



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

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LITTLE BROAD RUN LANDFILL-CCR LOCATION RESTRICTION EVALUATION

Mountaineer Plant, Graham Station Road, Mason County, New Haven, WV

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CONTENTS

Acı	onyn	ns and	Abbre	eviations	iv
1.	Obje	ective			1
2.	Bac	kgroun	d Info	rmation	2
	2.1	Facilit	y Loca	ation Description	2
	2.2	Descr	iption	of LBR Landfill CCR Unit	2
		2.2.1	Lanc	dfill Configuration	2
		2.2.2	Area	ı/Volume	2
		2.2.3	Cons	struction and Operational History	2
		2.2.4	Surfa	ace Water Control	3
	2.3	Previo	ous Inv	vestigations	4
	2.4	Hydro	geolo	gic Setting	5
		2.4.1	Clim	ate and Water Budget	5
		2.4.2	Regi	onal and Local Geologic Setting	5
		2.4	1.2.1	Unconsolidated	5
		2.4	1.2.2	Bedrock	6
		2.4.3	Surfa	ace Water and Surface Water Groundwater Interactions	6
		2.4.4	Wate	er Users	7
3.	Isola	ation fro	om the	Uppermost Aquifer	8
	3.1	Upper	rmost	Aquifer and Piezometric Analysis	8
		3.1.1	Piez	ometric Analysis	8
		3.1	.1.1	Horizontal and Vertical Position Relative to CCR Unit	8
		3.1	.1.2	Overall Flow Conditions	9
		3.1.2	Uppe	ermost Aquifer	9
		3.1	.2.1	CCR Rule Definition	9
		3.1	.2.2	Common Definitions	10
		3.1.3	Iden	tified Onsite Hydrostratigraphic Unit	10
	3.2	Comp	liance	with Isolation Distance	10
4.	Wet	lands			11
	4.1	Local	Wetla	ınds	11

	4.2 Compliance with Wetland Restrictions	11
5.	Fault Areas	12
	5.1 Description of Regional Geologic Structural Features	12
	5.2 Compliance with Fault Area Restrictions	12
6.	Seismic Impact Zone	13
	6.1 Definition of Seismic Impact Zone	13
	6.2 Compliance with Seismic Impact Zone Restriction	13
7.	Unstable Areas	14
	7.1 Definition of Unstable Area and local Conditions	14
	7.1.1 CCR Rule Definition	14
	7.1.2 Poor Foundation Soils	14
	7.1.3 Mass Movements	14
	7.1.4 Karst	14
	7.1.5 Subsurface Mining	14
	7.2 Compliance with Unstable Areas Restriction	15
8.	Summary, Conclusions, and PE Certification	16
9.	References	17

TABLE

Table 1. Water Level Data

FIGURES

- Figure 1. Site Location Map
- Figure 2. Plant and CCR Unit Location Map
- Figure 3. LBR Landfill Layout and Well Location Map
- Figure 4. Cross Section Location Map
- Figure 5A. Cross Section A-A'
- Figure 5B. Cross Section B-B'
- Figure 6. Potentiometric Surface Map Uppermost Aquifer, October 2001
- Figure 7. Surface Water Features

Figure 8. Nearby Fault Locations

Figure 9. Seismic Impact Zones

Figure 10. Nearby Landslides and Related Features

Figure 11. West Virginia Karst Areas

APPENDICES

- A Boring/Well Construction Logs
- B Banks Well Inventory Report

ACRONYMS AND ABBREVIATIONS

AEP American Electric Power Service Corporation

Arcadis U.S., Inc.

CCR Coal Combustion Residual

CFR Code of Federal Regulations

EPRI Electric Power Research Institute

FGD flue gas desulfurization

ft feet

LBR Little Broad Run

LCS Leachate Collection System

USGS United States Geological Survey

WVDOH West Virginia Department of Health

1. OBJECTIVE

This report was prepared by Arcadis U.S., Inc. (Arcadis) for American Electric Power Service Corporation (AEP) to assess location of the Little Broad Run (LBR) Landfill relative to the location restrictions included in the Coal Combustion Residual (CCR) requirements, as specified in Code of Federal Regulations (CFR) 40 CFR 257.60 to 257.64, for the LBR Landfill at the AEP 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 and an evaluation of whether the CCR unit meets up to 5 location restrictions. The restrictions include: 1) the base of the CCR unit is 5 feet (ft) above and isolated from the uppermost aquifer, and the CCR unit may not be 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.

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

This evaluation included a review of AEP-provided data associated with previously completed subsurface investigation activities in the vicinity of the LBR Landfill CCR unit, as well as publicly-available geologic, hydrogeologic data and recently acquired data from the additional boring and monitoring well installation related to the monitoring well network. The following report presents the current Conceptual Site Model (CSM), developed based on all available historical Site information.

1

2. BACKGROUND INFORMATION

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

2.1 Facility Location Description

The LBR Landfill is located in Mason County approximately 2 miles southwest of the Plant and west of West Virginia Route 62 (**Figures 1** and **2**). The Site occupies approximately 660 total acres, of which 325 acres is permitted for ash disposal. The landfill is located in an isolated area, with undeveloped wooded areas to the south, east, and west.

2.2 Description of LBR Landfill CCR Unit

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

2.2.1 Landfill Configuration

The landfill is situated within the drainage basin of Little Broad Run and consists of 9 planned fill areas. As of 2015, Areas 1 through 7 were either temporarily closed pending final capping, or in construction. The surface of the landfill will be covered with 2 ft of low-permeability compacted soil and vegetated with grass cover as construction at each landfill area is completed. Clay material for this cover will be derived from onsite borrow areas. General construction of the landfill is further detailed in the Vertical Expansion Engineering Design Report (Hull, 2008).

2.2.2 Area/Volume

The total area of the Site is approximately 660 acres which includes both disposal and non-disposal use. The current permitted area for disposal is 297 acres, with a total landfill disposal volume of approximately 56.5 million cubic yards, which includes both bottom ash and fly ash from both the Mountaineer and Sporn Plants (Hull, 2008) (**Figure 3**).

2.2.3 Construction and Operational History

The landfill began operation under West Virginia Department of Health (WVDOH) Permit Number 7285, dated November 16, 1978. Subsequently, the West Virginia Department of Natural Resources assumed regulatory status for the Site and operation was conducted under Application Number I-1588-L dated November 1, 1984 (Appalachian Power Company, 1984). In 1989, the pending permit Application Number I-1588-L was amended with the submission of the Class F Industrial Landfill Facility Application Addendum, Application Number WV0077038, dated September 21, 1989 (Appalachian Power Company, 1989). The landfill currently operated under Application Number WV 0077038, with addendums and/or

renewals having been submitted in 1991, 1997, 1998, 2003, 2004, 2007, 2008, 2013, and most recently 2015.

Landfill construction is planned for 9 individual sequences (i.e. areas), with a total landfill disposal volume of approximately 56.5 million cubic yards, which includes both bottom ash and fly ash from both the Mountaineer and Sporn Plants (Hull, 2008). The Sporn Plant was de-activated on June 1, 2015 and currently does not contribute CCR material to the Site. As of 2015, Areas 1 through 7 were either temporarily closed pending final capping, or in construction.

During typical landfill construction, a liner is placed at the base of each area. Liner construction specifics have varied over time. Liners at landfill Areas 1 through 3 consist of a minimum 2-ft thick natural clay liner overlain by a single-underdrain system to collect leachate and groundwater seepage. The liner at Area 4 consists of a minimum 2-ft thick engineered clay liner overlain by a single-underdrain system, as well as a groundwater interceptor drain system beneath the clay liner to capture spring flow from perched groundwater (EPRI, 1999). Liner construction for Areas 5 through 7 is described in detail in Solid Waste/NPDES Permit No. WV0077038 Permit Renewal Application (AEP, 2003), consisting in general of the following layers:

- Groundwater interceptor drainage system
- Minimum 12-inches of compacted or in-place clayey subbase
- · Minimum 24-inches of compacted clay liner
- Leachate Collection System (LCS)
- Protective cover zone

With the Sporn Plant closure in June 2015, only CCR byproducts from the Mountaineer Plant are currently placed in the landfill. These waste products include fly ash, bottom ash, flue gas desulfurization (FGD) (synthetic gypsum), and FGD purge stream treatment solids (limestone inerts and solids). The FGD and gypsum are transported to the landfill via above-ground conveyors, while fly ash and bottom ash are de-watered and removed from the Mountaineer bottom ash ponds or fly ash silo before being hauled to the landfill via private haul road. The landfill also occasionally receives CCR byproducts from the AEP Plants at Clinch River (VA), Glen Lyn (VA), and Kanawha River (WV) (AEP, 2003).

