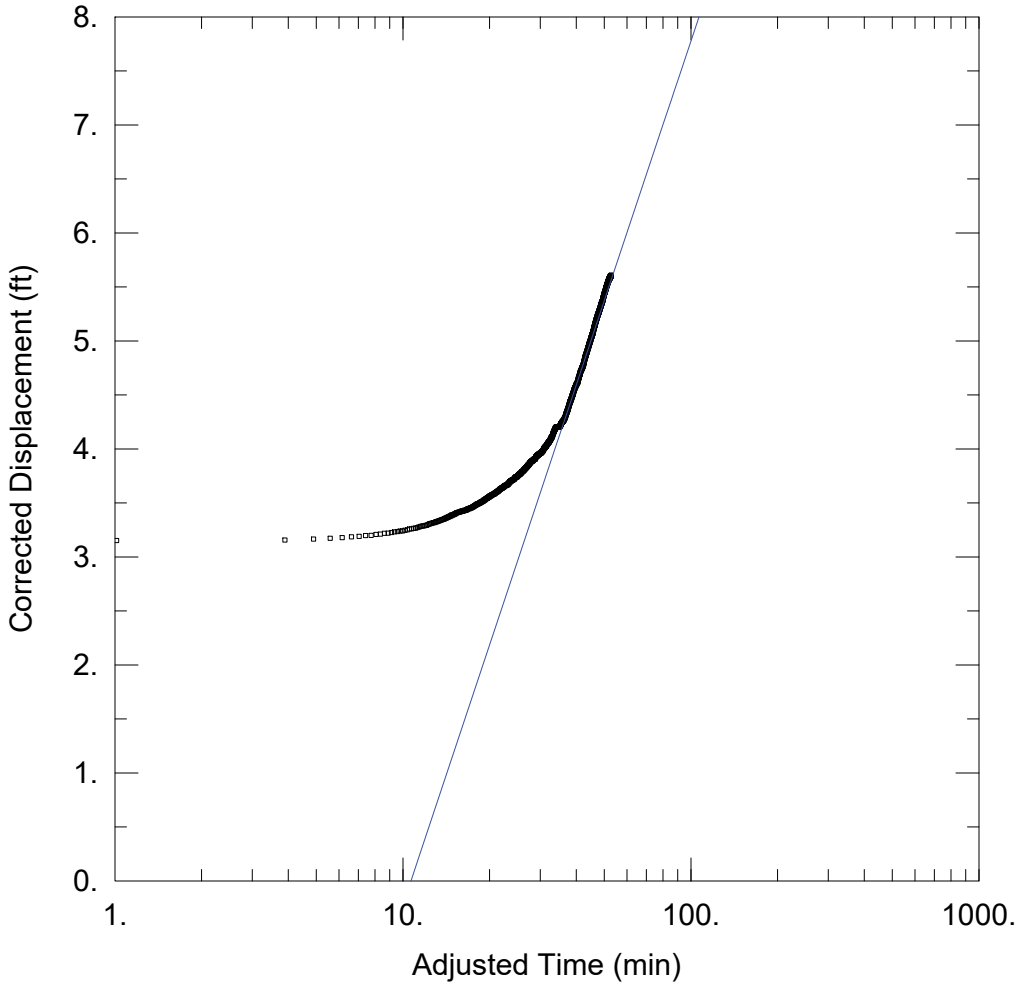
SOLUTION

Aquifer Model: Confined

Solution Method: Cooper-Jacob

T = 28.14 ft^2/day

S = 1.21



MW-1810A

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-1810A
Test Date: 6-18-2018

AQUIFER DATA

Saturated Thickness: 15.22 ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-1810A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW-1810A	0	0

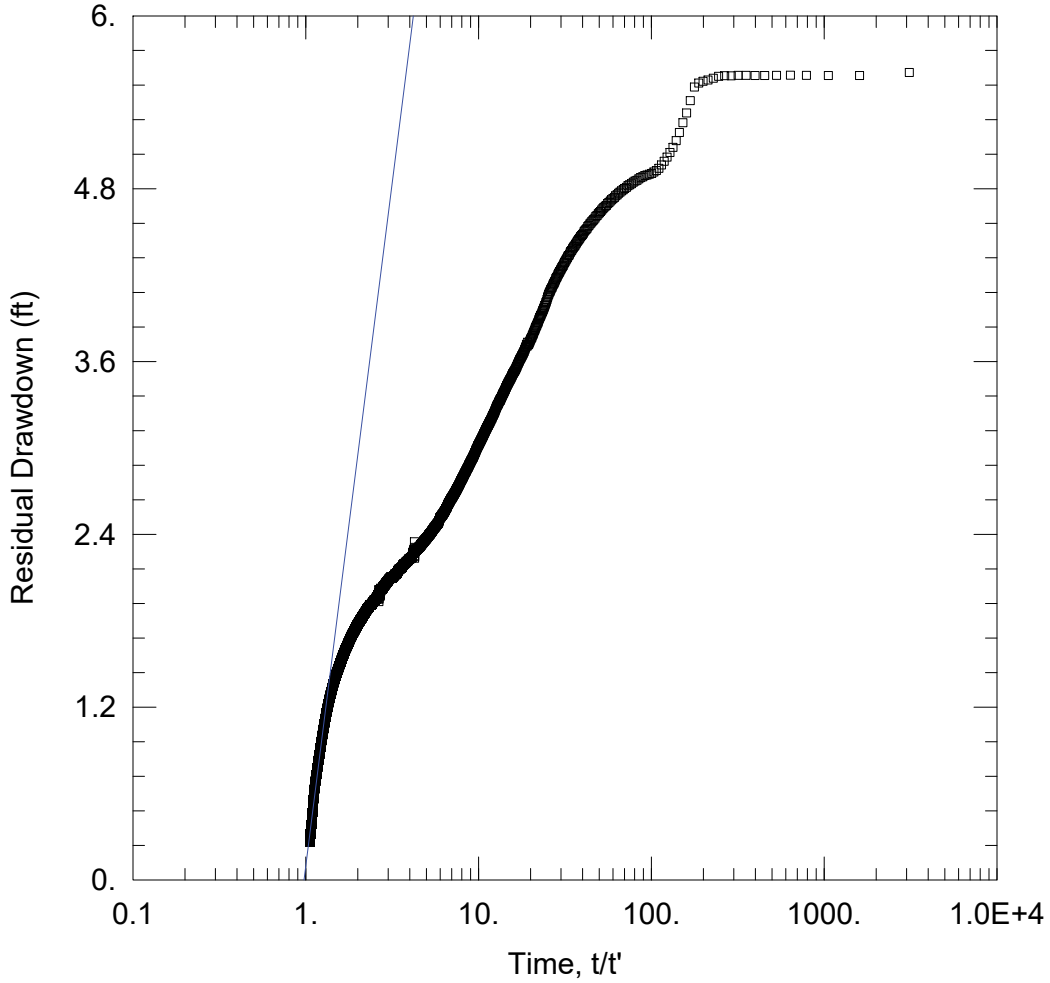
SOLUTION

Aquifer Model: Unconfined

Solution Method: Cooper-Jacob

T = 1.746 ft^2/day

S = 4.184



MW-1810A RECOVERY

Data Set: G:\...\Theis_Rec.aqt
Date: 11/08/18 Time: 14:11:41

PROJECT INFORMATION

Company: Arcadis
Client: AEP
Project: WV015976.0005
Location: Amos Fly Ash Pond
Test Well: MW-1810A
Test Date: 6-18-2018

AQUIFER DATA

Saturated Thickness: 15.22 ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-1810A	0	0

Observation Wells

Well Name	X (ft)	Y (ft)
▫ MW-1810A	0	0

SOLUTION

Aquifer Model: Confined Solution Method: Theis (Recovery)

T = 1.473 ft^2/day S/S' = 0.9774

ARCADIS

Well Yield Tests

Field Logs

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 Well ID MW-1 Date 4/5/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond Weather NR

Measuring Pt. Description TOC
Screen Setting (ft-bmp) NR
Casing Diameter (in.) 2
Well Material X PVC / SS

Static Water Level (ft-bmp) 12.76
Total Depth (ft-bmp) 53.05
Water Column 40.29
Gallons in Well 6.45

MP Elevation NA
Pump Intake (ft-bmp) NR
Purge Method: Pump

Pump On/Off NR
Volumes Purged 8
Centrifugal
Submersible x

Transducer SN NR
Observation Wells None
Other

Transducer Depth NR
Completed by J. Wanner

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
12:25	0:00	600	N/A	13.50	8.32	0.603	417.00	5.31	12.49	-42	90 HZ
12:31	0:06	600	NM	13.68	8.09	0.742	69.50	1.53	14.47	-69	90 HZ
12:36	0:11	600	NM	13.75	7.89	0.733	15.60	1.01	14.61	-89	90 HZ
12:40	0:15	600	2.64	13.78	7.83	0.729	10.70	0.77	14.68	-111	90 HZ
12:46	0:21	500	3.17	13.76	7.81	0.726	9.01	0.74	14.75	-132	91 HZ
12:50	0:25	500	3.70	13.78	7.80	0.724	6.62	0.62	14.76	-140	91 HZ
12:53	0:28	500	4.23	13.61	7.80	0.578	4.96	0.60	14.58	-145	92 HZ
12:57	0:32	500	4.76	13.67	7.79	0.722	4.74	0.58	14.58	-153	94 HZ
13:01	0:36	NR	5.28	13.68	7.78	0.727	4.31	0.51	14.79	-161	94 HZ
13:06	0:41	500	5.81	13.68	7.79	0.719	3.58	0.52	14.77	-164	94 HZ
13:10	0:45	NR	6.34	13.68	7.79	0.720	3.44	0.48	14.91	-166	94 HZ
13:11	0:46	Increase discharge/purge rate									
13:14	0:49	2000	7.40	16.24	7.79	0.721	6.89	0.63	15.17	-169	113 HZ
13:17	0:52	2000	9.25	16.70	7.78	0.720	4.40	0.72	15.12	-159	113 HZ
13:21	0:56	1900	10.57	17.13	7.78	0.720	3.46	0.36	15.04	-167	118 HZ
13:27	1:02	2000	11.89	17.29	7.77	0.720	4.19	0.30	15.04	-173	118 HZ
13:31	1:06	NR	14.53	17.39	7.76	0.720	4.17	0.25	15.05	-177	118 HZ
13:41	1:16	2000	16.11	17.35	7.76	0.582	3.35	0.20	15.04	-184	118 HZ
13:46	1:21	NR	18.49	17.28	7.77	0.584	3.22	0.18	15.12	-184	118 HZ
13:51	1:26	2000	21.13	17.13	7.76	0.584	3.05	0.18	15.10	-186	118 HZ
13:52	1:27	Increase discharge/purge rate									
13:55	1:30	2900	23.78	NM	7.75	0.721	6.20	0.70	15.16	-179	145 HZ
14:03	1:38	2800	29.06	20.78	7.75	0.720	6.45	0.24	15.15	-176	145 HZ
14:10	1:45	3400	31.70	21.96	7.75	0.721	NM	0.50	15.16	-176	145 HZ
14:17	1:52	3000	36.98	22.90	7.75	0.721	6.77	0.17	15.14	-178	145 HZ

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 Well ID MW-1 Date 4/5/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond Weather NR

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): NR
Casing Diameter (in.): 2
Well Material: X PVC, SS

Static Water Level (ft-bmp): 12.76
Total Depth (ft-bmp): 53.05
Water Column: 40.29
Gallons in Well: 6.45

MP Elevation: NA
Pump Intake (ft-bmp): NR
Purge Method: Pump

Pump On/Off: NR
Volumes Purged: 8
Centrifugal:
Submersible: x

Transducer SN: NR
Observation Wells: None
Other:

Transducer Depth: NR
Completed by: J. Wanner

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
14:24	1:59	NR	42.27	23.30	7.74	0.721	NM	0.18	15.15	-182	145 HZ
14:31	2:06	3200	48.87	NM	7.74	0.721	6.31	0.17	15.17	-183	145 HZ
14:39	2:14	3000	NM	NM	7.75	0.722	5.91	0.16	15.17	-185	145 HZ
14:43	2:18	Pump stopped									145 HZ
14:47	2:22	3100	NM	NM	7.71	0.722	5.70	0.19	15.08	-188	
14:54	2:29	3000	NM	NM	7.73	0.586	5.88	0.19	15.14	-185	
14:55	2:30	Increase discharge/purge rate									
14:58	2:33	6500	NM	NM	7.71	0.590	14.80	1.43	15.35	-168	
15:05	2:40	Test discontinued when DTW = 43.0 ft									

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 Well ID MW-2 Date 3/22/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond Weather 32°F, cold, cloudy

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): 96.1-105.0
Casing Diameter (in.): 2
Well Material: X PVC, SS

Static Water Level (ft-bmp): 55.38
Total Depth (ft-bmp): 108
Water Column: 52.62
Gallons in Well: 8.42

MP Elevation: NA
Pump Intake (ft-bmp): 100
Purge Method: Pump

Pump On/Off: NR
Volumes Purged: 6
Centrifugal:
Submersible: x
Other:

Transducer SN: NR
Observation Wells: None

Transducer Depth: 95 ft
Completed by: A. Gillespie

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
12:15	0:00	1000	N/A	55.38	NM	NM	NM	NM	NM	NM	
12:20	0:05	1000	NM	55.73	8.49	1.771	27.80	1.09	13.50	-140	
12:25	0:10	1000	NM	55.74	8.59	1.811	11.00	0.80	13.70	-159	
12:30	0:15	1000	NM	NM	8.65	1.829	4.78	0.76	13.26	-158	
12:40	0:25	1000	NM	55.85	8.73	1.823	3.88	0.63	13.66	-192	
12:50	0:35	1000	11	55.88	8.73	1.812	3.48	0.60	13.76	-210	
13:00	0:45	2000	NM	55.90	8.74	1.803	3.10	0.61	13.75	-213	
13:05	0:50	2000	NM	56.16	8.75	1.791	1.45	0.73	13.78	-221	
13:10	0:55	2000	NM	56.19	8.74	1.780	1.12	0.59	13.75	-213	
13:20	1:05	2000	26	56.23	8.74	1.768	0.95	0.55	13.78	-223	
13:30	1:15	2000	31	56.23	8.75	1.760	0.72	0.62	13.76	-224	
13:40	1:25	2000	41	56.23	8.76	1.755	0.69	0.69	13.77	-239	
13:50	1:35	2000	51	56.23	8.75	1.752	0.47	0.56	13.82	NR	
13:55	1:40	3000	Increase pumping rate								
14:00	1:45	3000	NM	56.61	8.73	1.747	0.48	0.55	13.73	-237	
14:05	1:50	3000	NM	56.71	8.75	1.751	0.42	0.55	13.83	-240	
14:15	2:00	3000	NM	56.79	8.75	1.747	0.55	0.46	13.82	-234	
14:25	2:10	3000	NM	56.82	8.75	1.752	0.49	0.47	13.81	-246	
14:35	2:20	3000	NM	56.84	8.75	1.750	0.40	0.50	13.72	-247	
14:40	2:25	4000	NM	57.09	8.74	1.751	0.39	0.46	13.78	-244	
14:50	2:35	4000	NM	57.20	8.74	1.755	0.48	0.37	13.80	-214	
15:00	2:45	4000	NM	57.26	8.74	1.756	0.48	0.39	13.77	-253	
15:10	2:55	4000	NM	57.31	8.75	1.739	0.48	0.39	13.80	-242	
15:15	3:00	Stop pumping, allow to recover									

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 Well ID MW-2 Date 3/23/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond Weather 22°F, sunny

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): 96.1-105.0
Casing Diameter (in.): 2
Well Material: X PVC, SS

Static Water Level (ft-bmp): 55.50
Total Depth (ft-bmp): 108
Water Column: 52.5
Gallons in Well: 8.40

MP Elevation: NA
Pump Intake (ft-bmp): 100
Purge Method: Pump

Pump On/Off: NR
Volumes Purged: NM
Centrifugal:
Submersible: x

Transducer SN: NR
Observation Wells: None
Other:

Transducer Depth: 95 ft
Completed by: A. Gillespie

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
10:40	0:00	1000	NM	55.50	NM	NM	NM	NM	NM	NM	
10:45	0:05	1000	NM	55.83	8.58	1.747	2.03	12.60	13.43	-111	
10:50	0:10	1000	NM	55.85	8.70	1.756	0.82	1.00	13.56	-136	
11:00	0:20	1000	NM	55.85	8.76	1.754	0.71	0.69	13.64	-173	Transducer running
11:10	0:30	1000	NM	55.76	8.77	1.757	0.82	0.58	13.82	-177	
11:15	0:35	2000	Increase pumping rate								
11:20	0:40	2000	NM	56.12	8.78	1.771	0.53	0.45	14.02	-205	
11:25	0:45	2000	NM	56.25	8.78	1.771	0.52	0.43	14.00	-211	
11:30	0:50	2000	NM	56.30	8.78	1.776	0.32	0.42	13.91	219	
11:40	1:00	2000	NM	56.36	8.77	1.766	0.30	0.35	14.03	-237	
11:55	1:15	2000	NM	56.41	8.77	1.769	0.30	0.31	14.08	-241	
12:05	1:25	2000	NM	56.44	8.77	1.768	0.32	0.29	14.02	-247	
12:20	1:40	2000	NM	56.46	8.77	1.767	0.16	0.24	14.02	-250	
12:25	1:45	3000	Increase pumping rate								
12:30	1:50	3000	NM	56.72	8.77	1.761	0.28	0.24	13.93	-252	
12:35	1:55	3000	NM	56.83	8.76	1.763	0.25	0.23	13.97	-255	
12:45	2:05	3000	NM	56.92	8.76	1.764	0.28	0.24	13.98	-258	
12:55	2:15	3000	Shut down pumping, battery low								
13:00	2:20	N/A	NM	56.26	NM	NM	NM	NM	NM	NM	
13:15	2:35	N/A	NM	55.84	NM	NM	NM	NM	NM	NM	
13:25	2:45	N/A	NM	55.80	NM	NM	NM	NM	NM	NM	
13:35	2:55	N/A	NM	55.77	NM	NM	NM	NM	NM	NM	
13:45	3:05	N/A	NM	55.75	NM	NM	NM	NM	NM	NM	
13:47	3:07	Stop transducer recording									

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 Well ID MW-2 Date 3/26/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond Weather NR

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): 96.1-105.0
Casing Diameter (in.): 2
Well Material: X PVC ___ SS

Static Water Level (ft-bmp): 55.54
Total Depth (ft-bmp): 108
Water Column: 52.46
Gallons in Well: 8.39

MP Elevation: NA
Pump Intake (ft-bmp): 100

Purge Method: Pump
Centrifugal ___
Submersible x
Other ___

Pump On/Off: NR
Volumes Purged: NM

Transducer SN: NR
Observation Wells: None

Transducer Depth: 95 ft
Completed by: A. Gillespie

Pumping Stress Test

Time	Min Elapsed	Rate (gpm)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
10:50	0:00	N/A	NM	55.54	NM	NM	NM	NM	NM	NM	
10:55	0:05	1.50	NM	56.71	8.70	1.765	2.22	1.63	13.87	-200	
11:00	0:10	1.25	NM	57.00	8.76	1.758	1.07	1.15	13.88	-212	
11:15	0:25	1.25	NM	57.32	8.79	1.756	0.62	0.62	13.92	-242	
11:35	0:45	1.25	NM	57.52	8.79	1.752	0.42	0.38	13.95	-255	
11:45	0:55	0.75	NM	Decrease pumping rate							
11:50	1:00	N/A	NM	57.05	Stop pumping, allow to recover						

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 Well ID MW-6 Date 4/6/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond Weather NR

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): NR
Casing Diameter (in.): 2
Well Material: X PVC, SS

Static Water Level (ft-bmp): 12.50
Total Depth (ft-bmp): NR
Water Column: NA
Gallons in Well: NA

MP Elevation: NA
Pump Intake (ft-bmp): 32
Purge Method: Pump
Centrifugal:
Submersible: x
Other:

Pump On/Off: NR
Volumes Purged: NM

Transducer SN: NR
Observation Wells: MW-1, MW-5

Transducer Depth: 29 ft
Completed by: A. Gillespie

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Observation Wells DTW		Comments
											MW-1	MW-5	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	12.78	32.88	
8:15	0:00	NR	N/A	NM	7.78	0.484	283.00	13.00	11.27	33	NM	NM	85 HZ
8:20	0:05	1100	NM	12.59	6.97	0.583	108.00	2.19	15.01	-80	NM	NM	90 HZ
8:28	0:13	Pump stopped due to error											
8:33	0:18	NR	3.70	12.60	6.30	0.561	12.90	0.96	14.99	-115	12.8	32.85	90 HZ
8:35	0:20	Pump stopped due to error											
8:42	0:27	NR	5.81	12.61	6.14	0.551	3.50	0.66	15.19	-117	NM	NM	90 HZ
8:51	0:36	1000	8.19	12.61	6.05	0.540	1.45	0.48	15.19	-116	NM	NM	90 HZ
8:59	0:44	NR	10.57	12.61	6.00	0.536	2.08	0.42	15.14	-115	12.82	32.84	90 HZ
9:02	0:47	Pump discharge/purge rate increased											
9:09	0:54	2000	14.53	12.71	5.97	0.531	11.60	0.31	15.25	-117	NM	NM	125 HZ
9:16	1:01	2000	NM	12.72	5.98	0.523	3.11	0.28	15.25	-119	12.88	32.86	125 HZ
9:24	1:09	2000	NM	12.73	6.03	0.508	1.38	0.25	15.29	-124	NM	NM	125 HZ
9:30	1:15	NR	NM	12.74	6.06	0.502	1.35	0.25	15.33	-127	NM	NM	125 HZ
9:35	1:20	NR	NM	12.74	6.08	0.500	1.10	0.23	15.32	-128	12.89	32.85	125 HZ
9:40	1:25	2000	NM	12.72	6.08	0.498	0.92	0.23	15.26	-127	NM	NM	125 HZ
9:45	1:30	NR	NM	12.75	6.08	0.500	1.17	0.20	15.36	-128	NM	NM	125 HZ
9:50	1:35	2000	NM	12.75	6.08	0.500	0.78	0.20	15.42	-128	NM	NM	125 HZ
9:52	1:37	Pump discharge/purge rate increased											
9:57	1:42	NR	NM	12.85	6.11	0.490	4.74	0.18	15.20	-131	NM	NM	125 HZ
10:02	1:47	3250	NM	12.85	6.10	0.488	3.75	0.17	15.14	-132	12.93	32.83	125 HZ
10:07	1:52	3250	NM	12.83	6.11	0.488	2.86	0.17	15.14	-131	NM	NM	125 HZ
10:12	1:57	NR	NM	12.85	6.12	0.487	1.24	0.16	15.19	-133	NM	NM	125 HZ
10:17	2:02	NR	NM	12.85	6.13	0.486	0.91	0.17	15.20	-134	12.95	32.84	125 HZ
10:22	2:07	NR	NM	12.87	6.15	0.485	0.73	0.16	15.18	-135	NM	NM	125 HZ

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 Well ID MW-6 Date 4/6/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond Weather NR

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): NR
Casing Diameter (in.): 2
Well Material: X PVC, SS

Static Water Level (ft-bmp): 12.50
Total Depth (ft-bmp): NR
Water Column: NA
Gallons in Well: NA

MP Elevation: NA
Pump Intake (ft-bmp): 32
Purge Method: Pump
Centrifugal
Submersible: x
Other

Pump On/Off: NR
Volumes Purged: NM

Transducer SN: NR
Observation Wells: MW-1, MW-5

Transducer Depth: 29 ft
Completed by: J. Wanner

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
10:27	2:12	3000	NM	12.89	6.15	0.485	1.12	0.17	15.17	-136	125 HZ
10:32	2:17	NR	NM	12.87	6.15	0.485	0.54	0.15	15.18	-137	125 HZ
10:37	2:22	3000	NM	12.88	6.15	0.486	0.98	0.14	15.17	-136	125 HZ
10:40	2:25	NR	NM	12.88	6.15	0.486	NM	0.15	15.21	-137	125 HZ
10:41	2:26	Pump discharge/purge rate increased									
10:44	2:29	3500	NM	12.92	6.15	0.488	1.41	0.14	15.31	-137	150 HZ
10:47	2:32	4400	NM	12.97	6.16	0.486	2.67	0.14	15.16	-137	150 HZ
10:52	2:37	4000	NM	13.01	6.16	0.487	1.90	0.14	15.19	-138	150 HZ
10:57	2:42	NR	NM	13.00	6.16	0.487	1.60	0.13	15.20	-138	150 HZ; MW-1 DTW = 13.03
11:02	2:47	4300	NM	13.03	6.16	0.487	2.15	0.13	15.15	-138	150 HZ
11:07	2:52	NR	NM	13.01	6.16	0.488	1.12	0.13	15.20	-138	150 HZ
11:12	2:57	NR	NM	12.99	6.15	0.488	1.86	0.13	15.17	-136	150 HZ
11:17	3:02	NR	NM	13.00	6.14	0.489	1.09	0.13	15.24	-136	150 HZ
11:18	3:03	Pump discharge/purge rate increased									
11:20	3:05	7500	NM	13.28	NM	NM	NM	NM	NM	NM	225 HZ
11:22	3:07	8000	NM	13.36	6.16	0.490	13.00	0.11	15.36	-138	225 HZ
11:25	3:10	NR	NM	13.37	6.16	0.489	5.85	0.11	15.36	-138	225 HZ
11:30	3:15	8000	NM	13.43	6.15	0.493	4.07	0.11	15.33	-138	225 HZ
11:40	3:25	8000	NM	13.45	6.14	0.493	2.97	0.10	15.31	-139	225 HZ
11:45	3:30	NR	NM	13.46	6.14	0.493	NM	0.11	15.31	-139	225 HZ
11:47	3:32	Pump discharge/purge rate increased									
11:49	3:34	12000	NM	13.82	6.11	0.495	35.40	0.11	15.44	-137	300 HZ
11:53	3:38	11000	NM	13.92	NM	NM	19.20	NM	NM	NM	
11:56	3:41	11000	NM	NM	NM	NM	NM	NM	NM	NM	

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 Well ID MW-6 Date 4/6/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond Weather NR

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): NR
Casing Diameter (in.): 2
Well Material: X PVC, SS

Static Water Level (ft-bmp): 12.50
Total Depth (ft-bmp): NR
Water Column: NA
Gallons in Well: NA

MP Elevation: NA
Pump Intake (ft-bmp): 32
Purge Method: Pump

Pump On/Off: NR
Volumes Purged: NM
Centrifugal:
Submersible: x

Transducer SN: NR
Observation Wells: MW-1, MW-5
Other:

Transducer Depth: 29 ft
Completed by: J. Wanner

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
12:00	3:45	12000	NM	14.15	6.12	0.496	19.20	0.1	15.42	-139	320 HZ
12:05	3:50	NR	NM	14.23	NM	NM	NM	NM	NM	NM	320 HZ
12:08	3:53	NR	NM	14.25	NM	NM	NM	NM	NM	NM	320 HZ
12:11	3:56	12000	NM	14.28	NM	NM	NM	NM	NM	NM	320 HZ
12:14	3:59	NR	NM	14.30	NM	NM	NM	NM	NM	NM	320 HZ
12:17	4:02	12000	NM	14.31	NM	NM	NM	NM	NM	NM	320 HZ
12:20	4:05	NR	NM	14.33	NM	NM	NM	NM	NM	NM	320 HZ
12:23	4:08	12000	NM	14.34	NM	NM	NM	NM	NM	NM	320 HZ
12:26	4:11	NR	NM	14.37	NM	NM	NM	NM	NM	NM	320 HZ
12:29	4:14	12000	NM	14.36	NM	NM	NM	NM	NM	NM	320 HZ
12:31	4:16	14500	NM	14.66	NM	NM	NM	NM	NM	NM	400 HZ
12:34	4:19	NR	NM	14.70	NM	NM	NM	NM	NM	NM	400 HZ
12:37	4:22	14000	NM	14.73	6.10	0.500	13.50	0.09	15.60	-141	400 HZ
12:40	4:25	NR	NM	14.76	NM	NM	NM	NM	NM	NM	400 HZ
12:43	4:28	13500	NM	14.78	6.10	0.501	10.90	0.09	15.58	-141	400 HZ
12:46	4:31	NR	NM	14.80	NM	NM	NM	NM	NM	NM	400 HZ
12:49	4:34	14200	NM	14.80	6.09	0.500	8.11	0.09	15.56	-141	400 HZ
12:52	4:37	NR	NM	14.81	NM	NM	NM	NM	NM	NM	400 HZ
13:01	4:46	NR	NM	14.84	6.09	0.501	10.60	0.07	15.54	-141	400 HZ
13:02	4:47	NR	NM	14.85	NM	NM	NM	NM	NM	NM	400 HZ
13:03	4:48	End of test, begin recovery									

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 Well ID MW-1801A Date 7/4/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond Weather Sunny, hot, humid, 82-94°F

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): NR
Casing Diameter (in.): 2
Well Material: X PVC, SS

Static Water Level (ft-bmp): 49.78
Total Depth (ft-bmp): 78.5
Water Column: 28.72
Gallons in Well: 4.60

MP Elevation: NA
Pump Intake (ft-bmp): 75
Purge Method: Pump

Pump On/Off: NR
Volumes Purged: 7
Centrifugal:
Submersible: x
Other:

Transducer SN: NR
Observation Wells: 1801B, 1801C

Transducer Depth: 73 ft
Completed by: A. Gillespie

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
10:30	0:00	500	N/A	49.78	NM	NM	NM	NM	NM	NM	
10:40	0:10	500	NM	50.39	7.27	0.708	68.70	3.12	15.34	88.2	Clear, no odors
10:50	0:20	500	NM	50.74	7.38	0.612	18.90	2.23	15.51	77.9	
11:00	0:30	500	3.96	50.87	7.38	0.570	18.10	1.84	16.14	78.8	
11:10	0:40	750	NM	51.44	7.39	0.572	16.10	2.23	14.74	73.7	Clear, no turbidity, no odors
11:20	0:50	750	NM	52.10	7.37	0.515	10.30	2.13	14.75	75.1	
11:30	1:00	750	9.91	52.38	7.37	0.514	7.42	2.11	14.92	74.1	Clear, no odors
11:40	1:10	1000	12.55	52.81	7.36	0.508	4.77	2.12	14.55	74.2	Clear, no odors
11:50	1:20	1000	NM	53.35	7.35	0.507	5.04	2.05	14.51	74.1	
12:00	1:30	1000	17.83	53.74	7.35	0.506	6.05	1.98	14.55	76.5	
12:05	1:35	1500	NM	NM	NM	NM	NM	1.98	14.55	76.5	
12:10	1:40	1500	NM	54.14	7.34	0.503	5.01	2.01	14.19	75.0	Clear, no odors
12:20	1:50	1500	25.1	55.06	7.35	0.504	3.22	1.92	14.10	73.3	
12:30	2:00	1500	NM	55.55	7.35	0.506	2.71	1.90	14.13	74.1	Clear, no odors
12:35	2:05	1500	31.04	55.73	Terminated pumping, allow to recover						
Well Recovery Data:											
12:52	2:22	N/A	N/A	54.30	NM	NM	NM	NM	NM	NM	
13:00	2:30	N/A	N/A	53.82	NM	NM	NM	NM	NM	NM	
13:15	2:45	N/A	N/A	53.14	NM	NM	NM	NM	NM	NM	
13:30	3:00	N/A	N/A	52.72	NM	NM	NM	NM	NM	NM	
13:45	3:15	N/A	N/A	52.33	NM	NM	NM	NM	NM	NM	
14:00	3:30	N/A	N/A	52.01	NM	NM	NM	NM	NM	NM	

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 | Well ID MW-1806A | Date 7/19/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond | Weather Sunny, hot, 65-92°F

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): NR
Casing Diameter (in.): 2
Well Material: X PVC / SS

Static Water Level (ft-bmp): 25.25
Total Depth (ft-bmp): 83.5
Water Column: 58.25
Gallons in Well: 9.32

MP Elevation: NA
Pump Intake (ft-bmp): 80
Purge Method: Pump

Pump On/Off: NR
Volumes Purged: NM
Centrifugal:
Submersible: x

Transducer SN: NR
Observation Wells: MW-1806B, MW-1806C
Other:

Transducer Depth: 75 ft
Completed by: A. Gillespie

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Observation Wells DTW		Comments
											MW-1806B	MW-1806C	
11:30	0:00	300	N/A	25.25	NM	NM	NM	NM	NM	NM	210.47	257.68	
11:35	0:05	300	NM	NM	NM	NM	NM	NM	NM	NM			Voltage output = 10
11:40	0:10	300	NM	28.52	8.04	0.659	242.00	2.19	15.73	51.1			Cloudy, no odors
11:45	0:15	300	NM	29.70	8.19	0.638	107.00	1.89	15.53	26.9	>200	257.68	
11:50	0:20	300	NM	30.12	8.21	0.635	69.80	0.56	15.96	20.7			Difficult to maintain constant pumping rate
11:55	0:25	300	NM	31.06	8.17	0.629	73.70	0.53	15.36	18.1			
12:05	0:35	300	NM	32.24	8.11	0.621	51.10	0.61	15.30	11.2	>200	257.68	Clearing, no odors
12:10	0:40	300	NM	32.91	8.06	0.621	18.70	0.69	15.51	18.3			
12:15	0:45	300	NM	32.85	8.06	0.620	16.60	0.75	15.86	18.1			
12:20	0:50	500	NM	34.37	8.07	0.623	23.60	0.91	14.84	17.2	>200	257.68	Clear, no odors
12:25	0:55	500	NM	35.84	8.04	0.623	14.60	1.12	14.84	14.1			Clear, no odors
12:30	1:00	500	NM	36.88	8.02	0.625	10.30	0.96	15.09	10.8			
12:40	1:10	500	NM	37.40	8.02	0.637	11.40	1.09	15.06	0.0	>200	257.68	Clear, no odors
12:50	1:20	500	NM	38.66	8.04	0.643	10.90	0.95	15.27	-16.0			
13:00	1:30	500	NM	39.52	8.05	0.647	7.79	0.82	15.07	-51.7			Voltage output = 12.7
13:05	1:35	Stop pumping, allow to recover w/transducer running											
Well Recovery Data:													
13:10	1:40	N/A	N/A	37.11	NM	NM	NM	NM	NM	NM			
13:15	1:45	N/A	N/A	35.9	NM	NM	NM	NM	NM	NM			
13:20	1:50	N/A	N/A	34.73	NM	NM	NM	NM	NM	NM			
13:25	1:55	N/A	N/A	33.77	NM	NM	NM	NM	NM	NM			

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 | Well ID MW-1808A | Date 7/20/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond | Weather Sunny, 82°F

Measuring Pt. Description: TOC | Screen Setting (ft-bmp): NR | Casing Diameter (in.): 2 | Well Material: X PVC, SS

Static Water Level (ft-bmp): 83.11 | Total Depth (ft-bmp): 112.7 | Water Column: 29.59

MP Elevation: NA | Pump Intake (ft-bmp): 109 | Gallons in Well: 4.73

Pump On/Off: NR | Volumes Purged: NM | Purge Method: Pump; Centrifugal; Submersible: x; Other

Transducer SN: NR | Observation Wells: None

Transducer Depth: 105 ft

1808B/A recently developed dry on 7/19/18. Pumps removed morning of 7/20/18.

Completed by: A. Gillespie

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
10:40	0:00	NR	N/A	83.11	NM	NM	NM	NM	NM	NM	
10:50	0:10	300	NM	83.19	7.54	1.261	369.00	3.38	15.29	-174	Slightly turbid, sulfur odor
10:55	0:15	400	NM	83.19	7.60	1.221	243.00	1.99	15.07	-165	Voltage output = 20.1
11:00	0:20	400	NM	83.22	7.61	1.203	174.00	1.54	14.89	-180	Voltage output fluctuating
11:05	0:25	500	NM	NM	7.60	1.188	181.00	1.52	15.20	-166	Controller moved to shade
11:10	0:30	500	NM	83.22	7.60	1.187	215.00	1.52	15.39	-165	Cloudy, no odors; voltage output = 17.6
11:20	0:40	600	NM	83.24	7.60	1.15	209.00	1.15	15.45	-171	Cloudy, no odors
11:25	0:45	600	NM	83.26	7.61	1.102	203.00	0.97	15.45	-179	Rate increased without adjusting controller; voltage output = 18.4
11:30	0:50	500	NM	83.26	7.64	1.053	172.00	0.69	15.55	-181	
11:35	0:55	500	NM	83.27	7.65	1.031	134.00	0.50	15.61	-191	Voltage output =16.9 w/o adjusting
11:40	1:00	800	NM	83.31	7.67	0.965	112.00	0.48	15.32	-182	Clearing, no odors; voltage output = 17.8
11:45	1:05	800	NM	83.32	7.68	0.939	74.30	0.53	15.29	-174	
11:55	1:15	800	NM	83.36	7.66	0.923	55.40	0.38	15.07	-178	Clearing, no odors; voltage output = 18.0
12:05	1:25	800	NM	83.39	7.63	0.937	53.20	0.40	14.98	-175	
12:15	1:35	800	NM	83.41	7.59	0.966	49.70	0.35	14.93	-170	Clear, no odors; voltage output = 17.9
12:25	1:45	800	NM	83.41	7.59	0.968	45.30	0.33	14.94	-169	
12:30	1:50	800	NM	83.40	7.58	0.969	43.40	0.37	15.17	-165	
12:35	1:55	1300	NM	83.46	7.57	0.974	25.30	0.31	14.72	-174	Clear, no odors; voltage output = 18.7
12:40	2:00	1300	NM	83.48	7.58	0.974	27.20	0.29	14.68	-177	
12:50	2:10	1300	NM	83.48	7.56	0.976	38.20	0.29	14.85	-178	Clear, no odors
13:00	2:20	1300	NM	83.49	7.57	0.978	56.40	0.26	14.79	-182	
13:05	2:25	1300	NM	Increase pumping rate							
13:10	2:30	2000	NM	83.59	7.55	0.979	46.30	0.21	14.62	-187	
13:15	2:35	2000	NM	83.61	7.56	0.978	45.60	0.21	14.45	-189	Rain approaching
13:20	2:40	3000	NM	83.75	7.55	0.975	NM	0.19	14.21	-193	
13:25	2:45	NR	NM	Stop work due to lightning and slight to moderate rain, stopped pump; heavy rain approaching; transducer running until 11:00 p.m.							

