



ASH POND SYSTEM-CCR GROUNDWATER MONITORING WELL NETWORK EVALUATION

Mountaineer Plant
Graham Station Road
Mason County
New Haven, West Virginia

October 27, 2016

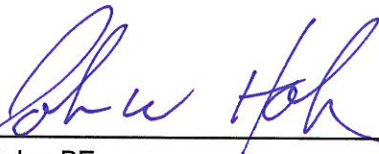
**ASH POND SYSTEM-
CCR GROUNDWATER
MONITORING WELL
NETWORK
EVALUATION**



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ACRONYMS AND ABBREVIATIONS

AEP	American Electric Power Service Corporation
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
ft	feet
LBR	Little Broad Run

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 bottom ash ponds (BAPs) (CCR Unit) at the AEP Mountaineer Generating Plant (Plant) located on Graham Station Road in New Haven, West Virginia (**Figure 1**). The CCR requirements include an evaluation of the adequacy of the groundwater monitoring well network to characterize groundwater quality up and down gradient of the CCR unit in the uppermost aquifer and an evaluation of whether the CCR unit meets up to 5 location restrictions. These restrictions include: 1) the base of the CCR unit is 5 feet (ft) above and isolated from the uppermost aquifer, and the CCR unit may not be 2) located in a wetland, 3) within 200 ft of the damage zone of a fault that has displacement during the Holocene, 4) within a seismic impact zone, or 5) in an unstable area. The objective of this report is to present an evaluation of the adequacy of the groundwater monitoring well network in the uppermost aquifer at the onsite BAPs (Site). The evaluation of the five location restriction criteria is not included in this report and will be completed under separate cover.

Two regulated CCR units associated with the Plant were identified for review, which include the onsite BAPs (east and west BAPs) and the offsite Little Broad Run (LBR) landfill (**Figure 2**). The evaluation of the LBR landfill is not included in this report and will be completed under separate cover.

Initial evaluation of the monitoring well network was completed in late 2015 into February 2016 and included a review of AEP-provided data associated with previously completed subsurface investigation activities in the vicinity of the BAPs, 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. Additional monitoring wells were installed from April through June 2016 to address these data gaps. Drilling activities were performed by a West Virginia-licensed drilling contractor (DLZ) with Arcadis personnel completing borehole logging and well installation oversight. The following report also presents the current Conceptual Site Model (CSM), combining the historical Site information with recently 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 BAPs in the uppermost aquifer; therefore, the report objective has been met.

2. BACKGROUND INFORMATION

The following section provides background information for the AEP Mountaineer Generating Plant BAPs.

2.1 Facility Location Description

The AEP Mountaineer Generating Plant is located in Mason County, bounded by Little Broad Run to the west and the Ohio River to the east. The Plant is approximately 2 miles east of New Haven, West Virginia. The BAP CCR units are located on the south side of the Plant, adjacent to and on the west side of West Virginia Route 62 (Graham Station Road). The BAPs are located approximately 0.5 miles southwest of the Ohio River (**Figures 1 and 2**).

2.2 Description of Bottom Ash Pond CCR Units

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

2.2.1 Embankment Configuration

The BAP CCR Unit includes two separate west and east BAPs. In general, embankments of the BAPs are constructed of earthen material. North, west and east embankment material is comprised from excavation of the ponds and consist of compacted silty sand with some gravel. The embankment crest widths range from 20 to 45 feet (ft), and are approximately 35 ft or less in height. This corresponds to crest elevations that range from 620 ft above mean sea level (amsl) on the north side of the BAPs. The BAP interior and exterior embankments have crest elevations of approximately 620 ft amsl (Woodward-Clyde, 1985). Embankment slopes are typically graded at horizontal to vertical ratios between 3:1 and 2.5:1 (Shaw, Stone and Webster, 2006).

2.2.2 Area/Volume

The BAPs occupy an estimated combined surface area of approximately 28 acres (EPRI, 1999). Specifically related to the ponds that receive CCR products, the west BAP has a normal pool area of 14.1 acres and the east BAP has a normal pool area of 13.9 acres. The normal reservoir volumes of the west and east BAPs are 193 and 152 acre ft, respectively. The maximum design volumes of the west and east BAPs are 266 and 225 acre ft, respectively (Shaw, Stone, and Webster, 2006).

2.2.3 Construction and Operational History

The AEP Mountaineer Generating Plant is a single-unit coal-fired generating plant and began operations in September 1980. The BAPs were constructed between 1978 and 1980 and were completed when the generating plant became operational. The original configuration is similar to the current configuration (**Figure 3**). All ponds are lined with a 3-ft clay liner with clay derived from offsite borrow areas (Woodward-Clyde, 1985). In 2006, the downstream (i.e. north) embankment of the BAPs was re-

designed to a steeper slope from 3:1 to 2.5:1. This design change was to accommodate the installation of two gypsum conveyors. Modifications to the downstream BAP embankment and installation of the gypsum conveyors were completed by the first half of 2007.

Currently, the BAPs receive all process wastewaters from the Plant via above ground and below ground steel piping. The BAPs are filled in an alternating fashion, with one BAP generally receiving waste streams while the other BAP is being cleaned out. Bottom ash is either used for beneficial re-use or disposed of in the LBR Landfill (EPRI, 1999).

2.2.4 Surface Water Control

The perimeter of the BAPs is graded such that surface runoff is directed away from the ponds. This grading is accomplished by either natural topographic relief or constructed embankments such as the main dike along the northwest side of the BAPs (**Figure 3**).

Surface water flow within the BAPs is controlled by a series of slide gates, corrugated metal pipes, vertical inlets, and overflow concrete channels. Pond elevations are maintained so that surface water flows via gravity or pumping to ponds in the following order: east and west BAPs and subsequently to east and west wastewater ponds, and the reclaim and/or clearwater pond (Woodward-Clyde, 1985). The stage levels of the BAPs are generally maintained no greater than the normal operating levels ranging from 603 to 612 ft amsl (H.C. Nutting, 2009). From the clearwater pond, water flows to the Ohio River through a National Pollutant Discharge Elimination System permitted outfall via underground piping (EPRI, 1999).

2.3 Previous Investigations

Prior to BAP construction, Casagrande Consultants performed site investigations from 1976 to 1977 related to suitability of onsite soils for pond and embankment construction and stability (Casagrande, 1977).

In 1985, Woodward-Clyde Consultants performed an assessment of dam safety for the BAPs (Woodward-Clyde, 1985). This assessment included review of AEP-provided data and previous site investigations and a complete visual inspection of the dikes and secondary structures. The Woodward-Clyde Consultants report concluded that dike and pond condition were satisfactory.

From 1995 through 1998, AEP worked in coordination with Ish, Inc., META Environmental, Inc., HIS GeoTrans, Inc., and the Electric Power Research Institute (EPRI) to evaluate groundwater quality associated with a number of AEP power generating facilities, including the Mountaineer Plant. The primary objectives of these site investigations were to characterize hydrogeology, identify potential contaminant source areas, establish existing groundwater quality, and identify constituents that exceeded West Virginia Groundwater Standards. These studies are described in detail in the report *Groundwater Quality at the Philip Sporn and Mountaineer Power Plants, Mason County, West Virginia* (EPRI, 1999). Field work for these investigations included 19 direct push technology groundwater sampling points, installation and sampling of 5 permanent monitoring wells (MW-001 through MW-005), surface water sampling, and geotechnical soil characterization.

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In 2005, GAI Consultants, Inc. performed stability analysis associated with previous mining activities associated with the Redstone Coal (GAI, 2005). As part of this investigation, GAI reviewed existing boring logs and rock cores, performed point load strength testing of core samples, performed stability calculations of mine pillars and ground movement from proposed future mining operations. GAI concluded that the Site is not expected to have adverse impacts from past or future mining of the Redstone Coal.

In 2006, H.C. Nutting Company performed site investigations associated with planned modifications to the main dike in preparation for construction of two gypsum conveyors (H.C. Nutting, 2006a; H.C. Nutting, 2006b). These investigations involved foundation inspections, compaction testing of fill material, geotechnical analysis of soil samples, and concrete testing associated with conveyor construction. Also in 2006, Shaw, Stone, and Webster, Inc. performed stability analysis related to the gypsum conveyor construction (Shaw, Stone, and Webster, 2006). Additional slope stability analyses for the north, west, and east embankments related to the gypsum conveyor construction in 2009 was also performed by Shaw, Stone, and Webster, Inc. The results of this analysis showed that, in general, embankment slopes would be stable under static and seismic loading. However, a blanket drain was recommended at the toe and cut faces of the embankment along gypsum conveyor #2 to prevent saturation and slumping (Shaw, Stone, and Webster, 2009).

H.C. Nutting performed a geotechnical investigation of the BAPs in 2009, specifically related to upstream and downstream embankment slope factors of safety under static and seismic conditions. Field methods involved drilling, logging, and sampling 6 soil borings through select embankments (B-09-01 through B-09-06). 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 piezometers (PZ-09-03, PZ-09-04, and PZ-09-05). This site investigation included numerical slope stability modeling, and concluded that the embankment slopes had adequate factors of safety for both long-term and earthquake stability (H.C. Nutting, 2009).

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 unconfined deeper sand zones. Maximum alluvium thickness is approximately 80 to 90 ft and thins westward towards the edges of the valley. Groundwater flow direction within the alluvium is generally towards the Ohio River. However, there are active production wells (East 1, West 1) and firewater supply wells (Well 5, Well 6) at the Site (**Figure 3**) that withdraw water from the alluvial aquifer. Groundwater flow is influenced towards those wells during pumping conditions.

In the upland areas surrounding the Site, bedrock consists of the Pennsylvanian age sandstones, shales, limestones, and coal of the Monongahela Group. At higher elevations, the hilltops are capped by the Permian age Dunkard Formation, which is lithologically similar to the Monongahela Group. Sandstone and shale of the Monongahela Group immediately underlie alluvial sediments at the Site.

Cross section A-A', which extends through the BAPs further illustrates the geology. The cross section A-A' trends from southwest to northeast as shown on **Figure 4** and is depicted as **Figure 5**. Boring logs and well construction diagrams are included in **Appendix A**.

2.4.1 Climate and Water Budget

The climate of Mason County, West Virginia is characterized as humid continental with an average rainfall of approximately 42 inches annually. The average maximum temperature is 68 °F and the average minimum temperature is 44 °F based on information from the 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 Ohio River alluvial plain along the western bank of the Ohio River. Alluvial sediments consist of clay, silt, sand and gravel deposits that generally coarsen downward. In general, shallow clays and silts range in thickness from 10 to 40 ft. Some fill material is present near the Ohio River, which was likely derived from on-site excavations. This fill material varies from silty clay to gravelly sand. Unconsolidated mine wastes can be found in the base of the BAPs and blanketing the BAP embankments in thicknesses ranging from 3 to 7 ft (Shaw, Stone and Webster, 2006; H.C. Nutting, 2009).

Bedrock is present underlying the alluvial deposits near the BAPs, as well as bounding ridges of the Ohio River alluvial valley. The primary regional bedrock units are sedimentary rocks of the Permian age Dunkard Formation and the Pennsylvanian age Monongahela Formation. The depositional environment for these formations is characterized by a gradually subsiding shallow sea with alternating marine and freshwater strata. Sedimentary rocks associated with the Monongahela Formation, which immediately underlie the alluvial sediments beneath the Site, consist 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. The base of the younger Dunkard group, which caps surrounding ridges and is lithologically similar to the Monongahela Formation, is marked by a thick, massive conglomeritic sandstone (EPRI, 1999).

2.4.3 Surface Water and Surface Water Groundwater Interactions

The Site is adjacent to the Ohio River, and the BAPs are located approximately 0.5 miles southwest of the Ohio River. Little Broad Run is immediately adjacent to the west of the BAPs. Groundwater flow direction is generally to the northeast and discharges to the Ohio River, although local pumping from Plant operations influences groundwater flow to the north. Groundwater recharge is primarily from precipitation. Despite its proximity, Little Broad Run is generally not connected to groundwater at the Site. The base of Little Broad Run is perched on surficial clay deposits and is at an elevation of 580 to 590 ft amsl (EPRI, 1999), which is approximately 30 to 40 ft above the groundwater table. The Ohio 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 Ohio River at 538 ft amsl (EPRI, 1999).

2.4.4 Water Users

There are currently five active pumping wells associated with the Plant that extract groundwater from the deep unconsolidated sand and gravel aquifer. Two of these wells (West 1, East 1) are alternately pumped for process water and are located approximately 2,200 feet and 2,600 feet northeast of the BAPs, respectively. At the time of this report, average pumping rates from September 6 through September 26, 2016 for West 1 and East 1 were 566 gallons per minute and 144 gallons per minute, respectively. There are also two pumping wells (Wells 5 and 6) which are used for fire water supply. Well 5 is located approximately 1,200 ft north of the BAPs and Well 6 is located approximately 2,700 feet northwest of the BAPs. A fifth well (Well 4) is used in the plant's wastewater system and is located approximately 2,500 feet northeast of the BAPs. Well location coordinates, production test data, and boring logs for the pumping wells are included in **Appendix A**. The screened intervals for each of these wells is from 63 to 78 feet below ground surface, which is near the base of the alluvial aquifer. There are no potable groundwater wells at the Site.

In 2014, a water well inventory for the Mountaineer Plant indicated information on one other groundwater well located within a 0.5-mile buffer of the Site (Banks, 2014) (**Appendix B**). The well is registered with the United States Geological Survey and is assumed to have been used for monitoring. The well is located approximately 3,700 feet east of the BAPs.

3. GROUNDWATER MONITORING WELL NETWORK EVALUATION

An initial evaluation of the monitoring well network present at the Site was performed in late 2015 into February 2016 to determine if any of the existing wells were viable for continued use as part of the groundwater quality 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. An additional 12 monitor wells were installed in April through June 2016. Monitoring wells included in the monitoring network are designated as up or down gradient. Up gradient monitoring wells represent background groundwater quality and the down gradient monitoring wells were placed down gradient of the CCR unit boundary to monitor water quality.

3.1 Hydrostratigraphic Units

3.1.1 Horizontal and Vertical Position Relative to CCR Unit

The uppermost unconsolidated aquifer consists of the saturated alluvial sediments beneath and surrounding the Site. The upper limit of the uppermost aquifer is defined by the water table elevation in the unconfined sand and gravel deposits, which ranges from approximately 543 to 556 ft amsl in the immediate vicinity of the BAPs. The base elevation of the BAPs (i.e. bottom of clay liner) is estimated to be approximately 586 to 597 ft amsl (Woodward-Clyde, 1985). Based on this information, there appears to be at least 30 ft of separation between the top of the saturated sand and gravel zone and the base of the CCR Unit, which is illustrated in cross section A-A' (**Figure 5**).

The vertical extent of the aquifer likely extends to the base of the unconsolidated deposits in the valley to the bedrock interface. There are no significant clay or silt layers within the aquifer. The saturated thickness of alluvial deposits is at least 20 to 30 ft, and likely greater where alluvial deposits are thickest. The uppermost unconsolidated aquifer appears laterally extensive in all directions around the BAPs. The uppermost aquifer pinches out towards the bedrock valley wall to the west. The soil liner beneath the ponds limits hydraulic connection of the BAPs to the subsurface.

3.1.2 Overall Flow Conditions

Regional groundwater recharge occurs from precipitation infiltration and from leakage from tributary streams crossing the Ohio River floodplain. Bedrock, to a lesser extent, likely contributes recharge of the uppermost unconsolidated aquifer from the west of the Site where the alluvial valley is in contact with the valley wall.

Available groundwater elevations are summarized on **Table 1** for 1997 through 2016. Current groundwater flow conditions that includes influence from groundwater pumping at the Mountaineer Plant was evaluated using the U.S. EPA's Wellhead Analytical Element Model (WhAEM2000) (Kraemer et al.,

2007). Details of the modeling are provided in **Appendix C**. Results of the current understanding of groundwater flow from the model under current pumping conditions and BAP use is shown on **Figure 6**. Groundwater flow direction as depicted is predominantly north to northeast towards the Plant pumping wells and the Ohio River. As presented in **Table 2**, wells included in the monitoring network have been designated as up or down gradient.

Vertical hydraulic gradients in the immediate vicinity of the BAPs are generally upwards. Groundwater elevations measured on September 26, 2016 indicated upward vertical hydraulic gradients ranging from 6.0×10^{-4} ft/ft (MW-1605S/MW-1605D) to 9.9×10^{-3} ft/ft (MW-1604S/MW-1604D). A downward vertical gradient of 1.8×10^{-3} ft/ft was measured at the MW-1606S/MW-1606D well pair.

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 new 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 results were used to assist with monitoring well design. The results of this analysis are summarized in **Table 3**, and complete laboratory reports are provided in **Appendix D**. Grain size analysis of samples collected within the final screen intervals indicated sediments were generally poorly-graded sand. Secondary proportions of silt or gravel were found at some boreholes within the final screen intervals.

3.1.4 Hydraulic Conductivity

Hydraulic testing was completed at wells MW-001, MW-002, MW-004, and MW-005 prior to this evaluation in the uppermost unconsolidated aquifer. Estimated hydraulic conductivity based on these slug tests was reported to range from 51 ft per day in sandy sediments to 772 ft per day in gravelly sediments with an overall geometric mean of 237 ft per day, based on site slug testing (EPRI, 1999).

Additional slug tests were performed at newly-installed monitoring wells on June 20-21, 2016. Pneumatic and bail down slug tests were performed on a total of 3 up gradient wells (MW-1601A, MW-1603, and MW-1608) and 4 down gradient wells (well pairs MW-1605S/MW-1605D, MW-1607S/MW-1607D) to provide a more spatial understanding of the hydraulic conductivity distribution within the alluvial sands (i.e. uppermost aquifer). Well construction details for these monitoring wells and all other wells are presented in **Table 2**.

Data-logging pressure transducers were used during these tests in 2016 to monitor water level displacement every 0.5 seconds and in real time. Three pneumatic slug tests were performed at each well except MW-1603, at which a bail down slug test was performed due to equipment issues. Two tests were performed using an identical initial pressure and one test was performed using approximately twice 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.

At MW-1603, three bail-down slug tests were completed. 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.

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 unconfined conditions, as appropriate based on the response. Results of the slug test analyses, including hydraulic conductivity estimates, are summarized in **Table 4** and solution reports with individual curve matches are provided in **Appendix E**.

The hydraulic conductivity estimates from the seven monitoring wells tested had a tight range from 147 ft per day (MW-1605S) to 213 ft per day (MW-1601A). The overall mean hydraulic conductivity estimate was 187 ft per day, while the overall geometric mean was 186 ft per day. Estimated hydraulic conductivity values for all the wells were consistent for a sand and gravel alluvium system and correlate to the geometric mean hydraulic conductivity estimates of the historical hydraulic testing.

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 unconfined sands and gravels. This aquifer is used locally for groundwater supply related to plant operations, but is not known to provide other private or industrial water use in the area.

3.3 Review of Existing Monitoring Well Network

3.3.1 Overview

The Site was visited by Arcadis and AEP personnel on August 12, 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 existing monitoring well network is included as **Table 2**.

The groundwater quality monitoring well network monitors the alluvial aquifer consisting of unconfined sand and gravel defined as the uppermost aquifer. It includes 12 wells installed from April to June 2016. An additional 8 Mountaineer Plant wells, and 3 piezometers, which were present prior to Arcadis initial evaluation, are utilized for the purpose of hydraulic monitoring (**Table 2**). Four well pairs (MW-1604S/MW-1604D, MW-1605S/MW-1605D, MW-1606S/MW-1606D, MW-1607S/MW-1607D) measure vertical flow.

Spatially, the network extends as far up gradient to the south as MW-1601A, and to the north as MW-1608. Down gradient, the network extends immediately down gradient of the BAPs (MW-1604S/MW-1604D through MW-1607S/MW-1607D). Eight existing wells and 3 existing piezometers have been retained in the network for hydraulic monitoring (**Table 2**). 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 late 2015 and in early 2016. Following monitoring well installation described in **Appendix F** of this report, there are no gaps in the monitoring network. Up gradient background water quality is not current and will need to be re-evaluated with analysis results from the new recommended monitoring well network. The recommended monitoring well network is 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 BAPs (up gradient or down gradient), well depth, and well construction. The recommended 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 12 monitoring wells were installed to establish an adequate network. Specifics on field methodology and other documentation on installation of the additional wells in 2016 is provided in **Appendix F**. Monitoring well construction was targeted to monitor the unconfined saturated alluvial sand and gravel, which is identified as the uppermost aquifer. The total groundwater quality monitoring network includes 4 up gradient wells and 8 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 12 groundwater quality wells, 8 wells and 3 piezometers are used to refine the understanding of groundwater flow and hydraulic gradients in the vicinity of the BAPs 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, northeast, and east of the BAPs. These wells include newly-installed wells MW-1604S, MW-1604D, MW-1605S, MW-1605D, and MW-1606S, MW-1606D, MW-1607S, and MW-1607D (**Table 2**). These wells monitor groundwater as it flows north and northeast past the CCR unit boundary. Down gradient wells were installed as shallow and deep well pairs within the uppermost aquifer in order to monitor the entire saturated thickness of the aquifer.

4.1.2 Up Gradient Locations

Up gradient monitoring wells are located southeast, south, and northwest of the BAPs. These wells include newly-installed wells MW-1601A, MW-1602, MW-1603, and MW-1608 (**Table 2**). These wells establish background groundwater quality up gradient of the CCR unit boundary, with the exception of MW-1608. MW-1608 establishes background groundwater quality of groundwater flowing from the bedrock ridge into the Ohio River valley.

4.2 Well Construction

Groundwater quality monitoring wells in the network are constructed of 2-inch Schedule 40 PVC risers with 10 to 15 ft slotted PVC screens. All monitoring wells were installed in general accordance with West Virginia Department of Environmental Protection Title 47 Series 60 Monitoring Well Design Standards dated June 21, 2011 by a state-licensed driller. Installation details and field methods are provided in

ASH POND SYSTEM-CCR GROUNDWATER MONITORING WELL NETWORK EVALUATION

Appendix F. 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**.

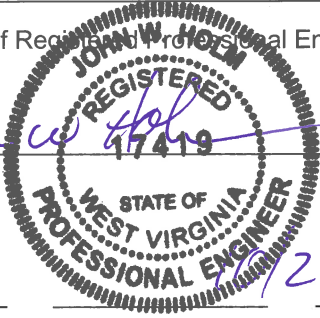
5. PROFESSIONAL ENGINEER'S CERTIFICATION

I, John W. Holm, 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.

John W Holm
Printed Name of Registered Professional Engineer

John W Holm
Signature

17419 WV 10/27/16
Registration No. Registration State Date



6. REFERENCES

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TABLES



FIGURES



APPENDIX A

Boring/Well Construction Logs



APPENDIX B

Banks Well Inventory Report



APPENDIX C

Groundwater Modeling Supporting Information



APPENDIX D

Soil Property Testing



APPENDIX E

Slug Testing Results



APPENDIX F

Field Methodology



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TABLES



Table 1
Water Level Data
AEP Mountaineer Generating Plant - Bottom Ash Ponds
New Haven, West Virginia

Well ID	5/1/1997	8/1/1997	12/1/1997	7/1/2008	10/1/2008	1/1/2009	4/1/2009	12/1/2009	3/10/2010	6/10/2010	9/10/2010	12/1/2010	4/1/2011	11/1/2011	6/12/2012	12/17/2012	6/11/2013	12/3/2013	6/10/2014	12/16/2014	6/9/2015	9/26/2016
	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl	GW Elev. ^a ft. amsl
Gravel Zone Wells																						
Downgradient																						
MW-001	NA	542.19	542.41	542.20	541.13	541.79	542.69	541.18	545.06	541.51	539.81	542.78	544.6	540.8	540.70	541.75	540.91	540.52	541.66	540.80	541.35	539.25
Sand Zone Wells																						
Upgradient																						
MW-1601A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	544.58
MW-1602	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	544.76
MW-1603	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	543.67
MW-1608	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	541.35
Downgradient																						
MW-002	NA	541.76	542.30	541.87	540.91	541.56	542.73	541.39	545.59	541.43	539.74	542.96	544.79	540.67	540.58	541.84	540.87	540.57	541.5	540.80	541.2	539.95
MW-003	NA	554.86	553.42	NA	NA	NA	NA	NA	NA	NA	545.18	545.06	dry	dry	dry	dry	dry	dry	dry	dry	dry	NA
MW-004	NA	541.65	542.19	541.74	540.79	541.46	542.63	541.26	545.54	541.34	539.71	542.81	544.65	540.59	540.48	541.77	540.76	540.44	541.42	540.67	541.14	540.15
MW-005	NA	556.42	555.05	NA	550.17	548.62	547.57	545.85	547.79	545.84	544.57	544.68	544.3	544.61	544.54	dry	545.14	544.66	545.84	544.17	545.71	NA
MW-016	NA	NA	NA	548.13	546.38	545.37	543.89	541.09	541.09	541.3	540.25	541.45	542.15	542.01	542.03	540.08	543.26	541.62	543.08	541.32	543.30	541.30
JTMN-1	NA	541.80	542.66	541.13	540.10	540.03	541.56	540.48	544.39	540.19	539.06	542.15	542.88	539.63	539.43	540.84	540.42	539.97	540.38	539.93	540.20	539.40
JTMN-2	NA	542.61	543.40	541.35	540.35	540.20	541.50	540.30	544.18	540.04	538.99	541.95	542.77	539.53	539.32	540.65	540.38	539.90	540.30	539.84	540.15	539.24
MW-1604S	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	542.54
MW-1604D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	542.74
MW-1605S	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	542.51
MW-1605D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	542.52
MW-1606S	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	543.19
MW-1606D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	543.15
MW-1607S	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	543.52
MW-1607D	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	543.56
Piezometers																						
Downgradient																						
PZ-09-03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	592.65
PZ-09-04	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	572.23
PZ-09-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	561.61
Sporn Wells ^b																						
MW-006	NA	551.48	551.13	NA	NA	NA	NA	NA	601.00	542.64	541.23	543.08	543.28	541.67	541.17	541.02	542.61	541.83	542.50	541.58	542.18	541.20
MW-008	NA	543.58	544.46	NA	NA	543.94	545.45	543.82	550.26	527.28	542.01	545.23	546.45	542.46	542.03	543.71	542.25	542.52	543.41	542.75	542.62	NA
MW-009	NA	543.48	544.33	535.64	534.40	535.63	537.16	535.78	540.94	536.16	533.90	537.27	538.38	534.39	533.93	535.86	533.97	534.45	536.35	534.75	534.45	540.97
MW-011	NA	557.51	554.95	NA	NA	552.21	551.04	551.46	556.52	570.44	552.17	551.79	552.4	547.43	548.34	547.86	547.05	549.22	550.05	547.99	547.67	NA
MW-013	NA	541.24	541.69	NA	NA	NA	NA	NA	581.21	542.99	540.47	544.18	545.81	540.36	540.82	542.90	540.92	541.22	542.40	541.61	541.41	540.33
MW-014	NA	540.14	541.70	NA	NA	NA	NA	NA	588.44	542.49	540.11	543.97	545.75	540.59	540.12	542.36	540.56	539.84	541.48	541.11	540.83	540.08

Notes:
a. Source: EPRI. June 1999. Groundwater Quality at the Philip Sporn and Mountaineer Power Plants, Mason County, West Virginia
b. Sporn wells used for the simulated groundwater flow model only. Sporn wells are not used for the CCR well network.
Elevation in feet above mean sea level
Unless otherwise noted, water level data collected during AEP well gauging events
amsl - above mean sea level
Elev - elevation
ft - feet
GW - groundwater
NA - not available

Table 2
Well Construction Details
AEP Mountaineer Generating Plant - Bottom Ash Ponds
New Haven, West Virginia

Well ID	Hydraulic Monitoring Only	Location Description to CCR Unit	Northing ^a	Easting ^a	Ground Surface Elevation	Top of Casing Elevation ft amsl	Borehole Depth ft. bls	Date Installed	Screen Material	Well Diameter inches	Top of Screen		Bottom of Screen	
											Depth ft. bls	Elevation ft. amsl	Depth ft. bls	Elevation ft. amsl
Gravel Zone Wells														
Downgradient														
MW-001 ^b	X	North	724542.7	1701713.0	569.18	571.32	38.0	6/18/1997	Sch. 40 PVC	2	27.0	542.18	37.0	532.18
Sand Zone Wells														
Upgradient														
MW-1601A ^c		Southeast	717349.0	1702641.3	607.47	610.66	80.0	6/9/2016	Sch. 40 PVC	2	67.0	540.47	77.0	530.47
MW-1602 ^c		South	717716.0	1702066.2	602.37	605.12	71.6	5/10/2016	Sch. 40 PVC	2	61.0	541.37	71.0	531.37
MW-1603 ^c		Northwest	719560.2	1701042.0	602.92	606.30	76.0	5/4/2016	Sch. 40 PVC	2	60.0	542.92	75.0	527.92
MW-1608 ^c		Northwest	723686.8	1699158.3	587.26	590.65	70.0	6/10/2016	Sch. 40 PVC	2	46.0	541.26	56.0	531.26
Downgradient														
MW-002 ^b	X	North	724901.8	1702197.6	580.82	582.81	73.0	6/24/1997	Sch. 40 PVC	2	60.5	520.32	70.5	510.32
MW-003 ^b	X	Northeast	719921.2	1702260.8	604.90	607.20	43.4	6/25/1997	Sch. 40 PVC	2	32.3	572.60	42.3	562.60
MW-004 ^b	X	North	724909.9	1702190.5	581.08	583.13	48.2	6/30/1997	Sch. 40 PVC	2	37.6	543.48	47.6	533.48
MW-005 ^b	X	East	719196.9	1702976.0	591.00	593.19	50.0	7/1/1997	Sch. 40 PVC	2	37.7	553.30	47.7	543.30
MW-016 ^d	X	North	721475.5	1701361.3	586.82	588.61	82.0	6/17/2008	Sch. 40 PVC	2	67.5	519.32	77.5	509.32
JTMN-1 ^d	X	North	723507.5	1702616.8	582.17	583.67	76.6	7/19/1990	Sch. 40 PVC	2	56.7	525.47	75.7	506.47
JTMN-2 ^d	X	North	723436.8	1702653.5	582.16	584.06	77.8	7/18/1990	Sch. 40 PVC	2	57.9	524.26	76.9	505.26
MW-1604S ^c		North	720233.9	1701624.2	595.48	598.07	60.0	5/2/2016	Sch. 40 PVC	2	49.0	546.48	59.0	536.48
MW-1604D ^c		North	720238.0	1701629.1	595.59	598.22	80.0	4/27/2016	Sch. 40 PVC	2	69.0	526.59	79.0	516.59
MW-1605S ^c		Northeast	720156.3	1702018.3	588.51	590.86	59.5	5/12/2016	Sch. 40 PVC	2	49.0	539.51	59.0	529.51
MW-1605D ^c		Northeast	720161.4	1702015.6	588.51	591.01	80.0	5/11/2016	Sch. 40 PVC	2	69.0	519.51	79.0	509.51
MW-1606S ^c		Northeast	719693.3	1702486.4	587.28	590.15	56.0	5/18/2016	Sch. 40 PVC	2	45.0	542.28	55.0	532.28
MW-1606D ^c		Northeast	719697.7	1702482.4	587.25	590.10	76.0	5/16/2016	Sch. 40 PVC	2	65.0	522.25	75.0	512.25
MW-1607S ^c		East	719276.0	1702912.2	590.79	593.99	60.0	5/26/2016	Sch. 40 PVC	2	50.0	540.79	60.0	530.79
MW-1607D ^c		East	719279.7	1702908.9	590.75	593.93	80.0	5/19/2016	Sch. 40 PVC	2	70.0	520.75	80.0	510.75
Piezometers														
Downgradient														
PZ-09-03 ^e	X	Northeast	719485.3	1702397.3	621.60	621.17	50.4	2/17/2009	Sch. 40 PVC	1.5	5.0	616.60	50.4	571.20
PZ-09-04 ^e	X	Northeast	719550.1	1702466.6	597.10	596.64	25.0	2/19/2009	Sch. 40 PVC	1.5	5.0	592.10	24.8	572.30
PZ-09-05 ^e	X	Southeast	718527.3	1703537.3	611.70	610.74	50.2	2/18/2009	Sch. 40 PVC	1.5	5.0	606.70	50.2	561.50
Sporn Wells^f														
MW-006 ^b		East	720299.8	1704227.1	601.31	601.57	96.0	7/8/1997	Sch. 40 PVC	2	81.1	520.21	91.1	510.21
MW-008 ^b		East	718959.9	1704700.6	NA	NA	34.9	7/22/1997	Sch. 40 PVC	2	23.8	NA	33.8	NA
MW-009 ^b		Southeast	718372.3	1704868.0	574.98	576.55	54.5	7/15/1997	Sch. 40 PVC	2	42.3	532.68	52.3	522.68
MW-011 ^b		Southeast	717710.5	1704997.8	NA	NA	50.0	7/23/1997	Sch. 40 PVC	2	36.3	NA	46.3	NA
MW-013 ^b		East	718802.7	1705591.5	579.48	581.51	50.5	7/30/1997	Sch. 40 PVC	2	39.5	539.98	49.5	529.98
MW-014 ^b		East	718936.5	1705374.9	586.89	588.89	61.0	7/30/1997	Sch. 40 PVC	2	49.7	537.19	59.7	527.19

Notes:

- a. 1983 West Virginia State Planar Coordinates
 - b. Source: EPRI. June 1999. Groundwater Quality at the Philip Sporn and Mountaineer Power Plants, Mason County, West Virginia
 - c. Source: AEP survey, September 2016
 - d. Source: AEP-provided boring logs
 - e. Source: H.C. Nutting. March 2009. Geotechnical Engineering Report. AEP Mountaineer Bottom Ash Pond Complex. Appendix A
 - f. Sporn wells used for the simulated groundwater flow model only. Sporn wells are not used for the CCR well network.
- amsl - above mean sea level
 bls - below land surface
 ft - feet
 NA - not available

Table 3
Grain Size Analysis Summary
AEP Mountaineer Generating Plant - Bottom Ash Ponds
New Haven, West Virginia

Sample ID	Depth feet	Grain Size Analysis				USCS Classification	Moisture Content %
		% Gravel	% Sand	% Silt	% Clay		
Sand Zone Wells							
Upgradient							
MW-1601A	66-76	8.9	89.2	1.3	0.5	(SP) POORLY-GRADED SAND	4.8
MW-1602	61-71	4.4	92.2	2.1	1.3	(SP) POORLY-GRADED SAND	17.9
MW-1603	60-75	24.1	71.2	3.8	0.8	(SP) POORLY-GRADED SAND with GRAVEL	15.7
MW-1608	46-56	10.5	84.5	2.2	2.8	(SP) POORLY-GRADED SAND	13.6
Downgradient							
MW-1604S	49-59	4.2	91.1	2.4	2.3	(SP) POORLY-GRADED SAND	17.4
MW-1604D	69-79	8.4	86.0	3.5	2.0	(SP-SM) POORLY-GRADED SAND with SILT	15.2
MW-1605S	49-59	8.6	85.7	4.4	1.3	(SP-SM) POORLY-GRADED SAND with SILT	18.1
MW-1605D	69-79	9.1	85.2	5.6	0.1	(SP-SM) POORLY-GRADED SAND with SILT	16.1
MW-1606S	45-55	7.9	88.5	1.9	1.6	(SP) POORLY-GRADED SAND	22.5
MW-1606D	65-75	14.0	82.9	1.7	1.4	(SP) POORLY-GRADED SAND	15.4
MW-1607S	56-60	23.2	76.2	0.1	0.5	(SP) POORLY-GRADED SAND with GRAVEL	17.6
MW-1607D	70-80	21.5	77.4	0.7	0.4	(SP) POORLY-GRADED SAND with GRAVEL	27.9

Notes:

Samples were collected from April to June 2016 and submitted to AEP Dolan Civil Engineering Laboratory
 USCS - Unified Soil Classification System

Table 4
Slug Testing Results Summary
AEP Mountaineer Generating Plant - Bottom Ash Ponds
New Haven, West Virginia

Well ID	Screen Interval ft bgs	Screened Interval USCS Classification	Slug Test Type	Hydraulic Conductivity ft/day	Hydraulic Conductivity cm/sec
Sand Zone Wells					
Upgradient					
MW-1601A	67-77	(SP) POORLY-GRADED SAND	Pneumatic - Rising Head	213	7.5E-02
MW-1603	60-75	(SP) POORLY-GRADED SAND with GRAVEL	Bail down - Rising head	201	7.1E-02
MW-1608	46-56	(SP) POORLY-GRADED SAND	Pneumatic - Rising Head	204	7.2E-02
Downgradient					
MW-1605S	49-59	(SP-SM) POORLY-GRADED SAND with SILT	Pneumatic - Rising Head	147	5.2E-02
MW-1605D	69-79	(SP-SM) POORLY-GRADED SAND with SILT	Pneumatic - Rising Head	190	6.7E-02
MW-1607S	50-60	(SP) POORLY-GRADED SAND with GRAVEL	Pneumatic - Rising Head	187	6.6E-02
MW-1607D	70-80	(SP) POORLY-GRADED SAND with GRAVEL	Pneumatic - Rising Head	167	5.9E-02
Slug Test Overall Mean				187	6.6E-02
Slug Test Overall Geometric Mean				186	6.6E-02
Slug Test Minimum				147	5.2E-02
Slug Test Maximum				213	7.5E-02

Notes:

All slug tests completed on June 20-21, 2016

Slug test analyses performed using Springer-Gelhar (1991) analytical solution for underdamped responses

Reference: Springer, R.K. and L.W. Gelhar, 1991. Characterization of large-scale aquifer heterogeneity in glacial outwash by analysis of slug tests with oscillatory response, Cape Cod, Massachusetts, U.S. Geol. Surv. Water Res. Invest. Rep. 91-4034, pp. 36-40

bgs - below ground surface

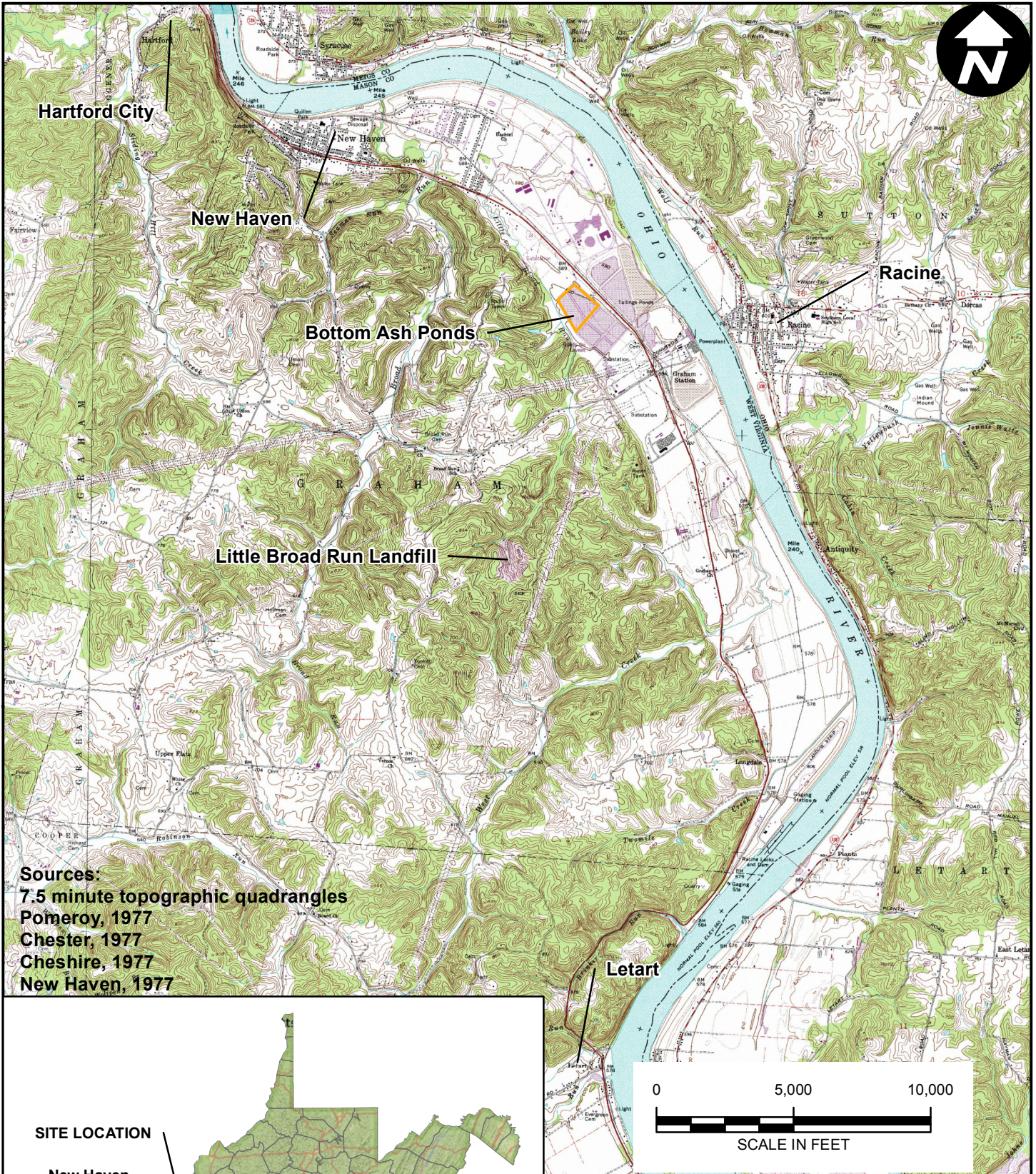
cm/sec - centimeters per second

ft - feet

USCS - Unified Soil Classification System

FIGURES





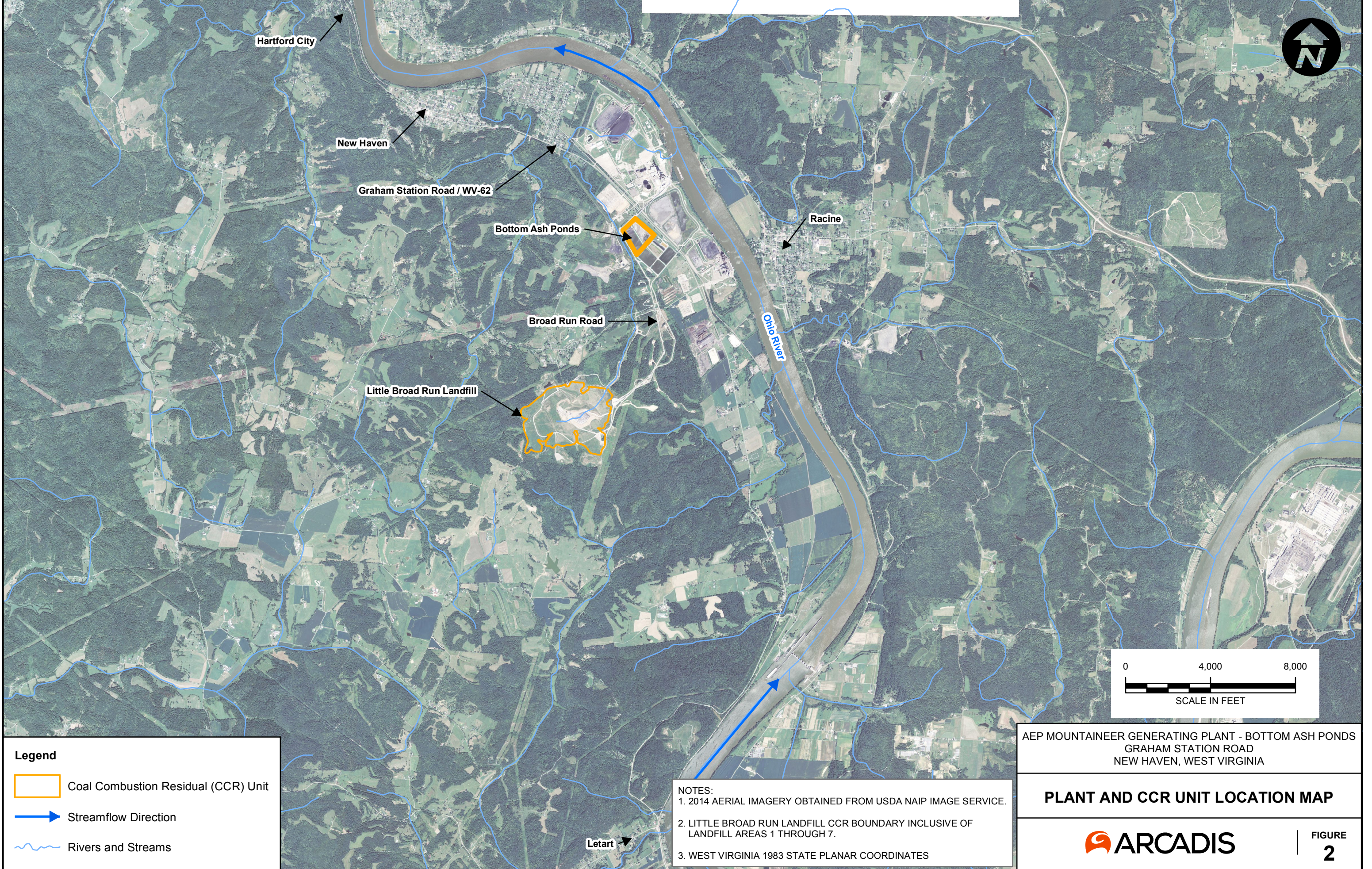
Sources:
 7.5 minute topographic quadrangles
 Pomeroy, 1977
 Chester, 1977
 Cheshire, 1977
 New Haven, 1977






AEP MOUNTAINEER GENERATING PLANT - BOTTOM ASH PONDS
 GRAHAM STATION ROAD
 NEW HAVEN, WEST VIRGINIA

SITE LOCATION MAP

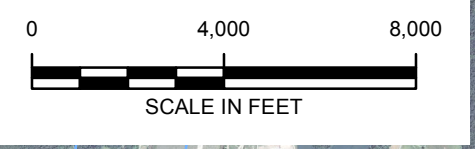
City: CITRIX Div/Group: IM/DV Created By: K.Ives Last Saved By: webb
OH:015976.0009.00001 (Mountaineer Ash Pond)
Z:\GIS\PROJECTS_ENV\AEP\Mountaineer\MXD\Ash Pond Report\Updated September 2016\F2_MountaineerRegionalMap.mxd 9/28/2016 2:42:50 PM



Legend

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

NOTES:
1. 2014 AERIAL IMAGERY OBTAINED FROM USDA NAIP IMAGE SERVICE.
2. LITTLE BROAD RUN LANDFILL CCR BOUNDARY INCLUSIVE OF LANDFILL AREAS 1 THROUGH 7.
3. WEST VIRGINIA 1983 STATE PLANAR COORDINATES



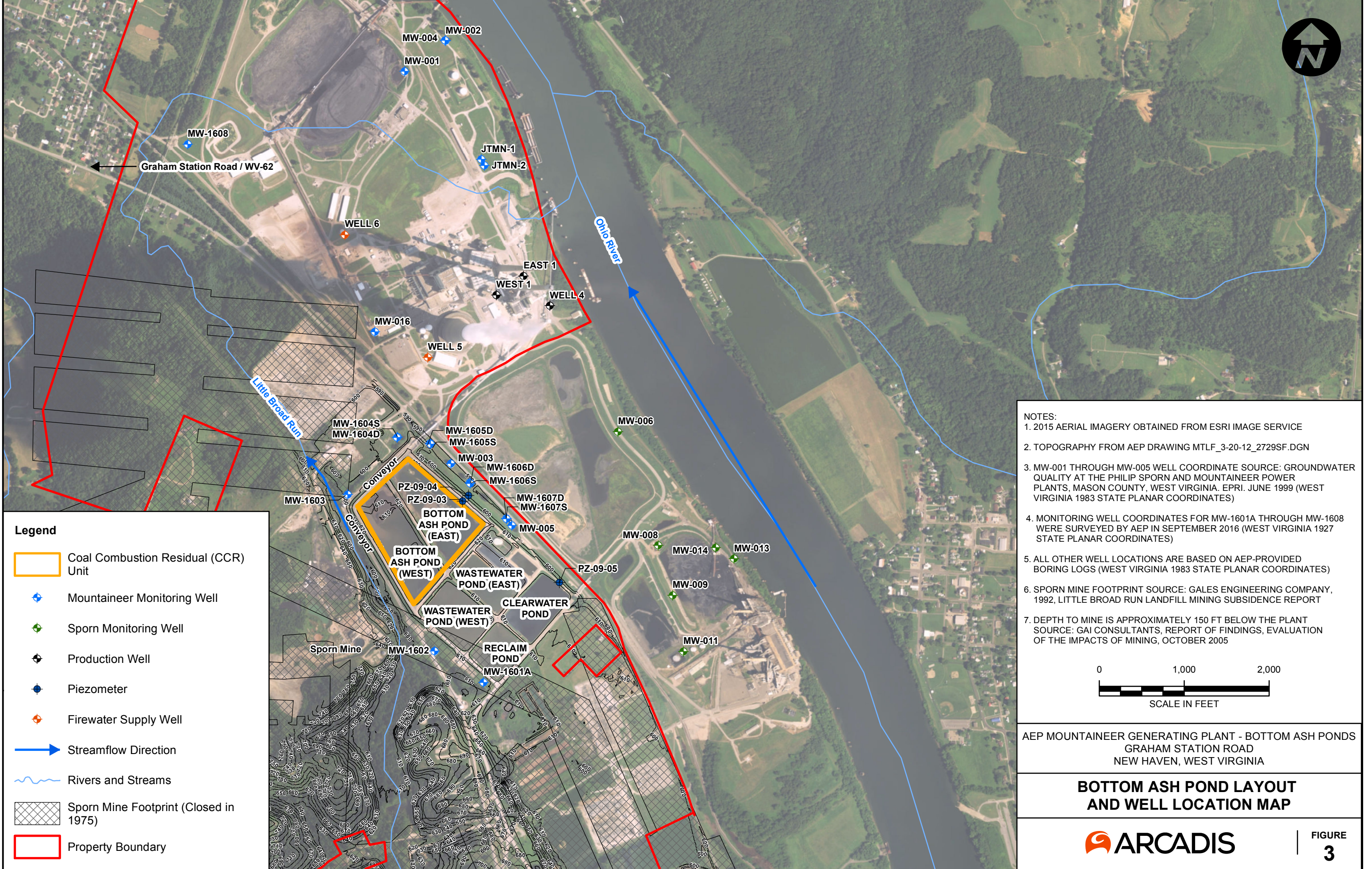
AEP MOUNTAINEER GENERATING PLANT - BOTTOM ASH PONDS
GRAHAM STATION ROAD
NEW HAVEN, WEST VIRGINIA

PLANT AND CCR UNIT LOCATION MAP



FIGURE
2

City: CITRIX Div/Group: IM/DV Created By: K.Ives Last Saved By: webb
 OH:015976.0009.00001 (Mountaineer Ash Pond)
 Z:\GIS\PROJECTS_ENV\AEP\Mountaineer\MXD\Ash Pond Report\Updated September 2016\F3_Mtr Ash Pond Layout And Well Location Map.mxd 10/4/2016 8:29:16 AM



Legend

- Coal Combustion Residual (CCR) Unit
- ◆ Mountaineer Monitoring Well
- ◆ Sporn Monitoring Well
- ◆ Production Well
- Piezometer
- ◆ Firewater Supply Well
- ➔ Streamflow Direction
- ~ Rivers and Streams
- Sporn Mine Footprint (Closed in 1975)
- Property Boundary

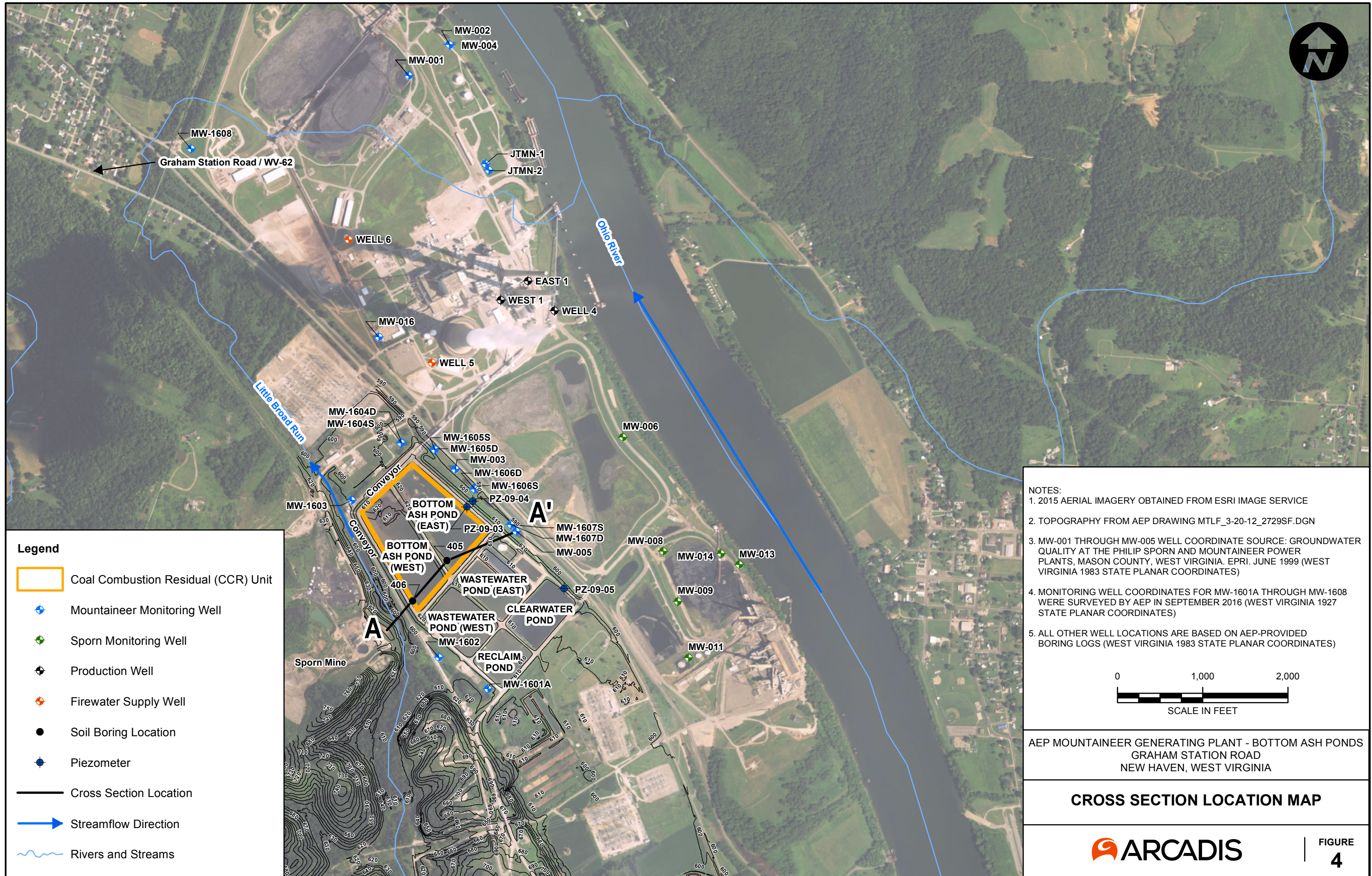
NOTES:

1. 2015 AERIAL IMAGERY OBTAINED FROM ESRI IMAGE SERVICE
2. TOPOGRAPHY FROM AEP DRAWING MTLF_3-20-12_2729SF.DGN
3. MW-001 THROUGH MW-005 WELL COORDINATE SOURCE: GROUNDWATER QUALITY AT THE PHILIP SPORN AND MOUNTAINEER POWER PLANTS, MASON COUNTY, WEST VIRGINIA. EPRI. JUNE 1999 (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)
4. MONITORING WELL COORDINATES FOR MW-1601A THROUGH MW-1608 WERE SURVEYED BY AEP IN SEPTEMBER 2016 (WEST VIRGINIA 1927 STATE PLANAR COORDINATES)
5. ALL OTHER WELL LOCATIONS ARE BASED ON AEP-PROVIDED BORING LOGS (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)
6. SPORN MINE FOOTPRINT SOURCE: GALES ENGINEERING COMPANY, 1992, LITTLE BROAD RUN LANDFILL MINING SUBSIDENCE REPORT
7. DEPTH TO MINE IS APPROXIMATELY 150 FT BELOW THE PLANT SOURCE: GAI CONSULTANTS, REPORT OF FINDINGS, EVALUATION OF THE IMPACTS OF MINING, OCTOBER 2005

SCALE IN FEET

AEP MOUNTAINEER GENERATING PLANT - BOTTOM ASH PONDS
 GRAHAM STATION ROAD
 NEW HAVEN, WEST VIRGINIA

BOTTOM ASH POND LAYOUT AND WELL LOCATION MAP

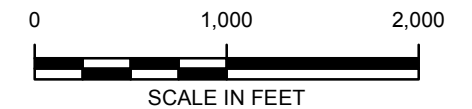


Legend

- Coal Combustion Residual (CCR) Unit
- ◆ Mountaineer Monitoring Well
- ◆ Sporn Monitoring Well
- ⊕ Production Well
- ◆ Firewater Supply Well
- Soil Boring Location
- ◆ Piezometer
- Cross Section Location
- ➔ Streamflow Direction
- ~ Rivers and Streams

NOTES:

1. 2015 AERIAL IMAGERY OBTAINED FROM ESRI IMAGE SERVICE
2. TOPOGRAPHY FROM AEP DRAWING MTLF_3-20-12_2729SF.DGN
3. MW-001 THROUGH MW-005 WELL COORDINATE SOURCE: GROUNDWATER QUALITY AT THE PHILIP SPORN AND MOUNTAINEER POWER PLANTS, MASON COUNTY, WEST VIRGINIA. EPRI. JUNE 1999 (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)
4. MONITORING WELL COORDINATES FOR MW-1601A THROUGH MW-1608 WERE SURVEYED BY AEP IN SEPTEMBER 2016 (WEST VIRGINIA 1927 STATE PLANAR COORDINATES)
5. ALL OTHER WELL LOCATIONS ARE BASED ON AEP-PROVIDED BORING LOGS (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)

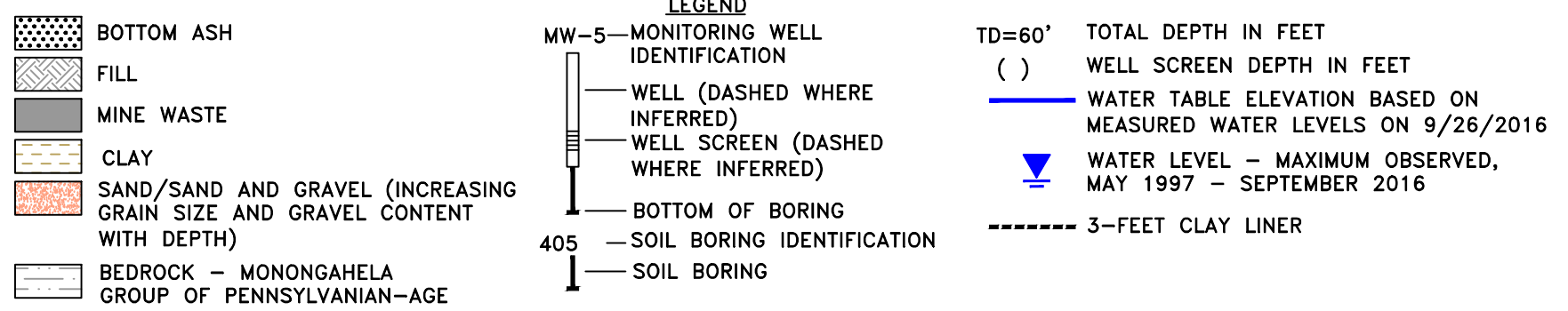
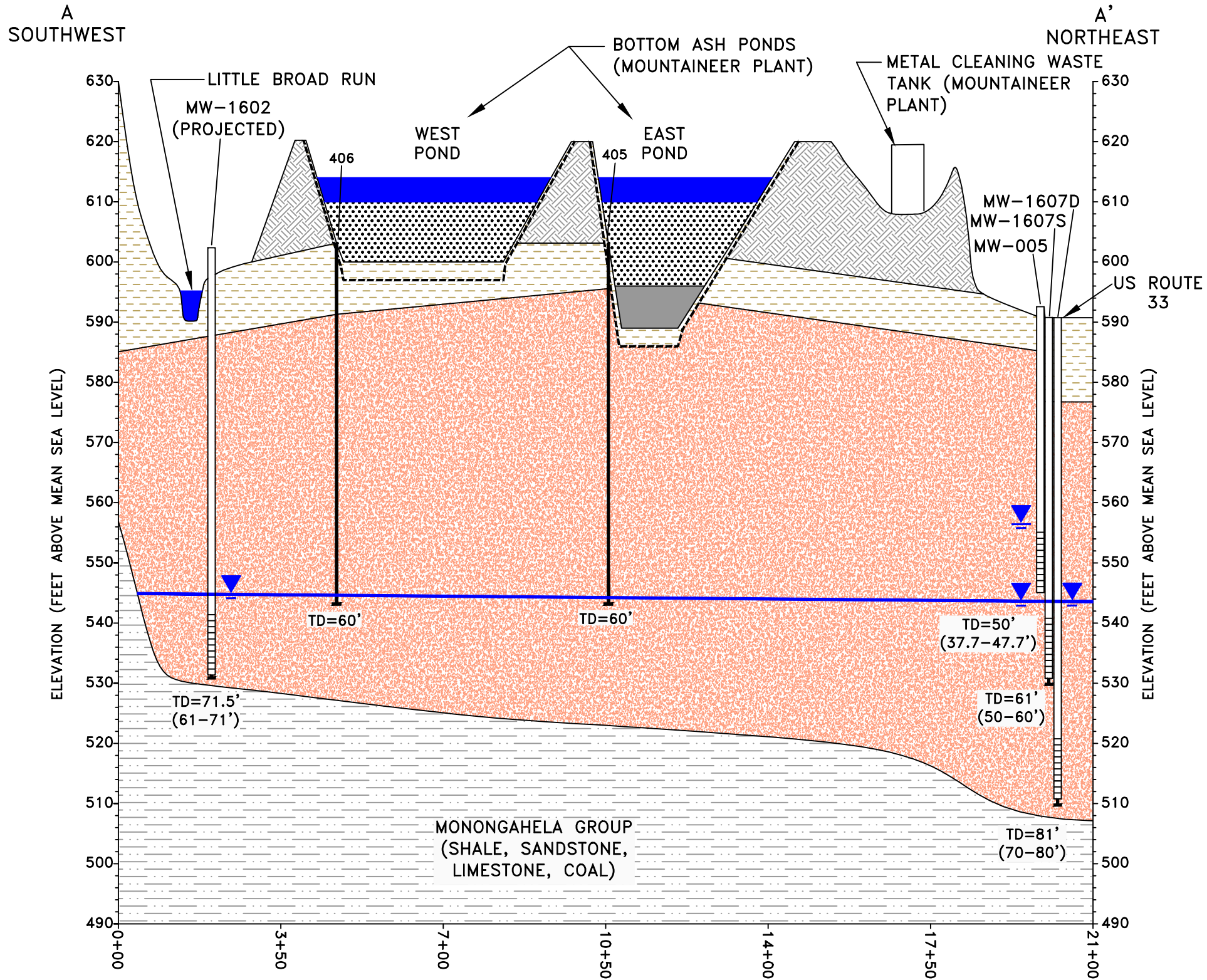


AEP MOUNTAINEER GENERATING PLANT - BOTTOM ASH PONDS
 GRAHAM STATION ROAD
 NEW HAVEN, WEST VIRGINIA

CROSS SECTION LOCATION MAP



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 C:\ENVCAD\bin\plot\plotter.ctb (PLOT) 10/16/2016 11:58 AM ACADVER: 19.1S (LMS TECH) PAGES: 10/16 PLOTTABLE: ACAD.CTB PLOTTED: 10/16/2016 2:55 PM BY: SMITH, BOB



VERTICAL SCALE: 1-INCH = 20- FEET
 HORIZONTAL SCALE: AS SHOWN
 NOTE: 1. BASE OF BOTTOM ASH PONDS BASED ON AEP DWG. No. 1-3018A-7.
 REFERENCE: CROSS SECTION MODIFIED FROM EPRI, 1999.

AEP MOUNTAINEER GENERATING PLANT - BOTTOM ASH PONDS
 GRAHAM STATION ROAD
 NEW HAVEN, WEST VIRGINIA

CROSS SECTION A-A'


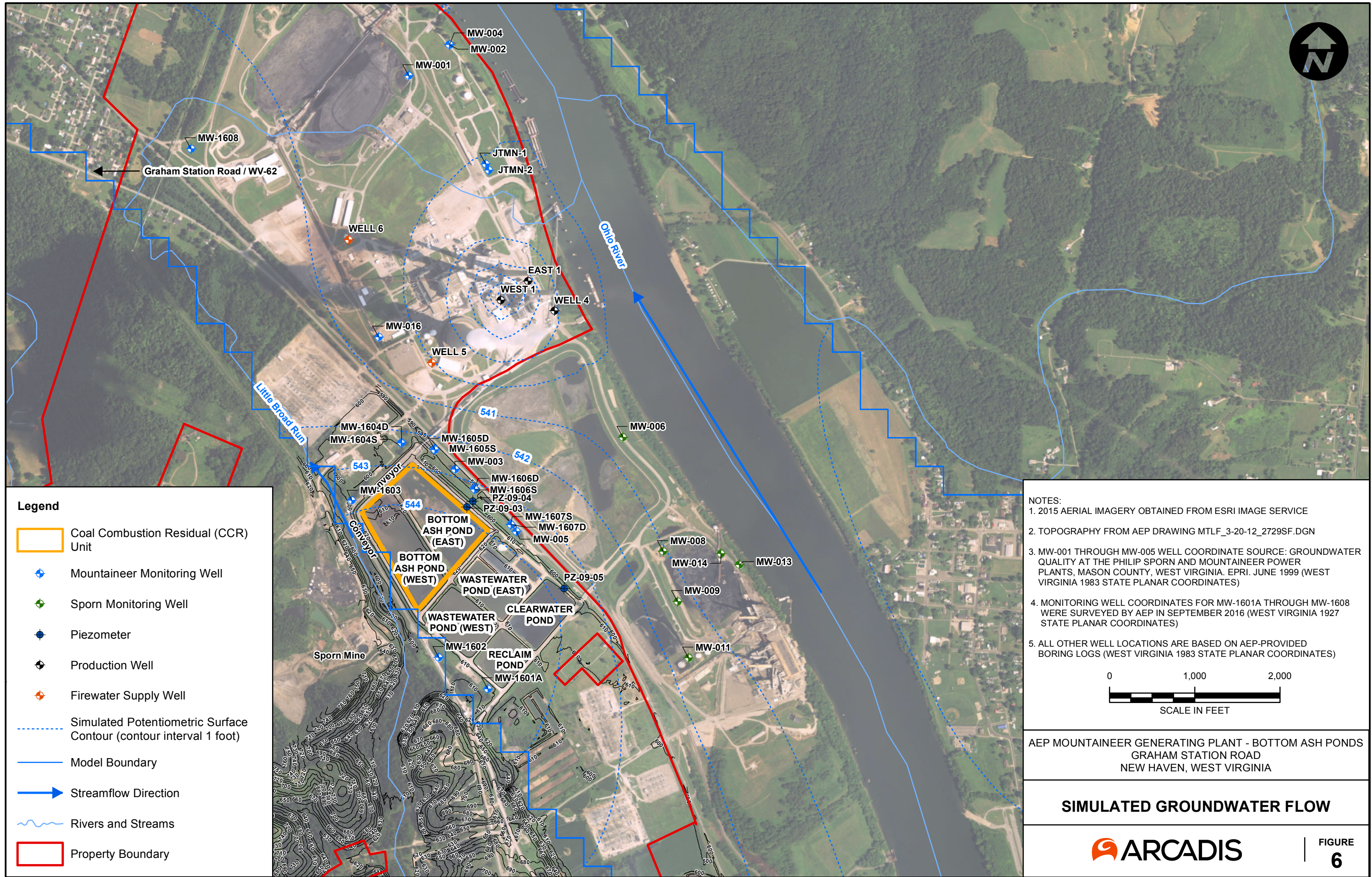


FIGURE **5**

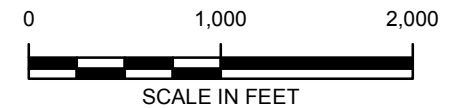


Legend

- Coal Combustion Residual (CCR) Unit
- Mountaineer Monitoring Well
- Sporn Monitoring Well
- Piezometer
- Production Well
- Firewater Supply Well
- Simulated Potentiometric Surface Contour (contour interval 1 foot)
- Model Boundary
- Streamflow Direction
- Rivers and Streams
- Property Boundary

NOTES:

1. 2015 AERIAL IMAGERY OBTAINED FROM ESRI IMAGE SERVICE
2. TOPOGRAPHY FROM AEP DRAWING MTLF_3-20-12_2729SF.DGN
3. MW-001 THROUGH MW-005 WELL COORDINATE SOURCE: GROUNDWATER QUALITY AT THE PHILIP SPORN AND MOUNTAINEER POWER PLANTS, MASON COUNTY, WEST VIRGINIA. EPRI. JUNE 1999 (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)
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5. ALL OTHER WELL LOCATIONS ARE BASED ON AEP-PROVIDED BORING LOGS (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)

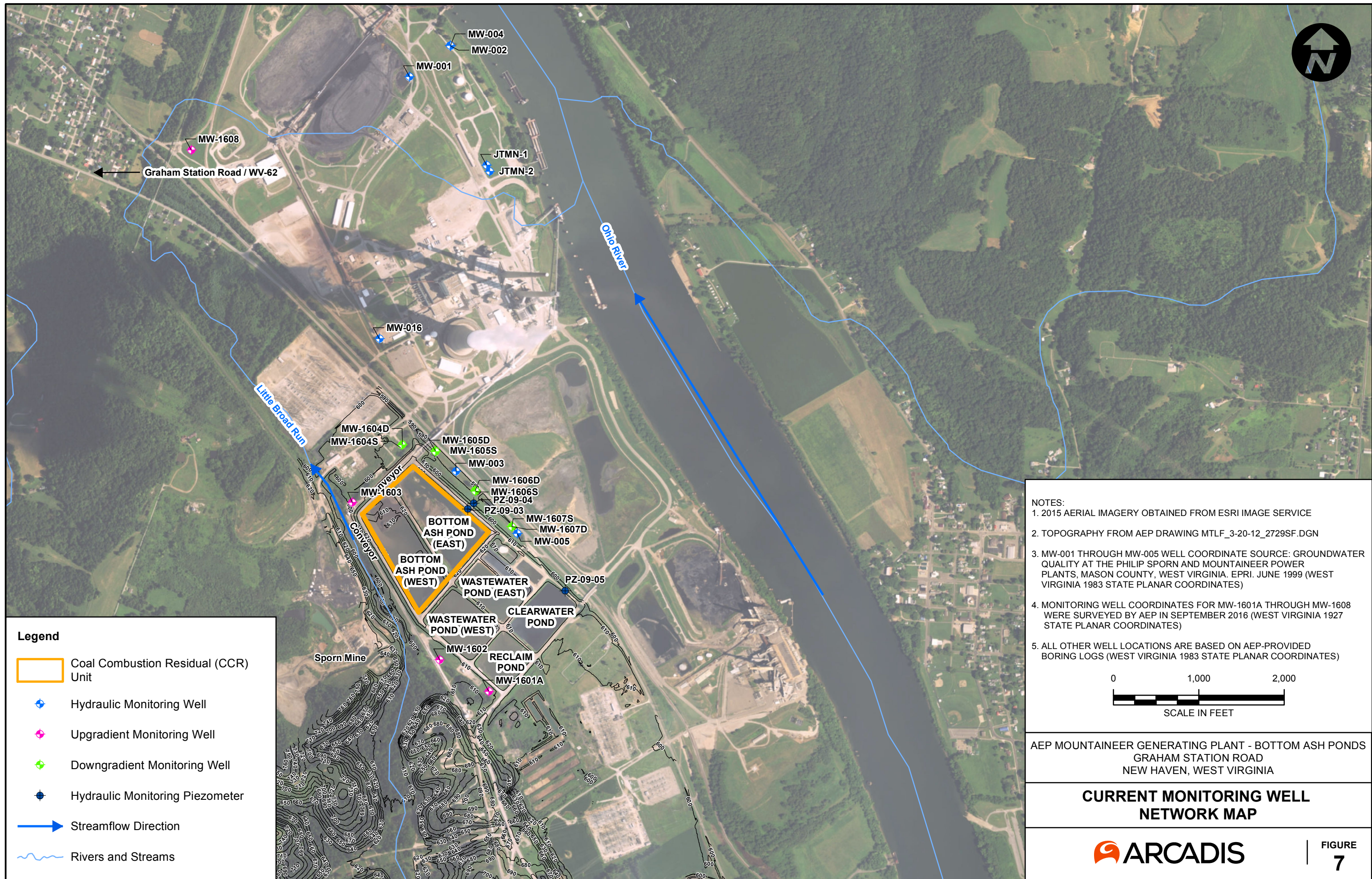


AEP MOUNTAINEER GENERATING PLANT - BOTTOM ASH PONDS
 GRAHAM STATION ROAD
 NEW HAVEN, WEST VIRGINIA

SIMULATED GROUNDWATER FLOW



City: CITRIX Div/Group: IM/DV Created By: K.Ives Last Saved By: webbb
 OH:015976.0009.00001 (Mountaineer Ash Pond)
 Z:\GIS\PROJECTS_ENV\AEP\Mountaineer\MXD\Ash Pond Report\Updated September 2016\F7_Mtr Ash Pond Current Monitoring Well Network.mxd 10/5/2016 12:14:13 PM

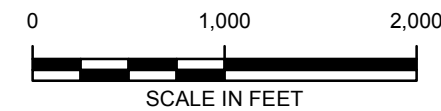


Legend

- Coal Combustion Residual (CCR) Unit
- ◆ Hydraulic Monitoring Well
- ◆ Upgradient Monitoring Well
- ◆ Downgradient Monitoring Well
- Hydraulic Monitoring Piezometer
- ➔ Streamflow Direction
- ~ Rivers and Streams

NOTES:

1. 2015 AERIAL IMAGERY OBTAINED FROM ESRI IMAGE SERVICE
2. TOPOGRAPHY FROM AEP DRAWING MTLF_3-20-12_2729SF.DGN
3. MW-001 THROUGH MW-005 WELL COORDINATE SOURCE: GROUNDWATER QUALITY AT THE PHILIP SPORN AND MOUNTAINEER POWER PLANTS, MASON COUNTY, WEST VIRGINIA. EPRI. JUNE 1999 (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)
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5. ALL OTHER WELL LOCATIONS ARE BASED ON AEP-PROVIDED BORING LOGS (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)



AEP MOUNTAINEER GENERATING PLANT - BOTTOM ASH PONDS
 GRAHAM STATION ROAD
 NEW HAVEN, WEST VIRGINIA

CURRENT MONITORING WELL NETWORK MAP



APPENDIX A

Boring/Well Construction Logs





Casagrande Consultants 1977

Soil Boring Logs





**401 to 415, 505, 506, 513, 514,
701 to 703, 801 to 803**

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company Appalachian Power Company
Project Project 1301 - Ash Ponds

Boring No. 401 Date 1-21-77 Sheet 1 of 3
Type of Boring Auger Rig B-50
Casing used _____ Size _____ Drilling mud used _____
Boring begun 1-21-77 Boring completed 1-24-77
Ground Elevation 596.14' referred to _____ Datum _____
Field Party: King and Smithson

Location of Boring:	
Water Level	<u>47'</u>
Time	
Date	<u>1-24-77</u>

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
					3		
					4		
	<u>1</u>	<u>3.5-5</u>	<u>5/6</u> <u>10</u>	<u>14"</u>	4		<u>Medium brown clayey silty sand.</u>
					5		
					6		
					7		
					8		
					9		
	<u>2</u>	<u>8.5-10</u>	<u>5/5</u>	<u>6"</u>	9		<u>Same as sample number 1.</u>
					10		
					11		
					12		
					13		
					14		
	<u>3</u>	<u>13.5-15</u>	<u>5/6</u> <u>6</u>	<u>6"</u>	14		<u>Same as sample number 1 but more sandy.</u>
					15		
					16		
					17		
					18		
					19		
	<u>4</u>	<u>18.5-20</u>	<u>16/17</u> <u>18</u>	<u>4"</u>	19		<u>Sand and gravel.</u> <u>Large gravel in end of spoon.</u>
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 401 Date 1-24-77 Sheet 2 of 3

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: King and Smithson

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23		
	5	23.5-25	19/ 25/24	10"	24	/	Medium brown coarse sand and gravel.
					25		
					26		
					27		
					28		
	6	28.5-29.5	45/ 60	6"	29	/	Dense sand and gravel.
					30		
					31		
					32		
					33		
	7	33.5-35	14/ 17/21	10"	34	/	More sand.
					35		
					36		
					37		
					38		
	8	38.5-40	13/ 16/17	12"	39	/	Same as sample number 7.
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 401 Date 1-24-77 Sheet 3 of 3

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____





Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: King and Smithson

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
	9	43.5-45	15/ 19/ 25	14"	44		
					45		Wet medium brown sand and gravel.
					46		
					47		Water
					48		
	10	48.5-50	15/ 20/ 21	16"	49		
					50		More sandy.
					51		
					52		Washed out 3' plug in augers.
					53		
	11	53.5-55	16/ 23/ 29	8"	54		
					55		Same as sample number 10.
					56		
					57		Washed out 2' plug in augers.
					58		
	12	58.5-60	32/ 16/ 23	10"	59		
					60		Medium brown sand and gravel w/sandstone fragments Stopped here at 60.0' 1-24-77
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Project Project 1301 - Proposed Ash Pond Area

Boring No. 402 Date 10-28-76 Sheet 1 of 3

Type of Boring Auger Rig B-61





Casing used _____ Size _____ Drilling mud used _____

Boring begun 10-28-76 Boring completed 10-28-76

Ground Elevation 597.40' referred to _____ Datum

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	45.5'
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					0		
					1		
					2		
					3		
	1	3-4.5	4/4/6	17"	3		Medium brown clayey silt.
					4		
					5		
					6		
					7		
					8		
	2	8-9.5	3/4/5	13"	8		Same as sample number 1.
					9		
					10		
					11		
					12		
					13		
	3	13-14.5	3/4/4	13"	13		Medium brown clayey fine sand.
					14		
					15		
					16		
					17		
					18		
	4	18-19.5	3/9/10	14"	18		Same as sample number 3
					19		
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING





Job No. _____

Company _____

Project _____

Location of Boring:	
Water Level	45.5'
Time	
Date	

Boring No. 402 Date 10-28-76 Sheet 2 of 3
 Type of Boring _____ Rig _____
 Casing used _____ Size _____ Drilling mud used _____
 Boring begun _____ Boring completed _____
 Ground Elevation _____ referred to _____ Datum _____
 Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					20		
					21		
					22		
					23		
	5	23-24.5	7/7/5	12"	24		Medium brown sand and gravel.
					25		
					26		
					27		
					28		
	6	28-29.5	7/8/10	13"	29		Medium brown sand w/trace of gravel.
					30		
					31		
					32		
					33		
	7	33-34.5	10/14/17	14"	34		Same as sample number 6 w/more gravel.
					35		
					36		
					37		
					38		
	8	38-39.5	9/15/13	1"	39		Same as sample number 6 - Large gravel in end of spoon.
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 402 | Date 10-28-76 Sheet 3 of 3

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____





Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Project _____

Location of Boring:	
Water Level	45.5
Time	
Date	

Field Party: Roush and REitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
	9	43-44.5	9/6/8	-	44		No recovery.
					45		Water
					46		
					47		
					48		
	10	48-49.5	6/9/11	13"	49		Medium brown sand w/trace of gravel.
					50		
					51		
					52		
					53		
	11	53-54.5	7/8/10	12"	54		Same as sample number 10.
					55		
					56		
					57		
					58		
	12	58-59.5	8/11/12	11"	59		Same as sample number 10. Stopped hole at 59.5' 10-28-76
					60		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Boring No. 403 Date 10-29-76 Sheet 1 of 3

Type of Boring Auger Rig B-61

Casing used _____ Size _____ Drilling mud used _____

Boring begun 10-29-76 Boring completed 10-29-76

Ground Elevation 591.09 referred to _____ Datum

Project Project 1301 - Proposed Ash Pond Area

Location of Boring:	
Water Level	50.5
Time	
Date	

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
	1	3-4.5	4 5/7	17"	3		Medium brown clayey silt.
					4		
					5		
					6		
					7		
	2	8-9.5	4 3/4	13"	8		Same as sample number 1.
					9		
					10		
					11		
					12		
	3	13-14.5	6 7/6	13"	13		Same as sample number 1. Medium brown, medium grain sand and gravel.
					14		
					15		
					16		
					17		
	4	18-19.5	4 5/5	12"	18		Same as sample number 3 w/less gravel.
					19		
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 403 Date 10-29-76 Sheet 2 of 3

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	50.5
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23		
	5	23-24.5	5/ 5/4	12"	24		Medium brown, medium grain sand w/trace of gravel.
					25		
					26		
					27		
					28		
	6	28-29.5	4/ 5/7	12"	29		Same as sample number 5 w/medium and fine grain gravel.
					30		
					31		
					32		
					33		
	7	33-34.5	6/ 6/8	12"	34		Same as sample number 5 w/more gravel.
					35		
					36		
					37		
					38		
	8	38-39.5	5/ 8/12	13"	39		Same as sample number 7.
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 403 Date 10-29-76 Sheet 3 of 3

Project _____

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	50.5
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from top (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
	9	43-44.5	8/ 13/ 14	14"	44	///	Light brown medium grain sand w/trace of gravel.
					45		
					46		
					47		
					48		
	10	48-49.5	9/ 15/ 19	15"	49	///	Medium brown sand and gravel.
					50		Water
					51		
					52		
					53		
	11	53-54.5	7/ 10/ 13	0	54	///	No recovery.
					55		
					56		
					57		
					58		
	12	58-59.5	8/ 11/ 12	13"	59	///	Medium and dark brown sand and gravel. Stopped hole at 59.5 10-29-76
					60		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Project Project 1301 - Proposed Ash Pond Area

Boring No. 404 Date 10-28-76 Sheet 1 of 3

Type of Boring Auger Rig B-61





Casing used _____ Size _____ Drilling mud used _____

Boring begun 10-28-76 Boring completed 10-28-76

Ground Elevation 600.27' referred to _____ Datum

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	47.0'
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					0		Boring off set about 15' east because of corn field.
					1		
					2		
	1	3-4.5	3 1/4 / 6	17"	3		Medium brown silty clay.
					4		
					5		
					6		
					7		
	2	8-9.5	3 1/6 / 8	13"	8		Same as sample number 1.
					9		
					10		
					11		
					12		
	3	13-14.5	3 1/4 / 6	7"	13		Medium brown clayey sand.
					14		
					15		
					16		
					17		
	4	18-19.5	6 / 5/8	12"	18		Medium brown sand and gravel.
					19		
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 404 Date 10-28-76 Sheet 2 of 3

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____





Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Project _____

Location of Boring:	
Water Level	47.0'
Time	
Date	

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23		
	5	23-24.5	5/9/9	12"	24		Medium brown fine sand and gravel.
					25		
					26		
					27		
					28		
	6	28-29.5	11/6/5	11"	29		Same as sample number 5.
					30		
					31		
					32		
					33		
	7	33-34.5	4/5/5	7"	34		Medium brown fine sand w/trace of gravel.
					35		
					36		
					37		
					38		
	8	38-39.5	12/12/11	14"	39		Same as sample number 7 w/light brown sand
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Project _____

Boring No. 404 Date 10-28-76 Sheet 3 of 3

Type of Boring _____ Rig _____





Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	47.0'
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
	9	43-44.5	5/8/13	13"	44		Medium brown fine sand w/trace of gravel.
					45		
					46		
					47		Water
					48		
	10	48-49.5	4/6/9	14"	49		Same as sample number 9.
					50		
					51		
					52		
					53		
	11	53-54.5	3/4/6	18"	54		Same as sample number 9 w/medium grain sand.
					55		
					56		
					57		
					58		
	12	58-59.5	4/7/8	-	59		No recovery.
					60		Stopped hole at 59.5'
							10-28-76
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Project Project 1301 - Ash Pond