2.2.4 Surface Water Control

Surface water control at the Site is discussed in detail in Vertical Expansion Engineering Design Report (Hull, 2008). Structures are in place at the Site that control surface runoff and infiltration of surface runoff. Surface runoff is managed through a series of leachate ponds, sediment control basins, and diversion ditches that channel flow to temporary sediment collection ponds around the perimeter of the site (noncontact runoff) or the permanent leachate collection pond located to the northeast and downstream of the Little Broad Run valley (contact runoff). The two leachate ponds consist of an underdrain/groundwater interceptor system consisting of (from bottom to top) a 1.0-foot drainage layer that collects groundwater and a 4" perforated high density polyethylene (HDPE) pipe that coveys collected groundwater to a sump via gravity flow; an 8 ounce non-woven geotextile above the drainage layer; a minimum 1.5-foot compacted clayey soil liner; HDPE geomembrane, a 16 ounce non-woven geotextile above the HDPE

membrane; and a 12-inch minimum reinforced concrete base installed above the 16-ounce geotextile (Hull, 2010).

2.3 Previous Investigations

Prior to submission of the original WVDOH Permit Number 7285, AEP performed a site investigation to characterize the conditions at the proposed landfill facility. These investigations included drilling through soil and into rock, split barrel soil sampling and standard penetration testing, undisturbed soil sampling (Shelby tubes), and continuous rock coring, where appropriate (AEP Service Corp., 1978).

Soil samples were analyzed for geotechnical parameters to assist with general site characterization and stability analyses. These parameters include grain size distribution, moisture content, plasticity, and permeability (AEP Service Corp., 1978).

In 1986, AEP published the results of additional site investigations in Ground-Water Monitoring of Little Broad Run Fly Ash Landfill, New Haven, W. Va. This investigation included the installation of additional soil and rock borings, packer testing of select borings to determine hydraulic properties of the water-bearing zones, and the installation of four monitoring wells (MW-1 through MW-4) (AEP Service Corp., 1986). Approximately half of the current monitoring well network was installed in subsequent investigation activities from 1992 to 1997. These monitoring wells were routinely sampled and gauged, and the results of routine monitoring were published in landfill permit renewals in 1997, 1998, and 2003. From 2004 to 2010, the remainder of the wells and piezometers of the monitoring well network were installed and are currently sampled or gauged as part of routine Site monitoring (AEP, 2003).

From 1995 through 1998, AEP worked in coordination with Ish, Inc., META Environmental, Inc., HIS GeoTrans, Inc., and Electric Power Research Institute (EPRI) to evaluate groundwater quality associated with a number of AEP power generating facilities, including the Mountaineer Plant. The primary objectives of these site investigations were to characterize hydrogeology and identify potential contaminant source areas, establish existing groundwater quality, and identify constituents that exceeded West Virginia Groundwater Standards. 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). For the landfill, groundwater quality was assessed in these studies from analytical results dated April, July, and October 1997 from 24 existing wells (MW-3 to MW-9, MW-12, MW-14 to MW-22, MW-27 to MW-33).

In addition to groundwater monitoring and site characterization investigations, an evaluation of stability related to underground mining at the Philip Sporn Mine was performed in 1992 (Gales, 1992). As part of this investigation, one test hole was drilled to intercept the Pittsburg Coal seam. Samples of the coal and surrounding rock strata were collected and analyzed for mechanical properties. Additionally, pillar load calculations were performed to assess pillar strength under post-landfill construction conditions. This investigation concluded that subsidence has not occurred at the LBR Landfill, that the pillars would not fail under increased loading, and that no sensible strain would be present at the ground surface as a result of previous mining (Gales, 1992).

2.4 Hydrogeologic Setting

The hydrogeologic setting is discussed in detail in Solid Waste/NPDES Permit No. WV0077038 Permit Renewal Application (AEP, 2003). The geologic setting surrounding the Site primarily 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 (EPRI, 1999). Groundwater occurrence in the bedrock generally coincides with the stress relief fracture system and is not necessarily related to lithology. Fracture orientation ranges from vertical (predominantly along valley slopes) to horizontal (along bedding planes). Groundwater flow occurs primarily in this fracture network, and the lateral flow generally follows topography towards the LBR valley center. The principal direction of groundwater flow in the valley is towards the LBR valley mouth to the northeast.

Unconsolidated deposits in the vicinity of the landfill consist primarily of weathered bedrock and residuum blanketing the underlying bedrock, with some colluvial deposits consisting of weathered rock, sand, silt, and clay. Soils are generally clay-type and vary in thickness from 1.8 ft to 20.3 ft (AEP, 2003). Further down valley towards the valley mouth, alluvial deposits derived from Little Broad Run, combined with residuum, are present in thickness up to 28 ft. These alluvial sediments overlie bedrock and are in hydraulic connection to the fracture network.

These features are further illustrated on two lines of cross section that were initially prepared by AEP with modifications through the LBR landfill made by Arcadis to incorporate data obtained in 2016. One cross section trends from southwest to northeast through the landfill (A to A') and the other cross section trends from the northwest to the southeast through the landfill (B to B'). The cross section location map is included as **Figure 4** and the cross sections are included as **Figure 5A** (A to A') and **Figure 5B** (B to B'). 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).

The results of a mass balance water budget analysis performed as part of the March 2003 Solid Waste/NPDES Permit No. WV0077038 Permit Renewal Application is described in detail in Section D of that application (AEP, 2003). The primary objective of this analysis was to estimate the average annual precipitation, evapotranspiration, and leachate production (AEP, 2003).

2.4.2 Regional and Local Geologic Setting

2.4.2.1 Unconsolidated

The Site is located in the Appalachian Plateau physiographic province, and unconsolidated soils are limited in extent. Depending on geologic setting, soils are residual, colluvial, and/or alluvial in origin.

Soils in lower topographic areas (i.e. valleys) consist of a combination of residuum derived from weathered sandstone/shale and colluvium. Adjacent to the Little Broad Run, alluvial deposits are present, consisting of silty to sandy clay. Further up the ridges, soils are composed mainly of residuum. Unconsolidated material is thickest in the valley floors. Based on historical and recent soil samples and well installation logs, the soil thickness ranges from 1.8 to 28 ft.

2.4.2.2 Bedrock

The primary regional bedrock units underlying the landfill 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 Dunkard Formation, which immediately underlie unconsolidated sediments beneath the Site, consist of predominantly clay-shale with alternating beds of siltstone, sandstone, and occasionally thin limestone beds (AEP, 2003). The base of the Dunkard Formation is marked by a thick, massive conglomeritic sandstone that separates it from the deeper Monongahela Formation (EPRI, 1999). The Monongahela Formation is lithologically similar to the Dunkard Formation. Several coal horizons are present in the region and often serve as marker beds for unit identification. Locally, the Pittsburg No. 8A coal bed defines the base of the Monongahela Formation (EPRI, 1999). Bedrock occurrence is illustrated on both cross sections (Figures 5A and 5B) and detailed in boring logs included in Appendix A.

No geologic structures have been mapped in the immediate vicinity of the Site. Regionally, a series of gently dipping anticlines and synclines strike to the north-northeast, and the Parkersburg Syncline is located approximately 11 miles to the east-southeast from the Site (AEP, 2003). The Parkersburg Syncline appears to dip to the north-northwest, and bedding planes generally dip toward the axis of the syncline. Locally, however, bedding planes are reversed due to mild up-warping, and are essentially flat lying (EPRI, 1999).

2.4.3 Surface Water and Surface Water Groundwater Interactions

One intermittent stream, Little Broad Run, occurs in the vicinity of the Site and originates at the northeastern corner of the landfill. Little Broad Run flows to the north and ultimately discharges into the Ohio River. Groundwater flow follows topographic relief and is generally in the flow direction of Little Broad Run to the northeast. Two leachate collection ponds are constructed northeast of the landfill. This system collects surface water runoff, as well as groundwater from the leachate and groundwater interceptor drain systems as well as the gypsum stack-out pad. The two leachate ponds consist of an underdrain/groundwater interceptor system consisting of (from bottom to top) a 1.0-foot drainage layer that collects groundwater and a 4" perforated high density polyethylene (HDPE) pipe that coveys collected groundwater to a sump via gravity flow; an 8 ounce non-woven geotextile above the drainage layer; a minimum 1.5-foot compacted clayey soil liner; HDPE geomembrane, a 16 ounce non-woven geotextile above the HDPE membrane; and a 12-inch minimum reinforced concrete base installed above the 16-ounce geotextile (Hull, 2010).

The leachate collection ponds discharge water to the leachate surge pond at Mountaineer Plant. The water is pumped to the bioreactor for treatment and then pumped to the clear water pond where this water will eventually flow to outlet 001, which discharges to the Ohio River.

2.4.4 Water Users

In 2014, a water well inventory for the Mountaineer Plant indicated no information regarding the use of wells located in the vicinity of the Site was available (Banks, 2014). However, the one well that was identified was registered with the United States Geological Survey, is located at the Phillip Sporn Power Plant, and appears to be used for groundwater monitoring. A copy of the well report is included in **Appendix B**.