Notes: MW-1808M depth to water measurements: 11:45 = 197.54 ft, 12:05 = 197.13 ft, 12:25 = 196.56 ft
Stopped collecting water level measurements on MW-1808M: depth to water decreasing from well development on 7/19/18 and removal of pump the morning of 7/20/18. Well is recovering from development.

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 Well ID MW-1809A Date 6/28/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond Weather Sunny, hot, 81°F

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): NR
Casing Diameter (in.): 2
Well Material: X PVC, SS

Static Water Level (ft-bmp): 48.39
Total Depth (ft-bmp): 75.12
Water Column: 26.73
Gallons in Well: 4.28

MP Elevation: NA
Pump Intake (ft-bmp): 73
Purge Method: Pump

Pump On/Off: NR
Volumes Purged: 28
Centrifugal:
Submersible: x

Transducer SN: NR
Observation Wells: MW-1807A, MW-1807B
Other:

Transducer Depth: 71 ft
Completed by: A. Gillespie

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
13:05	0:00	NR	N/A	48.39	NM	NM	NM	NM	NM	NM	
13:15	0:10	NR	NM	48.39	NM	NM	NM	NM	NM	NM	
13:20	0:15	500	1.06	48.54	6.97	1.370	30.10	12.35	19.06	-52.1	Clearing, no odors
13:30	0:25	500	NM	48.59	6.93	1.361	18.00	6.26	20.45	-56.4	Air bubbles in flow thru cell
13:45	0:40	500	NM	48.58	6.95	1.353	12.70	5.48	20.95	-58.1	Clear, no odors
13:55	0:50	500	5.68	48.66	7.01	1.353	5.59	5.19	19.19	-81.9	
14:00	0:55	750	Increase pumping rate								
14:05	1:00	750	NM	48.80	7.03	1.334	4.53	4.55	18.40	-83.1	Air bubbles in flow thru cell
14:15	1:10	750	NM	48.84	7.04	1.334	5.59	4.18	18.71	-76.3	Clear, no odors
14:30	1:25	750	11.62	48.88	7.07	1.332	3.96	4.01	18.54	-96.1	Clear, no odors
14:45	1:40	750	14.61	48.90	7.08	1.329	3.53	3.89	18.61	-92.0	
14:50	1:45	1000	NM	49.08	7.08	1.326	3.46	3.63	17.33	-78.6	Clear, no odors
15:00	1:55	1000	18.57	49.13	7.09	1.323	2.12	3.20	17.86	-71.4	
15:10	2:05	1000	21.21	49.12	7.09	1.313	2.81	2.84	17.54	-81.5	
15:20	2:15	NR	23.85	49.16	7.09	1.313	3.32	2.68	17.44	-82.1	
15:30	2:25	1000	26.50	49.17	7.10	1.309	4.18	2.40	17.36	-84.4	
15:35	2:30	1500	NM	49.38	7.10	1.304	3.83	2.28	16.77	-83.9	Clear, no odors
15:45	2:40	1500	32.44	49.43	7.09	1.301	3.14	2.24	16.83	-74.8	
15:55	2:50	1500	36.40	49.48	7.10	1.304	3.82	2.01	16.16	-97.6	
16:05	3:00	1500	40.37	49.51	7.10	1.302	0.85	1.84	16.59	-101.8	
16:10	3:05	2000	43.00	49.75	7.10	1.303	1.21	1.86	16.02	-103.2	Clear, no odors
16:20	3:15	2000	48.29	49.84	7.10	1.304	1.13	1.63	15.99	-105.8	
16:30	3:25	2000	53.57	49.93	7.10	1.303	3.18	1.41	16.01	-108.5	Clear, no odors
16:40	3:35	2000	58.86	49.99	7.10	1.302	3.24	1.12	15.88	-109.9	

Note: >4 inch rain event last night (4 inches in approximately 1 hour).

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 | Well ID MW-1809A | Date 6/28/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond | Weather Sunny, hot, 83°F

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): NR
Casing Diameter (in.): 2
Well Material: X PVC / SS

Static Water Level (ft-bmp): 48.39
Total Depth (ft-bmp): 75.12
Water Column: 26.73
Gallons in Well: 4.28

MP Elevation: NA
Pump Intake (ft-bmp): 73
Purge Method: Pump

Pump On/Off: NR
Volumes Purged: 28
Centrifugal:
Submersible: x

Transducer SN: NR
Observation Wells: MW-1807A, MW-1807B
Other:

Transducer Depth: 71 ft
Completed by: A. Gillespie

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
16:48	3:43	3000	NM	50.80	7.08	1.298	2.16	0.95	15.26	-112.3	Clear, no odors
16:55	3:50	3000	70.75	50.92	7.10	1.295	1.02	0.82	15.15	-114.2	
17:05	4:00	3000	78.67	51.06	7.11	1.293	0.77	0.68	15.20	-115.3	
17:10	4:05	4000	82.63	Increase pumping rate							
17:15	4:10	4000	87.92	51.62	7.11	1.291	1.21	0.63	15.00	-111.6	Clear, no odors
17:25	4:20	4000	98.48	51.70	7.12	1.288	1.61	0.60	14.99	-114.0	
17:35	4:30	4000	109.05	51.89	7.13	1.294	2.80	0.54	15.02	-116.9	
17:45	4:40	4000	119.62	51.95	7.14	1.294	1.10	0.48	15.09	-117.3	
17:50	4:45	Stop pumping, allow to recover with transducers running/on overnight; depth to water = 51.98; no water back-flow from tubing, crimped several times and zip tied									
Well Recovery Data:											
18:00	4:55	N/A	N/A	49.88	NM	NM	NM	NM	NM	NM	
18:07	5:02	N/A	N/A	49.80	NM	NM	NM	NM	NM	NM	

Note: Turned off transducers in well 1809, 1807SRF, and 1807C on 6/29/18 from 7:40 to 8:30.

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 | Well ID MW-1810A | Date 6/15/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond | Weather Mostly cloudy, humid, 72°F

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): NR
Casing Diameter (in.): 2
Well Material: X PVC / SS

Static Water Level (ft-bmp): 68.10
Total Depth (ft-bmp): 83.71
Water Column: 15.61
Gallons in Well: 2.50

MP Elevation: NA
Pump Intake (ft-bmp): 80
Purge Method: Pump

Pump On/Off: NR
Volumes Purged: 10
Centrifugal:
Submersible: x
Other:

Transducer SN: NR
Observation Wells: None (nearest wells 1807/1808 being developed by DLZ)

Transducer Depth: 75 ft
Completed by: A. Gillespie

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
9:30	0:00	NR	NM	68.24	Pump malfunction, low voltage, changed power cords						
9:35	0:05	2000	NM	68.24	NM	NM	NM	NM	NM	NM	
9:45	0:15	NR	NM	71.51	NM	NM	32.60	NM	NM	NM	Calibrating Horiba meter
9:50	0:20	2000	NM	71.79	7.42	1.080	14.20	1.33	17.90	45	Clear
10:00	0:30	2000	NM	72.71	7.67	0.897	14.00	0.35	15.76	-71	Clear
10:10	0:40	2000	NM	73.40	7.78	0.845	3.11	0.17	15.75	-82	
10:20	0:50	2000	23.78	80.00	Pumped dry, turn off pump, allow to recover; crimped hose-no back-flow						
Well Recovery Data:											
10:25	0:55	NR	NM	74.73	NM	NM	NM	NM	NM	NM	
10:35	1:05	NR	NM	69.91	NM	NM	NM	NM	NM	NM	
10:45	1:15	NR	NM	69.45	NM	NM	NM	NM	NM	NM	
11:25	1:55	NR	NM	69.39	NM	NM	NM	NM	NM	NM	
12:15	2:45	NR	NM	69.30	NM	NM	NM	NM	NM	NM	
12:20	2:50	Turn off transducer in well									

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

ARCADIS Design & Consultancy for natural and built assets

Well Yield - Pumping Drawdown/Recovery Log

Project No. WV015976 Well ID MW-1810A Date 6/18/2018

Project Name/Location AEP Amos Plant - Fly Ash Pond Weather Sunny, humid, 92°F

Measuring Pt. Description: TOC
Screen Setting (ft-bmp): NR
Casing Diameter (in.): 2
Well Material: X PVC, SS

Static Water Level (ft-bmp): 68.49
Total Depth (ft-bmp): 83.71
Water Column: 15.22
Gallons in Well: 2.44

MP Elevation: NA
Pump Intake (ft-bmp): 80
Purge Method: Pump

Pump On/Off: NR
Volumes Purged: 8
Centrifugal:
Submersible: x

Transducer SN: NR
Observation Wells: None (DLZ developing wells 1808A/B/C)
Other:

Transducer Depth: 75 ft
Completed by: A. Gillespie

Time	Min Elapsed	Rate (mL/min)	Total Gallons Purged	Depth to Water (ft)	pH (s.u.)	Cond. (mS/cm)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temp. (°C)	Redox (mV)	Comments
12:45	0:00	NR	NM	68.49	NM	NM	NM	NM	NM	NM	
12:50	0:05	500	NM	NM	NM	NM	NM	NM	NM	NM	
13:00	0:15	500	NM	69.62	7.54	1.040	5.90	9.27	22.28	77	Clear, no turbidity
13:10	0:25	500	NM	69.86	7.56	0.957	2.90	2.40	21.49	12	Tubing in sun, increasing temp.
13:20	0:35	500	3.96	70.04	7.69	0.885	1.30	1.58	21.54	-7	
13:30	0:45	500	5.28	70.14	7.76	0.845	0.73	1.25	21.99	-22	
13:40	0:55	1000	7.93	71.25	7.83	0.783	0.21	1.28	19.29	-49	16.2 mV setting/controller
13:50	1:05	1000	10.57	71.56	7.81	0.771	0.11	1.31	19.98	-65	
14:00	1:15	1000	13.21	71.79	7.91	0.738	0.10	1.20	20.42	-67	
14:10	1:25	NR	15.85	72.02	7.95	0.727	0.10	1.28	20.24	-73	
14:20	1:35	NR	19.81	73.60	7.98	0.708	3.20	1.39	19.21	-95	
14:35	1:50	NR	NM	75.91	7.79	0.715	1.30	1.22	18.88	-47	
Stopped pumping, depth to water near transducer depth, allow to recover; crimp/sealed tubing, back-flow into well											
Well Recovery Data:											
14:40	1:55	NR	NM	72.35	NM	NM	NM	NM	NM	NM	
14:50	2:05	NR	NM	70.99	NM	NM	NM	NM	NM	NM	
15:10	2:25	NR	NM	70.68	NM	NM	NM	NM	NM	NM	Water from tubing running into well

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units	NA	Not Available
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	NR	Not Recorded
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	HZ	hertz

APPENDIX G

Geophysical Logs

ARCADIS

Marshal Miller & Associates, 2018

Geophysical Logs

MW-1801, MW-1802, MW-1805, MW-1806, and MW-1808

CO AEP
WELL 1801
FLD Amos Plant
CTY Kanawha
STE WV
FILING No

GEOLOGICAL LOGGING SYSTEMS

COMPANY AEP
WELL ID 1801
FIELD Amos Plant
COUNTRY USA
STATE WEST VIRGINIA
LOCATION API#
OTHER SERVICES

SEC
TWP
RGE
PERMANENT DATUM GL
ELEVATION K.B.
LOG MEAS. FROM GL D.F.
ABOVE PERM. DATUM G.L.
DRILLING MEAS. FROM GL
DATE 02/22/18
RUN No. 1
TYPE LOG
BIT
DEPTH-DRILLER
DEPTH-LOGGER
BTM LOGGED INTERVAL
TOP LOGGED INTERVAL
TYPE FLUID IN HOLE
SALINITY
DENSITY
LEVEL
MAX. REC. TEMP.
OPERATING RIG TIME
RECORDED BY N. PAINTER
WITNESSED BY

RUN NO.	BIT	BOREHOLE RECORD FROM	TO	CASING RECORD SIZE	WGT.	FROM	TO

GAM(NAT) 0 CPS 300 CALIPERL 4 INCH 14

Depth 1ft:120ft

Apparent Dip 0° 90° 180° 270° 0°

Centralized AMPL 0° 90° 180° 270° 0°

DENS(TYH) 3 G/CC 1 POR(NEUTRON) 0 PERCENT 100

RES(16N) 0 OHM-M 400 RES 0 OHM 400 LATERAL 0 OHM-M 400

TEMP 53 DEG F 63 DEL TEMP -0.1 DEG F 0.1 SP COND 200 US/CM 600

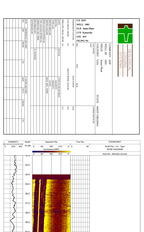
HOLE WAS BLOWN OUT JUST BEFORE LOGGING WATER WAS COMING INTO HOLE AS LOGGING OF VARIOUS TOOLS PROGRESSED, WATER LEVEL ROSE FROM 128 (WHEN TEMP -RES-FL COND LOG RUN) UP TO 54.5 WHEN ATV LOG -FINAL LOGGING RUN

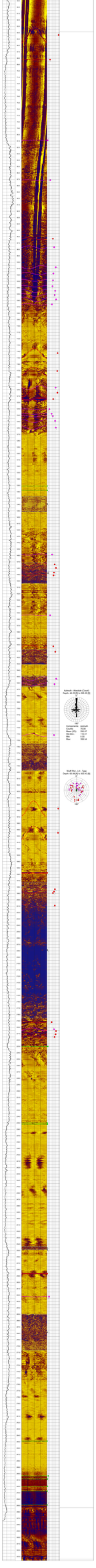
DARK SHADOW HERE IS THE ORIGINAL CORE HOLE TRACE IN SIDWALL OF ROTARY HOLE, WHERE ROTARY HOLE IS NOT FOLLOWING CORE HOLE AND IS "BESIDE" THE ORIGINAL HOLE.

Water Level at 128 when Temp Res Fluid Cond. Log run
Water level continued to rise while logging other logs.

WASHED OUT ZONE

0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
190.0
200.0
210.0
220.0
230.0
240.0
250.0
260.0
270.0
280.0
290.0
300.0





MARSHALL MILLER & ASSOCIATES

GEOLOGICAL LOGGING SYSTEMS
A DIVISION OF MARSHALL MILLER & ASSOCIATES

Acoustic Televiewer Interpretation

Well: 1801 — **AEP Amos Plant**

Depth Feet	Dip Direction Degrees	DIP Angle Degrees	APERTURE mm	Feature Category
64.36	9.23	81.87	0	1
68.22	174.41	22.2	0	1
80.87	16.06	6.16	0	2
87.12	253.6	23.36	0	2
96.31	283.24	43.83	0	1
97.65	286.3	52.6	0	2
100.79	98.27	60.28	0	2
101.77	247.77	47.2	0	2
102.84	195.94	41.61	0	2
103.77	190.93	38.38	0	2
104.49	187.04	57.54	0	2
105.14	202.48	54.07	0	2
105.83	212.79	65.28	0	2
106.61	269.64	37.52	0	2
114.26	357.57	77.82	0	1
117.07	348.34	75.14	0	1
119.67	89.39	60.11	0	2
120.48	10.2	75.95	0	1
121.45	81.43	44.54	16.8	1
121.61	255.92	40.03	0	1
123.05	233.86	17.95	0	2
123.76	177.33	30.96	0	2
124.13	181.21	39.62	0	2
124.89	180.24	56.31	0	2
125.94	154.98	60.28	0	2
135.1	325.02	1.37	0	5
135.77	317.25	0	0	5
137.94	357.57	0	283.94	0
145.84	94.25	34.84	0	2
147.4	111.74	52.35	0	1
147.96	127.29	61.42	0	1
148.68	106.88	48.14	0	1
148.76	358.54	9.54	384.84	0
149.11	92.79	45.23	0	1
155.37	283.24	23.94	0	2
160.25	295.87	46.88	0	1
161.11	18.46	60.62	0	1
161.92	355.63	2.75	275.12	0
165.33	128.5	63.62	0	2
165.72	4.86	1.37	199.33	0
166.17	177.17	51.03	0	2
174.18	320.16	52.6	0	2

Feature Category Legend

Color	Label	Description
Black	0	Broken Zone / Undifferentiated
Red	1	Major Open Joint/Fracture
Magenta	2	Minor Open Joint/Fracture
Orange	3	Partially Open Joint/Fracture
Gray	4	Filled Fracture/ Joint
Green	5	Bedding/Banding/Foliation

177.63	4.86	1.37	499.7	0				
185.7	350.28	82.21	0	1				
189.5	350.77	80.95	0	1				
195.77	271.58	0	22.2	1				
198.34	135.06	54.07	0	1				
198.71	136.03	47.83	0	1				
198.94	130.2	39.21	0	1				
200.91	243.89	56.31	0	1				
207.89	346.88	0	2560.63	0				
219.18	232.23	32.94	0	1				
220.32	333.07	53.59	0	2				
220.59	236.6	63.89	0	1				
221.09	253.6	61.89	0	1				
221.52	279.35	55	0	1				
223	245.67	6.17	0	5				
235.02	273.52	2.75	0	5				
235.21	270.61	4.12	0	5				
254.61	343	1.38	60.93	0				
254.88	355.63	0	0	0				
258.64	77.25	0	11.34	1				
262.24	195.79	13.5	0	2				
267.82	0.97	1.37	677.28	0				
284.9	341.05	1.38	0	5				
290.36	179.06	7.52	0	5				
290.84	177.17	2.75	0	5				
291.98	351.02	5.48	0	5				
292.73	0	0	0	5				
294.91	6.14	2.75	0	5				

CO AEP AMOS FAP
WELL MW-1802
FLD
CTY PUTNAM
STE WV
FILING No

GEOLOGICAL SYSTEMS LOGGING

PERMANENT DATUM
LOG MEAS. FROM GL
DRILLING MEAS. FROM GL

RUN No. 1
TYPE LOG GAMMA
DEPTH-DRILLER 310
DEPTH-LOGGER 311
BTM LOGGED INTERVAL 309
TOP LOGGED INTERVAL SURFACE
CASING-DRILLER 6 @ 20
BIT SIZE 5.5
TYPE FLUID IN HOLE AIR
DENSITY
LEVEL
MAX. REC. TEMP.

RUN NO. 1
BIT SIZE 5.5
FROM SURFACE
TO 310
CASING RECORD
SIZE 6
WGT.
FROM SURFACE
TO 20
RECORDED BY P.WATERS
WITNESSED BY A.LANG

SEC
TWP
RGE
ELEVATION
ABOVE PERM. DATUM
K.B.
D.F.
G.L.

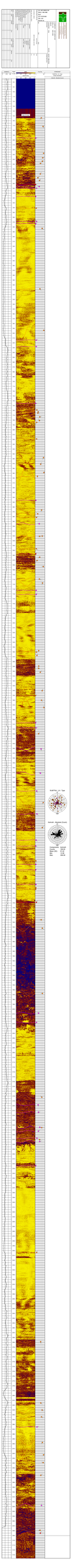
COMPANY AEP AMOS FAP
WELL ID MW-1802
FIELD
COUNTRY USA
LOCATION
STATE WEST VIRGINIA
OTHER SERVICES

GAM(NAT) 0 CPS 300
CALIPERL 4 INCH 14
Depth 1ft:120ft
AMPL 0° 90° 180° 270° 0° 3
Apparent Dip 0° 90° 180° 270° 0°
DENSITYH 1 G/CC 0
POR(NEUTRON) 100 PERCENT 0
RES(16N) 0 OHM-M 200
LATERAL 0 OHM-M 200
RES 100 OHM 600
DEL TEMP -0.1 DEG F 0.1
TEMP 53 DEG F 63

Well was initially "dry" when logged first run, water level at 305. Some slight water inflow was possible around 80 feet. "Potable water" was added to fill the hole in order to be able to run resistivity, neutron and ATV logs. Temp, delta temp, SP Conductivity logs are basically not meaningful due to this.

WASHED OUT ZONE

0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
190.0
200.0
210.0
220.0
230.0
240.0
250.0
260.0
270.0
280.0
290.0
300.0
310.0


Well Information
Well: 15/9-19 A
Field: Sleipner
Country: Norway
Date: 2008
Comments
Gamma Ray
Caliper
Bit Size
Resistivity
Density
Neutron
Sonic
Lithology
Interpretation
Depth
Stratigraphy
Structure
Dip Azimuth
Dip Angle
Image Orientation
Dip Azimuth - Dip Angle (Count)
Dip Azimuth - Dip Angle (Azimuth)

		Acoustic Televiewer Interpretation						
MW 1802			**AEP AMOS FAP**					
Depth Feet	**Dip Direction Degrees**	**DIP Angle Degrees**	**APERTURE mm**	**Feature Category**	**Feature Category Legend**			
15.41	232.94	57.94	0	3	**Color**	**Label**	**Description**	
17.18	161.28	73.54	0	3	Black	0	Broken Zone / Undifferentiated	
19.58	88.49	4.21	0	2	Red	1	Major Open Joint/Fracture	
22.73	75.04	79.2	0	3	Magenta	2	Minor Open Joint/Fracture	
23.68	69	70.69	0	3	Orange	3	Partially Open Joint/Fracture	
24.37	62.97	68.03	0	3	Gray	4	Filled Fracture/ Joint	
24.84	77.82	49.56	0	3	Green	5	Bedding/Banding/Foliation	
27.02	30.12	48.4	0	3	Teal	6	Induced Fracture	
27.8	49.66	25.71	0	3	Dk Green	7	Top of Coal	
28.38	35.71	40.76	0	3	Dk Blue	8	Bottom of Coal	
29.21	99.47	3.31	14.02	1	Purple	9	Cleat	
29.63	280.74	38.5	0	2				
29.99	267.33	12.68	0	2				
31.69	247.16	4.79	0	2				
34.1	236.63	10.27	0	3				
36.85	318.03	12.88	0	2				
37.33	60.09	5.11	0	2				
38.3	126.86	65.86	0	3				
50.82	143.14	44.38	0	3				
59.41	104.21	81.32	0	3				
61.44	62.82	9.96	0	2				
62.76	279.41	10.62	0	2				
74.52	102.4	3.07	0	2				
75.9	291.33	17.12	0	3				
76.28	207.39	28.59	0	3				
76.55	94.71	24.73	0	3				
77.33	82.24	42.72	0	3				
78.09	334.94	39.98	0	3				
78.47	208.86	13.85	0	3				
81.91	287.96	13.17	0	3				
85.76	203.54	78.75	0	3				
87.13	21.77	51.71	0	3				
88.86	32.51	81.85	0	3				
89.64	184.35	20.7	0	3				
94.59	274.28	7.25	0	2				
96.63	199.02	59.71	0	3				
97.42	316.28	23.76	0	3				
98.15	62.02	11.38	0	3				
99.48	282.59	39.15	0	2				
102.01	86.15	66.25	0	3				
102.06	265.66	42.52	0	3				

104.66	122.78	10.12	0	3				
105.72	35.27	5.46	0	1				
106.39	253.28	42.33	0	3				
107.07	217.55	18.15	0	3				
108.32	280.55	76.86	0	3				
110.92	113.84	39.57	0	3				
111.74	197.27	68.97	0	3				
113.25	248.85	9.88	0	2				
114.1	24.81	10.09	0	2				
125.74	217.45	33.07	0	3				
126.05	15.27	11.09	0	3				
126.74	15.2	17.02	0	3				
128.94	194.37	32.82	0	3				
129.41	291.36	33.2	0	3				
130.22	41.15	48.35	0	3				
134.02	25.87	66.33	0	3				
135.06	54.51	2.59	0	3				
136.01	132.29	59.46	0	3				
137.53	354.91	81.96	0	3				
140.69	30.33	3.14	0	2				
141.73	84.51	8.02	0	2				
142.96	46.45	31.44	0	3				
146.1	174.96	55.94	0	2				
151.11	292.35	49.43	0	2				
154.81	158.73	13.91	0	2				
157.21	219.14	76.14	0	3				
159.56	130.65	16.68	0	2				
162.39	40.49	67.2	0	3				
164.98	136.68	9.24	0	2				
166.21	113.03	4.51	0	2				
169.27	159.17	7.54	0	3				
170	260.64	6.92	0	2				
171.15	53.73	3.18	0	2				
174.15	225.3	7.82	0	2				
174.83	267.52	7.3	0	3				
175.13	284.86	5.53	0	3				
177.86	33.37	11.29	3.75	1				
181.48	270.92	57.36	0	3				
183.22	124.14	67.15	0	3				
196.73	269.54	68.29	0	3				
200.81	286.76	31.43	0	2				
202.73	223.17	11.94	0	2				
218.22	318.05	62	0	3				
219.81	171.06	27.82	0	2				
221.33	81.06	30.45	0	2				
224.45	104.12	42.78	0	2				
224.51	84.2	61.17	0	3				

225.26	48.02	30.01	0	2				
226.7	112.88	16.13	0	2				
226.99	184.23	41.34	0	3				
227.39	73.48	41.87	0	2				
232.44	13.56	5.45	0	2				
250.39	24.69	13.59	0	3				
268.87	165.83	50.85	0	3				
281.54	123.31	52.25	0	3				
283.01	120.47	65.13	0	3				
284.43	121.89	59.55	0	3				
286.51	70.16	17.48	0	2				
289.72	218.98	68.1	0	3				
292.29	51.73	79.11	0	3				
293.9	287.01	74.82	0	3				
296.52	59.53	52.58	0	3				
302.78	358.58	59.55	0	2				
307.91	265.04	46.11	0	3				
308.5	31.89	48.59	0	1				

CO AEP
WELL 1805
FLD Amos Plant
CTY Kanawaha
STE WV
FILING No

GEOLOGICAL LOGGING SYSTEMS

COMPANY AEP
WELL ID 1805
FIELD Amos Power Plant
COUNTRY STATE WEST VIRGINIA

LOCATION FAP
SEC TWP RGE
PERMANENT DATUM -
ELEVATION
LOG MEAS. FROM
ABOVE PERM. DATUM
DRILLING MEAS. FROM
K.B.
D.F.
G.L.
OTHER SERVICES

DATE 02/22/18
RUN No. 1
TYPE LOG Composite
DEPTH-DRILLER
DEPTH-LOGGER
BTM LOGGED INTERVAL
TOP LOGGED INTERVAL
OPERATING REC TIME
RECORDED BY N. PAINTER
WITNESSED BY

TYPE FLUID IN HOLE
SALINITY
DENSITY
LEVEL
MAX. REC. TEMP.

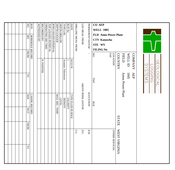
RUN NO. | BOREHOLE RECORD: BIT | FROM | TO | CASING RECORD: SIZE | WGT. | FROM | TO

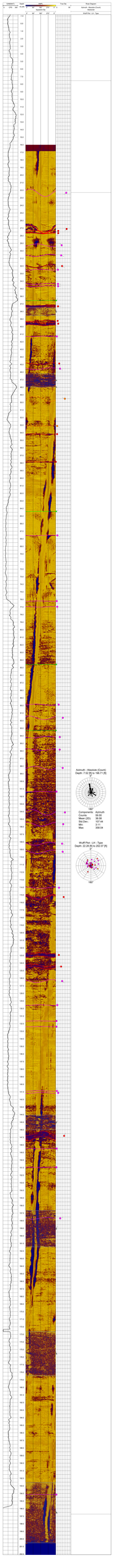
GAM(NAT) 0 CPS 300
CALIPERL 4 INCH 14
Depth 1ft:120ft
AMPL 0° 90° 180° 270° 0° Apparent Dip
DENSITYH 3 G/CC 1
POR(NEU) 0 PERCENT 100
RES(16N) 0 OHM-M 400
RES 0 OHM 400
LATERAL 0 OHM-M 400
DEL TEMP -0.1 DEG F 0.1
SP COND 200 US/CM 500
TEMP 56 DEG F 62

0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
110.0
120.0
130.0
140.0
150.0
160.0
170.0
180.0
190.0
200.0

Water Level at about 17 feet when logged.

DARK SHADOW HERE IS THE ORIGINAL CORE HOLE TRACE IN SIDWALL OF ROTARY HOLE. WHERE ROTARY HOLE IS NOT FOLLOWING CORE HOLE AND IS "BESIDE" THE ORIGINAL HOLE.





MARSHALL MILLER & ASSOCIATES

GEOLOGICAL LOGGING SYSTEMS
A DIVISION OF MARSHALL MILLER & ASSOCIATES

Acoustic Televiewer Interpretation

Well: 1805 — **AEP Amos Plant**

Depth Feet	Dip Direction Degrees	DIP Angle Degrees	APERTURE mm	Feature Category
22.33	234.67	62.37	0	2
27.1	222.29	64.97	3.71	1
27.36	244.32	14.89	0	1
27.65	212.06	14.71	4.55	1
29.25	316.19	35.31	0	2
30.59	114.37	32.13	0	2
32	123.64	38.05	0	1
32.48	348.44	12.41	0	2
34.35	98.61	13.09	0	2
34.66	86.22	13.7	0	2
36.55	41.1	2.62	0	5
37.31	90.61	13.53	26.9	1
38.01	18.58	0.88	125.99	0
39.24	47.79	11.42	0	1
39.61	223.52	15.01	42.23	1
41.28	76.7	6.91	0	2
44.86	160.74	20.47	0	1
45.54	120.25	25.56	0	2
47.08	345.22	0.91	210.24	0
47.96	347.5	0.88	0	0
49.51	294.45	54.12	0	3
53.11	119.72	8.01	0	3
54.18	277.73	8.08	0	1
57.84	356.8	0.23	0	1
64.37	60.93	2.49	0	5
67.55	119.56	9.46	0	2
76.21	350.04	6.43	0	2
76.97	170.04	8.97	0	2
84.58	14.91	3.17	0	5
89.88	311.68	17.82	0	2
91.61	222.3	42.15	0	2
93.3	20.75	1.16	0	5
94.16	85.04	23.87	0	2
95.81	188.11	23.36	0	2
98.24	292.36	41.45	0	2
101.36	340.09	5.05	0	2
104.11	257.8	55.08	0	2
105.66	188.38	44.18	0	2
108.23	110.23	38	0	2
109.3	139.6	41	0	2
114.05	177.82	19.64	0	2
115.27	149.19	47.64	11.34	1

Feature Category Legend

Color	Label	Description
Black	0	Broken Zone / Undifferentiated
Red	1	Major Open Joint/Fracture
Magenta	2	Minor Open Joint/Fracture
Orange	3	Partially Open Joint/Fracture
Gray	4	Filled Fracture/ Joint
Green	5	Bedding/Banding/Foliation

122.93	340.38	18.8	52.93	1				
124.45	260.86	31.93	34.93	1				
126.37	129.89	38.12	0	2				
129.54	350.51	9.09	0	2				
131.64	337.56	4.27	0	2				
132.39	26.89	3.82	0	2				
140.87	350.75	6.98	0	2				
141.13	15.54	14.4	0	2				
145.03	51.73	1.1	235.04	0				
146.8	25.67	49.83	53.45	1				
148.48	156.87	6.06	0	2				
150.94	160.84	3.55	0	2				
157.68	70.87	26.64	0	2				
159.05	30.37	1.27	576.38	0				
175.54	3.11	1.38	700.39	0				
194.14	316.71	3.6	0	2				
196.53	358.04	2.72	956.16	0				

CO AEP
WELL 1806
FLD Amos Plant
CTY Kanawha
STE WV
FILING No

GEOLOGICAL LOGGING SYSTEMS

COMPANY AEP
WELL ID 1806
FIELD Amos Plant
COUNTRY USA
STATE West Virginia
OTHER SERVICES

LOCATION
SEC
TWP
RGE

PERMANENT DATUM
ELEVATION
K.B.
LOG MEAS. FROM
D.F.
DRILLING MEAS. FROM
G.L.
ABOVE PERM. DATUM

RUN
BIT
BOREHOLE RECORD
FROM
TO

CASING RECORD
SIZE
WGT.
FROM
TO

RUN No.
TYPE LOG
DEPTH-DRILLER
DEPTH-LOGGER
BTM LOGGED INTERVAL
TOP LOGGED INTERVAL
TYPE FLUID IN HOLE
SALINITY
DENSITY
LEVEL
MAX. REC. TEMP.
OPERATING RIG TIME
RECORDED BY
WITNESSED BY

GAM(NAT)
0 CPS 300
CALIPER1
4 INCH 14

Depth
1ft:120ft

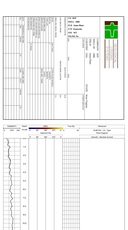
Apparent Dip
0° 90° 180° 270° 0°
Centralized AMPL
0° 90° 180° 270° 0°

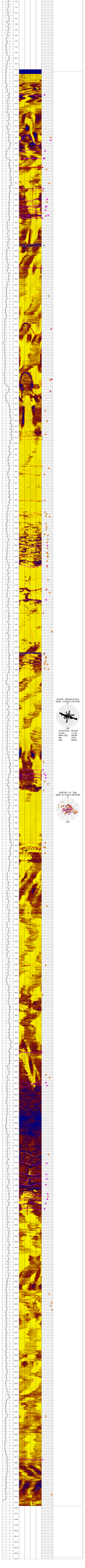
DENSITYH
1 G/CC 3
POR(NEU)
100 PERCENT 0

