



# ASH POND-CCR GROUNDWATER MONITORING WELL NETWORK EVALUATION - REVISION 1

Amos Plant Winfield Road Putnam County Winfield, West Virginia

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#### Amos Plant Winfield Road Putnam County Winfield, West Virginia

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# **ACRONYMS AND ABBREVIATIONS**

AEP	American Electric Power Service Cooperation
amsl	above mean sea level
Arcadis	Arcadis U.S., Inc.
bgs	below ground surface
BAP	bottom ash pond
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
CSM	Conceptual Site Model
EPRI	Electric Power Research Institute
FGD	flue gas desulfurization
ft	feet
GA	Geo/Environmental Associates, Inc.

# **1 OBJECTIVE**

This report was prepared by Arcadis U.S., Inc. (Arcadis) for American Electric Power Service Corporation (AEP) to assess the adequacy of the groundwater monitoring well network included in the Coal Combustion Residual (CCR) requirements, as specified in Code of Federal Regulations (CFR) 40 CFR 257.91, for the ash pond system (CCR Unit) at the AEP Amos Generating Plant (Plant) located on Winfield Road in Winfield, West Virginia (**Figure 1**). This report has been revised to modify the ash pond system boundary from the original report dated October 18, 2016. 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 objective of this report is to present an evaluation of the adequacy of the groundwater monitoring well network in the uppermost aquifer at the onsite ash pond system (Site).

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

Initial evaluation of the monitoring well network was completed in November 2015 and included a review of AEP-provided data associated with previously completed subsurface investigation activities in the vicinity of the ash pond system, as well as publicly-available geologic and hydrogeologic data. Gaps in the monitoring well network, as well as in the characterization of subsurface geology, were identified during this initial evaluation. An electrical resistivity geophysical survey was conducted in December 2015, and additional monitoring wells were installed from April through May 2016 to address these data gaps. Drilling activities were performed by AEP personnel with Arcadis personnel completing borehole logging and well installation oversight. The following report presents the current Conceptual Site Model (CSM), combining the historical Site information with collected 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 cover the up and down gradient areas of the ash pond system in the uppermost aquifer; therefore, the report objective has been met.

# 2 BACKGROUND INFORMATION

The following section provides background information for the AEP Amos Generating Plant ash pond system.

# 2.1 Facility Location Description

The AEP Amos Generating Plant is located in Putnam County, bounded by U.S. Route 35 to the west and the Kanawha River to the east. The Plant is approximately 5 miles southeast of Winfield, West Virginia. The ash pond system CCR unit is immediately northwest of the Plant. The ash pond system is located south and adjacent to Bill's Creek and less than one quarter mile southwest of the Kanawha River (**Figures 1** and **2**).

# 2.2 Description of Ash Pond System CCR Unit

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

## 2.2.1 Embankment Configuration

The ash pond system main dike extends 800 feet (ft) along the northwest side of the ash pond system. The maximum height of the dike is approximately 28 ft above ground surface with a minimum crest elevation of approximately 588 ft. Prior to 2010, the minimum crest elevation was 584 ft, however it was heightened to accommodate raising the operating pool level of the ash pond system. The main dike is approximately 10 to 26 ft wide and is primarily constructed of clay/shale fill above native clayey gravel and clay (GA, 2005).

Secondary splitter dikes were constructed that separate the ash pond system into individual ponds including: Bottom Ash Pond (BAP) 1A, BAP 1B, Reclaim Pond, and Clearwater Pond. The splitter dike separating BAP 1A and BAP 1B has a minimum elevation of 585 ft, but is typically greater than 587 ft. The splitter dike separating BAP 1A and the Reclaim Pond has a minimum elevation of approximately 584 ft while the splitter dike separating the Reclaim Pond and the Clearwater Pond has a minimum elevation of approximately 583.5 ft (GA, 2005).

## 2.2.2 Area/Volume

The ash pond system, consisting of BAP 1A, BAP 1B, Reclaim Pond, and Clearwater Pond occupies a total surface area of approximately 38.5 acres (**Figure 3**). The combined normal reservoir volume of BAP 1A and BAP 1B is 297 acre ft; the combined maximum reservoir volume of BAP 1A and BAP 1B is 312 acre ft (GA, 2008).

#### 2.2.3 Construction and Operational History

The AEP Amos Generating Plant began operations in 1971 with Unit 1. Units 2 and 3 were brought online in 1972 and 1973, respectively. The first available design drawings of the ash pond system are dated June 28, 1970. Fly ash and wastewater generated from Units 1, 2 and 3 were assumed to be transferred to the ash pond system as early as 1971 when Unit 1 became active. The ash pond system was constructed by excavation below natural ground surface. From 1970 to 1976 the ash pond system configuration changes included construction of a road embankment on the northwest corner of BAP 1B and removal of an emergency spillway from the northwest corner of BAP 1B. While some modifications to the ash pond system have been made since 1977, the present-day configuration of the ash pond system with respect to splitter dikes and individual pond units has remained the same since 1976 (GA, 2005; **Figure 3**). All ash ponds are unlined (EPRI, 1999). In 2010, the main dike (northwest dike) was raised 5 ft using concrete block filled with compacted soil.

Currently, bottom ash and coal mill rejects from all three generating units are sluiced to the BAP 1A and BAP 1B for settling. The BAPs are filled in an alternating fashion, with one BAP generally receiving bottom ash while the other BAP is being cleaned out. Additionally, wastewaters from the generation building sumps are pumped to BAP 1A and BAP 1B. Finally, Unit 3 coal pulverizer wastewater is pumped to the Pyrites Pond (EPRI, 1999).

#### 2.2.4 Surface Water Control

The perimeter of the ash pond system is graded such that surface runoff is directed away from the ponds. This grading is accomplished by either natural topographic relief or constructed embankments, for example the main dike along the northwest side of ash pond system (GA, 2008). Surface runoff is directed towards storm water ponds, which are unlined and were constructed by excavating into clayey silt soil (EPRI, 1999). The nearest storm water ponds to the ash pond system are located to the southwest and northeast of the system (**Figure 3**).

Surface water flow within the ash pond system is controlled by a series of embankments and splitter dikes. Pond elevations are maintained so that surface water flows via gravity through underground pipes to ponds in the following order: BAP 1A and BAP 1B, Reclaim Pond, and Clearwater Pond (EPRI, 1999). A majority of water in the Reclaim Pond is pumped to the Plant for re-use. Water that is not recycled into the Plant continues to the Clearwater Pond (GA, 2005). From the Clearwater Pond, water flows to the Kanawha River through a National Pollutant Discharge Elimination System permitted outfall via underground piping.

Two spillway pipes are present in the ash pond system (**Figure 3**). These spillway pipes are intended to discharge excess storm flow into Bill's Creek in the event of a large storm event. One spillway pipe is located at BAP 1B, and the other is located at the Reclaim Pond. Both pipes cross the main dike and discharge in the watershed of Bill's Creek.

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## 2.3 **Previous Investigations**

From 1995 through 1998, AEP worked in coordination with Ish, Inc., META Environmental, Inc., HIS GeoTrans, Inc., and Electric Power Research Institute (EPRI) to evaluate groundwater quality associated with a number of AEP power generating facilities, including the Amos Plant. The primary objectives of these site investigations were to characterize hydrogeology and identify potential contaminant source areas, establish existing groundwater quality, and identify constituents that exceeded West Virginia Groundwater Standards (WVGS). These studies are described in detail in the report *Groundwater Quality at the John E. Amos Power Plant, Putnam County, West Virginia* (EPRI, 1999). Field work for these investigations included 41 direct push technology (DPT) groundwater sampling points, installation of 10 permanent monitoring wells (MW-1 through MW-10), surface water sampling from onsite ponds and Bill's Creek, and geotechnical soil characterization.

In 2005, Geo/Environmental Associates, Inc. (GA) performed site investigations at the direction of AEP associated with planned modifications to the main dike. Field methods involved drilling and logging 8 soil borings through the main dike (B-1 through B-8). Split-spoon samples were collected during installation of the borings for the purpose of slope stability analysis, and 3 of the borings were converted to standpipe piezometers (P1, P3, P6). Additionally, boring B-7 was converted to a 2-inch monitoring well, P7 (GA, 2005). This site investigation included numerical hydraulic and slope stability analysis.

The findings of the above-mentioned GA site investigation were submitted to West Virginia Department of Environmental Protection (WVDEP) and were subsequently returned to AEP with comments. This prompted a revision of the hydraulic analyses and construction design specification associated with the plans to raise the elevation of the main dike. No additional field work was performed as part of this scope (GA, 2008).

# 2.4 Hydrogeologic Setting

The Site is immediately underlain by Quaternary-aged alluvial deposits consisting of clay, silt, sand, and gravel. While there is a general coarsening downward pattern, the shallower clay matrix is interbedded with silty or sandy layers and the deeper sand matrix is interbedded with silty or clayey layers. The uppermost groundwater zone occurs in the confined to semi-confined deeper sand zones that exhibit a potential head. Maximum alluvium thickness is approximately 50 ft and thins towards the edges of the valley. Groundwater flow direction within the alluvium is towards the Kanawha River or Bill's Creek.

In the upland areas surrounding the Site, bedrock primarily consists of the Pennsylvanian age sandstones, shales, limestones, and coal of the Monongahela and Conemaugh Groups. At higher elevations, the hilltops are capped by the Permian age Dunkard Formation. The Conemaugh Group immediately underlies alluvial sediments at the Site, and gently dips to the north. Groundwater occurrence in the bedrock generally coincides with the stress relief fracture system and is not necessarily related to lithology. Bedrock groundwater flow generally mimics surface topography, flowing from ridges towards valleys.

These features are further illustrated on three lines of cross section that were prepared through the ash pond system. The cross section location map is included as **Figure 4** and the lines of cross section are

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https://arcadiso365.sharepoint.com/sites/AEP\_US\_teamsite/ARCADIS\_Only/Amos/BAP/Well Network/Revised-2020-10/Amos-CCR-Ash Pond-Well Network Report-2020-10-22.docx 4 included as **Figure 5A** (A to A'), **Figure 5B** (B to B'), and **Figure 5C** (C to C'). Boring logs and well construction diagrams are included in **Appendix A**.

#### 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 °F and the average minimum temperature is 44 °F based on information from Southeast Regional Climate Center (SERCC, 2015).

## 2.4.2 Regional and Local Geologic Setting

The Site is located in the Appalachian Plateau physiographic province and is also situated in the Kanawha River valley along the southern bank of the Kanawha River. Alluvial sediments consist of clay, silt, sand and gravel deposits that generally coarsen downward. Unconsolidated alluvial sediments are present in thicknesses to approximately 50 ft with thinning towards the valley walls.

Bedrock is present underlying the alluvial deposits, as well as in ridges located to the west of the Site. The primary bedrock units encountered are sedimentary rocks of the Permian age Dunkard Formation and the Pennsylvanian age Monongahela and Conemaugh Formations. The depositional environment for these formations is characterized by a gradually subsiding shallow sea with alternating marine and freshwater strata; the sedimentary units associated with the Monongahela and Conemaugh Formations consists of alternating shale and sandstone units, with occasional thin limestone beds. Several coal horizons are present in the region and often serve as marker beds for unit identification (EPRI, 1999).

Unconsolidated sediments in the upland areas are generally limited to nominal thicknesses of residuum overlying the bedrock. In incised valleys, there is generally a layer of colluvium or alluvium derived from eroded up-valley bedrock on top of the colluvium.

#### 2.4.3 Surface Water and Surface Water/Groundwater Interactions

The Site is adjacent to the Kanawha River, and the ash pond system is located approximately 1,000 ft southwest of the Kanawha River. Bill's Creek, a tributary of the Kanawha River, is immediately adjacent and north of the Reclaim Pond. Groundwater flow direction is generally to the north, northeast, and east towards the Kanawha River and Bill's Creek. The Kanawha River stage level is dam controlled and is a gaining surface water feature. Groundwater elevations on site are higher than the normal stage elevation of the Kanawha River of 566 ft.

The stage levels of the ash pond system are generally maintained no greater than the normal operating levels ranging from 583 to 583.5 ft above mean sea level (amsl) (GA, 2008). Groundwater is generally present at lower elevations at around 570 ft amsl based on 2016 data. The ponds are unlined and likely providing recharge to the uppermost aquifer resulting in groundwater mounding in the vicinity of the ash pond system.

#### 2.4.4 Water Users

The Amos Plant uses Putnam County Public Service Department water supply. There are no active groundwater production wells at the Site. During the development of a water well inventory for the Site by Arcadis in 2014, no information was available regarding the location of nearby public or private water supply wells.

# 3 GROUNDWATER MONITORING WELL NETWORK EVALUATION

An initial evaluation of the monitoring well network present at the Site was performed in November 2015 to determine if any of the wells were viable for continued use as part of the groundwater monitoring well network or also be retained as part of a larger groundwater hydraulic monitoring well network. As part of this review, hydrogeologic conditions were evaluated to determine if the 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. As a result of this evaluation, a geophysical investigation was completed in December 2015 along with installation of additional borings and monitoring wells in April through May 2016. Monitoring wells included in the monitoring network are designated as up or down gradient. Up gradient wells represent background groundwater quality and the down gradient monitoring wells monitor wells monitor ing network are designated as up or down gradient. Up gradient wells represent background groundwater quality and the down gradient monitoring wells monitor water quality groundwater down gradient of the CCR unit.

## 3.1 Hydrostratigraphic Units

#### 3.1.1 Horizontal and Vertical Position Relative to CCR Unit

The uppermost unconsolidated aquifer consists of the saturated alluvial sediments beneath and surrounding the Site. The upper limit of the uppermost aquifer is defined by the elevation of the top of the saturated sand zone, which is variable across the Site. The uppermost aquifer is generally confined to semi-confined by clay and sandy clay deposits. However, alluvial sands may be semi-confined to unconfined in some areas of the Site (e.g. SB-1604, MW-1602A). The base elevation of the ash pond system varies, but ranges from approximately 559 ft amsl (SB-1604) to 584 ft amsl (SB-1603). Soil borings installed in 2016 indicate that the base of the ash pond system is in contact with the underlying uppermost aquifer. This is illustrated in cross sections A-A', B-B', and C-C' (**Figures 5A, 5B, and 5C**).

The vertical extent of the aquifer extends to the base of the unconsolidated deposits in the valley at the bedrock interface. The uppermost unconsolidated aquifer is approximately 50 feet thick and appears laterally extensive to the north, south and east around the ash pond system. The uppermost aquifer pinches out towards the bedrock valley wall to the west.

#### 3.1.2 Overall Flow Conditions

Groundwater recharge occurs from regional precipitation infiltration and from ash pond use. Bedrock, to a lesser extent, contributes recharge to the uppermost unconsolidated aquifer from the west of the Site were the alluvial valley is in contact with the valley wall.

Available groundwater elevations for 1995 through 1996, as well as groundwater elevations collected in July 2016 from installed wells, are summarized on **Table 1**. The average vertical hydraulic gradient from 1995 to 1996 between wells MW-2 and MW-3 was 0.008 in an upward direction from MW-2, which is screened in the shallow sandy clay, to MW-3, which is screened deeper in the basal gravel zone. In July 2016, a similar upward vertical hydraulic gradient of 0.009 was observed. Near the ash pond system, the

average vertical gradient between wells MW-4 and MW-5 from 1995 to 1996 was -0.036 in a downward direction. In July 2016, a similar downward vertical gradient of -0.046 was observed. Both of these wells are screened in the uppermost aquifer (i.e. alluvial sands), indicating likely localized recharge from the ash pond system.

The most recent groundwater data set, collected on July 25, 2016, is depicted with potentiometric surface contours on **Figure 6**. Groundwater flow is generally to the north and east towards the Kanawha River. There is also a northern component of groundwater flow towards Bill's Creek. As presented in **Table 2**, wells included in the monitoring network have been designated as up or down gradient.

## 3.1.3 Soil Property Testing

During unconsolidated monitoring well installation, selected split-spoon soil samples were retained for particle-size analysis by sieving and hydrometer in accordance with American Society for Testing and Materials (ASTM) D421, D422, and D4718 and moisture content in accordance with ASTM D2216. Split spoon samples selected for particle-size analysis corresponded to the final well screen interval at each boring. For each installed monitoring well location, one composite soil sample was compiled from the selected split spoon samples, which was then transported to the AEP Dolan Civil Engineering Laboratory in Groveport, Ohio for particle-size analysis. The particle-size analysis indicates silty sands and poorly graded sands that make up the alluvial deposits within the screened intervals of the installed monitoring wells in 2016. Note that MW-1603A is installed in a weathered bedrock sequence adjacent to Bill's Creek. The results of this analysis are summarized in **Table 3**, and complete laboratory reports are provided in **Appendix B**.

#### 3.1.4 Hydraulic Conductivity

Pneumatic and bail down slug tests were performed on a total of 2 up gradient wells (MW-1602A, MW-1603A) and 3 down gradient wells (MW-1604, MW-1605, MW-1606) on June 16 and 17, 2016 to provide a broader understanding of the hydraulic conductivity distribution within the alluvial sands (i.e. uppermost aquifer). Well construction details for these wells, as well as all other wells in the monitoring well network, are presented in **Table 2**. Data-logging pressure transducers were used during these tests to monitor and record water level displacement.

Three pneumatic slug tests were performed at each well except MW-1604. Two tests were performed using an identical initial pressure and one test was performed using approximately double the pressure applied in the other two tests. This protocol was implemented to verify the initial head displacement and to evaluate the reproducibility of the results. Equilibration was achieved prior to and after each pneumatic slug test in order to minimize any potential interference between tests. Equilibration was achieved when water level readings stabilized. The pressure applied to each monitor well induced head displacements ranging from approximately 0.5 to 1.5 feet.

At MW-1604, three bail-down slug tests were completed. The pneumatic tests could not be completed due to insufficient initial displacement upon pressurization. Two tests were performed by submerging and removing half the bailer (24-inches) and one test was performed by submerging and removing the entire bailer (48-inches). This protocol was implemented to verify the initial head displacement and to evaluate

the reproducibility of the results. The bailer removal induced head displacements ranging from approximately 1.1 to 2.1 feet.

For each well, one representative test was selected for analysis and analyzed using AQTESOLV® for Windows® Version 4.50 (Duffield, 2007). The hydraulic conductivity values were determined using applicable analytical solutions for a single (partially-penetrating) well under confined or unconfined conditions, as appropriate. Analytical solutions were selected based on the observed response. Results of the slug test analyses are summarized in **Table 4** and solution reports with individual curve matches are provided in **Appendix C.** 

The hydraulic conductivity estimates from the five monitoring wells tested ranged from 0.7 ft per day (MW-1605) to 12.5 ft per day (MW-1602A). The overall mean hydraulic conductivity estimate was 6.8 ft per day, while the overall geometric mean was 4.6 ft per day. Estimated hydraulic conductivity values at MW-1602A, MW-1603A, and MW-1606 were consistent with silty sand. The estimated hydraulic conductivity values at MW-1604 and MW-1605 were lower, which is likely due to increased fines associated within the alluvial sand zone.

#### 3.1.5 Geophysical Survey

In order to provide an initial characterization of the ash pond system and the hydrostratigraphic units at the Site, Arcadis completed an electrical resistivity survey from December 8 through December 11, 2015. This geophysical investigation aided in boring/monitoring well placement and provided insight on subsurface conditions between borings. Five total electrical resistivity transects (Line ER-1 through Line ER-5) were performed. Lengths of the resistivity transects ranged from 291 meters (approximately 950 ft.) to 333 meters (1,100 feet). For each survey line, up to 112 non-corrosive stainless-steel electrode stakes were used, which were separated by a distance of 3 meters (approximately 6.6 feet) and inserted into surface soils with an approximate constant spacing along a relatively straight transect. Once the electrical resistivity data set was collected, the data was downloaded for processing. Additional detail of the procedures and results of the electrical resistivity surveys are included in **Appendix D**. The locations of the transect lines are illustrated on **Figure D-1**.

There are three distinct zones of contrasting electrical resistivity apparent on all four resistivity crosssections. As shown in **Figures D-2** through **D-5**, the uppermost resistivity zone is characterized by lower resistivity values (generally 10 to 100 Ohm-meters, shown in blue to green colors) and is interpreted as finer-grained unconsolidated native clay soils, clay fill materials, or fine-grained ash fill deposits. The second resistivity layer is characterized by higher resistivity values (generally 100 to 800 Ohm-meters, shown in green to red colors) and are interpreted as unconsolidated coarser-grained native sand or sand/gravel soils, or sandy fill materials. This coarser-grain layer is consistent with the sand saturated zone and is delineated by black dashed lines in **Figures D-2** through **D-5**. The third resistivity zone is characterized by significantly low resistivity values of less than 10 Ohm-meters (shown as dark blue to white colors). These zones of anomalous low resistivity are not likely due to naturally occurring soils/geologic conditions but are rather interpreted to indicate saturated soils impacted by high concentrations of total dissolved solids in groundwater.

# 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 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 Unit

The identified Site hydrostratigraphic unit is the unconsolidated alluvial aquifer consisting of confined sands. This aquifer is not known to be used locally for groundwater supply or industrial water use.

# 3.3 Review of Existing Monitoring Well Network

#### 3.3.1 Overview

Arcadis and AEP personnel visited the Site on August 11, 2015 to review existing well network conditions and locations. The well network that existed at the time of that site visit was deficient, lacking the 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. A well construction table that summarizes the location, ground surface elevation, borehole depth, installation date, and associated well construction details of the monitoring well network is included as **Table 2**. The wells that were not located or abandoned are gray shaded on **Tables 1** and **2** and **Figure 3**.

The groundwater quality monitoring well network monitors the alluvial aquifer consisting of confined to semi-confined sands. It includes 4 wells installed between 1995 and 2005 and 6 wells installed from April to May 2016. An additional 3 wells, which were pre-existing, are utilized only for the purpose of hydraulic monitoring (**Table 2**). Two well pairs, MW-2/MW-3 and MW-4/MW-5 measure vertical flow.

Spatially, the groundwater quality monitoring well network extends as far up gradient to the south as MW-1602A and up gradient along Bill's Creek to the west (MW-1603A). Down gradient, the network extends from immediately down gradient of the ash pond system (MW-4, MW-1604) to the Kanawha River (MW-1605). The current monitoring well network distribution is presented on **Figure 7**.

#### 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 2015. Following a geophysical survey and boring/monitoring well installation described in **Appendix D** of this report, there are no gaps in the monitoring network. The recommended monitoring well network is further described in Section 4.

# 4 RECOMMENDED MONITORING WELL NETWORK

The groundwater monitoring well network is intended to meet specifications stated in 40 CFR 257.91. The network is discussed with respect to location to the ash pond system (up gradient or down gradient), well depth, and well construction. The recommended existing monitor well network described below will provide an adequate understanding of seasonal and temporal fluctuations in groundwater quality, hydraulics, and groundwater flow in the uppermost aquifer.

# 4.1 Monitoring Well Network Distribution

A total of 6 monitoring wells were installed to augment the existing network. Specifics on field methodology and other documentation on installation of the additional wells in 2015 and 2016 is provided in **Appendix D**. Monitoring well construction was targeted to monitor the saturated alluvial sands down gradient, which is identified as the uppermost aquifer. Up gradient wells were installed in the upper most alluvial aquifer and weathered bedrock (MW-1603A). The total groundwater quality monitoring network includes 4 up gradient wells and 6 down gradient wells (**Table 2** and **Figure 7**). The monitoring well distribution adequately covers down gradient and up gradient areas as detailed in the following sections. In addition to the 10 groundwater quality wells, 3 wells are used to refine the understanding of groundwater flow and hydraulic gradients in the vicinity of the ash pond system and down gradient at the Plant (**Table 2** and **Figure 7**).

#### 4.1.1 Down Gradient Locations

Down gradient monitoring wells are located to the north and east of the ash pond system. These wells include existing wells MW-1, MW-4, and MW-5, as well as 2016 installed wells MW-1604, MW-1605, and MW-1606 (**Table 2**). These wells monitor groundwater as it flows north and east past the CCR unit boundary.

#### 4.1.2 Up Gradient Locations

Up gradient monitoring wells are located south and west of the ash pond system. These wells include existing well MW-6, as well as 2016 installed wells MW-1601, MW-1602A, and MW-1603A (**Table 2**). These wells establish background groundwater quality up gradient of the CCR unit boundary.

## 4.2 Well Construction

Monitoring wells in the network are constructed of 2-inch Schedule 40 PVC risers with 5 to 10 ft of 0.01 inch slotted PVC screens, with the exception of MW-1606 which has 15 ft of screen. Installation details and field methods are provided in **Appendix D**. Well construction data for the monitoring well network is summarized on **Table 2**. Boring logs and the monitoring well completion diagrams are provided in **Appendix A**.

# 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.

Todd A. Minehardt

Printed Name of Registered Professional Engineer

Signature

023518

West Virginia 10/22/2020

Registration No.

Registration State Date

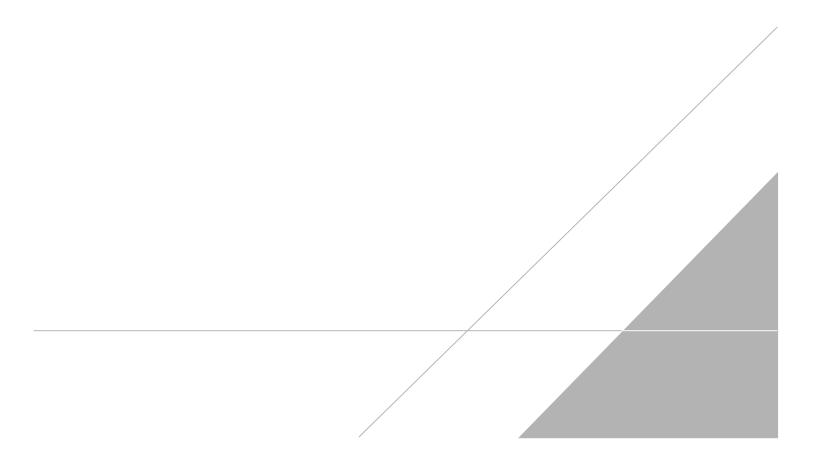


arcadis.com https://arcadiso365.sharepoint.com/sites/AEP\_US\_teamsite/ARCADIS\_Only/Amos/BAP/Well Network/Revised-2020-10/Amos-CCR-Ash Pond-Well Network Report-2020-10-22.docx 13

# 6 **REFERENCES**

- Duffield, G.M. 2007. AQTESOLV® for Windows® 95/98/Mw/NT/2000/XP/Vista, Version 4.50 Professional. HydroSOLVE, Inc.
- Electric Power Research Institute (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.
- Geo/Environmental Associates, Inc. (GA) 2005. Responses to February 15, 2005 DEP Review Letter, John Amos Plant – Bottom Ash Complex, Putnam County, West Virginia, Prepared for AEP Service Corporation.
- Geo/Environmental Associates, Inc. (GA) 2008. Responses to May 12, 2008 DEP Review Letter, John Amos Plant – Bottom Ash Complex, Putnam County, West Virginia, Prepared for AEP Service Corporation.
- Southeast Regional Climate Center. 2015. Historical Climate Summaries, Winfield Locks, West Virginia, http://www.sercc.com, Query conducted by Mr. Josh Roberts of Arcadis on October 6, 2015.
- United States Geological Survey (USGS), Aquifers and Groundwater. 2015. Available online at www.usgs.gov.
- Wilmoth, B.M. 1966. Ground Water in Mason and Putnam Counties, West Virginia, West Virginia Geological and Economic Survey Bulletin 32.

# **TABLES**





	Sep-95	Mar-96	Jul-96	Jul-16
Well ID	GW Elev <sup>a</sup>	GW Elev <sup>a</sup>	GW Elev <sup>a</sup>	GW Elev
	ft amsl	ft amsl	ft amsl	ft amsl
Sandy Clay Zone Wells				
MW-2	572.27	572.97	572.90	574.80
MW-6	571.21	572.71	572.47	571.55
MW-8	575.24	576.23	576.05	577.13
MW-9	572.26	572.77	572.58	
Sand Zone Wells				
MW-1	565.86	566.28	565.95	567.04
MW-4	569.84	570.35	570.31	570.99
MW-5	569.10	569.62	569.60	570.08
MW-7	573.84	574.84	574.88	
MW-1601				574.87
MW-1602A				576.11
MW-1603A				579.14
MW-1604				568.10
MW-1605				568.79
MW-1606				572.73
<b>Basal Gravel Zone Wells</b>				
MW-3	572.45	573.28	573.21	575.10
MW-10	572.21	572.76	572.51	

#### Notes:

Shaded - well abandoned or not verified

a. Source: EPRI. April 1999. Groundwater Quality at the John E. Amos Power Plant, Putnam County, West Virginia, Table 2-5.

-- - not measured

amsl - above mean sea level

Elev - elevation

ft - feet

GW - groundwater

# Table 2Well Construction DetailsAEP Amos Generating Plant - Ash Pond SystemWinfield, West Virginia

| Hydraulic          | Location                   |  |   | Ground   | Top of   | Borehole  
   
   | Dete   | Corror   
   | Well  
  | Top of   
  | Eilter Deelr   | Detterne  | f Eilfer Deels   | Top   | f Corror   | Detter   |  
   |
|--------------------|----------------------------|--|---|--|--
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--|---|--|---|--|---
--|--|--|
| Monitoring<br>Only | Description to<br>CCR Unit | Northing <sup>a</sup>  | Easting <sup>a</sup>  | Surface<br>Elevation <sup>a</sup>  | Casing<br>Elevation <sup>a</sup>   | Depth<br>ft bls   
   
   | Installed  | Material   
   | Diameter<br>inches  
  | Depth<br>ft bls  
  | Elevation<br>ft amsl   | Depth<br>ft bls   | Elevation<br>ft amsl   | Depth<br>ft bls   | Elevation<br>ft amsl   | Depth<br>ft bls  | Elevation<br>ft amsl   
   |
|                    |                            |  |   |  |  |   
   
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  |  |   |  |   |  |  |  
   |
|                    | West                       | 539170.0   | 1729695.5   | 586.5  | 589.42   | 43.0  
   
   | 8/30/1995  | Slotted PVC  
   | 2   
  | 27.0   
  | 559.54   | 42.7  | 543.84   | 31.0  | 555.54   | 41.0   | 545.54   
   |
| x                  | South                      | 536151.9   | 1732199.2   | 584.8  | 587.57   | 24.0  
   
   | 9/13/1995  | Slotted PVC  
   | 2   
  | 6.0  
  | 578.82   | 21.9  | 562.92   | 10.0  | 574.82   | 20.0   | 564.82   
   |
|                    | Southeast                  | 536983.3   | 1734099.7   | 586.8  | 588.54   | 32.0  
   
   | 8/29/1995  | Slotted PVC  
   | 2   
  | 17.0   
  | 569.80   | 32.0  | 554.80   | 21.0  | 565.80   | 31.0   | 555.80   
   |
|                    |                            |  |   |  |  |   
   
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  |  |   |  |   |  |  |  
   |
| x                  | East                       | 539188.3   | 1732745.0   | 586.3  | 589.10   | 57.9  
   
   | 8/24/1995  | Slotted PVC  
   | 2   
  | 9.0  
  | 577.34   | 24.7  | 561.64   | 13.0  | 573.34   | 23.0   | 563.34   
   |
|                    |                            |  |   |  |  |   
   
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|                    |                            |  |   |  |  |   
   
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  |  |   |  |   |  |  |  
   |
|                    | Southeast                  | 537838.4   | 1731735.7   | 587.1  | 588.72   | 39.0  
   
   | 8/31/1995  | Slotted PVC  
   | 2   
  | 24.0   
  | 563.10   | 39.0  | 548.10   | 28.0  | 559.10   | 38.0   | 549.10   
   |
|                    | Southeast                  | 538186.6   | 1731490.3   | 586.5  | 589.48   | 42.0  
   
   | 5/10/2016  | Slotted PVC  
   | 2   
  | 24.0   
  | 562.49   | 42.0  | 544.49   | 28.4  | 588.09   | 38.0   | 548.49   
   |
|                    | South                      | 537031.1   | 1730894.1   | 598.0  | 600.66   | 59.5  
   
   | 5/25/2016  | Slotted PVC  
   | 2   
  | 43.4   
  | 554.56   | 59.5  | 538.46   | 47.9  | 550.06   | 58.0   | 539.96   
   |
|                    | West                       | 538963.7   | 1729314.5   | 584.1  | 586.81   | 45.0  
   
   | 5/24/2016  | Slotted PVC  
   | 2   
  | 34.0   
  | 550.06   | 45.0  | 539.06   | 38.0  | 546.06   | 43.0   | 541.06   
   |
|                    |                            |  |   |  |  |   
   
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  |  |   |  |   |  |  |  
   |
|                    | Northeast                  | 540566.9   | 1731165.6   | 582.1  | 584.33   | 56.0  
   
   | 9/6/1995   | Slotted PVC  
   | 2   
  | 19.9   
  | 562.21   | 35.0  | 547.11   | 24.0  | 558.11   | 34.0   | 548.11   
   |
|                    | Northeast                  |  | 1731129.0   |  |  |   
   
   | 9/8/1995   | Slotted PVC  
   | 2   
  | 19.9   
  |  |   | 550.70   | 24.0  | 561.70   | 34.0   | 551.70   
   |
|                    |                            |  |   |  |  |   
   
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  |  |   |  |   |  |  | 531.03   
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|                    |                            |  |   |  |  |   
   
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  |  |   |  |   |  |  | 542.01   
   |
|                    |                            |  |   |  |  |   
   
   |  | -  
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  |  
  |  |   |  |   |  | -  | 541.85   
   |
|                    | East                       |  |   |  |  |   
   
   |  | -  
   | 2   
  | -  
  |  |   |  |   |  | -  | 541.79   
   |
|                    |                            |  |   |  |  |   
   
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|                    |                            |  |   |  |  |   
   
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  |  |   |  |   |  |  |  
   |
|                    | Southeast                  | 536989.9   | 1734094.7   | 586.4  | 588.47   | 59.0  
   
   | 8/28/1995  | Slotted PVC  
   | 2   
  | 43.0   
  | 543.40   | 58.9  | 527.50   | 47.5  | 538.90   | 57.5   | 528.90   
   |
|                    |                            |  |   |  |  | 00.0  
   
   | 2,20,1000  |  
   | _   
  |  
  | 0.01.0   | 00.0  | 0200   |   |  | 00   | 020.00   
   |
| x                  | Fast                       | 539200 1   | 1732739 6   | 586.3  | 588 97   | 58.0  
   
   | 8/23/1995  | Slotted PVC  
   | 2   
  | 42 7   
  | 543 64   | 57.9  | 528 44   | 46.9  | 539 44   | 56.9   | 529.44   
   |
|                    | Monitoring<br>Only<br>X    | Monitoring<br>OnlyDescription to<br>CCR UnitxWest<br>SouthxSoutheastxEastxSoutheastSoutheastSoutheast<br>SouthSouthWestNortheast<br>Northeast<br>Northeast<br>Northeast<br>EastImage: South of the sector of | Monitoring<br>OnlyDescription to<br>CCR UnitNorthing axWest539170.0xSouth536151.9Southeast536983.3xEast539188.3xSoutheast537838.4Southeast538186.6South537031.1West538963.7Northeast539605.5Northeast539605.5Northeast539459.6Northeast539459.6Northeast539197.0Southeast539197.0 | Monitoring<br>Only         Description to<br>CCR Unit         Northing a         Easting a           x         West<br>South         539170.0<br>536151.9         1729695.5<br>1732199.2           x         South         536983.3         1734099.7           x         East         539188.3         1732745.0           x         Southeast         537838.4         1731735.7           Southeast         538186.6         1731490.3           South         537031.1         1730894.1           West         539605.5         1731129.0           Northeast         539605.5         1731129.0           Northeast         539614.2         1731120.8           Northeast         539459.6         1729931.7           Northeast         539197.0         1731401.7           East         539197.0         1731401.7 | Monitoring<br>Only         Description to<br>CCR Unit         Northing <sup>a</sup> Easting <sup>a</sup> Surface<br>Elevation <sup>a</sup> x         West<br>South         539170.0<br>536151.9         1729695.5<br>1732199.2         586.5<br>586.3           x         Southeast         536983.3         1734099.7         586.3           x         East         539188.3         1732745.0         586.3           x         Southeast         537838.4         1731735.7         587.1           Southeast         538186.6         1731490.3         586.5           Southeast         538063.7         1729314.5         584.1           West         539605.5         1731129.0         585.7           Northeast         539605.5         1731129.0         585.7           Northeast         539605.5         1731120.8         585.0           Northeast         539459.6         172931.7         586.0           Northeast         539197.0         1731559.3         580.3           Northeast         539197.0         1731559.3         580.3           Southeast         539197.0         1731401.7         583.4           South         Southeast         539197.0         1731401.7           Southeast         539197 | Monitoring<br>Only         Description to<br>CCR Unit         Northing <sup>a</sup> Easting <sup>a</sup> Surface<br>Elevation <sup>a</sup> Casing<br>Elevation <sup>a</sup> x         West<br>South         539170.0         1729695.5         586.5         589.42           x         South         536151.9         1732199.2         584.8         587.57           x         Southeast         539188.3         1734099.7         586.8         588.54           x         East         539188.3         1732745.0         586.5         589.42           x         East         539188.3         1732745.0         586.5         589.10           x         East         537031.1         1730894.1         598.0         600.66           South         537031.1         1730894.1         598.0         600.66           West         539605.5         1731165.6         582.1         584.33           Northeast         539605.5         1731120.0         585.7         587.96           Northeast         539197.0         1731120.8         585.0         587.10           Northeast         539197.0         1731120.8         585.0         587.10           Northeast         539197.0         1731559.3         580.8 <t< td=""><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing a         Easting a         Surface<br/>Elevation a         Casing<br/>Elevation a         Depth<br/>ft bls           x         West<br/>South         539170.0<br/>536151.9         1729695.5<br/>1732199.2         586.5<br/>586.5         589.42         43.0<br/>587.57         24.0           x         Southeast         536983.3         1734099.7         586.8         588.54         32.0           x         East         539188.3         1732745.0         586.3         589.10         57.9           x         East         539188.3         1732745.0         586.1         589.42         43.0           x         East         539188.3         1732745.0         586.3         589.10         57.9           x         East         537838.4         1731735.7         587.1         588.72         39.0           Southeast         538186.6         1731490.3         586.5         589.48         42.0           Southeast         538963.7         1729314.5         584.1         586.81         45.0           West         539615.5         1731120.0         585.7         587.96         35.0           Northeast         540566.9         1731120.8         586.0         587.10</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing <sup>a</sup>         Easting <sup>a</sup>         Surface<br/>Elevation <sup>a</sup>         Casing<br/>Elevation <sup>a</sup>         Depth<br/>ft bls         Date<br/>Installed           x         West<br/>South         539170.0<br/>536151.9         1729695.5<br/>1732199.2         586.8         589.42         43.0         8/30/1995           x         South         536151.9         1732199.2         586.8         587.57         24.0         9/13/1995           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995           x         East         538186.6         1731490.3         586.5         589.48         42.0         5/10/2016           Southeast         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995           Southeast         538963.7         1729314.5         586.1         45.0         5/25/2016           Northeast         540566.9         1731165.6         582.1         584.33         56.0         9/6/1995           Northeast         539459.6         172931.7         586.0         <td< td=""><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing <sup>a</sup>         Easting <sup>a</sup>         Surface<br/>Elevation <sup>a</sup>         Casing<br/>Elevation <sup>a</sup>         Depth<br/>ft bis         Date<br/>Installed         Screen<br/>Material           x         West<br/>South         539170.0         1729695.5         586.5         589.42         43.0         8/30/1995         Slotted PVC           x         South         536151.9         1732199.2         584.8         587.57         24.0         9/13/1995         Slotted PVC           x         East         539188.3         1732099.7         586.8         588.54         32.0         8/29/1995         Slotted PVC           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC           Southeast         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC           South         537031.1         1730894.1         598.0         600.66         59.5         5/25/2016         Slotted PVC           South         538963.7         1729314.5         584.1         586.51         589.48         42.0         5/10/2016         Slotted PVC           Northeast         539605.5         <td< td=""><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>a</sup>         Easting<sup>a</sup>         Surface<br/>Elevation<sup>a</sup>         Casing<br/>Elevation<sup>a</sup>         Depth<br/>ft bls         Date<br/>Installed         Screen<br/>Material         Diameter<br/>inches           x         West<br/>South         539170.0         1729695.5         586.5         589.42         43.0         8/30/1995         Slotted PVC         2           x         Southeast         536983.3         1734099.7         586.8         588.54         32.0         8/29/1995         Slotted PVC         2           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2           x         East         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2           Southeast         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2           Southeast         537838.4         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2           Northeast         54056.9         1731149.5         584.1         586.81         45.0         &lt;</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing *         Easting *         Surface<br/>Elevation *         Casing<br/>Elevation *         Depth<br/>ft bls         Date<br/>Installed         Screen<br/>Material         Diameter<br/>inches         Top of<br/>Depth<br/>Table           x         West<br/>South         539170.0<br/>538151.9         1729695.5<br/>1732199.2         586.5<br/>586.5         589.42<br/>587.57         43.0<br/>24.0         8/30/1995<br/>9/13/1995         Slotted PVC         2         27.0<br/>6.0           x         Southeast         536983.3         1734099.7         586.8         588.4         32.0         8/29/1995         Slotted PVC         2         9.0           x         East         539188.3         1732745.0         586.5         588.72         39.0         8/31/1995         Slotted PVC         2         24.0           x         East         539188.3         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         24.0           x         East         538186.6         1731490.3         588.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0           Southeast         538963.7         1729314.5         584.1         586.81         45.0         5/24/2016         Slotted</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>1</sup>         Easting<sup>1</sup>         Surface<br/>Elevation<sup>2</sup>         Casing<br/>Elevation<sup>2</sup>         Depth<br/>Itsli         Date<br/>Installed         Screen<br/>Installed         Diameter<br/>Material         Top of Filter Pack<br/>Depth<br/>Itsli           x         West<br/>South         539170.0<br/>536151.9         1729695.5<br/>1732199.2         586.5         589.42         43.0         8/30/1995         Slotted PVC         2         2.0         559.54           x         South         536983.3         1734099.7         586.8         588.54         32.0         8/29/1995         Slotted PVC         2         6.0         578.82           x         East         539188.3         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         9.0         577.34           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         9.0         577.34           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0         563.10           x         East         537031.1         1731490.3</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>3</sup>         Easting<sup>3</sup>         Surface<br/>Elevation<sup>3</sup>         Casing<br/>Elevation<sup>3</sup>         Depth<br/>ft bis         Date<br/>Installed         Screen<br/>Material         Diameter<br/>Material         Top of Filter Pack<br/>Elevation         Botton<br/>ft bis           x         South         539170.0         1729695.5         586.5         589.42         43.0         8/30/1995         Slotted PVC         2         2.7.0         559.54         42.7           x         South         536151.9         1732199.2         586.8         589.54         22.0         8/29/1995         Slotted PVC         2         6.0         578.82         21.9           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2         9.0         577.34         24.7           x         East         539188.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         2.4.0         563.10         39.0           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0         562.10         35.0&lt;</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing*         Easting*         Surface<br/>Elevation*         Casing<br/>Elevation*         Depth<br/>ft bls         Date<br/>Installed<br/>ft bls         Screen<br/>Material         Diameter<br/>inches         Top of Filter Pack<br/>bit         Botton<br/>ft bls         Dog of Filter Pack<br/>ft amsi         Botton<br/>ft amsi           x         Southeast         539170.0<br/>536151.9         172999.5         588.5         589.42         43.0         8/30/1995         Slotted PVC         2         27.0         559.54         42.7         543.84           x         Southeast         539180.3         1732199.2         586.8         589.77         24.0         9/13/1995         Slotted PVC         2         17.0         569.80         20.0         5578.82         21.9         562.92           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2         9.0         577.34         24.7         561.64           x         East         539186.6         1731490.3         586.5         589.42         20.0         5/10/2016         Slotted PVC         2         24.0         563.10         39.0         548.10           x         East         539186.6         &lt;</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>3</sup>         Easting<sup>3</sup>         Surface<br/>Elevation<sup>3</sup>         Depth<br/>Elevation<sup>3</sup>         Depth<br/>Itslalled         Date<br/>Installed         Screen<br/>Matorial         Diameter<br/>Inches         Top of Filter Pack<br/>Depth         Bottom of Filter Pack<br/>Tamel         Depth<br/>Tamel         Easting 3           x         Southeast         53913         1732499.7         588.8         589.5         584.4         32.0         8/30/1995         Slotted PVC         2         40.0         564.80         30</td><td>Monitoring<br/>Only         Description to<br/>CR Unit         Northing<sup>3</sup>         Easting<sup>3</sup>         Surface<br/>Elevation<sup>3</sup>         Casing<br/>Elevation<sup>3</sup>         Depth<br/>ft bls         Depth<br/>Installed         Screen<br/>Material         Diameter<br/>Material         Top of Filer Pack         Bottom of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom fFiler Pack         Bottom fFiler Pack</td><td>Monitoring<br/>Only         Description to<br/>CR Unit         Northing*         Easting*         Surface<br/>Elevation*         Casing<br/>Elevation*         Depth<br/>tis         Screen<br/>Installed         Diameter<br/>Material         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom<br/>tis         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom<br/>tis         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom of Filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter</td></td<></td></td<></td></t<> | Monitoring<br>Only         Description to<br>CCR Unit         Northing a         Easting a         Surface<br>Elevation a         Casing<br>Elevation a         Depth<br>ft bls           x         West<br>South         539170.0<br>536151.9         1729695.5<br>1732199.2         586.5<br>586.5         589.42         43.0<br>587.57         24.0           x         Southeast         536983.3         1734099.7         586.8         588.54         32.0           x         East         539188.3         1732745.0         586.3         589.10         57.9           x         East         539188.3         1732745.0         586.1         589.42         43.0           x         East         539188.3         1732745.0         586.3         589.10         57.9           x         East         537838.4         1731735.7         587.1         588.72         39.0           Southeast         538186.6         1731490.3         586.5         589.48         42.0           Southeast         538963.7         1729314.5         584.1         586.81         45.0           West         539615.5         1731120.0         585.7         587.96         35.0           Northeast         540566.9         1731120.8         586.0         587.10 | Monitoring<br>Only         Description to<br>CCR Unit         Northing <sup>a</sup> Easting <sup>a</sup> Surface<br>Elevation <sup>a</sup> Casing<br>Elevation <sup>a</sup> Depth<br>ft bls         Date<br>Installed           x         West<br>South         539170.0<br>536151.9         1729695.5<br>1732199.2         586.8         589.42         43.0         8/30/1995           x         South         536151.9         1732199.2         586.8         587.57         24.0         9/13/1995           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995           x         East         538186.6         1731490.3         586.5         589.48         42.0         5/10/2016           Southeast         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995           Southeast         538963.7         1729314.5         586.1         45.0         5/25/2016           Northeast         540566.9         1731165.6         582.1         584.33         56.0         9/6/1995           Northeast         539459.6         172931.7         586.0 <td< td=""><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing <sup>a</sup>         Easting <sup>a</sup>         Surface<br/>Elevation <sup>a</sup>         Casing<br/>Elevation <sup>a</sup>         Depth<br/>ft bis         Date<br/>Installed         Screen<br/>Material           x         West<br/>South         539170.0         1729695.5         586.5         589.42         43.0         8/30/1995         Slotted PVC           x         South         536151.9         1732199.2         584.8         587.57         24.0         9/13/1995         Slotted PVC           x         East         539188.3         1732099.7         586.8         588.54         32.0         8/29/1995         Slotted PVC           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC           Southeast         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC           South         537031.1         1730894.1         598.0         600.66         59.5         5/25/2016         Slotted PVC           South         538963.7         1729314.5         584.1         586.51         589.48         42.0         5/10/2016         Slotted PVC           Northeast         539605.5         <td< td=""><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>a</sup>         Easting<sup>a</sup>         Surface<br/>Elevation<sup>a</sup>         Casing<br/>Elevation<sup>a</sup>         Depth<br/>ft bls         Date<br/>Installed         Screen<br/>Material         Diameter<br/>inches           x         West<br/>South         539170.0         1729695.5         586.5         589.42         43.0         8/30/1995         Slotted PVC         2           x         Southeast         536983.3         1734099.7         586.8         588.54         32.0         8/29/1995         Slotted PVC         2           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2           x         East         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2           Southeast         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2           Southeast         537838.4         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2           Northeast         54056.9         1731149.5         584.1         586.81         45.0         &lt;</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing *         Easting *         Surface<br/>Elevation *         Casing<br/>Elevation *         Depth<br/>ft bls         Date<br/>Installed         Screen<br/>Material         Diameter<br/>inches         Top of<br/>Depth<br/>Table           x         West<br/>South         539170.0<br/>538151.9         1729695.5<br/>1732199.2         586.5<br/>586.5         589.42<br/>587.57         43.0<br/>24.0         8/30/1995<br/>9/13/1995         Slotted PVC         2         27.0<br/>6.0           x         Southeast         536983.3         1734099.7         586.8         588.4         32.0         8/29/1995         Slotted PVC         2         9.0           x         East         539188.3         1732745.0         586.5         588.72         39.0         8/31/1995         Slotted PVC         2         24.0           x         East         539188.3         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         24.0           x         East         538186.6         1731490.3         588.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0           Southeast         538963.7         1729314.5         584.1         586.81         45.0         5/24/2016         Slotted</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>1</sup>         Easting<sup>1</sup>         Surface<br/>Elevation<sup>2</sup>         Casing<br/>Elevation<sup>2</sup>         Depth<br/>Itsli         Date<br/>Installed         Screen<br/>Installed         Diameter<br/>Material         Top of Filter Pack<br/>Depth<br/>Itsli           x         West<br/>South         539170.0<br/>536151.9         1729695.5<br/>1732199.2         586.5         589.42         43.0         8/30/1995         Slotted PVC         2         2.0         559.54           x         South         536983.3         1734099.7         586.8         588.54         32.0         8/29/1995         Slotted PVC         2         6.0         578.82           x         East         539188.3         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         9.0         577.34           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         9.0         577.34           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0         563.10           x         East         537031.1         1731490.3</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>3</sup>         Easting<sup>3</sup>         Surface<br/>Elevation<sup>3</sup>         Casing<br/>Elevation<sup>3</sup>         Depth<br/>ft bis         Date<br/>Installed         Screen<br/>Material         Diameter<br/>Material         Top of Filter Pack<br/>Elevation         Botton<br/>ft bis           x         South         539170.0         1729695.5         586.5         589.42         43.0         8/30/1995         Slotted PVC         2         2.7.0         559.54         42.7           x         South         536151.9         1732199.2         586.8         589.54         22.0         8/29/1995         Slotted PVC         2         6.0         578.82         21.9           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2         9.0         577.34         24.7           x         East         539188.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         2.4.0         563.10         39.0           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0         562.10         35.0&lt;</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing*         Easting*         Surface<br/>Elevation*         Casing<br/>Elevation*         Depth<br/>ft bls         Date<br/>Installed<br/>ft bls         Screen<br/>Material         Diameter<br/>inches         Top of Filter Pack<br/>bit         Botton<br/>ft bls         Dog of Filter Pack<br/>ft amsi         Botton<br/>ft amsi           x         Southeast         539170.0<br/>536151.9         172999.5         588.5         589.42         43.0         8/30/1995         Slotted PVC         2         27.0         559.54         42.7         543.84           x         Southeast         539180.3         1732199.2         586.8         589.77         24.0         9/13/1995         Slotted PVC         2         17.0         569.80         20.0         5578.82         21.9         562.92           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2         9.0         577.34         24.7         561.64           x         East         539186.6         1731490.3         586.5         589.42         20.0         5/10/2016         Slotted PVC         2         24.0         563.10         39.0         548.10           x         East         539186.6         &lt;</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>3</sup>         Easting<sup>3</sup>         Surface<br/>Elevation<sup>3</sup>         Depth<br/>Elevation<sup>3</sup>         Depth<br/>Itslalled         Date<br/>Installed         Screen<br/>Matorial         Diameter<br/>Inches         Top of Filter Pack<br/>Depth         Bottom of Filter Pack<br/>Tamel         Depth<br/>Tamel         Easting 3           x         Southeast         53913         1732499.7         588.8         589.5         584.4         32.0         8/30/1995         Slotted PVC         2         40.0         564.80         30</td><td>Monitoring<br/>Only         Description to<br/>CR Unit         Northing<sup>3</sup>         Easting<sup>3</sup>         Surface<br/>Elevation<sup>3</sup>         Casing<br/>Elevation<sup>3</sup>         Depth<br/>ft bls         Depth<br/>Installed         Screen<br/>Material         Diameter<br/>Material         Top of Filer Pack         Bottom of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom fFiler Pack         Bottom fFiler Pack</td><td>Monitoring<br/>Only         Description to<br/>CR Unit         Northing*         Easting*         Surface<br/>Elevation*         Casing<br/>Elevation*         Depth<br/>tis         Screen<br/>Installed         Diameter<br/>Material         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom<br/>tis         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom<br/>tis         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom of Filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter</td></td<></td></td<> | Monitoring<br>Only         Description to<br>CCR Unit         Northing <sup>a</sup> Easting <sup>a</sup> Surface<br>Elevation <sup>a</sup> Casing<br>Elevation <sup>a</sup> Depth<br>ft bis         Date<br>Installed         Screen<br>Material           x         West<br>South         539170.0         1729695.5         586.5         589.42         43.0         8/30/1995         Slotted PVC           x         South         536151.9         1732199.2         584.8         587.57         24.0         9/13/1995         Slotted PVC           x         East         539188.3         1732099.7         586.8         588.54         32.0         8/29/1995         Slotted PVC           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC           Southeast         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC           South         537031.1         1730894.1         598.0         600.66         59.5         5/25/2016         Slotted PVC           South         538963.7         1729314.5         584.1         586.51         589.48         42.0         5/10/2016         Slotted PVC           Northeast         539605.5 <td< td=""><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>a</sup>         Easting<sup>a</sup>         Surface<br/>Elevation<sup>a</sup>         Casing<br/>Elevation<sup>a</sup>         Depth<br/>ft bls         Date<br/>Installed         Screen<br/>Material         Diameter<br/>inches           x         West<br/>South         539170.0         1729695.5         586.5         589.42         43.0         8/30/1995         Slotted PVC         2           x         Southeast         536983.3         1734099.7         586.8         588.54         32.0         8/29/1995         Slotted PVC         2           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2           x         East         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2           Southeast         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2           Southeast         537838.4         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2           Northeast         54056.9         1731149.5         584.1         586.81         45.0         &lt;</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing *         Easting *         Surface<br/>Elevation *         Casing<br/>Elevation *         Depth<br/>ft bls         Date<br/>Installed         Screen<br/>Material         Diameter<br/>inches         Top of<br/>Depth<br/>Table           x         West<br/>South         539170.0<br/>538151.9         1729695.5<br/>1732199.2         586.5<br/>586.5         589.42<br/>587.57         43.0<br/>24.0         8/30/1995<br/>9/13/1995         Slotted PVC         2         27.0<br/>6.0           x         Southeast         536983.3         1734099.7         586.8         588.4         32.0         8/29/1995         Slotted PVC         2         9.0           x         East         539188.3         1732745.0         586.5         588.72         39.0         8/31/1995         Slotted PVC         2         24.0           x         East         539188.3         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         24.0           x         East         538186.6         1731490.3         588.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0           Southeast         538963.7         1729314.5         584.1         586.81         45.0         5/24/2016         Slotted</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>1</sup>         Easting<sup>1</sup>         Surface<br/>Elevation<sup>2</sup>         Casing<br/>Elevation<sup>2</sup>         Depth<br/>Itsli         Date<br/>Installed         Screen<br/>Installed         Diameter<br/>Material         Top of Filter Pack<br/>Depth<br/>Itsli           x         West<br/>South         539170.0<br/>536151.9         1729695.5<br/>1732199.2         586.5         589.42         43.0         8/30/1995         Slotted PVC         2         2.0         559.54           x         South         536983.3         1734099.7         586.8         588.54         32.0         8/29/1995         Slotted PVC         2         6.0         578.82           x         East         539188.3         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         9.0         577.34           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         9.0         577.34           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0         563.10           x         East         537031.1         1731490.3</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>3</sup>         Easting<sup>3</sup>         Surface<br/>Elevation<sup>3</sup>         Casing<br/>Elevation<sup>3</sup>         Depth<br/>ft bis         Date<br/>Installed         Screen<br/>Material         Diameter<br/>Material         Top of Filter Pack<br/>Elevation         Botton<br/>ft bis           x         South         539170.0         1729695.5         586.5         589.42         43.0         8/30/1995         Slotted PVC         2         2.7.0         559.54         42.7           x         South         536151.9         1732199.2         586.8         589.54         22.0         8/29/1995         Slotted PVC         2         6.0         578.82         21.9           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2         9.0         577.34         24.7           x         East         539188.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         2.4.0         563.10         39.0           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0         562.10         35.0&lt;</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing*         Easting*         Surface<br/>Elevation*         Casing<br/>Elevation*         Depth<br/>ft bls         Date<br/>Installed<br/>ft bls         Screen<br/>Material         Diameter<br/>inches         Top of Filter Pack<br/>bit         Botton<br/>ft bls         Dog of Filter Pack<br/>ft amsi         Botton<br/>ft amsi           x         Southeast         539170.0<br/>536151.9         172999.5         588.5         589.42         43.0         8/30/1995         Slotted PVC         2         27.0         559.54         42.7         543.84           x         Southeast         539180.3         1732199.2         586.8         589.77         24.0         9/13/1995         Slotted PVC         2         17.0         569.80         20.0         5578.82         21.9         562.92           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2         9.0         577.34         24.7         561.64           x         East         539186.6         1731490.3         586.5         589.42         20.0         5/10/2016         Slotted PVC         2         24.0         563.10         39.0         548.10           x         East         539186.6         &lt;</td><td>Monitoring<br/>Only         Description to<br/>CCR Unit         Northing<sup>3</sup>         Easting<sup>3</sup>         Surface<br/>Elevation<sup>3</sup>         Depth<br/>Elevation<sup>3</sup>         Depth<br/>Itslalled         Date<br/>Installed         Screen<br/>Matorial         Diameter<br/>Inches         Top of Filter Pack<br/>Depth         Bottom of Filter Pack<br/>Tamel         Depth<br/>Tamel         Easting 3           x         Southeast         53913         1732499.7         588.8         589.5         584.4         32.0         8/30/1995         Slotted PVC         2         40.0         564.80         30</td><td>Monitoring<br/>Only         Description to<br/>CR Unit         Northing<sup>3</sup>         Easting<sup>3</sup>         Surface<br/>Elevation<sup>3</sup>         Casing<br/>Elevation<sup>3</sup>         Depth<br/>ft bls         Depth<br/>Installed         Screen<br/>Material         Diameter<br/>Material         Top of Filer Pack         Bottom of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom fFiler Pack         Bottom fFiler Pack</td><td>Monitoring<br/>Only         Description to<br/>CR Unit         Northing*         Easting*         Surface<br/>Elevation*         Casing<br/>Elevation*         Depth<br/>tis         Screen<br/>Installed         Diameter<br/>Material         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom<br/>tis         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom<br/>tis         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom of Filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter</td></td<> | Monitoring<br>Only         Description to<br>CCR Unit         Northing <sup>a</sup> Easting <sup>a</sup> Surface<br>Elevation <sup>a</sup> Casing<br>Elevation <sup>a</sup> Depth<br>ft bls         Date<br>Installed         Screen<br>Material         Diameter<br>inches           x         West<br>South         539170.0         1729695.5         586.5         589.42         43.0         8/30/1995         Slotted PVC         2           x         Southeast         536983.3         1734099.7         586.8         588.54         32.0         8/29/1995         Slotted PVC         2           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2           x         East         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2           Southeast         537838.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2           Southeast         537838.4         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2           Northeast         54056.9         1731149.5         584.1         586.81         45.0         < | Monitoring<br>Only         Description to<br>CCR Unit         Northing *         Easting *         Surface<br>Elevation *         Casing<br>Elevation *         Depth<br>ft bls         Date<br>Installed         Screen<br>Material         Diameter<br>inches         Top of<br>Depth<br>Table           x         West<br>South         539170.0<br>538151.9         1729695.5<br>1732199.2         586.5<br>586.5         589.42<br>587.57         43.0<br>24.0         8/30/1995<br>9/13/1995         Slotted PVC         2         27.0<br>6.0           x         Southeast         536983.3         1734099.7         586.8         588.4         32.0         8/29/1995         Slotted PVC         2         9.0           x         East         539188.3         1732745.0         586.5         588.72         39.0         8/31/1995         Slotted PVC         2         24.0           x         East         539188.3         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         24.0           x         East         538186.6         1731490.3         588.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0           Southeast         538963.7         1729314.5         584.1         586.81         45.0         5/24/2016         Slotted | Monitoring<br>Only         Description to<br>CCR Unit         Northing <sup>1</sup> Easting <sup>1</sup> Surface<br>Elevation <sup>2</sup> Casing<br>Elevation <sup>2</sup> Depth<br>Itsli         Date<br>Installed         Screen<br>Installed         Diameter<br>Material         Top of Filter Pack<br>Depth<br>Itsli           x         West<br>South         539170.0<br>536151.9         1729695.5<br>1732199.2         586.5         589.42         43.0         8/30/1995         Slotted PVC         2         2.0         559.54           x         South         536983.3         1734099.7         586.8         588.54         32.0         8/29/1995         Slotted PVC         2         6.0         578.82           x         East         539188.3         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         9.0         577.34           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         9.0         577.34           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0         563.10           x         East         537031.1         1731490.3 | Monitoring<br>Only         Description to<br>CCR Unit         Northing <sup>3</sup> Easting <sup>3</sup> Surface<br>Elevation <sup>3</sup> Casing<br>Elevation <sup>3</sup> Depth<br>ft bis         Date<br>Installed         Screen<br>Material         Diameter<br>Material         Top of Filter Pack<br>Elevation         Botton<br>ft bis           x         South         539170.0         1729695.5         586.5         589.42         43.0         8/30/1995         Slotted PVC         2         2.7.0         559.54         42.7           x         South         536151.9         1732199.2         586.8         589.54         22.0         8/29/1995         Slotted PVC         2         6.0         578.82         21.9           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2         9.0         577.34         24.7           x         East         539188.4         1731735.7         587.1         588.72         39.0         8/31/1995         Slotted PVC         2         2.4.0         563.10         39.0           x         East         539188.6         1731490.3         586.5         589.48         42.0         5/10/2016         Slotted PVC         2         24.0         562.10         35.0< | Monitoring<br>Only         Description to<br>CCR Unit         Northing*         Easting*         Surface<br>Elevation*         Casing<br>Elevation*         Depth<br>ft bls         Date<br>Installed<br>ft bls         Screen<br>Material         Diameter<br>inches         Top of Filter Pack<br>bit         Botton<br>ft bls         Dog of Filter Pack<br>ft amsi         Botton<br>ft amsi           x         Southeast         539170.0<br>536151.9         172999.5         588.5         589.42         43.0         8/30/1995         Slotted PVC         2         27.0         559.54         42.7         543.84           x         Southeast         539180.3         1732199.2         586.8         589.77         24.0         9/13/1995         Slotted PVC         2         17.0         569.80         20.0         5578.82         21.9         562.92           x         East         539188.3         1732745.0         586.3         589.10         57.9         8/24/1995         Slotted PVC         2         9.0         577.34         24.7         561.64           x         East         539186.6         1731490.3         586.5         589.42         20.0         5/10/2016         Slotted PVC         2         24.0         563.10         39.0         548.10           x         East         539186.6         < | Monitoring<br>Only         Description to<br>CCR Unit         Northing <sup>3</sup> Easting <sup>3</sup> Surface<br>Elevation <sup>3</sup> Depth<br>Elevation <sup>3</sup> Depth<br>Itslalled         Date<br>Installed         Screen<br>Matorial         Diameter<br>Inches         Top of Filter Pack<br>Depth         Bottom of Filter Pack<br>Tamel         Depth<br>Tamel         Easting 3           x         Southeast         53913         1732499.7         588.8         589.5         584.4         32.0         8/30/1995         Slotted PVC         2         40.0         564.80         30 | Monitoring<br>Only         Description to<br>CR Unit         Northing <sup>3</sup> Easting <sup>3</sup> Surface<br>Elevation <sup>3</sup> Casing<br>Elevation <sup>3</sup> Depth<br>ft bls         Depth<br>Installed         Screen<br>Material         Diameter<br>Material         Top of Filer Pack         Bottom of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom of Filer Pack         Top of Filer Pack         Bottom fFiler Pack         Bottom fFiler Pack | Monitoring<br>Only         Description to<br>CR Unit         Northing*         Easting*         Surface<br>Elevation*         Casing<br>Elevation*         Depth<br>tis         Screen<br>Installed         Diameter<br>Material         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom<br>tis         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom<br>tis         Dop of Filter Pack         Bottom of Filter Pack         Top of Screen         Bottom of Filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter Pack         Bottom of Filter Pack         Dop tis         Elevation         Depth filter Pack         Bottom of Filter |

Notes:

Shaded - well abandoned or not verified

Elevation in feet above mean sea level

a. Monitoring well coordinates and elevations were surveyed by AEP in June 2016 (1983 West Virginia State Planar Coordinates, NAVD 88).

b. Well Construction Source: EPRI. April 1999. Groundwater Quality at the John E. Amos Power Plant, Putnam County, West Virginia, Appendix B.

amsl - above mean sea level

bls - below land surface

ft - feet



Table 3 Grain Size Analysis Summary AEP Amos Generating Plant - Ash Pond System Winfield, West Virginia



		(	Grain Size	e Analysi	s			
Sample ID	Depth feet	% Gravel	% Sand	% Silt	% Clay	USCS Classification	Moisture Content %	
MW-1601	27-39	0.6	87.8	5.3	6.3	(SP-SM) POORLY-GRADED SAND with SILT	23.0	
MW-1602A	48-58	2.6	80.8	5.5	11.1	(SM) SILTY SAND	21.9	
MW-1603A	38-43	10.0	60.3	16.7	13.0	(SM) SILTY SAND	20.3	
MW-1604	33-43.5	0.8	80.0	7.9	11.4	(SM) SILTY SAND	23.8	
MW-1605	25.5-42	0.2	83.6	4.7	11.4	(SM) SILTY SAND	25.5	
MW-1606	29-39	0.4	90.4	4.3	4.8	(SP-SM) POORLY-GRADED SAND with SILT	23.4	

Note:

USCS - Unified Soil Classification System

#### Table 4 Hydraulic Testing Results Summary AEP Amos Generating Plant - Ash Pond System Winfield, West Virginia



Well ID	Screen Interval ft bgs	Aquifer Thickness <sup>a</sup> ft	Screened Interval USCS Classification	Slug Test Type	Hydraulic Conductivity ft/day	Hydraulic Conductivity cm/sec	Slug Test Solution
MW-1602A	47.9-58.0	19	(SM) SILTY SAND	Pneumatic - Rising head	12.5	4.4E-03	Hyder et al., 1994
MW-1603A	38.0-43.0	5	(SM) SILTY SAND	Pneumatic - Rising head	8.8	3.1E-03	Hyder et al., 1994
MW-1604	33.9-44.0	27	(SM) SILTY SAND	Bail Down - Rising head	2.7	9.6E-04	Hyder et al., 1994
MW-1605	26.3-41.5	31	(SM) SILTY SAND	Pneumatic - Rising head	0.7	2.6E-04	Hyder et al., 1994
MW-1606	24.3-39.0	40	(SP-SM) POORLY-GRADED SAND with SILT	Pneumatic - Rising head	9.4	3.3E-03	Hyder et al., 1994
			Slug 1	Fest Overall Mean	6.8	2.4E-03	
			Slug Test Overal	I Geometric Mean	4.6	1.6E-03	
			SI	ug Test Minimum	0.7	2.6E-04	
			SI	ug Test Maximum	12.5	4.4E-03	

#### Notes:

a. Estimate made from boring logs

bgs - below ground surface

cm/sec - centimeters per second

ft - feet

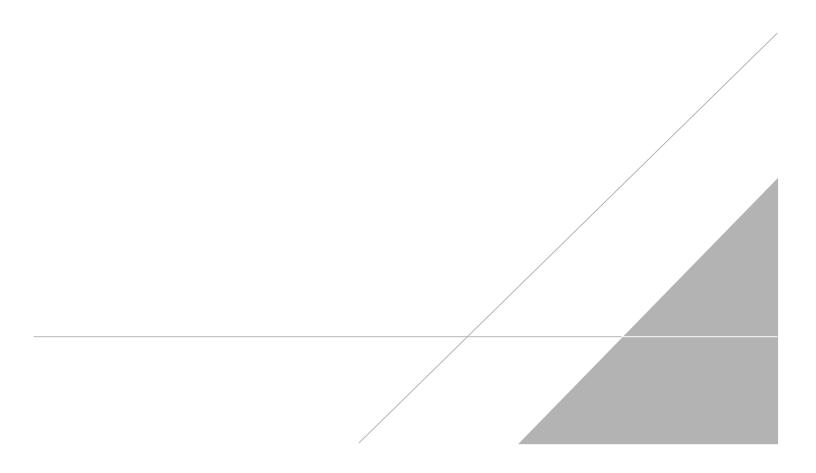
USCS - Unified Soil Classification System

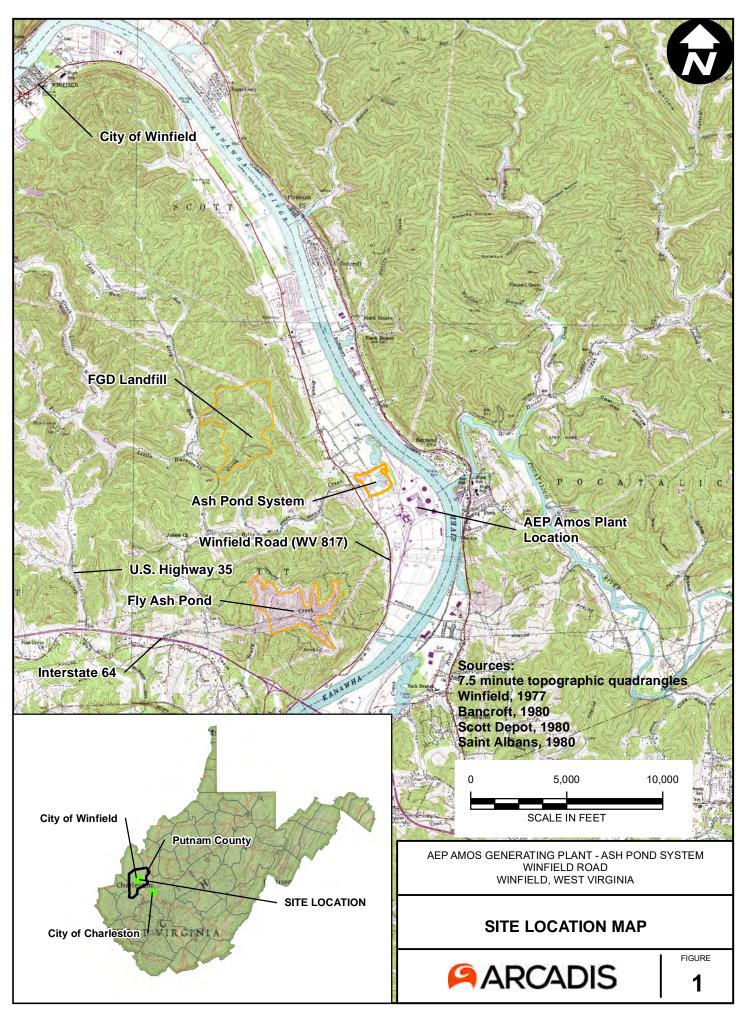
#### References:

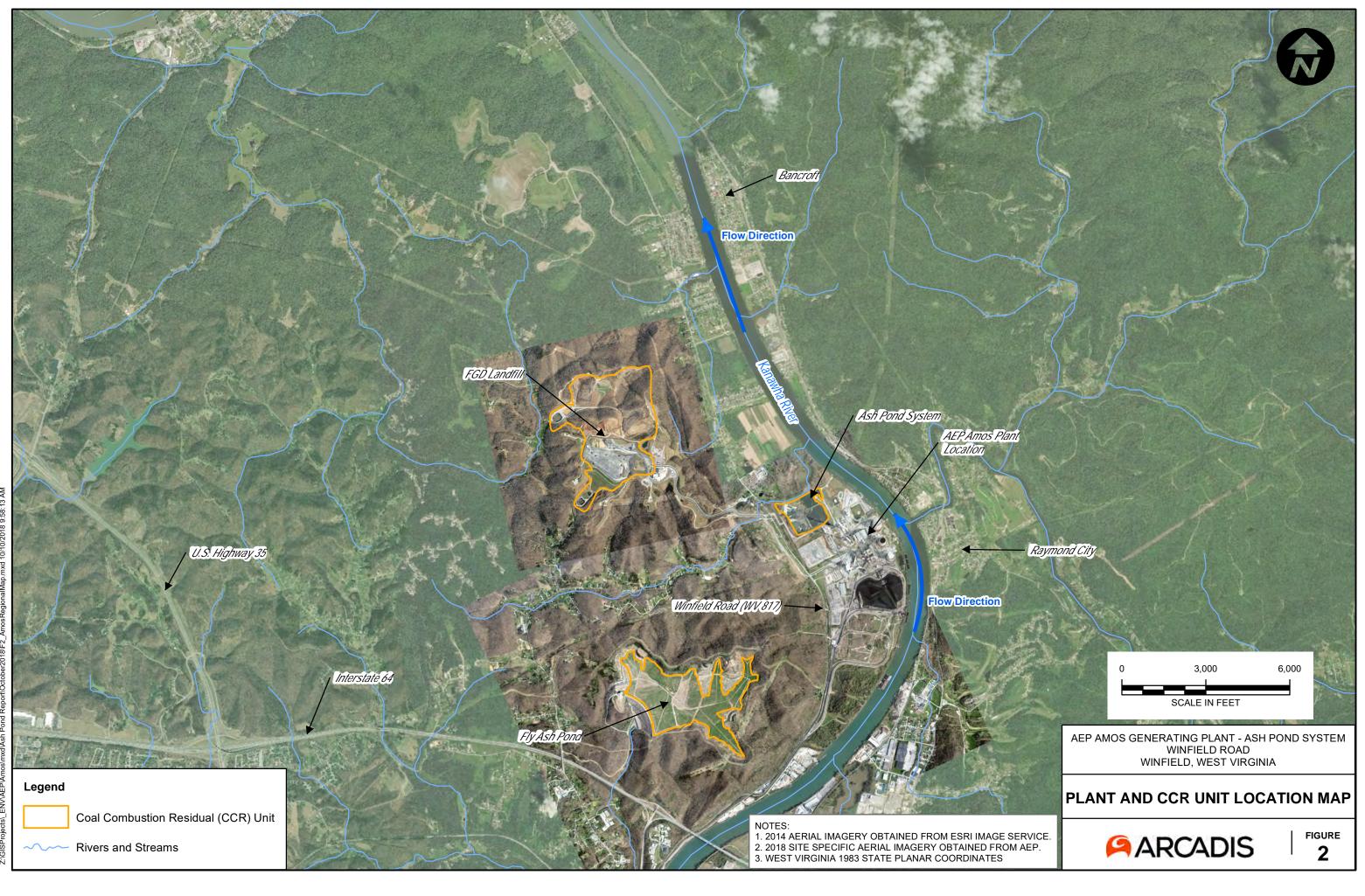
Butler Jr, J.J., 1998. The design, performance, and analysis of slug tests. CRC Press.

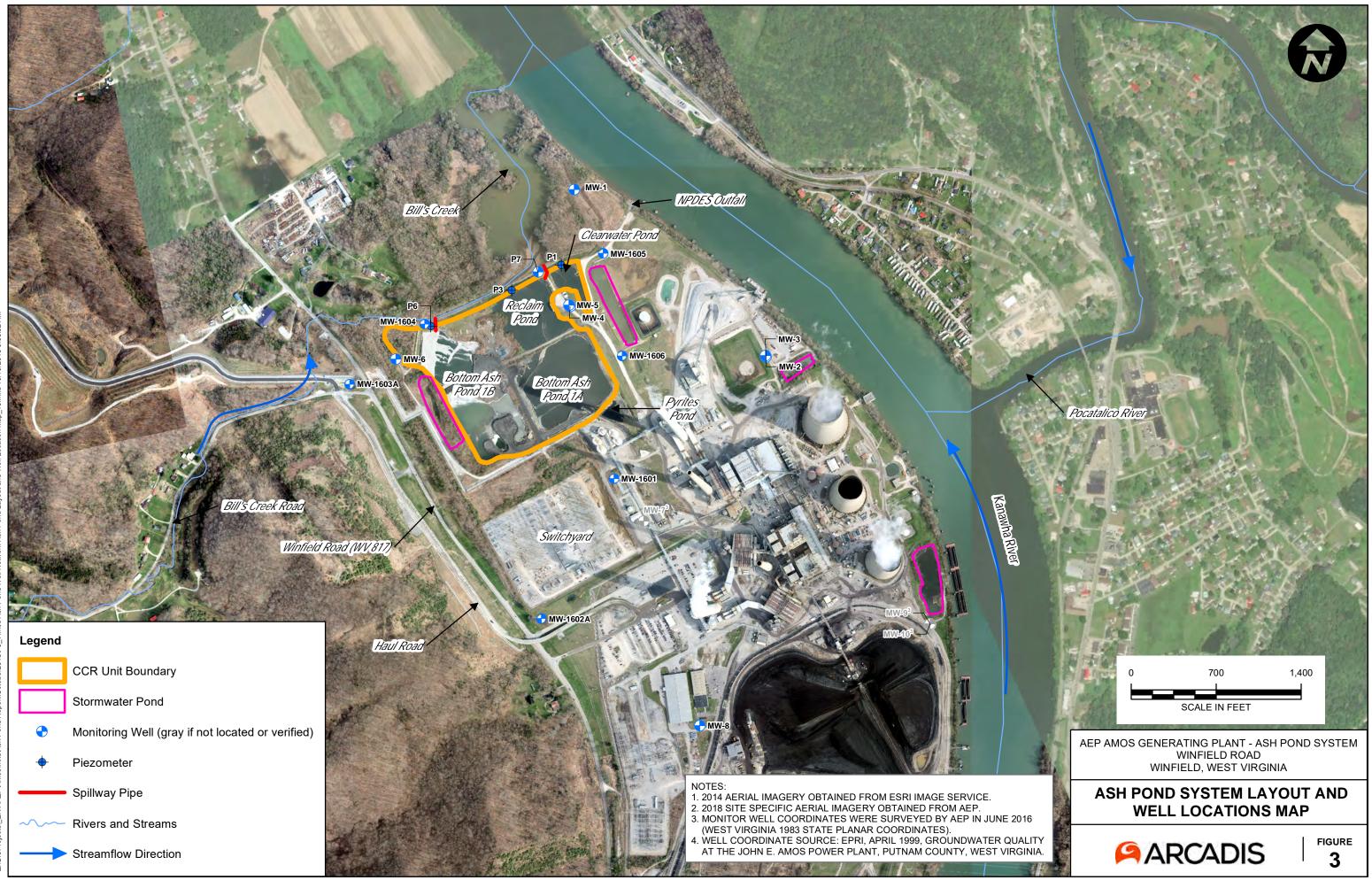
Hyder, Z, J.J. Butler, Jr., C.D. McElwee and W. Liu, 1994. Slug tests in partially penetrating wells, Water Resources Research, vol. 30, no. 11, pp. 2945-2957.