3. ISOLATION FROM THE UPPERMOST AQUIFER

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

3.1 Uppermost Aquifer and Piezometric Analysis

3.1.1 Piezometric Analysis

3.1.1.1 Horizontal and Vertical Position Relative to CCR Unit

Groundwater occurrence at the Site is generally in fractured sandstone units, and have been identified as Hydrologic Units 1 through 4 in order from shallowest to deepest beneath the landfill. Hydrologic Units 1 and 2 are limited in lateral extent in this area and are restricted to higher elevations along valley walls, and likely discharge to a seepage face or local drainages in close proximity to the landfill. Therefore. these units are not sources of groundwater for wells or developed springs and thus not considered as part of the uppermost aguifer. Therefore, the uppermost aguifer at the Site is defined as the laterally extensive Hydrologic Unit 3, and in the absence of Hydrologic Unit 3 the uppermost aguifer is defined as the deeper Hydrologic Unit 4. Hydrologic Unit 3 is present throughout most of the Site; however, the bedrock unit pinches out to the northeast (in the vicinity of MW-15 and MW-20) and the southeast (between SB-1602R and MW-24/MW-25) (Figure 5B). Hydrologic Unit 4 pinches out to the northeast between the MW-9/MW-19/MW-32 well cluster and SB-1609R/SB-1619R, but is otherwise present underlying the landfill (Figure 5A). In addition to primary porosity which provides groundwater storage, secondary porosity in the form of stress relief fractures (paleo-relief) occur in both the Dunkard and Monongahela Formations. Stress relief fractures are likely hydraulically connected with deeper open horizontal bedding planes. In similar stress relief fracture systems, the aquifers are generally unconfined; however, conditions can exhibit confined behavior in valley floors if low-transmissivity sediments (i.e. clay) are present (USGS, 1981). Vertical stress relief fracture frequency decreases with depth, and fractures are less common in interbedded shale units between sandstone units (EPRI, 1999). As a result, deeper Hydrologic Units 3 and 4 exhibit confined conditions. The uppermost aquifer, consisting of Hydrologic Units 3 and/or 4, is horizontally continuous across the entire Site.

Towards the northeast valley mouth and down gradient of the landfill, Hydrologic Unit 4 is blanketed by alluvium consisting of silty to sandy clay. The alluvium and shallow weather shale bedrock occurrence continues down valley and is hydraulically connected to Hydrologic Unit 4; Therefore, these shallow units are included as part of the down gradient monitoring of the landfill. Alluvial thickness observed at MW-1611 and SB-1609R ranged from 26 to 28 ft, respectively (**Figure 5A**).

The upper limit of the uppermost aquifer is located beneath the original ground surface prior to landfill construction and is defined as the top of Hydrologic Unit 3, or the top of Hydrologic Unit 4 in the absence of Hydrologic Unit 3. The top of Hydrologic Unit 3 occurs at depths as shallow as 15 ft below ground surface (bgs) (near MW-15 and MW-20). The top of Hydrologic Unit 4 occurs at depths as shallow as 26 ft bgs (MW-1611).

3.1.1.2 Overall Flow Conditions

Groundwater flow is laterally continuous throughout most of the Site within Hydrologic Units 3 and 4. Where Hydrologic Unit 3 is no longer present, Hydrologic Unit 4 is present and continuous. Groundwater flow in these units follow historical topography towards the LBR valley bottom. Groundwater underlying the valley floor generally flows to the northeast towards the northeast valley mouth. Available groundwater elevations for Hydrologic Units 3 and 4 wells are summarized on **Table 1** from August 1993 to August 2016. Potentiometric contours from October 2001 is the most complete data set with the closed wells in the center portion of the landfill and were used to depict groundwater flow conditions (**Figure 6**). Recently installed monitoring wells MW-1611 and MW-1612 were not be used in potentiometric contouring presented on **Figure 6**; However, groundwater levels collected during from these two wells are consistent with general piezometric elevation understanding and groundwater flow directions.

Towards the northeast valley mouth down gradient of the landfill, Hydrologic Unit 4 is likely hydraulically connected to the overlying and laterally adjacent alluvium and weathered bedrock. Groundwater flow in this northeastern portion of the Site is likely towards the valley center and down valley in the direction of Little Broad Run. Available groundwater elevations for alluvium monitoring wells are summarized on **Table 1**.

Water level gauging conducted at well nests at the Site are from historical information since many of the wells are now closed. The wells nests water levels indicate downward vertical hydraulic gradients between Hydrologic Units 1 and 3 ranging from 0.39 to 0.91 ft/ft, whereas deeper vertical hydraulic gradients tend to be upwards. An upward vertical hydraulic gradient of 0.09 ft/ft was measured at the MW-20/MW-15 well pair (EPRI, 1999).

3.1.2 Uppermost Aquifer

3.1.2.1 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 (approximately 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.

3.1.2.2 Common Definitions

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

3.1.3 Identified Onsite Hydrostratigraphic Unit

The identified Site hydrostratigraphic unit is Hydrologic Unit 3, or Hydrologic Unit 4 in the absence of Hydrologic Unit 3. This aquifer is not known to be used locally for groundwater supply or industrial water use.

3.2 Compliance with Isolation Distance

The estimated base of the CCR unit varies based on pre-construction surface topography. The upper limit of the uppermost aquifer is defined as the top of the applicable hydrologic unit, which are generally flat lying (**Figure 5A** and **Figure 5B**) beneath the landfill. In the portion of the Site where Hydrologic Unit 3 constitutes the uppermost aquifer, the elevation of the upper limit of the uppermost aquifer is shallowest in the vicinity of abandoned monitoring well MW-20, which was located in the central portion of the landfill near the intersection of Cross Sections A-A' and B-B'. At MW-20, the depth to the top of Hydrologic Unit 3 was approximately 15 ft bgs before landfill construction and approximately 15 ft below the base of the landfill liner after landfill construction (**Figure 5A**).

Based on this review of historical data, there is currently at least 15 ft of separation between the upper limit of the uppermost aquifer and the estimated base of the CCR unit. This is illustrated in cross section A-A' (**Figure 5A**). This CCR unit meets the location restriction for separation of 5 ft from the uppermost aquifer.

4. WETLANDS

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

4.1 Local Wetlands

Based on the August 12, 2015 site visit and review of available published information, the landfill is not located within any areas that exhibited wetland characteristics that might be classified as a regulated wetland. The landfill is, however, located within the Little Broad Run valley, a tributary of the Ohio River. Little Broad Run originates at the northeastern boundary of the CCR unit and flows to the northeast (**Figure 3** and **Figure 7**).

4.2 Compliance with Wetland Restrictions

Based on the August 12, 2015 site visit and review of available information, the landfill is not located within wetlands. Therefore, this CCR unit meets the location restriction regarding wetlands.

5. FAULT AREAS

CCR Rule 40 CFR Part 257.62 requires that existing and new CCR surface impoundments must not be located within 200 ft of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates that the and alternate setback will prevent damage to the structural integrity of the CCR unit.

5.1 Description of Regional Geologic Structural Features

The Parkersburg Syncline is the predominant regional structural feature in the vicinity of the Site. The axis of the syncline is located approximately 11 miles east-southeast of the Site and it trends northeastward. Regionally, bedrock dips gently to the east-southeast towards the axis of the syncline. Locally, however, bedrock dip is essentially flat lying and is affected by isolated anticlines and mild upwarping of the bedrock strata (EPRI, 1999).

5.2 Compliance with Fault Area Restrictions

A review of available geologic reports and maps has indicated that the Site is not located near any faults with displacement in the Holocene. **Figure 8** presents a map depicting known faults in the region, all of Paleozoic age (USGS, 2005; WVGES, 2013). As shown on the figure, the nearest faults that do exist are at least tens of miles from the site. Therefore, the CCR units at this Site meet the location restriction for faults.

6. SEISMIC IMPACT ZONE

CCR Rule 40 CFR Part 257.63 requires that existing and new CCR surface impoundments must not be located within a seismic impact zone unless the owner or operator demonstrates that all structural components of the CCR unit are designed to withstand the maximum horizontal acceleration in lithified earth material for the Site.

6.1 Definition of Seismic Impact Zone

CCR Rule 40 CFR Part 257.53 defines a seismic impact zone as an area having a 2% or greater probability that the maximum horizontal acceleration expressed as a percentage of the earth's gravitational pull (g) will exceed 0.10 g in 50 years.

6.2 Compliance with Seismic Impact Zone Restriction

Figure 9 presents the map of the peak ground acceleration with a 2% probability of exceedance in 50 years for West Virginia, as published by the United States Geological Survey (USGS) Earthquake Hazards Program (USGS, 2014). As shown on **Figure 9**, the Site falls within the zone having a maximum horizontal acceleration of 0.06 to 0.1 g. Therefore, the CCR unit meets the location restriction for seismic impact zone.

7. UNSTABLE AREAS

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

7.1 Definition of Unstable Area and local Conditions

7.1.1 CCR Rule Definition

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

7.1.2 Poor Foundation Soils

An initial geotechnical investigation of the Little Broad Run valley was conducted in 1979 prior to construction of the CCR unit. This report classified foundation soils as clay or silty clay with relatively low plasticity. Weathered sandstone and clayshale fragments. There were no poor foundation soils identified in this initial investigation (AEP, 1978).