RES(16N)
0 OHM-M 800
RES
0 OHM-M 800
LATERAL

DEL TEMP
-0.1 DEG F 0.1
SP COND
200 US/CM 2000
TEMP
54 DEG F 58

WASHED OUT ZONE





Acoustic Televiewer Interpretation

Hole ID 1806 — **AEP - Amos Plant**

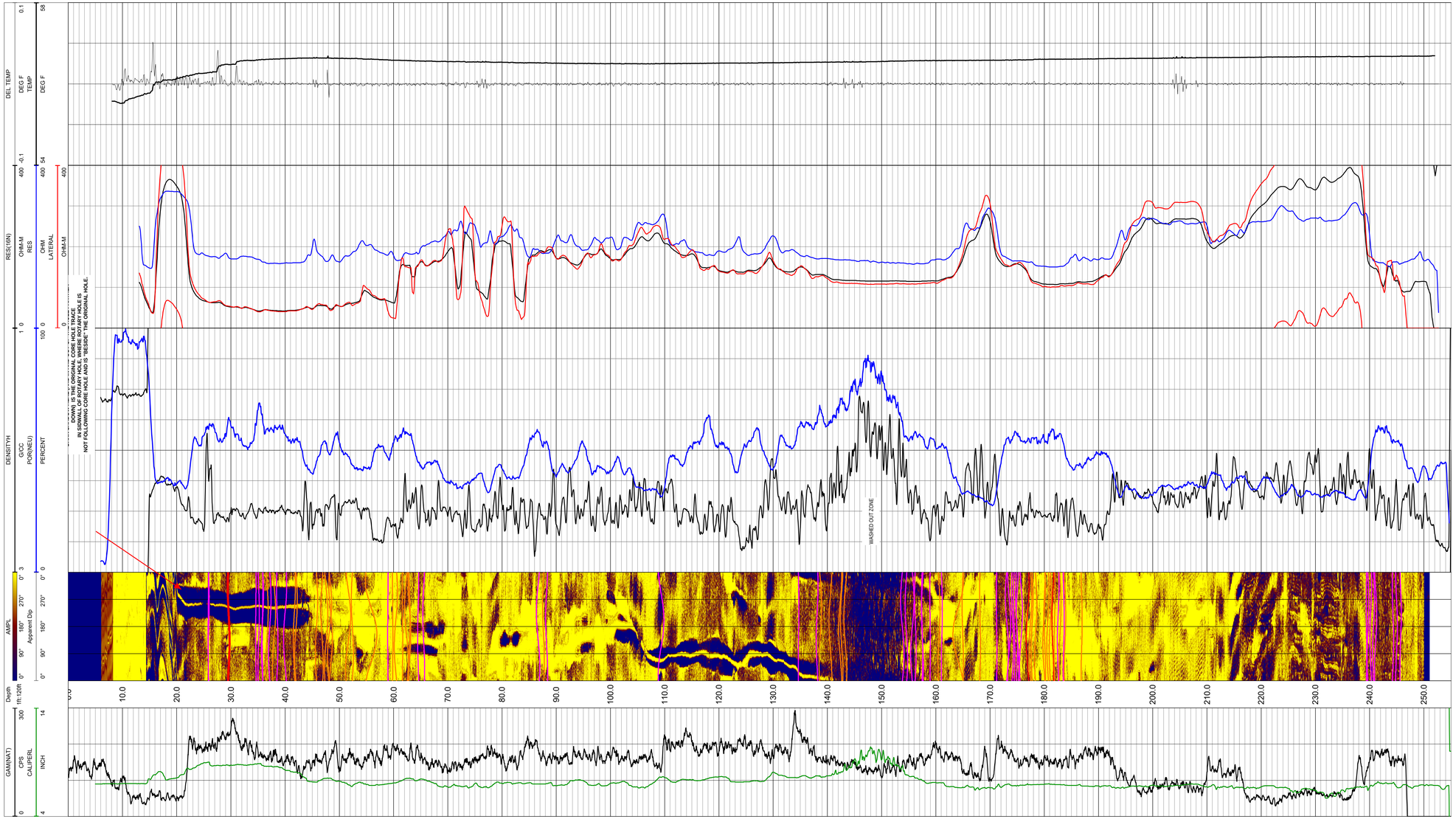
Depth Feet	Dip Direction Degrees	DIP Angle Degrees	APERTURE mm	Feature Category
26.49	250.87	23.04	0	2
33.99	291.26	74.82	0	3
34.51	301.89	74.44	0	2
36.37	353.62	28.17	0	2
37.71	72.99	22.27	0	2
37.73	22.68	15.83	0	2
39.3	72.99	7.18	12.06	1
39.69	34.02	38.22	0	3
42.13	291.97	62.88	0	3
43.06	118.35	11.57	0	2
43.42	111.26	7.18	0	3
44.93	172.91	44.32	0	2
45.4	274.25	44.32	0	3
46.21	87.87	37.66	0	2
46.23	270.71	34.72	0	2
46.84	296.22	32.21	0	2
47.36	0	0	0	3
47.78	68.74	52.25	0	2
47.85	248.03	38.22	0	2
48.27	102.05	4.5	0	2
53.04	161.57	18.3	51.47	0
57.09	0	0	0	2
62	133.94	54.79	0	3
67.82	289.84	78.64	0	1
76.7	288.43	82.21	0	1
76.84	289.13	70.16	0	3
78.85	300.47	72.3	0	1
82.27	13.46	29.55	0	3
84.12	342.99	45.22	0	3
86.43	286.3	34.72	0	3
86.79	0	0	0	3
87.32	0	0	0	3
92.06	0	0	0	3
92.43	123.31	57.58	0	3
93.51	314.65	23.79	0	3
98.11	310.39	26.75	0	3
98.17	0	0	0	3
100.15	206.93	28.17	0	3
100.48	184.96	40.38	0	3
100.85	234.57	35.92	0	3
100.96	119.76	62.88	0	3
102.2	231.73	37.09	0	3

Feature Category Legend

Color	Label	Description
Black	0	Broken Zone / Undifferentiated
Red	1	Major Open Joint/Fracture
Magenta	2	Minor Open Joint/Fracture
Orange	3	Partially Open Joint/Fracture
Gray	4	Filled Fracture/ Joint
Green	5	Bedding/Banding/Foliation

102.81	23.39	40.38	0	3				
103.21	255.83	39.31	0	3				
104.07	272.13	26.75	0	3				
104.25	254.41	52.25	0	3				
104.96	186.38	50.12	0	3				
105.5	229.61	45.22	0	3				
106.06	208.35	47.38	0	2				
106.53	218.98	48.59	0	3				
107.3	149.53	41.41	0	3				
107.39	97.8	46.96	0	3				
107.86	82.2	48.59	0	3				
108.11	276.38	50.85	0	3				
108.79	240.94	43.38	0	3				
109.63	194.17	42.41	0	2				
109.77	189.21	45.67	0	3				
112.1	131.81	49.75	0	3				
113.83	199.13	38.77	0	1				
114.35	108.43	62.11	0	3				
115.66	325.98	39.31	0	2				
117.98	46.06	12.43	0	3				
121.26	284.88	84.21	0	3				
125.06	16.3	23.79	36.86	0				
125.25	174.33	18.3	0	3				
125.74	26.22	36.51	0	3				
125.9	80.79	30.9	0	3				
126.39	16.3	34.72	0	3				
126.73	281.34	27.46	0	3				
127.01	50.31	26.75	0	3				
127.03	192.76	47.79	0	3				
127.71	162.99	23.04	0	3				
127.9	290.55	55.39	0	3				
144.26	195.59	15.83	0	3				
145.67	245.2	12.43	0	2				
146.35	41.81	19.91	0	2				
146.61	69.45	32.21	0	2				
147.08	77.95	32.21	0	2				
147.74	231.73	26.75	0	3				
148.17	45.35	50.12	0	3				
149.26	280.63	19.11	0	3				
158.03	0	0	0	3				
158.6	352.2	30.23	0	3				
159.32	338.74	20.7	0	3				
159.41	342.99	30.9	0	3				
160.36	76.54	26.02	0	3				
169.72	191.34	41.91	0	3				
180.17	103.46	30.23	0	3				
185.4	133.23	6.29	0	3				

195.54	0	0	0	2				
199.51	166.54	34.72	0	3				
200.01	279.92	67.06	0	3				
200.9	216.85	35.32	0	2				
201.44	74.41	41.91	0	2				
213.56	258.66	57.06	0	3				
215.15	258.66	43.38	0	2				
217.08	216.85	39.31	0	2				
217.91	107.01	40.9	0	2				
218.91	143.86	33.48	0	2				
220.56	306.85	50.49	0	2				
221	24.8	51.56	0	3				
221.47	347.95	46.54	0	2				
222.23	17.01	33.48	0	2				
223.15	341.57	26.02	0	2				
238.25	294.8	63.61	0	3				
239.34	102.05	74.69	0	3				
240.29	279.21	75.64	0	3				
241.01	114.09	82.37	0	3				
259.8	314.65	36.51	0	3				
267.48	270	9.83	0	2				
273.64	140.31	78.91	0	3				



GEOLOGICAL LOGGING SYSTEMS

CO AEP AMOS FAP
WELL MW-1808
FLD
CTY PUTNAM
STE WV
FILING No

COMPANY AEP AMOS FAP
WELL ID MW-1808
FIELD
COUNTRY USA STATE WEST VIRGINIA

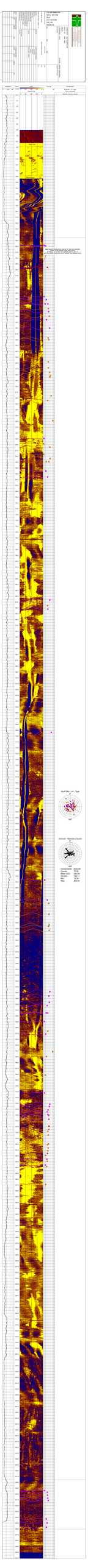
LOCATION
SEC TWP RGE

OTHER SERVICES

PERMANENT DATUM ELEVATION K.B.
LOG MEAS. FROM ABOVE PERM. DATUM D.F.
DRILLING MEAS. FROM GL G.L.

DATE	05/01/18	TYPE FLUID IN HOLE	
RUN No	1	SALINITY	
TYPE LOG		DENSITY	
DEPTH-DRILLER		LEVEL	
DEPTH-LOGGER	255.04	MAX. REC. TEMP.	
BTM LOGGED INTERVAL			
TOP LOGGED INTERVAL			
OPERATING RIG TIME			
RECORDED BY	PJ WATERS		
WITNESSED BY	ALAN G		

RUN NO.	BOREHOLE RECORD BIT	FROM	TO	CASING RECORD SIZE	WGT.	FROM	TO
	6						


Wulff Plot - L/R - Type
Azimuth - Absolute (Count)
Components Azimuth
Counts 3144
Top Int. 172.68
Bot Int. 191.41
Min. 352.44
Max. 352.44

Acoustic Televiewer Interpretation

MW 1808 — **AEP AMOS FAP**

Depth Feet	Dip Direction Degrees	DIP Angle Degrees	APERTURE mm	Feature Category
25.81	319.33	9.32	0	2
25.9	266.21	20.24	0	2
29.58	132.26	33.36	17.97	1
34.6	344.14	8.4	0	2
35.11	228.55	25.47	0	2
35.84	321.23	16.19	0	2
35.84	287.66	37.84	0	2
36.65	233.19	40.93	0	3
37.17	272.16	42.86	0	2
37.96	229.37	48.91	0	3
38.55	124.5	26.86	0	2
40.01	318.61	51.08	0	2
41.7	314.54	39.94	0	3
42	268.04	45.15	0	3
45.8	268.62	40.81	0	3
46.81	52.48	40.45	0	3
47.58	219.23	50.71	0	3
48.19	258.51	57.45	0	3
48.38	138.61	51.66	0	3
51.62	215.38	62.47	0	3
52.42	88.98	35.72	0	3
55.86	153.4	76.15	0	3
58.94	319.75	7.64	0	2
59.84	144.03	4.84	0	3
60.43	294.37	52.27	0	3
61.66	117.73	5.82	0	3
62.38	65.06	54.21	0	3
62.9	152.88	44.48	0	3
62.91	208.94	25.03	0	3
64.51	325.78	21.94	0	2
65.53	35.55	35.4	0	2
86.66	47.18	51.61	0	2
87.63	63.38	33.97	0	3
88.21	25.02	37.31	0	2
109.34	201.43	63.4	0	2
134.68	243.96	12.44	0	2
138.1	316.36	32.82	0	2
138.69	241.36	43.89	0	3
140.55	12.39	46.2	0	3
142.36	352.44	47.26	0	3
142.64	23.42	42.12	0	3
143.32	32.36	47.67	0	3

Feature Category Legend

Color	Label	Description
Black	0	Broken Zone / Undifferentiated
Red	1	Major Open Joint/Fracture
Magenta	2	Minor Open Joint/Fracture
Orange	3	Partially Open Joint/Fracture
Gray	4	Filled Fracture/ Joint
Green	5	Bedding/Banding/Foliation
Teal	6	Induced Fracture
Dk Green	7	Top of Coal
Dk Blue	8	Bottom of Coal
Purple	9	Cleat

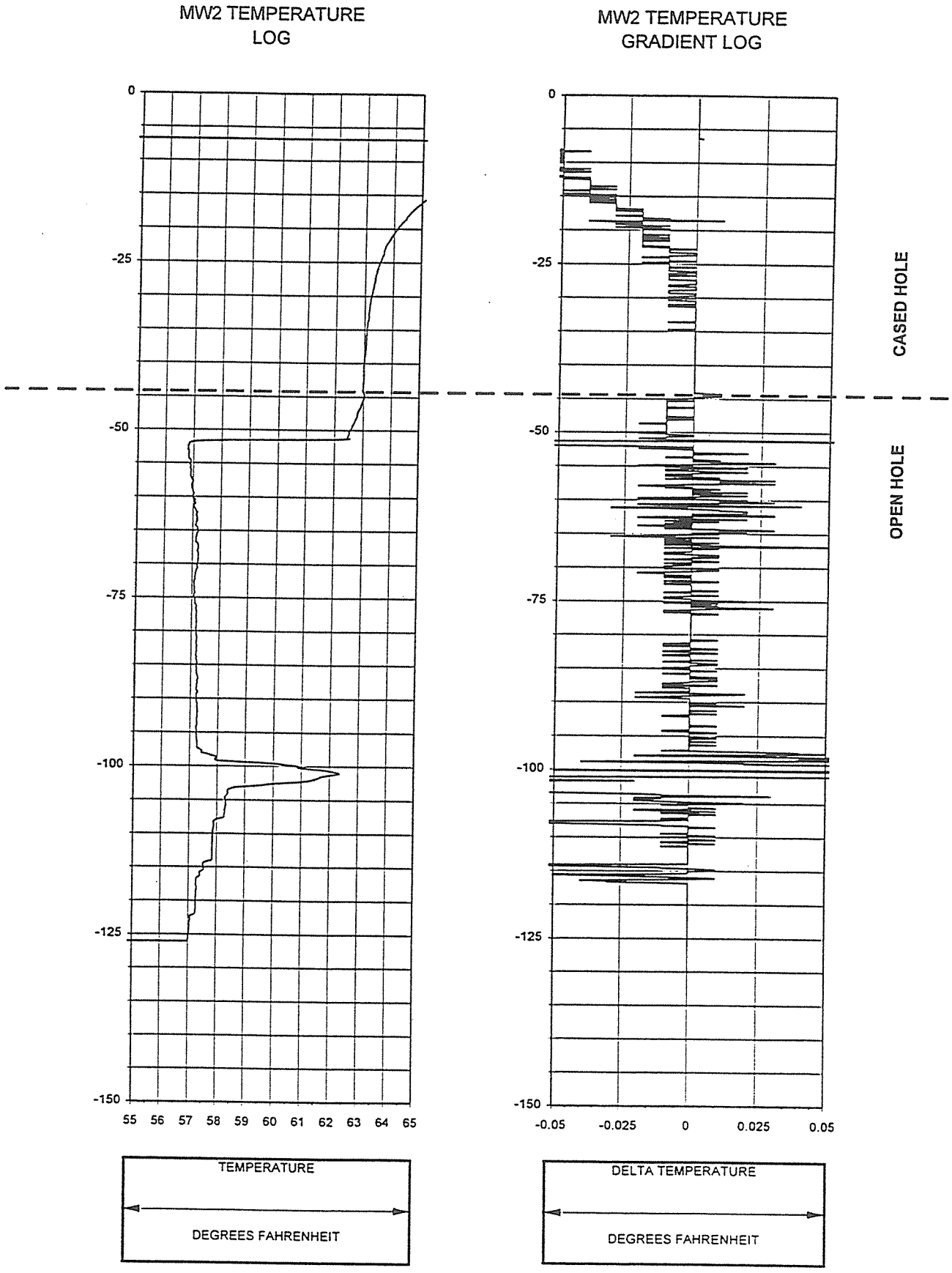
153.82	88.85	52.82	0	2				
154.58	71.66	44.52	0	2				
155.66	268.92	48.93	0	2				
156.23	104	31.87	0	2				
157.48	98.22	24.47	0	2				
157.5	51.46	36.47	0	2				
158.95	106.74	9.22	0	2				
160.6	231.99	37.61	0	3				
161.1	228.74	20.58	0	2				
164.15	334.01	75.13	0	3				
164.98	67.85	26.34	0	3				
168.15	111.72	17.59	0	3				
171.2	88.22	10.79	0	2				
173.12	97.96	52.26	0	2				
173.51	185.71	48.89	0	2				
174.12	111.35	38.61	0	2				
174.45	92.7	31.98	0	2				
174.89	105.73	37.38	0	2				
175.06	45.52	42.93	0	2				
175.71	226.85	45.51	0	2				
176.91	319.25	46.36	0	1				
177.45	277.84	46.1	0	3				
177.77	279.46	38.06	0	3				
178.43	252.55	40.5	0	3				
179.96	308.1	41.97	0	3				
180.09	36.19	33.35	0	3				
180.66	298.21	39.74	0	3				
181.12	276.68	37.27	0	3				
181.58	22.39	34.5	0	1				
181.91	294.84	19.97	0	3				
182.58	312.48	30.48	0	2				
182.93	251.93	32.84	0	3				
183.57	195.7	18.23	0	2				
183.81	213.54	29.11	0	3				
186.89	192.94	20.6	0	3				
239.42	79.14	9.24	0	2				
239.69	260.62	32.84	0	2				
240.21	324.89	34.35	0	2				
240.72	269.82	36.73	0	2				
241.12	215.84	40.6	0	2				
244.28	137.84	24.75	0	2				
244.96	181.62	31.4	0	2				
245.71	222.77	26.46	0	2				

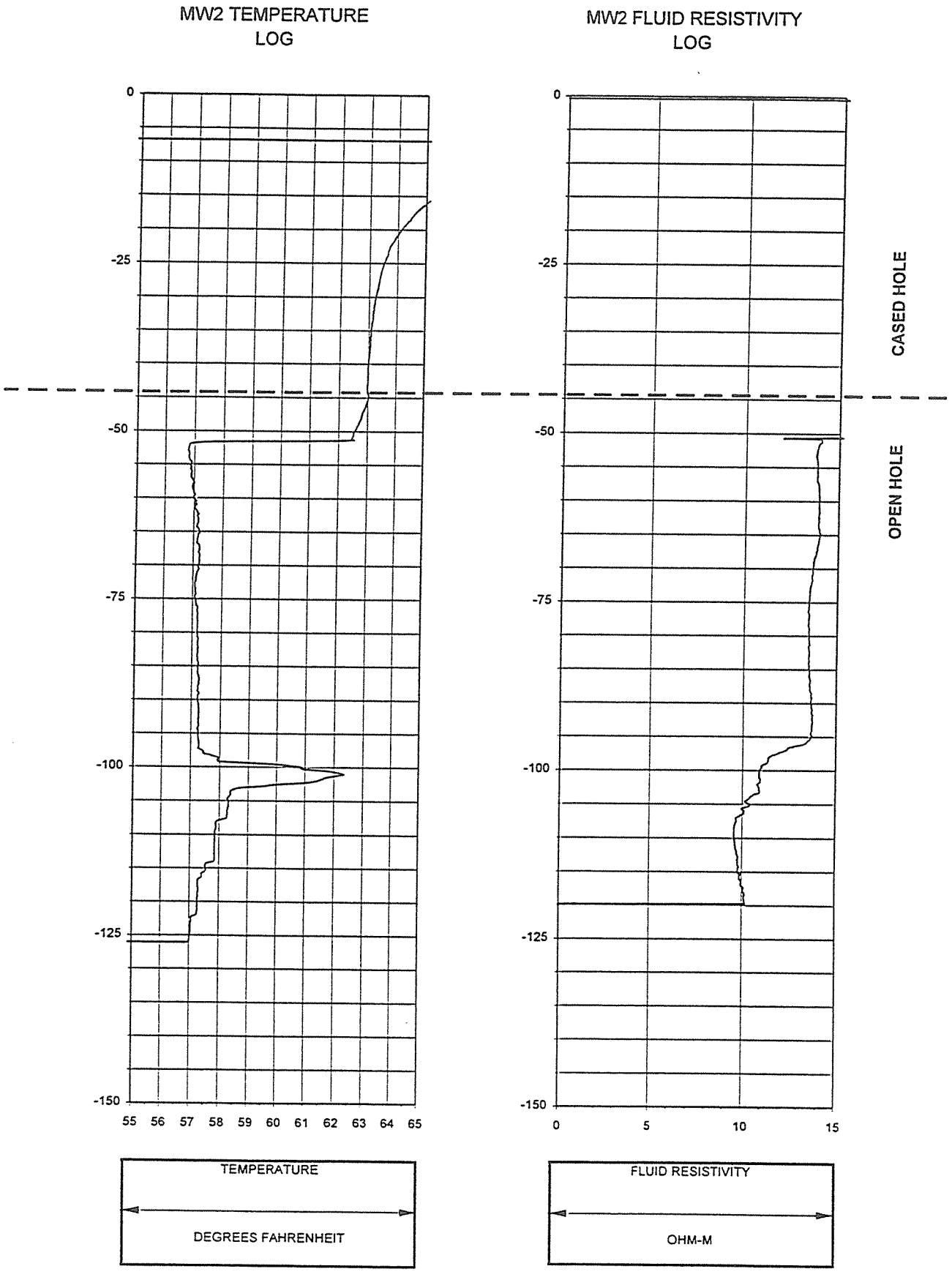
ARCADIS

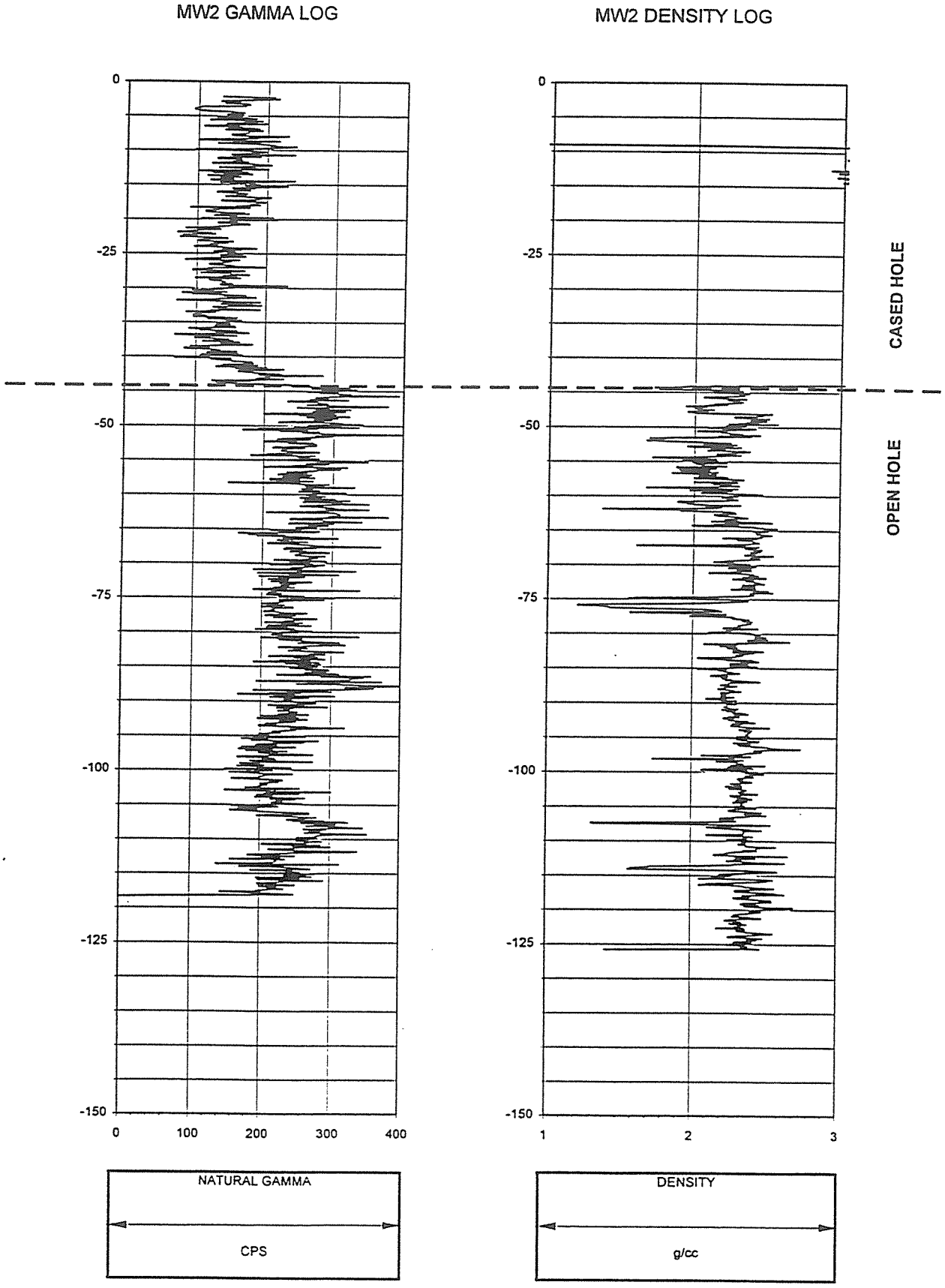
Electric Power Research Institute, 1999; Geological Logging Systems, 2002; H.C. Nutting Company, 2008; Cardno GLS, 2014

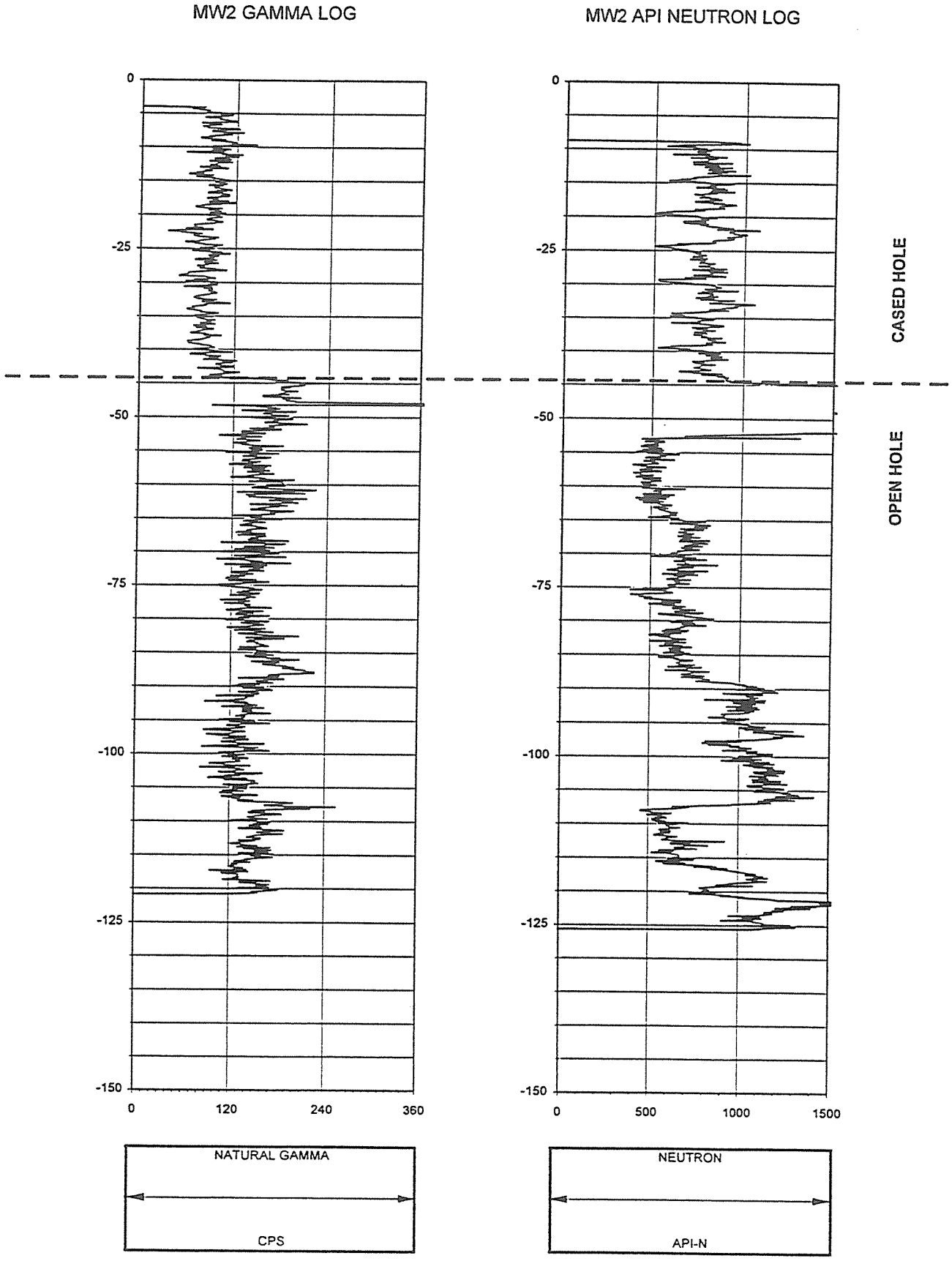
Geophysical Logs

MW-2, MW-4, & MW-5; MW-9 & MW-10; 2008-17; B-1401 & B-1402


MW2 TEMPERATURE LOG
MW2 TEMPERATURE GRADIENT LOG
0
-25
-50
-75
-100
-125
-150
55 56 57 58 59 60 61 62 63 64 65
-0.05 -0.025 0 0.025 0.05
CASED HOLE
OPEN HOLE
TEMPERATURE
DEGREES FAHRENHEIT
DELTA TEMPERATURE
DEGREES FAHRENHEIT

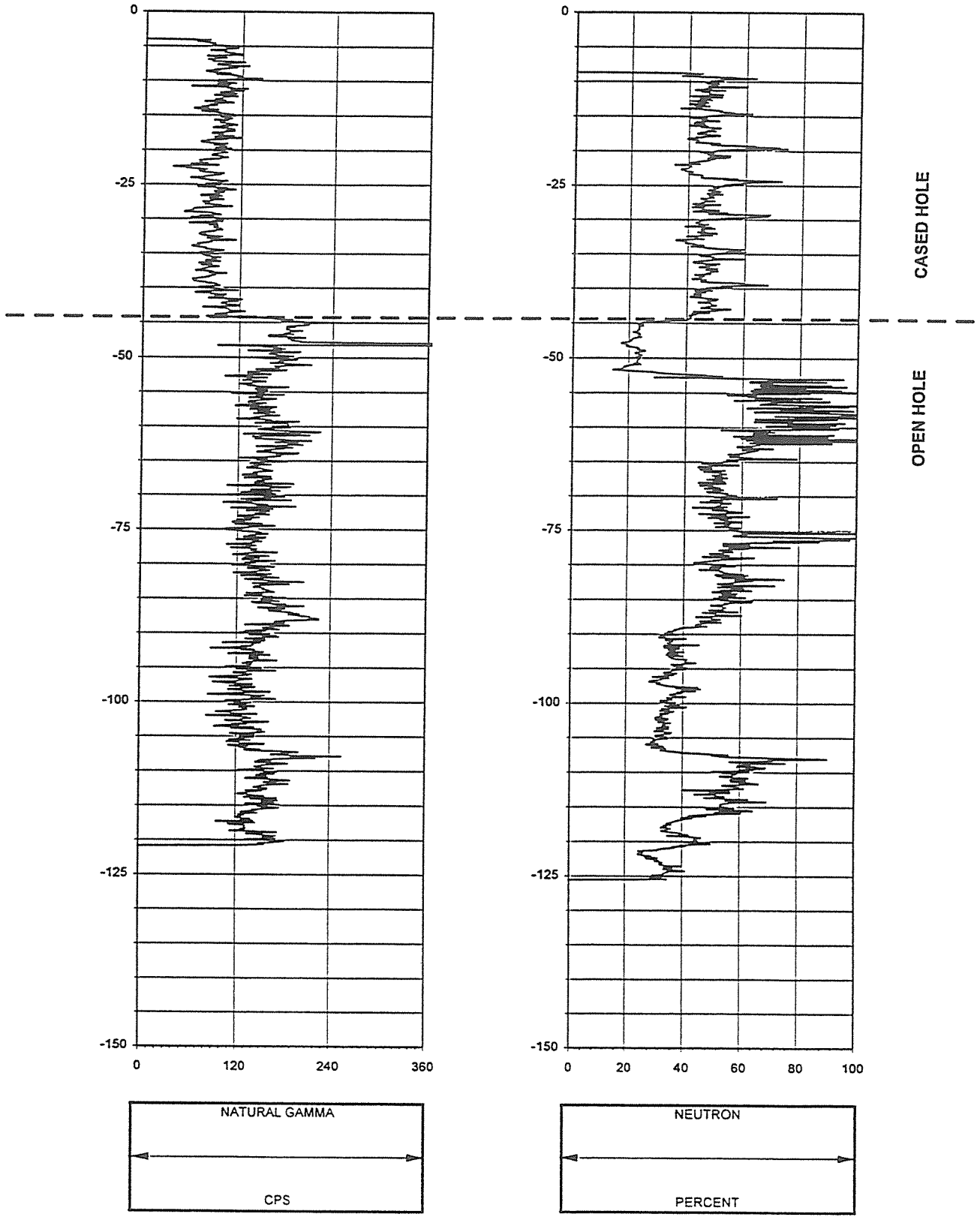

MW2 TEMPERATURE LOG
MW2 FLUID RESISTIVITY LOG
0
-25
-50
-75
-100
-125
-150
55 56 57 58 59 60 61 62 63 64 65
0 5 10 15
CASED HOLE
OPEN HOLE
TEMPERATURE
DEGREES FAHRENHEIT
FLUID RESISTIVITY
OHM-M

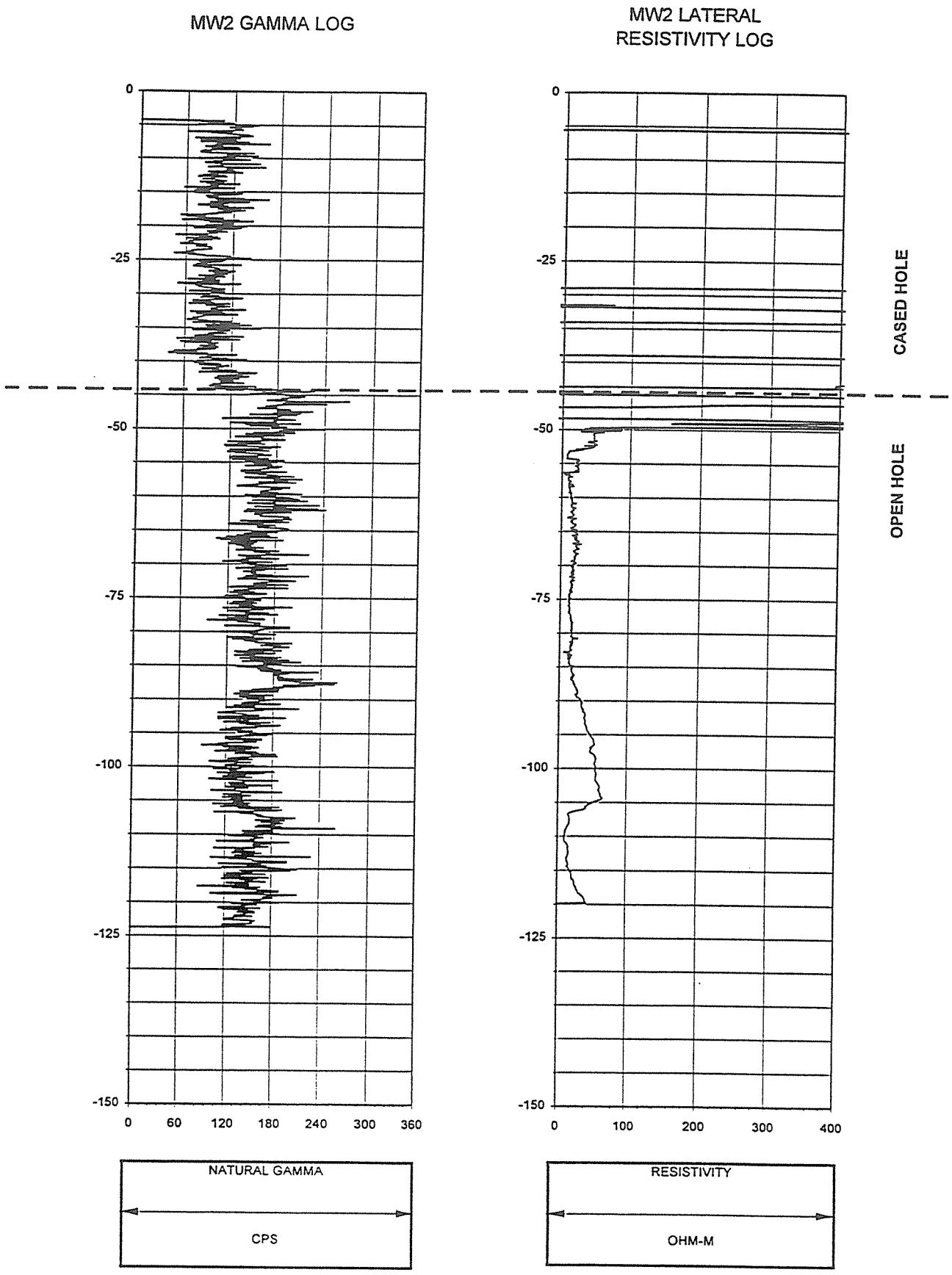

MW2 GAMMA LOG
MW2 DENSITY LOG
0
-25
-50
-75
-100
-125
-150
0
100
200
300
400
1
2
3
CASED HOLE
OPEN HOLE
NATURAL GAMMA
CPS
DENSITY
g/cc