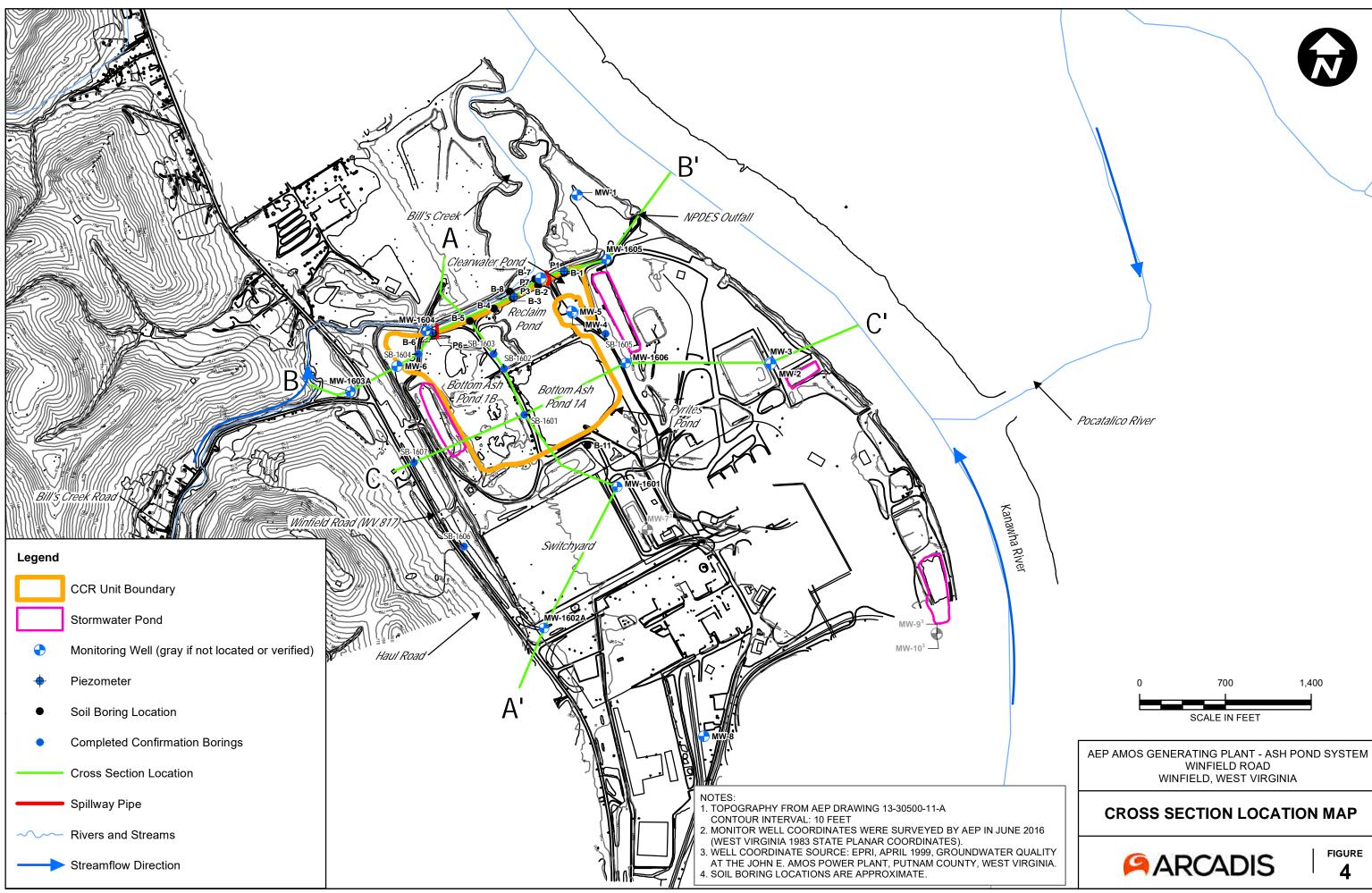
# **FIGURES**







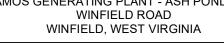


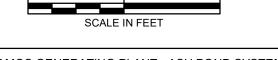


# ARCADIS

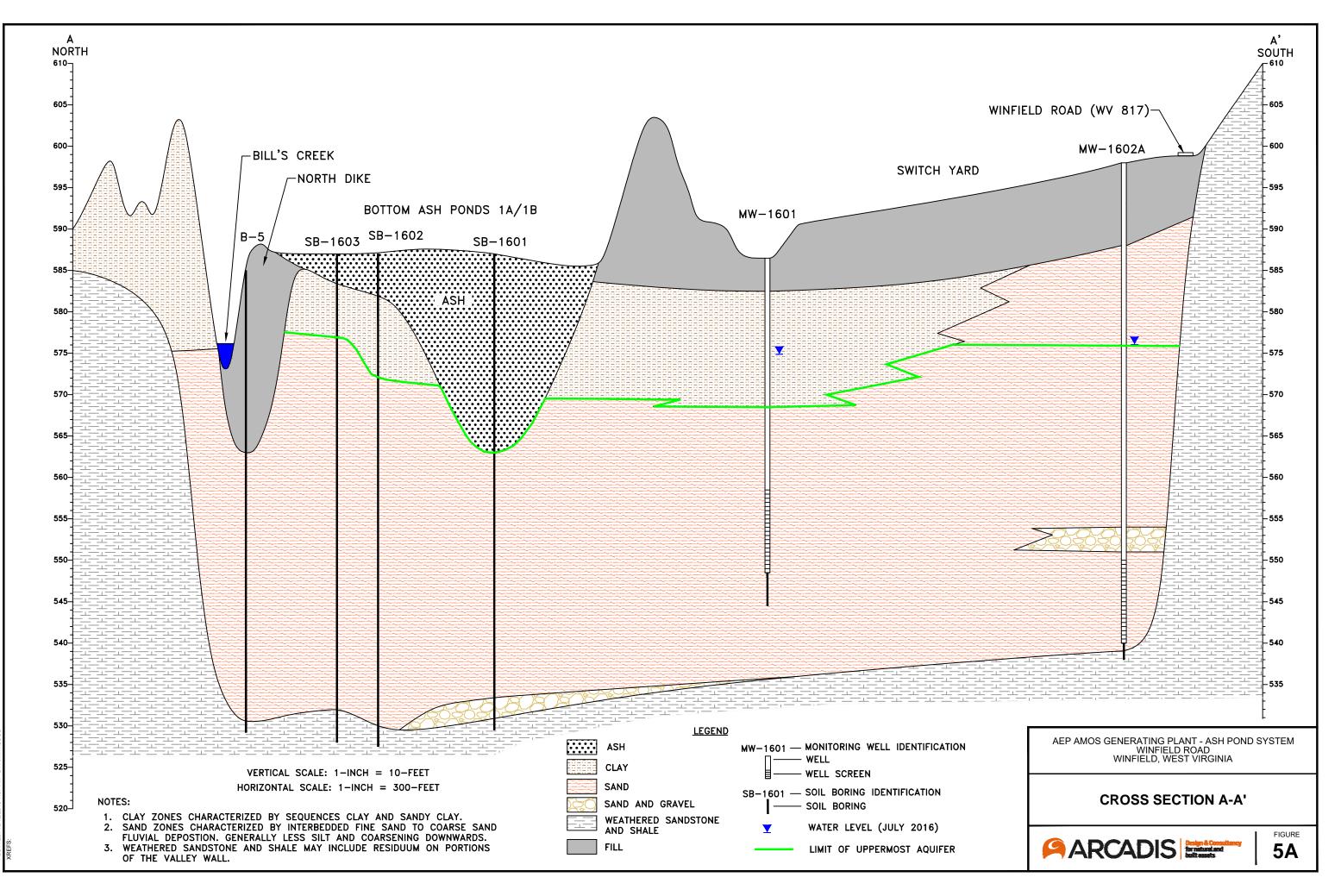
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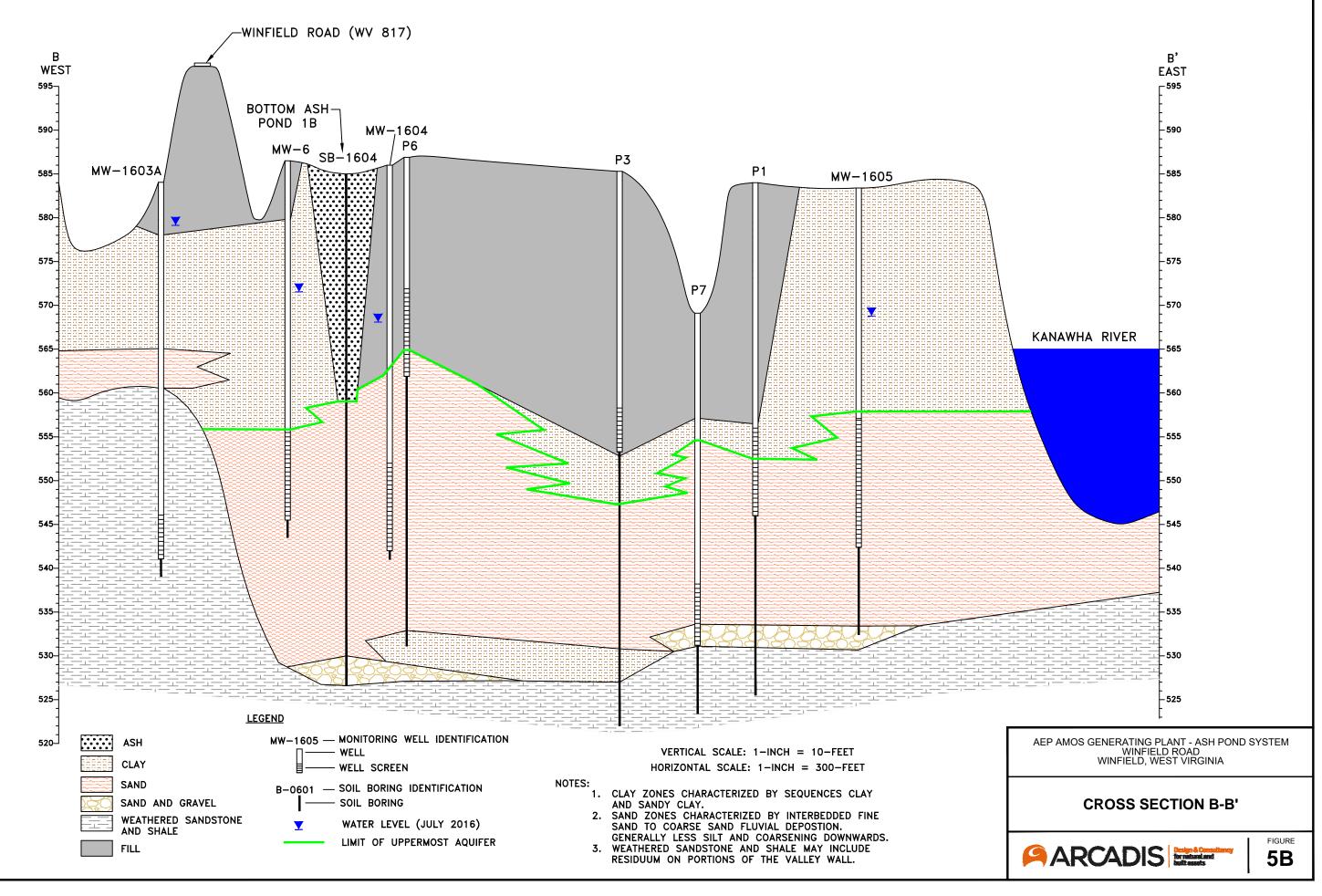
# **CROSS SECTION LOCATION MAP**

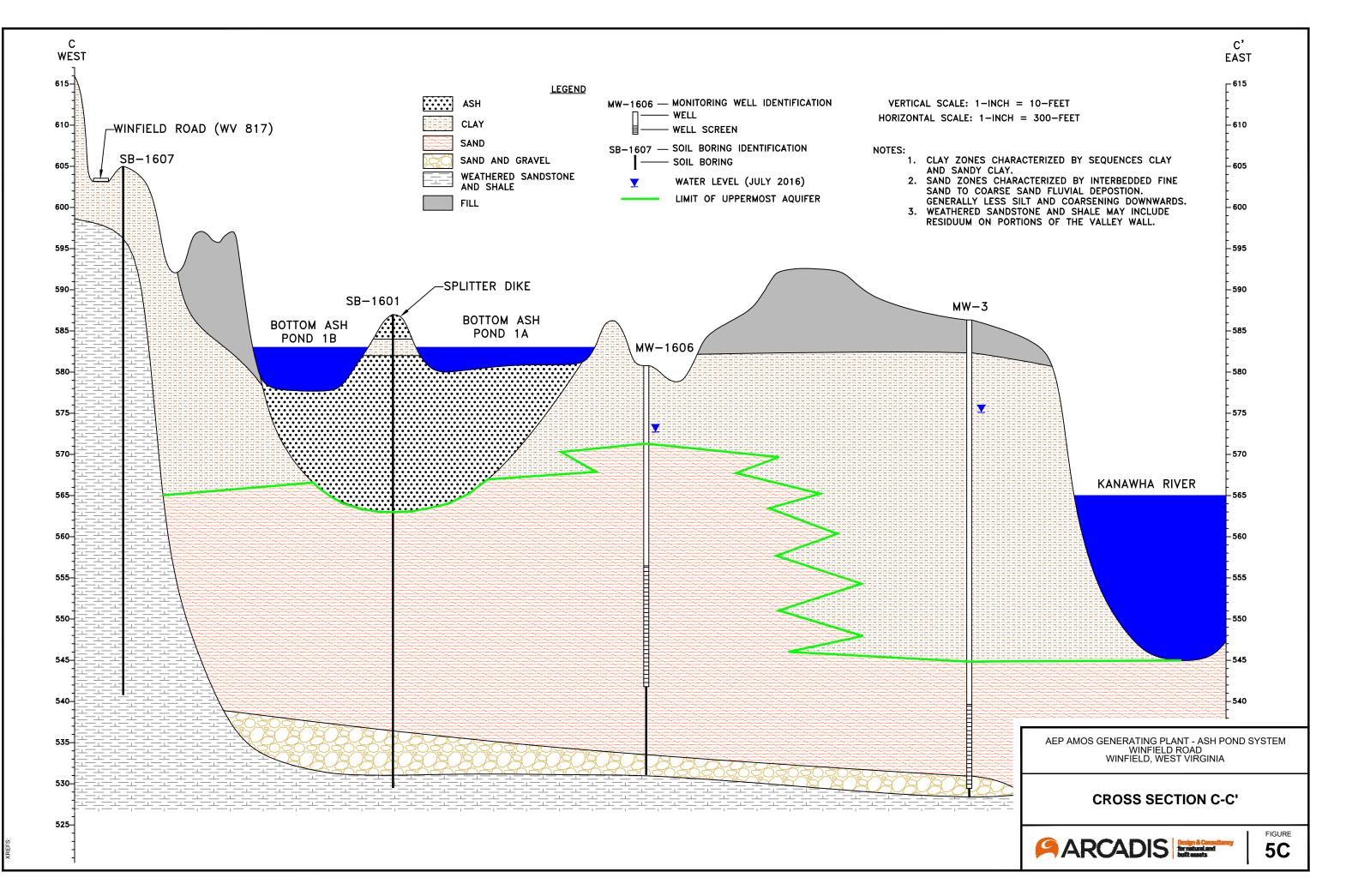


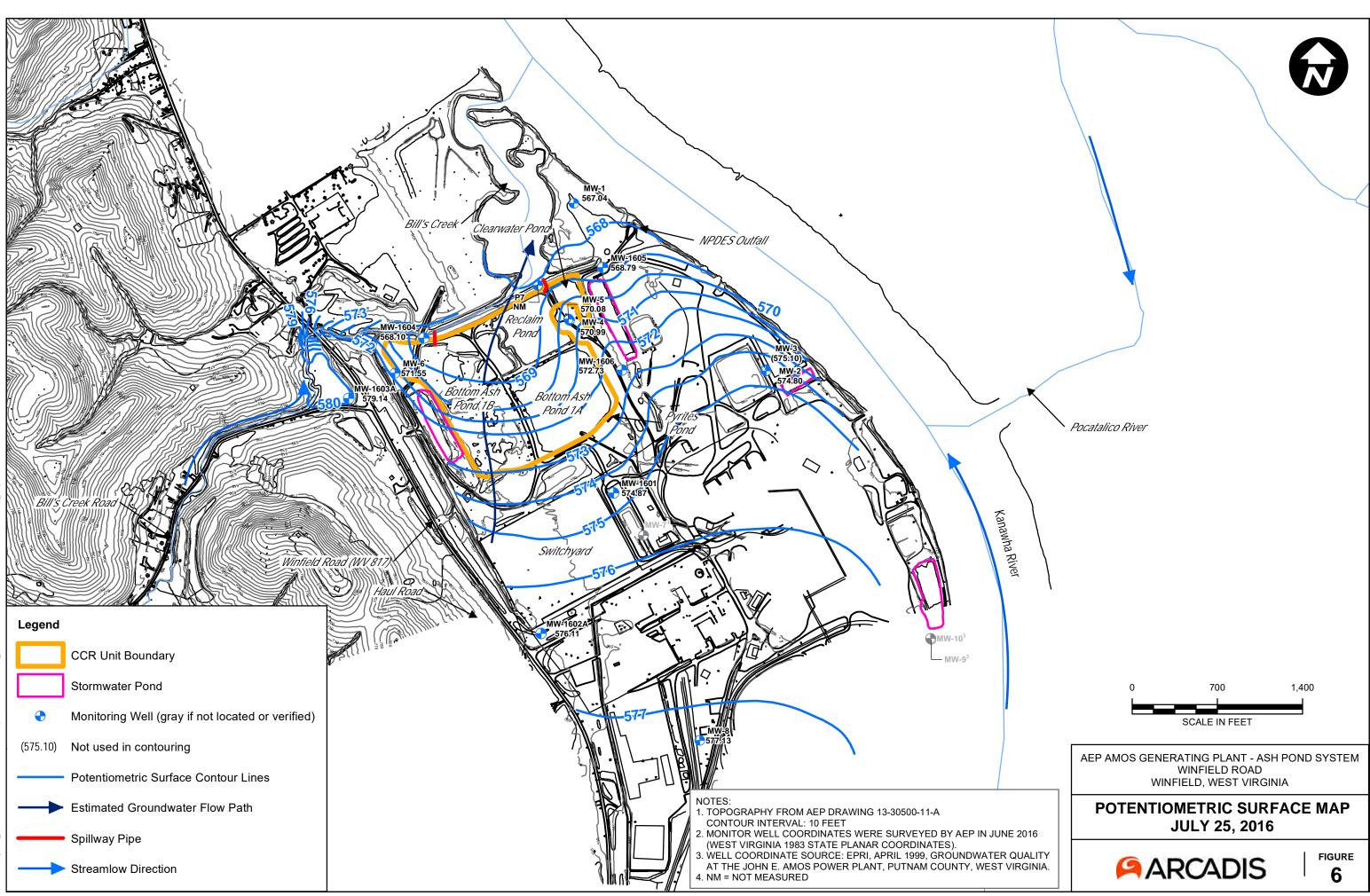


700

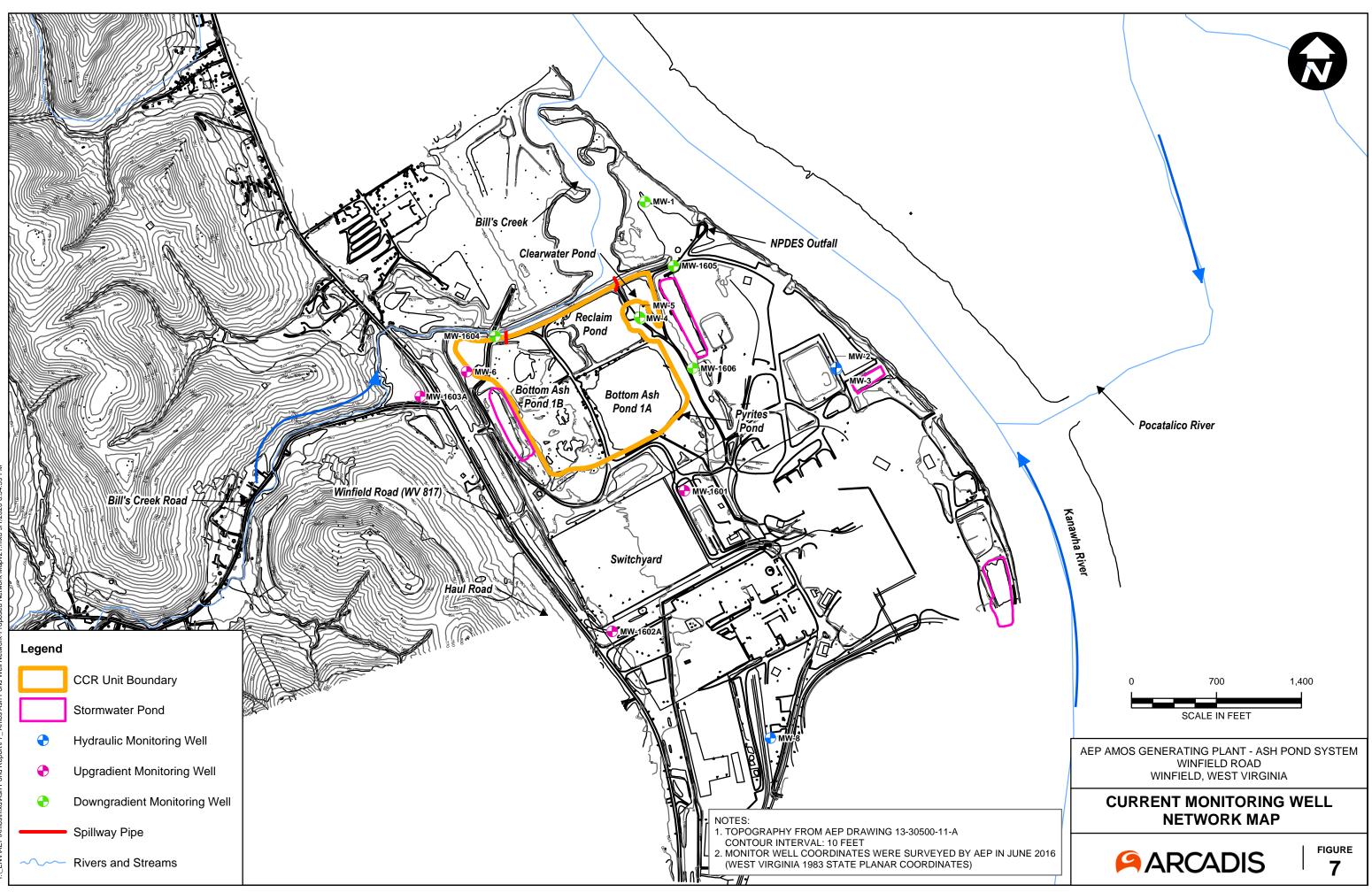






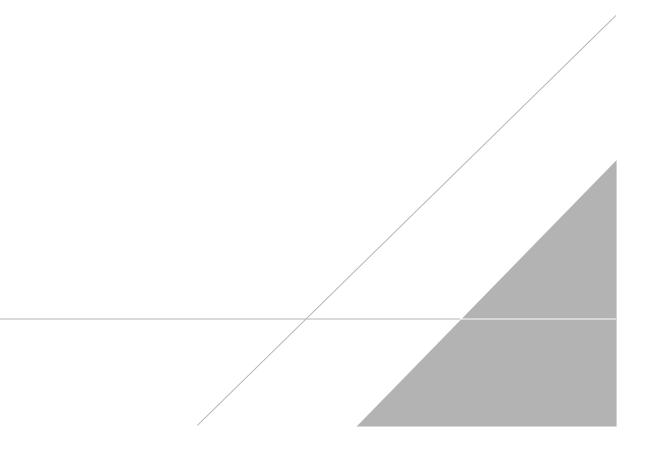






# **APPENDIX A**

**Boring/Well Construction Logs** 





AEP 1995

Soil Boring Logs

MW-01 to MW-10

JOB NUMBE	R	5423						LC	G	OF BORIN
COMPANY _	A	PPALA	CHIAN	POWI	ER CON	ЛРА	NY			BORING N
PROJECT	W.	VA. G	ROUNE	WAT	ER STU	IDY				BORING ST
COORDINAT	ES	<u>N 54</u>	0,266.8	E 1,	731,165	5.6				PIEZOMET
GROUND EL	EVA		581.5	S'	YSTEM _	ST/	ATE P		Ξ	HGT. RISEF
WATER LEVE	EL	춘		1 V		Y				DEPTH TO
ТІМЕ										WELL DEVE
DATE										FIELD PART
MPLE	DE	MPLE PTH FEET	PENET	DARD RATION			DEPTH IN	APH 0G	N U	

BORING NO. AMW-01 DATE 11/	17/95 SHEET 1 OF 2
BORING START 09/05/95 BOR	
PIEZOMETER TYPE	WELL TYPE OW
HGT. RISER ABOVE GROUND	
DEPTH TO TOP OF WELL SCREEN2	
WELL DEVELOPMENT YES	BACKFILLQUICK GROUT
FIELD PARTY	RIG CME-75

List         SAMPLE         STANDARD         Comparison         Solid         Solid         Solid         Comparison         Depth         Depth <th></th> <th></th> <th></th> <th></th> <th>······</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>0002 10</th>					······								0002 10
2         SS         2.0         4.0         7.6-9-8         1.5           3         55         4.0         7.6-9-8         1.5           4         55         4.0         6.0         4-56-8         2.0           4         55         6.0         8.0         4-56-8         2.0           5         58         8.0         10.0         4-57-9         1.9           5         58         10.0         4-57-7         1.8           5         58         8.0         10.0         4-57-79         1.9           7         58         12.0         14.0         4-57-77         1.8           3         55         16.0         18.0         1-2-23         2.0           10         55         16.0         18.0         1-2-23         2.0           10         55         18.0         20.0         1-1-1-2         1.5           11         55         22.0         24.0         1-1-1-2         2.0           12         55         22.0         24.0         1-1-1-2         2.0           13         55         22.0         24.0         1-1-1-2         2.0           14 <td>SAMPLE</td> <td>SAMPLE</td> <td>DI</td> <td>EPTH FEET</td> <td>PENETRATION RESISTANCE</td> <td>FOTAL ENGT COVE</td> <td></td> <td>IN</td> <td>RAP! LOG</td> <td>s C</td> <td></td> <td>мегг</td> <td></td>	SAMPLE	SAMPLE	DI	EPTH FEET	PENETRATION RESISTANCE	FOTAL ENGT COVE		IN	RAP! LOG	s C		мегг	
2       SS       2.0       4.0       7-6-9-8       1.5         3       SS       4.0       7-6-9-8       1.5         4       SS       6.0       4.5-8-7       1.9         4       SS       6.0       8.0       4-5-8-8       2.0         5       SS       8.0       10.0       4-5-8-8       2.0         5       SS       8.0       10.0       4-5-7-9       1.9         5       SS       10.0       4-5-7-9       1.9       10         7       SS       12.0       14.0       4-5-7-9       1.9         10       SS       16.0       12.0       10       10         7       SS       12.0       14.0       4-5-7-9       1.9         10       SS       16.0       12.0       10       10         11       SS       16.0       12.0       1.0       10         11       SS       16.0       12.2.3       2.0       10       10         12       SS       16.0       12.2.3       2.0       10       10       10         11       SS       20.0       12.1.1.2       2.0       10       10	1	SS	0.0	2.0		1.4					GRAVELLY SANDY CLAY MINTUR AT CLASH	11 12	
1       1	2	SS	2.0	4.0				-			fragments, hard, dry, no odor, angular-subangular, 10yr4\2, dark yellow brown, poorly sorted, second color 5yr3\2 grayish brown pebbles 4-6 mm areas, angular./		
10       SS       18.0       20.0       1-1-1-2       1.5       11.1       11.1       SS       20.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       11.1.1.2       2.0       13.1.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       10.1.1.1.2       2.0       2.1.1.1.1.2       2.0       2.1.1.1.1.2       2.0       10.1.1.1.2       2.0       2.1.1.1.1.2       2.0       2.1.1.1.1.2       2.0       2.1.1.1.1.2       2.0       2.1.1.1.1.2       2.0       2.1.1.1.1.2       2.0       2.1.1.1.1.2       2.0       2.1.1.1.1.2       2.0       2.1.1.1.1.2       2.0       2.1.1.1.1.2       2.0       2.1.1.1.1.2       2.1.1.1.1.2       2.0.1.1.1.1.2       2.0.	3	SS	4.0	6.0	4-5-8-7	1.9		-			5yr5\4 and 10yr 6\2, hard, dry, low plasticity,		
10       SS       18.0       20.0       1-1-1-2       1.5       11.1       11.1       SS       20.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       11.1.1.2       2.0       11.0 </td <td>4</td> <td>SS</td> <td>6.0</td> <td>8.0</td> <td>4-5-6-8</td> <td>2.0</td> <td></td> <td>5</td> <td></td> <td></td> <td>SILTY CLAY 10%, 90%, sand &lt;2%, 5yr5\6 and 10yr6\2, damp, very stiff. Some small inregular, black, horizontal lens,</td> <td></td> <td></td>	4	SS	6.0	8.0	4-5-6-8	2.0		5			SILTY CLAY 10%, 90%, sand <2%, 5yr5\6 and 10yr6\2, damp, very stiff. Some small inregular, black, horizontal lens,		
10       SS       18.0       20.0       1-1-1-2       1.5       11.1       11.1       SS       20.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       11.1.1.2       2.0       13.1.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.0 <td< td=""><td>5</td><td>SS</td><td>8.0</td><td>10.0</td><td>4-5-7-9</td><td>1.9</td><td></td><td></td><td></td><td></td><td>1<u>/41/2 x 1/2. damp</u>,</td><td></td><td></td></td<>	5	SS	8.0	10.0	4-5-7-9	1.9					1 <u>/41/2 x 1/2. damp</u> ,		
10       SS       18.0       20.0       1-1-1-2       1.5       11.1       11.1       SS       20.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       11.1.1.2       2.0       13.1.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.0 <td< td=""><td></td><td>ST</td><td>10.0</td><td>12.0</td><td></td><td>1</td><td></td><td>10 -</td><td>크</td><td></td><td><u>A few black lens, damp.</u></td><td></td><td></td></td<>		ST	10.0	12.0		1		10 -	크		<u>A few black lens, damp.</u>		
10       SS       18.0       20.0       1-1-1-2       1.5       11.1       11.1       SS       20.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       11.1.1.2       2.0       13.1.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.1.1.2       2.0       11.0 <td< td=""><td>7</td><td>SS</td><td>12.0</td><td>14.0</td><td>4-5-77</td><td>1.8</td><td></td><td></td><td></td><td></td><td>SANDY CLAY 30%, 70%, Moist, 5yr5\6, fine lining, v-fine, grains 1/16-1/8 mm, sand grains.</td><td></td><td></td></td<>	7	SS	12.0	14.0	4-5-77	1.8					SANDY CLAY 30%, 70%, Moist, 5yr5\6, fine lining, v-fine, grains 1/16-1/8 mm, sand grains.		
10       SS       18.0       20.0       1-1-1-2       1.5       11.1       11.1       SS       20.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       12.1.3       2.0       11.1.1.2       2.0       11.0 </td <td>8</td> <td>SS</td> <td>14.0</td> <td>16.0</td> <td>3-3-2-2</td> <td>1.5</td> <td></td> <td>Ŧ</td> <td></td> <td>SC</td> <td></td> <td></td> <td></td>	8	SS	14.0	16.0	3-3-2-2	1.5		Ŧ		SC			
11       SS       20.0       22.0       1-2-1.3       20       20						2.0		15 -		SC	1/16-1/4 mm, sand grains, well sorted, poorly graded, 10yr5\2, yellowish brown, moist, loose, no odor, easy to auger, no HCL, no lens./ Wet SANDY CLAY 10%, 90%, Moist, 10yr5\4, v-soft,		
13       SS       24.0       26.0       1-1-5-6       1.8       25 -       SAND With little or no fines, medium 1/4-1/2 mm sub-angular sand grains, 5yr5(5-10yr5)6, light brown, well sorted, poorly graded, v-loose, no odor, no HCL, a clean sand, east to auger, wet to moist.       25 -       SAND With little or no fines, medium 1/4-1/2 mm sub-angular sand grains, 5yr5(5-10yr5)6, light brown, well sorted, poorly graded, v-loose, no odor, no HCL, a clean sand, east to auger, wet to moist.       26 -       24.0 Top of screen.         14       SS       28.0       6-6-7-8       1.0       25 -       SAND With little or no fines, medium 1/4-1/2 mm sub-angular sand grains, 5yr5(5-10yr5)6, light brown, well sorted, poorly graded, v-loose, no odor, no HCL, a clean sand, east to auger, wet to moist.       26 -       24.0 Top of screen.         15       SS       28.0       30.0       5-4-3-3       1.0       25 -       Sand well sorted, poorly graded, v-loose, no odor, no HCL, a clean sand, east to auger, wet to moist.       26 -       26 -       27 -       27 -       28 -       28 -       28 -       29 -       29 -       29 -       29 -       29 -       29 -       29 -       29 -       29 -       29 -       24.0 Top of screen.       29 -       24.0 Top of screen.       29 -       24.0 Top of screen.       29 -       29 -       29 -       29 -       28 -       29 -       29 -       29 -       29 -       29 -       29 -	11	SS	20.0	22.0	1-2-1-3	2.0		20 -				•	19.9 Top of sand.
14       SS       26.0       28.0       6-6-7-8       1.0       25 -       SAND With little or no fines, medium 1/4-1/2 mm sub-angular sand grains, 5yr5\6-10yr5\6, light brown, well sorted, poorly graded, v-loose, no odor, no HCL, a clean sand, east to auger, wet to moist. Moist Medium course 1/2-1.0 mm sand       10       25 -       SAND With little or no fines, medium 1/4-1/2 mm sub-angular sand grains, 5yr5\6-10yr5\6, light brown, well sorted, poorly graded, v-loose, no odor, no HCL, a clean sand, east to auger, wet to moist. Moist Medium course 1/2-1.0 mm sand       10	12	SS	22.0	24.0	1-1-1-2	2.0							
14       SS       26.0       28.0       6-6-7-8       1.0       25 –       SAND With little or no fines, medium 1/4-1/2 mm sub-angular sand grains, 5yr5\6-10yr5\6, light brown, well sorted, poorly graded, v-loose, no odor, no HCL, a clean sand, east to auger, wet to moist.         15       SS       28.0       30.0       5-4-3-3       1.0	13	ss	24.0	26.0	1-1-5-6	1.8		  .		SP	10yr5\4-10yr5\2		24.0 Top of screep
TYPE OF CASING USED       Continued Next Page         NQ-2 ROCK CORE       PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE         X       6" x 3.25 HSA         9" x 6.25 HSA       SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC         HW CASING ADVANCER 4"       WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON         NW CASING       3"								25 -	-	~			
TYPE OF CASING USED       Continued Next Page         NQ-2 ROCK CORE       PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE         X       6" x 3.25 HSA         9" x 6.25 HSA       SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC         HW CASING ADVANCER 4"       WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON         NW CASING       3"	13	33	20.0	30.0	5-4-3-3	1.0		4			Medium course 1/2-1.0 mm sand		
X       6" x 3.25 HSA         9" x 6.25 HSA         HW CASING ADVANCER 4"         NW CASING         3"		ť_	TYPE	OF CA	SING USED	i		l_	<u> </u>		•		
x       0       x3.25 HSA         9" x 6.25 HSA       SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC         HW CASING ADVANCER 4"       WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON         NW CASING       3"					ORE		F	PIEZOMET	TER T	YPE	PT = OPEN TUBE POROUS TIP SS -	Ope	
HW CASING ADVANCER 4"     WELL TYPE:     OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON       NW CASING     3"	<u>X</u>				······						REEN, $G = GEONOR, P = PNEUMATIC$	UPE	
NW CASING 3"					DVANCER	4"	-  v						
		1	<u>NW CA</u>	SING		3"				T			

JOB NUMBER 5423

## LOG OF BORING

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COMPANY <u>APPALACHIAN POWER COMPANY</u> PROJECT <u>W. VA. GROUND WATER STUDY</u>

 BORING NO.
 AMW-01
 DATE
 11/17/95
 SHEET
 2
 OF
 2

 BORING START
 09/05/95
 BORING FINISH
 09/06/95

SAMPLE NUMBER		DE IN FROM		BLOWS / 6"	RFC0	%	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	НЕГГ	DRILLER'S NOTES
16         17         18         19         20         21         22         23         24         25         26         27	SS SAMPLE SS SS SS SS SS SS SS SS SS SS SS	DE	EPTH FEET	PENETRATION RESISTANCE	TOTAL LENGT	%	IN FEET 	GRAPH	c s	IDENTIFICATION CLAYEY SAND 50%,50%, < 2% silt, fine-medium 1/8-1/2 mm, subangular to sub-rounded sand grains, 5yr5\6 and 10yr5\4, black smear n-1, no odor, easy to auger no HCL, moist, medium stiff. <u>SANDY CLAY</u> 30%, 70%, fine 1/8-1/4 mm, sub-angular sand, medium stiff to soft, well		-

NE

COMPANY A	PPALACHIAN	POWER CO	MPANY								
PROJECT W. VA. GROUND WATER STUDY											
COORDINATES N 539,188.1 E 1,732,744.9											
GROUND ELEVATION _ 585.1 SYSTEM _ STATE PLANE											
WATER LEVEL	<u> </u>	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Y								
TIME											
DATE 8-23-95											
			j								

JOB NUMBER \_5423

1

BORING NO. AMW-02 DATE 11/17/95 SHEET 1 OF 1
BORING START 08/23/95 BORING FINISH 08/24/95
PIEZOMETER TYPE WELL TYPE
HGT. RISER ABOVE GROUND <u>1.64</u> DIA <u>2.0</u>
DEPTH TO TOP OF WELL SCREEN 13.0 BOTTOM 23.0
WELL DEVELOPMENT YES BACKFILLQUICK GROUT
FIELD PARTY

<u> </u>	1						·				-	
SAMPLE	AMPLE	D IN	AMPLE EPTH FEET	STANDARD PENETRATION RESISTANCE	TAL NGTH DUERY		DEPTH IN	RAPH LOG	c v	SOIL / ROCK		DRILLER'S
SA	s Nu	FROM		BLOWS / 6"	LEN RECO		FEET	GR CR	s n	IDENTIFICATION	HELL	NOTES
1	SS		2.0	2-3-4-5	1.5			0.10.1	GC	CLAYEY GRAVEL 45% 55%, first six inches includes plant material fragments, 5yr2\1, dry, <5% fines, 5yr3\2-5yr3\4, sub-angular, poorly sorted, poorly graded, no odor, no reaction to HCL, easy to auger.		
2	SS	6.0	8.0	3-4-5-4	1.7		5 - - 10		CL	SANDY CLAY 20%, 80%, <5% fines, v-fine grain 1/16-1/8 mm, well sorted, poorly graded, 5YR4\2, 5YR4\4, sub-angular sand, moist, no odor, medium stiff, no reaction to HCL, wood fragments, easy to auger.		
3	ss	12.0	14.0	2-2-2-3	1.9		10			SANDY CLAY 40%, 60%, <2% silt, v-fine, sub-angular sub-rounded grains, well sorted, wet, soft, 5yr4\4-5yr4\6, no odor, grain size 1/16-1/8 mm, easy to auger.		13.0 Top of screen.
4	ss	18.0	20.0	1-1-1-3	1.8							
5	SS	22.0	24.0	1-2-2-2	2.0					Syr5\5. medium to stiff. soft. no odor. wet. CLAYEY SAND 40%, 60%, wet SANDY CLAY 45%, 55%, wet, v-fine sand 1/16-1/8 mm, well sorted, poorly graded, 5yr5\5-5yr6\5. no odor, no reaction to HCL,		23.0 Bottom of screen. 24.7 Bottom sand.
		ТҮРЕ	OF CA	SING USED								
V			OCK C	ORE		P	IEZOMET	TER TY	PE:	PT = OPEN TUBE POROUS TIP, SS =		
Х	<u>9" x 6.25 HSA</u> <u>9" x 6.25 HSA</u> <u>SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC</u>											
1		<u>1W CA</u>	SING A	DVANCER 4	4"	- v	VELL TYP			= OPEN TUBE SLOTTED SCREEN, GM	- 65	
	<u> </u>	JW CA	SING	3	3"				T		= GE	
	S	SW CAS	SING	E	5"					RECORDER DG		

JOB NUMBER 5423

NW CASING

SW CASING

3"

6"

## COMPANY APPALACHIAN POWER COMPANY BORING NO. AMW-03 DATE 11/17/95 SHEET 1 OF 2 PROJECT W. VA. GROUND WATER STUDY BORING START 08/22/95 BORING FINISH 08/23/95

17	V	4	
	1	1	<u>_</u>
1			

CC	OR		N 53	9,199.9	EI	720 7.	0 4			-	50 MING FINISH 08/23/95
<u> </u>			T			YSIEM		TATE F	LAN	E	HGT. RISER ABOVE GROUND DIA
		LEVEL	<u> </u>	4.5	Ā		Ţ				DEPTH TO TOP OF WELL SCREEN BOTTOM
TIN	1E										WELL DEVELOPMENT YES BACKFILLQUICK GROUT
DA	TE		8-2	3-95							FIELD PARTY TJH=REB RIGCME-75
	1			1							
SAMPLE	AMPLE	SA	MPLE EPTH	PENETI			RQD	DEPTH	+   <sub>±</sub>	0	
MP	E E	IN	FEET		TANCE	1-22		IN	GRAPH LOG	U	SOIL / ROCK - DRILLER'S IDENTIFICATION - NOTES
SP	S S	FROM				Г <u>- </u> Ш	%	FEET	GR GR	s l	
1	SS		2.0	BLOW		2					
		0.0	2.0	10-13-	10-20	1.6			1.1	GC	CLAYEY GRAVEL 30%, 60%, silt 10%, poorly graded, v-course angular gravels and pebbles,
									0.	}	2-4 mm, 5yr2\1 mm, dry, no reaction to HCL,
2	SS	2.0	4.0	7-8-1	0-13	1.5			7.1		last 1.5 very hard, first 4" plant debris.
3	SS	4.0	6.0	5-6-	8-9	1.5			1	CL	Less gravel
		1	1					5 -	+		SANDY CLAY 20%, 80%, little of no silt, v-fine sand 1/16-1/8 mm well sorted, poorly graded,
4	ss								<u>[</u> ]		5YR3\ 4-5YR2 \4, no odor, dry, hard, easy to
4	33	6.0	8.0	4-6-9	-10	1.8					auger.
											Sand 30%-clay70%_5yr3\4
5	SS	8.0	10.0	4-4-{	5-8	1.6			1		SANDY CLAY 40%-60%, <2% silt, v-fine-fine
									<u>t</u>		sub-rounded grains, 1/16-1/8 mm, well sorted.
6	SS	10.0	12.0	2-4-6	3-8	1.7		10 -			5yr4\4-5yr4\6, no odor, dry, no reaction to
				2					曰		HCL, medium stiff to soft.
									E		Moist
7	SS	12.0	14.0	2-2-3	-4	1.8			1		
								-	1		Sand 35% moist medium stiff.
8	SS	14.0	16.0	1-1-1	-2	1.7		-	1		
				·····				15 -	[]		sand 45% clay 55%, wet, medium stiff-soft
9	SS	16.0	18.0		_			-			Sand Starlay Star Mel Ineculum Sun-Son
5	55	10.0	16.0	1-1-1	-2	1.5		-			
											5/14\4-5/14\6_wet_soft
10	SS	18.0	20.0	1-1-2	-2	2.0		-			Statistic testeric
											Wet
11	SS	20.0	22.0	1-1-1	-1	1.9		20 —			.5yr4\6_medium_stiff_soft.
										SCI	<u>\5715\</u> 5
	~							_			CLAYEY SAND 40%, 60%, v-fine sand, no odor.
12	SS	22.0	24.0	1-1-1	-1	2.0					CLAYEY SAND 40%, 60%, v-fine sand, no odor./ SANDY CLAY 40%, 60%, Wet. SANDY CLAY 40%, 60%, v-fine grain, 1/16-1/8 mm, sub-angular, well sorted, poorly graded,
								7			SANDY CLAY 40%, 60%, v-fine grain, 1/16-1/8
13	SS	24.0	26.0	1-0-1-	0	2.0		1			mm, sub-angular, well sorted, poorly graded, 5yr5\5, medium stiff-soft, no odor, no reaction
		İ						25 -			to HCL, moist to wet, very easy to auger.
14	ss	26.0	28.0	1-1-1-	.1	2.0		1	-		Clay 65% sand 35% wet.
			2010	1 1 1	•	2.0		4		sci	CLAYEY SAND v-fine grain 1/16-1/8 mm, wet,
								-		CL	odor. <u>SANDY CLAY</u> 55%, 45%, no odor, 5yr5\6, wet, medium stiff-soft, well sorted.
15	SS	28.0	30.0	1-1-1-	1	1.9		ļ		sci	SANDY CLAY 55%, 45%, no odor, 5yr5\6, wet,
	2       SS       22.0       24.0       1-1-1-1       2.0         3       SS       24.0       26.0       1-0-1-0       2.0         4       SS       26.0       28.0       1-1-1-1       2.0         5       SS       26.0       28.0       1-1-1-1       2.0         5       SS       26.0       28.0       1-1-1-1       2.0         5       SS       28.0       30.0       1-1-1-1       1.9         5       SS       28.0       30.0       1-1-1-1       1.9										
					350						Continued Next Page
X				ORE			L F	IEZOME			
^			5 HSA 5 HSA				_	SLO	TTEC	) SC	REEN, G = GEONOR, P = PNEUMATIC
				DVANC	ER	4"	$\dashv$ v	VELL TY	PE:	OW	/ = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
	h	1141 04	01110								GMI = GEOMON

RECORDER DG

NJ:

JOB NUMBER	5423		
COMPANY AP	PALACHIAN	POWER	COMPANY

PROJECT W. VA. GROUND WATER STUDY

 BORING NO.
 AMW-03
 DATE
 11/17/95
 SHEET
 2
 OF
 2

 BORING START
 08/22/95
 BORING FINISH
 08/23/95

шα	ĸш	S	AMPLE	STANDARD	, I		DEPTH	T	S		T	<u> </u>
SAMPLE	AMPLE		EPTH	PENETRATION	AL AL	J		PH DG	υ	SOIL / ROCK	-	DRILLER'S
SAI	SAL	1	FEET	RESISTANCE	TOT	%		GRAPI LOG	S	IDENTIFICATION	MELL	NOTES
16		FROM		BLOWS / 6"	<u> </u>		FEET		∍		-	
10	1 35	30.0	32.0	2-1-1-1	1.8			튑		CLAYEY SAND Fine sand 1/8-1/4 mm, wet, no odor.		
17	SS	32.0	34.0	1-1-1-1	2.0		-	티		SANDY CLAY 35%, 65%, wet, easy to auger, soft, 5yr5\6-5yr6\6.		
18	ss	34.0	36.0	2-1-1-1	2.0		- 35 -			5yt5\6=5yt5\3		
19	ss	36.0	38.0	2-2-1-1	2.0		-		SC CL	CLAYEY SAND 50%, 60%, wet, pale brown, 5YR5\2.		
20	ss	38.0	40.0	2-2-3-4	2.0		-		CL	SANDY CLAY 50%, 50%, <2% silt, v-fine sand 1/8-1/4 mm, sub-angular, well sorted, poorly graded, v-loose, wet, faint musky odor,		
							40			(swamp like), 5yr5\2-5yr5\1, no reaction to //		
21	SS	40.0	42.0	2-4-4-4	1.6		40 -			SANDY CLAY 40%, 60%, <2% silt, well sorted, poorly grade, medium stiff, moist to wet, no		40.0 Top of seal.
22	SS	42.0	44.0	2-2-4-5	1.7		-		SC	odor, no reaction to HCL, easy to auger. Medium dark gray n\4. moist. no odor.		
23	SS	44.0	46.0	2-4-5-6	1.5		45			CLAYEY SAND 35%, 65%, wet. CLAYEY SAND fine grain 1/8-1/4, wet sub-angular, sub-rounded, well sorted, poorly		42.7 Top of sand.
24	ss	46.0	48.0	5-6-8-4	.8		45 -		SP	graded,n\5 medium gray, loose, no odor, no reaction to HCL. Small wood fragments.		
25	SS	48.0	50.0	4-4-12-18	1.0		-			SAND Poorly graded, little or no fines, clay 10%, well sorted, medium course sand 1/4-1.0 mm, wet, 10yr6\2, sub-angular grains, loose,		46.9 Top of screen.
26	SS	50.0	52.0	19-19-6-4	1.5		50 -		SP 1	no odor, no reaction to HCL, easy to auger, wood fragments. SAND <2%, poorly graded, medium -course		
27	ss	52.0	54.0	8-12-34-17	1.8					grain 1/4-1.0 mm, n\5-n\6, medium gray color, angular-sub-angular, very loose, no odor, wet, well sorted, last .5 small sub-angular		
28	ss	54.0	56.0	7-30-36-34	1.7					GRAVELLY SAND With little fines or no fines, pebbles, a4-6 mm, poorly sorted, poorly		
29	ss	56.0	58.0	30-33-25-90	1.8		55 -		SC	graded, pebbles content 10%, loose-medium stiff, no odor, wet. Sand 60%, gravel 20%, pebbles 20%,		
and a second										5vr6\1-5vr5\2. wet.		56.9 Bottom of screen. 57.9 Bottom sand.

JOB NUMBER 5423

## COMPANY \_\_\_\_\_APPALACHIAN POWER COMPANY

PROJECT \_\_\_\_\_ W. VA. GROUND WATER STUDY COORDINATES N 539,605.5 E 1,731,128.7

GROUND ELEVATION 585.7 SYSTEM STATE PLANE

			JIATE PLANE
WATER LEVEL	<u> </u>	<u>R</u>	Y
TIME			
DATE	9-7-95		

BORING NO. AMW-04 DATE 11/17/95 SHEET 1 OF 2
BORING START
PIEZOMETER TYPE WELL TYPE
HGT. RISER ABOVE GROUND 2.21 DIA 2.0
DEPTH TO TOP OF WELL SCREEN BOTTOM
WELL DEVELOPMENT YES BACKFILLQUICK GROUT
FIELD PARTY JCM=REB RIG CME-75

SAMPLE	_		AMPLE EPTH I FEET M TO 1.5	STANDARD PENETRATION RESISTANCE BLOWS / 6" 11-15-50	TOTAL LENGTI RECOVEL	RQD %	DEPTH IN FEET	- GRAPH LOG	2	SOIL / ROCK IDENTIFICATION	МЕЦ	DRILLER'S NOTES
		0.0		11-15-50	1.1				SC	CLAYEY SAND AND GRAVEL 10%, 30%, 60%, mixture, first 3' plant fragments, gravels to cobbles, dry, 2-75 mm, fine to v-fine sand 1/16-1/4, very hard, 1-yr3\4=5yr3\4, hard to auger, no order.		
2	SS	6.0	6.9	4-50/.4	.8		5			medium stiff to soft, smooth texture, 5yr5\2-10yr4\2, moist, hard to auger, musky organic odor, low plasticity, no reaction to HCL, olive gray.		
3	SS	14.0	16.0	6-6-7-7	2.0		10 - - -					
							15 — - - -					18.0 Top of seal.
4	SS	20.0	22.0	3-3-5-5	2.0		20		CL	SANDY CLAY 5%, 95%, v-fine sand, small amount of silt, small irregular horizontal blackish, two colors 5yr5\6 50%, n\6 50%, moist to wet, sand 1/16-1/8 mm, sub-angular, well sorted, poorly graded, no odor.		19.9 Top of sand.
5	SS	26.0	28.0	5-7-3-3	1.8		25 -			sand, sub-angular-sub-rounded, 1/8-1/2 mm, poorly graded, 5yr4\4-5yr3\4, no odor, v-loose, wet.		24.0 Top of screen.
		TYPE	OF CA	SING USED		<u> </u> 					:目:I	
		NQ-2 F	OCK C			P	IEZOMF	TERT	YPF.	PT = OPEN TUBE POROUS TIP SS -	Opt	
X	X 6" x 3.25 HSA 9" x 6.25 HSA						PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC					
	HW CASING ADVANCER 4" NW CASING 3"					w	ELL TYP	PE: (	<u>ow</u>	= OPEN TUBE SLOTTED SCREEN, GM	= GE	EOMON
		SW CA			5"	1				RECORDER DG		



JOB NUMBER 5423

COMPANY \_ APPALACHIAN POWER COMPANY PROJECT W. VA. GROUND WATER STUDY BORING START 09/07/95 BORING FINISH 09/08/95

BORING NO. AMW-04 DATE 11/17/95 SHEET 2 OF 2

SAMPLE	SAMPLE	DE IN I	MPLE PTH FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	HELL	DRILLER'S NOTES
6	SS	32.0	34.0	3- <del>6-9-</del> 8	1.3					SAND Little of no fines, sub-angular to sub-rounded, course, medium grain, 1.0-1/2 mm, two colors n\3 dark gray = 20% and 5yr6\6 light brown = 80%, wet, no odor.		34.0 Bottom of
							35 -					screen. 35.0 Bottom sand.

JOB NUMBER 5423

COMPANY A	PPALACHIAN	POWER COMPANY							
		D WATER STUDY							
		1 E 1,731,120.7							
GROUND ELEVATION SYSTEM STATE PLANE									
WATER LEVEL	<b>¥</b> 23.8	T T							
TIME									
DATE	9-1-95	İ							

BORING NO. AMW-05 DATE 11/17/95 SHEET 1 OF 2
BORING START 08/31/95 BORING FINISH 09/07/95
PIEZOMETER TYPE WELL TYPE
HGT. RISER ABOVE GROUND DIA
DEPTH TO TOP OF WELL SCREEN BOTTOM
WELL DEVELOPMENT YES BACKFILLQUICK GROUT
FIELD PARTY

SAMPLE	SAMPI	I D IN FROM	MPLE EPTH FEET A TO	STANDARD PENETRATION RESISTANCE BLOWS / 6*	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	ИЕГГ	DRILLER'S NOTES		
2			2.0	3-7-12-15 12-9-6-6	1.67		-		GC SC	GRAVEL, 25% CLAY, 30% FINE SAND, 45% ANGULAR, POORLY SORTED FINE TO COARSE GRAVEL, POORLY GRADED, NO HCI, NO ODOR, PLANT FRAGMENTS FIRST 4*/				
3	s	\$ 4.0	6.0	3-3-5-5	1.91		5		CL	5YR4/4 - 5YR4/2 CLAYEY SAND, 55% FINE SAND, 40% CLAY, 5% GRAVEL, LOOSE, NO				
4	SS	6.0	8.0	3-2-3-3	1.67					ODOR, DAMP <u>5YA5/2 - 5YB6/4 LEAN CLAY</u> , 2% SAND, MED. STIFF, SMOOTH TEXTURE, NO ODOR, NO HCI, DAMP, MEDIUM PLASTICITY				
5	SS	8.0	10.0	2-2-4-7	1.83					5YR5/2 - 5YR6/4 DRY, SEMI-SMOOTH TEXTURE, MED-LOW PLASTICITY				
6	SS	10.0	12.0	5-6-9-11	2.0		10 -	-						
7	ss	12.0	14.0	2-5-9-11	1.83				CL	5YB5/2-5YB4/4 LEAN CLAY, LESS THAN 10% FINE SAND, STIFF, DRY, SMALL IRREGULAR BLACK LENSES, LOW		:		
8	ss	14.0	16.0	4-5-7-9	1.83		 [ 15 —			PLASTICITY, NO ODOR				
9	ss	16.0	18.0	3-4-7-8	1.75					INCREASED No. OF VERY SMALL HORIZONTAL IRREGULAR BLACK LENSES, 5YR4/4 - 5YR5/2 ABSENCE OF BLACK LENSES, 5YR4/4,				
10	SS	18.0	20.0	2-4-5-7	1.75					5YR5/2. MOIST, NO ODOR, LESS THAN 5% FINE SAND 5YR4/4 = 20%, 5YR5/2 = 80%, MOIST-WET				
11	SS	20.0	22.0	2-3-4-5	1.83		20							
12	ss	22.0	24.0	2-2-3-3	1.91					5YR4/4 <= 10%, 5YR5/2 >= 90%, MOIST, NO ODOR				
13	SS	24.0	26.0	2-5-5-8	2.0		25	1.1	SP SC	5YR4/4 = 20%, N5(MED GRAY) = 80%, MOIST, 5% V. FINE SAND .5YR4/4 - 5YR3/4 CLAYEY SAND, 10% CLAY,				
14	SS	26.0	28.0	4-6-8-8	1.33		20		SP   \	MEDIUM SAND, SUB-ANGULAR TO SUB ROUNDED, V. LOOSE, WELL SOBTED				
15	SS	28.0	30.0	5-7-7-9	1.91					POORLY GRADED, WET, NO ODOR, NO HCI 5YB3/4-5YR2/2 SAND. <2% FINES, FINE TO MEDIUM GRAIN, V. LOOSE, WET, NO ODOR, SUB ANGULAR 5YR5/6 LIGHT BROWN				
	TYPE OF CASING USED						I	<u>i I.I</u>	I	Continued Next Page				
X	NQ-2 ROCK CORE 6" x 3.25 HSA				F	PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE								
	9" x 6.25 HSA HW CASING ADVANCER 4"						SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON							
		NW CA SW CA	SING		<del>3"</del> 6"		RECORDER _DG							



f

JOB NUMBER 5423

## COMPANY <u>APPALACHIAN POWER COMPANY</u> PROJECT <u>W. VA. GROUND WATER STUDY</u>

 BORING NO.
 AMW-05
 DATE
 11/17/95
 SHEET
 2
 OF
 2

 BORING START
 08/31/95
 BORING FINISH
 09/07/95

		········	-									
ш	х   ш	SA	MPLE	STANDARD PENETRATION RESISTANCE	+~~	RQD	DEPT		0	1		1
SAMPLE	AMPLE	0	EPTH	PENETRATION	V HE H		DEPTI	GRAPH	0 0		,	00000
E L	Ę	IN	FEET	RESISTANCE	LON0		IN	AF			ИЕГГ	DRILLER'S
SI	s s	I				%	FEET	. 89	N  L	IDENTIFICATION	Ц	NOTES
16	1	FROM		BLOWS / 6"	<u>к</u> 1		ree i					
17			32.0	6-7-8-9 4-4-7-9	1.67				SN	NS-N6 MED GRAY SAND WITH FINES, 10% CLAY, 10% SILT, FINE TO MEDIUM SAND ANGULAR TO SUB-ANGULAR, SOME BLACK STAINING, V. LOOSE, WELL SORTED, POORLY GRADED, UNCONSOLIDATED, WET, NO ODOR, NO HCI		
18	ss	34.0	36.0	6-7-13-6	1.0			-	·	NO ODOR, NO HCI		
19	ss	36.0	38.0	3-2-3-8	1.5		35 -		    SF  -	SAND = 90%, CLAY = 5%, SILT = 5%, WET <u>NG MED LT GRAY TO 5YR6/1 SAND</u> , FINE TO MEDIUM GRAIN, POORLY GRADED, V.		36.2 Top of seal.
20	SS	38.0	40.0	6-5-5-4	1.17				•	LOOSE, WET, UNCONSOLIDATED, NO ODOR, NO HCI		00.2 100 01 3521.
21	SS	40.0	42.0	3-3-8-7	1.25		40 -		SM	FINE TO MEDIUM GRAIN SAND, WELL		39.3 Top of sand.
22	SS	42.0	44.0	7-8-9-9	1.58			-		SORTED, LOOSE, NO ODOR, WET 2" WEATHERED COAL DEPOSITS, WET		
23	SS	44.0	46.0	4-4-6-6	1.33		45 -					44.0 Top of screen.
24	SS	46.0	48.0	8-5-8-9	1.67							
25	SS	48.0	50.0	4-4-5-7	1.91					BOTTOM 6" 5YR6/1 LT. BROWNISH GRAY, WET WEATHERED COAL DEPOSITS, WET, NO ODOR		
25	SS	50.0	52.0	5-10-7-7	2.0		50 -			WET		
27	ss	52.0	54.0	22-22-11-14	1.17		-		CL	5YR3/4 - 5YR2/2 SANDY CLAY, 55% CLAY, FINE GRAIN, SUB ANGULAR SAND, LOOSE, WELL SORTED, POORLY GRADED,		
28	ss	54.0	55.0	15-63-53/3	1.0		- 55 —		CL	UNCONSOLIDATED, WET, NO ODOR 5YB3/4-5YB2/2 GRAVELLY CLAY, 15% SUB ANGULAR TO SUB ROUNDED GRAVEL (2 - 25		
						ana a su an an an an an an an an an an an an an				mm) POORLY SORTED, MOIST, NO ODOR, CONSOLIDATED WEATHERED BEDROCK AT 55'		55.0 Bottom sand.
												54.0 Bottom of screen.





JOB NUMBER	5423		LOG									
COMPANY A	PPALACHIAN	POWER CON	ΛΡΑΝΥ									
PROJECT W.	VA. GROUNI	D WATER STU	IDY									
COORDINATES N 539,169.8 E 1,729,695.5												
GROUND ELEVA	GROUND ELEVATION 587.5 SYSTEM STATE PLANE											
WATER LEVEL	<u> </u>	N. N. N. N. N. N. N. N. N. N. N. N. N. N	Ē									
TIME												
DATE	8-30-95											

BORING NO. AMW-06 DATE 11/17/95 SHEET 1 OF 2
BORING START 08/29/95 BORING FINISH 08/30/95
PIEZOMETER TYPE WELL TYPE
HGT. RISER ABOVE GROUND DIA
DEPTH TO TOP OF WELL SCREEN 31.0 BOTTOM 41.0
WELL DEVELOPMENT YES BACKFILLQUICK GROUT
FIELD PARTY

SAMPLE		D IN FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"		%	DEPTH IN FEET	GRAPH LOG	U S C S U	SOIL / ROCK IDENTIFICATION	MELL	DRILLER'S NOTES
2	SS		4.0	3-4-5-6 3-3-5-7	1.5				OL CL	TOP 3" PLANT FRAGMENTS OLIVE GRAY SANDY LEAN CLAY, 10% FINE TO COARSE SAND, NO ODOR, NO HCI, MOIST TO DAMP MEDIUM BROWN (5YB3/4) SANDY LEAN		
3	ss	4.0	6.0	7-7-4-6	1.7		F -		Ű.	CLAY, 20% COARSE SAND, STIFF, NO ODOR, DAMP		1
4	SS	6.0	8.0	4-4-3-4	1.8		5-					
5	ss	8.0	10.0									
6	SS	10.0	12.0	2-2-4-5	1.5		10 -		CL	10YB5/4.5GY6/1.SANDY_CLAY, 40% FINE TO MEDIUM SAND, SOFT TO MEDIUM STIFF, NO ODOR, MOIST TO WET		
7 8	SS SS	12.0	14.0	1-1-2-5 2-2-4-5	1.8							
9	ss	16.0	18.0	1-2-2-3	2.0		15 -		Сн	BENTONITE CHIPS, 40% HYDRATED,		
10	ss	18.0	20.0	3-3-5-5	1.83					BACKFILL SEAL, WET, 2' THICK <u>5Y6/1 LEAN CLAY</u> , LESS THAN 5% SAND, MEDIUM STIFF TO STIFF, MOIST, NO HCL		
11	SS	20.0	22.0	2-3-3-3	1.67		20 —			20' - 22' 5YR5/6 AND 10YR6/2		
12 13	SS SS	22.0 24.0	24.0	3-3-3-5	1.83		-			22' - 24' 10% SAND		
	ss	26.0	28.0	3-3-4-6 5-4-6-8	1.91		25 –			SOME SMALL IRREGULAR HORIZONTAL LENSES 1.0 mm H X 1/4" L, N-1-N-2.	at inner	24.6 Top of seal.
15	SS	28.0	30.0	2-2-2-4	1.83					26'-28' 5YR5/6 LT. BROWN AND N-6 LT. GRAY		27.0 Top of sand.
		TYPE		SING USED			ł			28'-30' LESS THAN 2% SAND, 5Y41 OLIVE		
	1									Continued Next Page		
Х						F	PIEZOME SLO			PT = OPEN TUBE POROUS TIP, SS = REEN, G = GEONOR, P = PNEUMATIC	OPE	N TUBE
	9" x 6.25 HSA HW CASING ADVANCER 4"											
	1	<u>NW CA</u>	3"									
	5	SW CA	SING		6"	1			!	RECORDER DG		

JOB NUMBER 5423

# NT:

COMPANY <u>APPALACHIAN POWER COMPANY</u> PROJECT <u>W. VA. GROUND WATER STUDY</u>

SAMPLE		DE IN FROM	MPLE EPTH FEET I TO	STANDARD PENETRATION RESISTANCE BLOWS / 6*	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	ИЕГГ	DRILLER'S NOTES
16		30.0 32.0	32.0 34.0	2-2-3-5 1-1-1-2	2.0 2.0				SC CL SW	MEDILIM CRAIN BOORLY CODTED NO		31.0 Top of screen.
18	ss	34.0	36.0	4-2-2-3	2.0		35 –		CL	SANDY LEAN CLAY, MOIST, 40% SAND 5Y4/1 SAND FINE TO MEDIUM GRAIN, POORLY SORTED, NO ODOR, NO HCI, VERY		
19	SS	36.0	38.0	1-1-2-3	1.91		-			LOOSE, WET <u>5YR4/1 SANDY CLAY</u> , 40% FINE SAND, BROWNISH GRAY, SOFT, MOIST NO ODOR		
20	SS	38.0	40.0	3-2-3-3	1.91					36' - 38' 20% SAND 38' - 40' 10% SAND		
21	SS	40.0	42.0	1-2-2-3	2.0		40 -			40' 42' LESS THAN 5% SAND		41.0 Bottom of
22	SS	42.0	43.0	2-3	1.0		-					42.7 Bottom sand.

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1	T	Ξ	2
<b>M</b>	Ċ		2

J	OB N	UMBER	542;	3				L	-OG	OF BORING	( and				
С	OMP	ANY	APPAL	ACHIAN PO	NER C	OMP	ANY			BOBING NO AMW-07 DATE 11/17/05 SUFER 4					
P	ROJE	ECT	<u>V. VA. (</u>	GROUND WA	TER S	יסטד				BORING NO. <u>AMW-07</u> DATE <u>11/17/95</u> SHEET <u>1</u> OF <u>2</u> BORING START <u>08/30/95</u> BORING FINISH <u>08/31/95</u>					
				37,838.4 E						PIEZOMETER TYPE WELL TYPE	<u>.</u>				
G	GROUND ELEVATION SYSTEM STA								NE	HGT RISER ABOVE GROUND 1.52					
		LEVEL	1	11.0 🗵		<u> T</u>			<u>יי</u> ר	HGT. RISER ABOVE GROUND <u>1.62</u> DIA <u>2.0</u>					
	ME					<u> </u> =			-	DEPTH TO TOP OF WELL SCREEN _28.0 BOTTOM _38.0					
DA	TE		8-	31-95					-	WELL DEVELOPMENT YES BACKFILLQUICK G					
				51-95					]	FIELD PARTY					
ш	2 L		AMPLE	STANDARD	1.10	RQD	DEPT	н	0						
SAMPLE	AMPL		DEPTH	PENETRATIC	TAL 00E		IN		၃ ပ		LER'S				
SA	NU SA			RESISTANC		%	FEET	GRAPI	N L		TES				
-	S			BLOWS / 6	<u> </u>				>		120				
			2.0	12-30/3	.5				. OI SN						
2	s	5 2.0	10					]. ·		SILTY SAND, 50% SAND, 50% SILT, VERY FINE SAND, DRY, DUSTY, SOME GRANULES					
1	0	2.0	4.0	10-5-5-6	1.83					AND PEBBLES, VERY HARD, ONE LARGE					
								1		COBBLE					
3	SS	4.0	6.0	6-5-5-5	1.17	1	_		]	SANDY CLAY, 40% SAND, 40% CLAY, 20% SILT, VERY FINE (1/16-1/8) S.ANG. SAND,					
							5	1-		DAMP, 1ST COLOR 5Y6/1 LT, OLIVE GRAY					
4	SS	6.0	8.0	2-3-3-4	2.0	ĺ		+	1	2ND COLOR 5YRG/4 LT, BROWN, NO ODOR					
										NO HCI, LOOSE TO MED. DENSE					
5	ST	8.0	10.0					1	1	10YB4/2 AND 5Y5/4 LEAN CLAY WITH SILT, DAMP, MED. STIFF TO STIFF, NO ODOR,					
						ĺ				LOW PLASTICITY					
6	SS	10.0	12.0	2-2-2-3	1.17		10 -	+=	CL	SANDY CLAY 5 100 1 Store					
					1.17			F	02	SANDY CLAY, 5-10% V. FINE SAND, BOTTOM HALF OF SPOON WET, MED. PLASTICITY,					
7	ss	12.0	140					1-1		SOFT TO V. SOFT, NO ODOR					
	00	12.0	14.0	2-2-2-3	2.0										
•						i		[]		12'-14' 10YR5/4					
8	SS	14.0	16.0	2-2-3-4	2.0			日							
							15 -	귿		14'-16' A FEW SM. BLACK HORIZONTAL					
9	SS	16.0	18.0	4-5-8-8	2.0			F		DEPOSITS, ONE BLACK (N-2) LENS, 1/2 mm H X 1/4* LONG, 10YR6/6 DK YEL-ORANGE					
										AND N-7 LT. GRAY, MOIST					
10	SS	18.0	20.0	5-5-8-9	2.0			1							
								11		18'-20' CLAY W/V. FINE SAND AND SILTS,					
11	SS	20.0	22.0	3-5-5-7	1.91		20 -	는		DAMP, NO ODOR, STIFF					
							-	F		20'-22' A FEW SM. IRREG. HORIZONTAL					
12	ss	22.0	24.0	2-3-5-5	1.75		-	[-]		BLACK (N-2) LENSES AND DEPOSITS, DAMP					
							-	1-1		22.0 Top of s	seal.				
13	ss	24.0	26.0	200.			-	[ <u> </u>		22'-24' (N-7) LT. GRAY = 80%, AND 5YR5/6 LT BROWN = 20%, NO DEPOSITS, DAMP					
		24.0	26.0	2-2-3-4	1.91		25 -	E-J		24.0 Top of s	and.				
.							25-								
14	ss	26.0	28.0	1-1-2-2	1.67			<u>[-]</u>							
							بـ ا			26' - 28' LESS THAN 2% SAND					
15	ss	28.0	30.0	1-1-2-2	1.91		7		SP	5YB4/1 OLIVE GRAY_CLEAN SAND, MED					
							-			(1/4-1/2 mm) S. ANG. SAND, WELL SORTED [-日:120.0 100 01 S	creen.				
					l	<u> </u>									
										Continued Next Page					
X	<u>NO-2 ROCK CORE</u>						PIEZOMETER TYPE: PT = OPEN TUBE POROLIS TIP SS - OPEN TUBE								
<u></u> ;	6" x 3.25 HSA 9" x 6.25 HSA						SLO	TTED	SC	REEN, $G = GEONOR$ , $P = PNEUMATIC$					

HW CASING ADVANCER 4" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON NW CASING 3"

RECORDER \_DG

en el

; ;

SW CASING

6"

JOB NUMBER 5423

## LOG OF BORING



COMPANY \_\_\_\_\_\_ APPALACHIAN POWER COMPANY PROJECT W. VA. GROUND WATER STUDY

BORING NO. AMW-07 DATE 11/17/95 SHEET 2 OF 2 BORING START 08/30/95 BORING FINISH 08/31/95

SAMPLE NUMBER	1	DE IN I FROM	MPLE PTH FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	ROD %	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	мегг	DRILLER'S NOTES
16 17 18	SS SS SS	30.0 32.0 34.0	32.0 34.0 36.0	2-3-2-3 2-3-7-6 5-3-6-8	2.0 1.17 1.67		-		CL SW SC	LOOSE, MOIST LEAN CLAY, WITH MEDIUM TO FINE S. ANG. SAND, MOIST, NO ODOR <u>N-4 MED. DK GRAY SAND</u> , 5% SILT AND CLAY, FINE TO MEDIUM (1/8-1/2 mm) GRAIN SAND, S. ANG., POORLY SORTED, NO ODOR		
19	SS	36.0	38.0	5- <del>9</del> -21-23	2.0		35 — - -					38.0 Bottom of
												38.0 Bottom of screen. 39.0 Bottom sand.

JOB NUMBER	5423
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COMPANY A	PPALACHIAN	POWER CO	MPANY									
PROJECT	VA. GROUNE	WATER STL	JDY									
COORDINATES N 536,151.7 E 1,732,198.9												
GROUND ELEVATION _ 584.9 SYSTEM _ STATE PLANE												
WATER LEVEL	<u> </u>	1 2 1	N N N N N N N N N N N N N N N N N N N									
TIME												
DATE	8-29-95											

BORING NO. AMW-08 DATE 11/1	7/95 SHEET 1 OF 1
BORING START 09/13/95 BOR	NG FINISH
PIEZOMETER TYPE	WELL TYPE OW
HGT. RISER ABOVE GROUND	DIA0
DEPTH TO TOP OF WELL SCREEN _1(	0.0 BOTTOM _20.0
WELL DEVELOPMENT YES	BACKFILLQUICK GROUT
FIELD PARTY JCM=REB	RIG CME-75

SAMPLE	<u> </u>	I D IN FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"	L TO RECO	%	DEPTH IN FEET	GRAPH LOG		SOIL / ROCK IDENTIFICATION	мегг	DRILLER'S NOTES
2	SS		4.0	8-16-14-8 6-7-11-9	1.67				CL SC	10RY5/4 AND 10YR5/6 GRAVELLY CLAY, 30% GRAVEL WITH SILT, 5% MEDIUM TO COARSE POORLY SORTED GRAVEL (2 - 75 mm), MOD. HARD, DRY, NO HCI, NO ODOR		
3	SS	6 4.0	6.0	5-7-3-3	2.0		5 -			10YR6/2 AND 10YR6/4 CLAYEY SAND, 45% CLAY, SAND S. ANGULAR WITH 5% 2 TO 4 mm, LOOSE, DRY, NO ODOR, NO HCI		4.0 Top of seal.
4	SS	6.0	8.0	5-3-5-4	1.67		-		CL	4' - 6' 5YR5/6 - 5YR6/6, DRY, 5% FINES <u>5YR4/4 - 5YR4/6 SANDY CLAY</u> , 45% VERY FINE S. ANG, WELL SORTED, POORLY		6.0 Top of sand.
5	ST	8.0	10.0				-		SC	GRADED SAND, MOIST, NO ODOR 10YR5/4 - 5YR5/6 CLAYEY SAND, 50% VERY		
6	SS	10.0	12.0	2-2-2-1	1.17		10 — -			FINE TO FINE SAND, LOOSE, WET, NO HCI, NO ODOR		10.0 Top of screen.
7	SS	12.0	14.0	2-2-3-3	1.5		4			12'-14' SAND 65%. WET		
8	SS	14.0	16.0	1-1-3-3	1.5		15 -					
9	SS	16.0	18.0	2-2-3-2	1.67		-			14'-16' WET		
10	SS	18.0	20.0	1-1-2-3	1.83					5YB5/4-5YB5/2 SANDY_CLAY, 50% SAND, 50% CLAY, STIFF, MOIST, NO ODOR, NO HCI		
11	SS	20.0	22.0	8-10-9-4	1.83		20 -			18'-20' SANDY CLAY, SAND 40%, MOIST 20'-22' SAND 20%, DRY, N5 MED. GRAY = 40%, 5YR5/4 = 60%	•	20.0 Bottom of screen. 21.9 Bottom sand.
						a - a - a - a - a - a - a - a - a - a -						
				SING USED								
X		NQ-2 R 5" x 3.2	ORE		P	IEZOMET		YPE:	PT = OPEN TUBE POROUS TIP, SS =	OPE	N TUBE	
	<u> </u>	9″ x 6.2				SLUI	IED	SC	REEN, $G = GEONOR$ , $P = PNEUMATIC$			
		<u>IW CA</u>			4" 3"	WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON						OMON
i		SW CA			5"		······································			RECORDER DG		



JOB NUMBER	<u>5423</u>
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## COMPANY \_\_ APPALACHIAN POWER COMPANY PROJECT W. VA. GROUND WATER STUDY COORDINATES N 536,983.3 E 1,734,099.7

GROUND ELEVATION \_ 586.8

GROUND ELEV	ATION 58	SYSTEMSTATE PLAN						
WATER LEVEL	¥ 13.5	5 🗵		E				
TIME								
DATE	8-29-	95						

BORING NO. AMW-09 DATE 11/17/95 SHEET 1 OF 2	
BORING START 08/29/95 BORING FINISH 08/29/95	-
PIEZOMETER TYPE WELL TYPE	-
HGT. RISER ABOVE GROUND 1.79 DIA 2.0	•
DEPTH TO TOP OF WELL SCREEN BOTTOM	•
WELL DEVELOPMENT YES BACKFILLQUICK GROUT	•
FIELD PARTY	•

SAMPLE				STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	ROD %	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	MELL	DRILLER'S NOTES
2		2.0	4.0	8-24-45-60	1.0		-		GC	5YB4/4 - 5YB3/4 CLAYEY GRAVEL 30% CLAY, S. ANG. POORLY SORTED GRAVEL 2-100 mm, VERY HARD, NO ODOR		
3		4.0	6.0				-	å	CL	5YR5/4 - 5YR5/6 SANDY CLAY, 15% S ANG.		
4		6.0	8.0	6-6-9-9	1.67		5 -			1/16 - 18 in. WELL SORTED SAND, MED. STIFF TO STIFF, LOW PLASTICITY, DRY, NO ODOR, NO HCI		
5	S	8.0	10.0									
6		10.0	12.0				10 -	Ē	CL	5YB5/4 - 5YB5/5 SANDY CLAY, FINE WELL SORTED SAND, MED. STIFF, NO ODOR,		;
7		12.0	14.0	3-4-5-6	2.0					MOIST TO WET, LOW PLASTICITY 10'-12' MOIST		
8		14.0	16.0				-1					
9		16.0	18.0				15					15.0 Top of seal.
10		18.0	20.0				SC <u>5YB5/4 TO 5YR4/4 CLAYEY SAND</u> , FINE GRAIN S. ANGULAR SAND (1/8 - 1/4 mm), V LOOSE, WELL SORTED, POORLY GRADED, WET, 30% CLAY, NO ODOR, NO HCI					17.0 Top of sand.
11		20.0	22.0	1-1-1-2	2.0		20 -					
12		22.0	24.0								2	1.0 Top of screen.
13		24.0	26.0	1-1-1-2	2.0				SC	SYR4/4 CLAYEY SAND 50% CLAY, 50% MEDIUM TO FINE GRAIN ANGULAR TO SUB-ANGULAR, POORLY SORTED, POORLY		
14		26.0	28.0				25 - /			GRADED SAND, LOOSE, WET, NO HCI		
15		28.0	30.0							5YR5/2 - 5YR5/4 SANDY CLAY, 15% VERY FINE TO FINE S. ANGULAR SAND, V. LOOSE,		
		TYPE	OF CA	SING USED		_ <u>'</u>				WET, NO ODOR, NO HCI	<u>=:-</u>	
Х		NQ-2 R		ORE		PIE	ZOMET	ER TY	PE:	PT = OPEN TUBE POROUS TIP SS -		N TUBE
^		<u>6" x 3.2</u> 9" x 6.2		·		PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC						
		HW CA	SING A		t	WE		E: (	SW	= OPEN TUBE SLOTTED SCREEN, GM =	GEC	ОМОН
		<u>NW CA</u> SW CA			3" 5"	1				RECORDER DG		



JOB NUMBER 5423

## LOG OF BORING



COMPANY \_\_\_\_\_APPALACHIAN POWER COMPANY

PROJECT W. VA. GROUND WATER STUDY

BORING NO. AMW-09 DATE 11/17/95 SHEET 2 OF 2 BORING START 08/29/95 BORING FINISH 08/29/95

SAMPLE	SAMPLE	SAI DE IN I	MPLE PTH FEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"			DEPTH IN FEET	GRAPH LOG U S C S		SOIL / ROCK IDENTIFICATION	негг	DRILLER'S NOTES
10	5	30.0	32.0	1-1-1-1	2.0		-					31.0 Bottom of screen. 32.0 Bottom sand.