7.1.3 Mass Movements

Figure 10 presents a map of known landslide activity in the area (USGS, 1978). While this figure indicates some areas of the landfill may be susceptible to landslides, these susceptible areas are limited in spatial extent and exist only in thin valleys at higher elevations. The majority of the CCR unit is located in the larger Little Broad Run valley, which is not susceptible to landslides. Therefore, the FGD landfill meets the siting criteria for mass movements.

7.1.4 Karst

Figure 11 presents a map of known karst features in West Virginia (WVGES, 1968). As shown on this figure, the landfill is not located in a karst area.

7.1.5 Subsurface Mining

In addition to groundwater monitoring and site characterization investigations, an evaluation of stability related to underground mining at the Philip Sporn Mine was performed in 1992 (Gales, 1992). As part of this investigation, one test hole was drilled to intercept the Pittsburg Coal seam. Samples of the coal and surrounding rock strata were collected and analyzed for mechanical properties. Additionally, pillar load calculations were performed to assess pillar strength under post-landfill construction conditions. This investigation concluded that subsidence has not occurred at the LBR Landfill, that the pillars would not fail

under increased loading, and that no sensible strain would be present at the ground surface as a result of previous mining (Gales, 1992).

7.2 Compliance with Unstable Areas Restriction

Based on the Site visit and review of available information, the landfill is not located within unstable areas. Therefore, this CCR unit meets the location restriction requirements for unstable areas.

8. SUMMARY, CONCLUSIONS, AND PE CERTIFICATION

I, 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, as well as the evaluations discussed within this report, the Mountaineer LBR Landfill meets the CCR surface impoundment location restrictions of 40 CFR Part 257 for separation from the uppermost aquifer, wetlands, fault areas, seismic impact zones, and unstable areas.

Printed Name of Registered Professional Engineer

John w Holm

Signature

17419

Registration No. Registration State

9. REFERENCES

- American Electric Power Service Corporation. 1978. Geotechnical Investigation of Little Broad Run Valley, New Haven, West Virginia.
- American Electric Power Service Corporation. 1986. Ground-Water Monitoring of Little Broad Run Valley, New Haven, West Virginia.
- American Electric Power. 1997. Class F Industrial Landfill Facility Application. Little Broad Run Landfill Disposal Site. Solid Waste/NPDES Permit Reissue Application Number WV0077038.
- American Electric Power. 1998. Class F Industrial Landfill Facility Application. Little Broad Run Landfill. Solid Waste/NPDES Permit No. WV0077038. Application for Permit Renewal Addendum No. 1.
- American Electric Power. 2003. Solid Waste/NPDES Permit No. WV0077038, Permit Renewal Application, Little Broad Run Landfill.
- Appalachian Power Company. 1984. Application for Landfill Permit, West Virginia Department of Natural Resources Number I-1588-L, Little Broad Run Landfill, New Haven, West Virginia.
- Appalachian Power Company. 1989. Class F Industrial Landfill Facility Application Addendum, Application Number WV0077038.
- Appalachian Power Company. 1991. Initial Supplement to WVDNR Request for Additional Information Date August 28, 1990, Application Number WV0077038.
- Banks Environmental Data, Inc. 2014. Water Well Report, AEP Water Well Inventory, Mountaineer Plant, ES-112028.
- Electric Power Research Institute (EPRI). 1999. Groundwater Quality at the Phillip Sporn and Mountaineer Power Plants, Mason County, West Virginia, Prepared for American Electric Power Service Corp.
- Fetter, Charles Willard, and C. W. Fetter. 2001. Applied hydrogeology. Vol. 3. No. 3. Upper Saddle River:

 Prentice Hall
- Gales Engineering Company. 1992. Little Broad Run Landfill Mining Subsidence Evaluation, Mason County, West Virginia. Prepared for Mountaineer Plant, Sporn Plant, Appalachian Power Company.
- GAI Consultants, 2005. Report of Findings, Evaluation of the Impacts of Mining, New Haven, West Virginia, October 20, 2005.
- Hull & Associates, Inc. 2008. Vertical Expansion Engineering Design Report, Appalachian Power Company, Mountaineer Plant.
- Hull & Associates, Inc. 2010. Leachate Collection Pond and Conveyance System Engineering Design Report, Appalachian Power Company, Mountaineer Plant.
- Southeast Regional Climate Center. 2015. Historical Climate Summaries, Winfield Locks, West Virginia, http://www.sercc.com, Query conducted by Mr. Josh Roberts of Arcadis on October 6, 2015.

- United States Geological Survey (USGS). 1978. Landslides and Related Features of the New Haven, W. Va.-Ohio Quadrangle. Open File Map 83-80 (N-1).
- United States Geological Survey (USGS). 1981. Water-Supply Paper 2177, Hydrologic Effects of Stress-Relief Fracturing in an Appalachian Valley.
- United States Geological Survey (USGS). 2005. Preliminary integrated Geologic Map Databases for the United States: Kentucky, Ohio, Tennessee, and West Virginia. http://mrdata.usgs.gov/geology/state/state.php?state=WV
- United States Geological Survey (USGS). 2014. Seismic-Hazard Maps for the Conterminous United States. http://earthquake.usgs.gov/hazards/products/conterminous/
- United States Geological Survey (USGS), Aquifers and Groundwater. 2015. Available online at www.usgs.gov.
- West Virginia Geological and Economic Survey (WVGES). 1968. Karst regions derived from 1968 geological map of West Virginia. http://wvgis.wvu.edu/data/dataset.php?ID=133
- West Virginia Geological and Economic Survey (WVGES). 2013. West Virginia Faults. https://catalog.data.gov/dataset/west-virginia-faults

TABLE

Table 1
Water Level Data
AEP Mountaineer Generating Plant - Little Broad Run Landfill
New Haven, West Virginia



	Aug-93	Oct-93	Feb-94	Apr-94	Jul-94	Oct-94	Dec-94	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Apr-96	Jul-96	Oct-96	Jan-97	Apr-97	Jul-97	Oct-97	Jan-98	Apr-98	Jul-98	Oct-98
Well ID			GW Elev.			GW Elev.								GW Elev.			GW Elev.		GW Elev.				
1101112	ft. amsl	ft. amsl	ft. amsl	ft. amsl		ft. amsl	ft. amsl	ft. amsl		ft. amsl		ft. amsl		ft. amsl									
Groundwater Quality Monitoring Wells																							
Alluvium																							
Downgradient																							
MW-38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydrologic Unit 3																							
Upgradient																							
MW-30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		695.29	693.72	697.14	698.29	698.79	698.68	697.95
MW-1612	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Downgradient																							
MW-26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydrologic Unit 4																							
Downgradient																							
MW-27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	646.94	646.54	645.95	645.91	646.81	647.14	NA
MW-39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-1611	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydraulic Monitoring Wells Only																							
Hydrologic Unit 3																							
MW-2	657.55	653.25	655.01	654.75	657.05	653.15	653.35	653.65	653.05	655.83	654.65	657.87	655.25	654.93	653.20	656.31	654.58	656.95	654.4	657.47	659.04	660.81	662.8
MW-12	714.61	713.33	716.30	717.61	718.04	717.58	716.92	712.85	718.50	718.21	717.95	719.38	718.75	718.93	693.67	719.30	719.72	719.51	718.77	719.65	720.42	719.72	719.12
MW-34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-37	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydrologic Unit 4																							
MW-23	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	583.91	586.07	587.66	589.61	581.83	593.74	595.8
MW-25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other and Abandoned Wells																							
Alluvium																							
MW-16	618.88	618.22	620.95	621.11	620.39	619.13	620.48	621.03	620.92	619.36	619.08	621.14	620.88	620.53	620.86	621.18	620.78	619.46	618.66	620.82	621.06	621.08	617.58
MW-17	615.58	614.14	615.52	617.49	616.88	615.06	616.70	618.09	616.43	616.19	616.29	617.02	617.42	616.52	617.53	617.57	617.29	615.84	615.22	617.67	617.33	617.91	613.85
MW-18	614.86	614.97	615.81	617.61	616.86	615.78	617.44	617.23	616.97	615.35	615.78	617.20	617.60	617.39	617.58	617.74	617.48	616.02	615.43	617.04	617.64	617.97	614.13
MW-19	642.14	642.14	643.33	644.34	643.71	642.75	644.14	644.64	644.39	643.02	643.54	645.14	645.14	644.23	644.11	644.04	644.24	644.24	643.84	645.14	645.14	645.14	643.34
MW-43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-44s	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-44i	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-44d	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hydrologic Unit 1																							
MW-1	717.35	710.10	712.23	710.50	710.90	710.45	709.85	709.70	709.55	710.47	710.15	711.25	709.47	709.82	709.90	712.09	709.58	709.78	709.64	711.4	713.32	715.01	716.97
MW-3	752.75	752.64	753.22	753.41	752.93	752.62	752.84	752.61	753.36	752.92	752.76	753.42	753.60	752.90	752.81	753.43	753.58	753.39	752.93	753.34	753.61	753.26	752.9
MW-4	721.42	721.14	722.04	721.84	722.17	722.49	722.99	723.04	722.68	724.21	724.74	725.52	725.44	725.46	725.65	726.04	726.54	726.88	726.95	727.04	727.97	728.11	727.85
MW-5	760.24	760.00	760.13	761.95	760.25	759.45	759.45	759.30	760.19	760.30	760.15	756.95	760.77	760.78	760.25	760.41	761.18	761.06	760.45	759.51	760.73	760.78	760.17
MW-7	759.43	759.60	761.12	762.02	759.49	759.51	759.60	759.77	760.87	759.72	759.62	760.39	761.07	760.45	749.57	754.97	755.12	753.88	753.6	753.68	781.88	754.97	NA
MW-10	724.50	724.47	724.25	724.27	724.01	724.60	724.07	723.67	724.25	723.67	723.71	724.40	724.27	724.33	724.29	724.82	724.37	723.69	724.57	723.65	724.04	724.29	724.34
MW-24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	790.06	795.11	797.31	798.26	792.45	792.17	NA
MW-29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	711.14	714.75	715.61	715.94	714.33	713.14	NA
MW-31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	752.41	755.85	757.27	758.01	758.99	758.97	NA
MW-35	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-46	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-47	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 1
Water Level Data
AEP Mountaineer Generating Plant - Little Broad Run Landfill
New Haven, West Virginia