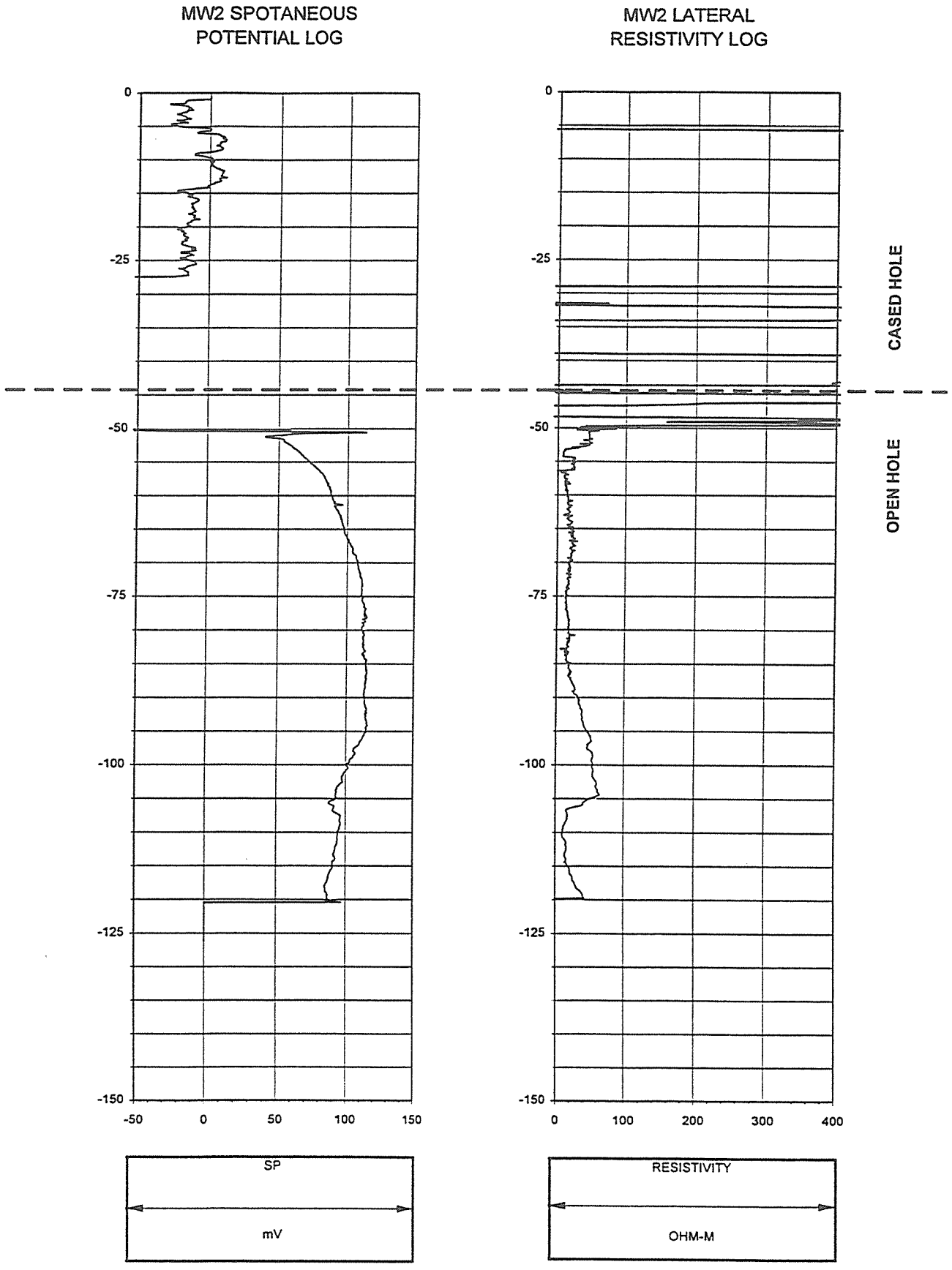

MW2 GAMMA LOG
MW2 API NEUTRON LOG
0
-25
-50
-75
-100
-125
-150
0
120
240
360
0
500
1000
1500
CASED HOLE
OPEN HOLE
NATURAL GAMMA
CPS
NEUTRON
API-N

MW2 GAMMA LOG

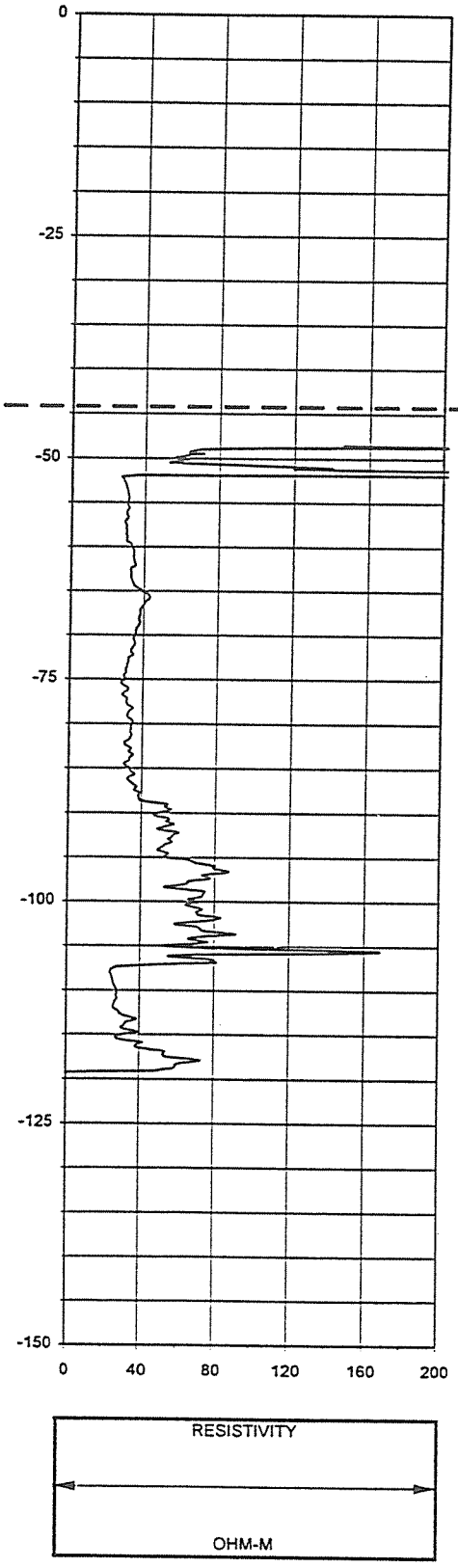
MW2 NEUTRON LOG



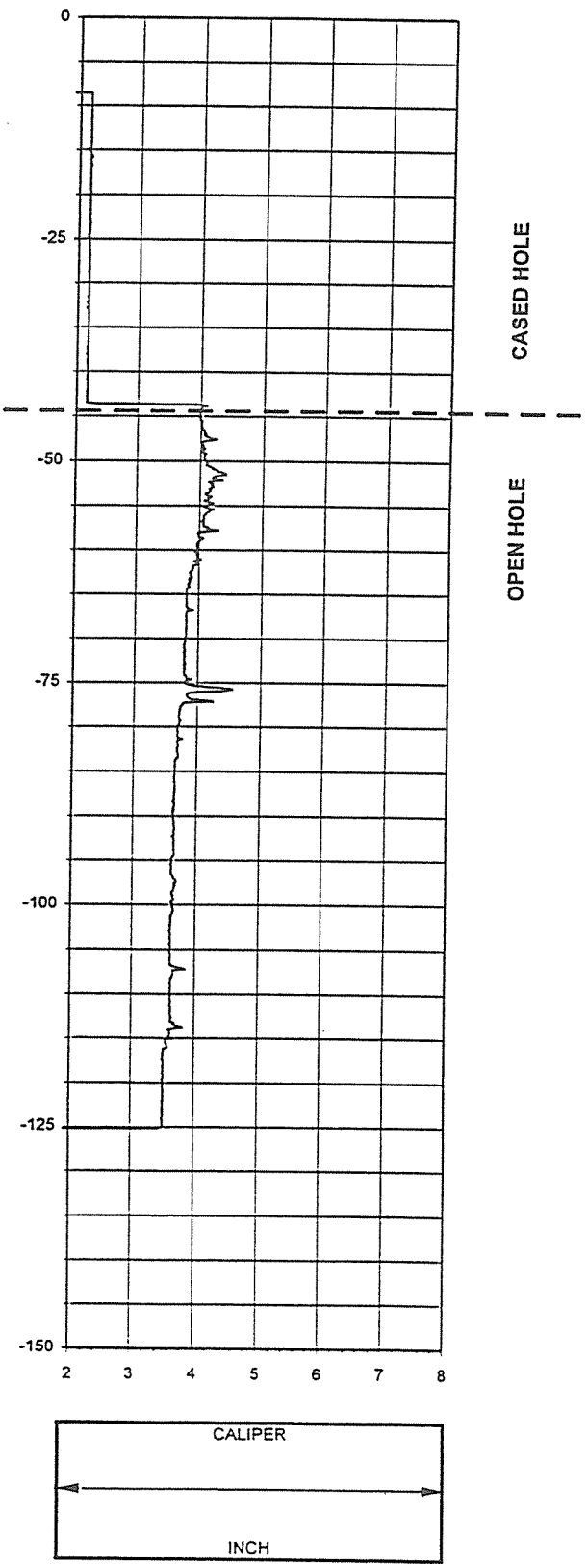

MW2 GAMMA LOG
MW2 LATERAL RESISTIVITY LOG
0
-25
-50
-75
-100
-125
-150
0
60
120
180
240
300
360
0
100
200
300
400
CASED HOLE
OPEN HOLE
NATURAL GAMMA
CPS
RESISTIVITY
OHM-M

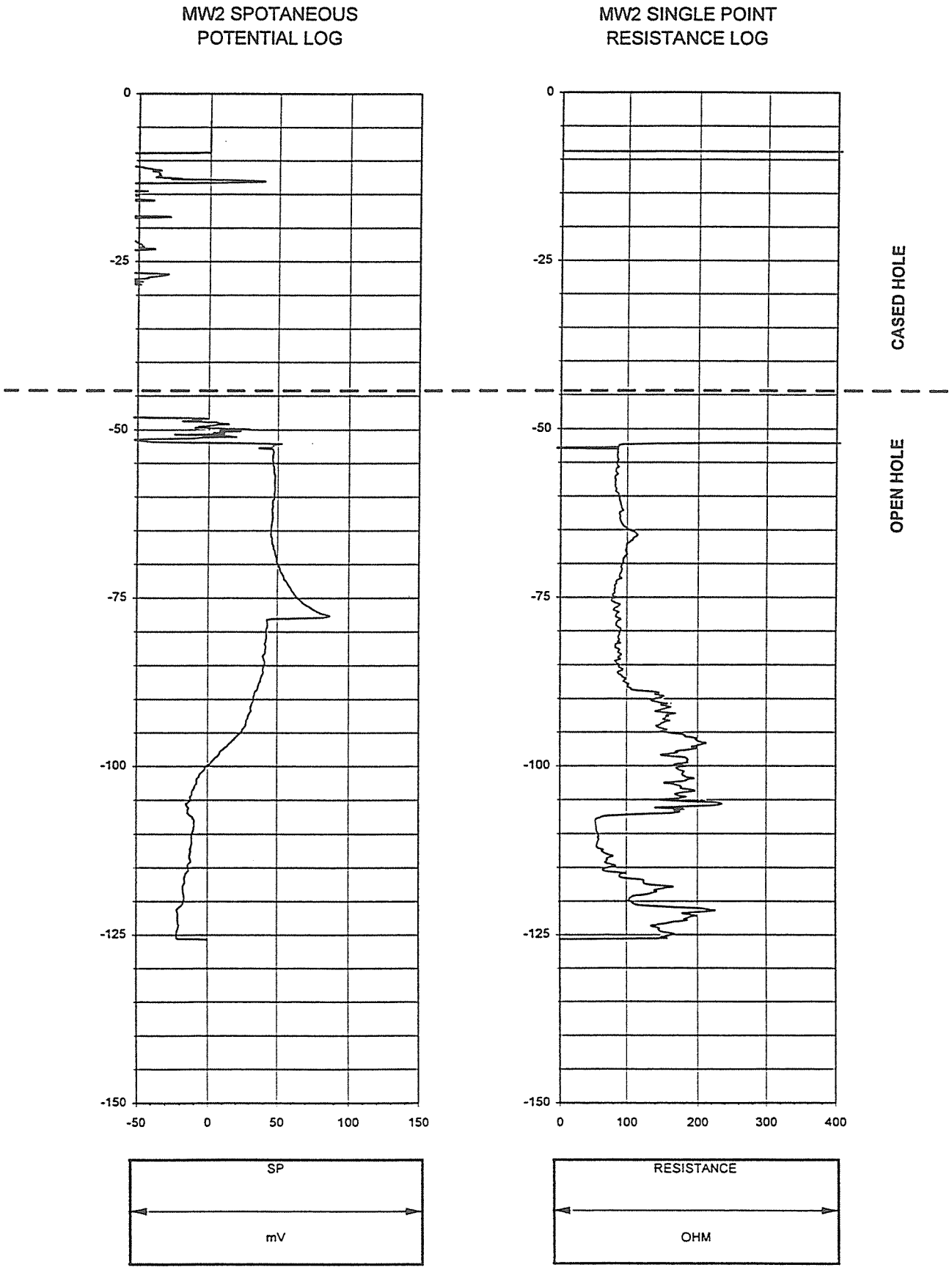

MW2 SPOTANEOUS POTENTIAL LOG
MW2 LATERAL RESISTIVITY LOG
0
-25
-50
-75
-100
-125
-150
-50
0
50
100
150
0
100
200
300
400
CASED HOLE
OPEN HOLE
SP
mV
RESISTIVITY
OHM-M

MW2 RESISTIVITY (MG)
LOG

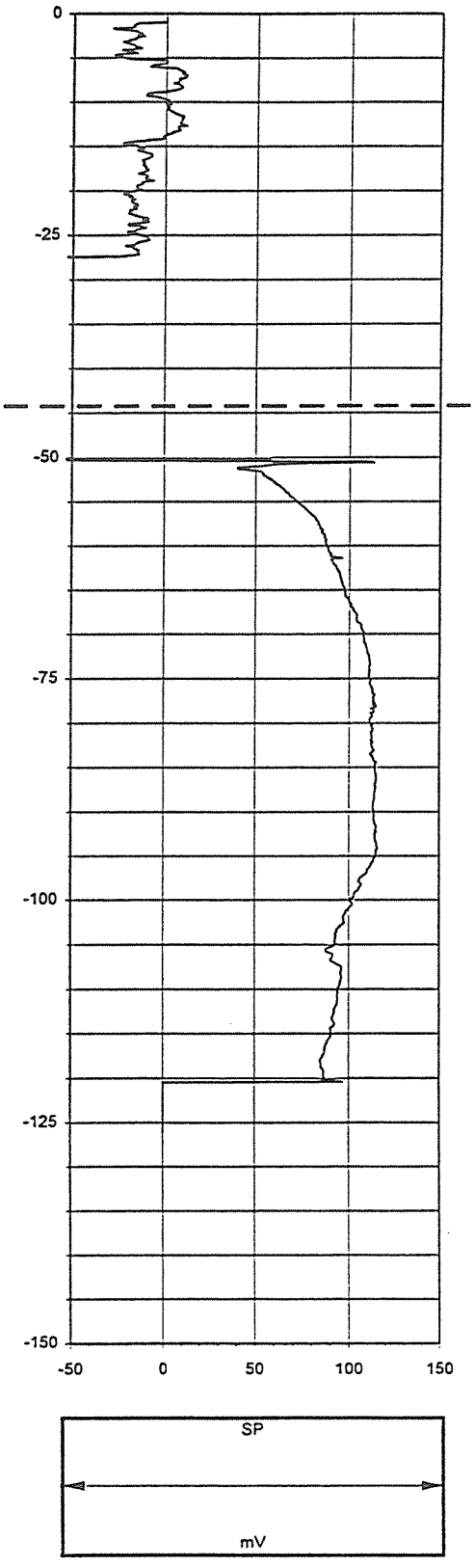


MW2 CALIPER LOG

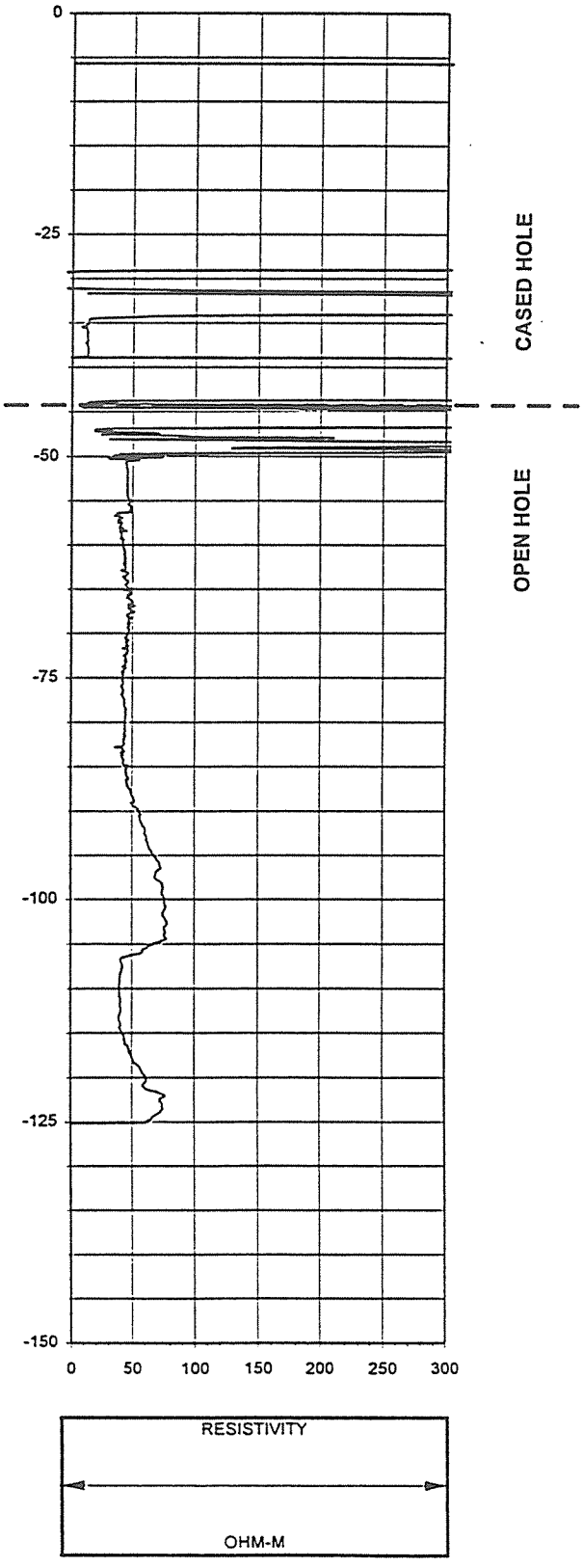


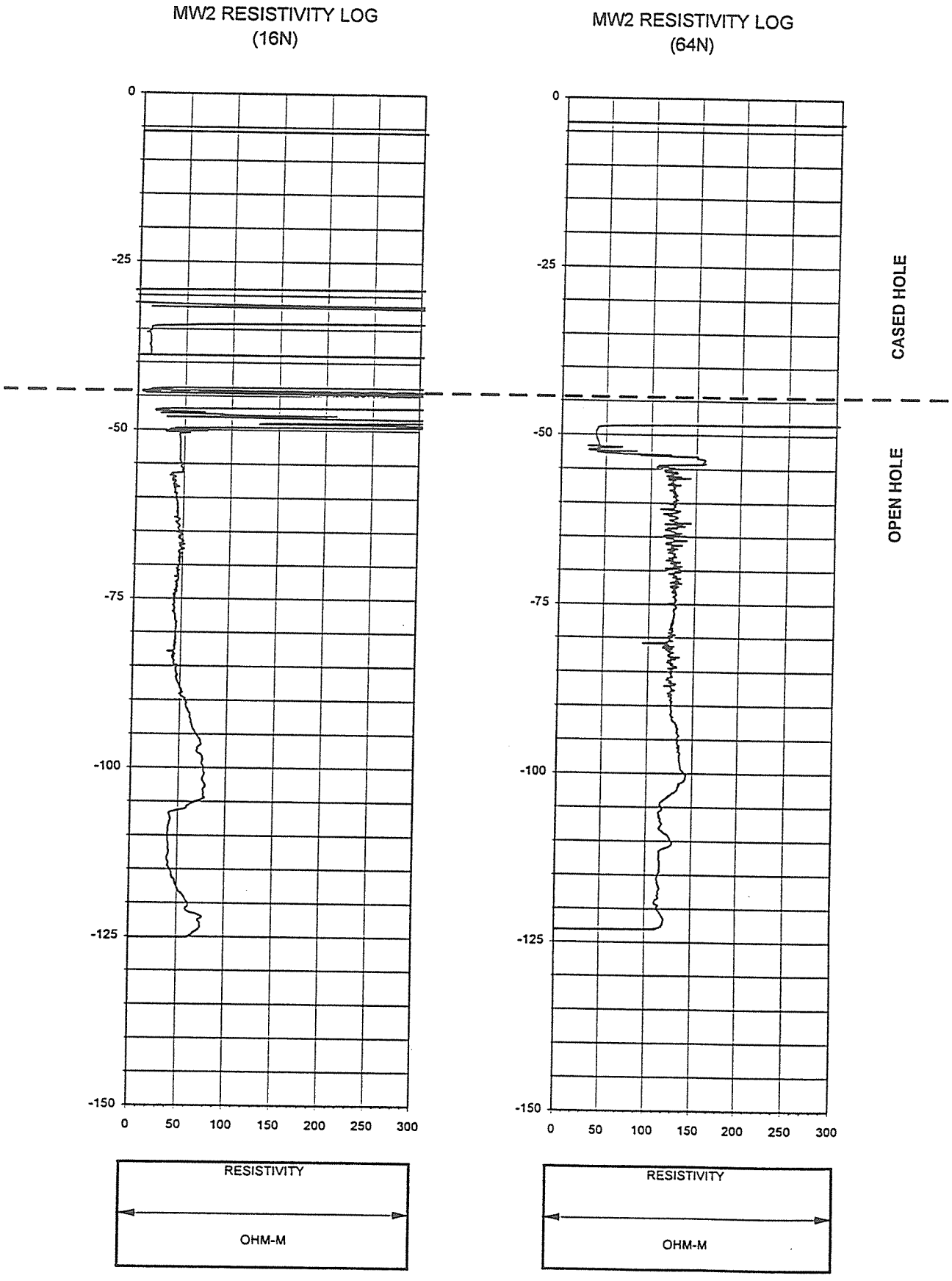

MW2 SPOTANEOUS POTENTIAL LOG
MW2 SINGLE POINT RESISTANCE LOG
0
-25
-50
-75
-100
-125
-150
-50
0
50
100
150
0
100
200
300
400
CASED HOLE
OPEN HOLE
SP
mV
RESISTANCE
OHM

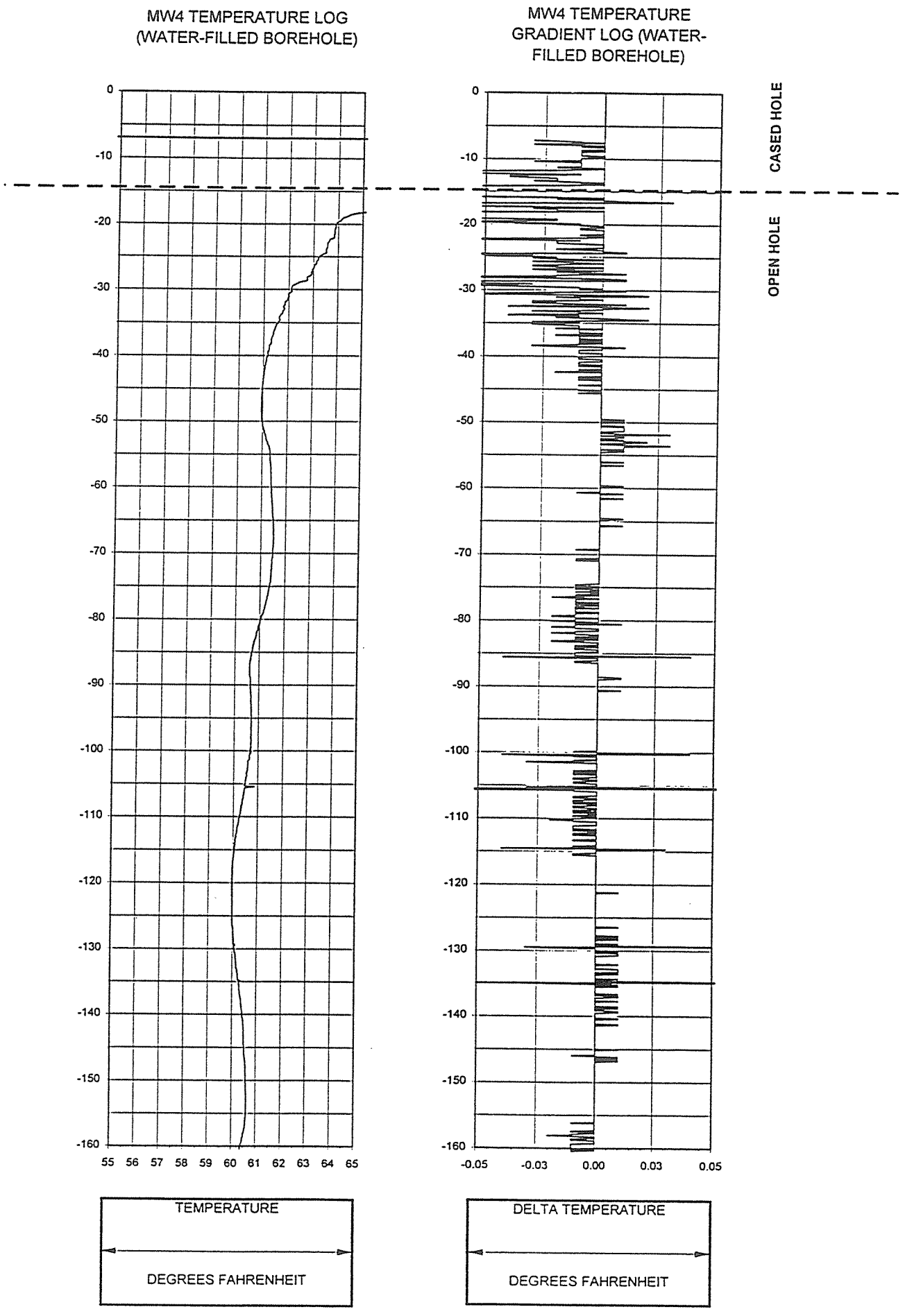
MW2 SPOTANEOUS POTENTIAL LOG



MW2 RESISTIVITY LOG (16N)

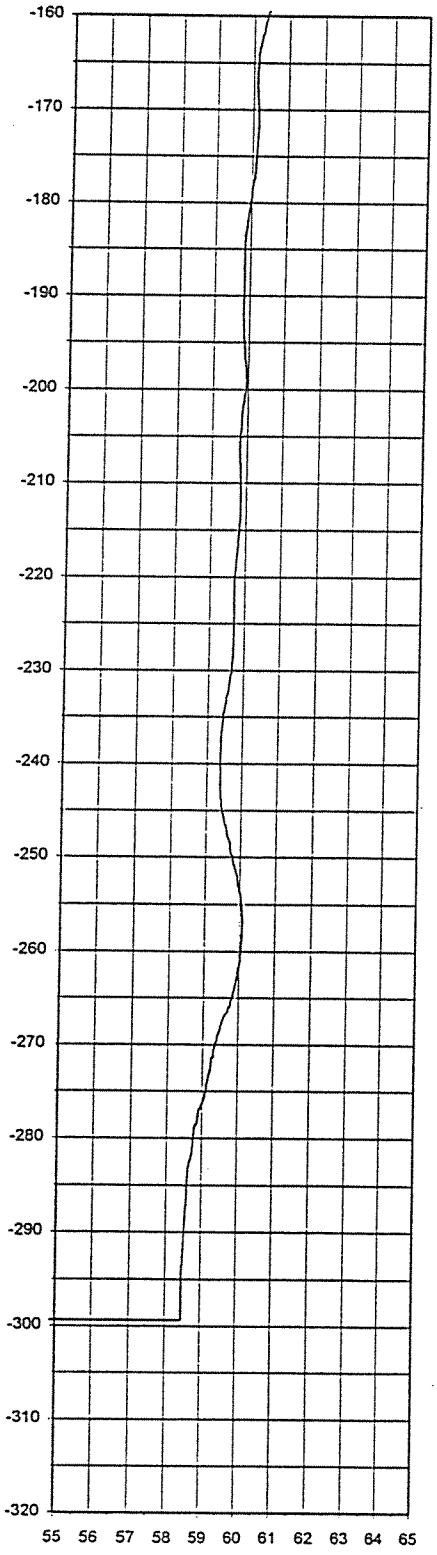



MW2 RESISTIVITY LOG
(16N)
MW2 RESISTIVITY LOG
(64N)
0
-25
-50
-75
-100
-125
-150
0
50
100
150
200
250
300
CASED HOLE
OPEN HOLE
RESISTIVITY
OHM-M
RESISTIVITY
OHM-M


MW4 TEMPERATURE LOG (WATER-FILLED BOREHOLE)
MW4 TEMPERATURE GRADIENT LOG (WATER-FILLED BOREHOLE)
CASED HOLE
OPEN HOLE
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
55 56 57 58 59 60 61 62 63 64 65
-0.05 -0.03 0.00 0.03 0.05
TEMPERATURE
DEGREES FAHRENHEIT
DELTA TEMPERATURE
DEGREES FAHRENHEIT

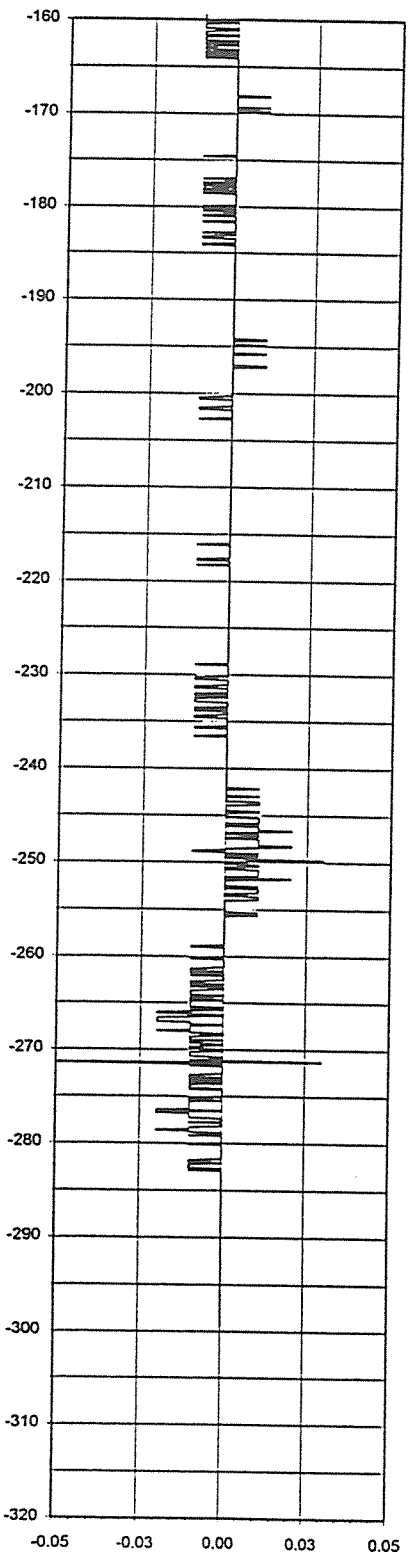
MW4 TEMPERATURE LOG
(WATER-FILLED BOREHOLE)

(Continued)



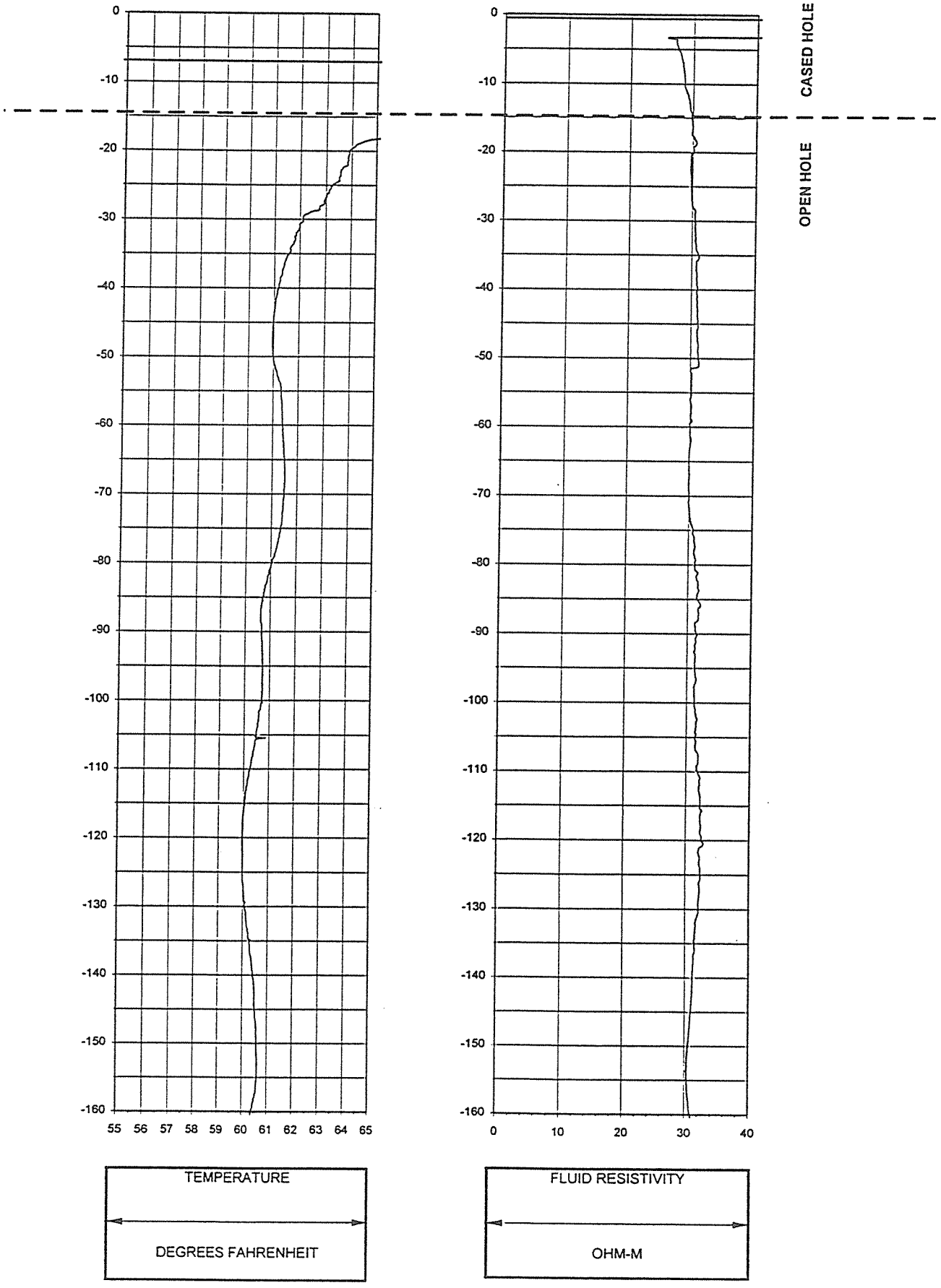
MW4 TEMPERATURE GRADIENT LOG (WATER-FILLED BOREHOLE)

(Continued)



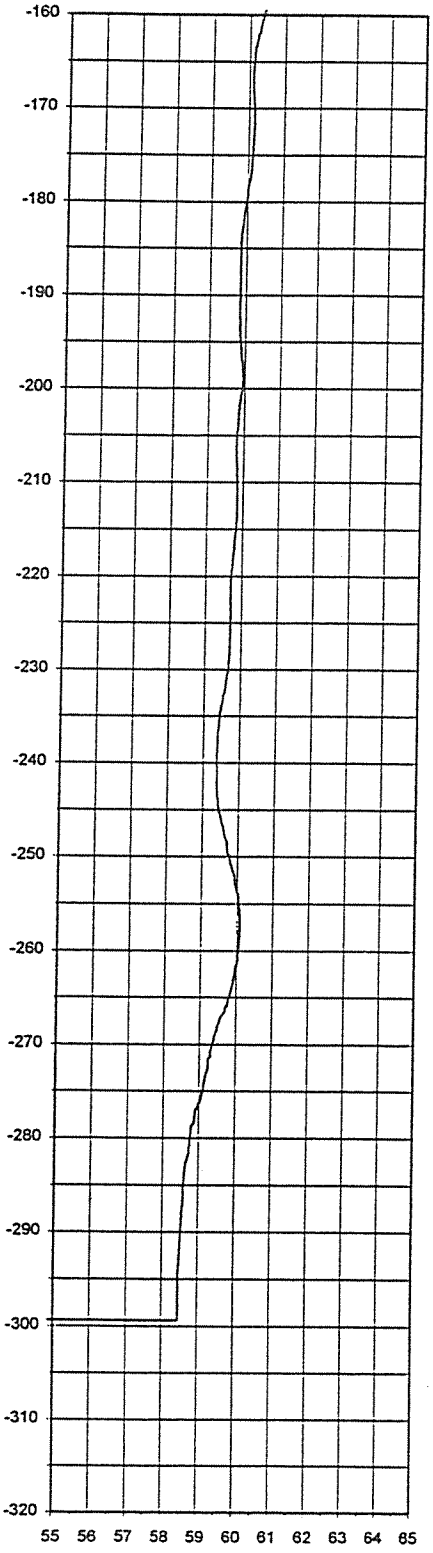
MW4 TEMPERATURE LOG (WATER-FILLED BOREHOLE)