JOB NUMBER \_5423

				_	 -	•	•••	
LOG	OF	BOI	RIN	IG				

Γ.	V	4	Þ
L	1	-	_

	•											
COMPANYAPPALACHIAN POWER COMPANY												
PROJECT W. VA. GROUND WATER STUDY												
COORD	INATES	<u>N 53</u>	6,989.9	<u> </u>	734,09	94.7				PIE		
GROUN	D ELEVA		586.4	S	YSTEM	_ <u>S</u>	TATE PI	LAN	Е	HG		
WATER	LEVEL	<u> </u>	4.8	Ţ		Ţ				DE		
TIME										WE		
DATE		5-95							FIE			
	SAL	MPLE	STAN	DARD		ROD		 		1		
PLE PLE	1	PTH		RATION	AL BTH	nQU	DEPTH	H 9	S C			
SAMPL NUMBE SAMPL	IN	FEET	RESIS	TANCE	CO/CO	%	IN	GRAPH LOG	S			
0 2 0	EDOM	70			<u>Г</u> _ци	1	FFFT		-	1		

BORING NO. AMW-10 DATE 11/17/95 SHEET 1 OF	2
BORING START 08/24/95 BORING FINISH 08/28/95	
PIEZOMETER TYPE WELL TYPE	
HGT. RISER ABOVE GROUND DIA	
DEPTH TO TOP OF WELL SCREEN BOTTOM	
WELL DEVELOPMENT YES BACKFILLQUICK GROUT	•
FIELD PARTY	

SAMPLE	AMPLE	SA D	MPLE EPTH	STANDARD PENETRATION	FAL GTH VERY	RQD	DEPTH	H C	s c	SOIL / ROCK		
AMI	AME AME	IN	FEET	RESISTANCE	ENG COU	%	IN	GRAPH LOG	s		HELL	DRILLER'S
S	zv	FROM	л то	BLOWS / 6"	REL 1	70	FEET	9	D	IDENTIFICATION	н	NOTES
	SS	3 0.0	2.0	7-17-17-38	1.5			5-1	OL	PLANT FRAGMENTS		
							-		GC	5YR4/4 DARK RED-BROWN CLAYEY GRAVEL		
	s	2.0	4.0	20-16-14-12	1.17		-			25% CLAY, 30% FINE SAND, 45%		
							-			SUB-ANGULAR TO ANGULAR GRAVEL (2 TO 64 mm), POORLY SORTED, NO HCI, NO		
							-		ML	ODOR		
3	SS	4.0	6.0	4-4-7-8	1.33		c	<b>三</b> ]		N2-N3 GRAYISH BLACK SANDY SILT, 40%		
							5			VERY FINE SAND, 20% CLAY, MUSKY ODOR,		
4	SS	6.0	8.0	5-6-6-7	1.5		-			DAMP. A FEW SMALL IRREGULAR HORIZONTAL (N1) BLACK LENSES (20 mm L	30	
							-	=	CL	X 1 mm H) THROUGHOUT, MED. STIFF		
5	ss	8.0	10.0	5-5-5-7	1.25	ĺ	-					
							4			5YBB5/6-5YB4/4 SANDY CLAY, 30% VERY		
6	i SS	100					10 -			FINE TO FINE SAND, MED. STIFF TO STIFF, LOW PLASTICITY, NO ODOR, DAMP. 2	10	
ľ	33	10.0	12.0	3-3-4-4	1.33					LARGER LENSES 5mm L X 111/8 TO 1//4 mm	88	
	Ì						ľ			н.		
7	SS	12.0	14.0	2-2-2-2	1.83		-	_				
							4				10	
8	ss	14.0	16.0	1-1-1-2	1.91		-		sc	10YR5/4 YELLOW BROWN CLAYEY SAND		
-	1						15 -			35% CLAY, POORLY SORTED, GRADED FINE TO MEDIUM SAND, UNCONSOLIDATED.	彩	
9	ss	16.0	18.0				4			LOOSE. A FEW ROUND SMALL IRREGULAR		
		10.0	10.0	1-1-2-3	1.67		1			BLACK (N2) DEPOSITS, WET		
							F			5YB4/4-5YR5/4 SANDY_CLAY, 25% V. FINE		
10	SS	18.0	20.0	1-1-2-3	1.8.		ŀ	_		SAND, SOFT, MED PLASTICITY, NO HCI, NO ODOR, MOIST	10	
							Ť					
11	SS	20.0	22.0	1-2-1-3	1.67		20 -				10	
							4			20'22' SAND 20%	10	
12	ss	22.0	24.0	1-1-3-3	1.5							
							4			221 241 CAND 222		
1 40							j.			22'-24' SAND 20%		
13	SS	24.0	26.0	1-1-1-2	1.0		ac _[					
		İ			1		25 -			24'-26' SAND 25%		
14	SS	26.0	28.0	1-2-1-2	1.83		- F					
							1.			26'-27.5' SAND 40%		
15	ss	28.0	30.0	1-1-2-2	1.5		-1:		sc			
			l			ļ	-			5Y4/1DLIVE_GRAY_CLAYEY_SAND, 40% CLAY, VERY FINE TO FINE SAND, V. LOOSE TO LOOSE, WET, NO ODOR, NO HCI		
						<u> </u>	1.			LOOSE, WET, NO ODOR, NO HCI		
				SING USED						Continued Next Page		
			ROCK C	ORE		F	PIEZOME				OPF	N TUBE
<u>x</u>			25 HSA 25 HSA				SLOT	TED	SC	REEN, $G = GEONOR$ , $P = PNEUMATIC$		
 				DVANCER	4"	Ξ v	VELL TYP	E:	ow	/ = OPEN TUBE SLOTTED SCREEN, GM	- 65	
		NW CA			<del>4</del> 3"				<u> </u>			
		<u>SW CA</u>			6"	!			1	RECORDER DG		

JOB NUMBER 5423

# NE

COMPANY <u>APPALACHIAN POWER COMPANY</u> PROJECT <u>W. VA. GROUND WATER STUDY</u>

 BORING NO.
 AMW-10
 DATE
 11/17/95
 SHEET
 2
 OF
 2

 BORING START
 08/24/95
 BORING FINISH
 08/28/95

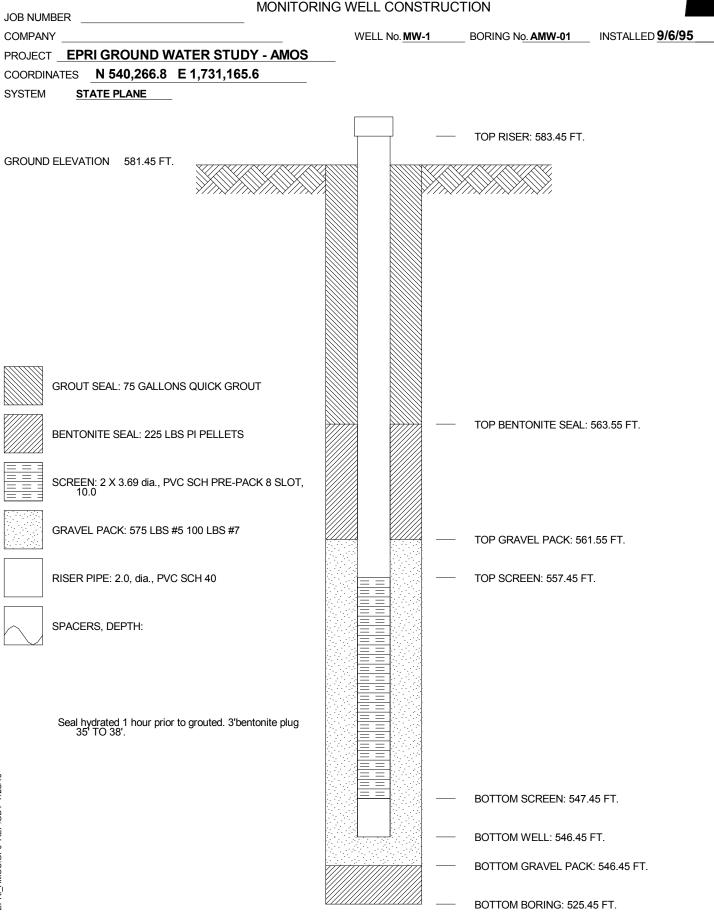
SAMPLE	SAMPL	D IN FROM	AMPLE EPTH FEET A TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"		1	DEPTH IN FEET	GRAPH LOG	U S C S	SOIL / ROCK IDENTIFICATION	HELL	DRILLER'S NOTES
16 17			32.0 34.0	1-1-1-2 2-2-3-7	2.0				CL	30'-32' 20% CLAY 5Y4/1 OLVE GBAY SANDY CLAY, 40% SAND		
18	ss	34.0	36.0	1-1-3-2	1.83		35 -		SC	CLAYEY SAND, 10% CLAY, VERY FINE TO FINE SAND, POORLY SORTED, GRADED,		
19	ss	36.0	38.0	2-2-2-3	2.0		55		CL	UNCONSOLIDATED, LOOSE, WET, NO ODOR, NO HCI 10YR4/4 SANDY CLAY, 10% VERY FINE TO		
20	ss	38.0	40.0	2-2-2-3	2.0					FINE WELL SORTED SAND, SOFT TO MED. STIFF, MED. PLASTICITY, MOIST, NO ODOR, NO HCI 38'-40' 10YR4/2 AND 5YR5/6		
21	SS	40.0	42.0	1-2-2-3	2.0		40 -			40'-42' 30% SAND		40.8 Top of seal.
22	SS SS	42.0	44.0	1-2-4-4	2.0		-			42'-44' N4-N4 MED DARK GRAY, 40% SAND	:	• 43.0 Top of sand.
23	SS	44.0	46.0	4-6-12-12 4-6-11-17	2.0		45		SC SW	CLAYEY SAND, 20% CLAY, FINE TO MEDIUM GRAIN SAND, ANGULAR, POORLY SORTED, WELL GRADED, WET, LOOSE TO MED. DENSE, NO ODOR, NO HCI	· · · · · ·	
25	SS	48.0	50.0	12-5-5-10	1.17		-			5Y6//1 LT. OLIVE GRAY SAND, 2% CLAY, MEDIUM TO COARSE GRAIN, WELL GRADED, MOIST TO WET, SUB-ANGULAR TO SUB-ROUNDED, NO ODOR, NO HCI		47.5 Top of screen.
26	SS	50.0	52.0	9-13-16-18	1.5		50 -		sc	5Y4/1 - 5Y6/1 OLIVE GRAY GRAVELLY, CLAYEY SAND, CLAY 20%, 30% FINE TO		•
	SS	52.0	54.0	9-60-23-9	1.33					COARSE SUB-ROUNDED, FRIABLE SANDSTONE GRAVEL, 40% FINE TO MEDIUM GRAIN SUB-ANGULAR TO SUB-ROUNDED SAND, POORLY SORTED, NO ODOR, DRY TO		
28	SS	54.0	56.0	13-22-25-20	1.33		55 —			MOIST 5Y4/1 - 5Y6/1 OLIVE GRAY SANDY.		
29	SS	56.0	58.0	13-14-16-30	1.17		-8			GRAVELLY CLAY, 30% SUB-ROUNDED FRIABLE SANDSTONE GRAVEL, 20% SAND 54'-56' GRAVEL 35%, SAND 10%, GRAVEL 4		
30	SS	58.0	59.0	32-100/4	.67		······································			256mm, DAMP WEATHERED BEDROCK, 5YR4/4 - FFYR3/4 - MOD. BROWN, DRY		57.5 Bottom of screen. 58.9 Bottom sand.
						-						

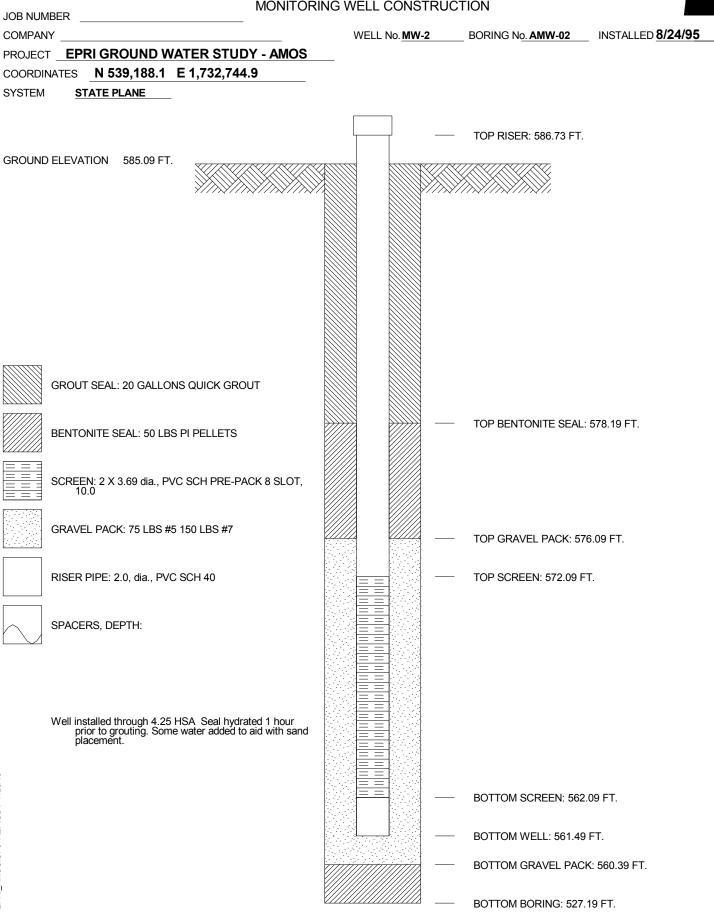


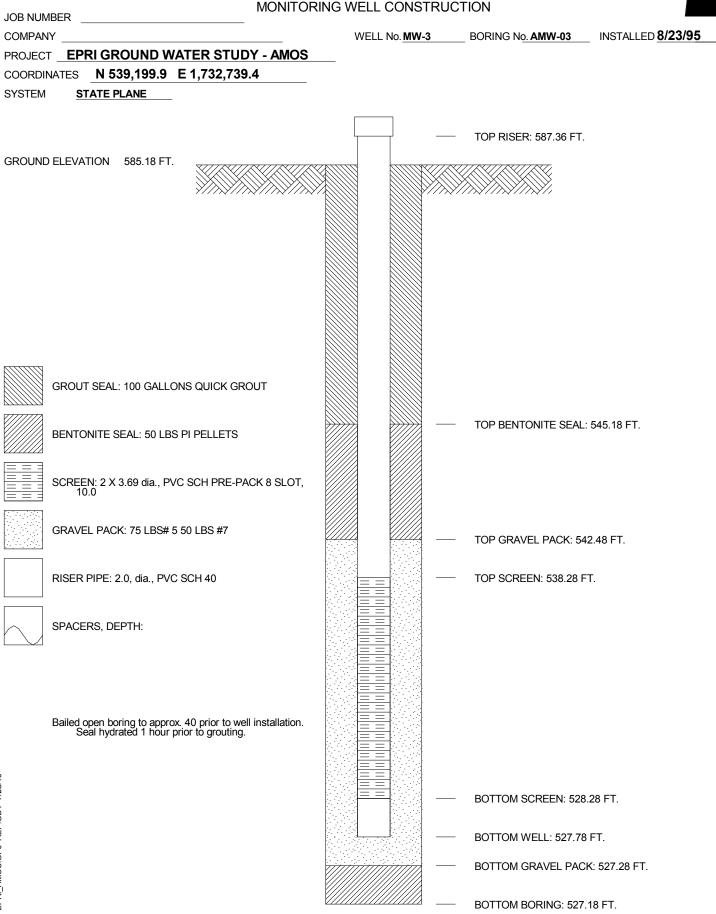
AEP 1995

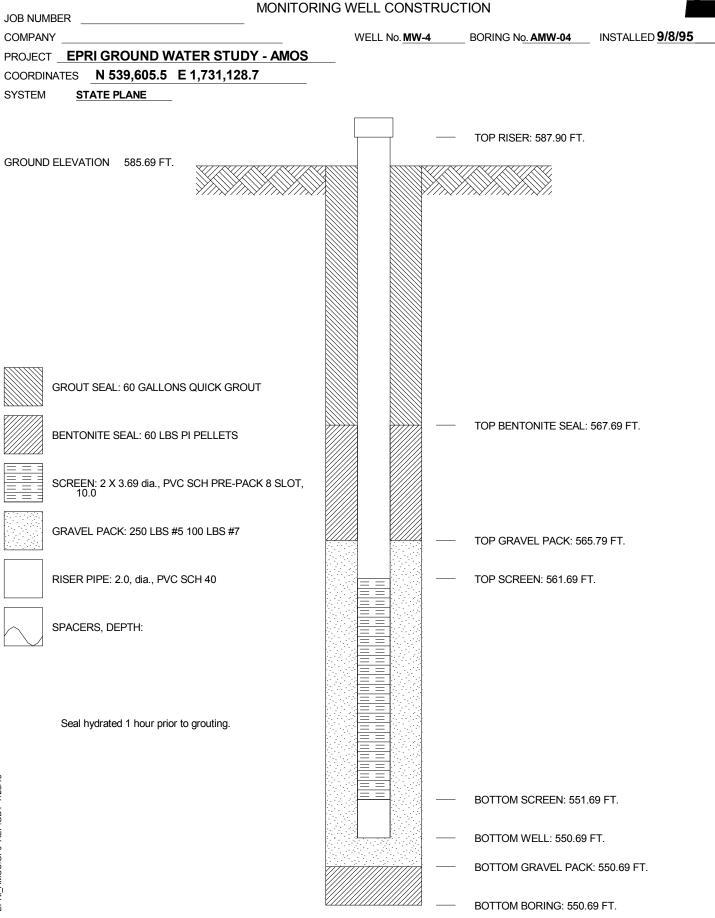
Well Construction Diagrams

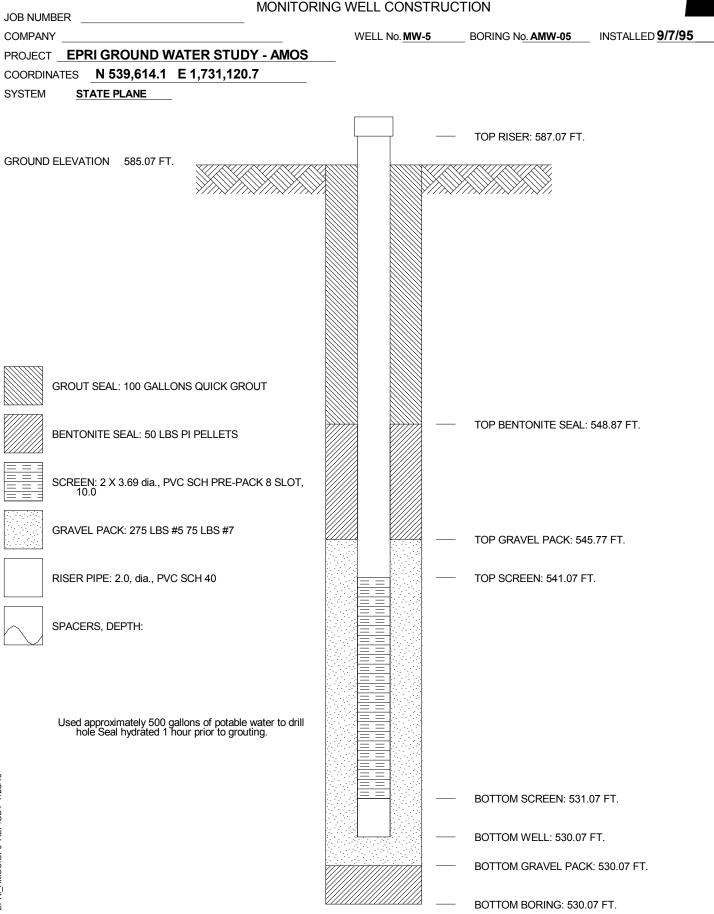
MW-01 to MW-10

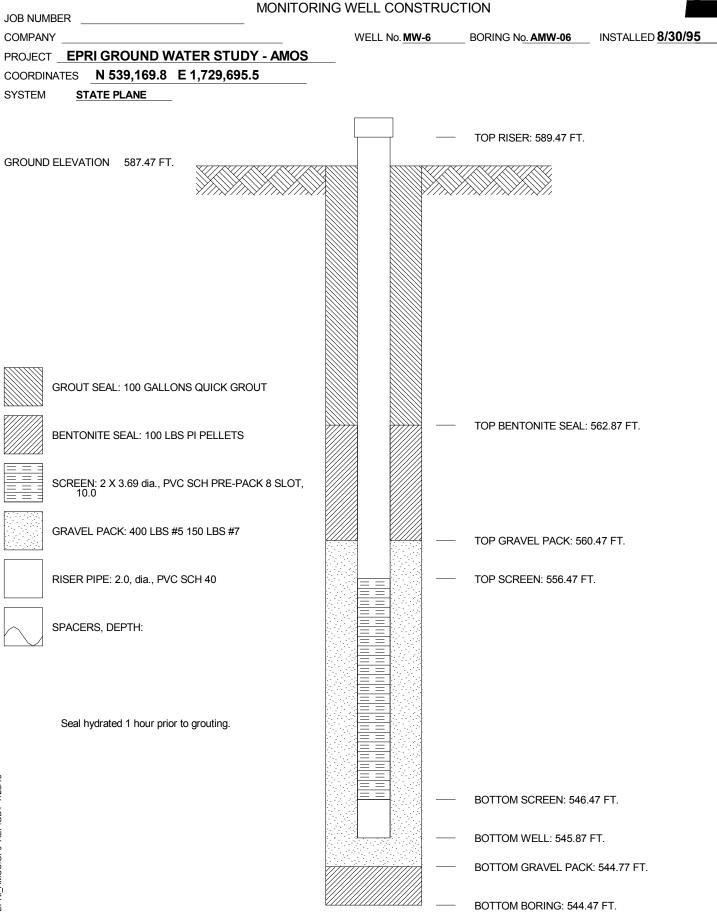


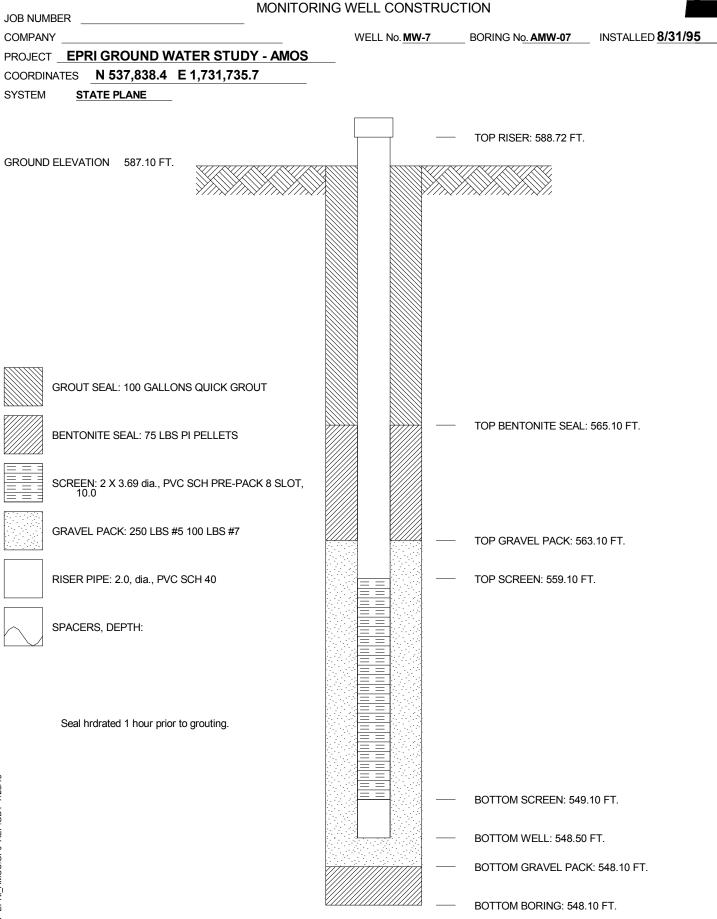


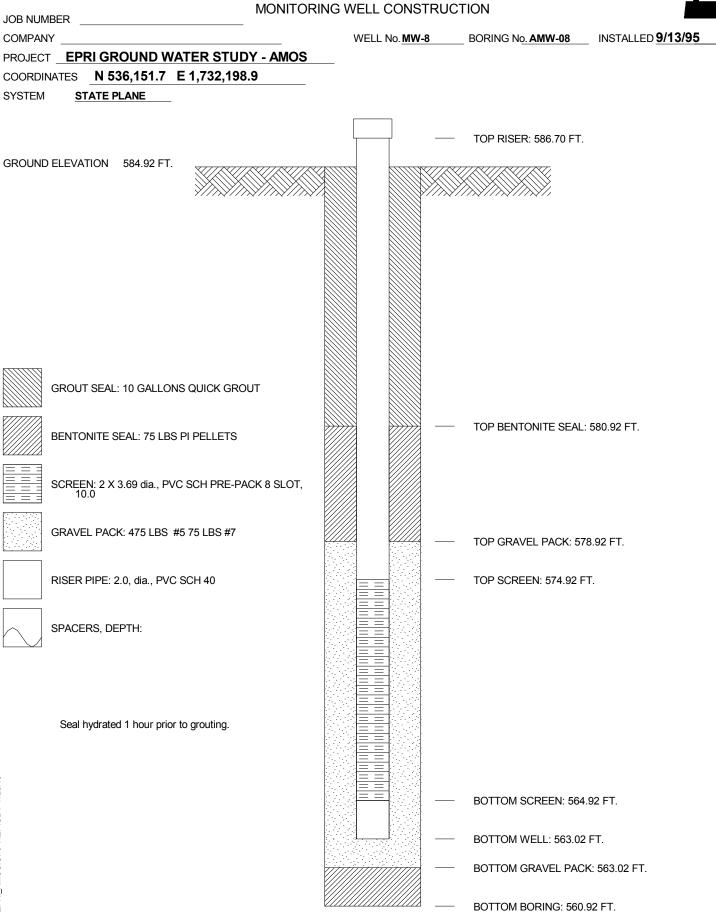


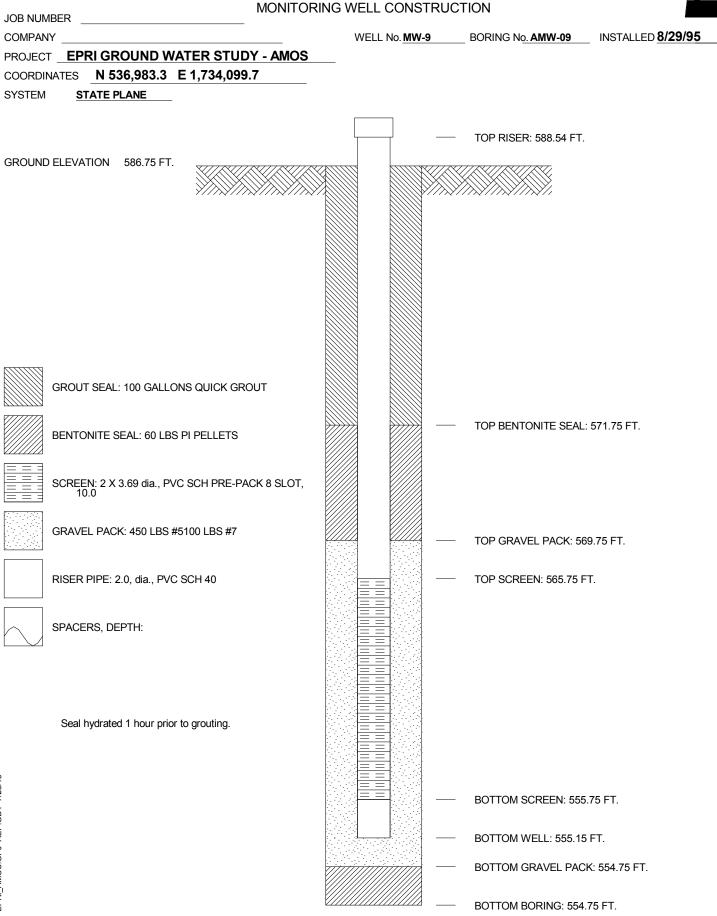


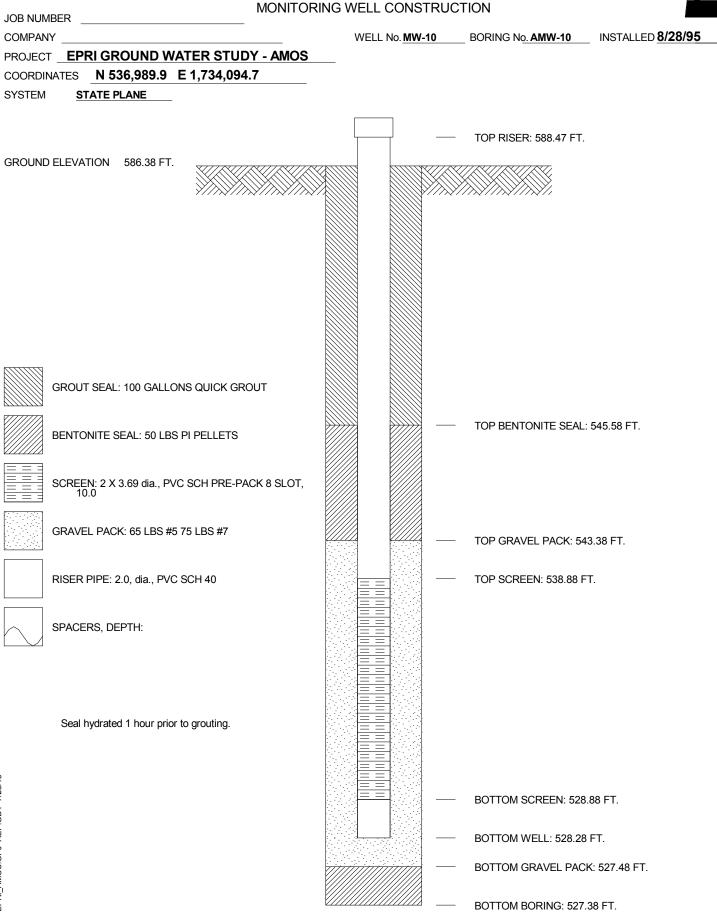










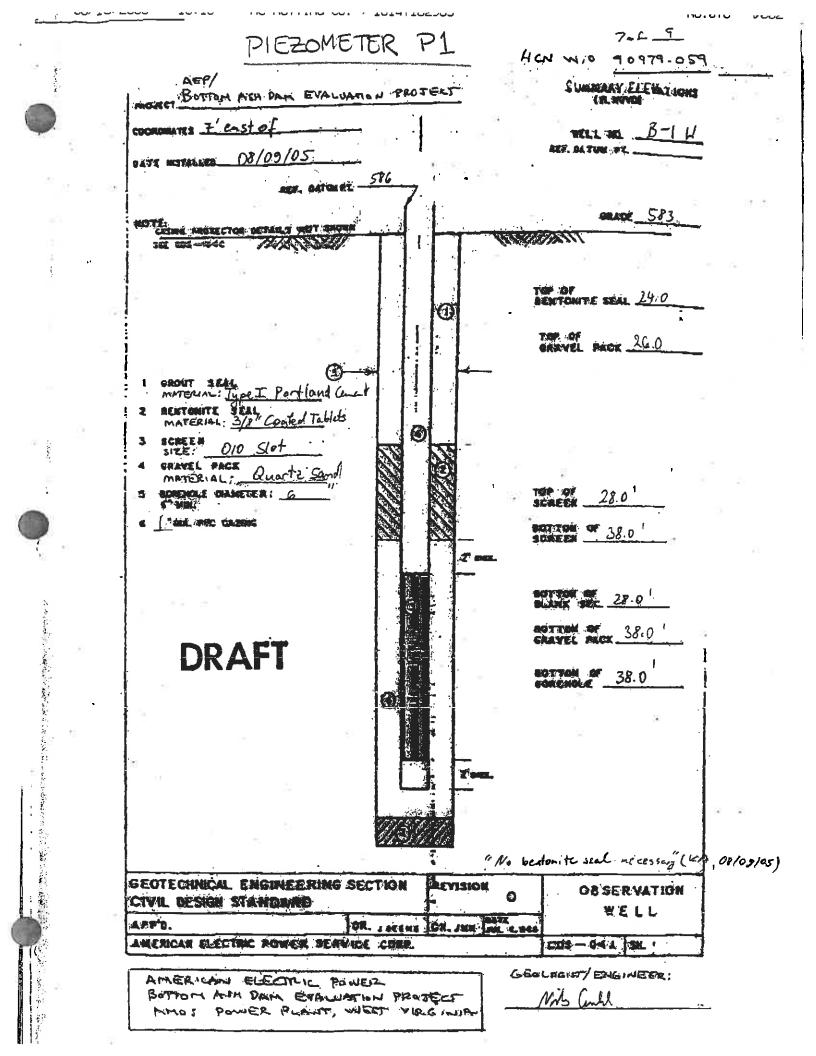




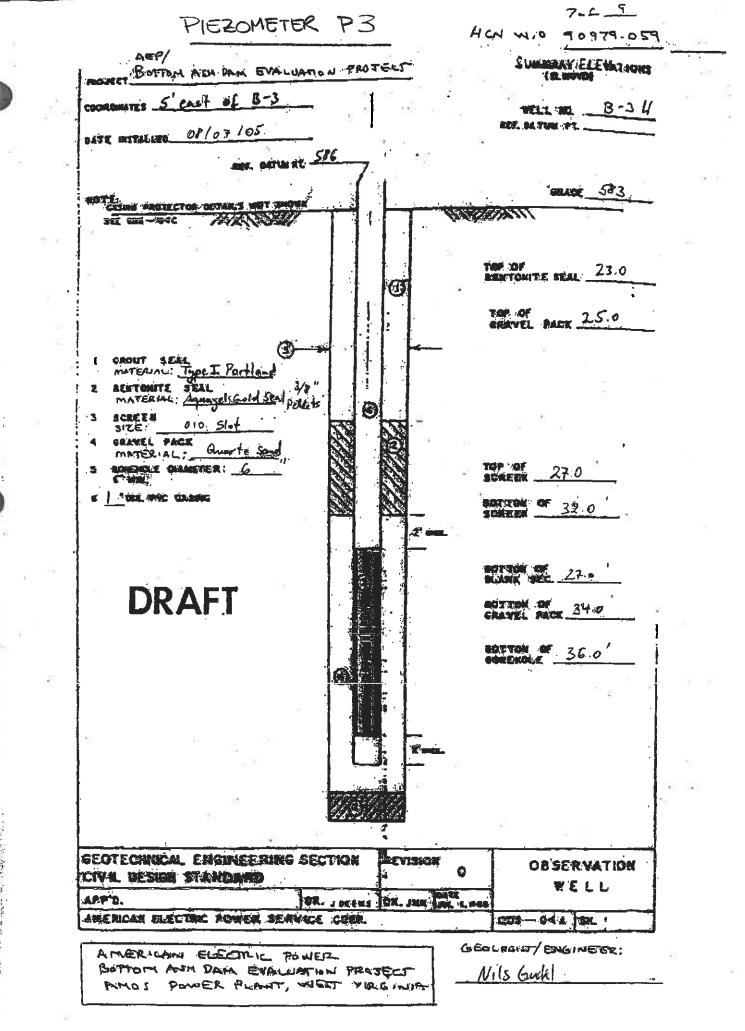
Geo/Environmental Associates, Inc. 2005

Piezometer Construction Diagrams

P1, P3, & P6



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7-6-9 PIEZOMETER PG HCN NO 90979-059 AEP/ SUMMARY ELEVATIONS MONET BOTTOM ASH DAM EVALUATION PROTECT ( SLAGVOL COORDINATES 6 West of B-6 WELL THE B-6 H AST. OL THE ML. 08/06/:05 SATE MITALEED. ART. DATIN AL SEC GRADE S83 ANDRECTOR DETAR I NOT DOWN SHE ENS-444C TOP ST BENTOMTE SEAL 10.5 Ð BRAVEL BACK 13.0 (D 1 GROUT SEAL materin: TypeI Partland Come BENTONITE SEAL MATERIAL: Aquasel Gold Seal (3) 2 S) · Pates) SIZE DIO SIST х MATERIAL; Qualt' Snod TOP OF 15.0 6 C 1 CONCINCTING SCREEN 25.0 21 15.0 DRAFT STATEL MEX 27.0 ...... and the second  $\langle t \rangle$ and a local and a second GEOTECHNICAL ENGINEERING SECTION Incrusion OB SERVATION 0 CTVIL DESIGN STANDARD 戦害しし SH. JOCEES DH. JAN AN. C. BES 427D. AMERICAN ELECTRIC POWER SERVICE CORR. COS - 04 1 191. GEALAGIST ENGINEER; AMERICANI ELECTRIC POWER BOTTOM ANT DAM EXALUATION PROJECT Nils Guhl MMOS POWER PLANT, WEET VIRGINUR



H.C. Nutting Company 2005

Test Boring Logs

B-1 to B-8, B-11

	23::	18	HC NUTTING CO. → 1614716	2703		IAI							
			H.C. NUTTING COMPANY APPALACHAN REGION - 812 MORRIS STREET	T	T	DJ-		TFS	T RA		NC		ige 1
			CHARLESTON, WV 25301 (304) 344-0121 FAX (304) 342-4711		-						NG		Dade de /a
	OTECHNICA	and the second s	INCOYEE OWNED	័ព	LUNKEN I JTAMACH SE (613)	ARK DRVI OH 48232 46816	COLUMBUS, SH 4323 (014) 003-3113	IBDS 10 (91004/3)       INC 1914450 (191604/3)       INC 1914450 (191644578         B-1       B-1         d       8/8/2005         No.       90979.059         SAMPLE       REC.       ROD W       LL       PI         GLOWS/6"       REC.       ROD W       LL       PI       HCS1         7-9-9       40       I       Interface       Interface       Interface         5-6-5       100       Interface       Interface       Interface       Interface         3-4-4       80       Interface       Interface       Interface       Interface         3-4-4       73       Interface       Interface       Interface       Interface         80       Interface       Interface       Interface       Interface         1-2-1       100       Interface       Interface       Interface         100       Interface       Interface       Interface       Interface         Water Level Observations       Interface       Interface       Interface       Interface         Intractilizet       24.0       Interface       Interface       Interface       Interface         Interface       24.0       Interface       Interface					
Client			merican Electric Power		(A), (613) 3	Boring	FAX (FIN) BID 6475	F.	NC (812) 336	-10(1		FAK (I	617) 435-801
Project	t	_	ottom Ash Dam Evaluation - Amos Plant, 1	W			Started	8/8/200					
	Location				_	Date C	Completed	8/8/200	5				
Elevati ELEV.			EP Boring Location Plan			Work	Order No.						
ft. 583.00	ft.	cotor, r	DESCRIPTION OF MATERIALS naterial description, melsture, stiffness/censity/hardr (visual classification unless otherwise noted)	1	ю. Гт	DEPTH		6" REC	ROD		1 -		HCSI
582.60	0.4	22	0.4 Topsoil with organics		╼┼╌	S 0.0-1.5	700		1-	<u> </u>	<u>†~</u>		
581.00	2.0		1.6 FILL: BrownIsh gray, silty sand with gravel (SM) nonplastic, dry, medium dense				(18)					$\vdash$	
		$\mathcal{D}$	FILL: Reddish brown and gray, lean clay (CL) (shale fiil), dry - very moist stiff - medium stiff										
			some semi-durable shale fragmeni	s 2	2 S	S 5.0-6.5		100				-+	-+
		D.	at 5.0'									$\neg$	
		B					<u> </u>				$ \downarrow$		_
			<ul> <li>little sandy shale fragments at 11.0'</li> <li>very moist from 11.0'</li> </ul>		+		(8)	+		_	-+	_	
					S	[ 11.5-13.5	5	85		_	-		$\downarrow$
568.00	_15.0 *		FILL: Reddish brown, blueish gray. and yellowish gray, ciayey gravel with sand (GC) (gravel=sandstone	4	ss	15.0-16.5		73	+			+-	
		$\lambda$	fragments), moist - very moist, loose	·									
		2,	dense	2	ST	17.5-19.5		80		D	R	4	FT
				5	ss	20.0-21.5	3-17-22 (39)	60					
559.000	24.0	2_		6	5\$	22.5-24.0	5-10-8 (18)	100		+	$\overline{+}$	+	-
		3		7	ŝŝ	24.0-25.5	1-2-1 (3)	100					
555.50	27,5	<b>A</b>	- abundant non-durable to semidurable shale fregments Gray, LEAN CLAY with SAND (CL).			ļ							
6414005		4.0	wei, very soft	8	SS	27.5-29.0	WOH-WOH WOH	100					0.2
	31.5	IJ	Gray, SILTY SAND (SM) low plasticity	3	ST	29.5-31.5		100					
551.50	K	4.5	to non-plastic, wet, very loose - loose	9	SS	31.5-33,0	1-2-2 (4)	100	$\square$	T	Ţ	$\overline{-}$	$\Box$
E Gene	ral Notee		Remarks										
Driller	HCN	_	Located boring 1' off edge of Rd. (approx.	7' off i	Rd. CI	.) on naturel	side of Imm		r Level			lons	- T
Kig No Rig Type Method	J. Johnso ATV	<u>n  </u>	dam. vvater at completion measured through	iah the	e avoe	rs. Boring c	AL to heve	ompletio	n		_		_ีก. ⊽
Method	SS/ST	<u> </u>	34' after 24 hrs. Installed MW with screen 8-1.	trom 2	28' lo :	18' in hole 7'							_n.▼

5	H.C. NUTTING COMPANY APPALACHIAN REGION - 912 MORRIS STREET			LC	)g of	TESI	r BC	RI	NG		ige 2	2 01
GEOTECHNICA	CHARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711	CINCIN CINCIN	NRATE CÊN (EN PARK NATL OH 4 N 821-8611 S12) 921-86	1745 CENT DANE 7301 4230 COLO	AL ONO REGION MORRIDON ROAD UNBUR, OH 49250 814) 883-8115 X 1914 853-8475	S43 WA LAWRY	CANA REALANT STRI ENCEBURG (412) 00044 (412) 535	CHON: EE7, STE L IN 4702 500	EB 4	9LUE3 76-8 CON LEXING (169	RASS RE WAY CT. 1014, KY 1435-45. 89) 435-15.	, 87E 4051 1 10
Cilent	American Electric Power			Boring No			<b>B</b> -	-		PAC	03) 436-1	30
Project	Bottom Ash Dam Evaluation - Amos Plant, WV		<u> </u>	Date Star	-	8/8/200				<u> </u>		
Boring Location		_		Date Con	-	8/8/200	_					
Elevation Ref.	AEP Boring Location Plan			Work Ord	• -	90979.0						
ELEV. DEPTH	DESCRIPTION OF MATERIALS					SAMPLE						
ft. ft.	color, material description, molsture, stiffness/density/hardness (visual classification unless otherwise rated)	NO.	TYPE	OEPTH (	BLOWS/6 (N Value)		RQD %	w *	LL %	P! %	HCSI	Pf E
547,00 36.0	- little organics (wood framents) throughout	10	SS	35.0-36.5	4-8-6 (14)	100						
	Gray, SILTY SAND with GRAVEL (SM) (grave=sandstone fragments) non-plastic, wet, medium dense - loose											
<u>542.50 40.5</u>	- cobbles at 38.0' to 39.0' - trace organics (peal) Gray, SILTY SAND (SM) non-plastic,	11	SS	40.0-41.5	2-2-3 (5)	67				-	_	
	wet, loose 4.5 - trace cost fragments and organics				(0)							
538.00 45.0	(pest)											
	Gray, POORLY GRADED SAND with SILT (SP-SM), wet, loose	12	SS	45.0-46.5	3-3-2 (5)	100		~		-+		
	- trace organics (peat)			-				D	R	A	F	ſ
		13	ss	50.0-51.5	3-3-7 (10)	100			+	-+		
529.50 53.5	<ul> <li>little gravel (sendy shale fragments)</li> <li>at 51.5'</li> </ul>							-+			-	
	Blueish gray and reddish brown, LEAN CLAY with SAND (residual SHALE), wet - moist, stiff - very hard			· · · ·								
	5.0	14	SS	55.0-56.5	5-10-26 (36)	100			$\downarrow$	$\downarrow$	_	
24.50 58.5		15	ss	57.5-58.5	26-50/0.5	100	~+	-+-		-+-		
	BORING COMPLETED @ 58.5'				20-30/0.5		-+		-	+-		
F												
F												
F												
General Notes												
iller <u>HCN</u>	Toritorica	. <b>M</b> ID -	- 01-5		[.		r Leve			tions		
No. J. Johnso		the a	erenu	Borton on	ad at . At C	ediate omplotio	. —		24.0		_ft,	
Type ATV	34' after 24 hrs. Installed MW with acreen from	m 28'	to 38'	in hole 7' en	st of After				24.2 Him	33.0	ft.	
thod <u>SS/ST</u>	<u>B-1.</u>					Brused i		 0		<u>33.</u> 1.5	<u>г</u> п. ћ.	*
pector <u>NG</u>						BF = BAC		NN C		WAT		

Ø8/1	4/2005
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23:18

s.

					H.C. NUTTING COMPANY					· · · · · · · · · · · · · · · · · · ·					Pa	age 1	l c
		AIC N			APPALACHIAN REGION - 912 MORRIS STREET CHARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 PLOYEE ONMED	011 L	IPORA I JNKEN CINKA IST3) 82	PARK 13 0H 46	'EA CEN' AIVE 799 238 COL	DG OF	بن پیروسر اورسر		DON BET, STE		BLVEG 70-8 COM LEXING	RA23 R2 WAY CT, TCN, KY	. ST
		_			WENTAL AND TESTING ENGINEERS SINCE 1921		UL (613)			(814) 883,3113 V. (814) 885,0679		X (#12) 530	4301	_	FAX	30) 406-1	jes:
	Client				erican Electric Power			-	Boring N	-		<u>B-</u>	2				
	1	u 1 Locati		001	tom Ash Dam Evaluation - Amos Plant, V	<u>vv</u>	~	-	Date Sta Date Cor		8/1/200				<b>-</b>		
		tion Ref		AEF	Boring Location Plan			-	Work Ord		8/2/200						
	ELEV	_	_						THUR ON	the second second second second second second second second second second second second second second second se	SAMPLE				<u> </u>		—
	ft. 583 0	n. 01 0.0	`	color, me	DESCRIPTION OF MATERIALS Kertal description, molsture, softmess/density/hardin (visual classification unless otherwise noted)		о. Iт	YPE	DEPTH	BLOWS/	· · · · · ·	RQD	W %	LL %	РІ %	HCSI	1
		Ļ		$\overline{A}$	FILL: Brown, silty sand with gravel (SM) nonplastic, dry - moist, dense		-	55	0.0-1.5	28-25-1 (42)	· · · · · · · · · · · · · · · · · · ·	//	70			<u> </u>	┞
		F	Ê	$\Delta$	i.5		T										ŀ
		-															
	577.50	<u>5.5</u>	┦	A	FILL: Reddish brown, lean clay with sand (CL) (shale fill), dry - moist, stif	2		is	5.0-6.5	7-6-7 (13)	67	┟╌╴┤	-+				╞
1		F			very stiff	1	5	π	6.5-8,5		100				- [		 
		-					+	+							-+	-	
		F		Ŋ.	<ul> <li>little friable sandstone fragments at 10.0°</li> </ul>	3	s	s	10.0-11.5	5-6-10 (16)	100						-
		F		A 15	5	2	s	т	11.5-13.5		100						
		F					┥		6	<u>_</u>	-	+	D	R	A	F	
	•	4	Ø		- multi-colored, moist, and trace	4	S	s ·	15.0-16.5	4-11-8 (19)	100					-+	-
		-			organics (grass/roots) at 18.0'	3	ร	r   1	6.5-18.5		100	_		T	T		
														╈			~
$\left  \right $	562.00	21.0	K		FILL: Reddish brown and gray, sandy lean clay with gravel (CL)	5	s	3 2	0.0-21.5	3-4-14 (18)							
		-			(gravel), moist - wet, medium stiff - stiff	4	SI	2	1.5-23.5		60			$\downarrow$		$\downarrow$	
	ļ	-		7.5	- VARY ARTIVALLY ALC: A	6		+		8-10-7						$\downarrow$	
	Ť	-			- wet from 26,5'	<u> </u>	SS	┢	5.0-26.5	(17)	80			+-		-	
-	554.50	<u>28.5</u>	Ĥ	4-	Gray, SANDY LEAN CLAY (CL), very	5	ST	-20	5.5-28.5		90	~	+-	$\downarrow$	_	_	
	<u>552.50</u>	<u>-30.5</u>	Щ	2.0	moist - wet, soft Gray, SILTY SAND (SM) nonplastic,	7	ss	31	0.0-31.5	1-2-4		4		+-	+-		
	F		/	4.5	wet, loose			ļ"		(6)	100		+-	╀	┿	+	_
5 D R R M In	48.00	35.0															
Ľ		eral No	tes	┺╼┲	Remarks		_	L		- <u> </u>	Nat-t-		1				
D	filer	нс		- L	ocated boring 2' off Rd. CL on natural da	m skie	No	indic	ation of vo	id Imn	wata Jediate	r Leve		ervai 26.5	uo <b>ns</b>	fl.	ς.
R	ig No. Ig Type	D. Sn AT		- 4	oted in NQ2 #2. Material probably washe	d out (	due t	she o	ort run.	At C	ompletio	n		18.0		_ ft.	
M	leihod	NQ2/S		-  -				_		Afte	r	2	4	Hrs.	16.0	<u>F</u> t.	۷
	spactor			~ H						Wai	er used i	n drillia			5.0	Ĥ.	

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	ICI TECHNICA		APPALACHIAN REGION - 912 MORRIB STREET CHARLESTON. WY 26301 (304) 344-0821 FAX (304) 342-4711 EMPLOYEE OWNED INMENTAL AND TESTING ENGINEERS SAICE 1921		CHCN CHCN	28478 CEA KEN PARK NATL OF A 27 22 1-05 1 5 13 32 1-07	ITER CEN DRAVE 780 0228 col B	DG OF	t s Ses wi Lawit		01254 (BET. 87) 2 94 470)	64 A	BLUGA *0-8 CON LEXING (154	nast re	. 378 94 40\$13 19
Client		<u>A</u>	merican Electric Power				Boring N	io.		B-	2				
Project		_ <u></u> B	ottom Ash Dam Evaluation - Amos Plan	e, wiv		_	Date Sta	rted	8/1/200	5					
Boring L	ocation						Date Cor	mplated	8/2/200	5					
Elevatio	Ref.	A	EP Boring Location Plan	_			Work Or	der No.	90979.0	159					
ELEV.	DEPTH		DESCRIPTION OF MATERIALS	· -			<u></u>		SAMPLE						
ft.	ft.	color, i	material description, moisture, attimess/density/ha (visual classification unless otherwise noted)		NQ.	TYPE	DEPTH	BLOWSA		1	W	LL.	Pi	HCSI	PPR
		• • •	Gray, POORLY GRADED SAND	with	8	SS	n. 35.0-36.5	(N Value 2-2-2	) %	*	%	%	*		ts1
ļ	-	••••	SILT (SP-SM), wat, very loose - I	oose	-	33	35.0-30,5	(4)		<b> </b>					
	-	••••													
ŀ				Γ	9	SS	40.0-41.5	10-10-9 (19)	80						
		••	15.0												
-		•••			10	SS	45.0-46.5	3-2-4 (6)	67						
		•••									n	D	A	C 1	-
F	[.											Ŋ	4	<b>F</b>	
533.00	50.0		Gray, SILTY SAND with GRAVEL						$\downarrow$		$\downarrow$	_			
F			(SM) (gravel=sandstone fragments nonplastic, wet, medium dense	».   <sup>1</sup>	11	SS	50.0-61.5	4-5-11 (16)	80		_				
F	ł	·/ '	40												
29.00	54.0	$\overline{\mathbf{H}}$	Gray and brown, LEAN CLAY with				Ì								
27.00	56.0		2.0 SAND (CL) (residual sendy SHALE wet, very stiff - hard		2	ss	55.0-56.0	26-50/0.5	90		-+	4	_		
	56.4	\$	Gray, sandy SHALE, completely to highly weathered, extremely soft -		-+			20-50/0.5	190		-+-	+	-+-	+	
-  -			Reddish brown, CLAYSTONE, completely to highly weathered, extremely soft - very soft	-/ ,	1	NQ2 !	56.0-60.4		98	0			0	-1	
<u>2.00 e</u>	<u>1.0 X</u>	전_		2	1	102 E	50.4-61.0		0	0	╇	+		<del>.</del>  -	
-			BORING COMPLETED @ 61.0								-		1	+	-
Gener	El Notos		Rema	rka											
riller	HCN	_	Localed boring 2' off Rd. CL on natural		da I	No ind	cation of	ы I		r Lova			lions	_	
g No. 📃	D. Smith	_	noted in NO2 #2. Meterial probably was	shed ou	t du	e to sh	ort run.		ediata ompletio		_	<u>28.5</u> 16.0		t.	¥
	-														
ід Туре 📜	ATV 02/SS/S	<del>,</del>						Afte					16.0		

[ .

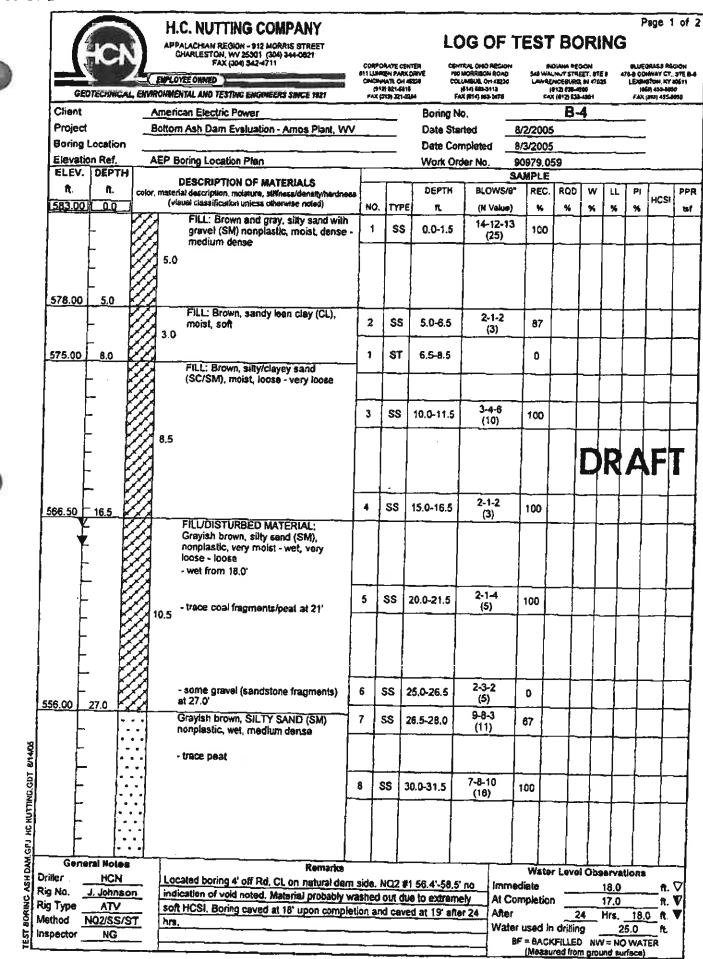
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	4	0	Ĩ		H.C. NUTTING COMPANY PPALACHIAN REGION - 912 MORNIS STREET CHARLESTON, WW 25301 (304) 344.0021				LC	)G OF	TES	ST BO	DR	NG		3 <b>0</b> e -
	_	CHINCA	L, ENM		FAX (204) 342-4711 LOYEE OWNED MENTAL AND TESTING ENOINEERS SINCE 1921	6911 QB	UNICENP		E 790 COL	/RAL DHQ REON MO4RISCH ROA UHBUS, OH #521 (814) #53-3113 X (814) #53-0476	D 34	PICIANA AG WALNUT STF WRENCEBUR (812) 591- FAX (812) 53	LEET ST 0, IN 470 4300 194501	E1 4 23	76-B CON LEXING (85)	MASS N WAY GT TON KY R AGE-BE 850) ASS
CI			_	_	arican Electric Power			. '	Boring N	<b>0</b> .		B	3			
	ject			Bott	om Ash Dam Evaluation - Amos Plant,	<u>w</u>		, I	Date Star	rted	8/7/2	005	-			
	ing Lo vation I		_						Date Con	•	8/7/20			<u> </u>		
	EV. D	-			Boring Location Plan	1-	_		Work Ord	ler No.	90979 SAMPI					_
f		ft.		'. mai	DESCRIPTION OF MATERIALS Lerial description, moisture, stiffness/density/hard		T		DEPTH	BLOWS			W	Tu.	PI	
563	.001	00		(	(visual clausification unlace chowice noted)		о.   п	PE	ft.	(N Velu	- 1	6 %	56	1%	%	HCSI
	7			3	FILL: Brown, silty sand with gravel (SM) non-plastic, dry - moist, medi 0 dense	im _	1 5	is i	0.0-1.5	4-9-7 (16)		0			Ť.	
580	.00	3,0			FILL: Reddish brown and											
	L				multi-colored, lean clay (CL) (shale fill), moist, medium stiff - very stiff				1							
	F					2	s	s s	5.0-6,5	7-4-4 (8)	9	3				
	Ē	i				1	s	те	5-8.5		80					
	F			13.	5 - little sandstone/sandy shale											
			Ĵ		fragments	3	SS	5 10	.0-11.5	4-3-6 (9)	93			_	_+	
	F		ß			2	S1	r   11.	.5-13.5		100			R		
	+		Ŋ			·				3-7-9		$\downarrow$	4		1	
566.5	0 - 10	<u>5.5</u>	A		FILL: Brown and gray, clayey gravel	4	SS		0-16.5	(16)	100		_			
	Ŧ		$\beta$		with sand (GC) (gravel=sandstone fregments), moist, medium dense	3	ST	16	5-17.0		100	╞╼╌╊				7
	F	Ē	$\beta$	5.5	- very gravelly at 20.0°	4	ST	18.	5-20.0		67					
561.0	22	<u>.</u>	A		- clay component vary moist to wet and soft at 21.0' to 21.5'	5	SS	20.0	21.5	11-6-5 (11)	80					$\downarrow$
	F	Ê	Ð.	4.0	FILL: Brown and gray, silly gravel with sand (GM) (gravel=sandstone fragments) non-plastic, vary moist,	6	SS	22.0	-23.2 7	-17-50/0.2	2 117	┝╌┼	_	_	—	_
557.00	26.		A		medium dense - very dense - thin clayey gravel seams	7	ss		-26.5	38-19-6			-+-	_	+	_+-
<u>555.50</u>	27.	5	20	1.5	FILUDISTURBED Material: brown and greenish gray, clayey gravel with sand (GC) (gravel=sandstone	8	55 55	┣	-28.0	(25) 4-2-2	100 87		+		+	
ş	$\overline{F}$	K	<b>7</b> 7	<u>2.0</u> 2.0	fragments), wel - very moist, very loose FILUDISTRUBED MATERIAL: gray,	9	<b>S</b> S	28.0	-29.5	(4) 3-1-2 (3)	47		+	+	┿	-
5	<u>30.</u> -		ΪĮ,	.5	lean clay (CL), slight organic odor, wat, soft	5	डा	30.0-	32.0		100		┾	+	+	╪
550.50	- <u>32.</u>	₽	Щ.		recrish gray, sity/clayey gravel with sand (GC/GM) (gravel⇒sandstone (regments), wet, very loose	10	58	32.0-		2-5-4	100		+-	+-	+-	+-
SHILL 550.50 G Driller Driller	  ,	Ľ			Gray, LEAN CLAY with SAND (CL). wet, very soft - soft	+				(9)	+		+	+-	╀╾	+-
E) G Driller Rig No.		Notes HCN ohnso	_	Le	Remarks ocated boring at edge of Rd. (approx. 6'	off Rd	CL) 0	n natu	mal side o	1 <u>f</u> Imn	Wa Wa	ter Leve		ervati 26,0	iona	
Rig Typ Method	<u>,,,</u>   /	<u>onnso</u> ATV	<u>n</u>	08	m. STK3 failed due to presence of grav presence of gravel. Installed MW with s	el STE	4 terr	unster	1 of 201 de		Complet	ion		17.5		ft. \ ft. \
Method		ISS/S	-	1	A REAL PLANE, THE REAL MAA MULT	icreen l	rom 2	7.0° to	32.0' in t	hole Afte	1	2	4	Hrs.	00.5	

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	1CN	H.C. NUTTING COMPANY APPALACHIAN REGION - 912 MORRIS STREET CHARLESTON. WY 25301 (304) 3040821			L	DG OF	TES	T B	ORI	NG	Page	2
GEO	TECHNICAL,	FAX (304) 342-4711 EMPLOYEE OWNED ENVIRONMENTAL AND TESTING ENGINEERS SINCE 1921	CINE CINE	PORATE C INIGEN PAR (INIGEN PAR (INIGEN PAR (INIGEN PAR (INIGEN PAR (INIGEN PAR)	ik DRIVE 73 FeSZO GG I W	NT-RAL, OHO REGION 10 MORESON ROAD 21.JHNUUS, OH 43230 1014) UG-2113 7AL (014) 102-0175	Liw		REET. STE 10. IN 47021 4300	8 470- L	LUEGRADI 5 CONWAY EXINGTON (459) 455 FAT (659) 4	C7.9 KY 40
Client	-	American Electric Power			8oring 1	No.		B				
Project		Bottom Ash Dam Evaluation - Amos Plant, W	v		Date St	-	8/7/200					
Boring L	ocation				Data Co	mpieted _	8/7/200					
Elevation	n Ref.	AEP Boring Location Plan		,	Work Or	-	90979.					
ELEV.	DEPTH	DESCRIPTION OF MATERIALS					SAMPLI					-
ft.		color, material description, moleture, stiffness/density/hardne (visual classification unless otherwise noted)	\$\$ N	). TYP	DEPTH	BLOWS/6		ROC	W 16		PI HC	Si
		- trace wood and coal fragments at	+	-			-		┼┈┼			-
		34,0 Gray, SILTY SAND (SM) non-plastic, wet, loose (LAYER CONTINUED DESCRIPTION REPEATED)			35.0-36.6	(6)	100	<u>}</u>		-+	+-	
	-	12.5 - trace peat										
			12	SS	40.0-41.5	2-4-6 (10)	100					
538.00	45.0											
		Gray, POORLY GRADED SAND with SILT (SP-SM), wet, medium danse	13	SS	45.0-46.5	5-6-5 (12)	100					1
									D	R/	4F	
	   	9.5 - trace coal fragments at 50.0'	14	SS	50.0-51.5	4-6-14 (20)	100			+		
526.50	54.5											
		Blueish gray to reddish brown, LEAN CLAY with SAND (CL) (residual 3.8 SHALE), very stiff - very hard	15	SS	55.0-56.5	21-44-25 (69)	100			-	-	╞
			<b></b>			(03)	┼╌╌╋		╶╌┼╌╸			┝
524.70 - 5	83	4	16	SS	57.5-58.3	30-50/0.3	100			+	<u> </u>	┝
<u>522.40 6</u>	0.6	2.3 CLAYSTONE, completely to highly weathered, extremely soft - very soft Blueish gray, SANDY SILTSTONE,	1							<u>+</u>		
<u>519.70 - 6</u>	3.3	2.7 Slightly weathered, soft - medium hard		NQ2	58.3-63,3		100	25			0-3	
Ganera		BORING COMPLETED @ 83.3'										~
Ganera	I Notes											
Driller	HCN	Remerks	KDJ -	<b>N</b> 1 k -				r Leve	i Obee			
Rig No, J.	Johnson	Located boring at edge of Rd. (approx, 5' of dam. ST#3 failed due to presence of gravel	. ST#4	termi	nated at 201	due lato	diate		_	3.0	fl	. 1
Rig Type	ATV	to presence of gravel, installed MW with sci	een fr	om 27	0' to 32.0' in	hole After	mplatio	·		7.5		
Method NC	12/55/51 NG	5 east of B-3.					r used i			тв. <u>2</u> 35.0		
	FILS										ATER	

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Client Project Boring Lo Elevation	DCation 1 Ref. DEPTH ft.	Ame Bott AEF	MEMTAL AND TESTING ENGINEERS SINCE 1921 erican Electric Power tom Ash Dam Evaluation - Amos Plant, WA P Boring Location Plan DESCRIPTION OF MATERIALS storad description, maisture, stiffnast/density/hardnas (visual classification unless otherwise noted) 5.0 Gravish brown, SILTY SAND (SM) nonplastic, wet, medium dense (LAYER CONTINUED DESCRIPTION REPEATED)	, 		Boring N Date Sta Date Co Work Or DEPTH	rted 8/ mpleted 8/ der No, 9/ BLOWS/8* (N Value)	2/2005 3/2005 3979.02 MPLE REC. % 100	;		L %	P1 %	HCSI	2
Project Boring Lo Elevation ELEV. fl.	Ref. DEPTH ft.	Bott	tom Ash Dam Evaluation - Amos Plant, WA P Boring Location Plan DESCRIPTION OF MATERIALS areful description, melsairc, stiffnass/density/hardnass (visual classification unless otherwise noted) 5.0 Gravish brown, SiLTY SAND (SM) nonplastic, wet, medium dense (LAYER CONTINUED	• NO		Dete Sta Date Cor Work Or DEPTH it.	rted <u>8</u> / mpleted <u>8</u> / der No, <u>9</u> ( SA BLOWS/6* (N Value) 6-8-5	3/2005 979.0 MPLE REC. %	59 RQD	w			HCSI	1
Boring Lo Elevation ELEV. fl.	Ref. DEPTH ft.	AEP cotor, ma	Boring Location Plan     DESCRIPTION OF MATERIALS     xertal description, maissure, stiffnass/density/hardnass     (visual casefficcition unless otherwise noted)     5.0 Grayish brown, SILTY SAND (SM)     nonplastic, wet, medium dense     (LAYER CONTINUED	• NO		Date Cor Work Or DEPTH it.	mpleted 8/ der No, 94 BLOWS/6* (N Value) 6-8-5	3/2005 979.0 MPLE REC. %	59 ROD				HCSI	-
Elevation ELEV. fL	Ref. DEPTH ft.	cator, ma	DESCRIPTION OF MATERIALS serial description, melsure, stiffnass/density/hardnas (visual classification unless otherwise noted) 5.0 Grayish brown, SILTY SAND (SM) nonplastic, wet, medium dense (LAYER CONTINUED	NO		Work Or DEPTH	der No, 90 SA BLOWS/8* (N Value) 6-8-5	979.0 MPLE REC. %	59 ROD				HCSI	
ELEV. fl.	DEPTH ft.	cator, ma	DESCRIPTION OF MATERIALS serial description, melsure, stiffnass/density/hardnas (visual classification unless otherwise noted) 5.0 Grayish brown, SILTY SAND (SM) nonplastic, wet, medium dense (LAYER CONTINUED	NO		DEPTH It.	SA BLOWS/6* (N Value) 6-8-5	MPLE REC.	ROD				HCSI	
fL	ft,		<ul> <li>Kental Gescription, melsture, stiffnass/density/hardnass (visual classification unless otherwise noted)</li> <li>6.0 Grayish brown, SILTY SAND (SM) nonplastic, wet, medium dense (LAYER CONTINUED)</li> </ul>	NO		ñ.	BLOWS/6" (N Value) 6-8-5	REC.					HCSI	ſ
540.00	-		5.0 Gravish brown, SILTY SAND (SM) nonplastic, wet, medium dense (LAYER CONTINUED				6-8-5	┿╾┷	<b> </b> *-	%	%	<u>%</u>		ι.
540.00	-	•••				1		<u> </u>				-		
<u>540.00</u>	}		little and formatic and next at 44.0	10	ss	40.0-41.5	7-9-11 (20)	73						
F			- little coal fragments and peat at 41.0 Gray, POORLY GRADED SAND with											-
-	· • •	• •	SILŤ (SP-SM), wet, medium dense				4-7-5				_			
F	-		0 - trace coal fragments at 46.0°	11	SS	45.0-46.5	(12)	73						
<u>33.00</u>	-										K	Ą		ļ
30.00	-	3,	Gray, POORLY GRADED SAND with SILT and GRAVEL (SP-SM) 0 (gravel=sandstone fragments), wet, dense	12	SS	50.0-51.5	5-20-18 (38)	67		-	_	-		_
	53.0	3.	Reddish brown and gray, LEAN CLAY (CL) (residual SHALE), wet - molet, 4 stiff - hard											
26.60 - 5	56.4			13	ss	55.0-56.4	10-27-50/0.4	100				1	$\top$	
		5.1	Reddish brown and gray, CLAYSTONE, completely to highly weathered, extremely soft	1	NQZ	56.4-61.5		69	0				0	
2 <u>1,50                                    </u>	<u>)1.5</u>		BORING COMPLETED @ 61.5									+	-	
	al Notes		Remarka					Wate	er Leve	el Obu	serva	tione		-
lier	HCN	~	Located boring 4' off Rd. CL on natural dar	n side	. NQ2	1 56.4'-58.		diale			18.0		ft,	٢
No. <u>J</u> Type	<u>Johnso</u> ATV	<u>e</u>	indication of vold noted, Material probably	washe	d out d	ue to extrem	nely At Co	mpletic	_		17.0		ft.	
	02/55/5	<del>;</del> – ⊢	soft HCSI. Boring caved at 18' upon compli-	etion	and cav	<u>(ed at 19' al</u>		'used i			Hrs.	18.	<u>0</u> n.	۲

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4			APPA	C. NUTTING COMPANY			LO	GO	F TEST	BC	DRI	NG		age	1 of
GEO	TECHNICAL	1_	C+	VARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 EE ONIMED TAL AND TESTING ENGINEERS SINCE 1121	CINCIN CINCIN (51	20.475 CE 1014 PARM NATL ON 1 91 321-081 6131 321-0	04WE 780 / 1228 COLL	WL 040 AE MORASON R JP903, 044 514) 663-3113 1 (514) 503-64	0AD 348 WA 3230 LAWRE	(Judaia, RE LINUT BTR INCEBURI 012) 530-4 X (012) 631	16, 14: 476 2, 14: 476 1900		76-6 00 LÉXN	08488 RE NWAY CT STON, KY M) 435-86 (134) 435-1	1, BTE ( 140511 140
Client		_		an Electric Power			Boring No	<b>.</b>		8.	5				
Project				Ash Dam Evaluation - Amos Plant, W	1		Date Star	ted	8/3/2005	5					
BoringL	ocation	_					Date Con	npleted	8/13/200	)5					
Elevatio	n Ref	AE	P Bo	oring Location Plan			Work Ord	ier No.	90979.0	59					
ELEV.	DEPTH		ŕ	ESCRIPTION OF MATERIALS					SAMPLE						
ft. 583.00/	lt. 0.0	color, m	nateria	al description, moistura, stiffness/deneity/hardness un classification unless otherwise noted)		TYPE	DEPTH ft.	BLOV		RQD %	w %	۲.L	Pi %	HÇSI	P
			5.5	FILL: Brownish gray, sity sand with gravel (SM) nonplastic, moist, dense medium dense	1	SS	0.0-1.5	10-1: (3)		 					-
<u>577.50</u>	- - 5.5			- trace cost fragments at 5.0'				3-4	-3			 			
	-		3.5	FIN: Brown, poorly graded sand (SP), dry - moist, loose - uniform appearance	2	ss	5.0-6,5	(7	- / 100		[				
574.00	9.0			FILL: Brown, poorly graded sand with silt (SP-SM), moist, loose	3	SS	10.0-11.5	2-1			 		 		
	- 2		6.5	- uniform appearance				(5)			D	R	4	F	T
567.50 V	<u>15,5</u>		2.5	FILL: Brown, sity/clayey sand (SC/SM), very moist - wet, loose - wet from 18.0"	4	SS	15.0-16.5	4-3- (5)							
565.00	<u>18.0</u>			- uniform appearance FILL: Grayish brown, silly sand (SM), nonplastic to low plasticity, wat, loose											
61.00	22.0				5	SS	20.0-21.5	1-2- (6)		_	_		_		
ŀ	.			Brown and gray, SILTY SAND (SM), nonplastic to low plasticity, moist - wat, loose - medium dense				_							
Ļ		•••		- trace peat from 26.5'	6	SS	25.0-26.5	5-5-9 (14)							_
		•••													-
+  -  -	•				7	SS	30.0-31.5	4-6-9 (15)		-+		-+		-+	
Gene		• • • • •	7-	Remarks				·							
niller	HCN	-	Loc	cated boring 3' off Rd. CL on natural da	n side	Borin	a caveri et 1/	R ·	wat Immediate	er Lev	ei Ut	16 (			t. V
	J. Johns	on		er 24 hrs.					At Completi	on		17.	_	"	¥
g Type _	ATV								After		24	Hrs	-	w'n	
ethod spector	SS NG								Water used BF = BAG		ing		20 0	ft	

	1Ch		APPALACHIAN REGION - 912 MORRIS STREET CHARLESTON, WV 25201 (304) 3440821 FAX (304) 342-4711	411 LUN	HATE CEA GEN PARK NAT, OH 4	TER CENTI DAVE 700 N	GOF	n Sas Wa		GION SET. STE	1 1 470-	LUEGRASS	¢1
GEO	TECHNICAL		CHIMENTAL AND TESTING ENGINEERS SINCE 1821	(31)	1) 521-54 H	) (	14) 463-3113 (814) 863-0478		(8 12) 539-4 X (812) 99	200		(160) 4684 FAX (169) 43	-65
Client		A	merican Electric Power			Boring No	),		B-	5			
Project		В	ottom Ash Dam Evaluation - Amos Plant, W	V		Date Star	_	8/3/200					
Boring L	ocation			•		Date Corr	-	8/13/200					
Elevatio			EP Boring Location Plan			Work Ord		90979,0			_		
ELEV.	DEPTH							SAMPLE	_				_
ft.	ñ.	colar,	DESCRIPTION OF MATERIALS melensi description, moisture, stillness/deneky/hardne (visual classification unless otherwise noted)	IS NO.	TYPE	DEPTH fl.	BLOWS/6 (N Value)	1 -	ROD %	W %	LL %	PI %	s
	-	• • •	Brown and gray, SiLTY SAND (SM). nonplastic to low plasticity, moist - wet, loose - medium dense (LAYER CONTINUED DESCRIPTION REPEATED) 32.5 - clayey seam at 36.0'	8	SS	35.0-36.5	2-5-6 (11)	100					
	-	•••	aayoy scam at so.v										
		• • •		9	SS	40.0-41.5	3-5-8 (13)	100					-
	-												
ľ I	-	• • •		10	SS	45.0-46.5	6-8-8 (16)	100			_		
ŀ										D	R	AF	
F	-  .						5-8-11	┽╍┥		-+			
			<ul> <li>little gravel (sandstone fragments) at 51.0<sup>o</sup></li> </ul>	11	SS	50.0-51.5	(19)	100	_	_+		+	
528.50													ĺ
	55.8		1.3 Reddish brown and gray, LEAN CLAY (CL) (residual SHALE), moist, hard	12	SS	55.0-55.8	30-50/0.3	100		+		₋	
Ē		1	BORING COMPLETED @ 55.8				00-00-0.0		-+	+	╶┼╾	+	
1- <u>1</u> - 1- 1-													
	Tal Notes												
Gene riller	H <u>CN</u>	5	Remerke Located boring 3' off Rd, CL on natural dat	n eide	Por:or				or Leve		ervalle		-
-	J. Johned ATV	n	after 24 hrs.		ooning	<u>cave</u> at 18		iediale Ompletia			<u>16.5</u> 17.5 H <i>r</i> s,		fi fi R

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	fici		API	C. NUTTING COMPANY	CONF 011 LUN	ORATE DE	NTER CE				BC	3:0N		BLuck	age 1	0)CI+
	C Olecanac			ITEE OWNED	CINC) (6	HUGT OH 13) 321-36 (613) 321-4	4720 GC 16	01.04004, 0 (814) 885-3 PAK (814) 88	H1 42230	LAWRE	NCEBURG 412 338-4 412 338-4	) (AN 1470 300	a		100 LIT	436(1 10
Client		_		can Electric Power		10 139 3 5 14	Boring I	_			<b>B</b> -			744	(03) 433-4	466
Project	t		_	n Ash Dam Evaluation - Amos Plant, W	v		Date St			/4/2005		<u> </u>				
	Location			Cart Brint Presentation - Feited I Iding 43			Date Co			/5/2005						
Elevati		_		Joring Location Plan			Work O		_	0979.0						
	DEPTH								_	MPLE				<u> </u>		
n.	n.			DESCRIPTION OF MATERIALS risk description, malsture, stiffness/density/hardner			DEPTH	BLO	OW\$/6"	REC	ROD	Tw	11	PI	<u> </u>	PPR
583.00	0.0			sual classification unless otherwise noted)	"   NO		E R.	ON	Value)	%	56	56	1%	34	HCSI	lsf
582.50			0.5		<u></u>			_ <del></del>	-5-4	+	<u> </u>	<del>  ~</del>	<u> </u>	<u> </u>		
582.00			4.5	nonplastic, dry - molst, loose FILL: Brown, sendy lean clay (CL),	7-	SS	0.0-1.5		(9)	100						
<u>577.50</u>	<u>- 5.5</u>	$\mathcal{U}$		FILL: Reddish brown and	2	ss	5.0-6.5		-5-5 10)	87						
	-		5.0	multicolored, lean clay with gravel (CL) (gravel=sandstone fragments) (shale fill), moist, stiff	1	ST	6.5-8.5			85						
<u>572.50</u>	- 			Brown to light brown, sandy lean clay	3	ss	10.0-11.5		-8-7 15)	100						
	-			(CL), moist, stiff	$\left  \right $	<del> </del>		<u> -`</u>		╎──┦						
	-		4	- uniform appearance	1	· ·	1			1		K	A	\F	•	
	L~		8.0	- trace organics (hair roots)				ł				Ĩ			-	
	-				4	ss	15.0-16.5	-	4-8 10)	100		-				4.5
564.50	- 7 <u>18.5</u>	$\square$			2	ST	16.5-18.5			45						
ļ	-	$\int$	3.5	FILL/DISTURBED MATERIAL, silty/clayey sand (SC/SM), wet, loose				<u> </u>								
561.00	- 22.0	$\langle \rangle$		- uniform appearance	5	SS	20.0-21,5	3.4	5-2 7)	100						
	-	711	2.0	Brown, LEAN CLAY with SAND (CL), wet, soft	 											
59.00	<u>24.0</u> -		` <b></b> _	- logged from cuttings and ST Brown, SiLTY SAND (SM), nonplastic, wet, loose	3	ST	23.0-25.0			100						
F					6	SS	25.0-26.5	2-5 (9		100		$\downarrow$	_			
			11.5													
					7	ss	30.0-31.5	2-3- (5)	1	100				Ţ		
		$\Delta$				1										
	eral Note		T	Remarks				·		Wate	r Leve	i Ob		tions	] 6	4
riller in No	J. Johns		Lo	cated boring 3' off Rd, edge (approx, 8')	off Rd.	CL) or	natural dai	m	Imme		_		18.5		ī.	$\nabla$
ig No. g Type	J. Johns ATV	01	84	e. Water level at completion measured	through	h the a	ugers, Insta	lied	1	mpletio			24.5		R	V
ethod	SS/ST	<u>г</u>		W with screen from 15.0' to 25.0' in hole	6' Wes	t of B-	<u>.</u>		After			24	Hrs.	_		
spector	NG									' USOC İI		•		25,0	ft.	
		_		······································					1 81	F = BACI	KFILLEI					

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	tch	ł	H.C. NUTTING COMPANY APPALACHIAN REGION - 912 MORRIS STREET CHARLESTON, WY 25301 (304) 344-0121 FAX (304) 342-0711		11F				_		NG	1	aga 2	
GEO	TECHNICAL		MPLOYEE OWNED	GINCRO CINCRO (INS	en Parks I Iati, Qitat   121-1494	DAUVE 740 % 1224 COLU 1 40	1088150N #048 MBUE, CH 43288 319 MS-31 13	SAD WAL	NCEBURG	EET, STE 5, IN 4792 500		76-8 (C) LC204 (K	MWAY CT GTON, XY 20) <del>455-65</del>	1
Client	Chronic Strop, WY, 201 (200, 54-031)         Concent of each of the analysis o	6												
Project		B	ottom Ash Dam Evaluation - Amos Plant, WV			Dale Star	ted	8/4/2005	5					
Boring	ocation			<u> </u>			·	8/5/2005	i					
Elevatio	Conjunct and prestrike set of the set of t	Work Ord		_	59					•				
ELEV.	CONRESTON, WY SET (DAY SAUGY CONTROL OF AN INFORMATION AND AND AND AND AND AND AND AND AND AN		1000	1 w	<u> </u>		1							
ft.		color,			TYPE		(Ni Value)			*	%	%	HCS	
547.50	35.5	1		8	SS	35.0-36.5		80						
	_	Augustantik regioner in boreke street Deficie under street boreke street bor												
	-	Bit Construction         Construct												
1 1	-	1 t	LOGO OF TESTS BORNING     Provide the series     Provide the se											
	_	Bit Construction         Construct												
	Device for projection         Device for projection <thdevice for="" projection<="" th=""></thdevice>													
	-	Character of Water Statu Status         Convert Corer         Convert Corer         Convert Corer         Convert Corer         Convert Core												
	_	Characterities         Constant density         Constant density <td></td>												
	_ {												}	
	_													
537.00	46.0		Gray, POORLY GRADED SAND with	10	\$ <b>\$</b>	45.0-46.5		80						
	-		SILT and GRAVEL (SP-SM) 3.0 (gravel=sandsione fragments), wet.											
534.00	49.D	•••							Ļ	개	24			
	-	••{				50.0 St 5	5-6-7						<u> </u>	1
	•		LOG OF TEST BORINGS     LOGING THE PART CONTRICT OF THE CONTRECT OF THE CONTRET OF THE CONTRECT OF THE CONTRET OF THE CON											
											ļ			
529.00	24.0	$\Pi$												
527.20	55.8		dry, very stiff - very hard	12	SS	55.0-55.8	40-50/0.3	100						ļ
	-	LOG OF EISE BURKING       LOG OF CIPST BURKING       LOG OF CIPST BURKING       Colspan="2">Colspan="2"       Colspan="2">Colspan="2"       America Burkin Power       Bottom Ash Dam Evaluation - Amos Plant, WV       Colspan="2"       Colspan="2" <th< td=""></th<>												
Driller	HCN		Located boring 3' off Rd. edge (approx, 8'	off Rd.	CL) or	n natural dan	n imn	nediate		rei Ot	18.	5	1	
Rig Type	ATV		MW with screen from 15.0' to 25.0' in hole	6' wes	of 8-			•	<u> </u>	24				
lethod	Client American Electric Power Project Botion Ash Dam Evaluation - Amos Pla Boring Location Elevation Ref. AEP Boring Location Plan ELEV. DEPTH DESCRIPTION OF MATERIALS ft. Color, natural description, masker, elfiness/denative (visual cleantification unless otherwise noted) 547.50 35.5 - Gray, POORLY GRADED SAN 						•	in drill			_			
nspector	<u>NG</u> _							BF = BA	CKFILU	ED N	W = 1	N OI	ATER	

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4	ICN		H.C. NUTTING COMPANY APPALACHAN REGION - 912 MORRIS STREET CHARLESTON, WY 25501 (2004) 344-3421			LC	og of 1	EST	BC	RI	NG		19e -	
GEO	TECHNICAL		FAX (304) 342-4711 MPLOYEE OWNED	CINCI CINCI U	NORATE CE NUEN PARI NUEN PARI NUEN PARI SISI SIT-SI SISI SIT-SI SISI SIT-SI	K DRIVE 130 46236 COL 10	784, OHIO REGION MISERIDON ROAD (MISUR, OH 43230 (14) 693-3115 X (114) 693-3175	LAWRE	(112) 530-4 500 (12) 530-4 50 (12) 530-4 50 (12) 530-4 50 (12) 530-4	667 STI 1 1470 300	E 6 4 26	70-8 CON LEXING (859	RASS 11 NAY (1 70N( 1() 1) 433-40 1521 435	7 7 5
Client		Ar	merican Electric Power			Boring N	0.	······································	B-	7				
Project		Bo	ottom Ash Dam Evaluation - Amos Plant, WV	1		Date Sta	rted _(	<u>3/11/20</u> 0	05					
Boring L	ocation			_		Date Cor	nplated	/11/200	05					
Elevatio			EP Boring Location Plan			Work Ore		0979.0						
ELEV.	DEPTH		DESCRIPTION OF MATERIALS			- <del></del>	1	AMPLE	-7	<del>,</del>	<b>-</b>			-
t.	ft.	color, n	naterial description, moleture, stiffness/density/herdnes			DEPTH	BLOWS/6"	REC.	1	W	1 lt	PI	HCS	1
568.00	0.0	<u> </u>	(visual classification unless otherwise noted)	NO	I. TYP	E R.	(N Vakie)	<u>*</u>	%	%	%	%		-
<u>.567.70</u>	0 <u>,3</u>		FILL: Reddish and yallowish brown, lean clay with sand (CL), dry, stiff 3.7 - some semi-friable shale fragments	1-	SS	0.0-1.5	3-4-10 (14)	100						
564.00	7 4.0		FILL: Gray, poorly graded gravel with silt and sand (GP-GM), wet. loose	-										
	-		5.5	2	SS	5.0-6.5	<b>3-4-</b> 1 (5)	47						1
558.50	9,5		<i>4.</i> 2							D	R	A	F	
335.30			FILUDISTURBED MATERIAL, gravelly lean clay (CL), wet, soft - very	1			3-2-1					_		1
556.00	12.0		2.5 soft	3	SS	10.0-11.5	(3)	40				_		
			Gray, LEAN CLAY (CL), wet, very soft 2.5	-	ST	42.0.45.0	·							
553.50	14.5		Gray, SILTY SAND (SM), wet, very loose - loose		ss	13.0-15.0	1-2-2	100		_	-	-+		ŀ
			- trace organics (wood fragments) at 16'	-	33	13.0-18,5	(4)	100		-	_	-+		ſ
-  -			3.5											
F			- trace friable sandstone fragments	5	SS	20.0-21.5	1-3-4 (7)	100		1				•
545.00	23,0		and little coal fragments/peat at 21'	-						-+				
	•		Gray, POORLY GRADED SAND with SILT (SP-SM), wet, loose											
F	-		- trace coal fragments/peat	6	SS	25.0-26.5	3-4-3 (7)	100						
F														
F		12	2.5											
F			r	7	SS	30.0-31,5	3-2-3 (5)	100					Ţ	
F	-													
	ral Notes													_
Genei Sriller	HCN	•	Remarks			- 41-1			er Leve	il Ob		tions		•
_	). William	ns	Located boring at dam toe, appr. 3.5' above sediment control. Water level upon complete	s créé ation -	K. Hay	SUCK used for		adiate	_ ~		4.0		ft	
Rig Type 🗌	Track		augers before NQ2, 24 hr. water level mea	anueq	through	an the augers	After	mpletic		24	3,0 Hrs.	3.0		
lethod N	102/\$5/5 NG	ST 1	Installed MVV with screen from 40.9' to 30.9	1				r used i				<u>3.0</u> 20.0	<u>ւ</u> ռ ք	

08/:	14/2005	23:	18	HC NUTTING CO.	→ 161471629	963						t	۷D. E
D				I.C. NUTTING CO PALACHIAN REGION - 912 MO CHARLESTON, WY 25001 (20 FAX (304) 342-4711 CAYEE OMMED HENTAL AND TISTING BYGINEE	RRIS STREET 1) 244-0421	CINCING (512	RATE CEN EN PARK ( 1 321-010 1 321-010	12R CENT 18WE 7801 228 COLU	GOF	INI 348 WAL LAWRE	BC	10N ET. 97E 14(4702) 60	s 47
	Client		Ame	rican Electric Powar				Boring No	),		B-	7	
	Project		Botto	m Ash Dam Evaluation	- Amos Plant, WV			Date Star	ted	8/11/200	15		
	Boring	Location						Date Con	pleted	8/11/200	5		
	Elevation	on Ref.	AEP	Boring Location Plan				Work Ord	er No.	90979.05	59		
	ELEV.	DEPTH				L	_			BAMPLE			
			color, mat	DESCRIPTION OF MA erial description, moleture, still			r	DEPTH	BLOWS/8	F REC.	RQD	W	u
	l î.	ft.		visual classification unless of		NO.	TYPE	ft.	(N Value)	· · · · ·	%	%	%
	532.50	35.5	0,0	Gray and multicolore GRAVEL with SAND		8	SS	35.0-36.5	6-16-18 (34)	100			
	1	1	[o_d 2.	5		1							

Project Boring Locatio			Ash Dam Evaluation - Amos Plant, W			Date Star Date Con		<u>8/11/20</u> 8/11/200					•
-	•	460.0					_					-	•
Elevation Ref.		ALP BO	oring Location Plan			Work Ord		90979.0					-
ELEV. DEP			DESCRIPTION OF MATERIALS		<b>-</b> r	DEPTH	BLOWS		<b>—</b> ——	w	1.11	Pf	7
ft. ft.	00	xor, materia (visi	al description, moleture, stittness/density/hardne usi classification unless otherwise noted)	15 NO.	TYPE		(N Value)	REC.		%	и. %	96	
532.50 35.	5			<u> </u>	- <u></u>		6-16-18		+	1	-	<u> </u>	1
	0	°C 2.5	Gray and multicolored, SILTY GRAVEL with SAND (GM) (gravel	8	SS	35.0-36.5	(34)	100	1	ļ	<b> </b>		-
530.00 38.0		o] 2.5	=sandstone fragments), nonplastic to low plasticity, wat, dense				{			6.			3
330.00 30.0	ήŤ	<u>т</u> П	Reddish brown and gray, LEAN CLAY						1	Vi	R/	$\mathbf{A}$	ĺ
F		2.9		, i -					ł				
527.10 40.9			very stiff - very hard	9	SS	40.0-40.9	30-50/0.4	100	1			-	1
	X	X	Raddish brown, CLAYSTONE, completely to highly weathered,										1
E	K	X	extremely soft - very soft										
_		4.8		1	NQ2	40,9-45,7		100	0				
	$\otimes$	3							ĺ				
<u>522.30 45.7</u>	-12	¥	BORING COMPLETED @ 45.7				*	+					ł
<u> </u>		1											
F													ł
<u> </u>										Í			l
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+					Í				1				
General No	<u> </u>	L	Remarks								1		

HCN	Located boring at dam toe, appr. 3.5' above creek. Hay stick used for	Immediate	4.0	n. 🗸
	Remarks	Wate	F Level Observation	5
Seneral Notes				
$\vdash$				
ГІ				

sodiment control. Water level upon completion measured through the

augers before NO2. 24 hr. water level measured through the augers.