	Aug-93	Oct-93	Feb-94	Apr-94	Jul-94	Oct-94	Dec-94	Jan-95	Apr-95	Jul-95	Oct-95	Jan-96	Apr-96	Jul-96	Oct-96	Jan-97	Apr-97	Jul-97	Oct-97	Jan-98	Apr-98	Jul-98	Oct-98
Well ID	GW Elev.																						
	ft. amsl																						
Hydrologic Unit 3																							
MW-6	665.21	665.43	674.86	671.73	677.18	672.33	681.53	682.16	680.93	677.53	664.53	670.43	675.21	671.93	669.14	678.94	684.01	681.45	676.18	676.02	674.36	667.38	NA
MW-11	681.74	679.48	682.08	682.01	682.63	682.65	680.13	682.83	682.42	682.90	682.97	683.13	682.94	682.78	682.83	683.28	683.23	682.82	684.2	685.78	687.38	687.79	687.48
MW-13	674.90	669.74	674.73	671.55	673.25	671.20	667.28	664.55	671.30	672.30	671.15	666.77	672.03	672.16	673.21	673.65	673.55	676.15	674.25	673.88	674.8	672.95	674.58
MW-14	702.45	697.37	701.87	700.87	701.67	700.19	698.24	693.87	701.59	686.92	701.27	677.05	701.61	691.59	701.52	699.97	702.81	702.81	702	702.31	702.82	703.05	NA
MW-20	667.33	666.85	668.05	668.88	667.46	666.84	666.80	667.03	668.03	667.18	667.08	668.13	668.91	667.91	668.26	668.83	668.68	667.68	667.38	668.48	668.8	669.11	666.96
Hydrologic Unit 4																							
MW-8	671.43	671.43	673.28	674.09	672.33	670.61	671.19	671.97	673.03	670.98	671.03	673.65	674.54	671.86	672.38	674.34	671.81	671.23	670.55	672.73	672.39	672.99	670.53
MW-9	634.15	633.90	635.58	635.90	634.35	633.72	634.18	634.73	635.38	634.07	633.80	635.37	635.64	634.51	635.10	635.65	635.55	634.2	633.71	634.75	635.53	634.99	632.92
MW-15	671.28	671.52	673.22	674.00	672.20	670.75	671.57	672.20	673.25	671.00	670.95	673.56	674.62	671.84	672.39	673.85	671.84	671.46	670.57	671.5	672.42	673.49	670.45
MW-21	NA	655.03	653.1	653.04	654.5	655.45	655.26	652.75															
MW-22	NA	647.76	686.27	689.54	694.47	694.62	694.42	691.4															
MW-33	NA	672.17	671.15	670.71	671.79	672.83	673.42	670.75															
Pittsburg Sandstone																							
MW-40	NA																						
Redstone Coal																							
MW-41	NA																						
MW-42	NA																						
Pittsburg Coal																							
MW-32	NA	516.87	517.32	517.01	517.6	519.55	520.71	NA															
<u>Piezometers</u>																							
CTL PZ-1	NA																						
CTL PZ-4	NA																						
MW-46S	NA																						
MW-47S	NA																						
HMW-1	NA																						
HMW-2	NA																						
HMW-3	NA																						
HMW-4	NA																						
HMW-5	NA																						

Table 1
Water Level Data
AEP Mountaineer Generating Plant - Little Broad Run Landfill
New Haven, West Virginia



	Jan-99	Apr-99	Jul-99	Oct-99	Jan-00	Feb-00	Apr-00	Jul-00	Oct-00	Jan-01	Apr-01	Mav-01	Jul-01	Oct-01	Jan-02	Apr-02	Jul-02	Oct-02	Jan-03	Jul-05	Jul-16	Aug-16
Well ID		GW Elev.			GW Elev.		GW Elev.	GW Elev.		GW Elev.		GW Elev.										
	ft. amsl		ft. amsl	ft. amsl	-	ft. amsl	ft. amsl		ft. amsl		ft. amsl											
Groundwater Quality Monitoring Wells																						
Alluvium																						
Downgradient																						
MW-38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	623.49	NA	NA
Hydrologic Unit 3																						
Upgradient																						
MW-30	NA	697.45	NA	698.12	NA	NA	698.02	NA	698.07	NA	699.33	NA	NA	698.4	NA	698.7	NA	698.34	NA	700.85	NA	NA
MW-1612	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	737.34
Downgradient																						
MW-26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	669.80	NA	NA
Hydrologic Unit 4																						
Downgradient																						
MW-27	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	647.39	NA	NA
MW-39	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	623.20	NA	NA
MW-1611	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	642.80	NA
Hydraulic Monitoring Wells Only																						
Hydrologic Unit 3																						
MW-2	674.46	664.94	667.47	668.14	669.88	NA	670.68	672.1	676.42	673.1	674.63	NA	675.2	676	681.59	676.47	677.18	NA	NA	689.75	NA	NA
MW-12	720.9	720.8	720.23	720.26	721.85	NA	722.76	722.12	721.86	719.5	719.17	NA	719.97	718.04	717.59	718.04	718.92	721.32	NA	723.83	NA	NA
MW-34	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	673.88	NA	NA
MW-37	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	687.03	NA	NA
Hydrologic Unit 4																						
MW-23	NA	601.23	604.81	NA	NA	NA	618.34	621.03	NA	NA	627.58	NA	NA	629.91	NA	NA	631.75	NA	NA	NA	NA	NA
MW-25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Other and Abandoned Wells																						
Alluvium																						
MW-16	NA	620.94	NA	620.18	NA	NA	621.31	NA	619.42	NA	621.32	NA	NA	617.96	NA	620.93	NA	619.20	NA	618.78	NA	NA
MW-17	NA	617.29	NA	616.27	NA	NA	617.99	NA	616.65	NA	617.5	NA	NA	615.17	NA	617.86	NA	616.59	NA	616.11	NA	NA
MW-18	NA	617.19	NA	615.91	NA	NA	618.05	NA	616.35	NA	617.78	NA	NA	615.57	NA	617.83	NA	616.63	NA	615.62	NA	NA
MW-19	NA	645.14	NA	644.52	NA	NA	645.14	NA	644.17	NA	645.14	NA	NA	643.59	NA	645.14	NA	643.89	NA	NA	NA	NA
MW-43	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	630.15	NA	NA
MW-44s	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	617.43	NA	NA
MW-44i	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	616.79	NA	NA
MW-44d	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	617.04	NA	NA
Hydrologic Unit 1																						
MW-1	718.48	719.35	720.82	721.95	723.19	NA	724.12	725.13	725.82	727.15	728.24	NA	729.03	730.03	730.76	731.51	732.2	NA	NA	746.95	NA	NA
MW-3	NA	753.55	NA	752.69	NA	NA	752.69	NA	752.64	NA	753.14	NA	NA	752.71	NA	752.36	NA	752.76	NA	753.06	NA	NA
MW-4	728.07	728.4	725.74	724.93	NA	724.93	724.18	723.99	723.99	723.9	723.79	NA	723.65	723.71	724.44	723.49	722.77	722.48	NA	NA	NA	NA
MW-5	760.07	760.11	760.32	759.86	760.1	NA	760.45	760.33	760.16	759.53	760.23	NA	760.06	759.75	759.23	759.47	759.68	759.41	760.01	758.90	NA	NA
MW-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-10	NA	724.34	724.33	724.11	725.57	NA	724.65	723.89	NA	724.62	724.59	NA	724.45	724.57	724.07	724.3	723.49	723.77	NA	NA	NA	NA
MW-24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	737.76	NA	NA
MW-28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	808.73	NA	NA
MW-29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	748.73	NA	NA
MW-31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	762.56	NA	NA
MW-35	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	728.15	NA	NA
MW-36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	731.05	NA	NA
MW-45	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	750.28	NA	NA
MW-46	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	775.68	NA	NA
MW-47	NA NA	NA NA	NA NA	NA	NA NA	NA NA	NA	NA NA	NA NA	NA NA	NA	NA.	NA NA	NA NA	NA NA	NA NA	NA NA	NA	NA	766.39	NA	NA