MW4 FLUID RESISTIVITY LOG (WATER-FILLED BOREHOLE)



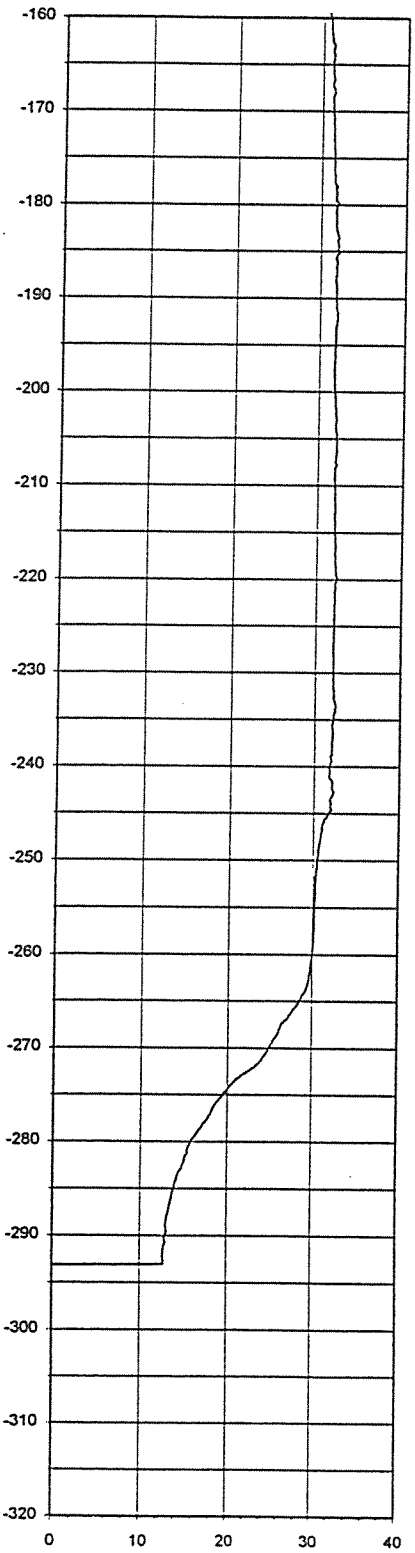
MW4 TEMPERATURE LOG
(WATER-FILLED BOREHOLE)

(Continued)



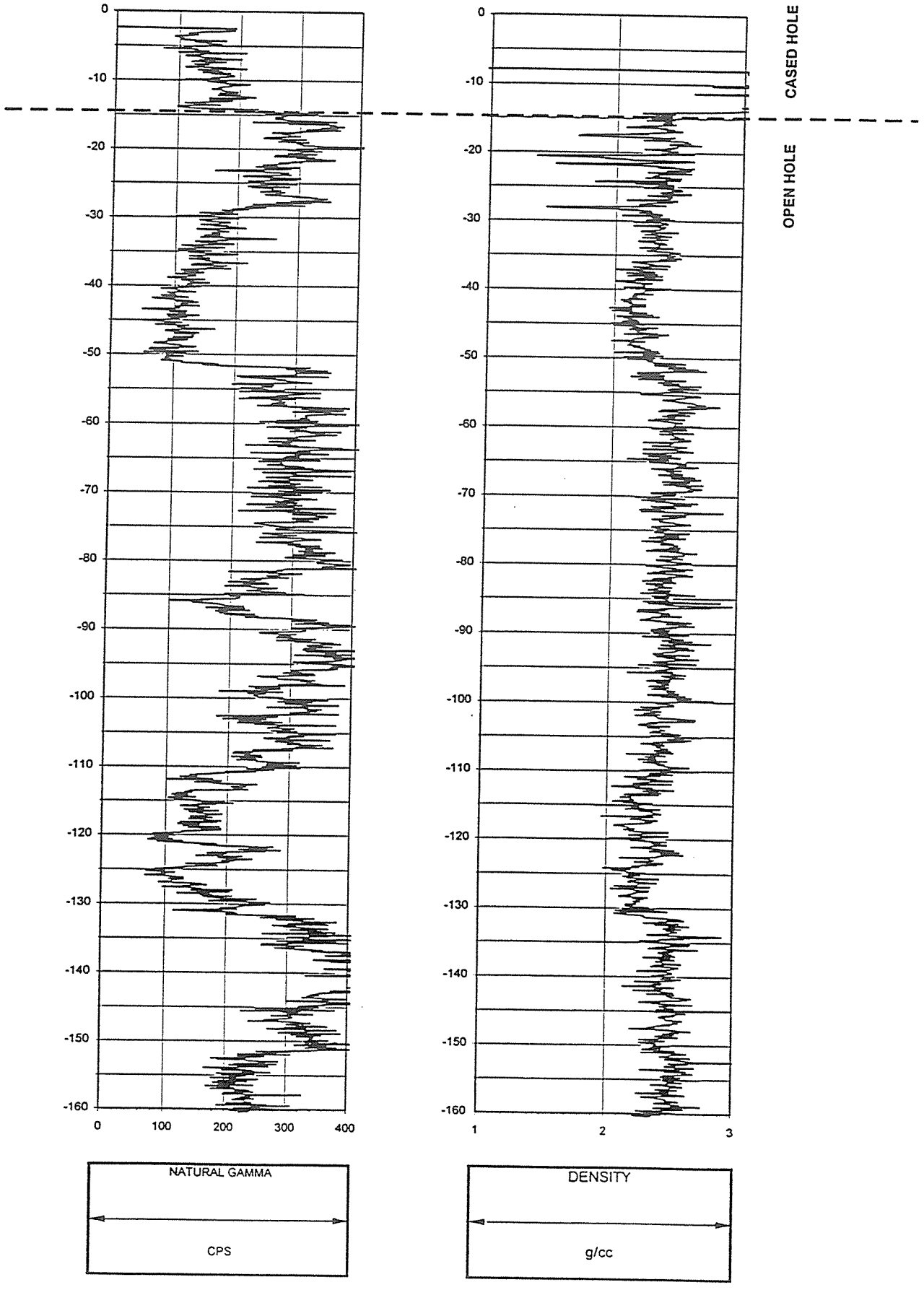
MW4 FLUID RESISTIVITY LOG
(WATER-FILLED BOREHOLE)

(Continued)



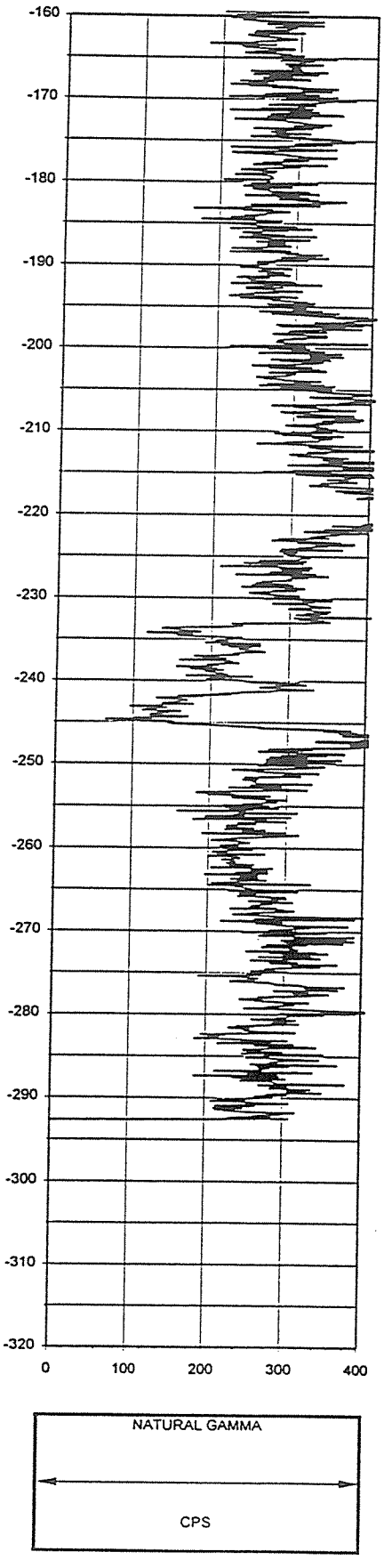
MW4 GAMMA LOG

MW4 DENSITY LOG



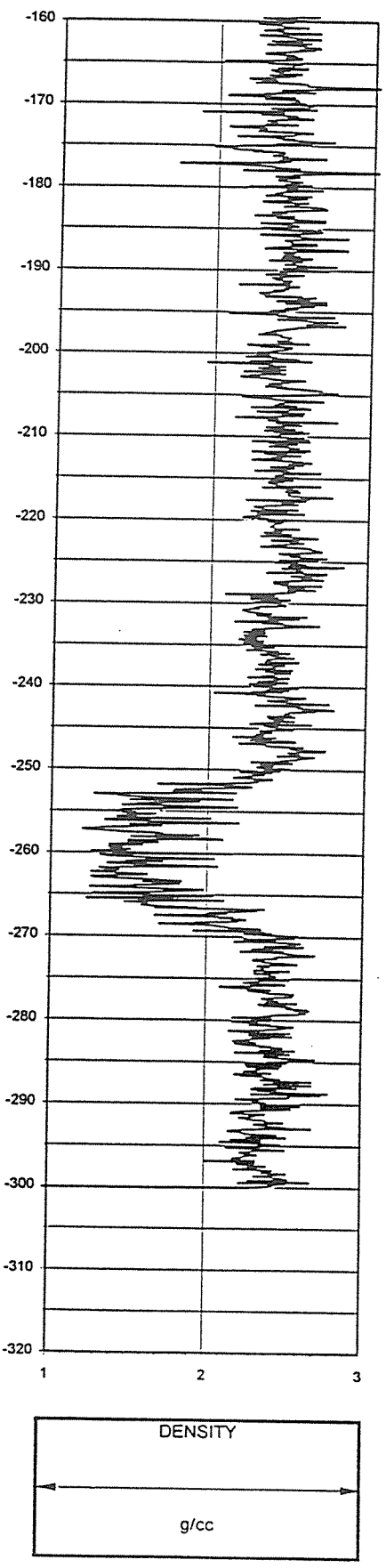
MW4 GAMMA LOG

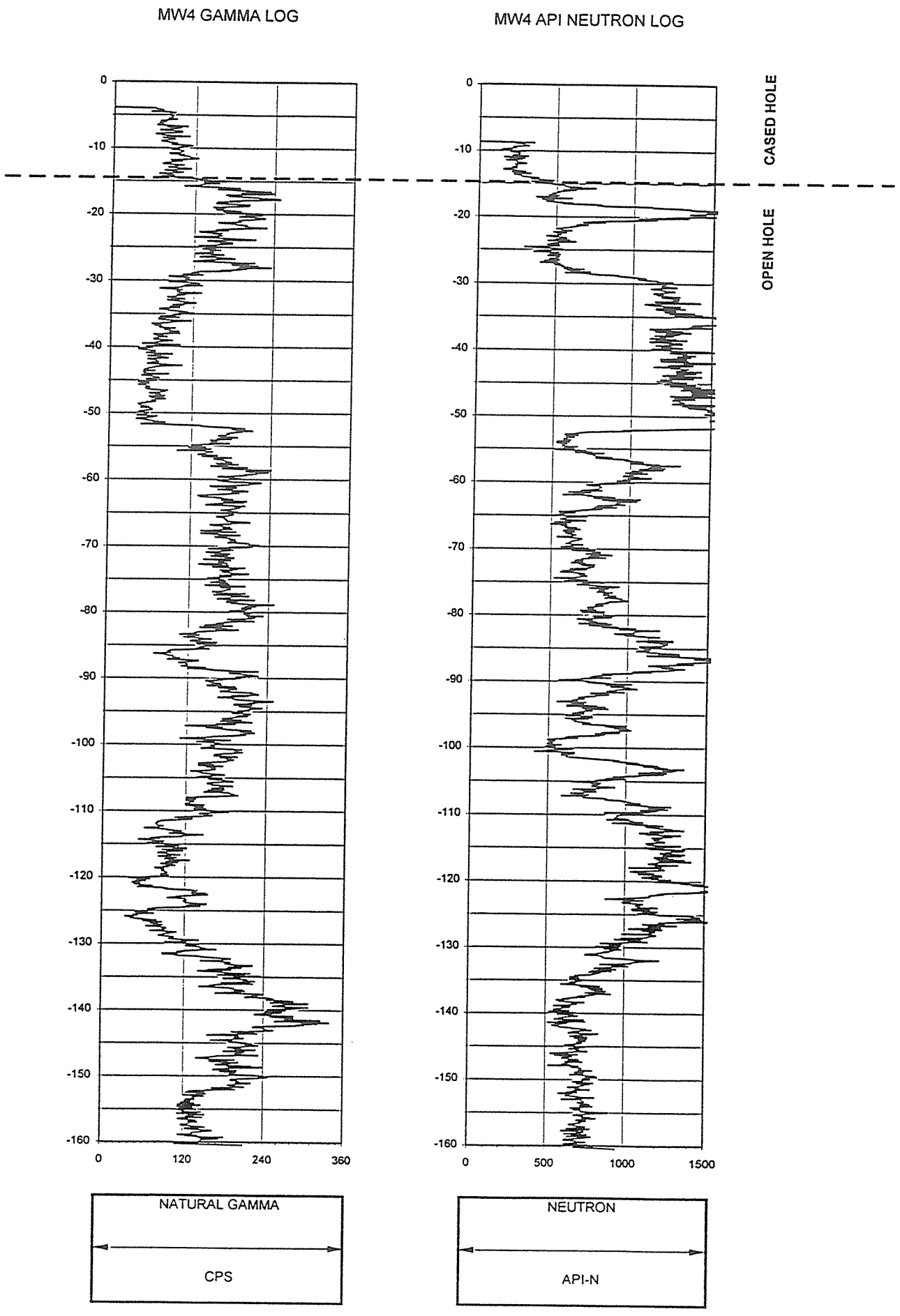
(Continued)



MW4 DENSITY LOG

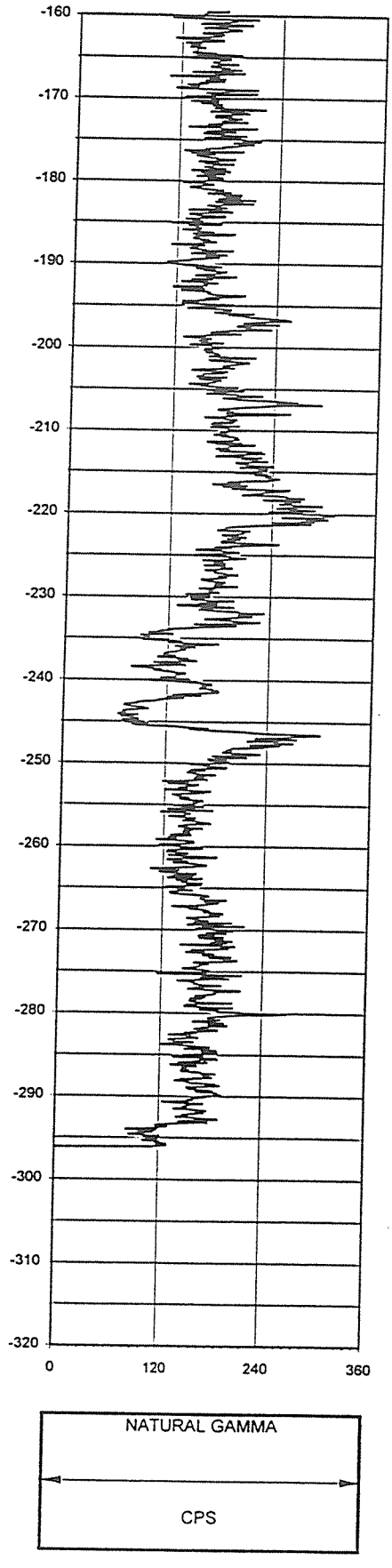
(Continued)




MW4 GAMMA LOG
MW4 API NEUTRON LOG
CASED HOLE
OPEN HOLE
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
0
120
240
360
0
500
1000
1500
NATURAL GAMMA
CPS
NEUTRON
API-N

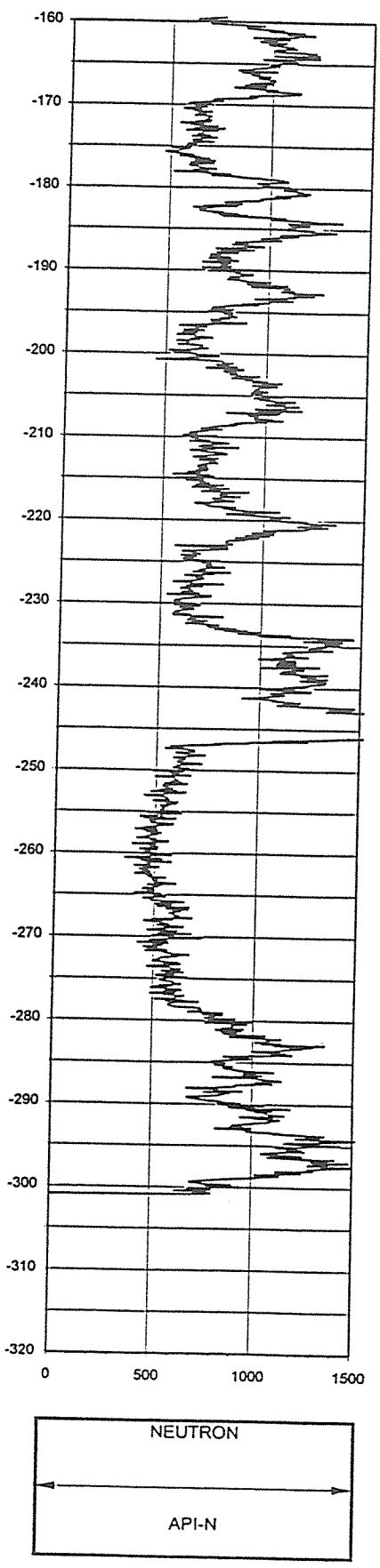
MW4 GAMMA LOG

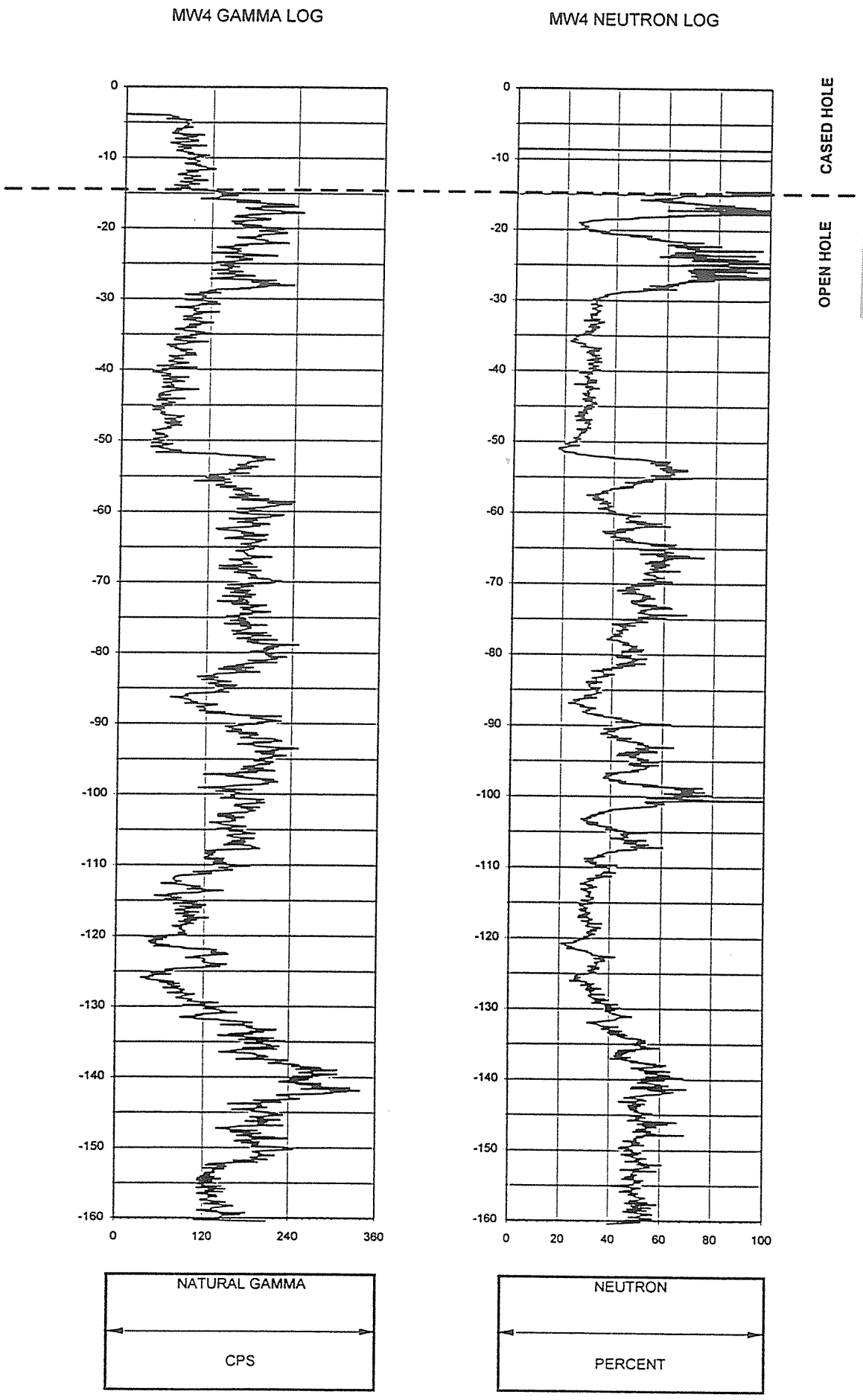
(Continued)



MW4 API NEUTRON LOG

(Continued)

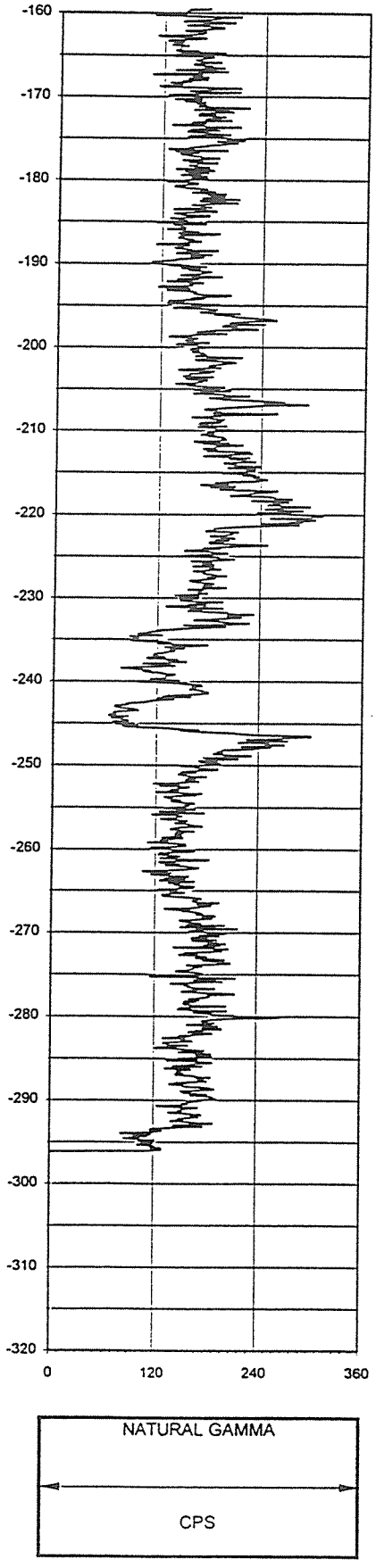



MW4 GAMMA LOG
MW4 NEUTRON LOG
CASED HOLE
OPEN HOLE
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
0
120
240
360
0
20
40
60
80
100
NATURAL GAMMA
CPS
NEUTRON
PERCENT

GRADE EL 953

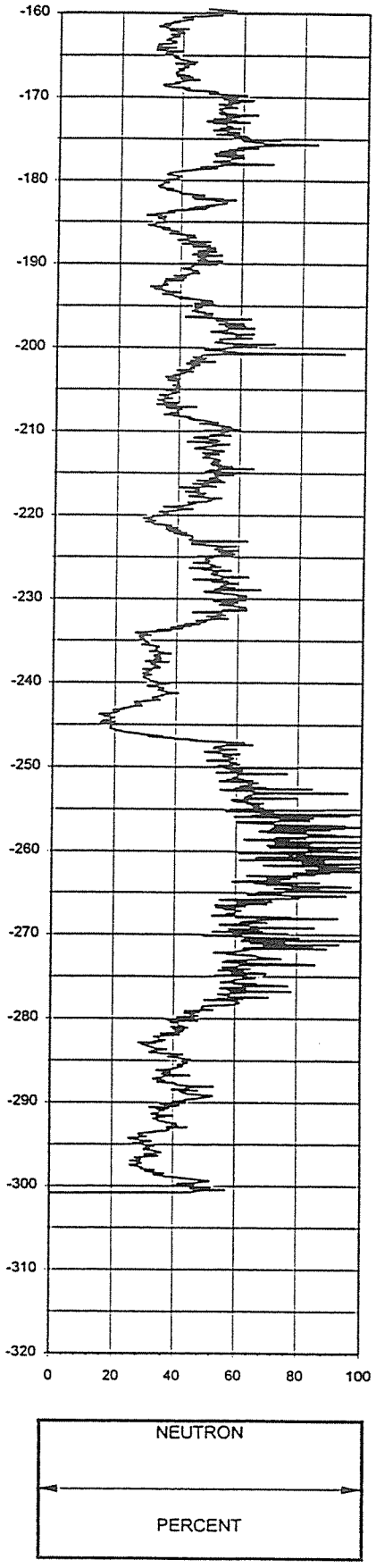
MW4 GAMMA LOG

(Continued)



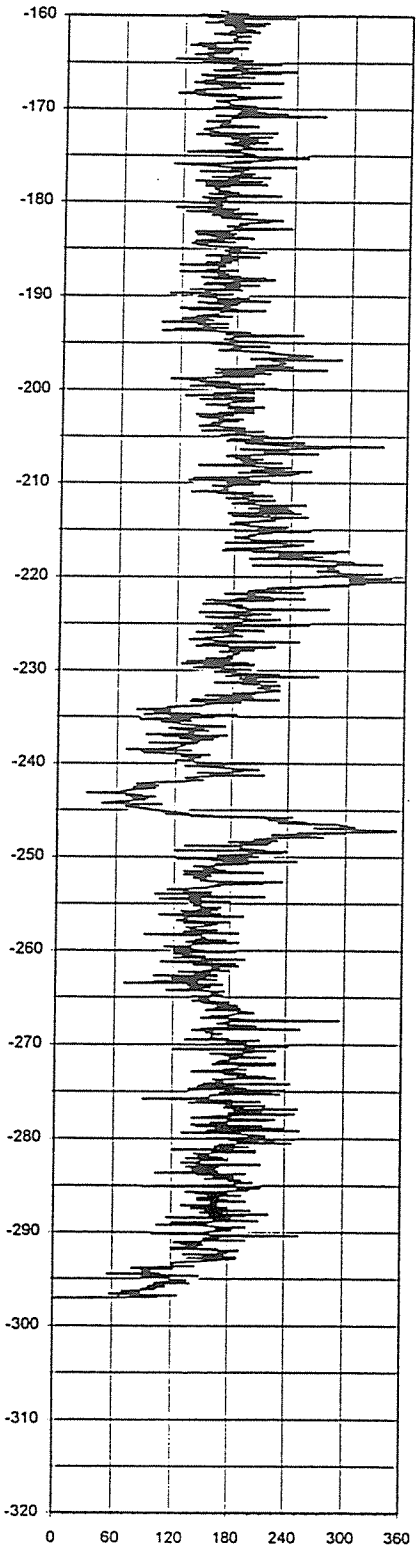
MW4 NEUTRON LOG

(Continued)



MW4 GAMMA LOG

(Continued)

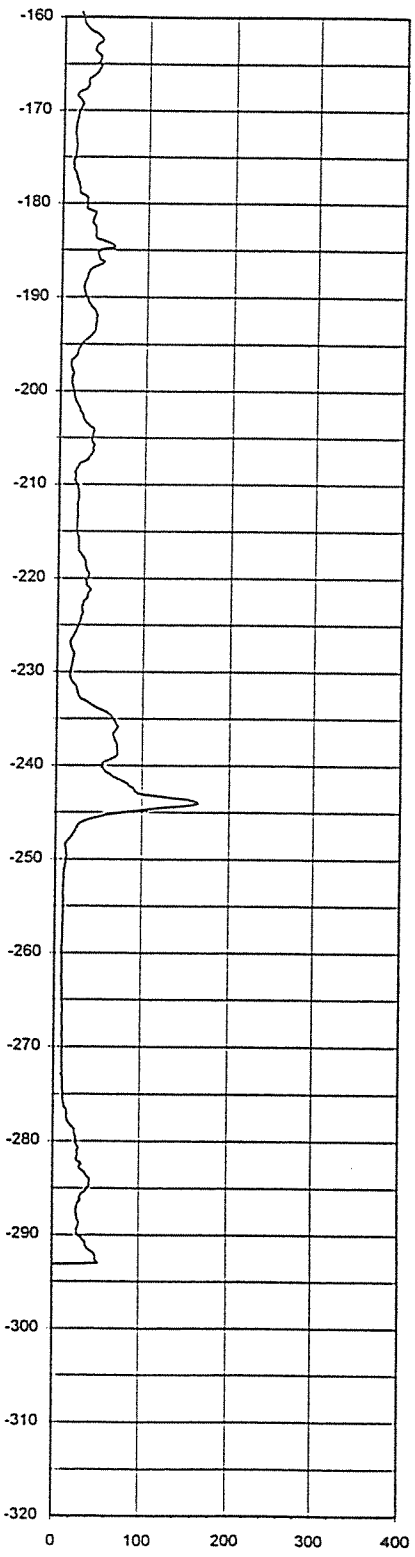


NATURAL GAMMA

CPS

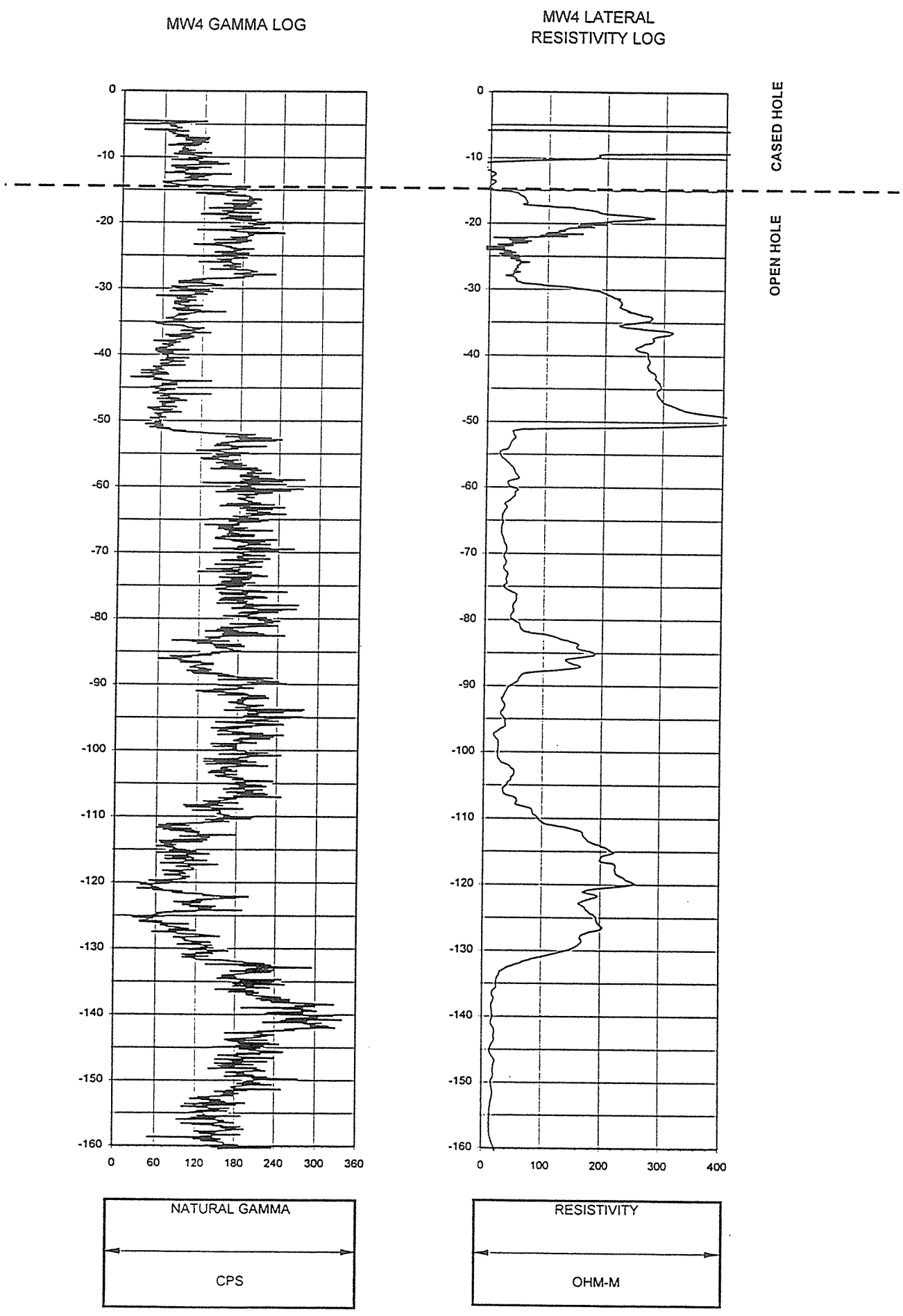
MW4 LATERAL RESISTIVITY LOG

(Continued)



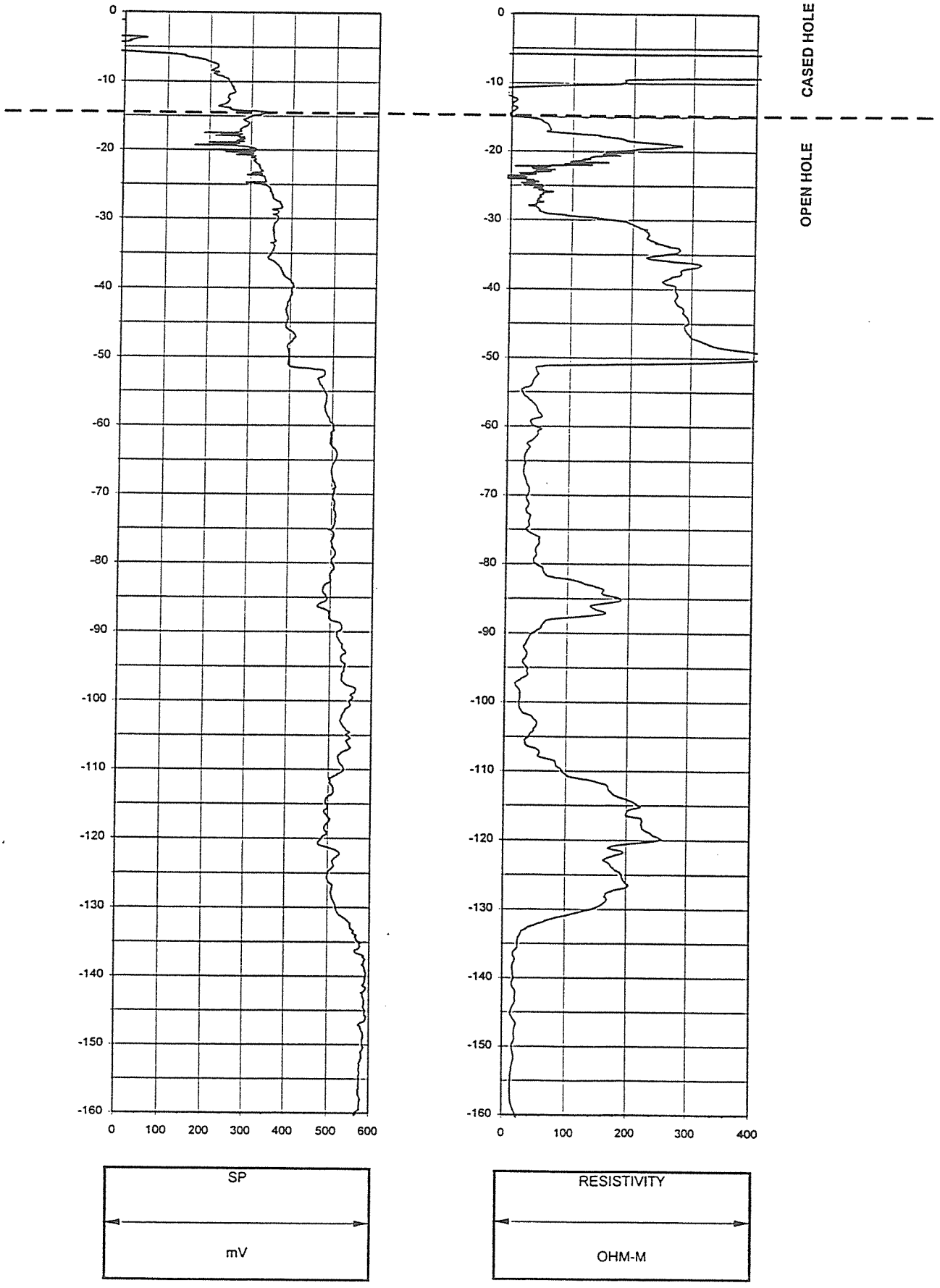
RESISTIVITY

OHM-M


MW4 GAMMA LOG
MW4 LATERAL RESISTIVITY LOG
CASED HOLE
OPEN HOLE
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
-130
-140
-150
-160
0
60
120
180
240
300
360
0
100
200
300
400
NATURAL GAMMA
CPS
RESISTIVITY
OHM-M