Boring No. 405 Date 1-24-77 Sheet 1 of 3

Type of Boring Auger Rig B-50





Casing used _____ Size _____ Drilling mud used _____

Boring begun 1-24-77 Boring completed 1-25-77

Ground Elevation 603.14 referred to _____ Datum _____

Field Party: King and Smithson

Location of Boring:	
Water Level	51.0'
Time	
Date	1-24-77

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					0		
					1		
					2		
					3		
	1	3.5-5	2/ 4/3	5"	4		Fragments of clay with silt.
					5		
					6		
					7		
					8		
	2	8.5-10	5/ 6/7	8"	9		Brown sand.
					10		
					11		
					12		
					13		
	3	13.5-15	7/ 8/9	7"	14		Same as sample number 2 w/some larger grains.
					15		
					16		
					17		
					18		
					19		
	4	18.5-20	4/ 4/7	6"	20		Same as sample number 3.
					21		
					22		
					23		
					24		
					25		
					26		
					27		
					28		
					29		
					30		
					31		
					32		
					33		
					34		
					35		
					36		
					37		
					38		
					39		
					40		
					41		
					42		
					43		
					44		
					45		
					46		
					47		
					48		
					49		
					50		
					51		
					52		
					53		
					54		
					55		
					56		
					57		
					58		
					59		
					60		
					61		
					62		
					63		
					64		
					65		
					66		
					67		
					68		
					69		
					70		
					71		
					72		
					73		
					74		
					75		
					76		
					77		
					78		
					79		
					80		
					81		
					82		
					83		
					84		
					85		
					86		
					87		
					88		
					89		
					90		
					91		
					92		
					93		
					94		
					95		
					96		
					97		
					98		
					99		
					100		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 405 Date 1-24-77 Sheet 2 of 3

Project _____

Type of Boring _____ Rig _____



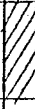

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: King and Smithson

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23		
	5	23.5-25	4/ 4/8	6"	24		Light brown sand.
					25		
					26		
					27		
					28		
	6	28.5-30	6/ 8/7	5"	29		Larger grain sand with small gravel light brown.
					30		
					31		
					32		
					33		
	7	33.5-35	8/ 11/11	6"	34		Medium grain sand - light brown.
					35		
					36		
					37		
					38		
	8	38.5-40	11/ 11/15	6"	39		Gravelly sand - light brown.
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY LOG OF BORING

Job No. _____

Company _____

Boring No. 405 Date 1-25-77 Sheet 3 of 3

Project _____

Type of Boring _____ Rig _____

Location of Boring:	
Water Level	
Time	
Date	

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: King and Smithson

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					40		
					41		
					42		
					43		
	9	43.5-45	4 1/6	5"	44	//	
					45		Same as sample number 8 with more gravel.
					46		
					47		
					48		
	10	48.5-50	9 9/11	8"	49	//	
					50		Small gravel with some sand.
					51		Water
					52		
					53		
	11	53.5-55	4 1/8	10"	54	//	
					55		Brown medium grain sand.
					56		
					57		
					58		
	12	58.5-60	4 4/7	8"	59	//	
					60		Fine medium brown sand. Stopped hole at 60.0'
					1		1-25-77

Engineer _____

Job No. _____

Company Appalachian Power Company

Project Project 1301 - Ash Pond

Boring No. 406 Date 1-25-77 Sheet 1 of 3

Type of Boring Auger Rig B-50





Casing used _____ Size _____ Drilling mud used _____

Boring begun 1-25-77 Boring completed 1-25-77

Ground Elevation 603.14 referred to _____

Field Party: King and Smithson Date _____

Location of Boring:	
Water Level	51.0'
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					0		
					1		
					2		
	1	3.5-5	3/ 5/7	18"	3		
					4		Silty clay.
					5		
					6		
					7		
					8		
	2	8.5-10	3/ 4/5	8"	9		
					10		Same as sample number 1.
					11		
					12		
					13		
	3	13.5-15	5/ 6/7	6"	14		
					15		Light brown sand.
					16		
					17		
					18		
					19		
	4	18.5-20	4/ 4/6	8"	20		
					21		Medium grain sand with trace of small gravel.
					22		
					23		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 406 Date 1-25-77 Sheet 2 of 3

Project _____

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: King and Smithson _____ Date _____

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23		
	5	23.5-25	5/6/7	9"	24	[Hatched]	
					25		Light brown medium grain sand.
					26		
					27		
					28		
	6	28.5-30	5/6/7	6"	29	[Hatched]	
					30		Same as sample number 5 w/larger grain.
					31		
					32		
					33		
	7	33.5-35	10/12/12	6"	34	[Hatched]	
					35		Light brown to light gray sand.
					36		
					37		
					38		
	8	38.5-40	8/12/16	10"	39	[Hatched]	
					40		Same as sample number 7.
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY LOG OF BORING

Job No. _____

Company _____

Boring No. 406 Date 1-25-77 Sheet 3 of 3

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Type of Boring _____ Rig _____
 Casing used _____ Size _____ Drilling mud used _____
 Boring begun _____ Boring completed _____
 Ground Elevation _____ referred to _____
 Field Party: King and Smithson

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					40		
					41		
					42		
					43		
	9	43.5-45	18/ 18 1/2	9"	44		Same as sample number 8.
					45		
					46		
					47		
					48		
	10	48.5-50	10/ 17 1/2	6"	49		Medium brown sand w/trace of coal.
					50		
					51		Water
					52		
					53		
	11	53.5-55	10/ 14 1/2	5"	54		Grayish gravelly sand.
					55		
					56		
					57		
					58		
	12	58.5-60	14/ 16 1/7		59		Small gravelly sand (dark)
					60		
					1		Stopped hole at 60'

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Project Project 1301 - Proposed Ash Pond Area

Boring No. 407 Date 10-27-76 Sheet 1 of 3

Type of Boring Auger Rig B-61





Casing used _____ Size _____ Drilling mud used _____

Boring begun 10-27-76 Boring completed 10-27-76

Ground Elevation 613.27' referred to _____ Datum

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	<u>Dry</u>
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
					3		
	1	3-4.5	3/4/3	8"	3		Medium coarse and brown sand.
					4		
					5		
					6		
					7		
					8		
	2	8-9.5	3/3/3	8"	8		Same as sample number 1.
					9		
					10		
					11		
					12		
					13		
	3	13-14.5	3/4/6	12"	13		Same as sample number 1.
					14		
					15		
					16		
					17		
					18		
	4	18-19.5	11/7/6	14"	18		Same as sample number 1.
					19		
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 407 Date 10-27-76 Sheet 2 of 3

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					20		
					21		
					22		
					23		
	5	23-24.5	6/6/7	10"	24		Medium brown and medium coarse sand.
					25		
					26		
					27		
					28		
	6	28-29.5	6/7/9	12"	29		Fine medium brown sand.
					30		
					31		
					32		
					33		
	7	33-34.5	9/10/15	12"	34		First six tenths fine sand. Second six tenths sand with small gravel.
					35		
					36		
					37		
					38		
	8	38-39.5	17/19/16	12"	39		Sand and small gravel.
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 407 Date 10-27-76 Sheet 3 of 3
 Type of Boring _____ Rig _____
 Casing used _____ Size _____ Drilling mud used _____
 Boring begun _____ Boring completed _____
 Ground Elevation _____ referred to _____ Datum _____
 Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		Ran through bolder.
					43		
	9	43-44.5	30/ 50 1/2	6"	44		Sand with larger gravel.
					45		
					46		
					47		
					48		
	10	48-49.5	15/ 20 1/4	12"	49		First six tenths sand. Second six tenths sand and gravel.
					50		
					51		
					52		
					53		
	11	53-54.5	13/ 20 1/8	14"	54		Sand with small gravel.
					55		
					56		
					57		
					58		
	12	58-59.5	20/ 18 1/2	14"	59		Same as sample number 11. Stopped hole at 59.5' 10-27-76
					60		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Project Project 1301 - Proposed Ash Pond Area

Location of Boring:	
Water Level	59.5
Time	
Date	

Boring No. 408 Date 10-27-76 Sheet 1 of 3

Type of Boring Auger Rig B-61

Casing used _____ Size _____ Drilling mud used _____

Boring begun 10-27-76 Boring completed 10-28-76

Ground Elevation 608.06' referred to _____ Datum

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		Boring offset about 40' because of corn field
					1		
					2		
	1	3-4.5	3 1/4 / 4	8"	3		Medium brown fine sand w/trace of gravel.
					4		
					5		
					6		
					7		
	2	8-9.5	3 1/4 / 4	18"	8		Same as sample number 1.
					9		
					10		
					11		
					12		
					13		
	3	13-14.5	3 1/3 / 5	14"	13		Same as sample number 1.
					14		
					15		
					16		
					17		
					18		
	4	18-19.5	4 1/3 / 3	12"	18		Same as sample number 1.
					19		
					20		
					1		




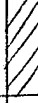
Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company _____
Project _____

Boring No. 408 Date 10-27-76 Sheet 2 of 3
Type of Boring _____ Rig _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring completed _____
Ground Elevation _____ referred to _____ Datum _____
Field Party: Roush and Reitmire

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					20		
					21		
					22		
	5	23-24.5	3/4/5	8"	23		Medium brown fine sand.
					24		
					25		
					26		
					27		
	6	28-29.5	8/12/14	14"	28		Light brown fine sand w/some gravel.
					29		
					30		
					31		
					32		
	7	33-34.5	12/14/20	18"	33		Light brown coarse sand w/some gravel.
					34		
					35		
					36		
					37		
	8	38-39.5	8/8/6	14"	38		Light brown coarse sand and gravel.
					39		
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 408 Date 10-27-76 Sheet 3 of 3





Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
	9	43-44.5	15/ 30/34	18"	44		Light brown sand and gravel.
					45		
					46		
					47		
					48		
	10	48-49.5	20/ 29/21	18"	49		Light brown coarse sand w/some gravel.
					50		
					51		
					52		
					53		
	11	53-54.5	10/ 11/10	14"	54		Light brown fine sand.
					55		
					56		
					57		
					58		
	12	58-59.5	5/ 6/6	12"	59		Coarse medium brown sand.
					60		Water
							Stopped hole at 59.5
							10-28-76
					1		





Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company Appalachian Power Company
Project Project 1301 - Proposed Ash Pond Area

Boring No. 410 Date 10-26-76 Sheet 1 of 3
Type of Boring Auger Rig B-61
Casing used _____ Size _____ Drilling mud used _____
Boring begun 10-26-76 Boring completed 10-26-76
Ground Elevation 604.65 referred to _____ Datum _____
Field Party: Roush and Retimire

Location of Boring:	
Water Level	51.5
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		Boring offset 5' east.
					1		
					2		
	1	3-4.5	2/4/4	5"	3		Medium brown fine sand.
					4		
					5		
					6		
					7		
	2	8-9.5	3/4/5	12"	8		Same as sample number 1 w/light colored sand.
					9		
					10		
					11		
					12		
	3	13-14.5	5/5/6	14"	13		Same as sample number 2.
					14		
					15		
					16		
					17		
	4	18-19.5	6/7/8	14"	18		Same as sample number 2 w/some gravel.
					19		
					20		
					1		

Engineer _____

**AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING**

Job No. _____

Company _____

Boring No. 410 Date 10-22-76 Sheet 2 of 3

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: Roush and REitmire

Project _____	
Location of Boring: _____	
Water Level	_____
Time	_____
Date	_____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					20		
					21		
					22		
	5	23-24.5	8/10/11	14"	23	[Hatched]	Medium brown sand and gravel.
					24		
					25		
					26		
					27		
	6	28-29.5	8/8	13"	28	[Hatched]	Same as sample number 5.
					29		
					30		
					31		
					32		
	7	33-34.5	6/9/12	15"	33	[Hatched]	Same as sample number 5.
					34		
					35		
					36		
					37		
	8	38-39.5	6/10/12	13"	38	[Hatched]	Same as sample number 5.
					39		
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Project _____

Boring No. 410 Date 10-26-76 Sheet 3 of 3

Type of Boring _____ Rig _____





Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	51.5'
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
	9	43-44.5	12/17	8"	44		Medium brown sand w/trace of gravel.
					45		
					46		
					47		
					48		
	10	48-49.5	5/10	13"	49		Same as sample number 9.
					50		
					51		Water
					52		
					53		
	11	53-54.5	7/10	17"	54		Same as sample number 9 w/more gravel.
					55		
					56		
					57		
					58		
	12	58-59.5	14/13	16"	59		Same as sample number 11. Stopped hole at 59.5 10-26-76
					60		
					1		





Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
 Company Appalachian Power Company
 Project Project 1301 - Proposed Ash Pond Area

Boring No. 411 Date 10-27 76 Sheet 1 of 3
 Type of Boring Auger Rig B-61
 Casing used _____ Size _____ Drilling mud used _____
 Boring begun 10-22-76 Boring completed 10-26-76
 Ground Elevation 607.25 referred to _____ Datum
 Field Party: Roush and Reitmire

Location of Boring:	
Water Level	55'
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		Moved boring 5' north
					1		
					2		
	1	3-4.5	3/4/4	14"	3		Medium brown fine sand.
					4		
					5		
					6		
					7		
	2	8-9.5	3/4/4	12"	8		Same as sample number 1.
					9		
					10		
					11		
					12		
	3	13-14.5	8/3/5	14"	13		Same as sample number 1.
					14		
					15		
					16		
					17		
	4	18-19.5	5/5	12"	18		Same as sample number 1.
					19		
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Project _____

Boring No. 411 Date 10-26-76 Sheet 2 of 3

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	55'
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23		
	5	23-24.5	7 1/5 / 4	8"	24		Medium brown fine sand.
					25		
					26		
					27		
					28		
	6	28-29.5	5 1/4 / 5	5"	29		Light brown fine sand.
					30		
					31		
					32		
					33		
	7	33-34.5	6 1/8 / 5	8"	34		Medium brown sand w/trace of gravel.
					35		
					36		
					37		
					38		
	8	38-39.5	4 1/5 / 5	10"	39		Light brown fine sand.
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 411 Date 10-26-76 Sheet 3 of 3

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Project _____

Location of Boring:	
Water Level	55'
Time	
Date	

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
	9	43-44.5	8 9/13	14"	44		Medium brown sand and gravel.
					45		
					46		
					47		
					48		
	10	48-49.5	5 6/11	13"	49		Same as sample number 9 w/less gravel.
					50		
					51		
					52		
					53		
	11	53-54.5	6 9/12	13"	54		Same as sample number 9
					55		Water
					56		
					57		
					58		
	12	58-59.5	8 6/6	15"	59		Same sample number 9.
					60		Stopped hole at 59.5' 10-26-76
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY LOG OF BORING

Job No. _____
 Company Appalachian Power Company
 Project Project 1301 - Ash Ponds
 Location of Boring: _____
 Water Level 52.0'
 Time _____
 Date 1-26-77

Boring No. 412 Date 1-26-77 Sheet 1 of 3
 Type of Boring Auger Rig B-50
 Casing used _____ Size _____ Drilling mud used _____
 Boring begun 1-26-77 Boring completed 1-27-77
 Ground Elevation 600.49' referred to _____ Datum _____
 Field Party: King and Smithson

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					0		
					1		
					2		
					3		
	1	3.5-5	$10\frac{1}{11}$ / 15	18"	4	[Hatched Box]	Sandy, silty clay.
					5		
					6		
					7		
					8		
	2	8.5-10	$11\frac{1}{8}$ / 8	8"	9	[Hatched Box]	Red sand - medium grain.
					10		
					11		
					12		
					13		
	3	13.5-15	$3\frac{1}{4}$ / 7	9"	14	[Hatched Box]	Medium grain brown sand.
					15		
					16		
					17		
					18		
	4	18.5-20	$3\frac{1}{4}$ / 3	5"	19	[Hatched Box]	Fine grain brown sand
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Project _____

Boring No. 412 Date 1-26-77 Sheet 2 of _____

Type of Boring _____ Rig _____





Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: King and Smtihson

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23		
	5	23.5-25	11 7/7	6"	24		
					25		Medium grain sand - light brown.
					26		
					27		
					28		
	6	28.5-30	4/ 3/3	9"	29		
					30		Medium to fine grain sand.
					31		
					32		
					33		
	7	33.5-35	6/ 6/6	8"	34		
					35		Same as sample number 6.
					36		
					37		
					38		
	8	38.5-40	8/ 11/10	6"	39		
					40		Medium grain sand w/one large gravel.
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Project _____

Boring No. 412 Date 1-27-77 Sheet 3 of _____
 Type of Boring _____ Rig _____
 Casing used _____ Size _____ Drilling mud used _____
 Boring begun _____ Boring completed _____
 Ground Elevation _____ referred to _____

Location of Boring:	
Water Level	
Time	
Date	

Field Party: King and Smithson

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					40		Soil type, color, texture, consistency, sampler driving not blows per foot on casing, depths wash water lost, observe fluctuations in water level, notes on drilling ease, etc.
					41		
					42		
					43		
	9	43.5-45	10/9/15	7"	44		
					45		Medium grain sand - light brown Trace of coal.
					46		
					47		
					48		
	10	48.5-50	9/12/15	7"	49		
					50		Same as sample number 9 w/no coal.
					51		
					52		Water
					53		
	11	53.5-55	8/9/8	12"	54		
					55		Medium grain sand.
					56		
					57		
					58		
	12	58.5-60	16/9/11	-0-	59		
					60		No recovery. Stopped hole at 60.0' 1-27-77
					1		

Engineer _____





AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____
 Company Appalachian Power Company
 Project Project 1301 - Ash Pond Area

Boring No. 413 Date 3-3-77 Sheet 1 of 3
 Type of Boring Auger Rig B-50
 Casing used _____ Size _____ Drilling mud used _____
 Boring begun 3-3-77 Boring completed 3-3-77
 Ground Elevation _____ referred to _____ Datum _____
 Field Party: Smithson and Smith

Location of Boring:	
Water Level	50'
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
					3		
	1	3.5-5	⁵ / _{5/6}	6"	4		Medium brown sand w/small pea gravel.
					5		
					6		
					7		
					8		
	2	8.5-10	⁴ / _{3/4}	7"	9		Same as sample number 1.
					10		
					11		
					12		
					13		
	3	13.5-15	⁵ / _{3/4}	9"	14		Medium brown sand w/legnite.
					15		
					16		
					17		
					18		
	4	18.5-20	⁴ / _{7/8}	10"	19		Medium brown sand w/some pea gravel.
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY LOG OF BORING

Job No. _____

Company _____

Boring No. 413 Date 3-3-77 Sheet 2 of 3

Project _____

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: Smithson and Smith

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23		
	5	23.5-25	7 6/7	8"	24	/ / / / /	Medium brown sand w/trace of pea gravel.
					25		
					26		
					27		
					28		
	6	28.5-30	6 7/6	7"	29	/ / / / /	Same as sample number 5.
					30		
					31		
					32		
					33		
	7	33.5-35	9 12/12	11"	34	/ / / / /	Medium brown medium coarse sand and gravel.
					35		
					36		
					37		
					38		
	8	38.5-40	6 8/11	12"	39	/ / / / /	Same as sample number 7.
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY LOG OF BORING

Job No. _____

Company _____





Boring No. 413 Date 3-3-77 Sheet 3 of 3

Type of Boring _____ Rig _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring completed _____
Ground Elevation _____ referred to _____ Datum _____

Project _____

Field Party: Smithson and Smith

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
	9	43.5-45	12/15/14	15"	44		Light brown sand and gravel. Very small claylike seam.
					45		Light brown sand and gravel.
					46		
					47		
					48		
	10	48.5-50	18/26/24	10"	49		Dark brown silty sand and gravel.
					50		Water
					51		
					52		
					53		
	11	53.5-55	10/12/11	12"	54		Light brown fine sand w/trace of gravel.
					55		
					56		
					57		
					58		
	12	58.5-60	5/8/10	9"	59		Dark brown silty sand.
					60		Stopped hole at 60.0' 3-3-77
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Project Project 1301 - Ash Pond Area

Boring No. 414 Date 3-3-77 Sheet 1 of 3

Type of Boring Auger Rig B-50





Casing used _____ Size _____ Drilling mud used _____

Boring begun 3-3-77 Boring completed 3-3-77

Ground Elevation _____ referred to _____ Datum _____

Field Party: Smithson and Smith

Location of Boring:	
Water Level	48'
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
					3		
	1	3.5-5	4/7/10	12"	4		Light brown silty clay.
					5		
					6		
					7		
					8		
	2	8.5-10	4/4/5	8"	9		Medium brown, medium silty sand.
					10		
					11		
					12		
					13		
	3	13.5-15	5/4/4	7"	14		Same as sample number 2 w/trace of pea gravel.
					15		
					16		
					17		
					18		
	4	18.5-20	6/5/5	10"	19		Same as sample number 3.
					20		
					1		

Engineer _____

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 414 Date 3-3-77 Sheet 2 of 3

Type of Boring _____ Rig _____





Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: Smithson and Smith

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					20		
					21		
					22		
					23		
	5	23.5-25	7/8/8	11"	24		Medium brown coarse sand and pea gravel.
					25		
					26		
					27		
					28		
	6	28.5-30	8/8/9	9"	29		Light brown fine sand.
					30		
					31		
					32		
					33		
	7	33.5-35	8/8/10	13"	34		Medium brown coarse sand and gravel (pea)
					35		
					36		
					37		
					38		
	8	38.5-40	8/10/10	8"	39		Same as sample number 7.
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 414 Date 3-3-77 Sheet 3 of 3

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

_____ Date _____

Field Party: Smithson and Smith





Project _____

Location of Boring: _____

Water Level _____

Time _____

Date _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					40		
					41		
					42		
					43		
	9	43.5-45	5/6/8	10"	44		Dark brown medium to coarse sand and pea gravel.
					45		
					46		
					47		
					48		Water
	10	48.5-50	10/13/14	14"	49		Medium brown silty sand and pea gravel.
					50		
					51		
					52		
					53		
	11	53.5-55	7/8/10	4"	54		Medium silty sand w/gravel.
					55		
					56		
					57		
					58		
	12	58.5-60	15/19/20	10"	59		Medium brown fine to medium coarse sand.
					60		Stopped hole at 60.0' 3-3-77
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Project Project I301 - ASH Pond Area

Boring No. 415 Date 3-8-77 Sheet 1 of _____

Type of Boring Auger Rig B-61

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation 3-8-77 referred to 3-8-77

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					0		
					1		
					2		
	1	3-4.5	2/4/4	14"	3	/	
					4	/	Medium brown clayey silt.
					5		
					6		
					7		
	2	8-9.5	4/5/7	13"	8	/	
					9	/	Medium brown clayey silt.
					10	/	Medium brown sand.
					11		
					12		
	3	13-14.5	3/4/6	8"	13	/	
					14	/	Medium brown, medium grain sand
					15		
					16		
					17		
	4	18-19.5	2/3/5	8"	18	/	
					19	/	Medium brown sand.
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Project _____

 Boring No. 415 Date 3-8-77 Sheet 2 of 3

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

 Field Party: Roush and Reitmire

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
	5	23-24.5	3 1/4 / 7	15"	23		
					24		Medium brown sand w/trace of pea gravel.
					25		
					26		
					27		
	6	28-29.5	5 / 8 / 8	13"	28		
					29		Same as sample number 5 w/more pea gravel.
					30		Medium brown coarse sand and pea gravel.
					31		
					32		
	7	33-34.5	6 / 10 / 12	14"	33		
					34		Medium brown sand and pea gravel.
					35		
					36		
					37		
	8	38-39.5	10 / 22 / 28	16"	38		
					39		Medium and medium brown coarse sand and gravel.
					40		Medium brown medium coarse sand and pea gravel w/trace of large gravel.
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Project _____

Boring No. 415 Date 3-8-77 Sheet 3 of _____

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					40		Soil type, color, texture, consistency, sampler driving notes blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					41		
					42		
	9	43-44.5	10/ 12/14	13"	43		Medium brown gravelly sand.
					44		
					45		
					46		
					47		
	10	48-49.5	11/ 13/15	14"	48		Medium brown sand and pea gravel.
					49		Water
					50		
					51		
					52		
	11	53-54.5	10/ 12/13	10"	53		Medium brown sand with pea gravel and lignite.
					54		
					55		
					56		
					57		
	12	58-59.5	11/ 12/15	11"	58		Medium brown coarse sand and pea gravel.
					59		
					60		Stopped hole at 59.5'
							3-8-77
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING





Job No. _____

Company Appalachian Power Company
Project Project 1301 - Conveyor

Boring No. 505 Date 11-17-76 Sheet 1 of 4
Type of Boring Auger Rig B-61
Casing used _____ Size _____ Drilling mud used _____
Boring begun 11-17-76 Boring completed 11-18-76
Ground Elevation 586.9' referred to _____ Datum

Location of Boring:	
Water Level	
Time	
Date	

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
	1	3-4.5	² / ₃	10"	3		Medium brown clay silt.
					4		
					5		
					6		
					7		
	2	8-9.5	² / ₃	8"	8		Top .3 medium brown silt remainder medium brown very wet pure silt.
					9		
					10		
					11		
					12		
	3	13-14.5	² / ₂	6"	13		Same as sample number 2.
					14		
					15		
					16		
					17		
	4	18-19.5	¹⁵ / ₁₇ / ₂₃	8"	18		Medium grain brown sand with gravel some broken gravel.
					19		
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 505 Date 11-17-76 Sheet 2 of 4

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____





Ground Elevation _____ referred to _____ Datum _____

Field Party: Roush and Reitmire

Project _____

Location of Boring: _____

Water Level	_____
Time	_____
Date	_____

Depth of Casing, ft.	Sample No.	Sample depth from top (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					20		
					21		
					22		
					23		
	5	23-24.5	16/ 18/22	10"	24		Sand and gravel with more smaller gravel.
					25		
					26		
					27		
					28		
	6	28-29.5	15/ 17/18	10"	29		Light to medium brown sand with medium amount of gravel.
					30		
					31		
					32		
					33		
	7	33-34.5	13/ 11/12	8"	34		Same as sample number 6.
					35		
					36		
					37		
					38		
	8	38-39.5	13/ 14/18	10"	39		Fine to medium grain sand with gravel. Some broken gravel.
					40		
					1		

Engineer _____

AMERICAN CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 505 Date 11-17-76 Sheet 3 of 4

Project _____

Type of Boring _____ Rig _____





Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: Roush & Reitmire

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		Water
	9	43-44.5	13/ 18/15	6"	44		Sand with small amount of small gravel.
					45		
					46		
					47		
	10	48-49.5	11/ 13/11	6"	48		Large grain sand with traces of larger gravel.
					49		
					50		
					51		
					52		
					53		
	11	53-54.5	11/ 11/13	6"	54		Top.3 large grain sand Remainder small to medium grain sand.
					55		
					56		
					57		
					58		
	12	58-59.5	11/ 13/15	10"	59		Medium to dark sand with small amount of gravel with traces of coal in the top of spoon.
					60		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY LOG OF BORING

Job No. _____

Company _____

Boring No. 505 Date 11-18-76 Sheet 4 of 4

Project _____

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					60		
					61		
					62		
					63		
	13	63-64.5	11/ 22/36	6"	64	//	Medium brown and grain sand with a few gravels.
					65		
					66		
					67		
					68		
	14	68-69.5	11/ 12/13	6"	69	//	Medium brown with large grain sand with some gravel.
					70		
					71		
					72		
					73		
	15	73-74.5	11/ 12/14	0	74	//	No recovery.
					75		
					76		
					77		
					78		
	16	78-79.5	65/ 2	0	79	//	Large gravel in end of spoon
					80		Rock Stopped hole at 80.6'
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Project Project 1301 - Conveyor

Boring No. 506 Date 11-17-76 Sheet 1 of 4

Type of Boring Auger Rig B-61





Casing used _____ Size _____ Drilling mud used _____

Boring begun 11-17-76 Boring completed 11-17-76

Ground Elevation 579.43' referred to _____ Datum

Field Party: Roush and REitmire

Location of Boring:	
Water Level	37.5
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					0		Elevation changed about 1' lower.
					1		
					2		
	1	3-4.5	2/4/4	6"	3		Dark brown pure silt.
					4		
					5		
					6		
					7		
	2	8-9.5	6/2/3	6"	8		Top .2 dark brown silt Remainder medium grain brown sand with small pieces of gravel.
					9		
					10		
					11		
					12		
	3	13-14.5	14/18/21	8"	13		Fine grain light brown sand with some small gravel.
					14		
					15		
					16		
					17		
	4	18-19.5	15/23/24	2"	18		Gravel with medium grain dark brown sand - one fragments of broken sandstone.
					19		
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 506 Date 11-17-76 Sheet 2 of 4

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____





Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					20		
					21		
					22		
					23		
	5	23-24.5	24/ 31/39	12"	24		Medium and light brown sand and gravel.
					25		
					26		
					27		
					28		
	6	28-29.5	26/ 56/50/ .3	12"	29		Same as sample number 5 w/large gravels in spoon.
					30		
					31		
					32		
					33		
	7	33-34.5	28/ 30/33	13"	34		Same as sample number 5.
					35		
					36		
					37		Water
					38		
	8	38-39.5	16/ 10/10	4"	39		Medium brown sand and gravel.
					40		
					1		

Engineer _____

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Project _____
Location of Boring: _____
Water Level _____
Time _____
Date _____

Boring No. 506 Date 11-17-76 Sheet 3 of 4
Type of Boring _____ Rig _____
Casing used _____ Size _____ Drilling mud used _____
Boring begun _____ Boring completed _____
Ground Elevation _____ referred to _____ Datum _____

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
	9	43-44.5	11/ 10/13	7"	44		Medium brown sand and gravel.
					45		
					46		
					47		
					48		
	10	48-49.5	10/ 22/34	6"	49		Medium brown, dark brown sand and small gravel w/traces of coal.
					50		
					51		
					52		
					53		
	11	53-54.5	13/ 15/18	5"	54		Medium brown sand and gravel.
					55		
					56		
					57		
					58		
	12	58-59.5	17/ 13/14	7"	59		Same as sample number 11 w/small gravel.
					60		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 506 Date 11-17-76 Sheet 4 of 4

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: Roush and Reitmire




Project _____

Location of Boring: _____

Water Level _____

Time _____

Date _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					60		
					61		
					62		
					63		
	13	63-64.5	15/ 24/30	14"	64		Medium brown sand and gravel.
					65		
					66		
					67		
					68		
	14	68-69.5	12/ 19/23	9"	69		Same as sample number 13.
					70		
					71		
					72		
					73		
	15	73-74.5	17/ 26/4	6"	74		Same as sample number 13.
					75		Stopped hole at 75.6'
					76		11-17-76
					77		
					78		
					79		
					80		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY





LOG OF BORING

Job No. _____
 Company Appalachian Power Company
 Project Project 1301 - Coal Handling

Boring No. 513 Date 2-3-77 Sheet 1 of 4
 Type of Boring Auger Rig B-50
 Casing used _____ Size _____ Drilling mud used _____
 Boring begun 2-3-77 Boring completed 2-3-77
 Ground Elevation 573.73 referred to _____ Datum

Location of Boring:	
Water Level	33.5
Time	
Date	2-3-77

Field Party: King and Smithson

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
					3		
	1	3.5-5	5/6/8	13"	4		Medium light and medium brown mottled silty clay.
					5		
					6		
					7		
					8		
	2	8.5-10	5/12/17	18"	9		Very stiff mottled brown silty clay.
					10		
					11		
					12		
					13		
	3	13.5-15	5/9/12	18"	14		Very stiff mottled brown silty clay.
					15		
					16		
					17		
					18		
	4	18.5-20	4/8/12	18"	19		Same as sample number 3.
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 513 Date 2-3-77 Sheet 2 of 4

Type of Boring Auger Rig B-50

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: King and Smithson

Project _____	
Location of Boring: _____	
Water Level	33.5
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23		
	5	23-24.5	3/4/5	18"	24	[Hatched]	Loose medium brown silty sand.
					25		
					26		
					27		
					28		
	6	25-29.5	23/24/25	14"	29	[Hatched]	Dense medium brown gray sand w/trace of silt.
					30		
					31		
					32		
					33		Water
	7	33.5-35	8/12/11	10"	34	[Hatched]	Medium brown to medium gray sand w/trace of silt.
					35		
					36		
					37		
					38		
	8	38.5-40	1/1/4	6"	39	[Hatched]	Loose medium brown and gray sand w/trace of silt.
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 513 Date 2-3-77 Sheet 3 of 4

Type of Boring Auger Rig B-50

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: King and Smithson

Project _____	
Location of Boring: _____	
Water Level	33.5
Time	
Date	2-3-77

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					0		
					1		
					2		
					3		
	9	43.5-45	5/7/9	0	4		Sand and gray wash water.
					5		
					6		
					7		
					8		
	10	48.5-50	5/9/11	4"	9		Medium brown sand and gravel.
					10		
					11		
					12		
	11	53.5-55	9/14/16	8"	14		Dense medium brown gray sand w/trace of silt.
					15		
					16		
					17		
					18		
	12	58.5-60	12/20/25	10"	19		Dense medium brown, gray sand.
					20		
					21		
					22		
					23		
					24		
					25		
					26		
					27		
					28		
					29		
					30		
					31		
					32		
					33		
					34		
					35		
					36		
					37		
					38		
					39		
					40		
					41		
					42		
					43		
					44		
					45		
					46		
					47		
					48		
					49		
					50		
					51		
					52		
					53		
					54		
					55		
					56		
					57		
					58		
					59		
					60		
					61		
					62		
					63		
					64		
					65		
					66		
					67		
					68		
					69		
					70		
					71		
					72		
					73		
					74		
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					76		
					77		
					78		
					79		
					80		
					81		
					82		
					83		
					84		
					85		
					86		
					87		
					88		
					89		
					90		
					91		
					92		
					93		
					94		
					95		
					96		
					97		
					98		
					99		
					100		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY LOG OF BORING

Job No. _____

Company _____

Boring No. 513 Date 2-3-77 Sheet 4 of 4

Type of Boring Auger Rig B-50

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: King and Smithson

Location of Boring:	
Water Level	33.5
Time	
Date	2-3-77

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					60		
					61		
					62		
					63		
	13	63.5-65	13/ 23/27	6"	64	//	Very dense medium brown and gray sand w/trace of silt.
					65		
					66		
					67		
					68		
	14	68.5-70	11/ 18/60	12"	69	//	Same as sample number 13. .2 gray sandstone in end of tube.
					70	//	
					1		Stopped hole at 70.0'
					2		2-3-77
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____





Company Appalachian Power Company

Project Project 1301- Coal Yard

Boring No. 514 Date 2-4-77 Sheet 1 of 4
 Type of Boring Auger Rig B-50
 Casing used _____ Size _____ Drilling mud used _____
 Boring begun 2-4-77 Boring completed 2-4-77
 Ground Elevation 573.09 referred to _____ Datum

Field Party: King and Smithson

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
					3		
	1	3.5-5	5/9/13	12"	4		Mottled light brown and rusty sandy silty clay w/rock fragments. Very stiff - dry -
					5		
					6		
					7		
					8		
	2	8.5-10	11/22/27	14"	9		Medium brown silty clayey sand w/gravel. dense-dry
					10		
					11		
					12		
					13		
					14		
	3	13.5-15	15/20/19	12"	14		Medium brown coarse sand and gravel. - dense-dry-
					15		
					16		
					17		
					18		
					19		
	4	18.5-20	15/16/20	10"	19		Medium brown coarse sand and gravel. dense - dry
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 514 Date 2-4-77 Sheet 2 of 4

Type of Boring Auger Rig B-50

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: King and Smithson





Project _____

Location of Boring: _____

Water Level _____

Time _____

Date _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					20		
					21		
					22		
					23		
					24		
	5	23.5-25	19/19/20	8"	25		Medium brown sand and gravel dense and dry
					26		
					27		
					28		
					29		
	6	28.5-30	11/9/15	6"	30		Medium brown damp sand and gravel - medium -
					31		
					32		
					33		
					34		Water
	7	33.5-35	12/15/13	6"	35		Medium brown wet - sand and gravel. - medium -
					36		
					37		
					38		
					39		
	8	38.5-40	4/6/7	5"	40		Medium brown gravelly sand - wet -
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 514 Date 2-4-77 Sheet 3 of 4

Type of Boring Auger Rig B-50









Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: King and Smithson

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
					44		Washed out plug 2'
	9	43.5-45	7 1/4 / 15	-0-	45		- Lost sample -
					46		
					47		
					48		
					49		
	10	48.5-50	11 1/8 / 21	7"	50		Medium brown sand and gravel Dense - wet
					51		
					52		
					53		
					54		
	11	53.5-55	6 7/8 / 12	12"	55		Medium brown fine to medium sand
					56		
					57		
					58		
					59		
	12	58.5-60	13 25/17	-0-	60		Washed out plug 2' Lost sample
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 514 Date 2-4-77 Sheet 4 of 4

Type of Boring Auger Rig B-50

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: King and Smithson

Project _____

Location of Boring: _____

Water Level _____

Time _____

Date _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					60		
					61		Augers settled down after drilling 6"
					62		
					63		
					64		
	13	63.5-65	12/22/23	-0-	65		No recovery. * Used stiff spring.
					66		
					67		
					68		
					69		
	14	68.5-70	24/30/80	8"	70		Medium brown sand and gravel w/trace of sandstone fragments in end of spoon.
					71		
					72		Stopped hole at 70' 2-4-77
					73		
					74		
					75		
					76		
					77		
					78		
					79		
					80		
					1		



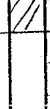




Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____
Company Appalachian Power Company
Project Project 1301 - Flyash Pipe Bridge

Boring No. 701 Date 2-4-77 Sheet 1 of 5
Type of Boring Auger Rig B-50
Casing used _____ Size _____ Drilling mud used _____
Boring begun 2-4-77 Boring completed 2-9-77
Ground Elevation 584.92 referred to _____ Datum _____
Field Party: King and Smithson

Location of Boring:	
Water Level	<u>40.0'</u>
Time	
Date	<u>2-4-77</u>

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
					3		
	<u>1</u>	<u>3.5-5</u>	<u>6/9/12</u>	<u>15"</u>	4		<u>Silty medium brown to gray clay.</u>
					5		
					6		
					7		
					8		
					9		
	<u>2</u>	<u>8.5-10</u>	<u>5/5/8</u>	<u>8"</u>	10		<u>Sandy silt.</u>
					11		
					12		
					13		
					14		
	<u>3</u>	<u>13.5-15</u>	<u>5/9/7</u>	<u>8"</u>	15		<u>Medium grain brown sand and silt.</u>
					16		
					17		
					18		
					19		
	<u>4</u>	<u>18.5-20</u>	<u>15/20/22</u>	<u>11"</u>	20		<u>Medium grain sand w/trace of gravel.</u>
					21		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 701 Date 2-7-77 Sheet 2 of 5





Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: King and Smithson

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23		
					24		
	5	23.5-25	8 13/17	9"	25		Fine sand w/trace of coal and some gravel.
					26		
					27		
					28		
					29		
	6	28.5-30	7 8/11	8"	30		Medium grain sand w/small gravel.
					31		
					32		
					33		
					34		
	7	33.5-35	5 6/8	12"	35		Medium grain sand - medium brown
					36		
					37		
					38		
					39		
	8	38.5-40	4 9/11	18"	40		Light brown medium grain sand. Water at 40.0'
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 701 Date 2-8-77 Sheet 3 of 5
 Type of Boring _____ Rig _____
 Casing used _____ Size _____ Drilling mud used _____
 Boring begun _____ Boring completed _____
 Ground Elevation _____ referred to _____ Datum _____

Project _____

Location of Boring: _____

Water Level _____

Time _____

Date _____

Field Party: King and Smithson

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					40		
					41		
					42		
					43		
					44		
	9	43.5-45	4/6/7	-0-	45		No recovery.
					46		
					47		
					48		
					49		
	10	48.5-50	21/4/7	3"	50		Medium grain sand w/small gravel.
					51		
					52		
					53		
					54		
	11	53.5-55	17/12/15	16"	55		Medium grain sand w/several large gravel.
					56		
					57		
					58		
					59		
	12	58.5-60	6/12/16	8"	60		Medium grain sand w/small gravel.
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Boring No. 701 Date 2-8-77 Sheet 5 of 5

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: King and Smithson

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					80		Auger refusal at 80.5'
					81		Started coring at 80.5'
					82		
					83		
					84		
	Core	80.5-90.5		7.6'	85		Gray coarse grain sandstone.
					86		
					87		
					88		
					89		
					90		Stopped hole at 90.5'
					91		2-8-77
					92		
					93		
					94		
					95		
					96		
					97		
					98		
					99		
					100		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Project Project 1301 - Fly ash Pond

Boring No. 703 Date 2-1-77 Sheet 1 of 5

Type of Boring Auger Rig B-50





Casing used _____ Size _____ Drilling mud used _____

Boring begun 2-1-77 Boring completed 2-2-77

Ground Elevation 567.70 referred to _____ Date _____

Field Party: King and Smithson

Location of Boring:	
Water Level	39.0
Time	
Date	2-1-77

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
					3		
					4		
	1	3.5-5	5/7/7	16"	5		Silty clay.
					6		
					7		
					8		
					9		
	2	8.5-10	3/4/5	12"	10		Sandy, silty clay.
					11		
					12		
					13		
					14		
	3	13.5-15	1/3/3	12"	15		Sandy clay.
					16		
					17		
					18		
					19		
	4	18.5-20	13/22/19	5"	20		Sand and medium large gravel. Trace of coal.
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 703 Date 2-1-77 Sheet 2 of 5

Type of Boring Auger Rig B-50






Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed 1

Ground Elevation _____ referred to _____ Datum

Field Party: King and Smithson

Location of Boring:	
Water Level	39.0
Time	
Date	2-1-77

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					20		
					21		
					22		
					23		
					24		
	5	23.5-25	10/ 15/18	8"	24		Medium grain sand, light gray.
					25		
					26		
					27		
					28		
					29		
	6	28.5-30	7/ 8/11	5"	29		Medium grain sand w/trace of coal.
					30		
					31		
					32		
					33		
	7	33.5-35	5/ 6/10	7"	33		Medium grain sand, medium brown.
					34		
					35		
					36		
					37		
					38		
					39		Water
	8	38.5-40	5/ 5/5	8"	39		Same as sample number 7.
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 703 Date 2-1-77 Sheet 3 of 5

Type of Boring Auger Rig B-50

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Project _____

Field Party: King and Smithson

Location of Boring:	
Water Level	
Time	
Date	<u>2-1-77</u>

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
					44		
	9	43.5-45	4/6/7	1"	45		Washed out. Two large gravels and medium grain sand.
					46		
					47		
					48		
	10	48.5-50	5/4/6	10"	49		Same as sample number 9.
					50		
					51		
					52		
					53		
					54		
	11	53.5-55	8/8/10	10"	55		Smaller gravel - medium grain sand.
					56		
					57		
					58		
					59		
	12	58.5-60	15/20/22	8"	60		Medium brown - medium grain sand.
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 703 Date 2-1-77 Sheet 4 of 5

Type of Boring auger Rig B-50

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum

Field Party: King and Smithson

Project _____

Location of Boring:	
Water Level	39.0
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					60		
					61		
					62		
					63		
	13	63.5-65	7 1/6 / 14	5"	64	///	Several large gravel and medium grain sand.
					65		
					66		
					67		
					68		
	14	68.5-70	15 / 20 / 22	10"	69	///	Medium grain sand w/trace of gravel and shale.
					70		
					71		
					72		
					73		
	15	73.5-75	12 / 12 / 14	9"	74	///	Large grain sand and small gravel.
					75		
					76		
					77		
					78		
					79	///	
	16	78.5-80	56 / 20 / 17	10"	80	///	Same
					81		
					82		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 703 Date 2-1-77 Sheet 5 of 5

Type of Boring Auger Rig B-50

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: King and Smithson

Project _____	
Location of Boring: _____	
Water Level	_____
Time	_____
Date	_____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					80		
					81		
					82		Rock
					83		
					84		
	Run #1	82.7-92.7		10.0	85		82.7' started coring.
					86		
					87		
					88		
					89		
					90		
					91		All sandstone core 100% recovery.
					92		Stopped coring at 92.7'
					93		2-2-77
					94		
					95		
					96		
					97		
					98		
					99		
					100		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____





Company Appalachian Power CompanyProject Project 1301 - Truck Bridge CrossingBoring No. 801 Date 3-16-77 Sheet 1 of 5Type of Boring Auger Rig B-61

Casing used _____ Size _____ Drilling mud used _____

Boring begun 3-16-77 Boring completed 3-16-77Ground Elevation 594.95 referred to _____ Datum

Location of Boring:	
Water Level	
Time	
Date	

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from top (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
	1	2.5-4	21/ 24/27	15"	3		Black fly ash and dark brown sand and gravel. (FIII)
					4		
					5		
					6		
					7		
	2	7.5-9	11/ 4/5	13"	8		Dark fill brown sand and gravel.
					9		
					10		Medium brown clayey silt.
					11		
					12		
	3	12.5-14	2/ 3/4	14"	13		Medium brown clayey, sandy silt.
					14		
					15		
					16		
					17		
	4	17.5-19	3/ 4/5	16"	18		Medium brown clayey sand.
					19		
					20		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 801 Date 3-16-77 Sheet 2 of 5

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____





Ground Elevation _____ referred to _____

_____ Date _____

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
	5	22.5-24	10/ 15/17	15"	23		
					24		Medium brown gravelly sand.
					25		
					26		
					27		
	6	27.5-29	8/ 13/17	16"	28		
					29		Same as sample number 5.
					30		
					31		
					32		
	7	32.5-34	5/ 6/9	15"	33		
					34		Medium brown sand w/trace of gravel.
					35		
					36		
					37		
	8	37.5-39	6/ 8/11	14"	38		
					39		Medium brown sand.
					40		Water
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 801 Date 3-16-77 Sheet 3 of _____

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

_____ Da

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Field Party: _____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
	9	42.5-44	2 3/4	13"	43		
					44		Medium brown sand w/trace of gravel.
					45		
					46		
					47		
	10	47.5-49	6 7/8	1"	48		
					49		Same as sample number 9.
					50		
					51		
					52		
	11	52.5-54	4 4/7	2"	53		
					54		Same as sample number 9.
					55		
					56		
					57		
	12	57.5-59	7 12/13	14"	58		
					59		Medium brown sand.
					60		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 801 Date 3-16-77 Sheet 4 of 5

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____





Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

_____ Date _____

Field Party: Roush and Reitimre

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					60		
					61		
					62		
	13	62.5-64	8/9/13	13"	63		
					64		Medium brown sand.
					65		
					66		
					67		
	14	67.5-69	8/10/12	10"	68		
					69		Same
					70		
					71		
					72		
	15	72.5-74	4/8/13	11"	73		
					74		Same
					75		
					76		
					77		
	16	77.5-79	10/26/27	12"	78		
					79		Same
					80		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 801 Date 3-16-77 Sheet 5 of 5

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____


Ground Elevation _____ referred to _____

_____ Date _____

Field Party: Roush and Reitmire

Project _____

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					80		
					81		
					82		
					83		
	17	82.5-84	12/ 18/21	6"	84		Medium brown sand and gravel.
					85		
					86		Auger refusal at 86.8'
					87		Stopped hole at 86.8'
					88		3-16-77
					89		
					90		
					1		
					2		
					3		
					4		
					5		
					6		
					7		
					8		
					9		
					0		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Project Project 1301 - Truck Bridge Crossing

Boring No. 802 Date 3-17-77 Sheet 1 of 4

Type of Boring Auger Rig B-61





Casing used _____ Size _____ Drilling mud used _____

Boring begun 3-17-77 Boring completed 3-17-77

Ground Elevation 588.46 referred to _____

Field Party: Roush and Rietmire

Location of Boring:	
Water Level	34.5
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					0		
					1		
					2		
					3		
	1	3.5-5	5 1/8	17"	4		Medium brown and gray clayey silt.
					5		
					6		
					7		
					8		
	2	8.5-10	3 1/4	16"	9		Medium brown and gray sandy, clayey silt.
					10		
					11		
					12		
					13		
	3	13.5-15	2 1/5	14"	14		Medium brown clayey sand.
					15		
					16		
					17		
					18		
					19		
	4	18.5-20	7 1/8	8"	20		Medium brown gravelly sand.
					21		
					22		
					23		
					24		
					25		
					26		
					27		
					28		
					29		
					30		
					31		
					32		
					33		
					34		
					35		
					36		
					37		
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					41		
					42		
					43		
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					97		
					98		
					99		
					100		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Boring No. 802 Date 3-17-77 Sheet 2 of 4

Project _____

Type of Boring _____ Rig _____





Location of Boring:	
Water Level	34.5
Time	
Date	

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23		
	5	23.5-25	5/7/10	14"	24		Medium brown sand - fine grain
					25		
					26		
					27		
					28		
	6	28.5-30	3/7/9	14"	29		Same as sample number 5 fine grain.
					30		
					31		
					32		
					33		
	7	33.5-35	13/14/13	15"	34		Same as sample number 5 w/medium and coarse grain sand.
					35		
					36		
					37		
					38		
	8	38.5-40	4/7/8	13"	39		Same as sample number 5 w/medium and coarse grain sand.
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Project _____

Boring No. 802 Date 3-17-77 Sheet 3 of 4

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	34.5
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					40		
					41		
					42		
					43		
					44		
	9	43.5-45	3/ 5/6	13"	45		Medium brown sand - medium and coarse grain.
					46		
					47		
					48		
					49		
	10	48.5-50	6/ 8/10	14"	50		Same as sample number 9, medium grain.
					51		
					52		
					53		
					54		
	11	53.5-55	5/ 6/10	12"	55		Same as sample number 10 - medium grain.
					56		
					57		
					58		
					59		
	12	58.5-60	8/ 10/14	13"	60		Same as sample number 11 - medium grain.
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 802 Date 3-17-77 Sheet 4 of 4

Project _____

Type of Boring _____ Rig _____





Location of Boring:	
Water Level	34.5
Time	
Date	

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: Roush and Reitmire

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					60		
					61		
					62		
					63		
	13	63.5-65	13/14/17	13"	64		
					65		Medium brown sand - fine grain - medium coarse grain.
					66		
					67		
					68		
	14	68.5-70	5/8/12	12"	69		
					70		Same as sample number 13 - medium and coarse grain.
					71		
					72		
					73		
	15	73.5-75	8/15/22	15"	74		
					75		Same as sample number 13 - medium grain.
					76		
					77		
					78		
	16	78.5-80	9/14/20	14"	79		
					80		Same as sample number 13 - medium and coarse grain.
					1		Auger refusal at 82.5'

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

 Company Appalachian Power Company

 Project Project 1301 - Truck Bridge Crossing

 Boring No. 803 Date 3-15-77 Sheet 1 of 1

 Type of Boring Auger Rig B-61

Casing used _____ Size _____ Drilling mud used _____

 Boring begun 3-15-77 Boring completed 3-16-77

Ground Elevation _____ referred to _____

 Field Party: Roush and Reitmire

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from top (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					0		*Boring offset about 25' east because of power lines.
					1		
					2		
	1	2.5-4	3/4/6	14"	3	/	
					4	/	Medium brown clayey silt.
					5		
					6		
					7		
	2	7.5-9	4/5/5	13"	8	/	
					9	/	Medium brown, medium grain, gravelly sand.
					10		
					11		
					12		
	3	12.5-14	4/4/5	7"	13	/	
					14	/	Same as sample number 2 w/fine and medium grain sand.
					15		
					16		
					17		
					18		
	4	17.5-19	5/6/7	14"	19	/	
					20	/	Medium brown sand and gravel.
					21		
					22		
					23		
					24		
					25		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Boring No. 803 Date 3-15-77 Sheet 2 of 5

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____ Datum _____

Field Party: Roush and Reitmire

Project _____	
Location of Boring: _____	
Water Level	_____
Time	_____
Date	_____

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					20		
					21		
					22		
					23	/	
	5	22.5-24	10/ 11/ 13	12"	24	/	Medium brown sand and gravel.
					25		
					26		
					27		
					28	/	
	6	27.5-29	6/ 8/ 6	1"	29	/	Medium brown gravelly sand.
					30		
					31		
					32		
					33	/	
	7	32.5-34	8/ 10/ 5	6"	34	/	Medium brown, medium grain gravelly sand.
					35		
					36		
					37		
					38	/	
	8	37.5-39	5/ 6/ 8	14"	39	/	Same
					40		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company _____

Project _____

 Boring No. 803 Date 3-15-77 Sheet 3 of 5

Type of Boring _____ Rig _____

Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

 Field Party: Roush and Reitmire Date _____

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					1/0		Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					1/1		
					1/2		
	9	42.5-44	5/4/6	13"	1/3	[Hatched]	Medium brown, medium coarse grain gravelly sand.
					1/4		
					1/5		
					1/6		
					1/7		
	10	47.5-49	7/8/10	12"	1/8	[Hatched]	Medium brown, coarse grain sand w/some gravel.
					1/9		
					1/10		
					1/11		
					1/12		
					1/13		
	11	52.5-54	6/8/12	6"	1/14	[Hatched]	Same as sample number 10 w/medium grain sand trace of gravel.
					1/15		
					1/16		
					1/17		
					1/18		
					1/19		
	12	57.5-59	8/10/12	7"	1/20	[Hatched]	Same
					1/21		
					1/22		
					1/23		
					1/24		
					1/25		
					1/26		
					1/27		
					1/28		
					1/29		
					1/30		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY

LOG OF BORING

Job No. _____

Company Appalachian Power Company

Project Project 1301 - Truck Bridge Crossing

Boring No. 803 Date 3-15-77 Sheet 4 of _____

Type of Boring _____ Rig _____





Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: Roush and Reitnre

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
					60		
					61		
					62		
	13	62.5-64	7/11/15	6"	63		
					64		Medium brown coarse grain gravelly sand.
					65		
					66		
					67		
	14	67.5-69	13/17/25	5"	68		
					69		Medium brown fine sand.
					70		
					71		
					72		
	15	72.5-74	6/9/13	13"	73		
					74		Same
					75		
					76		
					77		
	16	77.5-79	8/13/20	13"	78		
					79		Same - medium grain.
					80		
					1		

Engineer _____

AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

Job No. _____

Company _____

Project _____

Boring No. 803 Date 3-15-77 Sheet 5 of _____

Type of Boring _____ Rig _____


Casing used _____ Size _____ Drilling mud used _____

Boring begun _____ Boring completed _____

Ground Elevation _____ referred to _____

Field Party: Roush and Reitmire

Location of Boring:	
Water Level	
Time	
Date	

Depth of Casing, ft.	Sample No.	Sample depth from-to (in feet)	Standard Penetration Resistance Blows/Foot	Tot. length of recov. sample	DEPTH IN FEET	SOIL GRAPH	DESCRIPTION
							Soil type, color, texture, consistency, sampler driving notes, blows per foot on casing, depths wash water lost, observed fluctuations in water level, notes on drilling ease, etc.
					80		
					81		
					82		
	17	82.5-84	8/10/22	1"	83		
					84		Medium brown gravelly sand.
					85		
					86		
					87		
	18	87.3-87.4	50/.1	-	88		
					89		Hit rock at 86.8'
					90		No recovery
					91		Started coring at 87.6'
					92		100' recovery.
					93		8.0' of +.4 core
	Run #1	87.6-97.6		10.0	94		10.0' medium gray medium grain hard sandstone.
					95		
					96		
					97		
					98		Stopped hole at 97.6'
					99		3-16-77
					100		
					1		

Engineer _____



**AEP 1990, 1996, 1997, 2001,
2008**

Monitoring Well Boring Logs

**MW-001 to MW-16, 96-01 to 96-
06, 96-101 to 96-110, JTMN-1,
JTMN-2**

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 724,498.7 E 1,733,165.9**
 GROUND ELEVATION **569.2** SYSTEM **State Plane using NAD27**

BORING NO. **001** DATE **7/23/15** SHEET **1** OF **2**
 BORING START **6/18/97** BORING FINISH **6/18/97**
 PIEZOMETER TYPE _____ WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **2.14** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **27.0** BOTTOM **37**
 WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 24.9	▼	▼
TIME			
DATE	6-18-97		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	1.5	3.0	4-5-4	1.0		5		ML	Road gravel, grass and fill material SILTY SAND Dark, yellow, brown, 10yr 4/2, with minor cl- silty clay at base, also gravel and limestone aggregate, dry, no contamination no odor, 80% sand, 20% silt, fine to medium grain.		11' TO 13' SHELBY TUBE TAKEN 6-25-97.
2	SS	6.5	8.0	4-3-3	1.5	10		SM	SILTY CLAY Dark yellow, brown, 10 yr 4/2, >50 % fines, 80% clay, 20% silt, dry, no contamination, poorly graded, CL grades into SM medium sand, 10yr 4/2, <15% gravel, well sorted, 95% sand, medium to fine 25% silt, moist, black streaking interbedded, no contamination, grades to CL.			
3	SS	11.5	13.0	1-2-3	.7	15		CL	silty clay Moderate yellow brown, 10 yr 5/4, 80% clay, 20% silty, moist, slight plasticity, no contamination, no odor, grades into SM @15'			
4	SS	16.5	18.0	1-3-4	.7			SM	MODERATE BROWN 5 YR 4/4 SILTY SAND 95 % sand, 5% silt and gravel. Sand well washed, medium to fine grain, sub-rounded, no contamination, no odor, moist.			

TYPE OF CASING USED

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

Continued Next Page

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

RECORDER **T ROGERS**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **001** DATE **7/23/15** SHEET **2** OF **2**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/18/97** BORING FINISH **6/18/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
5	ST	21.5	23.5		.7		25			MATTER BROWN 5YR 4/4 SILTY SAND 85 % Sand, 15% silt, moist, sand is medium to fine grain, quartz sub-rounded, with minor clay.		SHELBY TUBE TAKEN TO MUCH GRAVEL NO GOOD.
6	SS	26.5	28.0	3-4-9	1.5		30		SW	DARK YELLOW BROWN 10 YR 4/2 TO MODERATE BROWN 5YR 4/2 GRAVELLY SAND Well graded sand, <15% gravel, 90% sand, coarse to fine grain, well graded, quartz sub-rounded, wet, no odor, no contamination.		27.0 TOP OF SCREEN.
7	SS	31.5	33.0	7-12-11	1.5		35			DARK YELLOW BROWN 10 YR 4/2 MODERATE BROWN 5YR3/4 GRAVELLY SAND Well graded, <15% gravel, 90% sand, coarse to fine grain, quartz sub-rounded while gravel is sub-angular to sub-rounded, wet, no contamination, no odor, grades into ml @ 35'.		GRAIN SIZE ANALYSIS SAMPLE COLLECTED.
8	SS	36.5	38.0	4-6-4	.9				ML SM	LIGHT BROWN 5 YR5/6 CLAYEY SILT Interval grading in SM. PALE YELLOW BROWN 10YR6/2 SAND 60% sand, fine grain, 40% silty\clay grading into SM, silty sand, 80% sand with minor gravel 20% silty and clay, wet, no odor, no visible contamination.		37.0 BOTTOM OF SCREEN 37.5 BOTTOM OF SAND.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 724,857.8 E 1,733,650.5**
 GROUND ELEVATION **580.8** SYSTEM **State Plane using NAD27**

BORING NO. **002** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **6/19/97** BORING FINISH **6/24/97**
 PIEZOMETER TYPE _____ WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **1.99** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **60.5** BOTTOM **70.5**
 WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 37.8	▼	▼
TIME			
DATE	6-25-97		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	1.6	3.1	4-11-11	1.4		5		ML	FILL MATERIAL, GRASS AND GRAVEL WITH TOP SOIL		
									CL	MODERATE BROWN 5YR4/4 SANDY SILT 60% silt, 40 % sand, minor clay, sub-rounded with quartz gravels 1/2-3/4", dry, no contamination.		
2	SS	6.6	8.1	4-4-3	1.5		10		CL	MODERATE BROWN 5YR4/4 SANDY SILT 60% silt, 40% sand grading to ML, 60% silt, 30% clay, 10% sand ? in gravel (quartz) to CL, dark yellow brown 10 yr4\2, 70% clay, 20% silt, 10% sand, sand fine grain, minor gravel and black interbedded clay, moist, no contamination.		
									CL	10 YR5/4 MODERATE YELLOW BROWN SILTY CLAY 90% clay, 10% silt, minor sand, clay very stiff, light gray interbeds with some root zones, moist, no contamination, no odor.		
3	SS	11.6	13.1	3-5-6	1.1		15					
4	SS	16.6	18.1	3-4-5	1.5							

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

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC
 WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
 RECORDER **T ROGERS**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **002** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/19/97** BORING FINISH **6/24/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
5	SS	21.6	23.1	2-1-3	1.5		25		SC	MODERATE BROWN TO LIGHT BROWN 10 YR 5/4 TO 5YR 4/4 SANDY CLAY 60% clay, 40% sand fine grain, mica and quartz, clay moderate stiff, moist, interbedded with CL from above 6" at 22.0 to 22.6, moist, no contamination, no odor.		
6	SS	26.6	28.1	1-1-2	1.5		30		SC	MODERATE YELLOW BROWN 10YR5/4 SILTY CLAY 80% clay, 20% silt, minor sand-very fine grain, moist, interbedded of black material, very minor, stiff clay, sand is mica and quartz, no contamination, no odor.		
7	SS	31.6	33.1	1-1-1	0							
8	SS	34.6	36.1	1-1-2	1.5		35		SC	MODERATE BROWN 5YR4/4 SANDY CLAY 60% clay, 40% sand, clay moderate stiff, sand fine grain, mica and quartz, with iron coloring at base, very red minor black (organic?), sample wet at base.		Sample wet at base (perched).
9	SS	36.6	38.1	1-1-1	1.5				SW	LIGHT BROWN 5YR 5/6 SANDY CLAY 60% clay, 40% sand from 36.6 to 36.9 grades to SM clayey silty sand, light brown 5yr5/6, 80% sand, 20% silt/clay, sand is quartz, mica, fine grain, grading to reddish brown 10r 4/6 at base, moist.		
10	SS	41.6	43.1	1-8-13	1.5		40			LIGHT BROWN 5YR 6/6 SILTY CLAYEY SAND 80% sand, 20% silt/clay, same as above from 41.6-42.3, 42.3-42.7, the color change to dark yellow orange 10yr6/6 to SC sandy, medium gray n5 40% clay 60% sand, clay is moderate stiff, wet, sand is quartz, mica, fine grain, wet, grading into sw at 1.8 -2' well graded sand, dark yellow brown 10yr4/2 medium to coarse sand 90% sand, 10% silt/clay, sand quartz, sub-rounded, wet.		Water in sample. Will add water inside augers. Water in sample.
							45		SW	m=sc		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **002** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/19/97** BORING FINISH **6/24/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
11	SS	46.6	48.1	11-12-14	1.5		50			MODERATE YELLOW BROWN SAND Well graded, 95% sand, 5% silt, minor clay sand coarse to fine with gravel quartz, granite(?), minor silt, no clay, wet, no contamination.		
12	SS	51.6	53.1	5-6-7	.2		55			PALE YELLOW BROWN 10 YR 6/2 SAND Well graded, 95% sand, 5% silt/minor clay, quartz, sand medium to fine grain 51.6-52.4 grades medium coarse sand of quartz, granite(?) with gravel and clay, fine sand, light brown 5yr 5/6 to moderate brown 5yr 4/4 from 52.4-52.7, grades into medium sand. 95% sand with 5% 52.7-53.1 silty clay, wet, no contamination.		54.1 Top of seal.
13	SS	56.6	58.1	6-6-7	1.3		60		SP	DARK YELLOW BROWN 10YR 4/2 SAND 95% sand, 5% silt/clay, sand is medium to fine grain with quartz, sandstone grains (quartzite), wet, no contamination.		57.9 Top of sand.
14	SS	61.6	63.1	5-5-10	1.5		65			PALE YELLOW BROWN SAND Poorly graded, 98% sand, 2% silt, sand is clean to white, fine grain, sand has some rounded, medium grain, mostly sub-angular, wet, no contamination.		60.5 Top of screen. Grain size analysis sample collected.
15	SS	66.6	68.1	8-4-5	.9		70		SW	BROWN GRAY 5YR 4/1 SAND Well graded, 100% sand from fine to coarse with gravel, sand is quartz, quartzite gravel with angular gneiss pieces, wet, little to no fines-clay, sand is sub-rounded, large quartzite gravel in bottom of spoon, no contamination.		70.5 Bottom of screen

AEP_EPRI_SPORN_MOUNTAINEER.GPJ_AEP.GDT 7/23/15

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **002** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/19/97** BORING FINISH **6/24/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
16	SS	71.7	71.9	50/2	.2					<p>LIGHT GRAY SANDSTONE N7 Medium grain sand, friable at top of sample, competent at base, loosely cemented, quartz grain, sub-angular to sub-rounded, dry.</p> <p>Auger return includes sub-angular cobbles and gravel of granite, quartzite, gneiss from bottom of borehole.</p>		71.8 Bottom of sand. Approximately 200 gallons water injected into bore hole during augering.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,877.2 E 1,733,713.7**
 GROUND ELEVATION **604.9** SYSTEM State Plane using NAD27

BORING NO. **003** DATE **7/23/15** SHEET **1** OF **2**
 BORING START **6/25/97** BORING FINISH **6/25/97**
 PIEZOMETER TYPE _____ WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **2.30** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **32.3** BOTTOM **42.3**
 WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 31.9	▼	▼
TIME			
DATE	6-26-97		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	1.5	3.0	3-5-6	1.5		5		ML	GRAYISH ORANGE TO DARK YELLOW ORANGE 10YR 7/2 TO 10YR 6/6 SILTY CLAY 80% clay, 20% silt, dry, mottled, some mica, iron, staining possibly, no contamination.		
2	SS	6.5	8.0	3-2-4	1.5		10			GRAYISH ORANGE 10YR 7/4 SILTY CLAY 70% clay, 30% silt, moist, clay content decrease with depth, mottled, iron staining, mica no contamination.		
3	SS	11.5	13.0	2-2-3	1.5		15		CL	MODERATE YELLOW BROWN 10YR 5/4 SILTY CLAY 90% clay, 10% silt, increase in clay, moist to minor water, some mica, no contamination.		Perched water.
4	SS	16.5	18.0	5-6-8	1.1				SW	MODERATE YELLOW 10yr 5/4 BROWN SAND Well graded, 95% sand, 5% silt, some coarse grain gravel, sand is medium to coarse, sub-rounded, quartz, dry, no contamination.		

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

Continued Next Page

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

RECORDER **T ROGERS**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **003** DATE **7/23/15** SHEET **2** OF **2**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/25/97** BORING FINISH **6/25/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
5	SS	21.5	23.0	8-9-9	1.2		25			MODERATE YELLOWISH BROWN 10YR 5/4 SAND 95% sand, 5% silt/fine sand, some coarse gravel of quartzite/granite, sand is medium to coarse grain quartz, dry, subrounded, no contamination.		
6	SS	26.5	28.0	4-4-5	1.2		30			DARK YELLOW BROWN 10YR 4/2 SILTY SAND 95% sand, 5% silt, sand sand medium to coarse minor silt, sand rounded to sub-rounded quartz, minor mica, some gravel, moist, sand increase in sorting, no contamination.		25.3 Top of seal. 28.1 Top of sand.
7	SS	31.5	33.0	3-2-3	1.2		35		SM	DARK YELLOW BROWN 10YR 4/2 SILTY SAND 95% sand, 5% silt, no gravel, sand fine to medium, poorly graded, wet, no contamination, SW at bottom sand.		32.3 Top of screen.
8	SS	33.0	34.5	2-2-2	1.5		35			DARK YELLOW BROWN 10YR 4/2 SILTY SAND 95% sand, 5% silt, sand is fine to medium quartz, some mica, poorly graded, no contamination.		Grain size analysis sample 35.3-36.8
9	SS	36.5	38.0	1-1-2	1.4		40			DARK YELLOW BROWN 10YR 4/2 SILTY SAND 95% sand, 5% silt, sand medium to fine grain quartz, where poorly graded.		100 gallons of water used in augers. Filled augers with water.
10	SS	41.5	43.0	7-10-7	1.5		40			DARK YELLOW BROWN 10YR 4/2 SILTY SAND 95% sand, 5% silt, sand medium to fine, quartz, wet, poorly graded and uniform grain size, no contamination.		42.4 Bottom of screen. 43.4 Bottom of sand. Advance augers to 43.4 to install screen.

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 724,865.9 E 1,733,643.4**
 GROUND ELEVATION **581.1** SYSTEM State Plane using NAD27

BORING NO. **004** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **6/26/97** BORING FINISH **6/30/97**
 PIEZOMETER TYPE _____ WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **2.05** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **37.6** BOTTOM **47.6**
 WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 37.6	▼	▼
TIME			
DATE	6-30-97		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
							5					
							10					
							15					

TYPE OF CASING USED				<i>Continued Next Page</i>								
	NQ-2 ROCK CORE			PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC								
	6" x 3.25 HSA			WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON								
	9" x 6.25 HSA			RECORDER T ROGERS								
	HW CASING ADVANCER 4"											
	NW CASING 3"											
	SW CASING 6"											
	AIR HAMMER 8"											

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **004** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/26/97** BORING FINISH **6/30/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
							25					
1	ST	26.0	28.0									26.0 Shelby tube.
							30					30.0 Top of seal.
												32.8 Top of sand.
							35					
												37.6 Top of screen.
2	SS	41.5	43.0	4-6-7	1.5		40		SC	MEDIUM GRAY N5 CLAYEY SAND 60% sand, 40 % clay, clay slight plasticity, sand is medium to fine , quartz, mica, wet, well sorted.		
3	SS	43.5	45.0	8-13-21	1.2				SW	DARK YELLOW BROWN 10YR 4/2 BROWN SAND Well graded, sand is medium to coarse, 90% sand, 10 % silt/clay, sand quartz, sub-angular, wet, no contamination.		Grain size analysis 43.5-45.0
							45					

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **004** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/26/97** BORING FINISH **6/30/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
												47.6 Bottom of screen. 48.2 Bottom of sand.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,152.8 E 1,734,428.9**
 GROUND ELEVATION **591.0** SYSTEM **State Plane using NAD27**

BORING NO. **005** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **7/1/97** BORING FINISH **7/1/97**
 PIEZOMETER TYPE _____ WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **2.19** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **37.7** BOTTOM **47.7**
 WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 33.8	▼	▼
TIME			
DATE	7-2-97		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	2.0	3.5	3-3-4	1.1		5		ML	GRASS. ORGANIC MATTER SOILS. SILT, FINE SAND		
									ML	DARK YELLOW, ORANGE 10YR 6/6 CLAYEY SILT 60 % silt 40 % clay, silty v-fine grain, mottled, root, some of black organic, iron stain, dark, no contamination.		
2	ST	7.0	9.0		2.0		10		SC	Sample from bottom of shelly tube MOTTLED YELLOW BROWN 10YR 5/4 CLAYEY SAND 80% sand, 20% silt/sand, moist, sand is fine grain w/ subrounded quartz, no contamination.		
3	ST	12.0	14.0		1.8		15		SM	Sample from bottom of shelly tube MOTTLED YELLOW BROWN 10 YR 5/4 CLAYEY SAND 90% sand 10% silt/clay, moist, sand is fine to medium grain subrounded, quartz, no contamination.		
4	SS	18.5	20.0	6-6-7	1.25				SW	MOTTLED YELLOW BROWN 10YR 5/4 SAND Well graded 95% sand, 5% silt, sand is medium to coarse grain quartz subrounded, moist, no contamination, some gravel is granite.		

TYPE OF CASING USED

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

Continued Next Page

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

RECORDER **T ROGERS**

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **005** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/1/97** BORING FINISH **7/1/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
5	SS	23.5	25.0	2-1-2	1.4		25		SP	MOTTLED YELLOW BROWN 10YR 5/4 SAND Poorly grade, 95% sand, 5% silt, sand is medium to fine grain , very well sorted, moist, sand subrounded quartz, no contamination, stringers of coal .25" thick at 22.7'.		
6	SS	28.5	30.0	3-4-5	1.5		30		SW SP	DARK YELLOW ORANGE 10YR 6/6 SAND Well graded sand, 95 % sand, 5% silt, medium to coarse with fine interbedded rounded quartz, grades into SP, poorly graded sand DARK YELLOW ORANGE 10YR 6/6 SAND , 95 % sand 5% silt, sand is medium to fine grain , well sorted, subrounded quartz, wet.		29.7 Top of seal.
7	SS	33.5	35.0	2-3-4	1.2		35		SW	DARK YELLOW ORANGE 10YR 6/6 SAND Well graded, 95% sand, 5% fine sand, sand is medium to coarse, well rounded, quartz, wet, stringers of coal at bottom of spoon 33.5', no contamination.		33.5 Top of sand. Rods wet 34.5.
8	SS	38.5	40.0	3-4-4	1.5		40		SM	SM/SW MODERATE YELLOW BROWN 10YR 5/4 SILTY SAND. TO WELL GRADED SAND 100% sand, fine to coarse, w/minor gravel, sand is subrounded quartz, wet, no contamination.		Adding water to augers 125 gallons. 37.7 Top of screen.
9	SS	43.5	45.0	3-4-7	1.4		45		SP	MODERATE YELLOW BROWN 10YR 5/4 SAND 100% sand, medium grain, well sorted quartz, subrounded to rounded, wet, no contamination, minor clay at bottom 1/2".		
11	SS	45.0	46.5	4-4-6	1.5		45			MODERATE YELLOW BROWN SAND Poorly		Sample 10 grain size

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AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **005** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/1/97** BORING FINISH **7/1/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
10	SS	48.5	50.0	4-4-6	1.5		50			graded, 100% sand, medium grain quartz, including gravel layers, wet, no contamination. MODERATE YELLOW BROWN 10YR 5/4 SAND Medium grain, quartz, well rounded to subrounded, wet, no visible contamination.		analysis from 45.5-47.0 47.7 Bottom of screen. 48.8 Bottom of sand.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 720,255.7 E 1,735,680.0**
 GROUND ELEVATION **601.3** SYSTEM **State Plane using NAD27**

BORING NO. **006** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **7/1/97** BORING FINISH **7/8/97**
 PIEZOMETER TYPE _____ WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **0.26** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **81.1** BOTTOM **91.1**
 WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 50.3	▽ 61.0	▽ 70.0
TIME			
DATE	7-29-97	7-7-97	7-8-97

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
										ASPHALT, BOTTOM ASH, GRAVEL ROAD BED		
1	SS	6.0	7.5	18-22-24	1.5		5		SW	LIGHT BROWN 5YR 5/6 SILTY SAND Well graded, fill, 90% sand, 10% silt, fine sand, sand is medium to coarse, with gravel, quartz, subrounded, no contamination, dry.		
2	SS	7.5	9.0	9-15-13	1.5							
3	SS	9.0	10.5	9-13-15	1.5		10					
4	SS	10.5	12.0	7-9-9	1.5					LIGHT BROWN 5YR 5/6 SAND Well graded, fill, 95% sand, 5% silt, sand is medium to coarse with gravel, quartz, dry no contamination.		
5	SS	12.0	13.5	7-9-11	1.4				SM	DARK YELLOW BROWN 10YR 4/2 SILTY SAND 95% sand, 5% silty, minor gravel, sand is quartz dry, no contamination, fill ?.		
6	SS	13.5	15.0	9-10-12	1.4					LIGHT BROWN 5YR 5/6 SILTY SAND/GRAVEL 90% sand, 10% silt, sand medium grain.		
7	SS	15.0	16.5	7-9-13	1.5		15			MODERATE YELLOW BROWN 10YR 5/4 SILTY CLAY TO CLAYEY SILT 10% clay, 90% silt, fine grain, minor sand, dry, no contamination.		
8	SS	16.5	18.0	7-9-10	1.8							
9	SS	18.0	19.5	5-5-11	1.5							
10	SS	19.5	21.0	6-9-9	1.5							

TYPE OF CASING USED		<i>Continued Next Page</i>	
	NQ-2 ROCK CORE	PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC	
	6" x 3.25 HSA	WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON	
	9" x 6.25 HSA	RECORDER T ROGERS	
	HW CASING ADVANCER 4"		
	NW CASING 3"		
	SW CASING 6"		
	AIR HAMMER 8"		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **006** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/1/97** BORING FINISH **7/8/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
11	SS	21.0	22.5	4-6-7	1.3		25					
12	SS	22.5	24.0	5-7-11	1.5							
13	SS	24.0	25.5	9-10-9	1.5							
14	SS	25.5	27.0	7-7-8	1.4		30					
15	SS	27.0	28.5	5-8-9	1.3							
16	SS	28.5	30.0	5-5-6	1.5							
17	SS	30.0	31.5	6-7-8	1.5		35					
18	SS	31.5	33.0	4-6-9	1.5							
19	SS	33.0	34.5	5-5-8	1.3							
20	SS	34.5	36.0	3-6-9	1.5							
21	SS	36.0	37.5	3-3-6	1.5		40					
22	SS	37.5	39.0	3-3-5	1.5							
23	SS	39.0	40.5	3-4-6	1.5							
24	SS	40.5	42.0	4-4-6	1.5		45					
25	SS	42.0	43.5	2-4-4	1.5							
26	SS	43.5	45.0	3-3-3	1.5							
27	SS	45.0	46.5	1-2-2	1.4							

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **006** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/1/97** BORING FINISH **7/8/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES	
		FROM	TO			%							
28	SS	46.5	48.0	2-3-4	1.5		50						
29	SS	48.0	49.5	3-3-4	1.5								
30	SS	49.5	51.0	1-2-3	1.5								
31	SS	51.0	52.5	3-4-4	1.5		55						
32	SS	52.5	54.0	1-1-2	1.5							52.5 Wet.	
33	SS	54.0	55.5	2-3-4	1.5							53.2 Wet zone.	
34	SS	55.5	57.0	2-3-3	1.5		60						
35	SS	57.0	58.5	1-3-3	1.5								
36	SS	58.5	60.0	3-3-4	1.56								
37	SS	60.0	61.5	3-4-4	1.5		65						
38	SS	61.5	63.0	1-2-4	1.5								62.2 Wet at 62.2-63.0
39	SS	63.0	64.5	3-4-5	1.5								
40	SS	64.5	66.0	3-3-3	1.5		70						
41	SS	66.0	67.5	3-3-4	1.5								66 Wet .2" zone.
42	SS	67.5	69.0	3-4-4	1.5								
43	SS	69.0	70.5	3-4-4	1.5								
44	SS	70.5	72.0	1-4-4	1.5								

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **006** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/1/97** BORING FINISH **7/8/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
45	SS	72.0	73.5	1-3-4	1.5							
46	SS	73.5	75.0	4-4-5	1.5		75					73.6 Top of seal.
47	SS	75.0	76.5	4-4-5	1.5							
48	SS	76.5	78.0	4-4-5	1.5							77.0 Top of sand.
49	SS	78.0	79.5	2-3-3	1.5							78.5 Wet sand.
50	SS	79.5	81.0	2-5-9	1.5		80					79.5 Water in sand base (80.8-81.0) water added to augers.
51	SS	81.0	82.5	11-11-11	1.5							81.1 Top of screen.
52	SS	82.5	84.0	9-11-11	.9							
53	SS	84.0	85.5	12-12-12	1.5		85					
54	SS	85.5	87.0	8-10-15	1.2							
55	SS	87.0	88.5	7-14-7	1.2							
56	SS	88.5	90.0	7-7-10	1.2		90					Total of 250 gallon of water added to bore hole.
57	SS	90.0	91.5	12-21-17	1.5							91.1 Bottom of screen.
58	SS	91.5	93.0	7-14-14	1.2							
59	SS	93.0	94.5	16-29-50/.2	1.1		95					93.7 Bottom of sand.

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 718,915.8 E 1,736,153.5**
 GROUND ELEVATION _____ SYSTEM State Plane using NAD27

BORING NO. **008** DATE **7/23/15** SHEET **1** OF **2**
 BORING START **7/14/97** BORING FINISH **7/22/97**
 PIEZOMETER TYPE _____ WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **2.10** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **23.8** BOTTOM **33.8**
 WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 13.8	▼	▼
TIME			
DATE	7-21-97		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		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
		FROM	TO									
1	SS	1.9	3.4	4-3-2	.7		5		CL	ORGANIC MATERIAL, GRASS, WEEDS, ROOT ZONE IN SILTY CLAY AND CLAYEY SILT		
										CL		
2	SS	6.9	8.4	4-2-3	1.5		10		CL	MODERATE BROWN 5YR 4/4 TO YELLOW ORANGE 10YR 6/6 SILTY CLAY 90% clay, 10% silt, grading to no silt and yellow color at base, mica, dry to top moist at bottom, purged water, no visible contamination.		
3	SS	11.9	13.4	4-3-2	1.4		15		CL	MODERATE BROWN-DARK YELLOW ORANGE 5YR 4/4 TO 10YR 6/6 SILTY CLAY From above grading into SM at 12.6.		
4	SS	16.9	18.4	2-2-1	1.2				SM	MODERATE BROWN 5YR 3/4 CLAYEY SAND 70% sand, 30% clay, sand is v-fine grain quartz, moist no contamination.		
										MODERATE YELLOW BROWN 10YR 5/4 CLAYEY/SILT SAND 80% sand, 20% clay, moist, sand is v-fine grain, quartz, mica flakes, no visible contamination.		

TYPE OF CASING USED

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

Continued Next Page

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

RECORDER **T ROGERS**

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **008** DATE **7/23/15** SHEET **2** OF **2**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/14/97** BORING FINISH **7/22/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
5	SS	21.9	23.4	1-1-1	1.5		25			<p><u>MODERATE YELLOW BROWN 10YR 5/4 CLAYEY/SILTY SAND</u> 80% sand, 20% clay, sand is v-fine grain, quartz with some silty and clay, sand is wet and contains mica, no visible contamination.</p>		<p>21.4 Top of sand.</p> <p>23.8 Top of screen.</p>
6	SS	26.9	28.4	1-1-2	1.5		30			<p><u>MODERATE YELLOW BROWN 10YR 5/4 SILTY/CLAYEY SAND</u> 80% sand, 20% clay/silt grading to 90% sand, 10% silt at base, fine sand at bottom of spoon, quartz, mica(minor) no visible contamination.</p>		<p>Wet.</p>
7	SS	31.9	33.4	3-1-2	1.3					<p><u>MODERATE BROWN 5YR 4/4 SILTY SAND</u> 95% sand, 5% silt, sand is fine grading to medium at 32.3', quartz, f's par, mica flakes, wet, no visible contamination.</p>		<p>31.9 Grain sized analysis.</p>
8	SS	33.4	34.9	2-2-4	1.1					<p><u>MODERATE BROWN 5YR 4/4 SILTY SAND</u> 95% sand, 5% silt, sand is fine to medium grain, quartz, subrounded, wet, no contamination, then fine sand and clay at base.</p>		<p>33.8 Bottom of screen.</p> <p>34.9 Bottom of sand.</p>
												<p>39.9 Added water to augers.</p>

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 718,328.2 E 1,736,320.9**
 GROUND ELEVATION **575.0** SYSTEM **State Plane using NAD27**

BORING NO. **009** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **7/15/97** BORING FINISH **7/15/97**
 PIEZOMETER TYPE _____ WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **1.57** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **42.3** BOTTOM **52.3**
 WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB-JCM** RIG **BK-81**

Water Level, ft	▽ 25.6	▼	▼
TIME			
DATE	7-17-97		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	1.9	3.4	4-4-4	1.5		5	[Symbol]		ASH	[Symbol]	
										FLY ASH With coal stringers, some clay, interbedded, dry, compact.		
2	SS	6.9	8.4	8-7-5	1.5		10	[Symbol]	CL	MODERATE YELLOW BROWN 10YR 5/4 SILTY SAND 95% sand, 5% silt, sand medium grain with quartz grading into CL SILTY CLAY DARK GRAY N3, v-fine grain, stiff, 90% , clay, 10% silt moist, no combinations.	[Symbol]	
										MODERATE YELLOW 10YR 5/4 BROWN SILTY SAND 95% sand, 5% silt, sand is medium to fine grades into CL SILTY CLAY DARK GRAY N3, v-fine grain with some silty, 90% clay, 10% silt, moist, moderately stiff, no contamination.		
3	SS	11.9	13.4	2-2-3	1.4		15	[Symbol]		MODERATE YELLOW BROWN 10YR 5/4 SILTY CLAY 90% clay, 10% silt, very stiff, wet, no visible contamination, trace of black organics.	[Symbol]	
4	SS	16.9	18.4	2-2-2	1.5			[Symbol]			[Symbol]	

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

Continued Next Page

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

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

RECORDER **T ROGERS**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **009** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/15/97** BORING FINISH **7/15/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
5	SS	21.9	23.4	2-2-1	1.5		25			MODERATE YELLOW BROWN 10YR 5/4 SILTY CLAY 70% clay, 30% silty/sand, fine to medium grain at bottom, wet, no contamination, clay is little stiff.		22.4 Sandy zone.
6	SS	26.9	28.4	1-2-2	1.5		30			DARK GRAY N3 SILTY CLAY 90% clay, 10% silt, very stiff, moist.		
7	SS	31.9	33.4	1-2-1	1.5		35			DARK GRAY N3 SILTY CLAY 70% clay 30% silt, fine sand, wet throughout, sand v-fine grain with interbedded in section, no visible contamination.		
8	SS	36.9	38.4	1-1-1	1.5		40			DARK GRAY N3 SILTY CLAY 90% clay, 10% silt, moist, clay is v-stiff, trace of black organic material.		34.8 Top of seal. 38.5 Top of sand.
9	SS	42.9	44.4	8-17-27	1.5		45		GM	MEDIUM DARK GRAY N4 SILTY GRAVEL 60% gravel, 40% sand/silty, gravel subrounded, quartz, quartzite wet, no contamination.		41.9-43.9 Shelby tube 800 PSi, 20 sec., 42.3 Top of screen.