Installed MW with screen from 40.9' to 30.9'.

After

At Completion

Water used in drilling

4.0

3.0

Hrs.

3.0

20.0

24

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

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ft,

Page 2 of 2

PPR

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BLUEGRABS REGION 470-9 COMMAY CT., STE. 9-6 LEXINGTON, KY 405-1 (869) 458-359 FAX (859) 456-359 FAX (859) 456-355

			C		A	H.C. NUTTING COMPANY PPALACHIAN REGION - 912 MORRIS STREET CHARLESTON, WY 25301 (304) 344-0821 FAX (304) 342-1711 LOYCE OWNED	911 U	PORATE C	INTER CE	OG (	IN RCAD	540 WA	BC	GION BLET, STI	ED 4	PLUE	GRA2S RE	010N . STE B-0
		SEOTE-	HINCA	LEW	_	MENTAL AND TESTING ENGINEERS SINCE 1021		518 321-0 K (519) 321	818 ·	(#14) 883- FAX (814) 80	3113		(812) <u>536</u> X (812) 536	300	49	jild	(458) 455.863 (458) 455.8	0
	Clier	it		-		rican Electric Power			Boring I	No.	·		8-	8				
	Proje	ect		_	Botte	om Ash Dam Evaluation - Amos Plant, Wh	/		Date St	arted	8	/12/20	05					
		ig Loc							Date Co	mplete	d <u>6</u>	/12/200	)5					
	Eleva	ation F	lef. ЕРТИ		AEP	Boring Location Plan			Work O	rder No	_	0979.0	59		_			
	ft		trin t			DESCRIPTION OF MATERIALS		- 1	DEPTH		_	MPLE	1	T	1		T	
	568.0		п. 0.0	0000	or, mal (	tarial description, moisture, stiffness/denaity/hardnes (visual classification unless otherwise noted)	IS NO	). TYF			OWS/8*	REC.	ROD	W	L LL	PI	HCSI	PPR
	567.7		0.3		<u>he</u>	2 Topsail				-	Value) 50/0.4	100	<b>*</b>	5	<b>*</b>	%	╁╌╾╌┥	taaf
	567.1	-	Q <u>.9</u>			.8. FtLL: Reddish brown, lean clay with sand (CL) (shale fill), molst, madium stiff FiLL: Greenish brown and gray, sandy shale and sandstone COBBLES (drill pressure at 8.0'; 800 psi) - some clayey-soft seams							D	R	A	F	T	
		Ł			8.	6 - some daycy solt seams	2	ss	5.0-6.5		-22-7 (29)	93						
	ſ	F		J.			3	Iss	7.5-7.9		2/0.4							
i		Γ		ZZ,	Å			100		<u> </u>	<u>V0.4</u>	100						
	<u>558.5</u>	0 - 3	.5	4	<b>/</b>	Dark gray, LEAN CLAY (CL) (mostly	-			]								
		F				Ilquid), wet, very soft	4	ss	10.0-11.5	1-WO	H-WOH	100						
		- trace organics (wood) - 7.0 - slight organic odor - 16.5					1	ST	11.5-13.5			D						
-	551.50	<u>  16</u>					5	SS	15.0-16.5	WOH	WOH-1	100						
		-	.			Gray, SILTY SAND (SM), nonplastic, wet, loose	2	SТ	17.0-19.0			55				-+ -+		
			-  -			- trace coal fragments at 21	6	SS	20.0-21.5	2-2 (5	2-3 5)	100						
			•															
			•		16.0		7	SS	25.0-28.5	2-3 (7		100						
61 4/US		  -  -	.   .   .			- trace wood, trace 0,25" coal												
		-	·.	-		fragments, and little gravel (sandstone fragments) at 30'	8	SS	30.0-31.5	<b>4-4</b> (7)		100				-		
5	34.00	- <u>34.0</u>	_															
-		Beer"	<u>.</u>							_							1	
۶ D	riller	neral i F	NO 198 ICN			Remarks							r Leve	I Obs	êrva	tione		1
ใก	lg No.		lillan	is_	30	ocated boring at dam toe, appr. 3.5' above ediment control. Water level upon comple	Cree tion r	K. Hay	stick used for	or	Immed				6.0			⊻
R	g Type		rack		81	ugers before NQ2. Recovery of ST-1 faile	d due	to var	v soft materi	<u>90</u>	At Con After	npletio	_		1.5	•	ħ. 1	V
	ethod		/SS/S	<u>n</u>	F				<u>,</u>	<b></b>	Water	used ir			Hrs.	<u>NA</u> 30	<u>∖_</u> #. π.	1
in:	spector		NG		F							= BACI		2 M	/ = NC	WAT	TER	

4	ich		APPA	C. NUTTING COMPANY LACHIAN REGION - 912 MORRIS STREET IARLESTON W 2500 ( 1041) 344-0821 FAX (3041) 342-4711	CORP	DRATE CEN	TER CENT	G OF 1	ja Ja	OINNA RE	GION		BLUEOR		Ċĸ¢
GEO	TECHNICAL			E OWNED TAL AND TESTING ENGINEERS SINCE 1921		NEN PARK NATI, OH 4 15 321-801 (219) 321-60	92346 COLL	IDERIBON ROAD INIGUE, ON 43236 INIG 505-3113 I (214) 603-0475	UNWAR	UNUT STR RICEBURG 912) 539-4 R (812) 539	), en 1762 1998		18-18 COMM LEXUNION (F397 PAX (ES		401 10
Client		Ar	nerica	en Electric Power			Boring No	).		<b>B</b> -	8				
Project		Bo	tom	Ash Dam Evaluation - Amos Plant, V	w		Date Ster	ted <u>(</u>	3/12/200	)5					
Boring L	ocation						Date Con	pleted 8	3/12/200	5					
Elevation	<u>n Ref.</u>	AE	PBo	ring Location Plan			Work Ord		0979.0	59					-
ELEV.	DEPTH		Đ	ESCRIPTION OF MATERIALS			DEPTH	S. BLOWS/6"	REC.	ROD	w	T LL	PI		1
ft.	ft.	color, r		a description, molsture, stimpess/density/hero al classification unless otherwise noted)	NO.	TYPE		(N Value)	%	%	76	70	*	HC\$1	
	-	•••	3.5	Gray, SILTY GRAVEL with SAND (GM) (gravel=sandstone fragments) nonplastic, wet, medium dense -	9	SS	35.0-36.5	6-16-25 (41)	100						
530.50	- <u>37.5</u>			dense (LAYER CONTINUED \DESCRIPTION REPEATED)			1			ſ	DF		ΎΕ	T	
	-		2.9	Gray and Reddish brown, LEAN CLAY with SAND (CL) (residual SHALE), molst - dry, hard - very har	đ	ĺ									
527.60	-40.4	<del>73</del>		Reddish brown and gray,	10	ISS.	40.0-40.4	50/0.4	100				- +		F
F	_		5.0	CLAYSTONE, completely to highly weathered, extremely soft - very soft			10 4 15 4						ŀ		
F			9.0		1	NQ2	40.4-45.4		100	0				0-1	
522.60	45.4	$\sim$		- bottom 2" residual soll BORING COMPLETED @ 45.4"					+-			_		_	
ŀ															
	.														
Ę															
F															
F													ļ		
F															
F															
Gene	ral Notes		7		┸					Ļ			L		
filer	HCN	•	Loc	Remark ated boring at dem toe, appr. 3.5' ab		e binne	efick used fo			er Lev	ei Ob		tions		
ig No.	J. Willian	19	eed	iment control. Water level upon com	plation n	Neasun	ed through th		ediate ompletic			<u>6.0</u> 1.5		ft. ft.	
g Туре _	Track		aug	ers before NQ2. Recovery of ST-1 f	lied dua	to very	soft materia	I. After			24	Hrs.	NA		
	102/55/	<u>57</u>	<u> </u>						used.	_	_		30	_n.	
spector _	NG		┣					<u> </u>	BF = BAC	KFILLE				ER	

	CN		OWNED	912 MORF CHARLEST( (304) 3	IAN REGION RIS STREET DN, WV 2503 144-0821 1342-4711	V CENTRAL 790 MOI 31 COLUMI (814	COHIO REGION RRISON ROAD 3US, OH 43230 () 663-3113 141 863-0475	INDIA 349 WALN LAWRENK (81	NNA REGI UT STREE	ON 1, STE 8 IN 47025 30	E 470-	8 CONW EXINGTO (859)	SS REGIO NY CT., ST N, KY 405 155-8530 1) 455-863	re 8-8 511
GEOT	ECHNICAL,	ENVIRONMENTAL	AND TESTING ENGINEERS SINCE 1921	FAX (304	342-4/11	Boring No.			B-1	1				
Client		AEP				Date Starte	ed 5/	9/2005						
Project		Amos RF				Date Comp		/9/2005				-		
Boring L	ocation	As Staked				Work Orde		0979.05	7					
Elevation	n Ref.	Exline Su	rveying	1			SA	MPLE		<b>.</b>	r1	1	r	
ELEV. ft.	DEPTH ft.		SCRIPTION OF MATERIALS description, moisture, stiffness/density/hardness	NO.	TYPE	DEPTH ft.	BLOWS/6" (N Value)	REC.	RQD %	W %	LL %	P1 %	Qu tsf	PP ts
591,35	0.0	1.1	Brown SILTY CLAYEY SAND (SM), moist-loose	1	SS	0.0-1.5	3-6-3 (9)	67						
	-			2	SS	2.5-4.0	4-3-5 (8)	100						
	_	7.5				5065	7-4-5	67						┝
	-			3	SS	5.0-6.5	(9)							╞─
583.85	- 7.5		Brown and gray mottled SILTY CLAY (CL-ML), moist-stiff to very stiff	4	SS	7.5-9.0	5-5-7 (12)	~ 100	-	19	34	12		1
	-			5	SS	10.0-11.5	6-8-11 (19)	100		19				2
	-	7.5								1				
<u>576 35</u>	15.0		Brown, fine to medium grained		SS	15.0-16.5	5-3-2	10	 	22	2			╋
		5.0	POORLY GRADED SAND (SP), wet-loose				(5)		-	-	_			
571.35	20.0		Brown SILTY WITH SAND (SM), tra	ce 7	ss	20.0-21.5	2-1-1	6	7			_		+
			clay, saturated-very loose	-	33	20.0-21.0	(2)						-	
	-	10.0					- 1-1-1						_	
0/05				3	3 55	<u>3</u> 25.0-26.	5 (2)						+-	
9 561.3	<u>5 30.(</u>		Brown SILTY SAND (SM), saturated-loose		9 S	S 30.0-31	5 2-2-3	3 1	00					
H 745 55	-	5.0	)											
2	┝	. KA								erLe		heer	ation	<u> </u>
2 556.3	General	Notes	Rem	arks				Imme		er Le	ver U	20.		
ਤੇ ਨੋ Drille	-	Smith	60.9 tsf at 60.9'		·			At Co		on -		23.		
Rig		B-57						After			0	Hrs	. В	F
		Truck						Wate	nucod	Lin dri	llina		25.0	

Clien		IICAL, I	ENVIRON	PLOYEE OWNED	е сни	PALACHI 12 MORRI VRLESTOI (304) 34 AX (304)	S STREET N. WV 250 4-0821	r 790 131 CO	NTRAL OHIO REGI DI MORRISON ROA LUMBUS, OH 432; (614) 663-3113 AX (614) 863-0475	D 349 V 30 LAW	INDIANA R VALNUT STI RENCEBUR (812) 539- FAX (812) 53	REET, ST 1G, IN 470 4300	E 8 4	470-8 CON LEXING (85)	RASS RE 4WAY CT. 570N, KY 9) 455-45; 859) 455-4	, STE 8 40511
Proje			AEP			·······	-	Boring N	lo.		B-	11			1307 4334	
	ici Ig Locati	<b>07</b>		os RFD Retrofit			-	Date Sta	irted	5/9/200						
	tion Rel			Staked			-	Date Cor	mpleted	5/9/200	)5					
		T	<u></u>	he Surveying	r			Work Ord	der No.	90979.	057					
ELEV ft				DESCRIPTION OF MATERIALS	-					SAMPLI						
<u>п</u> .	ft.		color, ma	iterial description, moisture, stiffness/density/hardn	ess	10. T		DEPTH	BLOWS	1	ROD	W	LL	PI	Qu	PP
		V	$\Lambda$	Brown SANDY SILT (ML) moist to			YPE	ft.	(N Valu		%	%	%	%	tsf	ts
				wet-loose to medium dense		10 5	35 :	35.0-36.5	2-3-3 (6)	100						
	-	K	10	.0	1	1 S	is 4	0.0-41.5	4-7-7 (14)	100						
	-								(14)							
546 35	45.0	0		Brown, fine to medium grained		_			17 20 4	-						
		0000000	្នុំ ១ 4 5.0	POORLY GRADED SAND WITH WITH GRAVEL (SP), wet-dense	1:	2 S	S 4	5.0-46.5	17-30-1 (40)	100						
41.35	50.0	00		0												
				Brown, fine to medium grained POORLY GRADED SAND (SP), wet-medium dense	13	SS	5 50	0.0-51.5	5-6-8 (14)	100			-+			
			10.0													
					14	SS	55	.0-56.5	5-6-6 (12)	100						
1.35		· · ·   · · ·	a •													
		000000	.4	Brown, fine to medium grained POORLY GRADED SAND WITH GRAVEL (GP), wet-dense to very dense	15	SS	60.	0-61.5	23-25-27 (52)	100	+- +-					
6.35	65.0	0000														
	-			Reddish-brown to gray, fine grained SILTY CLAYSTONE, thick to masive bedded, highly weathered, very soft to soft	1	<u>SS</u> NQ		5-70.2	50/0.2	7 100 39	0	+	+	1-: HC		=
	eral Not	$\bigotimes$	1													
er No. Type	D. Srr B-5	nith 7	-6	Remarks 50.9 tsf at 60.9	I			<u>L</u>		Wate Wate nediate Completic	er Løve		20.0	tions	ft. `	
hod hod	Truc NQ/S				`				Afte		n drillir	0 1g	23.0 Hrs. 2	BF 5.0	ft. ft. ft.	v

(;	CN		FAX (513) 321-0254	APPALACHI 912 MORR CHARLESTO (304) 3 FAX (304)	IS STREET	CENTRAL 790 MOR 1 COLUMB	OHO REGION RISON ROAD IUS. OH 43230 1 653-3113 14) 563-0475	INDIA 349 WALNU LAWRENC (812 FAX (8	NA REGK	DN T, STE 8 N 47025 0 .301	8 470-8 U	E CONW EXINGTO (859)	ASS REGIOF AY CT , STE 2N, KY 4051 455-8530 9) 455-8530	E 8-8 11
GEOT	ECHNICAL,					Boring No.			D-1					
ient		AEP	Detrofit			Date Starte		9/2005						
roject		Amos RFD	Reton			Date Comp		/9/2005						
oring L	ocation	As Staked	•			Work Orde		0979.05	/					
levation	n Ref.	Exline Surv	veying					MPLE		w	u	PI	Qu	PPF
LEV.	DEPTH ft.	DES	CRIPTION OF MATERIALS escription, moisture, stiffness/density/hardness	NO.	ΤΥΡΕ	DEPTH ft.	BLOWS/6" (N Value)	REC.	RQU %	%	%	%	tsf	tsf
ft.		10.2 R S b	eddish-brown to gray, fine grained ILTY CLAYSTONE, thick to masive edded, highly weathered, very soft o soft (LAYER CONTINUED DESCRIPTION REPEATED)	2	NQ	70.2-75.2		100	0				1-2 HCSI	
516.15 5			3ORING COMPLETED @ 75.2				•							
H Fage 1 Dec 0 DH Fa		General Notes	Re	marks				Imm	Wa		evel (		rvatior	15
CB			60.9 tsf at 60.9'						omple				3.0	
Dri		D. Smith B-57						After			0			BF
- Rig	ј No ј Туре	Truck						Wat	er use	ed in d	Inilling		25.0	
9 Die		Truck						i vval				·	= NO V	



H.C. Nutting Company 2006

Test Boring Logs

B-0601 to B-0610

				IARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711		RATE CEN		RAL OHIO REGI MORRISON ROA		IDIANA REI		- 9		GRASS REC	
				EE OWNED	CINCIN	NATI, OH 4 3) 321-5816	5226 COL	MORRISON ROF UMBUS, OH 432 (614) 863-3113	30 LAWR	ENCEBURG (812) 539-4	G, IN 4702		LEXIN	IGTON, KY 4 59) 455-853	0511
	TECHNICAL			ITAL AND TESTING ENGINEERS SINCE 1921	FAX (	513) 321-02	94 FA	X (614) 863-0475	5 FA	X (812) 539	9-4301			(859) 455-86	
Client				an Electric Power			Boring No			<b>B-0</b>	601			,	
Project				mos Plant Access Road to Dewatering Isla	ind		Date Start		3/10/200						
Boring L				036.4 <b>E</b> 1,729,204.2			Date Com	-	3/10/200						
Elevation	DEPTH		ovide	d by American Electric Power			Work Ord	er No.	90979.00 SAMPLE	57					
ft.	ft.					1	DEPTH	BLOW		RQD	W	LL	PI		PI
577.60	0.0			ial description, moisture, stiffness/density/hardness sual classification unless otherwise noted)	NO.	TYPE		(N Val		%	%	%	%	HCSI	t
	_			Brown, SILTY CLAY, moist, very soft	1	SS	0.0-1.5	0-0-(1)							
	– 2		5.0		1	ST	1.5-3.5		45						
	_														
572.60	5.0 			Brown, SILTY CLAY, trace gravel, moist, very soft	2	SS	5.0-6.5	1-1-2 (3)							
	_		5.4		2	ST	6.5-8.5		15						
	-														
567.20	<u>    10.4                                </u>		2.6	Gray, SILT, trace sand, trace gravel, moist, very loose	3	SS	10.0-11.5	0-2-2 (4)	2 80						
564.60	– 7 13.0	4	2.0	Brown and gray, SILT with SAND, trace	3	ST	11.5-13.5		100						
-	_		3.0	gravel, wet, loose											
561.60	16.0			Gray, SILT with SAND, trace gravel, moist, loose - medium dense	4	SS	15.0-16.5	2-3-4 (7)	100						
-	-														
	-		9.0		5	SS	20.0-21.5	2-6-7	100						
-	_						20.0 21.0	(13)	100						
	-														
552.60	_25.0			Brown, SILT with SAND, moist, loose	6	SS	25.0-26.5	2-2-4 (6)	100						
-	-		6.0												
	_														
546.60	31.0	$\square$		Gray, SILT with SAND, trace gravel, moist, loose	7	SS	30.0-31.5	2-3-4 (7)	100						
-	-		4.0												
542.60	35.0			Remarks						torla		here			
Driller Rig No.	Johns								wa Immediate At Completi	ter Le <sup>-</sup>	vel U	13. 3.0	.0	ft	. T
Rig Type Nethod	ATV NQ2/SS		1						After Water used	_	NA	Hrs		NA ft	

				C. NUTTING COMPANY				)g of t	<b>E61</b>		וסר			Page 2	? of 2
			CH	ALACHIAN REGION - 912 MORRIS STREET HARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711		ORATE CEN	VTER CEN	TRAL OHIO REGION MORRISON ROAD		NDIANA RE	GION		BLUE	GRASS REC	
GEC	DTECHNICA			TEE OWNED STATESTING ENGINEERS SINCE 1921	CINCIN (51	NNATI, OH 4 13) 321-5816 (513) 321-02	5226 COL	LUMBUS, OH 43230 (614) 863-3113 XX (614) 863-0475	LAWR	LNUT STF ENCEBUR (812) 539-4 X (812) 53	G, IN 47025 1300		LEXING (85	NWAY CT., GTON, KY 4 59) 455-853( (859) 455-86	0511 0
Client			America	an Electric Power			Boring No	)		<b>B-0</b>	601				
Project			lohn Ar	mos Plant Access Road to Dewatering Isla	and		Date Star	ted 3	/10/200	)6					
Boring L			<b>1</b> 538,9	936.4 <b>E</b> 1,729,204.2			Date Corr	npleted 3	/10/200	)6					
Elevatio	n Ref.	F	Provide	ed by American Electric Power			Work Ord		0979.0						
ELEV.	DEPTH	1	[	DESCRIPTION OF MATERIALS			DEDTU	1	MPLE				T =:		
ft.	ft.	colo		rial description, moisture, stiffness/density/hardness isual classification unless otherwise noted)	NO.		DEPTH	BLOWS/6" (N Value)	REC.	RQD %	W %	LL %	PI %	HCSI	PPR tsf
	-			Reddish brown, SHALE, completely weathered, extremely soft	8	SS	35.0-36.5	8-6-12 (18)	80						
	-	$\geq$													
	-	$\leq$	6.0												
	F	$\geq$											ĺ		
	-	$\leq$											<u> </u>		
536.60 536.10	41.0	$\leq$	0.5	Gray, SHALE, completely weathered,	9	SS	40.0-41.5	12-18-50/6"	100						
	-	$\geq$		extremely soft - soft											
533.80	_ 	M	2.3	Gray, SHALE, laminated, moderately weathered, soft			44.5.40.0								
	_	$\leq$		Reddish brown, SHALE, moderately weathered, soft	1	NQ2	41.5-46.3		83	73					
	_	$\geq$		High angle fracture at 44.3' to 44.5'											
	-	$\leq$	4.1												
-20 70	-	$\leq$													
529.70	47.9	$\leq$		Reddish and gray, SHALE, laminated,	-										
		$\leq$		highly weathered, very soft	2	NQ2	46.3-51.3		74	48					
		$\leq$	3.4												
526.30	- 51.3	$\leq$													
20.00		<		BORING COMPLETED @ 51.3'											
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	a and M.														
	neral Not			Remarks	5					ter Le	vel Ol				
riller ig No.	Johns								ediate ompleti			13. 3.0			. ∇ . <b>V</b>
ig Type	AT	/	-	· · · · · · · · · · · · · · · · · · ·		-		Al Co			NA	J.U Hrs		π √A ft	
lethod	NQ2/S								er used	in drill			41.5		
nspector	Ven	u							BF = BA	CKFILL	ED N		NO W	ATER	
									(Mea	sured	from gr	ound	surfac	ce)	

GEO			CH EMPLOY	LACHIAN REGION - 912 MORRIS STREET JARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 <u>'EE OWNED</u> ITAL AND TESTING ENGINEERS SINCE 1921	611 LUN CINCII (5	ORATE CEM IKEN PARK NNATI, OH 4 13) 321-5810 (513) 321-02	VTER CENT DRIVE 790 / 5226 COLI 3 (	PG OF RAL OHIO REGIO MORRISON ROAD UMBUS, OH 43230 (614) 863-3113 X (614) 863-0475	N 1 349 W4 D LAWR	NDIANA RE LINUT STR ENCEBURG (812) 539-4 X (812) 539	GION EET, STE 3, IN 4702	E8 4	BLUE 170-B CO LEXIN (8	GRASS RE( NWAY CT., GTON, KY 4 59) 455-853 (859) 455-8	, STE 40511 80
Client		/	America	an Electric Power			Boring No	).		<b>B-0</b>	<u>602</u>				
Project			John Ai	mos Plant Access Road to Dewatering Isla	nd		Date Start	ted	3/9/2006	6					
Boring L	ocation		<b>N</b> 540,5	557.7 <b>E</b> 1,726,086.2			Date Com	pleted	3/9/2006	6					
Elevatio	n Ref.	F	Provide	d by American Electric Power			Work Ord	er No.	90979.0	67					
ELEV.	DEPT	1		DESCRIPTION OF MATERIALS					SAMPLE						
ft. 886.80	ft.		or, matei (vi	rial description, moisture, stiffness/density/hardness isual classification unless otherwise noted)	NO		DEPTH ft.	BLOWS (N Valu		RQD	W %	LL %	PI %	HCSI	F
885.50	- 1.3		1.3	Brown, CLAYEY SAND, little organics (roots), moist, soft	1	SS	0.0-1.5	1-1-2 (3)	100						
				Reddish brown, SANDY LEAN CLAY, trace rock fragments, moist, soft - medium stiff											
	_		8.7		2	SS	5.0-6.5	4-4-5 (9)	100						
876.80	- - 10.0														
		1~~		Brown, SANDSTONE, fine grained,	3	<u>ss</u>	10.0-10.3	50/4"	100	70				3	F
			3.3	slightly weathered, medium hard	1	NQ2	10.3-11.3		70	/0				3	-
	_	<	3.5	High angle fractures at 11.3' to 11.5'											
	- 13.3			and 12.8' to 13.1'											
873.00	13.8	$\leq$	0.5	Brown, SHALE, laminated, moderately	2	NQ2	11.3-16.3		100	44				3-2	
		$\geq$	1.9	weathered, soft	/										
871.10	15.7	$\geq$		Gray, SHALE, thinly laminated, slightly weathered, soft - medium hard											
	-		1	Gray, SANDSTONE, fine grained,	1										
-	_	{~~~	1	micaceous, faintly weathered, medium											
-	_		1	hard - hard											
	_	1	{		3	NQ2	16.3-21.3		100	88				3-4	
	_	1	1												
Ī		1~~	}												
ŀ	-	1	]												
ŀ		K~~	1												
ŀ	-	1.	4												
ļ	_		15.6		4	NQ2	21.3-26.3		100	92				3-4	
	_	1~~	ł		1	1							1		
Γ	-	{~~~	1												
ŀ	-		1						_						
F	-	111													
ŀ	-	$\langle \cdot \rangle \rangle$	]												
ŀ	-		ł		5	NQ2	26.3-31.3		100	92				3-4	
		1.													
355.50	- 21 2														
00.00	- 31.3	1.1.1		BORING COMPLETED @ 31.3'											
	-			Ç											
Gei	neral No	tes		Remarks					W	ater Le	evel C	bser	vatio	ns	
Driller	Willia							1	nmediate			N			ft.
Rig No.									t Complet	ion –		NV			ft.
Rig Type	Tra	ck						A	After	_	24	_ Hr			ft.
/lethod	NQ2	/SS						V	Vater usec	l in drill	ling		10.3	3 f	ft.
nspector	Vei	211								OV/FUL			NOV	VATER	

GEO		and the state of the state	EMPLO	HARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 YEE OWNED	611 LUI CINCI	PORATE CEI NKEN PARK INNATI, OH 4 513) 321-581 K (513) 321-0	DRIVE 790 45226 COL 6	TRAL OHIO REGIO MORRISON ROAD LUMBUS, OH 43230 (614) 863-3113 AX (614) 863-0475	349 WA LAWR	NDIANA RE ALNUT STR ENCEBURO (812) 539-4 AX (812) 539	EET, STI 6, IN 4702 300		470-B CO LEXIN (8	GRASS RE NWAY CT., GTON, KY 4 59) 455-853 (859) 455-8	STE 4051 0
Client		A	meric	an Electric Power			Boring No	o.		<b>B-0</b>	603				
Project		J	ohn A	mos Plant Access Road to Dewatering	Island		Date Star	ted	3/8/2006	5					
Boring L	_ocation	N	540,	310.5 <b>E</b> 1,726,267.7			Date Con	npleted	3/8/2006	6					
Elevatio			rovide	ed by American Electric Power			Work Orc	ler No.	90979.0	67					
ELEV.		1		DESCRIPTION OF MATERIALS					SAMPLE						
ft. 940.80	ft.	colo	r, mate	rial description, moisture, stiffness/density/hardn isual classification unless otherwise noted)	ess NO		DEPTH	BLOWS (N Valu		.   RQD   %	W %	LL %	PI %	HCSI	F
1340.00	0.0		1	Brown, fine SAND, moist, medium	1	SS		3-4-12			/0	70	70		
	- -		5.0	dense			0.0-1.0	(16)		_					
935.80	<u>5.0</u>	·/		Reddish brown, SHALE, completely weathered, soft	2	SS	5.0-6.5	14-26-3	<sup>i0</sup> 100						
		MMMM	5.0												
930.80	10.0	$\ge$		Brown, SANDY SHALE, laminated,	3	SS	10.0-10.8	12-50/4	" 38						
		MMM	5.2	highly weathered, soft											
925.60	_ 15.2	MMM >>		Brown, SANDSTONE, fine to mediun											
			4.7	grained, weakly cemented, micaceous moderately weathered - slightly weathered, soft		NQ2	10.8-20.8		95	52				2	
920.90	19.9		4 5	Brown, SANDY SHALE, laminated,											
919.40	_ 21.4	$\mathbb{N}$	1.5	slightly weathered, very soft Reddish brown, SHALE, laminated,											
916.80	- 24.0	MMM	2.6	moderately weathered, soft Vertical fracture from 21.4' to 21.9'											
	_	MMM	3.3	Brown and reddish brown, SHALE, laminated, slightly weathered, soft	2	NQ2	20.8-30.8		95	46				2-1	
913.50	- 27.3	MMM		Vertical fracture from 25.9' to 26.7' High angle fracture from 26.7' to 26.9										- '	
	-	MMMM	3.9	Gray, SHALE, laminated, moderately weathered, very soft - soft											
909.60 -	- 31.2	MMM		Reddish brown, SHALE, slightly weathered, extremely soft - very soft											
	-	MMM													
Driller	n <b>eral No</b> Willia			Rema	rks				nmediate	ter Le	vel O	bserv	/ation	f	
Rig No. Rig Type	Tra		-						t Completi	on _	N1.4			ft	
vig i ype	Ind	~~						I A	fter		NA	Hrs	: ľ	VA ft	r i

			APPA CH	C. NUTTING COMPANY LACHIAN REGION - 912 MORRIS STREET ARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 EE OWNED	611 LUN CINCIN	ORATE CEN IKEN PARK INNATI, OH 4	ITER CENT DRIVE 790 5226 COL	DG OF T	II 349 WA LAWRI	NDIANA RE ALNUT STR ENCEBURG	GION EET, STE 3, IN 4702	8 4	BLUE 170-B CO LEXIN	GRASS REG NWAY CT., GTON, KY	310N STE B-8 10511
GEO	TECHNICAL	., ENVIR	ONMEN	TAL AND TESTING ENGINEERS SINCE 1921		13) 321-5816 (513) 321-02		(614) 863-3113 X (614) 863-0475		(812) 539-4 AX (812) 53	9-4301		(8 FAX	59) 455-853 (859) 455-8	0 630
Client		-		an Electric Power			Boring No	)		<b>B-0</b>	603				
Project				nos Plant Access Road to Dewatering Isla	nd		Date Star		3/8/2006	6			· · · ·		
Boring L			540,3				Date Com	npleted	3/8/2006	5					
Elevatio	n Ref.	<u>Р</u>	rovide	d by American Electric Power			Work Ord		90979.0						
ELEV.	DEPTH			DESCRIPTION OF MATERIALS			DEPTH	BLOWS/6"	AMPLE REC		W	LL	PI		PPR
ft.	ft.	colo		ial description, moisture, stiffness/density/hardness sual classification unless otherwise noted)	NO.			(N Value)	%	%	%	%	%	HCSI	tsf
	-	MMMMMMM	9.6	Reddish brown, SHALE, slightly weathered, extremely soft - very soft (LAYER CONTINUED DESCRIPTION REPEATED)	3	NQ2			33	19				0-1	
900.00	40.8 - - - 44.5	MMMMMM	3.7	Gray and reddish brown, SHALE, laminated, moderately weathered, soft								E			
696.30			6.4	Gray, SILTSTONE, thinly bedded, fresh, soft - medium hard	4	NQ2	40.8-50.8		98	80				2-3	
889.90				Gray, SANDSTONE, fine to medium grained, micaceous, fresh, hard											
			12.4		5	NQ2	50.8-60.8		100	98				4	
877.50	- - - 63.3			Brown, SANDSTONE, fine to medium											
-	- ////////////////////////////////////		6.7	grained, micaceous, fresh, hard	6	NQ2	60.8-70.8		95	95				4	
870.80	70.0	~~													
	neral Note	es		Remarks					Wa	ater Le	vel O	bser	vatio	ns	
Driller Rig No. Rig Type Method Inspector	Williar Track NQ2/S Venu	k SS			ô			At C Afte	nediate Completi er t <b>er used</b> BF = BA	ion _ _ I in drill	NA ing _ED	Hr: 	s l 10.8 NO W	fi NA fi 3 fi /ATER	t. t.

TEST BORING JOHN AMOS DEWATERING PLANT ACCESS ROAD GPJ HC NUTTING GDT 10/25/11

			H.C. NUTTING COMPANY									F	age 3	3 of
			APPALACHIAN REGION - 912 MORRIS STREET CHARLESTON, WV 25301 (304) 344-0821			LC	G OF <sup>-</sup>	rest	BC	DRI	NG			
			FAX (304) 342-4711	611 LUNK CINCINI	ORATE CEN KEN PARK D NATI, OH 45 3) 321-5816	0RIVE 790 5226 COL	RAL OHIO REGION MORRISON ROAD UMBUS, OH 43230 (614) 863-3113	349 WA LAWRE	NDIANA REG LNUT STRI ENCEBURG (812) 539-4:	EET, STE 6, IN 4702		70-B CON LEXING	RASS RE WAY CT., TON, KY 4 9) 455-853	, STE B-8 40511
	DTECHNICAL		DNMENTAL AND TESTING ENGINEERS SINCE 1921		513) 321-029	94 FA	X (614) 863-0475	FA	X (812) 539	-4301		FAX (	359) 455-8	630
Client			nerican Electric Power			Boring No			<b>B-06</b>	<u>603</u>				
Project			hn Amos Plant Access Road to Dewatering Isla	nd		Date Star		3/8/2006						
Boring L			540,310.5 <b>E</b> 1,726,267.7			Date Com	·	3/8/2006						
Elevatio	n Ref.	Pr	ovided by American Electric Power			Work Ord		90979.0	67					
ELEV.	DEPTH		DESCRIPTION OF MATERIALS	-	1	DEPTH	BLOWS/6	REC.	RQD	W	LL	PI		PPI
ft.	ft.	COIO	, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)	NO.	TYPE		(N Value)	%	%	%	%	%	HCSI	tsf
2	-		Gray, SANDSTONE, fine grained, micaceous, faintly weathered, hard				(********							
	-		5.8	7	NQ2	70.8-75.8		100	100				4	
	-	<												
005.00	-													
865.00	75.8	$  \cdot  $	BORING COMPLETED @ 75.8'											
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F	-								1					
Ger	neral Not	es	Remarks					Wa	ter Le	vel O	hserv	ation	s	
Driller	Williar						Imr	nediate						t.
Rig No.								Completi	on —				f	
Rig Type	Trac						Afte	er		NA	Hrs		IA fi	t.
Method	NQ2/S						Wa	ter used				10.8	f	t.
Inspector	Venu	<u>ــــــــــــــــــــــــــــــــــــ</u>						BF = BA (Mea	CKFILL sured f					

		<u>N</u>	CH	LACHIAN REGION - 912 MORRIS STREET	611 LUN	DRATE CEN KEN PARK	ITER CEN DRIVE 790	DG OF	N ) 349 W	INDIANA RE ALNUT STR	GION REET, STI	E 8 4	BLUE 70-B CO	GRASS REO NWAY CT.,	STE B
GEO	DTECHNIC			TEE OWNED TESTING ENGINEERS SINCE 1921	(51	NATI, OH 4 3) 321-5816	6	UMBUS, OH 4323 (614) 863-3113		(812) 539-4	1300	25	(85	GTON, KY 4 59) 455-853	0
Client					FAX	(513) 321-02		X (614) 863-0475		AX (812) 53	_		FAX	(859) 455-8	530
				an Electric Power			Boring No				004				
Project				mos Plant Access Road to Dewatering Islar	nd		Date Star		3/8/200						
Boring l	Location	1	<b>1</b> 540,0	073.9 <b>E</b> 1,726,436.9			Date Con	npleted	3/8/200	6					
Elevatio			Provide	ed by American Electric Power			Work Ord	ler No.	90979.0	)67					
ELEV.	DEPT	1		DESCRIPTION OF MATERIALS					SAMPLE						
ft.	ft.	col	or, mate	rial description, moisture, stiffness/density/hardness			DEPTH	BLOWS	5/6" REC	. RQD	w	LL	PI	HCSI	PF
909.80	0.0		(vi	isual classification unless otherwise noted)	NO.	TYPE	ft.	(N Valu	e) %	%	%	%	%	11001	ts
				Brown, SANDY LEAN CLAY, moist,	1	ss	0.0-1.5	6-10-1							
				very stiff			0.0 1.0	(20)		′					
	-		1 - 0												
	L		5.0												
904.80	5.0														
	- 0.0		•	Brown, SANDSTONE, fine grained,	2	SS	5.0-5.0	50/0	0			1			
	F	1~~		micaceous, highly weathered, medium											
	-		1	hard											
		<	5.2		1	NQ2	5.0-10.6		89	20				3	
	Γ		1			1				20				Ŭ	
	-	1.	}												
899.60	10.2		1												
	L		}	Brown, SANDSTONE, fine to medium	<u> </u>										
			]	grained, micaceous, slightly weathered, medium hard											
		1.	3.9												
	-		1	Vertical fracture from 11.9' to 12.6'											
895.70	_ 14.1	1~~	1												
			1	Brown, SANDSTONE, fine grained, micaceous, faintly weathered, medium											
			1	hard	2	NQ2	10.6-20.6		100	79				3	
	-	1.	{		-	1	1010 2010		100	10				Ŭ	
	-		]												
		1	7.5												
			]												
	—	111	}												
		1~~													
888.20	21.6		}											+	
000.20				Brown, SANDSTONE, fine to coarse											
		1~~		grained, slightly weathered, medium											
ŀ		$V_{\sim}$	4.2	hard - hard											
ŀ		1.	4.2												
884.00	25.8	<~~·		Brown SANDSTONE fine arrived	3	NQ2	20.6-30.6		0	98				3-4	
				Brown, SANDSTONE, fine grained, faintly weathered, hard											
	_	1~~													
-															
ŀ	_	~~~		1											
L	_		8.3												
Γ		1~~	0.0	ļ					_						
F	-														
ŀ	_	1-~1													
Ļ	_	ĽĽĽI													
375.70	_ 34.1	1													
		/ / / /													
Ge	neral No	1.1.1		Remarks					14/	ater Le		baar			
Driller	Willia			Remarks						aler Le	ver U				
Rig No.	v v III č	61110	-						nmediate	ior –		NV		fl	
Rig Type	Tra		-						t Complei	1011 _	NIA.	NV Hr		fl	
/lethod	NQ2		$\vdash$							t in drill	NA	_ Hr		NÀ ft	
nspector	Ver							V	Vater used BF = B/		-		5.0	ft	
opoliol	vei	iu											surfac		

GEO		Arton States	APPA CH	C. NUTTING COMPANY LACHIAN REGION - 912 MORRIS STREET JARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 TAL AND TESTING ENGINEERS SINCE 1921	611 LUNI CINCIN (51	ORATE CEN KEN PARK [ INATI, OH 45 (3) 321-5816 (513) 321-02	ITER CENT DRIVE 790 N 5226 COLL	<b>GOF</b> RAL OHIO REGION MORRISON ROAD MBUS, OH 43230 314) 863-3113 (614) 863-0475	il 349 WA LAWRI FA	NDIANA REG LINUT STRE ENCEBURG (812) 539-43 X (812) 539	GION EET, STE 8 5, IN 47025 300 -4301		BLUEC 70-B CON LEXING (85	GRASS RE( NWAY CT., GTON, KY 4 59) 455-853 (859) 455-8	STE 10511 0
Client		A	merica	an Electric Power	_		Boring No.			<b>B-06</b>	<b>504</b>				
Project		Jo	ohn Ai	mos Plant Access Road to Dewatering Isla	nd		Date Start	ed	3/8/2006	6					
Boring L	ocation	N	540,0	073.9 E 1,726,436.9			Date Com	pleted	3/8/2006	3					
Elevatio	n Ref.	P	rovide	d by American Electric Power			Work Orde	er No.	90979.0	67					
									AMPLE						
ELEV.	DEPTH			DESCRIPTION OF MATERIALS rial description, moisture, stiffness/density/hardness			DEPTH	BLOWS/6			W	LL	PI		F
ft.	ft.			sual classification unless otherwise noted)	NO.	TYPE	ft.	(N Value)	%	%	%	%	%	HCSI	
872.90	36.9		2.8	Gray, SANDSTONE, fine grained, faintly weathered, hard ( <i>LAYER</i> <i>CONTINUED DESCRIPTION</i> <i>REPEATED</i> )	4	NQ2		(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	100	95		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	10	4	
	_		5.5	Brown, SANDSTONE, fine to medium grained, slightly weathered, hard											
867.40	- - 42.4														
			4.3	Gray, SANDSTONE, fine to medium grained, faintly weathered, hard			10.0 50.0								
863.10	46.7			PROWN SANDSTONE for arrival	5	NQ2	40.6-50.6		0	75				4-3	
-	_			Brown, SANDSTONE, fine grained, faintly weathered, medium hard Shale interbeds from 47.4' to 47.9' and											
	-		6.6	50.1' to 50.6'											
856.50 -	- <u>53.3</u> -			Brown, SANDSTONE, fine grained, faintly weathered, hard	-										
-			5.5		6	NQ2	50.6-60.6		100	71				4-2	
		1		Vertical fracture from 56.6' to 58.2'											
851.00	- 58.8 -	<u> </u>		Gray, SHALE, laminated, moderately											
		$\geq$	1.8	weathered, soft			ĺ							Ť	
849.20	60.6	$\leq$		Gray, SANDSTONE, fine grained,											
847.80	62.0		1.4	Gray, SANDSTONE, fine grained, micaceous, slightly weathered, medium hard											
-	-	MMM		Gray, SHALE, laminated, slightly weathered, medium hard											
ŀ	<b>-</b>	M			7	NQ2	60.6-70.6		100	66				3	
	-	M	9.3												
F	-	M													
Ger	neral Not	es		Remarks	1	L			Wa	ater Le	vel Ol	ser	/atio	ns	
Driller	Willia							Im	nediate			NW			t.
Rig No.									Completi	ion –		NW			t.
Rig Type	Trac	:k						Aft		_	NA	Hrs			t.
<b>Aethod</b>	NQ2/	SS						Wa	ter used	l in drill	ing		5.0	f	t.
nspector	Ven		- T											ATER	

6			H.C. NUTTING COMPANY APPALACHIAN REGION - 912 MORRIS STREET CHARLESTON, WV 25301 (304) 344-0821				LO	G OF	TEST	вс	RI	NG		Page	3 of
GEO	TECHNICAL	AND COLUMN	FAX (304) 342-4711 PLOYEE OWNED NMENTAL AND TESTING ENGINEERS SINCE 1921		611 LUNK CINCINI (513	RATE CEN EN PARK D NATI, OH 45 3) 321-5816 513) 321-029	RIVE 790 1 226 COLI	RAL OHIO REGION MORRISON ROAD JMBUS, OH 43230 614) 863-3113 X (614) 863-0475	349 WA LAWRE	NDIANA REG LNUT STRI ENCEBURG (812) 539-4 X (812) 539	EET, STE , IN 4702 300	8 4 5	70-B COI LEXING (85	GRASS RE NWAY CT. GTON, KY (9) 455-853 (859) 455-8	, STE B-8 40511 30
Client		Am	erican Electric Power				Boring No			<b>B-06</b>	<b>604</b>				
Project		Joh	nn Amos Plant Access Road to Dewateri	ing Islan	d		Date Start	ed	3/8/2006	;					
Boring L	ocation	<b>N</b> 5	40,073.9 <b>E</b> 1,726,436.9				Date Com	pleted	3/8/2006	i					
Elevatio	n Ref.	Pro	vided by American Electric Power				Work Ord	er No.	90979.00	67					
ELEV.	DEPTH		DESCRIPTION OF MATERIALS			1			SAMPLE			· · · ·		r	
ft.	ft.	color, r	material description, moisture, stiffness/density/ha (visual classification unless otherwise noted)	ardness	NO.	TYPE	DEPTH ft.	BLOWS/ (N Value		RQD %	W %	LL %	PI %	нсѕі	PP tst
838.50 837.60	- 71.3 - 72.2	-	Gray, SHALE, laminated, slightly weathered, medium hard (LAYER 0.9 (REPEATED)	<b>R</b> /	8	NQ2	70.6-72.6		100	100				3	
-837.20	72.6		Reddish brown and gray, SHALE, laminated, faintly weathered, soft medium hard Gray, SANDSTONE, fine grained, micaceous, fresh, medium hard BORING COMPLETED @ 72.6'	-											
-	-														
	Note		Re	marks						ter Le	vel O				
Driller Rig No.	Williar	115							nmediate t Completi	- 		NV			ft. ft.
Rig Type	Tracl	<							t Completi fter	- 10	NA	Hrs			τ. τ.
Method	NQ2/S								ater used	in drill		_ 113	5.0		t. it.
Inspector	Venu								BF = BA	CKFILL	ED I		NO W	ATER	
										sured 1					

GE			APPA CH	C. NUTTING COMPANY ALACHIAN REGION - 912 MORRIS STREET HARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 TEE OWNED TAL AND TESTING ENGINEERS SINCE 1921	611 LUN CINCIN (51	ORATE CEN IKEN PARK I NNATI, OH 4 13) 321-5816 (513) 321-02	TER CENT DRIVE 790 1 5226 COLI	TRAL OHIO REGIC MORRISON ROAL UMBUS, OH 4323 (614) 863-3113 X (614) 863-0475	0 349 WA 0 LAWRI	NDIANA RE LLNUT STR ENCEBURG (812) 539-4 X (812) 535	GION EET, STE 3, IN 4702 300	8 4	BLUEG 70-B CON LEXING (85	RASS REC WAY CT., STON, KY 4 9) 455-853( 859) 455-86	STE B-8 10511 0
Client		Α	merica	an Electric Power			Boring No	).		B-0				·	
Project	t	J	ohn Ai	mos Plant Access Road to Dewatering Isla	nd		Date Start		3/7/2006						
	Location		1 539,8				Date Com		3/8/2006						
Elevatio				d by American Electric Power			Work Ord	•	90979.0	-					
ELEV.			TOVIGO					er no.	SAMPLE						
ft. 793.70	ft.		or, matei	DESCRIPTION OF MATERIALS rial description, moisture, stiffness/density/hardness sual classification unless otherwise noted)	NO.	. TYPE	DEPTH ft.	BLOWS (N Valu	6/6" REC.	1	W %	LL %	PI %	HCSI	PPF tsf
	-			Brown, SANDY LEAN CLAY, trace organics (roots), moist, soft	1	SS	0.0-1.5	1-1-2 (3)	·						
788.70	- 5.0		5.0												
	_			Reddish brown, SANDY LEAN CLAY, trace rock fragments, moist, stiff	2	SS	5.0-6.5	5-7-8 (15)	100						
	-		10.0												
	-				3	SS	10.0-11.5	4-2-10 (12)	) 100						
778.70															
778.50	15.2_/	/~~	0.2	Gray, SHALE, laminated, moderately weathered, soft	$\frac{4}{1}$		15.0-15.2	50/2"	100	100				2	
	-			Gray, SANDSTONE, fine grained, micaceous, slightly weathered, soft - medium hard	2	NQ2	15.8-20.8		100	94				2-3	
	_		12.8												
					3	NQ2	20.8-25.8		100	100				2-3	
65.70	28.0		1.0	Gray, SANDSTONE, fine grained,	4	NQ2	25.8-30.8		100	100				2-3	
64.70	29.0			micaceous, faintly weathered, medium hard/ Gray, SANDSTONE, medium grained,											
62.80	30.9		3.4	micaceous, fresh, medium hard Gray, SANDSTONE, fine to medium grained, micaceous, fresh, medium hard	5	NQ2	30.8-34.8		100	93				3-4	
<b>59.40</b>	- 34.3		0.5	Gray, SHALE, laminated, fresh, soft											
Ge	eneral Not	es	T	Remarks		T			Wa	ter Le	vel O	bser	vatior	is	
riller	Willia								mmediate			NV		f	t.
ig No.								A	At Completi	ion –		NV		fi	
ig Type								A	After	-	NA	Hrs	sN	JA fl	t.
lethod	NQ2/3							V	Vater used	in drill	ing		12.2	fl	t.
spector	r Ven								BF = BA						

TEST BORING JOHN AMOS DEWATERING PLANT ACCESS ROAD.GPJ HC NUTTING.GDT 10/25/11

GEOTECHNICAL, ENVIRONMENTAL AND TESTING ENGINEERS SINCE 1921       CINCINNAT, OH 45228 (613) 821-8916 FAX (513) 821-8916       COLUMBUS, OH 45228 (614) 883-8916         Client       American Electric Power       Boring No.         Project       John Amos Plant Access Road to Dewatering Island       Date Started       3/7/         Boring Location       N 539,810.0       E 1,726,630.7       Date Completed       3/8/         Elevation Ref.       Provided by American Electric Power       Work Order No.       909         ELEV.       DEPTH       DESCRIPTION OF MATERIALS       SAM	INDIANA REGION 349 WALNUT STREET, STE LAWRENCEBURG, IN 4702 (812) 539-4300 FAX (812) 539-4301 <b>B-0605</b> /2006 /2006 079.067	BL 8 470-B ( 5 LE>	HCSI
Bit LUNKEN PARK DRIVE         GEOTECHNICAL, ENVIRONMENTAL AND TESTING ENGINEERS SINCE 1921         GEOTECHNICAL, ENVIRONMENTAL AND TESTING ENGINEERS SINCE 1921         Client         American Electric Power       Boring No.         Project       John Amos Plant Access Road to Dewatering Island       Date Started       3/7/         Boring Location       N 539,810.0       E 1,726,630.7       Date Completed       3/8/         Elevation Ref.       Provided by American Electric Power       Work Order No.       909         ELEV.       DEPTH       DESCRIPTION OF MATERIALS (visual classification unless otherwise noted)       DEPTH       BLOWS/6"         ft.       (visual classification unless otherwise noted)       NO.       TYPE       ft.       (N Value)	349 WALNUT STREET, ST LAWRENCEBURG, IN 4702 (812) 539-4300 FAX (812) 539-4300 742006 /200	:8 470-B ( 5 LE> F/	20NWAY CT., STE E (MGTON, KY 40511 (859) 455-8530 XX (859) 455-8630 
Client     American Electric Power     Boring No.       Project     John Amos Plant Access Road to Dewatering Island     Date Started     3/7/       Boring Location     N 539,810.0     E 1,726,630.7     Date Completed     3/8/       Elevation Ref.     Provided by American Electric Power     Work Order No.     909       ELEV.     DEPTH ft.     DESCRIPTION OF MATERIALS (visual classification unless otherwise noted)     DEPTH     BLOWS/6"       NO.     TYPE     ft.     (N Value)	<b>B-0605</b> /2006 /2006 779.067 <b>IPLE</b> REC. RQD W	LL P	- - - I HCSI PF
Project     John Amos Plant Access Road to Dewatering Island     Date Started     3/7/       Boring Location     N 539,810.0     E 1,726,630.7     Date Completed     3/8/       Elevation Ref.     Provided by American Electric Power     Work Order No.     909       ELEV.     DEPTH ft.     DESCRIPTION OF MATERIALS (visual classification unless otherwise noted)     DEPTH     BLOWS/6"       NO.     TYPE     ft.     (N Value)	/2006 /2006 079.067 <b>IPLE</b> REC. RQD W		HCSI
Boring Location     N 539,810.0     E 1,726,630.7     Date Completed     3/8/       Elevation Ref.     Provided by American Electric Power     Work Order No.     909       ELEV.     DEPTH ft.     DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)     DEPTH     BLOWS/6"       NO.     TYPE     ft.     (N Value)	/2006 079.067 <b>IPLE</b> REC. RQD W		HCSI
Elevation Ref.         Provided by American Electric Power         Work Order No.         909           ELEV.         DEPTH ft.         DESCRIPTION OF MATERIALS color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)         DEPTH NO.         DEPTH TYPE         DEPTH ft.         DEPTH (N Value)	979.067 <b>IPLE</b> REC. RQD W		HCSI
BEEV.         DEPTH         DESCRIPTION OF MATERIALS         DEPTH         BLOWS/6"           ft.         ft.         (visual classification unless otherwise noted)         NO.         TYPE         ft.         (N Value)	IPLE REC. RQD W		HCSI
ELEV.         DEPTH         DESCRIPTION OF MATERIALS           ft.         ft.         color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)         DEPTH         BLOWS/6"           NO.         TYPE         ft.         (N Value)	REC. RQD W		HCSI
BORING COMPLETED @ 34.8'			
General Notes Remarks	Water Level O	heenvoti	
iller Williams Immed		NW	ft.
g No At Corr		NW	ft.
ig Type Track After	NA	Hrs.	NA ft.
	used in drilling	12	.2 ft.
spector Venu BF	= BACKFILLED I (Measured from g	W = NO	WATER

GEO		1.000 A. 100	APPA CH	C. NUTTING COMPANY ALACHIAN REGION - 912 MORRIS STREET JARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 (EE OWNED) WTAL AND TESTING ENGINEERS SINCE 1921	611 LUN CINCIN (51	DRATE CEN KEN PARK INATI, OH 4 3) 321-5816 (513) 321-02	NTER CENT DRIVE 790 M 5226 COLU	CAL OHIO REGI MORRISON ROA UMBUS, OH 432 614) 863-3113 X (614) 863-0475	AD 349 W/ 30 LAWR	INDIANA RE ALNUT STR ENCEBUR (812) 539-4 AX (812) 53	EGION REET, STE G, IN 4702 4300	8 4	BLUEG 170-B CON LEXING (85	RASS REC WAY CT., 5TON, KY 4 9) 455-8531 859) 455-84	GION STE B 40511 0
Client		_A	America	an Electric Power			Boring No			<b>B-0</b>	606				
Project		J	lohn Ai	mos Plant Access Road to Dewatering Isla	nd		Date Start	ted	3/6/200	6					
Boring L	ocation		<b>1</b> 539,3				Date Com	pleted	3/6/200	6					
Elevatio				d by American Electric Power			Work Orde	•	90979.0						
ELEV.	DEPTH				1			01110.	SAMPLE						
ft.	ft.			<b>DESCRIPTION OF MATERIALS</b> rial description, moisture, stiffness/density/hardness			DEPTH	BLOW			w	LL	PI		PF
746.30				isual classification unless otherwise noted)	NO.	TYPE	ft.	(N Val		%	%	%	%	HCSI	ts
140.00				Brown, SANDY LEAN CLAY, trace rock fragments, moist, soft	1	SS	0.0-1.5	1-2- (4)	2 67						
741.30	 		5.0												
			1	Brown, SANDSTONE, fine to medium grained, completely weathered, very soft	2	SS	5.0-6.5	4-7- (14)							
735.80	  			Brown, SHALE, laminated, highly weathered, very soft	3	SS	10.0-11.5	8-12-1 (29)							
731.30	  15.0	MMMMM	4.5												
	_	MMM	5.2	Reddish brown and gray, SHALE, laminated, moderately weathered, very soft	4	SS	15.0-16.5	9-27-3 (63)	1 31 01						
726.10	_ _ 20.2	MMM			5		20.0.20.2	50/0 /	2 100						
725.30	21.0	~~~	0.8	Brown, SANDSTONE, fine grained, moderately weathered, soft - medium		<u>  SS</u>   NQ2	20.0-20.2	50/0.2	2 100	80	├			2-3	
		$\leq$		hard	<u></u>				<u> </u>						
723.00 -	- - <u>23.3</u> -	MMM	2.3	Gray, SHALE, laminated, faintly weathered, soft Vertical fracture from 21.3' to 21.5'	2	NQ2	20.7-25.7		100	58				2	
-	_	WWW	6.6	Reddish brown, SHALE, faintly weathered, soft								_			
716.40	- - 29.9	MMMM			3	NQ2	25.7-30.7		94	72				2	
715.60	30.7	$\geq$	0.8	Gray, SHALE, faintly weathered, soft BORING COMPLETED @ 30.7'											
Ger Driller Rig No.	neral No Willia			Remarks					Wi Immediate At Complet	ater Le	evel C	bser NV	N	f	 't.
Rig Type Aethod	Tra NQ2/ Ver	/SS							After Water used BF = B/	t in dril	-	_ Hrs	s↑ 20.2	NA f	it. It.

GEO		constitution and a little of	CH EMPLOY	ALACHIAN REGION - 912 MORRIS STREET JARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 TEE OWNED ITAL AND TESTING ENGINEERS SINCE 1921	611 LUN CINCII (5	ORATE CEI IKEN PARK NNATI, OH 4 13) 321-5811 (513) 321-02	ITER CENT DRIVE 790 I 5226 COLI	<b>GOF</b> RAL OHIO REGION WORRISON ROAD JMBUS, OH 43230 614) 863-3113 X (614) 863-0475	II 349 WA LAWR	NDIANA REG ALNUT STRI ENCEBURG (812) 539-4 AX (812) 539	GION EET, STE 6, IN 4702 300 1-4301	E 8 4	BLUE 170-B COI LEXINO (85	GRASS REC NWAY CT., GTON, KY 4 59) 455-853 (859) 455-86	STE   40511
Client		A	meric	an Electric Power			Boring No			<b>B-0</b>	<u>607</u>				
Project		J	ohn A	mos Plant Access Road to Dewatering Isla	and		Date Start	ed	3/6/2006	6					
Boring L	.ocation	N	539,0	042.2 <b>E</b> 1,727,354.8			Date Com	pleted	3/6/2006	6					
Elevatio	n Ref.	F	rovide	d by American Electric Power			Work Ord	er No.	90979.0	67					
ELEV.	DEPT	-							SAMPLE		_				
ft.	ft.	colo		DESCRIPTION OF MATERIALS rial description, moisture, stiffness/density/hardness			DEPTH	BLOWS/6	" REC	RQD	W	LL	PI		Р
740.60	0.0			isual classification unless otherwise noted)	NO		ft.	(N Value	%	%	%	%	%	HCSI	l t
	-			Brown, SANDY LEAN CLAY, trace organics, trace cinders, moist, medium stiff	1	SS	0.0-1.5	4-2-4 (6)	100	-					
735.60	- 5.0		5.0												
	_	M		Brown, SHALE, completely weathered, very soft	2	SS	5.0-6.5	3-4-5 (9)	100						
		MMM	5.0												
730.60	10.0	MMM		Reddish brown, SHALE, completely weathered, very soft	3	SS	10.0-11.5								, <del></del>
		MMM	5.0												
725.60	15.0	$\leq$													
724.00		MM	1.6	Gray, SHALE, laminated, moderately weathered, soft	4	SS NQ2	15.0-15.4 15.5-16.0		100	0				2	
-		WW		Reddish brown, SHALE, slightly weathered, soft			10.0.01.0			70					
	_	WWW	4.8		2	NQ2	16.0-21.0		90	70				2	
719.20	- 21.4	$\leq$			_										
-	_		3.9	Gray, SANDSTONE, fine grained, faintly weathered, soft - medium hard											
715.30	- 		3.3	Vertical fracture from 24.6' to 24.6'	3	NQ2	21.0-26.0		100	90				2-3	
713.10	- - <u>27.5</u>	MMM	2.2	Gray and reddish brown, SHALE, laminated, slightly weathered, soft											
712.10	<sup>-</sup> 28.5 -		1.0	Gray, SHALE, slightly weathered, extremely soft Gray, SANDSTONE, fine grained, fresh,	4	NQ2	26.0-31.0		100	58				3-0	
-	-			soft - medium hard											
-	-		6.5		5	NQ2	31.0-35.0		98	88				2-3	
05.60	- 35.0														
	neral No			BORING COMPLETED @ 35.0'Remarks	\$	I			Wa	ter Le	vel O	bser	vatio	ns	
Driller	Willia	ams						Im	mediate			NV			ť.
Rig No.									Completi	ion –		NV		ft	
Rig Type	Tra							Afl	•	_	24	Hr		NA ft	
lethod	NQ2	/SS				-		W	ater used	in drill			15.5		t.
nspector	Ver													ATER	

GE			APPA CH	C. NUTTING COMPANY ALACHIAN REGION - 912 MORRIS STREET HARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 YEE OWNED	611 LUN CINCII (5	ORATE CEN IKEN PARK I NNATI, OH 4 13) 321-5816 (513) 321-02	NTER CENT DRIVE 790 M 5226 COLU	<b>GOF</b> RAL OHIO REGION MORRISON ROAD JMBUS, OH 43230 614) 863-3113 ( 6(4) 863-0475	ii 349 WA LAWRI	NDIANA REC LINUT STRI ENCEBURG (812) 539-4: X (812) 539	GION EET, STE 6, IN 4702 300	8 4	BLUEG 70-B COI LEXING (85	Page 1 GRASS REG NWAY CT., GTON, KY 4 59) 455-853 (859) 455-85	GION STE B-8 40511 0
Client		A	Americ	an Electric Power			Boring No			B-06					
Project				mos Plant Access Road to Dewatering Isla	and		Date Start		2/27/200		000				
-	Location		1 538,8				Date Com		3/3/2006						
Elevatio			rovide	ed by American Electric Power			Work Orde		90979.0	67					
ELEV.				DESCRIPTION OF MATERIALS					AMPLE	- <u></u>	1			1	· · · · ·
ft.	ft.	colo		rial description, moisture, stiffness/density/hardness			DEPTH	BLOWS/6	REC.	RQD	W	LL	PI	HCSI	PPF
825.90	0.0	]	(V	isual classification unless otherwise noted)	NO	. TYPE	ft.	(N Value)	%	%	%	%	%		tsf
	_			Reddish brown, LEAN CLAY with SAND, trace gravel, moist, medium stiff	1	SS	0.0-1.5	2-2-3 (5)	100						
820.90	_ 		5.0	Brown, SANDSTONE, fine grained,			5050	50/0.2	100						
			1	moderately weathered, soft - medium	2	<u> </u>	5.0-5.2	50/0.2	$\frac{100}{100}$	100				2	
		1~~	3.3	hard	<u> </u>		/		100	1					
817.60	- 8.3														
	_	WWW		Brown, SHALE, laminated, highly weathered, soft Vertical fracture from 9.2' to 9.8'	2	NQ2	5.8-10.8		100	34				2-3	
		MMMM	6.5		3	NQ2	10.8-15.8		100	10				2	
811.10	14.8			Gray, SILTSTONE, moderately	_										
808.80	_ _ 17.1		2.3	weathered, soft											
				Brown, SANDSTONE, fine grained, micaceous, moderately weathered, medium hard - hard	4	NQ2	15.8-20.8		96	74				2-4	
			8.8		5	NQ2	20.8-25.8		100	90				3-4	
800.00	– – 25.9			High angle fracture at 23.6' Shale layer at 25.2'											
799.00	26.9		1.0	Gray, SANDSTONE, fine to medium grained, micaceous, moderately weathered, medium hard											
			3.9	Brown, SHALE, laminated, moderately weathered, soft	6	NQ2	25.8-30.8		100	38				3-2	
795.10	30.8	$\leq$							.						
793.90	- 32.0		1.2	Brown, SANDSTONE, fine grained, moderately weathered, medium hard											
791.50	- 34.4	MMM	2.4	Gray and brown, SHALE, laminated, moderately weathered, soft	7	NQ2	30.8-35.8		100	54				3-2	
		1			1										
Ge	neral Not			Remarks	5				Wa	ater Le	vel O	bser	vatio	ns	
Driller	Willia	ms	L					Imr	nediate			N٧	N	f	t.
Rig No.									Completi	ion –		NV			t.
Rig Type	Trac	:k						Afte	er		24	Hr	s.	NA f	t.
0 11		~~													
/lethod	NQ2/	SS						Wa	ter used	l in drill	ing		5.2	f	t.

TEST BORING JOHN AMOS DEWATERING PLANT ACCESS ROAD GPJ HC NUTTING GDT 10/25/11

GEO			CH MPLOY	LACHIAN REGION - 912 MORRIS STREET ARLESTON, WV 25301 <sup>,</sup> (304) 344-0821 FAX (304) 342-4711 EE OWNED TAL AND TESTING ENGINEERS SINCE 1921	611 LUN CINCI (5	PORATE CEN NKEN PARK NNATI, OH 4 13) 321-5816 (513) 321-02	ITER CENT DRIVE 790   5226 COLI	DG OF MORRISON ROAD UMBUS, OH 43230 (614) 863-3113 X (614) 863-0475	II 349 WA LAWR	NDIANA REG ALNUT STRI ENCEBURG (812) 539-4 AX (812) 539	GION EET, STE 6, IN 4702 300	8 4	BLUE 470-B COI LEXIN (85	GRASS REG NWAY CT., GTON, KY 4 59) 455-853 (859) 455-8	STE E 40511
Client		A	merica	an Electric Power			Boring No	)		<b>B-0</b>	608				
Project		Jo	ohn Ar	mos Plant Access Road to Dewatering Isla	and		Date Star	ted	2/27/200	06					
Boring L	ocation	N	538,8	77.6 <b>E</b> 1,727,472.3			Date Com	pleted	3/3/2006	6					
Elevatio	n Ref.	P	rovide	d by American Electric Power			Work Ord	er No.	90979.0	67					
ELEV.	DEPTH			DESCRIPTION OF MATERIALS				;	SAMPLE						
ft.	ft.		r, mater	ial description, moisture, stiffness/density/hardness sual classification unless otherwise noted)	NO	. TYPE	DEPTH ft.	BLOWS/6 (N Value		. RQD %	W %	LL %	PI %	HCSI	P t
787.50 787.10	<u>38.4</u> 38.8		4.0	Brown, SANDSTONE, fine grained, micaceous, vertical fracture from 34.8' to 35.4', highly weathered, soft - medium hard (LAYER CONTINUED DESCRIPTION REPEATED) Gray, SILTSTONE, moderately weathered, soft	8	NQ2	35.8-40.8		100	82				3-0	
	<b>—</b>	MM		Gray, SHALE, laminated, slightly weathered, soft - extremely soft	-										
	 	MMMMM	8.6	High angle fracture at 41.9'	9	NQ2	40.8-45.8		100	90				0-2	
778.50	- - 47.4 -			Brown, CLAYSTONE, slightly weathered, soft - extremely soft	10	NQ2	45.8-50.8		100	96				0-2	
775 40	-		3.4												
775.10	<u>50.8</u> - - -		6.6	Gray, SHALE, thinly laminated, slightly weathered, soft	11	NQ2	50.8-55.8		100	84				2	
ŀ	-	$\leq$													
768.50	- 57.4	$\leq$			-										
767.40	- 58.5 -		1.1	Brown, SANDSTONE, fine grained, micaceous, high angle fracture at 57.5' to 57.7', moderately weathered, soft - medium hard Brown, SANDSTONE, fine grained,	12	NQ2	55.8-60.8		100	84				2-3	
762.20	- 63.7		5.2	micaceous, slightly weathered, medium hard	13	NQ2	60.8-65.8		100	92				3	
759.80	- - 66.1		2.4	Gray, SANDSTONE, fine grained, micaceous, vertical fracture from 63.8' to 64.1', faintly weathered, medium hard											
758.50	67.4	$\ge$	1.3	Dark gray, SHALE, thinly laminated, faintly weathered, very soft											
				Black, COAL, blocky, fresh, soft	14	NQ2	65.8-70.8		92	44				1-2	
Gei	neral Not		4.4	Remarks	L;				W	ater Le	vel O	bser	vatio	ns	
Driller Rig No.	Willia								imediate Complet	_		N\ N\	N	f	ft. ft.
Rig Type	Trac								ter	-	24	_ Hr			ft.
Nethod	NQ2/							W	ater useo		0		5.2		ft.
nspector	Venu/I	K R	1						BF = BA	CKEILI	IFD	NNA/	NOW	ATER	

GEO			APP/ CI	C. NUTTING COMPANY ALACHIAN REGION - 912 MORRIS STREET HARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 YEE OWNED TAL AND TESTING ENGINEERS SINCE 1921	611 LUN CINCIN (51	ORATE CEI IKEN PARK INATI, OH 4 13) 321-581 (513) 321-0.	NTER CENT DRIVE 790 / 15226 COLI 6 (	RAL OHIO REGION WORRISON ROAD UMBUS, OH 43230 614) 863-0475	II 349 WA LAWR	NDIANA REI LINUT STRI ENCEBURG (812) 539-4 X (812) 539	GION EET, STE 6, IN 4702 300	8 4	BLUEC 170-B COI LEXING (85	GRASS REC NWAY CT., GTON, KY 4 59) 455-853 (859) 455-853	GION STE B- 10511 0
Client			Americ	an Electric Power			Boring No			<b>B-0</b>				()	
Project				mos Plant Access Road to Dewatering Islar	nd		Date Start		2/27/200						
-	Location		N 538,				Date Com		3/3/2006						
Elevatio				ed by American Electric Power			Work Ord		90979.0						
					T	and the second second	WORK OIG		SAMPLE				-		
ELEV.				DESCRIPTION OF MATERIALS arial description, moisture, stiffness/density/hardness			DEPTH	BLOWS/6		1	W	LL	PI		PP
ft.	ft.			visual classification unless otherwise noted)	NO.		E ft.	(N Value)	%	%	%	%	%	HCSI	tst
754.10	71.8			Black, COAL, blocky, fresh, soft (LAYER CONTINUED DESCRIPTION REPEATED)					_						
753.10	72.8	$\leq$	1.0	Gray, SHALE, fresh, very soft	1										
	- 			Gray, SANDSTONE, fine grained, faintly weathered, medium hard	15	NQ2	70.8-75.8		80	64				1-3	
	-														
748.70	_ 77.2	$\swarrow$	-	Gray, SHALE, laminated, fresh, soft -	-										
	-	$\geq$	2.1	medium hard	16	NQ2	75.8-80.8		100	100				3-2	
746.60	- 79.3	$\leq$				, tot	10.0-00.0		100					0-2	
	_	1/	1	Gray, SILTSTONE, fresh, medium hard	]										
	L	1/1	3.0												
		×/.	1												
743.60	- 82.3	12×		Croy SHALE think lominated fresh	-										
	-	$\leq$		Gray, SHALE, thinly laminated, fresh, soft - medium hard	17	NQ2	80.8-85.8		100	100				2-3	
	<u> </u>	$\leq$					00.0 00.0		100	100				20	
		$\leq$													
		$\leq$	:												
	Γ	$\geq$													
	-	$\leq$													
	-	$\leq$			18	NQ2	85.8-90.8		100	50				2-3	
	-	$\geq$	12.7	Vertical fractures from 88.3' to 88.5' and 88.7' to 89.0'											
		$\leq$													
		$\leq$													
		$\leq$													
	_	$\leq$													
	-	$\leq$			19	NQ2	90.8-95.8		98	58				3-1	
	-	$\leq$													
730.90	95.0	$\leq$		Poddiah braum CLIALE frash some fi											
	_	$\geq$		Reddish brown, SHALE, fresh, very soft											
		$\geq$	3.2												
707 70	00.0	$\leq$													
727.70	- 98.2			Gray, SANDSTONE, fine grained,	20	NQ2	95.8-100.8		100	90				1-3	
-	— [	/~~	ł	slightly weathered, medium hard											
-	-		3.8												
ŀ	_			ŀ											
723.90	102.0	1.					*								
		$\leq$	1.4	Gray, SHALE, laminated, fresh, soft											
22.50	- 103.4	$\leq$		Reddish brown, SHALE, fresh, very soft	21	NQ2	100.8-105.8		98	86				3-1	
	- 405.0	$\geq$	1.6	Requisit brown, STALE, itesh, very solt											
20.90   Ge	105.0			Remarks					10/-	iter Le		heer	vatio		
)riller	Willia			Remarks				Im	wa mediate	Ler Le	veiU	bser NV			
lig No.	vviiiia								mediate Completi	on –		NV		fi fi	
lig Type	Trac	ck						Aft	•	-	24	Hrs		NA fi	
lethod	NQ2/								ater used	in drill			5.2	<u>•/</u> fi	
spector									BF = BA	CKFILL	.ED I		NO W	ATER	
									(Mea	asured t	from g	round	surfa	ce)	

TEST BORING JOHN AMOS DEWATERING PLANT ACCESS ROAD.GPJ HC NUTTING.GDT 10/25/11

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 Client American Electric Power					611 LUM CINCI (5	PORATE CE NKEN PARK INNATI, OH 113) 321-581 ( (513) 321-0	NTER CENTR DRIVE 790 M 45226 COLU 6 (6	LOGG OFF T CENTRAL OHIO REGION 780 MORRISON ROAD COLUMBUS, OH 43230 (614) 863-0475		EST BORIN INDIANA REGION 349 WALNUT STREET, STE 8 LAWRENCEBURG, IN 47025 (812) 539-4300 FAX (812) 539-4301			Page 4 of 9 BLUEGRASS REGION 470-B CONWAY CT., STE B-8 LEXINGTON, KY 40511 (859) 455-8530 FAX (859) 455-8630		
							Boring No.			B-0608					
Project John Amos Plant Access Road to Dewatering Isla					land					2/27/2006					
Boring Location         N 538,877.6         E 1,727,472.3															
-		-	,				Date Comp		3/3/2006						
Elevatio	on Ret.		rovide	d by American Electric Power			Work Orde		90979.0	67					
ELEV.	DEPTH		1	DESCRIPTION OF MATERIALS			DEDTU		SAMPLE LOWS/6" REC.			1		<b></b> _	
ft.	ft.	colo	color, material description, moisture, stiffness/density/hardness (visual classification unless otherwise noted)			. TYP	DEPTH ft.	(N Value)	%	RQD %		LL %	PI %	HCSI	PPR tsf
719.30	106.6	M	1.6	Gray, SHALE, laminated, fresh, soft											
747.00		$\mathbb{N}$	2.0	Reddish brown, SHALE, laminated, fev slickensided surfaces, fresh, soft - very soft	/										
717.30	108.6	$\leq$		Gray, SHALE, laminated, slightly	22	NQ2	2 105.8-110.8		98	82				2-1	
716.10	109.8	$\geq$	1.2	_ weathered, soft											
740.00	-		2.3	Gray, SANDSTONE, fine grained, micaceous, faintly weathered, medium hard											
713.80	112.1	$\leq$	1	∖Shale interbed at 110.9' to 111.6'											
	_	MM	3.3	Gray, SHALE, laminated, faintly weathered, soft	23	NQ2	110.8-115.8		98	82				3-2	
710.50	115.4	$\leq$													
110.00	_			Gray, SANDSTONE, fine grained, faint weathered - moderately weathered, medium hard - soft	у										
		1.	}	moduli nala - solt				•							
	-		6.1		24	NQ2	115.8-120.8		100	44				3-2	
	-			Vertical fracture from 118.6' to 120.3'											
	<b>—</b>														
704.40	121.5			High angle fracture (60°) from 120.8' to \121.2'											
703.30		M	1.1	Brownish gray to gray, SHALE, laminated, slightly weathered, soft	25	NQ2	120.8-125.8		100	72				2-1	
	-	$\leq$		Reddish brown, SHALE, laminated,											
		$\leq$	5.5	slightly weathered, very soft										-	
		$\leq$	5.5				-								
		$\leq$													
007.00	100.1	$\leq$													
697.80	_128.1	$\ge$		Reddish brown and gray, SHALE,	26	NQ2	125.8-130.8		98	82				1-0	
	L	$\leq$		moderately weathered, extremely soft -										-	
	_	$\leq$		very soft											
		$\leq$	4.4												
		$\geq$													
693.40	132.5	$\leq$													
592.30	133.6	/ / / /	1.1	Brown and gray, SANDSTONE, fine grained, slightly weathered, medium	27	NO2	130.8-135.8		100	88				0-3	
	-	Ž	/	hard	/	ITGL	100.0 100.0			00				0-0	
	_	$\leq$		Browish gray to gray, SHALE,											
Γ		$\geq$		laminated, moderately fractured, slightly											
ŀ	-	$\leq$		weathered, soft - medium hard											
ŀ	-	$\leq$	6.9	Sandstone interbed at 135.1' to 135.8'											
ļ	_	$\leq$		Horizontal fracture at 136.1' Vertical fracture from 137.7' to 137.9'		NICO	105 0 110 0			_					
L	_	$\leq$			28	NQ2	135.8-140.8		100	54				2-3	
Γ		$\leq$													
Ge	neral No	tes		Remark	S i	1			Wa	iter Le	vel O	bserv	vatio	ns	
Driller	Willia				Imr	nediate			NV		fi	t.			
Rig No.									Completi	on –		NV		fi	
ig Type Track								Afte			24	Hrs		NA fi	
5 71-								Water used in drilling 5.2 ft.							
lethod	NQ2/	SS						Wa	ter used	in drilli	ing		5.2	fl	t.