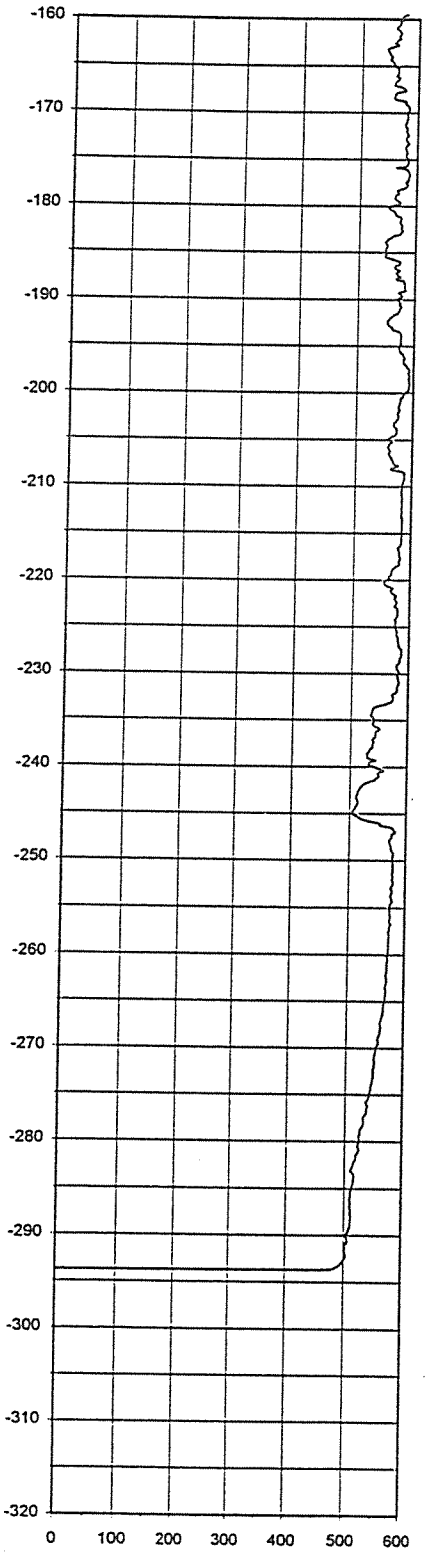
MW4 SPOTANEOUS POTENTIAL LOG

MW4 LATERAL RESISTIVITY LOG



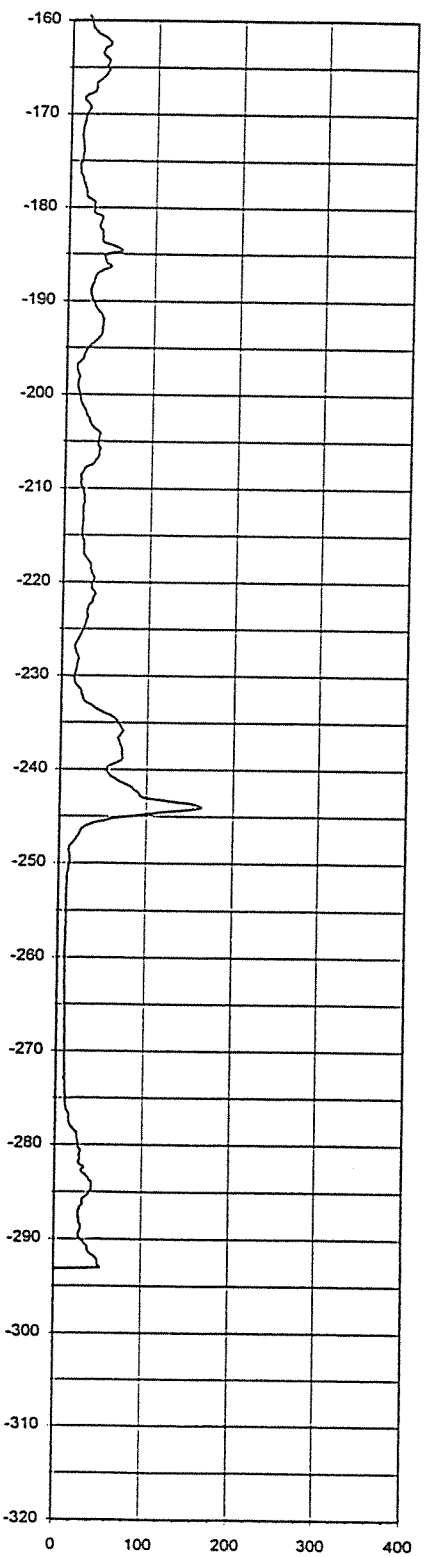
MW4 SPOTANEOUS
POTENTIAL LOG

(Continued)



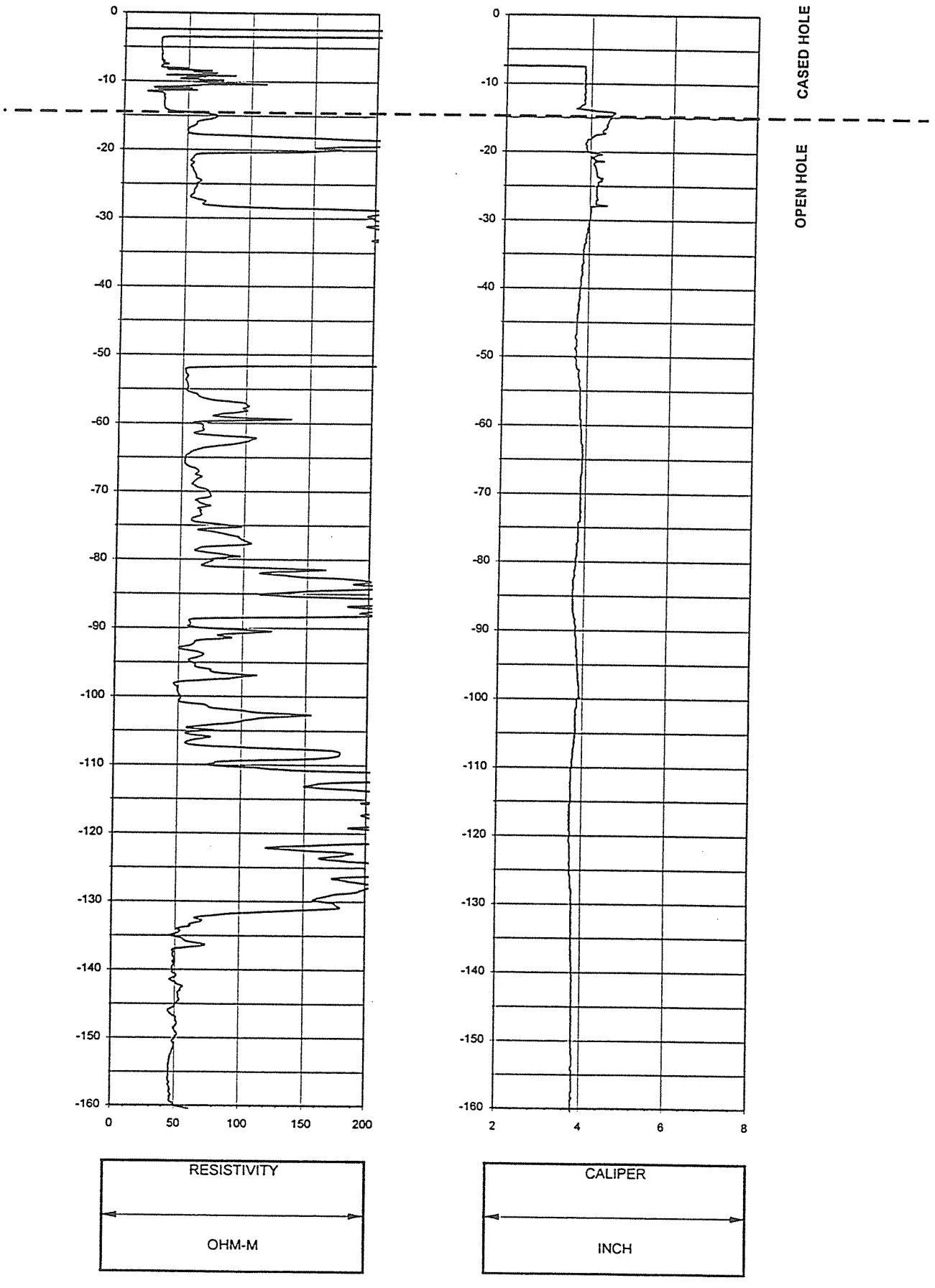
MW4 LATERAL
RESISTIVITY LOG

(Continued)



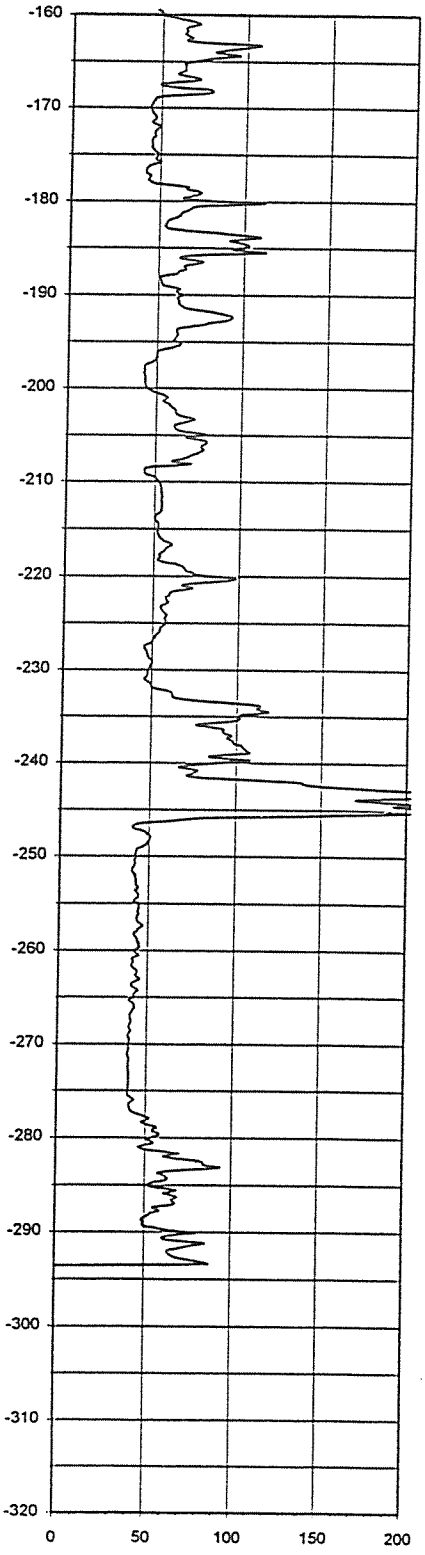
MW4 RESISTIVITY (MG) LOG

MW4 CALIPER LOG



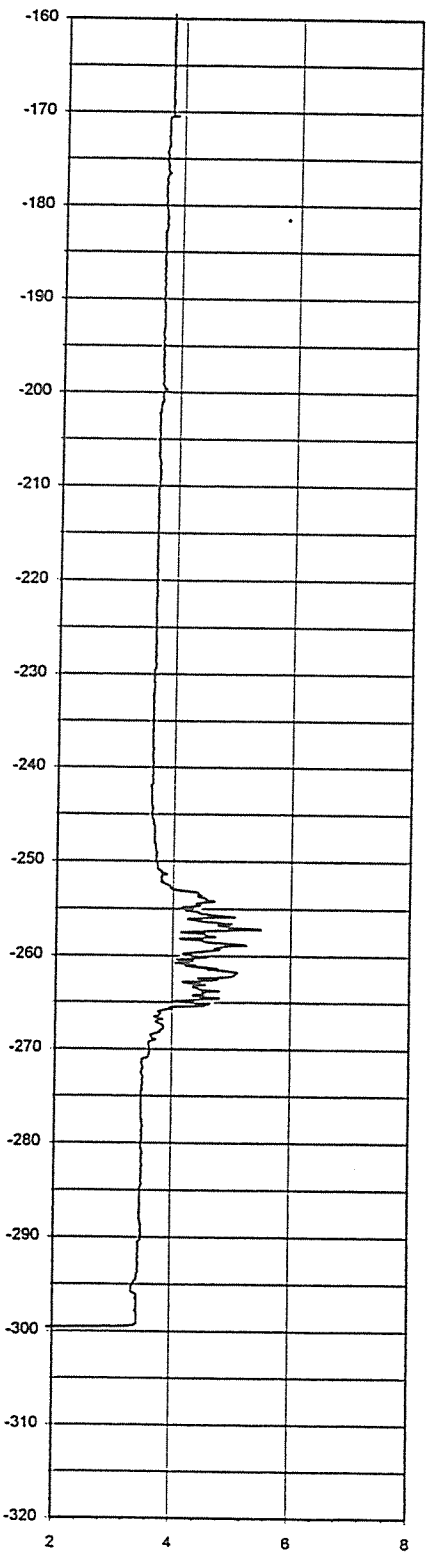
MW4 RESISTIVITY (MG) LOG

(Continued)



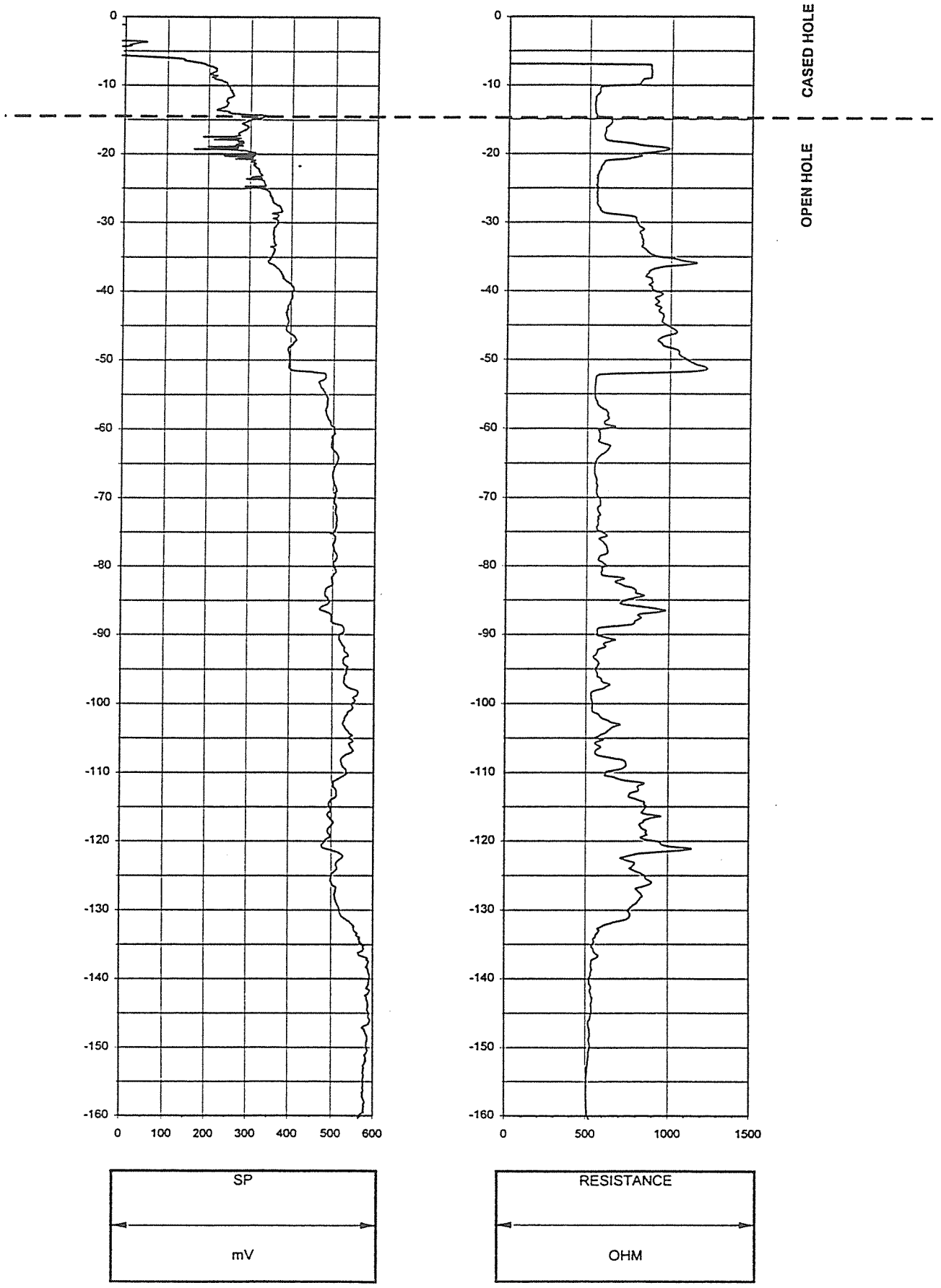
MW4 CALIPER LOG

(Continued)



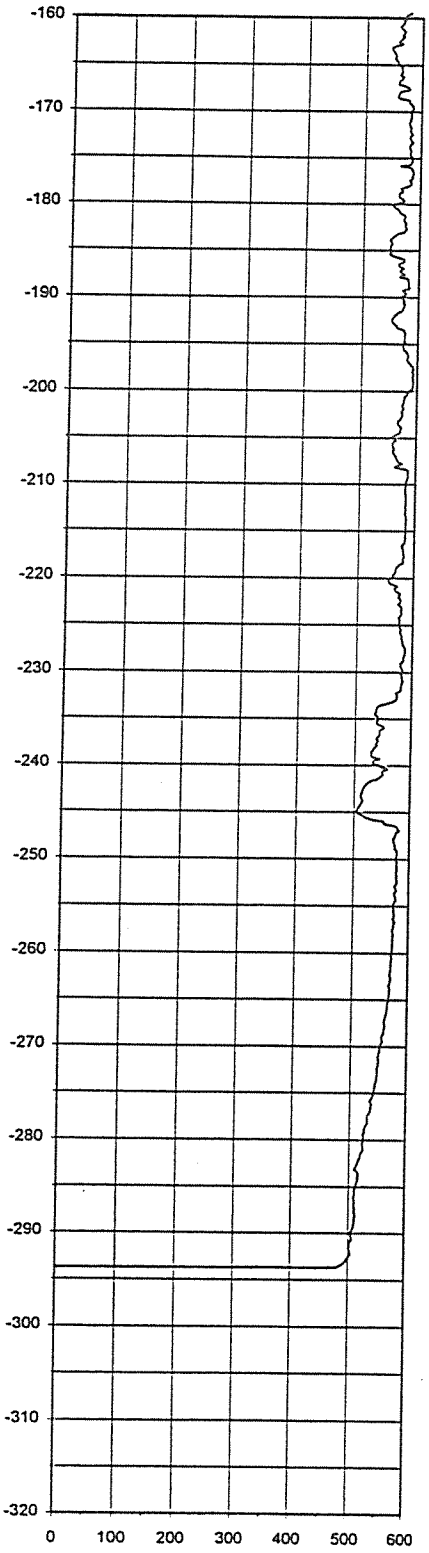
MW4 SPOTANEOUS POTENTIAL LOG

MW4 SINGLE POINT RESISTANCE LOG



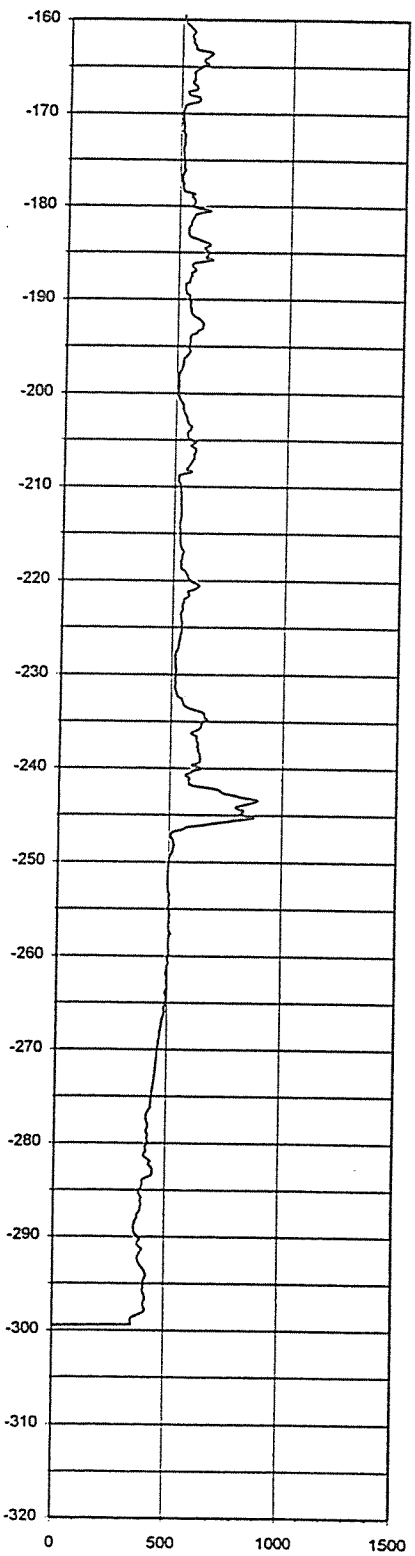
MW4 SPOTANEOUS POTENTIAL LOG

(Continued)



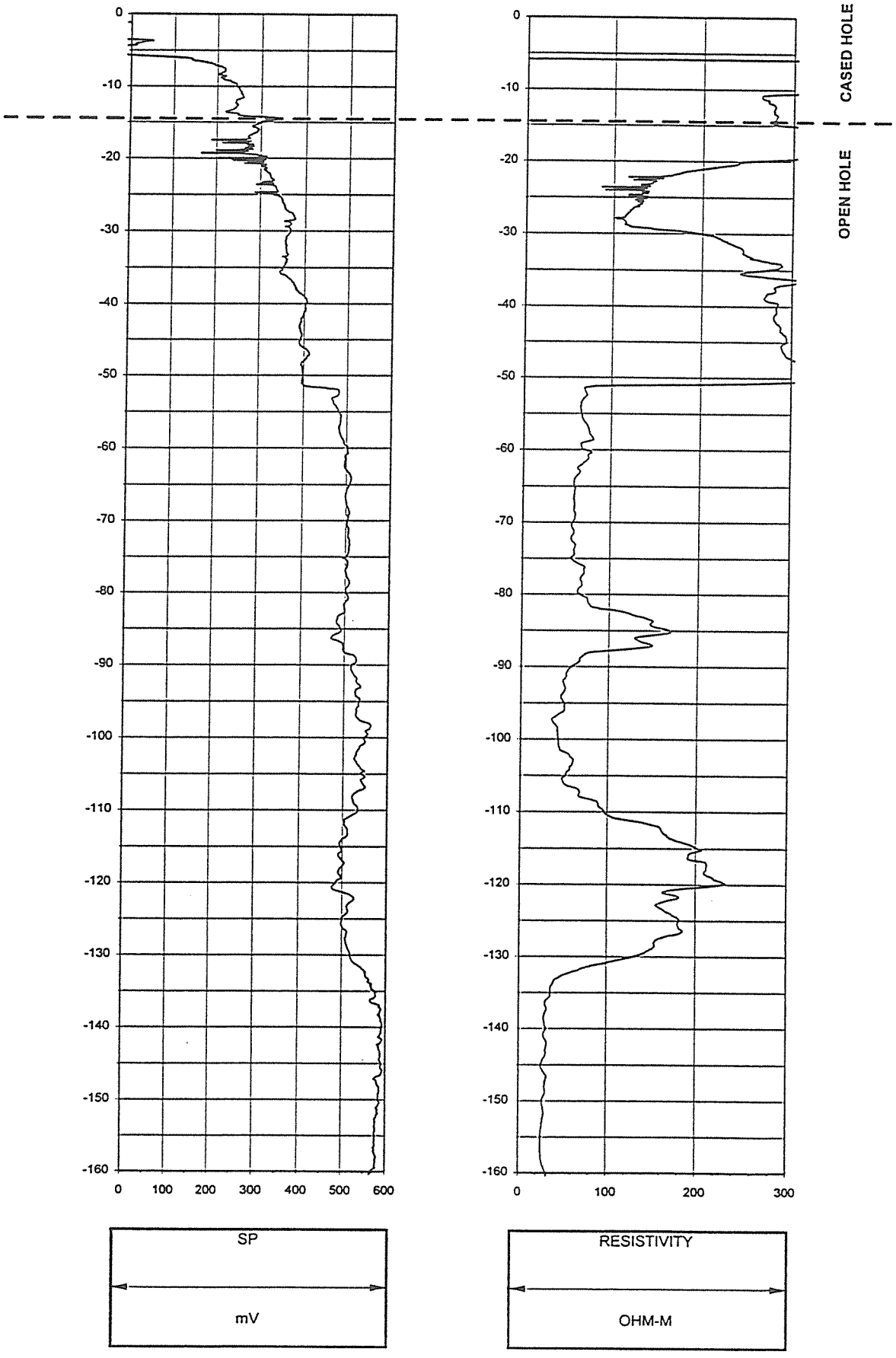
MW4 SINGLE POINT RESISTANCE LOG

(Continued)



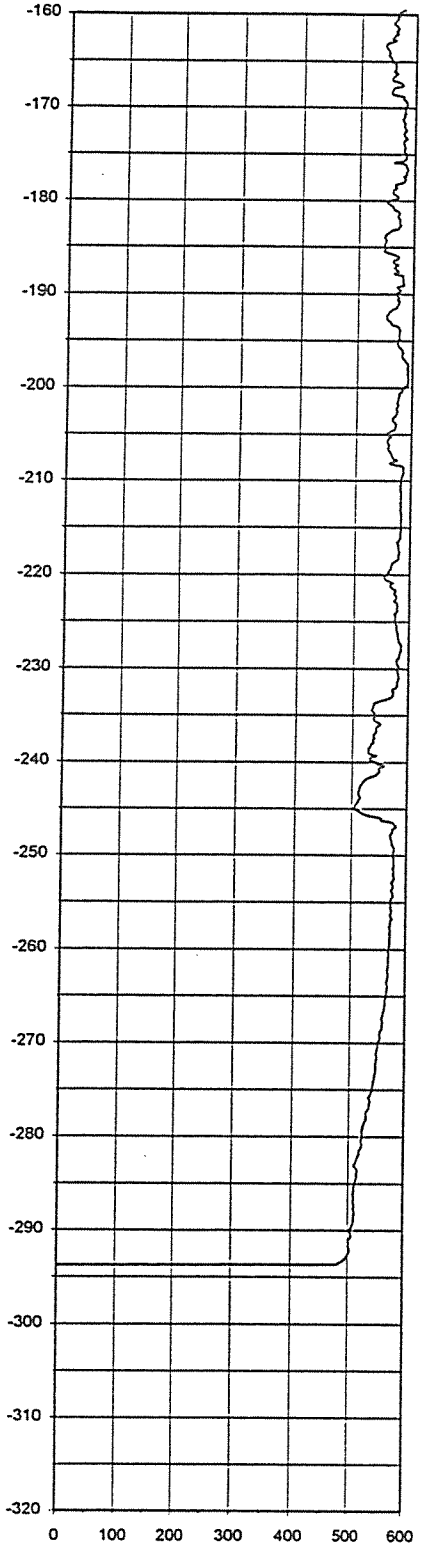
MW4 SPOTANEOUS POTENTIAL LOG

MW4 RESISTIVITY LOG (16N)



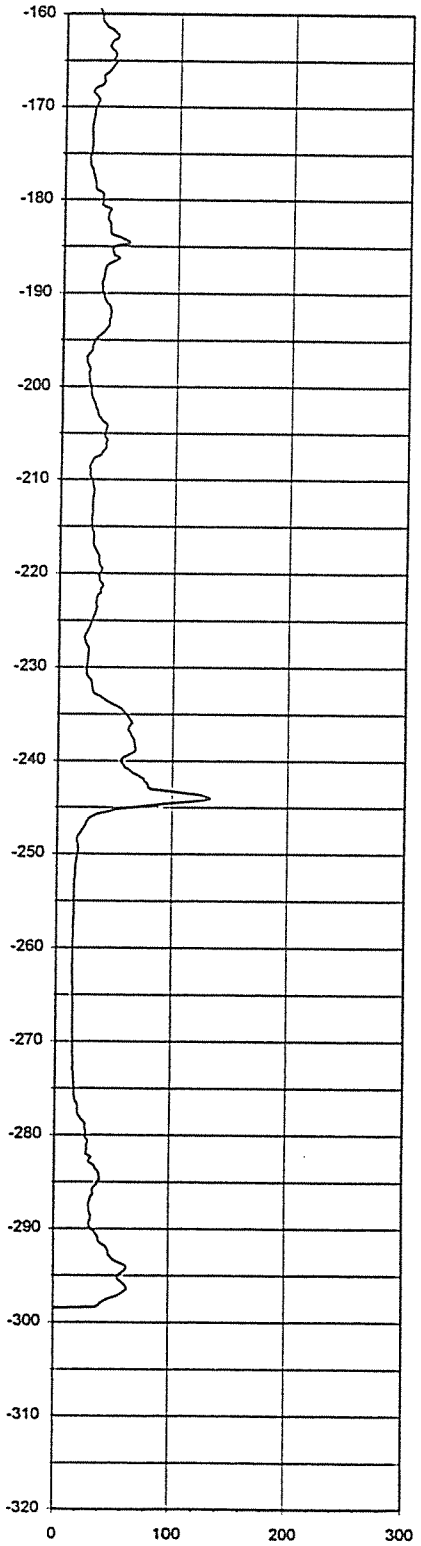
MW4 SPOTANEOUS POTENTIAL LOG

(Continued)

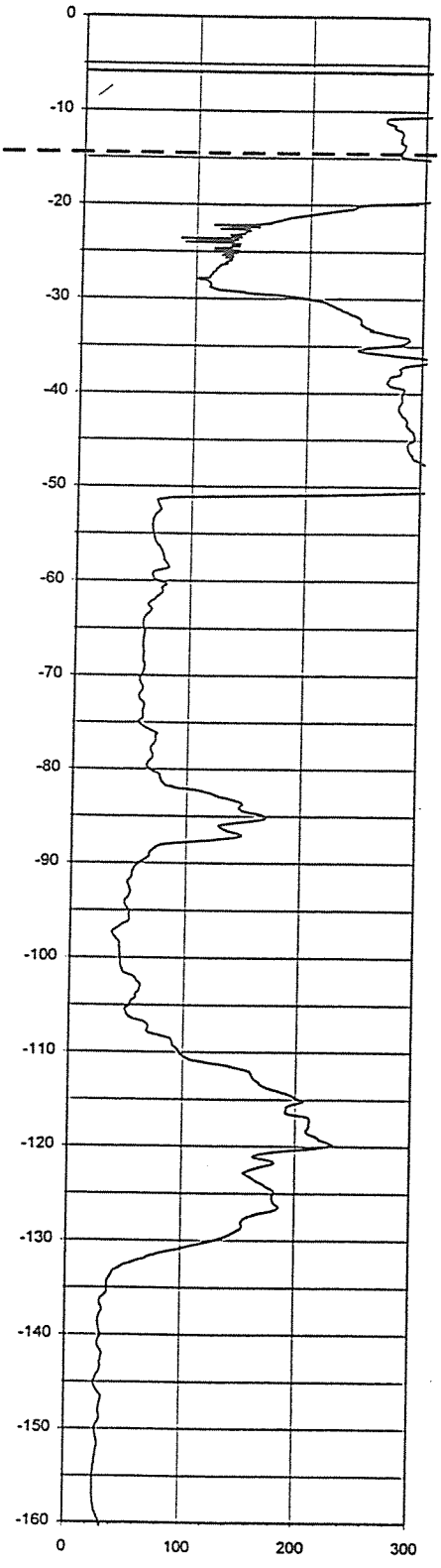


MW4 RESISTIVITY LOG (16N)

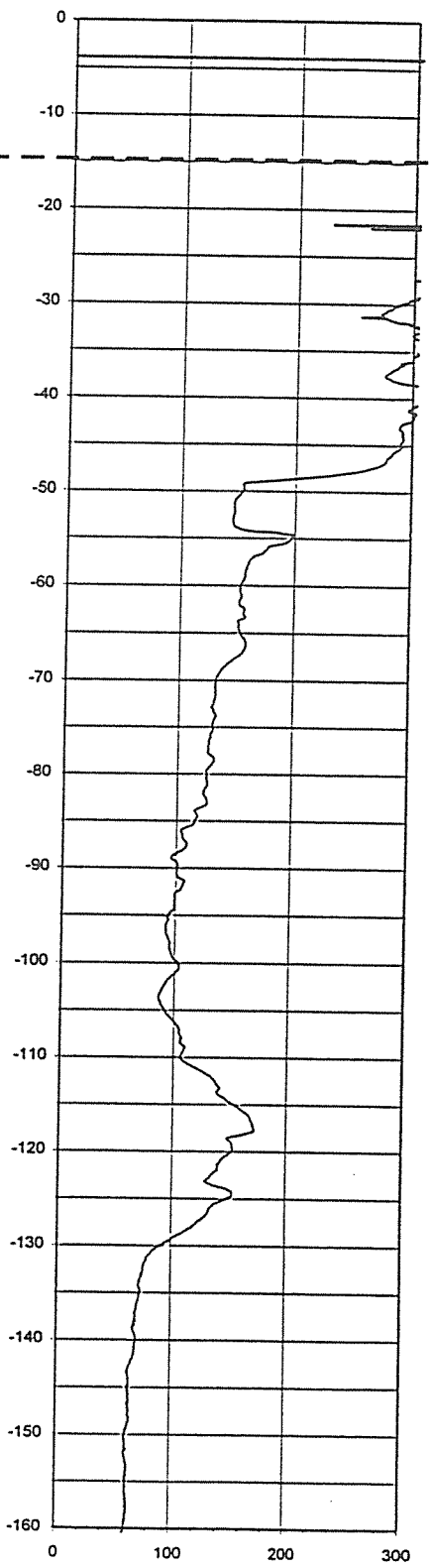
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MW4 RESISTIVITY LOG
(16N)

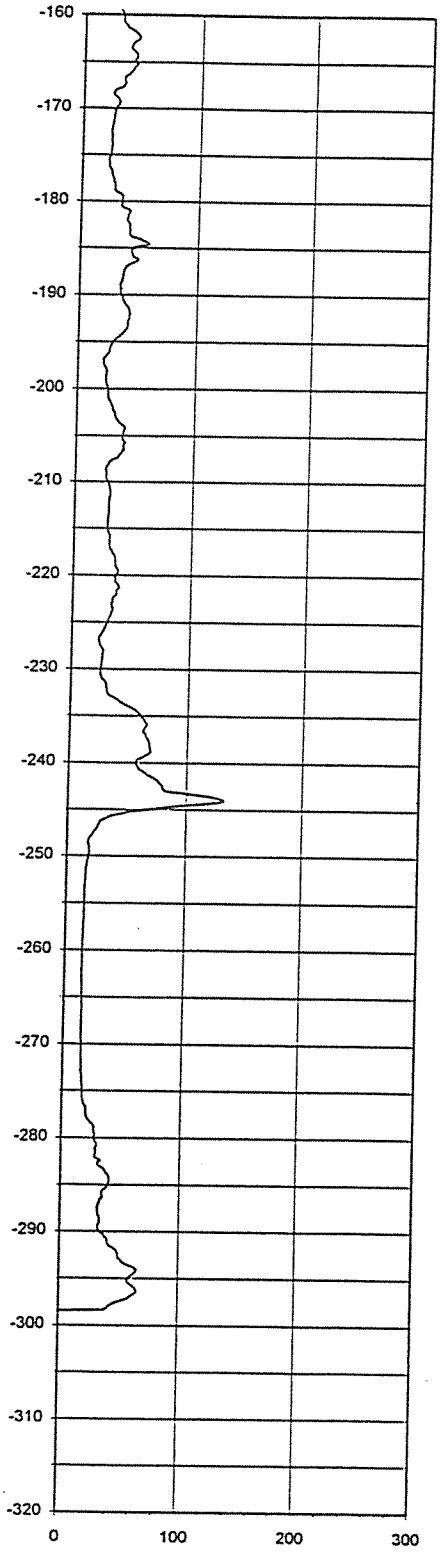


MW4 RESISTIVITY LOG
(64N)