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **009** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/15/97** BORING FINISH **7/15/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
10	SS	46.9	48.4	15-15-10	1.5		50			MEDIUM DARK GRAY N4 60% gravel, 40% sand/silt, gravel is quartz, subrounded, sand is fine to coarse, wet, quartzite, wet, no contamination.		46.9-48.4 Grain size analysis.
11	SS	51.9	53.4	10-15-20	1.5					MEDIUM DARK GRAY N4 SILTY SANDY GRAVEL 60% gravel, 40% sand/silt, gravel is subrounded, quartzite, quartzite, other rock, sand medium to coarse, with silt, quartz subrounded, wet, no contamination.		52.3 Bottom of screen. 54.5 Bottom of sand.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 717,666.4 E 1,736,450.7**
 GROUND ELEVATION _____ SYSTEM State Plane using NAD27

BORING NO. **011** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **7/22/97** BORING FINISH **7/23/97**
 PIEZOMETER TYPE _____ WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **2.39** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **36.3** BOTTOM **46.3**
 WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 32.0	▼	▼
TIME			
DATE	7-24-97		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		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
		FROM	TO									
1	SS	1.5	3.0	6-8-8	.8				ML	GRASS. OM. ML. SILT. GRAYISH ORANGE. 10YR 7/4 Dry.		
2	SS	6.5	8.0	7-7-10	1.3		5			MEDIUM DARK GRAY N4 ASH V-fine grain, dry, no contamination, ash is very dusty, coarse, bottom ash 1.8-2.4		
3	SS	11.5	13.0	5-3-5	1.4		10			MEDIUM DARK GRAY N4 ASH V-fine-fine sandy texture, dry at top moist at base.		
4	SS	16.5	18.0	4-5-10	1.5		15		CL	DARK GRAY N4 ASH/BOTTOM ASH V-fine sand texture, dry throughout with thin coal layers, no contamination.		
										SAME AS ABOVE 16.5-17.0 MODERATE YELLOW BROWN 10YR 5/4 SILTY CLAY Clay is moderately stiff with silt and fine sand, interbedded, moist, no contaminate.		

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

Continued Next Page

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

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

RECORDER **T ROGER**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **011** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/22/97** BORING FINISH **7/23/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
5	SS	21.5	23.0	5-5-5	1.5		25			BROWNISH GRAY 5YR 4/1 BOTTOM ASH Fine sand texture, moist, includes coal, no contamination.		
6	SS	26.5	28.0	3-2-5	1.5		30			MEDIUM DARK GRAY N4 BOTTOM ASH V-fine to fine sand texture, some cinders, wet, no visible contamination.		28.2 Top of seal.
7	SS	31.5	33.0	3-2-2	1.5		35		GM	MODERATE YELLOW BROWN 10YR 5/4 SILTY SAND 90% sand, 10% silty, and clay, wet, sand fine grain, quartz, no contamination.		34.0 Top of sand.
8	SS	36.5	38.0	4-2-2	1.2		40			SAME AS ABOVE		36.3 Top of screen.
9	SS	41.5	43.0	4-2-2	1.3		45			MODERATE YELLOW BROWN 10YR 5/4 CLAYEY SAND 70% sand, 30% clay, sand fine to medium grain, quartz, subrounded, wet, no visible contamination.		41.5-43.0 Grain size analysis.

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **011** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/22/97** BORING FINISH **7/23/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
10	SS	46.5	48.0	8-11-12	1.5					<p>CL DARK YELLOW ORANGE 10YR 6/6 SILTY CLAY 90% clay, 10% silt, wet.</p> <p>MODERATE BROWN 5YR 4/4 SILTY SAND 80% sand, 20% silt/clay, sand medium to coarse grain with some gravel, subrounded, wet.</p>		46.3 Bottom of screen.
11	SS	51.5	53.0	12-14-14	1.5		50			<p>YELLOW BROWN 10YR 5/4 SILTY SAND 90% sand, 10% silt, sand medium grain, quartz, wet grading into GM.</p> <p>MODERATE YELLOW BROWN SANDY GRAVEL 70% gravel, 30% sand/silt, gravel subrounded, granite, quartzite, sand medium to fine grain, wet, no contamination.</p>		50.0 Bottom of sand.
12	SS	56.5	58.0	9-7-6	1.2		55			<p>MODERATE YELLOW BROWN 10YR 5/4 SANDY/SILTY GRAVEL 80% gravel, 20% sand /silt, minor clay, gravel is subrounded, quartz, granite, quartzite, sand medium to fine quartz, wet, no contamination.</p>		

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 718,753.1 E 1,737,045.5**
 GROUND ELEVATION **580.0** SYSTEM State Plane using NAD27

BORING NO. **012** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **7/23/97** BORING FINISH **7/29/97**
 PIEZOMETER TYPE _____ WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **2.02** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **62.3** BOTTOM **72.3**
 WELL DEVELOPMENT **YES** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 38.8	▼	▼
TIME			
DATE	7-30-97		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	3.0	4.5	3-2-2	1.5		5			MEDIUM DARK GRAY TO GRAY N3-N4 BOTTOM ASH Ash dust, some interbedde, dry, top of spoon. MODERATE YELLOW BROWN		
2	SS	8.0	9.5	3-3-4	1.5		10					
3	SS	13.0	14.5	1-2-2	1.5		15					
4	SS	18.0	19.5	2-3-3	1.5							

TYPE OF CASING USED

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

Continued Next Page

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

RECORDER **T ROGERS**

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **012** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/23/97** BORING FINISH **7/29/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
5	SS	23.0	24.5	2-3-3	1.5		25					
6	SS	28.0	29.5	3-3-4	1.5		30					
7	SS	33.0	34.5	2-2-3	1.5		35					
8	SS	38.0	39.5	2-2-2	1.5		40					Spoon wet.
9	SS	43.0	44.5	2-2-2	1.5		45					45.5 Water on rods.

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **012** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/23/97** BORING FINISH **7/29/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
10	SS	48.0	49.5	2-3-3	1.5		50					
11	SS	53.0	54.5	22-24-29	1.3		55					
12	SS	58.0	59.5	17-15-19	1.1		60					57.4 Top of seal.
13	SS	63.0	64.5	10-16-22	1.1		65					61.4 Top of sand. 62.3 Top of screen.
14	SS	68.0	69.5	3-3-5	1.5		70					68.0-69.5 Grain size analysis.

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING




JOB NUMBER _____

COMPANY _____

BORING NO. **012** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/23/97** BORING FINISH **7/29/97**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
15	SS	73.0	74.5	50/3	.3		75					72.3 Bottom of screen. 73.9 Bottom of sand.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,504.2 E 1,736,239.5**
 GROUND ELEVATION **599.9** SYSTEM State Plane using NAD27

BORING NO. **MW-015** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **12/6/01** BORING FINISH **12/11/01**
 PIEZOMETER TYPE **SS** WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **1.73** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **78.2** BOTTOM **87.2**
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-REB** RIG **BK-81**

Water Level, ft	▽ 22.6	▼	▼
TIME			
DATE	12/10/01		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	1.9	3.4	6-7-8	1.5		5			BOTTOM ASH Dry		Grounding procedures not in use on this boring. This boring used to collect soil samples to determine where to set well. Potable water for drilling from old C E Lab site. Flushed lines for approx. 1 hr before using.
2	SS	6.9	8.4	2-3-3	1.5		10			LOOSE 5B 7/1 LIGHT BLUISH GRAY FLY ASH Dry; 0.2' moist area @ 18.0'		
3	SS	11.9	13.4	2-2-2	1.5		15					
4	SS	16.9	18.4	2-2-2	1.5							

TYPE OF CASING USED

<input type="checkbox"/>	NQ-2 ROCK CORE	
<input checked="" type="checkbox"/>	6" x 3.25 HSA	
<input type="checkbox"/>	9" x 6.25 HSA	
<input type="checkbox"/>	HW CASING ADVANCER	4"
<input type="checkbox"/>	NW CASING	3"
<input type="checkbox"/>	SW CASING	6"
<input type="checkbox"/>	AIR HAMMER	8"

Continued Next Page

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

RECORDER **MCR**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **MW-015** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **12/6/01** BORING FINISH **12/11/01**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		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
		FROM	TO			%						
5	SS	21.9	23.4	2-3-3	1.5		25			LOOSE 5B 7/1 LIGHT BLUISH GRAY FLY ASH Moist throughout, some areas larger grain size than others	▽ SWL @ 22.6' on 12/10/01. This is about 80 hrs since bore hole was disturbed; HSA's to 51.9'. Water coming from saturated fly ash from 6.0' to 43.4'	
6	SS	26.9	28.4	1-1-2	1.5	30	LOOSE 5B 7/1 LIGHT BLUISH GRAY FLY ASH Wet					
7	SS	31.9	33.4	2-2-3	1.5	35	LOOSE 5B 7/1 LIGHT BLUISH GRAY FLY ASH Moist in some areas, wet in others					
8	SS	36.9	38.4	1-1-1	1.5	40	LOOSE 5B 7/1 LIGHT BLUISH GRAY FLY ASH Wet					
9	SS	41.9	43.4	0-0-0	1.5	45	VERY LOOSE 5B 5/1 MEDIUM BLUISH GRAY FLY ASH Saturated, very fine					

AEP_EPRI_SPORN_MOUNTAINEER.GPJ_AEP.GDT 7/23/15

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **MW-015** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **12/6/01** BORING FINISH **12/11/01**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
10	SS	46.9	48.4	3-4-6	1.5		50			STIFF 10YR 5/4 MODERATE YELLOWISH BROWN CLAYEY SILT 1.5 tsf, moist		Started adding drill mud to inside of HSA's to prevent heaving sand @ 51.9'
11	SS	51.9	53.4	3-4-5	1.4		55			MEDIUM STIFF 10YR 5/4 MODERATE YELLOWISH BROWN CLAYEY SILT 1.0 tsf, moist		
12	SS	56.9	58.4	2-3-3	1.5		60			MEDIUM STIFF N5 MEDIUM GRAY CLAYEY SILT 1.0 tsf, moist		
13	SS	61.9	63.4	2-2-2	1.5		65			MEDIUM STIFF N5 MEDIUM GRAY CLAYEY SILT 1.0 tsf, moist		
14	SS	66.9	68.4	2-2-2	1.5		70			MEDIUM STIFF N5 MEDIUM GRAY CLAYEY SILT 1.0 tsf, moist		

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AEP_EPRI_SPORN_MOUNTAINEER.GPJ_AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **MW-015** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **12/6/01** BORING FINISH **12/11/01**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD		DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%	%						
15	SS	71.9	73.4	2-3-3	1.5			75			LOOSE BROWN & GRAY FINE GRAIN SAND Wet		
16	SS	76.9	78.3	19-39-50/.4	1.3			80			VERY DENSE 10YR 5/4 MODERATE YELLOWISH BROWN MEDIUM to COARSE GRAIN SAND With little gravel		Gravelly area @ 77.0'-88.4' (set well)
17	SS	81.9	83.4	30-37-21	1.5			85			VERY DENSE 10YR 6/6 DARK YELLOWISH ORANGE MEDIUM to COARSE GRAIN SAND With little gravel		
18	SS	86.9	88.4	11-12-12	1.5			90			MEDIUM DENSE N5 MEDIUM GRAY MEDIUM to COARSE GRAIN SAND With trace gravel, wet		
19	SS	91.9	93.4	15-16-17	1.5						DENSE N5 MEDIUM GRAY MEDIUM to COARSE GRAIN SAND Wet		
20	SS	94.3	94.5	50/.2	0.2						N7 LIGHT GRAY SANDSTONE		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

Stopped boring at auger and spoon refusal @ 94.5' on 12/11/01.
 Tremie grouted from 94.5' to grade using approx. 150 gallons of quick grout.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 721,431.5 E 1,732,814.2**
 GROUND ELEVATION **586.8** SYSTEM **State Plane using NAD27**

BORING NO. **MW-16** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **6/17/08** BORING FINISH **6/18/08**
 PIEZOMETER TYPE **N/A** WELL TYPE **OW**
 HGT. RISER ABOVE GROUND **1.787** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **67.5** BOTTOM **77.5**
 WELL DEVELOPMENT **Yes/Reclaimer** BACKFILL **Quick Grout**
 FIELD PARTY **MCR / ZLR** RIG **D-120**

Water Level, ft	▽	▼	▼
TIME			
DATE			

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
							5					GROUNDING PROCEDURES IN USE ON THIS BORING; DIGGING PERMIT IN HAND; NO SPT TAKEN @ 1.7' BECAUSE OF POSSIBLE UNDERGROUNDS - CUTTINGS SHOW MOIST SILTY CLAY
1	SPT	6.7	8.2	3-3-6	1.5		10			STIFF 10YR 6/6 DARK YELLOWISH ORANGE SILTY CLAY tsf 2.75, moist		
2	SPT	11.7	13.2	1-1-3	1.5		15			SOFT 5YR 5/6 LIGHT BROWN CLAYEY SILT tsf 0.5, very moist		
3	SPT	16.7	18.2	10-13-15	1.2					5YR 5/6 LIGHT BROWN FINE to MEDIUM SAND w/trace of fine gravel, moist		

TYPE OF CASING USED

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

Continued Next Page

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

RECORDER _____

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **MW-16** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/17/08** BORING FINISH **6/18/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
4	SPT	21.7	23.2	8-10-13	1.1		25					
5	SPT	26.7	28.2	5-8-13	1.2		30			MEDIUM DENSE 10YR 5/4 MODERATE YELLOWISH BROWN COARSE SAND w/trace of fine gravel, moist		
6	SPT	31.7	33.2	6-8-12	.8		35			MEDIUM DENSE 5YR 6/4 LIGHT BROWN COARSE SAND w/some coarse gravel, moist		
7	SPT	36.7	38.2	1-3-6	1.2		40			LOOSE 10YR 4/2 DARK YELLOWISH BROWN SAND medium moist to wet		SWL = 36.4' 06/18/08 w/ HSA'S @ 36.7' 14 hr READING WATER ON SPOON @ 37.5'; STARTED INDUCING WEAK DRILLING MUD TO INSIDE OF AUGERS TO PREVENT HEAVING SANDS
8	SPT	41.7	43.2	3-4-5	1.2		45			LOOSE 5 YR 4/4 MODERATE BROWN MEDIUM SAND w/trace of coarse gravel, wet		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ_AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **MW-16** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/17/08** BORING FINISH **6/18/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
9	SPT	46.7	48.2	3-3-3	1.5		50			LOOSE 5YR 4/4 MODERATE BROWN MEDIUM GRAIN SAND w/trace of fine gravel, wet		
10	SPT	51.7	53.2	2-3-5	1.4		55			LOOSE 5YR 4/4 MODERATE BROWN MEDIUM GRAIN SAND w/trace of fine gravel, wet		
11	SPT	56.7	58.2	6-10-15	1.5		60			MEDIUM DENSE 5YR 3/4 MODERATE BROWN COARSE GRAIN SAND wet		
12	SPT	61.7	63.2	4-7-12	1.5		65			MEDIUM DENSE 10YR 5/4 MODERATE YELLOWISH BROWN MEDIUM GRAIN SAND wet		
13	SPT	66.7	68.2	6-12-15	1.5		70			MEDIUM DENSE 5YR 5/2 PALE BROWN MEDIUM to COARSE GRAIN SAND wet		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ_AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **MW-16** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/17/08** BORING FINISH **6/18/08**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
14	SPT	71.7	73.2	10-15-17	1.0		75			MEDIUM DENSE 10YR 6/2 PALE YELLOWISH BROWN FINE SAND and FINE GRAVEL wet		
15	SPT	76.7	78.2	15-18-25	1.3		80			DENSE N5 MEDIUM GRAY COARSE SAND w/some coarse gravel, wet		
16	SPT	81.7	82.0	50/3	.2					N6 MEDIUM LIGHT GRAY WEATHERED COARSE GRAIN SANDSTONE		STOPPED BORING @ 82.0'; INSTALLED 2" MONITORING WELL

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 717,700.5 E 1,735,921.2**
 GROUND ELEVATION **592.7** SYSTEM **STATE PLANE**

BORING NO. **96-01** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **6/14/96** BORING FINISH **6/20/96**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 27.9	▼	▼
TIME			
DATE	6-20-96		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
		0.0	1.5							ROAD BASE		
2	SS	3.0	4.5	11-10-7	1.5							
3	SS	5.0	6.5	8-9-11	1.3		5	SW		BLACK BOTTOM ASH Moist. YELLOWISH ORANGE GRAVELLY SAND Dry to moist, 3/4" max size.		
4	SS	8.5	10.0	10-25-30	1.2		10			BLACK BOTTOM ASH Moist.		
5	SS	11.7	13.2	11-12-16	1.5		15			DARK BROWN SANDY SILT Moist, v-fine grain sand.		
6	SS	16.7	18.2	7-7-11	1.5					BLACK BOTTOM ASH Dry.		

TYPE OF CASING USED

<input type="checkbox"/>	NQ-2 ROCK CORE	
<input checked="" type="checkbox"/>	6" x 3.25 HSA	
<input type="checkbox"/>	9" x 6.25 HSA	
<input type="checkbox"/>	HW CASING ADVANCER	4"
<input type="checkbox"/>	NW CASING	3"
<input type="checkbox"/>	SW CASING	6"
<input type="checkbox"/>	AIR HAMMER	8"

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

RECORDER **WEB**

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-01** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/14/96** BORING FINISH **6/20/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	21.7	23.2	7-3-2	1.5		25			<u>Moist this area</u>		
8	SS	26.7	28.2	1-1-1	1.5		30			<u>Saturated this area</u>	▽	
9	SS	31.7	33.2	1-2-2	1.5		35		CL	<u>GREENISH BROWN SANDY CLAY</u> Saturated, low plasticity.		
10	SS	36.7	38.2	3-2-2	1.2		40		CL	<u>MULTI-COLORED BROWN SANDY CLAY</u> Wet to saturated, low plasticity, v-fine sand.		
11	ST	41.7	43.7		0		45					Belive material to soft to pickup in tube.
12	ST	43.7	45.7		0							

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-01** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/14/96** BORING FINISH **6/20/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
13	SS	51.7	53.2	1-1-2	1.0		50		CL	DARK GRAY SANDY CLAY Saturated, v-fine sand.		Stopped boring at 53.2' grouted from 53.2 to grade with approximately 60 gallons of quick grout.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 718,158.5 E 1,736,270.7**
 GROUND ELEVATION **594.6** SYSTEM **STATE PLANE**

BORING NO. **96-02** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **6/13/96** BORING FINISH **6/13/96**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TIME			
DATE			

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	0.0	1.5	10-12-13	1.2					GRAY BOTTOM ASH Dry, with 2 to 3" of sandy clay.		
2	SS	3.0	4.5	10-13-13	1.5					GRAY BOTTOM ASH Dry.		
3	SS	5.0	6.5	9-8-7	1.3		5		CL	LIGHT BROWN CLAY Dry, medium to high plasticity.		
4	SS	8.5	10.0	16-16-12	1.1		10		GP	DARK BROWN SAND AND GRAVEL Dry, 3/4" max size, rounded with some fines.		
5	SS	11.9	13.4	8-10-8	1.4		15					
6	SS	16.9	18.4	6-11-9	1.3					DARK BROWN SAND AND GRAVEL Moist, quartz, 1/2" max size, rounded with some fines.		

TYPE OF CASING USED

<input type="checkbox"/>	NQ-2 ROCK CORE	
<input checked="" type="checkbox"/>	6" x 3.25 HSA	
<input type="checkbox"/>	9" x 6.25 HSA	
<input type="checkbox"/>	HW CASING ADVANCER	4"
<input type="checkbox"/>	NW CASING	3"
<input type="checkbox"/>	SW CASING	6"
<input type="checkbox"/>	AIR HAMMER	8"

Continued Next Page

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

RECORDER **WEB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-02** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/13/96** BORING FINISH **6/13/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	21.9	23.4	7-7-7	1.3		25			<u>DARK BROWN SAND AND GRAVEL</u> Saturated, rounded, 1" max size, quartz with some fines.		
8	SS	26.9	28.4	1-1-2	1.5		30			<u>DARK GRAY FLY ASH</u> Saturated.		
9	SS	31.9	33.4	1-1-1	1.5		35					
10	SS	36.9	38.4	1-1-1	1.5		40					
11	SS	41.9	43.4	4-4-6	1.3		45		CL	<u>DARK GRAY CLAY</u> Wet, medium to high plasticity, trace of organic material.		
12	ST	43.9	45.9		1.0							

AEP_EPRI_SPORN_MOUNTAINEER.GPJ_AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-02** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/13/96** BORING FINISH **6/13/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
13	ST	46.9	48.9		2.0		50					
14	SS	51.9	53.4	3-3-4	1.5		55					
15	SS	56.9	58.4	1-3-4	1.5							Grouted hole from 58.4' to grade with approximately 75 gallons of quick grout.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

PROJECT **EPRI GROUND WATER STUDY**

COORDINATES **N 718,215.9 E 1,736,382.8**

GROUND ELEVATION **566.9** SYSTEM **STATE PLANE**

BORING NO. **96-03** DATE **7/23/15** SHEET **1** OF **3**

BORING START **6/17/96** BORING FINISH **6/18/96**

PIEZOMETER TYPE _____ WELL TYPE _____

HGT. RISER ABOVE GROUND _____ DIA _____

DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____

WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**

FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 22.2	▼	▼
TIME			
DATE	6-18-96		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	0.0	1.5	1-2-4	1.3					GRAY FLY ASH Moist.		Boring was grouted from grade to 60' w/ 60 gallons of quick grout
2	SS	3.0	4.5	6-5-4	1.5					GRAY BOTTOM ASH Moist.		
3	SS	5.0	6.5	3-2-2	1.5		5					
4	SS	8.5	10.0	4-6-6	1.5					BLACK COAL		
5	SS	11.7	13.2	4-3-3	1.5		10		SC	LIGHT BROWN SANDY CLAY Dry to moist, v-fine grain sand.		
6	SS	16.7	18.2	7-1-1	1.5		15		CL	DARK GRAY CLAY Wet, medium to high plasticity, trace of organic material.		

TYPE OF CASING USED				<i>Continued Next Page</i>			
				PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC			
X				WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON			
				RECORDER WEB			

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-03** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/17/96** BORING FINISH **6/18/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	ST	21.7	23.7		2.0		25				▽	
8	SS	26.7	28.2	1-1-1	1.5		30					
9	ST	31.7	33.7		2.0		35					
10	SS	36.7	38.2	1-2-2	1.5		40	SP	DARK GRAY AND BROWN SILTY SAND Wet to saturated, quartz, fine grain.			
11	SS	41.7	43.2	7-14-19	.6		45	GW	GRAY SAND AND GRAVEL Saturated, quartz, 1/2" max size, rounded.			

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-03** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/17/96** BORING FINISH **6/18/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
12	SS	46.7	47.6	37-50/4	.9		50			Brown		
13	SS	51.7	53.2	18-19-20	1.5		55			Same with 3/4" max size.		
14	SS	56.7	57.0	50/3	.3					Brown		
15	SS	59.8	60.0	50/2	.2		60			LIGHT GRAY SANDSTONE Fine grain.		

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 717,954.5 E 1,735,752.5**
 GROUND ELEVATION **593.5** SYSTEM **STATE PLANE**

BORING NO. **96-04** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **6/18/96** BORING FINISH **6/19/96**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TIME			
DATE			

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
		0.0								ROAD BASE		Grouted boring from 88' to grade w/ 80 gallons of quick grout and placed concrete plug in road bed.
2	SS	3.0	4.5	11-12-13	1.3			SC	DARK BROWN CLAYEY SAND Moist, trace of small gravel.			
3	SS	5.0	6.5	11-19-16	1.5	5		SP	DARK BROWN GRAVELLY SAND Moist, 1/2" max size, rounded with fines.			
4	SS	8.5	10.0	9-12-10	1.5	10						
5	SS	11.6	13.1	16-22-17	1.5	15			BLACK BOTTOM ASH Moist with 1" layer of silty clay with slight plasticity.			
6	SS	16.6	18.1	9-9-7	.4				DARK BROWN, BLACK CLAYEY SAND Moist, some organic, may be older road base.			

TYPE OF CASING USED

<input type="checkbox"/>	NQ-2 ROCK CORE	
<input checked="" type="checkbox"/>	6" x 3.25 HSA	
<input type="checkbox"/>	9" x 6.25 HSA	
<input type="checkbox"/>	HW CASING ADVANCER	4"
<input type="checkbox"/>	NW CASING	3"
<input type="checkbox"/>	SW CASING	6"
<input type="checkbox"/>	AIR HAMMER	8"

Continued Next Page

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

RECORDER **WEB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-04** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/18/96** BORING FINISH **6/19/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	21.6	23.1	5-5-6	1.5					BLACK BOTTOM ASH Saturated.		
										BLACK FLY ASH Saturated.		
8	SS	26.6	28.1	1-2-2	1.2		25					
9	SS	31.6	33.1	1-1-1	1.5		30					
10	SS	36.6	38.1	.2-3-3	1.5		35		CL	ORANGE AND LIGHT BROWN MOTTLED SILTY CLAY Wet to saturated, medium to low plasticity.		
11	SS	41.6	43.1	3-3-3	1.5		40			Same as sample with trace of organic material.		
							45					

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



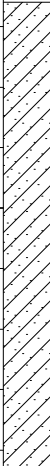



JOB NUMBER _____

COMPANY _____

BORING NO. **96-04** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/18/96** BORING FINISH **6/19/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
12	ST	46.6	48.6		2.0		50					
13	SS	51.6	53.1	1-1-1	1.5		55		SC	GRAY AND BROWN CLAYEY SAND Wet to saturated, v-fine grain sand, slight to non plasticity.		
14	SS	59.3	60.8	3-3-3	.8		60		SP	DARK BROWN SAND Saturated, fine grain, with some fines, quartz.		
15	SS	64.3	65.8	15-16-2	1.5		65			DARK BROWN SAND Saturated, v-fine grain with some fines, quartz.		
16	SS	69.3	70.8	8-9-11	1.5		70		SW	DARK BROWN SAND Saturated, quartz.		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-04** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/18/96** BORING FINISH **6/19/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
17	SS	74.3	75.8	14-14-19	1.5		75					
18	SS	79.3	80.8	8-10-8	1.5		80		SP	DARK BROWN AND GRAY SAND Saturated, quartz, fine grain.		
19	SS	84.3	85.1	8-50/.3	.8		85		GW	BROWN SAND AND GRAVEL Saturated, quartz, 1/2" max size, rounded.		
20	SS	87.7	87.9	50/.2	.2					GRAY CLAY SHALE Dry.		

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 718,463.6 E 1,736,113.5**
 GROUND ELEVATION **597.4** SYSTEM **STATE PLANE**

BORING NO. **96-05** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **6/12/96** BORING FINISH **6/12/96**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 48.8	▼	▼
TIME			
DATE	6-12-96		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	0.0	1.5	14-22-35	1.0					GRAY BOTTOM ASH		Boring grouted from grade to 58.2.
2	SS	3.0	4.5	11-12-15	1.2			SP	DARK BROWN GRAVELLY SAND Moist, 1/2" max size, some fines. BROWN CLAYEY SILT Moist, slight to non plasticity.			
3	SS	5.0	6.5	10-10-15	1.3		5	SM	LIGHT BROWN SILTY SAND Dry, v-fine grain.			
5	SS	8.5	10.0	8-13-15	1.5		10	SC	LIGHT AND DARK BROWN CLAYEY SAND Moist, trace of small gravel.			
6	SS	11.7	13.2	11-11-13	1.2		15	GP	DARK BROWN CLAYEY SAND AND GRAVEL Moist, quartz, 3/4" max size, rounded.			
7	SS	16.7	18.2	3-2-4	1.5			SM	LIGHT BROWN SILTY SAND Moist, v-fine grain sand.			
								CL	DARK GRAY SILTY CLAY Wet, medium to low plasticity, trace of organic material.			

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

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PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC
 WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
 RECORDER **WEB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-05** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/12/96** BORING FINISH **6/12/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
8	SS	21.7	23.2	3-4-6	1.5		25		CL	LIGHT BROWN CLAYEY SILTY Moist to wet, slight plasticity.		
9	SS	26.7	28.2	2-2-1	1.1		30			GRAY BOTTOM ASH Saturated.		
10	SS	31.7	33.2	1-2-2	1.3		35		CL	DARK GRAY CLAY Wet to saturated, medium to low plasticity, trace of organic.		
11	SS	36.7	38.2	1-1-1	1.5		40			GRAY FLY ASH Saturated.		
12	SS	41.7	43.2	1-1-1	1.5		45		CL	DARK GRAY SILTY CLAY Moist, low to medium plasticity, trace of organic material.		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-05** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/12/96** BORING FINISH **6/12/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
13	SS	46.7	48.2	1-1-2	1.5					▽		
14	ST	51.7	53.7		2.0							
15	SS	56.7	58.2	2-2-3	1.5							

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 718,519.1 E 1,736,243.1**
 GROUND ELEVATION **566.1** SYSTEM **STATE PLANE**

BORING NO. **96-06** DATE **7/23/15** SHEET **1** OF **2**
 BORING START **6/18/96** BORING FINISH **6/18/96**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽ 23.6	▼	▼
TIME			
DATE	6-18-96		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	0.0	1.5	1-1-4	1.5					GRAY FLY ASH Moist.		
2	SS	3.0	4.5	5-6-4	1.5							
3	SS	5.0	6.5	3-3-2	1.5		5			GRAY BOTTOM ASH Saturated.		
4	SS	8.5	10.0	5-5-6	1.5		10		CL	BROWN SILTY CLAY Moist, low to medium plasticity (DIKE MATERIAL).		
5	SS	11.5	13.0	3-4-2	1.5		15			DARK BROWN SILTY CLAY Saturated, medium to low plasticity, (DIKE MATERIAL).		
6	SS	16.5	18.0	4-4-3	1.5				SM	GRAY SILTY SAND Saturated, v-fine grain, quartz.		

TYPE OF CASING USED	
<input type="checkbox"/>	NQ-2 ROCK CORE
<input checked="" type="checkbox"/>	6" x 3.25 HSA
<input type="checkbox"/>	9" x 6.25 HSA
<input type="checkbox"/>	HW CASING ADVANCER 4"
<input type="checkbox"/>	NW CASING 3"
<input type="checkbox"/>	SW CASING 6"
<input type="checkbox"/>	AIR HAMMER 8"

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC
 WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
 RECORDER **WEB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-06** DATE **7/23/15** SHEET **2** OF **2**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/18/96** BORING FINISH **6/18/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	21.5	23.0	1-1-2	1.3		25				▽	
8	SS	26.5	28.0	1-1-1	1.5				CL	DARK GRAY CLAY Saturated, medium to low plasticity with v-fine grain sand lens.		
9	SS	31.5	33.0	2-3-3	1.5		30					

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 720,983.0 E 1,734,516.1**
 GROUND ELEVATION **619.0** SYSTEM **STATE PLANE**

BORING NO. **96-101** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **6/5/96** BORING FINISH **6/5/96**
 PIEZOMETER TYPE **SS** WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN **24.4** BOTTOM **33.4**
 WELL DEVELOPMENT **NO** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-REB** RIG **BK-81**

Water Level, ft	▽	▼	▼
TIME			
DATE			

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1		0.0			0					No sample taken boring in road way		
2	SS	3.0	4.5	12-13-16	1.1				SM	BROWN SILTY GRAVELLY SAND Dry to moist, 1/2" max size, rounded, quartz.		
3	SS	5.0	6.5	7-9-9	1.2		5					
3	SS	8.5	10.0	3-4-5	1.2		10		SC	BROWN CLAYEY SAND Moist, fine grain with trace of gravel.		
4	SS	11.5	13.0	17-27-38	1.2				SM	BROWN SILTY GRAVELLY SAND Moist, fine grain, trace of gravel, quartz.		
5	SS	16.5	18.0	12-19-26	1.1		15					

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

Continued Next Page

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

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

RECORDER **REB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-101** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/5/96** BORING FINISH **6/5/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
												20.0 Top of seal.
6	SS	21.5	23.0	16-21-27	1.1				SW	BROWN GRAVELLY SAND Moist, trace of small gravel, quartz, rounded.		22.0 Top of sand.
							25					24.4 Top of screen.
7	SS	26.5	28.0	12-20-23	1.2				GP	BROWN SAND AND GRAVEL Moist to wet, quartz, rounded, 3/4" max size, some fines.		
							30					
8	SS	31.5	33.0	4-5-7	1.1				SM	BROWN SILTY SAND Moist, 100% fine grain.		
9	ST	33.5	35.5		1.6				CL	Push 2.0 Time 5 sec. PSI 800 Top of sample. BROWN SILTY SAND Bottom of sample. LIGHT GRAY CLAY Moist, low to medium plasticity.		34.0 Bottom of pipe. 34.4 Bottom of screen.
							35					35.0 Bottom of sand.
10	SS	36.5	38.0	4-6-8	1.1							
							40					
11	SS	41.5	43.0	4-5-6	1.1				SM	DARK GRAY SILTY SAND Wet, non to slight plasticity, with reddish brown quartz sand lens.		
12	ST	43.5	45.5		1.5				ML	PUSH 2.0 TIME 5 SEC PSI 800 Bottom of sample. Drillers identification fly ash believe it is a light gray clay		
							45					

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 720,707.5 E 1,734,001.7**
 GROUND ELEVATION **619.6** SYSTEM **STATE PLANE**

BORING NO. **96-102** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **6/5/96** BORING FINISH **6/5/96**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-REB** RIG **BK-81**

Water Level, ft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TIME			
DATE			

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1		0.0			0					<u>NO SAMPLE TAKEN BORING IN ROAD AUGER CUTTINGS INDICATE BROWN SAND AND GRAVEL</u>		Boring was grouted from grade to 48.2' with quick grout.
2	SS	3.0	4.5	12-16-19	1.1			SP	<u>BROWN GRAVELLY SAND</u> Moist, 1/2" max size, rounder, quartz with fines.			
3	SS	5.0	6.5	17-21-26	1.2	5						
4	SS	8.5	10.0	13-16-19	1.2							
5	SS	11.7	13.2	15-28-32	1.2	10						
6	SS	16.7	18.2	17-21-26	1.2	15						

TYPE OF CASING USED		<i>Continued Next Page</i>	
<input checked="" type="checkbox"/>	NQ-2 ROCK CORE	PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC	
	6" x 3.25 HSA	WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON	
	9" x 6.25 HSA	RECORDER REB	
	HW CASING ADVANCER 4"		
	NW CASING 3"		
	SW CASING 6"		
	AIR HAMMER 8"		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-102** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/5/96** BORING FINISH **6/5/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		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
		FROM	TO			%						
7	SS	21.7	23.2	19-21-24	1.1		25			<u>Sample moist to wet.</u>		
8	SS	26.7	28.2	9-9-11	1.1		30		SM	<u>DARK BROWN SANDY SILT</u> Moist, non-plastic.		
9	SS	31.7	33.2	3-4-5	1.1		35		SC	<u>BROWN SANDY CLAY</u> Moist, low plasticity, with v-fine sand lens.		
10	ST	33.7	35.7		?					<u>Time 5 sec.</u> <u>Push 2.0</u> <u>PSI 1000</u>		
11	SS	36.7	38.2	4-4-5	1.1		40		SM	<u>BROWN SILTY SAND</u> Moist, with very fine sand lens.		
12	SS	41.7	43.2	3-5-8	1.1		45		SP	<u>BROWN GRAVELLY SAND</u> Moist, 3/4" max size, rounded, quartz.		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-102** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/5/96** BORING FINISH **6/5/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
13	SS	46.7	48.2	13-15-21	1.2			-				

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,785.3 E 1,734,133.3**
 GROUND ELEVATION **618.0** SYSTEM **STATE PLANE**

BORING NO. **96-103** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **6/4/96** BORING FINISH **6/4/96**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-REB** RIG **BK-81**

Water Level, ft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TIME			
DATE			

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1		0.0			0					<u>NO SAMPLE TAKEN BORING LOCATED IN ROAD CUTTINGS INDICATE BROWN SAND AND GRAVEL.</u>		Boring grouted from grade to 48.1 w/ 60 gallons of quick grout.
2	SS	3.0	4.5	12-19-24	1.1			SP	<u>DARK BROWN GRAVELLY SAND</u> Moist, rounded, quartz, with fines, 3/4" max size.			
3	SS	5.0	6.5	14-17-19	1.2	5						
4	SS	8.5	10.0	17-21-25	1.1	10						
5	SS	11.6	13.1	19-25-28	1.1	15						
6	SS	16.6	18.1	12-19-25	1.2							

TYPE OF CASING USED		<i>Continued Next Page</i>	
<input checked="" type="checkbox"/>	NQ-2 ROCK CORE	PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC	
	6" x 3.25 HSA	WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON	
	9" x 6.25 HSA	RECORDER REB	
	HW CASING ADVANCER 4"		
	NW CASING 3"		
	SW CASING 6"		
	AIR HAMMER 8"		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-103** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/4/96** BORING FINISH **6/4/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	21.6	23.1	5-14-21	1.1		25					
8	SS	26.6	28.1	11-17-28	1.2		30					
9	SS	31.6	33.1	8-9-10	1.1		35	CL	BROWN SILTY CLAY Moist, with fine grain sand lens, low plasticity.			
10	ST	36.6	38.6		1.6		40	SP	time 5 sec. Push 2.0 PSI 700 LIGHT BROWN SAND Fine grain.			
11	SS	41.6	43.1	4-5-6	1.1		45		BROWN SAND Moist, 100% fine grain, with fines.			

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-103** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/4/96** BORING FINISH **6/4/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
12	SS	46.6	48.1	6-6-5	?			[Dotted pattern]				

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,229.2 E 1,734,600.2**
 GROUND ELEVATION **618.7** SYSTEM **STATE PLANE**

BORING NO. **96-104** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **6/4/96** BORING FINISH **6/4/96**
 PIEZOMETER TYPE **SS** WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN **24.1** BOTTOM **33.1**
 WELL DEVELOPMENT **NO** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-REB** RIG **BK-81**

Water Level, ft	▽	▼	▼
TIME			
DATE			

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	0.0		2-4-8	1.1				CL	-		
2	SS	3.0	4.5	9-14-18	1.2				SP	DARK BROWN CLAY Moist, medium to high plasticity trace of sand.		
3	SS	5.0	6.5	73	1.1		5		GW	BROWN GRAVELLY SAND Dry, quartz, 1/2" max, rounded. DARK BROWN SAND AND GRAVEL Dry, quartz, 1/2" max, rounded.		
4	SS	8.5	10.0	9-18-25	1.2		10			Same as above some fines, moist		
5	SS	11.7	13.2	19-26-31	1.2		15		SP	DARK BROWN GRAVELLY SAND Dry, 3/4" max, rounded, quartz.		
6	SS	16.7	18.2	18-21-26	1.2				SC	DARK BROWN CLAYEY SAND Moist, trace of gravel.		

TYPE OF CASING USED

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

Continued Next Page

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

RECORDER **REB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-104** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/4/96** BORING FINISH **6/4/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	21.7	23.2	17-21-25	1.2		25		SP	LIGHT BROWN GRAVELLY SAND Dry, quartz, 3/4" max, rounded.		20.4 Top seal. 22.5 Top of sand. 24.1 Top of screen.
8	SS	26.7	28.2	4-6-8	1.1		30		CL	LIGHT BROWN SILTY CLAY Moist, low to medium plasticity.		33.1 Bottom of screen. 34.7 Bottom of sand.
9	ST	31.7	33.7		1.6		35			PUSH 2.0 PSI 900 TIME 6 SEC. BROWN CLAYEY SAND Fine grain?		33.1 Bottom of screen. 34.7 Bottom of sand.
10	SS	36.7	38.2	3-3-5	1.2		40			LIGHT BROWN SILTY CLAY Moist, low to medium plasticity.		33.1 Bottom of screen. 34.7 Bottom of sand.
11	SS	41.7	43.2	4-4-7	1.1		45		SM	LIGHT BROWN SILTY SAND Moist. v-fine grain 100%.		33.1 Bottom of screen. 34.7 Bottom of sand.

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-104** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/4/96** BORING FINISH **6/4/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
12	ST	46.7	48.7		1.5					PUSH 2.0 PSI 1200 TIME 6 SEC. DARK BROWN SANDY CLAY Fine grain.		

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 718,782.8 E 1,735,084.7**
 GROUND ELEVATION **619.3** SYSTEM **STATE PLANE**

BORING NO. **96-105** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **6/3/96** BORING FINISH **6/3/96**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-REB** RIG **BK-81**

Water Level, ft	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
TIME			
DATE			

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	3.0	4.5	7-10-11	1.1				SW	No sample taken. Boring located in road bed. Auger cuttings sand and gravel.		Boring grouted from grade to 48.5' with 75 gallons of quick grout
2	SS	5.0	6.5	12-16-21	1.2		5			BROWN SAND Dry, quartz, rounded with trace of gravel.		
3	SS	8.5	10.0	9-15-17	1.2		10			BROWN GRAVELLY SAND Dry quartz, rounded, 1/2" max size.		
4	SS	11.5	13.0	9-16-19	1.1		15			3/4" max size trace of fines.		
5	SS	16.5	18.0	9-14-17	1.2					Moist		

TYPE OF CASING USED

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

Continued Next Page

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

RECORDER **REB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-105** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/3/96** BORING FINISH **6/3/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		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
		FROM	TO			%						
6	SS	21.5	23.0	7-9-14	1.1		25		SM	<u>DARK BROWN SILTY SAND</u> Moist, with trace of small gravel.		
7	SS	26.5	28.0	5-6-7	1.2		30		CL	<u>BROWN SILTY CLAY</u> Moist, low to medium plasticity.		
8	ST	31.5	33.5		1.7		35			<u>PUSH 2.0</u> <u>PSI 700</u> <u>TIME 8 SEC.</u>		
9	SS	36.5	38.0	3-3-5	1.1		40					
10	SS	41.5	43.0	4-4-5	1.2		45		SP SC	<u>LIGHT BROWN CLAYEY SAND</u> Moist, 100% v-fine grain.		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-105** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/3/96** BORING FINISH **6/3/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
11	ST	46.5	48.0		1.8					TIME 5 SEC PSI 800 PUSH 2.0		

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,271.8 E 1,735,858.4**
 GROUND ELEVATION **618.9** SYSTEM **STATE PLANE**

BORING NO. **96-106** DATE **7/23/15** SHEET **1** OF **3**
 BORING START **5/28/96** BORING FINISH **5/28/96**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-REB** RIG **BK-81**

Water Level, ft	▽ 60.2	▼	▼
TIME			
DATE	5-28-96		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
										<u>NO SAMPLE TAKEN BORING IN ROAD BED.</u>		
1	SS	3.0	4.5	15-17-21	1.1				GP	<u>DARK BROWN SAND AND GRAVEL</u> Moist, 1/2" max, rounded, quartz, some fines.		
2	SS	5.0	6.5	17-24-30	1.1		5			<u>1" max size</u>		
3	SS	8.5	10.0	13-17-20	1.2					<u>1/2" max size</u>		
4	SS	11.5	13.0	11-11-14	1.2		10					
5	SS	16.5	18.0	13-15-17	1.1		15			<u>1/2" max size</u>		

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

Continued Next Page

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

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

RECORDER **REB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING




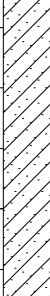


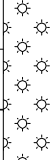
JOB NUMBER _____

COMPANY _____

BORING NO. **96-106** DATE **7/23/15** SHEET **2** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **5/28/96** BORING FINISH **5/28/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
6	SS	21.5	23.0	6-8-10	1.2		25		SC	BROWN SANDY CLAY Dry, slight to low plasticity.		
7	SS	26.5	28.0	4-6-6	1.2		30			GRAY FLY ASH Dry.		
8	SS	31.5	33.0	1-1-1	1.2		35			Saturated		
9	SS	36.5	38.0	1-1-1	1.2		40					
10	SS	41.5	43.0	1-1-1	1.2		45					

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-106** DATE **7/23/15** SHEET **3** OF **3**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **5/28/96** BORING FINISH **5/28/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
11	SS	46.5	48.0	3-2-2	1.1		50					
12	SS	51.5	53.0	2-2-2	1.2		55					
13	SS	56.5	58.0	3-4-4	1.2		60		CL	DARK GRAY SILTY CLAY Wet, low to medium plasticity, trace of organic material.		
14	ST	61.5	63.5		1.6		65			Time 7 sec. Push 2.0 PSI 600 BROWN SILTY CLAY Trace of fine sand.	▽	
15	SS	66.5	68.0	3-4-5	1.2					BROWN CLAY Wet, medium to high plasticity.		
												Boring grouted from 68.0' to grade with 125 gallons quick grout.

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,691.4 E 1,736,040.0**
 GROUND ELEVATION **618.8** SYSTEM **STATE PLANE**

BORING NO. **96-107** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **5/29/96** BORING FINISH **5/29/96**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-REB** RIG **BK-81**

Water Level, ft	▽ 39.1	▼	▼
TIME			
DATE	5-29-96		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
										<u>NO SAMPLE TAKEN BORING IN ROAD BED. AUGER CUTTINGS INDICATE BROWN SAND AND GRAVEL.</u>		Boring was grouted from 73.1 to grade w/approximately 100 gallons of quick grout.
1	SS	3.0	4.5	14-17-21	1.1			GP	<u>BROWN SAND AND GRAVEL</u> Moist, quartz, rounded, some fine 3/4" max size.			
2	SS	5.0	6.5	17-21-28	1.2	5						
3	SS	8.5	10.0	14-18-24	1.1	10			<u>1/2" max size</u>			
4	SS	11.6	13.1	13-16-21	1.2	15						
5	SS	16.6	18.1	5-8-10	1.1			ML	<u>BROWN SILT</u> Moist, non to v-slight plasticity.			

TYPE OF CASING USED

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

Continued Next Page

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

RECORDER **REB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-107** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **5/29/96** BORING FINISH **5/29/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
6	SS	21.6	23.1	8-8-11	1.2		25		SM	Attempted shelby tube lifted rig BROWN SILT SAND Moist, 100% v-fine grain.		
7	SS	26.6	28.1	4-5-9	1.2		30			GRAY FLY ASH Moist.		
8	SS	31.6	33.1	5-8-11	1.2		35			Saturated		
9	SS	36.6	38.1	1-1-1	1.1		40					
10	SS	41.6	43.1	1-1-1	1.2		45					



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AEP_EPRI_SPORN_MOUNTAINEER.GPJ_AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-107** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **5/29/96** BORING FINISH **5/29/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
11	SS	46.6	48.1	1-1-1	1.2		50				Weight of 140# hammer.	
12	SS	51.6	53.1	2-1-1	1.2		55					
13	SS	56.6	58.1	0	1.3		60					
14	SS	61.6	63.1	4-7-10	1.2		65		CL	DARK BROWN CLAY Moist. medium to high plasticity.		
15	ST	66.6	68.6		1.5		70			Push 2.0 Time 5 sec. PSI 600 BROWN CLAY		
16	SS	71.6	73.1	4-6-7	1.2							

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-107** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **5/29/96** BORING FINISH **5/29/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,761.8 E 1,736,125.4**
 GROUND ELEVATION **603.4** SYSTEM **STATE PLANE**

BORING NO. **96-108** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **6/11/96** BORING FINISH **6/11/96**
 PIEZOMETER TYPE **SS** WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN **63.3** BOTTOM **72.3**
 WELL DEVELOPMENT **NO** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-WEB** RIG **BK-81**

Water Level, ft	▽	▼	▼
TIME			
DATE			

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
										No sample road base		
1	SS	3.0	4.5	11-15-16	1.2					BLACK SAND AND BOTTOM ASH Moist.		
3	SS	5.0	6.5	12-17-21	1.5		5					
4	SS	8.5	10.0	12-16-29	.9				SC	DARK BROWN CLAYEY SAND Moist, with fine sand lens.		
5	SS	11.6	13.1	9-18-22	1.2				SP	DARK BROWN GRAVELLY SAND Moist, quartz, some fine, 1/2" max size.		
6	SS	16.6	18.1	18-24-21	.8		15		SC	DARK BROWN CLAYEY SAND Moist, trace of small gravel and ash.		

TYPE OF CASING USED

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

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

RECORDER **REB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-108** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/11/96** BORING FINISH **6/11/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	21.6	23.1	6-6-8	1.5		25		CL	LIGHT BROWN SILTY CLAY Moist, low plasticity.		
8	SS	26.6	28.1	4-4-4	1.0		30			BLACK BOTTOM ASH Saturated.		
9	SS	31.6	33.1	2-1-2	1.1		35			GRAY FLY ASH Saturated.		
10	SS	36.6	38.1	2-1-1	1.5		40					
11	SS	41.6	43.1	3-5-7	.8		45		CL	LIGHT GRAY CLAY Moist to wet, medium to high plasticity.		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-108** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/11/96** BORING FINISH **6/11/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
12	ST	46.6	48.6		2.0		50			PUSH 2.0 TIME 7 SEC. PSI 1000		
13	SS	51.6	53.1	2-2-3	?		55		CL	DARK GRAY SILTY CLAY Wet, low plasticity, trace of organic and sand.		
14	SS	56.6	58.1	2-2-3	1.5		60					57.0 Top of seal.
15	SS	61.6	63.1	3-4-5	1.5		65					60.6 Top of sand. 63.3 Top screen.
16	SS	66.6	68.1	4-4-5	1.5		70					
17	SS	71.6	73.1	4-5-6	1.5							

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING




JOB NUMBER _____

COMPANY _____

BORING NO. **96-108** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/11/96** BORING FINISH **6/11/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
												72.3 Bottom of screen. 74.0 Bottom of sand.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 720,227.5 E 1,735,579.0**
 GROUND ELEVATION **619.6** SYSTEM **STATE PLANE**

BORING NO. **96-109** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **5/29/96** BORING FINISH **5/30/96**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN _____ BOTTOM _____
 WELL DEVELOPMENT _____ BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-REB** RIG **BK-81**

Water Level, ft	▽ 20.5	▼	▼
TIME			
DATE	5-30-96		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
										NO SAMPLE TAKEN BORING LOCATED IN ROAD BASE. AUGER CUTTINGS INDICATE BROWN SAND AND GRAVEL.		Boring grouted from 73.2 to grade with 150 gallons quick grout.
1	SS	3.0	4.5	13-19-24	1.2			GP	DARK BROWN SAND AND GRAVEL Moist, 1/2" max size, quartz, rounded, some fines.			
2	SS	5.0	6.5	15-18-21	1.1	5						
3	SS	8.5	10.0	15-18-21	1.2	10						
4	SS	11.7	13.2	12-13-14	1.0	15		SP	DARK BROWN SAND Moist, fine grain.			
5	SS	16.7	18.2	4-5-6	1.1			ML	BROWN SANDY SILT Moist, non plasticity.			

TYPE OF CASING USED

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

Continued Next Page

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

RECORDER **REB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-109** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **5/29/96** BORING FINISH **5/30/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
6	SS	21.7	23.2	4-6-8	1.2		25				▽	
7	ST	26.7	28.7		1.5		30			Time 10 sec PSI 1200 Push 2.0 By watching rig psi possible .4 to .5 of fly ash in bottom of tube. GRAY FLY ASH Moist.		
8	ST	31.7	33.2	4-7-10	1.1		35					
9	SS	36.7	38.2	1-1-1	1.2		40			Saturated		
10	SS	41.7	43.2	1-1-1	1.2		45					

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-109** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **5/29/96** BORING FINISH **5/30/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
11	SS	46.7	48.2	1-1-3	?		50					
12	SS	51.7	66.7	1-1-2	1.2		55					
13	SS	56.7	58.2	1-1-4	1.2		60					
14	SS	61.7	63.2	4-6-8	?		65		CL	DARK BROWN CLAY Moist, medium to high plasticity.		
15	ST	66.7	68.7		1.7		70			Time 8 sec. Push 2.0 PSI 1000 Material same as sample no. 14		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ_AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-109** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **5/29/96** BORING FINISH **5/30/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
16	SS	71.7	73.2	3-4-5	1.2							

AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 720,277.1 E 1,735,665.6**
 GROUND ELEVATION **602.3** SYSTEM **STATE PLANE**

BORING NO. **96-110** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **6/6/96** BORING FINISH **6/10/96**
 PIEZOMETER TYPE **SS** WELL TYPE _____
 HGT. RISER ABOVE GROUND _____ DIA _____
 DEPTH TO TOP OF WELL SCREEN **43.7** BOTTOM **52.7**
 WELL DEVELOPMENT **NO** BACKFILL **QUICK GROUT**
 FIELD PARTY **MCR-REB** RIG **BK-81**

Water Level, ft	▽ DRY	▼	▼
TIME			
DATE	6-10-96		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
										<u>No sample taken, boring in road.</u>		Grouted grade to 73.1' with approximately 80 gallons.
1	SS	3.0	4.5	13-18-24	1.1					<u>DARK GRAY BOTTOM ASH</u> Dry.		
2	SS	5.0	6.5	10-11-14	1.2	5						
3	SS	8.5	10.0	5-7-9	1.1			GP		<u>DARK BROWN SAND AND GRAVEL</u> Dry, quartz, rounded, 3/4" max.		
4	SS	11.6	13.1	6-7-10	1.1	10						
5	SS	16.6	18.1	8-10-10	1.2			CL		<u>BROWN CLAY</u> Dry, low to medium plasticity with trace of v-fine sand.		
6	SS	18.6	20.1	9-11-12	1.2	15		SC		<u>Attempted to push tube lifted drill, destroyed end of tube.</u> <u>BROWN SANDY CLAY</u> Moist, low to medium		

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

Continued Next Page

PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC
 WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
 RECORDER **REB**

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-110** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/6/96** BORING FINISH **6/10/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
7	SS	21.6	23.1	5-7-11	1.2					plasticity with v-fine grain sand lens. <u>Grading to more sand</u> <u>Attempted to push tube, top hole broken in tube, pushed approximately 1' lifted rig.</u>		
		23.6					25					
9	SS	26.6	28.1	5-7-11	1.2					<u>GRAYISH BROWN SILTY CLAY</u> Moist, low to medium plasticity.		
							30			<u>Could not move or knock tube off to the side of lead auger, pulled augers grouted hole moved approximately three feet down stream to start new hole. No spt taken on new hole until this point. SWL dry augers to 26.6'. Auger set all weekend at this point.</u> <u>REDDISH BROWN CLAY</u> Dry to moist, medium to high plasticity.		
10	SS	31.6	33.1	7-10-9	1.3			CL				
							35					
11	SS	36.6	38.1		1.5							
							40		CL	<u>MEDIUM GRAY CLAY</u> Moist to dry, medium to high plasticity, with odor of organic. <u>PUSH 2.0</u> <u>PSI 1200</u> <u>TIME 6 SEC.</u> <u>Top DARK BROWNISH GRAY SANDY CLAY</u> <u>Bottom BROWN SANDY CLAY</u>		
12	ST	38.6	40.6		2.0							39.1 Top of seal.
							45					
13	SS	41.6	43.1	3-5-7	1.5					<u>DARK GRAY CLAY</u> Moist to wet, medium to high plasticity, strong odor of organic.		41.7 Top of sand. 43.7 Top of screen.

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-110** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/6/96** BORING FINISH **6/10/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
14	SS	46.6	48.1	3-4-4	1.5		50			GRAY BROWN CLAY Moist to wet, medium to high plasticity, odor of organic with v-fine grain sand lens, water on out side of spoon.		52.7 Bottom of screen. 53.3 Bottom of sand.
15	SS	51.6	53.1	3-3-5	1.5		55					
16	SS	56.6	58.1	3-4-4	1.5					PUSH 2.0 TIME 7 SEC. PSI 770 DARK GRAY SILTY CLAY		
17	ST	58.6	60.6		2.0		60					
18	SS	61.6	63.1		?					DARK GRAY CLAY Moist to wet, medium to high plasticity, strong odor of organic material.		
19	SS	66.6	68.1	3-4-5	1.5		65					
20	SS	71.6	73.1	4-7-11	1.4		70					

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **96-110** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **6/6/96** BORING FINISH **6/10/96**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 723,463.5 E 1,734,069.7**
 GROUND ELEVATION **582.2** SYSTEM State Plane using NAD27

BORING NO. **JTMN-1** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **7/19/90** BORING FINISH **7/19/90**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND **1.5** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **56.7** BOTTOM **75.7**
 WELL DEVELOPMENT _____ BACKFILL **Benseal**
 FIELD PARTY **MCR / JD** RIG **B-61**

Water Level, ft	▽ 38.0	▼	▼
TIME			
DATE	7/19/90		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	2.7	4.2	4-8-7	1.4		5			BROWN SANDY SILT Moist, w/some quartz sand (fill)		20' North of well hub.
2	SS	7.7	9.2	3-3-3	0.9		10					
3	SS	12.7	14.2	4-7-9	1.3		15			MULTI-COLORED BROWN CLAY Moist, med to low plasticity		
4	SS	17.7	19.2	4-7-9	1.3					w/ trace of very fine sand		

TYPE OF CASING USED

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

Continued Next Page

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

RECORDER **JCM**

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **JTMN-1** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/19/90** BORING FINISH **7/19/90**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
5	SS	22.7	24.2	4-7-9	1.4		25			BROWN SILTY CLAY w/ trace of very fine sand, low to medium plasticity		
6	SS	27.7	29.2	3-4-6	1.4		30			BROWN SAND Moist to wet, 100% fine grain		
7	SS	32.7	34.2	3-4-4	1.3		35					
8	SS	37.7	39.2	6-6-10	1.3		40			BROWN CLAYEY SAND & GRAVEL Saturated, quartz - 3/4" max size, rounded	▽	
9	SS	42.7	44.2	6-8-10	1.1		45			BROWN SAND & GRAVEL Saturated, quartz - 3/4" max size, rounded, w/ trace of fines		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **JTMN-1** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/19/90** BORING FINISH **7/19/90**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
10	SS	47.7	49.2	12-16-25	0.4		50			1" max size		
11	SS	52.7	54.2	10-12-16	0.9		55			BROWN SAND Saturated, 70% fine grain, w/ some fines		
12	SS	57.7	59.2	10-12-17	1.3		60			BROWN SAND Saturated, 90% medium to fine grain		
13	SS	62.7	64.2	12-17-15	0.9		65			BROWN SAND Saturated, 80% medium to fine grain quartz, trace of fines		
14	SS	67.7	69.2	17-16-16	1.0		70			BROWN SILTY SAND Saturated, quartz, w/ trace of small gravel		

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **JTMN-1** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/19/90** BORING FINISH **7/19/90**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
15	SS	72.7	74.2	9-18-19	0.4		75			BROWN SAND Saturated, quartz, w/ trace of fines		Auger refusal @ 76.6'. Installed 2" observation well.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 723,392.8 E 1,734,106.4**
 GROUND ELEVATION **582.2** SYSTEM **State Plane using NAD27**

BORING NO. **JTMN-2** DATE **7/23/15** SHEET **1** OF **4**
 BORING START **7/17/90** BORING FINISH **7/18/90**
 PIEZOMETER TYPE _____ WELL TYPE _____
 HGT. RISER ABOVE GROUND **1.9** DIA **2**
 DEPTH TO TOP OF WELL SCREEN **57.9** BOTTOM **76.9**
 WELL DEVELOPMENT _____ BACKFILL **Benseal**
 FIELD PARTY **MCR / JD** RIG **B-61**

Water Level, ft	▽ 40.2	▼	▼
TIME			
DATE	7/18/90		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
1	SS	2.7	4.2	5-2-12	0		5			NO RECOVERY - DROVE SPOON ON COBBLES		100' North of potable well hub.
2	SS	7.7	9.2	2-2-8	0		10			CONCRETE FRAGMENTS & SAND ON SPOON		
3	SS	12.7	14.2	4-5-8	0.9		15			BROWN CLAY Moist, medium to low plasticity		
4	SS	17.7	19.2	3-5-8	1.0							

TYPE OF CASING USED

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

Continued Next Page

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

RECORDER **JCM**

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **JTMN-2** DATE **7/23/15** SHEET **2** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/17/90** BORING FINISH **7/18/90**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
5	SS	22.7	24.2	3-4-7	0		25					
6	SS	27.7	29.2	3-5-4	0.4		30			BROWN SILTY SAND Moist, 100% fine grain		
7	SS	32.7	34.2	4-5-5	1.3		35			BROWN CLAY Moist, medium to low plasticity BROWN SAND Quartz, 95% fine grain, trace of fines		
8	SS	37.7	39.2	3-5-7	1.3		40			BROWN CLAYEY SAND Wet to saturated.	▽	
9	SS	42.7	44.2	10-11-8	1.0		45			BROWN SAND & GRAVEL Quartz, rounded, 3/4" max size, w/ fines		Started washing out augers.

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING



JOB NUMBER _____

COMPANY _____

BORING NO. **JTMN-2** DATE **7/23/15** SHEET **3** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/17/90** BORING FINISH **7/18/90**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
10	SS	47.7	49.2	8-11-11	0.3		50					
11	SS	52.7	54.2	9-14-10	0.5		55					
12	SS	57.7	59.2	7-7-7	0.9		60		BROWN SAND Quartz, saturated, trace of gravel			
13	SS	62.7	64.2	8-14-12	1.1		65		BROWN SAND Quartz, saturated, trace of gravel, trace of fines			
14	SS	67.7	69.2	7-13-14	1.2		70					

AEP_EPRI_SPORN_MOUNTAINEER.GPJ AEP.GDT 7/23/15

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING





JOB NUMBER _____

COMPANY _____

BORING NO. **JTMN-2** DATE **7/23/15** SHEET **4** OF **4**

PROJECT **EPRI GROUND WATER STUDY**

BORING START **7/17/90** BORING FINISH **7/18/90**

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
15	SS	72.7	74.2	8-13-16	1.2		75			BROWN SAND Saturated		
16	SS	77.7	77.8	50/0.1	0.1					LIGHT BROWN SANDSTONE		Auger refusal @ 77.8' Installed 2" observation well.

**AEP 1990, 1996, 1997, 2001,
2008**

**Monitoring Well Construction
Diagrams**

**MW-001 to MW-16, 96-101, 96-
104, 96-108, 96-110, JTMN-1,
JTMN-2**







AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION

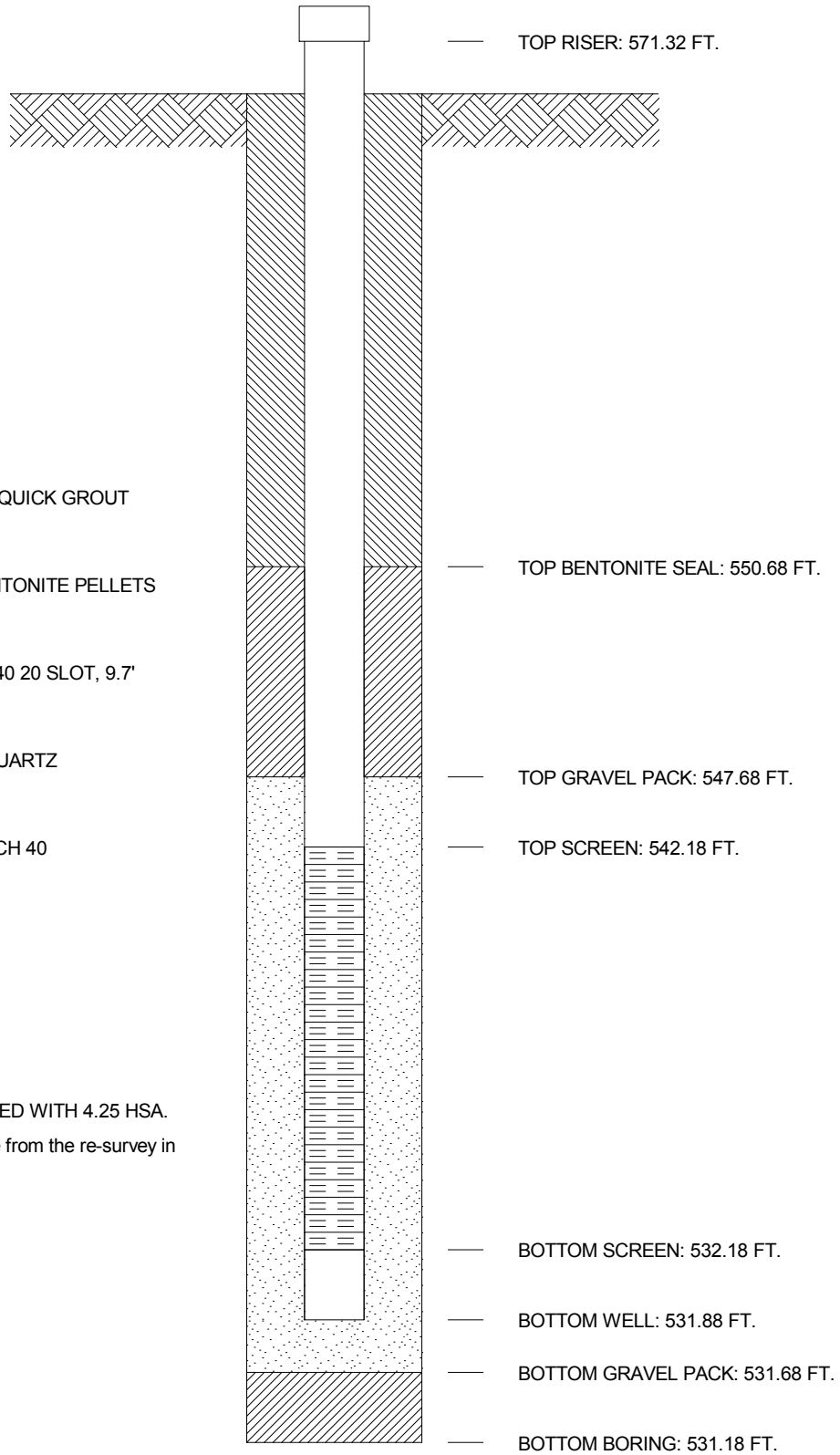


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 724,498.7 E 1,733,165.9**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-001** BORING No. **001** INSTALLED **6/18/97**

GROUND ELEVATION 569.18 FT.

-  GROUT SEAL: 50 GALLONS QUICK GROUT
-  BENTONITE SEAL: 125 #BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'
-  GRAVEL PACK: 95 #7@#4 QUARTZ
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



PRE-PACK SCREEN. DRILLED WITH 4.25 HSA.
 Coordinates and elevations are from the re-survey in June 2008.







AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION

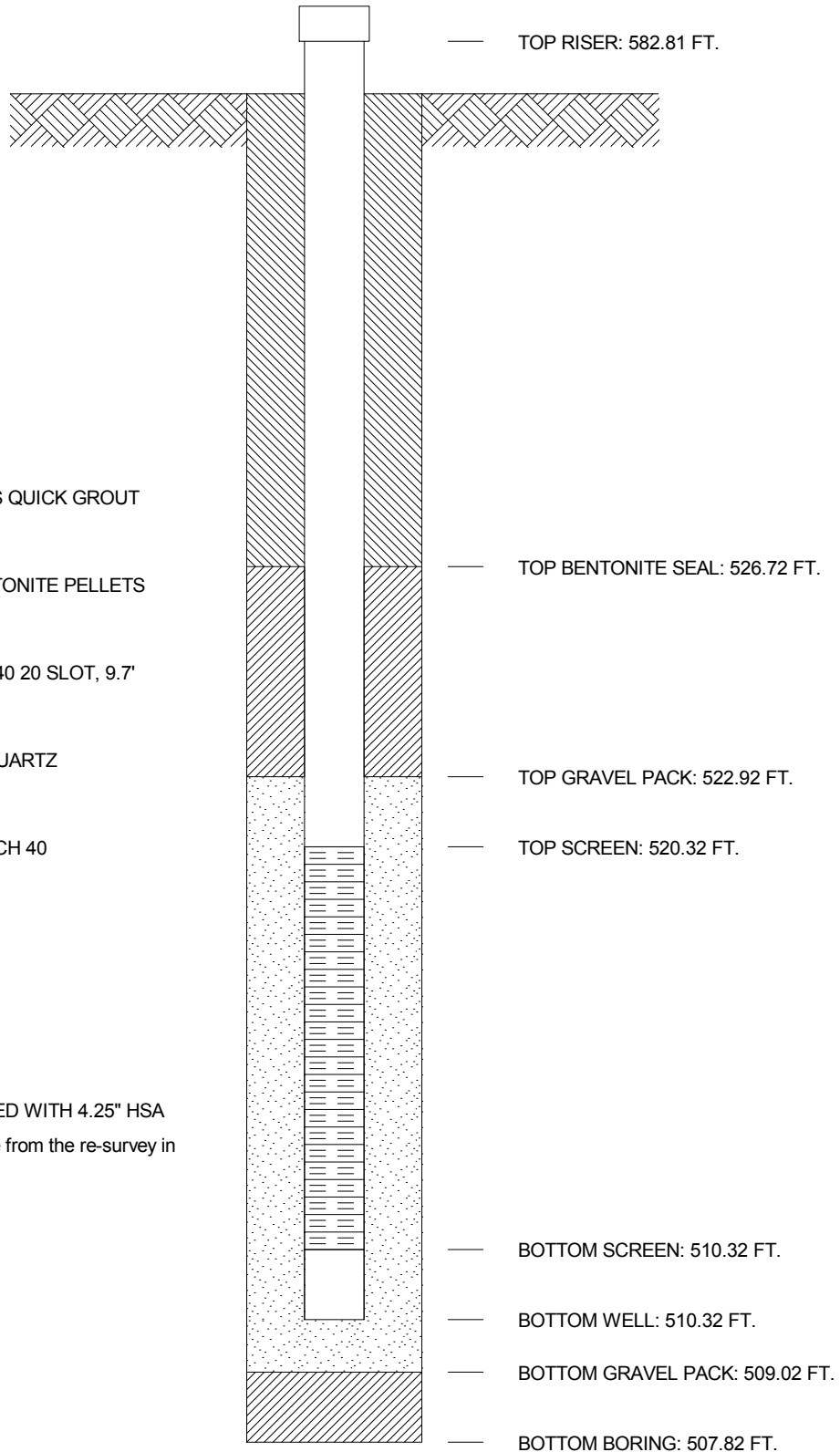


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 724,857.8 E 1,733,650.5**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-002** BORING No. **002** INSTALLED **6/24/97**

GROUND ELEVATION 580.82 FT.

-  GROUT SEAL: 100 GALLONS QUICK GROUT
-  BENTONITE SEAL: 25# BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'
-  GRAVEL PACK: 97# 7@#4 QUARTZ
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



PRE-PACK SCREEN DRILLED WITH 4.25" HSA
 Coordinates and elevations are from the re-survey in
 June 2008.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION



JOB NUMBER _____

COMPANY _____

WELL No. **MW-003** BORING No. **003**

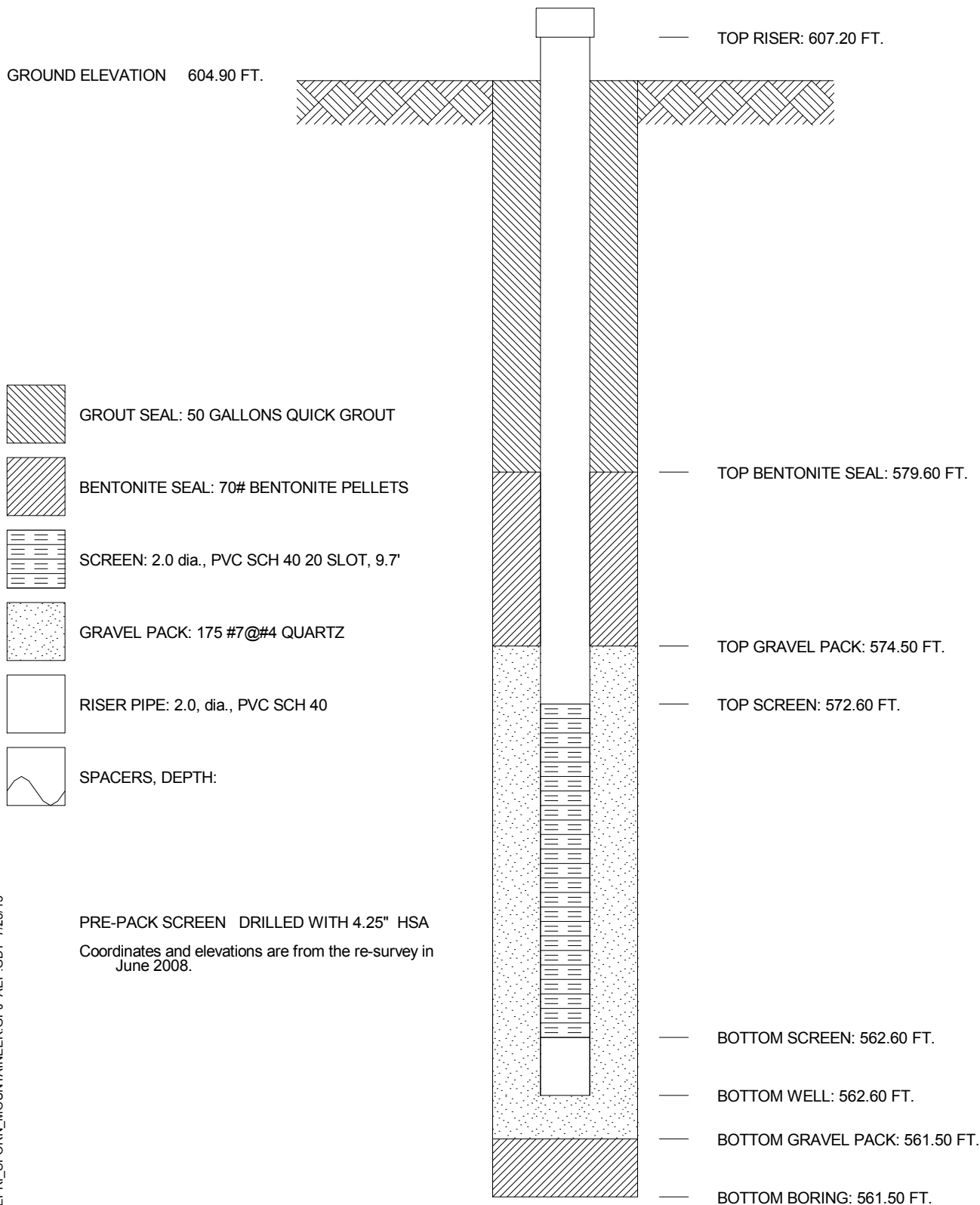
INSTALLED **6/25/97**

PROJECT **EPRI GROUND WATER STUDY**

COORDINATES **N 719,877.2 E 1,733,713.7**

SYSTEM **State Plane using NAD27**

GROUND ELEVATION 604.90 FT.



PRE-PACK SCREEN DRILLED WITH 4.25" HSA
 Coordinates and elevations are from the re-survey in
 June 2008.







AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION

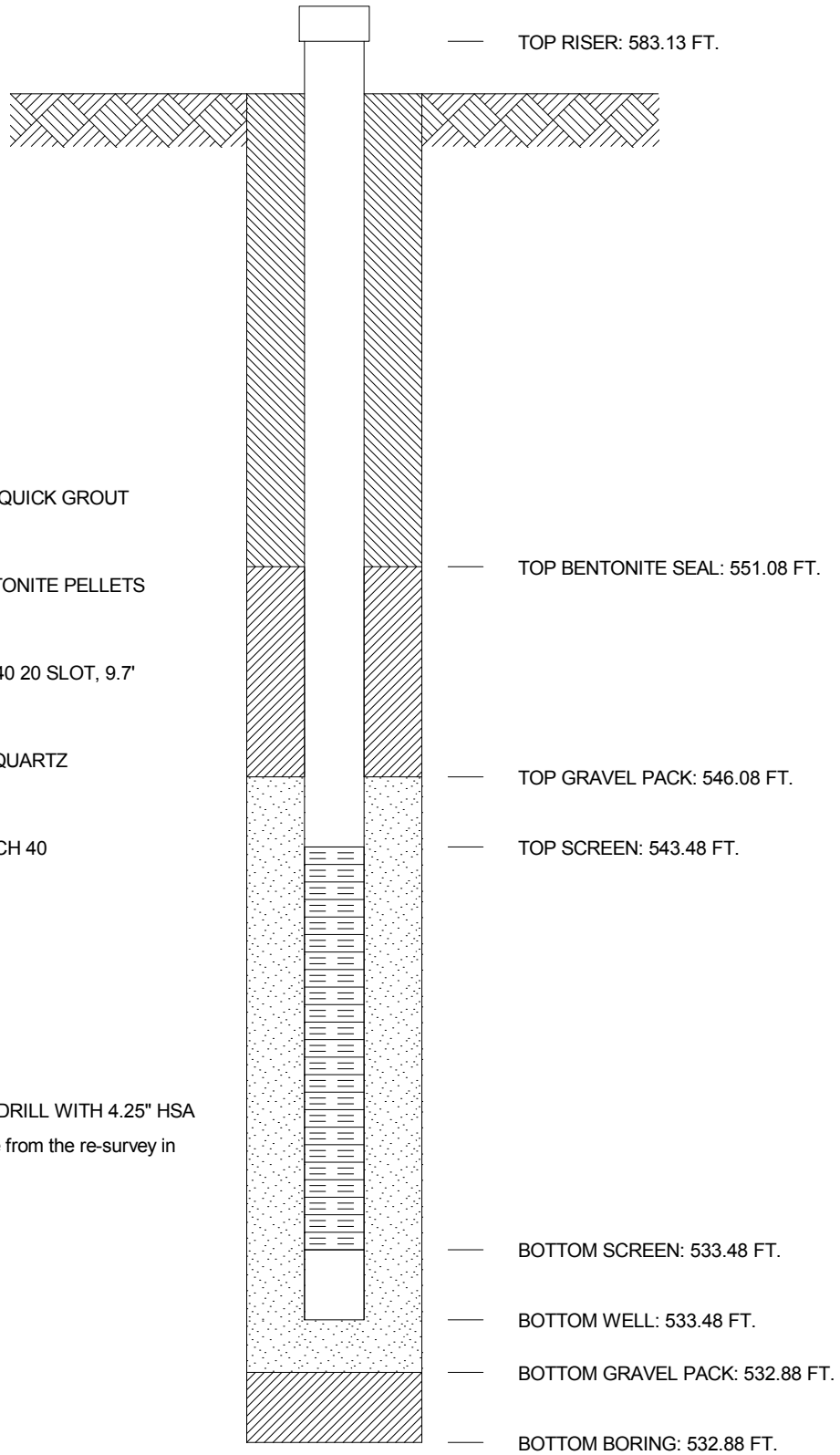


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 724,865.9 E 1,733,643.4**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-004** BORING No. **004** INSTALLED **6/30/97**

GROUND ELEVATION 581.08 FT.

-  GROUT SEAL: 50 GALLONS QUICK GROUT
-  BENTONITE SEAL: 50# BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'
-  GRAVEL PACK: 375 #7@#4 QUARTZ
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



PRE-PACK SCREEN HOLE DRILL WITH 4.25" HSA
 Coordinates and elevations are from the re-survey in
 June 2008.







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 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION

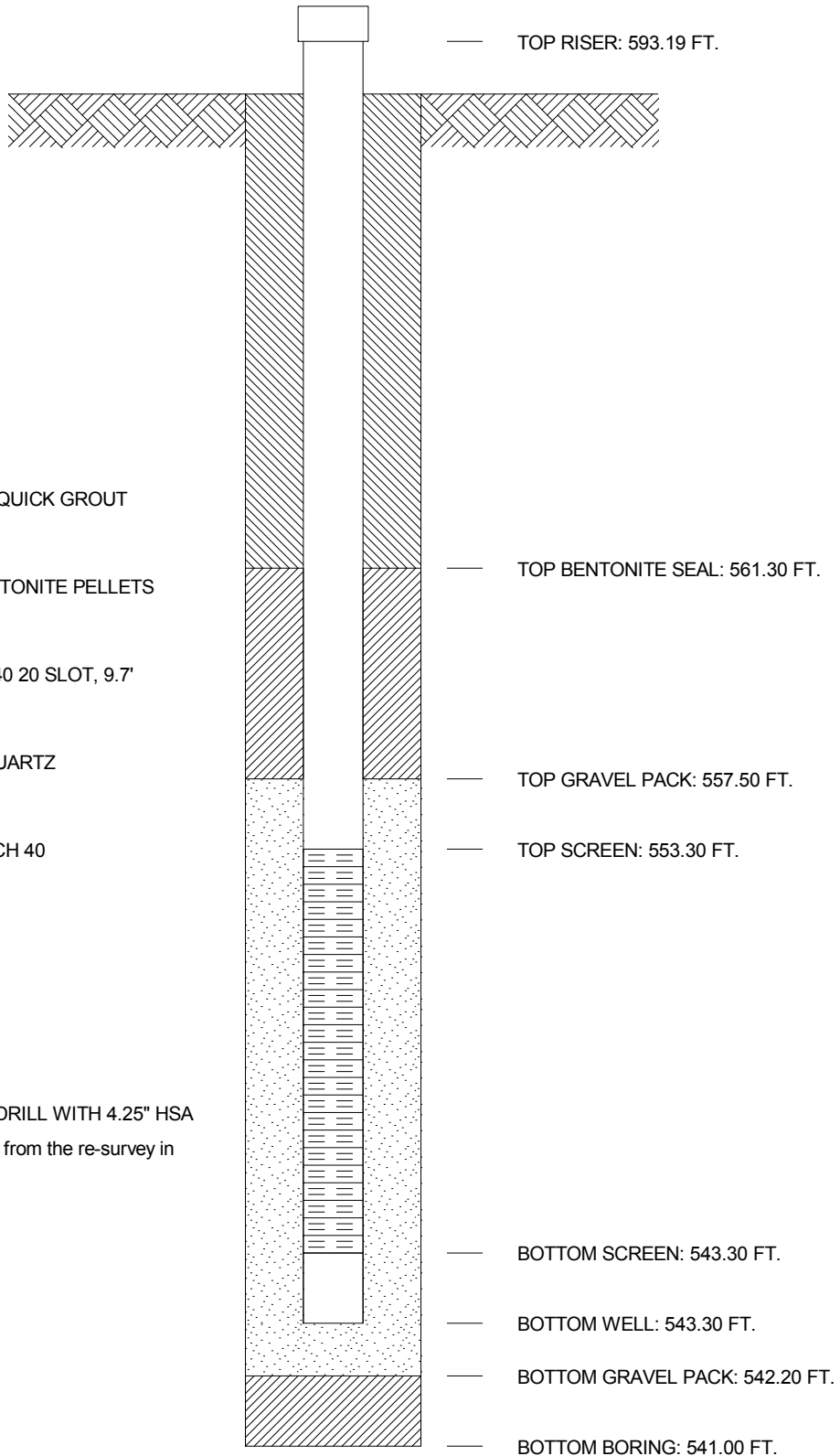


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,152.8 E 1,734,428.9**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-005** BORING No. **005** INSTALLED **7/1/97**

GROUND ELEVATION 591.00 FT.

-  GROUT SEAL: 80 GALLONS QUICK GROUT
-  BENTONITE SEAL: 150# BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'
-  GRAVEL PACK: 75# 7@#4 QUARTZ
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



PRE-PACK SCREEN HOLE DRILL WITH 4.25" HSA
 Coordinates and elevations are from the re-survey in
 June 2008.







AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION

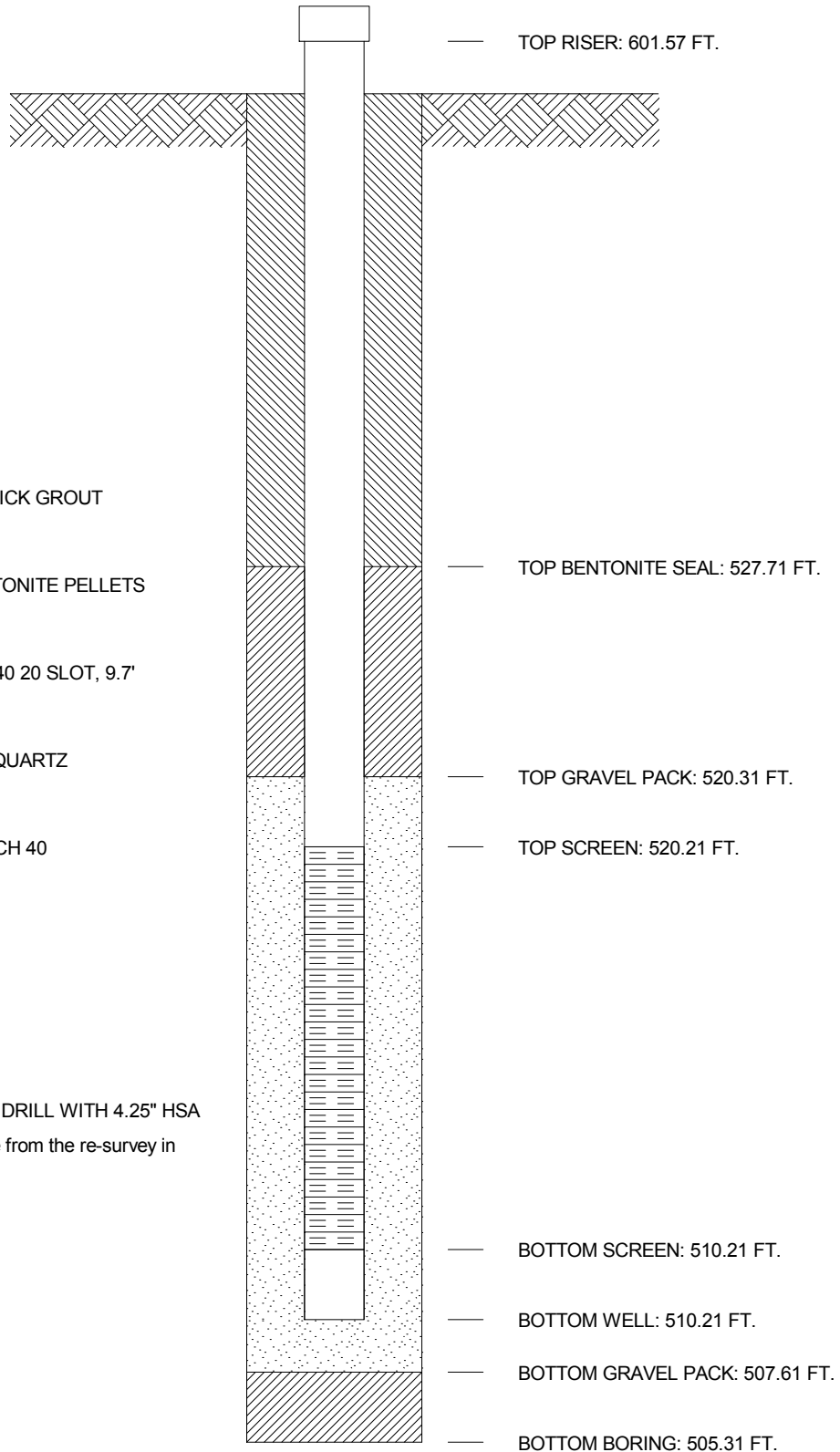


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 720,255.7 E 1,735,680.0**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-006** BORING No. **006** INSTALLED **7/8/97**

GROUND ELEVATION 601.31 FT.

-  GROUT SEAL: GALLONS QUICK GROUT
-  BENTONITE SEAL: 80# BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'
-  GRAVEL PACK: 185# 7@#4 QUARTZ
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



PRE-PACK SCREEN. HOLE DRILL WITH 4.25" HSA
 Coordinates and elevations are from the re-survey in
 June 2008.







AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION

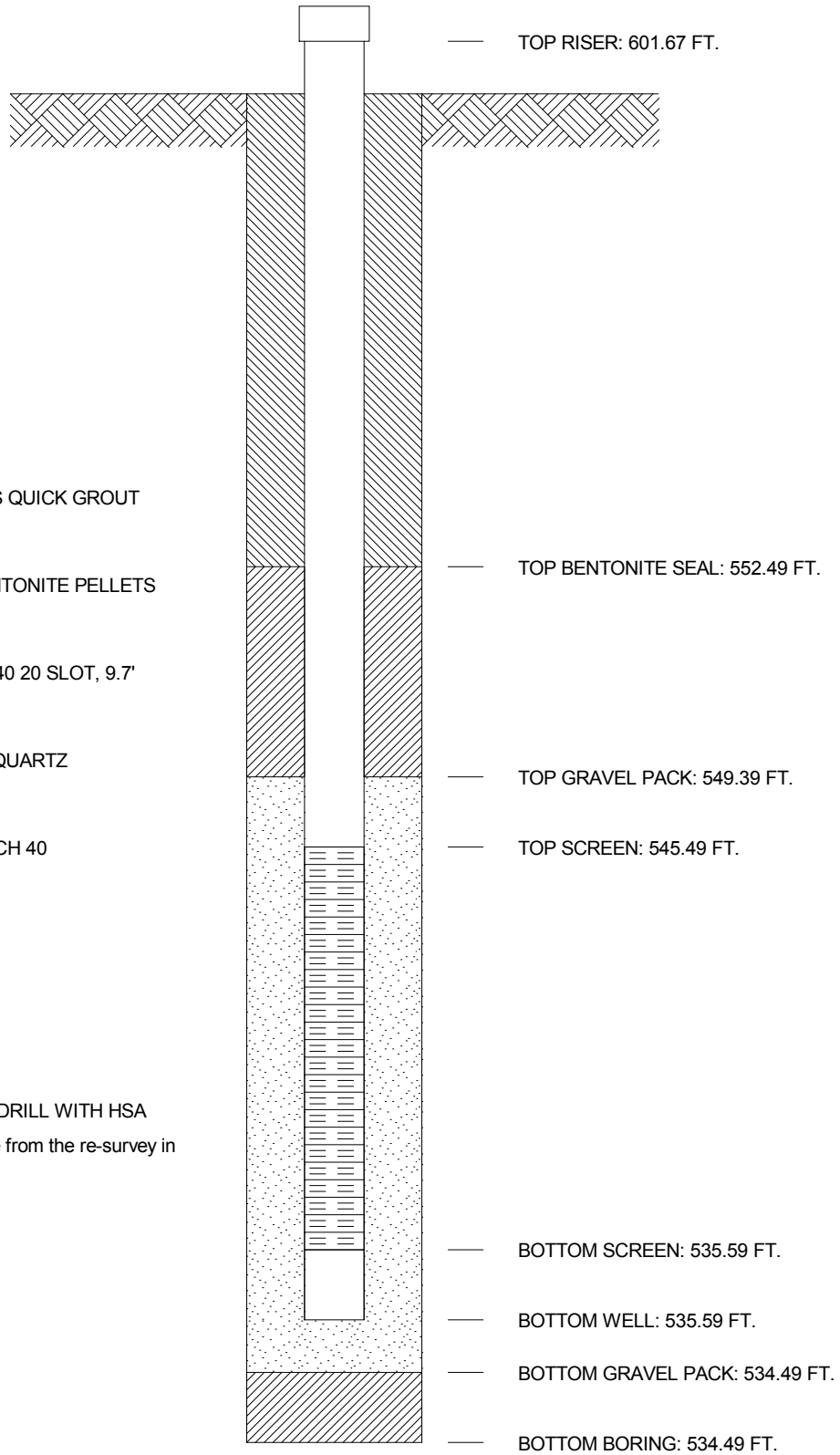


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 720,265.1 E 1,735,674.4**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-007** BORING No. **007** INSTALLED **7/10/97**

GROUND ELEVATION 601.49 FT.

-  GROUT SEAL: 100 GALLONS QUICK GROUT
-  BENTONITE SEAL: 100# BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'
-  GRAVEL PACK: 525# 7@#4 QUARTZ
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



PRE-PACK SCREEN HOLE DRILL WITH HSA
 Coordinates and elevations are from the re-survey in
 June 2008.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION



JOB NUMBER _____

COMPANY _____

WELL No. **MW-008** BORING No. **008**

INSTALLED **7/22/97**

PROJECT **EPRI GROUND WATER STUDY**

COORDINATES **N 718,915.8 E 1,736,153.5**

SYSTEM **State Plane using NAD27**

GROUND ELEVATION FT.



GROUT SEAL: GALLONS QUICK GROUT



BENTONITE SEAL: 70# BENTONITE PELLETS



SCREEN: 2.0 dia., PVC SCH 40 08 SLOT, 9.7'



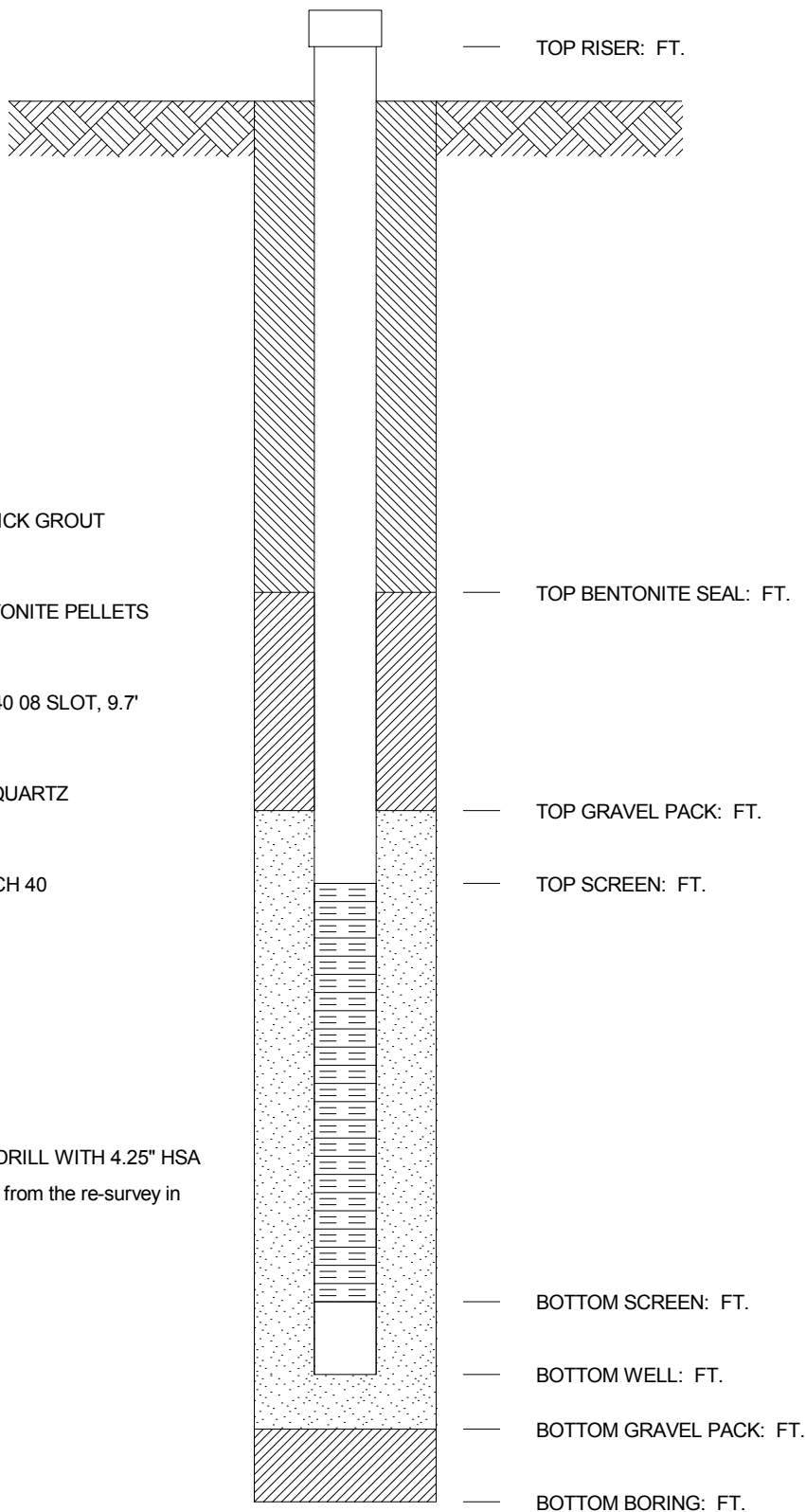
GRAVEL PACK: 360# 7@#4 QUARTZ



RISER PIPE: 2.0, dia., PVC SCH 40



SPACERS, DEPTH:



TOP RISER: FT.

TOP BENTONITE SEAL: FT.

TOP GRAVEL PACK: FT.

TOP SCREEN: FT.

BOTTOM SCREEN: FT.

BOTTOM WELL: FT.

BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: FT.

PRE-PACK SCREEN HOLE DRILL WITH 4.25" HSA

Coordinates and elevations are from the re-survey in June 2008.







AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION

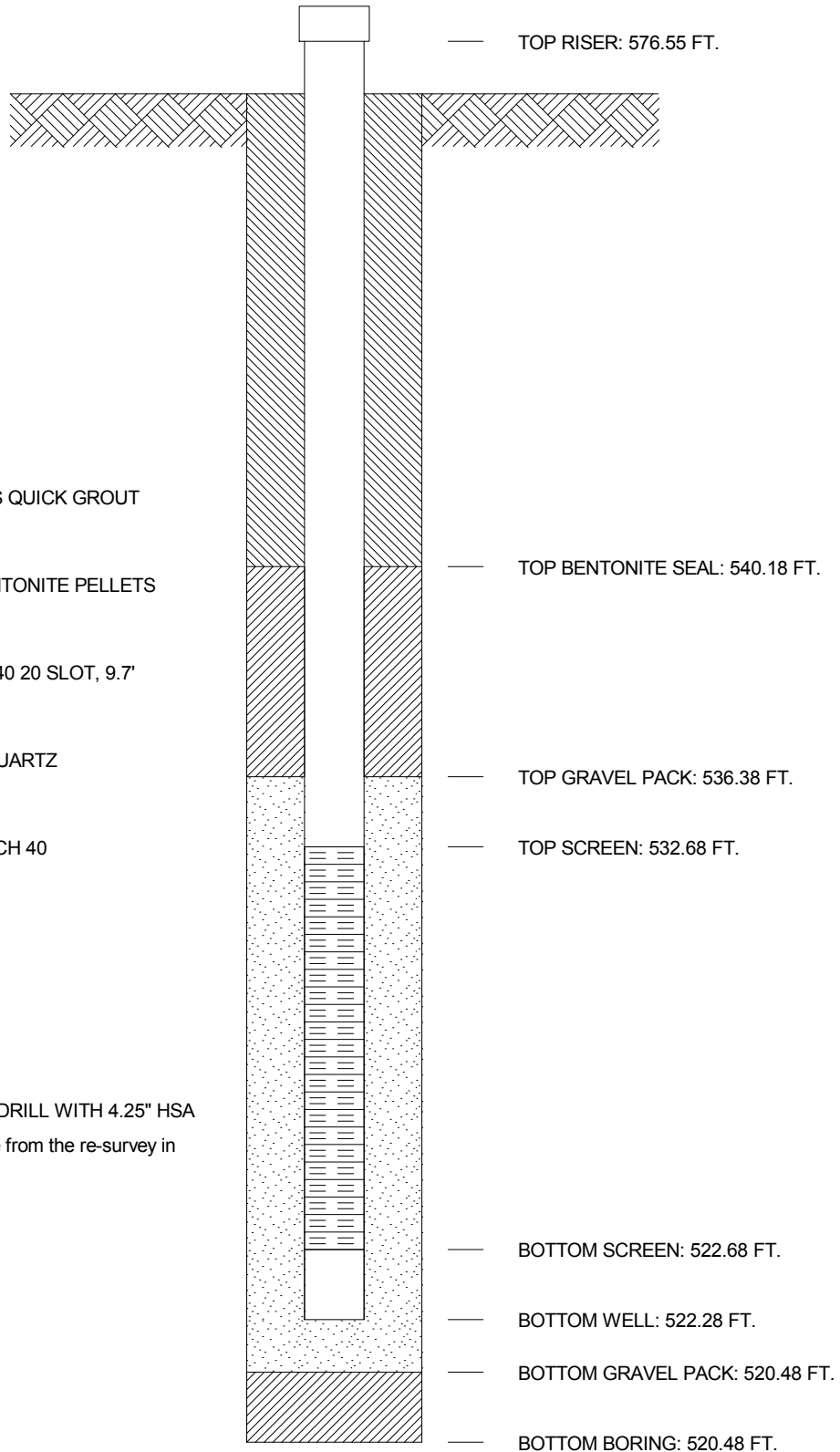


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 718,328.2 E 1,736,320.9**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-009** BORING No. **009** INSTALLED **7/15/97**

GROUND ELEVATION 574.98 FT.

-  GROUT SEAL: 180 GALLONS QUICK GROUT
-  BENTONITE SEAL: 100# BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'
-  GRAVEL PACK: 65# 7@#4 QUARTZ
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



PRE-PACK SCREEN HOLE DRILL WITH 4.25" HSA
 Coordinates and elevations are from the re-survey in
 June 2008.







AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION

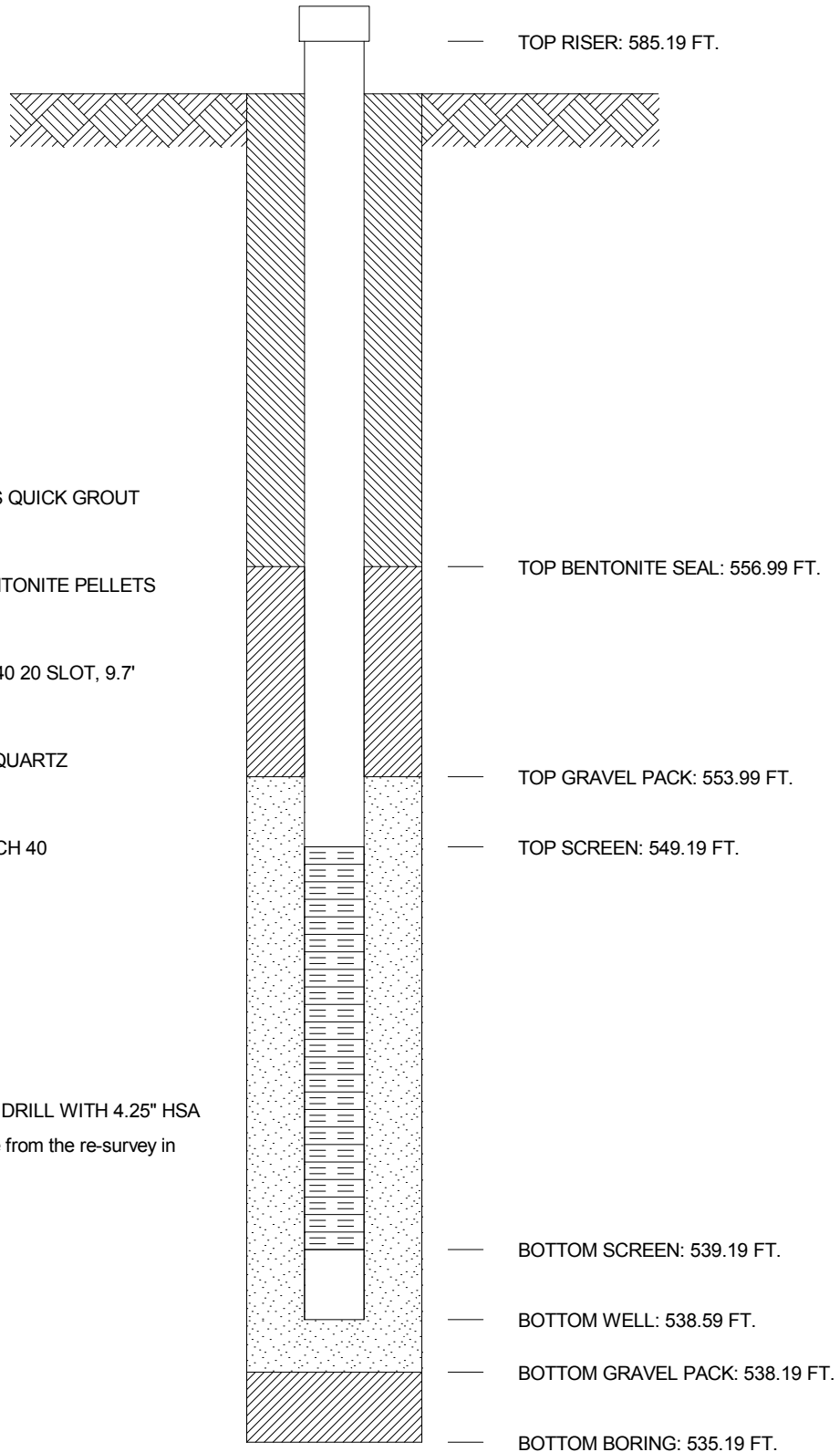


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 716,771.2 E 1,738,107.3**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-010** BORING No. **010** INSTALLED **7/17/97**

GROUND ELEVATION 583.19 FT.

-  GROUT SEAL: 100 GALLONS QUICK GROUT
-  BENTONITE SEAL: 100# BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'
-  GRAVEL PACK: 255# 7@#4 QUARTZ
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



PRE-PACK SCREEN. HOLE DRILL WITH 4.25" HSA
 Coordinates and elevations are from the re-survey in
 June 2008.

AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
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JOB NUMBER _____

COMPANY _____

WELL No. **MW-011** BORING No. **011**

INSTALLED **7/23/97**

PROJECT **EPRI GROUND WATER STUDY**

COORDINATES **N 717,666.4 E 1,736,450.7**

SYSTEM **State Plane using NAD27**

GROUND ELEVATION FT.



GROUT SEAL: 75 GALLONS QUICK GROUT



BENTONITE SEAL: 30# BENTONITE PELLETS



SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'



GRAVEL PACK: 330# 7@#4 QUARTZ

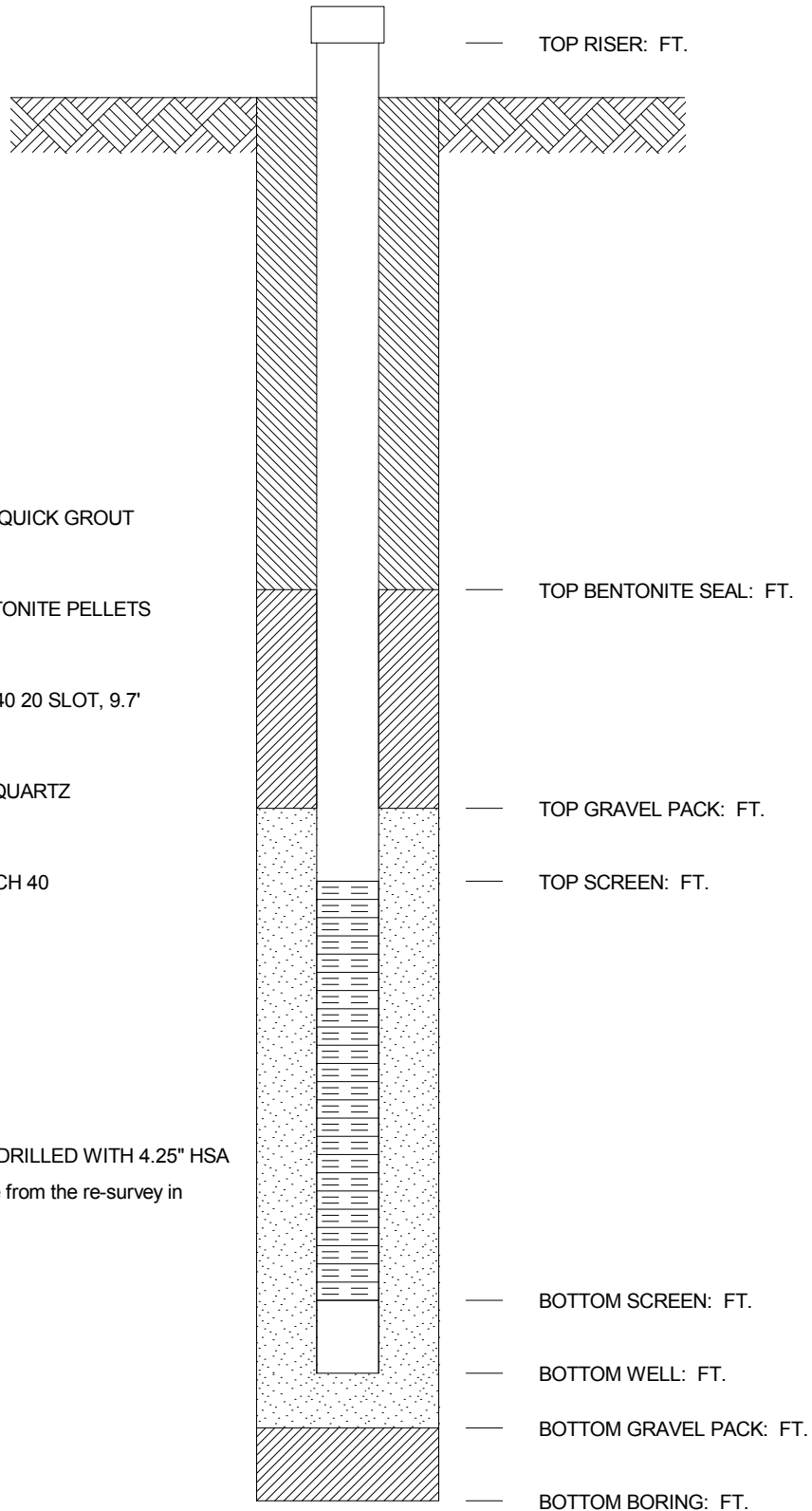


RISER PIPE: 2.0, dia., PVC SCH 40



SPACERS, DEPTH:

PRE-PACK SCREEN HOLE DRILLED WITH 4.25" HSA
 Coordinates and elevations are from the re-survey in
 June 2008.









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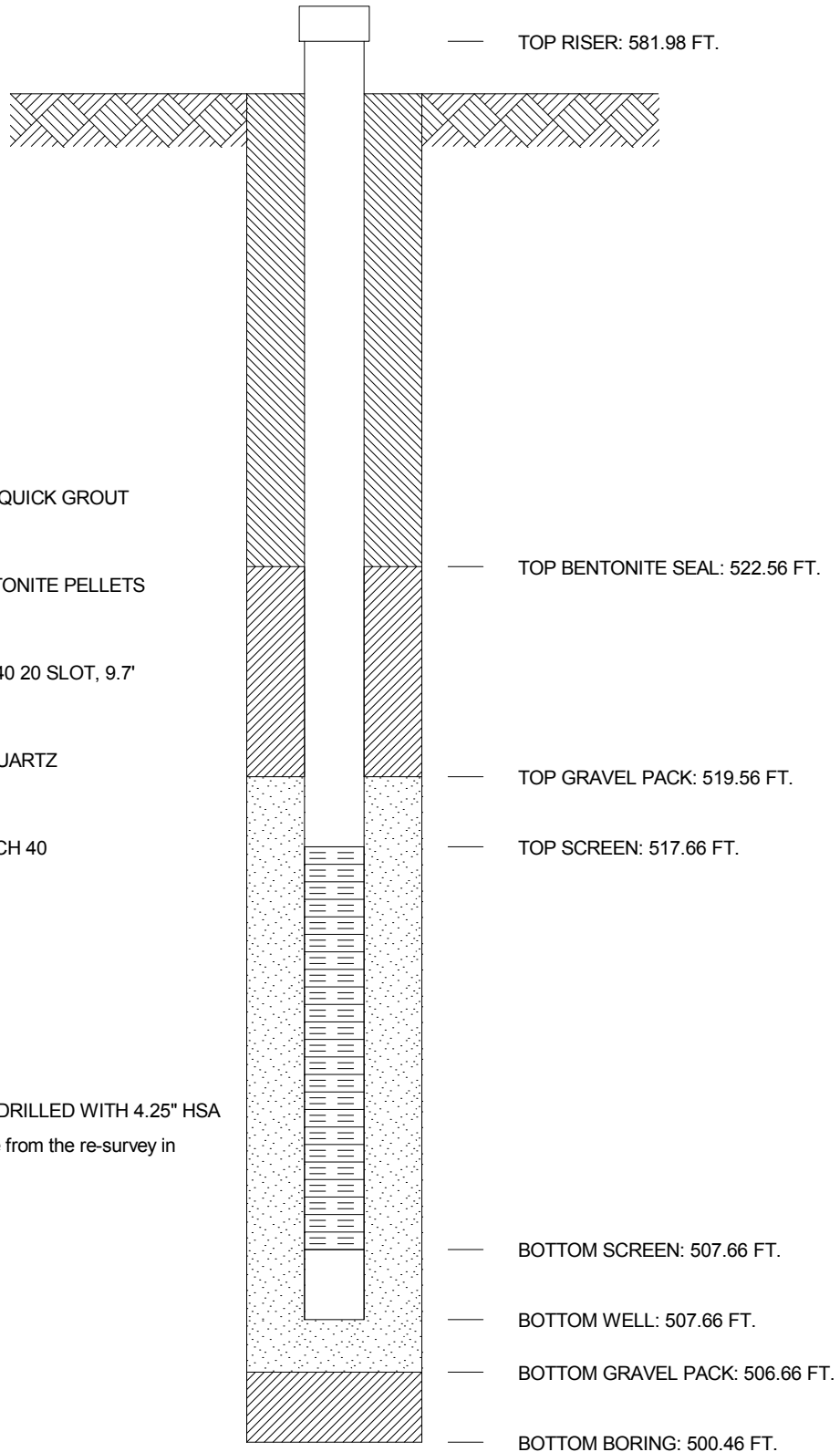


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 718,753.1 E 1,737,045.5**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-012** BORING No. **012** INSTALLED **7/29/97**

GROUND ELEVATION 579.96 FT.

-  GROUT SEAL: 75 GALLONS QUICK GROUT
-  BENTONITE SEAL: 40# BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'
-  GRAVEL PACK: 40# 7@#4 QUARTZ
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



PRE-PACK SCREEN HOLE DRILLED WITH 4.25" HSA
 Coordinates and elevations are from the re-survey in
 June 2008.







AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION

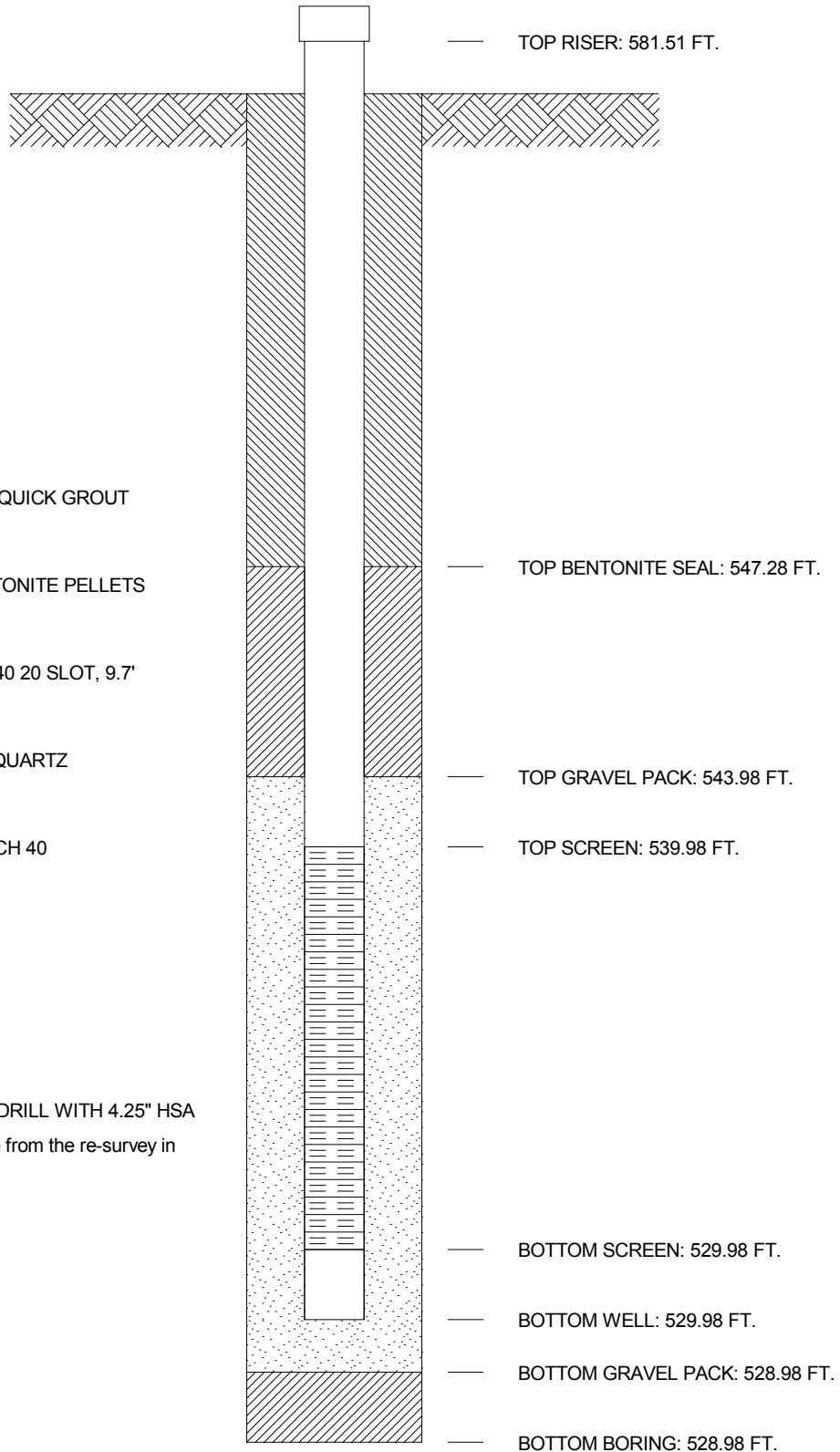


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 718,758.6 E 1,737,044.4**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-013** BORING No. **013** INSTALLED **7/30/97**

GROUND ELEVATION 579.48 FT.

-  GROUT SEAL: 50 GALLONS QUICK GROUT
-  BENTONITE SEAL: 85# BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'
-  GRAVEL PACK: 375# 7@#4 QUARTZ
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



PRE-PACK SCREEN HOLE DRILL WITH 4.25" HSA
 Coordinates and elevations are from the re-survey in
 June 2008.







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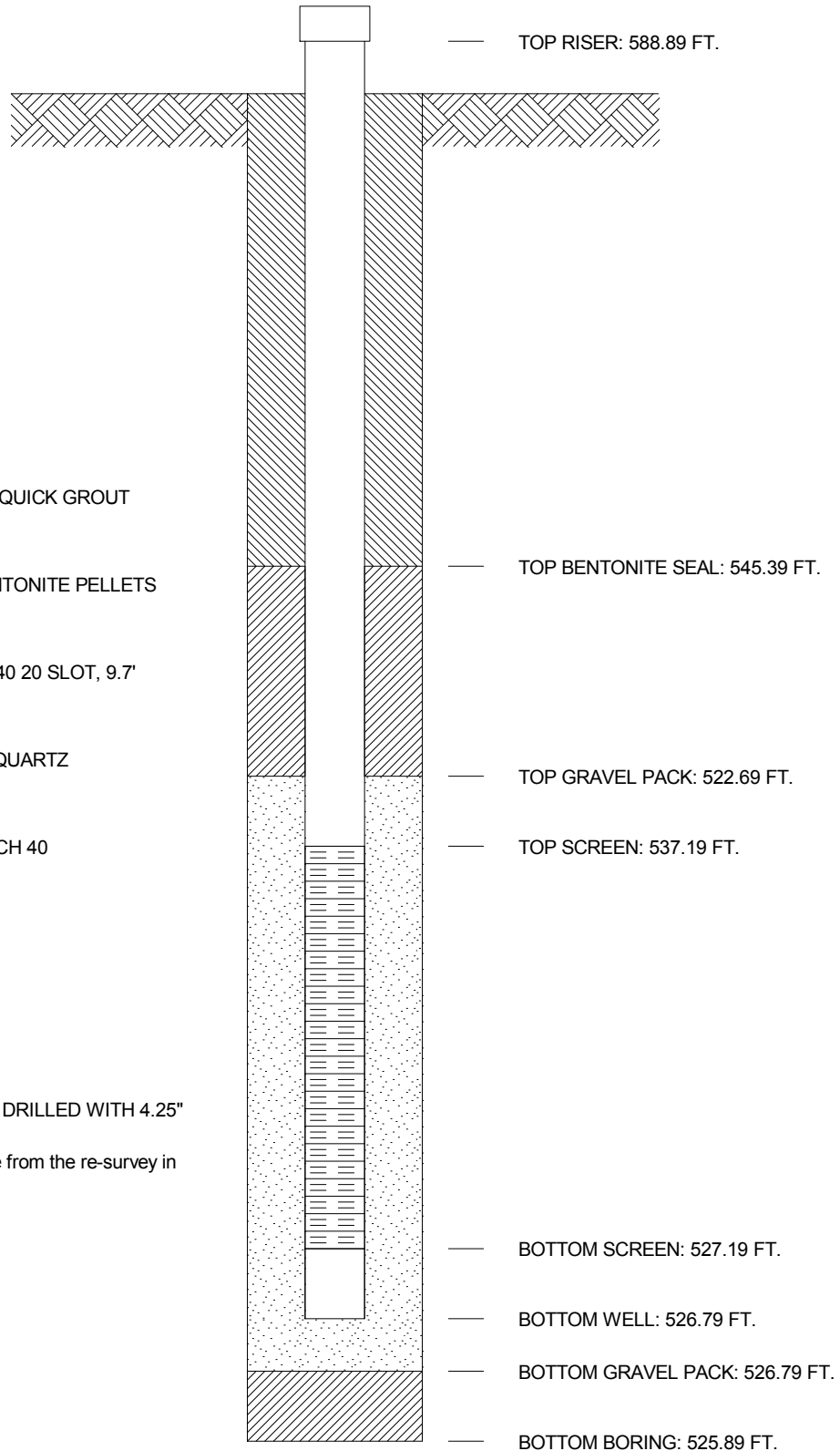


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 718,892.4 E 1,736,827.8**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-014** BORING No. **014** INSTALLED **7/30/97**

GROUND ELEVATION 586.89 FT.

-  GROUT SEAL: 75 GALLONS QUICK GROUT
-  BENTONITE SEAL: 100# BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.7'
-  GRAVEL PACK: 375# 7@#4 QUARTZ
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



PRE-PACK SCREEN. HOLE DRILLED WITH 4.25" HSA

Coordinates and elevations are from the re-survey in June 2008.







AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION

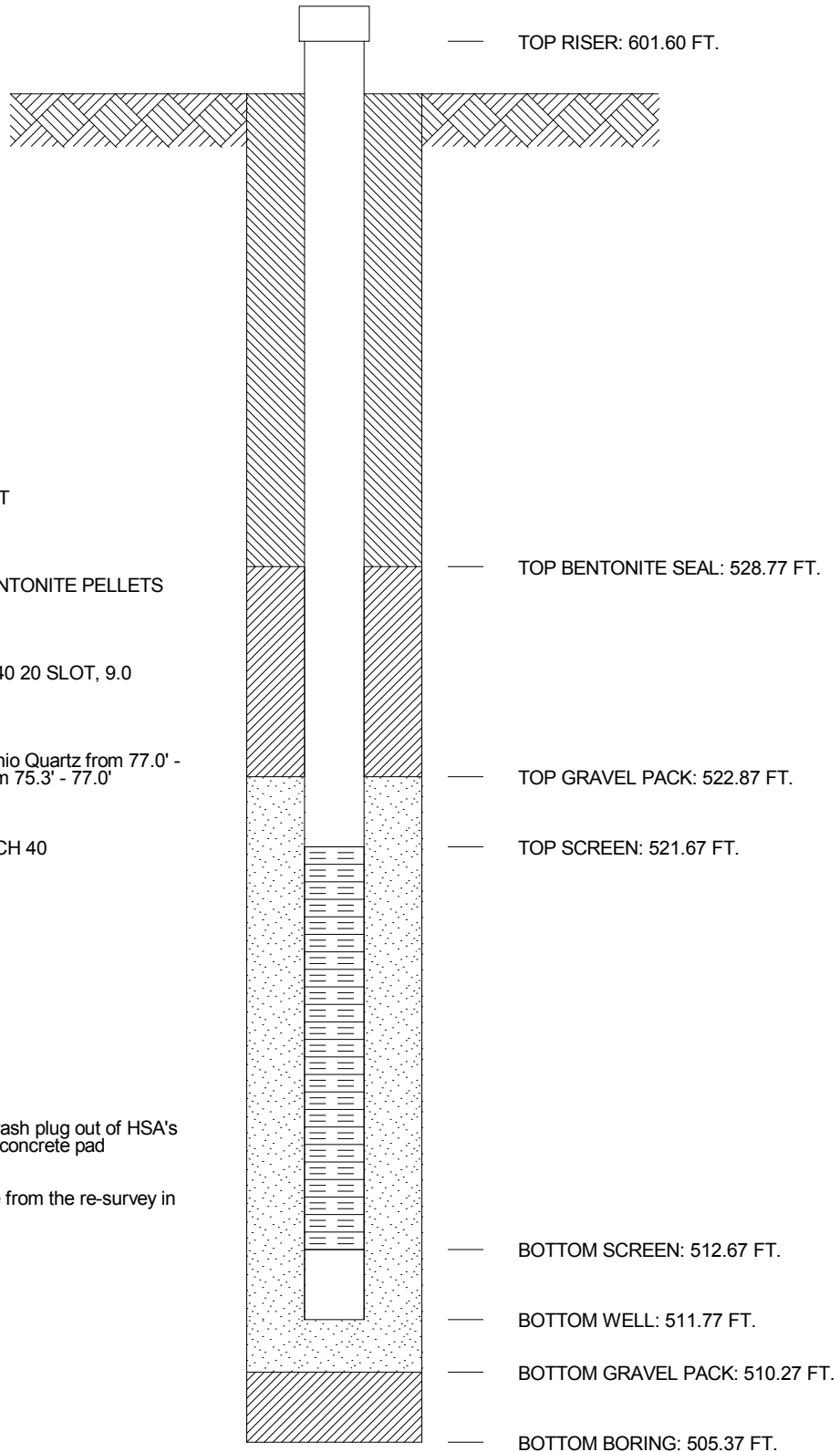


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,504.2 E 1,736,239.5**
 SYSTEM **State Plane using NAD27**

WELL No. **MW-015** BORING No. **MW-015** INSTALLED **12/11/01**

GROUND ELEVATION 599.87 FT.

-  GROUT SEAL: QUICK GROUT
-  BENTONITE SEAL: 50 lbs BENTONITE PELLETS
-  SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.0
-  GRAVEL PACK: 200 lbs #4 Ohio Quartz from 77.0' - 89.6'; 75 lbs #7 Sand from 75.3' - 77.0'
-  RISER PIPE: 2.0, dia., PVC SCH 40
-  SPACERS, DEPTH:



Installed with 4.25" HSA's
 Used 300 gallons of water to wash plug out of HSA's
 Set steel protector and poured concrete pad
 Grouted from 71.1' to grade

Coordinates and elevations are from the re-survey in June 2008.

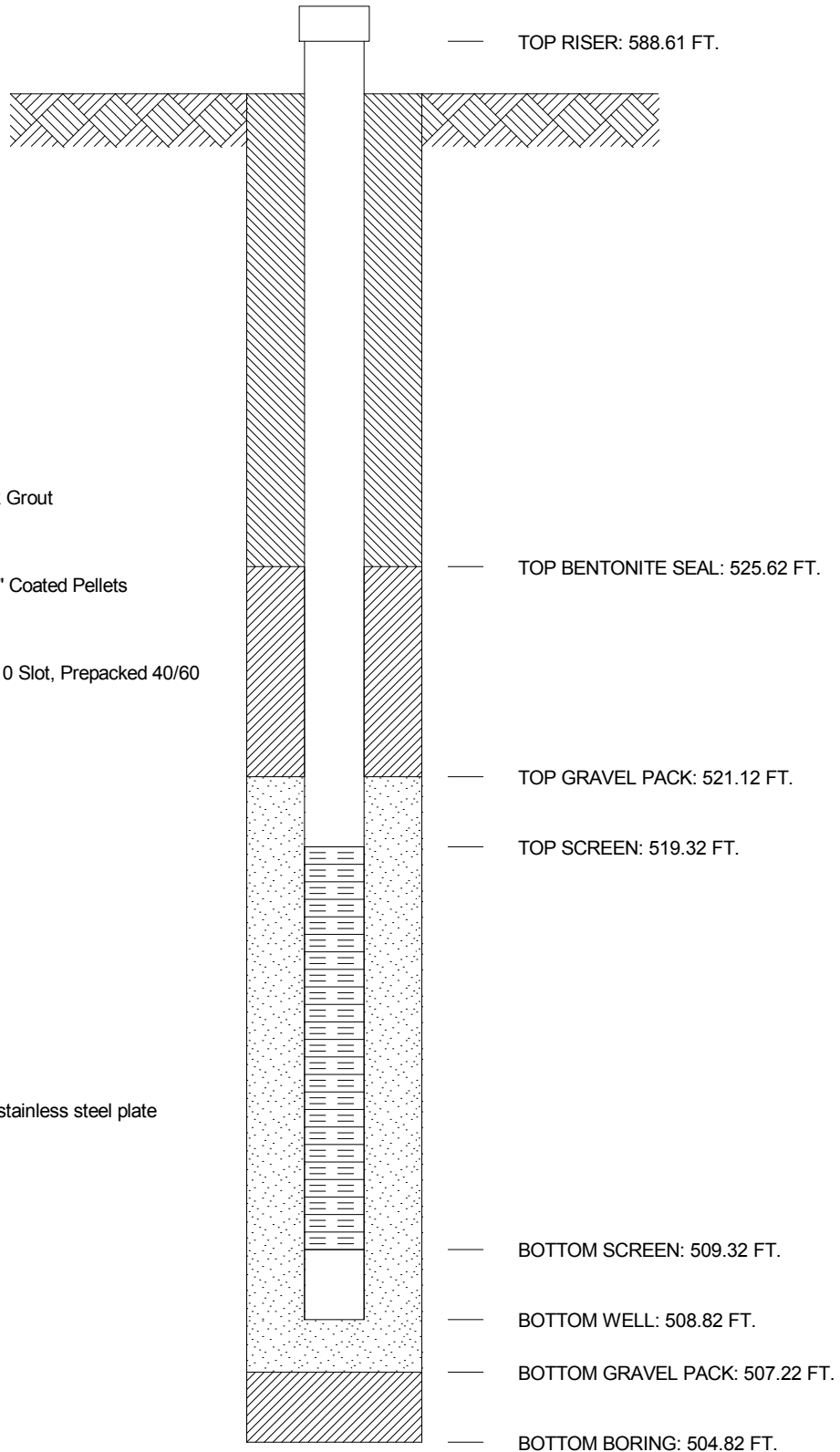
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 AEP CIVIL ENGINEERING LABORATORY
 MONITORING WELL CONSTRUCTION









JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 721,431.5 E 1,732,814.2**
 SYSTEM **State Plane using NAD27**

WELL No. **M-16** BORING No. **MW-16** INSTALLED **6/18/08**

GROUND ELEVATION 586.82 FT.



-  GROUT SEAL: 300 gals Quick Grout
-  BENTONITE SEAL: 80 lbs 3/8" Coated Pellets
-  SCREEN: 2" dia., Sch 40, 0.010 Slot, Prepacked 40/60 Pack, 10'
-  GRAVEL PACK: 40/60 Pack
-  RISER PIPE: 2", dia., Sch 40
-  SPACERS, DEPTH: N/A

Installed with 6.25' HSA's and stainless steel plate
 SWL @ install = 36.7'

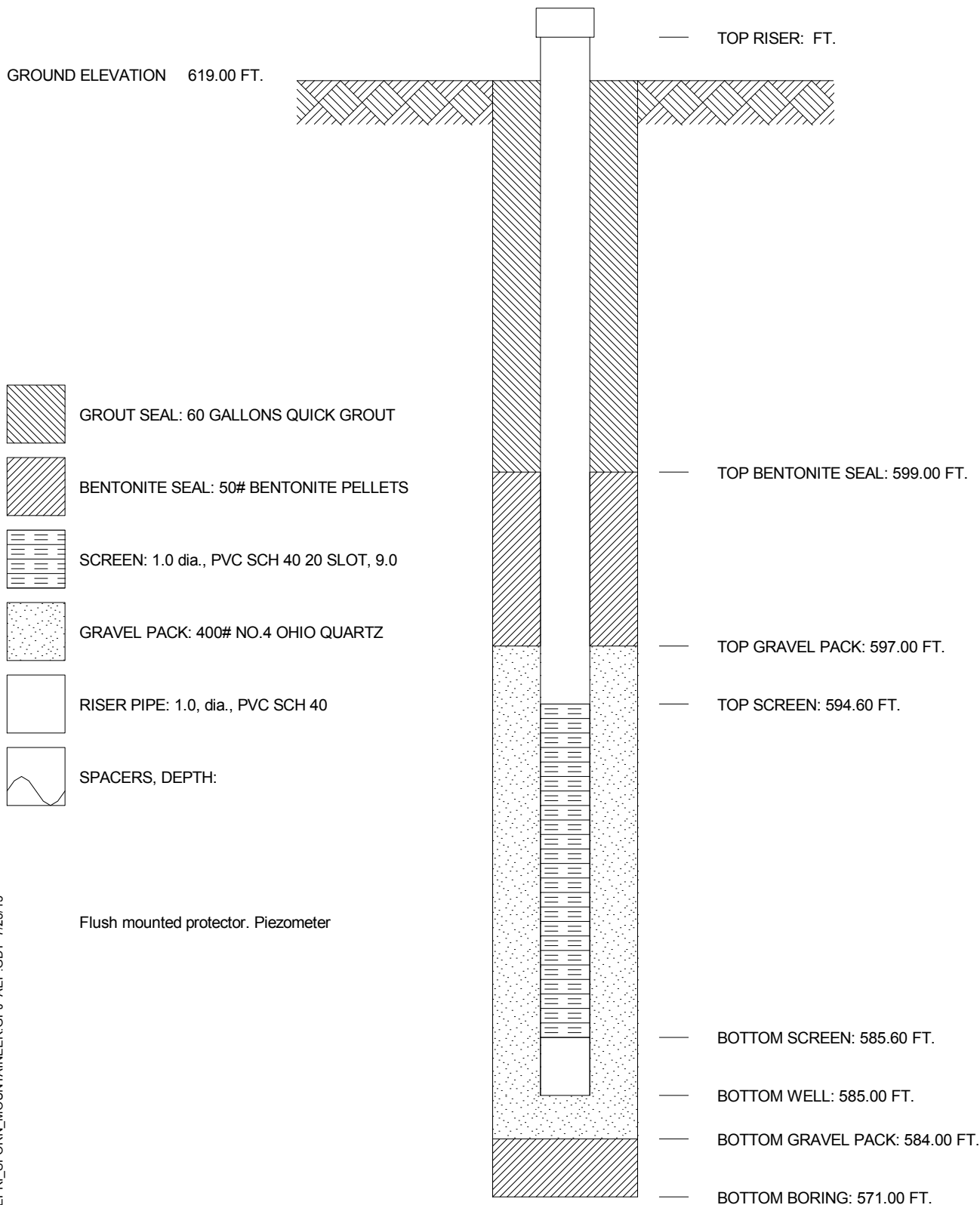
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 MONITORING WELL CONSTRUCTION



JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 720,983.0 E 1,734,516.1**
 SYSTEM **STATE PLANE**

WELL No. **96-101** BORING No. **96-101** INSTALLED **6/5/96**

GROUND ELEVATION 619.00 FT.



GROUT SEAL: 60 GALLONS QUICK GROUT



BENTONITE SEAL: 50# BENTONITE PELLETS



SCREEN: 1.0 dia., PVC SCH 40 20 SLOT, 9.0



GRAVEL PACK: 400# NO.4 OHIO QUARTZ



RISER PIPE: 1.0, dia., PVC SCH 40



SPACERS, DEPTH:

Flush mounted protector. Piezometer

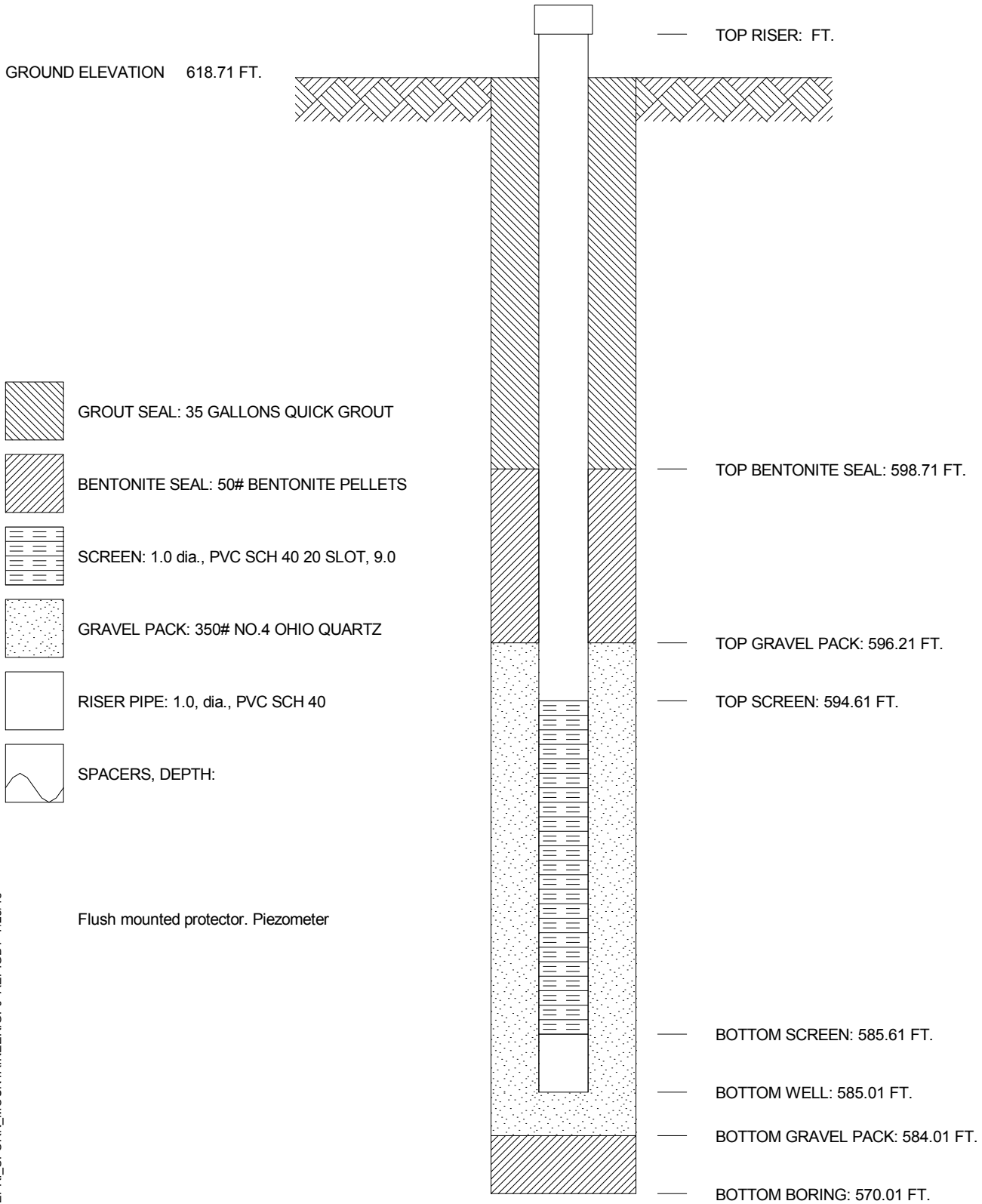
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







JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,229.2 E 1,734,600.2**
 SYSTEM **STATE PLANE**

WELL No. **96-104** BORING No. **96-104** INSTALLED **6/4/96**

GROUND ELEVATION 618.71 FT.



-  GROUT SEAL: 35 GALLONS QUICK GROUT
-  BENTONITE SEAL: 50# BENTONITE PELLETS
-  SCREEN: 1.0 dia., PVC SCH 40 20 SLOT, 9.0
-  GRAVEL PACK: 350# NO.4 OHIO QUARTZ
-  RISER PIPE: 1.0, dia., PVC SCH 40
-  SPACERS, DEPTH:

Flush mounted protector. Piezometer







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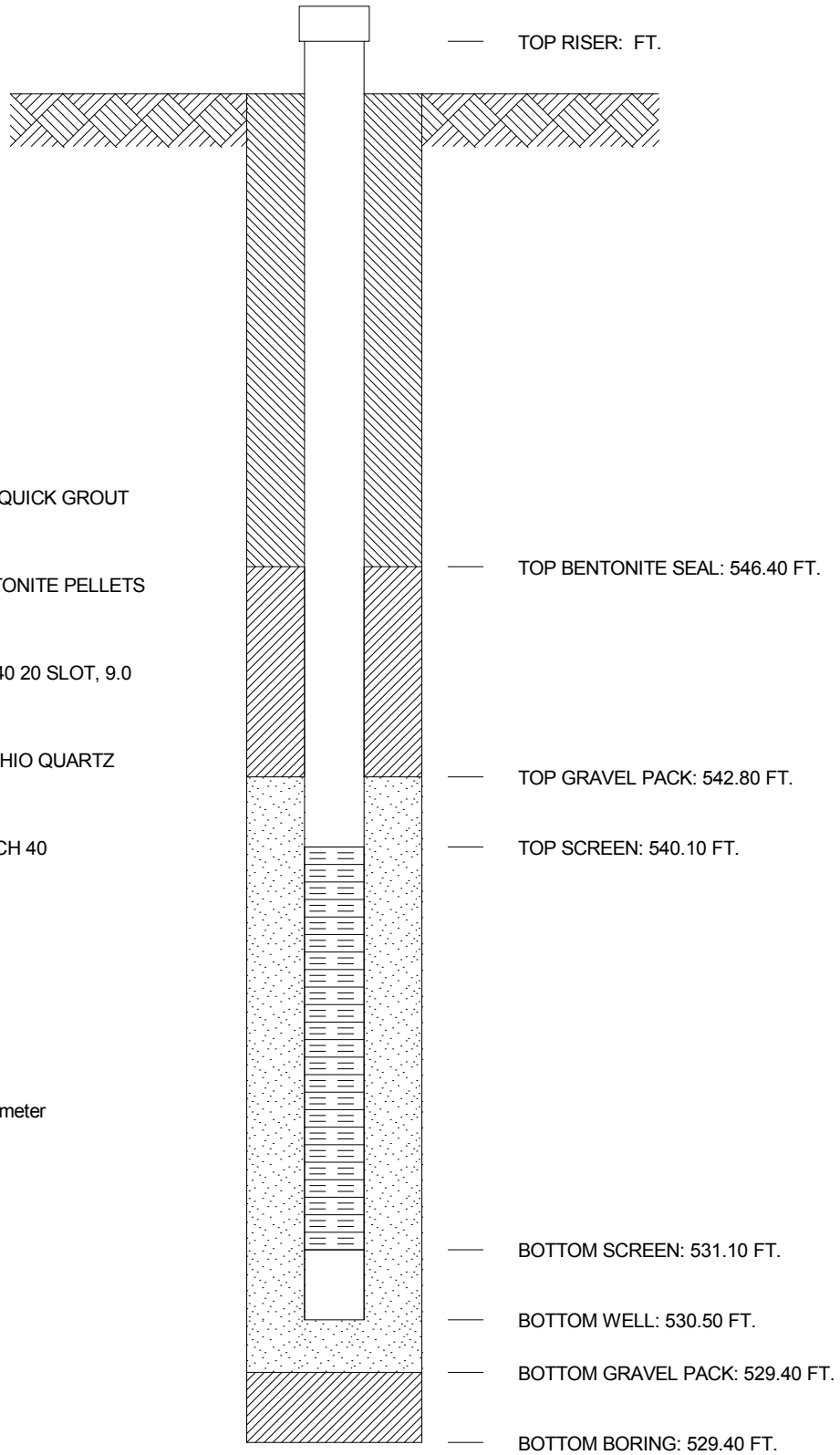
JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 719,761.8 E 1,736,125.4**
 SYSTEM **STATE PLANE**

WELL No. **96-108** BORING No. **96-108** INSTALLED **6/11/96**

GROUND ELEVATION 603.40 FT.

-  GROUT SEAL: 80 GALLONS QUICK GROUT
-  BENTONITE SEAL: 50# BENTONITE PELLETS
-  SCREEN: 1.0 dia., PVC SCH 40 20 SLOT, 9.0
-  GRAVEL PACK: 250# NO.4 OHIO QUARTZ
-  RISER PIPE: 1.0, dia., PVC SCH 40
-  SPACERS, DEPTH:

Flush mounted protector Piezometer



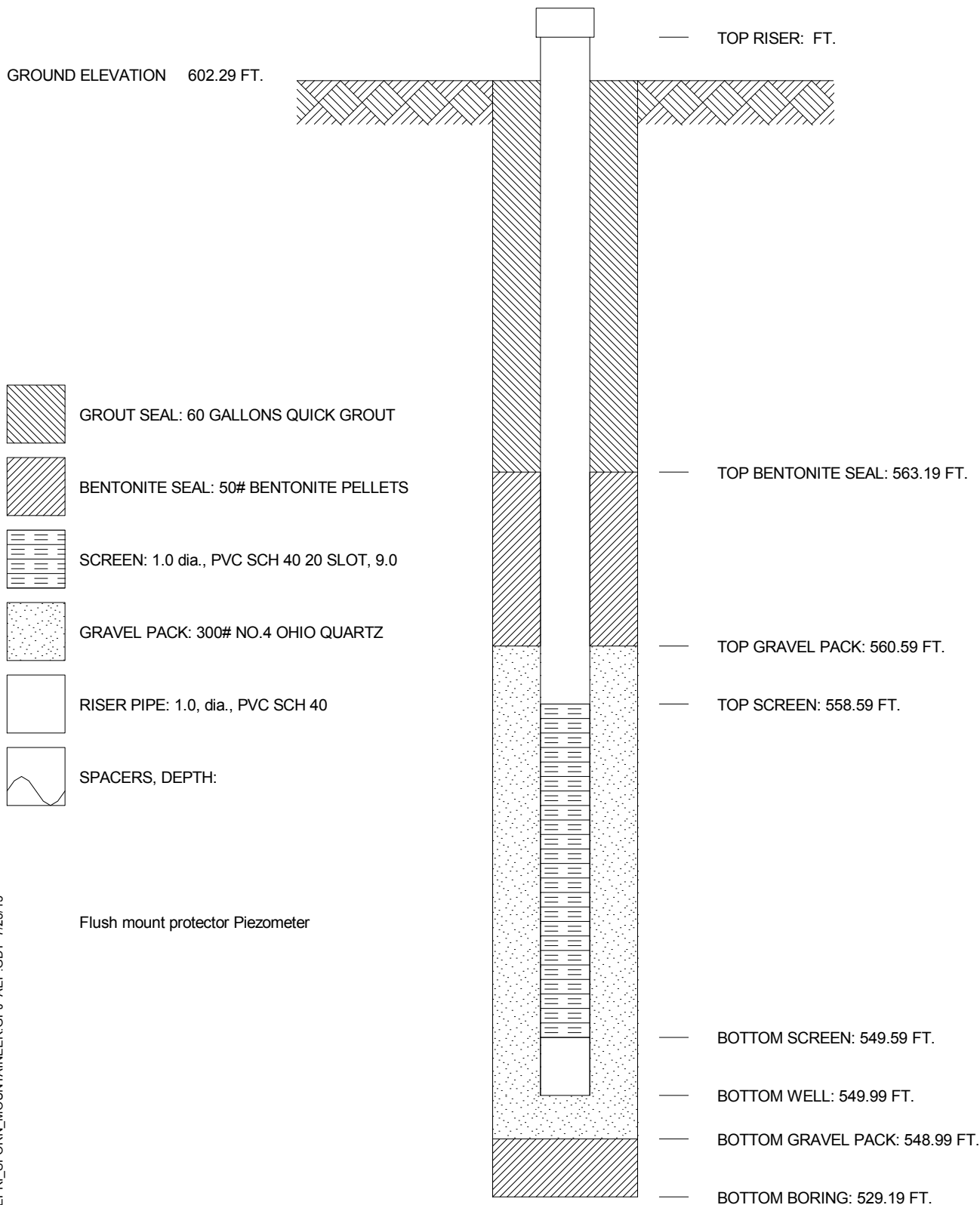
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JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 720,277.1 E 1,735,665.6**
 SYSTEM **STATE PLANE**

WELL No. **96-110** BORING No. **96-110** INSTALLED **6/10/96**

GROUND ELEVATION 602.29 FT.









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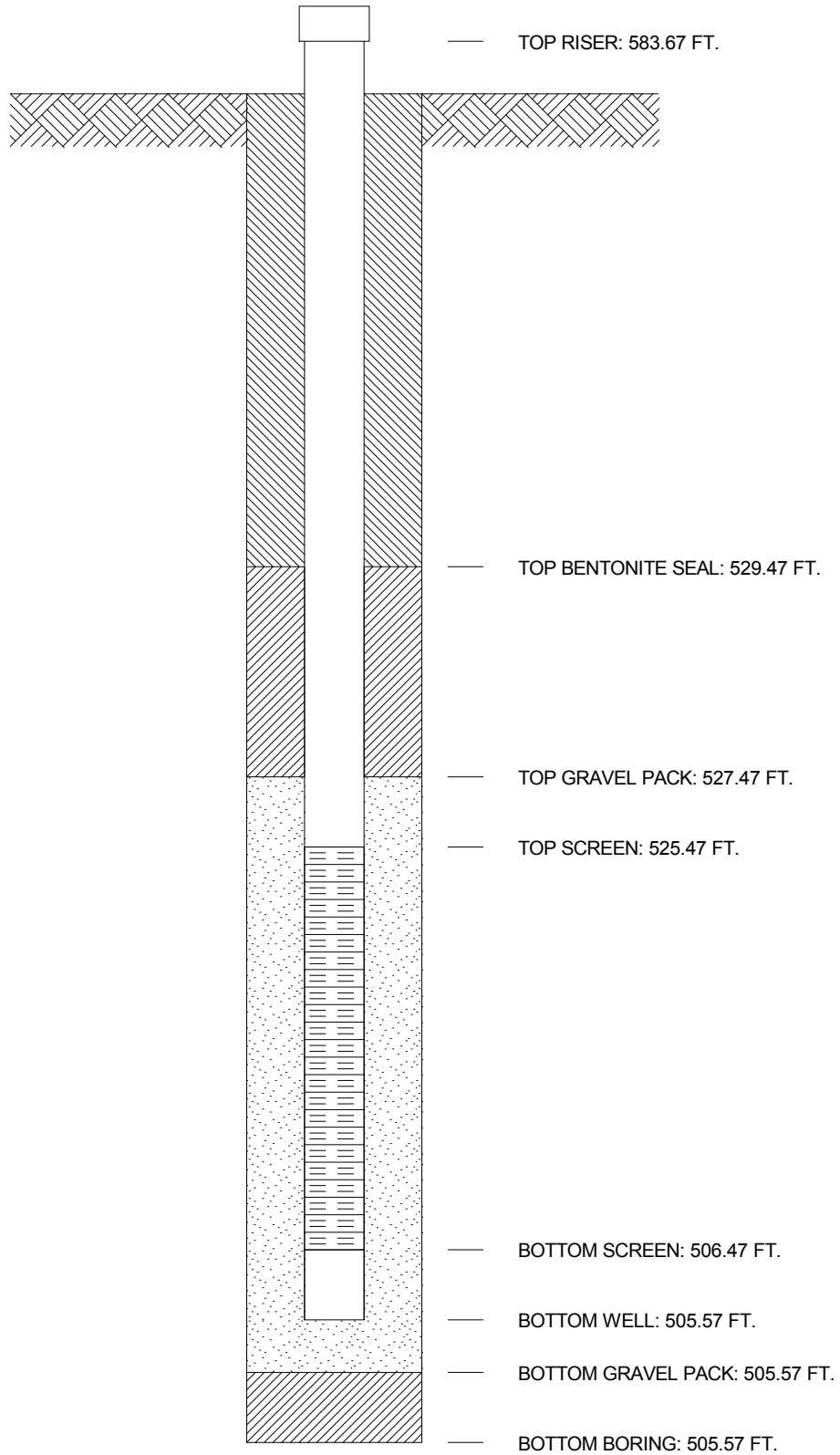


JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 723,463.5 E 1,734,069.7**
 SYSTEM **State Plane using NAD27**

WELL No. **JTMN-1** BORING No. **JTMN-1** INSTALLED **7/19/90**

GROUND ELEVATION 582.17 FT.

-  GROUT SEAL: Benseal
-  BENTONITE SEAL:
-  SCREEN: 2.0 dia., 20 slot, 19'
-  GRAVEL PACK:
-  RISER PIPE: 2.0, dia.,
-  SPACERS, DEPTH:



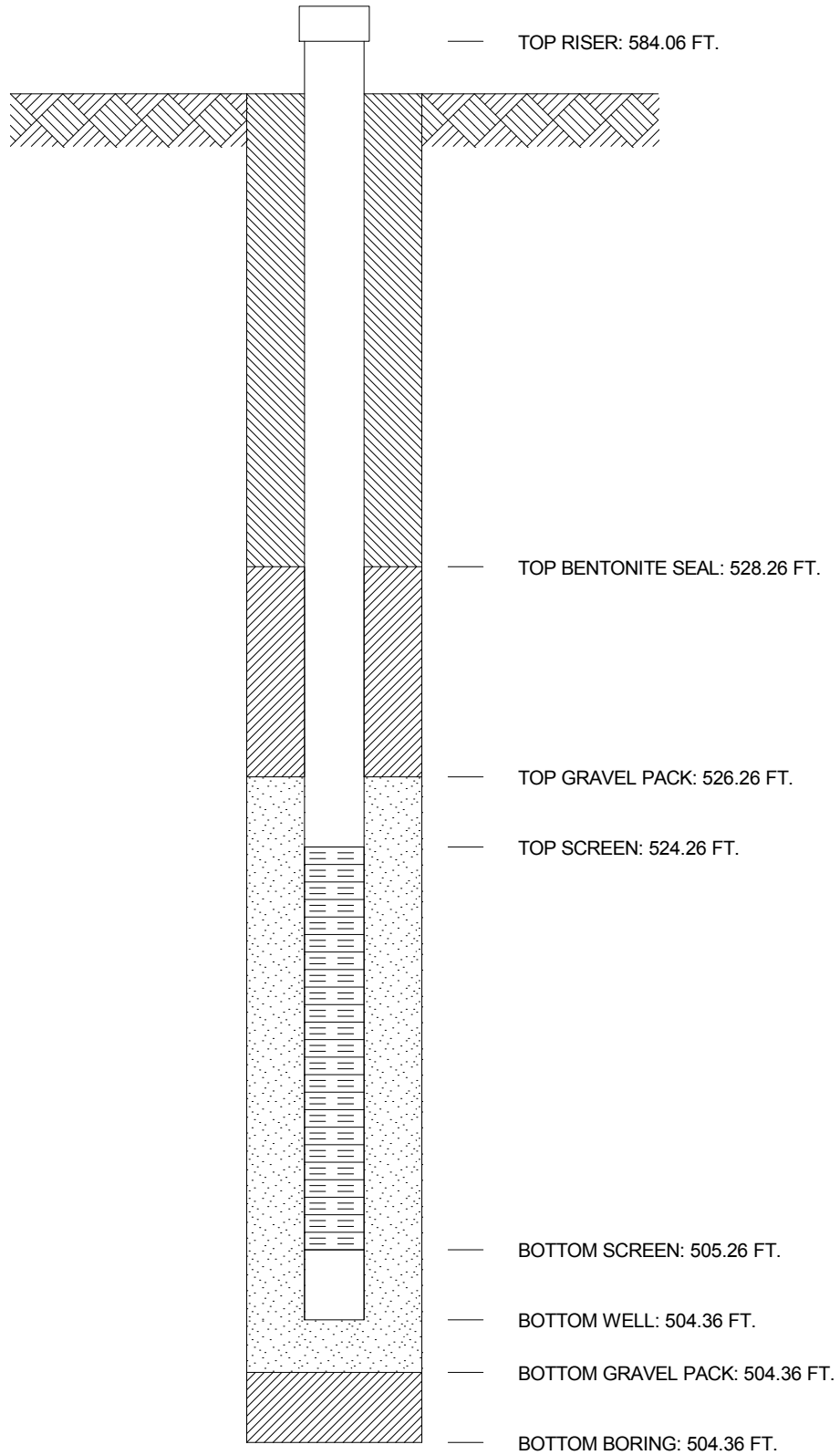
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







JOB NUMBER _____
 COMPANY _____
 PROJECT **EPRI GROUND WATER STUDY**
 COORDINATES **N 723,392.8 E 1,734,106.4**
 SYSTEM **State Plane using NAD27**

WELL No. **JTMN-2** BORING No. **JTMN-2** INSTALLED **7/18/90**

GROUND ELEVATION 582.16 FT.



-  GROUT SEAL: Benseal
-  BENTONITE SEAL:
-  SCREEN: 2.0 dia., 20 slot, 19'
-  GRAVEL PACK:
-  RISER PIPE: 2.0, dia.,
-  SPACERS, DEPTH:



AEP 2008, 2010

Production Well Information

East 1, West 1, Well 4 to Well 6

MOUNTAINEER SUPPLY WELLS					
DATUM: NAD27 / NGVD29 WV S				Surveyed: 2/24/2010	
WELL	NORTH	EAST	ELEV.	DESC.	NOTE
EAST 1	722087.67	1734564.25	588.47	WELL PUMP	Top of PVC @ Inspection Hole
			585.91	GROUND	
WEST 1	721864.73	1734247.03	587.32	FGD	Top of Inspection Hole
			585.64	GROUND	
WELL 4	721739.55	1734875.42	583.43	WASTEWATER WELL	Top of Inspection Hole
			581.95	GROUND	
WELL 5	721130.76	1733439.50	589.09	WAREHOUSE	Top of Inspection Hole
			586.64	GROUND	
WELL 6	722576.53	1732461.99	588.45	OLD LAB	Top of Inspection Hole
			587.45	GROUND	

AEP-DOLAN CIVIL LAB
MT PLANT - WELL CONVERSIONS

25 February 2010

INPUT
State Plane, NAD27
4702 - West Virginia South, U.S. Feet

OUTPUT
Geographic, NAD27

EAST 1

1/5

Northing/Y: 722087.67
Easting/X: 1734564.25

Latitude: 38 58 45.45449
Longitude: 81 56 01.14811

Convergence: -0 34 37.84628
Scale Factor: 1.000021856

WEST 1

2/5

Northing/Y: 721864.73
Easting/X: 1734247.03

Latitude: 38 58 43.21944
Longitude: 81 56 05.13625

Convergence: -0 34 40.31173
Scale Factor: 1.000021706

WELL 4

3/5

Northing/Y: 721739.55
Easting/X: 1734875.42

Latitude: 38 58 42.04479
Longitude: 81 55 57.16376

Convergence: -0 34 35.38317
Scale Factor: 1.000021627

WELL 5

4/5

Northing/Y: 721130.76
Easting/X: 1733439.50

Latitude: 38 58 35.88458
Longitude: 81 56 15.26701

Convergence: -0 34 46.57452
Scale Factor: 1.000021213

Remark:

AEP-DOLAN CIVIL LAB
MT PLANT - WELL CONVERSIONS

25 February 2010

INPUT

State Plane, NAD27
4702 - West Virginia South, U.S. Feet

OUTPUT

Geographic, NAD27

WELL 6

5/5

Northing/Y: 722576.53

Latitude: 38 58 50.07601

Easting/X: 1732461.99

Longitude: 81 56 27.82955

Convergence: -0 34 54.34062

Scale Factor: 1.000022168

Remark:



Reynolds, Inc.

6451 Germantown Road * Middletown, Ohio 45042 * Phone: (513) 424-7287

Date: 12/12/2008

Job No.: 68658

Page 1 of 3

PRODUCTION TEST

FGD West Well

Owner: AEP - Mountaineer Plant City: New Haven State: WV

Well No.: FGD West Location: in gravel area

Measured from Top Casing: X Total Depth 77' Inside Diam. 16" Static Level / Standing Water Level 44.70'

Type Well: Gravel Wall X Tubular Rock New X

Old Cleaned Gravel Wall Diam. 30"

Screen: Length 15' Diam. 16" Slot Size 60

Type Stainless Steel-Pipe Size Depth to top 62'

Driven By: Electric Engine Pump Bowl Stages

Length Suction Pipe None X Well Top to Bottom of Suction

Orifice Size 6 By 5 Water discharged 200' from well into pit in building

Well Top to Bottom of Air Line N/A Gauge Reads: Feet Pounds

TIME	INCHES ON ORIFICE	G.P.M.	P.S.I.	AMPS	PUMPING LEVEL (ft)	DRAW DOWN (ft)	SPECIFIC CAPACITY	COMMENTS
8:27 AM					44.70			SWL
9:10 AM	6.0	305						Pump on
9:12 AM					47.50	2.80		
9:14 AM					47.60			
9:17 AM					47.70	3.00		
9:21 AM					47.70			
9:30 AM					47.75			
9:34 AM	6.5	317			47.78	3.08		
9:38 AM					47.81			
9:45 AM					47.83			
9:50 AM					47.86	3.16	100.0	
9:55 AM					47.89			
								Step 2
9:57 AM					49.40			

Tested and Witnessed By Terry Breckenridge - Witnessed By For Purchaser TC during test - 32" above gr.

TIME	INCHES ON ORIFICE	G.P.M.	P.S.I.	AMPS	PUMPING LEVEL (ft)	DRAW DOWN (ft)	SPECIFIC CAPACITY	COMMENTS
9:59 AM	13.5	457			49.35			
10:01 AM					49.36	4.66	98.0	
10:07 AM					49.40			
10:12 AM					49.43			
10:16 AM					49.50			
10:21 AM					49.50	4.80	95.0	
10:28 AM					49.55			
10:32 AM					49.56			
10:35 AM					49.57	4.87	94.0	
10:40 AM								Step 3
10:40 AM	23.5	603						
10:41 AM	24.5	616			51.00	6.30	98.0	
10:43 AM					51.05			
10:45 AM					51.06			
10:52 AM					51.12			
10:55 AM					51.13	6.43	96.0	
11:02 AM					51.18	6.48		
11:08 AM					51.21			
11:09 AM					39.50			FGD East
11:11 AM					51.23			
11:14 AM					51.24	6.54	94.0	
11:20 AM					51.26	6.56		
11:25 AM					51.28			
11:30 AM								Step 4
11:32 AM	30.0	682			51.85	7.15		
11:35 AM					51.98	7.28	94.0	
11:40 AM					52.00	7.30		
11:46 AM					39.70			FGD East
11:50 AM					52.01	7.31		
11:55 AM					52.05	7.35		



Reynolds, Inc.

6451 Germantown Road * Middletown, Ohio 45042 * Phone: (513) 424-7287

Date: 12/17/2008

Job No.:

Page 1 of 4

PRODUCTION TEST

FGD East Well

Owner: AEP - Mountaineer Plant City: New Haven State: WV

Well No.: FGD East Location: along railroad tracks

Measured from Ground Level: Total Depth 78' Inside Diam. 16" Static Level / Standing Water Level 45.38'

Type Well: Gravel Wall X Tubular Rock New X

Old Cleaned Gravel Wall Diam. 30"

Screen: Length 15' Diam. 16" Slot Size 60

Type Stainless Steel - Pipe Size Depth to top 63'

Driven By: Electric Engine Pump Bowl Stages

Length Suction Pipe None: X Well Top to Bottom of Suction

Orifice Size By Water Discharged 600' +/- from well into pit in building

Well Top to Bottom of Air Line N/A Gauge Reads: Feet Pounds

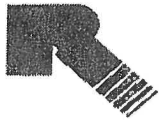
TIME	INCHES ON ORIFICE	G.P.M.	P.S.I.	AMPS	PUMPING LEVEL (ft)	DRAW DOWN (ft)	SPECIFIC CAPACITY	COMMENTS
10:30 AM								Stop surging east well
10:52 AM					45.45	+ 0.07		
11:00 AM					45.45	+ 0.07		
11:15 AM					45.40	+ 0.02		
11:25 AM					44.59			FGD West
11:27 AM					45.38	0		SWL
11:30 AM								Pump on
11:31 AM					48.27	2.89		Rate 1
11:32 AM					48.30	2.92		
11:33 AM					48.33	2.95		
11:35 AM					48.35	2.97		
11:40 AM	6.0	305			48.85	3.47		
11:44 AM					48.90	3.52	95	
11:50 AM					49.00	3.62		

Tested and Witnessed By Terry Breckenridge Witnessed By For Purchaser

TC 2.7' above ground.
450' +/- north of Ohio Drilling well (original FGD well)

TIME	INCHES ON ORIFICE	G.P.M.	P.S.I.	AMPS	PUMPING LEVEL (ft)	DRAW DOWN (ft)	SPECIFIC CAPACITY	COMMENTS
11:55 AM	5.0	278			49.15	3.77	74	
12:00 PM					49.14	3.76		
12:04 PM					44.60			FGD West
12:10 PM					49.19	3.81		
12:14 PM					49.20	3.82		
12:15 PM								Rate 2
12:19 PM					50.91	5.53		
12:20 PM					50.94	5.56		
12:23 PM	10.5	403			50.97	5.59	72	
12:25 PM					50.97	5.59		
12:29 PM					44.62			FGD West
12:34 PM					51.02	5.64		
12:38 PM					51.04	5.66	71	
12:43 PM					51.05	5.67		
12:50 PM					51.08	5.7		
12:51 PM					44.67			FGD West
12:55 PM					51.10	5.73		
1:00 PM								Rate 3
1:07 PM	23.5	603			54.20	8.82		
1:08 PM					54.20	8.82		
1:10 PM					54.21	8.83		
1:11 PM					47.67			FGD West
1:13 PM					54.22	8.84		
1:18 PM					54.23	8.85		
1:27 PM					54.28	8.9		
1:35 PM					54.30	8.92		
1:40 PM					54.32	8.94		
1:45 PM								Rate 4
1:47 PM	41.5	802			56.88	11.5	70	
1:50 PM					57.92	12.24		
1:52 PM					57.60	12.22		
1:54 PM					57.65	12.27		

TIME	INCHES ON ORIFICE	G.P.M.	P.S.I.	AMPS	PUMPING LEVEL (ft)	DRAW DOWN (ft)	SPECIFIC CAPACITY	COMMENTS
1:57 PM					57.6	12.28		
1:58 PM					44.71			FGD West
2:00 PM					57.69	12.31		
2:04 PM					57.70	12.32	65	
2:06 PM					57.70	12.32		
2:07 PM					57.72	12.34		
2:08 PM	41.5	802			57.71	12.33		
2:10 PM					57.75	12.37		
2:13 PM					57.76	12.38		
2:15 PM								Rate 5
2:19 PM	52.5	902			58.85	13.47	67	
2:22 PM					59.59	14.21		
2:24 PM					59.60	14.22		
2:25 PM					59.60	14.22		
2:27 PM					59.63	14.25		
2:30 PM					59.64	14.26		
2:31 PM					44.73			FGD West
2:40 PM					59.73	14.35		
2:43 PM					59.75	14.37		
2:45 PM								Rate 6
2:47 PM	64.5	1000			60.55	15.17		
2:48 PM					61.20	15.82		
2:50 PM					61.25	15.87		
2:51 PM					44.72			FGD West
2:52 PM					61.28	15.9		
2:54 PM					61.30	15.92		
2:58 PM					61.34	15.96		
3:01 PM					61.35	15.97		
3:05 PM					61.39	16.01		
3:08 PM					61.40	16.02		
3:12 PM					61.41	16.03		
3:14 PM					61.44	16.06	62.5	



Reynolds, Inc.

6451 Germantown Road * Middletown, Ohio 45042 * Phone: (513) 424-7287

Date: 7/8/2008

Job No.: 68570

PRODUCTION TEST

Page 1 of 1

Owner: AEP-Mountaineer Plant City: New Haven State: WV

Well No.: Fire Well #1 Location: 50' +/- from old Fire Well #1 (Abandoned)

Measured from Ground Level: Total Depth Inside Diam. 10 Static Level / Standing Water Level 40.52

Type Well: Gravel Wall 16 Tubular Rock New X

Old Cleaned Gravel Wall Diam. 16"

Screen: Length 15' Diam. 10" PS Slot Size 80

Type Johnson Depth to top 63 (Bel. Gr.)