Table 1 Water Level Data AEP Mountaineer Generating Plant - Little Broad Run Landfill New Haven, West Virginia



	Jan-99	Apr-99	Jul-99	Oct-99	Jan-00	Feb-00	Apr-00	Jul-00	Oct-00	Jan-01	Apr-01	May-01	Jul-01	Oct-01	Jan-02	Apr-02	Jul-02	Oct-02	Jan-03	Jul-05	Jul-16	Aug-16
Well ID	GW Elev.																					
	ft. amsl																					
Hydrologic Unit 3																						
MW-6	NA																					
MW-11	NA	687.45	687.43	686	686.32	NA	686.45	686.31	NA	685.61	685.74	NA	685.63	685.62	685.55	685.8	686.05	684.51	NA	NA	NA	NA
MW-13	679.44	680.46	680.52	680.7	681.3	NA	681.43	680.82	680.73	681.05	681.3	NA	680.92	680.95	680.97	680.88	680.55	680.45	NA	NA	NA	NA
MW-14	NA																					
MW-20	NA	668.37	NA	668.18	NA	NA	669.28	NA	667.35	NA	668.65	NA	NA	667.03	NA	668.1	NA	667.27	NA	NA	NA	NA
Hydrologic Unit 4																						
MW-8	NA	671.73	NA	671.58	NA	NA	671.66	NA	670.67	NA	670.9	NA	NA	669.66	NA	670.9	NA	670.28	NA	NA	NA	NA
MW-9	NA	635.12	NA	633.12	NA	NA	635.66	NA	633.98	NA	635.16	NA	NA	633.09	NA	634.95	NA	633.63	NA	NA	NA	NA
MW-15	671.96	671.78	671	670.39	NA	670.39	671.67	671.67	670.64	670.2	670.91	NA	670.56	669.73	670.22	671.42	670.85	670.54	NA	NA	NA	NA
MW-21	NA	654.66	NA	653.7	NA	NA	655.18	NA	653.62	NA	654.78	NA	NA	652.9	NA	654.36	NA	652.95	NA	NA	NA	NA
MW-22	NA	685.91	NA	695.89	NA	NA	695.75	NA	694.78	NA	694.65	NA	NA	693.75	NA	690.94	NA	692.91	NA	NA	NA	NA
MW-33	NA	NA	671.01	671.83	NA	NA	671.99	NA	670.5	NA	NA	670.39	NA	669.8	NA	671.02	NA	671.23	NA	NA	NA	NA
Pittsburg Sandstone																						
MW-40	NA	504.16	NA	NA																		
Redstone Coal																						
MW-41	NA																					
MW-42	NA	622.57	NA	NA																		
Pittsburg Coal																						
MW-32	NA																					
<u>Piezometers</u>																						
CTL PZ-1	NA	774.05	NA	NA																		
CTL PZ-4	NA	791.14	NA	NA																		
MW-46S	NA	803.73	NA	NA																		
MW-47S	NA	789.55	NA	NA																		
HMW-1	NA	723.07	NA	NA																		
HMW-2	NA	796.19	NA	NA																		
HMW-3	NA	799.06	NA	NA																		
HMW-4	NA	785.35	NA	NA																		
HMW-5	NA	814.86	NA	NA																		

Notes:

Shaded - well not verified or abandoned

Elevation in feet above mean sea level

amsl - above mean sea level

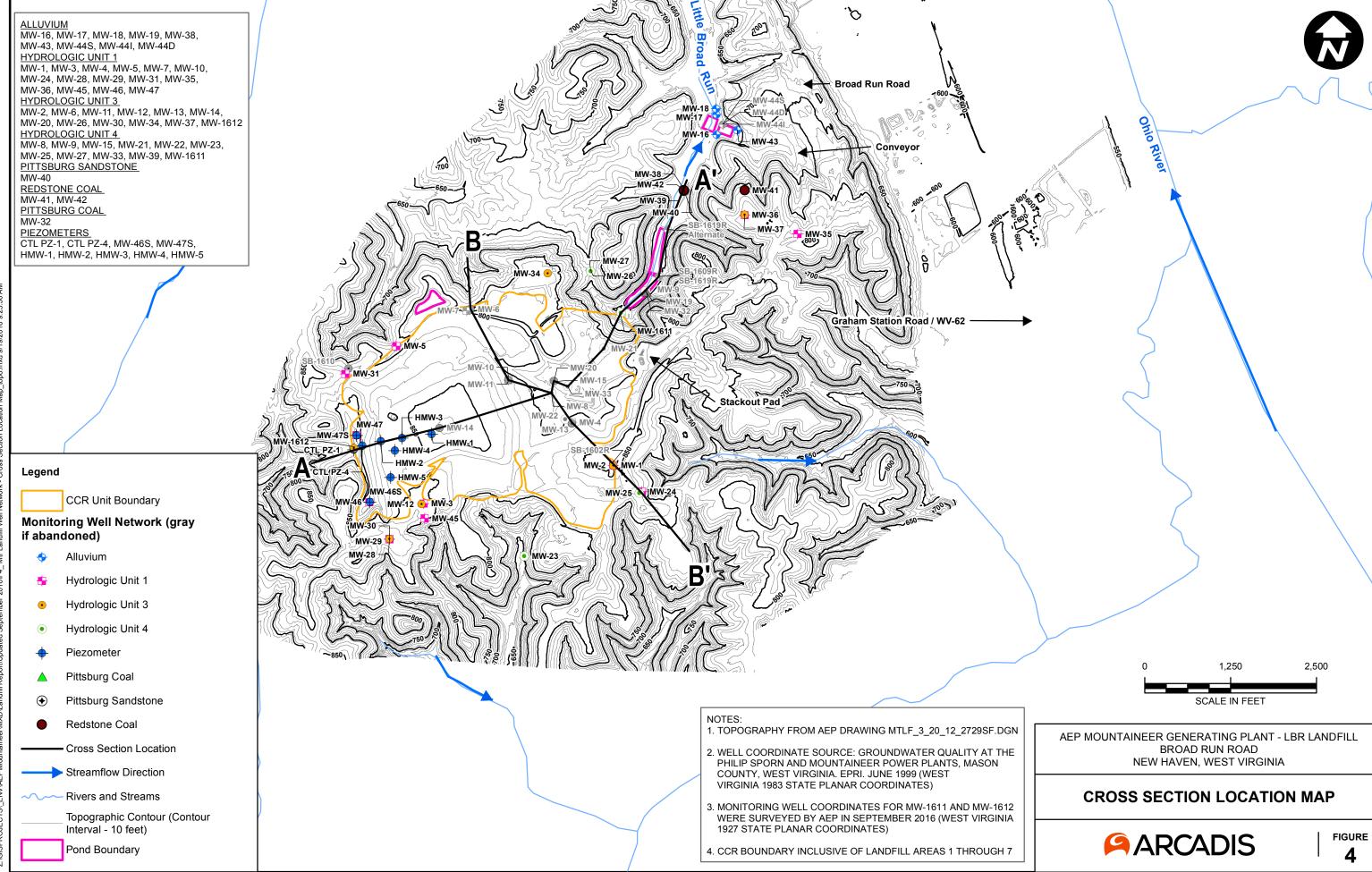
Elev - elevation ft - feet

GW - groundwater NA - Not available

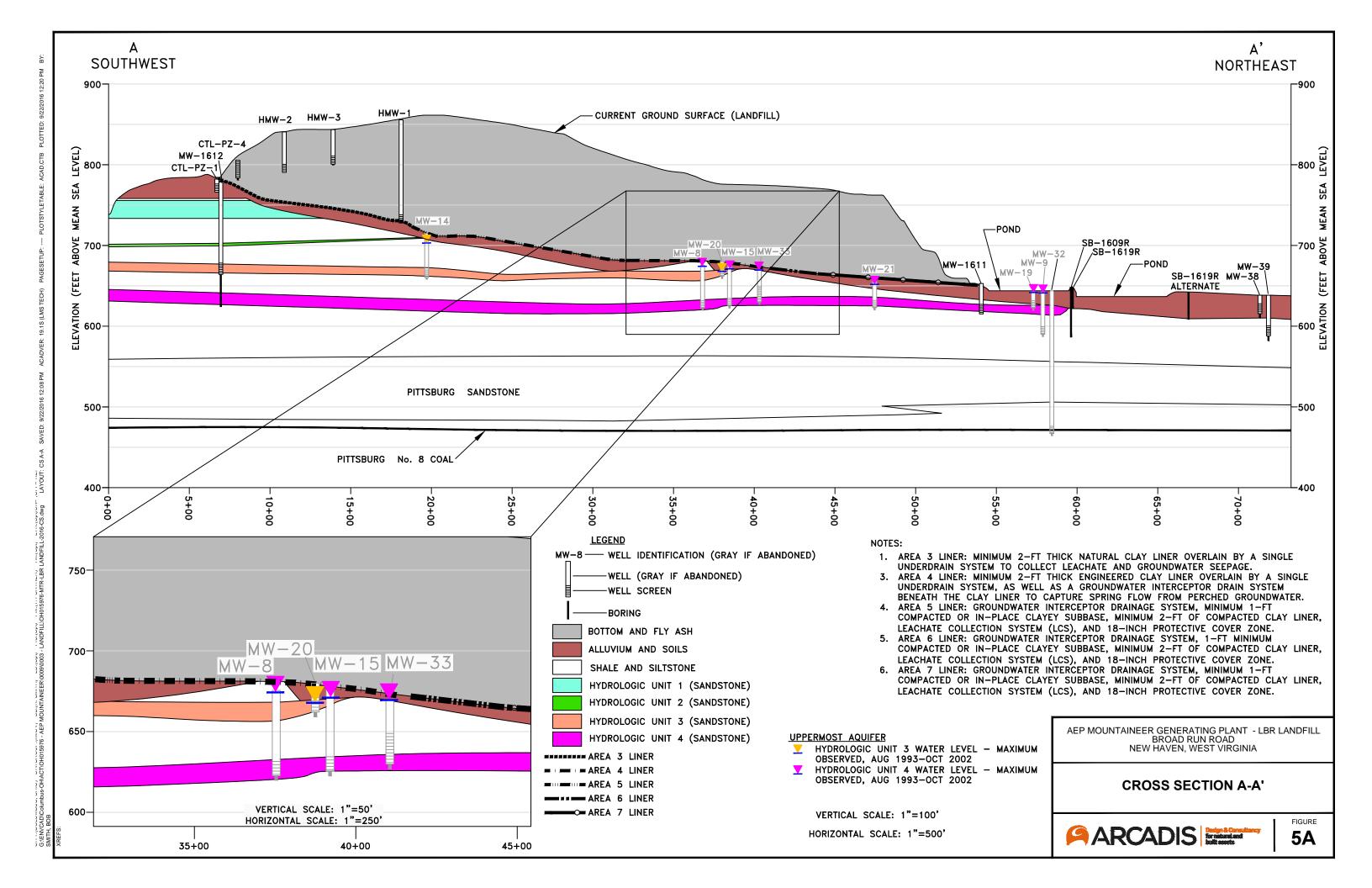
FIGURES

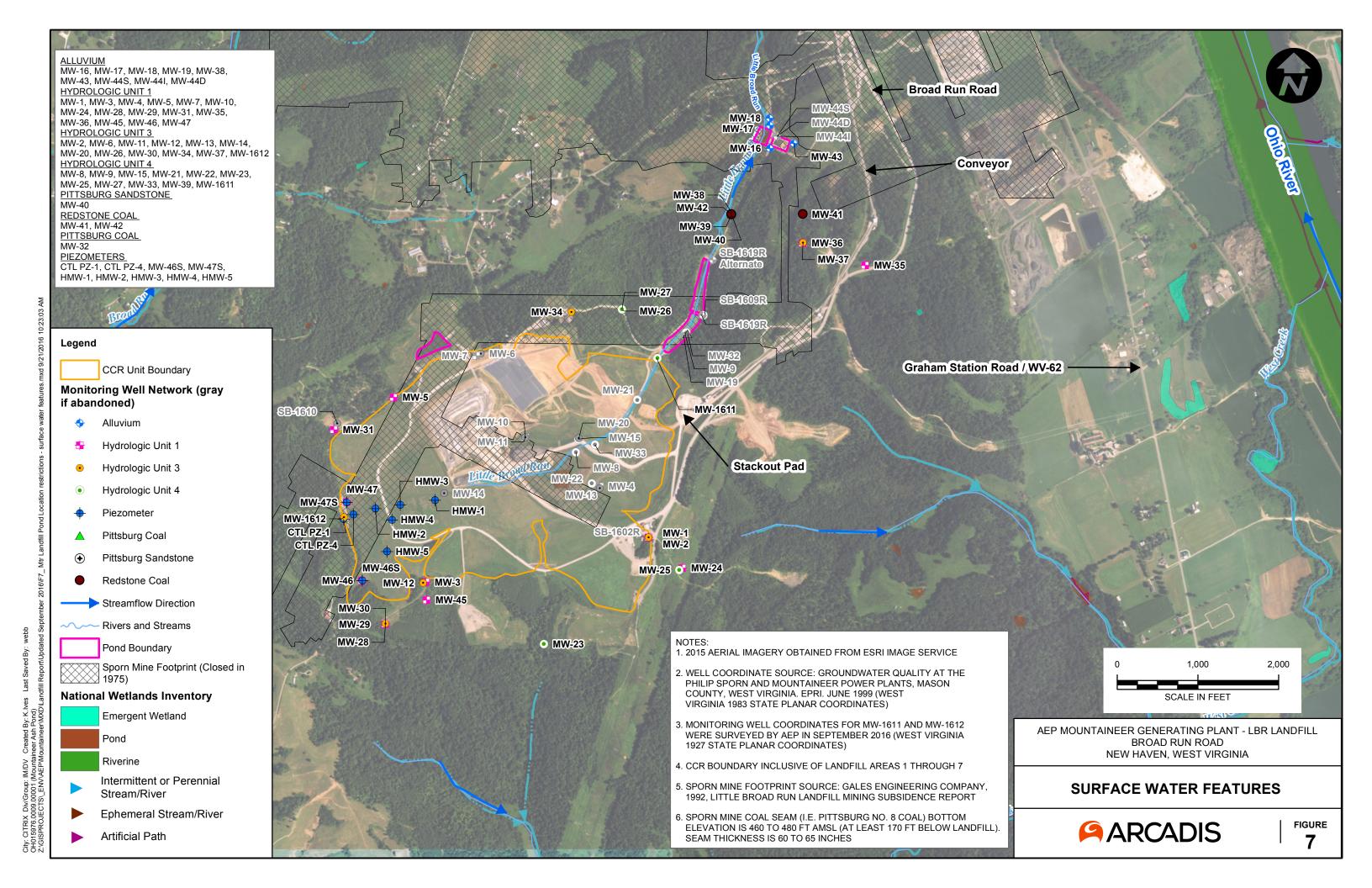
Document Path: Z:\GISPROJECTS_ENVAEP\\Mountaineer\\MXD\\Landfill Report\\Updated September 2016\randfill Site Map.mxd

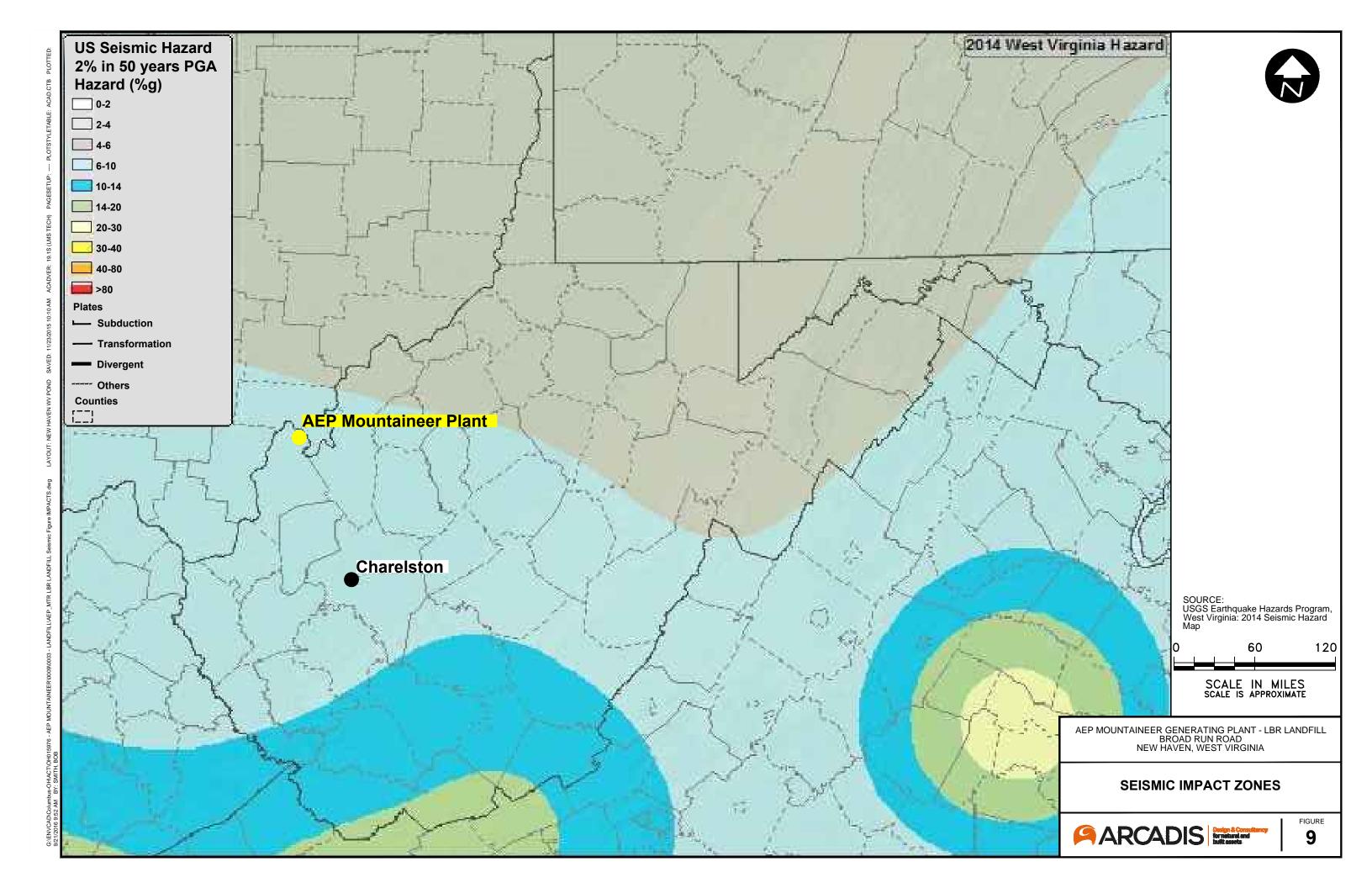
City: CITRIX Div/Group: IM/DV Created By: K. Ives Last Saved By: webb
OH016976.009000001 Mountaineer Ash Pond)