TEST BORING JOHN AMOS DEWATERING PLANT ACCESS ROAD GPJ HC NUTTING GDT 10/25/11

GEO		S. 6 18 199 .	APPA CH	C. NUTTING COMPANY LACHIAN REGION - 912 MORRIS STREET ARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 EE OWNED TAL AND TESTING ENGINEERS SINCE 1921	611 LUN CINCIN (51	ORATE CEI IKEN PARK NNATI, OH 4 13) 321-581 (513) 321-0/	NTER CENTR DRIVE 790 M 15226 COLU 6 (6	<b>GOF</b> RAL OHIO REGION JORRISON ROAD JMBUS, OH 43230 614) 863-01475	II 349 WA LAWR	NDIANA RE ALNUT STR ENCEBURG (812) 539-4 AX (812) 539	GION EET, STE 3, IN 4702	8 4	BLUEC 170-B COI LEXING (85	GRASS REC NWAY CT., GTON, KY 4 59) 455-853 (859) 455-853	GION , STE 40511
Client		A	merica	an Electric Power			Boring No.			<b>B-0</b>	608				
Project		J	ohn Ar	nos Plant Access Road to Dewatering Isla	Ind		Date Starte		2/27/200	06					
Boring L	ocation		538,8				Date Com		3/3/2006						
Elevation				d by American Electric Power			Work Orde	•	90979.0						
Lievalioi			IONUC	by American Electric Tower			WORK Olde		SAMPLE						
ELEV.	DEPTH			DESCRIPTION OF MATERIALS			DEPTH	BLOWS/6			W	LL	PI		P
ft.	ft.	COID		ial description, moisture, stiffness/density/hardness sual classification unless otherwise noted)	NO.			(N Value)		%	%	%	%	HCSI	t
685.40	140.5	$\geq$					- 10	(11 100)	70		70	- /0	70		<u> </u>
684.30	141.6	$\leq$	1.1	Reddish brown, SHALE, laminated,							-				+
004.00	-	$\leq$		fresh, soft	1										
		$\leq$		Brown, SHALE, laminated, fresh, soft Vertical fracture from 142.1' to 142.2'											
Ĩ	_	$\leq$			29	NQ2	2 140.8-145.8		100	52				2	
-	-	$\geq$	4.9												
		$\leq$													
070 40	- 146.5	$\leq$							-	-	-				$\vdash$
679.40	140.5	$\leq$		Reddish brown and gray, SHALE,	-										
ſ		$\leq$		slightly weathered, very soft - soft											
ł	_	$\leq$			30	NQ2	145.8-150.8		86	32				1-2	
ŀ	_	$\leq$	5.3	30° fracture at 149.1'							1				
Ļ		$\geq$		50 fracture at 149.1											
	_	$\geq$													
674.10	151.8	$\leq$													
F	-	$\bigotimes$		Reddish brown, CLAYSTONE,											
ŀ	_	$\mathbb{X}$		moderately weathered, very soft	31	NO2	150.8-155.8		100	26				1-2	
-	_	$\mathbb{K}$					100.0 100.0			20					
	_	$\mathbb{X}$													
		$\mathbb{K}$													
-	-	$\bigotimes$													
ŀ	_	$\mathbb{X}$	44.5												
-	_	$\mathcal{K}$	11.5		0.00		155 0 100 0								
	_	$\bigotimes$		No recovery from 155.8 ft to 160.8 ft (inner barrel did not latch).	32	INQZ	155.8-160.8		0	0				1	
		$\otimes$		(											
F	-	$\sim$													
ŀ	-	$\mathbb{X}$													
F	-	$\otimes$													
662.60	- 163.3	$\sim$													
		$\leq$		Brown and reddish brown, SHALE,	33	NQ2	160.8-165.8		98	24				1-2	
F	-	$\leq$		slightly weathered, very soft - soft		1									
F	-	$\geq$		Vertical fracture from 164.0' to 164.3'											
┝	-	$\geq$	5.3	10° fracture at 166.0' and 166.9'											
Ļ	-	$\leq$		10 Huddie at 100.0 and 100.3											
		$\leq$		Horizontal fracture at 167.7'											
357.30	168.6	$\leq$			34	NQ2	165.8-170.8		96	74				1-2	
F		$\leq$		Gray and reddish brown, SHALE, thinly laminated, slightly weathered, soft											
⊢	-	$\geq$	2.7												
654.60	171.3	$\geq$													
		1~~		Gray, SANDSTONE, fine grained, fresh,											
ſ				medium hard - hard											
F		/~~	4.1		35	NQ2	170.8-175.8		100	98				3-4	
⊢		///													
	arel No.	<u>////</u>		Descrite	L				14/	oterl		)h	Vet! -		
<b>Ger</b> Driller	neral Not			Remarks	;				Wa mediate	ater Le	evel C				F4
Rig No.	Willia	113	-						mediate Complet	- tion					ft. ft.
Rig Type	Trac							Af	•	-	24	Hr			n. ft.
	NQ2/		-						ater used	- d in dril		_ '"	5.2		ft.
/lethod	14622/														

Client Project Boring Lo Elevation ELEV. ft. 650.50 647.30	action		YEE OWNED CONTRACT AND TESTING ENGINEERS SINCE 1921	611 LUNI CINCIN (51	0RATE CEN KEN PARK I NATI, OH 4 3) 321-5816 513) 321-02	DRIVE 790 M 5226 COLUI (6	AL OHIO REGION ORRISON ROAD MBUS, OH 43230 14) 863-3113 (614) 863-0475	349 WA LAWRE	NDIANA REC LNUT STRE ENCEBURG (812) 539-43 X (812) 539	EET, STE , IN 47025 300	8 4 ;	70-B CON LEXING (85	GRASS REG WAY CT., GTON, KY 4 9) 455-8530 (859) 455-86	STE B-8 0511 )
Project Boring Lo Elevation <b>ELEV.</b> ft. 650.50	action	Ameri	can Electric Power			Boring No.			B-06					
Boring Lo Elevation ELEV. ft. 650.50 647.30	action			nd		Date Starte		2/27/200						
Elevation ELEV. ft. 650.50			Amos Plant Access Road to Dewatering Isla											
ELEV. ft. 650.50 647.30			,877.6 <b>E</b> 1,727,472.3			Date Comp		3/3/2006						
ft.	Ref.	Provid	ed by American Electric Power			Work Orde		0979.00	67					
ft.	DEPTH		DESCRIPTION OF MATERIALS		1			AMPLE		1				
647.30	ft.		erial description, moisture, stiffness/density/hardness visual classification unless otherwise noted)	NO.	ТҮРЕ	DEPTH ft.	BLOWS/6" (N Value)	REC.	RQD %	W %	LL %	PI %	HCSI	PPR tsf
	175.4_/ 	3.2												
645.10	178.6	$\leq$	High angle fracture (60°) at 177.7'	36	NQ2	175.8-180.8		100	80				2-3	
	180.8	2.2	Gray, SANDSTONE, fine grained, faintly weathered, medium hard High angle fracture (60°) from 178.8' to 179.1' and 179.8' to 179.9'	′										
	-	4.0	Reddish brown, SHALE, laminated, slightly weathered, soft	37	NQ2	180.8-185.8		94	50				2-1	
641.10	<u>184.8</u> - -		Reddish brown, CLAYSTONE, slightly weathered, very soft											
-		11.	1	38	NQ2	185.8-190.8		94	32				1	
-				39	NQ2	190.8-195.8		100	42				1	
	<u>195.9</u> 200.0	××× × × × × × × × × × × × × × × × × × ×	Gray, SANDSTONE, fine grained, faintly weathered, medium hard	40	NQ2	195.8-200.8		96	86				3	
	200.0		Reddish brown, SHALE, thinly laminated, faintly weathered, soft	41	NQ2	200.8-205.8		100	96				2	
-		11.4		42	NQ2	205.8-210.8		100	100	~			2	
			Desculo					14/-	ator I -		heer			
Gen Driller Rig No. Rig Type Method Inspector	Willian Trac NQ2/S Venu/E	ms k SS	Remarks	5			At 0	nediate Complet	- _ l in dril	24 ling	N\ Hr	W W 's 5.2	ff f f	it. it. it. i <b>t.</b>

Deplect         John Anors Plant Access Read to Dewatering Island         Date Samid         227/2006           Boring Location         N 538.877.6         E 1,727.472.3         Date Completed         3/3/2006           ELEV         DEPTH         The Completed         3/3/2006         3/3/2006           Completed         Completed         3/3/2006         3/3/2006           ELEV         DEPTH         DESCRIPTION OF MATERIALS         DESCRIPTION FOR MATERIALS         South Completed         South Completed <td< th=""><th>GEO</th><th>TECHNICAL</th><th>2</th><th>CH MPLOY</th><th>LACHIAN REGION - 912 MORRIS STREET ARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 EE OWNED TAL AND TESTING ENGINEERS SINCE 1921</th><th>611 LUN CINCIN (51</th><th>DRATE CEI KEN PARK INATI, OH 4 (3) 321-581 (513) 321-0;</th><th>NTER CENTR DRIVE 790 M 15226 COLUI 6 (6</th><th>G OF AL OHIO REGION ORRISON ROAD WBUS, OH 43230 14) 863-3113 (614) 863-0475</th><th>li 349 WA LAWRI</th><th>NDIANA REG LINUT STRE ENCEBURG (812) 539-4: X (812) 539</th><th>GION EET, STE 6, IN 4702 300</th><th>8 4</th><th>BLUE 70-B CO LEXIN (85</th><th>GRASS RE( NWAY CT., GTON, KY 4 59) 455-853 (859) 455-8</th><th>STE 10511 0</th></td<>	GEO	TECHNICAL	2	CH MPLOY	LACHIAN REGION - 912 MORRIS STREET ARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 EE OWNED TAL AND TESTING ENGINEERS SINCE 1921	611 LUN CINCIN (51	DRATE CEI KEN PARK INATI, OH 4 (3) 321-581 (513) 321-0;	NTER CENTR DRIVE 790 M 15226 COLUI 6 (6	G OF AL OHIO REGION ORRISON ROAD WBUS, OH 43230 14) 863-3113 (614) 863-0475	li 349 WA LAWRI	NDIANA REG LINUT STRE ENCEBURG (812) 539-4: X (812) 539	GION EET, STE 6, IN 4702 300	8 4	BLUE 70-B CO LEXIN (85	GRASS RE( NWAY CT., GTON, KY 4 59) 455-853 (859) 455-8	STE 10511 0
Being Location Elevation Ruf.         NS38.877.6         E.1.727.472.3         Date Completed Work Order No.         3920206 9077.027           Elevation Ruf.         Provided by American Eachic Power (coalid admition urres downer each) (coalid admition urres downer each)         DEPTH R. DEVTH R. DEVTHR R. DEVTHR R. DEVTHR R. DEVTHR R. DEVTHR R. D	Client		An	nerica	an Electric Power			Boring No.	÷		B-06	608	_			
Elsevision Ref.         Provided by American Elischic Power         York Order N.         9077.067         York         York         York           ELEV.         DEPTH ft.         etcr. malerial discontraction traction.         BLOWSet?         REC.         ROD         W         LL         P           614.50         211.4         Reddish brown SHALE, finity off         DEPTH (IV value)         BLOWSet?         REC.         ROD         W         LL         P         -         CS           613.70         212.2         Vol         O.B         Intermed, median hard         F         Reddish brown SHALE, finity efficience         NO         TYPE         R.         NO	Project		Jol	hn Ar	nos Plant Access Road to Dewatering Islan	d		Date Starte	ed	2/27/200	)6					
Elsevision Ref.         Provided by American Elischic Power         York Order N.         9077.067         York         York         York           ELEV.         DEPTH ft.         etcr. malerial discontraction traction.         BLOWSet?         REC.         ROD         W         LL         P           614.50         211.4         Reddish brown SHALE, finity off         DEPTH (IV value)         BLOWSet?         REC.         ROD         W         LL         P         -         CS           613.70         212.2         Vol         O.B         Intermed, median hard         F         Reddish brown SHALE, finity efficience         NO         TYPE         R.         NO	Boring L	ocation	N	538,8	577.6 <b>E</b> 1,727,472.3			Date Com	oleted	3/3/2006	3					
ELEV It.         DESCRIPTION OF MATERIALS contending discription, normal, stiffware/instrumture (M Value)         SAMPLE         V <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>•</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								•								
ELEV         DEPTH n.         ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup> ELOVESS <sup>C</sup>																
Bit 16:0         Description         Laminated, finitity weathered, soft           613.70         212.2         0.8         ////////////////////////////////////				mater	ial description, moisture, stiffness/density/hardness sual classification unless otherwise noted)	NO.	TYPE								HCSI	F
0.00000000000000000000000000000000000	044.50		$\leq$										-			
0.000         1.000         1.000         100         100         100         2.4           610.90         215.0         Gray, SANDE TONE, fine grained, fresh, medium hard         43         NQ2         210.8-215.8         100         100         2.4           610.90         215.0         Gray, SANDE TONE, fine grained, fresh, medium hard         44         NQ2         210.8-215.8         100         100         2.4           60.90         219.0         Feddish brown, SHALE, Isinjated, disponie interbed at 21 0f b 221.3;         100         96         3.2           608.90         221.7         Roddish brown, CLAYSTONE, fine grained, fresh, medium hard         45         NQ2         20.8-225.8         100         52         3-2           97.40         228.5         Gray, SANDSTONE, fine grained, fresh, medium hard - hard         46         NQ2         225.8-230.8         100         74         2.4           98.90         237.0         Roddish brown to gray, SULTOTONE, fine grained, fresh, medium hard - hard         46         NQ2         23.8-230.8         100         74         2.4           98.90         237.0         Roddish brown to gray, SULTOTONE, fine grained, medium hard         48         NQ2         23.8-240.8         100         100         4-2 <td< td=""><td></td><td></td><td></td><td>0.8</td><td>(LAYER CONTINUED DESCRIPTION</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>				0.8	(LAYER CONTINUED DESCRIPTION											
2.8       weathered, medium hard       red       43       NU2       210.8-215.8       100	613.70	-212.2	$\geq$	0.0												
Gray, SANDSTONE, fine grained, fresh, medium hard         4.0         Shale interbed at 216.6 to 217.4'         44         NQ2 215.8-220.8         100         96         3-2           606.90         219.0         Reddish brown, SHALE, laminated, claystone interbed, soft - medium hard         44         NQ2 215.8-220.8         100         96         3-2           303.20         222.7         Reddish brown, CLAYSTONE, fine grainated, interbeds, few thin clay seams, faintly weathered, soft - medium hard         45         NQ2 220.8-225.8         100         52         3-2           303.20         222.7         Reddish brown, CLAYSTONE, fine grained, mitarbods, few thin clay seams, faintly weathered, soft         45         NQ2 220.8-225.8         100         52         3-2           307.40         228.5         Gray, SANDSTONE, fine grained, mitarbodied, filesh, medium hard         46         NQ2 225.8-230.8         100         74         2.4           889.0         237.0         Reddish brown to gray, SILTSTONE, faintly weathered, soft - medium hard         48         NQ2 230.8-235.8         96         100         3.4           883.00         237.0         Reddish brown to gray, SILTSTONE, faintly weathered, soft - medium hard         48         NQ2 240.8-245.8         100         100         4-2           83.30         242.6         Gray, SANDSTONE, fine graine	610.90	215.0	MMM	2.8	weathered, medium hard - hard Gray, SHALE, thinly laminated, fresh,	43	NQ2	2 210.8-215.8		100	100				2-4	
Sinale interfed at 216.0 to 217.4         44         NQ2         215.8-220.8         100         96         3-2           B08.90         219.0         Reddish brown, SHALE, laminated, claystone interbed at 221.0 to 221.3', 3.7         fainty weathered, soft - molium hard         44         NQ2         215.8-220.8         100         96         3-2           B03.20         222.7         Reddish brown, CLAYSTONE, slickenidd surfaces, few shale interbeds, returned, swith nage seams, faintly weathered, soft         45         NQ2         220.8-225.8         100         52         3-2           5.8         Gray, SANDSTONE, fine grained, friesh, medium hard - hard         46         NQ2         225.8-230.8         100         74         2-4           8.5         Gray, SANDSTONE, fine grained, friesh, medium hard - hard         46         NQ2         230.8-235.8         96         100         3-4           6         Gray, SANDSTONE, fine grained, friesh, medium hard - hard         48         NQ2         235.8-240.8         100         100         4-2           83.90         237.0         Reddish brown to gray, SILTSTONE, faintly weathered, soft - medium hard         48         NQ2         235.8-240.8         100         100         4-2           83.30         242.6         Gray, SANDSTONE, fine grained, micaceous, faintly weathered, nicaceo		_	1		Gray, SANDSTONE, fine grained, fresh,			-								
606.90         219.0         Reddish brown, SHALE, Iaminated, claystone interbed at 221.01 to 221.3°, 3.7           3.7         Faintly weathered, soft - molium hard           3.7         Reddish brown, CLAYSTONE, slickensided surfaces, few shale interbeds, few thin clay seams, faintly weathered, soft           5.8         Soft Constraints           597.40         228.5           5.8         Gray, SANDSTONE, fine grained, micaceous, medium hard           688.90         237.0           Reddish brown to gray, SILTSTONE, fine grained, fresh, medium hard - hard           688.90         237.0           Reddish brown to gray, SILTSTONE, fine grained, fresh, medium hard - hard           688.90         237.0           Reddish brown to gray, SILTSTONE, fine grained, fresh, medium hard - hard           688.90         237.0           Reddish brown to gray, SILTSTONE, fine grained, fresh, medium hard - hard           638.30         242.6           Gray, SANDSTONE, fine grained, medium hard           64         NQ2           95         100           96         100           96         100           96         100           97.40         242.6           96         100           96         100           96	-	_	<	4.0	Shale interbed at 216.6' to 217.4'	44	NQ2	215.8-220.8		100	96				3-2	
503.20       222.7       Reddish brown, CLAYSTONE, slickensided surfaces, few shale interbeds, few thin clay seams, faintly weathered, soft       45       NQ2       220.8-225.8       100       52       3-2         597.40       228.5       5.8       46       NQ2       225.8-230.8       100       74       2-4         597.40       228.5       Gray, SANDSTONE, fine grained, micaceous, medium to thinly bedded, fresh, medium hard - hard       46       NQ2       225.8-230.8       100       74       2-4         689.90       237.0       Reddish brown to gray, SILTSTONE, fine grained, micaceous, medium to thinly bedded, fresh, medium hard - hard       48       NQ2       230.8-235.8       96       100       3-4         688.90       237.0       Gray, SANDSTONE, fine grained, micaceous, faintly weathered, soft - medium hard       48       NQ2       235.8-240.8       100       100       4-2         688.90       237.0       Gray, SANDSTONE, fine grained, medium hard       48       NQ2       235.8-240.8       100       100       4-2         683.30       242.6       Gray, SANDSTONE, fine grained, medium bedded, micaceous, faintly weathered - fresh, hard       49       NQ2       240.8-245.8       100       100       2-4         693.30       2422.6       Gray, SANDSTONE, fine grained, medium bedded, micaceous	606.90			0.7	claystone interbed at 221.0' to 221.3',											
397.40       228.5       Cray, SANDSTONE, fine grained, micaceous, medium hard - hard       46       NQ2       225.8-230.8       100       74       2.4         597.40       228.7       Cray, SANDSTONE, fine grained, micaceous, medium hard - hard       46       NQ2       225.8-230.8       100       74       2.4         6       S5.8       46       NQ2       230.8-235.8       96       100       3.4         6       S5.8       47       NQ2       230.8-235.8       96       100       3.4         6       S5.8       47       NQ2       230.8-235.8       96       100       3.4         6       S5.6       47       NQ2       230.8-235.8       96       100       3.4         6       S5.6       47       NQ2       230.8-235.8       96       100       3.4         6       S5.6       48       NQ2       235.8-240.8       100       100       4.2         63.30       242.6       Gray, SANDSTONE, fine grained, medium hard       48       NQ2       240.8-245.8       100       100       2.4         69.30       Capeeral Notes       Gray, SANDSTONE, fine grained, medium bedded, micaceous, faintly weathered - fresh, hard       49       NQ2       240.8-245.	603.20	222.7		3.7	Deddiet haven OLAVOTONE											
Gray, SANDSTONE, fine grained, micaceous, medium to thinly bedded, fresh, medium hard - hard       Image: Constraint of thinly bedded, fresh, medium hard - hard         Image: Constraint of thinly bedded, fresh, medium hard - hard       Image: Constraint of thinly bedded, fresh, medium hard - hard       Image: Constraint of thinly bedded, fresh, medium hard - hard         Image: Constraint of thinly bedded, fresh, medium hard - hard       Image: Constraint of thinly bedded, fresh, medium hard       Image: Constraint of thinly bedded, fresh, fresh, hard       Image: Constraint of thinly bedded, fresh, fresh, hard       Image: Constraint of thinly bedded, fresh, hard       Image: Constra	-			5.8	slickensided surfaces, few shale interbeds, few thin clay seams, faintly	45	NQ2	220.8-225.8		100	52				3-2	
is fresh, medium hard - hard       is free - fresh, hard       is free - fresh, hard       is free - fresh, hard       is free - f	597.40	- 228.5				46	NQ2	225.8-230.8		100	74				2-4	
is88.90       237.0       Reddish brown to gray, SILTSTONE, very thinly bedded, clayey upper 1.5', faintly weathered, soft - medium hard       47       NQ2       230.8-235.8       96       100       3.4         is83.30       242.6       S.6       Reddish brown to gray, SILTSTONE, faintly weathered, soft - medium hard       48       NQ2       235.8-240.8       100       100       4-2         is83.30       242.6       Gray, SANDSTONE, fine grained, medium bedded, micaceous, faintly weathered - fresh, hard       49       NQ2       240.8-245.8       100       100       2-4         Water Level Observations         williams       Milliams       MW       ft.         ig No.       Milliams       MW       ft.         ig Type       Track       MW       ft.         Meduum bedded, NQ2/SS       NQ2       Water used in drilling       5.2	-	_														
S88.90       237.0       Second       Reddish brown to gray, SILTSTONE, faintly bedded, clayey upper 1.5', faintly weathered, soft - medium hard       48       NQ2       235.8-240.8       100       100       4-2         S83.30       242.6       Second       Second       48       NQ2       240.8-245.8       100       100       2-4         Second       Gray, SANDSTONE, fine grained, medium bedded, micaceous, faintly weathered - fresh, hard       49       NQ2       240.8-245.8       100       100       2-4         General Notes       Remarks       Water Level Observations         Immediate       NW       MW       ft.         Lig Type       Track       MQ2/SS       After       24       Hrs. NA       ft.	-	-		8.5		47	NQ2	230.8-235.8		96	100				3-4	
istriction       istriction <td>588.90</td> <td></td> <td></td> <td></td> <td>very thinly bedded, clayey upper 1.5',</td> <td>48</td> <td>NQ2</td> <td>235.8-240.8</td> <td></td> <td>100</td> <td>100</td> <td></td> <td></td> <td></td> <td>4-2</td> <td></td>	588.90				very thinly bedded, clayey upper 1.5',	48	NQ2	235.8-240.8		100	100				4-2	
Gray, SANDSTONE, fine grained, medium bedded, micaceous, faintly weathered - fresh, hard       49       NQ2       240.8-245.8       100       100       2-4         General Notes       Remarks       100       100       100       2-4         Williams       Williams       MW       ft.         Lig Type       Track       NQ2/SS       After       24         Water used in drilling       5.2       ft.		-		5.6	-											
Williams     Immediate     NW     ft.       tig No.     At Completion     NW     ft.       tig Type     Track     After     24     Hrs.     NA     ft.       tethod     NQ2/SS     Water used in drilling     5.2     ft.	583.30	242.6	~~~		medium bedded, micaceous, faintly	49	NQ2	240.8-245.8		100	100				2-4	
Inig No.     At Completion     NW     ft.       Inig Type     Track     After     24     Hrs.     NA     ft.       Iethod     NQ2/SS     Water used in drilling     5.2     ft.	Ger	neral Not	es		Remarks			l		W	ater Le	evel C	bser	vatio	ns	
Inig Type         Track         After         24         Hrs.         NA         ft.           Nethod         NQ2/SS         Water used in drilling         5.2         ft.	Driller	Willia	ms								_					
NQ2/SS         Water used in drilling         5.2         ft.	Rig No.									•	ion _					
	Rig Type			-									_ Hr			
ispector Venu/B.B. BF = BACKFILLED NW = NO WATER	Method nspector			<u> </u>					W							

	<b>IC</b>		APPAL CH/	C. NUTTING COMPANY LACHIAN REGION - 912 MORRIS STREET ARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711	611 LUN	DRATE CEN KEN PARK INATI, OH 4	ITER CENTR DRIVE 790 M	GOF 7	IN 349 WA	DIANA REC	GION EET, STE	8 4	BLUE	Page 8	BON STE B-8
GEO	OTECHNICAL			TAL AND TESTING ENGINEERS SINCE 1921	(51	3) 321-5816 (513) 321-02	(6	14) 863-3113 (614) 863-0475	(	(812) 539-43 X (812) 539	300	<u> </u>	(85	59) 455-8530 (859) 455-86	)
Client		A	merica	an Electric Power			Boring No.			B-06	608				
Project		Jo	ohn An	nos Plant Access Road to Dewatering Isl	and		Date Starte	ed 2	2/27/200	6					
Boring L	ocation	N	538,8	77.6 <b>E</b> 1,727,472.3			Date Com	oleted 3	3/3/2006	;					
Elevatio	on Ref.	Ρ	rovideo	d by American Electric Power			Work Orde	er No. 9	90979.00	67					
ELEV.	DEPTH			DESCRIPTION OF MATERIALS				S	AMPLE						
ft.	ft.		r, materi	ial description, moisture, stiffness/density/hardness sual classification unless otherwise noted)	NO.	TYPE	DEPTH ft.	BLOWS/6' (N Value)	' REC. %	RQD %	W %	LL %	PI %	HCSI	PPF tsf
	-	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>		Gray, SANDSTONE, fine grained, medium bedded, micaceous, faintly weathered - fresh, hard <i>(LAYER</i> <i>CONTINUED DESCRIPTION</i> <i>REPEATED</i> )	50	NQ2	245.8-250.8		100	100				4	
	-		18.9		51	NQ2	250.8-255.8		100	100				4	
					52	NQ2	255.8-260.8		100	100				4	
564.40 561.40	- <u>261.5</u> - - - <u>264.5</u>		3.0	Light gray, SANDSTONE, medium to coarse grained, medium bedded, conglomeratic, faintly weathered, hard Reddish brown, CLAYSTONE,	53	NQ2	260.8-265.8		88	74				4-2	
				slickensided surfaces, slightly weathered, soft	54	NQ2	265.8-270.8		84	42				2	
			20.5		55	NQ2	270.8-275.8		100	20				2	
					56	NQ2	275.8-280.8		92	72				2	
Ge Driller Rig No. Rig Type Method	willia Willia Trac	ms		Remark	S			At At	mediate Completi	_	24	N\ N\ N\ Hr	N N	f f NAf	t. t. t.
nspector									BF = BA		_ED		NO V	VATER	

TEST BORING JOHN AMOS DEWATERING PLANT ACCESS ROAD.GPJ HC NUTTING.GDT 10/25/11

GEO		Same Summer	CH. MPLOY	LACHIAN REGION - 912 MORRIS STREET ARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 EE OWNED TAL AND TESTING ENGINEERS SINCE 1921	611 LUN CINCIN (51	DRATE CEN KEN PARK INATI, OH 4 (3) 321-5816 (513) 321-02	NTER CENTR DRIVE 790 M 5226 COLU 3 (6	<b>GOF</b> RAL OHIO REGION MORRISON ROAD JMBUS, OH 43230 514) 863-3113 (614) 863-0475	II 349 WA LAWRI	NDIANA REG LINUT STRI ENCEBURG (812) 539-4 X (812) 539	GION EET, STE 5, IN 4702 300 -4301	8 4	BLUEC 170-B COI LEXINO (85	GRASS REC NWAY CT., GTON, KY 4 59) 455-853( (859) 455-86	STE E 40511 10
Client		Ar	nerica	an Electric Power			Boring No.			<b>B-06</b>	608				
Project		Jo	hn Ar	nos Plant Access Road to Dewatering Isl	and		· Date Starte	ed	2/27/200	)6					
Boring L	ocation	N	538,8	77.6 <b>E</b> 1,727,472.3			Date Com	pleted	3/3/2006	6					
Elevatior	n Ref.	Pr	ovide	d by American Electric Power			Work Orde	er No.	90979.0	67					
ELEV.	DEPTH		г	DESCRIPTION OF MATERIALS			- <u>1</u>	1	SAMPLE	-					
ft.	ft.		mater	ial description, moisture, stiffness/density/hardness sual classification unless otherwise noted)	s NO.	TYPE	DEPTH ft.	BLOWS/6 (N Value)		RQD	W %	LL %	PI %	HCSI	P t
540.90	_ _ _ _285.0			Reddish brown, CLAYSTONE, slickensided surfaces, slightly weathered, soft (LAYER CONTINUED DESCRIPTION REPEATED) Reddish brown to gray, SILTSTONE,	57	NQ2	280.8-285.8		90	82				2-3	
-	  		6.8	medium bedded, slickensided surfaces, clayey, faintly weathered, soft - medium hard	58	NQ2	285.8-290.8		100	66				2-3	
534.10			5.0	Gray, SANDSTONE, very fine grained, thinly bedded, faintly weathered, medium hard - hard	59	NQ2	290.8-295.8		100	100				3-4	
529.10	296.8		3.2	Gray to reddish brown, CLAYSTONE, slickensided surfaces, slightly weathered, soft	60	NQ2	295.8-300.0		90	64				4-2	
525.90	<u>300.0</u>			BORING COMPLETED @ 300.0'											
	-														
Ger	eral Not	85		Remark					W	ater Le	well	beer	vatio	ns	
Driller	Willia			Reffark				Im	mediate	TEL TE	VEIU	NN			ft.
Rig No.	vviiid								Complet	ion –		NV			ft.
Rig Type	Trac	k							ter		24	Hr			ft.
- vr-			-												ft.
1ethod	NQ2/	50						VV	ater usec	a in oni	ing		5.2		τ.

		- interesting and the second	APPA CH EMPLOY	C. NUTTING COMPANY LACHIAN REGION - 912 MORRIS STREET IARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711	611 LUN CINCIN (51	ORATE CEN IKEN PARK VNATI, OH 4 13) 321-5816	NTER CEN DRIVE 790 5226 COL	DG OF TRAL OHIO REGION MORRISON ROAD LUMBUS, OH 43230 (614) 863-3113	II 349 WA LAWR	NDIANA RE ALNUT STR ENCEBURG (812) 539-4	GION EET, STE 3, IN 4702 300	8 4	BLUEG 170-B COM LEXING	GRASS REG WAY CT., STON, KY 4 99 455-853	GION , STE E 40511
	TECHNICA			TAL AND TESTING ENGINEERS SINCE 1921	FAX	(513) 321-02	294 F/	AX (614) 863-0475	FA	AX (812) 539	-4301		FAX (	859) 455-8	630
Client				an Electric Power			Boring No			<b>B-0</b>	509				
Project				mos Plant Access Road to Dewatering Isla	and		Date Star		3/9/2006			C			
Boring L			538,8				Date Con	· –	3/9/2006						
Elevation	DEPTH		rovide	d by American Electric Power			Work Orc	and the second sec	90979.0						
ft.	ft.			DESCRIPTION OF MATERIALS ial description, moisture, stiffness/density/hardness			DEPTH	BLOWS/6			W	LL	PI		Р
664.00	0.0			sual classification unless otherwise noted)	NO.		E ft.	(N Value		%	%	%	%	HCSI	1
	_			Reddish brown, LEAN CLAY with SAND, moist, soft	1	SS	0.0-1.5	1-1-2 (3)	100						
	-		4.0												
660.00	4.0	$\leq$		Reddish brown and brown, SANDY SHALE, highly weathered, soft											
	_	MM			2	SS	5.0-6.5	17-17-13 (30)	100						
	-	MMM	7.0												
653.00	 11.0	W			3	SS	10.0-11.4	18-36-50/	5" 100						
	_	MMM	2.6	Brown, SANDY SHALE, laminated, highly weathered - moderately weathered, soft			10.0-11.4	10-30-30/							
650.40		MMM		Reddish brown, SHALE, laminated, moderately weathered, extremely soft - soft	1	NQ2	11.4-16.4		98	58				2-0	
			9.8		2	NQ2	16.4-21.4		100	84				2-0	
640.60	- 23.4	MM			3	NQ2	21.4-23.4		100	95				2-0	
	-			BORING COMPLETED @ 23.4'											
								<u>_</u>							
<b>Ger</b> riller	n <b>eral Not</b> Willia			Remarks					Wa mediate	ater Le	vel O	bser\ NV			ť.
Rig No.	· · · · · · · · ·								Completi	ion –		NV			ι. t.
lig Type	Trac	k						Afi		_	24	Hrs			t. t.
1ethod	NQ2/								ater used	l in drill		,	11.4		t.
											-				

GEO		(1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	APP, CI	C. NUTTING COMPANY ALACHIAN REGION - 912 MORRIS STREET HARLESTON, WV 25301 (304) 344-0821 FAX (304) 342-4711 YEE OWNED NTAL AND TESTING ENGINEERS SINCE 1921	611 LUN CINCI (5	PORATE CE NKEN PARK NNATI, OH (13) 321-581 (513) 321-0	NTER CEN DRIVE 790 15226 COL 6	DG OF MORISON ROAD LUMBUS, OH 43230 (614) 863-3113 AX (614) 863-0475	N 349 W LAWF	INDIANA RE ALNUT STF RENCEBUR (812) 539- AX (812) 53	EGION REET, STE G, IN 4702 4300	E 8 4	BLUE 70-B CO LEXIN (85	GRASS REG NWAY CT., STON, KY 4 59) 455-853 (859) 455-85	GION STE E 10511
Client			Americ	an Electric Power			Boring No			<b>B-0</b>				(	
Project				mos Plant Access Road to Dewatering Isla	and		Date Star	-	3/7/200						
Boring L	ocation			986.3 <b>E</b> 1,728,717.8			Date Con	-	3/7/200						
Elevatio				ed by American Electric Power			Work Ord	· -	90979.0						
ELEV.	DEPTH								SAMPLE						
ft.	ft.	colo	or. mate	DESCRIPTION OF MATERIALS erial description, moisture, stiffness/density/hardness			DEPTH	BLOWS	/6" REC	RQE	w	LL	PI		P
638.20	0.0	וכ	, (v	risual classification unless otherwise noted)	NO	. TYPI	∃ ft.	(N Value	e) %	%	%	%	%	HCSI	ts
	_			Brown, SANDY LEAN CLAY, trace organics (roots), moist, medium stiff	1	SS	0.0-1.5	1-4-5 (9)	100						
633.20	_ 		5.0												
	_	MM	•	Reddish brown, SHALE, completely weathered, very soft	2	SS	5.0-6.5	14-21-2 (46)	<sup>5</sup> 100						
		MMMM	5.0												
628.20	10.0			Brown, SANDSTONE, fine grained,	3	ss	10.0-10.4	50/5"	100						
	-		}	weakly cemented, moderately weathered, soft											
	_				1	NQ2	10.4-15.4		74	40				2	
<u>618.90</u>	- - - - 19.3	>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	9.3	Brown, SANDY SHALE, laminated,	2	NQ2	15.4-20.4		100	72				2-1	
617.80	-20.4	$\geq$	1.1	_slightly weathered, very soft - soft											
-	-		5.7	Brown, SANDSTONE, fine grained, micaceous, slightly weathered, soft	3	NQ2	20.4-25.4		92	54				2	
612.10	- - 26.1														
	-		5.5	Reddish brown, SHALE, slightly weathered, very soft - soft	4	NQ2	25.4-30.4		94	70				2-1	
606.60 605.80 -	31.6		0.8	Gray, SANDY SHALE, laminated, faintly	5	NQ2	30.4-32.4		100	100				2	
-		<		weathered, soft BORING COMPLETED @ 32.4'											
	neral Not			Remarks	; ;					ater Le	evel O				
Driller Rig No. Rig Type	Willia Trac	:k						At	nmediate t Complet fter	ion _	NA	NV NV	V	ff ff NA ff	t.
/lethod nspector	NQ2/3							W	BF = BA		LED I			ATER	



Arcadis 2016

Soil Boring Logs

MW-1601 to MW-1606, SB-1601 to SB-1607

JOB NUMBER	OH015976.0	007		LUG
COMPANY An	nerican Elect	ric Power		
PROJECT	nn E. Amos Pl	ant CCR		
COORDINATES	N 538,186.6	E 1,731,490	.3	
GROUND ELEVA	TION 586.5	SYSTEM _		
Water Level, ft	<b>⊻ 18.5</b>	Ţ	$ \Psi $	
TIME				
DATE	4/26/2016			

BORING NO. <u>MW-1601</u>	DATE 7/19/16	_ SHEET	1	OF <u>2</u>
BORING START 4/25/	16 BORING F	INISH 4	/26/16	
PIEZOMETER TYPE NA	WELL	TYPE _	W	
HGT. RISER ABOVE GROUI	ND 3.0'	_ DIA _2		
DEPTH TO TOP OF WELL S	CREEN <u>28.61</u> BO	ттом 3	8.0'	
WELL DEVELOPMENT 5	/18 & 6/13/16 BAC	KFILL	A	
FIELD PARTY <b>NA</b>		RIG <b>[</b>	Diedric	h

	SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
	1	SS	0.0	1.5	1/2"	0					No recovery.		
	2 3	SS SS	1.5 3.0	3.0 4.5	1/2" 1/2"	3 5		-			Ash, fine sand, trace silt, trace medium and coarse angular sand and slag, saturated, very soft, dark grayish brown (10YR 4/2).		
	4	SS	4.5	6.0	1-2-4/0"	7		-		CL	Clay, little silt, trace ash sand and gravel, moist,		
	5	SS	6.0	7.5	2-5-5/0"	13		5		ML CL	\soft, reddish brown (5YR 4/3).         Silt, little clay, medium stiff, low plasticity, moist, no dilatancy, dark gray (10YR 4/1).         Clay, little silt, medium stiff, medium plasticity, moist, dark yellowish brown (10YR 4/4).		
	6	SS	7.5	9.0	2-2-4/0"	12		-					
	7	SS	9.0	10.5	1-1-2/0"	12		- 10		CL	Clay, little silt, trace sand, very soft, medium plasticity, wet, dark yellowish brown with gray		
PJ	8	SS	10.5	12.0	2-4-5/0"	16		-		CL	mottling (10YR 5/1). Note: dark yellowish brown (10YR 4/3) with <1mm thick black laminations from 10.5 to 10.7		
FIELD WV.G	9	SS	12.0	13.5	4-6-9/0"	16		-			feet. Clay, some silt, trace sand, stiff, low plasticity, moist, dark yellowish brown with dark brown and gray (10YR 4/6).		
EP\AEP WIN	10	SS	13.5	15.0	4-7-11/0"	14		15					
UMENTSVA	11	SS	15.0	16.5	3-5-7/0"	16		-	-	ML	Silt and very fine sand, little clay, moist, medium stiff, non plastic, strong brown and gray (7.5YR 9/6).		
EWERDOC	12	SS	16.5	18.0	2-4-7/0"	16		-			Note: stiff from 16.5 to 18.0 feet.		
AEP.GDT - 7/19/16 15:49 - C:USERS\SBREWERDOCUMENTS\AEP\AEP WINFIELD WV.GPJ	13	SS	18.0	19.5	4-4-6/0"	21		-		SP	Sand, fine grain, well sorted, angular to round little silt and decreasing to trace at 19.0 feet, stiff, wet	Ţ	
5:49 - C:	14	SS	19.5	21.0	3-2-1/0"	15					(7.5YR 4/6).		
9/16 15			NQ-2 R		ASING USED			PIEZOM	ETED		Continued Next Page E: PT = OPEN TUBE POROUS TIP, SS	= 00	
DT - 7/1			<u>6" x 3.25</u> 9" x 6.25	HSA HSA							SCREEN, $G = GEONOR$ , $P = PNEUMATIC$		
AEP.G			NW CAS	SING	VANCER	4" 3"		WELL TY	/PE:	0\	W = OPEN TUBE SLOTTED SCREEN, GN	<b>Л = G</b>	EOMON
AEP -			<u>SW CAS</u> AIR HAN			6" 8"					RECORDER K. Eldridge		

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. MW-1601
 DATE 7/19/16
 SHEET 2
 OF 2

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/25/16
 BORING FINISH
 4/26/16

 BORING NO. <u>MW-1601</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>2</u>

SAMPLE NUMBER	SAMPLE	SAM DEI IN F FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	MELL	DRILLER'S NOTES
15 16	SS SS	21.0 22.5	22.5 24.0	2-1-3/0" 2-2-3/0"	17 15		-			Note: trace silt and clay from 19.5 to 21.0 feet. Note: some clay from 20.7 to 20.9 feet. Note: trace silt and clay from 21.0 to 22.5 feet. Note: trace silt and clay from 22.5 to 23 feet.		
17	SS	24.0	25.5	3-4-7/0"	15		25 -			Note: <2% silt and clay, trace small black subrounded gravel from 24.3 to 25.5 feet.		
18	SS	25.5	27.0	3-5-6/0"	15		25 -	-		Note: black lenses 1-2 mm thick at 24.5 and 25 feet. Note: trace small black subrounded gravel, <2%		
19	SS	27.0	28.5	3-6-13/0"	14					silt and clay from 25.5 to 27 feet. Note: dark brown to black horizontal lamination from 26.0 to 27.0 feet. Note: 5% silt and clay, dark yellowish brown from		
20	SS	28.5	30.0	6-10-13/0"	13		-			27 to 27.5 feet. Note: sand, fine grain, well sorted, loose, 2% silt and clay, wet, strong brown, from 27.5 to 28.0		
21	SS	30.0	31.5	9-8-10/0"	20		30 -	-		feet. Note: lighter in color from 29.5 to 30.0 feet.		
22	SS	31.5	33.0	2-3-8/0"	15			-		Note: <2% silt and clay from 30.0 to 31.5 feet.		
23	SS	33.0	34.5	2-5-11/0"	7		-			Note: 2-3 mm thick laminations of gray clay from 32.5 to 32.6 feet. Note: sand, fine to medium grain, well sorted, loose, wet, gray, angular to round from 32.6 to		
24	SS	34.5	36.0	4-7-10/0"	12		35 -	-		33.0 feet. Note: 2-3 mm lamination of brown clay from 34.0		
24	SS	36.0	37.5	2-3-12/0"	2		-			to 34.3 feet. Note: trace coarse sand, granules of coal from 34.5 to 36.0 feet. Note: trace coarse sand sized pieces of coal from 36.0 to 37.5 feet		
26	SS	37.5	39.0	4-7-7/0"	9			_		Note: trace angular fine to coarse gravel from 37.5 to 39.0 feet.		
27	SS	39.0	40.5	6-6-9/0"	14		40 -		SP	Sand, fine grained well-sorted, angular to round, loose, grayish brown, wet (10YR 5/2).		
28	SS	40.5	42.0	6-6-8/0"	14							
26 27 28								<u></u>		Note: 1-2 mm thick lamination of black coal from 40.0 to 40.5 feet. End of boring at 42.0 feet.		
? 												

AEP - AEP.GDT - 7/19/16 15:49 - C:USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ

JOB NUMBER	OH015976.0	007		LOG
COMPANY An	nerican Elect	ric Power		
PROJECT Joh	nn E. Amos P	ant CCR		
COORDINATES	N 537,031.1	E 1,730,894	.1	
GROUND ELEVA	TION <b>598.0</b>	SYSTEM _		
Water Level, ft	⊻ 15.8	Ţ	Ţ	
TIME				
DATE	5/25/2016			

BORING NO. MW-1602A	DATE 7	7/19/16	SHE	et <u>1</u>	_ OF	3
BORING START 5/25/	16	BORING FI	NISH	5/25/1	6	
PIEZOMETER TYPE <b>NA</b>		WELL 1	TYPE	OW		
HGT. RISER ABOVE GROUN	ND 3.0'		DIA	2"		
DEPTH TO TOP OF WELL S	CREEN _	48.4' BOT	ТОМ	58.0'		
WELL DEVELOPMENT 6	/14/2016	BACK	FILL	NA		
FIELD PARTY NA			RIG	Diedri	ch	

SAMPLE	NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"		RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
	1	SS	0.0	1.5							Hydro-Vac 0.0 to 6.0 feet.		
	2	SS	1.5	3.0					-				
	3	SS	3.0	4.5					_				
	4	SS	4.5	6.0				5 -					
	5	SS SS	6.0 7.5	7.5 9.0	4-4-3/0" 2-2-6/0"	6				GM	Small subangular gravel, some silt, trace medium sand, trace gravel, fine sand, stiff, moist, red brown, non plastic, no dilatancy (5YR 4/6). Note: gravel clogged in shoe from 7.5 to 9.0 feet.		
	7	SS	9.0	10.5	4-6-7/0"	13		-		00			
	8	SS	10.5	12.0	3-2-3/0"	12		10 -		SP CL ML	Fine sand, very uniform grain size, trace silt (3-5%), moist, medium stiff, no dilatancy, non plastic, moist (5YR 4/6). Silty clay, little silt, mottled red brown/gray, stiff,		
RIDOCUMENTSVAEPVAEP WINFIELD WV.GPJ	9	SS	12.0	13.5	2-1-1/0"	0		-		SP	<ul> <li>\high plasticity, no dilatancy (5YR 4/6-5YR 5/1).</li> <li>Fine sand, very uniform grain size, trace silt (3-5%), moist, medium stiff, no dilatancy, non plastic, moist (5YR 4/6).</li> </ul>		
EP\AEP WINF	10	SS	13.5	15.0	1-1-0/0"	16		15 -		SP SM	Fine sand, some silt, trace organics, roots, wood, soft, moist, medium dilatancy, low-no plasticity (5YR 5/1).		
IENTS/A	11	SS	15.0	16.5	1-1-1-0/0"	16		10			Note: color change 5YR 3/1 at 14.5 feet. Note: water at 15.75 feet, very soft and rapid	Ţ	
	12	SS	16.5	18.0	1-1-2/0"	10					dilatancy. Note: trace organics from 16.3 to 16.5 feet. Note: color shift 0.5-10 mm alternating laminate of fine sand, trace silt at 16.5 feet.		
RS\SBRI	13	SS	18.0	19.5	1-2-2/0"	12		-		00			
- 7/19/16 15:49 - C:\USERS\SBREWE	14	SS	19.5	21.0	2-2-2/0"	0		-		SP	Fine sand, trace silt, very soft, wet, uniform grain size, poorly sorted, gray, trace black sand, medium dilatancy, non plastic (7.5YR 5/1).		
6 15:4(			TYPE	OF C	ASING USED						Continued Next Page		
- 7/19/1			NQ-2 RC 6" x 3.25		RE		PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC						EN TUBE
AEP.GDT -			<u>9" x 6.25</u>	HSA	VANCER	4"							
			NW CAS	SING		3" 6"		WELL T	TPE:		N = OPEN TUBE SLOTTED SCREEN, GN RECORDER T. Runge	/i – G	
AEP			AIR HAN			8"					NEOONDER I. INDING		

 
 COMPANY
 American Electric Power
 BORING NO.
 MW-1602A
 DATE
 7/19/16
 SHEET
 2
 OF
 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 5/25/16
 BORING FINISH
 5/25/16
 BORING NO. <u>MW-1602A</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	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
										Note: subrounded sandstone gravel clogged shoe from 19.5 to 21.0 feet.		
16	SS	21.0	22.5	1-1-1/0"	18		-			Note: very fine sand, trace silt, wet from 21.5 to 22.5 feet.		
17	SS	22.5	24.0	1-1-2/0"	5.5		-			Note: trace (1 piece) of small subrounded gravel in run at 16.5 feet.		
18	SS	24.0	25.5	1-1-1/0"	11		- 25		ML	Very fine sand, little silt (2%), very soft, moist-wet, medium dilatancy, no plasticity, gray, poorly		
19	SS	25.5	27.0	1-2-2/0"	12.5		20 -			graded (7.5YR 5/1). Note: trace clay, low plasticity from 25.9 to 28.0		
20	SS	27.0	28.5	1-1-1/0"	16		-			feet.		
21	SS	28.5	30.0	3-2-4/0"	4.5		-	-		Note: clay content no longer present, no plasticity, wet at 28.0 feet.		
22	SS	30.0	31.5	2-3-4/0"	16.5		30 –					
	SS	31.5	22.0	2.4.5/0"	15.5		-			Note: addition of trace clay, moist, medium stiffness from 30.4 to 31.9 feet.		
23	55	31.5	33.0	3-4-5/0"	15.5		-			Note: moist not wet, slow dilatancy from 31.9 to 33.0 feet.		
24	SS	33.0	34.5	3-3-5/0"	14		-		ML	Very fine sand, some silt, trace (8-10%) clay, soft,		
25	SS	34.5	36.0	3-3-4/0"	17		35 -		ML	moist-wet, low-medium plasticity, slow dilatancy, gray, grains of micah/muscovite visible (7.5YR		
26	SS	36.0	37.5	2-3-4/0"	13		-	-		5/1). Very fine sand, little silt (2%), very soft, moist-wet, medium dilatancy, no plasticity, gray, poorly graded (7.5YR 5/1). Note: 3-5 mm laminate of fine sand in shoe, silt.		
27	SS	37.5	39.0	2-2-4/0"	17		-			trace frequency at 34.8 feet. Note: trace amounts of clay, low plasticity from 37.5 to 38.7 feet.		
28	SS	39.0	40.5	2-2-3/0"	19.5		40					
	SS	40.5	42.0	2-2-2/0"	17		40		SW	Fine sand, trace silt (10%), very soft, wet, medium-rapid dilatancy, no plasticity, gray, muscovite grains visible (7.5YR 5/1).		
30	SS	42.0	43.5	1-1-3/0"	13		-	•••••	• • •	Note: 5-10 mm laminations of silt rich deposits, fine sand with little silt (25%) at 41.0 feet. Note: wet from 42.0 to 43.5 feet.		
31	SS	43.5	45.0	3-14-14/0"	14		-		sw	Fine sand with little subangular to angular small		
32	SS	45.0	46.5	6-7-11/0"	10.5		45		• • • •	sandstone gravel, trace silt (5%), wet, stiff, no dilatancy, non plastic, sandstone, fine sand clast size (7.5YR 5/1).		

AEP - AEP.GDT - 7/19/16 15:49 - C:USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. MW-1602A
 DATE 7/19/16
 SHEET 3
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 5/25/16
 BORING FINISH
 5/25/16

 BORING NO. <u>MW-1602A</u> DATE <u>7/19/16</u> SHEET <u>3</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
33	SS	46.5	48.0	10-10-13/0"	13				SP	Note: less sandstone gravel, trace (5-8%), very wet, rapid dilatancy from 46.0 to 46.5 feet. Fine sand, trace silt, uniform sand grain size, soft,		
34	SS	48.0	49.5	8-9-13/0"	9.5		-			wet, rapid dilatancy, no plasticity, gray (7.5YR 5/1). Note: 3-4 mm bands/laminate of black sand, same grain size, trace frequency from 48.0 to		
35	SS	49.5	51.0	6-5-10/0"	12.5					49.5 feet. Note: 1" black bank/lamination of black material		
36	SS	51.0	52.5	14-11-7/0"	10		50 -			(small gravel to fine sand in size) within band there is no regular material at 49.5 feet. Note: slight color shift (7.5YR 5/2), silt (3-5%) contains dispersed in run, black material in trace amounts 3-5% from 51.0 to 52.5 feet.		
37	SS	52.5	54.0	6-5-6/0"	7		-	-				
38	SS	54.0	55.5	4-7-8/0"	9		55 -	-		Note: laminae 2-3mm of black sand (fine size)		
39	SS	55.5	57.0	7-8-10/0"	9.5			_		present from 54.5 to 55.7 feet.		
40	SS	57.0	58.5	6-8-14-3/0"	14		-	_		Note: trace amounts (3%) of small angular sandstone gravel from 57.0 to 58.5 feet.		
41	SS	58.5	60.0	9-10-23/0"	7							
							60 -			Weathered sandstone.		
										End of boring at 60 feet.		

	OH015976.0	007	L	LUG OF BORING	
	nerican Electi	ric Power		BORING NO. MW-	1603A
PROJECT JO	hn E. Amos Pl	ant CCR		BORING START	5/23/ <sup>,</sup>
COORDINATES	N 538,963.7	E 1,729,315	5.5	PIEZOMETER TYPE	= <u>NA</u>
GROUND ELEVA	TION <b>584.1</b>	SYSTEM		HGT. RISER ABOVI	E GROUN
Water Level, ft	<b>∑</b> 19.1	<b>▼</b>	Ţ	DEPTH TO TOP OF	WELL S
TIME				WELL DEVELOPME	ent <u>6</u>
DATE	5/24/2016			FIELD PARTY N	Α

BORING NO. MW-1603A DATE	7/19/16 SHE	ET <u>1</u> OF <u>2</u>
BORING START <b>5/23/16</b>	BORING FINISH	5/24/16
PIEZOMETER TYPE <b>NA</b>	WELL TYPE	WO
HGT. RISER ABOVE GROUND	DIA	2"
DEPTH TO TOP OF WELL SCREEN	38.0' воттом	43.0'
WELL DEVELOPMENT 6/14/2016	BACKFILL	NA
FIELD PARTY <b>NA</b>	RIG	Diedrich

	NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES	
	1	SS	0.0	1.5				-			Hydrovac from 0.0 to 6.0 feet. Fill materials, large cobbles to small gravel, limestone.			
	2	SS	1.5	3.0				-						
	3	SS	3.0	4.5				-						
	4	SS	4.5	6.0				5 -						
	5	SS	6.0	7.5	5-3-3/0"	7		-		CL	Clay with little silt, soft, high plasticity, moist, gray (7YR 4/1), no dilatancy.	-		
	6	SS	7.5	9.0	3-2-3/0"	4.5		-			Note: sandstone plug from sluff in shoe for first 1/2 of run (6.0 to 7.5 and 7.5 to 9.0 feet).			
	7	SS	9.0	10.5	2-2-2/0"	9		-			Note: gray (7YR 4/1) mottling, trace (1%) grains of medium to coarse sand.			
	8	SS	10.5	12.0	2-1-2/0"	20		10 –						
ELD WV.GPJ	9	SS	12.0	13.5	1-1-1/0"	22		-		SW	Sand, medium to fine with little silt, soft, wet, gray (10YR 4/1), rapid dilatancy, no plasticity, trace			
- AEP.GDT - 7/19/16 15:49 - C:\USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ	10	SS	13.5	15.0	1-1-1/0"	12		-		ML	amounts of oxidized mudstone. Silt with trace clay, medium plasticity, very uniform, moist gray (10YR 4/1), trace organics			
IENTSVAEF	11	SS	15.0	16.5	3-1-1/0"	15		15 -			(wood, organics, roots), soft, dilatancy.			
/ER/DOCUN	12	SS	16.5	18.0	1-2-2/0"	10		-	-		Note: little clay from 16.0 to 16.5 feet.			
ERS/SBREW	13	SS	18.0	19.5	1-1-2/0"	15		-	-					
9 - C:\USE	14	SS	19.5	21.0	2-2-2/0"	15.5		-		SW	Fine sand, little silt, well sorted, poorly graded, $_{\Box}$ soft, wet, gray, uniform, grain size, trace oxidized $_{\Box}$	. <u>V</u>		
6 15:49			TYPE	OF C	ASING USED			Continued Next Page						
7/19/1			NQ-2 RC 6" x 3.25		RE			PIEZOM			,		EN TUBE	
GDT -			9" x 6.25	HSA	VANCER	4"	SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC							
- AEP			NW CAS	SING		4 3" 6"	=	WELL T	YPE:		N = OPEN TUBE SLOTTED SCREEN, G	vi = G	EOMON	
AEP	d SW CASING 6" ₩ AIR HAMMER 8"										RECORDER <u><b>T. Runge</b></u>			

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. MW-1603A
 DATE 7/19/16
 SHEET 2
 OF 2

 PROJECT
 John E. Amos Plant CCR
 BORING START
 5/23/16
 BORING FINISH
 5/24/16

 BORING NO. <u>MW-1603A</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>2</u>

15       SS       21.0       22.5       1-1-20°       13         16       SS       22.5       24.0       4-4-610°       22         17       SS       24.0       25.5       4-3-60°       22         17       SS       24.0       25.5       4-3-60°       22         18       SS       25.5       27.0       2-2-20°       7         19       SS       27.0       2.8.5       1-2-20°       10         20       SS       28.5       30.0       3-3-40°       17.5         20       SS       28.5       30.0       3-4-60°       20         21       SS       30.0       3-5       4-5-60°       20         22       SS       31.5       4-5-60°       20       30         22       SS       31.5       3.0.0       2-3-40°       16         23       SS       30.0       3-5       2-2-30°       23         24       SS       36.0       2-2-30°       23         25       SS       38.0       3-5       2-2-30°       23         24       SS       36.0       2-2-50°       21         25 <t< th=""><th>SAMPLE</th><th>SAMPLE</th><th>DEF</th><th></th><th>STANDARD PENETRATION</th><th>LE C</th><th>QD DEPTH</th><th>GRAPHIC</th><th>c s</th><th>SOIL / ROCK</th><th>WELL</th><th>DRILLER'S</th></t<>	SAMPLE	SAMPLE	DEF		STANDARD PENETRATION	LE C	QD DEPTH	GRAPHIC	c s	SOIL / ROCK	WELL	DRILLER'S
15       SS       21.0       22.5       1-1-20"       13         16       SS       22.5       24.0       4-4-80"       22         17       SS       24.0       25.5       4-3-60"       22         18       SS       25.5       27.0       2.2-20"       7         19       SS       25.5       27.0       2.2-20"       7         19       SS       27.0       2.8.5       1-2-20"       10         20       SS       28.5       30.0       3-3-40"       17.5         21       SS       30.0       31.5       4-5-60"       20         22       SS       33.0       2-3-40"       16         23       SS       33.0       2-3-40"       16         24       SS       36.0       37.5       3-1-50"       22         25       SS       36.0       37.5       3-1-50"       22         26       SS       35.0       2-2-50"       21         27       SS       30.0       3-6-50"       14         27       SS       30.0       3-6-50"       14         27       SS       30.0       3-6-50"	SAN	SAN			RESISTANCE BLOWS / 6"	RECO	6	GRA	1 01	IDENTIFICATION	WE	NOTES
16       SS       22.5       24.0       4-4-610"       22         17       SS       24.0       25.5       4-3-610"       22         18       SS       25.5       27.0       2.2-2:00"       7         19       SS       27.0       28.5       1-2:20"       10         20       SS       28.5       1.2:20"       10         21       SS       30.0       3-3-40"       17.5         22       SS       31.5       4-5-60"       20         23       SS       33.0       2-3-40"       16         23       SS       33.0       2-3-40"       16         24       SS       34.5       2-2:30"       23         24       SS       31.5       3-3.0       2-3-40"         24       SS       31.6       4-5-60"       20         25       SS       36.0       37.5       3-1-50"       22         26       SS       37.5	15	SS	21.0	22.5	1-1-2/0"	13		-		Note: water at 19.1 feet.		
17       SS       24.0       25.5       4-3-6/0"       22         18       SS       25.5       27.0       2-2-2/0"       7         19       SS       27.0       28.5       1-2-2/0"       10         20       SS       28.5       30.0       3-3-4/0"       17.5         21       SS       30.0       31.5       4-5-6/0"       20         22       SS       31.5       33.0       2-3-4/0"       16         23       SS       33.0       34.5       2-2-2/0"       7         24       SS       36.0       2-2-3/0"       23         25       SS       36.0       2-2-3/0"       16         24       SS       36.0       2-2-5/0"       21         25       SS       36.0       37.5       3-1-5/0"       22         26       SS       37.5       39.0       3-5-5/0"       14         27       SS       30.0       3-5-5/0"       14         28       SS       40.5       42.0       3-5-5/0"       14         29       SS       43.5       45.0       50-30"       15         26       SS       37.5<	16	SS	22.5	24.0	4-4-6/0"	22		_	SM	Silt with little clay, medium plasticity, moist, stiff, no diltancy, trace root structures.		
18       SS       25.5       27.0       2-2-20°       7         19       SS       27.0       28.5       1-2-20°       10         20       SS       28.5       30.0       3-3-40°       17.5         21       SS       30.0       31.5       4-5-60°       20         22       SS       31.5       4-5-60°       20         30       23       SS       33.0       2-3-40°       16         23       SS       33.0       2-3-40°       16         24       SS       34.5       2-2-30°       23         24       SS       34.5       2-2-30°       23         24       SS       36.0       2-2-50°       21         30	17	SS	24.0	25.5	4-3-6/0"	22		-		soft, non plastic, rapid dilatancy, trace amounts of black/oxidized material, coarse sand sized		
19       SS       27.0       28.5       1.2-220°       10       feet.         20       SS       28.5       30.0       3-3-4/0°       17.5       ML       Note: oddized sandstone, angular, small gravel, wet from 28.0 to 28.2 feet.         21       SS       30.0       31.5       4-5-6/0°       20       Silt with lifte day, stiff, no dilatancy, moderate plasticity, uniform texture.         22       SS       31.5       33.0       2-3-4/0°       16       SM       Weathered sandstone, small angular gravel with liftle fine same, liftle silt, wet, no dilatancy, no plasticity, slow dilatancy, no plasticity, slow dilatancy, very soft, poorly graded, wet, sfff, trace amount of clay, low to no plasticity, slow dilatancy, very soft, poorly graded, wet, sfff, trace amount of clay, low to no plasticity, slow dilatancy, very soft, poorly graded, wet, sfff, trace amount of clay, low to no plasticity, slow dilatancy, very soft, poorly graded, wet, sfff, trace amount of clay, low dilatancy, wet soft, poorly graded, wet, sfff, trace amount of clay, low dilatancy, very soft, poorly graded, wet, sfff, trace amount of clay, low dilatancy, were soft, poorly graded, wet, sfff, trace amount of clay, low dilatancy, were soft, poorly graded, wet, sfff, trace amount of clay, low dilatancy, mount and soft, more silt, info amount of clay, low dilatancy, mount and soft, more silt, info amount of clay, low dilatancy, mount and soft, more silt, info amount of clay, low dilatancy, mount and soft, more silt, info amount of low soft, more silt, more and soft, more silt, info amount of clay, low dilatancy, mount and the soft amount of clay, income moist/wet.         26       SS<	18	SS	25.5	27.0	2-2-2/0"	7	— 25 ·		•	clasts with fine sand with some silt, stiff, moist,		
20       SS       28.5       30.0       3-3-4/0"       17.5         21       SS       30.0       31.5       4-5-6/0"       20         22       SS       31.5       33.0       2-3-4/0"       16         23       SS       33.0       2-3-4/0"       16         23       SS       33.0       2-3-4/0"       16         23       SS       33.0       2-2-3/0"       23         24       SS       34.5       2-2-3/0"       23         24       SS       34.5       2-2-5/0"       21         25       SS       36.0       37.5       3-1-5/0"       22         26       SS       37.5       3-1-5/0"       22         26       SS       37.5       39.0       3-6-6/0"       14         27       SS       39.0       40.5       3-5-50"       14         28       SS       40.5       42.0       3-5-50"       14         29       SS       43.5       45.0       50-30"       14         30       SS       43.5       45.0       50-30"       14         40	19	SS	27.0	28.5	1-2-2/0"	10			•	feet.		
21       SS       30.0       31.5       4-5-6/0"       20         22       SS       31.5       33.0       2-3-4/0"       16         23       SS       33.0       2-3-4/0"       16         23       SS       33.0       34.5       2-2-3/0"       23         24       SS       34.5       2-2-5/0"       21         25       SS       36.0       2-2-5/0"       21         26       SS       37.5       3-1-5/0"       22         26       SS       37.5       3-1-5/0"       22         27       SS       39.0       3-6-6/0"       14         27       SS       39.0       3-6-6/0"       14         28       SS       40.5       3-5-5/0"       14         30       SS       43.5       45.0       50-3/0"       15         30       SS       43.5       45.0       50-3/0"       14	20	SS	28.5	30.0	3-3-4/0"	17.5		-	ML	wet from 28.0 to 28.2 feet.           Silt with little clay, stiff, moist, no dilatancy,		
22       SS       31.5       33.0       2-3-4/0"       16         23       SS       33.0       34.5       2-2-3/0"       23         24       SS       34.5       2-2-5/0"       21         25       SS       36.0       37.5       3-1-5/0"       22         26       SS       37.5       39.0       3-6-6/0"       14         27       SS       39.0       40.5       3-5-5/0"       14         28       SS       40.5       42.0       3-5-5/0"       14         29       SS       42.0       43.5       4-7-44/0"       14         30       SS       43.5       45.0       50-3/0"       15	21	SS	30.0	31.5	4-5-6/0"	20		-		moderate plasticity, uniform texture.		
24       SS       34.5       36.0       2-2-5/0"       21         25       SS       36.0       37.5       3-1-5/0"       22         26       SS       37.5       39.0       3-6-6/0"       14         27       SS       39.0       40.5       3-5-5/0"       14         28       SS       40.5       42.0       3-5-5/0"       14         29       SS       42.0       43.5       4-7-44/0"       14         30       SS       43.5       45.0       50-3/0"       15	22	SS	31.5	33.0	2-3-4/0"	16			SM	little fine sane, little silt, wet, no dilatancy, no plasticity, well graded, stiff.		
25       SS       36.0       37.5       3-1-5/0"       22         26       SS       37.5       39.0       3-6-6/0"       14         27       SS       39.0       40.5       3-5-5/0"       14         28       SS       40.5       42.0       3-5-5/0"       14         29       SS       42.0       43.5       4-7-44/0"       14         29       SS       43.5       45.0       50-3/0"       15	24								SM	Silty sand, fine with some silt, wet, fast dilatancy, very soft, poorly graded, very uniform, grain size,		
26       SS       37.5       39.0       3-6-6/0"       14       Note: trace fine sand, wet (saturated) at 38.3 with 2" band of fine sand with trace silt.         27       SS       39.0       40.5       3-5-5/0"       14       Weathered sandstone, small, angular gravel with trace silt, little fine sand, trace coarse sand, stiff, wet, non plastic, no dilatancy.         28       SS       40.5       42.0       3-5-5/0"       14         29       SS       42.0       43.5       4-7-44/0"       14         30       SS       43.5       45.0       50-3/0"       15			36.0	37.5	3-1-5/0"	22	35		ML	Silt with trace clay, trace fine sand bands (some 30%) of more clay rich sediment 1/2 to 1" thick laminae, moist, moderately stiff, no dilatancy,		
29       SS       42.0       43.5       4-7-44/0"       14         30       SS       43.5       45.0       50-3/0"       15    45	26	SS	37.5	39.0	3-6-6/0"	14		-		Note: trace fine sand, wet (saturated) at 38.3 with		
29       SS       42.0       43.5       4-7-44/0"       14         30       SS       43.5       45.0       50-3/0"       15    45	27	SS	39.0	40.5	3-5-5/0"	14	40.		•	trace silt, little fine sand, trace coarse sand, stiff, wet, non plastic, no dilatancy.		
29       SS       42.0       43.5       4-7-44/0"       14         30       SS       43.5       45.0       50-3/0"       15    45	28	SS	40.5	42.0	3-5-5/0"	14		-	•	Note: some fine sand and trace oxidized sand		
30 SS 43.5 45.0 50-3/0" 15 some moisture (localized).	29	SS	42.0	43.5	4-7-44/0"	14			:			
45 End of boring at 45.0 feet.	30	SS	43.5	45.0	50-3/0"	15		-	· · ·			
							45		•	End of boring at 45.0 feet.		