Driven By: Electric X Engine Pump Bowl Test Pump Stages

Length Suction Pipe None Well Top to Bottom of Suction NA

Orifice Size 6 By 5 Water Discharged 300 from Well into Cooling Tower

Well Top to Bottom of Air Line N/A Gauge Reads: Feet Pounds

TIME	INCHES ON ORIFICE	G.P.M.	P.S.I.	AMPS	PUMPING LEVEL	DRAW DOWN	SPECIFIC CAPACITY	COMMENTS
11:00 AM	6	305			45.22	4.70		
11:10 AM					45.45	4.93		
11:20 AM					45.47	4.95	61.2	
11:30 AM	14	466			49.61	9.09		
11:40 AM					49.59	9.07		
11:50 AM					49.54	9.02	51.8	
12:00 PM	22	584			52.00	11.48		
12:30 PM					52.25	11.73		
1:00 PM					52.30	11.78		
1:30 PM					52.25	11.73	49.8	
								Water clear
								at end of test

Tested and Witnessed By

Steve Back

Witnessed By For Purchaser

Rev 3/08 OWNER/CO USE ONLY DATE RECEIVED MM DD YY	DATE THE WELL WAS COMPLETED MM DD YY 07 08 08	STATE OF WEST VIRGINIA WATER WELL COMPLETION REPORT	FORM SW-258 THIS REPORT MUST BE SUBMITTED WITHIN 30 DAYS AFTER WELL IS COMPLETED
	PERMIT NO. DW-_____		FILL IN THIS FORM COMPLETELY PLEASE PRINT OR TYPE

LOCATION OF WELL
Well Owner: ~~XXXXXXXXXX~~ AEP ~~XXXXXXXXXX~~ Mountaineer Power Plant
Street/Road Route 62 County Mason Zip Code 25265-0419

Latitude: 38 Deg 58.603 Min Longitude: 81 Deg 56.240 Min Acquired By: <input checked="" type="checkbox"/> GPS <input type="checkbox"/> Topo <input type="checkbox"/> Other	AREA NAME/LOCATION: Fire Well #1 Replacement Well	TYPE OF WELL: <input type="checkbox"/> Potable <input type="checkbox"/> Public Water Supply <input type="checkbox"/> Geothermal <input checked="" type="checkbox"/> Industrial <input type="checkbox"/> Commercial <input type="checkbox"/> Dewatering <input type="checkbox"/> Irrigation <input type="checkbox"/> Test/Exploratory <input type="checkbox"/> Other
--	---	--

WELL LOG		DRILLING METHOD <input checked="" type="checkbox"/> Cable Tool <input type="checkbox"/> Rotary <input type="checkbox"/> Rotary Hammer <input type="checkbox"/> Other	GROUTING RECORD Grouting Material: <input checked="" type="checkbox"/> Cement <input type="checkbox"/> Bentonite Clay Other: _____ No. of Bags: Bulk _____ Installation Method: Tremic
Depth	State the kind of formation penetrated, their color, caves, and if water bearing with estimate flow (GPM).	Hole Diameter 16 (in) Total depth 78 (ft) CASINGS RECORD MAIN CASING TYPE <input checked="" type="checkbox"/> Steel <input type="checkbox"/> Plastic <input type="checkbox"/> Other _____ Casing Diameter 10 (in) Wall Thickness 0.365 (in) Casing Length 63 (ft) Other Casing or Liner Used Type <input type="checkbox"/> Steel <input type="checkbox"/> Plastic <input type="checkbox"/> Other _____ Casing/Liner Diameter _____ (in) Length _____ (ft) from _____ (ft) to _____ (ft)	PUMP INSTALLED By Driller <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No ESTIMATED WELL YIELD Estimated at 500 G.P.M Static Water Level 40.5 (ft) *Pumping level below land surface 52 (ft) after 2.5 hrs. at 580 G.P.M. (Estimated) *Note: For Public Water Supply wells please submit required yield and drawdown tests.
From (ft.)	To (ft.)	SCREEN RECORD - SS <input type="checkbox"/> Not Installed <input checked="" type="checkbox"/> Installed Material: <input type="checkbox"/> Bronze <input type="checkbox"/> Plastic Diameter of screen 10 PS (in) Slot size 70 Length 15 (ft) from _____ (ft) to _____ (ft)	WELL HEAD COMPLETION Casing height above grade 2 (ft) Type Of Well Cap Baker Installed: Pitless adaptor
0	3	Top Soil	VARIANCE ISSUED <input type="checkbox"/> Yes <input type="checkbox"/> No Request Number _____
3	15	Br. sandy clay	COMMENTS BY INSTALLER: New Fire Well #1 - 50' +/- from old Well #1 Old Fire Well #1 abandoned/sealed
	30	Br. sand and gravel	
30	35	Same	
35	40	Same	
40	45	Br. medium sand little gravel	
45	60	Br. medium sand	
60	78	Br. medium sand little gravel	GRAVEL PACK RECORD Gravel Pack: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No From 63 (ft) to 78 (ft)

I hereby certify that this well has been constructed in accordance with state rules and in conformance with all conditions stated in the above captioned permit, and that the information presented herein is accurate and complete to the best of my knowledge.

Company Name Reynolds, Inc. WV Contractor No. WV000825
Business Registration No. _____ Master Well Driller Certification No. _____
Master Well Driller (print) John Workman
Master Well Driller Signature _____

THE SUPERVISOR (SIGNATURE OF DRILLER OR JOURNEYMAN RESPONSIBLE FOR NETWORK IF DIFFERENT FROM MASTER DRILLER.)
Journeyman Well Driller Certification No. _____
Journeyman Well Driller (please print) _____
Apprentice and Name (s) _____

Rev 3/08 ST/CO USE ONLY DATE RECEIVED MM DD YY _____	DATE THE WELL WAS COMPLETED MM DD YY <u>12 10 08</u> PERMIT NO. DW-_____	STATE OF WEST VIRGINIA WATER WELL COMPLETION REPORT	FORM SW-258 THIS REPORT MUST BE SUBMITTED WITHIN 30 DAYS AFTER WELL IS COMPLETED FILL IN THIS FORM COMPLETELY PLEASE PRINT OR TYPE
---	--	--	--

LOCATION OF WELL
 Well Owner: Last Name American Electric Power ~~XXXXXXXX~~ Mountaineer Plant
 Street/Road Route 62, New Haven County Mason Zip Code 26265-0419

Latitude: _____ Deg _____ Min _____ Sec Longitude: _____ Deg _____ Min _____ Sec Acquired By: <input checked="" type="checkbox"/> GPS <input type="checkbox"/> Topo <input type="checkbox"/> Other	AREA NAME/LOCATION: <u>FGD West Well</u>	TYPE OF WELL: <input type="checkbox"/> Potable <input type="checkbox"/> Public Water Supply <input type="checkbox"/> Geothermal <input checked="" type="checkbox"/> Industrial <input type="checkbox"/> Commercial <input type="checkbox"/> Dewatering <input type="checkbox"/> Irrigation <input type="checkbox"/> Test/Exploratory <input type="checkbox"/> Other _____
--	--	---

WELL LOG	DRILLING METHOD	GROUTING RECORD															
<table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:10%;">From (ft.)</th> <th style="width:10%;">To (ft.)</th> <th style="width:80%;">State the kind of formation penetrated, their color, caves, and if water bearing with estimate flow (GPM).</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0</td> <td style="text-align: center;">13</td> <td>Fill (fly ash)</td> </tr> <tr> <td style="text-align: center;">13</td> <td style="text-align: center;">52</td> <td>Band, Little gravel</td> </tr> <tr> <td style="text-align: center;">52</td> <td style="text-align: center;">78</td> <td>Med- Coarse sand and gravel</td> </tr> <tr> <td style="text-align: center;">78</td> <td style="text-align: center;"></td> <td>Clay</td> </tr> </tbody> </table>	From (ft.)	To (ft.)	State the kind of formation penetrated, their color, caves, and if water bearing with estimate flow (GPM).	0	13	Fill (fly ash)	13	52	Band, Little gravel	52	78	Med- Coarse sand and gravel	78		Clay	<input checked="" type="checkbox"/> Cable Tool <input type="checkbox"/> Rotary <input type="checkbox"/> Rotary Hammer <input type="checkbox"/> Other Hole Diameter <u>30</u> (in) Total depth <u>78</u> (ft)	GRROUTING RECORD Grouting Material: <input checked="" type="checkbox"/> Cement <input type="checkbox"/> Bentonite Clay Other _____ No. of Bags: <u>Bulk</u> Installation Method: _____
From (ft.)	To (ft.)	State the kind of formation penetrated, their color, caves, and if water bearing with estimate flow (GPM).															
0	13	Fill (fly ash)															
13	52	Band, Little gravel															
52	78	Med- Coarse sand and gravel															
78		Clay															

	CASINGS RECORD MAIN CASING TYPE <input checked="" type="checkbox"/> Steel <input type="checkbox"/> Plastic <input type="checkbox"/> Other _____ Casing Diameter <u>16</u> (in) Wall Thickness <u>0.375</u> (in) Casing Length <u>63</u> (ft) Other Casing or Liner Used Type <input type="checkbox"/> Steel <input type="checkbox"/> Plastic <input type="checkbox"/> Other _____ Casing/Liner Diameter _____ (in) Length _____ (ft) from _____ (ft) to _____ (ft)	PUMP INSTALLED By Driller <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No ESTIMATED WELL YIELD Estimated at <u>850</u> G.P.M Static Water Level <u>44.70</u> (ft) *Pumping level below land surface <u>52.24</u> (ft) after <u>4</u> hrs. at <u>682</u> G.P.M. (Estimated) *Note: For Public Water Supply wells please submit required yield and drawdown tests.
--	--	--

	SCREEN RECORD <input type="checkbox"/> Not Installed <input checked="" type="checkbox"/> Installed Material: <input type="checkbox"/> Bronze <input checked="" type="checkbox"/> Plastic Diameter of screen <u>16</u> (in) Slot size <u>0.06</u> Length <u>15</u> (ft) from <u>63</u> (ft) to <u>78</u> (ft)	WELL HEAD COMPLETION Casing height above grade <u>2</u> (ft) Type Of Well Cap _____ Installed: <u>Baker Pitless</u>
--	--	---

		VARIANCE ISSUED <input type="checkbox"/> Yes <input type="checkbox"/> No Request Number _____
--	--	---

		COMMENTS BY INSTALLER: Pump Test noted above was Step Test at: <div style="text-align: right;"> 317 gpm 457 gpm 616 gpm 682 gpm </div>
--	--	--

I hereby certify that this well has been constructed in accordance with state rules and in conformance with all conditions stated in the above captioned permit, and that the information presented herein is accurate and complete to the best of my knowledge.

Company Name Reynolds, Inc. WV Contractor No. WV 000825
 Business Registration No. _____ Master Well Driller Certification No. _____
 Master Well Driller (print) John Workman
 Master Well Driller Signature _____

SITE SUPERVISOR (SIGNATURE OF DRILLER OR JOURNEYMAN RESPONSIBLE FOR SITEWORK IF DIFFERENT FROM MASTER DRILLER.)

 Journeyman Well Driller Certification No. _____
 Journeyman Well Driller (please print) _____
 Apprentice and Name (s) _____

Rev 3/08	DATE THE WELL WAS COMPLETED MM DD YY <u>12 12 08</u>	STATE OF WEST VIRGINIA WATER WELL COMPLETION REPORT	FORM SW-258 THIS REPORT MUST BE SUBMITTED WITHIN 30 DAYS AFTER WELL IS COMPLETED
ST/CO USE ONLY DATE RECEIVED	PERMIT NO. DW-_____		FILL IN THIS FORM COMPLETELY PLEASE PRINT OR TYPE
MM DD YY ____			

LOCATION OF WELL
Well Owner: Last Name American Electric Power ~~First Name~~ Mountaineer Plant
Street/Road Route 62, New Haven County Mason Zip Code 26265-0419

Latitude: _____ Deg _____ Min _____ Sec Longitude: _____ Deg _____ Min _____ Sec Acquired By: <input checked="" type="checkbox"/> GPS <input type="checkbox"/> Topo <input type="checkbox"/> Other	AREA NAME/LOCATION: <u>FGD East Well</u>	TYPE OF WELL: <input type="checkbox"/> Potable <input type="checkbox"/> Public Water Supply <input type="checkbox"/> Geothermal <input checked="" type="checkbox"/> Industrial <input type="checkbox"/> Commercial <input type="checkbox"/> Dewatering <input type="checkbox"/> Irrigation <input type="checkbox"/> Test/Exploratory <input type="checkbox"/> Other _____
--	--	---

WELL LOG	DRILLING METHOD	GROUTING RECORD												
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th style="width:10%;">Depth</th> <th style="width:10%;">State the kind of formation penetrated, their color, caves, and if water bearing with estimate flow (GPM).</th> </tr> <tr> <td style="text-align:center;">From (ft.)</td> <td style="text-align:center;">To (ft.)</td> </tr> <tr> <td style="text-align:center;">0</td> <td style="text-align:center;">12</td> </tr> <tr> <td style="text-align:center;">12</td> <td style="text-align:center;">49</td> </tr> <tr> <td style="text-align:center;">49</td> <td style="text-align:center;">78</td> </tr> <tr> <td style="text-align:center;">78</td> <td style="text-align:center;"></td> </tr> </table>	Depth	State the kind of formation penetrated, their color, caves, and if water bearing with estimate flow (GPM).	From (ft.)	To (ft.)	0	12	12	49	49	78	78		<input checked="" type="checkbox"/> Cable Tool <input type="checkbox"/> Rotary <input type="checkbox"/> Rotary Hammer <input type="checkbox"/> Other Hole Diameter <u>30</u> (in) Total depth <u>78</u> (ft)	GROUTING RECORD Grouting Material: <input checked="" type="checkbox"/> Cement <input type="checkbox"/> Bentonite Clay Other _____ No. of Bags: <u>Bulk</u> Installation Method: _____
Depth	State the kind of formation penetrated, their color, caves, and if water bearing with estimate flow (GPM).													
From (ft.)	To (ft.)													
0	12													
12	49													
49	78													
78														

	CASINGS RECORD	PUMP INSTALLED
	MAIN CASING TYPE <input checked="" type="checkbox"/> Steel <input type="checkbox"/> Plastic <input type="checkbox"/> Other Casing Diameter <u>16</u> (in) Wall Thickness <u>0.375</u> (in) Casing Length <u>63</u> (ft)	By Driller <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No ESTIMATED WELL YIELD Estimated at <u>900</u> G.P.M Static Water Level <u>45.38</u> (ft) *Pumping level below land surface <u>61.44</u> (ft) after <u>4</u> hrs. at <u>1000</u> G.P.M. (Estimated) *Note: For Public Water Supply wells please submit required yield and drawdown tests.

	SCREEN RECORD	WELL HEAD COMPLETION
	<input type="checkbox"/> Not Installed <input checked="" type="checkbox"/> Installed Material: <input type="checkbox"/> Bronze <input checked="" type="checkbox"/> SS Diameter of screen <u>16"</u> Slot size <u>0.06"</u> Length <u>15</u> (ft) from <u>63</u> (ft) to <u>78</u> (ft)	Casing height above grade <u>2</u> (ft) Type Of Well Cap Installed: <u>Baker Pitless</u>

	GRAVEL PACK RECORD	VARIANCE ISSUED
	Gravel Pack: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No From <u>25</u> (ft) to <u>78</u> (ft)	<input type="checkbox"/> Yes <input type="checkbox"/> No Request Number _____

COMMENTS BY INSTALLER:
Pump Test noted above was Step Test at:

278 gpm
403 gpm
603 gpm
802 gpm
902 gpm
1000 gpm

I hereby certify that this well has been constructed in accordance with state rules and in conformance with all conditions stated in the above captioned permit, and that the information presented herein is accurate and complete to the best of my knowledge.

Company Name Reynolds, Inc. WV Contractor No. WV 000825
Business Registration No. _____ Master Well Driller Certification No. _____
Master Well Driller (print) John Workman
Master Well Driller Signature _____

SITE SUPERVISOR (SIGNATURE OF DRILLER OR JOURNEYMAN RESPONSIBLE FOR SITEWORK IF DIFFERENT FROM MASTER DRILLER.)

Journeyman Well Driller Certification No. _____
Journeyman Well Driller (please print) _____
Apprentice and Name (s) _____



H.C. Nutting Company 2009

**Piezometer Construction
Diagrams**

PZ-09-03 to PZ-09-05

PROJECT MOUNTAINEER BOTTOM ASH POND COMPLEX

SUMMARY ELEVATIONS
(FT. NGVD)

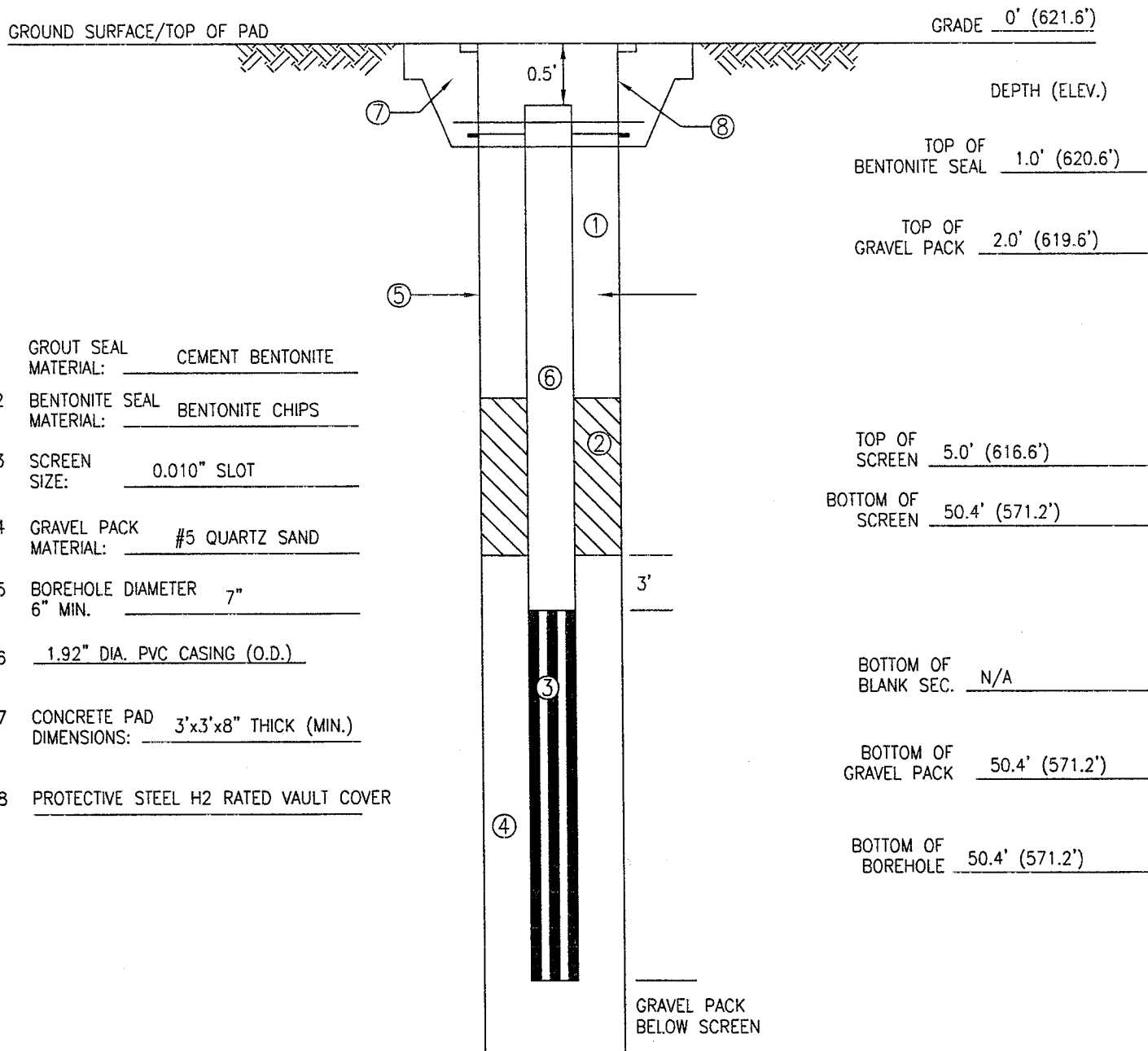
COORDINATES 71944.21 N/1733850.23 E (NAD 27)(NGVD29 WV S)

DATE INSTALLED 02/17/09

PIEZOMETER NO. PZ-09-03

REF. DATUM PT.:
TOP OF PROTECTIVE
VAULT/GROUND SURFACE

REF. DATUM PT. _____



- 1 GROUT SEAL MATERIAL: CEMENT BENTONITE
- 2 BENTONITE SEAL MATERIAL: BENTONITE CHIPS
- 3 SCREEN SIZE: 0.010" SLOT
- 4 GRAVEL PACK MATERIAL: #5 QUARTZ SAND
- 5 BOREHOLE DIAMETER 7"
6" MIN.
- 6 1.92" DIA. PVC CASING (O.D.)
- 7 CONCRETE PAD DIMENSIONS: 3'x3'x8" THICK (MIN.)
- 8 PROTECTIVE STEEL H2 RATED VAULT COVER

NOTE: DEPTHS OF MATERIALS ARE TAKEN FROM TOP OF VAULT/GROUND SURFACE

SCALE: NTS

GEOTECHNICAL ENGINEERING SECTION CIVIL DESIGN STANDARD		REVISION 0		OBSERVATION WELL	
APP'D.	DR.	C.K.	DATE		
AMERICAN ELECTRIC POWER SERVICE CORP.				CDS-04A	SH.

AMERICAN ELECTRIC POWER
MOUNTAINEER BOTTOM ASH POND COMPLEX

GEOLOGIST/ENGINEER:
TODD GRIFFITH H.C. NUTTING CO.

PROJECT MOUNTAINEER BOTTOM ASH POND COMPLEX

SUMMARY ELEVATIONS
(FT. NGVD)

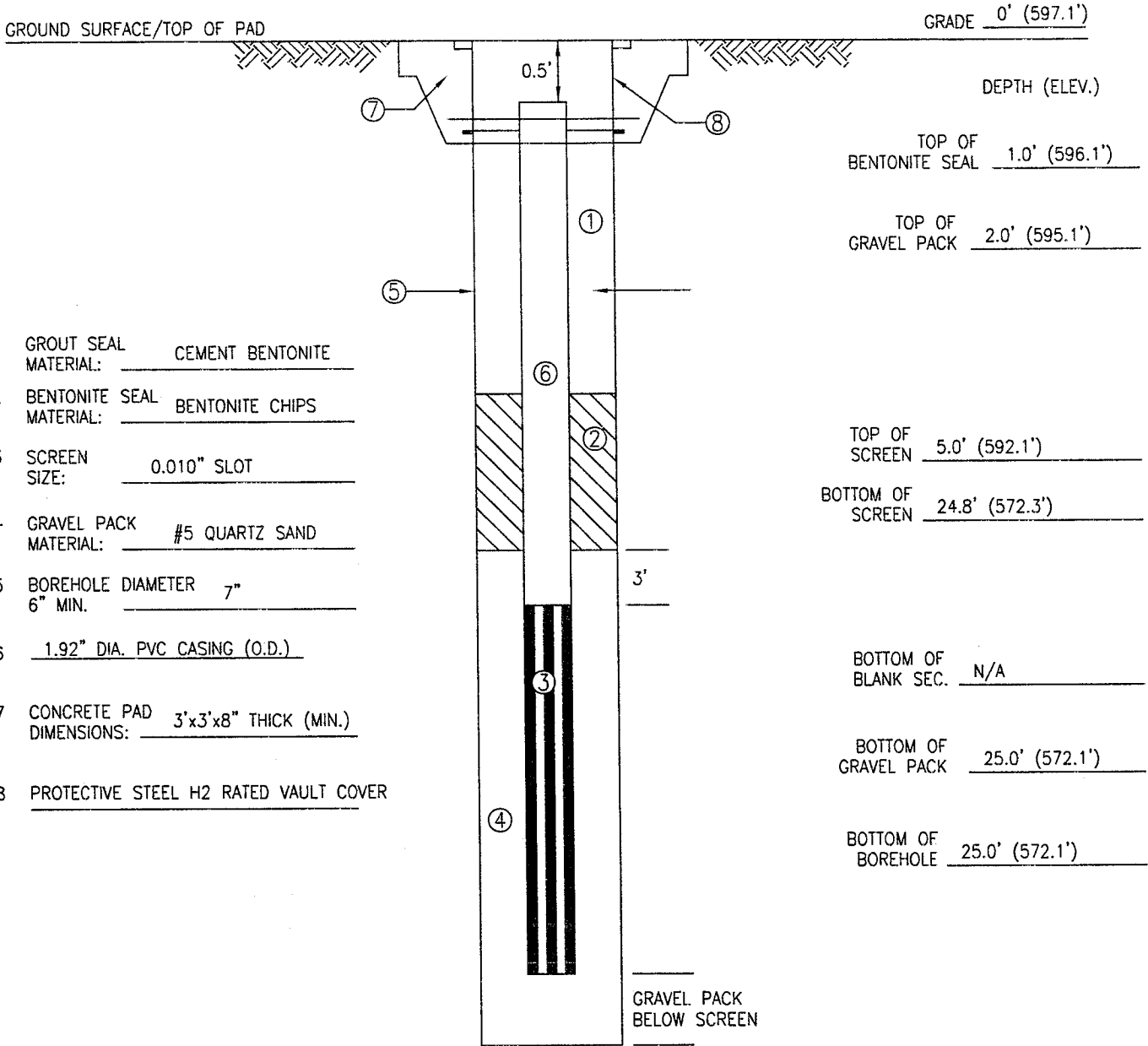
COORDINATES 719507.75 N/1733919.28 E (NAD 27)(NGVD29 WV S)

DATE INSTALLED 02/19/09

PIEZOMETER NO. PZ-09-04

REF. DATUM PT.:
TOP OF PROTECTIVE
VAULT/GROUND SURFACE

REF. DATUM PT. _____



- 1 GROUT SEAL MATERIAL: CEMENT BENTONITE
- 2 BENTONITE SEAL MATERIAL: BENTONITE CHIPS
- 3 SCREEN SIZE: 0.010" SLOT
- 4 GRAVEL PACK MATERIAL: #5 QUARTZ SAND
- 5 BOREHOLE DIAMETER 7"
6" MIN.
- 6 1.92" DIA. PVC CASING (O.D.)
- 7 CONCRETE PAD DIMENSIONS: 3'x3'x8" THICK (MIN.)
- 8 PROTECTIVE STEEL H2 RATED VAULT COVER

DEPTH (ELEV.)

GRADE 0' (597.1')

TOP OF BENTONITE SEAL 1.0' (596.1')

TOP OF GRAVEL PACK 2.0' (595.1')

TOP OF SCREEN 5.0' (592.1')

BOTTOM OF SCREEN 24.8' (572.3')

BOTTOM OF BLANK SEC. N/A

BOTTOM OF GRAVEL PACK 25.0' (572.1')

BOTTOM OF BOREHOLE 25.0' (572.1')

NOTE: DEPTHS OF MATERIALS ARE TAKEN FROM TOP OF VAULT/GROUND SURFACE

SCALE: NTS

GEOTECHNICAL ENGINEERING SECTION CIVIL DESIGN STANDARD		REVISION 0		OBSERVATION WELL	
APP'D.	DR.	C.K.	DATE		
AMERICAN ELECTRIC POWER SERVICE CORP.				CDS-04A	SH.

AMERICAN ELECTRIC POWER
MOUNTAINEER BOTTOM ASH POND COMPLEX

GEOLOGIST/ENGINEER:
TODD GRIFFITH H.C. NUTTING CO.

TERRACON PROJECT NO. N2095020

PROJECT MOUNTAINEER BOTTOM ASH POND COMPLEX

SUMMARY ELEVATIONS
(FT. NGVD)

COORDINATES 718480.58 N/1734992.79 E (NAD 27)(NGVD29 WV S)

DATE INSTALLED 02/18/09

PIEZOMETER NO. PZ-09-05

REF. DATUM PT.:
TOP OF PROTECTIVE
VAULT/GROUND SURFACE

REF. DATUM PT. _____

GROUND SURFACE/TOP OF PAD

GRADE 0' (611.7')

DEPTH (ELEV.)

TOP OF
BENTONITE SEAL 1.0' (610.7')

TOP OF
GRAVEL PACK 2.0' (609.7')

TOP OF
SCREEN 5.0' (606.7')

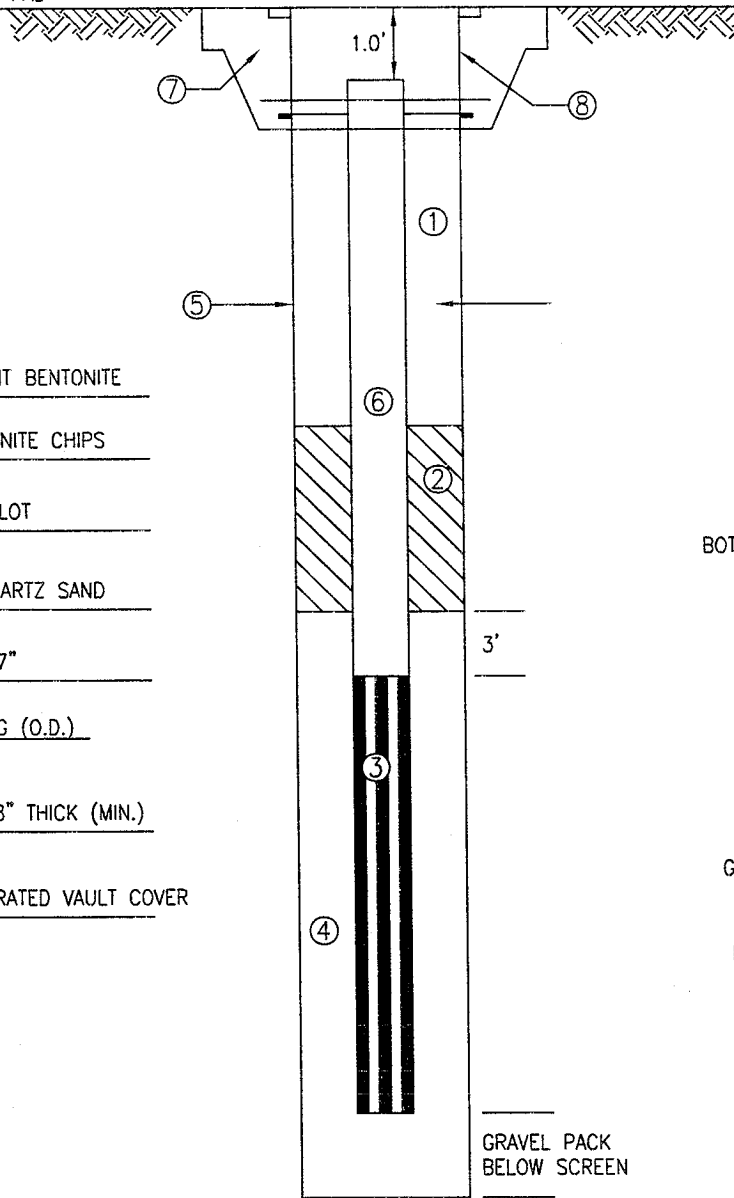
BOTTOM OF
SCREEN 50.2' (561.5')

BOTTOM OF
BLANK SEC. N/A

BOTTOM OF
GRAVEL PACK 50.2' (561.5')

BOTTOM OF
BOREHOLE 50.2' (561.5')

- 1 GROUT SEAL MATERIAL: CEMENT BENTONITE
- 2 BENTONITE SEAL MATERIAL: BENTONITE CHIPS
- 3 SCREEN SIZE: 0.010" SLOT
- 4 GRAVEL PACK MATERIAL: #5 QUARTZ SAND
- 5 BOREHOLE DIAMETER 7"
6" MIN.
- 6 1.92" DIA. PVC CASING (O.D.)
- 7 CONCRETE PAD DIMENSIONS: 3'x3'x8" THICK (MIN.)
- 8 PROTECTIVE STEEL H2 RATED VAULT COVER



GRAVEL PACK
BELOW SCREEN

NOTE: DEPTHS OF MATERIALS ARE TAKEN FROM TOP OF VAULT/GROUND SURFACE

SCALE: NTS

GEOTECHNICAL ENGINEERING SECTION CIVIL DESIGN STANDARD		REVISION 0		OBSERVATION WELL	
APP'D.	DR.	C.K.	DATE		
AMERICAN ELECTRIC POWER SERVICE CORP.				CDS-04A	SH.

AMERICAN ELECTRIC POWER
MOUNTAINEER BOTTOM ASH POND COMPLEX

GEOLOGIST/ENGINEER:
TODD GRIFFITH H.C. NUTTING CO.

AEPMT-000160



H.C. Nutting Company 2009

Soil Boring Logs

**B-09-01, B-09-02, PZ-09-03 to
PZ-09-05, B-09-06**

LOG OF BORING NO. B-09-01

CLIENT American Electric Power		PROJECT Mountaineer Bottom Ash Pond Complex	
SITE New Haven, West Virginia		Boring Location: 719673.518, 1733588.509	
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL
	Approx. Surface Elev.: 621.5 ft		
	1 FILL , gravel base for roadway 620.5		GP 1 SS 18 27
	5 FILL , poorly graded sand, some gravel and silt, fine grained, brown, medium dense to dense, moist		SP 2 SS 18 35 5
			SP 3 SS 18 29
			SP 4 SS 18 32
		10 SP 5 SS 18 38 11	
	12.5 609		SM 6 SS 18 53
	15 FILL , silty sand, grayish brown to brown, very dense to dense, moist to wet		SM 7 SS 18 51 8
			SM 8 SS 18 48
20 SM 9 SS 18 49			
22.5 599		SP 10 SS 18 44	
27.5 594	FILL , poorly graded sand, some gravel and silt, fine grained, brown to light brown, dense, saturated	25 SP 11 SS 18 38 14	
		30 SM 12 SS 18 12	
	SILTY SAND , very fine to fine grained, some thin sandy silt seams, brown to light brown, medium dense to loose, wet to moist	SM 13 SS 18 9	

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

**CME 140H SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	∇ 22.5	WD	∇ AB
WL	∇ 22.0	24 hour	∇
WL			



BORING STARTED		2-16-09	
BORING COMPLETED		2-16-09	
RIG	Track	FOREMAN	JW
LOGGED	TAG	JOB #	N2095020

REVISED BORING LOGS: MTNEER PLANT BOTTOM ASH.GPJ TERRACON.GDT 3/9/09

LOG OF BORING NO. B-09-01

CLIENT American Electric Power		PROJECT Mountaineer Bottom Ash Pond Complex									
SITE New Haven, West Virginia											
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	SAMPLES				TESTS				
			USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT - N** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
	<p>SILTY SAND, very fine to fine grained, some thin sandy silt seams, brown to light brown, medium dense to loose, wet to moist</p>	35	SM	14	SS	18	9				
		35	SM	15	SS	18	9				
		35	SM	16	SS	18	11	14			
		40	SM	17	SS	18	8				
		40	SM	18	SS	18	10				
	45	45	SP SM	19	SS	18	25				
		45	SP SM	20	SS	18	27	8			
	51.5	50	SP SM	21	SS	18	54				
	51.5	570	BORING COMPLETED								

REVISED BORING LOGS: MOUNTAINEER PLANT BOTTOM ASH GPJ TERRACON.GDT 3/9/09

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

**CME 140H SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 22.5	WD	▽ AB
WL	▽ 22.0	24 hour	▽
WL			



BORING STARTED		2-16-09	
BORING COMPLETED		2-16-09	
RIG	Track	FOREMAN	JW
LOGGED	TAG	JOB #	N2095020

LOG OF BORING NO. B-09-02

CLIENT
American Electric Power

SITE
New Haven, West Virginia

PROJECT
Mountaineer Bottom Ash Pond Complex

Boring Location: 719744.754, 1733658.992

DESCRIPTION

Approx. Surface Elev.: 594.5 ft

DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
		NUMBER	TYPE	RECOVERY, in.	SPT - N** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
2	CL	1	SS	18	4	19			
5	ML	2	SS	18	9	19			
5	ML	3	SS	18	7				
10	ML	4	SS	18	5				
10	ML	5	SS	18	6				
15	ML	6	SS	14	6				
15	SP SM	7	SS	18	9				
20	SP SM	8	SS	18	22	6			
20	SP SM	9	SS	18	14				
25	SP SM	10	SS	15	19				
25	SP SM	11	SS	18	30				

TOPSOIL, lean clay, high organic content, dark brown, very soft, saturated (possible seepage from dike)

SANDY SILT, fine grained, brown, loose, wet to moist

POORLY GRADED SAND with SILT and GRAVEL, light to dark brown, medium dense to dense, moist

BORING COMPLETED

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

**CME 140H SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 0	WD	▽ 26.0 AB
WL	▽	WD	▽
WL			



BORING STARTED		2-18-09	
BORING COMPLETED		2-18-09	
RIG	Track	FOREMAN	JW
LOGGED	TAG	JOB #	N2095020

REVISED BORING LOGS: MTNEER PLANT BOTTOM ASH.GPJ TERRACON.GDT 3/9/09

LOG OF BORING NO. PZ-09-03

CLIENT American Electric Power											
SITE New Haven, West Virginia		PROJECT Mountaineer Bottom Ash Pond Complex									
GRAPHIC LOG	Boring Location: 719441.213, 1733850.227				SAMPLES			TESTS			
	DESCRIPTION		DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT - N** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	Approx. Surface Elev.: 621.5 ft										
	1	620.5	FILL , gravel base for roadway	SP SM	1	SS	18	26			
			FILL , poorly graded sand with silt, some gravel, brown, medium dense to dense, moist	SP SM	2	SS	18	31	6		
				SP SM	3	SS	18	28			
				SP SM	4	SS	18	39			
				SP SM	5	SS	18	42			
				SP SM	6	SS	18	49	10		
				SP SM	7	SS	18	39			
	17.5	604									
		FILL , poorly graded sand, some gravel and silt, fine grained, brown, dense, saturated	SP	8	SS	18	38				
			SP	9	SS	18	42				
	22.5	599									
	24	597.5	CLAYEY GRAVEL with SAND , fine sand with rounded gravel, dark gray, medium dense, moist to wet	SC	10	SS	18	11			
		LEAN CLAY with SAND , brown to light brown, stiff, moist	CL	11	SS	18	12	19		4500* LL = 29 PI = 10	
			CL	12	SS	18	13			3500*	
	30	591.5	SILTY CLAY with sand , brown to light brown, stiff, moist	CL ML	13	SS	18	11	20	4500* LL = 25 PI = 5	
			CL	1	ST	22				LL = 25	

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

**CME 140H SPT automatic hammer
*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 17.5	WD	▽ 20.2
WL	▽ 15.8	2/25	▽
WL			



BORING STARTED		2-16-09	
BORING COMPLETED		2-17-09	
RIG	Track	FOREMAN	JW
LOGGED	TAG	JOB #	N2095020

REVISED BORING LOGS - MTNEER PLANT BOTTOM ASH.GPJ TERRACON.GDT 3/9/09

LOG OF BORING NO. PZ-09-03

CLIENT American Electric Power		PROJECT Mountaineer Bottom Ash Pond Complex								
SITE New Haven, West Virginia										
GRAPHIC LOG	DESCRIPTION	SAMPLES				TESTS				
		DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT - N** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
			ML							Pl = 7
34	587.5		SM	14	SS	14	10			
		35	SM	15	SS	18	11			
			SM	16	SS	18	8	13		
		40	SM	17	SS	18	7			
			SM	18	SS	18	8			
		45	SM	19	SS	18	10			
48.5	573		SM	20	SS	18	12			
		50	GP	21	SS	18	8	8		
51.5	570									
BORING COMPLETED										

SILTY SAND, very fine grained, trace gravel, many thin sandy silt seams, brown to light brown, loose to medium dense, moist

POORLY GRADED GRAVEL with SAND and SILT, subrounded to rounded gravel, brown, loose to medium dense, wet

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

**CME 140H SPT automatic hammer
*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ 17.5	WD	▽ 20.2 72
WL	▽ 15.8	2/25	▽
WL			



BORING STARTED		2-16-09	
BORING COMPLETED		2-17-09	
RIG	Track	FOREMAN	JW
LOGGED	TAG	JOB #	N2095020

REVISED BORING LOGS: MOUNTAINEER PLANT BOTTOM ASH GP.J TERRACON.GDT 3/9/09

LOG OF BORING NO. PZ-09-04

CLIENT American Electric Power		PROJECT Mountaineer Bottom Ash Pond Complex								
SITE New Haven, West Virginia		Boring Location: 719506.02, 1733919.514								
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	SAMPLES				TESTS			
	Approx. Surface Elev.: 597 ft		USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT - N** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf
	TOPSOIL , saturated		CL	1	SS	11	9			
	2									
	SANDY SILT , trace clay, fine to very fine grained, brown, loose, layered, wet		ML	2	SS	18	9	21		
	5									
			ML	1	ST	24				
			ML	3	SS	18	10			
	10									
			ML	4	SS	18	5			
	ML	5	SS	18	6	23				
15										
	ML	6	SS	18	5					
	ML	7	SS	18	7					
20										
	ML	8	SS	18	13					
21.4										
POORLY GRADED GRAVEL with SILT and SAND , subrounded gravel, brown with gray, medium dense to dense, very moist	GP GM	9	SS	12	19	6				
25										
	GP GM	10	SS	18	43					
26.5										
	BORING COMPLETE									

REVISED BORING LOGS - MTNEER PLANT BOTTOM ASH.GPJ TERRACON.GDT 3/9/09

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

**CME 140H SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ N/E	WD	▽ N/E	AB
WL	▽ N/E	48	▽ 25.5	2/25
WL				



BORING STARTED		2-19-09	
BORING COMPLETED		2-19-09	
RIG	Track	FOREMAN	JW
LOGGED	TAG	JOB #	N2095020

LOG OF BORING NO. PZ-09-05

CLIENT
American Electric Power

SITE
New Haven, West Virginia

PROJECT
Mountaineer Bottom Ash Pond Complex

Boring Location: 718483.249, 1734990.193

GRAPHIC LOG

DESCRIPTION

Approx. Surface Elev.: 611.5 ft

DEPTH, ft.	USCS SYMBOL	SAMPLES				TESTS			
		NUMBER	TYPE	RECOVERY, in.	SPT - N** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf	
0.3	SP	1	SS	18	20				
	SP	2	SS	18	30	4			
5	SP	3	SS	18	10				
	SP	4	SS	18	5				
10	SP	5	SS	18	5				
	SP	6	SS	18	4	7			
15	SP	7	SS	18	3				
	SP	8	SS	13	4				
20	SP	9	SS	18	5				
	SP	10	SS	18	3	6			
25	SP	11	SS	18	6				
	SP	12	SS	18	5				
30	GP	13	SS	18	10				

TOPSOIL 611

FILL, poorly graded sand, some silt and trace fine gravel, fine to medium grained sand, brown, dense, moist

5 606.5

POORLY GRADED SAND trace silt, fine grained, brown, loose to very loose, moist

20 591.5

POORLY GRADED SAND, trace silt, fine grained, brown, very loose to loose, moist

29 582.5

POORLY GRADED GRAVEL with SAND, subrounded gravel with fine to coarse sand, brown to dark brown, loose to medium dense, moist

Continued Next Page

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

**CME 140H SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft			
WL	▽ N/E	WD	▽ N/E AB
WL	▽ N/E	72	▽ N/E 2/25
WL			



BORING STARTED		2-18-09	
BORING COMPLETED		2-18-09	
RIG	Track	FOREMAN	JW
LOGGED	TAG	JOB #	N2095020

REVISED BORING LOGS - MTNEER PLANT BOTTOM ASH.GPJ TERRACON.GDT 3/9/09

LOG OF BORING NO. PZ-09-05

CLIENT American Electric Power		PROJECT Mountaineer Bottom Ash Pond Complex										
SITE New Haven, West Virginia												
GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	SAMPLES				TESTS					
			USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT - N** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf		
			GP	14	SS	18	19					
			35	POORLY GRADED SAND, some gravel, fine to coarse sand, brown, loose to medium dense, moist	35	SP	15	SS	18	10		
						SP	16	SS	18	13		
			40	POORLY GRADED SAND with GRAVEL brown, dense to medium dense, moist	40	SP	17	SS	18	30	3	
						SP	18	SS	18	20		
			45		45	SP	19	SS	18	21		
			47.5	POORLY GRADED SAND, some gravel, fine to medium grained sand, brown to light brown, medium dense, moist	50	SP	20	SS	18	14	7	
			51.5	BORING COMPLETED	50	SP	21	SS	18	13		

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

**CME 140H SPT automatic hammer

WATER LEVEL OBSERVATIONS, ft				
WL	▽ N/E	WD	▽ N/E	AB
WL	▽ N/E	72	▽ N/E	2/25
WL				



BORING STARTED		2-18-09	
BORING COMPLETED		2-18-09	
RIG	Track	FOREMAN	JW
LOGGED	TAG	JOB #	N2095020

REVISED BORING LOGS MTNEER PLANT BOTTOM ASH.GPJ TERRACON.GDT 3/9/09

LOG OF BORING NO. B-09-06

CLIENT American Electric Power		PROJECT Mountaineer Bottom Ash Pond Complex											
SITE New Haven, West Virginia													
Boring Location: 718535.672, 1735062.716		DESCRIPTION		SAMPLES				TESTS					
GRAPHIC LOG	Approx. Surface Elev.: 594.5 ft		DEPTH, ft.	USCS SYMBOL	NUMBER	TYPE	RECOVERY, in.	SPT - N** BLOWS / ft.	WATER CONTENT, %	DRY UNIT WT pcf	UNCONFINED STRENGTH, psf		
	0.3	594		SC	1	SS	14	11					
	TOPSOIL												
	FILL , clayey sand, fine to medium grained, organics such as roots fragments throughout, brown, medium dense to loose, moist to wet		3.5	591	SC	2	SS	18	5			2000*	
	SILTY CLAY with SAND , fine sand, light brown, medium stiff, moist				CL ML	1	ST	24					
					CL ML	3	SS	18	7	23		2000*	LL = 25 PI = 6
					CL ML	4	SS	18	7	23		2500*	LL = 26 PI = 6
	10.5	584			SP	5	SS	18	13				
	POORLY GRADED SAND with GRAVEL , fine to coarse sand, some silt, rounded to subrounded gravel, brown, medium dense to loose, moist				SP	6	SS	14	8				
					SP	7	SS	14	6				
					SP	8	SS	14	5				
	22.5	572			SP	9	SS	14	11				
POORLY GRADED SAND with SILT , brown, medium dense, moist				SP SM	10	SS	18	19	4				
26.5	568			SP SM	11	SS	18	14					
BORING COMPLETED													

REVISED BORING LOGS MTNEER PLANT BOTTOM ASH.GPJ TERRACON.GDT 3/9/09

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

**CME 140H SPT automatic hammer
*Calibrated Hand Penetrometer

WATER LEVEL OBSERVATIONS, ft			
WL	∇ N/E	WD	∇ AB
WL	∇	24 hour	∇
WL			



BORING STARTED		2-18-09	
BORING COMPLETED		2-18-09	
RIG	Track	FOREMAN	JW
LOGGED	TAG	JOB #	N2095020



Arcadis 2016

Boring Logs

SB-1601, MW-1601A to MW-1608

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

PROJECT Mountaineer Plant

COORDINATES Not Surveyed

GROUND ELEVATION NA SYSTEM NA

BORING NO. SB-1601 DATE 10/05/16 SHEET 1 OF 4

BORING START 05/05/16 BORING FINISH 05/06/16

PIEZOMETER TYPE NA WELL TYPE NA






HGT. RISER ABOVE GROUND NA DIA NA

DEPTH TO TOP OF WELL SCREEN NA BOTTOM NA

WELL DEVELOPMENT NA BACKFILL Grout

FIELD PARTY NA RIG Hollow Stem Auger

Water Level, ft	▽ 57.0	▼	▼
TIME			
DATE	5/6/2016		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	8.0							No recovery, boring was pre-drilled for utility clearance; no samples were taken.		
1	SH	8.0	10.0	0-3-3-1	12		5			Sand, fine to coarse; some silt; little fine gravel, angular to subrounded; trace medium subangular gravel; wet; dark yellowish brown (10YR 4/2).		
2	SS	10.0	12.0	1-1-1-1	12		10			Silt with clay with fine sand; moist; soft; non-plastic; very dark gray (N 3/).		
3	SS	12.0	14.0	0-0-1-1	18					Silt, some clay, some fine sand, trace coal fragments; moist; soft.		
4	SS	14.0	16.0	1-1-2-2	18							
5	SS	16.0	18.0	2-1-1-2	18		15					

TYPE OF CASING USED

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

Continued Next Page

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

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

RECORDER J. Wanner

AEP - AEP.GDT - 10/05/16 15:21 - C:\CHERYL\PROJECTS\GINT SAVED TO COLUMBUS SERVER USE FOR REFERENCE\AEP MOUNTAINEER BORING LOGS 9-2016\AEP MOUNTAINEER.GPJ

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER **OH015976.0009**








COMPANY **American Electric Power**

BORING NO. **SB-1601** DATE **10/05/16** SHEET **2** OF **4**

PROJECT **Mountaineer Plant**

BORING START **05/05/16** BORING FINISH **05/06/16**

AEP - AEP.GDT - 10/05/16 15:21 - C:\CHERYL\PROJECTS\GINT SAVED TO COLUMBUS SERVER\USE FOR REFERENCE\AEP MOUNTAINEER BORING LOGS 9-2016\AEP MOUNTAINEER.GPJ

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
6	SS	18.0	20.0	1-1-1-1	19		20					
7	SS	20.0	22.0	1-1-2-1	48							
8	SS	22.0	24.0	0-1-3-7	21							
9	SS	24.0	26.0	4-5-4-5	21		25		SM	Silty sand, fine to coarse; moist; loose; yellowish brown (10YR 5/4).		
10	SS	26.0	28.0	1-1-3-3	18				ML	Silt, some very fine sand; dry; rapid dilatancy; stratified; gray (5Y 6/1) with 30% iron staining as dark as dusky red (7.5R 3/3).		
11	SS	28.0	30.0	1-1-2-2	22				ML	Silt, trace clay; wet; soft; rapid dilatancy; stratified.		Note: Very finely stratified from 27.8 to 28 feet. Note: Color grades to yellowish brown (10YR 5/6) from 29 to 31 feet.
12	SS	30.0	32.0	1-1-3-9	19		30		SP	Note: Color change to gray (N 5/) abrupt upper and lower boundaries from 31 to 31.1 feet.		
13	SS	32.0	34.0	2-2-3-4	17				SP	Sand with silt, some clay; moist; loose; brown (7.5YR 4.3); sand is fine to coarse.		
14	SS	34.0	36.0	2-4-7-7	12					Sand, little to some silt; moist; yellowish brown (10YR 5/4); loose; sand is fine to coarse.		Note: Dry from 34 to 36 feet.
15	SS	36.0	38.0	5-7-8-7	12		35					Note: Dry grades to moist from 36 to 38 feet.
16	SS	38.0	40.0	2-4-5-6	19							Note: Moist from 38 to 44 feet.
17	SS	40.0	42.0	5-5-6-5	19		40					

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. SB-1601 DATE 10/05/16 SHEET 3 OF 4

PROJECT Mountaineer Plant

BORING START 05/05/16 BORING FINISH 05/06/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
18	SS	42.0	44.0	1-4-5-5	17							
19	SS	44.0	46.0	2-4-6-7	13		45					Note: Slight increase in silt content from 43 to 44 feet.
20	SS	46.0	48.0	5-5-7-7	17							
21	SS	48.0	50.0	8-10-10-10	18							Note: Weakly stratified from 48.5 to 50 feet.
22	SS	50.0	52.0	6-6-7-8	16		50					
23	SS	52.0	54.0	2-3-8-8	18							
24	SS	54.0	56.0	4-4-5-6	13		55					
25	SS	56.0	58.0	4-4-6-8	19							Note: Trace subrounded medium to coarse gravel, sedimentary very thinly bedded, pitted along bedding at 55.5 feet.
26	SS	58.0	60.0	2-4-6-4	13						▽	Note: Trace subrounded coal (250 mm diameter, readily disaggregate; broken apart; internal coal appearance is well preserved) at 56.1 feet. Note: Includes little amount of fine subangular gravel from 57.5 to 58 feet. Note: Weakly stratified from 59 to 59.5 feet.
27	SS	60.0	62.0	2-4-4-6	14		60					
28	SS	62.0	64.0	4-4-4-5	18							
29	SS	64.0	66.0	5-6-9-10	17				SP			Sand, fine to medium, little to some silt; moist; loose; yellowish brown (10YR 5/4).

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. SB-1601 DATE 10/05/16 SHEET 4 OF 4

PROJECT Mountaineer Plant

BORING START 05/05/16 BORING FINISH 05/06/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
30	SS	66.0	68.0	5-6-7-8	17		65			Note: Thin layer of coal fragments up to 10 mm in size. Note: Includes a little amount of fine subrounded gravel from 67 to 68 feet.		
31	SS	68.0	70.0	6-6-5-7	16							
32	SS	70.0	71.3	12-15-50/4	16		70		GP SP ML	Gravel, some sand; moist; loose; gravel is fine to medium, rounded and subrounded. Sand, some silt, little fine to medium gravel; dry; loose; yellowish brown (10YR 5.4); sand is fine to coarse. Silt, little very fine sand; dry; hard; very dark brown (7.5YR 2.5/2). Bedrock, weak, thin plates; looks like shale, but fine party crystals (like mica) are abduct; olive gray (5Y 5/2). Bedrock, weak, thin plates; looks like shale, but fine party crystals (like mica) are abduct; olive gray (5Y 5/2). End of boring at 71.3 feet.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NUMBER OH015976.0009
 COMPANY American Electric Power
 PROJECT Mountaineer Plant
 COORDINATES N 717,305.0 E 1,734,094.2
 GROUND ELEVATION 607.5 SYSTEM NAD 1927

BORING NO. MW-1601A DATE 10/05/16 SHEET 1 OF 4
 BORING START 06/08/16 BORING FINISH 06/08/16
 PIEZOMETER TYPE NA WELL TYPE OW
 HGT. RISER ABOVE GROUND 3.19 DIA 2"
 DEPTH TO TOP OF WELL SCREEN 67.0 BOTTOM 77.0
 WELL DEVELOPMENT NA BACKFILL Grout
 FIELD PARTY NA RIG Hollow Stem Auger

Water Level, ft	▽ 63.0	▼	▼
TIME			
DATE	6/8/2016		

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	10.0		0					Straight drill to 10 feet, boring was pre-drilled for utility clearance; no samples were taken.		
1	SS	10.0	12.0	1-2-4-5	13		10		ML	Silt, some clay, little sand; dry; firm; massive; 10YR 4/4 to 4/3.		
2	SS	12.0	14.0	3-4-5-5	16							
3	SS	14.0	16.0	4-5-4-7	13		15		CL ML SM	Silt with clay and sand; moist; soft. Interbedded sand and clay; dry; loose and soft; sands are fine to coarse; 10YR 4/4; silt/clay layers are silt with clay, some fine sand, dry, soft, black (10YR 2/1).		
4	SS	16.0	18.0	3-4-6-5	14				SW	Sand, fine to coarse, little silt, trace fine gravel; moist; loose; 10YR 5/4 to 4/4; in stratified.		
5	SS	18.0	20.0	2-2-2-3	16				SP	Note: Dry from 18 to 19 feet. Note: Abrupt boundary at 19 feet.		

TYPE OF CASING USED				<i>Continued Next Page</i>			
NA	NQ-2 ROCK CORE			PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC			
NA	6" x 3.25 HSA						
NA	9" x 6.25 HSA			WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON			
NA	HW CASING ADVANCER	4"					
NA	NW CASING	3"		RECORDER <u>J. Wanner</u>			
NA	SW CASING	6"					
NA	AIR HAMMER	8"					

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1601A DATE 10/05/16 SHEET 2 OF 4

PROJECT Mountaineer Plant

BORING START 06/08/16 BORING FINISH 06/08/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
6	SS	20.0	22.0	2-2-2-4	17				SW SW	Fine sand, some silt, dry; loose; 10YR 5/4. Silty sand; moist; soft; 10YR 4/4.		
7	SS	22.0	24.0	1-3-3-3	13					Sand, fine to coarse, little to some silt, trace fine to medium gravel; dry; loose; 10YR 5/4 to 10YR 4/4. Note: Gravel fraction is subrounded sedimentary and chert, both fine in size from 22 to 26 feet.		
8	SS	24.0	26.0	3-6-8-7	16		25					
9	SS	26.0	28.0	3-5-4-5	14					Note: Some gravel at 26 feet. Note: No gravel at 26.7 to 28 feet.		
10	SS	28.0	30.0	5-6-7-5	18							
11	SS	30.0	32.0	4-4-5-6	14		30					
12	SS	32.0	34.0	1-4-7-6	13							
13	SS	34.0	36.0	3-8-5-8	14					Note: Moist at 34.5 feet.		
14	SS	36.0	38.0	3-8-12-12	17					Note: No gravel from 36 to 37 feet. Note: Gravel fraction is fine to medium, subangular to subrounded, from 37 to 38 feet.		
15	SS	38.0	40.0	6-8-6-8	18					Note: Moist from 38 to 38.5 feet.		
16	SS	40.0	42.0	8-12-17-20	17		40		SW SW	Sand, fine, with silt; dry; loose; brown. Sand, fine to coarse, little to some fine gravel, little to some silt; dry; loose; brown; gravel is subangular to subrounded.		
17	SS	42.0	44.0	10-12-8-12	16					Note: No gravel from 42.5 to 43.5 feet.		
18	SS	44.0	46.0	9-10-12-6	13							
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1601A DATE 10/05/16 SHEET 3 OF 4

PROJECT Mountaineer Plant

BORING START 06/08/16 BORING FINISH 06/08/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
19	SS	46.0	48.0	12-12-15-20	17					Note: Igneous and sedimentary rock types from 46 to 52 feet.		
20	SS	48.0	50.0	12-12-10-12	17					Note: Moist from 48 to 50 feet.		
21	SS	50.0	52.0	9-10-14-16	16		50					
22	SS	52.0	54.0	6-10-13-14	13				SW	Sand with fine gravel, little silt, little amount of medium size gravel; dry; loose; sand is fine to coarse; gravel is subround dominant.		
23	SS	54.0	56.0	14-20-22-11	14					Note: Includes trace coarse gravel (subangular igneous, and subrounded sedimentary. from 54 to 56 feet.		
24	SS	56.0	58.0	9-12-14-24	17					Note: Includes trace coarse subrounded gravel from 56 to 60 feet.		
25	SS	58.0	60.0	14-15-20-15	17							
26	SS	60.0	62.0	20-20-14-14	18		60		SW	Sand with silt, little fine gravel; dry; loose; brown; sand is fine to coarse.		
27	SS	62.0	64.0	8-8-8-6	12					Note: Moist from 62 to 62.5 feet.		
28	SS	64.0	66.0	7-9-7-8	14				SW	Sand some silt, little fine to medium gravel; loose; weakly stratified. Note: Wet at 63 feet.	▽	
29	SS	66.0	68.0	5-4-3-12	16				SW	Sand, some gravel, fine to medium, little silt, trace coarse rounded gravel; wet; loose; unstratified; brown.		
30	SS	68.0	70.0	1-4-6-9	14					Note: Wet at 68 feet.		
31	SS	70.0	72.0	5-15-15-18	0.9		70		SW	Sand, little to some silt, trace fine gravel; wet; loose; unstratified; sand is very fine to medium dominant.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING


JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1601A DATE 10/05/16 SHEET 4 OF 4

PROJECT Mountaineer Plant

BORING START 06/08/16 BORING FINISH 06/08/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
32	SS	72.0	74.0	NM-NM-NM-NM	0					No sample attempted; heaving sands from 72 to 76 feet.		
33	SS	74.0	76.0	9-12-13-12	0		75					
34	SS	76.0	78.0	3-9-13-13	0.9				SW	Sand with silt, trace fine gravel; wet; loose; brown; sand is fine to medium.		
35	SS	78.0	80.0	9-13-22-23	0.6		80					
										End of boring at 80 feet. See well construction log for development information.		

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**AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING**

JOB NUMBER OH015976.0009

COMPANY American Electric Power

PROJECT Mountaineer Plant

COORDINATES N 717,671.9 E 1,733,519.1

GROUND ELEVATION 602.4 SYSTEM NAD 1927

BORING NO. MW-1602 DATE 10/05/16 SHEET 1 OF 3

BORING START 05/09/16 BORING FINISH 05/10/16

PIEZOMETER TYPE NA WELL TYPE OW

HGT. RISER ABOVE GROUND 2.75 DIA 2"

DEPTH TO TOP OF WELL SCREEN 61.0 BOTTOM 71.0

WELL DEVELOPMENT NA BACKFILL Grout

FIELD PARTY NA RIG Hollow Stem Auger

Water Level, ft	∇ <u>57.0</u>	\blacktriangledown	∇
TIME			
DATE	<u>5/9/2016</u>		

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	10.0		0							Straight drill to 10 feet, boring was pre-drilled for utility clearance; no samples were taken.
1	SS	10.0	12.0	1-0-0-1	18		5		ML	Silt, trace clay; wet; soft; rapid dilatancy; dark yellowish brown (10YR 4/4).		
2	SS	12.0	14.0	0-3-5-2	18					Note: From 12 to 13 feet wet.		
3	SS	14.0	16.0	0-3-3-4	18					Note: From 13 to 15 feet coarsely interbedded with sand, little silt, loose.		
4	SS	16.0	18.0	2-2-3-3	18		15		SP	Sand, little to some silt; loose; dry; yellowish brown (10YR 5/4).		
5	SS	18.0	20.0	3-2-3-3	17					Note: From 16 to 26.5 feet dry.		
6	SS	20.0	22.0	3-3-5-6	17		20			Note: At 21 feet trace fine gravel.		

TYPE OF CASING USED				<i>Continued Next Page</i>								
NA	NQ-2 ROCK CORE	PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC										
NA	6" x 3.25 HSA	WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON										
NA	9" x 6.25 HSA	RECORDER <u>J. Wanner</u>										
NA	HW CASING ADVANCER 4"											
NA	NW CASING 3"											
NA	SW CASING 6"											
NA	AIR HAMMER 8"											

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1602 DATE 10/05/16 SHEET 2 OF 3

PROJECT Mountaineer Plant

BORING START 05/09/16 BORING FINISH 05/10/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
7	SS	22.0	24.0	1-2-3-5	17					Note: At 22 feet little amount of fine gravel.		
8	SS	24.0	26.0	3-7-10-14	17		25			Note: At 24 feet trace medium subrounded gravel. Note: From 25.8 to 26 feet little coarse sand.		
9	SS	26.0	28.0	7-10-10-13	17				SP	Sand, little to some silt, little gravel; dry; loose; gravel is fine to medium, angular to subrounded; sand is fine to coarse.		
10	SS	28.0	30.0	2-3-7-10	17		30		SP		Sand, little to some silt; dry; loose; sand is fine to medium.	
11	SS	30.0	32.0	2-5-5-8	14					Sand, fine to coarse, little to some silt, little fine gravel, trace medium gravel; dry; loose. Note: From 32 to 34 feet trace coarse rounded gravel, igneous.		
12	SS	32.0	34.0	4-7-7-10	13				SP			
13	SS	34.0	36.0	7-11-11-11	18		35					
14	SS	36.0	38.0	7-10-13-16	17					Note: At 39 feet, trace coarse rounded gravel, igneous. Note: At 41 feet, trace coarse rounded gravel, igneous.		
15	SS	38.0	40.0	7-10-13-17	17		40					
16	SS	40.0	42.0	10-11-13-13	13							
17	SS	42.0	44.0	6-10-11-14	19							
18	SS	44.0	46.0	8-10-12-15	14		45					
19	SS	46.0	48.0	6-9-11-14	16							
20	SS	48.0	50.0	6-10-13-16	18							
21	SS	50.0	52.0	9-11-21-27	18		50					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NUMBER OH015976.0009
 COMPANY American Electric Power
 PROJECT Mountaineer Plant
 COORDINATES N 719,516.2 E 1,732,495.0
 GROUND ELEVATION 602.9 SYSTEM NAD 1927

BORING NO. MW-1603 DATE 10/05/16 SHEET 1 OF 4
 BORING START 05/03/16 BORING FINISH 05/04/16
 PIEZOMETER TYPE NA WELL TYPE OW
 HGT. RISER ABOVE GROUND 3.38 DIA 2"
 DEPTH TO TOP OF WELL SCREEN 60.0 BOTTOM 75.0
 WELL DEVELOPMENT NA BACKFILL Grout
 FIELD PARTY NA RIG Hollow Stem Auger

Water Level, ft	▽ <u>57.0</u>	▼	▼
TIME			
DATE	<u>5/3/2016</u>		

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	9.0		0							
1	SS	9.0	11.0	1-2-3-3	21		5					
2	SS	11.0	13.0	2-2-3-4	20		10	ML CL ML		Silt, trace clay; dry; rapid dilatancy; brown (7.5YR 4/4). Grades to silt with clay; dry; non-dilatant; non-plastic; brown (7.5YR 4/4).		
3	SS	13.0	15.0	3-4-4-5	17		10	SP CL ML		Sand, fine to medium, trace gravel, trace silt; moist; loose; dark yellowish brown (10YR 4/4). Silt with little to some clay; moist; non-dilatant; non-plastic; yellowish brown (10YR 5/4).		
4	SS	15.0	17.0	2-2-2-6	18		15	SP ML SP		Sand, fine to medium; dry; loose. Silt, some clay; dry; non-dilatant; non-plastic; yellowish brown (10YR 5/4).		
5	SS	17.0	19.0	2-2-4-5	16					Sand, fine to coarse, trace gravel, fine to medium, subangular to subrounded, little silt; dry; loose.		
6	SS	19.0	21.0	2-3-3-5	18					Note: From 19 to 21 feet no gravel present; moist.		

TYPE OF CASING USED		<i>Continued Next Page</i>	
NA	NQ-2 ROCK CORE	PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON RECORDER <u>J. Wanner</u>	
NA	6" x 3.25 HSA		
NA	9" x 6.25 HSA		
NA	HW CASING ADVANCER 4"		
NA	NW CASING 3"		
NA	SW CASING 6"		
NA	AIR HAMMER 8"		

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1603 DATE 10/05/16 SHEET 2 OF 4

PROJECT Mountaineer Plant

BORING START 05/03/16 BORING FINISH 05/04/16

AEP - AEP.GDT - 10/05/16 15:44 - C:\CHERYL\PROJECTS\GINT SAVED TO COLUMBUS SERVER\USE FOR REFERENCE\AEP MOUNTAINEER BORING LOGS 9-2016\AEP MOUNTAINEER.GPJ

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	21.0	23.0	3-2-4-4	18							
8	SS	23.0	25.0	2-5-8-8	17							Note: From 23.3 to 25 feet, includes trace gravel, fine to medium, subangular to subrounded.
9	SS	25.0	27.0	4-4-5-6	20		25					Note: From 25 to 27 feet no gravel; moist.
10	SS	27.0	29.0	4-4-6-8	18							Note: From 26 to 26.3 feet includes some gravel, fine to medium, subangular to subrounded. Note: From 27.5 to 28.5 feet weakly stratified.
11	SS	29.0	31.0	2-6-7-7	20							Note: At 28.5 feet trace very fine coal fragments.
12	SS	31.0	33.0	4-4-5-7	20		30					Note: From 30 to 30.9 feet includes some fine gravel.
13	SS	33.0	35.0	6-5-7-11	21							Note: From 33 to 33.6 feet; moist.
								SW		Fine sand with silt; moist; loose; yellowish brown (10YR 5/4).		
14	SS	35.0	37.0	10-8-10-10	21		35	SP		Sand, little silt, little gravel; moist; loose; sand is fine to coarse; gravel is fine to medium.		
								SP		Sandy silt, some fine gravel, trace clay; moist; very soft; sand is fine to coarse; dark yellowish brown (10YR 4/4).		
15	SS	37.0	39.0	13-8-10-9	18					Gravelly sand; dry; loose; sand is fine to coarse, gravel is fine to medium, both fractions are angular to subrounded.		
16	SS	39.0	41.0	5-7-10-10	20			SP		Sand, fine to medium, little silt; dry; loose; yellowish brown (10YR 5/4).		
							40					
17	SS	41.0	43.0	6-9-10-12	17							
18	SS	43.0	45.0	6-11-20-18	21							Note: From 42.6 to 42.9 feet includes some fine to medium gravel; subrounded. Note: From 44 to 44.8 feet includes some fine to medium gravel; round to subrounded.
19	SS	45.0	47.0	9-12-14-14	20		45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1603 DATE 10/05/16 SHEET 3 OF 4

PROJECT Mountaineer Plant

BORING START 05/03/16 BORING FINISH 05/04/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
20	SS	47.0	49.0	10-13-16-18	22					Note: From 46 to 46.9 feet includes some fine to medium gravel, subangular to subrounded.		
21	SS	49.0	51.0	6-7-10-14	18		50			Note: At 48 feet includes fine to medium gravel.		
22	SS	51.0	53.0	13-16-22-25	20					Note: From 50.5 to 51 feet slight increase in silt content.		
23	SS	53.0	55.0	7-9-12-15	20					Note: At 52 feet trace coal fines.		
24	SS	55.0	57.0	10-14-17-23	20		55		SM SP	Note: At 53 feet moist. Note: From 54.2 to 54.3 feet includes coal fines.		
25	SS	57.0	59.0	7-6-7-9	18					Sandy silt, some clay; moist; soft; dark yellowish brown (10YR 4/4). Sand, little silt; moist; loose; yellowish brown (10YR 5/4). Note: At 57 feet wet.	▽	
26	SS	59.0	61.0	4-5-7-9	19							
27	SS	61.0	63.0	9-13-15-19	0.9		60		SP	Gravelly sand; wet; loose; gravel is fine to medium, sand is fine to coarse; yellowish brown (10YR 5/4).		
28	SS	63.0	65.0	13-27-50/5	24					Sand, little silt; wet; loose; sand is fine to coarse.		
29	SS	65.0	67.0	10-6-6-9	12		65			Note: From 64 to 65 feet heaving sands.		
30	SS	67.0	69.0	6-6-8-9	0.9				GP SP	Gravel, some coarse sand; wet; loose; gravel is fine to medium, subangular to subrounded dominant; washed.		
31	SS	69.0	71.0	6-8-7-8	0.8				SP	Sand, fine to medium, little silt; wet; loose; yellowish brown (10YR 5/4). Sand with fine gravel, little silt; wet; loose; sand is fine to coarse.		
32	SS	71.0	73.0	4-5-4-5	0.9		70		SP	Sand with little fine gravel, little silt; wet; loose.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING


JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1603 DATE 10/05/16 SHEET 4 OF 4

PROJECT Mountaineer Plant

BORING START 05/03/16 BORING FINISH 05/04/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
33	SS	73.0	76.0	4-5-5-6	0.9		75					
										End of boring at 76 feet. See well construction log for development information.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING

JOB NUMBER OH015976.0009
 COMPANY American Electric Power
 PROJECT Mountaineer Plant
 COORDINATES N 720,194.0 E 1,733,082.0
 GROUND ELEVATION 595.6 SYSTEM NAD 1927

BORING NO. MW-1604D DATE 10/05/16 SHEET 1 OF 4
 BORING START 04/26/16 BORING FINISH 04/26/16
 PIEZOMETER TYPE NA WELL TYPE OW
 HGT. RISER ABOVE GROUND 2.63 DIA 2"
 DEPTH TO TOP OF WELL SCREEN 69.0 BOTTOM 79.0
 WELL DEVELOPMENT NA BACKFILL Grout
 FIELD PARTY NA RIG Hollow Stem Auger

Water Level, ft	▽ 51.0	▼	▼
TIME			
DATE	4/26/2016		

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	8.8		0							Straight drilled to 8.8 feet, boring was pre-drilled for utility clearance; no samples were taken.
1	SS	8.8	10.8	2-2-3-3	17			SM	Fine sand with silt, trace clay; dry; loose; yellowish brown (10YR 5/4).			
2	SS	10.0	12.0	3-2-3-4	19							
3	SS	12.0	14.0	3-1-5-10	18			ML	Silt, little clay, trace fine sand; moist; non-dilatant; non-plastic; yellowish brown (10YR 5/4).			
4	SS	14.0	16.0	9-9-8-9	0.9			SP	Sand, some gravel, little silt; dry; loose; gravel is fine to medium, subrounded to rounded, yellowish brown (10YR 5/4).			
5	SS	16.0	18.0	10-12-11-11	12							
6	SS	18.0	20.0	11-11-9-10	14							

TYPE OF CASING USED		<i>Continued Next Page</i>	
NA	NQ-2 ROCK CORE	PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC	
NA	6" x 3.25 HSA		
NA	9" x 6.25 HSA	WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON	
NA	HW CASING ADVANCER 4"		
NA	NW CASING 3"	RECORDER <u>J. Wanner</u>	
NA	SW CASING 6"		
NA	AIR HAMMER 8"		

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1604D DATE 10/05/16 SHEET 2 OF 4

PROJECT Mountaineer Plant

BORING START 04/26/16 BORING FINISH 04/26/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	20.0	22.0	8-9-12-12	18							
8	SS	22.0	24.0	5-10-12-13	16							
9	SS	24.0	26.0	7-10-13-14	12		25			Note: At 24 feet wet.		
10	SS	26.0	28.0	8-10-18-22	16			SP		Sand, little fine gravel, little silt; moist; loose; sand is fine to coarse, subangular to rounded; yellowish brown (10YR 5/4).		
11	SS	28.0	30.0	3-10-16-22	18							
12	SS	30.0	32.0	11-11-16-22	16		30					
13	SS	32.0	34.0	10-12-19-17	14					Note: At 32 feet dry.		
14	SS	34.0	36.0	6-11-16-18	18							
15	SS	36.0	38.0	8-8-10-12	14		35					
16	SS	38.0	40.0	6-7-7-10	17							
17	SS	40.0	42.0	7-11-10-19	19		40					
18	SS	42.0	44.0	6-8-14-17	19							
19	SS	44.0	46.0	10-8-8-9	19		45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1604D DATE 10/05/16 SHEET 3 OF 4

PROJECT Mountaineer Plant

BORING START 04/26/16 BORING FINISH 04/26/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
20	SS	46.0	48.0	8-10-14-11	19					Note: From 46.3 to 46.45 feet black, fine, soft, organic layer, weak platy structure.		
21	SS	48.0	50.0	5-5-7-10	21				SP	Sand, little silt; moist; loose; sand is very fine to medium; yellowish brown (10YR 5/4).		
22	SS	50.0	52.0	5-8-8-10	21		50			Note: From 51 to 54 feet wet.	▽	
23	SS	52.0	54.0	8-8-10-12	19							
24	SS	54.0	56.0	6-5-6-8	21					Note: From 54 to 55.6 feet color changes to very dark grayish brown (10YR 3/2); wet.		
25	SS	56.0	58.0	4-8-30-42	18				SP	Note: From 55.6 to 55.9 feet stratified with little clay, black color. Sand, some silt, trace clay; wet; loose; yellowish brown (10YR 5/4).		
26	SS	58.0	60.0	5-5-10-11	16							
27	SS	60.0	62.0	7-10-12-18	21		60			Note: From 60.9 to 61 feet little fine rounded gravel. Note: From 61.4 to 61.6 feet is about 25-35% fine black material, possible coal.		
28	SS	62.0	64.0	9-10-15-16	18							
29	SS	64.0	66.0	9-12-15-15	16							
30	SS	66.0	68.0	3-8-10-15	20							
31	SS	68.0	70.0	3-8-16-24	20							
32	SS	70.0	72.0	6-20-32-30	20		70			Note: At 69.3 feet color is very dark gray (10YR 3/1). Note: At 69.4 feet color is dark yellowish brown (10YR 4/6). Note: From 70 to 71.7 feet color changes to grayish brown (10YR 5/2).		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1604D DATE 10/05/16 SHEET 4 OF 4

PROJECT Mountaineer Plant

BORING START 04/26/16 BORING FINISH 04/26/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
33	SS	72.0	74.0	9-14-17-21	21				SM	Silty fine sand; wet; loose; rapid dilatant grades to medium dilatant, yellowish brown (10YR 5/4). Sand, some silt, trace clay; wet; loose; trace fine to medium gravel, subrounded, grayish brown (10YR 5/2).		
34	SS	74.0	76.0	9-14-14-19	17		75		SP			
35	SS	76.0	78.0	4-10-11-18	14							
36	SS	78.0	80.0	6-14-15-17	18							
							80			End of boring at 80 feet. See well construction log for development information.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER **OH015976.0009**

COMPANY **American Electric Power**

PROJECT **Mountaineer Plant**

COORDINATES **N 720,189.8 E 1,733,077.2**

GROUND ELEVATION **595.5** SYSTEM **NAD 1927**

BORING NO. **MW-1604S** DATE **10/05/16** SHEET **1** OF **3**

BORING START **04/28/16** BORING FINISH **04/28/16**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.59** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **49.0** BOTTOM **59.0**

WELL DEVELOPMENT **NA** BACKFILL **Grout**

FIELD PARTY **NA** RIG **Hollow Stem Auger**

Water Level, ft	▽ 51.0	▼	▼
TIME			
DATE	4/28/2016		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	49.0		0					Straight drilled from 0 to 49 feet; geologic descriptions adapted from the adjacent boring MW-1604D.		
							5					
							10					
							15					

TYPE OF CASING USED

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

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

RECORDER **J. Wanner**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1604S DATE 10/05/16 SHEET 2 OF 3

PROJECT Mountaineer Plant

BORING START 04/28/16 BORING FINISH 04/28/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
							25					
							30					
							35					
							40					
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1604S DATE 10/05/16 SHEET 3 OF 3

PROJECT Mountaineer Plant

BORING START 04/28/16 BORING FINISH 04/28/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
1	SS	49.0	51.0	4-7-10-13	17		50		SP	Sand some silt, trace clay; moist to wet; loose; yellowish brown (10YR 5/4). Note: From 50 to 50.2 feet includes black, fine material likely coal. Note: At 53 feet wet. Note: At 54 feet trace medium subrounded gravel. Note: High blow count cause by heaving sand. Note: From 55 to 60 feet wet.	∇	
2	SS	51.0	53.0	6-6-11-10	20							
3	SS	53.0	55.0	3-10-25-50/3	24							
4	SS	55.0	57.0	3-5-9-15	24							
5	SS	57.0	60.0	12-15-20-28	24							
							60			End of boring at 60 feet. See well construction log for development information.		

**AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING**

JOB NUMBER **OH015976.0009**

COMPANY **American Electric Power**

PROJECT **Mountaineer Plant**

COORDINATES **N 720,117.3 E 1,733,468.6**

GROUND ELEVATION **588.5** SYSTEM **NAD 1927**

BORING NO. **MW-1605D** DATE **10/05/16** SHEET **1** OF **4**

BORING START **05/09/16** BORING FINISH **05/10/16**

PIEZOMETER TYPE **NA** WELL TYPE **OW**

HGT. RISER ABOVE GROUND **2.50** DIA **2"**

DEPTH TO TOP OF WELL SCREEN **69.0** BOTTOM **79.0**

WELL DEVELOPMENT **NA** BACKFILL **Grout**

FIELD PARTY **NA** RIG **Hollow Stem Auger**

Water Level, ft	▽ 44.0	▼	▼
TIME			
DATE	5/9/2016		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	8.0		0					Straight Drilled to 8 feet, utility pre-clearance straight drilled; no samples taken.		
1	SS	8.0	10.0	3-3-5-6	24		5		CL CH	Clay with silt; medium to high plasticity; slow dilatancy; dry; soft; brown (10YR 5/3).		
2	SS	10.0	12.0	3-3-4-4	24		10		ML	Silt, little clay; low plasticity; little sand, very fine to fine; moist; soft; yellowish brown (10YR 5/4).		
3	SS	12.0	14.0	1-1-2-3	22				ML	Silt; non-plastic; rapid dilatancy; little sand, very fine; moist; soft; yellowish brown (10YR 5/4).		
4	SS	14.0	16.0	3-3-2-4	22		15		SM	Sand, very fine; and silt; trace gravel, small pebbles, subangular to subround, poorly sorted; wet; yellowish brown (10YR 5/4).		
5	SS	16.0	18.0	1-1-2-3	21				SM	Sand, very fine; and silt; trace gravel, small pebbles, subangular to subround, poorly sorted; wet; yellowish brown (10YR 5/4).		
6	SS	18.0	20.0	1-4-7-10	10				SM	Sand, fine to very coarse; little silt; little gravel, small pebbles, subangular to subround; poorly sorted; dry; brown (7.5Y 5/4).		

TYPE OF CASING USED

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

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

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

RECORDER **T. Darmon**

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1605D DATE 10/05/16 SHEET 2 OF 4

PROJECT Mountaineer Plant

BORING START 05/09/16 BORING FINISH 05/10/16

AEP - AEP.GDT - 10/05/16 15:54 - C:\CHERYL\PROJECTS\GINT SAVED TO COLUMBUS SERVER\USE FOR REFERENCE\AEP MOUNTAINEER BORING LOGS 9-2016\AEP MOUNTAINEER.GPJ

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	20.0	22.0	10-11-11-11	19							
8	SS	22.0	24.0	7-10-12-10	14			SM	Sand, fine to coarse; little silt; little gravel, small pebbles, subangular to subround; poorly sorted; dry; brown (7.5Y 5/4).			
9	SS	24.0	26.0	10-7-7-9	16		25	SP	Sand, fine to coarse; trace silt; trace gravel, small pebbles, subround; well sorted; dry; yellowish brown (10YR 5/4).			
10	SS	26.0	28.0	4-5-12-7	17			SW	Sand, coarse, some gravel; small to medium pebbles, subangular to subround; poorly sorted; dry; light yellowish brown (10YR 6/4).			
11	SS	28.0	30.0	4-5-6-5	3			SP	Sand, medium, subangular to subround; little silt; poorly graded; dark brown (10YR 8/2).			
							30	SP	Sand, coarse; some gravel; small pebbles, subround; well sorted; dry; light gray (7.5Y 7/3).			
12	SS	30.0	32.0	5-9-10-8	2			SP	Sand, medium to coarse, subangular to subround; poorly graded; dry; brown (10YR 5/3).			
13	SS	32.0	34.0	3-4-9-6	17			SP	Sand, fine to medium, subround; poorly graded; dry; yellowish brown (10YR 5/4).			
14	SS	34.0	36.0	2-6-7-6	18		35					
15	SS	36.0	38.0	6-6-6-8	19			SP	Sand, fine to coarse; little gravel; granules to small pebbles; subangular to subround; moderate to poorly graded; dry; yellowish brown (10YR 5/4).			
16	SS	38.0	40.0	5-7-8-9	24							
17	SS	40.0	42.0	5-6-7-8	17		40					
18	SS	42.0	44.0	5-6-7-7	16							
19	SS	44.0	46.0	4-5-6-5	23		45			Note: From 44 to 46 feet, moist.	▽	

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1605D DATE 10/05/16 SHEET 3 OF 4

PROJECT Mountaineer Plant

BORING START 05/09/16 BORING FINISH 05/10/16

AEP - AEP.GDT - 10/05/16 15:54 - C:\CHERYL\PROJECTS\GINT SAVED TO COLUMBUS SERVER USE FOR REFERENCE\AEP MOUNTAINEER BORING LOGS 9-2016\AEP MOUNTAINEER.GPJ

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
20	SS	46.0	48.0	3-5-7-7	24				SP	Sand, fine to coarse; trace gravel, small pebbles, subround; little silt; poorly graded; wet; light yellowish brown (10YR 6/4).		
21	SS	48.0	50.0	NM	0					No Recovery, augers dropped to 49.5 feet overnight due to heaving sands. Sands heaved 10.5 feet into auger.		
22	SS	50.0	52.0	5-11-23-39	24		50		SP	Sand, medium to coarse, subangular to subround; little silt; moderate to poorly graded; wet; light yellowish brown (10YR 6/4).		
23	SS	52.0	54.0	4-7-9-9	5							
24	SS	54.0	56.0	3-3-7-7	14							
25	SS	56.0	58.0	7-10-10-9	12							
26	SS	58.0	60.0	9-15-10-11	20					Note: From 59 to 60 feet black discoloration from sand granules.		
27	SS	60.0	62.0	9-10-13-13	24		60		SW	Sand, fine to coarse, angular to subround; little to some silt; well graded; wet; grayish brown (10YR 5/2).		
28	SS	62.0	64.0	9-13-17-6	24				SW	Sand, fine to coarse; trace coal fragments at 62 to 62.5 feet; subangular to subround; poorly sorted; wet; pale brown (10YR 6/3).		
29	SS	64.0	66.0	5-9-4-4	8				SW	Sand, fine to medium; trace to little silt; subround; poorly graded; wet; pale brown (10YR 6/3).		
30	SS	66.0	68.0	9-10-10-19	24		65		SP	Sand, medium to coarse; trace gravel, small pebbles, subangular to subround; well sorted; wet; light gray (10YR 7/2).		
31	SS	68.0	70.0	9-14-22-20	8				SW	Sand, coarse; small pebbles, subround; poorly sorted; wet; very pale brown (10YR 7/4).		
32	SS	70.0	72.0	9-8-8-7	12		70					

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1605D DATE 10/05/16 SHEET 4 OF 4

PROJECT Mountaineer Plant

BORING START 05/09/16 BORING FINISH 05/10/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
33	SS	72.0	74.0	7-8-14-11	14							
34	SS	74.0	76.0	9-21-8-10	20		75					
35	SS	76.0	78.0	10-13-21-10	13				SP	Sand, medium, subround; well sorted; wet; light gray (10YR 7/2).		
36	SS	78.0	80.0	13-14-29-14	16				SW	Sand, coarse; some gravel, small pebbles, subangular to subround; poorly sorted; wet; very pale brown (10YR 7/4).		
							80			End of boring at 80 feet. See well construction log for development information.		

AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

PROJECT Mountaineer Plant

COORDINATES N 720,112.2 E 1,733,471.2

GROUND ELEVATION 588.5 SYSTEM NAD 1927

BORING NO. MW-1605S DATE 10/05/16 SHEET 1 OF 3

BORING START 05/11/16 BORING FINISH 05/12/16

PIEZOMETER TYPE NA WELL TYPE OW

HGT. RISER ABOVE GROUND 2.35 DIA 2"

DEPTH TO TOP OF WELL SCREEN 49.0 BOTTOM 59.0

WELL DEVELOPMENT NA BACKFILL Grout

FIELD PARTY NA RIG Hollow Stem Auger

Water Level, ft	∇ <u>44.0</u>	\blacktriangledown	∇
TIME			
DATE	<u>5/11/2016</u>		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	48.0									
							5					
							10					
							15					

Straight drilled from 0 to 48 feet; geologic descriptions adapted from the adjacent boring MW-1605D.