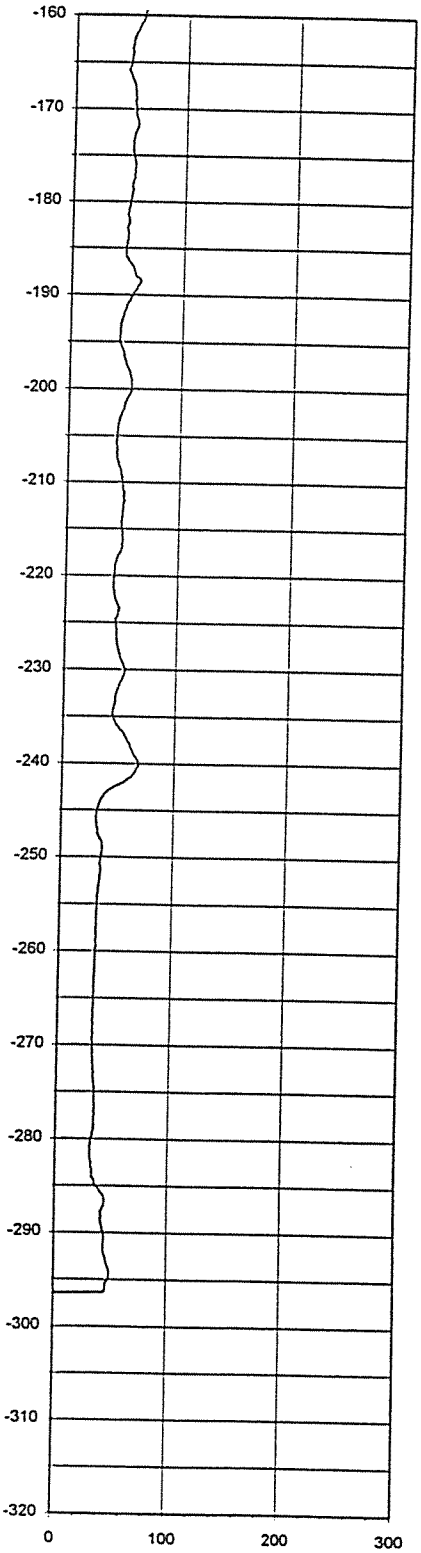
MW4 RESISTIVITY LOG
(16N)

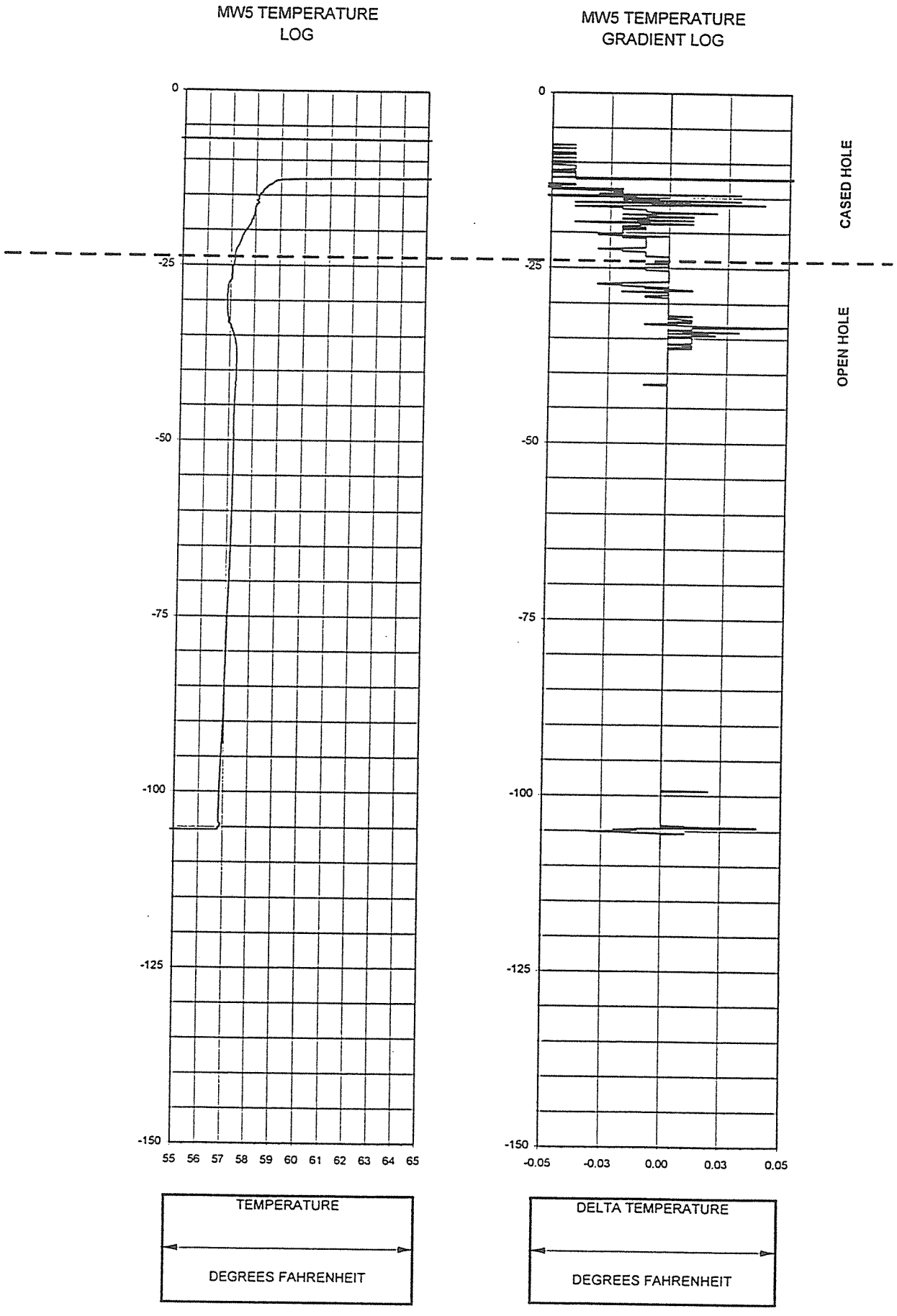
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MW4 RESISTIVITY LOG
(64N)

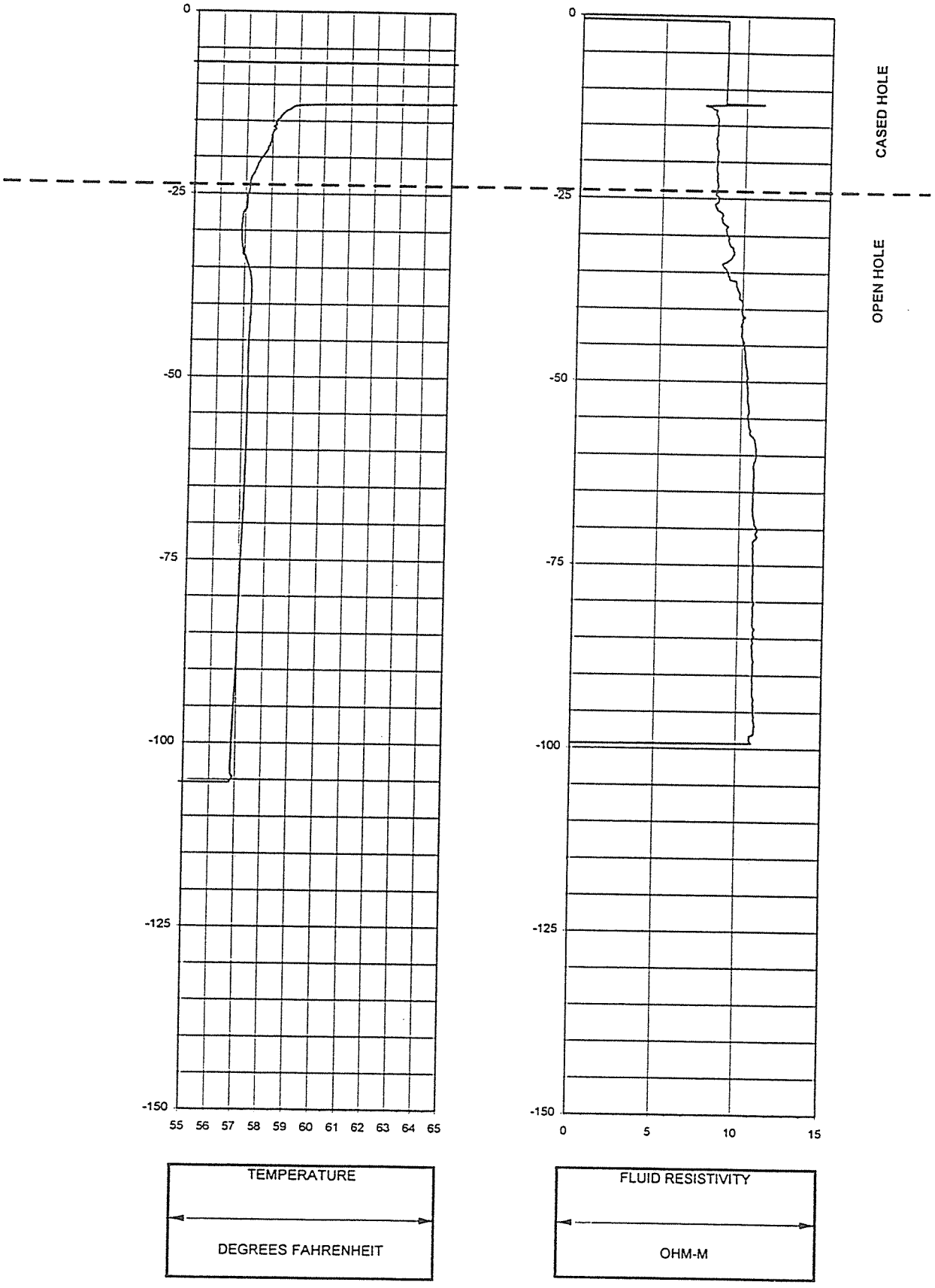
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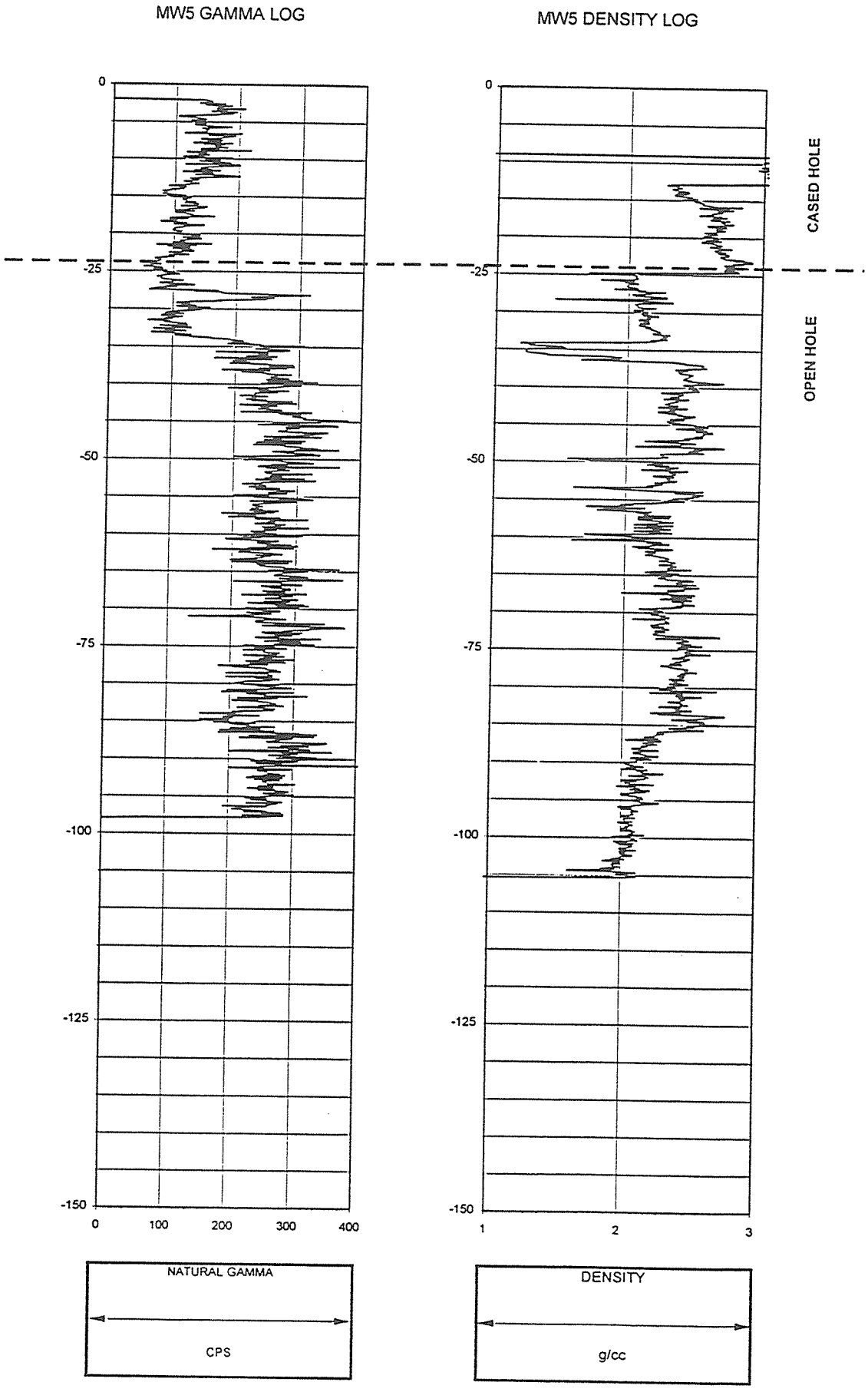


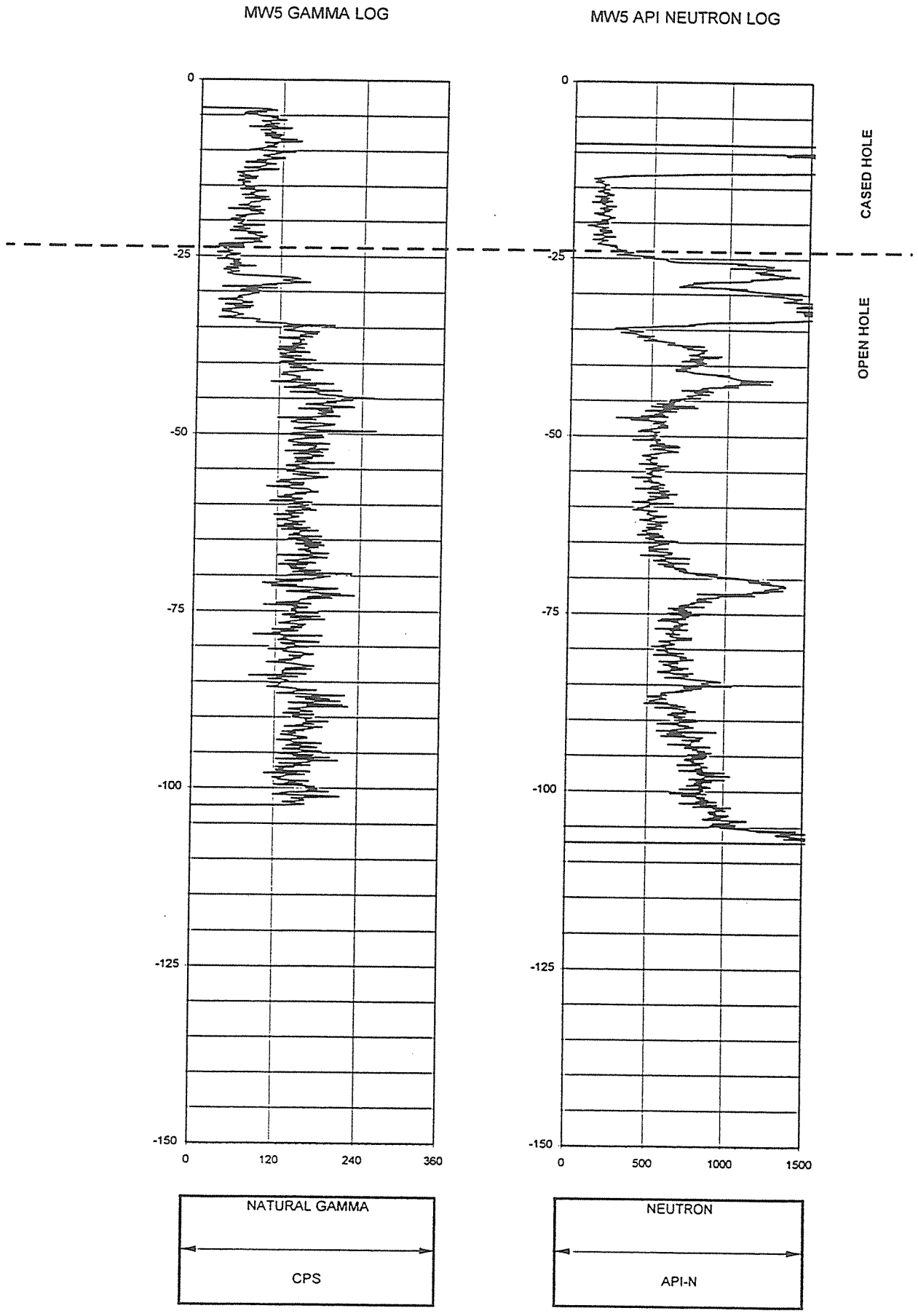

MW5 TEMPERATURE LOG
MW5 TEMPERATURE GRADIENT LOG
0
-25
-50
-75
-100
-125
-150
55 56 57 58 59 60 61 62 63 64 65
-0.05 -0.03 0.00 0.03 0.05
CASED HOLE
OPEN HOLE
TEMPERATURE
DEGREES FAHRENHEIT
DELTA TEMPERATURE
DEGREES FAHRENHEIT

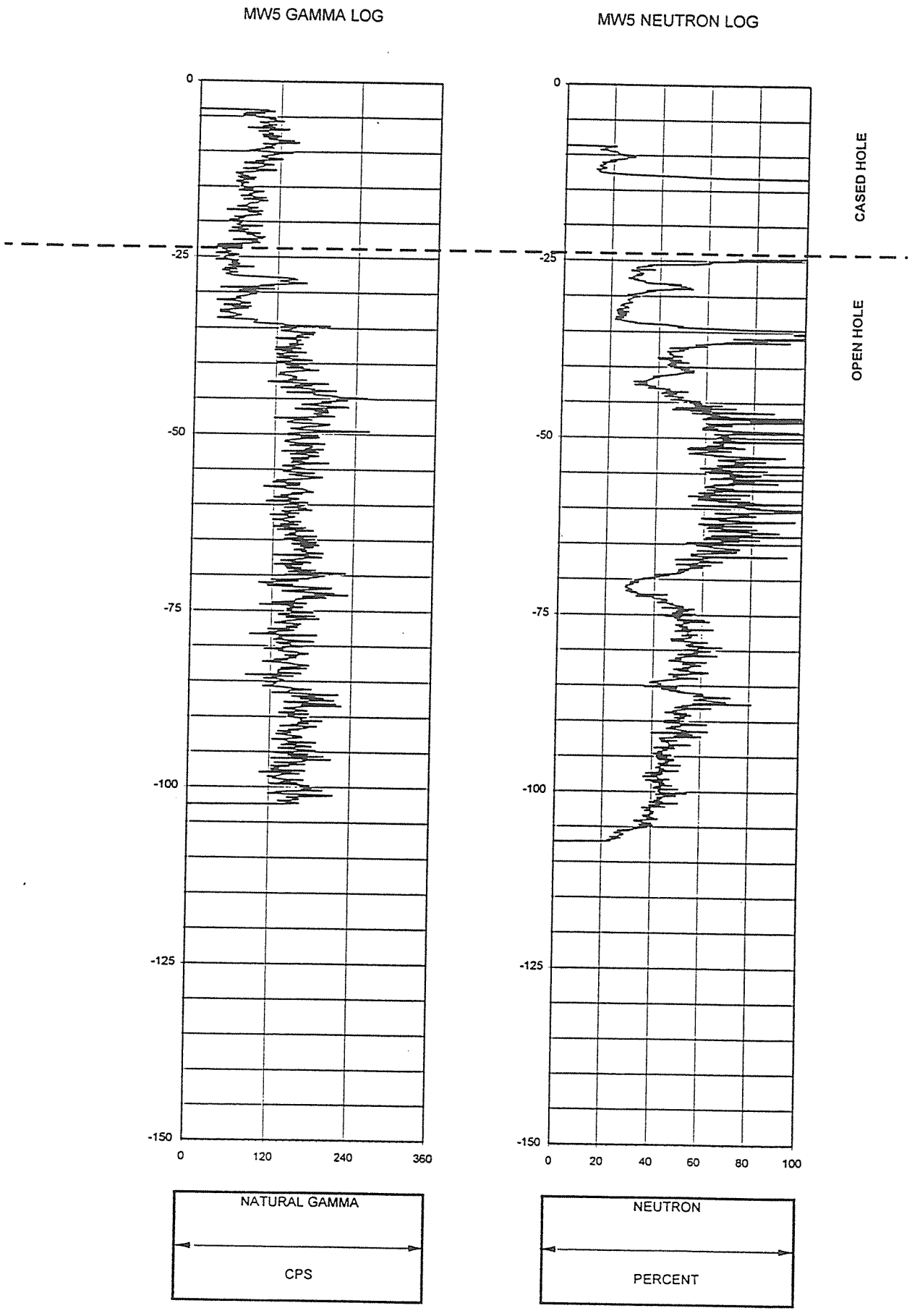
MW5 TEMPERATURE LOG

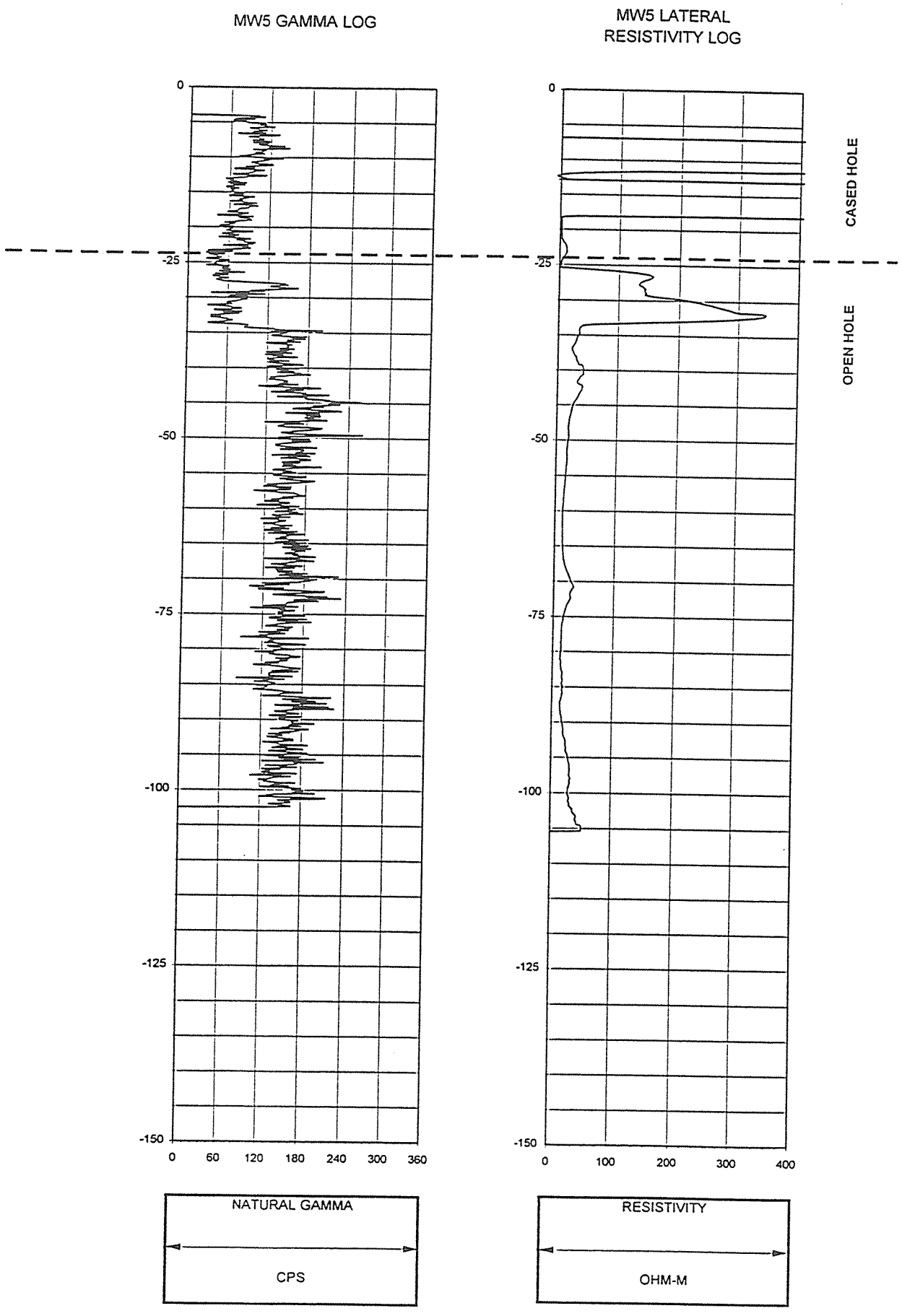
MW5 FLUID RESISTIVITY LOG




MW5 GAMMA LOG
MW5 DENSITY LOG
0
-25
-50
-75
-100
-125
-150
0
100
200
300
400
1
2
3
CASED HOLE
OPEN HOLE
NATURAL GAMMA
CPS
DENSITY
g/cc

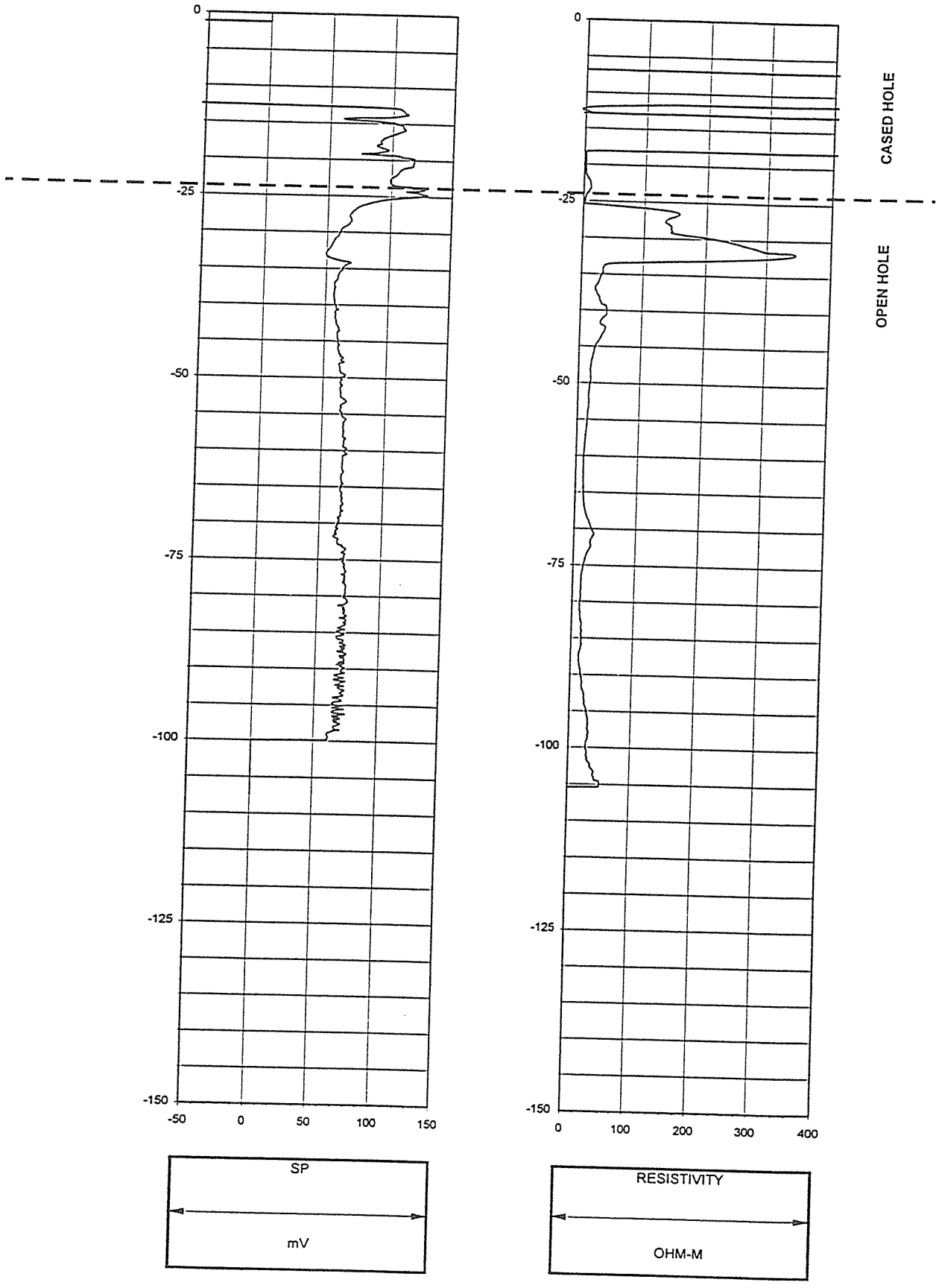

MW5 GAMMA LOG
MW5 API NEUTRON LOG
0
-25
-50
-75
-100
-125
-150
0
120
240
360
0
500
1000
1500
CASED HOLE
OPEN HOLE
NATURAL GAMMA
CPS
NEUTRON
API-N


MW5 GAMMA LOG
MW5 NEUTRON LOG
0
-25
-50
-75
-100
-125
-150
0
120
240
360
0
20
40
60
80
100
CASED HOLE
OPEN HOLE
NATURAL GAMMA
CPS
NEUTRON
PERCENT


MW5 GAMMA LOG
MW5 LATERAL RESISTIVITY LOG
CASED HOLE
OPEN HOLE
0
-25
-50
-75
-100
-125
-150
0
60
120
180
240
300
360
0
100
200
300
400
NATURAL GAMMA
CPS
RESISTIVITY
OHM-M