AEP - AEP.GDT - 7/19/16 15:49 - C:USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ

JOB NUMBER	OH015976.0	007		LUG OF BURING
	merican Electi	ric Power		BORING NO. MW-1604
PROJECT	hn E. Amos Pl	ant CCR		BORING START 5
COORDINATES	N 539,459.6	E 1,729,931	.7	PIEZOMETER TYPE
GROUND ELEVA	TION <b>586.0</b>	SYSTEM _		HGT. RISER ABOVE G
Water Level, ft	⊻ 18.8	Ţ	Ţ	DEPTH TO TOP OF WE
TIME				WELL DEVELOPMENT
DATE	5/6/2016		1	FIELD PARTY NA

BORING NO. MW-1604 DATE	7/19/16 SHE	ET <u>1</u> OF <u>3</u>
BORING START <b>5/5/16</b>	BORING FINISH	5/6/16
PIEZOMETER TYPE <b>NA</b>	WELL TYPE	WO
HGT. RISER ABOVE GROUND	DIA	2"
DEPTH TO TOP OF WELL SCREEN	<b>33.9'</b> воттом	43.5'
WELL DEVELOPMENT	BACKFILL	NA
FIELD PARTY <b>NA</b>	RIG	Diedrich

SAMPLE	NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	MELL	DRILLER'S NOTES
	1	SS	0.0	1.5	1-0-0/0"	0					No recovery, rock (limestone), clogged shoe.		
	2 3	SS SS	1.5 3.0	3.0 4.5	1-1-1/0" 1-1-1/0"	5				GM	Silty gravel and sand, silt some fine sand, little small subangular gravel, soft, wet, slow dilatancy, non plastic, brown, trace organics and root fibers.		
	4	SS	4.5	6.0	2-2-3/0"	11.5				ML	Silt with fine sand, very fine sand, soft, moist, no		
	5	ss	6.0	7.5	2-3-5/0"	16		5 -	-	IVIL	diltancy, moderate plasticity, brown (10YR 4/4), uniform texture, trace small black sand inclusions (1 mm).		
	6	SS	7.5	9.0	3-4-6/0"	15.5					Note: more stiff, trace root fibers, trace small (2-3 mm) areas of gray (10YR 4/4) coloration from 7.5 to 9.0 feet.		
	7	SS	9.0	10.5	3-4-4/0"	0		10 -			Note: sandstone (very fine grain) clogged shoe on run from 9.0 to 10.5 feet, subangular medium		
	8	SS	10.5	12.0	3-4-6/0"	16.5					gravel size.		
ELD WV.GPJ	9	SS	12.0	13.5	9-15-13/0"	18				ML	Silty sand, fine, little silt, stiff, uneven distribution of sand, moist, no diltancy, non plastic, gray brown (10YR 4/2).		
EP\AEP V	10	SS	13.5	15.0	5-7-10/0"	11.5		15 -		ML	inclusions-angular). Silt with very fine sand, little very fine sand, stiff, red brown (5YR 4/3), no dillatancy, no to low plasticity.		
NTS/A	11	SS	15.0	16.5	5-8-14/0"	12		15 -					
	12	SS	16.5	18.0	5-8-8/0"	15			-		Platy mudstone, interbedded with silt and very fine sand. Silty sand, fine, little to trace silt, very soft, moist, non plastic, brown, gray (2.5Y 4/2), no dilatancy,		
- 7/19/16 15:49 - C:\USERS\SBREWE	13	SS	18.0	19.5	4-4-5/0"	13			_		trace small, soft, sandstone, rounded gravel. Note: water at 18.75 feet, rapid dilatancy.	Ţ	
- C:\U	14	SS	19.5	21.0	5-7-11/0"	19							
3 15:49			ТҮРЕ	OF C	ASING USED			Continued Next Page					
DT - 7/19/16		(	NQ-2 RC 6" x 3.25 9" x 6.25	HSA	RE		PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC						EN TUBE
AEP.GDT				SING AD	VANCER	4" 3"	WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON					EOMON	
SW CASING 6" AIR HAMMER 8"											RECORDER T. Runge		

JOB NUMBER **OH015976.0007** 

SAMPLE NUMBER	SAMPLE	SAN DEF IN F FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	SS	21.0	22.5	3-4-5/0"	16.5			-		Note: color change to 7.5YR 4/2 at 19.9 feet. Note: oxidation/iron staining, color change to 7.5YR 5/8 at 20.7 feet.		
16	SS SS	22.5 24.0	24.0 25.5	3-7-10/0" 5-6-9/0"	17 15.5				SP	Poorly graded sand, fine, trace silt (5-8%), very soft, rapid dilatancy, brown, no plasticity, poorly graded.		
18	SS	25.5	27.0	9-7-6/0"	12		25 -			Note: 0.2' layer of silt with fine sand at 24.7 feet. Note: color change to 7.5YR 5/8 at 24.8 feet. Note: heaving sand at 25.5 feet.		
19	SS	27.0	28.5	3-4-4/0"	15.5			-		Note: small (1mm) layers of black sand (2 layers) at 26.9 feet. Note: contains trace small (5mm) layers of sandy		
20	SS	28.5	30.0	2-2-1/0"	19					silt, color change to 7.5YR 4/3 from 27.0 to 28.5 feet. Note: black material from 28.8 to 28.9 feet. Note: band of oxidation/iron staining at 29.25 feet,		
21	SS	30.0	31.5	1-2-3/0"	11.5		30 -			0.4' thick, 7.5YR 5/8. Note: 0.3' band of 10YR 6/6 coloration at 31.0		
22	SS	31.5	33.0	3-2-3/0"	15		-			feet.		
23	SS SS	33.0 34.5	34.5 36.0	3-3-4/0" 3-4-10/0"	16		-	-		Note: colored bands (5-10mm) 7.5YR 4/1 at 33.0 feet. Note: very soft, very wet, trace silt (3-5%) at 34.5		
	SS	36.0	37.5	4-5-8/0"	12		35 -	-		feet. Note: slightly stiff, 3% silt, very poorly graded, well		
25 26	SS	37.5	39.0	4-5-6/0"	11.5		-			sorted from 36.0 to 37.5 feet. Note: trace angular sandstone, small gravel (one clast per 18"), slight stiff, 3% silt from 37.5 to 39.0		
26 27 28 28 29	SS	39.0	40.5	7-10-11/0"	17		40 -			feet. Note: color grey 1 5G-/1, poorly cemented (3-5% silt) from 39.0 to 40.5 feet.		
28	SS	40.5	42.0	5-6-8/0"	12.5		40					
29	SS	42.0	43.5	7-11-10/0"	7.5		-	-		Note: trace silt (3-4%) from 42.0 from 43.5 feet. Note: rock stuck in shoe (sandstone) at 42.5 feet.		
30	SS	43.5	45.0	6-5-4/0"	14.5		45 -			Note: 10mm thick bands of higher concentration of silt and little amount of silt, 25% of run at 43.5 feet.		
31	SS	45.0	46.5	3-5-8/0"	16		70					

 COMPANY
 American Electric Power
 BORING NO. MW-1604
 DATE 7/19/16
 SHEET 2
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 5/5/16
 BORING FINISH
 5/6/16

 BORING NO. <u>MW-1604</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>3</u>

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO.
 MW-1604
 DATE
 7/19/16
 SHEET
 3
 OF
 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 5/5/16
 BORING FINISH
 5/6/16

 BORING NO. <u>MW-1604</u> DATE <u>7/19/16</u> SHEET <u>3</u> OF <u>3</u>

	SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
								_			End of boring at 46.5 feet.		
V.GPJ													
FIELD W													
AEP WIN													
ITS/AEP/													
OCUME													
REWER/D													
ERS/SBF													
9 - C:\US													
9/16 15:4													
GDT - 7/1													
AEP - AEP.GDT - 7/19/16 15:49 - C:\USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ													

JOB NUMBER	OH015976.0	007		LO	GC
	nerican Elect	ric Power			В
PROJECT Joh	nn E. Amos P	lant CCR			В
COORDINATES	N 540,038.8	E 1,731,401	.7		Ρ
GROUND ELEVA	TION 583.4	SYSTEM			Н
Water Level, ft	⊻ 18.0	Ţ	Ţ		D
TIME					W
DATE	5/2/2016				F

BORING NO. MW-1605 DATE	7/19/16 SHE	ET <u>1</u> OF <u>3</u>
BORING START <b>4/29/16</b>	BORING FINISH	5/2/16
PIEZOMETER TYPE NA	WELL TYPE	NA
HGT. RISER ABOVE GROUND	DIA	2"
DEPTH TO TOP OF WELL SCREEN	<b>26.3'</b> воттом	41.0'
WELL DEVELOPMENT	BACKFILL	NA
FIELD PARTY <b>NA</b>	RIG	Diedrich

	SAMPLE NUMBER	SAMPLE	SAM DEF IN F	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES	
	1	SS	0.0	1.5	0-1-0/0"	4		-		SM	Sandy silt, little fine sand, trace coarse sand, moist, soft, no dilatancy, low plasticity, 2.5YR 4/6.			
	2	SS	1.5	3.0	1-0-0/0"	2		-			Note: trace amounts of small angular limestone gravel (roadbed) from 1.5 to 3.0 feet.			
	3	SS	3.0	4.5	1-0-0/0"	5.5		-			Note: wet, slightly stick from 3.0 to 4.5 feet.			
	4	SS	4.5	6.0	2-2-4/0"	5.5		5 –						
	5	SS	6.0	7.5	5-11-8/0"	12.5		-						
	6	SS	7.5	9.0	4-5-7/0"	7.5		-			Note: at 6.75 feet rock fragment stuck in spoon, from 6.0 to 6.76 wet, from 6.76 to 7.5 dry. Note; trace small rounded gravel (3%) from 7.0 to 7.5 feet.			
	7	SS	9.0	10.5	2-3-6/0"	13		- 10 —		SM	Note: root structures (2-3%) from 7.3 to 9.0 feet. Note: little small gravel from 7.9 to 9.0 feet. Note: sandstone lodged in spoon at 8.8 feet.	-		
	8	SS	10.5	12.0	3-4-6/0"	16.5		-			Silt, trace medium sand, little fine sand, stiff, brown, moist, no dilatancy, 10YR 3/1.			
O WV.GPJ	9	SS	12.0	13.5	2-4-7/0"	13.5		-	-	ML	Silt, very fine sand, stiff, moist, grey mottling (3%), non plastic, no dilatancy 2.5Y 5/6.			
- 7/19/16 15:49 - C:\USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ	10	SS	13.5	15.0	5-5-7/0"	19		-			Note: slightly more stiff from 13.0 to 13.5 feet. Note: higher silt concentration, little amount of very fine sand (20%).			
JMENTS/AEP	11	SS	15.0	16.5	2-2-3/0"	17		15	-	ML	Silt, little fine sand (25%), moderate stiff, moist, low plasticity, 2.5Y 5/6. Note: moisture increases from 15.0 to 16.5 feet.			
EWER/DOCI	12	SS	16.5	18.0	2-1-3/0"	21.5		-			Note: 2" thick layers of higher dilatancy, silt concentration more stiff, less moisture (40% of total run) from 16.5 to 18.0 feet.			
USERS\SBR	13	SS	18.0	19.5	1-2-2/0"	14		-			Note: wet, medium dilatancy, very soft, no water in spoon from 18.0 to 19.5 feet. Note: water at 18.0 feet.	<u>⊥</u>		
49 - C:\	14	SS	19.5	21.0	2-1-2/0"	16.5						-		
/16 15:					ASING USED						Continued Next Page			
T - 7/19/			<u>NQ-2 RC</u> 6" x 3.25 9" x 6.25	HSA	RE			PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC						
AEP.GDT				SING AD	VANCER	4" 3"		WELL TY	/PE:	0	W = OPEN TUBE SLOTTED SCREEN, GM	И = G	EOMON	
<pre></pre>											RECORDER <u><b>T. Runge</b></u>			

JOB NUMBER **OH015976.0007** 

 
 COMPANY
 American Electric Power
 BORING NO.
 MW-1605
 DATE
 7/19/16
 SHEET
 2
 OF
 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/29/16
 BORING FINISH
 5/2/16
 BORING NO. <u>MW-1605</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>3</u>

SAMPLE	SAMPLE	DEI IN F	IPLE PTH EET		TOTAL LENGTH % Da		GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15		FROM 5 21.0	TO 22.5	BLOWS / 6" 1-2-2/0"	16			SM	Sandy silt with some fine sand, wet, soft, rapid dilatancy, low plasticity, high quantity of water in spoon, 2.5Y 5/6.		
16	s ss	22.5	24.0	1-2-2/0"	15.5						
17	' ss	24.0	25.5	3-4-9/0"	12	- 25 -		SM	Note: saturated, slightly less silt and more sand, \very soft from 23.5 to 24.0 feet.		
18	s	25.5	27.0	2-5-6/0"	11.5		-	SP	wet, rapid dilatancy, non plastic, poorly graded, 2.5Y 5/6. Rock lodged into shoe at 25.5 feet. Chert fractures, no cleavage, angular, all fresh breaks from split spoon. Chalky inclusions.		
19	) ss	27.0	28.5	4-5-9/0"	12		-		Heaving sand encountered at 25.5 feet. Poorly graded fine sand, trace (3%) silt, very soft, brown, wet, non plastic, rapid dilatancy, poorly graded, 2.5Y 5/6.		
20	) SS	28.5	30.0	4-7-7/0"	16.5	- 30 -			Note: trace 5mm layers of black sand from 28.5 to 30.0 feet.		
2			31.5 33.0	4-5-8/0" 3-4-4/0"	16				Note: 2.5" band of silty sand, wet, stiff to moderately stiff, fine sand, little silt at 30.4 feet. Note: 5mm layers of black sand (trace amounts) from 30.8 to 31.5 feet.		
23	s ss	33.0	34.5	4-3-6/0"	16				Note: oxidation/iron staining, 5YR 5/8 at 32.6 feet. Note: color change at 32.8 feet 5Y 5/1. Note: very abrupt and clear color shift to Gley 1		
24	s	34.5	36.0	4-5-6/0"	16.5	- 35 -	_		4N at 33.3 feet.		
MINHELD WV.6	s ss	36.0	37.5	6-3-6/0"	10.5		-		Note: color change to 7.5YR 4/1 at 35.25 feet.		
20 SVAEPVAEP WI	s ss	37.5	39.0	2-3-4/0"	12.5		-		Note: 2-3" trace/little amounts of black material in 2mm bands at 36.8 feet. Note: little black material, slightly more stiff, 10YR		
	' ss	39.0	40.5	3-3-2/0"	14	- 40 -	-		2/1 at 38.2 feet. Note: color change at 38.5 feet to 10YR 5/8.		
	s ss	40.5	42.0	6-2-6/0"	17			SP	Poorly graded, fine sand, trace to little silt (10-12%), very soft, wet, brown, no plasticity, rapid dilatancy. Note: sand grain size slightly		
29 - C:/USE			43.5	10-6-7/0"	24				larger at 40.5 feet. Note: trace silt from 42.0 to 43.5 feet. Note: angular piece of sandstone matching sand		
7/19/16 15: 05 05	SS	43.5	45.0	5-3-4/0"	3		-		in color, small gravel size at 43.0 feet. Note: heaving sand encountered at 43.5 feet.		
AEP.GDT - 7	SS	6 45.0	46.5	8-4-6/0"	10	45 -			Note: pieces of platy mudstone within sand in shoe, small gravel sized, very soft rock, subangular at 44.7 feet.		
- - -									Continued Next Page		

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JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. MW-1605
 DATE 7/19/16
 SHEET 3
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/29/16
 BORING FINISH
 5/2/16

BORING NO. <u>MW-1605</u> DATE <u>7/19/16</u> SHEET <u>3</u> OF <u>3</u>

SAMPLE	SAMPLE	SAM DE IN F	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
32	2 55	6 46.5	48.0	2-6-8/0"	11.5					Note: color change to 7.5YR 4/1 at 45.0 feet. Note: 2" band of silt with very fine sand layered 50/50. Note: heaving sand encountered at 46.5 feet.		
3	s ss	6 48.0	49.5	6-5-7/0"	14.5		-	-		Note: trace small gravel, subangular from 47.8 to 48.0 feet.		
34	se se	6 49.5	51.0	4-7-10/0"	20		50 –			Note: 0.5mm seam of black material, coarse to fine sand size and slight color change from 48.0 to 49.0 feet. Note: well graded, little rounded small gravel from		
							-			50.4 to 51.0 feet.		
-D WV.GPJ												
MENISVAEP												
- WERIDOCU												
USEKS/SBKI												
16 15:49 - C:\												
- AEP.GD I - //19/16 15:49 - C:USERS/SBREWER/DOCUMENTSAEPAEP WINFIELD WV.GFU												
<u>ا</u> ل			I	1				1			I	

JOB NUMBER	OH015976.00	)07	LOG
	nerican Electr	ric Power	
PROJECT Jol	nn E. Amos Pl	ant CCR	
COORDINATES	N 539,197.0	E 1,731,559.	3
GROUND ELEVA	TION 580.8	SYSTEM	
Water Level, ft	<b>⊻</b> 12.0	Ţ	$\bar{\mathbf{\Lambda}}$
TIME			
DATE	5/3/2016		

BORING NO. <u>MW-1606</u>	DATE 7	7/19/16	SHE	et <u>1</u>	OF _	3
BORING START 5/2/16		BORING FI	NISH	5/3/16		
PIEZOMETER TYPE <b>NA</b>		WELL 1	TYPE	WO		
HGT. RISER ABOVE GROUN	D <u>3.0</u>		DIA	2"		
DEPTH TO TOP OF WELL SC	CREEN	24.32BOT	ТОМ	39.0		
	Α	BACK	FILL	NA		
FIELD PARTY <b>NA</b>			RIG	Diedric	ch	

	NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
	1	SS	0.0	1.5	1-0-0/0"	0					No recovery.		
	2 3 4	SS SS SS	1.5 3.0 4.5	3.0 4.5 6.0	1-0-0/0" 9-10-14/0"	4 2 0				ML	Note: grade is sandy silt, topsoil, silt, trace fine sand, trace medium sand, root structures (5%), soft, low plasticity, no dilatancy, moist, brown (5YR 3/1). Note: only recovery is inside shoe from 3.0 to 4.5 feet. Note: rock lodged in shoe, sandstone, no recovery		
	5	SS	6.0	7.5	8-9-7/0"	6.5				ML	from 4.5 to 6.0 feet. Silt, trace fine sand, brown, moist, moderate plasticity, no dilatancy, soft, very uniform texture (10YR 4/4).	-	
	6	SS	7.5	9.0	2-2-4/0"	15		-		SM	Some fine sand, trace medium sand, soft, moist,		
	7	SS	9.0	10.5	4-4-7/0"	17		10 -		SM SM	no dilatancy, low plasticity, root structures (3%) (10YR 3/3). Silt, some fine sand, stiff, moist, low plasticity, no dilatancy (10YR 3/3).	-	
	8	SS	10.5	12.0	1-1-2/0"	21					Fine sand, little silt, soft, moist, no dilatancy, no plasticity, higher moisture content at bottom of 10.5 feet (10YR 5/6).		
ELD WV.GP.	9	SS	12.0	13.5	2-2-3/0"	22		-			Note: wet, very soft from 12 to 13.5 feet. Note: water at 12.0 feet.	Ţ	
AEP.GDT - 7/19/16 15:50 - C:\USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ	10	SS	13.5	15.0	2-2-3/0"	22		-					
JMENTSVAEF	11	SS	15.0	16.5	2-1-3/0"	14		15 -					
EWER/DOCI	12	SS	16.5	18.0	3-5-4/0"	14		-			Note: very soft from 16.5 to 18 feet. Slight color shift to 10YR 4/6 at 16.7 feet.		
JSERS\SBRE	13	SS	18.0	19.5	5-4-7/0"	14					Note: heaving sand encountered at 18 feet. Flushed with water, not enough to push down added mud.		
0 - C:\l	14	SS	19.5	21.0	5-7-10/0"	12							
6 15:5			TYPE	OF C	ASING USED						Continued Next Page		
7/19/1	100 NQ-2 ROCK CORE 6" x 3.25 HSA								ETER				EN TUBE
9" x 6.25 HSA 								SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC					
AEP.(			NW CAS	SING	VANCER	3"		WELL T	YPE:	0\	W = OPEN TUBE SLOTTED SCREEN, GI	1 = G	EOMON
SW CASING     6"       AIR HAMMER     8"									RECORDER <u><b>T. Runge</b></u>				

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. MW-1606
 DATE 7/19/16
 SHEET 2
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 5/2/16
 BORING FINISH
 5/3/16

BORING NO. <u>MW-1606</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	DEF	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15 16	SS	21.0	22.5 24.0	5-8-10/0" 5-10-13/0"	13					Note: band of black/dark brown and, 1 cm thick (5Y 3/2), trace silt, same characteristics. Note: same band of dark brown/black sand, trace silt from 21.0 to 21.1 feet. Color change to 7.5YR 5/6 with band layers of 5YR 5/3 (25%) heavily oxidized.		
17	SS	24.0	25.5	7-10-13/0"	12.5		25 -			Note: abrupt color change to 10YR 6/6 at 23.7 feet. Note: slight shift in color, back to 7.5YR 5/8		
18	SS	25.5	27.0	3-8-8/0"	10		20			oxidized slightly paler at 25.5 feet (10YR 6/6).		
19	SS	27.0	28.5	3-3-6/0"	1				SM	Note: color change to 10YR 4/8, trace silt at 26.5 \feet	-	
20	SS	28.5	30.0	6-4-4/0"	12.5					sand, little medium sand size subangular bits of black material (coal 15%), wet, soft-medium stiff, no dilatancy, no plasticity, gray, small bands of oxidation (5 mm) (5Y 5/1).		
21	SS	30.0	31.5	7-3-3/0"	17.5		30 -			Note: slightly darker coloration, no oxidation coloration, trace amounts of medium sand sized coal fragments from 30 to 31.5 feet.		
22	SS	31.5	33.0	9-7-7/0"	17				SP	Poorly graded sand, fine sand, little medium sand, subangular, trace silt (3%), gray, wet, no dilatancy, soft, no plasticity (5Y 5/1).	-	
23	SS	33.0	34.5	4-3-3/0"	15.5			-	SP	Poorly graded sand, fine sand, trace silt (3%), soft, wet, no plasticity, no dilatancy, red-gray	-	
24	SS	34.5	36.0	3-3-5/0"	13.5		35 -			(7.5YR 5/3).		
25	SS	36.0	37.5	2-3-3/0"	13.5							
26	SS	37.5	39.0	2-3-6/0"	18			-		Note: 5 mm bands of trace medium sand with fine sand from 37.5 to 39.0 feet.		
27	SS	39.0	40.5	4-4-6/0"	10		10					
25 26 27 28 29 30 31	SS	40.5	42.0	4-7-8/0"	13		40 -			Note: 10 mm band of black sand at 39.9 feet. Note: red streak on side of spoon (10YR 4/6), very fine sand from 40.5 to 42.0 feet.		
29	SS	42.0	43.5	3-4-5/0"	12.5					Note: trace medium sand (5-7%), slight color change to 10YR 5/8 from 42.8 to 43.5 feet.		
30	SS	43.5	45.0	3-3-6/0"	13.5					Note: 0.3" layer of little amount of coal bits		
31	SS	45.0	46.5	3-4-9/0"	16		45 -			ranging in size from fine to coarse, fine-little medium coarse sand at 44.25 feet.		

JOB NUMBER **OH015976.0007** 

AEP - AEP.GDT - 7/19/16 15:50 - C:USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ

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 COMPANY
 American Electric Power
 BORING NO. MW-1606
 DATE 7/19/16
 SHEET 3
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 5/2/16
 BORING FINISH
 5/3/16

BORING NO. <u>MW-1606</u> DATE <u>7/19/16</u> SHEET <u>3</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
32	SS	46.5	48.0	12-19-22/0"	11.5			**** **** ****	SW SW	Note: trace rounded small gravel at 46.4 feet. Well graded sand, fine sand, little medium sand, trace coarse sand, little small rounded gravel, wet,		
33	SS	48.0	49.5	50-4/0"	0		-			soft, non plastic, no dilatancy. Well graded sand, fine sand, trace medium sand, trace coarse sand (5Y 5/1), little angular to		
34	SS	49.5	51.5	50-2/0"	0			<u></u>		subangular small gravel sized pieces of sandstone (Gley 1 5/N) and mudstone (2.5YR 3/6). Note: nothing in shoe or spoon, likely a medium to large cobble from 48.0 to 49.5 feet.		
										End of boring at 49.7 feet due to refusal.		
010.00												

## AMERICAN ELECTRIC POWER SERVICE CORPORATION

						AE	EP C	SIVIL E			ERING LABORATORY				
				5976.00			-				_				
				<u>n Electi</u>							DRING NO. <u>SB-1601</u> DATE 7				
				mos Pl							ORING START <u>4/25/16</u>				
											EZOMETER TYPE NA				
GRC	UND	ELEVA				'STEM					ST. RISER ABOVE GROUND NA				
Wat	er Lev	el, ft	<b>∑ 9</b>	.0	Ţ		$ \mathbf{\bar{I}} $				PTH TO TOP OF WELL SCREEN				
ТІМ	Ξ										ELL DEVELOPMENT NA				
DAT	E		4/26/	/2016						FII	ELD PARTY <b>NA</b>	RIG	6 <u>H</u>	ollow Stem Auger 2	
SAMPLE NUMBER	SAMPLE	DE	IPLE PTH EET TO	STAN PENET RESIS BLOV	DARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES	
1	SS SS	0.0	3.0	1-0-	-0/0"	0.2					Ash, fine sand, trace medium angul greenish gray, moist, very soft, no c moderate plasticity (Gley 1 5/N). Note: trace organics, root fibers fro feet.	filatancy,			
3	SS	3.0	4.5	5-5-	10/0"	1.1		-		CL	Clay, little silt, trace medium sand s ash bits (angular) very stiff, moist, g no dilatancy, low placticity (Gley 1 5	greenish gray,			
5	SS	4.5	6.0	14-9-	-10/0"	1.3		5 -			Ash, some fine sand, trace medium sand, very stiff, moist, greenish gran low plasticity (Gley 1 5/N).				
6	SS	6.0	7.5	5-7-	-5/0"	0.1		-			Note: addition of organics, root fibe coarse sand-subangular from 6.2 to				
7	SS	7.5	9.0	5-3-	-3/0"	0.8		-			Ash, some fine sand, trace medium sand, soft, trace silt, moist, slow dia 5/N).		Ā		
8	SS	9.0	10.5	2-2-	-2/0"	0.7		10 -			Note: saturation encountered from the feet.	9.0 to 10.5			
9	SS	10.5	12.0	2-2-	-3/0"	0.8		-			Note: small-medium sand, pieces o 10.5 to 12.0 feet.	f brick from			
10	SS	12.0	13.5	3-3-	-5/0"	0.7		-			Note: layer of finer material, some f	ine sand			
11	SS	13.5	15.0	6-9-	10/0"	0.7		15			(70%), little medium sand (15%), lit from 13.1 to 13.5 feet. Note: laminae/layers of black "botto	tle silt (25%) m ash" admist			
12	SS	15.0	16.5		-7/0"	0.9		- 10 -	15 — gray ash 0.75/1.0 cm spacing (approximately) 0.25 cm thick.						
13	SS	16.5 18.0	18.0		10/0" -9/0"	0.9		-							

AEP - AEP.GDT - 7/19/16 15:50 - C:USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ 14 18.0 19.5 7-8-9/0" 15 SS 19.5 21.0 1 Note: black layers are not present from 19.5 to **TYPE OF CASING USED** Continued Next Page NQ-2 ROCK CORE PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE PIEZOMETER TYPE: 6" x 3.25 HSA SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC 9" x 6.25 HSA 4" HW CASING ADVANCER OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON WELL TYPE: NW CASING 3" SW CASING 6" RECORDER **T. Runge** 8" AIR HAMMER

JOB NUMBER **OH015976.0007** 

COMPANY American Electric Power

PROJECT John E. Amos Plant CCR

BORING NO. <u>SB-1601</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE		IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
16	SS	21.0	22.5	4-8-5/0"	1.1					21.0 feet.		
17	SS	22.5	24.0	5-2-1/0"	0.8							
18	SS	24.0	25.5	2-2-3/0"	0.9		25 -		ML	Silt, some clay, soft, medium sized pieces of muscovite, brown-gray, moist, dilatancy, high plasticity, uniform texture (Gley 1 6/N).		
19	SS	25.5	27.0		0			-		No recovery.		
20	SS	27.0	28.5	1-1-0/0"	1.4			_	SP	Medium sand, some fine sand, trace silt, moderate dilatancy, low plasticity, moist, very soft (Gley 1 5/N.		
21	SS	28.5	30.0	1-1-5/0"	1							
22	SS	30.0	31.5	2-3-3/0"	1.3		30 -	_				
23	SS	31.5	33.0	3-4-6/0"	1.1							
24	SS	33.0	34.5	9-2-1/0"	0.9			-				
25	SS	34.5	36.0	2-3-3/0"	1.73		35 -	-	SM	Medium sand, subangular, trace fine sand, trace silt, brown, wet, rapid dilatancy, low plasticity, very		
20	SS	36.0	37.5	4-5-5/0"	1.55					soft (7.5YR 4/2). Note: higher concentration of silt (15%) from 36.8		
L .	SS	37.5	39.0	2-2-5/0"	1.45				ML	to 37.1 feet.		
28	SS	39.0	40.5	3-2-6/0"	1.25				SM	little organics, root fibers, bits of wood (0.25 - 0.75 cm) (7.5YR 4/2). Medium sand, subangular, trace fine sand, trace		
29	SS	40.5	42.0	3-7-9/0"	1.25		40 -			silt, brown, wet, rapid dilatancy, low plasticity, very soft (7.5YR 4/2). Note: layer of silt, trace fine sand, very uniform		
27 28 29 30	SS	42.0	43.5	7-8-10/0"	0.95					from 39.3 to 39.5 feet. Note: stiff from 40.5 to 42.0 feet. Note: trace subrounded gravel (small) from 41.7 to 42.0 feet.		
31	SS	43.5	45.0	6-6-6/0"						Note: medium gravel, piece plugged shoe briefly at 43.0 feet.		
32	SS	45.0	46.5	3-6-9/0"	17		45 -			Note: brown laminae/layers at 45.0 feet.		

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. SB-1601
 DATE 7/19/16
 SHEET 3
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/25/16
 BORING FINISH
 4/26/16

 BORING NO. <u>SB-1601</u> DATE <u>7/19/16</u> SHEET <u>3</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
33	SS	46.5	48.0	6-7-11/0"	14.5		-			Note: color change to Gley 1 5/N at 46.8 feet.		
34	SS	48.0	49.5	5-7-6/0"	16.25		-					
35	SS	49.5	51.0	3-6-5/0"	0		50 —		SW	No recovery.		
36	SS	51.0	52.5	3-5-14/0"	16.25		-		SW	Medium sand, little fine sand, soft, wet, no plasticity, no dilatancy, gray, sand, subangular (Gley 1 5/104).	_	
37 38	SS SS	52.5 53.0	54.0 54.5	10-17-17/0" 20-20-38/0"	6 15		-		SW SW	Medium sand, little fine sand, subangular, little coarse subangular sand, trace subrounded small gravel, well graded (Gley 1 5/GN). Note: more small gravel (litle) from 53.0 to 54.5	-	
39 40	SS SS	54.5 55.0	56.0 56.5	20-20-38/0" 18-40-50-4/0"	15 10.5		55	••••• ••••• •••••	SW	feet. Medium sand, some fine sand, trace coarse sand, subangular, wet, soft, low plasticity, no dilatancy, gray (Gley 1 5/GN).	_	
							-	• • • • • • • • • • • • • • • • • • •		Medium sand, little coarse sand, trace small subangular gravel, trace medium subangular gravel, soft, trace fine sand (Gley 5/N).	-	
										Weathered sandstone, moist, very stiff, no plasticity, no dilatancy, uniform texture, gray mottling throughout (10R 3/6). End of boring at 57.5 feet.		
5												

JOB NUMBER _	OH0159/6.0	007			
COMPANY Ar	nerican Elect	ric Power		BORING NO. <u>SB-1602</u> DATE	7/19/16
PROJECT Jol	hn E. Amos P	ant CCR		BORING START <b>4/26/16</b>	BORING
COORDINATES				PIEZOMETER TYPE <b>NA</b>	WEL
GROUND ELEVA	TION	SYSTEM		HGT. RISER ABOVE GROUND NA	
Water Level, ft	Ā	<b>⊻</b>	Ţ	DEPTH TO TOP OF WELL SCREEN	<b>NA</b> BO
TIME				WELL DEVELOPMENT NA	BA
DATE				FIELD PARTY <b>NA</b>	

ET <u>1</u> OF <u>3</u>	<u>7/19/16</u> SHE	2 DATE_	BORING NO. SB-1
4/27/16	BORING FINISH	4/26/16	BORING START
NA	WELL TYPE	NA	PIEZOMETER TYP
NA	DIA	ROUND NA	HGT. RISER ABOV
NA	NA BOTTOM	ELL SCREEN	DEPTH TO TOP O
NA	BACKFILL	г <b>NA</b>	WELL DEVELOPM
Hollow Stem Auger 2"	RIG		

	NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
	1	SS	0.0	1.5	1-0-0/0"	1					Ash, fine sand, little medium sand, some silt, very soft, moist, gray (Gley 1 6/N) no plasticity, no dilatancy.		
	2	SS	1.5	3.0	1-0-0/0"	2					Ash, fine sand, some silt, trace medium sand, trace coarse sand, subangular, moist, gray (Gley 1 6/N), low plasticity, no dilatancy.		
	3	SS	3.0	4.5	1-1-0/0"	15			-		Note: little wood pieces 0.50-1.0cm in size, trace amounts rounded small gravel from 3.4 to 4.5		
	4	SS	4.5	6.0	3-3-6/0"	14.5		5 -		<u></u>	feet.		
	5	SS	6.0	7.5	2-3-4/0"	12.5		5 -		SM	Silt, little fine sand, trace medium subangular sand, brown (2.5Y 3/3), medium stiffness, no plasticity, moist, well graded. Note: color change to 10YR 5/6, from 6.0 to 7.5 feet.		
	6	SS	7.5	9.0	2-3-5/0"	12					Note: micaceous from 7.5 to 9.0 feet. Note: hardness change from 7.7 to 8.7 feet.		
	7	SS	9.0	10.5	3-5-9/0"	14		10 -			Note: stiff, gray mottling (Gley 1 7/N) from 9.3 to 12.0 feet.		
	8	SS	10.5	12.0	3-6-8/0"	14					Note: trace amounts of organics/roots from 11.3		
AEP.GDT - 7/19/16 15:50 - C:\USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ	9	SS	12.0	13.5	3-5-7/0"	16					to 12.0 feet. Note: interbedded layers of silty clay, grey (10YR 5/6), stiff, moist from 12.3 to 13.5 feet.		
P\AEP WINF	10	SS	13.5	15.0	2-3-7/0"	15					Note: no grey mottling from 13.5 to 15.0 feet.		
JMENTSVAE	11	SS	15.0	16.5	3-4-5/0"	18		15 -		SM	Fine sand, little silt, trace medium sand, soft, brown, moist, low plasticity, no dilatancy.		
EWER/DOCI	12	SS	16.5	18.0	3-3-3/0"	24					Note: uniform texture, poorly graded, well sorted from 16.5 to 18.0 feet.		
SERS\SBRE	13	SS	18.0	19.5	2-2-2/0"	18							
- C:\U	14	SS	19.5	21.0	2-2-2/0"	20							
3 15:50			TYPE	OF C	ASING USED						Continued Next Page		
DT - 7/19/16			NQ-2 R( 6" x 3.25 9" x 6.25	HSA	RE			PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC					
EP.GL				SING AD	VANCER	4" 3"		WELL T	YPE:	0\	W = OPEN TUBE SLOTTED SCREEN, GI	∕ <b>I =</b> GI	EOMON
AEP - A											RECORDER <u><b>T. Runge</b></u>		

JOB NUMBER **OH015976.0007** 

 
 COMPANY
 American Electric Power
 BORING NO. SB-1602
 DATE 7/19/16
 SHEET
 2
 OF
 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/26/16
 BORING FINISH
 4/27/16
 BORING NO. <u>SB-1602</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	SAN DEF IN F		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	SS	21.0 22.5	22.5	1-1-1/0" 1-1-1/0"	20 19				SM	Fine sand, some silt, very soft, wet, rapid dilatancy, brown (10YR 4/6), no plasticity. Note: silt (30%), very wet, very soft from 21.0 to 22.5 feet. Fine sand, some silt, very wet, very soft.		
17	SS	24.0	25.5	3-2-4/0"	18		25 -		SP	Fine sand, trace silt, soft, brown (10YR 4/6), rapid dilatancy, no plasticity, wet, silt ~10%.		
18	SS	25.5	27.0	4-4-7/0"	14		20 -			Note: heaving sand encountered (1' up auger) at 25.5 feet, trace medium sand subrounded from 25.8 to 26.4 feet.		
19	SS	27.0	28.5	9-11-12/0"	15				SW	Fine sand, little subangular medium sand, trace coarse sand, silt 5%, soft, wet, no plasticity.		
20	SS	28.5	30.0	6-7-11/0"	17.5		20	-****** -******		Note: small laminate of fine sand only, 1-1.5 cm thick from 28.5 to 30.0 feet.		
21	SS	30.0	31.5	5-6-16/0"	19		30 -			Note: fine medium sand, trace coarse sand from 30.0 to 39.0 feet.		
22	SS SS	31.5 33.0	33.0 34.5	10-12-9/0" 3-3-8/0"	10.5					Note: color change to 10YR 4/6 at 32.1 feet.		
24	SS	34.5	36.0	8-7-5/0"	16		35 -	- - - - - - - - - - - - - - - - - - -		Note: black staining present, piece of sandstone was lodged in shoe from 34.1 to 34.5 feet.		
	SS	36.0	37.5	4-5-12/0"	13					Note: 0.5-1.5 cm layers of black staining present, very wet from 34.5 to 35.8 feet. Note: color change to 5YR 5/8 from 36.5 to 37.5		
<u>۱</u>	SS	37.5	39.0	6-7-8/0"	17					feeet.		
27	SS	39.0	40.5	5-3-5/0"	16		40 -			Fine sand, trace medium sand, trace silt, wet, soft, no plasticity, rapid dilatancy, piece of sandstone in shoe.		
26 27 27 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	SS	40.5	42.0	7-7-6/0"	14.5					Note: color change to Gley1 6/N at 39.7 feet.		
	SS	42.0	43.5	3-3-7/0"	15					Note: color change to 2.5Y 4/2 from 42.3 to 43.5 feet.		
30	SS	43.5	45.0	3-4-5/0"	9.5		45 -		SW	Fine sand, trace medium sand, trace silt, wet, soft, no plasticity, no dilatancy, trace very coarse sand, subangular.		
31	SS	45.0	46.5	5-1-5/0"	11.5				SW	Fine sand, trace medium sand, trace silt, trace subangular coarse sand, wet, slow dilatancy, soft,		

Continued Next Page

AEP - AEP.GDT - 7/19/16 15:50 - C:USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. SB-1602
 DATE 7/19/16
 SHEET 3
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/26/16
 BORING FINISH
 4/27/16

 BORING NO. <u>SB-1602</u> DATE <u>7/19/16</u> SHEET <u>3</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
32	SS	46.5	48.0	4-3-4/0"	20				SP	brown gray (7YR 5/2), no plasticity. Fine sand, trace medium sand, trace silt, wet,		
33	SS	48.0	49.5	7-5-7/0"	22					soft, rapid dilatancy, brown gray (7YR 5/2).		
34	SS	49.5	51.0	8-7-10/0"	18			]		Note: black laminated/stained sand layers		
35	SS	51.0	52.5	8-7-9/0"	16		50 -	-		0.25-0.5 cm in thickiness from 49.2 to 49.5 feet. Note: black mottling (7YR 5/2) from 49.5 to 51.0 feet. Note: color change to 10YR 5/3 at 51.0 feet.		
36	SS	52.5	54.0	7-9-12/0"	19							
37	SS	53.0	54.5	4-4-9/0"	11.5				SW SP	Fine sand, trace medium sand, trace silt, trace coarse sand, trace small subangular gravel, brown (10YR 5/3), soft, well graded, wet, no plasticity,		
38	SS	54.5	56.0	9-11-16/0"	18		55 -			\rapid dilatancy.         Fine sand, trace silt, trace medium sand, wet,		
39	SS	55.0	56.5	4-23-28/0"	14		55			soft, poorly graded, no plasticity, moderate dilatancy, brown (10YR 5/3).		
40	SS	57.5	59.0	12-58-4/0"	6				SW	Fine sand, trace medium sand, little subangular, small gravel, wet, soft, rapid dilatancy, no plasticity, brown (10YR 5/3), well graded. Note: trace silt from 57.3 to 58.4 feet. Red and gray (10YR 3/4) weathered mudstone, weathered. Weathered gray (Gley1 6/N) sandstone at 59.5 feet.		
AEP.GDT - //19/10 13:00 - C:USEKS/SBKEWEKIDOCOMENTSMEP.MEP.WINFIELD WV.GPJ												

JOB NUMBER <b>OH015976.0007</b>	_
COMPANY American Electric Power	
PROJECT John E. Amos Plant CCR	
COORDINATES	
GROUND ELEVATION SYSTEM	
Water Level, ft $\ \ \underline{\nabla}$	Ţ

TIME DATE

BORING NO. <u>SB-1603</u>	DATE_	7/19/16	SHE	et <u>1</u>	_ OF	3	
BORING START 4/27/1	6	BORING FI	NISH	4/28/1	6		
PIEZOMETER TYPE <b>NA</b>		WELL T	YPE	NA			
HGT. RISER ABOVE GROUN	d <u>NA</u>		DIA	NA			
DEPTH TO TOP OF WELL SO		NA BOT	ТОМ	NA			
WELL DEVELOPMENT N	A	BACK	FILL	NA			
FIELD PARTY <b>NA</b>			RIG	Hollov	v Stem	<u>Auge</u> r	2"

щ	сщ		1PLE	STANDARD	노노	RQD	DEPTH	<u>ں</u>	S			
SAMPLE	SAMPLE		PTH EET	PENETRATION RESISTANCE	NGTH		IN	GRAPHIC LOG	S S C	SOIL / ROCK	WELL	DRILLER'S
SA	SA	FROM	ТО	BLOWS / 6"	TOTAL LENGTH RECOVER	%	FEET	GR	Š	IDENTIFICATION	2	NOTES
1	SS		1.5	1-1-1/0"	6.5					Ash, fine sand, trace medium sand, little silt, soft,		
		0.0								moist, non sticky, gray, no dilatancy, no plasticity,		
										Gley 1 4/N.		
2	SS	1.5	3.0	1-0-0/0"	3.5			-888		Note: some inclusions of brown sand in small spots (medium) 5Y 5/4 from 1.5 to 3.0 feet.		
3	ss	3.0	4.5	1-2-3/0"	14			-1000				
									SM	Silt, some fine sand, little medium sand,	1	
				0.4.0/0"	45 5					subangular, soft, brown, no dilatancy, moist, medium plasticity 5Y 4/4.		
4	SS	4.5	6.0	2-1-2/0"	15.5		5 -		SM	Silt, fine sand, little silt, trace medium sand,		
										brown, soft, moist, no dilatancy, low plasticity, 5Y		
5	SS	6.0	7.5	3-2-4/0"	14				SM	4/4.	-	
									SIVI	Silt, fine sand, some silt, brown, soft, moist, no diltancy, moderate plasticity, 5Y 4/4.		
6	SS	7.5	9.0	3-4-5/0"	15.5					Note: color change to 2.5Y 5/6, gray fine sand		
		1.0	0.0	0 4 0/0	10.0					seams (5%) from 7.5 to 9.8 feet.		
7	SS	9.0	10.5	3-3-5/0"	17							
	-						10 -	-	SM	Silt, little fine sand, brown, grey mottling, trace	1	
8	SS	10.5	12.0	4-4-7/0"	17				SM	root fibers/organics, soft, moist, gray, medium	-	
									SIVI	\plasticity, no dilatancy, 2.5Y 5/6. // Silty sand, fine sand, some silt, veins of oxidation,		
GPJ		10.0	10 -	0.5.0/0"	47					black veins (5%), soft, brown, moist, no diltancy,		
9	SS	12.0	13.5	3-5-8/0"	17					moderate plasticity, 2.5Y 5/6.		
ERIDOCUMENTSIAEPVAEP WINFIELD WV.GPJ												
¥ 10	SS	13.5	15.0	3-4-7/0"								
AEP												
d⊒ ∑/11	SS	15.0	16.5	3-4-5/0"	16.5		15 -		SM	Fine sand, little silt, soft, veins of oxidized sand/silt	-	
SLU NTO										(5%), gray, no dilatancy, moderate plasticity, trace		
CUM								7		black sand (5%), 2.5Y 4/3. Note: bottom 0.1' was		
	SS	16.5	18.0	2-3-3/0"	17					wet. Note: 10YR 3/2 band, approximately 2" thick at 21.9 feet.		
MEK MEK												
R 2 2 2 2 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3	SS	18.0	19.5	2-2-4/0"	16.5					Note: medium dilatancy, more moisture from 18.0		
SERS										to 19.5 feet.		
	SS	19.5	21.0	2-2-3/0"	18							
220	00	1			-							
16 15				ASING USED						Continued Next Page		
- 7/19/16 15:50 - C:\USERS\SBREW	_	NQ-2 R 6" x 3.25		RE			PIEZOM					EN TUBE
GDT -		9" x 6.25	5 HSA				SL(		D S	SCREEN, $G = GEONOR$ , $P = PNEUMATIC$	,	
AEP.G	_	HW CAS		VANCER	<u>4"</u> 3"		WELL T	YPE:	0	<i>N</i> = OPEN TUBE SLOTTED SCREEN, GI	<b>V</b> = G	GEOMON
		SW CAS	SING		6"					RECORDER <b>T. Runge</b>		
AEP		AIR HAN	MMER		8"					<b></b>		

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. SB-1603
 DATE 7/19/16
 SHEET 2
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/27/16
 BORING FINISH
 4/28/16

 BORING NO. <u>SB-1603</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	DEI	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	Ξg	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
16	SS	21.0	22.5	4-5-6/0"	21							
17	SS	22.5	24.0	3-2-3/0"	16			-	SM	Fine sand, little silt, medium stiff, grey, slow dilatancy, moderate plasticity, 7.5YR 5/2. Note: 10YR 3/2 band approximately 2" thick at 21.9 feet.		
18	SS	24.0	25.5	3-3-9/0"	22		25 -	_		Note: no oxidation indicators, wet, very soft, color change to 10YR 5/4 at 24.0 feet.		
19	SS	25.5	27.0	3-3-5/0"	18			-	SM	Fine sand, trace silt, trace medium subangular sand, medium stiff, wet, black, 0.50-0.25 cm		
20	SS	27.0	28.5	2-2-6/0"	13			_		veins, medium dilatancy, low plasticity, interbedded layers 1-3 cm containing little silt, 10YR 5/4.		
21	SS	28.5	30.0	5-7-10/0"	15					Note: heaving sand at 28.5 feet.		
22	SS	30.0	31.5	4-8-9/0"	13		30 -	-				
23	SS	31.5	33.0	3-4-9/0"	17					Note: seams of black sand 0.5-1 cm thick from		
24	SS	33.0	34.5	10-9-15/0"	14					32.1 to 33.0 feet. Note: color band (oxidized) 7YR 5/8 from 33.1 to 33.3 feet.		
25	SS	34.5	36.0	6-9-9/0"	13		35 -					
26 27 28 29 30 31 32	SS	36.0	37.5	5-5-7/0"	17					Note: oxidized color change 7YR 5/8 at 35.25 feet.		
27	SS	37.5	39.0	4-4-6/0"	14							
28	SS	39.0	40.5	3-4-6/0"	15		40 -			Note: color change to 7YR 4/2 at 38.7 feet. Note: 0.75" layer of weathered shale encountered,		
29	SS	40.5	42.0	6-6-11/0"	6					slight color shift 7YR 4/1 at 39.7 feet. Note: piece of sandstone lodged in shoe and another small gravel sized piece at 40.6 feet.		
30	SS	42.0	43.5	7-8-11/0"	11			_				
31	SS	43.5	45.0	5-6-9/0"	11.5							
32	SS	45.0	46.5	3-6-9/0"	18		45 -		SM	Silty sand, fine sand, little medium sand, trace silt, very soft, wet, no dilatancy, no plasticity, 1 cm		
										Continued Next Page		

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. SB-1603
 DATE 7/19/16
 SHEET 3
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/27/16
 BORING FINISH
 4/28/16

 BORING NO. <u>SB-1603</u> DATE <u>7/19/16</u> SHEET <u>3</u> OF <u>3</u>

		SAM	IPLE	STANDARD	_×	RQD	DEPTH	0				
SAMPLE NUMBER	SAMPLE	DEF IN F	РТН	STANDARD PENETRATION RESISTANCE BLOWS / 6"	DTAL NGTH OVEF		IN	GRAPHIC LOG	SCS	SOIL / ROCK	WELL	DRILLER'S
SAI	SAI	FROM	TO	BLOWS / 6"	RECE	%	FEET	GR/	$\Box$	IDENTIFICATION	N	NOTES
33	SS	46.5	48.0	5-7-9/0"	17					bands of higher concentrations of medium sand, gray brown 10YR 4/1. Note: trace rounded small gravel from 46.5 to 47.2 feet.		
34	SS	48.0	49.5	6-5-6/0"	19		-					
35	SS	49.5	51.0	4-6-8/0"	10		50 –			Note: trace coarse sand, subrounded from 49.5 to 51.0 feet.		
36	SS	51.0	52.5	3-4-8/0"	12		-			51.0 leet.		
37	SS	52.5	54.0	5-6-9/0"	13		-			Note: black/stained sand in end of shoe at 52.5 feet.		
38	SS	54.0	55.5	7-10-12/0"	12.5		- 55					
39	SS	55.5	57.0	11-13-10/0"	14		-		SW	Well graded sand, fine sand, some medium sand, little coarse subangular sand, little small subrounded gravel, soft, no dilatancy, no plasticity,		
40	SS	57.0	58.5	16-50-4/0"	10.5		-			10YR 4/1. Weathered mudstone with small gravel sized pieces of gray sandstone (trace amount), Gley 1		
41	SS	58.5	67.5	50-2/3"	5.5		-	· · · · · · · · · · · · · · · · · · ·		6/N. End of boring at 59 feet.		
- AEP.GDT - 7/19/16 15:50 - C:USERS/SBREWER/DOCUMENTS/AEP/AEP WINFIELD WV.GPJ												

AEP - AEP.GDT - 7/19/16 15:50 - C:\USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ

# AMERICAN ELECTRIC POWER SERVICE CORPORATION

						AEI	РС	IVIL E	NGI	INE	ERING LABORATORY					
JOB	NUM	BFR	OH01	5976.00	007				LO	GΟ	FBORING					
				n Electi		ver				BC	RING NO. <b>SB-1604</b> DATE <b>7/19/1</b>	<b>6</b> s⊦	IEET	1 OF 3		
COORDINATES										PIE	ZOMETER TYPE NA W	ELL TYPE	N	Α		
											T. RISER ABOVE GROUND					
Water Level, ft ↓ 10.5 ↓ ↓							DE	PTH TO TOP OF WELL SCREEN <b>NA</b>	BOTTON	1 <u>N</u>	Α					
TIME		- , -			-		-			WE	ELL DEVELOPMENT NA	BACKFILL	<u>N</u>	Α		
DATE			4/29/2016						FIE	FIELD PARTY NA RIC			Hollow Stem Auger 2"			
	1								]	1		r				
SAMPLE NUMBER	SAMPLE	DE	IPLE PTH EET TO	STAN PENET RESIS BLOV	DARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES		
1	SS	0.0	1.5			2					Ash, fine sand, some silt, trace small angul					
2	SS	1.5	3.0	1-1-	-0/0"	4			-		gravel, soft, moist, no dilatancy, low plastici (Gley 1 5/N).	ty, gray				
3	SS	3.0	4.5	1-1-	-0/0"	3					Note: no angular gravel present from 3 to 4	⊦.5 feet.				
4	SS	4.5	6.0	2-4-	-8/0"	13.5		5 -		ML	Silt, trace fine sand, trace coarse subangula	ar sand				
5	SS	6.0	7.5	8-14-	-15/0"	16.5		5 -	-		(3%), brown, stiff, moist, no dilatancy, low plasticity, sandstone chunk in shoe (2.5Y 4	/3).				
6	SS	7.5	9.0	6-8-	15/0"	12					Ash, fine sand, trace medium sand, little sil grey, no dilatancy, low plasticity, moist (Gle 5/N).					
7	SS	9.0	10.5	4-6-	-7/0"	14.5		10 -			Note: concentrated area of fine sand and si 8.7 to 8.9 feet. Note: wet, slow dilatancy at 9.3 feet.	ilt from				
8	SS	10.5	12.0	2-3-	-4/0"	13.5					Note: wet from 10.5 to 12 feet. Note: water at 10.5 feet.		Ā			
9	SS	12.0	13.5	3-2-	-2/0"	16.5										
10	SS	13.5	15.0	1-1-	-2/0"	19.5		45			Note: black angular bottom ash, trace amou coarse sand to small gravel size subangula angular from 13.5 to 14.7 feet.					
11	SS	15.0	16.5	9-3-	-2/0"	14		15 -			Ash, fine sand, little silt, trace medium sand angular coarse sand, wet, gray, soft, moder dilatancy, low plasticity (Gley 1 5/N).					

Note: coarse sand (3%) from 16.5 to 18 feet.

Note: trace silt present, moderate stiffness from

Continued Next Page

SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC

RECORDER **T. Runge** 

PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE

OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

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12 SS

13 SS

14 | SS

16.5

18.0

19.5

18.0

19.5

21.0

HW CASING ADVANCER

NQ-2 ROCK CORE

6" x 3.25 HSA

9" x 6.25 HSA

NW CASING SW CASING

AIR HAMMER

**TYPE OF CASING USED** 

2-1-2/0"

2-1-1/0"

1-1-1/0"

24

20

21.5

4"

3"

6"

8"

PIEZOMETER TYPE:

WELL TYPE:

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. SB-1604
 DATE 7/19/16
 SHEET 2
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/28/16
 BORING FINISH
 4/29/16

BORING NO. <u>SB-1604</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>3</u>

SAMPLE	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
16	SS	21.0	22.5	3-1-1/0"	22					19.5 to 21 feet. Note: very wet and slightly less angular coarse sand (bottom ash) 3-5% from 21 to 22.5 feet.		
17	SS	22.5	24.0	4-1-1/0"	24							
18	SS	24.0	25.5	2-3-5/0"	21		25 -			Note: moderate stiffness from 24 to 25.4 feet.		
19	SS	25.5	27.0	3-6-4/0"	12				SM	Note: color change to Gley 1 2.5/10GY at 25.4 feet. Note: heaving sand encountered at 25.5 feet.		
20	SS	27.0	28.5	3-3-2/0"	16.5					Fine sand, little medium sand, trace coarse angular sand, trace silt, soft, wet, no dilatancy, no plasticity (Gley 1 5/10Y).		
21	SS	28.5	30.0	2-1-2/0"	16				SM	Note: trace angular-subangular small gravel (Gley 1 4/5G 2) from 26.5 to 26.8 feet. Note: no coarse sand and little silt, stiff from 27.3 to 28.7 feet.		
22	SS	30.0	31.5	1-1-2/0"	0		30 -			Silty sand, fine sand, trace medium sand, trace silt, medium stiff, wet, rapid dilatancy, brown gray (5Y 4/3).		
23	SS	31.5	33.0	1-2-3/0"	12					Note: no recovery from 30 to 31.5 feet. Note: little silt from 31.5 to 31.7 feet. Note: color change to 2.5Y 5/4 from 32.1 to 32.9		
24	SS	33.0	34.5	2-1-1/0"	10				SM	feet. Fine sand, little silt, soft, very wet, rapid dilatancy,		
25 25	SS	34.5	36.0	2-3-4/0"	10.5		35 -			moderate plasticty, brown gray (5Y 4/3).		
26 NINHELL	SS	36.0	37.5	3-2-9/0"	15					Note: trace medium sand from 36.9 to 37.4 feet.		
ALSAEPAE	SS	37.5	39.0	6-8-6/0"	12.5							
	SS	39.0	40.5	7-8-6/0"	14.5		40 -	-	SM	Fine sand, trace silt, soft, rapid dilatancy, wet, low-moderate plasticity, gray, poorly graded (5Y 4/3).		
- C:USERSISBREWENDCOMMENTSWELVMED MINHELD WY. CPU- 28 29 30 30 30 30 30 30 30 30 30 30 30 30 30	SS	40.5	42.0	5-6-6/0"	5					Note: end of boring at 45.0 feet on 4/28/2016.		
	SS	42.0	43.5	2-2-6/0"	18							
09:91/61//-	SS	43.5	45.0	5-3-5/0"	16							
- 32 AEP.(6D	SS	45.0	46.5	5-5-7/0"	16.5		45 -		SM	Fine sand, trace medium sand, trace siilt, medium stiff, wet, rapid dilatancy, moderate plasticity, gray		

Continued Next Page

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. SB-1604
 DATE 7/19/16
 SHEET 3
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/28/16
 BORING FINISH
 4/29/16

 BORING NO. <u>SB-1604</u> DATE <u>7/19/16</u> SHEET <u>3</u> OF <u>3</u>

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
33	SS	46.5	48.0	2-6-13/0"	15.5					(5Y 4/3).		
34	SS	48.0	49.5	6-6-14/0"	11					Note: no medium sand, 0.5 cm black sand veins		
35	SS	49.5	51.0	9-10-9/0"	12		50 -			at 48.7 feet.		
36	SS	51.0	52.5	2-2-3/0"	22							
37	SS	52.5	54.0	3-3-10/0"	22							
38	SS	54.0	55.5	19-26-28/0"	17.5		55 -					
39	SS	55.5	57.0	9-11-21/0"	2				<u>SW</u> SW	Fine sand, little medium sand, trace coarse angular sand, trace (sandstone), small gravel, subrounded, few layers of sandstone 2-3 cm,		
40	SS	57.0	58.5	9-30-50-3/0"	17					sandstone (Gley 1 6N). Fine sand, trace (sandstone), small subrounded gravel, little silt, moist, soft to medium stiff, low plasticity, no dilatancy (5Y 4/3).		
41	SS	58.5	67.5	9-30-50-3/0"	3.5			- -		Note: weathered sandstone, little small subrounded gravel from 57.4 to 58.4 feet.		
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JOB	NUM	BER _	OH01	5976.000	07				LU	GO												
CON	1PAN'	An An	nericar	n Electrie	c Pow	ver				BC	RING NO. <u>S</u>	B-1605	D/	ATE 7/	/19/1	6	SHE	ET _	1	OF	3	_
PRO	JECT	Joh	n E. A	mos Pla	nt CC	R				BC	RING START	4/	29/16		BORII	NG FIN	NSH	5/2	/16			_
COC	RDIN	ATES								PIE	ZOMETER T	YPE _	A			/ELL T	YPE	NA				_
GRC	UND	ELEVA			SY	STEM _				HG	ST. RISER AB	OVE GR		NA			DIA	NA				
Wat	er Lev	el, ft	<b>∑</b> 17	7.8	Z		V			DE	PTH TO TOP	OF WE	LL SCRE	EN _	NA	BOT	ГОМ	NA				_
ТІМ		-, -			_		-			WE	ELL DEVELOF	PMENT	NA			BACK	FILL	NA				
DAT			5/2/2	2016						FIE		NA					RIG	Но	llow	Stem	Aug	<u>e</u> r 2'
	1		0							1	1											-
SAMPLE NUMBER	SAMPLE	DE	/IPLE PTH EET TO	STAND PENETR/ RESIST/ BLOWS		GTAL	QD %	DEPTH IN FEET	GRAPHIC LOG	USCS			OIL / RO NTIFICA					WELL		RILLEF		
1	SS	0.0	1.5	BLOW	570					SM	Sandy silt, I	ittle fine	sand, tra	ce medi	ium sa	and,						-
2	SS	1.5	3.0	1-1-0.	/0"	3					moist, wet, 5/6). Note: trace 1.5 to 3.0 fe	very soff coarse a	, brown,	no dilata	ancy (	7YR						
3	SS	3.0	4.5	1-1-2	/0"	7.5					Road base (7YR 4/6).				•	avel						
4	SS	4.5	6.0	6-6-8	/0"	11.5				SM	Silt, some f						2					
5	SS	6.0	7.5	8-4-2		12		5 -		SM	4/6). Note: layer 4.4 feet. Note: color	of black/ change	dark brov	vn 7YR 5.5 fee	from 4	4.2 to						
6	SS	7.5	9.0	3-7-9	/0"	14.5					Silt, trace fi dilatancy, g			•	•							
7	SS	9.0	10.5	8-6-9	/0"	2		10 -			Note: color sand veins		2.54 at 9.2	22 feet a	and gr	ay fine						
8	SS	10.5	12.0	2-3-5		15																
9	SS	12.0	13.5	3-4-5		21					Note: lower 12.0 to 13.5		/, rock jai	mmed s	shoe fr	om						
10	SS	13.5	15.0	3-3-4	-	1.5		15 -			Note: highe feet.											
11	SS SS	15.0 16.5	16.5	5-2-3 3-2-3		10 18		10	-	ML	Silt, trace fi plasticity, no Note: color content and	o dilatan change t	cy ((Gley to 10YR {	1 4/10Y 5/6, high	Y). her mo	oisture						
13	SS	18.0	19.5	2-2-2	/0"	18			-		Note: wet a	t 17.75 f	eet.				-	∑				
14	SS	19.5	21.0	4-2-2	/0"	14.5				_												
						17.0				.1		Contini	ued Ne	xt Pad	ae		1	I				1
<u> </u>							-+						TUBE F				<u> </u>					-
		6" x 3.2	5 HSA								SCREEN, G								NIC	JDE		
<u> </u>		<u>9" x 6.2</u> HW CA		VANCER		4"	-											- ~-		ואר		
		NW CA	SING			3"	$\Rightarrow$	WELL T	YPE:		W = OPEN					∟⊏IN,		- GE		JIN		-
<u> </u>	_	SW CA				<u>6"</u>	_				RECORD	ER <b>T</b>	. Rung	е								

AEP - AEP GDT - 7/19/16 15:50 - C:USERS\SBREWER\DOCUMENTS\AEP\AEP WINHELD WV.GPJ

AIR HAMMER

8"

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. SB-1605
 DATE 7/19/16
 SHEET 2
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/29/16
 BORING FINISH
 5/2/16

 BORING NO. <u>SB-1605</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>3</u>

SAMPLE	SAMPLE	DEI IN F	IPLE PTH EET	STANDARD PENETRATION RESISTANCE	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	SS	FROM 21.0	TO 22.5	BLOWS / 6" 6-4-3/0"	12				SM	Fine sand, trace medium sand, trace silt (10%), soft, wet, rapid dilanacy, no plasticity (10YR 5/6).		
16	SS	22.5	24.0	5-5-5/0"	10.5					Note: slightly more silt (15%) from 21.7 to 22.0 feet.		
17	SS	24.0	25.5	4-4-5/0"	8		25 -			Note: low recovery due to rock stuck in shoe, sandstone (cobble size) from 24.0 to 25.0 feet.		
18	SS	25.5	27.0	10-8-10/0"	3			-		Note: color change to 10YR 3/2 from 25.5 to 26.7 feet.		
19	SS	27.0	28.5	9-13-15/0"	15					Note: color change to 10YR 5/8 from 26.7 to 27.0 feet. Note: color change to 10YR 6/8 from 27.2 to 28.0		
20	SS	28.5	30.0	5-8-10/0"	7					feet.		
21	SS	30.0	31.5	8-9-9/0"	24		30 -	-				
22	SS	31.5	33.0	6-5-8/0"	16			-		Note: color change to 5YR 5/8 from 30.0 to 31.6 feet. Note: color change to 5Y 5/2 from 31.6 to 33.0 feet.		
23	SS	33.0	34.5	9-6-7/0"	12				SM	Fine sand, trace silt, trace medium sand, wet, brown/tan/gray, soft, rapid dilatancy, no plasticity.	-	
<u>24</u>	SS	34.5	36.0	6-5-6/0"	24		35 -	-		Note: heaving sand encountered at 34.5 feet.		
25 26 27 28 28 29 29 27 27 28 30 30 31 31 31 31 31 31 31 31 31 31 31 31 31	SS	36.0	37.5	6-3-4/0"	7.5					Note: color shift to 10YR 4/3 at 36.0 feet.		
26	SS	37.5	39.0	2-3-4/0"	21.5							
27	SS	39.0	40.5	2-4-5/0"	8		40 -					
	SS	40.5	42.0	4-3-5/0"	11		40 -					
29	SS	42.0	43.5	3-4-6/0"	16					Note: slight color shift to 10YR 4/4 at 42.0 feet. Note: end of boring at 42.0 feet 4/29/2016.		
30	SS	43.5	45.0	10-3-5/0"	10.5							
31	SS	45.0	46.5	4-5-6/0"	10		45 -		SM	Fine sand, trace silt, trace medium sand (1 to 3%), wet, brown/gray, soft to medium stiff, rapid		

Continued Next Page

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. SB-1605
 DATE 7/19/16
 SHEET 3
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/29/16
 BORING FINISH
 5/2/16

 BORING NO. <u>SB-1605</u> DATE <u>7/19/16</u> SHEET <u>3</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
32	SS	46.5	48.0	8-4-6/0"	17					dilatancy, no plasticity (10YR 4/3). Note: color change to 10YR 5/1 from 46.5 to 48.0 feet.		
33	SS	48.0	49.5	2-3-4/0"	10.5		-			Note: little black pieces of medium size sand,		
34	SS	49.5	51.0	3-2-3/0"	13.5		50 -			angular coal from 48.7 to 49.4 feet.		
35	SS	51.0	52.5	10-6-12/0"	14					Note: trace medium sand from 50.3 to 51.0 feet.		
36			54.0	18-38-43/0"	12		-			Weathered sandstone, gray with some red/oxidized inclusions, fine sand throughout sand (25%), sandstone (75%).		
30	SS	52.5	54.0	10-30-43/0	12					Mudstone/shale, dark gray (2.5YR 7/4).		
07	~	54.0		25 04 47/01			-			Weathered red sandstone (2.5YR 7/4).		
37	SS	54.0	55.5	35-21-17/0"	11					Weathered mudstone/shale, dark gray (2.5YR		
38	SS	55.5	57.0	20-21-25/0"	11.5		55 -	- 		Weathered red mudstone with sandstone		
										Wethered sandstone/mudstone/shale, moist (2.5YR 7/4).		
39	SS	57.0	58.5	8-22-50/0"	20					Weathered shale, dark gray, dry (2.5YR 7/4).		
										Red weathered mudstone.		
										Gray sandstone, very fine grain (2.5YR 7/4).		
40	SS	59.5	61.0	23-43-52/0"	13					End of boring at 59.5 feet.		
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JOB NUMBER	OH015976.0	007	L	JG UF BU
COMPANY An	nerican Elect	ric Power		BORING
PROJECT	nn E. Amos P	ant CCR		BORING
COORDINATES				PIEZOME
GROUND ELEVA	TION	SYSTEM _		HGT. RIS
Water Level, ft	<b>⊻ 8.2</b>	Ţ	Ā	DEPTH T
TIME				WELL DE
DATE	5/12/2016			FIELD PA

BORING NO. <u>SB-1606</u> DATE	7/19/16 SHE	ET <u>1</u> OF <u>3</u>
BORING START <b>5/11/16</b>	BORING FINISH	5/12/16
PIEZOMETER TYPE <b>NA</b>	WELL TYPE	NA
HGT. RISER ABOVE GROUND	DIA	NA
DEPTH TO TOP OF WELL SCREEN	NA BOTTOM	NA
	BACKFILL	NA
FIELD PARTY <b>NA</b>	RIG	Diedrich

Image: standard weight with the standard weight	MELL	DRILLER'S NOTES
1     SS     0.0     1.5     1/2"     3     ML     Poor recovery due to air knife, silt, some cl sand, fine to medium, topsoil (10YR 5/6).	lay and	
2 SS 1.5 3.0 1-1-1/0" 9		
3 SS 3.0 4.5 1/2" 5.5		
4 SS 4.5 6.0 1-3-4/0" 18 5		
5       SS       6.0       7.5       3-7-5/0"       18       SP       Sand, little clay, little silt, subround, poorly well graded, very loose, moist, dark gray m (10YR 5/6).         Note: no mottling from 6.0 to 7.5 feet.       Note: no mottling from 6.0 to 7.5 feet.		
6         SS         7.5         9.0         2-3-5/0"         18           Note: wet at 8.2 feet.	I⊥	
7         SS         9.0         10.5         1-2-3/0"         13         Note: wet, minor dark gray mottling from 9.           10         10.5         feet.         10.5         feet.	.0 to	
8 SS 10.5 12.0 1-2-2/0" 18		
9     SS     12.0     13.5     1-1-2/0"     18		
9       SS       12.0       13.5       1-1-2/0"       18         10       SS       13.5       15.0       2-2-2/0"       15         11       SS       15.0       16.5       1-1-1/0"       18         11       SS       15.0       16.5       1-1-1/0"       18         12       SS       16.5       18.0       1-1-2/0"       18         13       SS       18.0       19.5       1-1-2/0"       18         14       SS       19.5       21.0       2-1-3/0"       16         VPEE OF CASING USED         Continued Next Page         PIEZOMETER TYPE:       PT = OPEN TUBE POROUS T         9" x 6.25 HSA       SLOTTED SCREEN, G = GEONOR, P = PNEU         HW CASING ADVANCER       4"         NW CASING       3"		
HI     SS     15.0     16.5     1-1-1/0"     18     15     Note: more silt and trace very fine sand, ra dilatancy, low plasticity from 15.0 to 16.5 feet	•	
12       SS       16.5       18.0       1-1-2/0"       18         Note: more silt than clay and some very fin still wet from 16.5 to 18.0 feet.       End of boring at 16.5 feet (5-11-2016).	ne sand,	
8 13 SS 18.0 19.5 1-1-2/0" 18		
Image: Second state     Image: Second state     Note: very thin zone of micaceous minerals sandstone at 18.9 feet.	S,	
TYPE OF CASING USED Continued Next Page		
NQ-2 ROCK CORE       PIEZOMETER TYPE:       PT = OPEN TUBE POROUS TO SLOTTED SCREEN, G = GEONOR, P = PNEL		PEN TUBE
9" x 6.25 HSA     000000000000000000000000000000000000		GEOMON
WELL     OTHER     <		

JOB NUMBER **OH015976.0007** 

COMPANY American Electric Power

AEP -

PROJECT John E. Amos Plant CCR

BORING NO. <u>SB-1606</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
16	SS	21.0	22.5	1-2-2/0"	18		-		CL	Clay, little silt, little very fine sand, moist, medium plasticity (10YR 5/2). Note: very soft, almost vesicles present "spongy" appearance, possibly lacustrine from 15.0 to 22.5 feet.		
17	SS	22.5	24.0	2-3-3/0"	18		-			Note: minor mottling, very dark gray from 22.5 to 24.0 feet. Note: some very fine sand from 23.2 to 23.5 feet.		
18	SS	24.0	25.5	1-1-1/0"	18		25 -			Note: moist from 24.0 to 25.5 feet.		
19 20	SS SS	25.5 27.0	27.0 28.5	1-1-2/0"	18		-			Note: small white spots, very soft, possible weathered shell fragments from 26.0 to 27.0 feet.		
20	SS	28.5	30.0	3-4-6/0"	18		-					
22	SS	30.0	31.5	3-4-6/0"	18		30 -			Note: large pebbles of sandstone, weathered from 29.5 to 30.0 feet. Note: soft to medium stiff (10YR 4/4) from 30.0 to		
23	SS	31.5	33.0	3-5-6/0"	18		-			31.5 feet. Note: minor oxidation staining around sandstone, 10YR 5/2 at 32.0 feet.		
24	SS	33.0	34.5	3-3-5/0"	18		-			Note: ~5% sand/sandstone inclusions smaller ~1-2mm from 33.0 to 34.5 feet.		
25	SS	34.5	36.0	4-7-9/0"	18		35 -			Note: medium stiff to stiff from 34.5 to 36.0 feet.		
25 26	SS	36.0	37.5	4-6-8/0"	15		-			Note: color change to reddish gray (5YR 5/2) at 35.5 feet. Note: sandstone, weathered at 36.6 feet.		
	SS	37.5	39.0	3-5-9/0"	18		-			Note: sandstone ~5% at 37.5 feet. Note: sandstone ~25% from 38 to 38.7 feet.		
	SS	39.0	40.5	6-6-9/0"	18		40 -			Note: large weathered sandstone at 39.2 feet. Note: small cobble inclusions at 39.5 feet.		
29 29 29 29 29 20 20 20 20	SS SS	40.5 42.0	42.0 43.5	5-6-9/0"	18		-			Note: color change to dark yellowish brown (10YR 4/4) from 40.5 to 42.0 feet. Note: few weathered sandstone inclusions <1%		
SD 50 - nc:cl 31	SS	42.0	45.0	4-6-9/0" 4-7-9/0"	18		-			and very small from 42.0 to 43.5 feet.		
27 28 29 - //Ja/16 19:30 - C:UDSEK9/28PKE/MEK/0000MENI/34EL/MEK/ 30 30 31 32 32	SS	45.0	46.5	4-6-10/0"	18		45					

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. SB-1606
 DATE 7/19/16
 SHEET 3
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 5/11/16
 BORING FINISH
 5/12/16

 BORING NO. <u>SB-1606</u> DATE <u>7/19/16</u> SHEET <u>3</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
33	SS	46.5	48.0	4-6-10/0"	18		-		CL	Clay, some silt, some sand (very fine to fine), stiff, low plasticity, moist-dry, no dilatancy (10YR 4/4). Note: minor mottling ~15% from 46.5 to 48.0 feet.		
34	SS	48.0	49.5	5-7-10/0"	18		-			Note: no more weathered sandstone inclusions from 48.0 to 49.5 feet.		
35	SS	49.5	51.0	5-7-9/0"	18		50 -					
36	SS	51.0	52.5	3-4-8/0"	18		-			Note: soft from 51 to 51.9 feet. Note: zone of very fine to fine sand and silt, trace clay, wet, loose, subround, well sorted.		
37	SS	52.5	54.0	6-11-16/0"	18		-			Note: stiff to very stiff, reddish brown (5YR 4/3) with brownish yellow (10YR 6/8), mottling ~5%, very dark gray mottling ~3%, and red (2.5YR 4/6)		
38	SS	54.0	55.5	5-10-19/0"	18		55			mottling ~2% from 52.5 to 54 feet. Note: trace sand stone cobbles and large pebbles from 54.0 to 55.5 feet.		
39	SS	55.5	57.0	7-18-48/0"	18		-		ML SP	Silt, clay, very soft, slow dilatancy, wet, medium plasticity (2.5YR 3/4).		
40	SS	57.0	58.5	25-44-50-3/0"	13		-		ML	Sand, medium, subround, well sorted, wet, loose. Silt, some clay, non plastic, no dilatancy, dry, hard, dark reddish brown (2.5YR 3/4).		
41	SS	58.5	67.5	24-50-4/0"	10		-			Note: trace very fine sand from 57.0 to 58.5 feet.		
							60 -			Refusal at 59.4 feet, augered to 60.0 feet.		
							-			Weathered bedrock, dry.		
										End of boring at 61.9 feet.		

JOB NUMBE	R <b>OH</b>	159/6.000	/	
COMPANY	Americ	an Electric	Power	
PROJECT _	John E.	Amos Plai	nt CCR	
COORDINA	TES			
GROUND E	LEVATION		SYSTEM	
Water Level	, ft 🔽		<u>/</u>	Ā

TIME DATE 

BORING NO. <u>SB-1607</u> DATE	7/19/16 SHE	ET <u>1</u> OF <u>3</u>
BORING START <b>4/27/16</b>	BORING FINISH	4/28/16
PIEZOMETER TYPE <b>NA</b>	WELL TYPE	NA
HGT. RISER ABOVE GROUND NA	DIA	NA
DEPTH TO TOP OF WELL SCREEN	NA BOTTOM	NA
WELL DEVELOPMENT NA	BACKFILL	NA
FIELD PARTY <b>NA</b>	RIG	Diedrich

SAMPLE	NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
	1	SS	0.0	1.5	1/2"						No recovery.		
	2 3	SS SS	1.5 3.0	3.0 4.5	1/2" 1/2"	6 3.5		-		ML	Poor recovery, slow from air knife. Silt and clay, some sand, medium plasticity, slow dilatancy, moist, very soft, yellowish brown (10YR 5/6).		
	4	SS	4.5	6.0	1-1-4/0"	11		-			Note: some very dark grayish brown ~15% \mottled (10YR 4/2).		
	-	55	4.5	0.0	1-1-4/0			5 –			No recovery.		
	5	SS	6.0	7.5	1-1-5/0"	18		-		SP CL	Silt and clay, some sand, medium plasticity, slow dilatancy, moist, very soft, yellowish brown (10YR 5/6).		
	6	SS	7.5	9.0	4-5-9/0"	12		-		SP	Sand, trace silt, very fine grain, very loose, well sorted, moist, subangular.		
	7	SS	9.0	10.5	2-3-3/0"	18		-			Sand, very fine to fine, subangular, well sorted, little clay, trace silt, moist, loose, yellowish brown (10YR 5/6).		
	8	SS	10.5	12.0	3-3-3/0"	18		10 —			Note: compacted from 7.5 to 8.0 feet.         Sand, trace silt, very fine grain, very loose, well sorted, moist, subangular.         Note: little clay and silt from 9.2 to 9.5 feet.		
AEP.GDT - 7/19/16 15:50 - C:\USERS\SBREWER\DOCUMENTS\AEP\AEP WINFIELD WV.GPJ	9	SS	12.0	13.5	3-3-2/0"	18		-			Note: little clay, oxidation at 10.8 feet. Note: little clay, oxidation at 11.2 feet. Note: little clay, oxidation at 11.3 feet. Note: sand, very fine to medium, mottled 7.5YR at		
EP\AEP WINF	10	SS	13.5	15.0	2-2-2/0"	18		- 15	<u>,,,,,,,</u>	CL SP	11.4 feet. Note: some clay, little silt, grayish brown (10YR 5/2) from 12.1 to 12.3 feet.		
CUMENTS/A	11	SS	15.0	16.5	2-1-3/0"	18		- 10		CL SP	Note: some clay, little silt, grayish brown (10YR 5/2) from 12.6 to 12.7 feet. Note: some clay, little silt, grayish brown (10YR 5/2) from 13.4 to 13.5 feet.		
REWERDOO	12	SS	16.5	18.0	2-2-3/0"	18		-		CL	Clay, some silt, little very fine sand, medium plasticity, no dilatancy, moist, soft, gray (10YR 5/1).		
\USERS\SBI	13	SS	18.0	19.5	2-2-3/0"	18		-			Sand, medium, well sorted, dry, loose, wet. Clay. Sand, medium, well sorted, dry, loose, wet.		
50 - C:	14	SS	19.5	21.0	2-3-3/0"	18				СН			
16 15:			TYPE	ASING USED						Continued Next Page			
7/19/	NQ-2 ROCK CORE 6" x 3.25 HSA							PIEZOMI					EN TUBE
GDT -	9" x 6.25 HSA HW CASING ADVANCER 4"							SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC					
- AEP.			NW CAS	SING		3"		WELL TY	/PE:	0\	W = OPEN TUBE SLOTTED SCREEN, GN	/I = G	EOMON
AEP -			<u>SW CAS</u> AIR HAN			6" 8"					RECORDER <u>L. Martin</u>		

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. SB-1607
 DATE 7/19/16
 SHEET 2
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/27/16
 BORING FINISH
 4/28/16

 BORING NO. <u>SB-1607</u> DATE <u>7/19/16</u> SHEET <u>2</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	SAN DEF IN F		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	%	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	SS	21.0	22.5	2-4-5/0"	16				CL	Sand, fine-medium, trace clay and silt, subangular, well sorted, wet, loose. Clay, little silt, trace fine sand, high plasticity, no dilatancy, moist, soft, dark gray brown (10YR 4/2). Note: very soft, little, wet from 18.0 to 18.5 feet.		
16	SS	22.5	24.0	2-5-7/0"	13			-	CL ML	Note: little silt and sand, very soft, wet from 18.5 to 19 feet. Note: clay from 19.0 to 19.5 feet.		
17	SS	24.0	25.5	3-5-10/0"	15		25 -	-		Clay, some silt, medium plasticity. Note: <5% light olive (10YR 5/4), medium grained, very small ~0.3" from 20.7 to 21.0 feet.		
18	SS	25.5	27.0	4-6-9/0"	18			-		Clay, large sand inclusions, fine to coarse sand, medium stiff at 21.8 feet. Silt and fine sand, clay, little fine sand, ????, stiff, non plastic, oxidized with dark yellowish brown		
19	SS	27.0	28.5	3-13-11/0"	18					non plastic, oxidized with dark yellowish brown mottling (10YR 4/6). Note: some sand, stiff, no-low plasticity, mottled,		
20	SS	28.5	30.0	6-7-10/0"	18			-	CL ML	brown (10YR 4/6) 33%, brownish gray (10YR 6/8) 10%, grayish (Gley 1 6/10GY) 5% from 25.5 to 27.0 feet.		
21	SS	30.0	31.5	5-6-8/0"	18		30 -	-		Note: dry-moist from 27.0 to 28.0 feet. Sand, subangular, well sorted, loose, dry, yellowish brown (10YR 5/8).		
22	SS	31.5	33.0	3-4-7/0"	18			-		Clay and silt. Note: trace gravel (large pebble-small pebble) from 28.5 to 30.0 feet. Note: silt and clay at 29.8 feet.		
23	SS	33.0	34.5	4-6-9/0"	18					Note: more mottled ~20% 7.5YR 5/8 from 30.5 to 31.5 feet. Note: large micaceous sandstone at 30.4 feet.		
24	SS	34.5	36.0	9-6-9/0"	16		35 -					
rd5.vm 01312	SS	36.0	37.5	3-4-7/0"	18			-		Note: large pebble, weathered micaceous sandstone at 36.0 feet.		
	SS	37.5	39.0	3-5-7/0"	18			-				
27	SS	39.0	40.5	12-50-4/0"	18		40 -			Weathered sandstone, 0.7' cobbles (2.5Y 5/6).		
28 28	SS	40.5	42.0	8-6-14/0"	13				CL ML	Clay and silt, large sandstone pebbles.		
29 29	SS	42.0	43.5	4-8-12/0"	18							
26 2719/16 15:50 - C:UZEKSIBREMEKIDOCUMENTSIAEPIAEI 20 27 28 29 20 20 20 20 20 20 20 20 20 20 20 20 20	SS	43.5	45.0	5-8-11/0"	18							
AEP.GDT - 7	SS	45.0	46.5	6-8-50-4/0"	16		45 -			Note: large cobble sandstone from 45.5 to 45.9		
AEP-/										Continued Next Page		

JOB NUMBER **OH015976.0007** 

 COMPANY
 American Electric Power
 BORING NO. SB-1607
 DATE 7/19/16
 SHEET 3
 OF 3

 PROJECT
 John E. Amos Plant CCR
 BORING START
 4/27/16
 BORING FINISH
 4/28/16

 BORING NO. <u>SB-1607</u> DATE <u>7/19/16</u> SHEET <u>3</u> OF <u>3</u>

SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	%	EPTH IN EET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
32	SS	46.5	48.0	50-3/0"	3		-			feet. Weathered sandstone (2.5Y 5/6).		
33	SS	48.0	49.5	17-9-15/0"	18				CL ML	Clay and silt, large sandstone pebbles (2.5Y 5/6). Note: cobbles from 48.7 to 49.1 feet.		
34	SS	49.5	51.0	7-5-9/0"	14		50 -			Note: cobbles from 50.0 to 50.2 feet.		
35 36	SS SS	51.0 52.5	52.5 54.0	4-8-44/0" 3-36-16/0"	18		-			Note: very large pebble from 52.3 to 52.4 feet.		
37	SS	54.0	55.5	10-13-14/0"	18		-			Note: cobble, weathered sandstone from 53.1 to 53.6 feet.		
38	SS	55.5	57.0	4-7-10/0"	18		55 -			Note: cobble, weathered sandstone or schist (highly micaceous) from 54.9 to 55.3 feet. Note: cobbles/pebbles more common and less weathered from 55.5 to 57.0 feet.		
39	SS	57.0	58.5	8-10-15/0"	18		-			Note: less gravel and sand from 57.0 to 57.4 feet.		
40	SS	58.5	60.0	5-8-12/0"	18		60 -					
41	SS	60.0 61.5	61.5	8-26-50-5/0"	18			-	ML	Silt, some sand, little clay, no plasticity, dry, hard (2.5Y 5/6).		
42	SS SS	63.0	63.0 64.5	14-27-50-3/0" 29-50-3/0"	18					Note: trace granules, reddish brown (2.4YR 4/3) from 61.5 to 63.0 feet.		
44	SS	64.2	65.4		14		-			Note: shale/siltstone, very weathered, dry from 63.5 to 64.2 feet. End of boring at 64.2 feet. No water detected in		
										borehole.		