TYPE OF CASING USED

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

Continued Next Page

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

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

RECORDER T, Darmon

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1605S DATE 10/05/16 SHEET 2 OF 3

PROJECT Mountaineer Plant

BORING START 05/11/16 BORING FINISH 05/12/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
							25					
							30					
							35					
							40					
							45				▽	

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1605S DATE 10/05/16 SHEET 3 OF 3

PROJECT Mountaineer Plant

BORING START 05/11/16 BORING FINISH 05/12/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
1	SS	48.0	50.0	1-2-3-4	16							
2	SS	50.0	52.0	1-1-1-2	1		50		SP		Sand, medium to coarse; trace to little silt and gravel, small pebbles, subangular to subround; moderate to poorly graded; wet; light yellowish brown (10YR 6/4). Note: Poor recovery caused by drilling equipment failure at 51 feet.	
3	SS	52.0	54.0	5-6-5-5	12				SP		Sand, medium to coarse; trace to little gravel, small pebbles, subangular to subround; little silt; moderate to poorly graded; wet; pale brown (10YR 6/3).	
4	SS	54.0	56.0	5-6-6-3	15							
5	SS	56.0	58.0	8-3-3-7	20							
6	SS	58.0	60.0	10-13-50/6	24							
										End of boring at 59.5 feet spoon refusal. Note: Heaving sand. See well construction log for development information.		

**AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING**

JOB NUMBER OH015976.0009

COMPANY American Electric Power

PROJECT Mountaineer Plant

COORDINATES N 719,653.7 E 1,733,935.3

GROUND ELEVATION 587.3 SYSTEM NAD 1927

BORING NO. MW-1606D DATE 10/05/16 SHEET 1 OF 4

BORING START 05/12/16 BORING FINISH 05/13/16

PIEZOMETER TYPE NA WELL TYPE OW

HGT. RISER ABOVE GROUND 2.85 DIA 2"

DEPTH TO TOP OF WELL SCREEN 65.0 BOTTOM 75.0

WELL DEVELOPMENT NA BACKFILL Grout

FIELD PARTY NA RIG Hollow Stem Auger

Water Level, ft	∇ <u>43.0</u>	\blacktriangledown	\blacktriangledown
TIME			
DATE	<u>5/12/2016</u>		

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	8.0									Straight drilled to 8 feet, boring was pre-drilled for utility clearance; no samples were taken.
1	SS	8.0	10.0	3-3-4-5	25		5		ML	Silt and sand, very fine; non-plastic; non-plastic; no dilatancy; moist; soft; light yellowish brown (10YR 6/4).		
2	SS	10.0	12.0	1-3-5-4	22		10		SC SM	Sand, very fine; little silt; little clay; moist; light yellowish brown (10YR 6/4).		
3	SS	12.0	14.0	3-7-14-21	22							
4	SS	14.0	16.0	6-10-13-8	20				SW	Sand, fine to coarse; little gravel, small to medium pebbles; subround; trace to little silt; well graded; dry; yellowish brown (10YR 5/4).		
5	SS	16.0	18.0	10-13-10-10	17		15					
6	SS	18.0	20.0	6-6-7-10	17							

TYPE OF CASING USED			<i>Continued Next Page</i>		
NA	NQ-2 ROCK CORE		PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC		
NA	6" x 3.25 HSA		WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON		
NA	9" x 6.25 HSA		RECORDER <u>T. Darmon</u>		
NA	HW CASING ADVANCER	4"			
NA	NW CASING	3"			
NA	SW CASING	6"			
NA	AIR HAMMER	8"			

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER **OH015976.0009**

COMPANY **American Electric Power**

BORING NO. **MW-1606D** DATE **10/05/16** SHEET **2** OF **4**

PROJECT **Mountaineer Plant**

BORING START **05/12/16** BORING FINISH **05/13/16**

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	20.0	22.0	10-10-7-6	23							
8	SS	22.0	24.0	10-10-13-14	21				SP	Sand, medium to coarse; trace gravel, small pebbles, subround; dry; light yellowish brown (10YR 6/4).		
9	SS	24.0	26.0	6-8-9-8	24		25		SP	Sand, medium to coarse; trace gravel, small pebbles, subround; poorly graded; dry; brownish yellow (10YR 6/6).		
10	SS	26.0	28.0	5-4-3-4	18							
11	SS	28.0	30.0	4-5-4-4	22				SW SP	Sand, fine to coarse, subround; well graded; dry; light yellowish brown (10YR 6/4) with black staining coal (10YR 2/1).		
12	SS	30.0	32.0	4-4-5-6	17		30		SP	Sand, medium to coarse; trace to little gravel, small pebbles, subround; moderate to poorly graded; yellowish brown (10YR 5/4). Note: Stratified with a 1-inch layer of small pebbles.		
13	SS	32.0	34.0	2-2-5-5	24				SW	Sand, medium to coarse; trace gravel, small pebbles, subround; poorly graded; dry; yellowish brown (10YR 5/4).		
14	SS	34.0	36.0	6-6-6-6	22					Sand, medium to coarse; trace gravel, small pebbles, subangular to subround; some coal, highly weathered; stratified; well graded; dry; pale brown (10YR 6/3).		
15	SS	36.0	38.0	0-6-6-6	19		35		SP	Sand, fine to coarse, subround; trace to little silt; poorly graded; dry; yellowish brown (10YR 5/4).		
16	SS	38.0	40.0	2-3-3-2	20							
17	SS	40.0	42.0	2-2-3-5	22		40					
18	SS	42.0	44.0	1-3-5-6	24							Note: From 42 to 43 feet moist. Note: At 43 feet wet.
19	SS	44.0	46.0	8-9-10-13	24		45		SP	Sand, medium to coarse, subround; trace to little silt; poorly graded; wet; yellowish brown (10YR 5/4). Note: Recovered sample was all heaved		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER **OH015976.0009**

COMPANY **American Electric Power**

BORING NO. **MW-1606D** DATE **10/05/16** SHEET **3** OF **4**

PROJECT **Mountaineer Plant**

BORING START **05/12/16** BORING FINISH **05/13/16**

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
20	SS	46.0	48.0	10-15-23-23	29				SP	sands. Sand, medium to coarse, subround; poorly graded; wet; yellowish brown (10YR 5/4). Note heaving sands.		
21	SS	48.0	50.0	4-4-2-3	13				SP	Sand, fine to coarse, subround; poorly graded; wet; yellowish brown (10YR 5/4).		
22	SS	50.0	52.0	9-9-3-2	16		50		SP	Sand, medium to coarse; trace fine, subangular to subround; poorly graded; wet; yellowish brown (10YR 5/4).		
23	SS	52.0	54.0	3-2-9-9	19				SP	Sand, medium to coarse; trace silt and gravel, small pebbles, subangular to subround; poorly graded; wet; yellowish brown (10YR 5/4).		
24	SS	54.0	56.0	3-9-13-30	24		55		SP			
25	SS	56.0	58.0	9-13-13-3	21				SW	Sand, fine to coarse; little gravel, small to medium pebbles; trace silt, subround; moderate to well graded; wet; yellowish brown (10YR 5/4).		
26	SS	58.0	60.0	10-15-13-14	19				SP	Sand, fine to medium, subround; poorly graded; wet; yellowish brown (10YR 5/4).		
27	SS	60.0	62.0	7-12-15-10	16		60		SP	Sand, medium to coarse, subround; poorly graded; wet; yellowish brown (10YR 5/4).		
28	SS	62.0	64.0	7-10-10-11	24				SP	Sand, medium to coarse; trace gravel, small to medium pebbles, subround; poorly graded; wet; yellowish brown (10YR 5/4).		
29	SS	64.0	66.0	9-12-18-19	19		65		SP			
30	SS	66.0	68.0	7-13-18-32	13				SW	Sand, fine to coarse, subangular to subround; moderate to well graded; wet; light brownish gray (10YR 6/2).		
31	SS	68.0	70.0	8-8-24-7	13				SM	Note: At 60 feet 40% granules to small pebbles.		
32	SS	70.0	72.0	8-23-7-11	19		70		SP	Sand, fine to coarse; some silt; trace clay; well graded; wet; yellowish brown (10YR 5/4).		
									SW	Sand, medium to coarse, subround; poorly graded; wet; yellowish brown (10YR 5/4).		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING


JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1606D DATE 10/05/16 SHEET 4 OF 4

PROJECT Mountaineer Plant

BORING START 05/12/16 BORING FINISH 05/13/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
33	SS	72.0	74.0	13-20-22-23	15		75		SP	Sand and gravel, medium to coarse, small to medium pebbles; subround to round; well graded; wet; yellowish brown (10YR 5/4).		
34	SS	74.0	76.0	14-13-10-10	15							Sand, medium to coarse, subround; poorly graded; wet; yellowish brown (10YR 5/4).
										End of boring at 76 feet.		See well construction log for development information.

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
 AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009
 COMPANY American Electric Power
 PROJECT Mountaineer Plant
 COORDINATES N 719,649.2 E 1,733,939.3
 GROUND ELEVATION 587.3 SYSTEM NDA 1927

BORING NO. MW-1606S DATE 10/05/16 SHEET 1 OF 3
 BORING START 05/17/16 BORING FINISH 05/17/16
 PIEZOMETER TYPE NA WELL TYPE OW
 HGT. RISER ABOVE GROUND 2.87 DIA 2"
 DEPTH TO TOP OF WELL SCREEN 49.0 BOTTOM 59.0
 WELL DEVELOPMENT NA BACKFILL Grout
 FIELD PARTY NA RIG Hollow Stem Auger

Water Level, ft	▽ 43.0	▼	▼
TIME			
DATE	5/17/2016		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
0	NR	0.0	44.0							Straight drilled from 0 to 44 feet; geologic descriptions adapted from the adjacent boring MW-1606D.		
							5					
							10					
							15					

TYPE OF CASING USED				<i>Continued Next Page</i>								
		NQ-2 ROCK CORE		PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC								
NA		6" x 3.25 HSA										
NA		9" x 6.25 HSA		WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON								
NA		HW CASING ADVANCER										
NA		NW CASING		3"								
NA		SW CASING		6"								
NA		AIR HAMMER		8"	RECORDER <u>T. Darmon</u>							

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING


JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1606S DATE 10/05/16 SHEET 2 OF 3

PROJECT Mountaineer Plant

BORING START 05/17/16 BORING FINISH 05/17/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
							25					
							30					
							35					
							40					
1	SS	44.0	46.0	5-7-15-15	24		45		SP	Sand, fine to coarse, subround; poorly graded; wet; yellowish brown (10YR 5/4).	▽	

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1606S DATE 10/05/16 SHEET 3 OF 3

PROJECT Mountaineer Plant

BORING START 05/17/16 BORING FINISH 05/17/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
2	SS	46.0	48.0	2-2-5-5	13							
3	SS	48.0	50.0	3-7-11-11	24				SP	Sand, medium to coarse, subround; poorly graded; wet; yellowish brown (10YR 5/4).		
4	SS	50.0	52.0	5-7-7-8	24		50		SP	Sand, fine to coarse, subround; poorly graded; wet; yellowish brown (10YR 5/4).		
5	SS	52.0	54.0	5-5-4-4	18				SP	Sand, fine to coarse; trace silt; trace gravel, small pebbles, subround; poorly graded; wet; yellowish brown (10YR 5/4).		
6	SS	54.0	56.0	10-22-15-22	24		55			Note: From 55 to 56 feet increase small to medium pebbles.		
										End of boring at 56 feet.		
										See well construction log for development information.		

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**AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING**

JOB NUMBER OH015976.0009
 COMPANY American Electric Power
 PROJECT Mountaineer Plant
 COORDINATES N 719,235.7 E 1,734,361.8
 GROUND ELEVATION 590.8 SYSTEM NAD 1927

BORING NO. MW-1607D DATE 10/05/16 SHEET 1 OF 4
 BORING START 05/18/16 BORING FINISH 05/18/16
 PIEZOMETER TYPE NA WELL TYPE OW
 HGT. RISER ABOVE GROUND 3.18 DIA 2"
 DEPTH TO TOP OF WELL SCREEN 70.0 BOTTOM 80.0
 WELL DEVELOPMENT NA BACKFILL Grout
 FIELD PARTY NA RIG Hollow Stem Auger

Water Level, ft	∇ <u>46.0</u>	\blacktriangledown	\blacktriangledown
TIME			
DATE	<u>5/18/2016</u>		

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	8.0		0					Straight drill boring to 8 feet, boring was pre-drilled for utility clearance; no samples were taken.		
1	SS	8.0	10.0	1-2-3-4	24		5		ML	Silt, trace to little clay, non-plastic, none to slow dilatancy; trace sand, very fine; moist; soft; very pale brown (10YR 7/4).		
2	SS	10.0	12.0	1-3-4-4	22		10		SC SM	Sand, very fine to fine; silt; trace to little clay; well graded; moist; light yellowish brown (10YR 6/4).		
3	SS	12.0	14.0	2-4-5-5	20				CL	Clay; little silt; medium to high plasticity; trace to little very fine to fine sand; moist; medium stiff; yellowish brown (10YR 5/4).		
4	SS	14.0	16.0	4-6-8-10	22				SM	Sand and silt; fine; medium to well graded; dry; yellowish brown (10YR 5/4).		
5	SS	16.0	18.0	6-9-10-8	18		15		SW	Sand, medium to coarse; some gravel, small to medium pebbles, little fine, subangular to subround; well graded; dry; yellowish brown (10YR 5/4).		
6	SS	18.0	20.0	6-9-8-11	14					Note: At 19.5 feet coal fines present.		

TYPE OF CASING USED		<i>Continued Next Page</i>	
NA	NQ-2 ROCK CORE	PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON RECORDER <u>T. Darmon</u>	
NA	6" x 3.25 HSA		
NA	9" x 6.25 HSA		
NA	HW CASING ADVANCER 4"		
NA	NW CASING 3"		
NA	SW CASING 6"		
NA	AIR HAMMER 8"		

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1607D DATE 10/05/16 SHEET 2 OF 4

PROJECT Mountaineer Plant

BORING START 05/18/16 BORING FINISH 05/18/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	20.0	22.0	9-13-13-6	24				SM	Sand and silt; fine to coarse; little to some gravel, small to medium pebbles, subangular to subround; trace clay; well graded; moist; yellowish brown (10YR 5/4).		
8	SS	22.0	24.0	5-5-9-10	19				SP	Sand, medium to coarse; trace silt; subround; poorly graded; dry; yellowish brown (10YR 5/4).		
9	SS	24.0	26.0	8-8-9-6	20		25		SW	Sand, fine to coarse; trace to little silt; subround; well graded; dry; yellowish brown (10YR 5/4).		
10	SS	26.0	28.0	6-5-6-5	24				SW	Sand, fine to coarse; some gravel, angular to subround; trace silt; well graded; dry; yellowish brown (10YR 5/4).		
11	SS	28.0	30.0	5-6-6-5	22				SW	Sand, fine to coarse; some gravel, angular to subround; trace silt; well graded; dry; yellowish brown (10YR 5/4).		
12	SS	30.0	32.0	4-4-4-6	22		30		SP	Sand, fine to medium, subround; trace silt; poorly graded; dry; brown (10YR 5/3).		
13	SS	32.0	34.0	4-9-9-9	24				SW	Sand, fine to medium; trace coarse gravel; small to medium gravel; pebbles; subangular to subround; dry; brown (10YR 5/3).		
14	SS	34.0	36.0	5-7-9-4	24				SW	Sand, fine to medium; trace coarse gravel; small to medium gravel; pebbles; subangular to subround; dry; brown (10YR 5/3).		
15	SS	36.0	38.0	5-6-6-9	21		35		SW	Note: From 35.8 to 36 feet includes coal. Sand, fine to coarse; trace gravel; small pebbles, subangular to subround; well graded; satinfin <1" thick, pale brown (10YR 6/3).		
16	SS	38.0	40.0	4-6-8-8	18				SW	Note: From 26 to 39 feet includes trace to little amount of coal fragments.		
17	SS	40.0	42.0	4-4-6-8	22		40		SP	Sand, fine to medium, subround; trace to little silt; poorly graded; dry; yellowish brown (10YR 5/4).		
18	SS	42.0	44.0	3-6-8-8	20				SP	Sand, fine to medium, subround; trace to little silt; poorly graded; dry; yellowish brown (10YR 5/4).		
19	SS	44.0	46.0	4-6-7-8	24		45		SP	Note: At 46 feet, saturated.		

Continued Next Page

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER **OH015976.0009**

COMPANY **American Electric Power**

BORING NO. **MW-1607D** DATE **10/05/16** SHEET **3** OF **4**

PROJECT **Mountaineer Plant**

BORING START **05/18/16** BORING FINISH **05/18/16**

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
20	SS	46.0	48.0	1-2-2-8	24				SW	Sand, fine to coarse, subround; well graded; wet; yellowish brown (10YR 5/4).		
21	SS	48.0	50.0	NM	0					No recovery; heaving sands.		
22	SS	50.0	52.0	1-3-7-9	28		50		SP	Sand, medium to coarse; trace to little silt; subround; poorly graded; wet; yellowish brown (10YR 5/4).		
23	SS	52.0	54.0	5-6-9-15	28					Note: At 53.5 feet coal present.		
24	SS	54.0	56.0	7-9-14-15	15				SW	Sand, fine to coarse; little gravel, small pebbles; subround; medium to well graded, dark brown (10YR 7/4).		
25	SS	56.0	58.0	7-10-10-13	13				SW	Sand, fine to coarse; trace to little small pebbles, subround; well graded; wet; pale brown (10YR 7/4).		
26	SS	58.0	60.0	5-6-10-11	14							
27	SS	60.0	62.0	6-10-11-13	11		60		SP	Sand, medium to coarse; trace small pebbles, subround; poorly graded; wet; yellowish brown (10YR 5/4).		
28	SS	62.0	64.0	8-10-13-11	0					No recovery.		
29	SS	64.0	66.0	5-10-13-5	15				SP	Sand, medium to coarse; trace fine; trace silt; trace gravel; small to medium pebbles, subround, poorly graded; wet; yellowish brown (10YR 5/4).		
30	SS	66.0	68.0	10-15-20-22	18				SP	Sand, medium to coarse, subround; medium to poorly graded; wet; yellowish brown (10YR 5/4).		
31	SS	68.0	70.0	11-15-15-7	20				SW	Sand, fine to very coarse, subround; little to some silt; medium to well graded; wet; light brownish gray (10YR 6/2).		
32	SS	70.0	72.0	2-6-14-14	15		70					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1607D DATE 10/05/16 SHEET 4 OF 4

PROJECT Mountaineer Plant

BORING START 05/18/16 BORING FINISH 05/18/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
33	SS	72.0	74.0	10-15-18-18	12							
34	SS	74.0	76.0	9-12-12-7	11		75					
35	SS	76.0	78.0	6-6-8-8	24				SP	Sand, medium to coarse, subround; poorly graded; wet; pale brown (10YR 6/3).		
36	SS	78.0	80.0	20-30-22-11	24		80					
										End of boring at 80 feet. See well construction log for development information.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

PROJECT Mountaineer Plant

COORDINATES N 719,232.0 E 1,734,365.1

GROUND ELEVATION 590.8 SYSTEM NAD 1927

BORING NO. MW-1607S DATE 10/05/16 SHEET 1 OF 3

BORING START 05/26/16 BORING FINISH 05/26/16

PIEZOMETER TYPE NA WELL TYPE OW

HGT. RISER ABOVE GROUND 3.20 DIA 2"

DEPTH TO TOP OF WELL SCREEN 50 BOTTOM 60

WELL DEVELOPMENT NA BACKFILL Grout

FIELD PARTY NA RIG Hollow Stem Auger

Water Level, ft	▽ 46.0	▼	▼
TIME			
DATE	5/26/2016		

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	50.0		0							
							5					
							10					
							15					

Straight drill boring to 50 feet, boring was pre-drilled for utility clearance; no samples were taken.

TYPE OF CASING USED

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

Continued Next Page

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

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

RECORDER T. Darmon

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1607S DATE 10/05/16 SHEET 2 OF 3

PROJECT Mountaineer Plant

BORING START 05/26/16 BORING FINISH 05/26/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
							25					
							30					
							35					
							40					
							45					

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

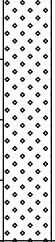
JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1607S DATE 10/05/16 SHEET 3 OF 3

PROJECT Mountaineer Plant

BORING START 05/26/16 BORING FINISH 05/26/16

SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
1	SS	50.0	52.0	NA	0		50			Augers dropped 4 foot into hole due to heaving sands, no samples collected.		
2	SS	52.0	54.0	NA	0							
3	SS	54.0	56.0	WOH-WOH-2-2	0		55			No sample collected, no recovery, attempted resample but auger dropped additional 2 feet due to heaving sands.		
4	SS	56.0	58.0	4-5-6-10	15				SW	Sand; fine to coarse; trace to little gravel; small pebbles; subround; moderate to well graded; wet; pale brown (10YR 7/4).		
5	SS	58.0	60.0	5-5	20		60			End of boring at 60 feet. See well construction log for development information.		

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**AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
LOG OF BORING**

JOB NUMBER OH015976.0009
 COMPANY American Electric Power
 PROJECT Mountaineer Plant
 COORDINATES N 723,642.8 E 1,730,611.2
 GROUND ELEVATION 587.3 SYSTEM NAD 1927

BORING NO. MW-1608 DATE 10/05/16 SHEET 1 OF 3
 BORING START 06/02/16 BORING FINISH 06/07/16
 PIEZOMETER TYPE NA WELL TYPE OW
 HGT. RISER ABOVE GROUND 3.39 DIA 2"
 DEPTH TO TOP OF WELL SCREEN 46.0 BOTTOM 56.0
 WELL DEVELOPMENT NA BACKFILL Grout
 FIELD PARTY NA RIG Hollow Stem Auger

Water Level, ft	∇ <u>48.0</u>	∇	∇
TIME			
DATE	<u>6/2/2016</u>		

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO									
0	NR	0.0	12.0		0							Straighted drilled to 12 feet, boring was pre-drilled for utility clearance; no samples were taken.
							5					
							10					
1	SS	12.0	14.0	5-4-5-5	24			ML	Silt; little clay; trace fine sand; dry; slow dilatancy; (10YR 4/5).			
4	SS	14.0	16.0	3-1-1-2	21			SW	Sand, fine to very fine; loose; dry.			
							15					
5	SS	16.0	18.0	1-1-1-3	21							
6	SS	18.0	20.0	1-2-4-3	21							

TYPE OF CASING USED				<i>Continued Next Page</i>								
NA	NQ-2 ROCK CORE			PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC								
NA	6" x 3.25 HSA											
NA	9" x 6.25 HSA			WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON								
NA	HW CASING ADVANCER											
NA	4"			RECORDER <u>J. Wanner</u>								
NA	3"											
NA	NW CASING											
NA	6"											
NA	SW CASING											
NA	8"											

AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1608 DATE 10/05/16 SHEET 2 OF 3

PROJECT Mountaineer Plant

BORING START 06/02/16 BORING FINISH 06/07/16

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
		FROM	TO			%						
7	SS	20.0	22.0	14	14							
8	SS	22.0	24.0	7-13-15-14	13				SW	Sand; some gravel; fine to medium; angular; dry; loose; unstratified; gravel is igneous dominant; (10YR 4/3).		
9	SS	24.0	26.0	10-16-14-11	13		25			Note: At 25 feet trace coal and gravel (metamorphic; rounded); foliated.		
10	SS	26.0	28.0	8-12-12-14	17				SW	Sand; some gravel, fine to medium; angular; dominant; little silt; dry; loose; unstratified; gravel is igneous dominant; (10YR 4/3).		
11	SS	28.0	30.0	9-15-12-14	14							
12	SS	30.0	32.0	6-8-9-17	18		30					
13	SS	32.0	34.0	11-10-9-9	20				SW	Sand, fine to coarse; little to some silt; trace gravel, fine to medium, angular to rounded; dry; loose; unstratified; (10YR 4/3).		
14	SS	34.0	36.0	7-10-12-9	24				SW	Sand, fine to coarse; little to some silt; little to some gravel, fine to medium dominant; igneous, sedimentary and metamorphic; rounded dominant; dry; loose; unstratified; (10YR 4/3).		
15	SS	36.0	38.0	10-8-5-6	16		35					
16	SS	38.0	40.0	9-8-11-10	17				SW	Sand; some silt; trace gravel, coarse, round, limestone; dry; loose; unstratified; (10YR 4/3).		
17	SS	40.0	42.0	5-5-8-8	19		40		SW	Note: At 39.5 feet very thin coal fragment layer. Sand; little to some silt; little to some gravel, fine, subrounded; dry; loose; unstratified; (10YR 4/3).		
18	SS	42.0	44.0	7-5-6-5	18				SW	Note: At 42.5 feet, coarse, rounded, igneous gravel. Silty sand; moist; loose; unstratified; (10YR 4/3).		
19	SS	44.0	46.0	2-3-5-3	19		45			Note: From 44 to 46 feet wet; trace coarse gravel, rounded, igneous.		
										Note: Heaving sands.		

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AMERICAN ELECTRIC POWER SERVICE CORPORATION
AEP CIVIL ENGINEERING LABORATORY
 LOG OF BORING

JOB NUMBER **OH015976.0009**

COMPANY **American Electric Power**

BORING NO. **MW-1608** DATE **10/05/16** SHEET **3** OF **3**

PROJECT **Mountaineer Plant**

BORING START **06/02/16** BORING FINISH **06/07/16**

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SAMPLE NUMBER	SAMPLE	SAMPLE DEPTH IN FEET		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES	
		FROM	TO			%							
20	SS	46.0	48.0	4-4-5-4	17				SW	Sand; little to some silt; some gravel; wet; loose; unstratified; gravel is fine to coarse; fine fraction is fine to rounded; sand is subrounded to round; gravel is igneous to sedimentary; gravel colors range from red and green and brown; (looks like outwash); includes trace coal fragments, up to 2cm in size. Note: From 48 to 49.5 feet wet.	▽		
21	SS	48.0	50.0		17				SW				
22	SS	50.0	52.0	6-8-11-9	16		50		SW				Silty sand; wet; loose; unstratified; sand is fine to medium; brown. Note: From 50 to 52 feet wet; include 20% coal material, fragments up to 3cm in size.
23	SS	52.0	54.0	5-7-7-10	13				SW				Sand with silt; wet; loose; unstratified; sand is fine to coarse grades to fine to medium. Note: At 53.5 feet coal fragments up to 2 cm in size.
24	SS	54.0	56.0	8-11-15-17	13		55		SW				Note: From 54 to 56 feet wet; no coal fragments.
25	SS	56.0	58.0	11-15-16-13	14				SM				Silt and sand; wet; loose; sand is fine to medium; brown.
26	SS	58.0	60.0	8-15-18-13	16				SW				Sand with silt; trace gravel; wet; loose; unstratified; sand is fine to coarse; gravel is medium to coarse, subrounded; brown.
27	SS	60.0	62.0	9-14-16-20	14		60		SW				Silty sand; trace fine gravel; wet; loose; unstratified; sand is fine to coarse; (10YR 4/3).
28	SS	62.0	64.0	2-12-40-50/2	19				SW				Recovery was all heaved sand.
29	SS	64.0	66.0	20-50/4	24		65		SW				
30	SS	66.0	68.0	12-20-25-30	0.9				SP	Fine sand with silt; wet; loose; sand is very fine to fine dominant; bottom of recovery includes coarse gravel (chert), subangular; (10YR 5/2).			
31	SS	68.0	70.0	12-15-20-20	17				SW	Note: At 68 feet coursing with depth.			
									SP SP	Sand and gravel; trace silt; clean-washed interval; wet; loose.			
							70			Sand with silt; little fine; gravel; wet; loose.			
										End of boring at 70 feet.			
										See well construction for development information.			



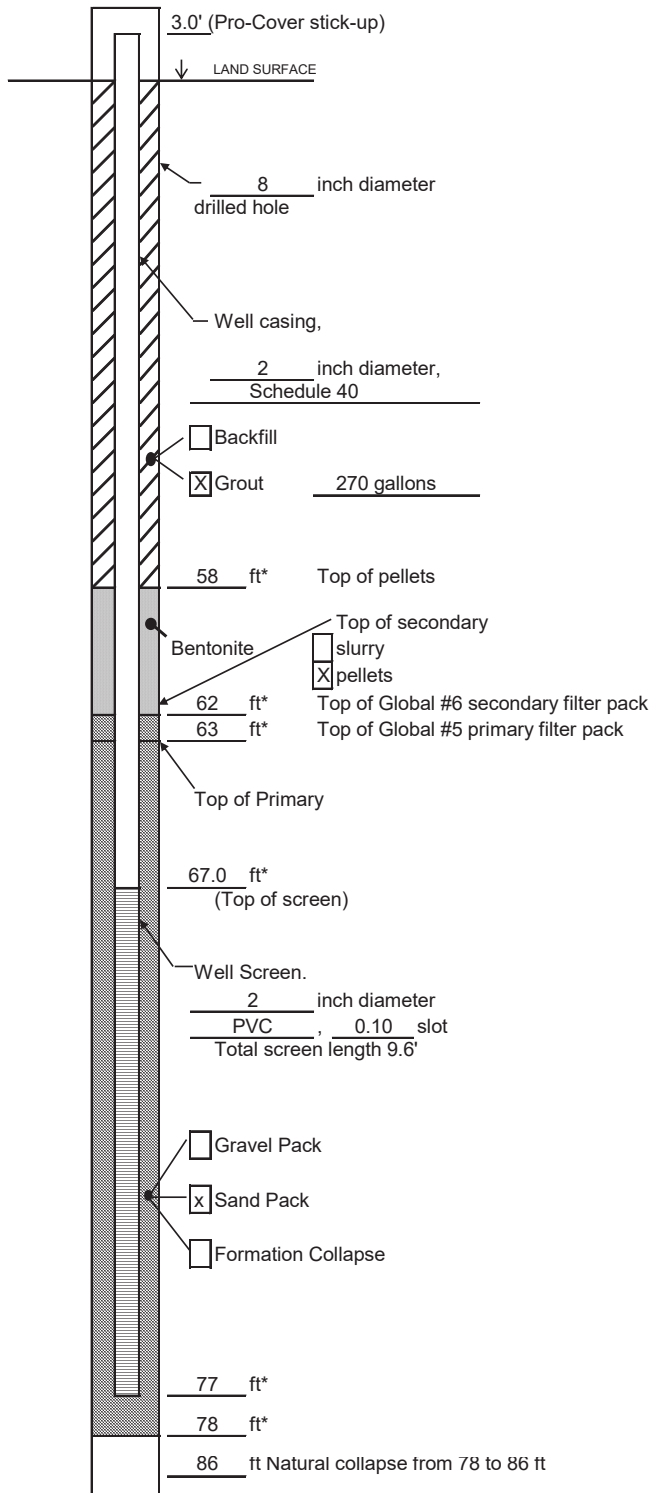
Arcadis 2016

Well Construction Diagrams

MW-1601A to MW-1608

WELL CONSTRUCTION LOG

(Unconsolidated)



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

Project AEP - Mountaineer Well MW-1601A
 Town/City New Haven
 County Mason County State WV
 Permit No. N/A
 Land-Surface (LS) Elevation and Datum:
 LS: 607.47; TOC: 610.66 feet Surveyed
 Estimated
 Installation Date(s) 6/9/2016
 Drilling Method Hollow Stem Auger
 Drilling Contractor DLZ Ohio, Inc.
 Drilling Fluid None

Development Technique(s) and Date(s)
Submersible Impeller Pump (6/15/16)

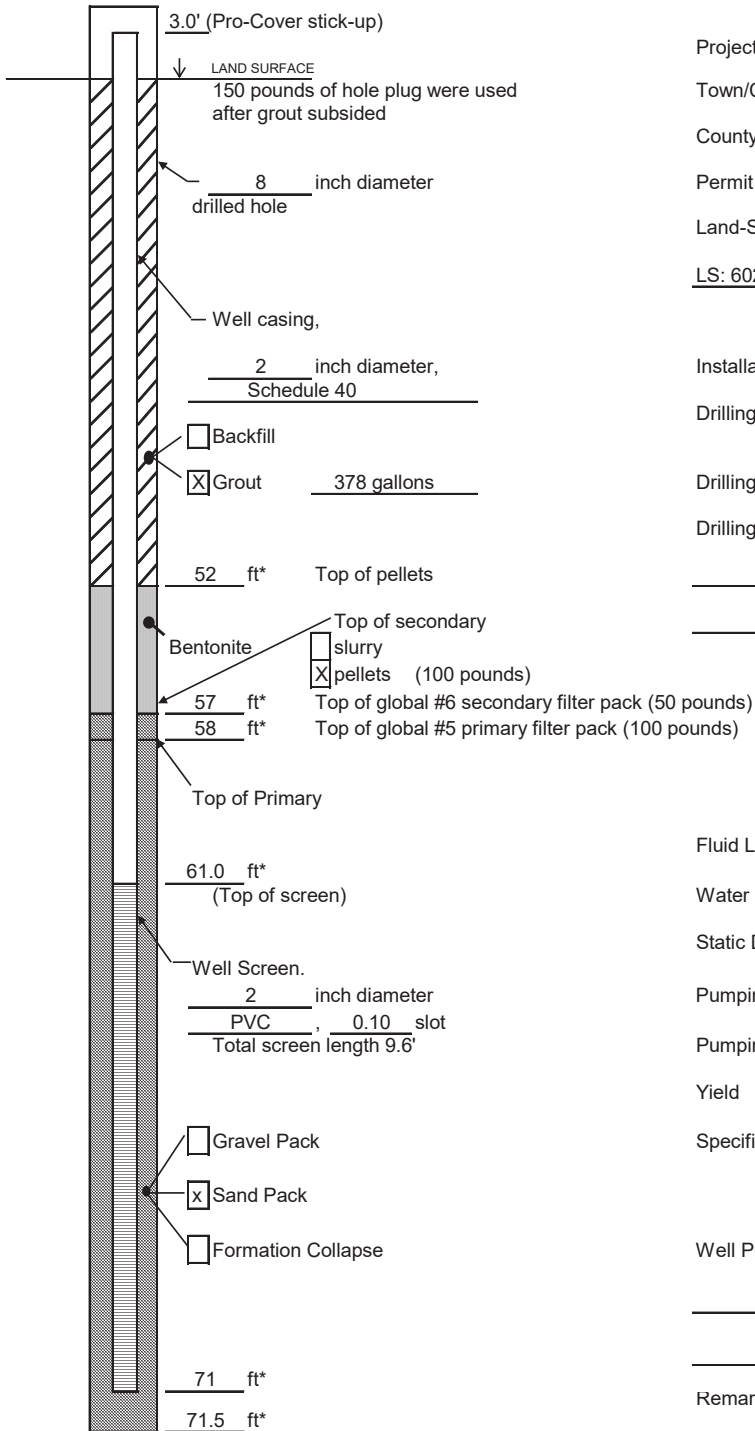
Fluid Loss During Drilling N/A gallons
 Water Removed During Development 30 gallons
 Static Depth to Water 65.81 feet below M.P.
 Pumping Depth to Water 80 feet below M.P.
 Pumping Duration NM hours
 Yield N/A gpm Date 6/15/2016
 Specific Capacity N/A gpm/ft

Well Purpose Monitoring well

Remarks Well Installed in the alternate #1 boring at this location.

Prepared by Judd Wanner

WELL CONSTRUCTION LOG
(Unconsolidated)



Project AEP - Mountaineer Well MW-1602

Town/City New Haven

County Mason County State WV

Permit No. N/A

Land-Surface (LS) Elevation and Datum:

LS: 602.37; TOC: 605.12 feet Surveyed Estimated

Installation Date(s) 5/10/2016

Drilling Method Hollow Stem Auger

Drilling Contractor DLZ Ohio, Inc.

Drilling Fluid None

Development Technique(s) and Date(s)

Wattera (6/7/16)

Submersible Impeller Pump (6/15/16)

Fluid Loss During Drilling N/A gallons

Water Removed During Development 37.9 gallons

Static Depth to Water 59.82 feet below M.P.

Pumping Depth to Water 70 feet below M.P.

Pumping Duration NM hours

Yield N/A gpm Date 6/15/2016

Specific Capacity N/A gpm/ft

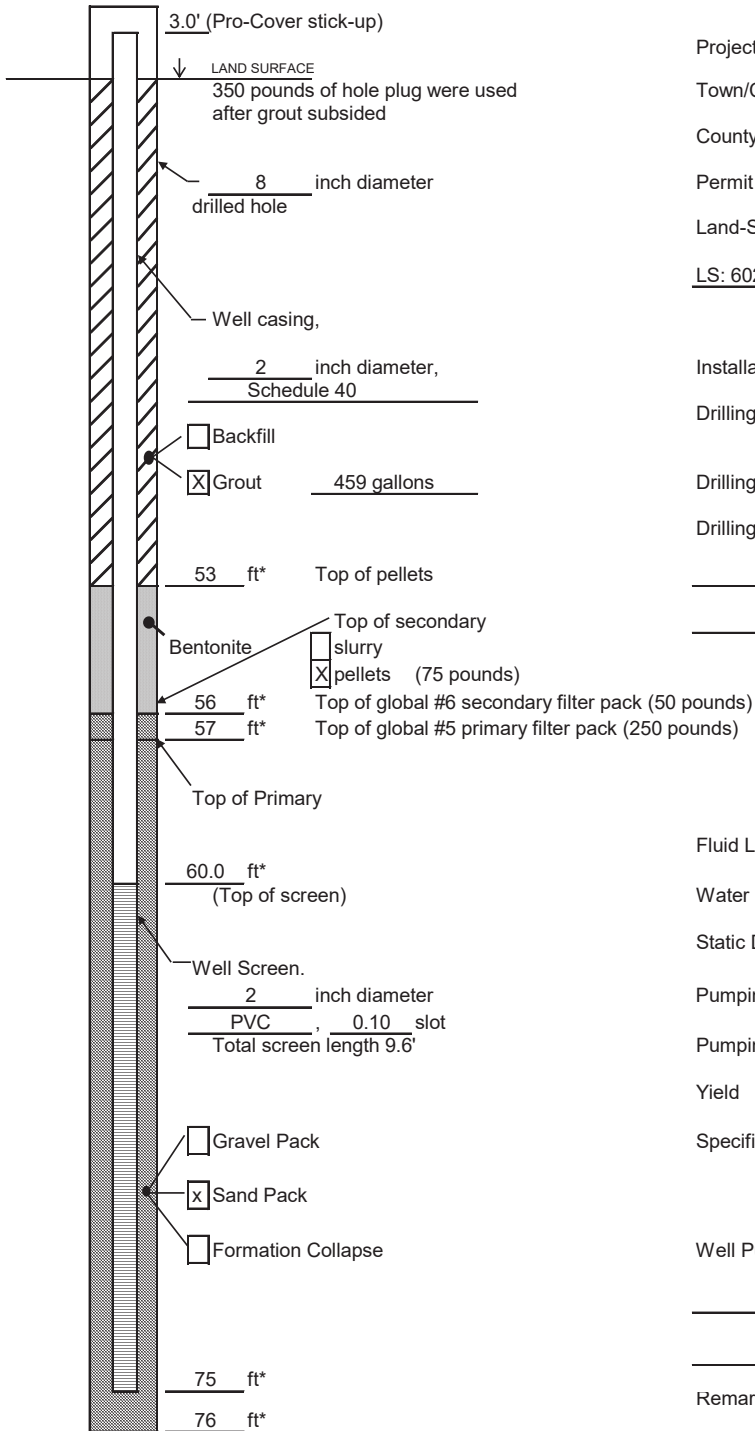
Well Purpose Monitoring well

Remarks

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

Prepared by Judd Wanner

WELL CONSTRUCTION LOG
(Unconsolidated)



Project AEP - Mountaineer Well MW-1603

Town/City New Haven

County Mason County State WV

Permit No. N/A

Land-Surface (LS) Elevation and Datum:

LS: 602.92; TOC: 606.30 feet Surveyed Estimated

Installation Date(s) 5/4/2016

Drilling Method Hollow Stem Auger

Drilling Contractor DLZ Ohio, Inc.

Drilling Fluid None

Development Technique(s) and Date(s)

Waterra (6/10/16)

Submersible Impeller Pump (6/15/16)

Fluid Loss During Drilling N/A gallons

Water Removed During Development 47.5 gallons

Static Depth to Water 61.35 feet below M.P.

Pumping Depth to Water 79 feet below M.P.

Pumping Duration NM hours

Yield N/A gpm Date 6/15/2016

Specific Capacity N/A gpm/ft

Well Purpose Monitoring well

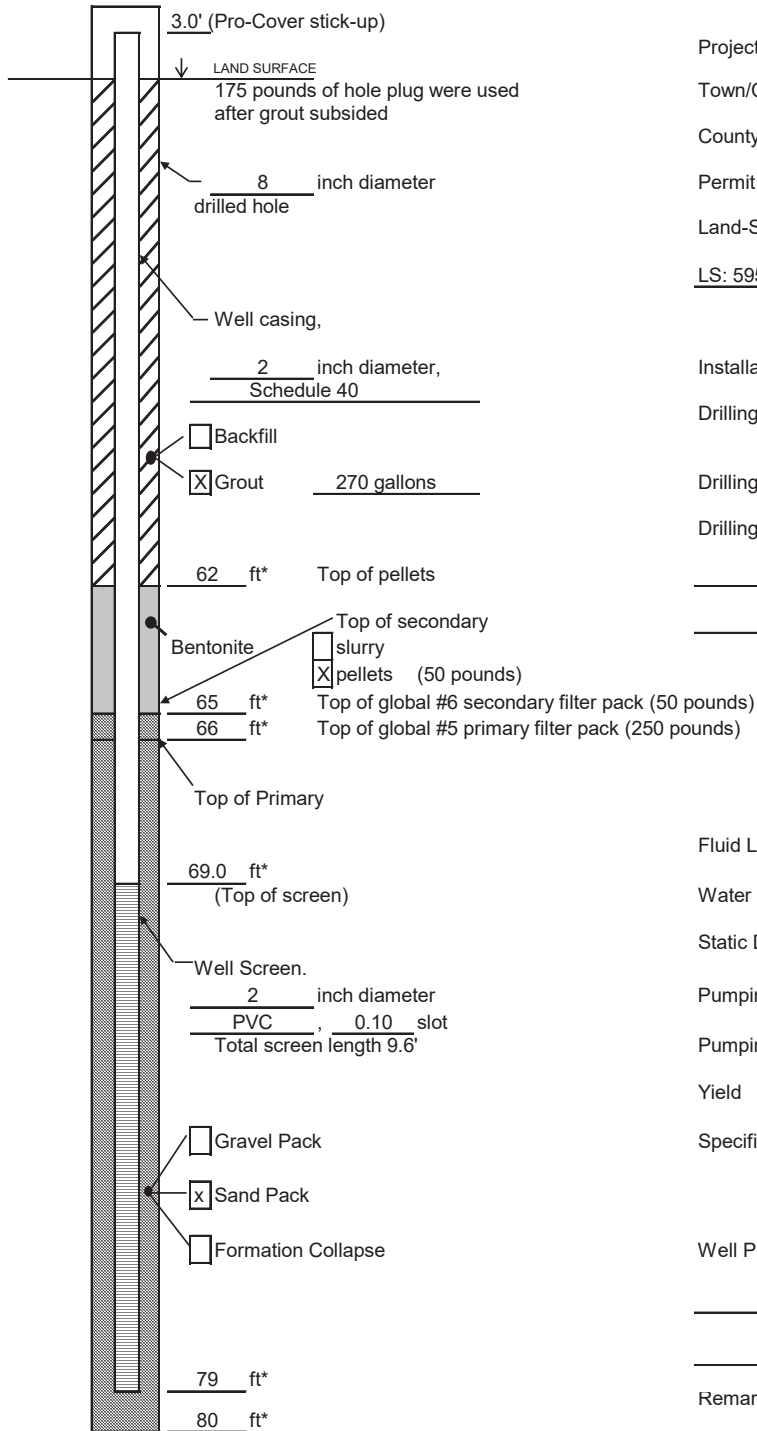
Remarks

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

Prepared by Judd Wanner

WELL CONSTRUCTION LOG

(Unconsolidated)



Project AEP - Mountaineer Well MW-1604D

Town/City New Haven

County Mason County State WV

Permit No. N/A

Land-Surface (LS) Elevation and Datum:

LS: 595.59; TOC: 598.22 feet Surveyed Estimated

Installation Date(s) 5/4/2016

Drilling Method Hollow Stem Auger

Drilling Contractor DLZ Ohio, Inc.

Drilling Fluid None

Development Technique(s) and Date(s)
Waterra and Submersible Pump (6/9/16)

Fluid Loss During Drilling N/A gallons

Water Removed During Development 45.1 gallons

Static Depth to Water 54.56 feet below M.P.

Pumping Depth to Water NM feet below M.P.

Pumping Duration NM hours

Yield NM gpm Date 6/9/2016

Specific Capacity NM gpm/ft

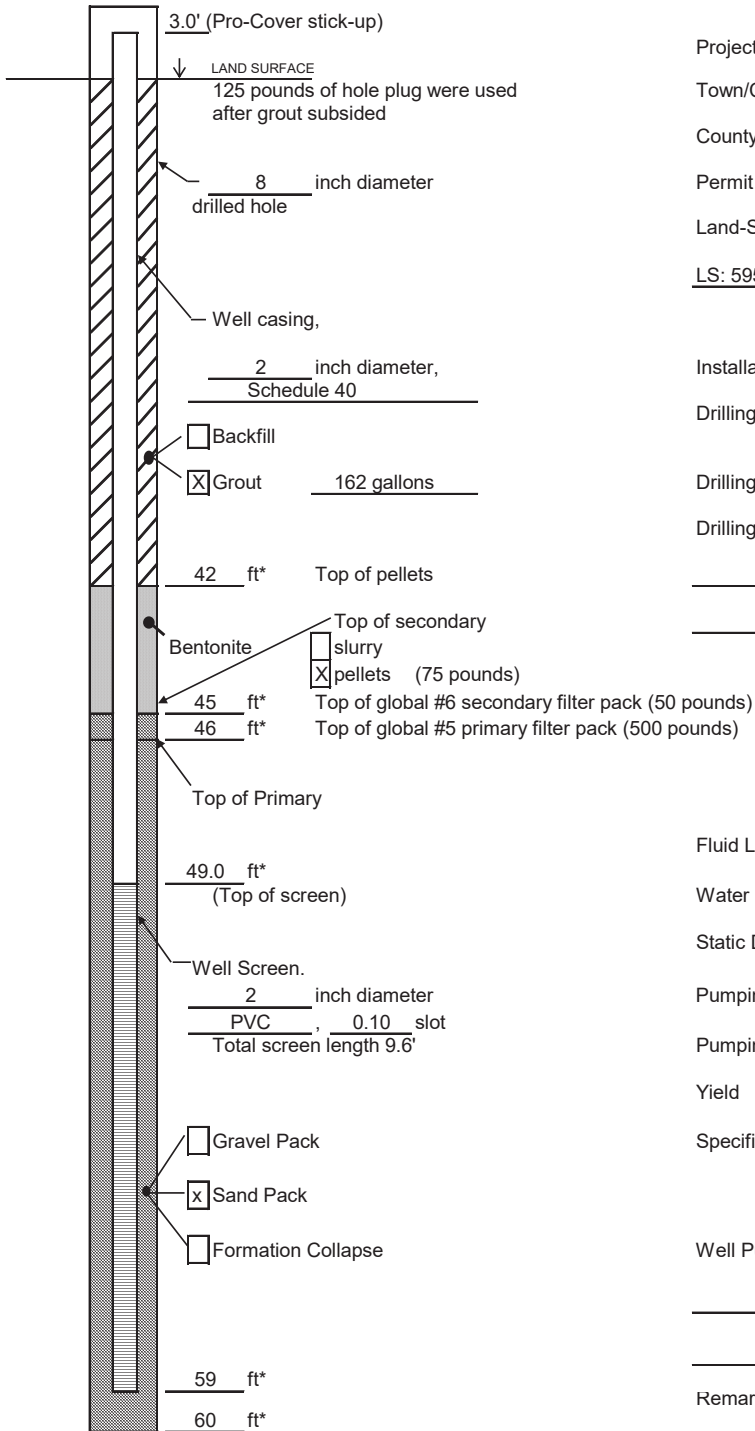
Well Purpose Monitoring well

Remarks Primary filter pack is #5 global sand; secondary filter pack is global #6 sand.

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

Prepared by Judd Wanner

WELL CONSTRUCTION LOG
(Unconsolidated)



Project AEP - Mountaineer Well MW-1604S
 Town/City New Haven
 County Mason County State WV
 Permit No. N/A

Land-Surface (LS) Elevation and Datum:
 LS: 595.48; TOC: 598.07 feet Surveyed
 Estimated

Installation Date(s) 5/2/2016
 Drilling Method Hollow Stem Auger
 Drilling Contractor DLZ Ohio, Inc.
 Drilling Fluid None

Development Technique(s) and Date(s)
Wattera (6/9/16)
Submersible Impeller Pump (6/16/16)

Fluid Loss During Drilling N/A gallons
 Water Removed During Development 30.8 gallons
 Static Depth to Water 54.49 feet below M.P.
 Pumping Depth to Water 62 feet below M.P.
 Pumping Duration NM hours
 Yield N/A gpm Date 6/16/2016
 Specific Capacity N/A gpm/ft

Well Purpose Monitoring well

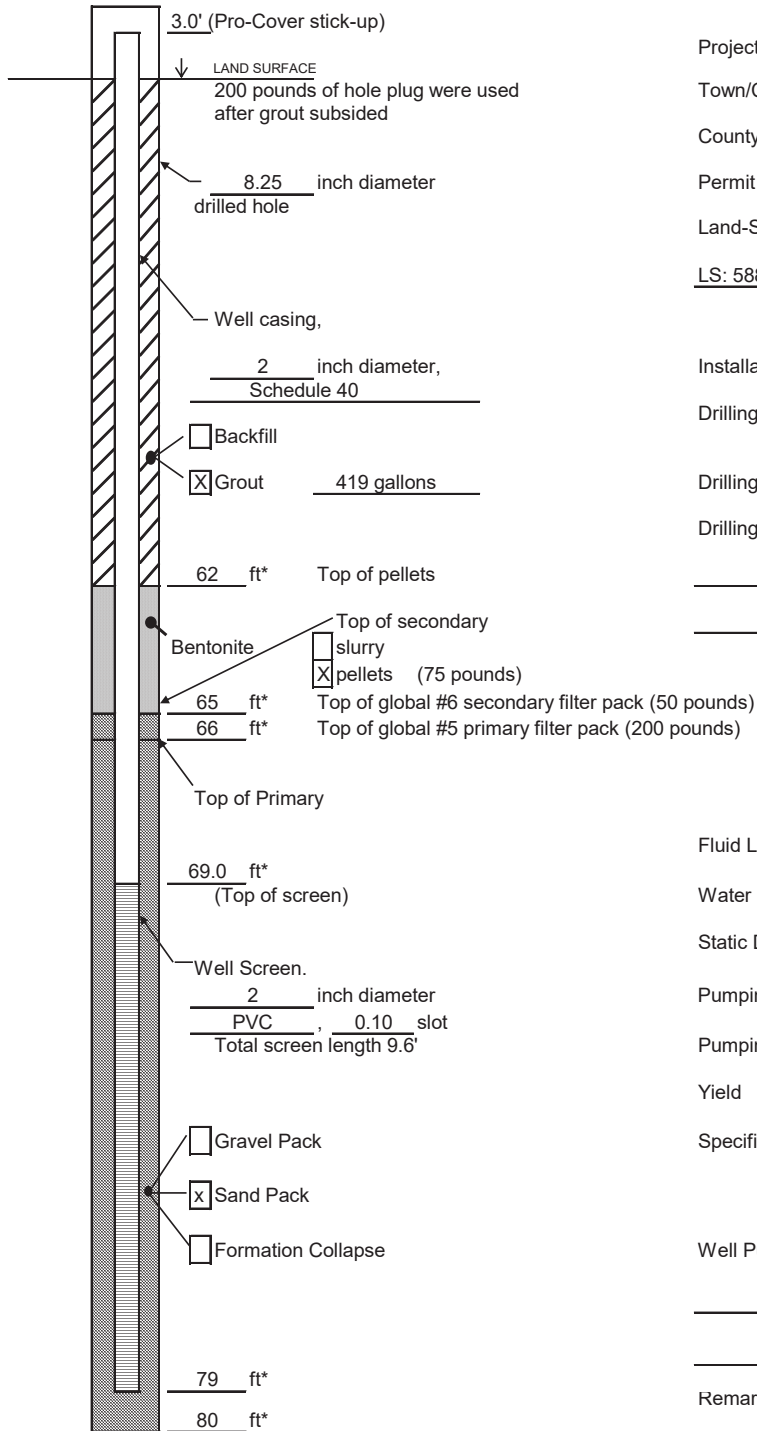
Remarks _____

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

Prepared by Judd Wanner

WELL CONSTRUCTION LOG

(Unconsolidated)



Project AEP - Mountaineer Well MW-1605D

Town/City New Haven

County Mason County State WV

Permit No. N/A

Land-Surface (LS) Elevation and Datum:

LS: 588.51; TOC: 591.01 feet Surveyed Estimated

Installation Date(s) 5-9-16 to 5-11-16

Drilling Method Hollow Stem Auger

Drilling Contractor DLZ Ohio, Inc.

Drilling Fluid Potable water

Development Technique(s) and Date(s)
Waterra and Submersible Pump (6/8/16)

Fluid Loss During Drilling 400 gallons

Water Removed During Development 65 gallons

Static Depth to Water 47.51 feet below M.P.

Pumping Depth to Water NM feet below M.P.

Pumping Duration NM hours

Yield N/A gpm Date 6/8/2016

Specific Capacity N/A gpm/ft

Well Purpose Monitoring well

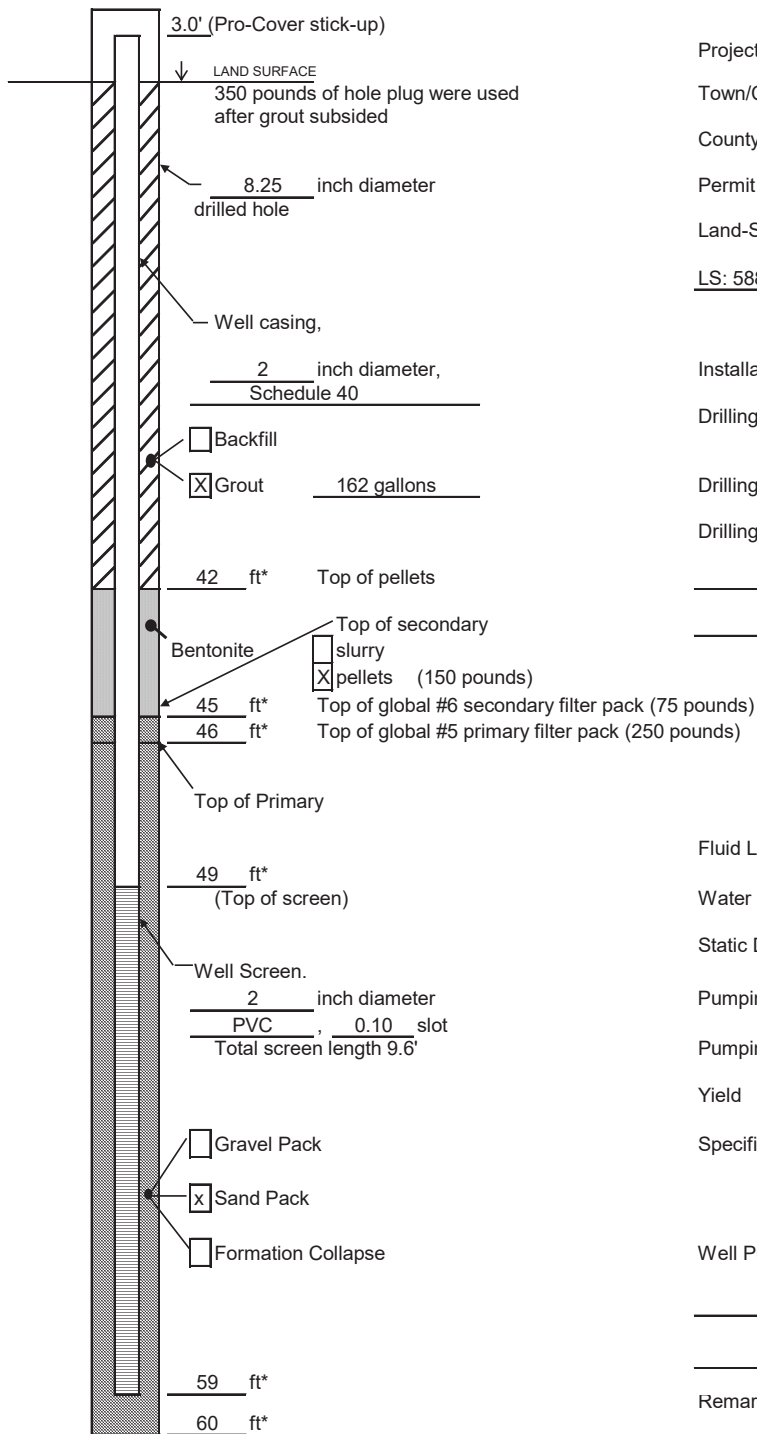
Remarks _____

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

Prepared by Tom Darmon

WELL CONSTRUCTION LOG

(Unconsolidated)



Project AEP - Mountaineer Well MW-1605S

Town/City New Haven

County Mason County State WV

Permit No. N/A

Land-Surface (LS) Elevation and Datum:

LS: 588.51; TOC: 590.86 feet Surveyed Estimated

Installation Date(s) 5/12/2016

Drilling Method Hollow Stem Auger

Drilling Contractor DLZ Ohio, Inc.

Drilling Fluid Potable water

Development Technique(s) and Date(s)

Waterra (6/8/16)

Submersible Impeller Pump (6/16/16)

Fluid Loss During Drilling 200 gallons

Water Removed During Development 36.1 gallons

Static Depth to Water 47.36 feet below M.P.

Pumping Depth to Water 61.5 feet below M.P.

Pumping Duration NM hours

Yield N/A gpm Date 6/16/2016

Specific Capacity N/A gpm/ft

Well Purpose Monitoring well

Remarks Fluid loss due to heaving sand estimated.

Removed water could not be quantified to clean

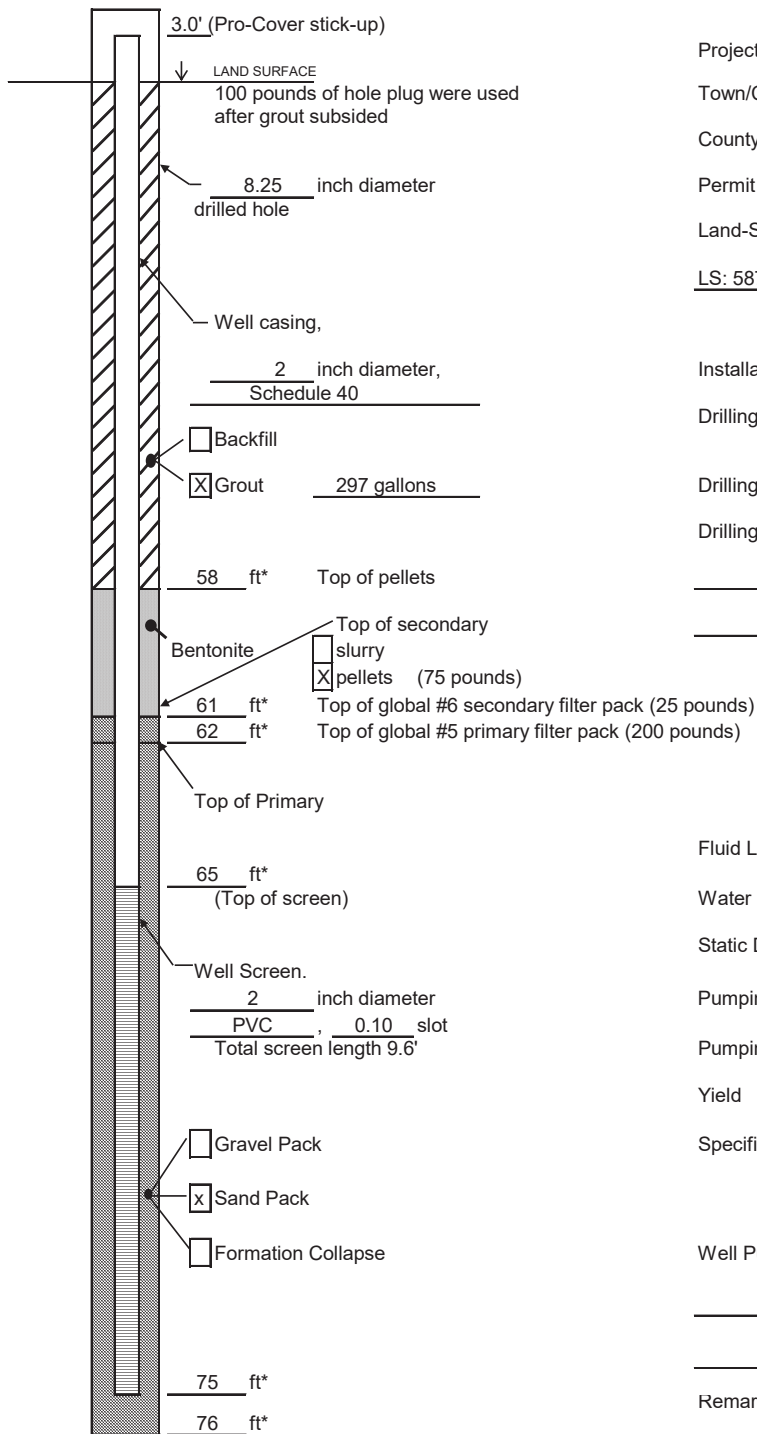
out augers.

Prepared by Tom Darmon

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

WELL CONSTRUCTION LOG

(Unconsolidated)



Project AEP - Mountaineer Well MW-1606D

Town/City New Haven

County Mason County State WV

Permit No. N/A

Land-Surface (LS) Elevation and Datum:

LS: 587.25; TOC: 590.10 feet Surveyed Estimated

Installation Date(s) 5-16-16 to 5-17-16

Drilling Method Hollow Stem Auger

Drilling Contractor DLZ Ohio, Inc.

Drilling Fluid Potable water

Development Technique(s) and Date(s)

Wattera and Submersible Pump (6/9/16)

Submersible Impeller Pump (6/15/16)

Fluid Loss During Drilling 250 gallons

Water Removed During Development 67 gallons

Static Depth to Water 46.03 feet below M.P.

Pumping Depth to Water 77.5 feet below M.P.

Pumping Duration NM hours

Yield N/A gpm Date 6/15/2016

Specific Capacity N/A gpm/ft

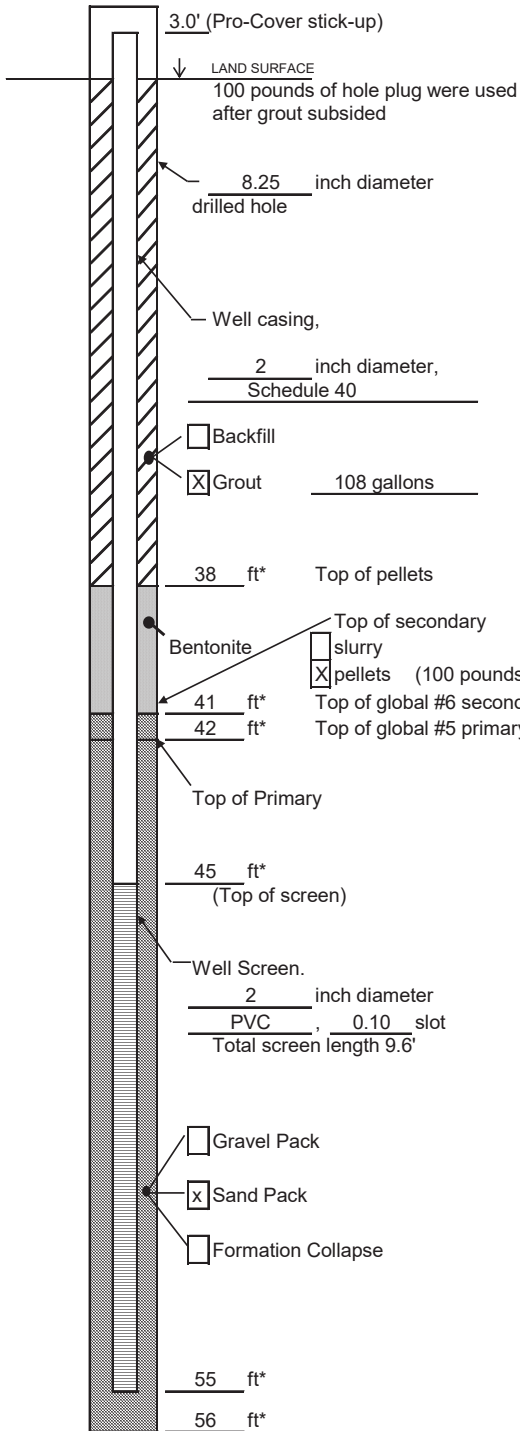
Well Purpose Monitoring well

Remarks _____

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

Prepared by Tom Darmon

WELL CONSTRUCTION LOG
(Unconsolidated)



Project AEP - Mountaineer Well MW-1606S

Town/City New Haven

County Mason County State WV

Permit No. N/A

Land-Surface (LS) Elevation and Datum:

LS: 587.28; TOC: 590.15 feet Surveyed Estimated

Installation Date(s) 5/17/16 - 5/18/16

Drilling Method Hollow Stem Auger

Drilling Contractor DLZ Ohio, Inc.

Drilling Fluid None

Development Technique(s) and Date(s)

Wattera (6/8/16)

Submersible Impeller Pump (6/15/16)

Fluid Loss During Drilling 0 gallons

Water Removed During Development 29.5 gallons

Static Depth to Water 46.02 feet below M.P.

Pumping Depth to Water 57 feet below M.P.

Pumping Duration NM hours

Yield N/A gpm Date 6/15/2016

Specific Capacity N/A gpm/ft

Well Purpose Monitoring well

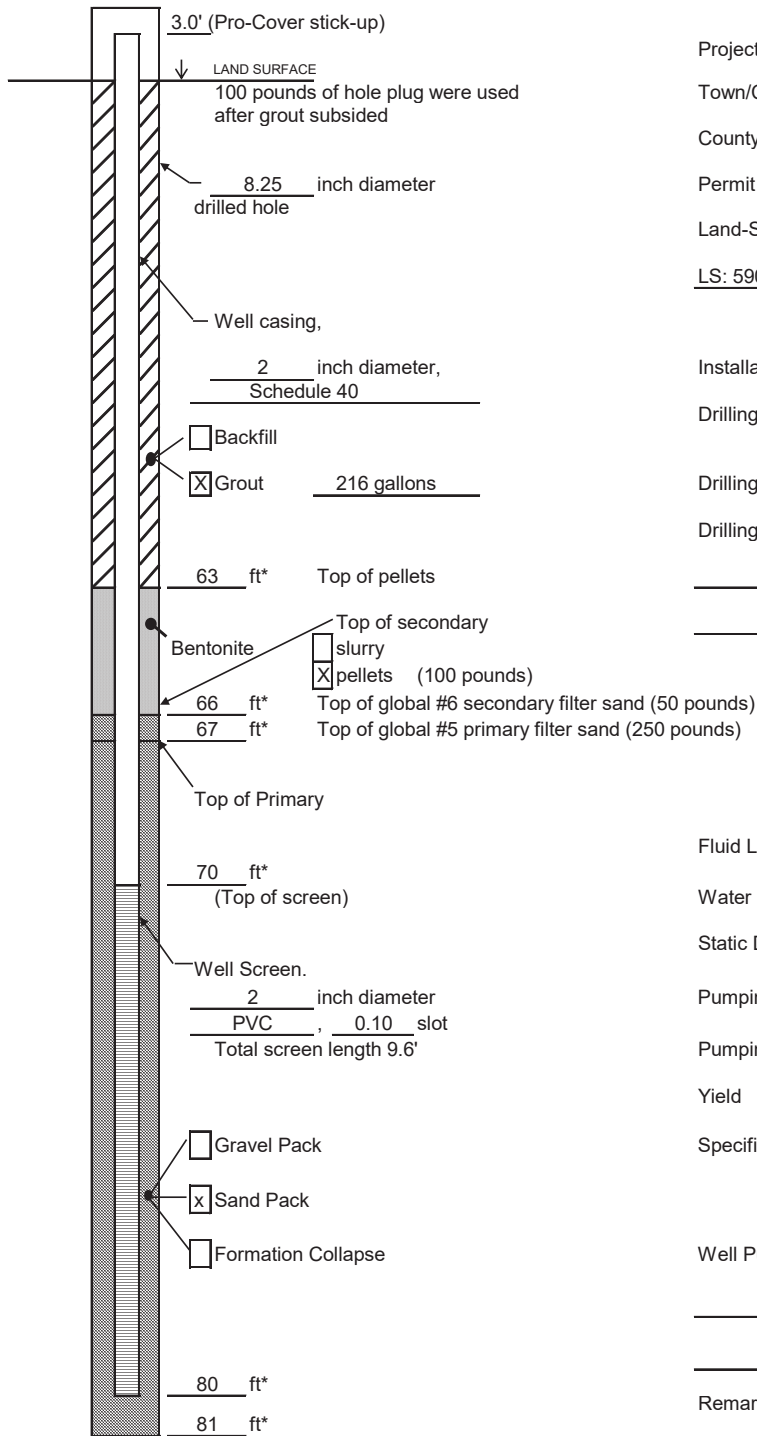
Remarks _____

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

Prepared by Tom Darmon

WELL CONSTRUCTION LOG

(Unconsolidated)



Project AEP - Mountaineer Well MW-1607D

Town/City New Haven

County Mason County State WV

Permit No. N/A

Land-Surface (LS) Elevation and Datum:
 LS: 590.75; TOC: 593.93 feet Surveyed Estimated

Installation Date(s) 5/19/2016

Drilling Method Hollow Stem Auger

Drilling Contractor DLZ Ohio, Inc.

Drilling Fluid Portable water

Development Technique(s) and Date(s)
Submersible Impeller Pump (6/15/16)

Fluid Loss During Drilling 300 gallons

Water Removed During Development 8.5 gallons

Static Depth to Water 46.72 feet below M.P.

Pumping Depth to Water 80 feet below M.P.

Pumping Duration NM hours

Yield N/A gpm Date 6/15/2016

Specific Capacity N/A gpm/ft

Well Purpose Monitoring well

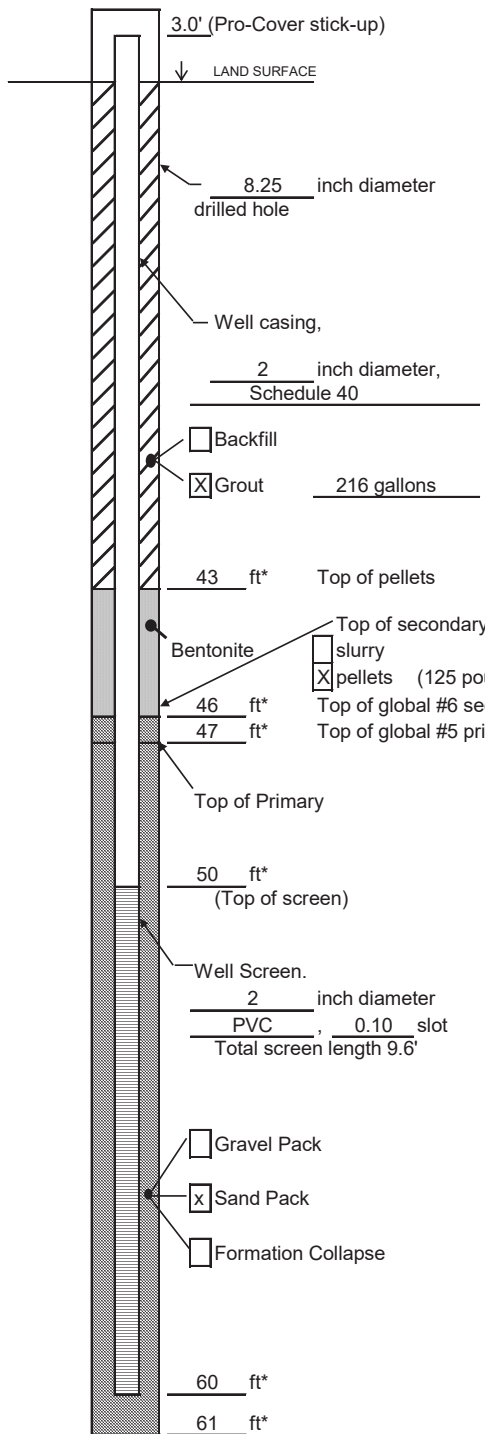
Remarks Fluid loss due to heaving sand estimated.
Removed water could not be quantified to clean
out augers.

Prepared by Tom Darmon

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

WELL CONSTRUCTION LOG

(Unconsolidated)



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

Project AEP - Mountaineer Well MW-1607S
Town/City New Haven
County Mason County State WV
Permit No. N/A

Land-Surface (LS) Elevation and Datum:
LS: 590.79; TOC: 593.99 feet Surveyed
 Estimated

Installation Date(s) 5/26/16 - 5/27/16
Drilling Method Hollow Stem Auger
Drilling Contractor DLZ Ohio, Inc.
Drilling Fluid Portable water

Development Technique(s) and Date(s)
Submersible Impeller Pump (6/15/16)

Fluid Loss During Drilling 400 gallons
Water Removed During Development 8.5 gallons
Static Depth to Water 46.56 feet below M.P.
Pumping Depth to Water 60 feet below M.P.
Pumping Duration NM hours
Yield N/A gpm Date 6/15/2016
Specific Capacity N/A gpm/ft

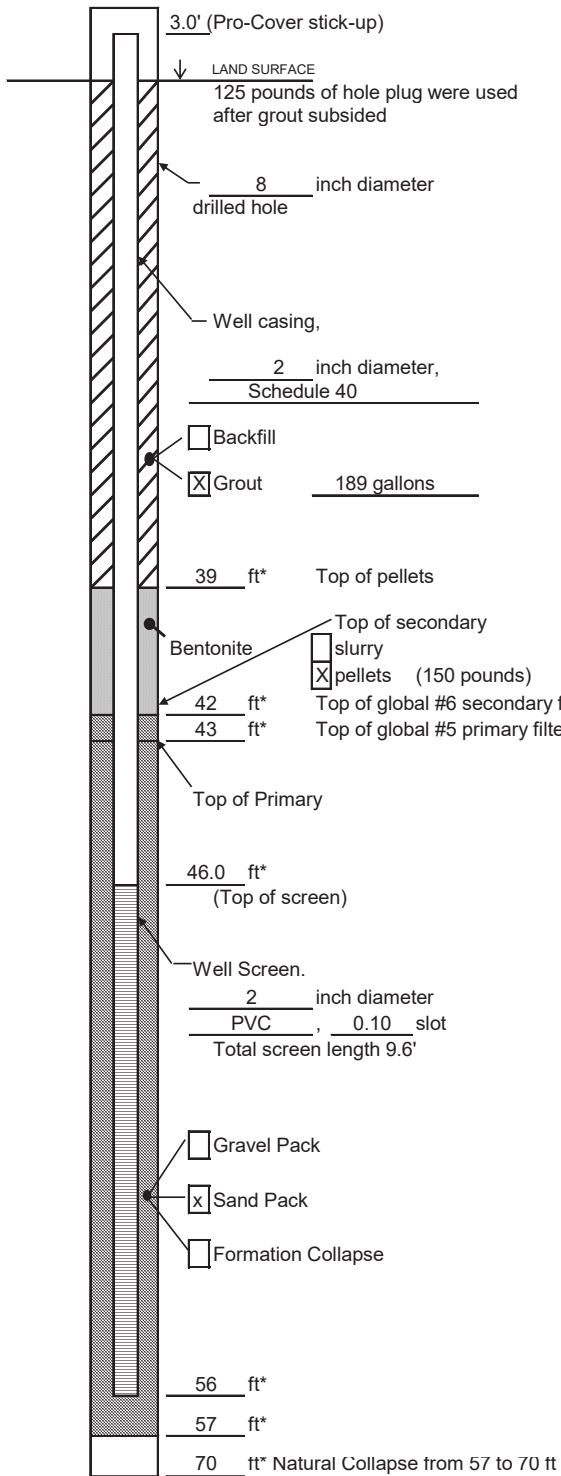
Well Purpose Monitoring well

Remarks Fluid loss due to heaving sand estimated.
Removed water could not be quantified to clean
out augers.