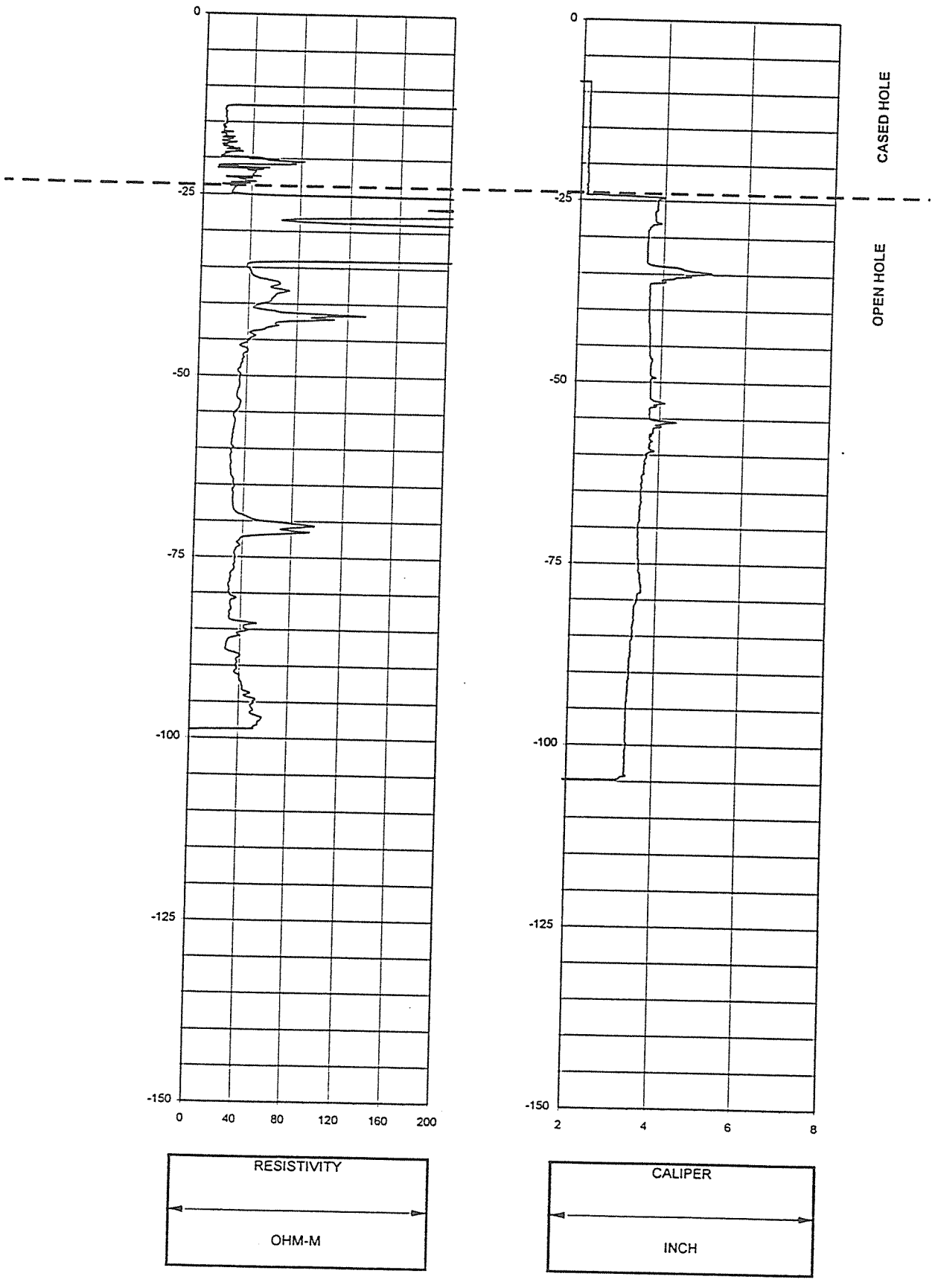
MW5 SPOTANEOUS POTENTIAL LOG

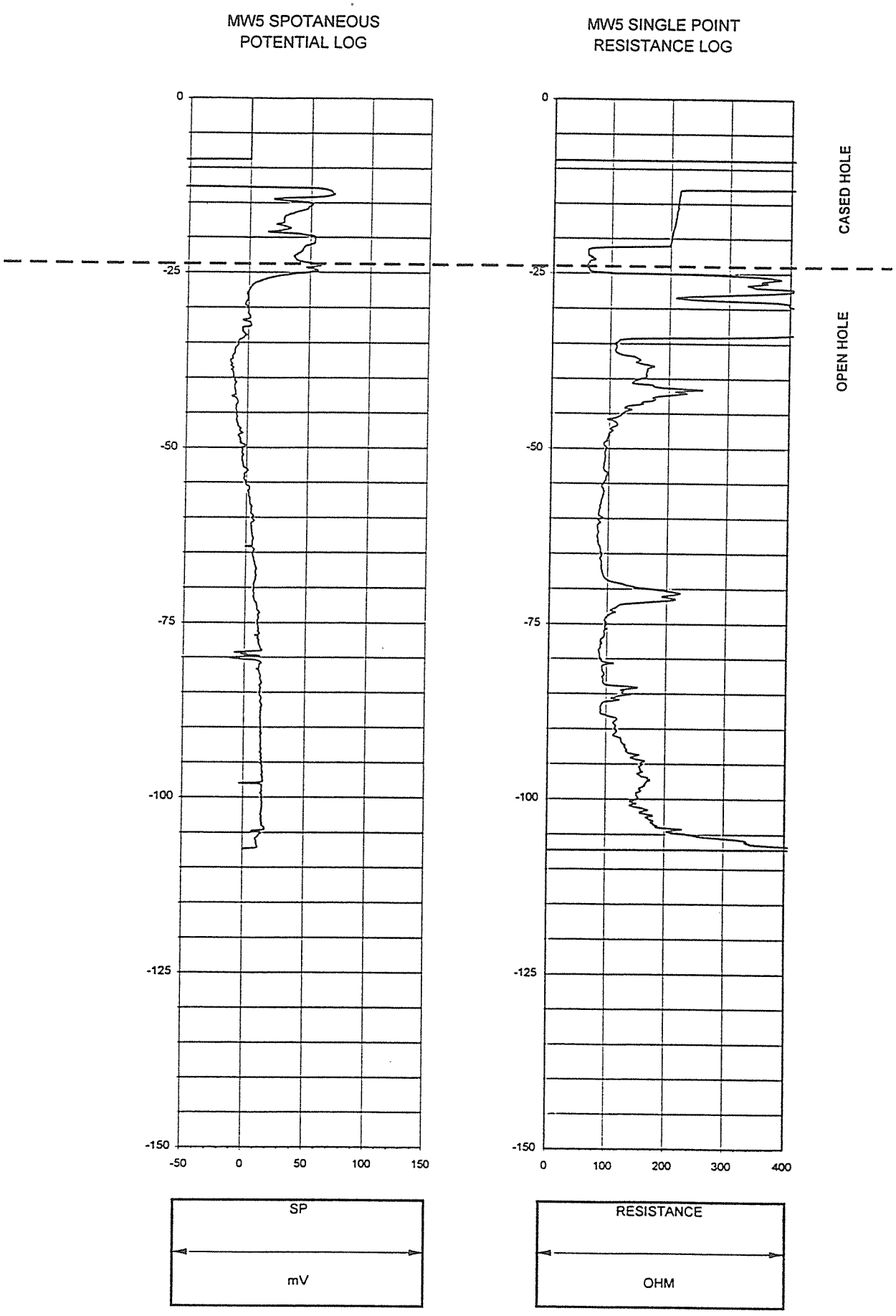
MW5 LATERAL RESISTIVITY LOG



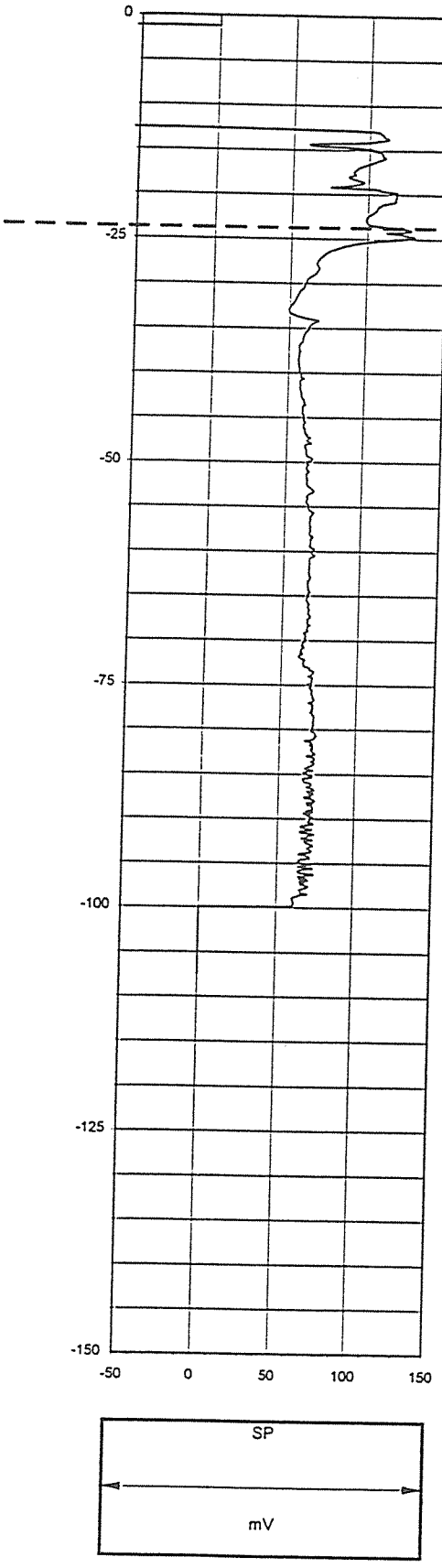
MW5 RESISTIVITY (MG) LOG

MW5 CALIPER LOG

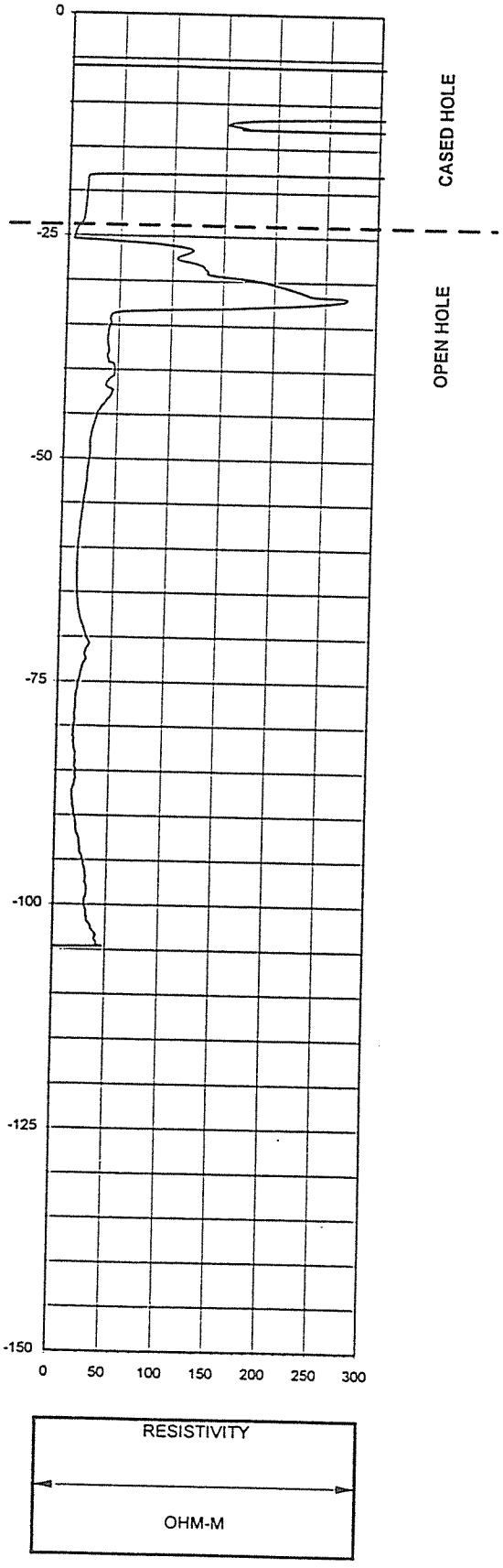



MW5 SPOTANEOUS POTENTIAL LOG
MW5 SINGLE POINT RESISTANCE LOG
CASED HOLE
OPEN HOLE
0
-25
-50
-75
-100
-125
-150
-50
0
50
100
150
0
100
200
300
400
SP
mV
RESISTANCE
OHM

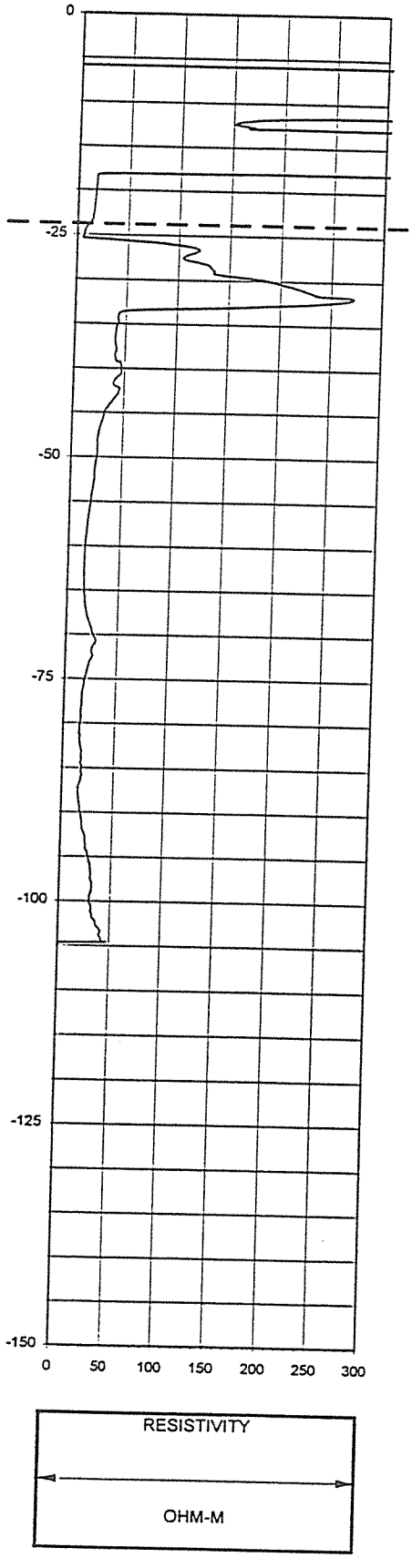
MW5 SPOTANEOUS POTENTIAL LOG



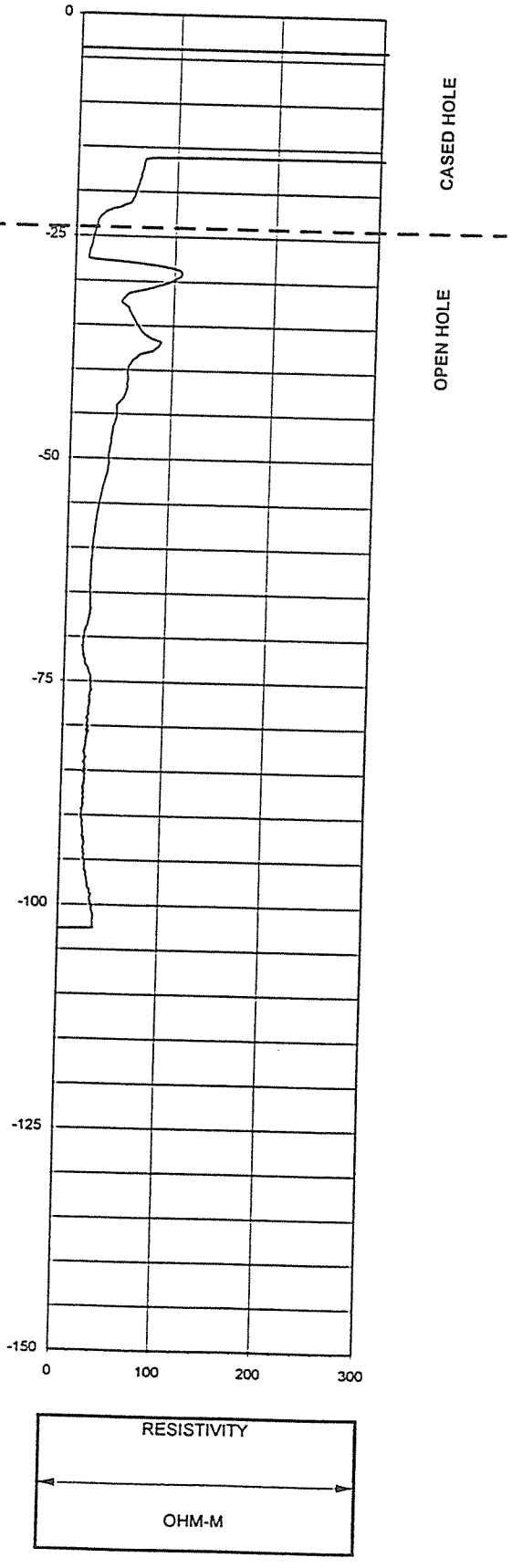
MW5 RESISTIVITY LOG (16N)



MW5 RESISTIVITY LOG
(16N)



MW5 RESISTIVITY LOG
(64N)



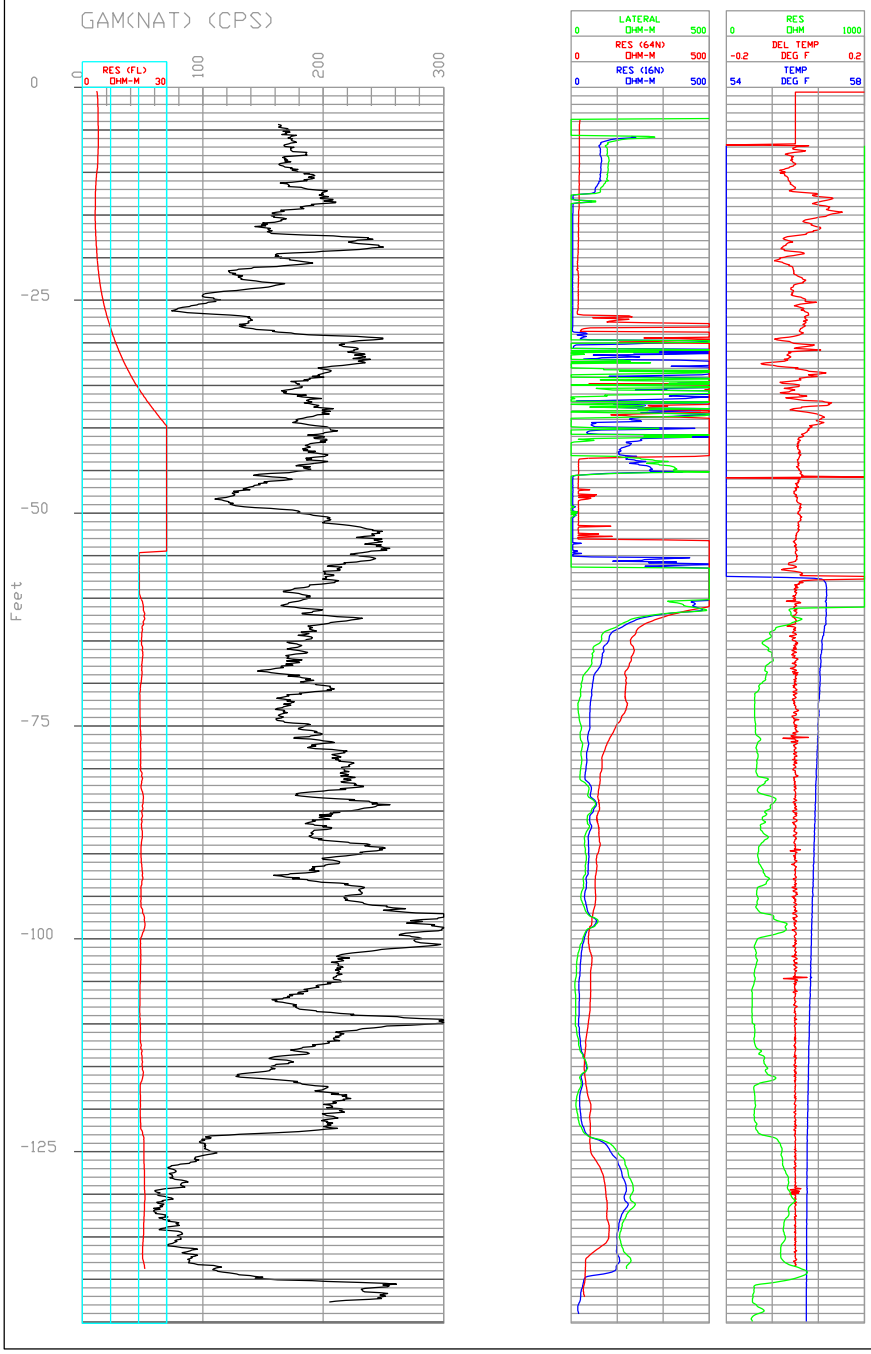
GEOLOGICAL LOGGING SYSTEMS
P.O. Box 848, Industrial Park, Bluefield VA 24605 276-322-5467

DIGITAL LOG

Company	: AEP			**Other Services:**	
Well	: MW 9			CORE	
Location/Field	: AMOS FLY ASH POND			9041	
County	: PUTNAM			-	
State	: WEST VIRGINIA				
Section	: -	**Township**	:	**Range**	:
Date	: 02/04/02	**Permanent Datum**	: -	**Elevations**	
Depth Driller	: 148	**Elev. Perm. Datum**	: -	**KB**	:
Log Bottom	: 145.10	**Log Measured From**	: GL	**DF**	:
Log Top	: 0.40	**Drl Measured From**	: GL	**GL**	:
Casing Driller	: 3	**Logging Unit**	: 10		
Casing Type	: PVC	**Field Office**	: BLFD.,VA		
Casing Thickness	: .25	**Recorded By**	: M. CASSADY		
Bit Size	: 2.85	**Borehole Fluid**	: 0	**File**	: ORIGINAL
Magnetic Decl.	: -6.9	**RM**	: 0	**Type**	: 9041C
Matrix Density	: 2.71	**RM Temperature**	: 0	**Log**	: 1"=10'
Fluid Density	: -	**Matrix Delta T**	: 140	**Plot**	:
Neutron Matrix	: SANDSTONE	**Fluid Delta T**	:	**Thresh**	: 20000
Remarks	:				

Electric Log Interpretation Is Empirical In Nature. Extreme Hole Conditions Will Make Completely Accurate Interpretations Difficult.

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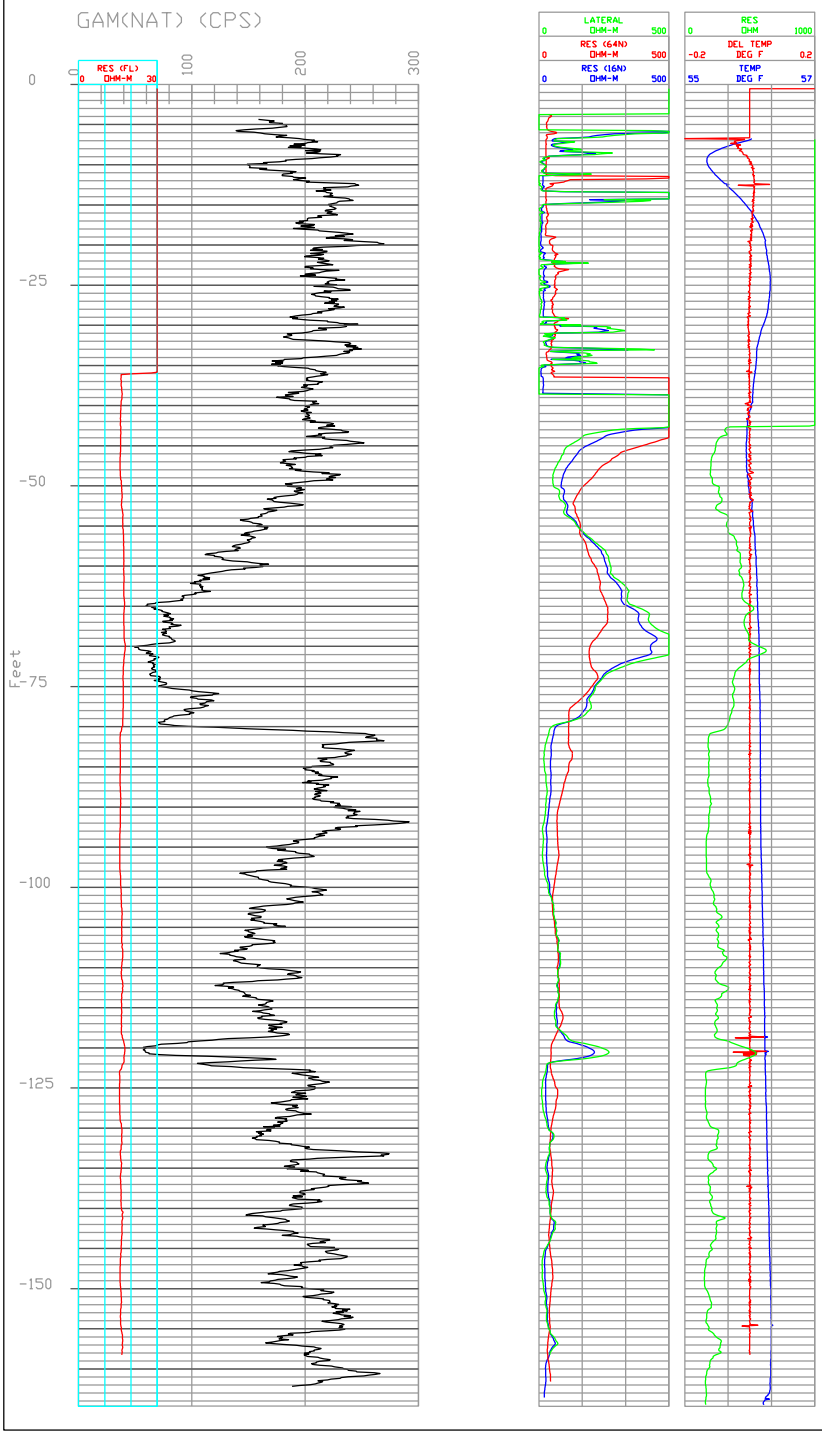
GEOLOGICAL LOGGING SYSTEMS
P.O. Box 848, Industrial Park, Bluefield VA 24605 276-322-5467

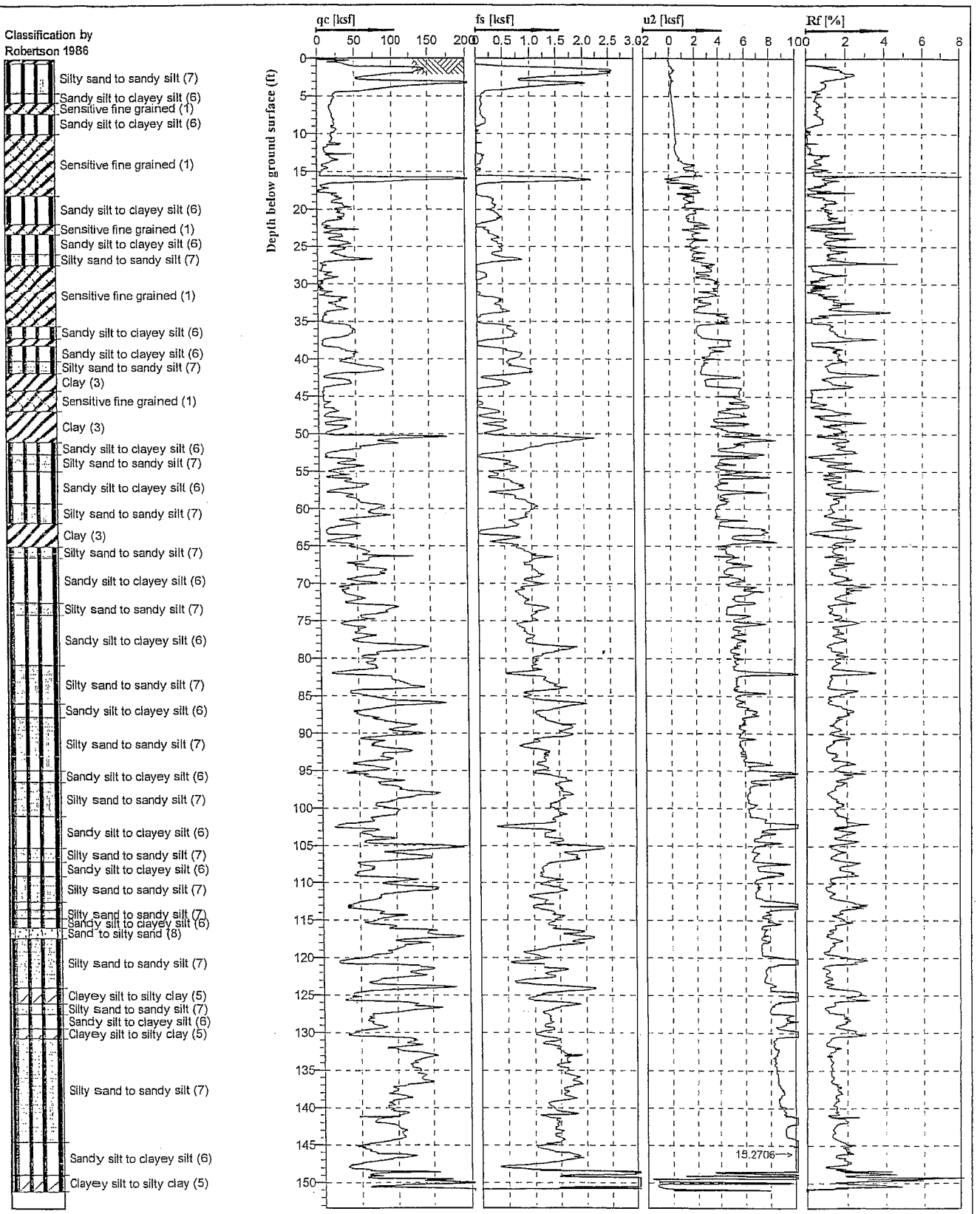
DIGITAL LOG

Company	: AEP			**Other Services:**	
Well	: MW 10			CORE	
Location/Field	: AMOS FLY ASH POND			9041	
County	: PUTNAM			-	
State	: WEST VIRGINIA				
Section	: -	**Township**	:	**Range**	:
Date	: 02/04/02	**Permanent Datum**	: -	**Elevations**	
Depth Driller	: 165	**Elev. Perm. Datum**	: -	**KB**	:
Log Bottom	: 164.60	**Log Measured From**	: GL	**DF**	:
Log Top	: 0.40	**Drl Measured From**	: GL	**GL**	:
Casing Driller	: 3	**Logging Unit**	: 10		
Casing Type	: PVC	**Field Office**	: BLFD.,VA		
Casing Thickness	: .25	**Recorded By**	: M. CASSADY		
Bit Size	: 2.85	**Borehole Fluid**	: 0	**File**	: ORIGINAL
Magnetic Decl.	: -6.9	**RM**	: 0	**Type**	: 9041C
Matrix Density	: 2.71	**RM Temperature**	: 0	**Log**	: 1"=10'
Fluid Density	: -	**Matrix Delta T**	: 140	**Plot**	:
Neutron Matrix	: SANDSTONE	**Fluid Delta T**	:	**Thresh**	: 20000
Remarks	:				

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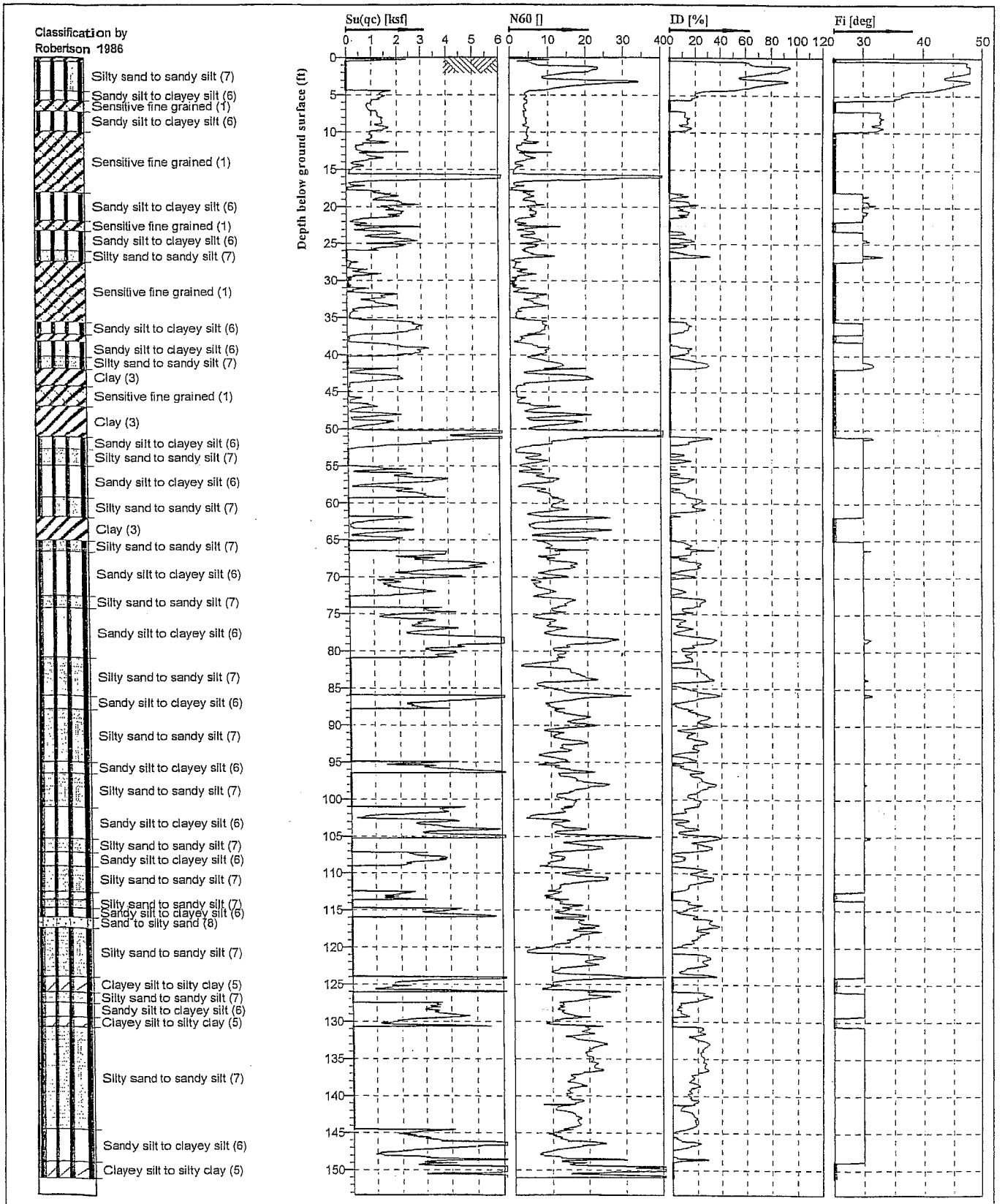


Location: Scary, Putnam County, WV	Position: X: 1726856.99 ft, Y: 532112.99 ft	Ground level: 875.00	Test no: B-17
Project ID: 90979.100	Client: American Electric Power	Date: 12/6/2007	Scale: 1 : 215
Project: Amos U3 Flyash Dam Raising		Page: 1/1	Fig:
LOG OF CONE PENETRATION TEST		File: B-17.cpd	

H. C. NUTTING CO.
P.O. BOX C
CINCINNATI, OH
45226
513 321 5816

U2

Cone No: 4202
Tip area [cm2]: 10
Sleeve area [cm2]: 150



Location: Scary, Putnam County, WV	Position: X: 1726856.99 ft, Y: 532112.99 ft	Ground level: 875.00	Test no: B-17
Project ID: 90979.100	Client: American Electric Power	Date: 12/6/2007	Scale: 1 : 215
Project: Amos U3 Flyash Dam Raising		Page: 1/1	Fig:
LOG OF CONE PENETRATION TEST		File: B-17.cpd	

H.C. NUTTING CO.
P.O. BOX 5
CINCINNATI, OH
45225
513.771.5815

U2

Cone No: 4202
Tip area [cm2]: 10
Sleeve area [cm2]: 150

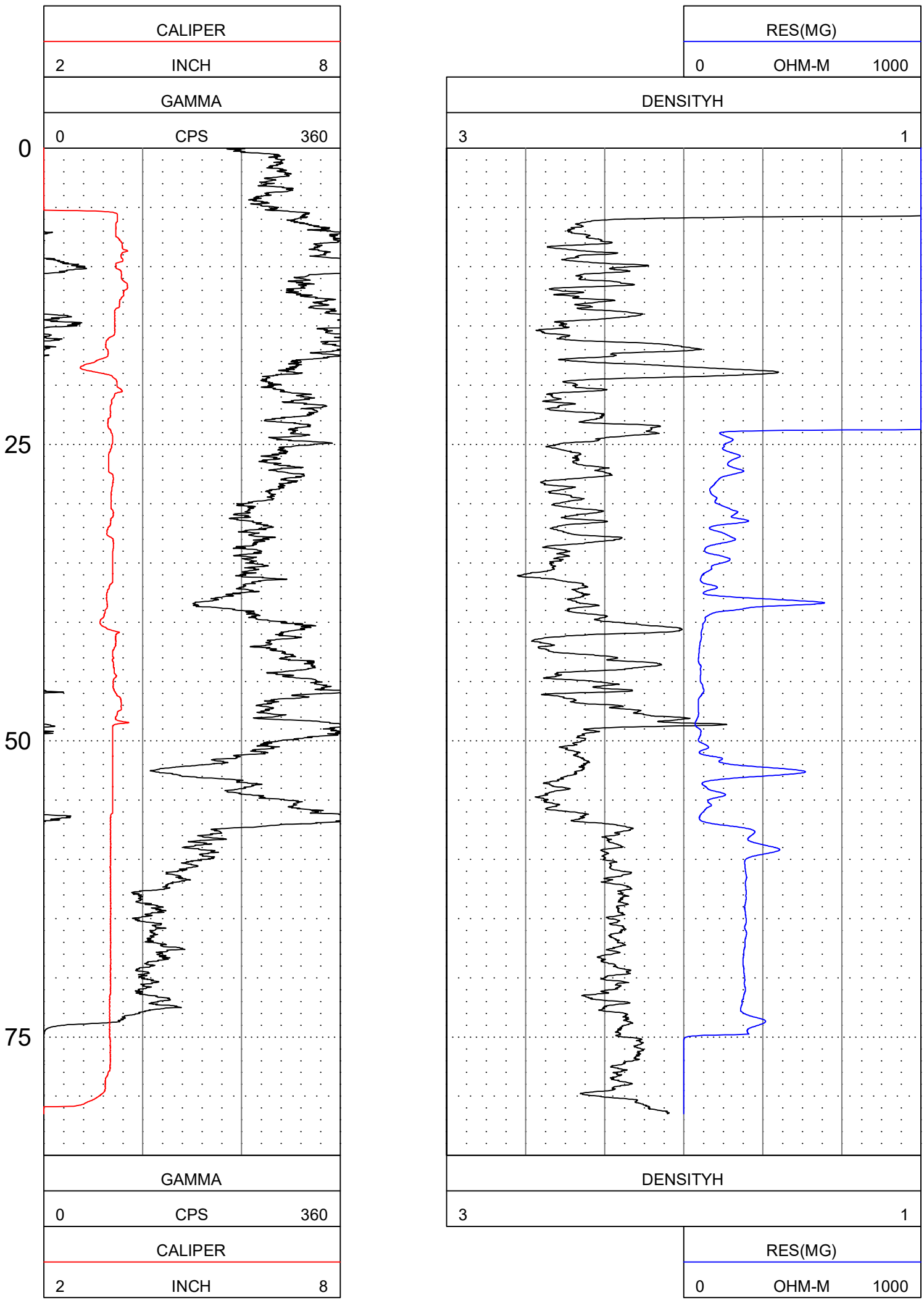
534 Industrial Park Road, Bluefield VA 24605 276-322-5467

B-1401
Gamma-Density Log

Company	: APCO			Other Services:	
Well	: B-1401			OPEN	
Location/Field	: -			ROTARY	
County	: PUTNAM			0033CH	
State	: WEST VIRGINIA				
Section	: -	Township	: -	Range	: -
Date	: 11/04/14	Permanent Datum	: -	Elevations	
Depth Driller	: 90.0	Elev. Perm. Datum	: -	KB	: -
Log Bottom	: 81.480	Log Measured From	: GL	DF	: -
Log Top	: 0.000	Drl Measured From	: GL	GL	: -
Casing Diameter	: -	Logging Unit	: 5		
Casing Bottom	: -	Field Office	: BLUEFIELD	Latitude	-
Casing Type	: -	Recorded By	: A. HUDAK	Longitude	-
Bit Size	: 3.0	Borehole Fluid	: WATER	File	: PROCESSED
Magnetic Decl.	: -8.29		: -	Type	: 0033CH
Matrix Density	: 2.65	RM Temperature	: -	Log	: 1"= 10'
Fluid Density	: -	Matrix Delta T	: 54	Plot	: -
Neutron Matrix	: SANDSTONE	Fluid Delta T	: -	Thresh	: 99999
Remarks	: -				

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Cardno GLS
Shaping the Future
534 Industrial Park Road, Bluefield VA 24605 276-322-5467

B-1402
Gamma-Density Log

Company	: APCO			Other Services:			
Well	: B-1402			OPEN			
Location/Field	: -			ROTARY			
County	: PUTNAM			9321C2			
State	: WEST VIRGINIA						
Section	: -	Township	: -			Range	: -
Date	: 11/04/14	Permanent Datum	: -			Elevations	
Depth Driller	: 90.0	Elev. Perm. Datum	: -			KB	: -
Log Bottom	: 54.500	Log Measured From	: GL			DF	: -
Log Top	: 0.000	Drl Measured From	: GL			GL	: -
Casing Diameter	: -	Logging Unit	: 5			Latitude	-
Casing Bottom	: -	Field Office	: BLUEFIELD			Longitude	-
Casing Type	: -	Recorded By	: A. HUDAK				
Bit Size	: 3.0	Borehole Fluid	: WATER			File	: PROCESSED
Magnetic Decl.	: -8.29		: -			Type	: 0033CH
Matrix Density	: 2.65	RM Temperature	: -			Log	: 1"= 10'
Fluid Density	: -	Matrix Delta T	: 54			Plot	: -
Neutron Matrix	: SANDSTONE	Fluid Delta T	: -			Thresh	: 99999
Remarks	: -						

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