Arcadis 2016

Well Construction Diagrams

MW-1601 to MW-1606





	3.0' (Pro-Cover stick-up) ↑ ft (#4 Sand 0.5 Bentonite Chips) ↓ LAND SURFACE	Project <u>AEP - Amos</u>		Well	MW-1601	
	Bentonite Chips	Town/City <u>W</u>		State	Ohio	
	8.25 inch diameter					
	drilled hole	Land-Surface (LS) Ele	evation and Datum	:		
		TOC 589.48	feet	X Surveyed		
	Well casing,			Estimated		
	<u>         2     </u> inch diameter,	Installation Date(s)	5/10/2016			
	PVC Backfill	Drilling Method	Hollow Stem	Auger		
	Grout 0.0 to 18.1'	Drilling Contractor	AEP Service	Corp.		
		Drilling Fluid	Water ~300 g	allon for drilling		
	18.1_ft* Top of pellet seal	~400 gallons for well ir	nstallation (amoun	t of return water		
•		not measured).				
	Bentonite slurry	Development Technique(s) and Date(s) Foot valve and surge block with centrifugal pump 5/18/16				
	25.4 ft* (100 lbs-2 buckets) (# 4 Sand-20 lbs-1/2 bag)	and 6/13/16.				
	28.4_ft* Top of screen	Fluid Loss During Drill Water Removed Durin	-	44.6 (5/18/16 44.1 (6/13/16		
	Well Screen.	Static Depth to Water	14.60	feet below	M.P.	
	inch diameter	Pumping Depth to Wa	ter14.62	feet below	M.P.	
	<u>PVC</u> , <u>0.10</u> slot Total screen length 9.6'	Pumping Duration	1 hr 10 min_hours	6		
		Yield NM	gpm	Date	NA	
	Gravel Pack	Specific Capacity	NM gpm/	ft		
•	xSand Pack #5 (225 lbs-4.5 bags)					
	Formation Collapse	Well Purpose	Monitoring we	ell		
	38.0_ft* Bottom of Screen					
	<u>38.5_</u> ft* Bottom of Screen Cap					
	40.5 ft* Bottom of Sand Pack	Remarks Square aluminum stick-up casing. Used 100 # of quick grout about 45 gallons total for grout.				
		Global sand used.				
	Measuring Point is Top of Well Casing					
	Unless Otherwise Noted. * Depth Below Land Surface	Prepared by	Kari Eldridge			





MW-1602A

3.0' (Pro-Cove	)	Project <u>AEP - Amos</u>	s Plant	Well MW-1602
LAND SURFA		Town/CityV	Vinfield	
Bentonite ch	hips	County F		State Ohio
8.25	inch diameter	Permit No.		
drilled hole		Land-Surface (LS) Ele	evation and Datum:	
K		TOC 601.40	feet	X Surveyed
Well casi	ng,			Estimated
	inch diameter,	Installation Date(s)	5/25/2016	_
PVC		Drilling Method	Hollow Stem A	Auger
		_		
∖⊠Grout	0.0 to 39.0' 50 gallons/100 lbs	Drilling Contractor	AEP Service (	Corp.
8		Drilling Fluid	Water ~250 g	allons used
<u>39.0</u> ft* To	p of seal			
		Development Technic		
	X pellets (100 lbs - 3/8" coated pe d 35 lbs)	Foot valve and surge		al pump 6/14/16.
44.8 (# 7 Sanc	(100 lbs - 3/8" coated p 3 35 lbs)	Foot valve and surge	block with centrifug	
44.8 ft*	(100 lbs - 3/8" coated p 3 35 lbs)	Foot valve and surge ellets-2 buckets)	block with centrifug	gallons
44.8 (# 7 Sanc	(100 lbs - 3/8" coated p 3 35 lbs)	Foot valve and surge ellets-2 buckets) Fluid Loss During Dril	block with centrifug	gallons
<u>44.8</u> ft* (# 7 Sanc <u>48.4</u> ft* To Well Screer <u>2</u>	(100 lbs - 3/8" coated p 3 35 lbs) p of screen inch diameter	Foot valve and surge ellets-2 buckets) Fluid Loss During Dril Water Removed Durin	block with centrifug	gallons 67.0_gallons feet below M.P.
<u>44.8</u> ft* (# 7 Sanc <u>48.4</u> ft* To Well Screer <u>2</u> PVC	(100 lbs - 3/8" coated p 3 35 lbs) p of screen	Foot valve and surge ellets-2 buckets) Fluid Loss During Dril Water Removed Durin Static Depth to Water	block with centrifug         Iling       NM         ng Development         r       24.56         ater       24.92	gallons 67.0_gallons feet below M.P. feet below M.P.
<u>44.8</u> ft* (# 7 Sanc <u>48.4</u> ft* To Well Screer <u>2</u> PVC	(100 lbs - 3/8" coated p 3 35 lbs) p of screen n. inch diameter s0.10slot	Foot valve and surge ellets-2 buckets) Fluid Loss During Dril Water Removed Durin Static Depth to Water Pumping Depth to Wa	Iling NM ng Development r 24.56 ater 24.92	gallons 67.0_gallons feet below M.P. feet below M.P.
<u>44.8</u> ft* (# 7 Sanc <u>48.4</u> ft* To Well Screer <u>2</u> PVC	(100 lbs - 3/8" coated p 3 35 lbs) p of screen inch diameter , <u>0.10</u> slot sen length 14.7'	Foot valve and surge ellets-2 buckets) Fluid Loss During Dril Water Removed Durin Static Depth to Water Pumping Depth to Wa Pumping Duration	block with centrifug         Iling       NM         ng Development         r       24.56         ater       24.92         50 min hours	gallons gallons feet below M.P. feet below M.P.
<u>44.8</u> ft* (# 7 Sanc <u>48.4</u> ft* To Well Screer <u>2</u> <u>PVC</u> Total scree Gravel Pa	(100 lbs - 3/8" coated p 3 35 lbs) p of screen inch diameter , <u>0.10</u> slot sen length 14.7'	Foot valve and surge ellets-2 buckets) Fluid Loss During Dril Water Removed Durin Static Depth to Water Pumping Depth to Wa Pumping Duration Yield	block with centrifug	gallons gallons feet below M.P. feet below M.P.
<u>44.8</u> ft* (# 7 Sanc <u>48.4</u> ft* To Well Screer <u>2</u> <u>PVC</u> Total scree Gravel Pa	(100 lbs - 3/8" coated p 3 35 lbs) p of screen <u>inch diameter</u> <u>, 0.10 slot</u> een length 14.7' ack ck #6 (Global-300 lbs)	Foot valve and surge ellets-2 buckets) Fluid Loss During Dril Water Removed Durin Static Depth to Water Pumping Depth to Wa Pumping Duration Yield	block with centrifug	gallons gallons feet below M.P. feet below M.P. foet below M.P.
44.8 ft* (# 7 Sanc 48.4 ft* To Well Screer 2 PVC Total scree Gravel Pa Sand Pac	(100 lbs - 3/8" coated p 3 35 lbs) p of screen <u>inch diameter</u> <u>, 0.10 slot</u> een length 14.7' ack ck #6 (Global-300 lbs)	Foot valve and surge ellets-2 buckets) Fluid Loss During Dril Water Removed Durin Static Depth to Water Pumping Depth to Wa Pumping Duration Yield Specific Capacity	block with centrifug         Iling       NM         ng Development         r       24.56         ater       24.92         50 min       hours        gpm       NM         NM       gpm/n	gallons gallons feet below M.P. feet below M.P. foet below M.P.
44.8 (# 7 Sanc (# 7 Sanc (# 7 Sanc (# 7 Sanc Well Screer 2 PVC Total screer 2 ( PVC Total screer 2 ( PVC Total screer 2 ( PVC Total screer 2 ( PVC Total screer 2 ( PVC Total screer 56.0 ft* En	(100 lbs - 3/8" coated p 3 35 lbs) p of screen , <u>0.10</u> slot een length 14.7' ack ck #6 (Global-300 lbs)	Foot valve and surge ellets-2 buckets) Fluid Loss During Dril Water Removed Durin Static Depth to Water Pumping Depth to Wa Pumping Duration Yield Specific Capacity	block with centrifug         Iling       NM         ng Development         r       24.56         ater       24.92         50 min       hours        gpm       NM         NM       gpm/n	gallons gallons feet below M.P. feet below M.P. foet below M.P.
$     44.8 \text{ ft}^* (\# 7 \text{ Sance})     48.4 \text{ ft}^* \text{To}     48.4 \text{ ft}^* \text{To}     48.4 \text{ ft}^* \text{To}     48.4 \text{ ft}^* \text{To}     7 \text{ Sance}     2     9VC     Total Screen     2     9VC     Total screen     5     Gravel Pa     Sand Pace     5     Formation     5     6.0 \text{ ft}^* En     5     8.0 \text{ ft}^* Bo $	(100 lbs - 3/8" coated p 35 lbs) p of screen inch diameter ,	Foot valve and surge ellets-2 buckets) Fluid Loss During Dril Water Removed Durin Static Depth to Water Pumping Depth to Wa Pumping Duration Yield Specific Capacity	block with centrifug	gallons feet below M.P. feet below M.P. feet below M.P. feet below M.P. feet below M.P.

Measuring Point is Top of Well Casing Unless Otherwise Noted. \* Depth Below Land Surface

Prepared by

Sand #6 used fom 44.8 to 56.0'

**Taylor Runge** 



## WELL CONSTRUCTION LOG (Unconsolidated)

\* Depth Below Land Surface

	<u>3.0' (</u> Pro-Cover stick-up) ↑ ft (Sand #4)	Project AEP - A	mos Plant		Well	MW-1603A
	LAND SURFACE	Town/City	Winfield		_	
8	Bentonite chips		Putnam		State	Ohio
И	8.25 inch diameter	Permit No.				
8	drilled hole	Land-Surface (LS)				
8	×.	TOC 586.86		feet	X Sur	veyed
8	Well casing,				Esti	mated
	2 inch diameter,	Installation Date(s	;)	5/24/2016		
		Drilling Method	H	ollow Stem A	uger	
8	Grout 0.0 to 28.0'	Drilling Contractor	A	EP Service C	Corp.	
8	<u>50 gallons - 100 lbs</u>	Drilling Fluid	W	/ater ~300 ga	allons us	ed
4	ft*					
	Bentonite Slurry					
	34.0 ft* Xpellets	Development Tech Foot valve and su			al numn	6/14/16
	(100 lbs - 3/8" coated pell		igo bioon i	ini continug		0/11/10:
	<u>37.0</u> ft* (Sand # 6-100 lbs)					
		Fluid Loss During	Drilling	NM		gallons
	38.0 ft* Top of screen	Water Removed D	During Dev	elopment	60.9	gallons
	Well Screen.	Static Depth to Wa	ater	7.60	feet	below M.P.
	2inch diameter	Pumping Depth to	Water	9.75	feet	below M.P.
	PVC , 0.10 slot Total screen length 14.49'	Pumping Duration	40 m	nin hours		
		Yield N	M gr	om	Date	e <u>NA</u>
	Gravel Pack	Specific Capacity		NM gpm/f	t	
	x Sand Pack #5 (230 lbs)					
	Formation Collapse	Well Purpose	M	onitoring we	I	
	43.0 ft* Bottom of Screen					
	43.4 ft* Bottom of Screen Cap					
	45.0 ft* Bottom of Sand Pack	Remarks <u>Squar</u> Global sand used.				
	Measuring Point is		<b>U</b>			
	Top of Well Casing Unless Otherwise Noted.	Prepared by	Та	aylor Runge		

# WELL CONSTRUCTION LOG (Unconsolidated)



П	3.0' (Pro-Cover stick-up) ↑ft (Sand #4) ↓ LAND SURFACE	Project <u>AEP - An</u>	nos Plant	WellMW-1604
		Town/City	Winfield	
	Bentonite Chips	County	Putnam	State Ohio
	8.25 inch diameter	Permit No.		
	drilled hole	Land-Surface (LS)	Elevation and Datum	:
		TOC 589.05	feet	X Surveyed
	Well casing,			Estimated
	<u> </u>	Installation Date(s)	5/6/2016	
	1	Drilling Method	Hollow Stem	Auger
				Com
	∑Grout <u>0.0 to 22.0'</u>		AEP Service	
	22.0. ft* Top of pollot cool	Drilling Fluid	Water ~500 g	gallons used
E E E	ft* Top of pellet seal			
	Bentonite slurry			
	29.0 ft* x pellets	•	nique(s) and Date(s) ge block with centrifu	
	(Sand #4-60 lbs 1.5 bags)			<u> </u>
	32.0 ft*			
	(#5 Sand 400 lbs-8 bags) (100 lbs-2 buckets)	Eluid Loss During D	Drilling NM	gallons
	<u>33.9</u> ft*		-	
	(Top of screen)		uring Development	
	Well Screen.	Static Depth to Wa	ter <u>20.81</u>	feet below M.P.
	2inch diameter PVC , 0.10 slot	Pumping Depth to	Water 21.78	feet below M.P.
	Total screen length 9.6	Pumping Duration	<u>1 hr 15 min</u> hour	S
		Yield NM	1gpm	Date NA
	Gravel Pack	Specific Capacity	<u>NM</u> gpm	/ft
	x Sand Pack #6 (Global-300 lbs)			
	Formation Collapse	Well Purpose	Monitoring w	ell
	43.5 ft* Bottom of Screen			
	ft* Bottom of Screen Cap	Remarks Square	aluminum stick-up c	asing 8x8' nad
	45.0 ft* Bottom of Sand Pack		(45.0 to 48.0') water	
			equired #4 Sand to se	
	Measuring Point is Top of Well Casing	sandpack.		
	Unless Otherwise Noted.  * Depth Below Land Surface	Prepared by	Taylor Runge	)





(Unconsolidated)

	<u>3.0' (</u> Pro-Cover							
	↑ ft ↓ LAND SURFAC	E	Project	AEP - Am	nos Plant		Well	MW-1605
	Bentonite Ch	-	Town/Ci	ty	Winfield			
ИИ	Demonite Cr	lips	County		Putnam		State	Ohio
10 N	8.25	inch diameter	Permit N	lo.				
10 N	drilled hole			Elevation and				
17 R								
ИЙ	$\backslash$		100 586	5.40		reet	X Sur	
1 N	└─ Well casin	g,					Est	imated
0	PVC	inch diameter,	Installati	on Date(s)	5/4	/2016		
00			Drilling N	/lethod	Hollow	v Stem A	Auger	
		0.0 to 17.5' 250 gallons						
1 N	XGrout	100 lbs per 55 gallon of grout	Drilling (	Contractor	AEP S	Service (	Corp.	
00			Drilling F	luid	Water	~500 g	allons us	ed
22	<u>17.3</u> ft* top	of seal						
	Bentonite	slurry	Davidar			$\sum (a)$		
	22.6 ft*	Xpellets	-		nique(s) and l ge block with o		al pump	5/17/16.
	(#6 Sand s	50 lbs-1 bag)						
	23.0_ft* (#5 Sand 4	450 lbs-9 bags)						
	·	3,	Fluid Los	ss During D	Drilling	NM		gallons
	<u>26.3</u> ft* (Top of sc	reen)	Water R	emoved Du	uring Develop	ment	43.03	gallons
N	<b>.</b>		Static De	epth to Wat	ter	17.39	feet	below M.P.
	Well Screen.							
	2 PVC	_inch diameter , 0.10 slot	Pumping	g Depth to \	Water	33.89	feet	below M.P.
	Total scree	en length 9.6'	Pumping	g Duration	1hr 15 min	hours	i	
			Yield	NM	1gpm		Date	e NA
	/ Gravel Pa	ck	Specific	Capacity	NM	gpm/1	ťt	
			·			_ • •		
		< #5 (Global-300 lbs)						
	Formation	Collapse	Well Pur	pose	Monite	oring we	II	
	41.0 ft* Bot	tom of Screen						
	41.5 ft* Bot	tom of Screen Cap	D =	C	oluminus - t	ale		
	42.5 ft* Bot	tom of Sand Pack			aluminum sti	ск-ир са	sing. ox	5 pau.
			S IBODELS	and used.				
	Measuring Poir							
	Top of Well Ca Unless Otherwi							
	* Depth Below		Prepare	d by	Taylo	Runge		

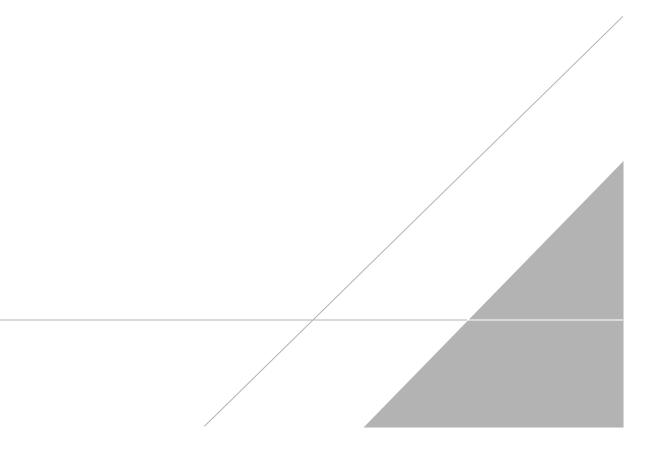


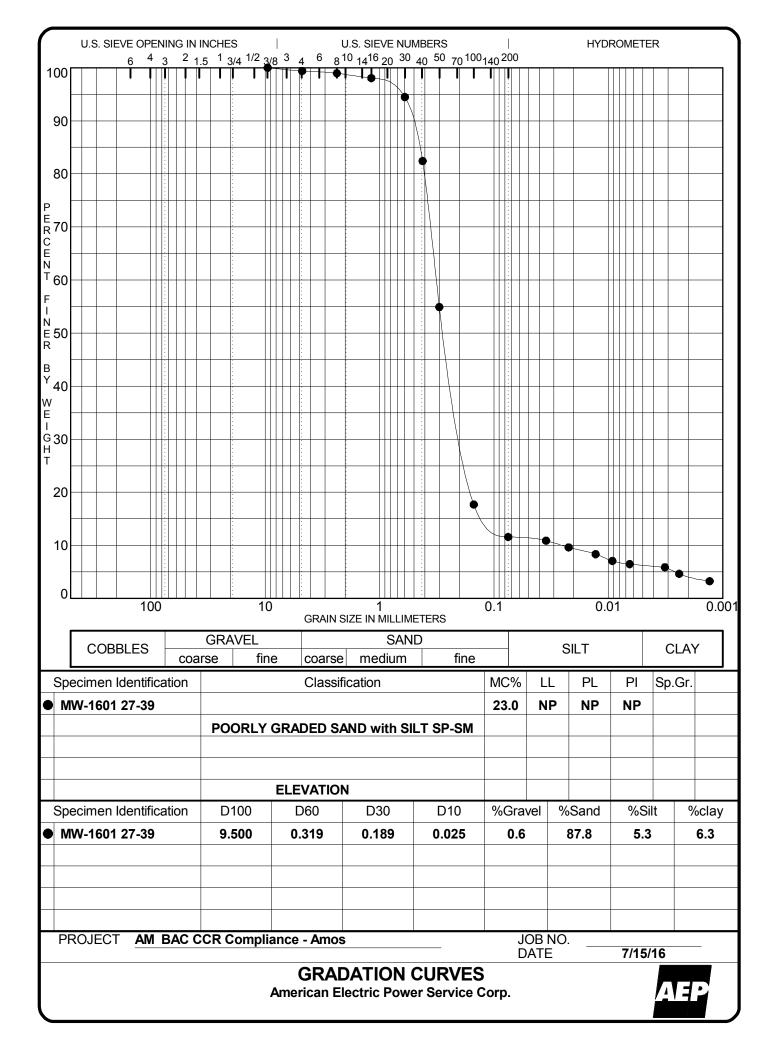


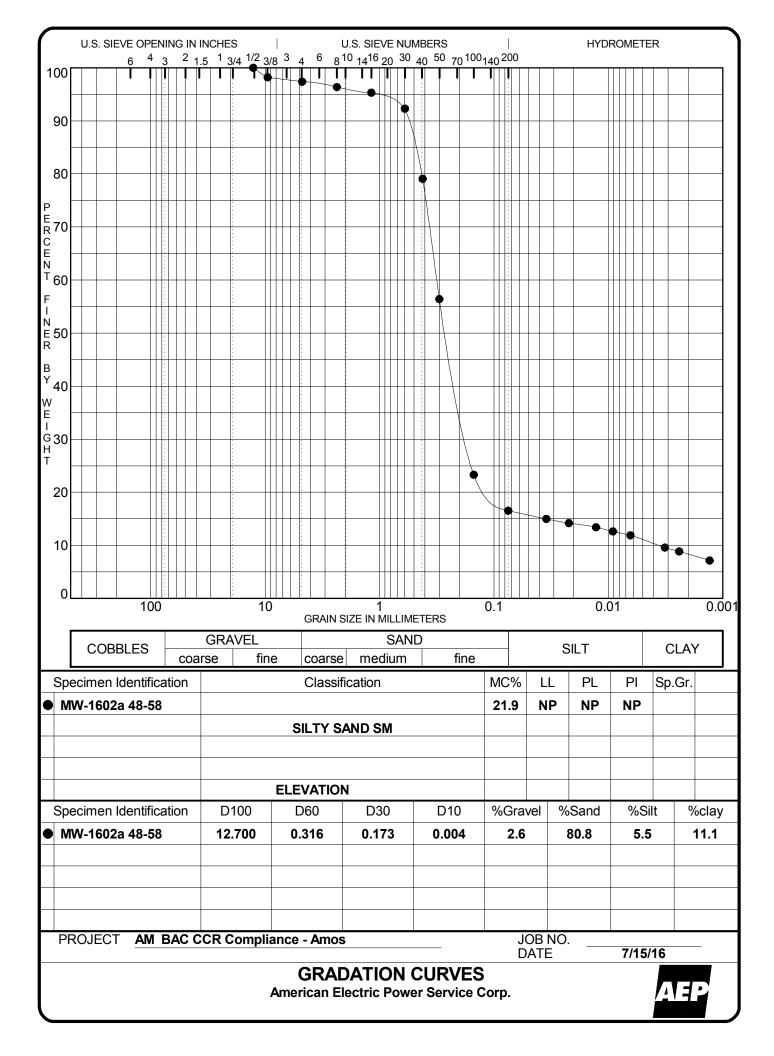
3.0' (Pro-Cover stick-up)	
↑ ft ↓ LAND SURFACE	Project <u>AEP - Amos Plant</u> Well <u>MW-1606</u>
Bentonite Chips	Town/City Winfield
	County Putnam State Ohio
8.25 inch diameter	Permit No.
	Land-Surface (LS) Elevation and Datum:
	TOC 583.88 feet X Surveyed
Well casing,	Estimated
2 inch diameter,	Installation Date(s) 5/3/2016
	Drilling Method Hollow Stem Auger
Backfill	
Grout	Drilling Contractor AEP Service Corp.
	Drilling Fluid Water ~500 gallons/mud when
$\frac{15.0}{(4\pi)}$ ft*	needed (quick gel 50 lbs per 35 gallons) ~35 gallons
(top of seal-110 lbs-2 1/8 bags)	used.
Bentonite	Development Technique(s) and Date(s)
20.19 ft* pellets (#6 Sand 50 lbs-1 bag)	Foot valve and surge block with centrifugal pump 5/17/16.
(#0 Sailu 50 ibs-1 bag)	
21.20 ft*	
(#5 Sand 495 lbs-10 bags)	Fluid Loss During Drilling NM gallons
24.32 ft* (Top of screen)	Water Removed During Development 68.14 gallons
Well Screen.	Static Depth to Water <u>11.23</u> feet below M.P.
2 inch diameter PVC , 0.10 slot	Pumping Depth to Water <u>11.78</u> feet below M.P.
(0.19' dead screen @ joint)	Pumping Duration <u>1.5</u> hours
	Yield <u>NM</u> gpm Date <u>N/A</u>
Gravel Pack	Specific Capacity NM _gpm/ft
x Sand Pack #5 (Global-495 lbs)	
	Well Purpose Monitoring well
39.0 ft* Bottom of Screen	
<u>39.5</u> ft* Bottom of Screen Cap	Remarks Square aluminum stick-up casing. 8x8' pad.
40.5 ft* Bottom of Sand Pack	Global sand used.
Measuring Doint in	
Measuring Point is Top of Well Casing	
Unless Otherwise Noted. * Depth Below Land Surface	Prepared by Taylor Runge

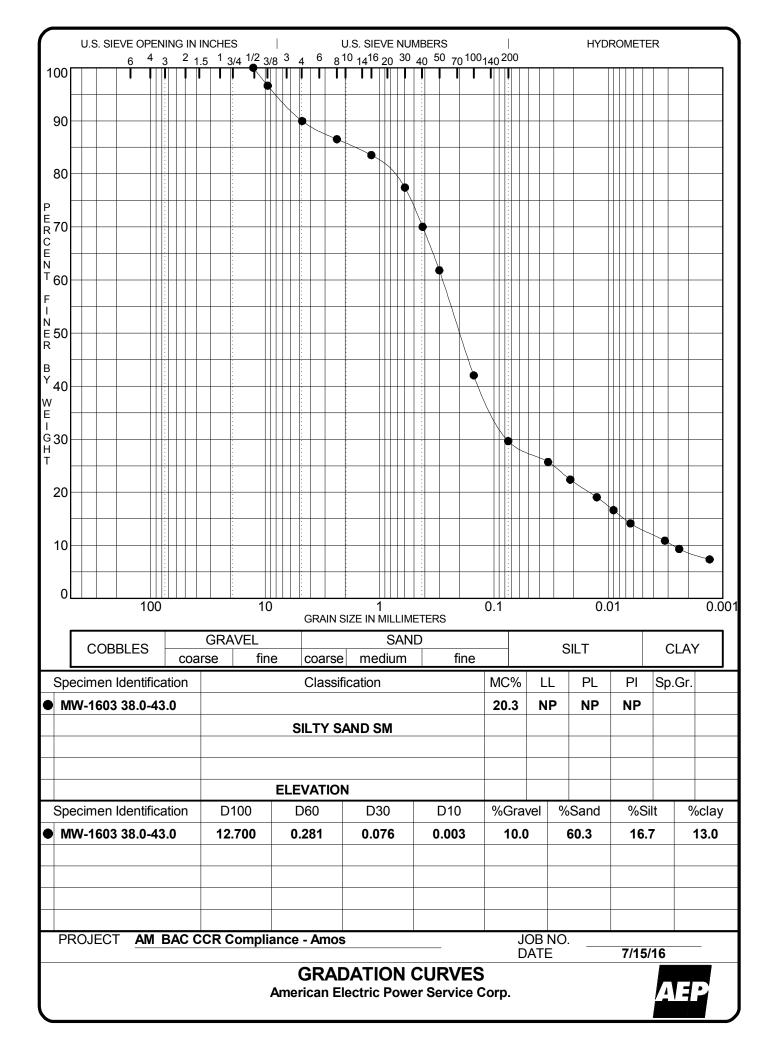
## **APPENDIX B**

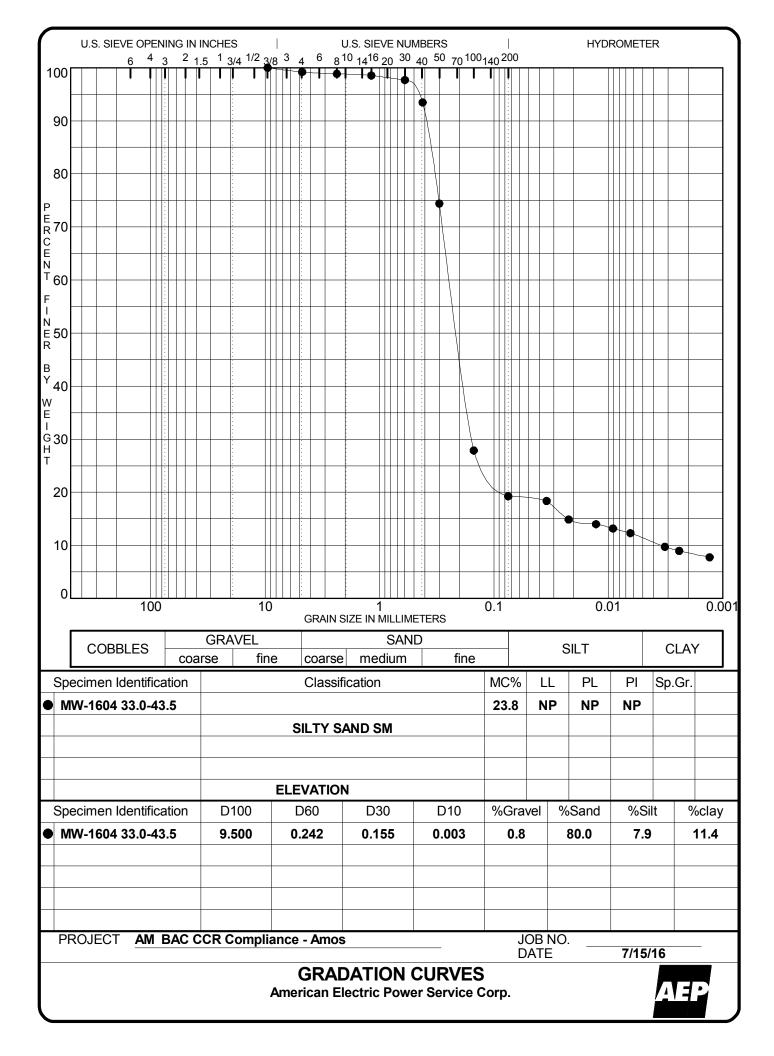
Grain Size Analysis Lab Reports

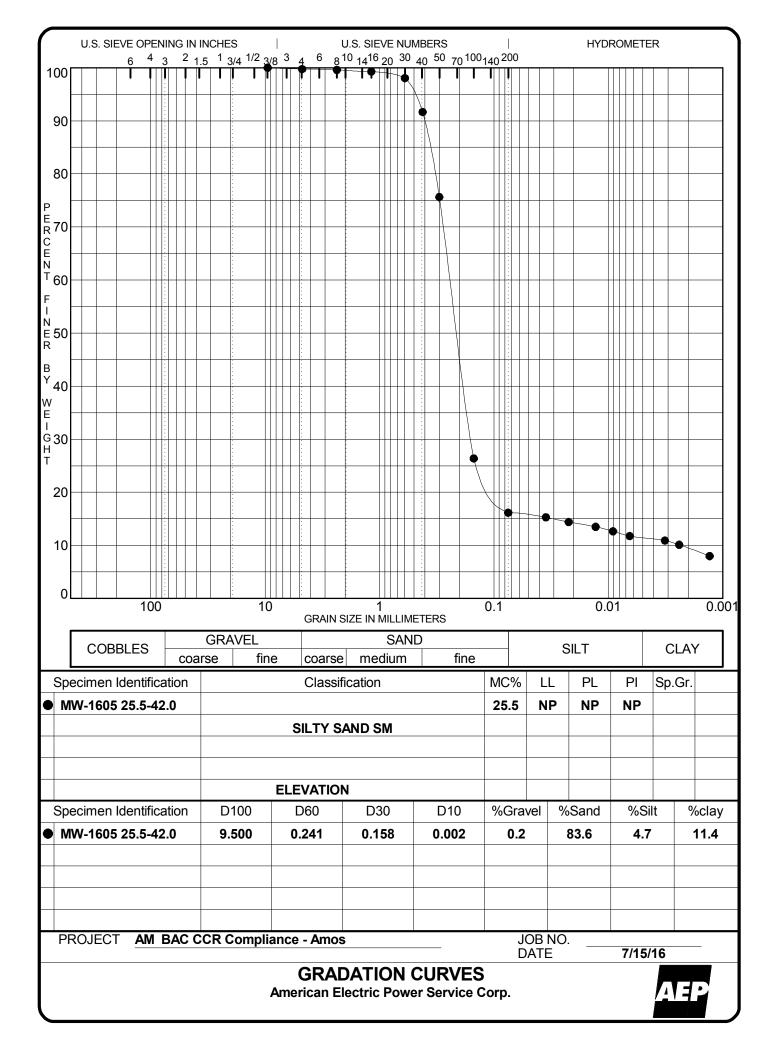


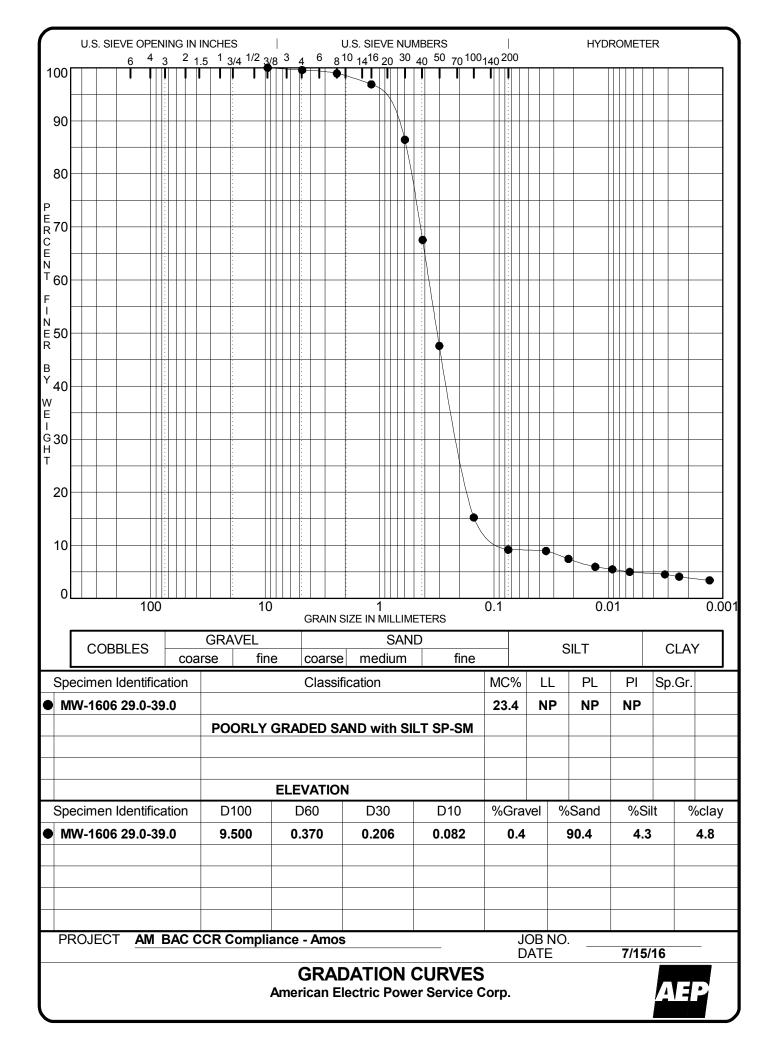






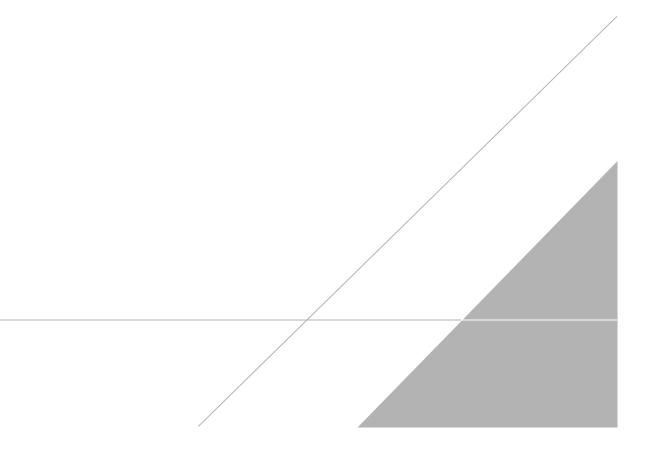


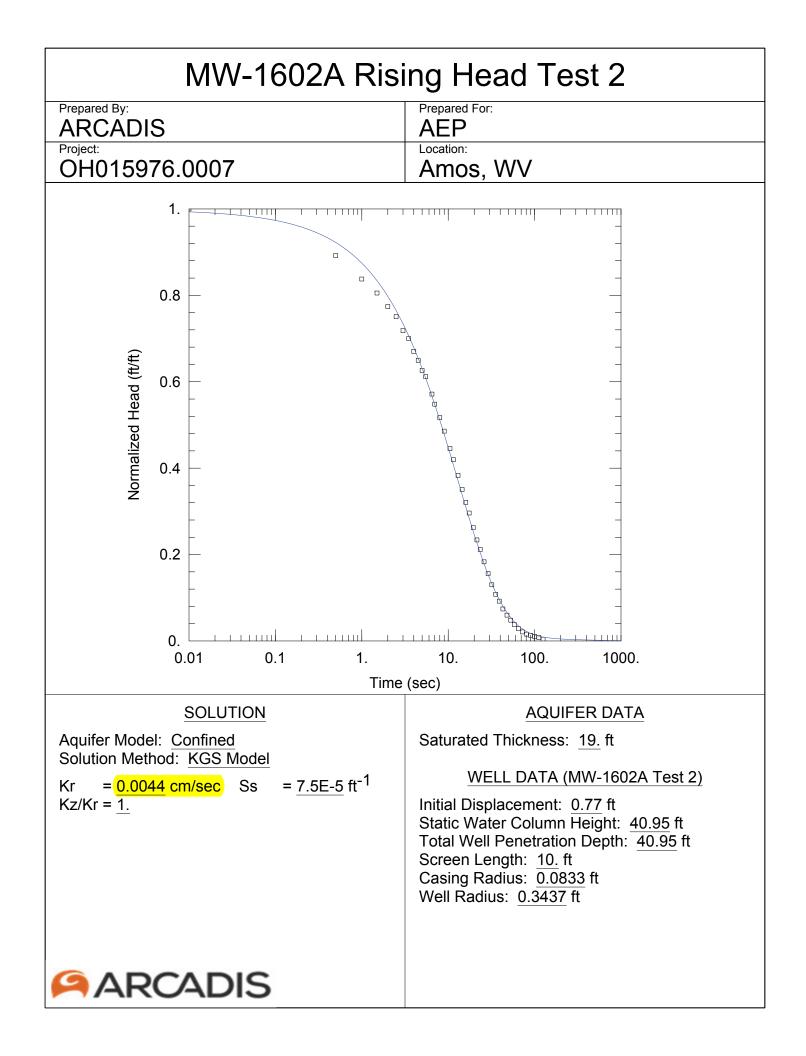


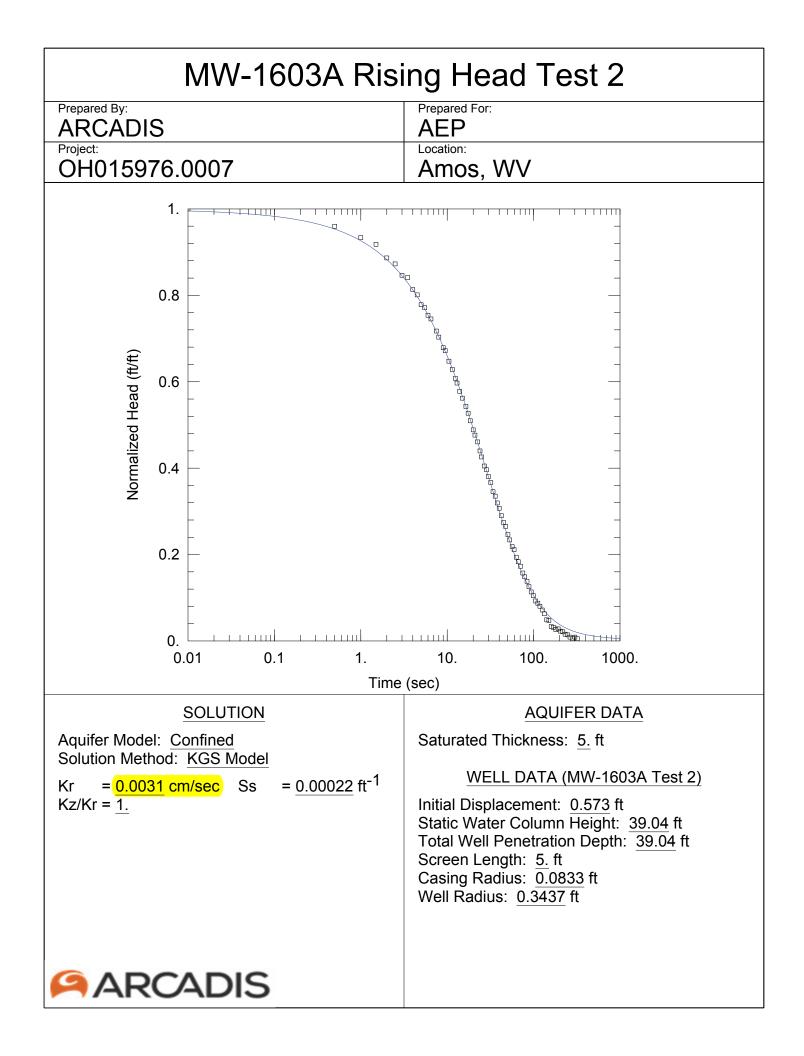


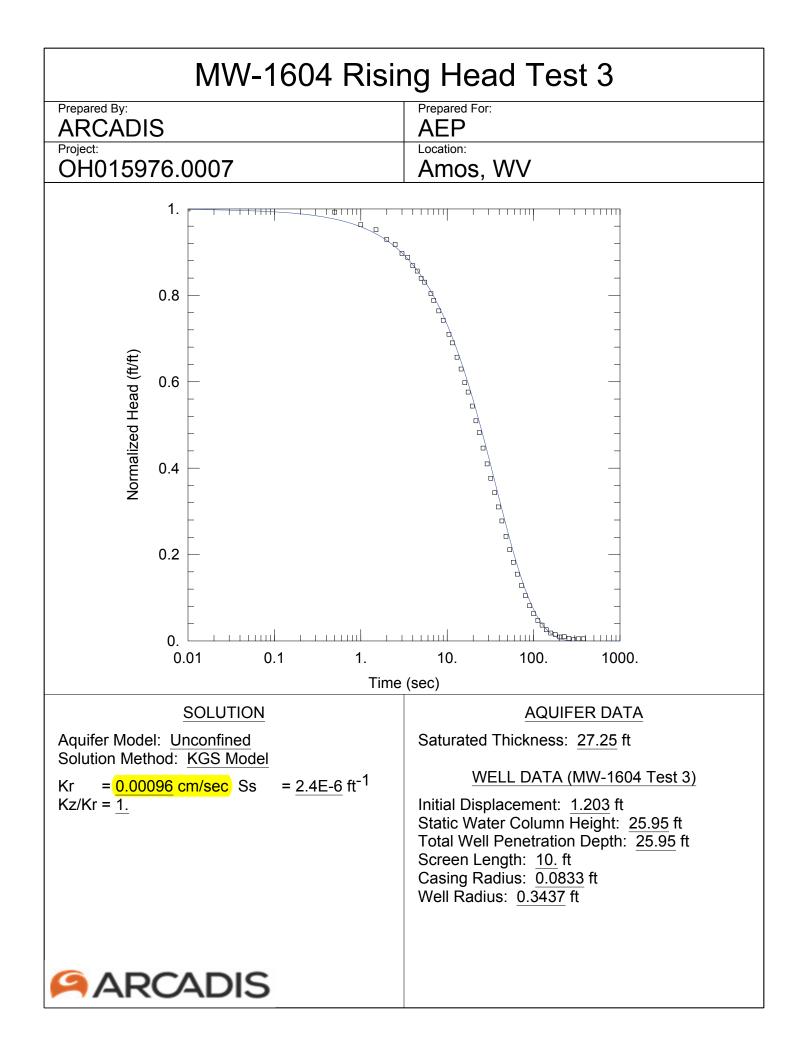
## **APPENDIX C**

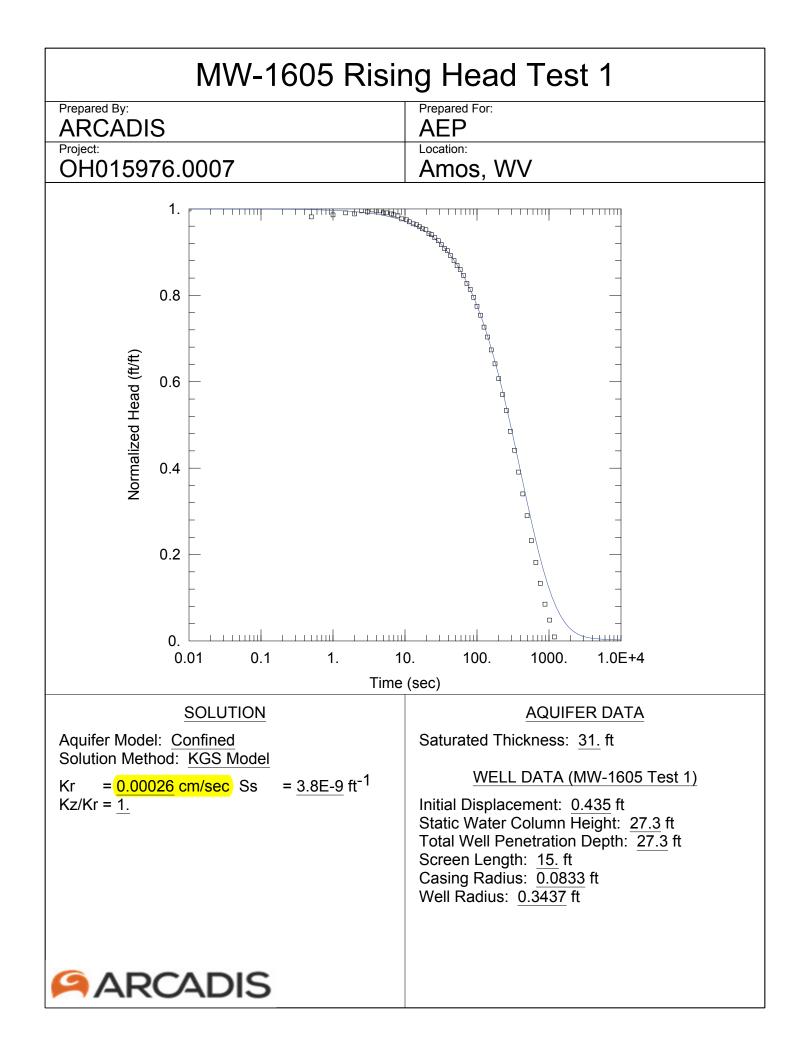
Hydraulic Testing Reports

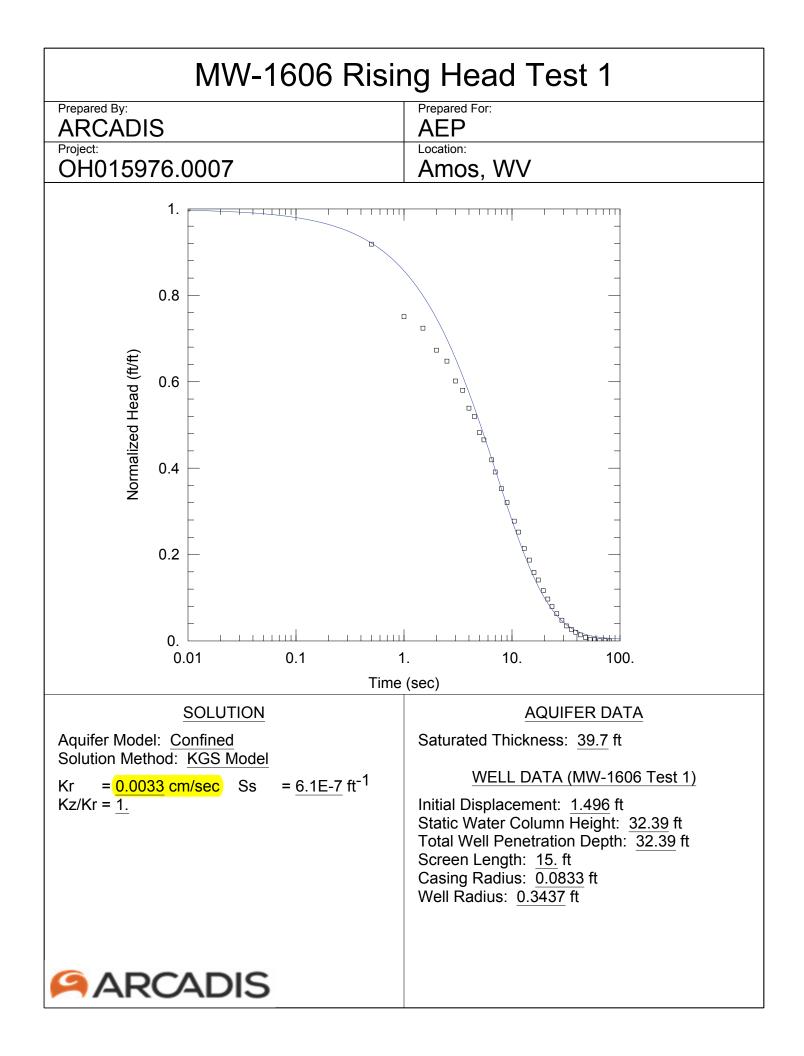






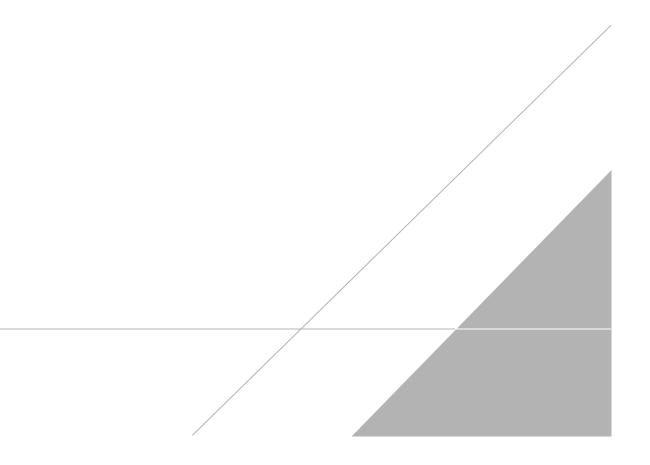






## **APPENDIX D**

Field Methodology and Geophysical Investigation





## **APPENDIX D**

## FIELD METHODOLOGY AND GEOPHYSICAL INVESTIGATION

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

- Installation and development of 6 new monitoring wells
- Installation of 6 confirmatory soil borings
- Redevelopment and repair of 8 existing monitoring wells
- Electrical resistivity survey of ash pond system

Field activities began with the electrical resistivity survey, performed by Arcadis from December 7 to December 11, 2016. Utility clearance activities were conducted from April 4 to April 6, 2016 in preparation for well installation. Arcadis provided oversight for the installation of 6 monitoring wells by an AEP drilling crew, which began on April 25, 2016 and ended on May 26, 2016. Well development activities began on May 17, 2016 and were completed on June 15, 2016. The following sections provide detail on methodology for each component of field activities.

#### Staking, Surveying, and Utilities Clearance

All proposed new monitoring well locations were staked by an AEP surveyor prior to drilling. AEP 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 boring subcontractor 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. An Arcadis representative will completed a visual inspection of the proposed well sites prior to drilling to assess the presence of any previously unidentified subsurface utilities. Prior to drilling, the new monitoring well locations were soft cleared using hand augering or air knife techniques to a diameter at least 10 percent larger than the largest diameter tooling to be used during drilling. Soft digging was completed to a minimum depth of 5 feet below ground surface (bgs).

#### **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 within the decontamination pad. The use of a pressure washer was used when possible. A decontamination was constructed for decontamination of the down-hole tools. The decontamination pad was constructed at a location near the existing AEP Amos Plant ash ponds in a manner such that all decontamination water would flow to the existing ash pond system. Containerization was not required for decontamination water, if directed to the ash pond system. Water for decontamination or drilling was potable and obtained from the AEP Amos Plant.

#### **Drilling – New Unconsolidated Monitoring Wells**

Boreholes for unconsolidated monitoring wells were drilled using standard hollow-stem auger methods in accordance with ASTM D5784. Augers with a hollow-stem inside diameter of 4 and 1/4 inches were used to drill and install the unconsolidated monitoring wells. Continuous spit-spoon sampling and standard penetration testing was performed in accordance with ASTM D1586 to the total boring depth. An Arcadis representative logged, classified, and recorded all samples in accordance with ASTM D5434 and D2488. No petroleum based lubricants or other VOC based liquids were used on down-hole tools.

#### **Drilling – Confirmatory Soil Borings**

Six boreholes to verify depth of ash were drilled using standard hollow-stem auger methods in accordance with ASTM D5784. Augers with a hollow-stem inside diameter of 4 and ¼ inches were used to drill and install the boreholes. Continuous spit-spoon sampling and standard penetration testing was performed in accordance with ASTM D1586 to the total boring depth. All borings were backfilled upon completion. Borings deeper than 20 feet were tremmie grouted using Benseal or equivalent bentonite grout. Borings less than 20 feet were backfilled with drill cuttings, provided drill cuttings did not show visual signs of potential impact. An Arcadis representative logged, classified, and recorded all samples in accordance with ASTM D5434 and D2488 using USCS classification. Soil boring logs are included in **Appendix A**. No petroleum based lubricants or other VOC based liquids will be used on down-hole tools.

#### **Geologic Sample Analysis**

An Arcadis representative retained selected split-spoon soil samples from the unconsolidated monitoring well locations for particle-size analysis by sieving and hydrometer in accordance with ASTM D421, D422, and D4718 and moisture content in accordance with ASTM D2216. Split spoon samples selected for particle-size analysis corresponded to the final screened interval for the given unconsolidated monitoring well. For each new monitoring well location, the selected split spoon samples from the screened interval were composited into a single 16-ounce glass sample container, which was appropriately labeled according to the monitoring well identification number. Samples were transported to the AEP Dolan Civil Engineering Laboratory in Groveport, Ohio for particle-size analysis.

#### **New Monitoring Well Construction**

All monitoring wells were constructed with 2-inch nominal diameter casing consisting of schedule 40 PVC pipe extending 3.0 feet above ground surface. All wells were constructed with 10-slot, schedule 40 PVC well screen. All monitoring wells used a primary filter pack consisting of a Global No. 5 to No. 7 brand or equivalent sand based on field observations. The filter pack was placed in the annular space between the borehole and the screened interval, extending from 1.0 feet below the bottom of the screen to 3.0 feet above the top of the screen. A secondary filter pack consisting of Global No. 6 or No. 7 brand sand or equivalent was placed in all wells. The secondary filter pack was placed in the annulus, extending from the top of the primary filter pack to 1.0 feet above the primary filter pack. Final placement of the primary and secondary filter packs were modified at some wells based on field conditions. Complete well construction details are provided in **Appendix A**. If backfilling of the borehole was necessary to set the monitoring well, the backfill consisted of bentonite pellets. A minimum of one foot of filter sand separated the bottom of the well screen and the backfill material.

A bentonite pellet seal was placed in the annulus immediately above the secondary filter pack in all monitoring wells. The bentonite pellet seal extended from the top of the secondary filter pack to at least 3.0 feet above the top of the secondary filter pack, which was below the water table. The bentonite pellet seal was allowed to hydrate for two hours prior to placing the overlying grout. A high-solids bentonite grout was placed using a tremmie pipe in the remaining annulus to near ground surface. The high-solids bentonite grout was and vater mixture with a minimum of 20 percent solids, mixed and placed in accordance with the manufacturer's written instructions (i.e. 66.75 lbs of grout to 40 gallons of water for Halliburton quick grout). Placement of bentonite grout was done in a controlled manner so as not to contaminate the well.

Lockable steel protective casings were installed over the PVC casings in accordance with ASTM D5787. The protective casing was at least 2 inches in diameter greater than the PVC casing above grade and was centered in a concrete pad measuring 4 feet by 4 feet and 6-inches thick. The steel outer casing was 3inches in diameter greater than the well casing (5-inches) and extended 4 feet below the ground surface and at least 2 feet above the ground surface. There were no signs of grout or concrete on the steel protective casing. The concrete pad was constructed so that there is slope away from the protective casing. Two weep holes were drilled on opposite sides at the base of the protective cap. The annular space between the PVC casing above grade and the steel protective casing was filled with washed pea gravel up to 4 inches below the top of the PVC casing. A watertight locking well cap was placed at the top of the PVC casing. A minimum of four concrete-filled barrier posts/bollards were installed around monitoring wells located in high-traffic areas to protect the monitoring wells from damage. The barrier posts were installed either at each corner of the pad or the midpoint of each side of the pad. The barrier posts were painted a high-visibility yellow color. An Arcadis representative produced a typed log of geologic materials encountered and of borehole and monitoring well construction details. A log was also filed with the West Virginia Department of Environmental Protection (WVDEP) in accordance with their recordkeeping requirements.

#### **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 well screens and casings were brushed using a tight fitting brush to dislodge encrusted materials prior to beginning the surge and pump cycles described below. The well was then purged with a pump or by air-lifting 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. A surge cycle was then be performed across the screen using a surge block. A second pumping cycle shall be performed until the discharge water has good visual clarity, followed by second surge cycle with the double disk surge block.

A final pumping cycle was performed to 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  $\pm 0.50$ C, pH stabilizes within  $\pm 0.2$  units, conductivity stabilizes within  $\pm 3$  percent, and turbidity is less than 10 nephelometric turbidity units). Well development logs are included as an attachment to **Appendix D**.

#### **Monitoring Well Restoration**

Surface completions (e.g. concrete pads, steel protective casings) of existing wells that were to be retained in the monitoring well network were inspected by Arcadis personnel. If the surface completions were not in good condition as described above in the Monitoring Well Construction section, then actions were taken to improve the deficiencies and to be consistent with new monitor well construction.

## FIELD METHODOLOGY – ELECTRICAL RESISTIVITY SURVEY

#### **Electrical Resistivity Method**

The electrical resistivity method consists of injecting electrical current into the subsurface and simultaneously measuring the potential difference along the subsurface within the vicinity of where the current is being injected using a series of electrodes at the ground surface - generally two current electrodes and two potential electrodes in various arrangements and separations called arrays. The injected current and measured potential values are quantified and recorded by the instrument. From these data the electrical resistance (in Ohms) is calculated using Ohm's Law (R = V/I). The apparent electrical resistivity (in Ohm-meters) is calculated from the resistance using volumetric geometrical scale factors related to the electrode arrangement (array). These geometric factors are what distinguish the various array types. The horizontal and vertical sensitivities, as well as the penetration ability vary between array types, and the array type choice is dependent on the project objectives. For this project, a dipole-dipole array was selected as a suitable option. This array type offers rapid data acquisition, a data-dense profile, good subsurface penetration, high data collection efficiency, and good sensitivity to both lateral and vertical variations in electrical resistivity.

Electrical resistivity is an intrinsic property of materials that varies widely in the subsurface and is often correlative with lithology and geochemistry. For soils and rock, resistivity is a function of porosity, ionic content of the pore fluids (usually groundwater), and electrically conductive/reactive minerals such as pyrite and some clay minerals. By measuring the distribution of resistivity values in the subsurface, the presence and structure of geologic features can be inferred.

Once the electrical resistivity data set was collected, the data is downloaded to a computer for processing. Since the true resistivity structure of the earth is the desired outcome, the apparent resistivity data were inverse-modeled using the software Earth Imager v 2.42 to obtain true resistivity<sup>1</sup> cross-sections of the subsurface.

<sup>&</sup>lt;sup>1</sup> The terms apparent versus true resistivity refers to whether the value is essentially a vertical average of the measured quantity, represented as an apparently equivalent uniform value, or whether the values are a portrayal of the actual resistivity or conductivity of the earth materials.

#### **Data Acquisition Procedures**

For the 2-dimensional (2D) ER survey conducted at the AEP Amos Plant, five ER transect lines ranging from 291 meters (approximately 950 ft.) to 333 meters (1,100 feet) long were installed to assess the ash pond system area (**Figure D-1**). The lines were identified as Line ER-1, Line ER-2, Line ER-3, Line ER-4, and Line ER-5. For each survey line, up to 112 non-corrosive stainless-steel electrode stakes were used, which were separated by a distance of three meters (approximately 6.6 feet), and inserted into surface soils with an approximate constant spacing along a relatively straight transect. The electrode stakes penetrated the subsurface from approximately 4 to 6 inches bgs to make electrical contact with the soil. The electrode stakes were connected to a specially designed cable that allowed contact with various combinations of electrodes from the meter controlling the data collection process. During the survey, current was injected into the subsurface through two of the electrodes and the potential difference (voltage) created by the flow of current was measured between one or more pairs of voltage electrodes along the survey transect. The pairs of electrodes were arranged in an approximately straight transect, although obstructions and topographic differences prevented perfectly straight transects. The spacing between the electrodes and the geometry of the current electrodes to the voltage electrodes are referred to as an "array type."

Various array types have advantages and disadvantages depending on the site setting and the objective(s). For this project the dipole-dipole array was used, which generally produces high resolution for both lateral and vertical heterogeneities but may have a limited depth penetration and is susceptible to electrical noise from metallic structures such as pipes.

"Apparent resistivity" is reported in units of ohm-meters and is defined as the bulk, average resistivity of all subsurface materials influencing the current, not the true resistivity of a material at a specific depth, and once the apparent resistivity data set is acquired, the data must be processed using an inversion modelling program to resolve an estimate of the true resistivity distribution of the subsurface.

ER equipment used during this investigation consisted of an Advanced Geosciences, Inc. (AGI) (Austin, Texas), SuperSting<sup>™</sup> R8/IP earth resistivity system with a 56 electrode switch box, electrode cables with 3meter connector spacing, and stainless-steel electrodes. Resistivity data were stored in the internal memory of the SuperSting<sup>™</sup> R8/IP and downloaded to a laptop computer. Field data files were assigned a name that included transect name and array type. After each survey was complete, the downloaded data were processed (i.e., inverted) in the field using AGI's proprietary EarthImager 2D software (Lagmanson and Yang 2002) to evaluate data quality and provide preliminary images to guide subsequent transect alignments.

#### **Data Position Control**

The locations of the EMI and resistivity data points were controlled using a Hemisphere A325 mapping grade GPS receiver, equipped with real-time differential correction (i.e., OmniSTAR). The accuracy of this GPS receiver is one meter or less under typical conditions.

#### **Data Processing and Presentation**

Once the data are acquired, they are transferred to a computer and processed to create modelled crosssections that are prepared for geologic interpretation by an experience geophysicist. The 2D ER data were processed using the program EarthImager<sup>™</sup> 2D v2.4.2. Build 627 software program by AGI (Lagmanson and Yang 2002). Prior to data modelling, a number of pre-processing steps were completed, including removal of data with voltage spikes, poor voltage decay, and low data quality readings in the raw field data.

Resistivity data were processed using a damped least-squares or smooth model inversion method using a finite element mesh to generate a 2D model of resistivity versus depth. The primary objective of inversion is to reduce data misfits between field measurements and calculated data of a reconstructed model.

Data from resistivity lines ER-1, ER-2, ER-4, and ER-5 are depicted graphically as cross-sectional images with annotations of the interpreted geologic conditions (**Figures D-2** through **D-5**). Note that output from Line ER-3 was omitted from this report due to poor data quality. The cross-sections were made using the inverted ERI model resistivity data output from the EarthImager<sup>™</sup> modeling program; they were gridded and contoured using Golden Software Surfer® 12 software. The descriptive geologic information from previous borings and Spring 2016 confirmation borings (SB-1601 through SB-1605, MW-1604, MW-1606) were superimposed on the cross-sections and interpretations made of the aquifer boundaries and other geologic information.

#### Sources of ER Data Interference

Some of the ERI datasets contained interference potentially caused by a combination of such factors as: 1) poor electrical contact between electrode and soil; 2) high contact resistance; 3) the presence of conductive subsurface infrastructure including metallic piping; and, 4) stray electrical currents and spontaneous potentials in the subsurface. Data artifacts attributed to interference caused by buried metal piping are shown in **Figure D-3** and **Figure D-5**, with the approximate extent of the affected data marked in gray fill.

#### ER RESULTS AND GEOLOGIC INTERPRETATIONS

Typically, lithologies can be distinguished by their ranges of electrical resistivity values. In freshwater environments, native sand and gravel are usually the most resistive material, and silt and clay are the least resistive materials. Non-native fill materials, such as those observed at the site, can also display a range of electrical resistivity values with coarser sand/gravel fill materials typically displaying higher resistivity values compared to finer-grained clayey fill materials that typically display lower resistivity values. Fly ash fill materials in particular are generally observed to have an elevated electrical conductivity in comparison to most native soils due to the fine grained nature of the fly ash (large amount of surface area) and the leachable materials such as iron and aluminum oxides and other elements such as Ca, K, Mg, Mn, Na, Sr, Ti, and S that are in large enough concentration to potentially increase total dissolved solids (TDS) levels and electrical conductivity if dissolved. Groundwater quality can also be assessed using electrical resistivity, with impacts associated with fly ash being significantly more electrically conductive (less resistive) than ambient groundwater conditions.

The electrical resistivity cross-section provides the foundation for the geoelectrical structure of the subsurface at the site, with the presumption that the bulk soil response approximates variations in lithologic materials and groundwater conductivity (see table below).

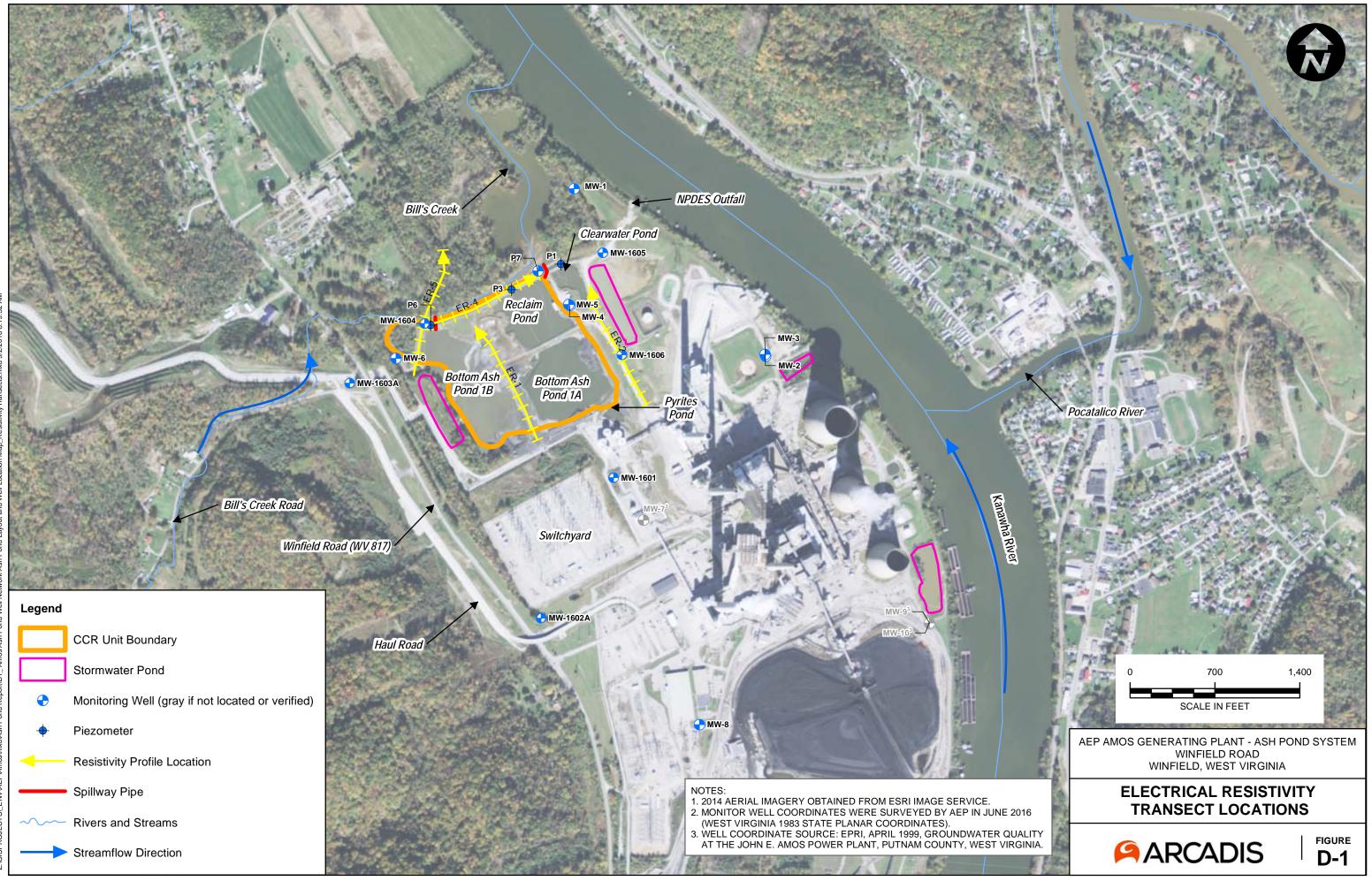
Material Types	Electrical Resistivity Cross-section (Ohm-meters)
Competent sandstone bedrock (background)	>800
Unconsolidated native sand/gravel soils, sand/gravel fill materials, (background)	100 to 800
Fly ash fill materials, clayey fill materials, unconsolidated native clay soils, shale bedrock (background)	10 to 100
Soil containing increasing total dissolved solids (anomalous)	<5.0

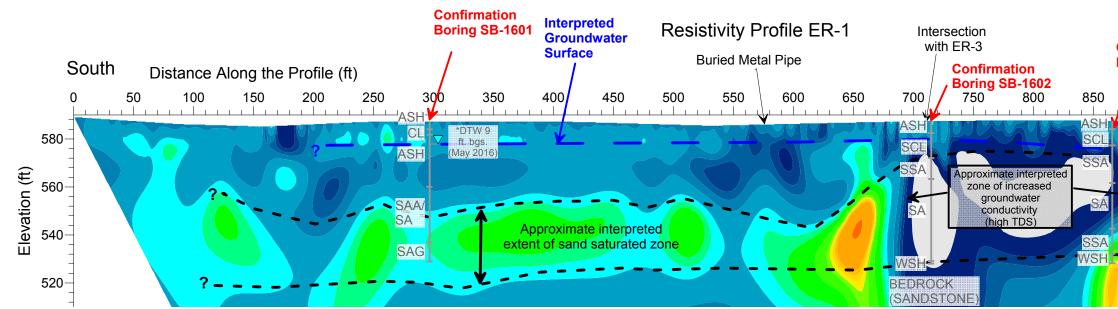
The calculated apparent resistivity values ranged over four orders of magnitude at the site from approximately 1 Ohm-meters to greater than 1000 Ohm-meters. Background resistivity values for sandstone bedrock observed in Line ER-5 data (Figure D-5) are greater than Ohm-meters (red to purple color range) which is consistent for competent sedimentary bedrock. Unconsolidated native sand/gravel soils or sandy fill materials fall in the range of about 100 to 800 Ohm-meters (green to red color range), which is consistent with fill materials and native soils with varying sand, silt, and gravel content. Unconsolidated native clay soils, clay fill materials, or fine-grained fly ash fill deposits fall in the range of about 10 to 100 Ohm-meters (blue to green color range). As depicted in Figure D-2 and Figure D-5, anomalous zones of significantly low anomalous resistivity less than 10 ohm-meters are shown (dark blue to white color range). These zones of anomalous low resistivity are not likely due to naturally occurring soils/geologic conditions, but are rather due to man-made external influences, such as the presence of geochemically impacted groundwater or metallic features (site structures or subsurface utility lines). Based on the presence of fly ash deposits above the significantly low resistivity zones observed in Figure D-2 and Figure D-5, these zones are interpreted to indicate saturated soils impacted by high TDS groundwater. Furthermore, the coarser-grained sand (SA) and sandy gravel (SG) soils observed at boring SB-1602 and SB-1603 (Figure D-2) and boring SB-1604 (Figure D-5) that lie at depths intersecting the interpreted high TDS zones, suggest a likely preferential pathway for groundwater flow. As noted in Figure D-5, the origin of coarser-grained material shown at SB-1604 is likely channel fill based on the depiction of a historic stream channel shown in 1909, 1931, and 1958 site topographic maps.

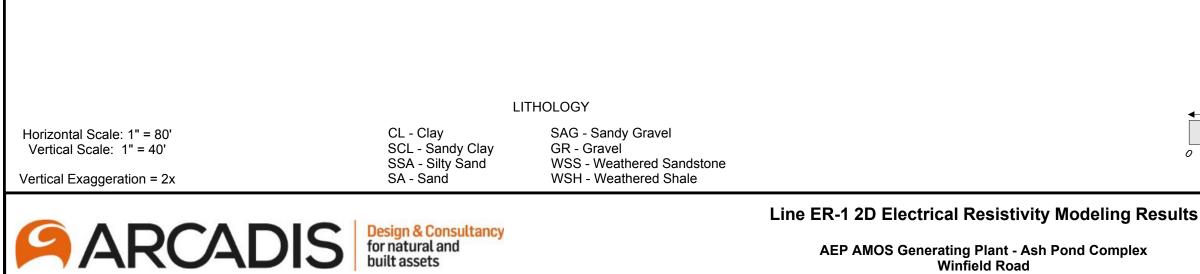
The geologic framework at the site has been previously reported to be an unconsolidated aquifer consisting of saturated alluvial sediments beneath and surrounding the site. The upper limit of the uppermost aquifer is defined by the elevation of the sand saturated zone, which ranges from approximately 550 to 560 ft. Using both boring log observations and resistivity values, the interpreted upper and lower extent of sand

saturated zone is delineated by black dashed lines as shown in **Figures D-2** through **D-5**. An interpreted groundwater surface is also shown as a blue dashed line in **Figures D-2** through **D-5**.

It should be noted that known fly ash deposits at the site, confirmed by Spring 2016 soil borings, exhibit resistivity values that fall in same range as native soils and therefore the sole use of resistivity values displayed in the cross-section cannot be used to distinguish ash deposits from native soils.

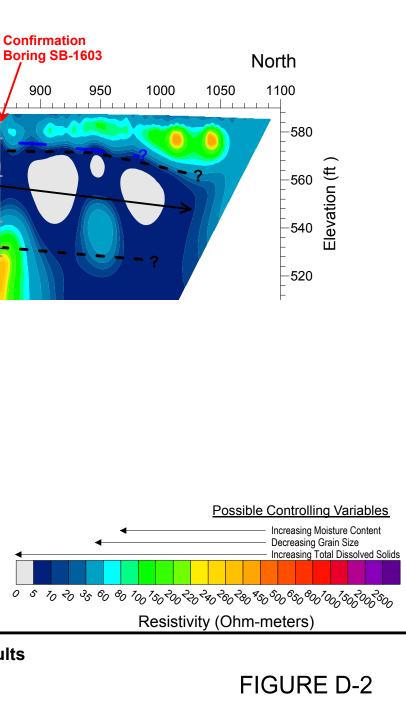


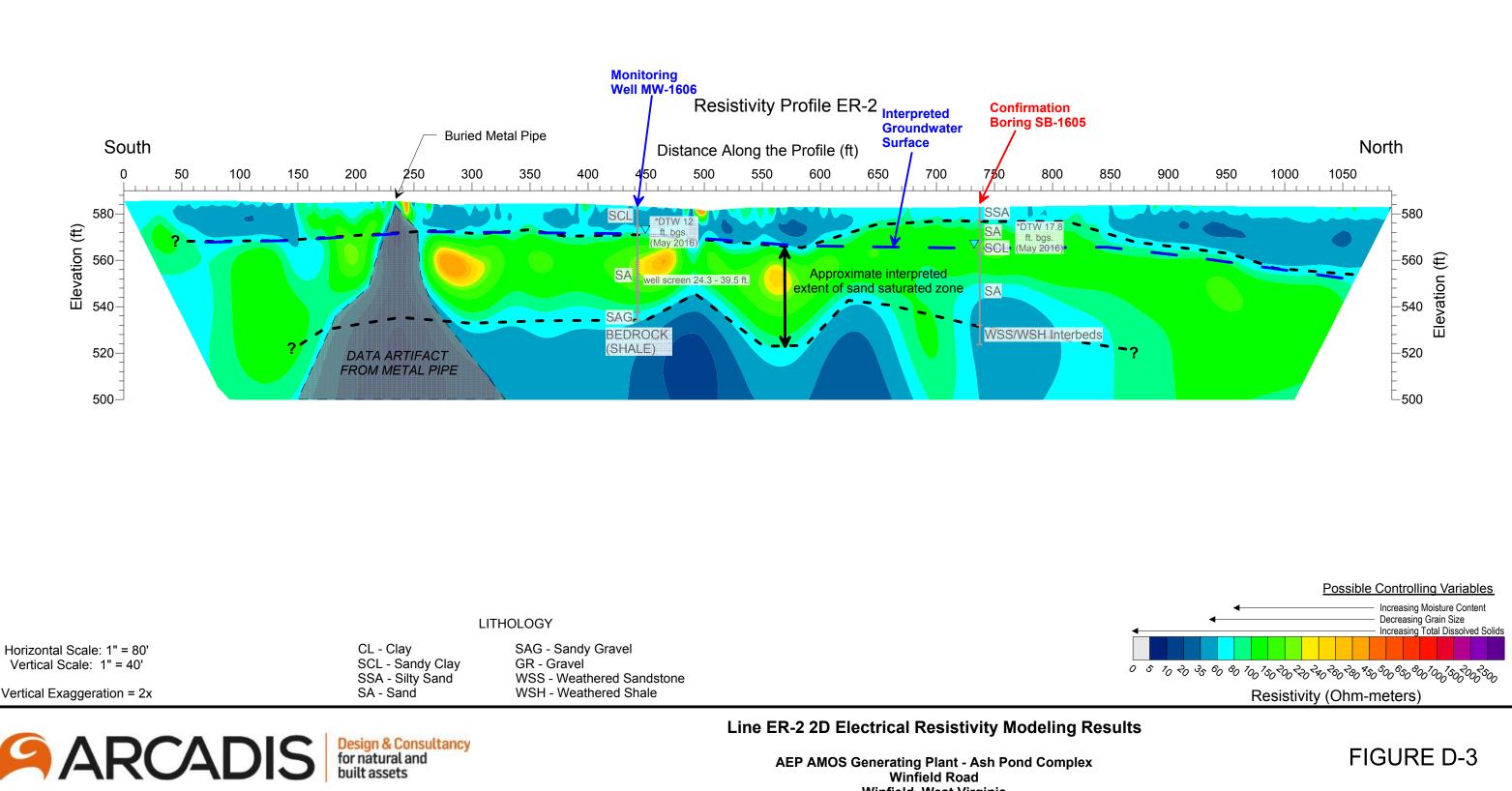


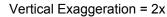




**AEP AMOS Generating Plant - Ash Pond Complex** Winfield Road Winfield, West Virginia

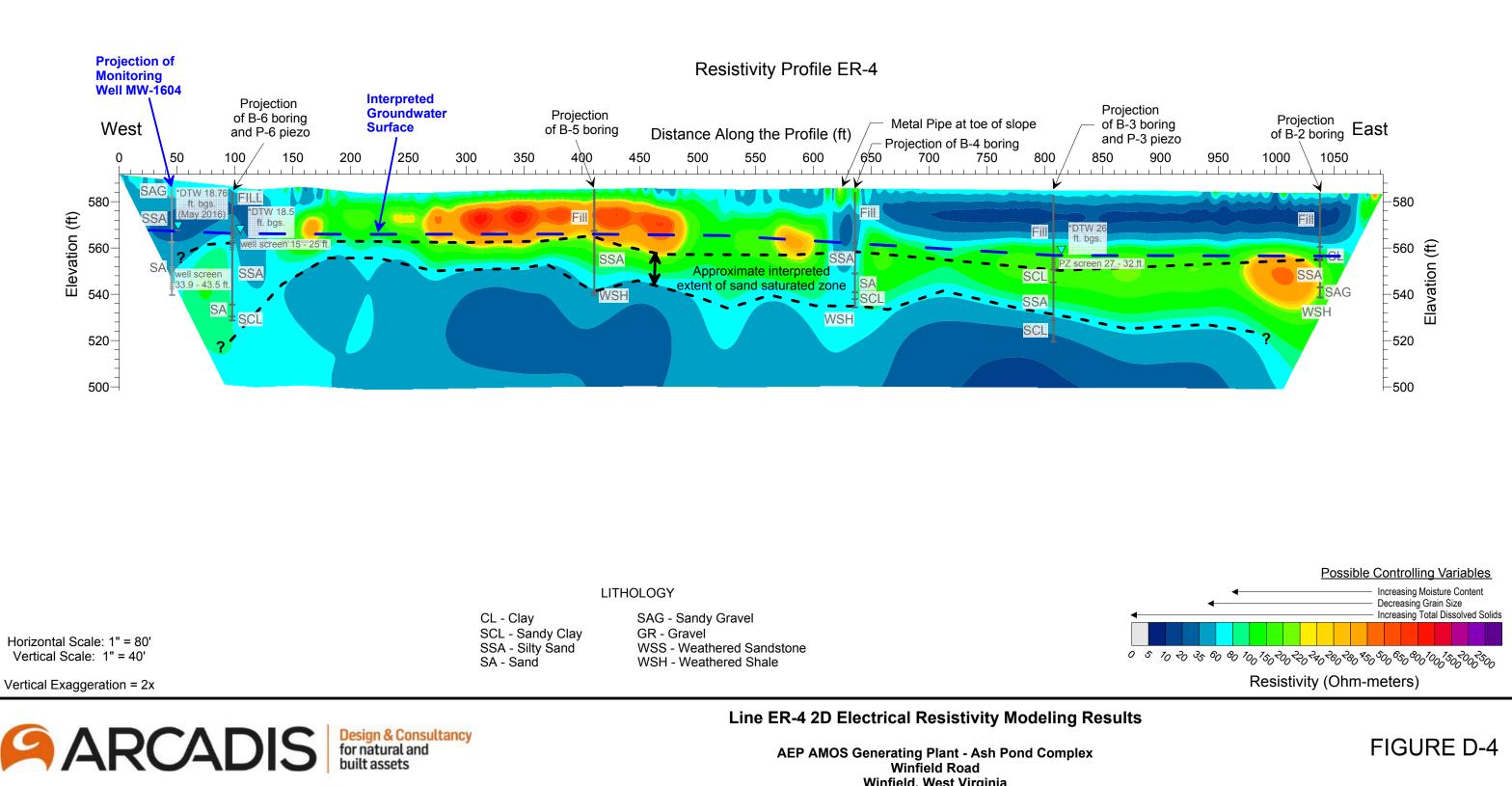






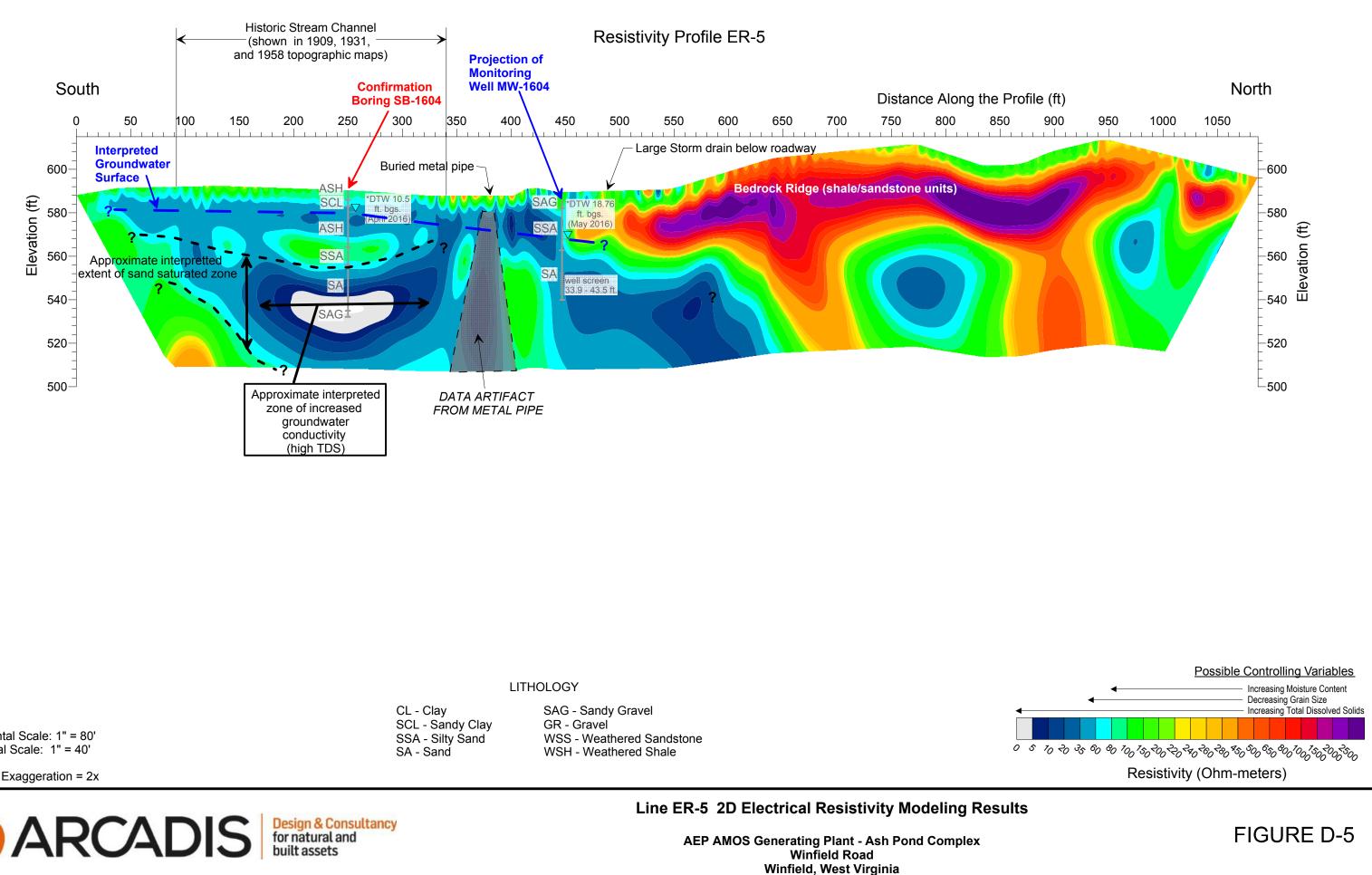


Winfield, West Virginia





Winfield, West Virginia



#### Horizontal Scale: 1" = 80' Vertical Scale: 1" = 40'

Vertical Exaggeration = 2x





Well Development Logs



Site/Well No.	MW-1									
Project	AEP Amos Plant		Project No.	OH01	5976.0007	Page	<u> </u>	of <u>1</u>		
Site Location						Date				
Weather			Developme	ent Time Be	egin <u>6/15/16 0</u>	9:20 AM		End	6/15/16 10:05 A	М
Evacuation Dat	а				0 a mars la	D				
Measuring Poi	nt		TOC		Sample Intake S	Pump etting (ft	bmp)			
MP Elevation (	(ft)		N/A		Pumping	g Rate (g	pm)	190		
Land Surface I	Elevation (ft)				Evacuat	ion Metho	bd	Subme	rsible Proactive F	Pump
Sounded Well	Depth (ft bmp)		36.35		Volumes	Purged				
Depth to Wate	r (ft bmp)		17.21							
Water-Level E	levation (ft)				Field Par	ameters				
Water Column	in Well (ft)		19.14		Color			Clear		
Casing Diame	ter/Type		2		Odor			None		
Gallons in Wel	I		3.06		Appeara	nce				
Time Min	Total Gallons Water (ft	Rate (n	onductivity mS/cm or	Turbidity	Temperature	pH	ORP	Dissolved Oxygen	Well Volume	Dementer

Time	Min Elapsed	Gallons Removed	Water (ft btoc)		(mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°F/°C)	рН (s.u.)	ORP (mV)	Oxygen (g/mL)	Well Volume (Gal)	Remarks
9:20	0:00	29.00	17.53	190	0.464	20.40	18.64	4.91	217	8.77	Initial	Clear; no odor
9:25	0:05	29.10	17.60	190	0.507	19.90	15.48	5.00	228	5.38	1st	Clear; no odor
9:30	0:10	29.20	17.60	180	0.506	7.60	15.39	4.92	238	4.20	2nd	Clear; no odor
9:35	0:15	29.30	17.60	180	0.500	4.30	15.33	4.90	245	3.60	3rd	Clear; no odor
9:40	0:20	29.40	17.60	180	0.496	3.90	15.44	4.97	244	3.30	4th	Clear; no odor
9:50	0:30	29.50	17.60	180	0.487	1.80	15.79	5.01	249	2.50	5th	Clear; no odor
9:55	0:35	29.60	17.54	180	0.476	2.30	15.62	5.04	254	2.30	6th	Clear; no odor
10:00	0:40	29.70	17.40	180	0.470	1.40	15.70	5.07	260	2.22	7th	Clear; no odor
10:05	0:45	29.80	17.33	180	0.466	1.90	15.74	5.05	213	2.15	8th	Clear; no odor

Development Personnel: K. Swiadek

Notes: Removed 30 gallons with surge block and proactive pump. Turb never high during development.