Prepared by Tom Darmon

WELL CONSTRUCTION LOG

(Unconsolidated)



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

Project AEP - Mountaineer Well MW-1608
 Town/City New Haven
 County Mason County State WV
 Permit No. N/A
 Land-Surface (LS) Elevation and Datum:
 LS: 587.26; TOC: 590.65 feet Surveyed
 Estimated
 Installation Date(s) 6/9/16 - 6/10/16
 Drilling Method Hollow Stem Auger
 Drilling Contractor DLZ Ohio, Inc.
 Drilling Fluid None

Development Technique(s) and Date(s)
Submersible Impeller Pump (6/17/16)

Fluid Loss During Drilling N/A gallons
 Water Removed During Development 33 gallons
 Static Depth to Water 47.66 feet below M.P.
 Pumping Depth to Water 60 feet below M.P.
 Pumping Duration NM hours
 Yield N/A gpm Date 6/17/2016
 Specific Capacity N/A gpm/ft

Well Purpose Monitoring well

Remarks _____

Prepared by Judd Wanner

APPENDIX B

Banks Well Inventory Report



Prepared for:

ARCADIS U.S., INC.-Columbus
630 Plaza Drive, Suite 600
Highlands Ranch, CO 80129



Water Well Report

AEP Water Well Inventory
MOUNTAINEER PLANT
1347 GRAHAM STATION ROAD
NEW HAVEN, WV
MASON County
PO #: OH015976.0004
ES-112028
Monday, September 08, 2014



Geographic Summary	3
Maps	
Summary Map - 0.5 Mile Buffer	4
Topographic Overlay Map - 0.5 Mile Buffer	5
Current Imagery Overlay Map - 0.5 Mile Buffer	6
Water Well Details	7
Database Definitions and Sources	8
Disclaimer	9

Geographic Summary *AEP Water Well Inventory*



Location	
MASON County, WV	
Target location is 0.131 square miles and has a 1.5 mile perimeter	

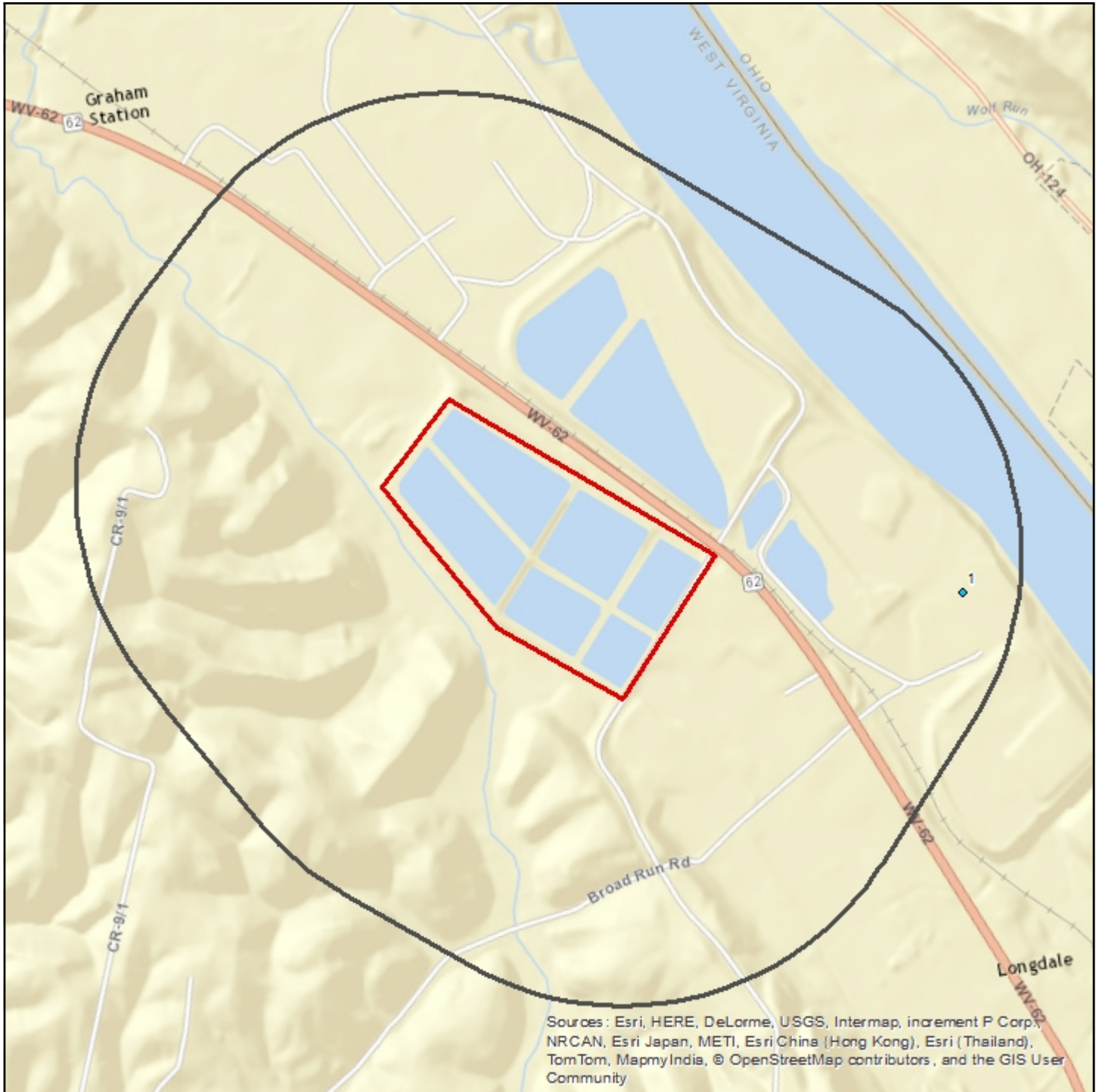
Coordinates	
Longitude & Latitude in Degrees Minutes Seconds	NA
Longitude & Latitude in Decimal Degrees	NA
X and Y in UTM	NA

Elevation	
NA	

Zip Codes Searched	
Search Distance	Zip Codes (historical zip codes included)
Target Property	25253, 25247, 25264, 25265
0.5 miles	25253, 25247, 25264, 25265

Topos Searched	
Search Distance	Topo Name
Target Property	New Haven (1977)
0.5 miles	New Haven (1977)

Summary Map - 0.5 Mile Buffer



AEP Water Well Inventory

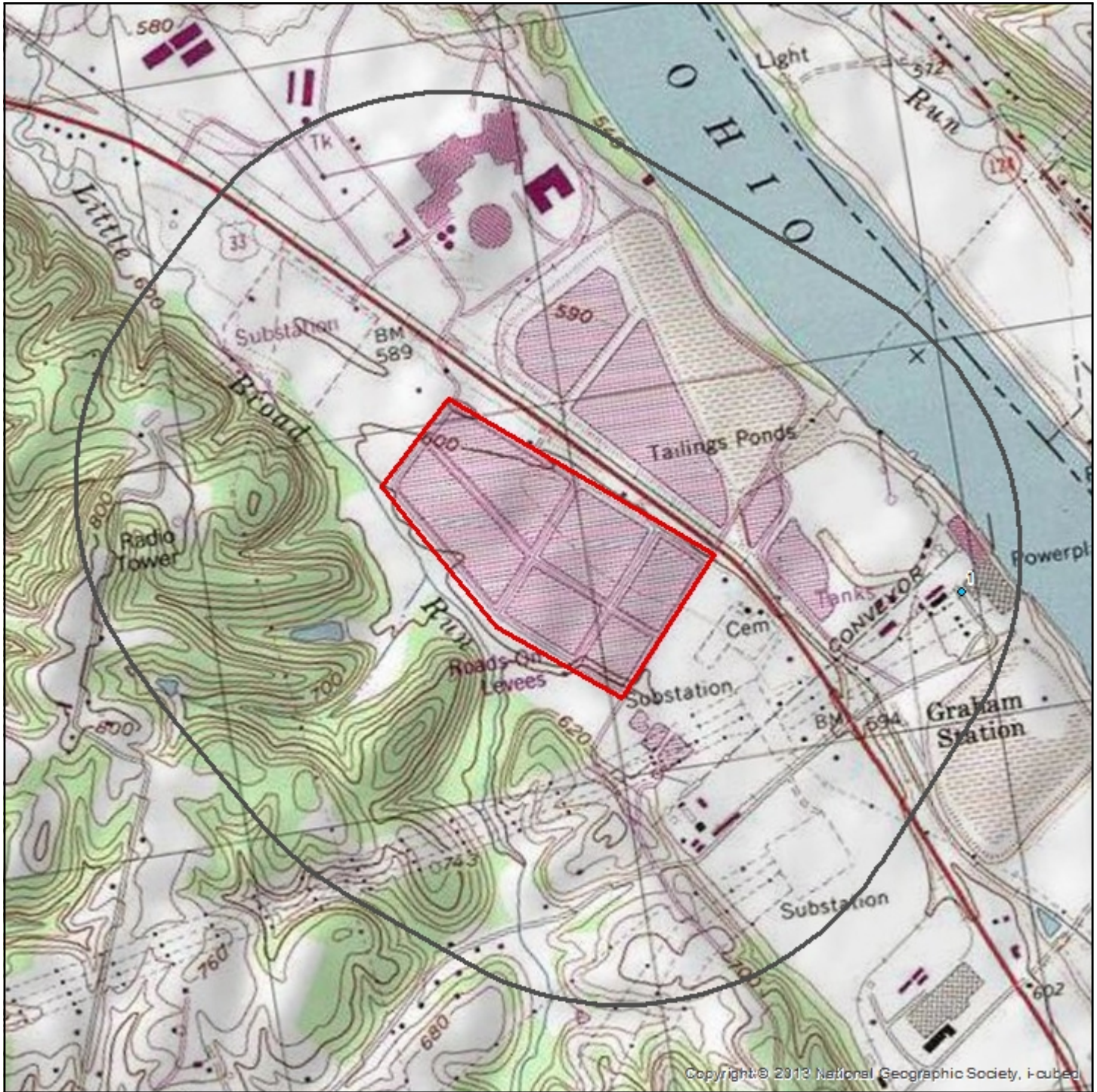
- Well
- Well Cluster
- Target Property
- Search Buffer

1 : 15,000
 1 inch = 0.237 miles
 1 inch = 1250 feet
 1 centimeter = 0.150 kilometers
 1 centimeter = 150 meters



Lambert Conformal Conic Projection
 1983 North American Datum
 First Standard Parallel: 33° 00' North
 Second Standard Parallel: 45° 00' North
 Central Meridian: 96° 00' West
 Latitude of Origin: 39° 00' North

Topographic Overlay Map - 0.5 Mile Buffer



Copyright © 2013 National Geographic Society, i-cubed

AEP Water Well Inventory

- Well
- Well Cluster
- Target Property
- Search Buffer

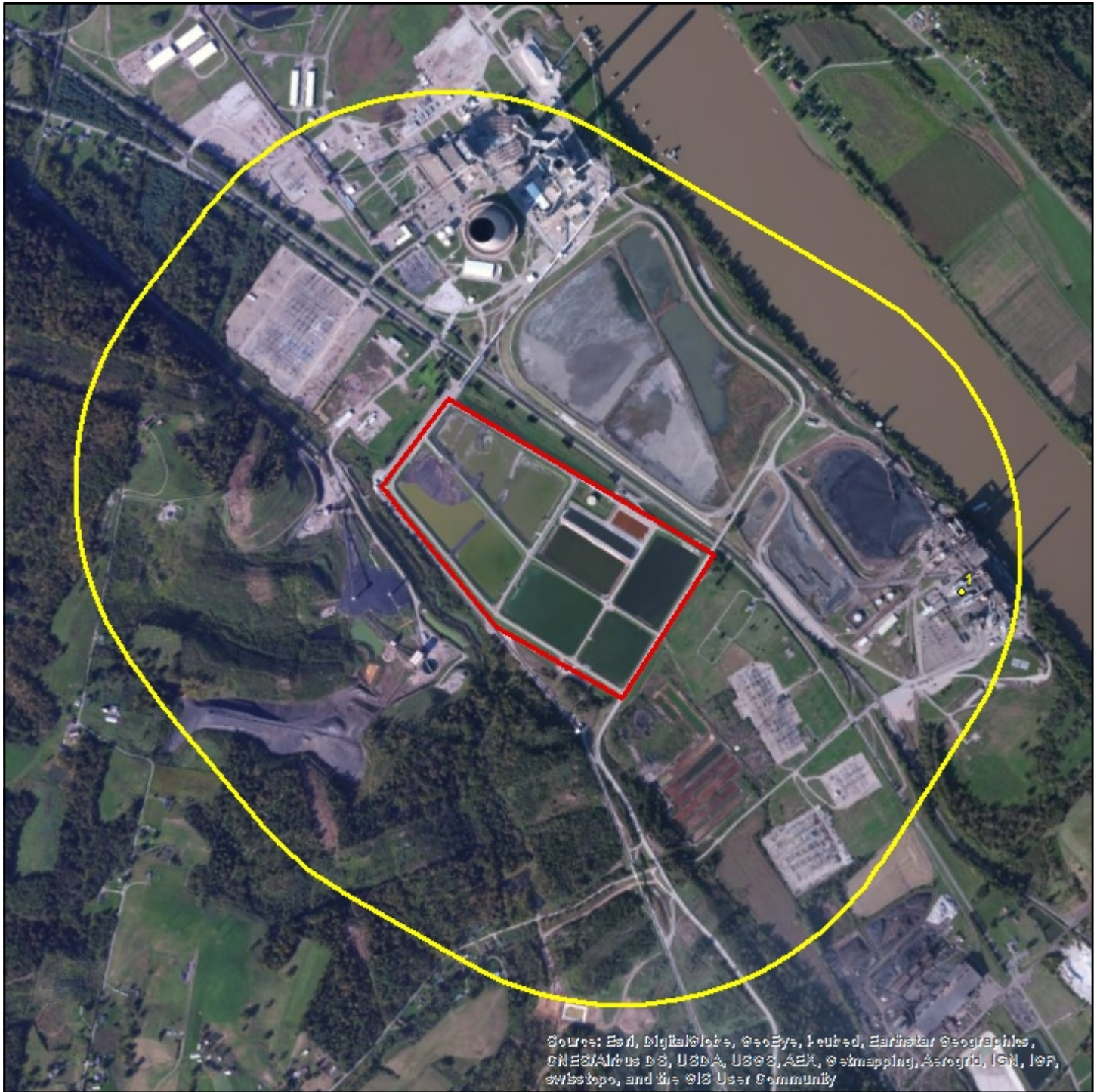
Target Property Quad Name(s)
New Haven (1977)

1 : 15,000
1 inch = 0.237 miles
1 inch = 1250 feet

Lambert Conformal Conic Projection
1983 North American Datum
First Standard Parallel: 33° 00' North
Second Standard Parallel: 45° 00' North
Central Meridian: 96° 00' West
Latitude of Origin: 39° 00' North



Current Imagery Overlay Map - 0.5 Mile Buffer



AEP Water Well Inventory

-  Well
-  Well Cluster
-  Target Property
-  Search Buffer

1 : 15,000
 1 inch = 0.237 miles
 1 inch = 1250 feet
 1 centimeter = 0.150 kilometers
 1 centimeter = 150 meters



Lambert Conformal Conic Projection
 1983 North American Datum
 First Standard Parallel: 33° 00' 00" North
 Second Standard Parallel: 45° 00' 00" North
 Central Meridian: 96° 00' 00" West
 Latitude of Origin: 39° 00' 00" North

Water Well Details *AEP Water Well Inventory*



Map ID	Source ID	Dataset	Owner of Well	Type of Well	Depth Drilled	Completion Date	Longitude	Latitude	Elevation	Driller's Logs
1	USGS-385802081552602	WW USGS	USGS	Not Reported	80	01/01/1950	-81.923748	38.967302	585 ft	N/A

Well Summary

Water Well Dataset	# of Wells
WW USGS	1
Total Count	1

Dataset Descriptions and Sources *AEP Water Well Inventory*



Dataset	Source	Dataset Description	Update Schedule	Data Requested	Data Obtained	Data Updated	Source Updated
WV WW - West Virginia Water Wells	West Virginia Department of Health and Human Resources	This dataset contains groundwater well information provided by West Virginia Department of Health and Human Resources.	As requested	N/A	N/A	N/A	N/A
OH WW - Ohio Water Wells	Ohio Department of Natural Resources	This dataset contains all historical water well records searched from Ohio Department of Natural Resources Division of Water	As requested	N/A	N/A	N/A	N/A
WW USGS - USGS Water Wells	U.S. Geological Survey	This dataset contains groundwater well records from the U.S. Geological Survey.	Quarterly	06/30/2014	06/30/2014	07/13/2014	06/30/2014

Disclaimer *AEP Water Well Inventory*



The Banks Environmental Data Water Well Report was prepared from existing state water well databases and/or additional file data/records research conducted at the state agency and the U.S. Geological Survey. Banks Environmental Data has performed a thorough and diligent search of all groundwater well information provided and recorded. All mapped locations are based on information obtained from the source. Although Banks performs quality assurance and quality control on all research projects, we recognize that any inaccuracies of the records and mapped well locations could possibly be traced to the appropriate regulatory authority or the actual driller. It may be possible that some water well schedules and logs have never been submitted to the regulatory authority by the water driller and, thus, may explain the possible unaccountability of privately drilled wells. It is uncertain if the above listing provides 100% of the existing wells within the area of review. Therefore, Banks Environmental Data cannot fully guarantee the accuracy of the data or well location(s) of those maps and records maintained by the regulatory authorities.

APPENDIX C

Groundwater Modeling Supporting Information



APPENDIX C – SUPPORTING INFORMATION FOR WELLHEAD ANALYTICAL ELEMENTS MODEL (WHAEM 2000) APPLICATION

Background

The AEP Mountaineer Plant (Plant) has several production wells that extract water from the unconsolidated sand and gravel aquifer system. The extraction of water from these wells depresses groundwater elevations near the wells and affects the groundwater flow patterns in the vicinity of the Mountaineer bottom ash ponds (BAPs). However, the effect of the operation of the production wells on flow patterns in the vicinity of the BAPs was not well understood. To improve the understanding of the effect of the production wells, a groundwater flow modeling study of the area was performed as described in the following sections.

Production Wells

There are currently five active production wells associated with the AEP Mountaineer Plant (**Figure C-1**). Two of the wells (West 1, East 1) are the most used and are pumped for process water. West 1 and East 1 are located approximately 450 feet and 825 feet north east of the Plant cooling tower, respectively. There are also two production wells (Wells 5 and 6) that are used to fill two fire water tanks used for emergency fire suppression and other low-volume water uses. Well 5 is located immediately west of the Plant cooling tower, and Well 6 is located approximately 750 feet northwest of the Plant cooling tower. A fifth well (Well 4) is used in the plant's wastewater system and is located approximately 950 feet east of the Plant cooling tower.

When active, East 1 currently pumps at an approximate rate 150 gallons per minute (gpm), and West 1 currently pumps at rate of approximately 750 gallons per minute (gpm). Average water use may be less when the wells are not pumped continuously. Wells 5 and 6 are not metered and likely pump intermittently for short periods of time as needed. Water use from Well 4 is not recorded and was assumed to be inactive. A plot of recent estimated daily water use (August and September shown on **Figure C-2**).

Groundwater Flow Model

Model Code

The one-dimensional analytical element model, WhAEM2000 (Kraemer et al., 2007) was used to simulate groundwater flow in the vicinity of the Mountaineer Plant. WhAEM2000 uses the principle of superposition of analytic functions to simulate complex hydrologic features such as wells, rivers, recharge zones, and impermeable boundaries. WhAEM2000 was selected because of the ability to simulate these features while still providing the streamlined level of analysis desired for this study.

Model Boundaries

The western and eastern boundaries of the model correspond to the edge of the unconsolidated sand and gravel aquifer extending along the Ohio River (**Figure C-1**). The bedrock surrounding the valley is low-yielding, and the quantities of water moving through the bedrock units are assumed to be insignificant relative to the large quantities of water moving through the sand and gravel aquifer. The northern and southern boundaries of the model were established approximately 13,000 and 17,000 feet from the Mountaineer BAPs, respectively and represent flow lines across which movement of groundwater generally does not occur under natural conditions. Horizontal flow barriers were assigned along the edges of the model to prevent the movement of water into or out of the active model domain.

The bottom of the model was assumed to be at elevation 508 above mean sea level (amsl). This corresponds to the approximate average bottom elevation of the unconsolidated valley-fill sediments as depicted on site geologic cross sections from the Mountaineer and Sporn Plants (EPRI, 1999). The thickness of the aquifer was assumed to be 60 feet based on the position of the lower permeability silt and clay sediments overlying the sand and gravel aquifer near the production wells. Over most of the area of the Mountaineer and Sporn Plants, groundwater elevations are below the overlying silt and clay sediments, and the sand and gravel aquifer is unconfined. The exception is a small area along the Ohio River and beneath the Sporn Plant, where the silt and clay unit thickens and the aquifer becomes confined (EPRI, 1999).

Streams

The Ohio River and its perennial tributaries were simulated using line sinks. The Ohio River was simulated with a line sink with a low resistance (high riverbed conductivity) to simulate a strong connection between the river and the aquifer. A low resistance was assigned to allow substantial quantities of water to flow into and out of the river proportional to the hydraulic gradients between the aquifer and the river. The tributaries, which include Broad Run, Little Broad Run, and West Creek, were simulated with line sinks with a high resistance (low riverbed conductivity), because these streams flow over the top of the silt and clay unit and the connection between the streams and aquifer is much less. The resistance values were adjusted during calibration, and final assigned values were 0.1 feet / feet per day for the Ohio River and 30 feet / feet per day for the Ohio River tributaries. Surface water elevations for the Ohio River were based on site gauging data provided by American Electric Power. Surface water elevations for the tributaries were estimated from United States Geological Survey (USGS) topographic maps and assuming a stream depth of 2 feet. The Ohio River was assigned a water depth of 21 feet based on profiles of the river (EPRI, 1999). The width of the line sinks was based on the width of the streams measured from aerial photographs and according to the guidance provided in Haitjema (2005).

Hydraulic Conductivity

The model was originally assigned a single hydraulic conductivity zone based on the results of two short variable rate tests conducted on the Plant production wells, East 1 and West 1. The variable rate test data were analyzed for hydraulic conductivity using the Nueman (1974) method for unconfined aquifers. An additional estimate of the hydraulic conductivity was made from the specific capacities measured for the wells using methods described in Walton (1962). The hydraulic conductivities estimated from the East 1 and West 1 wells ranged from 346 to 454 feet per day as summarized in **Table C-1**.

Additional hydraulic conductivity information was available in the form of slug tests performed on monitoring wells at both the Mountaineer and Sporn Plants. The slug tests were categorized based on whether the tested monitoring well was screened in a predominantly sand zone or gravelly zone. Hydraulic conductivity ranges estimated from the slug tests are also summarized in **Table C-1**.

During the calibration process, it was necessary to divide the model domain into zones of varying hydraulic conductivity. The first zone encompasses areas where Plant borings indicate the aquifer is gravelly. This zone includes the area around the production wells. The second zone encompasses areas where the aquifer is predominantly sand. This zone includes the area around the Mountaineer and Sporn Plant ponds and a second small area surrounding the Mountaineer Plant coal piles. These areas were assigned a lower hydraulic conductivity to simulate the less permeable nature of the sands relative to the gravelly sediments. The remaining areas of the model were assigned a hydraulic conductivity mid-range of the sand and the gravelly zone hydraulic conductivities. This zone predominantly represents far-field conditions where little information on sediment type or hydraulic conductivities is available. The variable hydraulic conductivity zones were added to the model by creating inhomogeneity zones in the model with unique hydraulic conductivity properties. The final hydraulic conductivities assigned to the model following calibration are depicted on **Figure C-1**.

Recharge

Recharge was also added to the model domain to simulate the infiltration of precipitation into the aquifer. Recharge was added to all areas of the model domain not overlain by the Ohio River. Recharge rates estimated for the lower terraces of the valley fill aquifers along the Ohio River are estimated to range from 6 to 12 inches per year (Kozar and McCoy, 2004). The final calibrated recharge rate used to represent infiltration of precipitation was 12 inches per year.

Zones of enhanced recharge were also added to wetted pond areas at the Mountaineer and Sporn Plants to simulate seepage through the bottom of the ponds. Pond seepage was applied to the model by creating additional inhomogeneities corresponding to the wetted extent of the ponds with unique recharge properties. The pond areas that were assigned unique recharge rates include;

- Mountaineer West BAP
- Mountaineer East BAP
- Mountaineer West Wastewater Pond
- Mountaineer East Wastewater Pond
- Mountaineer Reclaim Water Pond
- Mountaineer Clear Water Pond
- Sporn Wastewater and Fly Ash Pond

Mountaineer and Sporn Plant Ponds

The Mountaineer BAPs typically receive more than 9 million gallons per day (mgd) of water (AEP, 2012). The water exits the BAPs and passes into to the Wastewater Treatment Ponds where it is combined with

additional water from the plant. Water exiting the Wastewater Treatment Ponds passes into to the Reclaim Water Pond. Much of the water in the Reclaim Water Pond is recycled, with the remainder passing through to the Clearwater Pond and then being discharged to the Ohio River. Of the more than 13 mgd that enters the Reclaim Water Pond, approximately 4 to 6 mgd is discharged from the Clearwater Pond into the Ohio River on a typical monthly basis.

The Sporn Fly Ash Pond historically received more than 11 mgd of water (AEP, 2005). Water exiting the pond was discharged into the Ohio River. The pond is no longer actively receiving water due to closure of the Sporn plant, but a small portion of the pond remains filled with water. The Sporn Bottom Ash and Clear Water Ponds historically received more than 2 mgd of water. Water exiting these ponds was also discharged to the Ohio River. These ponds are also no longer active due to the closure of the Sporn plant.

Estimated Pond Seepage

Seepage through the base of the Mountaineer and Sporn ponds was estimated by performing a flow calculation through the low permeability materials at the base of the ponds. Seepage was estimated using the following equation:

$$Q = K \frac{h_s - h_b}{b} A$$

where Q is the flow rate through the bottom of the pond, K is the hydraulic conductivity of the low permeability sediments at the base of the pond, h_s is the water surface elevation of the pond, h_b is the elevation of the bottom of the pond, b is the thickness of the low permeability sediments at the base of the pond, and A is the area of the pond.

The water surface elevations in the ponds were based on measured pond elevations from AEP monthly pond inspection reports. The pond bottom elevations were determined from pond construction drawings and site cross-sections. Construction records (Casagrande Consultants, 1977) indicate that Mountaineer Ponds were constructed with an underlying liner three feet thick and had a design hydraulic conductivity of 6.24×10^{-5} feet per day (2.2×10^{-8} cm/sec). In-situ hydraulic conductivity of the liner material following placement is likely somewhat higher (Woodward-Clye Consultants, 1985). The Sporn Wastewater and Fly Ash Ponds are underlain by a large thickness of ash. The bottom of ash was estimated to be at elevation 561 feet above mean sea level (ft-amsl) from plant geologic cross-sections (EPRI, 1999). For modeling purposes, it was assumed that the ash materials controlled the rate of seepage from the Fly Ash Ponds to the sand and gravel aquifer beneath.

The final hydraulic conductivities assigned to the materials underlying the Mountaineer ponds and the Sporn Fly Ash Pond were based on calibration. The hydraulic conductivities were adjusted within reasonable ranges until the groundwater elevations in monitoring wells near the ponds were approximately reproduced. The calibrated hydraulic conductivities were 3.12×10^{-3} feet per day (1.1×10^{-6} cm/sec) for the liners beneath the Mountaineer ponds and 0.05 feet per day (1.8×10^{-5} cm/sec) for the ash materials beneath the Sporn Fly Ash pond.

The zones of enhanced recharge representing the Mountaineer ponds and the Sporn Fly Ash pond were defined by creating inhomogeneities in the model domain with unique recharge properties. Using the calibrated hydraulic conductivities, the recharge rates assigned to the Mountaineer and Sporn ponds were calculated for the September 2016 model calibration period as summarized in **Table C-2**.

Model Calibration

The model was qualitatively calibrated to a historical groundwater elevation data set to ensure the model is able to accurately simulate groundwater flow conditions. A December 2014 dataset was selected for calibration because the stage of the Ohio River had been stable (i.e. lack of high stage events) for a relatively long period of time prior to the measurement event. Monthly production well flow rates and pond inspection reports were also compiled for this period to define the extraction rates from the production wells and the seepage rates from the Mountaineer and Sporn ponds. The model parameter values discussed in the previous section were adjusted within reasonable ranges until the groundwater elevations were approximately reproduced.

The December 2014 groundwater elevation dataset included water levels from monitoring wells from both the Mountaineer and Sporn Plants. However, data from monitoring wells screened in the silt and clay unit overlying the aquifer and data from the shallow piezometers affected by unsaturated flow were excluded from the calibration simulation. The simulated groundwater elevations from the calibration scenario are depicted on **Figure C-3**.

Simulated groundwater elevations closely approximated measured groundwater elevations. The residuals (difference between the simulation and measured groundwater elevations) were less than one-half of one foot for most monitoring well locations (also depicted on **Figure C-3**), and the number of elevations that were over-simulated (simulated elevations that are greater than measured elevations) is similar to the number of elevation that were under-simulated (simulated elevations are less than measured elevations). The exception was two monitoring wells (MW-009 and MW-011) that have locations and ground surface elevations that are uncertain. Data from these monitoring wells were not used for calibration.

The calculated seepage rates for the ponds under the calibration scenario were relatively small. The seepage rates for all ponds were less than 0.1 mgd, and represent a small fraction of the total volume of flow passing through the ponds. The calibration simulation suggests that groundwater elevations are mounded beneath the Mountaineer ponds. Groundwater flows from the ponds to the cone-of-depression surrounding the East 1 and West 1 production wells. There is also a general component of flow from the boundary with the bedrock surrounding the valley-fill aquifer toward the Ohio River. The exception is near the East 1 and West 1 production wells where the model predicts that the wells induce flow from the Ohio River into the aquifer.

Near Future Groundwater Flow Simulation

Following calibration, a simulation was performed to predict the groundwater flow patterns in the sand and gravel aquifer at the Mountaineer and Sporn under a current or near future normal operating condition. Pertinent assumptions made for the simulation are summarized below;

- The East 1 and West 1 Production Wells are each pumping continuously at 370 gpm each (The East 1 production well pump is planned to be up-graded to have a capacity similar to West 1).
- The Firewater Production Wells (Well 5 and Well 6) will pump at a long-term average rate of 20 gpm each (based on historical average monthly pumping rates).
- The Mountaineer pond water surface elevations are at their normal operating level.
- The Sporn ponds are inactive due to closure of Sporn plant and are completely dry.
- The stage of the Ohio River is similar to the September 26, 2016 stage.

The simulated groundwater elevations under the current or near future condition are depicted on **Figure C-4**. Groundwater flow directions are generally similar to the calibration simulation, though groundwater elevations are somewhat lower in the vicinity of the production wells (due to the greater simulated rate of pumping) and slightly higher in the vicinity of the Mountaineer Ponds (due to the East BAP being full under the near future condition). The flow directions in the vicinity of the Sporn Fly Ash Pond are somewhat more toward the Ohio River, reflecting the closure of the Fly Ash Pond.

The calculated seepage rates for the Mountaineer ponds are in the same range as the calibration simulation, but are slightly different for those ponds that had water levels that were not at the normal operating level during the calibration period. The East BAP was also assumed to be operating during the current or near future condition, whereas this pond was inactive during the calibration simulation. The calculated seepage rates under the current or near future condition are summarized in **Table C-3**.

Similar to the calibration simulation, the model suggests a pattern of diverging flow away from the Mountaineer ponds, with flow being directed towards the Ohio River and the cone-of-depression surrounding the East 1 and West 1 production wells. The groundwater flow directions predicted by this simulation was used to assist in the selection of new monitoring well locations for monitoring of the Mountaineer Plant BAPs. A discussion of the selection of the new monitoring well locations is provided in the main report.

References

- AEP (2005). *Appalachian Power Co. Philip Sporn Plant Water Usage Flow Diagram*. Plant water balance schematic provided by Randall Brown, Appalachian Power, Mountaineer and Sporn Environmental Coordinator. Revised 11/18/2005.
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- Woodward-Clyde Consultants (1985). *Report on Dam Safety Inspection. Bottom Ash Pond Complex. Mountaineer Generating Plant. New Haven, West Virginia*. Consultant report prepared for American Electric Power Service Corporation.

TABLES



Table C-1
Summary of Hydraulic Conductivity Data
AEP Mountaineer Generating Plant - Bottom Ash Ponds
New Haven, West Virginia

	Transmissivity gpd/ft	Hydraulic Conductivity ft/day	Hydraulic Conductivity cm/sec
Variable Rate Tests			
FGD East 1 (Neuman, 1974)	90,514	367	1.3E-01
FGD East 1 (Walton, 1962)	85,400	346	1.2E-01
FGD West 1 (Neuman, 1974)	106,200	430	1.5E-01
FGD West 1 (Walton, 1962)	112,100	454	1.6E-01
Slug Tests (EPRI, 1999)			
Sporn Plant Slug tests (Sand Zone)		1.2 - 5.7	4.1E-04 - 1.9E-03
Sporn Plant Slug tests (Gravelly Zone)		20 - 333	7.1E-03 - 1.2E-01
Mountaineer Plant Slug tests (Sand Zone)		51- 286	1.8E-02 - 1.0E-01
Mountaineer Plant Slug tests (Gravelly Zone)		772	2.70E-01
Slug Tests (Mountaineer Bottom Ash Pond CCR Monitoring Network Evaluation)			
Mountaineer Plant Slug tests (Sand Zone)		147 - 213	5.2E-02 - 7.5E-02

Notes:

cm/sec - centimeters per second

ft/day - feet per day

gpd/ft - gallons per day per foot

Table C-2
Calculated Pond Seepage Rates - Calibration Simulation
AEP Mountaineer Generating Plant - Bottom Ash Ponds
New Haven, West Virginia

Plant	Mountaineer						Sporn			
	Bottom Ash Pond West	Bottom Ash Pond East	Wastewater Pond West	Wastewater Pond East	Reclaim Pond	Clearwater Pond	Fly Ash Pond North Basin	Fly Ash Pond South Basin	Clearwater Pond	Bottom Ash Pond
Pond Water Surface Elevation (ft-amsl) ^a	612.8	605.8	609.1	606.1	603.3	603.2	601	601	Dry	Dry
Pond Bottom Surface Elevation (ft-amsl) ^b	598	598	592	594.5	592	594	599	599		
Thickness of Low-Permeability Liner Sediments ^{c,d}	3	3	3	3	3	3	27	27		
Hydraulic Conductivity of Low-Permeability Liner Sediments (ft/day) ^e	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	5.00E-02	5.00E-02		
Hydraulic Conductivity of Low-Permeability Liner Sediments (cm/sec)	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.76E-05	1.76E-05		
Approximate Wetted Surface Area of Pond (ft ²) ^f	433,700	580,000	367,200	259,900	225,900	312,500	103,300	328,600		
Calculated Seepage Rate (ft ³ /day)	6,676	4,705	6,530	3,135	2,655	2,990	383	1,217		
Calculated Seepage Rate (mgd)	0.050	0.035	0.049	0.023	0.020	0.022	0.003	0.009		
Calculated Seepage Rate per ft ² of lakebed (ft/day)	0.0154	0.0081	0.0178	0.0121	0.0118	0.0096	0.0037	0.0037		
Calculated Seepage Rate per ft ² of lakebed (inches/year)	67.5	35.6	77.9	52.9	51.5	41.9	16.2	16.2		

Notes:

- a. Pond water surface elevations are from Mountaineer and Sporn Plant Monthly Dike Inspection Reports.
 - b. Pond Bottom surface elevations are from pond design documents and cross-sections (Casagrande Consultants, 1977; EPRI, 1999; Dewberry, 2009).
 - c. Mountaineer Ash Pond liner thicknesses was designed to be a minimum of 3 feet thick (Casagrande Consultants, 1977).
 - d. Sporn Fly Ash Pond ash thickness estimated from pond and dike subsurface cross-sections in EPRI, 1999 and Dewberry, 1999.
 - e. Hydraulic conductivities of low-permeability sediments underlying the ponds was assigned through calibration.
 - f. Wetted area of ponds estimated from aerial photographs.
- cm/sec - centimeters per second
 ft-amsl - feet above mean sea level
 ft/day - feet per day
 ft² - square feet
 ft³/day - cubic feet per day
 mgd - million gallons per day

Table C-3
Calculated Pond Seepage Rates - Current or Near Future Condition
AEP Mountaineer Generating Plant - Bottom Ash Ponds
New Haven, West Virginia

Plant	Mountaineer						Sporn			
	Bottom Ash Pond West	Bottom Ash Pond East	Wastewater Pond West	Wastewater Pond East	Reclaim Pond	Clearwater Pond	Fly Ash Pond North Basin	Fly Ash Pond South Basin	Clearwater Pond	Bottom Ash Pond
Pond Water Surface Elevation (ft-amsl) ^a	612	612	609	609	603	603	Dry	Dry	Dry	Dry
Pond Bottom Surface Elevation (ft-amsl) ^b	598	598	592	594.5	592	594				
Thickness of Low-Permeability Liner Sediments ^c	3	3	3	3	3	3				
Hydraulic Conductivity of Low-Permeability Liner Sediments (ft/day) ^d	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03	3.12E-03				
Hydraulic Conductivity of Low-Permeability Liner Sediments (cm/sec)	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.10E-06	1.10E-06				
Approximate Wetted Surface Area of Pond (ft ²) ^e	571,600	367,200	367,200	259,900	225,900	312,500				
Calculated Seepage Rate (ft ³ /day)	8,322	5,346	6,492	3,919	2,584	2,925				
Calculated Seepage Rate (mgd)	0.062	0.040	0.049	0.029	0.019	0.022				
Calculated Seepage Rate per ft ² of lakebed (ft/day)	0.015	0.015	0.018	0.015	0.011	0.009				
Calculated Seepage Rate per ft ² of lakebed (inches/year)	63.8	63.8	77.5	66.1	50.1	41.0				

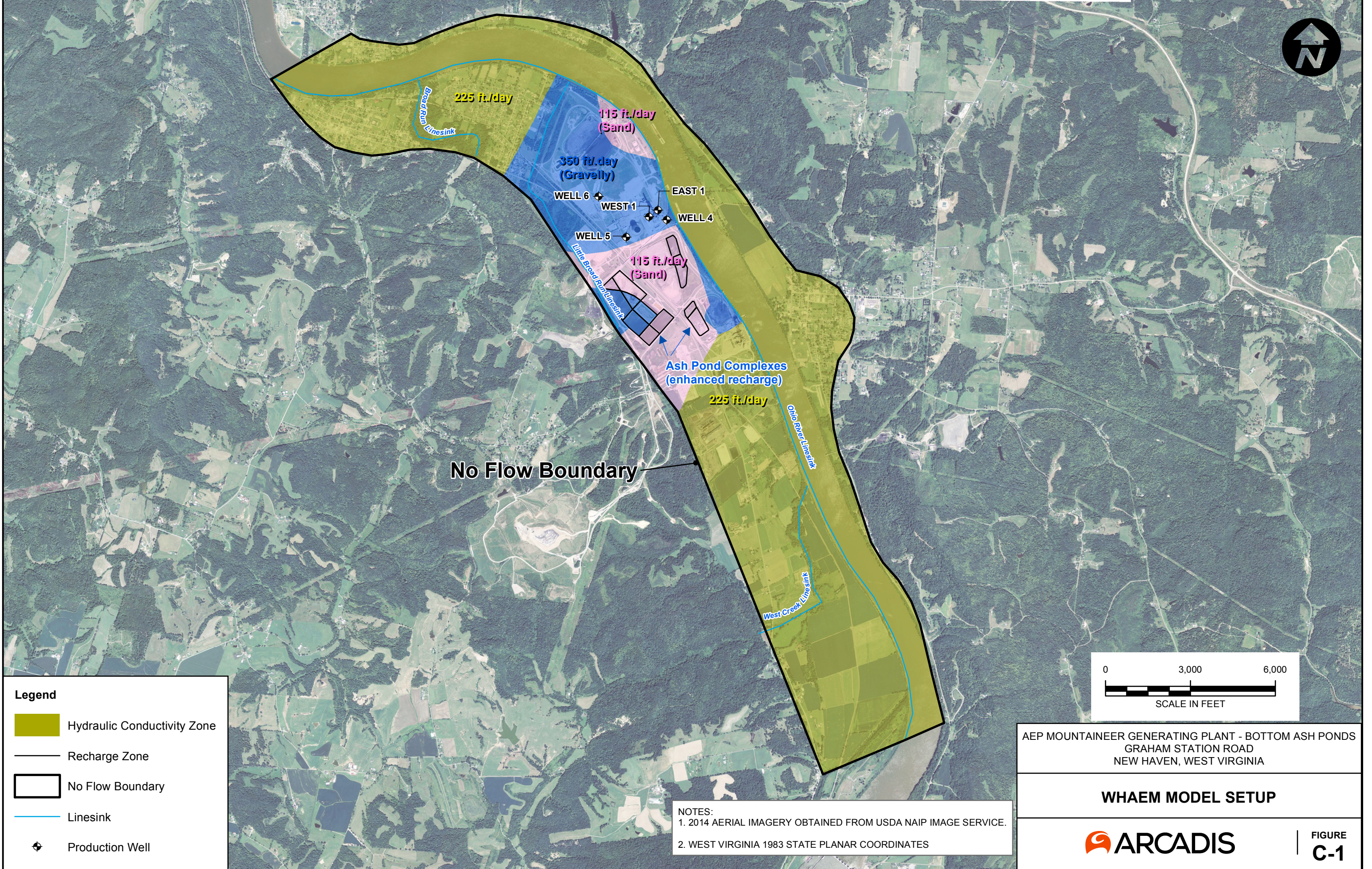
Notes:

- a. Normal operating elevation.
 - b. Pond Bottom surface elevations are from pond design documents and cross-sections (Casagrande Consultants, 1977; EPRI, 1999).
 - c. Mountaineer Ash Pond liner thicknesses was designed to be a minimum of 3 feet thick (Casagrande Consultants, 1977).
 - d. Hydraulic conductivities of low-permeability sediments underlying the ponds was assigned through calibration.
 - e. Wetted area of ponds estimated from aerial photographs.
- cm/sec - centimeters per second
 ft-amsl - feet above mean sea level
 ft/day - feet per day
 ft² - square feet
 ft³/day - cubic feet per day
 mgd - million gallons per day

FIGURES



City: CITRIX Div/Group: IM/DV Created By: K.Ives Last Saved By: webb
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Legend

- Hydraulic Conductivity Zone
- Recharge Zone
- No Flow Boundary
- Linesink
- Production Well

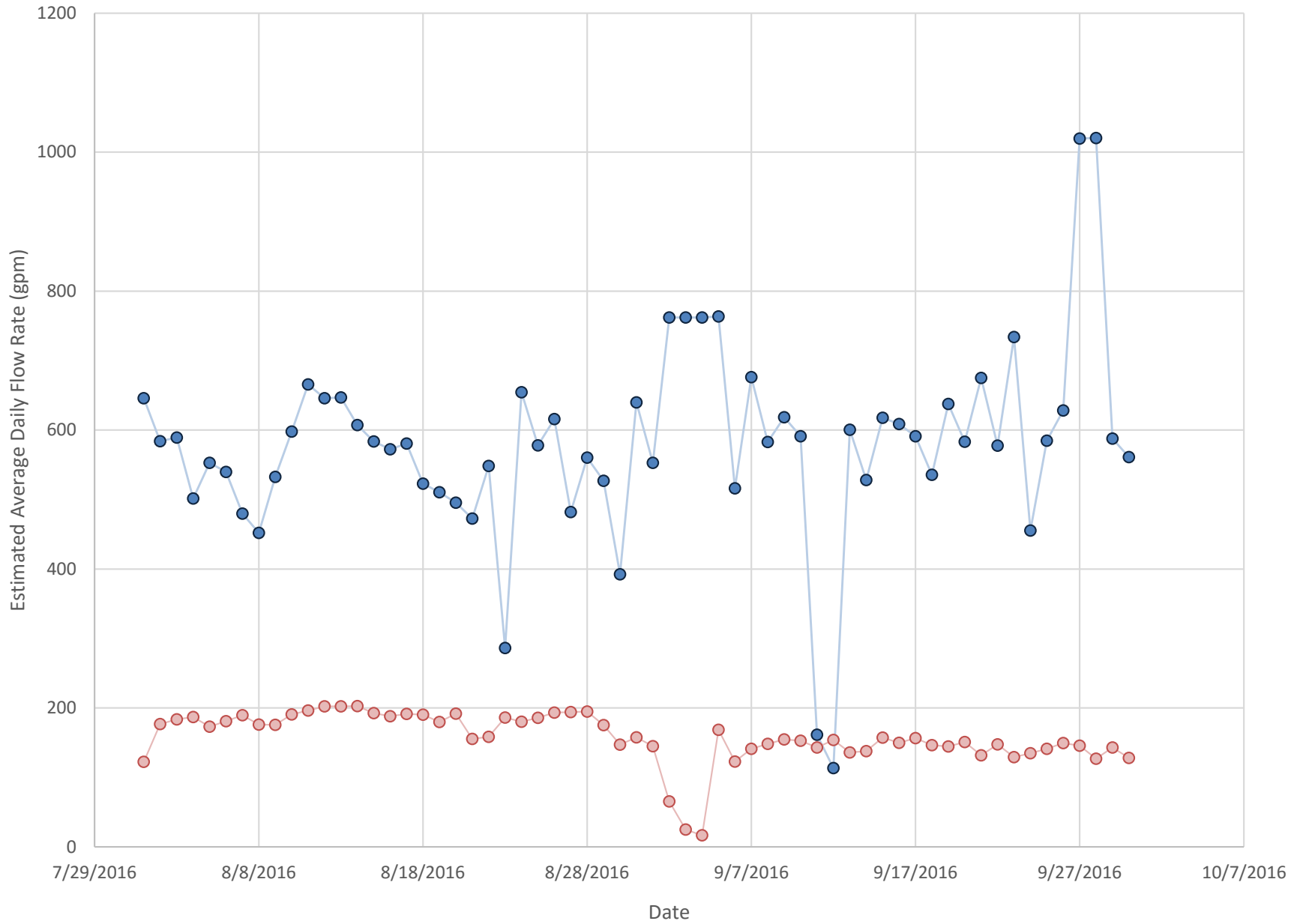
NOTES:
1. 2014 AERIAL IMAGERY OBTAINED FROM USDA NAIP IMAGE SERVICE.
2. WEST VIRGINIA 1983 STATE PLANAR COORDINATES

AEP MOUNTAINEER GENERATING PLANT - BOTTOM ASH PONDS
GRAHAM STATION ROAD
NEW HAVEN, WEST VIRGINIA

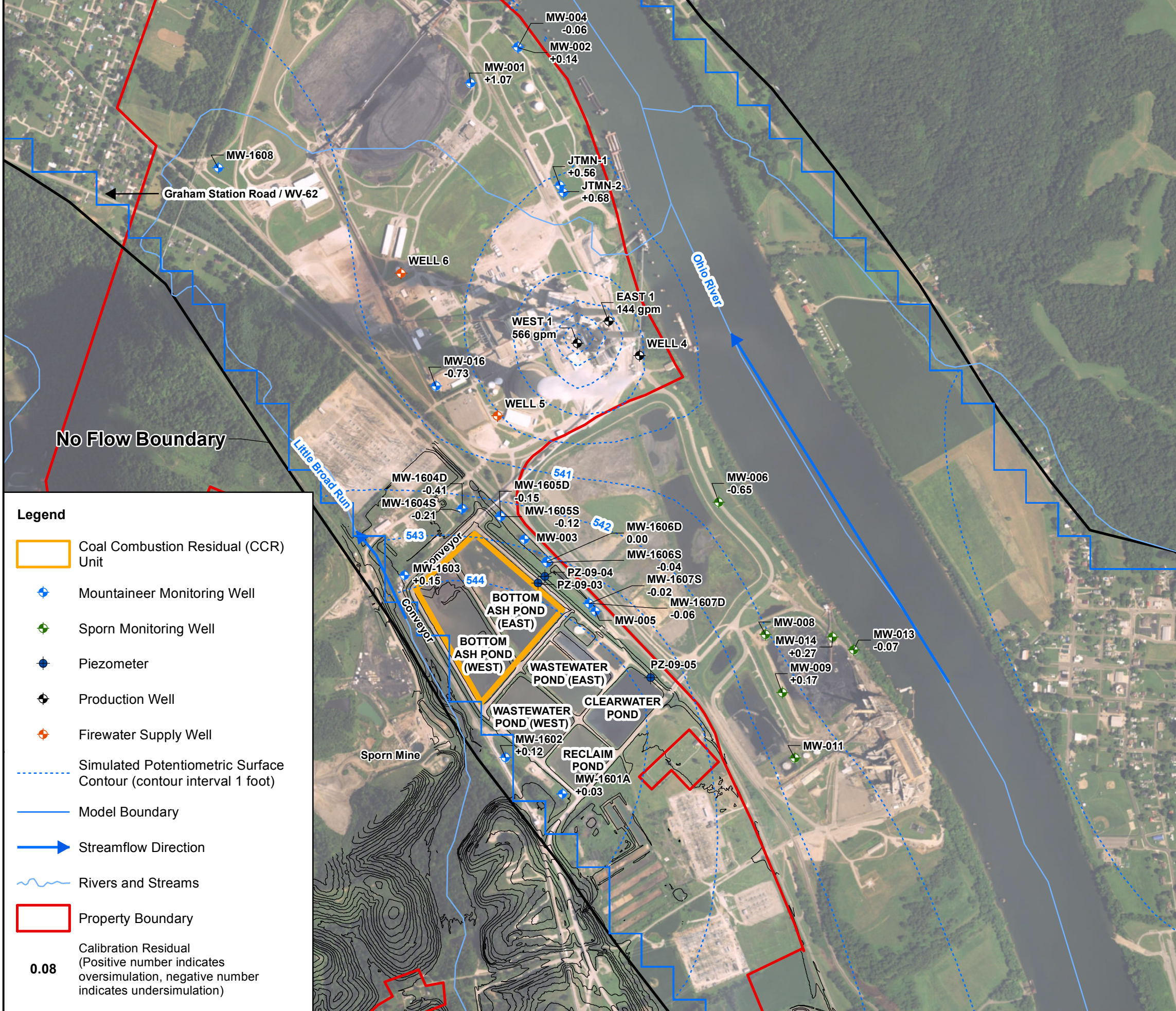
WHAEM MODEL SETUP



FIGURE C-2. MOUNTAINEER PLANT PRODUCTION WELL RECENT DAILY FLOW RATES



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September 2016 Water Levels

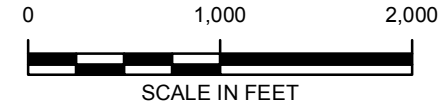
Well ID	GW Elevation (ft-msl)
MW-001	539.25
MW-002	539.95
MW-004	540.15
MW-006	541.20
MW-009	540.97
MW-013	540.33
MW-014	540.08
MW-016	541.30
MW-1601A	544.58
MW-1602	544.76
MW-1603	543.67
MW-1604D	542.74
MW-1604S	542.54
MW-1605D	542.52
MW-1605S	542.51
MW-1606D	543.15
MW-1606S	543.19
MW-1607D	543.56
MW-1607S	543.52
JTMN-1	539.40
JTMN-2	539.24



Legend

- Coal Combustion Residual (CCR) Unit
- ◆ Mountaineer Monitoring Well
- ◆ Sporn Monitoring Well
- Piezometer
- ◆ Production Well
- ◆ Firewater Supply Well
- - - Simulated Potentiometric Surface Contour (contour interval 1 foot)
- Model Boundary
- ➔ Streamflow Direction
- ~ Rivers and Streams
- Property Boundary
- 0.08** Calibration Residual (Positive number indicates oversimulation, negative number indicates undersimulation)

- NOTES:**
1. 2015 AERIAL IMAGERY OBTAINED FROM ESRI IMAGE SERVICE
 2. TOPOGRAPHY FROM AEP DRAWING MTLF_3-20-12_2729SF.DGN
 3. MW-001 THROUGH MW-005 WELL COORDINATE SOURCE: GROUNDWATER QUALITY AT THE PHILIP SPORN AND MOUNTAINEER POWER PLANTS, MASON COUNTY, WEST VIRGINIA. EPRI. JUNE 1999 (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)
 4. MONITORING WELL COORDINATES FOR MW-1601A THROUGH MW-1608 WERE SURVEYED BY AEP IN SEPTEMBER 2016 (WEST VIRGINIA 1927 STATE PLANAR COORDINATES)
 5. ALL OTHER WELL LOCATIONS ARE BASED ON AEP-PROVIDED BORING LOGS (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)

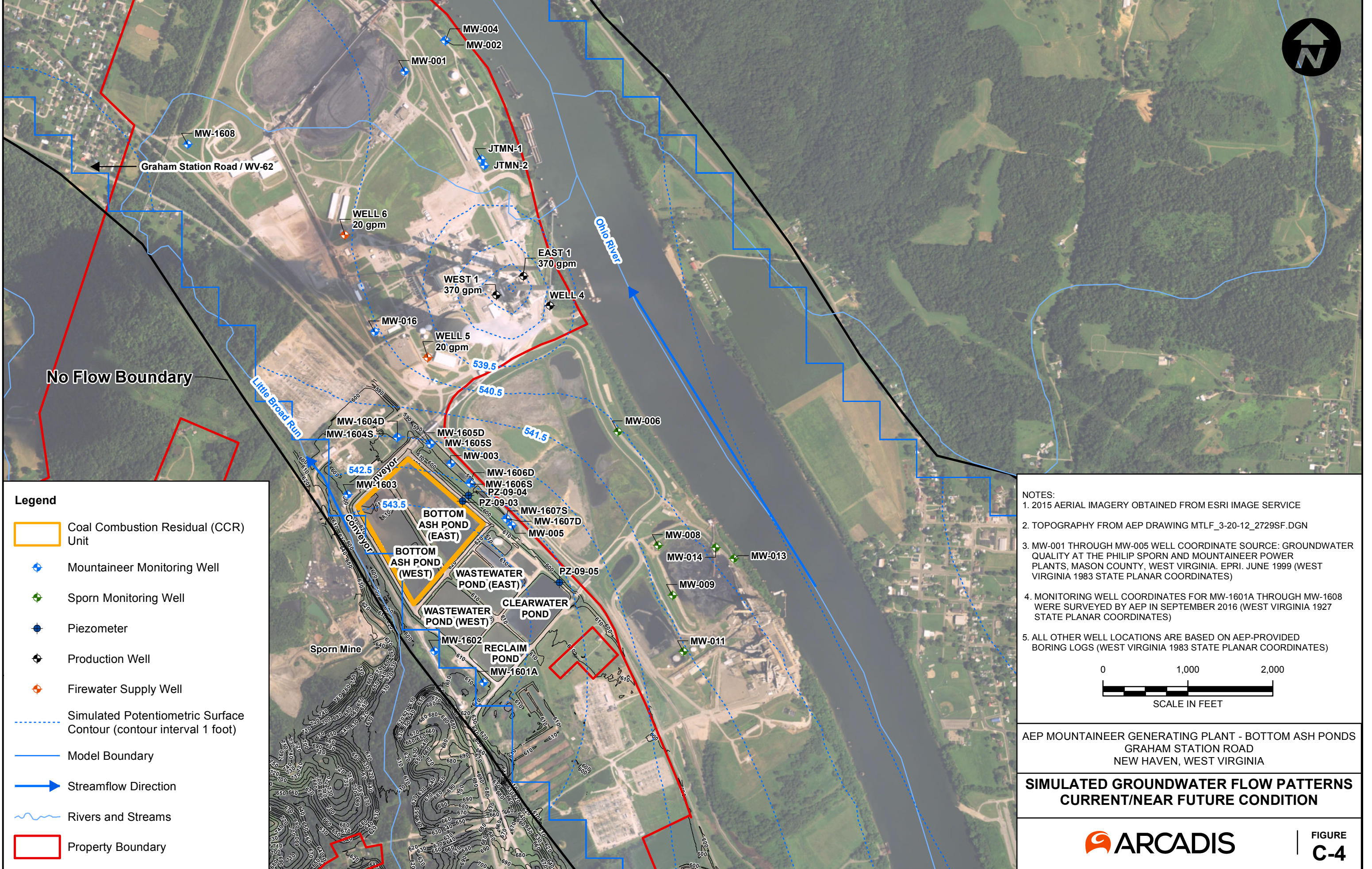


AEP MOUNTAINEER GENERATING PLANT - BOTTOM ASH PONDS
 GRAHAM STATION ROAD
 NEW HAVEN, WEST VIRGINIA

**MODEL CALIBRATION
 SEPTEMBER 2016 GROUNDWATER ELEVATIONS**



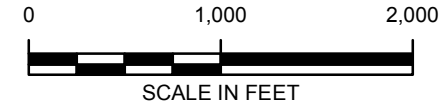
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Legend

- Coal Combustion Residual (CCR) Unit
- ◆ Mountaineer Monitoring Well
- ◆ Sporn Monitoring Well
- Piezometer
- ◆ Production Well
- ◆ Firewater Supply Well
- Simulated Potentiometric Surface Contour (contour interval 1 foot)
- Model Boundary
- ➔ Streamflow Direction
- ~ Rivers and Streams
- Property Boundary

- NOTES:**
1. 2015 AERIAL IMAGERY OBTAINED FROM ESRI IMAGE SERVICE
 2. TOPOGRAPHY FROM AEP DRAWING MTLF_3-20-12_2729SF.DGN
 3. MW-001 THROUGH MW-005 WELL COORDINATE SOURCE: GROUNDWATER QUALITY AT THE PHILIP SPORN AND MOUNTAINEER POWER PLANTS, MASON COUNTY, WEST VIRGINIA. EPRI. JUNE 1999 (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)
 4. MONITORING WELL COORDINATES FOR MW-1601A THROUGH MW-1608 WERE SURVEYED BY AEP IN SEPTEMBER 2016 (WEST VIRGINIA 1927 STATE PLANAR COORDINATES)
 5. ALL OTHER WELL LOCATIONS ARE BASED ON AEP-PROVIDED BORING LOGS (WEST VIRGINIA 1983 STATE PLANAR COORDINATES)



AEP MOUNTAINEER GENERATING PLANT - BOTTOM ASH PONDS
 GRAHAM STATION ROAD
 NEW HAVEN, WEST VIRGINIA

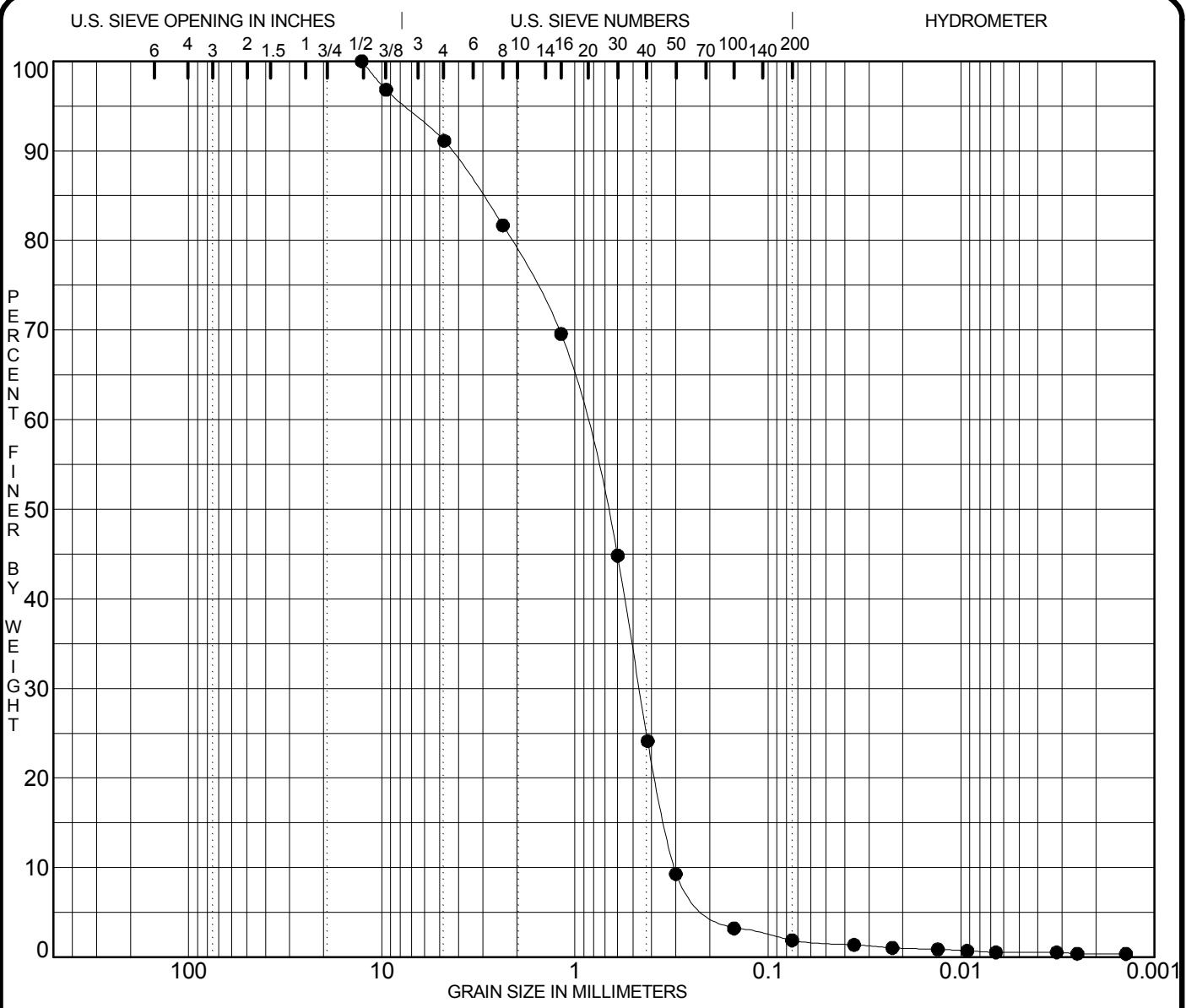
**SIMULATED GROUNDWATER FLOW PATTERNS
CURRENT/NEAR FUTURE CONDITION**



APPENDIX D

Soil Property Testing



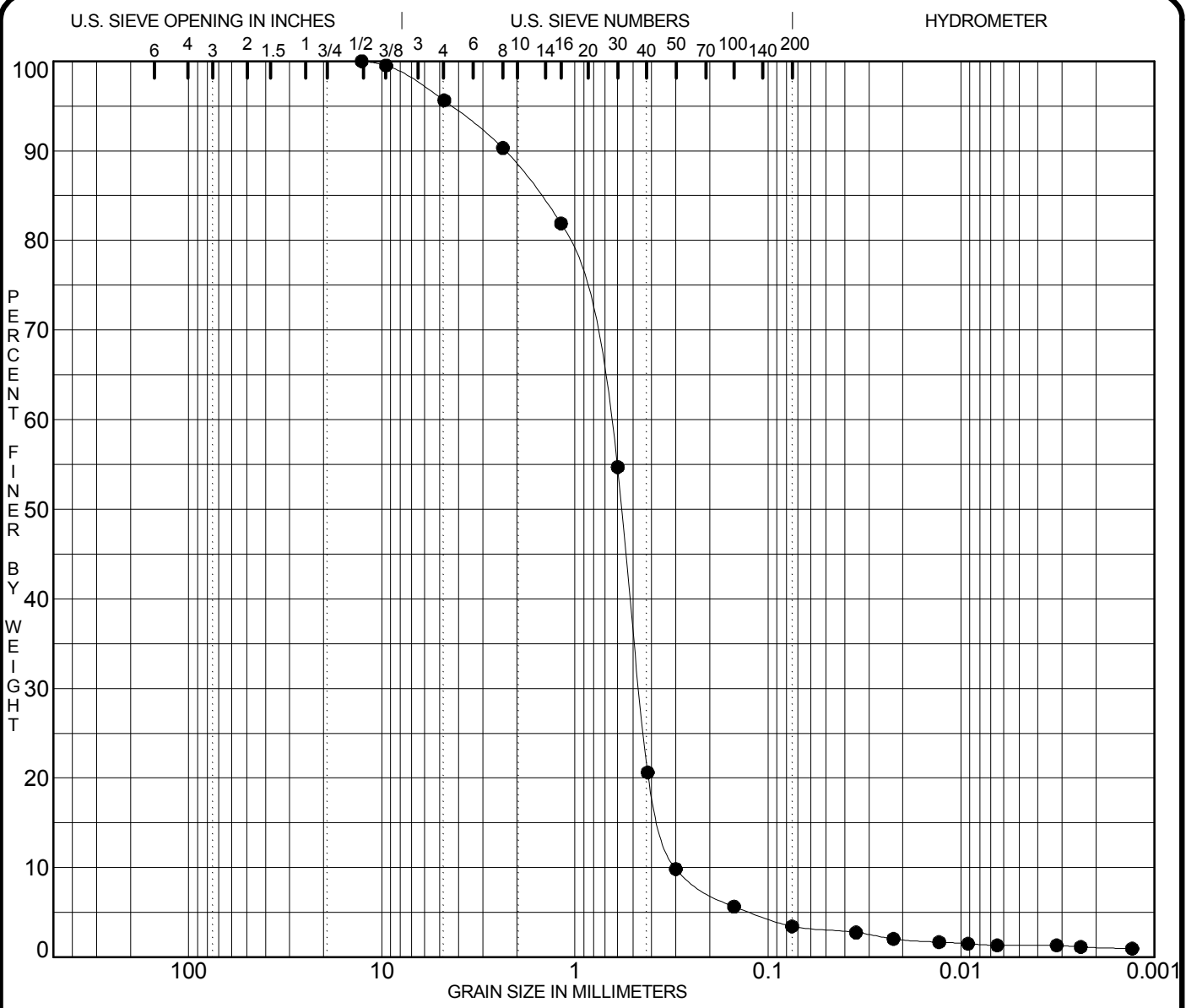


COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification					MC%	LL	PL	PI	Sp.Gr.
● MW-1601A 66.0-76.0	POORLY GRADED SAND SP					4.8				
ELEVATION										
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● MW-1601A 66.0-76.0	12.700	0.908	0.465	0.305	8.9	89.2	1.3	0.5		

PROJECT Mountaineer CCR Compliance - JOB NO. _____ DATE 7/27/16



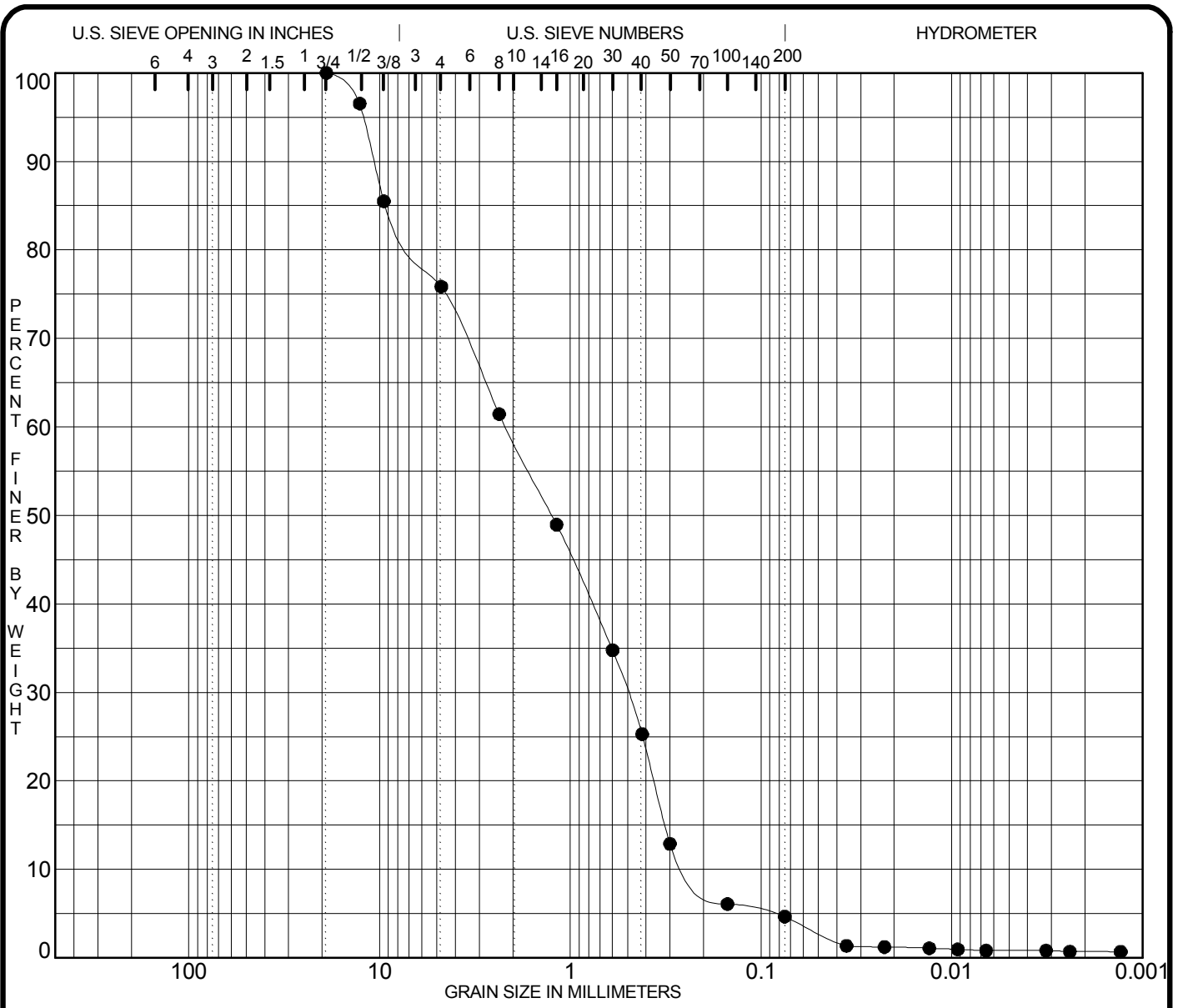


COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification					MC%	LL	PL	PI	Sp.Gr.
● MW-1602 61.0-71.0	POORLY GRADED SAND SP					17.9				
ELEVATION										
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● MW-1602 61.0-71.0	12.700	0.684	0.463	0.301	4.4	92.2	2.1	1.3		

PROJECT Mountaineer CCR Compliance - JOB NO. _____ DATE 7/27/16





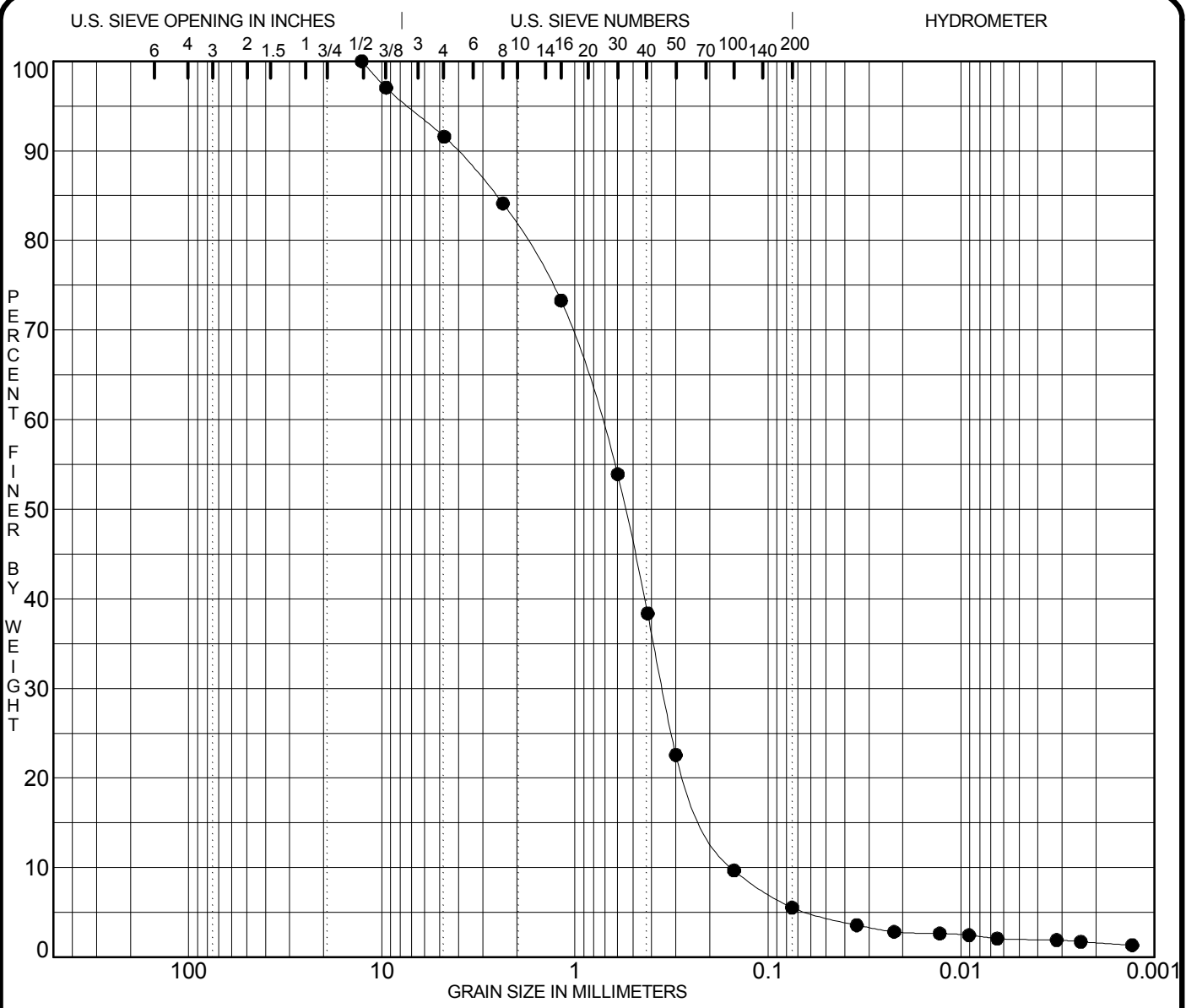
COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification				MC%	LL	PL	PI	Sp.Gr.
● MW-1603 60.0-75.0					15.7				
	POORLY GRADED SAND with GRAVEL SP								
	ELEVATION								
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%clay	
● MW-1603 60.0-75.0	19.000	2.178	0.501	0.224	24.1	71.2	3.8	0.8	

PROJECT Mountaineer CCR Compliance -

JOB NO. _____
DATE 7/27/16



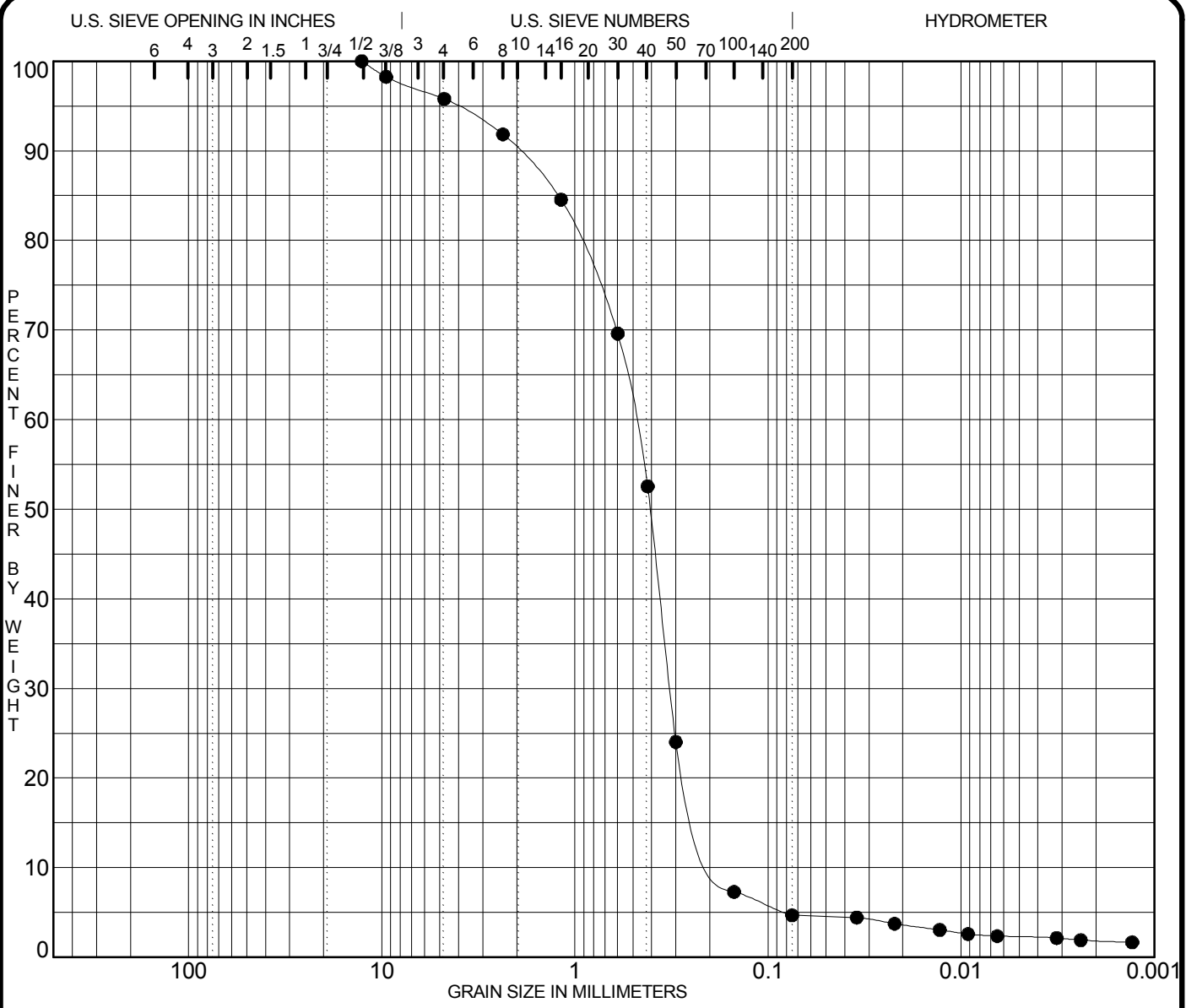


COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification				MC%	LL	PL	PI	Sp.Gr.
● MW-1604d 69.0-79.0	POORLY GRADED SAND with SILT SP-SM				15.2	NP	NP	NP	
ELEVATION									
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
● MW-1604d 69.0-79.0	12.700	0.742	0.351	0.153	8.4	86.0	3.5	2.0	

PROJECT Mountaineer CCR Compliance - JOB NO. _____ DATE 7/27/16



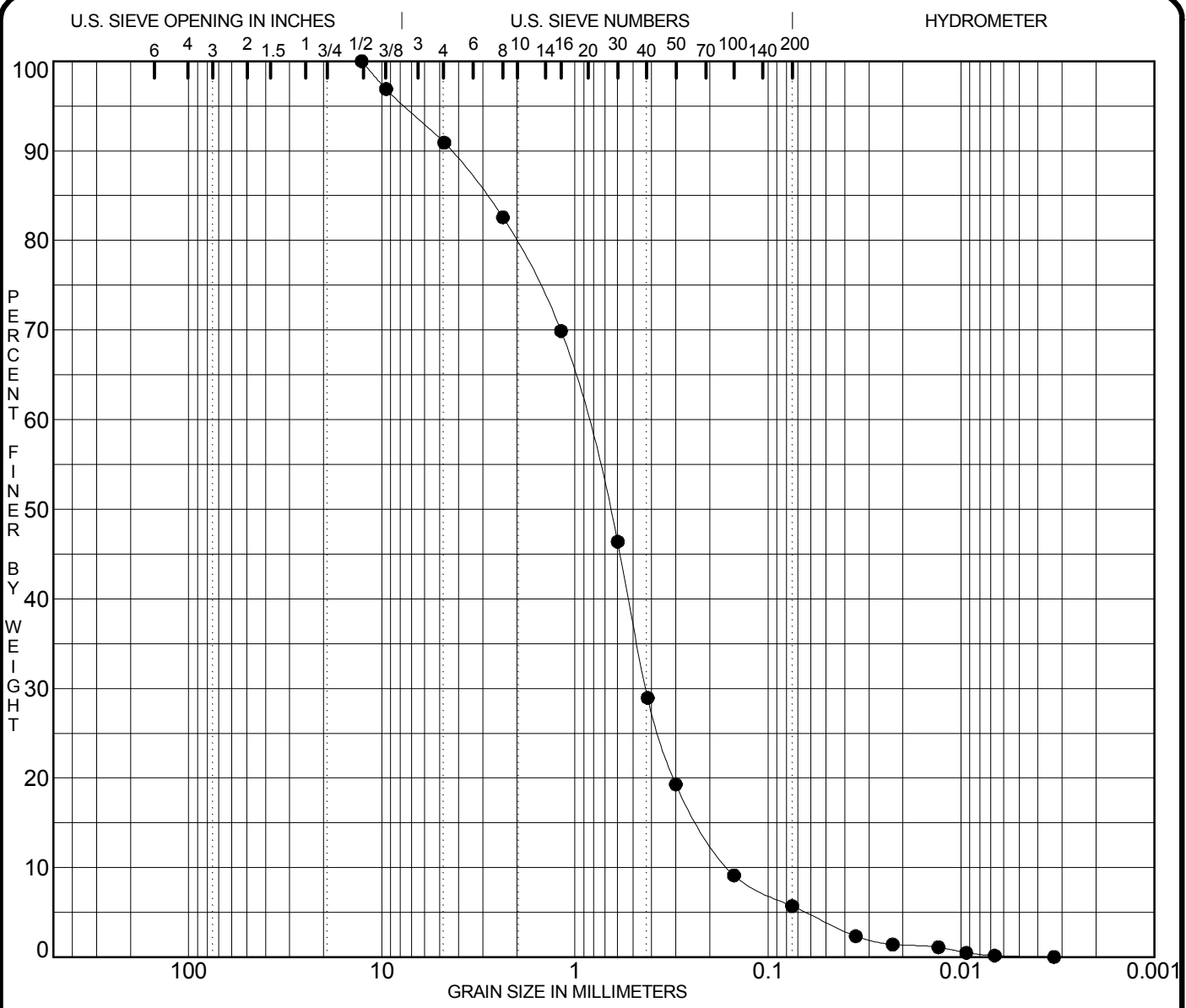


COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification				MC%	LL	PL	PI	Sp.Gr.
● MW-1604s 49.0-59.0	POORLY GRADED SAND SP				17.4	NP	NP	NP	
ELEVATION									
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
● MW-1604s 49.0-59.0	12.700	0.491	0.322	0.168	4.2	91.1	2.4	2.3	

PROJECT Mountaineer CCR Compliance - JOB NO. _____ DATE 7/27/16



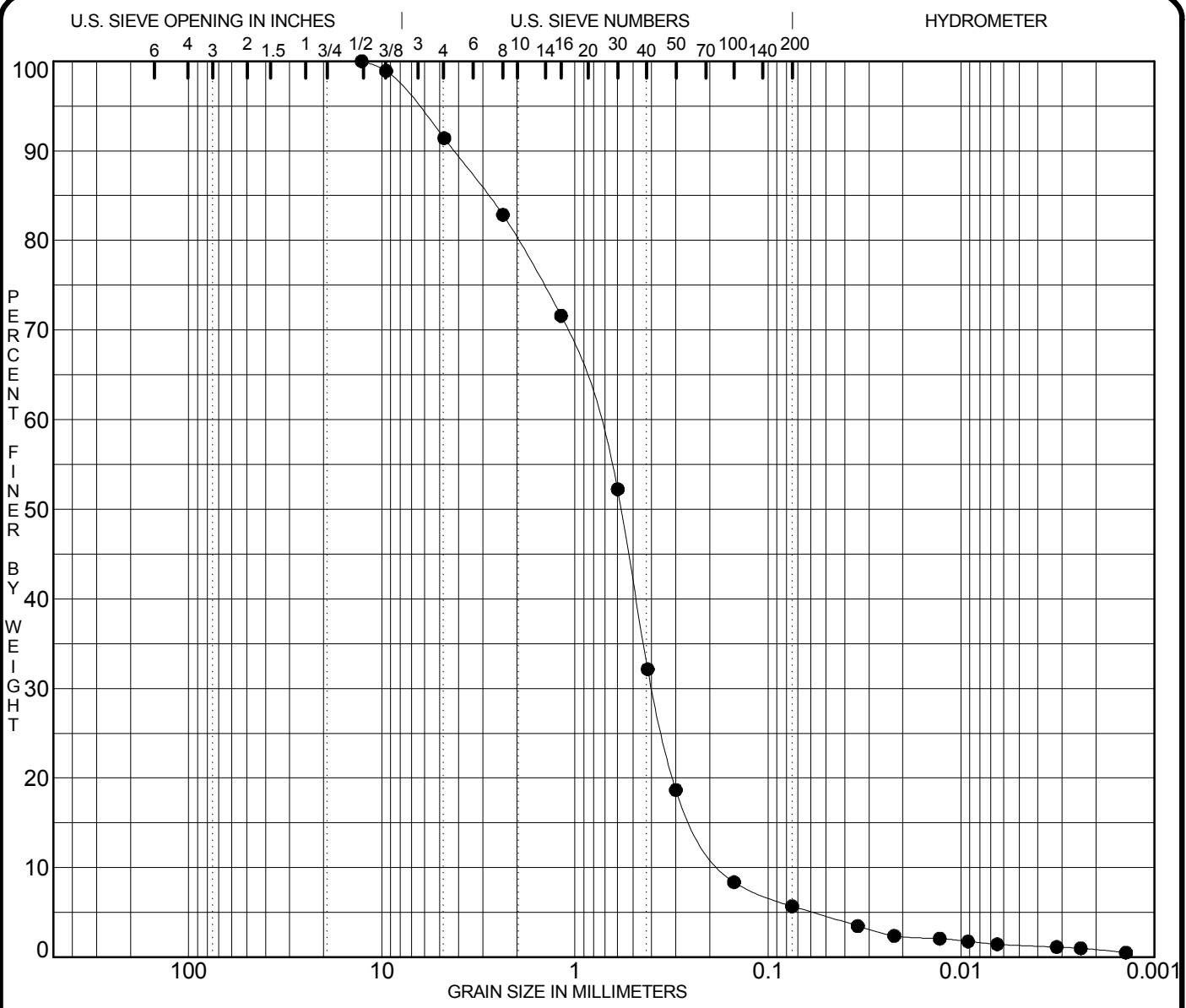


COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification					MC%	LL	PL	PI	Sp.Gr.
● MW-1605d 69.0-79.0	POORLY GRADED SAND with SILT SP-SM					16.1	NP	NP	NP	
ELEVATION										
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%clay		
● MW-1605d 69.0-79.0	12.700	0.888	0.429	0.159	9.1	85.2	5.6	0.1		

PROJECT Mountaineer CCR Compliance - JOB NO. _____ DATE 7/27/16



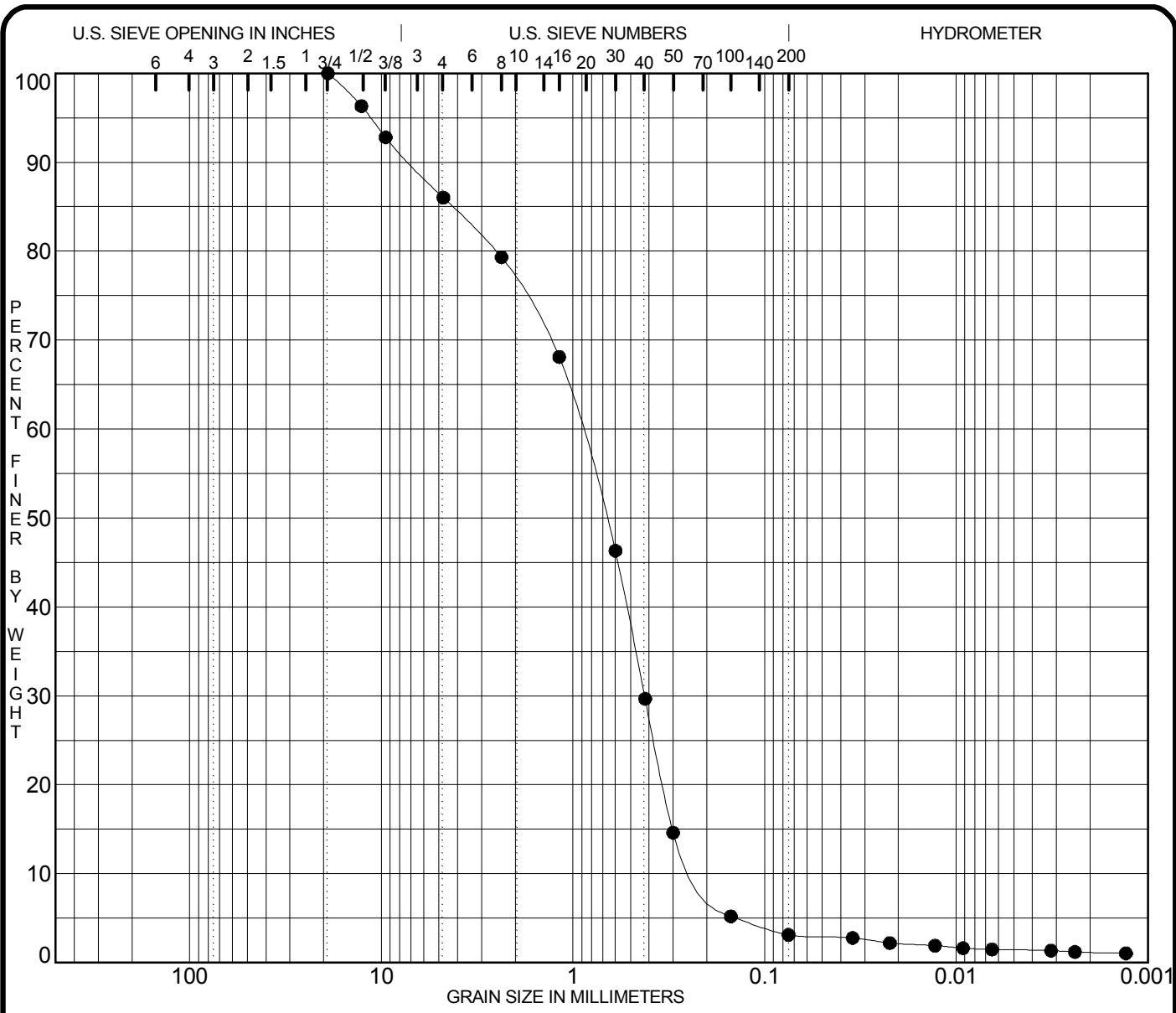


COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification				MC%	LL	PL	PI	Sp.Gr.
● MW-1605s 49.0-59.0	POORLY GRADED SAND with SILT SP-SM				18.1	NP	NP	NP	
ELEVATION									
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%clay	
● MW-1605s 49.0-59.0	12.700	0.787	0.398	0.167	8.6	85.7	4.4	1.3	

PROJECT Mountaineer CCR Compliance - JOB NO. _____ DATE 7/27/16





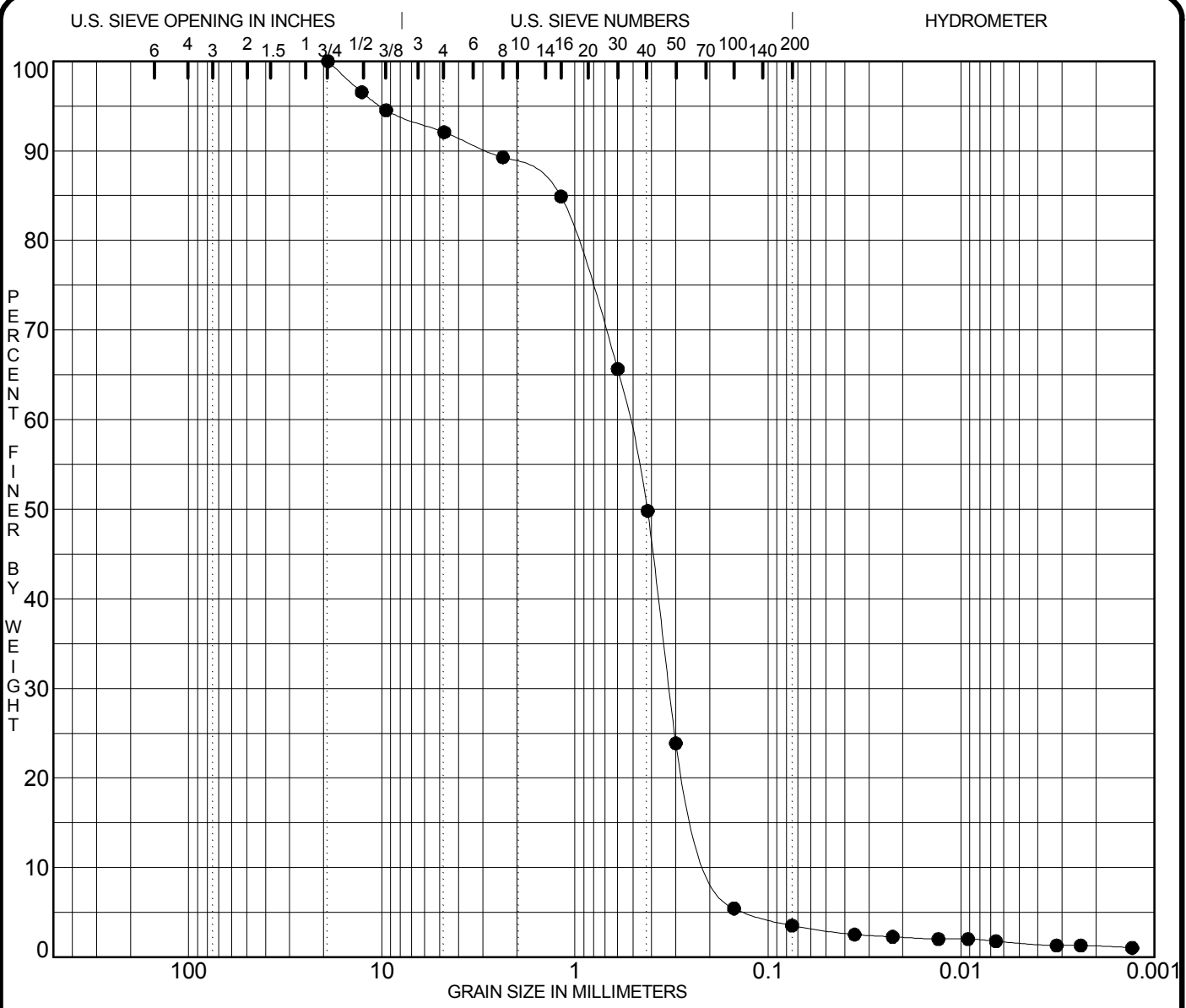
COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification					MC%	LL	PL	PI	Sp.Gr.
● MW-1606d 65.0-75.0						15.4				
POORLY GRADED SAND SP										
ELEVATION										
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%clay		
● MW-1606d 65.0-75.0	19.000	0.917	0.423	0.214	14.0	82.9	1.7	1.4		

PROJECT Mountaineer CCR Compliance - JOB NO. _____ DATE 7/27/16

GRADATION CURVES
American Electric Power Service Corp.