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06		2" = 0.16	3" = 0.37	4" = 0.65		
	1-1/2" = 0.09		2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potentia
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



Site/Well	No.	MW-2												
Project		AEP Amos	Plant		Project N	o. OH0	15976.0007	Page	e1	of 1				
Site Loca	ation	Winfield, W	V					Date	5	/20/2016				
Weather		66F, Sunny			Developm	nent Time E	Begin <u>10:20</u>			End	11:	31		
Evacuatio	on Data													
Measurir	ng Poin	t			тос		Sample Intake S	Pump setting (ft	bmp)	55.00				
MP Eleva	ation (fl	t)			N/A		Pumping	g Rate (g	pm)	580				
Land Su	face F	, levation (ft)						Evacuation Method Foot Valve			alve Proa	e Proactive Pump		
		Depth (ft bm	n)		59.05		Volumes						p	
Depth to			Ρ)		13.07		Volumoo	ruigeu						
·		evation (ft)			13.07		Field De-	amotore						
		( )					Field Parameters							
Water Co	olumn i	n Well (ft)			45.98		Color			Tan				
Casing D	asing Diameter/Type allons in Well				2" PVC		Odor			None				
Gallons i	Gallons in Well				7.36		Appeara	ance						
		Total			Conductivity					Dissolved				
	Min	Gallons	Depth To Water (ft	Rate	(mS/cm or	Turbidity	Temperature	pH	ORP	Oxygen	Well Vo			
Time	Elapsed	Removed	btoc)	(mL/min)	umhos/cm)	(NTU)	(°F/°C)	(s.u.)	(mV)	(g/mL)	(Ga	al)	Remarks	
10:25 10:30	0:00	65.77 66.54	14.11 14.00	580 580	0.651	87.40 32.90	20.72 19.13	6.45 6.60	-69 -71	0.56 3.15	Initial 1st		Tan; no odor Clear; no odor	
10:35	0:03	67.31	13.90	580	0.616	27.80	19.13	6.55	-65	1.02	2nd		Clear; no odo	
10:40	0:15	68.08	13.95	580	0.616	17.60	18.36	6.60	-67	2.40	3rd		Clear; no odo	
10:45	0:20	68.85	13.95	580	0.623	15.10	18.55	6.69	-63	2.58	4th		Clear; no odo	
10:50	0:25	69.62	13.95	580	0.633	8.45	18.47	6.68	-62	3.01	5th		Clear; no odo	
10:55	0:30	70.39	13.95	580	0.643	6.12	18.44	6.72	-61	2.61	6th		Clear; no odo	
11:00	0:35	71.16	13.95	580	0.638	4.07	18.67	6.69	-62	3.22	7th		Clear; no odo	
11:10	0:45	71.93	13.95	580	0.605	5.36	18.69	6.67	-57	0.80	8th		Clear; no odo	
11:15	0:50	72.70	13.95	580	0.603	4.97	18.71	6.68	-61	0.90	9th		Clear; no odo	
11:20	0:55	73.47	13.95	580	0.603	5.23	19.13	6.67	-55	0.96	10th		Clear; no odo	
11:25	1:00	74.34	13.95	580	0.309	3.92	18.33	6.74	-62	0.23	11th		Clear; no odo	
11:30	1:05	75.01	13.95	580	0.604	1.97	18.23	6.74	-62	2.09	12th		Clear; no odo	
Developr	ment P	ersonnel:		T. Runge	l									
Notes:					allons removed wit				pump (	40 surged). L	id and sti	ick-up l	pent	
	and pro	oken. Not 3' t	aii; no sa	and, pad d	imensions/conditio	n unkown. E	soliards need pa	iniea.						

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06		2" = 0.16	3" = 0.37	4" = 0.65		
	1-1/2" = 0.09		2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potentia
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



Site/Wel	l No.	MW-3											
Project		AEP Amos	Plant		Project No	о. <u>ОН</u> 0	15976.0007	Page	1	of <u>1</u>			
Site Loca	ation	Winfield, W	V					Date	5/	/19/2016			
Weather		64F, Sunny			Developm	ient Time E	Begin <u>15:05</u>			End	16:05		
Evacuatio	on Data						_						
Measurir	ng Poin	t			тос		Sample Intake S	Pump etting (ft	bmp)				
MP Elev	ation (f	t)			N/A		Pumping	g Rate (g	om)	580			
Land Su	rface E	levation (ft)						ion Meth		Foot Valve Proactive Pump			
		Depth (ft bm	n)		25.38		Volumes			12			
			Ρ)				Volumoo	ruigeu		12			
Depth to		· · · /			12.70		Fight P						
		evation (ft)		-			Field Par	ameters					
Water C	olumn i	n Well (ft)			12.68		Color			clear			
Casing D	asing Diameter/Type				2" PVC		Odor			None			
Gallons i	Gallons in Well				2.02		Appeara	ance					
		1				1				Disselved	1		
Time	Min Elapsed	Total Gallons Removed	Depth To Water (ft btoc)		Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°F/°C)	рН (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Well Volume (Gal)	Remarks	
15:10	0:05	16.77	13.42	580	0.393	12.60	19.91	6.05	136	3.26	Initial	Clear; no odor	
15:15	0:10	17.54	13.31	580	0.431	7.20	19.49	6.13	116	1.61	1st	Clear; no odor	
15:20	0:15	18.31	13.23	580	0.416	12.30	17.88	6.12	113	3.16	2nd	Clear; no odor	
15:25	0:20	19.08	13.21	580	0.416	8.70	18.50	6.10	130	1.93	3rd	Clear; no odor	
15:30	0:25	19.85	13.21	580	0.418	6.40	17.52	6.15	133	2.64	4th	Clear; no odor	
15:35	0:30	20.02	13.21	580	0.405	5.30	20.04	6.15	155	2.10	5th	Clear; no odor	
15:40	0:35	21.39	13.20	580	0.410	4.80	19.28	6.31	144	3.14	6th	Clear; no odor	
15:50	0:45	22.16	13.21	580	0.405	5.10	19.16	6.19 6.14	156 153	2.89	7th 8th	Clear; no odor	
15:55 16:00	0:50	22.93 23.70	13.20 13.20	580 580	0.411	3.00 2.10	18.89 18.46	6.14	153	1.00 2.38	9th	Clear; no odor Clear; no odor	
16:05	1:00	24.47	13.20	580	0.405	0.70	18.57	6.18	152	2.79	10th	Clear; no odor	
10.00	1.00	2	10.20	000	0.100	0.10	10.07	0.10	102	2.10			
												<u> </u>	
		ersonnel:		T. Runge									
Notes:					surge block. Well s			n; well stic	kup is le	ess than 3' tal	ll; cannot see/tel	l what	
	size pa	d is, if it's eve	en prese	ent. No sar	nd in stickup; bollar	ds need repa	ainting.						

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06 1-1⁄2" = 0.09		2" = 0.16 2-½" = 0.26	3" = 0.37 3-½" = 0.50	4" = 0.65 6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potentia
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



Site/Wel	l No.	MW-4											
Project		AEP Amos I	Plant		Project No	о. <u>ОН</u> 0	15976.0007	Page	<u> </u>	of <u>1</u>			
Site Loca	ation	Winfield, W	V					Date	5/	19/2016			
Weather	-	64F, Sunny			Developm	ient Time B	Begin <u>11:25</u>			End	12:05		
Evacuation	on Data												
Measurir	na Poin	t			тос		Sample Intake S	Pump etting (ft	(amd	30.00			
MP Elev	-			-	N/A			g Rate (g		880			
		levation (ft)		-	14/7			ion Metho	-		alvo Propotivo P	ump	
		Depth (ft bm	2	-	36.93		Volumes Purged 10				ot Valve Proactive Pump		
			P)	-			volumes	Purgeo	-	10			
Depth to		· · · /		-	17.05								
Water-Le	evel Ele	evation (ft)		-			Field Par	ameters					
Water C	/ater Column in Well (ft) asing Diameter/Type				19.8		Color			clear			
Casing D	Casing Diameter/Type				2" PVC		Odor		_	None			
Gallons i	Gallons in Well			_	3.18		Appeara	ince	_				
Time	Min Elapsed	Total Gallons Removed	Depth To Water (ft btoc)	Rate (mL/min)	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°F/°C)	рН (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Well Volume (Gal)	Remarks	
11:25	0:05	28.16	17.23	880	0.225	24.30	18.77	5.68	65	2.39	Initial	Clear; no odor	
11:30	0:10	29.19	17.23	780	0.219	21.20	18.81	5.71	61	2.47	1st	Clear; no odor	
11:35	0:15	30.09	17.26	680	0.219	39.00	18.48	5.60	78	0.96	2nd	Clear; no odor	
11:40	0:20	30.90	17.27	680	0.219	32.60	18.51	5.62	80	0.60	3rd	Clear; no odor	
11:45	0:25	31.89	17.27	680	0.219	30.80	18.41	5.61	79	0.54	4th	Clear; no odor	
11:50				680	0.222	23.50	18.69	5.66	73	1.22	5th	Clear; no odor	
	0:30	32.79	17.28			1						Clear; no odor	
11:55	0:35	33.69	17.27	680	0.219	31.80	18.60	5.62	76	1.83	6th	1	
12:00	0:35 0:40	33.69 34.59	17.27 17.27	680 680	0.218	15.40	18.57	5.66	76	0.99	7th	Clear; no odor	
	0:35	33.69	17.27	680			1 1					1	
12:00	0:35 0:40	33.69 34.59	17.27 17.27	680 680	0.218	15.40	18.57	5.66	76	0.99	7th	Clear; no odor	
12:00	0:35 0:40	33.69 34.59	17.27 17.27	680 680	0.218	15.40	18.57	5.66	76	0.99	7th	Clear; no odor	
12:00	0:35 0:40	33.69 34.59	17.27 17.27	680 680	0.218	15.40	18.57	5.66	76	0.99	7th	Clear; no odor	
12:00	0:35 0:40	33.69 34.59	17.27 17.27	680 680	0.218	15.40	18.57	5.66	76	0.99	7th	Clear; no odor	
12:00 12:05	0:35 0:40 0:45	33.69 34.59 35.49	17.27 17.27	680 680 680	0.218	15.40	18.57	5.66	76	0.99	7th	Clear; no odor	
12:00 12:05	0:35 0:40 0:45	33.69 34.59 35.49 ersonnel:	17.27 17.27 17.28	680 680 680 7. Runge	0.218	15.40 9.60	18.57 19.21	5.66	76 74	0.99	7th	Clear; no odor	

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06		2" = 0.16	3" = 0.37	4" = 0.65		
	1-1/2" = 0.09		2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potentia
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



Site/Wel	l No.	MW-5											
Project		AEP Amos I	Plant		Project No	о. <u>ОН</u> 0	15976.0007	Page	e <u>1</u>	of			
Site Loca	ation	Winfield, W	V					Date	5,	/19/2016			
Weather		61F, Sunny			Developm	nent Time E	Begin 9:55			End	11:17		
Weather		on, ounny			Beveloph						11.17		
Evacuation	on Data						<b>.</b> .	_					
Measurir	ng Poin	t			тос		Sample Intake S	Pump Setting (ft	bmp)	50.50			
MP Elev	ation (f	t)			N/A		Pumping	g Rate (g	om)	580			
Land Su	, rface E	/ levation (ft)						ion Metho		Proacti	ve Pump		
		Depth (ft bm	n)		55.5		Volumes			10			
			Ρ)				Volumes	i uigeu		10			
Depth to		· · · /			16.99								
Water-Le	evel Ele	evation (ft)					Field Pa	rameters					
Water C	olumn i	n Well (ft)			38.51		Color			clear			
Casing D	Diamete	er/Type			2" PVC		Odor			None			
Gallons i	Gallons in Well				6.16		Appeara	ance					
_													
		Total	Depth To		Conductivity		Tanananatuna			Dissolved			
Time	Min Elapsed	Gallons Removed	Water (ft btoc)	Rate (mL/min)	(mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°F/°C)	рН (s.u.)	ORP (mV)	Oxygen (g/mL)	Well Volume (Gal)	Remarks	
10:00	0:05	48.77	17.17	580	0.197	23.30	16.39	5.69	23	1.65	Initial	Clear; no odor	
10:05	0:10	49.67	17.16	680	0.194	6.84	16.68	5.82	18	1.58	1st	Clear; no odor	
10:10	0:15	50.87	17.16	680	0.191	6.31	17.24	5.88	13	2.54	2nd	Clear; no odor	
10:15	0:20	51.34	17.16	580	0.192	6.90	17.30	5.86	16	1.75	3rd	Clear; no odor	
10:20	0:25	52.11	17.16	580	0.191	4.20	17.44	5.81	23	2.99	4th	Clear; no odor	
10:25	0:30	52.88	17.16	580	0.191	3.50	17.43	5.72	26	1.74	5th	Clear; no odor	
10:30	0:35	53.78	17.16	680	0.191	4.75	17.45	5.69	24	1.58	6th	Clear; no odor	
10:35	0:40	54.68	17.16	680	0.190	3.88	17.85	5.70	24	1.86	7th	Clear; no odor	
10:40	0:45	55.58	17.16	680	0.191	2.37	17.70	5.74	28	1.26	8th	Clear; no odor	
10:45	0:50	56.61	17.16	780	0.190	2.89	17.71	5.75	28	1.01	9th	Clear; no odor	
10:50	0:55	57.64	17.16	780	0.190	3.00	17.70	5.75	28	0.99	10th	Clear; no odor	
10:55	1:00	58.67	17.16	780	0.191	4.11	17.76	5.76	27	1.78	11th	Clear; no odor	
11:00	1:05	59.70	17.16	780	0.192	2.67	17.84	5.78	26	1.91	12th	Clear; no odor	
11:10	1:15	60.73	17.16	780	0.192	3.49	17.79	5.77	27	3.64	13th	Clear; no odor	
11:15	1:20	61.76	17.16	780	0.190	4.01	17.69	5.74	28	5.15	14th	Clear; no odor	
		ersonnel:		T. Runge									
Notes:					off/broken. 2'x2' pa	d; no sand ir	ı stick-up.						
	40 gal	removed with	foot val	ve and su	rge block.								

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06		2" = 0.16	3" = 0.37	4" = 0.65		
	1-1/2" = 0.09		2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potentia
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



Site/Wel	l No.	MW-6										
Project		AEP Amos I	Plant		Project No	о. <u>ОН0</u>	15976.0007	Page	1	of <u>1</u>		
Site Loca	ation	Winfield, W	V					Date	5/	19/2016		
Weather		64F, Sunny			Developm	ent Time B	egin <u>13:35</u>			End	14:25	
Evacuatio	on Data											
Measurir	na Poin	t			тос		Sample Intake S	Pump etting (ft	(amd			
MP Eleva	0			-	N/A			g Rate (g	• • •	580		
		levation (ft)		-	IN/A			ion Metho			alve Proactive P	lump
		Depth (ft bm	n)	-	43.82					10	aive Fluactive F	ump
			P)	-			Volumes	Purgeo	-	10		
Depth to		,		-	16.76							
Water-Le	evel Ele	evation (ft)		-			Field Par	ameters				
Water Co	olumn i	n Well (ft)		-	27.06		Color		-	clear		
Casing D	Diamete	er/Type		-	2" PVC		Odor			None		
Gallons i	n Well				4.33		Appeara	ince				
·												
Time	Min Elapsed	Total Gallons Removed	Depth To Water (ft btoc)	Rate (mL/min)	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°F/°C)	рН (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Well Volume (Gal)	Remarks
13:35	0:05	40.77	28.87	580	0.226	24.20	19.10	6.31	-76	3.04	Initial	Clear; no odor
									1 1			- ,
13:40	0:10	41.54	28.90	580	0.229	21.30	19.08	6.20	-65	1.86	1st	Clear; no odor
13:40 13:45	1			580 580	0.229	21.30 7.00	19.08 17.92	6.20 6.25	-65 -68	1.86 1.89	1st 2nd	Clear; no odor Clear; no odor
	0:10	41.54	28.90									í í
13:45 13:50 13:55	0:10 0:15 0:20 0:25	41.54 42.31 43.08 43.85	28.90 27.85 27.05 26.96	580 580 580	0.223 0.222 0.222	7.00	17.92 17.18 16.94	6.25 6.10 6.22	-68 -57 -63	1.89 1.55 2.30	2nd 3rd 4th	Clear; no odor
13:45 13:50 13:55 14:00	0:10 0:15 0:20 0:25 0:30	41.54 42.31 43.08 43.85 44.62	28.90 27.85 27.05 26.96 26.91	580 580 580 580	0.223 0.222 0.222 0.222 0.224	7.00 2.50 2.10 1.50	17.92 17.18 16.94 16.55	6.25 6.10 6.22 6.28	-68 -57 -63 -66	1.89 1.55 2.30 1.58	2nd 3rd 4th 5th	Clear; no odor Clear; no odor Clear; no odor Clear; no odor
13:45 13:50 13:55 14:00 14:05	0:10 0:15 0:20 0:25 0:30 0:35	41.54 42.31 43.08 43.85 44.62 45.34	28.90 27.85 27.05 26.96 26.91 26.84	580 580 580 580 580 580	0.223 0.222 0.222 0.224 0.223	7.00 2.50 2.10 1.50 0.50	17.92 17.18 16.94 16.55 16.78	6.25 6.10 6.22 6.28 6.23	-68 -57 -63 -66 -64	1.89 1.55 2.30 1.58 1.89	2nd 3rd 4th 5th 6th	Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor
13:45 13:50 13:55 14:00 14:05 14:10	0:10 0:15 0:20 0:25 0:30 0:35 0:40	41.54 42.31 43.08 43.85 44.62 45.34 46.16	28.90 27.85 27.05 26.96 26.91 26.84 26.80	580 580 580 580 580 580 580	0.223 0.222 0.222 0.224 0.223 0.224	7.00 2.50 2.10 1.50 0.50 0.50	17.92 17.18 16.94 16.55 16.78 16.91	6.25 6.10 6.22 6.28 6.23 6.19	-68 -57 -63 -66 -64 -62	1.89 1.55 2.30 1.58 1.89 1.94	2nd 3rd 4th 5th 6th 7th	Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor
13:45 13:50 13:55 14:00 14:05 14:10 14:15	0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45	41.54 42.31 43.08 43.85 44.62 45.34 46.16 46.43	28.90 27.85 27.05 26.96 26.91 26.84 26.80 26.79	580 580 580 580 580 580 580 580	0.223 0.222 0.222 0.224 0.223 0.224 0.223 0.224 0.222	7.00 2.50 2.10 1.50 0.50 0.50 0.30	17.92 17.18 16.94 16.55 16.78 16.91 16.81	6.25 6.10 6.22 6.28 6.23 6.19 6.34	-68 -57 -63 -66 -64 -62 -70	1.89         1.55         2.30         1.58         1.89         1.94         1.60	2nd           3rd           4th           5th           6th           7th           8th	Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor
13:45 13:50 13:55 14:00 14:05 14:10 14:15 14:20	0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45 0:50	41.54 42.31 43.08 43.85 44.62 45.34 46.16 46.43 47.70	28.90 27.85 27.05 26.96 26.91 26.84 26.80 26.79 26.71	580 580 580 580 580 580 580 580 580	0.223 0.222 0.222 0.224 0.223 0.224 0.222 0.224	7.00 2.50 2.10 1.50 0.50 0.50 0.30 0.10	17.92 17.18 16.94 16.55 16.78 16.91 16.81 16.79	6.25 6.10 6.22 6.28 6.23 6.23 6.19 6.34 6.32	-68 -57 -63 -66 -64 -62 -70 -70	1.89         1.55         2.30         1.58         1.89         1.94         1.60         1.49	2nd           3rd           4th           5th           6th           7th           8th           9th	Clear; no odor Clear; no odor
13:45 13:50 13:55 14:00 14:05 14:10 14:15	0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45	41.54 42.31 43.08 43.85 44.62 45.34 46.16 46.43	28.90 27.85 27.05 26.96 26.91 26.84 26.80 26.79	580 580 580 580 580 580 580 580	0.223 0.222 0.222 0.224 0.223 0.224 0.223 0.224 0.222	7.00 2.50 2.10 1.50 0.50 0.50 0.30	17.92 17.18 16.94 16.55 16.78 16.91 16.81	6.25 6.10 6.22 6.28 6.23 6.19 6.34	-68 -57 -63 -66 -64 -62 -70	1.89         1.55         2.30         1.58         1.89         1.94         1.60	2nd           3rd           4th           5th           6th           7th           8th	Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor
13:45 13:50 13:55 14:00 14:05 14:10 14:15 14:20	0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45 0:50	41.54 42.31 43.08 43.85 44.62 45.34 46.16 46.43 47.70	28.90 27.85 27.05 26.96 26.91 26.84 26.80 26.79 26.71	580 580 580 580 580 580 580 580 580	0.223 0.222 0.222 0.224 0.223 0.224 0.222 0.224	7.00 2.50 2.10 1.50 0.50 0.50 0.30 0.10	17.92 17.18 16.94 16.55 16.78 16.91 16.81 16.79	6.25 6.10 6.22 6.28 6.23 6.23 6.19 6.34 6.32	-68 -57 -63 -66 -64 -62 -70 -70	1.89         1.55         2.30         1.58         1.89         1.94         1.60         1.49	2nd           3rd           4th           5th           6th           7th           8th           9th	Clear; no odor Clear; no odor
13:45 13:50 13:55 14:00 14:05 14:10 14:15 14:20	0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45 0:50	41.54 42.31 43.08 43.85 44.62 45.34 46.16 46.43 47.70	28.90 27.85 27.05 26.96 26.91 26.84 26.80 26.79 26.71	580 580 580 580 580 580 580 580 580	0.223 0.222 0.222 0.224 0.223 0.224 0.222 0.224	7.00 2.50 2.10 1.50 0.50 0.50 0.30 0.10	17.92 17.18 16.94 16.55 16.78 16.91 16.81 16.79	6.25 6.10 6.22 6.28 6.23 6.23 6.19 6.34 6.32	-68 -57 -63 -66 -64 -62 -70 -70	1.89         1.55         2.30         1.58         1.89         1.94         1.60         1.49	2nd           3rd           4th           5th           6th           7th           8th           9th	Clear; no odor Clear; no odor
13:45         13:50         13:55         14:00         14:05         14:10         14:15         14:20         14:25	0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45 0:50 0:55	41.54 42.31 43.08 43.85 44.62 45.34 46.16 46.43 47.70 48.47	28.90 27.85 27.05 26.96 26.91 26.84 26.80 26.79 26.71 26.65	580 580 580 580 580 580 580 580 580	0.223 0.222 0.222 0.224 0.223 0.224 0.222 0.224	7.00 2.50 2.10 1.50 0.50 0.50 0.30 0.10	17.92 17.18 16.94 16.55 16.78 16.91 16.81 16.79	6.25 6.10 6.22 6.28 6.23 6.23 6.19 6.34 6.32	-68 -57 -63 -66 -64 -62 -70 -70	1.89         1.55         2.30         1.58         1.89         1.94         1.60         1.49	2nd           3rd           4th           5th           6th           7th           8th           9th	Clear; no odor Clear; no odor
13:45 13:50 13:55 14:00 14:05 14:10 14:15 14:20 14:25 Develop	0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45 0:50 0:55	41.54 42.31 43.08 43.85 44.62 45.34 46.16 46.43 47.70 48.47	28.90 27.85 27.05 26.96 26.91 26.84 26.80 26.79 26.71 26.65	580 580 580 580 580 580 580 580 580 7. Runge	0.223 0.222 0.222 0.224 0.223 0.224 0.222 0.224	7.00 2.50 2.10 1.50 0.50 0.50 0.30 0.10 1.10	17.92 17.18 16.94 16.55 16.78 16.91 16.81 16.79 16.31	6.25 6.10 6.22 6.28 6.23 6.19 6.34 6.32 6.33	-68 -57 -63 -66 -64 -62 -70 -70 -70 -71	1.89 1.55 2.30 1.58 1.89 1.94 1.60 1.49 1.38	2nd           3rd           4th           5th           6th           7th           8th           9th	Clear; no odor Clear; no odor

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06		2" = 0.16	3" = 0.37	4" = 0.65		
	1-1/2" = 0.09		2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potentia
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



Site/Well No. <u>MW-8</u>												
Project		AEP Amos	Plant		Project No	о. <u>ОН</u> 0	15976.0007	Page	1	of 1		
Site Loc	ation	Winfield, W	V					Date	5	/20/2016		
Weather	-	64F, Sunny			Developm	nent Time E	Begin <u>12:00</u>			End	13:06	
Evacuati	on Data	1										
					700		Sample					
Measurii	0				TOC		setting (ft	• •				
MP Elev	ation (f	t)			N/A		Pumping	g Rate (g	om)	580		
Land Su	rface E	levation (ft)					Evacuat	ion Metho	bd	Foot Va	alve Proactive F	'ump
Sounded	d Well [	Depth (ft bm	p)		43.82		Volumes	Purged		10		
Depth to Water (ft bmp)         16.76												
Water-L	evel Ele	evation (ft)			Field Parameters							
Water C	olumn i	n Well (ft)			27.06		Color			clear		
Casing [	Diamete	er/Type			2" PVC		Odor			None		
Gallons	in Well				4.33		Appeara	ance				
					· · · · · · · · · · · · · · · ·							
		Total	Depth To		Conductivity					Dissolved		
Time	Min Elapsed	Gallons Removed	Water (ft btoc)	Rate (mL/min)	(mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°F/°C)	рН (s.u.)	ORP (mV)	Oxygen (g/mL)	Well Volume (Gal)	Remarks
12:04	0:05	15.77	10.50	580	0.446	530.00	18.60	6.63	68	3.45	Initial	Tan; no odor
12:09	0:10	16.54	10.25	580	0.386	146.00	17.81	6.59	89	2.68	1st	Tan; no odor
12:14	0:15	17.31	10.14	580	0.304	98.80	17.44	6.32	623	0.15	2nd	Clear; no odor
12:19	0:20	18.08	10.09	580	0.312	42.30	17.15	6.29	1023	0.17	3rd	Clear; no odor
12:24	0:25	18.85	10.08	580		15.58					4th	Clear; no odor
12:29	0:30	19.62	10.15	580		9.10					5th	Clear; no odor
12:34	0:35	20.39	10.18	580		4.09					6th	Clear; no odor
12:39	0:40	21.16	10.21	580		3.18					7th	Clear; no odor
12:44	0:45	21.93	10.20	580		2.16					8th	Clear; no odor
12:49	0:50	22.70	10.20	580		1.20					9th	Clear; no odor
12:54	0:55	23.47	10.20	580		1.09					10th	Clear; no odor
12:59	1:00	24.24	10.21	580		0.97					11th	Clear; no odor
13:04	1:05	25.01	10.21	580		0.70					12th	Clear; no odor
												+
Develop	ment P	ersonnel:		T. Runge			· · · · · ·					
Notes:	15.0 ga	allons remove	ed via pr	oactive/foo	ot valve/surge. Hori	ba not funct	oning at 1220.	Stick-up be	elow 3',	hinge broken	, 2'x2' pad.	
	ORP a	t 1214 and 12	219 likely	y an error	with probe.							
					· · ·							
					Well Casing \	/olumes (ga	llon/feet)					

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06		2" = 0.16	3" = 0.37	4" = 0.65		
	1-1⁄2" = 0.09		2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potentia
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



Site/Wel	l No.	MW-1601										
Project		AEP Amos I	Plant		Project No	о. ОНО	15976.0007	Page	1	of 1		
Site Loca	ation	Winfield, W	V					Date	5,	/18/2016		
Weather		54F, Rain			Developm	ent Time B	Begin 16:32			End	17:54	
							Ū					
Evacuation	on Data						Sample	Pump				
Measurir	ng Poin	t			TOC			etting (ft	bmp)	36.0		
MP Eleva	ation (f	t)			N/A		Pumping	g Rate (g	om)	608		
Land Su	, rface F	/ levation (ft)					Evacuat	ion Metho	bd	Proacti	ve Pump	
		Depth (ft bm	n)		41.70		Volumes			10.18	ro r unip	
		• •	Ρ)				Volumes	i uigeu		10.10		
Depth to		· · · /			14.60							
Water-Le	evel Ele	evation (ft)					Field Par	rameters				
Water Co	olumn i	n Well (ft)			27.1		Color			Clear		
Casing D	Diamete	er/Type			2" PVC		Odor			None		
Gallons i	in Well				4.34		Appeara	ance				
		Total	Depth To		Conductivity		<b>-</b>			Dissolved		
Time	Min Elapsed	Gallons Removed	Water (ft btoc)	Rate (mL/min)	(mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°F/°C)	рН (s.u.)	ORP (mV)	Oxygen (g/mL)	Well Volur (Gal)	ne Remarks
16:37	0:05	40.16	14.62	608	0.164	659.0	16.55	5.78	32	(g/mL) 1.42	Initial	Tan; no odor
16:42	0:10	40.32	14.62	608	0.164	618.0	16.21	5.77	52	2.80	1st	Tan; no odor
16:57	0:25	40.64	14.62	608	0.164	604.0	16.28	5.74	56	1.65	2nd	Tan; no odor
17:02	0:30	40.96	14.63	608	0.173	614.0	16.52	5.78	53	1.64	3rd	Tan; no odor
17:07	0:35	41.28	14.63	608	0.173	605.0	16.25	5.78	54	2.04	4th	Tan; no odor
17:12	0:40	41.60	14.62	608	0.172	417.0	16.24	5.81	50	2.56	5th	Tan; no odor
17:17	0:45	41.92	14.62	608	0.171	312.0	16.18	5.80	50	2.50	6th	Tan; no odor
17:22	0:50	42.24	14.63	608	0.172	302.0	16.18	5.81	51	2.60	7th	Tan; no odor
17:27	0:55	42.56	14.63	608	0.171	206.0	16.17	5.81	48	2.58	8th	Tan; no odor
17:32	1:00	42.88	14.63	608	0.173	114.0	16.15	5.89	52	2.66	9th	Tan; no odor
17:37	1:05	43.20	14.61	608	0.174	90.0	16.16	5.84	53	1.64	10th	Milky; no odor
17:42	1:10	43.52	14.61	608	0.173	63.0	16.22	5.86	51	1.53	11th	Milky; no odor
17:47	1:15	43.84	14.61	608	0.175	42.0	16.18	5.87	54	1.40	12th	Milky; no odor
17:52	1:20	44.16	14.61	608	0.174	39.0	16.19	5.83	51	1.81	13th	Clear; no odor
Develor	l mont D	 araannal:		T. Dum ::-								
		ersonnel:	footvel	T. Runge			lower					
Notes:	40 gal	removed with	ioot val	ve/surge t	olock. Pump rate w	ouid not go	iower.					

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06		2" = 0.16	3" = 0.37	4" = 0.65		
	1-1/2" = 0.09		2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potentia
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



Site/Well	l No.	MW-1602A AEP Amos I	Diant		Project No		15976.0007	Page	1	of 1		
Site Loca	ation	Winfield, W			Појестис	0.0110	13970.0007	Date		/14/2016		
			v		Davidance		10.05				10.00	
Weather		80F, Sunny			Developm	ent Time E	Begin 10:05			End	12:30	
Evacuatio	on Data						0					
Measurir	ng Poin	t			тос		Sample Intake S		bmp)			
MP Eleva	ation (ft	:)			N/A			g Rate (g		250		
Land Su	, rface El	/ levation (ft)					Evacuat	ion Metho	, , od	Subme	rsible Proactive	Pump
		)epth (ft bm	a)		60.40		Volumes					1
Depth to			F /		24.56			2.900				
		evation (ft)			24.00		Field Pa	rameters				
		( )						ameters				
		n Well (ft)			35.84		Color			Clear		
Casing D	Diamete	er/Type			2" PVC		Odor			None		
Gallons i	n Well				5.7		Appeara	ance				
		Total	1		Conductivity					Dissolved		1
	Min	Gallons	Depth To Water (ft	Rate	(mS/cm or	Turbidity	Temperature	pН	ORP	Oxygen	Well Volume	
Time	Elapsed	Removed	btoc)	(mL/min)	umhos/cm)	(NTU)	(°F/°C)	(s.u.)	(mV)	(g/mL)	(Gal)	Remarks
11:40	0:05	65.00	25.12	250	0.458	151.0	17.25	6.39	-19	13.56	Initial	Clear; no odor
11:45	0:10	65.20	25.69	270	0.437	112.0	17.24	6.32	-16	3.88	1st	Clear; no odor
11:50	0:15	65.40	25.30	200	0.444	82.6	16.15	6.35	-34	2.26	2nd	Clear; no odor
11:55	0:20	65.60	25.21	200	0.441	74.3	16.22	6.48	-59	1.64	3rd	Clear; no odor
12:00	0:25	65.80	25.00	180	0.426	68.4	16.94	6.50	-68	1.38	4th	Clear; no odor
12:05	0:30	66.00	24.92	180	0.430	60.2	17.11	6.53	-74	1.22	5th	Clear; no odor
12:10	0:35	66.20	29.88	180	0.438	48.9	17.18	6.56	-78	1.02	6th	Clear; no odor
12:15	0:40	66.40	29.88	180	0.441	36.0	17.40	6.58	-80	1.02	7th	Clear; no odor
12:20	0:45	66.60	29.85	180	0.430	34.3	17.56	6.61	-83	0.97	8th	Clear; no odor
12:25	0:50	66.80	29.85	180	0.445	33.6	17.36	6.62	-85	0.90	9th	Clear; no odor
12:30	0:55	67.00	29.86	180	0.446	33.4	17.54	6.64	-88	0.86	10th	Clear; no odor
									$\left  - \right $			
Develop	ment Pe	ersonnel:		K. Swiade	ek							

Notes: Removed 65 gallons with Waterra and proactive pump. Very fine sand/silt.

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06 1-1⁄2" = 0.09		2" = 0.16 2-½" = 0.26	3" = 0.37 3-½" = 0.50	4" = 0.65 6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potenti
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



Site Location         Winfield, WV         Date         6/14/2016           Weather         80F, Sunny         Development Time Begin         14:10         End         16:10           Evacuation Data         Sample Pump         Intake Setting (ft bmp)			of 1	1 (	Page	15976.0007		Project No		Plant	MW-1603A AEP Amos I		Site/Wel Project
Weather         80F, Sunny         Development Time Begin         14:10         End         16:10           Evacuation Data         Sample Pump Intake Setting (ft bmp)         Measuring Point         TOC         Intake Setting (ft bmp)           MP Elevation (ft)         N/A         Pumping Rate (gpm)         260           Land Surface Elevation (ft)         Evacuation Method         Submersible Proactive Pump           Sounded Well Depth (ft bmp)         7.60         Volumes Purged           Water-Level Elevation (ft)						10070.0007		1 10,000110					
Measuring Point         TOC         Sample Pump Intake Setting (ft bmp)           MP Elevation (ft)         N/A         Pumping Rate (gpm)         260           Land Surface Elevation (ft)         Evacuation Method         Submersible Proactive Pump           Sounded Well Depth (ft bmp)         46.40         Volumes Purged           Depth to Water (ft bmp)         7.60         Field Parameters           Water-Level Elevation (ft)         S8.8         Color         Clear           Casing Diameter/Type         2" PVC         Odor         None           Gallons in Well         6.2         Appearance         Odor         None           Time         Total Gallons         Depth To Water (ft mpn)         Conductivity (mS/men)         Turbidity (mS/men)         Temperature (°F/C)         pH (s.u.)         ORP         Oxygen Oxygen         Well Volume (Gal)         R           15:30         0:00         60.00         11.30         260         0.267         116.0         16.78         6.29         -12         10.80         Initial         Clear           15:35         0:05         60.20         11.23         260         0.267         116.0         16.78         6.29         -12         10.80         Initial         Clear           1		16:10				egin 14:10	ent Time B	Developm		v			
Measuring Point         TOC         Intake Setting (ft bmp)           MP Elevation (ft)         N/A         Pumping Rate (gpm)         260           Land Surface Elevation (ft)         Evacuation Method         Submersible Proactive Pump           Sounded Well Depth (ft bmp)         46.40         Volumes Purged												on Data	Evacuati
MP Elevation (ft)       N/A       Pumping Rate (gpm)       260         Land Surface Elevation (ft)        Evacuation Method       Submersible Proactive Pumping Rate (gpm)         Sounded Well Depth (ft bmp)       46.40       Volumes Purged          Depth to Water (ft bmp)       7.60       Field Parameters          Water-Level Elevation (ft)       38.8       Color       Clear         Casing Diameter/Type       2" PVC       Odor       None         Gallons in Well       6.2       Appearance       Oxygen (g/mL)       Well Volume (g/mL)         Time       Total Eleveet Removed bits       Conductivity (mS/cm or umho/cm)       Turbidity (NTU)       Temperature (°F/C)       0.80       11.80       Nital       Clear         15:30       0:00       60.00       11.30       260       0.267       116.0       16.78       6.29       -12       10.80       Initial       Clear         15:30       0:00       60.00       11.30       260       0.267       116.0       16.78       6.29       -12       10.80       Initial       Clear         15:30       0:00       60.00       11.30       260       0.267       116.0       16.78       6.29       -12       10.80				(amd				TOC				na Point	Measurir
Land Surface Elevation (ft)         Evacuation Method         Submersible Proactive Pump           Sounded Well Depth (ft bmp)         46.40         Volumes Purged			260						-			•	
Sounded Well Depth (ft bmp)         46.40         Volumes Purged           Depth to Water (ft bmp)         7.60           Water-Level Elevation (ft)         7.60           Water Column in Well (ft)         38.8           Casing Diameter/Type         2" PVC           Odor         None           Gallons in Well         6.2           Min         Galons           Number Column in Well         Rate           Min         Galons           Marce Column in Well         6.2           Appearance         None           Min         Galons           Number Column in Well         8.8           Conductivity         Turbidity           (mS/cm or water (ft btoc)         Turbidity           (mL/min)         Conductivity           (mS/cm or water)         (NTU)           (°F/°C)         (s.u.)           (g/mL)         (Gal)           15:30         0:00         60.00           111:30         260         0.267           116:40         0:10         6.3           15:40         0:10         60.30         10.33           15:40         0:10         60.30         10.33         220	Pump	arsible Proactive		-					-		,		
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	1 unp		Oubline	-				46.40	-	n)	. ,		
Water-Level Elevation (ft)         Field Parameters           Water Column in Well (ft)         38.8         Color         Clear           Casing Diameter/Type         2" PVC         Odor         None           Gallons in Well         6.2         Appearance         Dissolved         Oxygen           Time         Gallons         Removed         Rete         Conductivity         Turbidity         Temperature         pH         ORP         Oxygen         Well Volume         Rete           15:30         0:00         60.00         11.30         260         0.267         116.0         16.78         6.29         -12         10.80         Initial         Clear           15:35         0:05         60.20         11.23         260         0.269         97.5         16.66         6.45         -65         3.60         1st         Clear           15:40         0:10         60.30         10.33         220         0.264         79.9         16.65         6.63         -87         2.50         2nd         Clear           15:45         0:15         60.40         9.81         210         0.262         45.4         16.55         6.68         -96         1.9         3rd         Clear				-	aiyeu	VOIGITIES			-	P/			
Water Column in Well (ft)         38.8         Color         Clear           Casing Diameter/Type         2" PVC         Odor         None           Gallons in Well         6.2         Appearance         Mone           Time         Gallons         Color         None         Cear           Time         Gallons         Color         Appearance         None           Time         Gallons         Conductivity (mL/min)         Turbidity (mS/cm or umhos/cm)         Temperature (NTU)         pH (s.u.)         ORP (mV)         ORP (g/mL)         Well Volume (Gal)         R           15:30         0:00         60.00         11.30         260         0.267         116.0         16.78         6.29         -12         10.80         Initial         Clear           15:35         0:05         60.20         11.23         260         0.269         97.5         16.66         6.45         -65         3.60         1st         Clear           15:40         0:10         60.30         10.33         220         0.264         79.9         16.65         6.63         -87         2.50         2nd         Clear           15:50         0:20         60.50         9.75         210         0.262					ameters	Field Par		1.00	-		· · · /		·
Casing Diameter/Type         2" PVC         Odor         None           Gallons in Well         6.2         Appearance         Min         Gallons         Depth To Water (ft)         Rate         Conductivity         Turbidity         Temperature         pH         ORP         Oxygen         Well Volume         Gallons           15:30         0:00         60.00         11.30         260         0.267         116.0         16.78         6.29         -12         10.80         Initial         Cleat           15:35         0:05         60.20         11.23         260         0.262         45.4         16.65         6.63         -87         2.50         2nd         Cleat           15:45         0:15         60.40         9.81         210         0.262         31.9         16.61         6.73         -101         1.60         4th         Cleat           15:50         0:20         60.50         9.75         210         0.262         31.9         16.61         6.73         -101         1.60         4th         Cleat           15:55         0:25         60.60         9.75         210         0.261         26.8         16.63         6.79         -107         1.35         5th<			Clear		ameters			20.0	-		( )		
Gallons in Well         6.2         Appearance           Min         Total Gallons Removed         Deptit To Water (ft btoc)         Conductivity (mL/min)         Turbidity (mS/cm or umhos/cm)         Temperature (NTU)         pH (°F/°C)         ORP (s.u.)         Dissolved Oxygen (mV)         Well Volume (Gal)         R           15:30         0:00         60.00         11.30         260         0.267         116.0         16.78         6.29         -12         10.80         Initial         Cleat           15:35         0:05         60.20         11.23         260         0.269         97.5         16.66         6.45         -65         3.60         1st         Cleat           15:40         0:10         60.30         10.33         220         0.264         79.9         16.65         6.63         -87         2.50         2nd         Cleat           15:45         0:15         60.40         9.81         210         0.262         45.4         16.55         6.68         -96         1.9         3rd         Cleat           15:55         0:25         60.60         9.75         210         0.261         26.8         16.63         6.79         -107         1.35         5th         Cleat <tr< td=""><td></td><td></td><td>-</td><td>-</td><td></td><td></td><td></td><td></td><td>-</td><td></td><td>( )</td><td></td><td></td></tr<>			-	-					-		( )		
Time         Total Gallons Removed         Depth To boc)         Rate (mL/min)         Conductivity (mS/cm or umhos/cm)         Turbidity (NTU)         Temperature (°F/°C)         pH (s.u.)         ORP (mV)         Dissolved Oxygen (mV)         Well Volume (Gal)         Revised (Gal)         Revised (G			None	-					-		Глуре		•
Min         Gallons         Depth To Water (ft boc)         Rate (mL/min)         Conductivity (mS/cm or umhos/cm)         Turbidity (NTU)         Temperature (°F/°C)         pH (s.u.)         ORP (mV)         Oxygen (mV)         Well Volume (Gal)         Rate (Gal)         Normation           15:30         0:00         60.00         11.30         260         0.267         116.0         16.78         6.29         -12         10.80         Initial         Cleat           15:35         0:05         60.20         11.23         260         0.269         97.5         16.66         6.45         -65         3.60         1st         Cleat           15:40         0:10         60.30         10.33         220         0.264         79.9         16.65         6.63         -87         2.50         2nd         Cleat           15:45         0:15         60.40         9.81         210         0.262         45.4         16.55         6.68         -96         1.9         3rd         Cleat           15:50         0:20         60.50         9.75         210         0.261         26.8         16.63         6.79         -107         1.35         5th         Cleat           15:55         0:25         60.60				-	nce	Appeara		6.2	-			n vveii	Gallons
15:30       0:00       60.00       11.30       260       0.267       116.0       16.78       6.29       -12       10.80       Initial       Cleating         15:35       0:05       60.20       11.23       260       0.269       97.5       16.66       6.45       -65       3.60       1st       Cleating         15:40       0:10       60.30       10.33       220       0.264       79.9       16.65       6.63       -87       2.50       2nd       Cleating         15:45       0:15       60.40       9.81       210       0.262       45.4       16.55       6.68       -96       1.9       3rd       Cleating         15:50       0:20       60.50       9.75       210       0.262       31.9       16.61       6.73       -101       1.60       4th       Cleating         15:50       0:25       60.60       9.75       210       0.261       26.8       16.63       6.79       -107       1.35       5th       Cleating         16:00       0:30       60.70       9.73       210       0.261       19.8       16.74       6.83       -112       1.16       6th       Cleating         16:00	Remarks		Oxygen			· ·		(mS/cm or		Water (ft	Gallons		Time
15:35         0:05         60.20         11.23         260         0.269         97.5         16.66         6.45         -65         3.60         1st         Cleating           15:40         0:10         60.30         10.33         220         0.264         79.9         16.65         6.63         -87         2.50         2nd         Cleating           15:45         0:15         60.40         9.81         210         0.262         45.4         16.55         6.68         -96         1.9         3rd         Cleating           15:50         0:20         60.50         9.75         210         0.262         31.9         16.61         6.73         -101         1.60         4th         Cleating           15:55         0:25         60.60         9.75         210         0.261         26.8         16.63         6.79         -107         1.35         5th         Cleating           16:00         0:30         60.70         9.73         210         0.261         19.8         16.74         6.83         -112         1.16         6th         Cleating           16:05         0:35         60.80         9.72         210         0.261         11.7         16.	Clear; no odor								· · · · · · · · · · · · · · · · · · ·				
15:45       0:15       60.40       9.81       210       0.262       45.4       16.55       6.68       -96       1.9       3rd       Cleating         15:50       0:20       60.50       9.75       210       0.262       31.9       16.61       6.73       -101       1.60       4th       Cleating         15:55       0:25       60.60       9.75       210       0.261       26.8       16.63       6.79       -107       1.35       5th       Cleating         16:00       0:30       60.70       9.73       210       0.261       19.8       16.74       6.83       -112       1.16       6th       Cleating         16:05       0:35       60.80       9.72       210       0.261       11.7       16.99       6.77       -106       1.10       7th       Cleating	Clear; no odor	1 1		-65									
15:50         0:20         60.50         9.75         210         0.262         31.9         16.61         6.73         -101         1.60         4th         Cleating           15:55         0:25         60.60         9.75         210         0.261         26.8         16.63         6.79         -107         1.35         5th         Cleating           16:00         0:30         60.70         9.73         210         0.261         19.8         16.74         6.83         -112         1.16         6th         Cleating           16:05         0:35         60.80         9.72         210         0.261         11.7         16.99         6.77         -106         1.10         7th         Cleating	Clear; no odor	2nd	2.50	-87	6.63	16.65	79.9	0.264	220	10.33	60.30	0:10	15:40
15:55         0:25         60.60         9.75         210         0.261         26.8         16.63         6.79         -107         1.35         5th         Cleating           16:00         0:30         60.70         9.73         210         0.261         19.8         16.74         6.83         -112         1.16         6th         Cleating           16:05         0:35         60.80         9.72         210         0.261         11.7         16.99         6.77         -106         1.10         7th         Cleating	Clear; no odor	3rd	1.9			16.55	45.4		210	9.81	60.40	0:15	15:45
16:00         0:30         60.70         9.73         210         0.261         19.8         16.74         6.83         -112         1.16         6th         Cleating           16:05         0:35         60.80         9.72         210         0.261         11.7         16.99         6.77         -106         1.10         7th         Cleating	Clear; no odor												
16:05 0:35 60.80 9.72 210 0.261 11.7 16.99 6.77 -106 1.10 7th Clea	Clear; no odor												
	Clear; no odor Clear; no odor												
	Clear; no odor	1 1				1							
			1.00	100	0.10	11.00	0.1	0.201	210	0.70	00.00	0.70	
	<u> </u>												
	+	$\left  - \right $		$\left  \right $									
	1												

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06		2" = 0.16	3" = 0.37	4" = 0.65		
	1-1/2" = 0.09		2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potentia
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



Site/Wel	l No.	MW-1604											
Project		AEP Amos I	Plant		Project No	D. OHO	15976.0007	Page	<u> </u>	of <u>1</u>			
Site Loca	ation	Winfield, W	V					Date	5/	/18/2016			
Weather	-	54F, Rain			Developm	ient Time E	Begin <u>13:18</u>			End	14	4:45	
Evacuation	on Data	l											
Maggurin	na Doin	+			TOC		Sample		hmn)	40.0			
Measurir	-				TOC			Setting (ft		42.0			
MP Elev	ation (f	t)			N/A		Pumping	g Rate (g	pm)	591			
Land Su	rface E	levation (ft)					Evacuat	ion Metho	bc	Proacti	ve Pum	ıp	
Sounded	d Well [	Depth (ft bm	p)		47.33 Volumes Purged					12.19			
Depth to	Water	(ft bmp)			20.81								
Water-Le	evel Ele	evation (ft)					Field Pa	rameters					
Water C	olumn i	n Well (ft)			26.52		Color			Tan			
Casing D	Diamete	er/Type			2" PVC		Odor			None			
Gallons i					4.24		Appeara	ance					
_													
		Total	Depth To		Conductivity		-			Dissolved			
Time	Min	Gallons Removed	Water (ft		(mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°F/°C)	рН (s.u.)	ORP (mV)	Oxygen (g/mL)		Volume Gal)	Remarks
13:23	Elapsed 0:05	40.78	btoc) 21.89	591	0.212	239.0	17.29	(s.u.) 5.90	-16	4.60	Initial	5ai)	Tan; no odor
13:28	0:10	41.56	21.71	591	0.212	178.0	17.68	6.14	-15	3.06	1st		Tan; no odor
13:33	0:15	42.34	21.58	591	0.211	161.0	17.91	6.15	-16	3.91	2nd		Tan; no odor
13:38	0:20	43.12	21.43	591	0.207	138.0	18.05	6.19	-21	2.06	3rd		Tan; no odor
13:43	0:25	43.90	21.91	591	0.216	103.0	18.23	6.13	-14	2.19	4th		Tan; no odor
13:48	0:30	44.68	21.95	591	0.218	141.0	18.23	6.14	-15	1.66	5th		Tan; no odor
13:53	0:35	45.46	21.96	591	0.209	129.0	18.19	6.13	-14	1.88	6th		Tan; no odor
13:58	0:40	46.24	21.98	591	0.216	134.0	18.21	6.15	-15	1.60	7th		Tan; no odor
14:03	0:45	47.02	21.78	591	0.213	176.0	18.24	6.08	-8	2.27	8th		Tan; no odor
14:08	0:50	47.80	21.70	591	0.142	159.0	18.07	6.07	-11	8.77	9th		Tan; no odor
14:13	0:55	48.58	21.73	591	0.219	109.0	18.11	6.09	-12	8.74	10th		Tan; no odor
14:18	1:00	49.36	21.75	591	0.219	118.0	18.05	6.06	-14	8.63	11th		Tan; no odor
14:23	1:05	50.14	21.72	591	0.219	90.0	18.13	6.07	-13	2.49	12th		Tan; no odor
14:28	1:10	50.92	21.68	591	0.217	167.0	18.14	6.09	-14	3.65	13th		Tan; no odor
14:32	1:14	51.70	21.69	591	0.215	151.00	18.17	6.08	-17	4.51	14th		Tan; no odor
8		ersonnel:		T. Runge			•		·				

Notes: 40 gal removed with foot valve and surge block.

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06		2" = 0.16	3" = 0.37	4" = 0.65		
	1-1/2" = 0.09		2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potenti
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



Site/Well	l No.	MW-1605											
Project		AEP Amos F	Plant		Project No	о. <u>ОН</u> 0	15976.0007	Page	<u> </u>	of			
Site Loca	ation	Winfield, W	V		Date5/18/2016								
Weather	Veather <u>54</u> F, Rain				Developm	ient Time E	Begin10:45			End			
Evacuatio	on Data												
Measurir	na Doint	+			TOC		Sample	Pump etting (ft	hmn)	34.0			
	0							• •	• •				
MP Eleva	(	/			N/A			g Rate (g	,	993.6			
Land Su	rface El	levation (ft)					Evacuat	ion Metho	bc	Proacti	ve Pump		
Sounded	Well D	epth (ft bm	p)		44.76		Volumes	Purged		12.19			
Depth to	Water	(ft bmp)			17.39								
Water-Le	evel Ele	evation (ft)					Field Pa	rameters					
Water Co	olumn iı	n Well (ft)			27.37 Color					Tan			
Casing D	Diamete	er/Tvpe			2" PVC Odor				None				
Gallons i						4.37 Appearance							
Galions													
		Total			Conductivity					Dissolved			
		<u> </u>	Depth To		( 0)	Turbidity	Temperature	ъЦ	ORP	Oxygen			
	Min	Gallons	Water (ft	Rate	(mS/cm or			pH			Well Volume		
Time	Elapsed	Removed	btoc)	(mL/min)	umhos/cm)	(NTU)	(°F/°C)	(s.u.)	(mV)	(g/mL)	(Gal)	Remarks	
10:50	Elapsed 0:05	Removed 40.26	btoc) 36.97	(mL/min) 993.6	umhos/cm) 0.485	(NTU) 358.0	( <sup>°</sup> F/ <sup>°</sup> C) 16.18	(s.u.) 6.30	(mV) 24	(g/mL) 8.81	(Gal) Initial	Tan; no odor	
10:50 10:55	Elapsed 0:05 0:10	Removed 40.26 40.52	btoc) 36.97 35.89	(mL/min) 993.6 993.6	umhos/cm) 0.485 0.473	(NTU) 358.0 218.0	( <sup>°</sup> F/ <sup>°</sup> C) 16.18 16.33	(s.u.) 6.30 6.24	(mV) 24 27	(g/mL) 8.81 9.96	(Gal) Initial 1st	Tan; no odor Tan; no odor	
10:50 10:55 11:00	Elapsed 0:05 0:10 0:15	Removed 40.26 40.52 40.75	btoc) 36.97 35.89 35.58	(mL/min) 993.6 993.6 869.4	umhos/cm) 0.485 0.473 0.479	(NTU) 358.0 218.0 163.0	(°F/°C) 16.18 16.33 16.32	(s.u.) 6.30 6.24 6.18	(mV) 24 27 29	(g/mL) 8.81 9.96 1.24	(Gal) Initial 1st 2nd	Tan; no odor Tan; no odor Tan; no odor	
10:50 10:55 11:00 11:05	Elapsed 0:05 0:10 0:15 0:20	Removed 40.26 40.52 40.75 40.94	btoc) 36.97 35.89 35.58 35.29	(mL/min) 993.6 993.6 869.4 709.8	0.485 0.473 0.479 0.481	(NTU) 358.0 218.0 163.0 150.0	(°F/°C) 16.18 16.33 16.32 16.34	(s.u.) 6.30 6.24 6.18 6.01	(mV) 24 27 29 30	(g/mL) 8.81 9.96 1.24 7.18	(Gal) Initial 1st 2nd 3rd	Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor	
10:50 10:55 11:00 11:05 11:10	Elapsed 0:05 0:10 0:15 0:20 0:25	Removed           40.26           40.52           40.75           40.94           41.13	btoc) 36.97 35.89 35.58 35.29 35.18	(mL/min) 993.6 993.6 869.4 709.8 709.8	umhos/cm) 0.485 0.473 0.479 0.481 0.489	(NTU) 358.0 218.0 163.0 150.0 115.0	(°F/°C) 16.18 16.33 16.32 16.34 16.32	(s.u.) 6.30 6.24 6.18 6.01 5.96	(mV) 24 27 29 30 32	(g/mL) 8.81 9.96 1.24 7.18 6.43	(Gal) Initial 1st 2nd 3rd 4th	Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor	
10:50 10:55 11:00 11:05 11:10 11:15	Elapsed 0:05 0:10 0:15 0:20 0:25 0:30	Removed           40.26           40.52           40.75           40.94           41.13           41.32	btoc) 36.97 35.89 35.58 35.29 35.18 35.01	(mL/min) 993.6 993.6 869.4 709.8 709.8 709.8	umhos/cm) 0.485 0.473 0.479 0.481 0.489 0.488	(NTU) 358.0 218.0 163.0 150.0 115.0 110.0	(°F/°C) 16.18 16.33 16.32 16.34 16.32 16.29	(s.u.) 6.30 6.24 6.18 6.01 5.96 5.81	(mV) 24 27 29 30 32 49	(g/mL) 8.81 9.96 1.24 7.18 6.43 6.26	(Gal)       Initial       1st       2nd       3rd       4th       5th	Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor	
10:50 10:55 11:00 11:05 11:10 11:15 11:20	Elapsed 0:05 0:10 0:15 0:20 0:25 0:30 0:35	Removed           40.26           40.52           40.75           40.94           41.13           41.32           41.51	btoc) 36.97 35.89 35.58 35.29 35.18 35.01 34.97	(mL/min) 993.6 993.6 869.4 709.8 709.8 709.8 709.8	umhos/cm) 0.485 0.473 0.479 0.481 0.489 0.488 0.473	(NTU) 358.0 218.0 163.0 150.0 115.0 110.0 30.7	(°F/°C) 16.18 16.33 16.32 16.34 16.32 16.29 16.32	(s.u.) 6.30 6.24 6.18 6.01 5.96 5.81 6.06	(mV) 24 27 29 30 32 49 36	(g/mL) 8.81 9.96 1.24 7.18 6.43 6.26 2.80	(Gal) Initial 1st 2nd 3rd 4th 5th 6th	Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Clear; no odor	
10:50 10:55 11:00 11:05 11:10 11:15 11:20 11:25	Elapsed 0:05 0:10 0:20 0:25 0:30 0:35 0:40	Removed           40.26           40.52           40.75           40.94           41.13           41.32           41.51           41.70	btoc) 36.97 35.89 35.58 35.29 35.18 35.01 34.97 34.96	(mL/min) 993.6 993.6 869.4 709.8 709.8 709.8 709.8 709.8	umhos/cm) 0.485 0.473 0.479 0.481 0.489 0.488 0.473 0.473	(NTU) 358.0 218.0 163.0 150.0 115.0 110.0 30.7 13.7	(°F/°C) 16.18 16.33 16.32 16.34 16.32 16.29 16.32 16.35	(s.u.) 6.30 6.24 6.18 6.01 5.96 5.81 6.06 6.11	(mV) 24 27 29 30 32 49 36 28	(g/mL) 8.81 9.96 1.24 7.18 6.43 6.26 2.80 2.58	(Gal)Initial1st2nd3rd4th5th6th7th	Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Clear; no odor Clear; no odor	
10:50 10:55 11:00 11:05 11:10 11:15 11:20 11:25 11:30	Elapsed 0:05 0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45	Removed           40.26           40.52           40.75           40.94           41.13           41.32           41.51           41.70           41.89	btoc) 36.97 35.89 35.58 35.29 35.18 35.01 34.97 34.96 32.90	(mL/min) 993.6 993.6 869.4 709.8 709.8 709.8 709.8 709.8 709.8	umhos/cm) 0.485 0.473 0.479 0.481 0.489 0.488 0.473 0.473 0.473 0.491	(NTU) 358.0 218.0 163.0 150.0 115.0 110.0 30.7 13.7 34.8	(°F/°C) 16.18 16.33 16.32 16.34 16.32 16.32 16.29 16.32 16.35 16.34	(s.u.) 6.30 6.24 6.18 6.01 5.96 5.81 6.06 6.11 6.23	(mV) 24 27 29 30 32 49 36 28 21	(g/mL) 8.81 9.96 1.24 7.18 6.43 6.26 2.80 2.58 10.13	(Gal)Initial1st2nd3rd3rd4th5th6th7th8th	Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Clear; no odor Clear; no odor Clear; no odor	
10:50 10:55 11:00 11:05 11:10 11:15 11:20 11:25 11:30 11:35	Elapsed 0:05 0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45 0:50	Removed           40.26           40.52           40.75           40.94           41.13           41.32           41.51           41.70           41.89           42.08	btoc) 36.97 35.89 35.58 35.29 35.18 35.01 34.97 34.96 32.90 32.85	(mL/min) 993.6 993.6 869.4 709.8 709.8 709.8 709.8 709.8 725 725	umhos/cm) 0.485 0.473 0.479 0.481 0.489 0.488 0.473 0.473 0.473 0.491 0.492	(NTU) 358.0 218.0 163.0 150.0 115.0 110.0 30.7 13.7 34.8 25.9	(°F/°C) 16.18 16.33 16.32 16.34 16.32 16.32 16.32 16.32 16.35 16.34 16.34 16.34 16.27	(s.u.) 6.30 6.24 6.18 6.01 5.96 5.81 6.06 6.11 6.23 6.03	(mV) 24 27 29 30 32 49 36 28 21 33	(g/mL) 8.81 9.96 1.24 7.18 6.43 6.26 2.80 2.58 10.13 10.01	(Gal)Initial1st2nd3rd4th5th6th7th8th9th	Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor	
10:50           10:55           11:00           11:05           11:10           11:15           11:20           11:25           11:30           11:35           11:40	Elapsed 0:05 0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45 0:50 0:55	Removed           40.26           40.52           40.75           40.94           41.13           41.32           41.51           41.70           41.89           42.08           42.27	btoc) 36.97 35.89 35.58 35.29 35.18 35.01 34.97 34.96 32.90 32.85 32.74	(mL/min) 993.6 993.6 869.4 709.8 709.8 709.8 709.8 709.8 709.8 725 725 725	umhos/cm) 0.485 0.473 0.479 0.481 0.489 0.488 0.473 0.473 0.473 0.491 0.492 0.474	(NTU) 358.0 218.0 163.0 115.0 115.0 110.0 30.7 13.7 34.8 25.9 15.3	(°F/°C) 16.18 16.33 16.32 16.34 16.32 16.32 16.32 16.32 16.32 16.35 16.34 16.34 16.27 16.33	(s.u.) 6.30 6.24 6.18 6.01 5.96 5.81 6.06 6.11 6.23 6.03 6.21	(mV) 24 27 29 30 32 49 36 28 21 33 33 33	(g/mL) 8.81 9.96 1.24 7.18 6.43 6.26 2.80 2.58 10.13 10.01 4.41	(Gal)Initial1st2nd3rd4th5th6th7th8th9th10th	Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor	
10:50           10:55           11:00           11:05           11:10           11:15           11:20           11:25           11:30           11:35           11:40           11:45	Elapsed 0:05 0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45 0:50 0:55 1:00	Removed           40.26           40.52           40.75           40.94           41.13           41.32           41.51           41.70           41.89           42.08           42.27           42.46	btoc) 36.97 35.89 35.58 35.29 35.18 35.01 34.97 34.96 32.90 32.85 32.74 32.69	(mL/min) 993.6 993.6 869.4 709.8 709.8 709.8 709.8 709.8 725 725 725 725 725	umhos/cm) 0.485 0.473 0.479 0.481 0.489 0.488 0.473 0.473 0.473 0.491 0.492 0.474 0.472	(NTU) 358.0 218.0 163.0 115.0 115.0 110.0 30.7 13.7 34.8 25.9 15.3 10.9	(°F/°C) 16.18 16.33 16.32 16.34 16.32 16.34 16.32 16.35 16.34 16.27 16.33 16.35	(s.u.) 6.30 6.24 6.18 6.01 5.96 5.81 6.06 6.11 6.23 6.03 6.21 6.11	(mV) 24 27 29 30 32 49 36 28 21 33 33 33 34	(g/mL) 8.81 9.96 1.24 7.18 6.43 6.26 2.80 2.58 10.13 10.01 4.41 3.41	(Gal)Initial1st2nd3rd4th5th6th7th8th9th10th11th	Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor	
10:50           10:55           11:00           11:05           11:10           11:15           11:20           11:25           11:30           11:35           11:40           11:45           11:50	Elapsed 0:05 0:10 0:20 0:25 0:30 0:35 0:40 0:45 0:55 1:00 1:05	Removed           40.26           40.52           40.75           40.94           41.13           41.32           41.51           41.70           41.89           42.08           42.27           42.46           42.65	btoc) 36.97 35.89 35.58 35.29 35.18 35.01 34.97 34.96 32.90 32.85 32.74 32.69 32.59	(mL/min) 993.6 993.6 869.4 709.8 709.8 709.8 709.8 709.8 709.8 725 725 725 725 725 725	umhos/cm) 0.485 0.473 0.479 0.481 0.489 0.488 0.473 0.473 0.473 0.491 0.492 0.474 0.472 0.462	(NTU) 358.0 218.0 163.0 115.0 110.0 30.7 13.7 34.8 25.9 15.3 10.9 7.7	(°F/°C) 16.18 16.33 16.32 16.34 16.32 16.34 16.32 16.35 16.34 16.27 16.33 16.35 16.33 16.35 16.43	(s.u.) 6.30 6.24 6.18 6.01 5.96 5.81 6.06 6.11 6.23 6.03 6.21 6.11 6.09	(mV) 24 27 29 30 32 49 36 28 21 33 33 33 34 31	(g/mL) 8.81 9.96 1.24 7.18 6.43 6.26 2.80 2.58 10.13 10.01 4.41 3.41 2.61	(Gal)           Initial           1st           2nd           3rd           4th           5th           6th           7th           8th           9th           10th           11th           12th	Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor	
10:50           10:55           11:00           11:05           11:10           11:15           11:20           11:25           11:30           11:35           11:40           11:45	Elapsed 0:05 0:10 0:15 0:20 0:25 0:30 0:35 0:40 0:45 0:50 0:55 1:00	Removed           40.26           40.52           40.75           40.94           41.13           41.32           41.51           41.70           41.89           42.08           42.27           42.46	btoc) 36.97 35.89 35.58 35.29 35.18 35.01 34.97 34.96 32.90 32.85 32.74 32.69	(mL/min) 993.6 993.6 869.4 709.8 709.8 709.8 709.8 709.8 725 725 725 725 725	umhos/cm) 0.485 0.473 0.479 0.481 0.489 0.488 0.473 0.473 0.473 0.491 0.492 0.474 0.472	(NTU) 358.0 218.0 163.0 115.0 115.0 110.0 30.7 13.7 34.8 25.9 15.3 10.9	(°F/°C) 16.18 16.33 16.32 16.34 16.32 16.34 16.32 16.35 16.34 16.27 16.33 16.35	(s.u.) 6.30 6.24 6.18 6.01 5.96 5.81 6.06 6.11 6.23 6.03 6.21 6.11	(mV) 24 27 29 30 32 49 36 28 21 33 33 33 34	(g/mL) 8.81 9.96 1.24 7.18 6.43 6.26 2.80 2.58 10.13 10.01 4.41 3.41	(Gal)Initial1st2nd3rd4th5th6th7th8th9th10th11th	Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Tan; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor Clear; no odor	

Notes: 40 gal removed with foot valve and surge block.

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06		2" = 0.16	3" = 0.37	4" = 0.65		
	1-1/2" = 0.09		2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47		
bmp	below measuring point	ml	mililiter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potenti
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride	mV	millivolts
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter		
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds		



MW-1606

Site/Well No.

Project		AEP Amos I	Plant		Project No	o. <u>OH0</u>	15976.0007	Page	<u> </u>	of <u>1</u>			
Site Location     Winfield, WV       Weather     61F, Clouds/Rain						Date 5/17/2016							
					Development Time Begin <u>13:30</u>				End 15:00				
Evacuatio	on Data						Sample	Dump					
Measuring Point					TOC			Setting (ft	bmp)				
MP Eleva	ation (ft	)			N/A		Pumpin	ng Rate (g	pm)	300oz/	min	(8872.06	3 ml/min)
Land Su	rface El	evation (ft)					Evacua	tion Methe	bc	Proacti	ve Pur	пр	
Sounded	l Well D	epth (ft bm	p)		42.48		Volumes	s Purged		13.63			
Depth to	Water	(ft bmp)			11.23								
·		vation (ft)			-		Field Pa	arameters					
		n Well (ft)			31.25		Color			Tan			
		( )			2" PVC								
Casing E		пуре					Odor			None			
Gallons i	n vveli				5.00		Appear	ance					
		Total			Conductivity					Dissolved			
	Min	Gallons	Depth To Water (ft	Rate	(mS/cm or	Turbidity	Temperature	pH	ORP	Oxygen		Volume	
Time	Elapsed	Removed	btoc)	(mL/min)	umhos/cm)	(NTU)	(°F/°C)	(s.u.)	(mV)	(g/mL)	Č.	Gal) I	Remarks
1:30 1:35	0:05 0:10	32.34 34.68	11.81 11.70	8872 8872	0.454	883.0 737.0	15.71 15.71	5.57 5.69	37 19	10.13 10.09	Initial 1st		
1:40	0:10	37.02	11.62	8872	0.394	498.0	15.67	5.78	22	1.38	2nd		
1:45	0:20	39.36	11.50	8872	0.392	334.0	15.60	5.78	39	2.33	3rd		
1:50	0:25	41.70	11.41	8872	0.382	235.0	15.51	5.81	39	5.84	4th		
1:55	0:30	44.04	11.85	8872	0.376	213.0	15.62	5.80	38	1.90	5th		
2:00	0:35	46.38	11.79	8872	0.376	190.0	16.62	5.77	39	2.88	6th		
2:05	0:40	48.72	11.81	8872	0.384	174.0	15.63	5.76	38	1.97	7th		
2:10	0:45	51.06	11.80	8872	0.384	157.0	15.63	5.76	38	1.28	8th		
2:15 2:20	0:50 0:55	53.40 55.74	11.78 11.71	8872 8872	0.386	141.0 121.0	15.63 15.62	5.74 5.77	32 36	3.12 2.27	9th 10th		
2:20	1:00	58.08	11.54	8872	0.373	121.0	15.62	5.77	40	1.02	11th		
2:30	1:05	60.42	11.34	8872	0.371	102.0	15.62	5.78	40	0.57	12th		
2:35	1:10	62.76	11.31	8872	0.383	92.1	15.65	5.77	47	10.51	13th		
2:40	1:15	65.10	11.35	8872	0.384	103.0	15.57	5.77	47	10.43	14th		
2:45	1:20	65.80	11.33	2957	0.382	76.4	15.57	5.76	42	8.79	15th		
2:50	1:25	66.58	11.30	2957	0.382	63.8	15.54	5.75	42	9.30	16th		
2:55	1:30	67.36	11.29	2957	0.383	75.1	15.55	5.76	42	9.15	17th		
3:00	1:35	68.14	11.33	2957	0.384	73.20	15.58	5.76	44	6.17	18th		
		ersonnel:	llootody	T. Runge	rifugal/proactive pu		4						
NOIES.	Falalite	clers were co	illected i	when cent	inugai/proactive pui	mp was used	4						
		1-1⁄4" = 0.06			Well Casing V 2" = 0.16		llon/feet) = 0.37		4" = 0.	65			
		$1 - \frac{1}{4} = 0.06$ $1 - \frac{1}{2} = 0.09$			2" = 0.16 2-½" = 0.26		= 0.37 1⁄2" = 0.50		4" = 0. 6" = 1.				
bmp °C	Degrees	easuring point		ml mS/cm	mililiter Milisiemens per centi		NTU PVC	Nephelome Polyvinyl cl	etric Turk nloride		orp mV	Oxidation millivolts	-Reduction Potent
ft gpm mg/L		per minute s per liter		msl N/A NM	mean sea-level Not Applicable Not Measured		s.u. umhos/cm VOC	Standard u Micromhos Volatile Org	per cen				

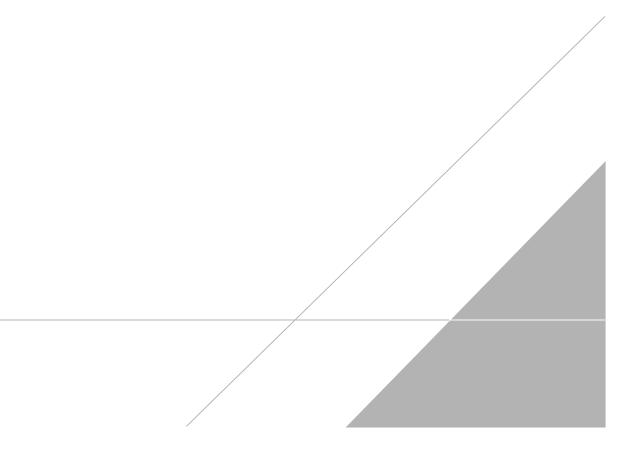


Site/Well	No.	MW-1605											
Project		AEP Amos F	Plant		Project No	о. <u>ОН0</u>	15976.0007	Page	1	of <u>1</u>			
Site Loca	ation	Winfield, W	V					Date	6/	15/2016			
Weather		80F, Cloudy			Development Time Begin End								
Evacuatio	on Data	l											
Measuring Point					тос		Sample Intake S	Pump Setting (ft I	(amc				
MP Elevation (ft)					N/A			g Rate (gr					
Land Surface Elevation (ft)								ion Metho	· ·	Bailer			
		Depth (ft bm	p)		43.15		Volumes	Purged					
Depth to	Water	(ft bmp)			3.60								
Water-Le	evel Ele	evation (ft)					Field Pa	rameters					
Water Co	olumn i	n Well (ft)			39.55		Color			Tan			
Casing D	iamete	er/Type			1" PVC		Odor			None			
Gallons in Well			2.37		Appearance								
		1								Disselved			
Time	Min Elapsed	Total Gallons Removed	Depth To Water (ft btoc)	Rate (mL/min)	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°F/°C)	рН (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)		Volume Gal)	Remarks
Developr	ment P	ersonnel:		K. Swiad	ek								
Notes:	Remov	ed 25 gallons	with W	aterra. Tu	urbidity >1000 throu	ghout.							

			Well Casing Volume	s (gallon/feet)			
	1-1⁄4" = 0.06 1-1⁄2" = 0.09		2" = 0.16 2-½" = 0.26	3" = 0.37 $3 - \frac{1}{2}" = 0.50$	4" = 0.65 6" = 1.47		
bmp °C ft gpm mg/L	below measuring point Degrees Celsius feet Gallons per minute Miligrams per liter	ml mS/cm msl N/A NM	mililiter Milisiemens per centimeter mean sea-level Not Applicable Not Measured	NTU PVC s.u. umhos/cm VOC	Nephelometric Turbidity Units Polyvinyl chloride Standard units Micromhos per centimeter Volatile Organic Compounds	ORP mV	Oxidation-Reduction Potentia millivolts

# **APPENDIX E**

**Record of Changes** 



## **RECORD OF CHANGES**

Revision No	Revision Date	Description
0	10/18/2016	Original Well Network Evaluation Report
1	10/22/2020	Revised Sections 2.2.1, 2.2.2, and 2.2.4 to remove the Pyrites Pond from the description of the BAP CCR unit.
		Updated the CCR unit outline on all figures to remove the Pyrites Pond and include the Clearwater Pond.
		Added Appendix E–Record of Changes.