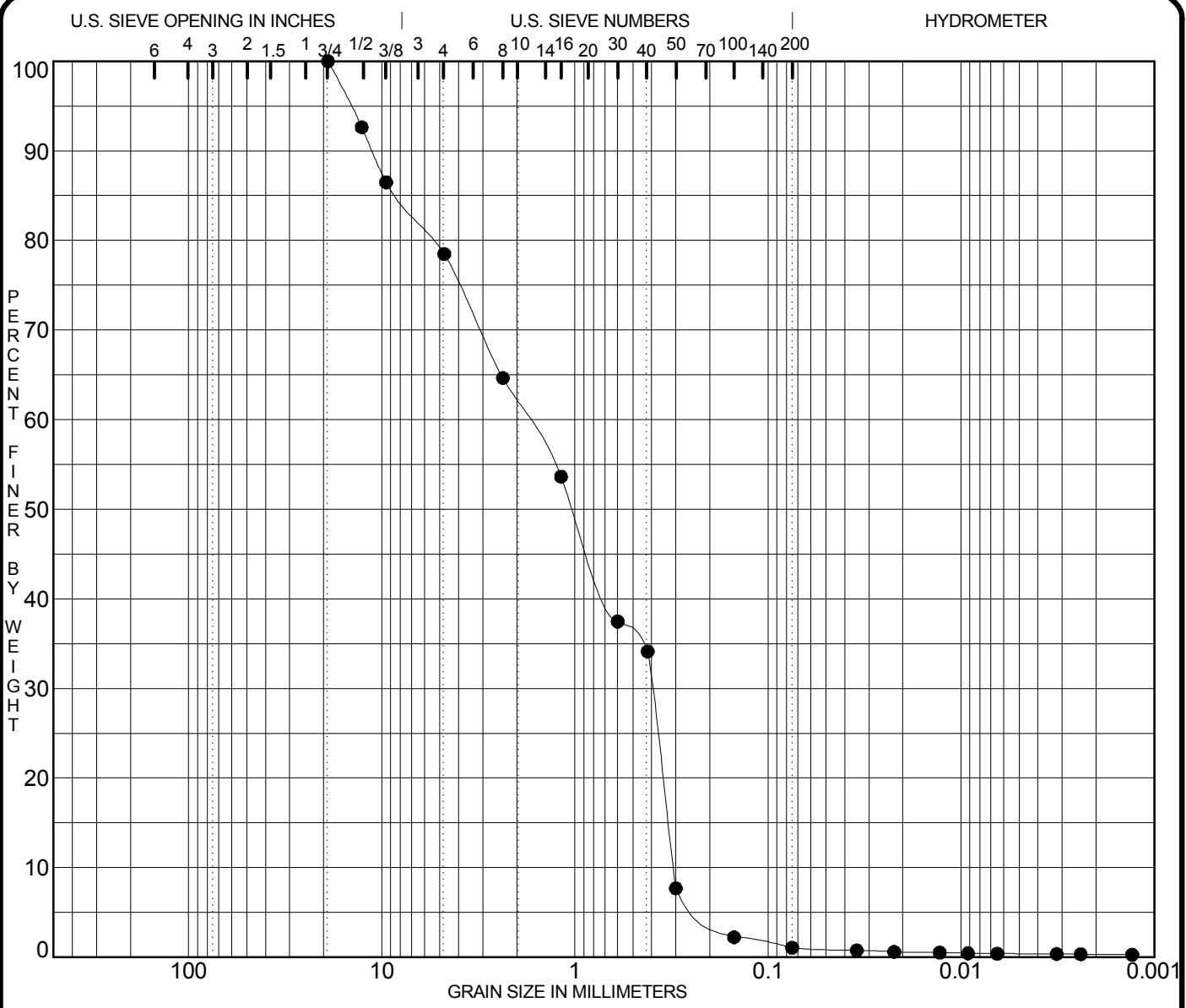


COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification				MC%	LL	PL	PI	Sp.Gr.
● MW-1606s 45.0-55.0	POORLY GRADED SAND SP				22.5	NP	NP	NP	
ELEVATION									
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay	
● MW-1606s 45.0-55.0	19.000	0.528	0.325	0.178	7.9	88.5	1.9	1.6	

PROJECT Mountaineer CCR Compliance - JOB NO. _____ DATE 7/27/16



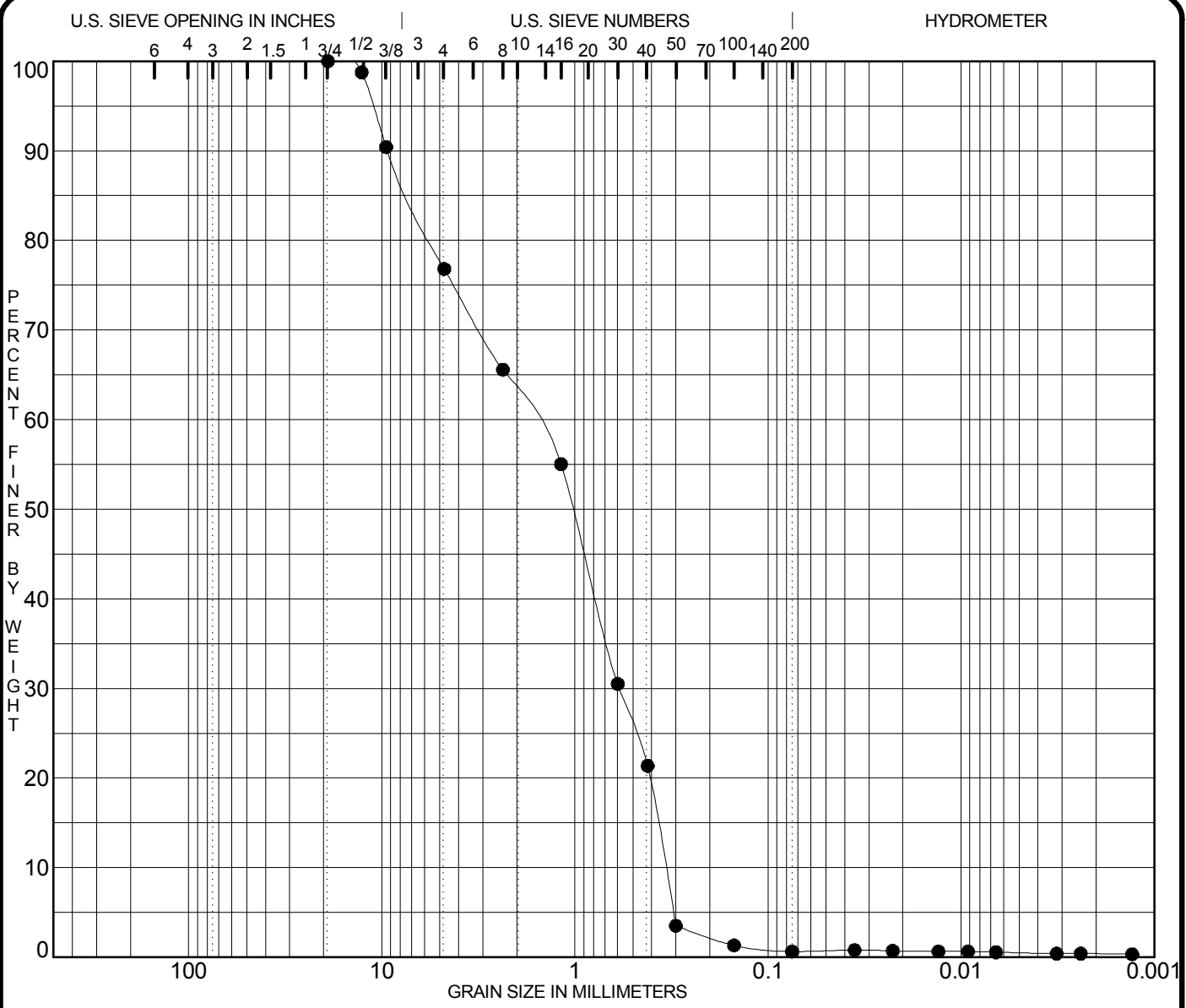


COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification					MC%	LL	PL	PI	Sp.Gr.
● MW-1607d 70.0-80.0	POORLY GRADED SAND with GRAVEL SP					27.9				
ELEVATION										
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● MW-1607d 70.0-80.0	19.000	1.762	0.399	0.309	21.5	77.4	0.7	0.4		

PROJECT Mountaineer CCR Compliance - JOB NO. _____ DATE 9/29/16



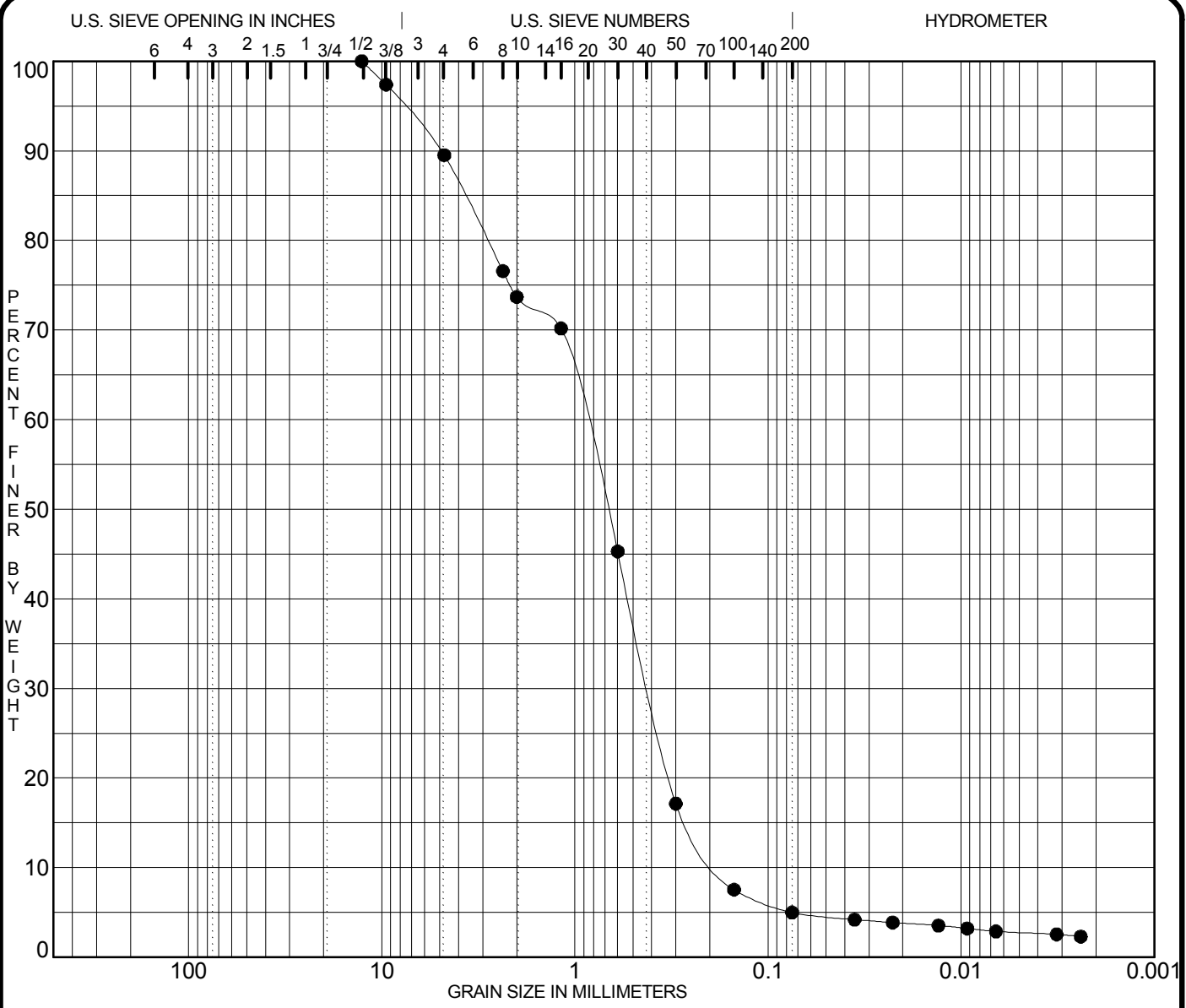


COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification					MC%	LL	PL	PI	Sp.Gr.
● MW-1607s 56.0-60.0	POORLY GRADED SAND with GRAVEL SP					17.6				
ELEVATION										
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● MW-1607s 56.0-60.0	19.000	1.636	0.588	0.339	23.2	76.2	0.1	0.5		

PROJECT Mountaineer CCR Compliance - JOB NO. _____ DATE 9/29/16





COBBLES	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

Specimen Identification	Classification					MC%	LL	PL	PI	Sp.Gr.
● MW-1608 46'-56'						13.6				
POORLY GRADED SAND SP										
ELEVATION										
Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay		
● MW-1608 46'-56'	12.700	0.895	0.412	0.179	10.5	84.5	2.2	2.8		

PROJECT Mountaineer CCR Compliance - JOB NO. _____ DATE 7/27/16

GRADATION CURVES
American Electric Power Service Corp.



APPENDIX E

Slug Testing Results



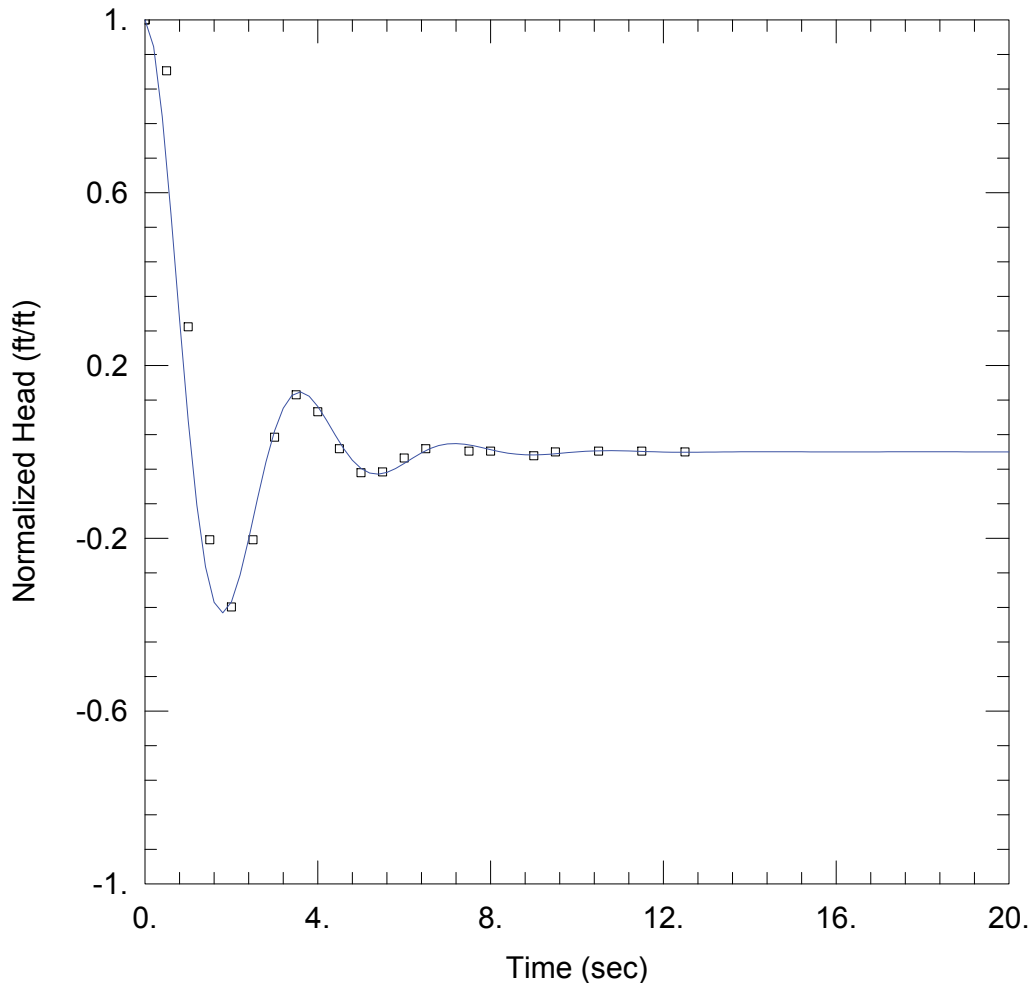
MW-1601A Test 3

Prepared By:
ARCADIS

Prepared For:
AEP

Project:
OH015976.0009

Location:
Mountaineer, WV



SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 0.075 cm/sec Le = 9.516 ft

AQUIFER DATA

Saturated Thickness: 16.5 ft

WELL DATA (MW-1601A Test 3)

Initial Displacement: 0.56 ft
Static Water Column Height: 11.5 ft
Total Well Penetration Depth: 11.5 ft
Screen Length: 10. ft
Casing Radius: 0.0833 ft
Well Radius: 0.3437 ft

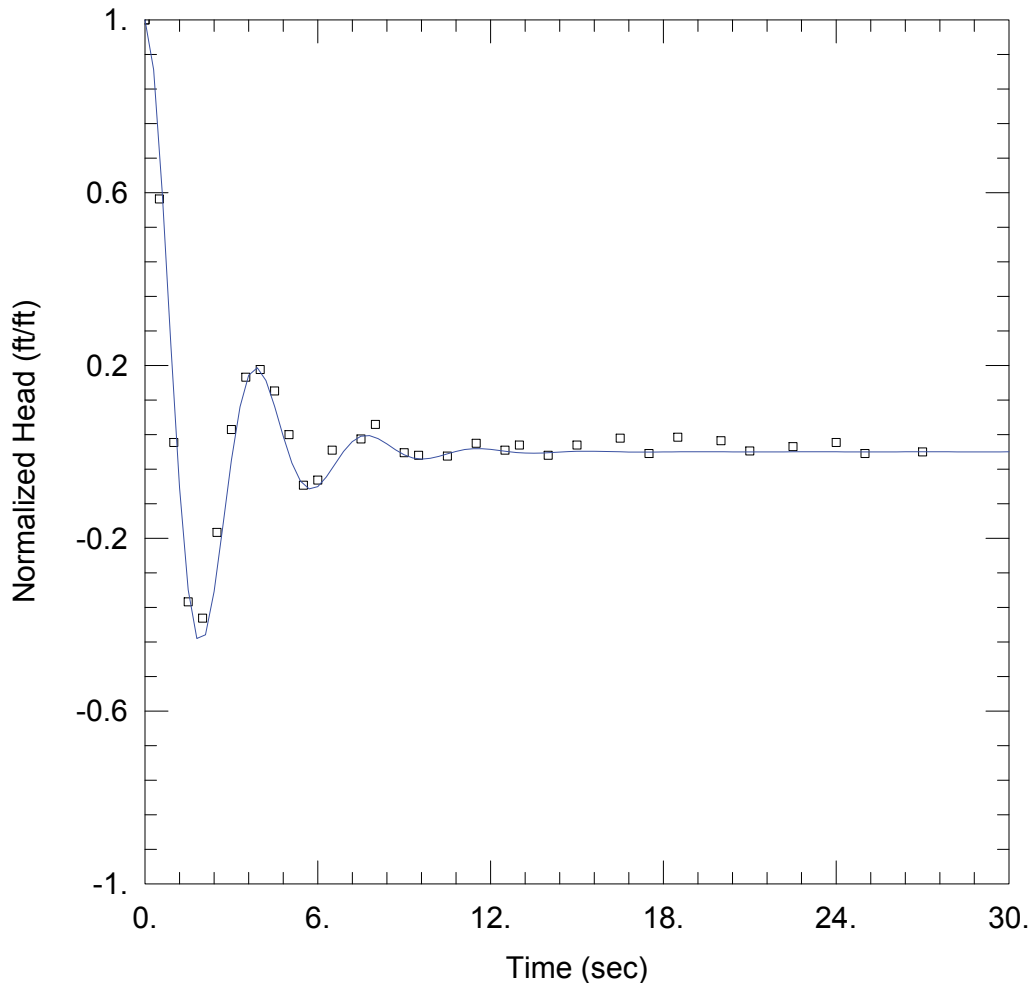
MW-1603 Test 1

Prepared By:
ARCADIS

Prepared For:
AEP

Project:
OH015976.0009

Location:
Mountaineer, WV



SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 0.071 cm/sec Le = 11.3 ft

AQUIFER DATA

Saturated Thickness: 17.9 ft

WELL DATA (MW-1603 Test 1)

Initial Displacement: 0.504 ft
Static Water Column Height: 17.9 ft
Total Well Penetration Depth: 17.9 ft
Screen Length: 15. ft
Casing Radius: 0.0833 ft
Well Radius: 0.3437 ft

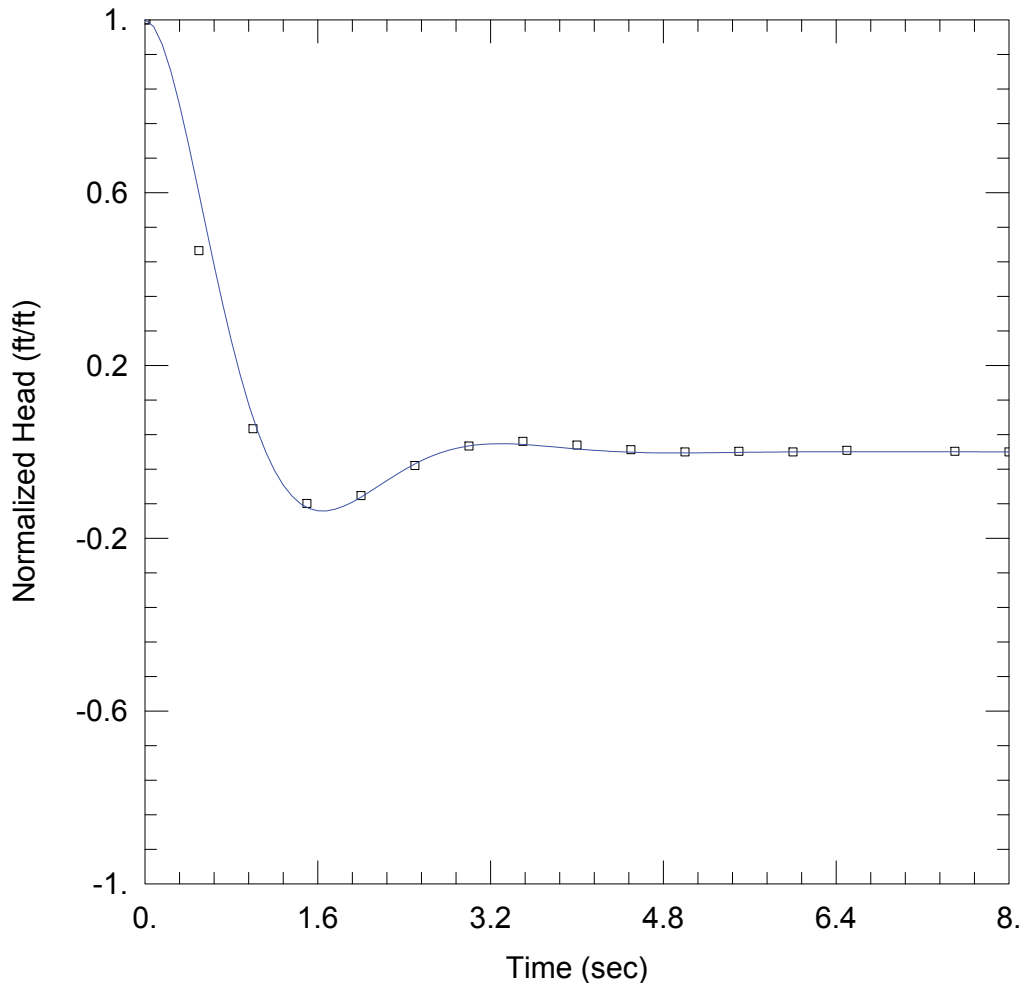
MW-1605S Test 3

Prepared By:
ARCADIS

Prepared For:
AEP

Project:
OH015976.0009

Location:
Mountaineer, WV



SOLUTION

Aquifer Model: Unconfined

Solution Method: Springer-Gelhar

K = 0.052 cm/sec

Le = 6.301 ft

AQUIFER DATA

Saturated Thickness: 37. ft

WELL DATA (MW-1605S Test 3)

Initial Displacement: 0.82 ft

Static Water Column Height: 14.9 ft

Total Well Penetration Depth: 14.9 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3437 ft

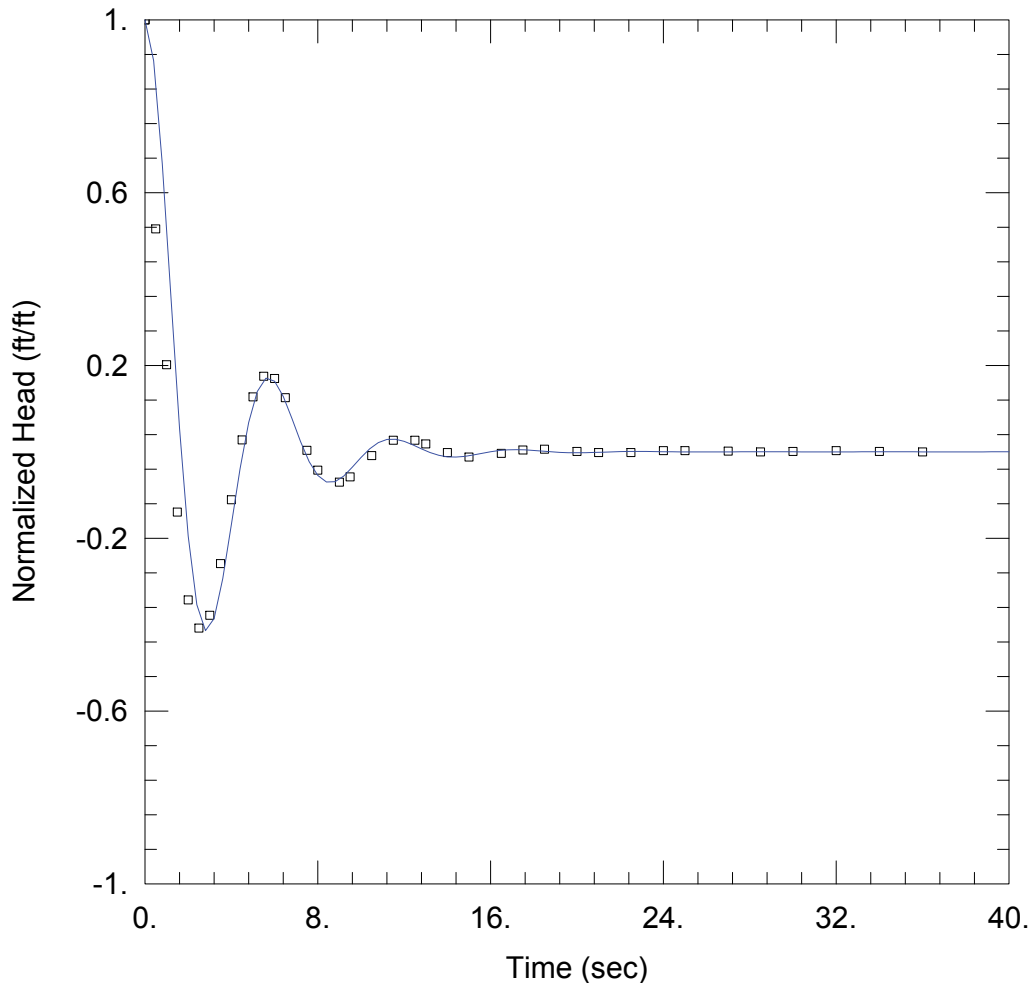
MW-1605D Test 3

Prepared By:
ARCADIS

Prepared For:
AEP

Project:
OH015976.0009

Location:
Mountaineer, WV



SOLUTION

Aquifer Model: Unconfined

Solution Method: Springer-Gelhar

K = 0.067 cm/sec

Le = 24.68 ft

AQUIFER DATA

Saturated Thickness: 37 ft

WELL DATA (MW-1605D Test 3)

Initial Displacement: 1.155 ft

Static Water Column Height: 35.32 ft

Total Well Penetration Depth: 35.32 ft

Screen Length: 10 ft

Casing Radius: 0.0833 ft

Well Radius: 0.3437 ft

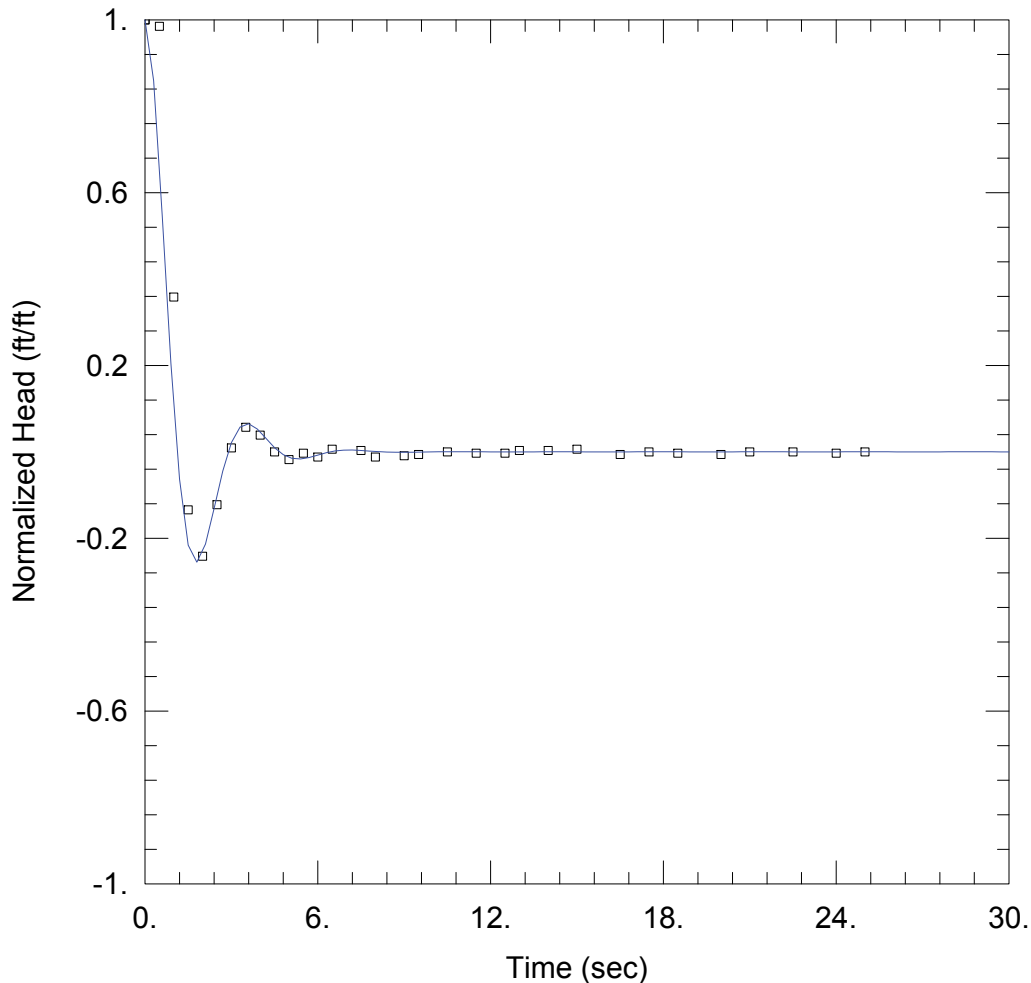
MW-1607S Test 1

Prepared By:
ARCADIS

Prepared For:
AEP

Project:
OH015976.0009

Location:
Mountaineer, WV



SOLUTION

Aquifer Model: Unconfined

Solution Method: Springer-Gelhar

K = 0.066 cm/sec

Le = 8.612 ft

AQUIFER DATA

Saturated Thickness: 37. ft

WELL DATA (MW-1607S Test 1)

Initial Displacement: 0.335 ft

Static Water Column Height: 23.2 ft

Total Well Penetration Depth: 23.2 ft

Screen Length: 10. ft

Casing Radius: 0.0833 ft

Well Radius: 0.3437 ft

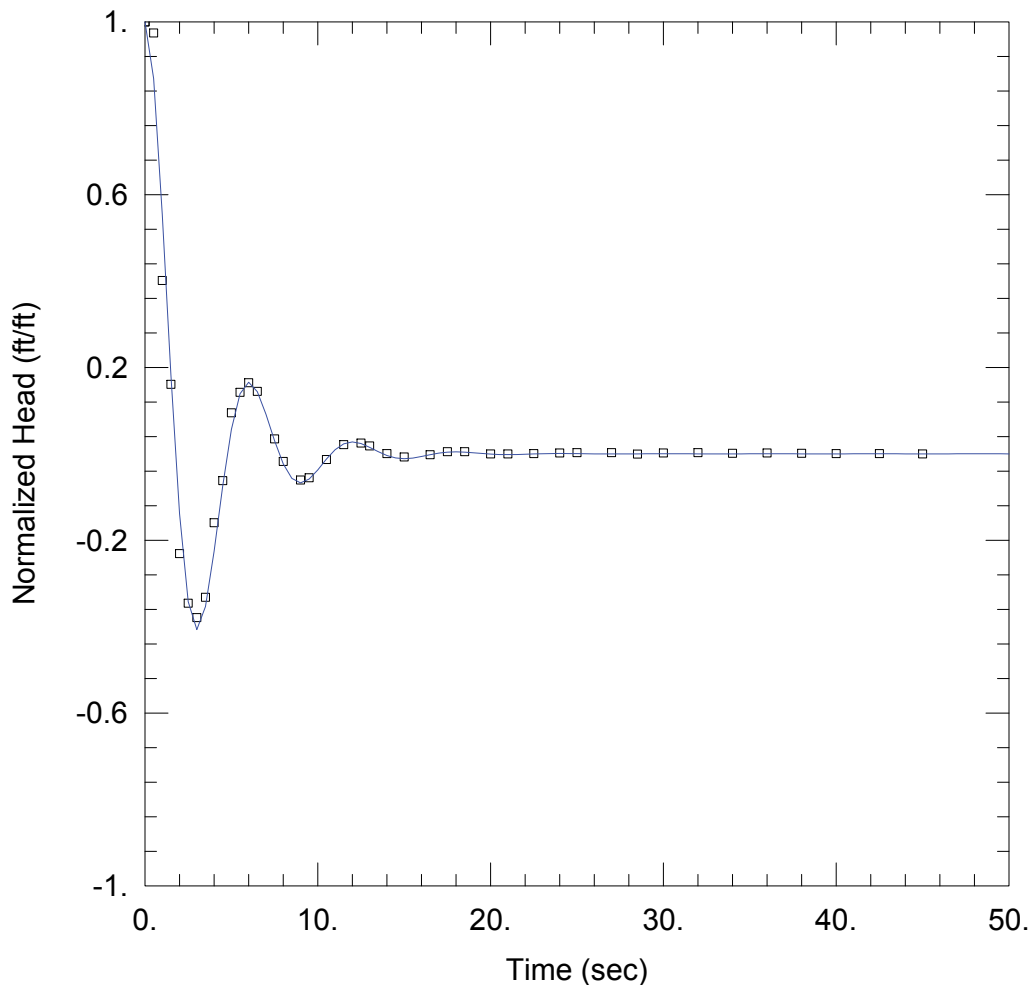
MW-1607D Test 3

Prepared By:
ARCADIS

Prepared For:
AEP

Project:
OH015976.0009

Location:
Mountaineer, WV



SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 0.059 cm/sec Le = 27.11 ft

AQUIFER DATA

Saturated Thickness: 37 ft

WELL DATA (MW-1607D Test 3)

Initial Displacement: 1.356 ft
Static Water Column Height: 32.81 ft
Total Well Penetration Depth: 32.03 ft
Screen Length: 10 ft
Casing Radius: 0.0833 ft
Well Radius: 0.3437 ft

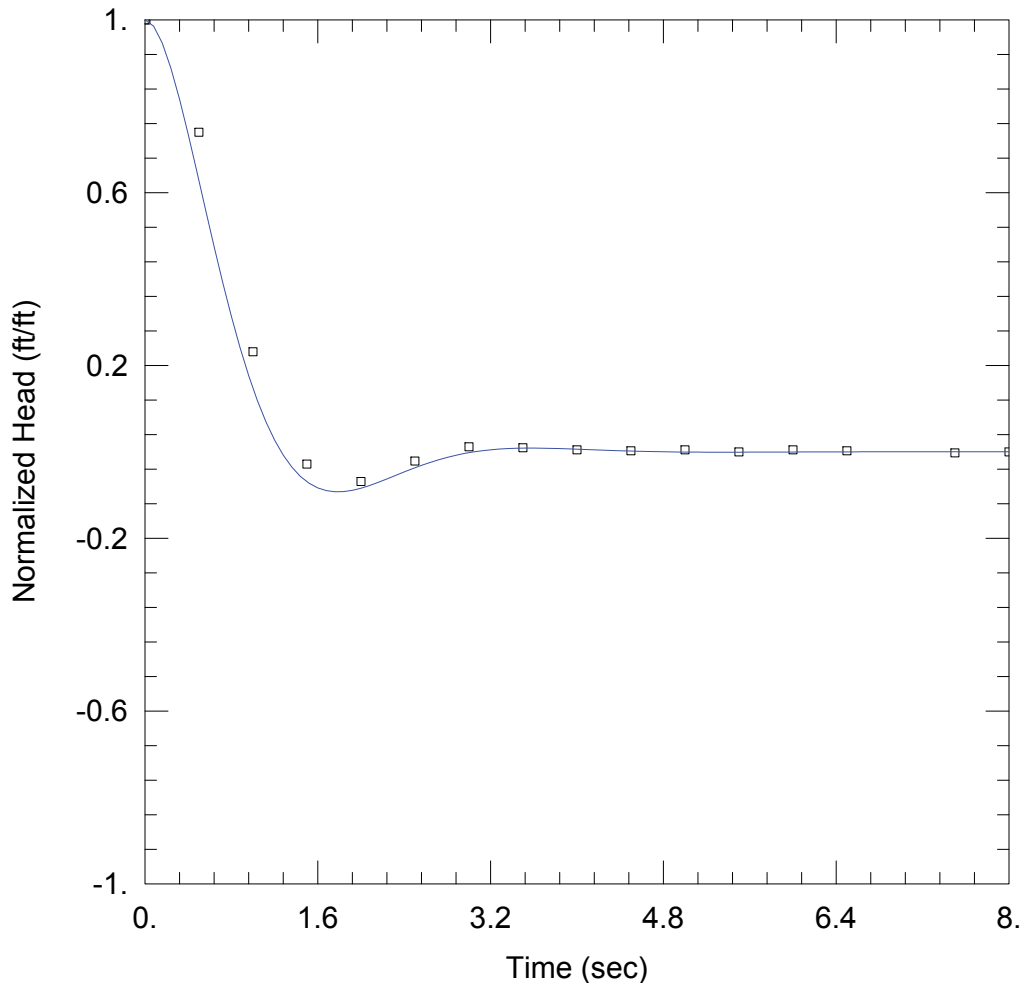
MW-1608 Test 2

Prepared By:
ARCADIS

Prepared For:
AEP

Project:
OH015976.0009

Location:
Mountaineer, WV



SOLUTION

Aquifer Model: Unconfined
Solution Method: Springer-Gelhar

K = 0.072 cm/sec Le = 6.607 ft

AQUIFER DATA

Saturated Thickness: 60. ft

WELL DATA (MW-1608 Test 2)

Initial Displacement: 0.423 ft
Static Water Column Height: 60. ft
Total Well Penetration Depth: 60. ft
Screen Length: 10. ft
Casing Radius: 0.0833 ft
Well Radius: 0.3437 ft

APPENDIX F

Field Methodology



APPENDIX F – FIELD METHODOLOGY

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

- Installation of 13 unconsolidated borings
- Installation and development of 12 new monitoring wells
- The redevelopment of 6 existing monitoring wells

Arcadis provided oversight for drilling of 13 unconsolidated borings that resulted in installation of 12 monitoring wells by a licensed drilling company (DLZ). One unconsolidated borings was sealed due to not encountering groundwater before reaching refusal at the soil-rock interface (SB-1601). Implementation of the field activities began with utility clearance activities beginning April 18, 2016. Additional utility location was completed on May 16, 2016 and May 24, 2016. Drilling operations began on April 25, 2016 and ended on June 10, 2016.

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 borings locations. Arcadis retained the services of a utility locating 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 8 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 pad was constructed for decontamination of the down-hole tools. Containerization was not required for decontamination water, if directed to the leachate system. Water for decontamination or drilling was potable and obtained from the AEP Mountaineer Plant.

Borehole Advancement and Stratigraphy/Lithology

Unconsolidated boreholes were drilled using standard hollow-stem auger methods with a minimum 4.25" inner diameter auger in accordance with ASTM D5784 until the soil-rock interface was encountered, or until the pre-determined termination depth was reached, whichever was shallowest. Continuous spit-spoon

sampling and standard penetration testing was performed in accordance with ASTM D1586 until the termination depth.

Arcadis logged all geologic samples collected during the drilling process. Field logging of the soil samples were performed in accordance with ASTM D5434-12, and were classified under the Unified Soil Classification System (USCS). Boring logs and well construction details for all installations completed during this scope of work are provided in **Appendix A**. Unconsolidated soil samples were collected continuously using 2-inch diameter by 2-foot long split spoon samplers. For each new monitoring well location, the selected split spoon samples from the screened interval were composited into a sample container. These containers were appropriately labeled according to the monitoring well identification number and were transported to the AEP Dolan Civil Engineering Laboratory in Groveport, Ohio for particle-size analysis.

Monitoring Well Installation and Construction

Monitoring well installation and construction was completed in accordance with the AEP- approved work plan prepared by Arcadis following an initial review of the Site monitoring well network. The work plan was prepared using West Virginia Department of Environmental Protection Title 47 Series 60 Monitoring Well Design Standards dated June 21, 2011 and American Society of Testing Material (ASTM) standards, where referenced, as guidance. Arcadis directed the drilling and installation of the identified up and down gradient monitoring wells. DLZ was the drilling company that installed the wells and was directly contracted through AEP. Drilling activities began on April 25, 2016. Prior to beginning work, daily health and safety meetings were held each morning, including a thorough discussion of the day's scope of work, identified hazards, hazard mitigation, and completion of the AEP Job Safety Analysis documentation in the presence of AEP staff. Health and safety documentation was retained by both Arcadis and AEP.

Based on the field conditions, Arcadis directed DLZ regarding the total drilling and well completion depths, well construction configuration, and well materials to be used. Screened intervals for unconsolidated monitoring wells targeted saturated alluvial sand and gravel. Final well depths and screened intervals are included in **Table 2**.

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

Unconsolidated monitoring wells were constructed of 2-inch Schedule 40 PVC risers and screens. Well screens were constructed of 10 slot (0.010 ft screen openings) PVC. A primary filter pack of Global® #5 sand was placed across the screened interval, followed by approximately 2 feet of secondary (finer gradation) filter pack composed of Global® #6 sand.

Boring logs and well construction diagrams are provided in **Appendix A**. **Table 2** provides a summary of the well construction details of all wells in the current monitoring well network.

Monitoring Well Development

Well development was completed at all newly-installed wells, as well as 6 existing wells to be retained in the monitoring well network. At existing wells, the wells were 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 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 $\pm 0.50^{\circ}\text{C}$, pH stabilizes within ± 0.2 units, conductivity stabilizes within ± 3 percent, and turbidity is less than 10 nephelometric turbidity units). Well development logs are included as an attachment to **Appendix F**.

Well Development Logs

WELL DEVELOPMENT LOG

Site/Well No. MW-001
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/28/2016
 Weather Sunny, ~73 F Development Time Begin 6/28/16 8:10 End 6/28/16 8:48

Evacuation Data

Measuring Point <u>TOC</u>	Pump Intake Setting (ft bmp) <u>~34</u>
MP Elevation (ft) <u>571.32</u>	Pumping Rate (gpm) <u>0.132</u>
Land Surface Elevation (ft) <u>569.18</u>	Evacuation Method <u>Submersible Pump</u>
Sounded Well Depth (ft bmp) <u>39.17</u>	Volumes Purged <u>2.97</u>
Depth to Water (ft bmp) <u>29.60</u>	
Water-Level Elevation (ft) <u>--</u>	Field Parameters
Water Column in Well (ft) <u>9.57</u>	Color <u>Light brown to clear</u>
Casing Diameter/Type <u>2" PVC</u>	Odor <u>None</u>
Gallons in Well <u>1.53</u>	Appearance <u>slightly turbid</u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/28/16 8:15	29.60	0.65	0.42	0.745	163.0	16.62	6.66	NM	7.33	0.132	---
6/28/16 8:20	29.89	1.30	0.85	0.758	92.4	16.88	6.51	NM	6.64	0.132	---
6/28/16 8:25	29.90	1.95	1.27	0.766	73.9	17.17	6.57	NM	6.40	0.132	---
6/28/16 8:30	29.90	2.60	1.70	0.773	19.3	17.49	6.64	NM	6.31	0.132	---
6/28/16 8:35	29.90	3.25	2.12	0.770	10.8	17.33	6.71	NM	6.26	0.132	---
6/28/16 8:40	29.90	3.90	2.55	0.769	9.3	17.27	6.74	NM	6.24	0.132	---
6/28/16 8:45	29.90	4.55	2.97	0.768	6.54	17.16	6.75	NM	6.21	0.132	---

Development Personnel: T. Darmon

Notes: _____

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-002
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/30/2016
 Weather Sunny, ~70s F Development Time Begin 6/30/16 8:15 End 6/30/16 8:35

Evacuation Data

Measuring Point	<u>TOC</u>	Pump Intake Setting (ft bmp)	<u>~67.5</u>
MP Elevation (ft)	<u>582.81</u>	Pumping Rate (gpm)	<u>0.132</u>
Land Surface Elevation (ft)	<u>580.82</u>	Evacuation Method	<u>Submersible Pump</u>
Sounded Well Depth (ft bmp)	<u>72.90</u>	Volumes Purged	<u>0.53</u>
Depth to Water (ft bmp)	<u>41.97</u>		
Water-Level Elevation (ft)	<u>--</u>	Field Parameters	
Water Column in Well (ft)	<u>30.93</u>	Color	<u>Light yellow</u>
Casing Diameter/Type	<u>2" PVC</u>	Odor	<u>None</u>
Gallons in Well	<u>4.95</u>	Appearance	<u>slightly turbid</u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/30/16 8:20	NM	0.65	0.13	0.444	53.8	14.55	8.09	NM	7.28	0.132	---
6/30/16 8:25	42.03	1.30	0.26	0.572	158	14.54	7.74	NM	5.30	0.132	---
6/30/16 8:30	NM	1.95	0.39	0.587	127	14.51	7.69	NM	4.97	0.132	---
6/30/16 8:35	42.06	2.60	0.53	0.591	117	14.61	7.67	NM	4.76	0.132	---

Development Personnel: T. Darmon

Notes: _____

Well Casing Volumes (gallon/feet)			
1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-004
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/30/2016
 Weather Sunny, ~70s F Development Time Begin 6/30/16 9:40 End 6/30/16 10:00

Evacuation Data

Measuring Point <u>TOC</u>	Pump Intake Setting (ft bmp) <u>~45.5</u>
MP Elevation (ft) <u>583.13</u>	Pumping Rate (gpm) <u>0.132</u>
Land Surface Elevation (ft) <u>581.08</u>	Evacuation Method <u>Submersible Pump</u>
Sounded Well Depth (ft bmp) <u>50.20</u>	Volumes Purged <u>2.15</u>
Depth to Water (ft bmp) <u>42.11</u>	
Water-Level Elevation (ft) <u>--</u>	
Water Column in Well (ft) <u>8.09</u>	
Casing Diameter/Type <u>2" PVC</u>	
Gallons in Well <u>1.21</u>	

Field Parameters

Color	<u>clear</u>
Odor	<u>None</u>
Appearance	<u>clear</u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/30/16 9:45	42.10	0.65	0.54	0.245	33.4	14.92	6.72	NM	3.57	0.132	---
6/30/16 9:50	42.14	1.30	1.07	0.242	34.7	14.95	6.63	NM	3.20	0.132	---
6/30/16 9:55	42.14	1.95	1.61	0.237	29.8	15.01	5.62	NM	2.57	0.132	---
6/30/16 10:00	42.16	2.60	2.15	0.238	18.7	15.03	5.59	NM	2.10	0.132	---

Development Personnel: T. Darmon

Notes: _____

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-016
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/10/2016
 Weather Cloudy, ~75 F Development Time Begin 6/10/16 10:52 End 6/10/16 11:42

Evacuation Data

Measuring Point <u>TOC</u>	Pump Intake Setting (ft bmp) _____
MP Elevation (ft) <u>588.61</u>	Pumping Rate (gpm) <u>0.132</u>
Land Surface Elevation (ft) <u>586.82</u>	Evacuation Method <u>Foot valve/proactive pump</u>
Sounded Well Depth (ft bmp) <u>81.80</u>	Volumes Purged <u>9.88</u>
Depth to Water (ft bmp) <u>46.11</u>	
Water-Level Elevation (ft) <u>--</u>	Field Parameters
Water Column in Well (ft) <u>35.69</u>	Color <u>clear</u>
Casing Diameter/Type <u>2" PVC</u>	Odor <u>None</u>
Gallons in Well <u>5.7</u>	Appearance <u>clear</u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/10/16 10:52	46.13	0.25	0.04	2.295	61.9	16.53	6.85	-10.0	0.86	0.145	Clear, no odor
6/10/16 10:57	46.13	0.50	0.09	2.285	58.4	16.81	6.90	-13.4	0.28	0.145	Clear, no odor
6/10/16 11:02	46.13	1.00	0.18	2.255	50.5	17.25	7.01	-11.5	0.30	0.145	Clear, no odor
6/10/16 11:07	46.13	1.50	0.26	2.235	29.1	17.16	7.05	-9.1	0.27	0.145	Clear, no odor
6/10/16 11:12	46.13	2.00	0.35	2.211	29.2	17.28	7.08	-11.6	0.19	0.145	Clear, no odor
6/10/16 11:17	46.13	2.50	0.44	2.189	35.7	17.21	7.09	-13.4	0.21	0.145	Clear, no odor
6/10/16 11:22	46.13	3.00	0.53	2.182	38.6	17.31	7.11	-10.6	0.17	0.145	Clear, no odor
6/10/16 11:27	46.13	3.50	0.61	2.173	31.3	17.43	7.12	-11.4	0.17	0.132	Clear, no odor
6/10/16 11:32	46.13	4.00	0.70	2.164	27.7	17.22	7.13	-7.2	0.17	0.132	Clear, no odor
6/10/16 11:37	46.13	4.50	0.79	2.165	32.0	17.16	7.13	-9.6	0.19	0.132	Clear, no odor
6/10/16 11:42	46.13	5.00	0.88	2.159	25.3	17.03	7.14	-16.5	0.14	0.132	Clear, no odor

Development Personnel: Tim Eyerdom
 Notes: ~2.5 well volumes removed with foot valve; ~6.5 well volumes removed with proactive pump prior to measuring water quality.
 Well Location: In gravel parking lot. Condition of well: good, needs j-plug. Well locked at arrival? Yes. Well locked at departure? Yes.

Well Casing Volumes (gallon/feet)			
1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. JTMN-1
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/29/2016
 Weather Sunny, 70s (F) Development Time Begin 6/29/16 9:50 End 6/29/16 11:15

Evacuation Data

Measuring Point <u>TOC</u>	Pump Intake Setting (ft bmp) <u>~66</u>
MP Elevation (ft) <u>583.67</u>	Pumping Rate (gpm) <u>0.08-2.2</u>
Land Surface Elevation (ft) <u>582.17</u>	Evacuation Method <u>submersible & waterra</u>
Sounded Well Depth (ft bmp) <u>76.39</u>	Volumes Purged <u>10.04</u>
Depth to Water (ft bmp) <u>43.40</u>	
Water-Level Elevation (ft) <u>--</u>	
Water Column in Well (ft) <u>32.99</u>	Field Parameters
Casing Diameter/Type <u>2" PVC</u>	Color <u>Brown</u>
Gallons in Well <u>5.28</u>	Odor <u>None</u>
	Appearance <u>Turbid</u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/29/16 9:55	43.42	0.65	0.12	0.581	225	15.99	7.21	NM	13.02	0.132	---
6/29/16 10:00	43.42	1.30	0.25	0.587	533	15.69	6.87	NM	1.58	0.132	---
6/29/16 10:05	43.44	1.95	0.37	0.590	707	15.76	6.91	NM	1.09	0.132	---
6/29/16 10:10	43.44	2.60	0.49	0.592	641	16.01	7.03	NM	0.98	0.132	---
6/29/16 10:15	43.44	3.25	0.62	0.595	598	16.21	7.15	NM	0.81	0.132	---
6/29/16 10:20	43.44	3.90	0.74	0.599	592	16.47	7.28	NM	0.72	0.132	---
6/29/16 10:25	43.44	4.55	0.86	0.608	421	16.69	7.31	NM	0.51	0.132	---
6/29/16 10:30	43.44	5.20	0.98	0.614	322	16.69	7.31	NM	0.43	0.132	---
6/29/16 10:40	Additional surging done on well										
6/29/16 11:00	NM	20.00	3.79	NM	NM	NM	NM	NM	NM	1.00	---
6/29/16 11:15	43.46	53.00	10.04	0.617	232	16.72	7.34	NM	0.57	2.20	---

Development Personnel: T. Darmon

Notes: _____

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. JTMN-1
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/16/2016
 Weather Sunny, ~80 F Development Time Begin 6/16/16 11:05 End 6/16/16 11:28

Evacuation Data

Measuring Point <u>TOC</u>	Pump Intake Setting (ft bmp) <u>~77.5</u>
MP Elevation (ft) <u>583.67</u>	Pumping Rate (gpm) <u>0.211</u>
Land Surface Elevation (ft) <u>582.17</u>	Evacuation Method <u>submersible impeller pump</u>
Sounded Well Depth (ft bmp) <u>77.80</u>	Volumes Purged <u>5.75</u>
Depth to Water (ft bmp) <u>43.63</u>	
Water-Level Elevation (ft) <u>--</u>	Field Parameters
Water Column in Well (ft) <u>34.17</u>	Color <u>Brown changing to clear</u>
Casing Diameter/Type <u>2" PVC</u>	Odor <u>None</u>
Gallons in Well <u>5.57</u>	Appearance <u></u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/16/16 11:08	43.65	26.00	4.67	0.577	26.4	15.53	7.43	NM	1.61	0.211	---
6/16/16 11:13	43.65	27.50	4.94	0.576	ERROR	15.52	7.43	NM	1.29	0.211	---
6/16/16 11:18	43.65	29.00	5.21	0.576	ERROR	15.57	7.42	NM	1.07	0.211	---
6/16/16 11:23	43.65	30.50	5.48	0.577	ERROR	15.59	7.44	NM	0.97	0.211	---
6/16/16 11:28	43.65	32.00	5.75	0.576	ERROR	15.58	7.42	NM	0.95	0.211	---

Development Personnel: T. Debnam

Notes: _____

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. JTMN-2
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/28/2016
 Weather Sunny, ~80s F Development Time Begin 6/28/16 15:30 End 6/28/16 16:45

Evacuation Data

Measuring Point <u>TOC</u>	Pump Intake Setting (ft bmp) <u>~67</u>
MP Elevation (ft) <u>584.06</u>	Pumping Rate (gpm) <u>0.080-0.132</u>
Land Surface Elevation (ft) <u>582.16</u>	Evacuation Method <u>submersible pump</u>
Sounded Well Depth (ft bmp) <u>75.84</u>	Volumes Purged <u>2.06</u>
Depth to Water (ft bmp) <u>43.87</u>	
Water-Level Elevation (ft) <u>--</u>	
Water Column in Well (ft) <u>31.97</u>	Field Parameters
Casing Diameter/Type <u>2" PVC</u>	Color <u>Light Brown changing to clear</u>
Gallons in Well <u>5.12</u>	Odor <u>None</u>
	Appearance <u>Slightly turbid</u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/28/16 15:35	43.76	2.50	0.49	0.665	Overrange	16.11	6.95	NM	36.43	0.650	rate from 0.5-0.8 gpm
6/28/16 15:40	43.76	3.25	0.63	0.668	Overrange	16.02	6.61	NM	18.71	0.159	---
6/28/16 15:45	43.76	3.90	0.76	0.680	Overrange	15.51	6.37	NM	7.23	0.132	---
6/28/16 15:50	43.76	4.55	0.89	0.629	803	19.60	6.68	NM	2.26	0.132	---
6/28/16 15:55	43.76	5.20	1.02	0.641	184	18.23	6.69	NM	1.07	0.132	---
6/28/16 16:00	43.76	5.85	1.14	0.618	162	17.54	6.74	NM	0.91	0.132	---
6/28/16 16:05	43.76	6.50	1.27	0.600	126	17.22	6.78	NM	0.65	0.132	---
6/28/16 16:10	43.76	7.15	1.40	0.595	108	16.89	6.79	NM	0.33	0.132	---
6/28/16 16:15	43.76	7.80	1.52	0.596	86.7	16.72	6.80	NM	0.32	0.132	---
6/28/16 16:20	43.76	8.45	1.65	0.592	52.1	16.28	6.80	NM	0.29	0.132	---
6/28/16 16:25	43.76	9.10	1.78	0.589	47.8	16.06	6.83	NM	0.23	0.132	---
6/28/16 16:30	43.76	9.75	1.90	0.584	22.4	15.48	6.83	NM	0.19	0.132	---
6/28/16 16:35	43.76	10.10	1.97	0.584	12.10	15.48	6.82	NM	0.21	0.08	---
6/28/16 16:40	43.76	10.55	2.06	0.584	9.28	15.47	6.81	NM	0.15	0.08	---

Development Personnel: T. Darmon

Notes: _____

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-1601A
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/15/2016
 Weather Cloudy, ~75 F Development Time Begin 6/15/16 11:22 End 6/15/16 12:43

Evacuation Data

Measuring Point <u>TOC</u>	Pump Intake Setting (ft bmp) <u>~80</u>
MP Elevation (ft) <u>610.66</u>	Pumping Rate (gpm) <u>0.211</u>
Land Surface Elevation (ft) <u>607.47</u>	Evacuation Method <u>Submersible impeller pump</u>
Sounded Well Depth (ft bmp) <u>80.84</u>	Volumes Purged <u>12.24</u>
Depth to Water (ft bmp) <u>65.81</u>	
Water-Level Elevation (ft) <u>--</u>	Field Parameters
Water Column in Well (ft) <u>15.03</u>	Color <u>Dark brown turning clear</u>
Casing Diameter/Type <u>2" PVC</u>	Odor <u>None</u>
Gallons in Well <u>2.45</u>	Appearance <u></u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/15/16 11:33	65.84	5.00	2.04	0.599	126	15.87	7.20	NM	4.93	0.211	---
6/15/16 11:38	65.84	7.00	2.86	0.598	62.7	15.74	7.21	NM	4.77	0.211	---
6/15/16 11:43	65.84	8.50	3.47	0.598	40.9	15.72	7.20	NM	4.77	0.211	---
6/15/16 11:48	65.84	10.00	4.08	0.599	44.5	16.01	7.19	NM	4.71	0.211	---
6/15/16 11:53	65.84	12.50	5.10	0.599	45.4	16.08	7.14	NM	4.65	0.211	---
6/15/16 11:58	65.84	14.00	5.71	0.599	34.5	15.98	7.14	NM	4.71	0.211	---
6/15/16 12:03	65.84	16.50	6.73	0.599	31.0	16.07	7.20	NM	4.73	0.211	---
6/15/16 12:08	65.84	17.50	7.14	0.600	31.2	15.97	7.20	NM	4.79	0.211	---
6/15/16 12:13	65.84	19.00	7.76	0.600	24.8	15.84	7.19	NM	4.67	0.211	---
6/15/16 12:18	65.84	21.50	8.78	0.601	25.7	15.90	7.18	NM	4.65	0.211	---
6/15/16 12:23	65.84	23.00	9.39	0.601	25.0	15.92	7.20	NM	4.58	0.211	---
6/15/16 12:28	65.84	24.50	10.00	0.601	14.2	15.80	7.15	NM	4.49	0.211	---
6/15/16 12:33	65.84	27.00	11.02	0.602	13.7	15.86	7.13	NM	4.32	0.211	---
6/15/16 12:38	65.84	28.50	11.63	0.603	12.9	15.80	7.13	NM	4.43	0.211	---
6/15/16 12:43	65.84	30.00	12.24	0.603	10.2	15.85	7.14	NM	4.39	0.211	---

Development Personnel: T. Debnam

Notes: _____

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-1602
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/15/2016
 Weather Cloudy, ~75 F Development Time Begin 6/15/16 10:27 End 6/15/16 11:05

Evacuation Data

Measuring Point <u>TOC</u> MP Elevation (ft) <u>605.12</u> Land Surface Elevation (ft) <u>602.37</u> Sounded Well Depth (ft bmp) <u>73.31</u> Depth to Water (ft bmp) <u>59.82</u> Water-Level Elevation (ft) <u>--</u> Water Column in Well (ft) <u>13.49</u> Casing Diameter/Type <u>2" PVC</u> Gallons in Well <u>2.2</u>	Pump Intake Setting (ft bmp) <u>~70</u> Pumping Rate (gpm) <u>0.211</u> Evacuation Method <u>Submersible impeller pump</u> Volumes Purged <u>6.82</u> Field Parameters Color <u>Dark brown turning clear</u> Odor <u>None</u> Appearance _____
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Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/15/16 10:45	59.85	5.00	2.27	0.494	10.6	14.38	6.78	NM	0.61	0.211	---
6/15/16 10:50	59.84	7.00	3.18	0.489	22.4	14.13	6.77	NM	0.80	0.211	---
6/15/16 10:55	59.84	9.00	4.09	0.488	11.7	14.10	6.77	NM	0.86	0.211	---
6/15/16 11:00	59.84	12.00	5.45	0.487	6.89	14.07	6.77	NM	0.88	0.211	---
6/15/16 11:05	59.84	15.00	6.82	0.487	4.52	14.07	6.77	NM	0.90	0.211	---

Development Personnel: _____ T. Debnam

Notes: _____

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-1603
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/15/2016
 Weather Cloudy, 75 F Development Time Begin 6/15/16 8:37 End 6/15/16 10:05

Evacuation Data

Measuring Point	<u>TOC</u>	Pump Intake Setting (ft bmp)	<u>~79</u>
MP Elevation (ft)	<u>606.30</u>	Pumping Rate (gpm)	<u>0.177</u>
Land Surface Elevation (ft)	<u>602.92</u>	Evacuation Method	<u>submersible impeller pump</u>
Sounded Well Depth (ft bmp)	<u>79.90</u>	Volumes Purged	<u>7.78</u>
Depth to Water (ft bmp)	<u>61.35</u>		
Water-Level Elevation (ft)	<u>--</u>	Field Parameters	
Water Column in Well (ft)	<u>18.55</u>	Color	<u>dark brown</u>
Casing Diameter/Type	<u>2" PVC</u>	Odor	<u>None</u>
Gallons in Well	<u>3.02</u>	Appearance	<u></u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/15/16 8:50	61.74	5.00	1.66	0.741	87.9	16.96	6.45	NM	3.68	0.177	---
6/15/16 8:55	61.74	5.75	1.90	0.758	74.9	16.71	6.47	NM	3.65	0.177	---
6/15/16 9:00	61.74	6.50	2.15	0.757	64.6	16.54	6.47	NM	3.56	0.177	---
6/15/16 9:05	61.74	7.50	2.48	0.753	46.0	16.56	6.48	NM	3.57	0.177	---
6/15/16 9:10	61.74	9.00	2.98	0.744	41.2	16.67	6.47	NM	3.59	0.177	---
6/15/16 9:15	61.74	10.00	3.31	0.750	30.0	16.60	6.47	NM	3.73	0.177	---
6/15/16 9:20	61.74	11.50	3.81	0.745	30.5	16.49	6.47	NM	3.71	0.177	---
6/15/16 9:25	61.74	12.50	4.14	0.743	24.7	16.49	6.47	NM	3.91	0.177	---
6/15/16 9:30	61.74	14.00	4.64	0.742	21.5	16.48	6.47	NM	3.87	0.177	---
6/15/16 9:35	61.74	15.00	4.97	0.737	17.5	16.38	6.46	NM	3.97	0.177	---
6/15/16 9:40	61.74	17.00	5.63	0.736	15.1	16.38	6.47	NM	3.97	0.177	---
6/15/16 9:45	61.74	18.00	5.96	0.736	15.0	16.42	6.46	NM	3.97	0.177	---
6/15/16 9:50	61.74	19.50	6.46	0.737	10.1	16.42	6.46	NM	3.98	0.177	---
6/15/16 9:55	61.74	21.00	6.95	0.732	10.2	16.37	6.46	NM	4.05	0.177	---
6/15/16 10:00	61.74	22.50	7.45	0.730	8.37	16.38	6.45	NM	4.04	0.177	---
6/15/16 10:05	61.74	23.50	7.78	0.730	8.52	16.39	6.45	NM	4.01	0.177	---

Development Personnel: T. Debnam

Notes: _____

Well Casing Volumes (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	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°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	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-1604S
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/16/2016
 Weather Sunny, 70 F Development Time Begin 6/16/16 7:35 End 6/16/16 8:30

Evacuation Data

Measuring Point <u>TOC</u>	Pump Intake Setting (ft bmp) <u>~62</u>
MP Elevation (ft) <u>598.07</u>	Pumping Rate (gpm) <u>0.211</u>
Land Surface Elevation (ft) <u>595.48</u>	Evacuation Method <u>Submersible Impeller pump</u>
Sounded Well Depth (ft bmp) <u>62.43</u>	Volumes Purged <u>12.79</u>
Depth to Water (ft bmp) <u>54.49</u>	
Water-Level Elevation (ft) <u>--</u>	Field Parameters
Water Column in Well (ft) <u>7.94</u>	Color <u>Brown ---> Clear</u>
Casing Diameter/Type <u>2" PVC</u>	Odor <u>None</u>
Gallons in Well <u>1.29</u>	Appearance <u></u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/16/16 7:40	54.51	1.50	1.16	1.444	173	16.57	7.34	NM	5.42	0.211	---
6/16/16 7:45	54.51	3.00	2.33	1.496	164	16.48	7.18	NM	3.23	0.211	---
6/16/16 7:50	54.51	4.50	3.49	1.537	124	16.85	7.13	NM	2.77	0.211	---
6/16/16 7:55	54.51	6.00	4.65	1.556	100	17.19	7.13	NM	2.33	0.211	---
6/16/16 8:00	54.51	7.50	5.81	1.569	88.7	17.31	7.12	NM	2.05	0.211	---
6/16/16 8:05	54.51	9.00	6.98	1.570	54.9	17.44	7.12	NM	1.95	0.211	---
6/16/16 8:10	54.51	10.50	8.14	1.571	34.7	17.47	7.12	NM	1.92	0.211	---
6/16/16 8:15	54.51	12.00	9.30	1.573	20.3	17.52	7.11	NM	1.95	0.211	---
6/16/16 8:20	54.51	13.50	10.47	1.574	14.3	17.58	7.11	NM	1.91	0.211	---
6/16/16 8:25	54.51	15.00	11.63	1.573	12.4	17.65	7.10	NM	1.87	0.211	---
6/16/16 8:30	54.51	16.50	12.79	1.577	9.34	17.64	7.10	NM	1.86	0.211	---

Development Personnel: T. Debnam

Notes: _____

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-1604D
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/9/2016
 Weather Sunny, 75 F Development Time Begin 6/9/16 13:05 End 6/9/16 14:05

Evacuation Data

Measuring Point <u>TOC</u>	Pump Intake Setting (ft bmp) _____
MP Elevation (ft) <u>598.22</u>	Pumping Rate (gpm) <u>0.132</u>
Land Surface Elevation (ft) <u>595.59</u>	Evacuation Method <u>proactive and foot valve</u>
Sounded Well Depth (ft bmp) <u>83.30</u>	Volumes Purged <u>12.83</u>
Depth to Water (ft bmp) <u>54.56</u>	
Water-Level Elevation (ft) <u>--</u>	Field Parameters
Water Column in Well (ft) <u>28.74</u>	Color _____
Casing Diameter/Type <u>2" PVC</u>	Odor <u>None</u>
Gallons in Well <u>4.59</u>	Appearance <u>Cloudy</u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/9/16 13:05	54.58	0.50	0.11	1.814	243	18.75	7.39	129.7	5.12	0.080	---
6/9/16 13:10	54.58	1.00	0.22	1.807	163	18.28	7.29	128.0	0.32	0.132	---
6/9/16 13:15	54.58	2.50	0.54	1.802	119	18.32	7.22	126.0	0.18	0.132	---
6/9/16 13:20	54.58	3.00	0.65	1.801	114	18.24	7.26	125.9	0.13	0.132	---
6/9/16 13:25	54.58	4.50	0.98	1.800	99	18.06	7.22	124.8	0.11	0.132	---
6/9/16 13:30	54.58	6.00	1.31	1.802	77.3	17.99	7.29	124.4	0.09	0.264	---
6/9/16 13:35	54.58	8.00	1.74	1.802	62.5	17.97	7.21	123.7	0.08	0.264	---
6/9/16 13:40	54.58	9.00	1.96	1.804	45.0	18.53	7.19	123.3	0.08	0.132	---
6/9/16 13:45	54.58	10.00	2.18	1.810	39.3	18.41	7.20	123.2	0.10	0.132	---
6/9/16 13:50	54.58	11.00	2.40	1.806	34.8	18.74	7.23	122.6	0.09	0.132	---
6/9/16 13:55	54.58	11.50	2.51	1.804	29.2	18.58	7.23	122.4	0.07	0.132	---
6/9/16 14:00	54.58	12.00	2.61	1.801	22.8	19.47	7.23	121.9	0.07	0.132	---
6/9/16 14:05	54.58	13.00	2.83	1.820	20.8	19.90	7.22	121.4	0.08	0.132	---

Development Personnel: T. Debnam

Notes: 3 well volumes removed with foot valve and 7 removed with proactive pump prior to taking water measurements.

Well location: Grass near gated area. Condition of well: good. Well locked at arrival? No. Well locked at departure? No.

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-1605S
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/16/2016
 Weather Sunny, 65 F Development Time Begin 6/16/16 6:40 End 6/16/16 7:07

Evacuation Data

Measuring Point	<u>TOC</u>	Pump Intake Setting (ft bmp)	<u>~61.5</u>
MP Elevation (ft)	<u>590.86</u>	Pumping Rate (gpm)	<u>0.211</u>
Land Surface Elevation (ft)	<u>588.51</u>	Evacuation Method	<u></u>
Sounded Well Depth (ft bmp)	<u>61.96</u>	Volumes Purged	<u>4.64</u>
Depth to Water (ft bmp)	<u>47.36</u>		
Water-Level Elevation (ft)	<u>--</u>	Field Parameters	
Water Column in Well (ft)	<u>14.57</u>	Color	<u>Brown-->Clear</u>
Casing Diameter/Type	<u>2" PVC</u>	Odor	<u>None</u>
Gallons in Well	<u>2.37</u>	Appearance	<u></u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/16/16 6:47	47.40	5.00	2.11	1.656	29.3	16.24	7.26	NM	10.76	0.211	---
6/16/16 6:52	47.40	6.50	2.74	1.657	16.5	16.51	7.25	NM	7.62	0.211	---
6/16/16 6:57	47.40	8.00	3.38	1.657	13.2	16.55	7.25	NM	4.28	0.211	---
6/16/16 7:02	47.40	9.50	4.01	1.657	9.53	16.61	7.26	NM	3.92	0.211	---
6/16/16 7:07	47.40	11.00	4.64	1.658	5.73	16.67	7.25	NM	3.86	0.211	---

Development Personnel: T. Eyerdorn

Notes: _____

Well Casing Volumes (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	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°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	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-1605D
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/8/2016
 Weather Sunny, 70 F Development Time Begin 6/8/16 10:40 End 6/8/16 11:20

Evacuation Data

Measuring Point <u>TOC</u>	Pump Intake Setting (ft bmp) _____
MP Elevation (ft) <u>591.01</u>	Pumping Rate (gpm) <u>0.132</u>
Land Surface Elevation (ft) <u>588.51</u>	Evacuation Method <u>Foot pump / Proactive</u>
Sounded Well Depth (ft bmp) <u>84.10</u>	Volumes Purged <u>10.85</u>
Depth to Water (ft bmp) <u>47.51</u>	
Water-Level Elevation (ft) <u>--</u>	
Water Column in Well (ft) <u>36.59</u>	Field Parameters
Casing Diameter/Type <u>2" PVC</u>	Color <u>Clear</u>
Gallons in Well <u>5.85</u>	Odor <u>None</u>
	Appearance <u>Clear</u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/8/16 10:40	47.50	1.00	0.17	2.517	77.3	16.92	7.15	128.7	4.16	0.132	clear, no odor
6/8/16 10:45	47.50	1.50	0.26	2.487	57.7	17.09	7.18	48.1	0.53	0.132	clear, no odor
6/8/16 10:50	47.50	2.00	0.34	2.442	12.5	16.81	7.23	89.9	0.26	0.132	clear, no odor
6/8/16 10:55	47.50	2.50	0.43	2.417	8.60	17.06	7.23	54.2	0.20	0.132	clear, no odor
6/8/16 11:00	47.50	3.00	0.51	2.416	9.77	17.18	7.24	21.7	0.18	0.132	clear, no odor
6/8/16 11:05	47.50	3.50	0.60	2.417	11.80	17.31	7.25	-1.2	0.19	0.132	clear, no odor
6/8/16 11:10	47.50	4.00	0.68	2.413	5.89	17.07	7.26	-15.9	0.25	0.132	clear, no odor
6/8/16 11:15	47.50	4.50	0.77	2.408	4.57	17.32	7.26	-23.9	0.29	0.132	clear, no odor
6/8/16 11:20	47.50	5.00	0.85	2.412	8.56	17.26	7.25	-28.5	0.20	0.132	clear, no odor

Development Personnel: T. Eyerdom

Notes: 40 gal removed with foot pump (~7 well volumes). 15 gal removed with proactive pump (~3 well volumes). 5 gal removed while taking water quality measurements (60 gal total). Well location: grass alongside Hwy 62. Condition of well: good, needs J-plug. Well locked at arrival: No. Well locked at departure: No.

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-1606D
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/9/2016
 Weather Sunny, 70 F Development Time Begin 6/9/16 9:34 End 6/9/16 10:34

Evacuation Data

Measuring Point	<u>TOC</u>	Pump Intake Setting (ft bmp)	<u></u>
MP Elevation (ft)	<u>590.10</u>	Pumping Rate (gpm)	<u>0.106</u>
Land Surface Elevation (ft)	<u>587.25</u>	Evacuation Method	<u>proactive and foot valve</u>
Sounded Well Depth (ft bmp)	<u>77.60</u>	Volumes Purged	<u>11.09</u>
Depth to Water (ft bmp)	<u>46.01</u>		
Water-Level Elevation (ft)	<u>--</u>	Field Parameters	
Water Column in Well (ft)	<u>31.59</u>	Color	<u>Clear</u>
Casing Diameter/Type	<u>2" PVC</u>	Odor	<u>None</u>
Gallons in Well	<u>5.05</u>	Appearance	<u></u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/9/16 9:34	46.09	0.00	0.00	2.017	202	16.84	7.26	-22.0	2.46	0.106	cloudy, no odor
6/9/16 9:39	46.11	0.50	0.10	2.017	156	17.07	7.31	-24.6	0.44	0.106	cloudy, no odor
6/9/16 9:44	46.11	1.00	0.20	2.009	148	17.82	7.32	-25.3	0.27	0.106	cloudy, no odor
6/9/16 9:49	46.11	1.50	0.30	2.014	225	16.21	7.37	-27.5	0.94	0.106	cloudy, no odor
6/9/16 9:54	46.11	2.00	0.40	2.001	337	16.81	7.33	-25.9	0.25	0.106	cloudy, no odor
6/9/16 9:59	46.11	2.50	0.50	1.988	438	16.81	7.39	-29.0	0.34	0.106	cloudy, no odor
6/9/16 10:04	Proactive used to surge well to lower turbidity										
6/9/16 10:09	46.11	3.00	0.59	2.033	403	16.35	7.46	-31.8	0.75	0.106	cloudy, no odor
6/9/16 10:14	46.11	3.50	0.69	2.022	378	17.26	7.36	-27.4	0.17	0.106	cloudy, no odor
6/9/16 10:19	46.11	4.00	0.79	2.034	339	17.46	7.35	149.7	0.12	0.106	cloudy, no odor
6/9/16 10:24	46.11	4.50	0.89	2.026	155	17.01	7.34	149.5	0.11	0.106	cloudy, no odor
6/9/16 10:29	46.11	5.00	0.99	2.015	152	18.18	7.33	147.4	0.17	0.106	cloudy, no odor
6/9/16 10:34	46.11	5.50	1.09	2.017	163	17.39	7.34	146.4	0.16	0.106	cloudy, no odor

Development Personnel: T. Eyerdorn

Notes: 8 well volumes were removed with the foot valve. 2 well volumes were removed with proactive pump before taking water quality measurements.

Location of well: grass along hwy 62. Condition of well: good. Well locked at arrival: no. Well locked at departure: no.

Well Casing Volumes (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	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°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	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-1606D
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/15/2016
 Weather Sunny, 85 F Development Time Begin 6/15/16 17:36 End 6/15/16 18:00

Evacuation Data

Measuring Point <u>TOC</u>	Pump Intake Setting (ft bmp) <u>~77.5</u>
MP Elevation (ft) <u>590.10</u>	Pumping Rate (gpm) <u>0.211</u>
Land Surface Elevation (ft) <u>587.25</u>	Evacuation Method <u>submersible impeller pump</u>
Sounded Well Depth (ft bmp) <u>77.78</u>	Volumes Purged <u>2.12</u>
Depth to Water (ft bmp) <u>46.03</u>	
Water-Level Elevation (ft) <u>--</u>	
Water Column in Well (ft) <u>31.75</u>	Field Parameters
Casing Diameter/Type <u>2" PVC</u>	Color <u>brown-->clear</u>
Gallons in Well <u>5.18</u>	Odor <u>None</u>
	Appearance <u></u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/15/16 17:40	46.06	5.0	0.97	1.747	23.6	16.25	7.33	NM	2.62	0.211	---
6/15/16 17:45	46.06	6.5	1.25	1.748	15.0	16.17	7.30	NM	0.40	0.211	---
6/15/16 17:50	46.06	8.0	1.54	1.748	11.2	16.13	7.30	NM	0.24	0.211	---
6/15/16 17:55	46.06	9.5	1.83	1.749	9.62	16.10	7.30	NM	0.23	0.211	---
6/15/16 18:00	46.02	11.0	2.12	1.749	7.82	16.12	7.29	NM	0.20	0.211	---

Development Personnel: T. Debnam
 Notes: _____

Well Casing Volumes (gallon/feet)

1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride		
ft	feet	msl	mean sea-level	s.u.	Standard units		
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-1607S
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/15/2016
 Weather Sunny, 85 F Development Time Begin 6/15/16 16:30 End 6/15/16 16:55

Evacuation Data

Measuring Point	<u>TOC</u>	Pump Intake Setting (ft bmp)	<u>~60</u>
MP Elevation (ft)	<u>593.99</u>	Pumping Rate (gpm)	<u>0.211</u>
Land Surface Elevation (ft)	<u>590.79</u>	Evacuation Method	<u>submersible impeller pump</u>
Sounded Well Depth (ft bmp)	<u>60.28</u>	Volumes Purged	<u>3.57</u>
Depth to Water (ft bmp)	<u>46.56</u>		
Water-Level Elevation (ft)	<u>--</u>	Field Parameters	
Water Column in Well (ft)	<u>13.72</u>	Color	<u>brown--->clear</u>
Casing Diameter/Type	<u>2" PVC</u>	Odor	<u>None</u>
Gallons in Well	<u>2.24</u>	Appearance	<u></u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/15/16 16:35	46.59	2.0	0.89	0.836	63.3	15.91	7.51	NM	0.93	0.211	---
6/15/16 16:40	46.59	3.5	1.56	0.835	28.3	15.92	7.47	NM	0.98	0.211	---
6/15/16 16:45	46.59	5.0	2.23	0.836	18.3	15.92	7.47	NM	0.80	0.211	---
6/15/16 16:50	46.59	6.5	2.90	0.836	12.0	15.90	7.46	NM	0.81	0.211	---
6/15/16 16:55	46.59	8.0	3.57	0.835	9.73	15.90	7.44	NM	0.82	0.211	---

Development Personnel: T. Debnam

Notes: _____

Well Casing Volumes (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	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°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	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

WELL DEVELOPMENT LOG

Site/Well No. MW-1607D
 Project AEP Mountaineer Plant Project No. OHO15976.0009 Page 1 of 1
 Site Location 1347 Graham Station Rd., New Haven, WV 25253 Date 6/15/2016
 Weather Partly Cloudy, 80 F Development Time Begin 6/15/16 15:50 End 6/15/16 16:20

Evacuation Data

Measuring Point	<u>TOC</u>	Pump Intake Setting (ft bmp)	<u>~80</u>
MP Elevation (ft)	<u>593.93</u>	Pumping Rate (gpm)	<u>0.224</u>
Land Surface Elevation (ft)	<u>590.75</u>	Evacuation Method	<u>submersible impeller pump</u>
Sounded Well Depth (ft bmp)	<u>80.61</u>	Volumes Purged	<u>1.54</u>
Depth to Water (ft bmp)	<u>46.72</u>		
Water-Level Elevation (ft)	<u>--</u>	Field Parameters	
Water Column in Well (ft)	<u>33.89</u>	Color	<u>light brown--->clear</u>
Casing Diameter/Type	<u>2" PVC</u>	Odor	<u>None</u>
Gallons in Well	<u>5.52</u>	Appearance	<u></u>

Time	Depth to Water (ft btoc)	Volume Withdrawn (gal)	Well Volumes Removed	Conductivity (mS/cm or umhos/cm)	Turbidity (NTU)	Temperature (°C)	pH (s.u.)	ORP (mV)	Dissolved Oxygen (g/mL)	Rate (gpm)	Remarks
6/15/16 16:00	46.76	2.5	0.45	0.759	57.1	16.32	7.72	NM	0.24	0.224	---
6/15/16 16:05	46.76	4.0	0.72	0.759	26.5	16.45	7.69	NM	0.20	0.224	---
6/15/16 16:10	46.76	5.5	1.00	0.759	15.4	16.56	7.66	NM	0.16	0.224	---
6/15/16 16:15	46.76	7.0	1.27	0.758	9.23	16.55	7.65	NM	0.15	0.224	---
6/15/16 16:20	46.76	8.5	1.54	0.757	5.94	16.58	7.67	NM	0.14	0.224	---

Development Personnel: T. Debnam

Notes: _____

Well Casing Volumes (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	milliliter	NTU	Nephelometric Turbidity Units	ORP	Oxidation-Reduction Potential
°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	mV	millivolts
mg/L	Miligrams per liter	NM	Not Measured	VOC	Volatile Organic Compounds	BPI	Below Pump Intake