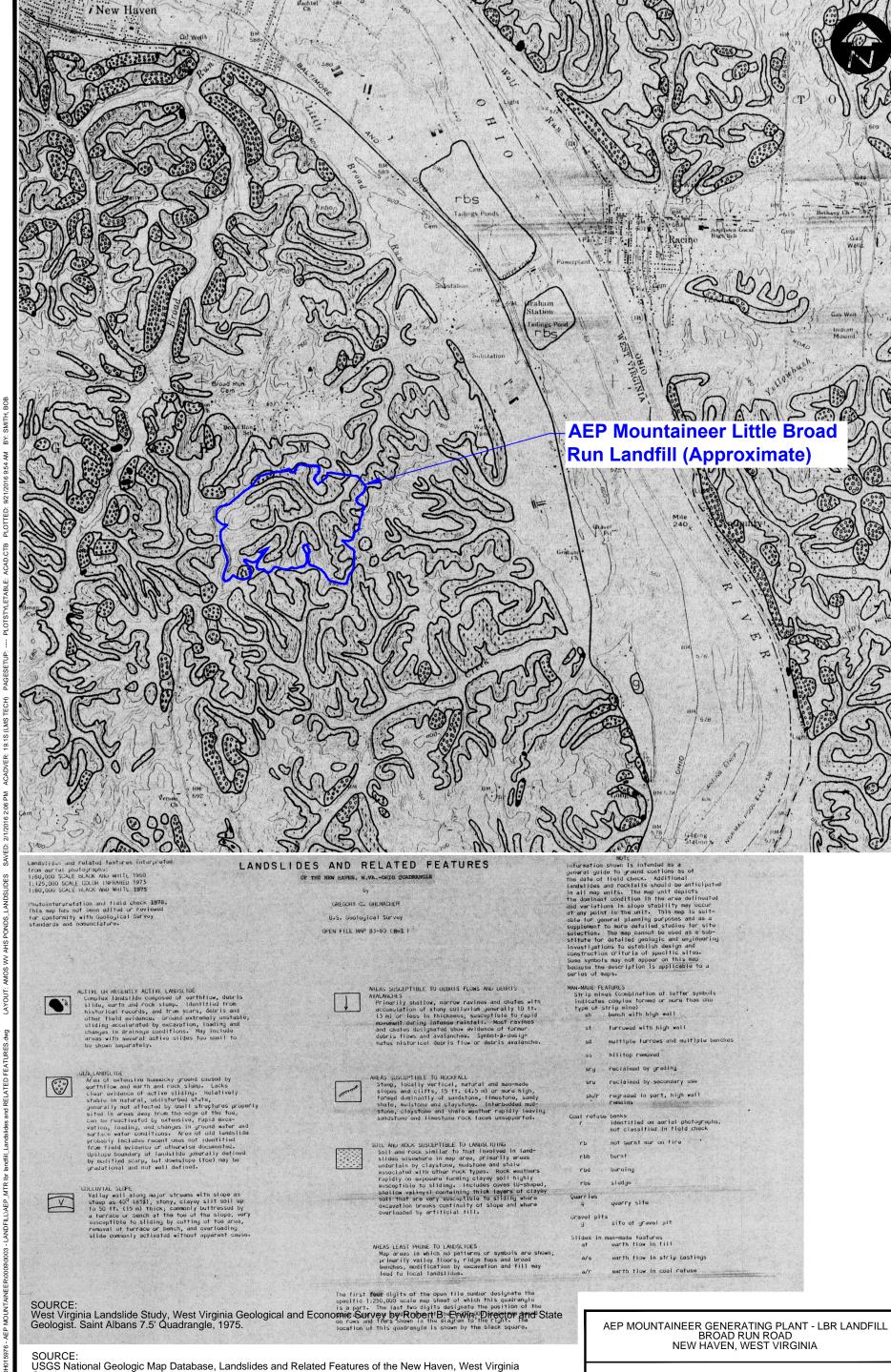


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OH015976.0009.00001 (Mountaineer Ash Pond)
7-ACISED DIFCTES: ENVIAEDMA-undaineer Ash Pond)









0

0.5

SCALE IN MILES SCALE IS APPROXIMATE

1

NEARBY LANDSLIDES AND RELATED FEATURES

APPENDIX A

Boring/Well Construction Logs



AEP 1986, 1992

Boring Logs

B-400 to B-405, BFA-1



			BER _					-				ST BOTHITO
					CHIAN							ORING NO. <u>B-400</u> DATE <u>7/23/15</u> SHEET <u>1</u> OF <u>9</u>
												ORING START 3/12/86 BORING FINISH 3/18/86
												IEZOMETER TYPE WELL TYPE
(GRO	JND	ELEVAT	TION	792.2	SY	STEM					IGT. RISER ABOVE GROUND DIA
	Wate	r Lev	el, ft	<u> </u>	6.0	Ā		$ar{ar{A}}$	7 -			PEPTH TO TOP OF WELL SCREEN BOTTOM
ŀ	TIME											VELL DEVELOPMENT BACKFILL
	DATE	Ξ		5/2/ ⁻	1986							IELD PARTY ROUSH/LAMBERT RIG B-61
	SAMPLE NUMBER	SAMPLE	DE	MPLE PTH FEET TO 3.0	PENET RESIS	IDARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC	SOSO	SOIL / ROCK IDENTIFICATION BROWN CLAY DRILLER'S NOTES
	1	SS	3.0	4.5	2-:	3-6	1.2		- 5 -			
	2 3	SS NQ2	8.0 8.2	8.2 15.0	50	0/.2	0.1 6.6		- 10 -			GREENISH BROWN CLAY SHALE Started coring @ 8.2'
												GREENISH BROWN SANDSTONE
	4	NQ2	15.0	25.0			8.6		- - 15 - -			GRAY SANDSTONE BROWN SANDSTONE BROWN SANDSTONE BROWN SHALE GRAY SANDY SHALE
AEP.GDI //23/15												GRAY CLAY SHALE GRAY SANDY SHALE
6FJ			TYPE	E OF C	ASING	USED	ı					Continued Next Page
LBK LF FKA SI.C	X		6" x 3.25 9" x 6.25	5 HSA	ORE OVANCER	₹	4"			OTTE	ED S	
<u>-</u>			NW CAS	SING			3"		WELL T	TPE:		
- F			SW CAS AIR HAI				6" 8"				_	RECORDER JCM
							_	-			-	



LOG OF BORING JOB NUMBER BORING NO. **B-400** DATE **7/23/15** SHEET **2** OF _ COMPANY APPALACHIAN POWER COMPANY PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 3/18/86 STANDARD
PENETRATION PLOOP
SISTANCE RQD RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO **GRAY CLAY SHALE GRAY SANDY SHALE** 25 NQ2 25.0 35.0 9.3 MULTI COLOR CLAY SHALE **GRAY SANDSTONE GRAY SANDY SHALE GRAY SANDSTONE GRAY CLAY SHALE** MULTI COLOR CLAY SHALE 30 **RED CLAY SHALE** 35 6 NQ2 35.0 45.0 9.8 **GRAY CLAY SHALE** 40

45

10.0

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15

Continued Next Page

GRAY SANDSTONE

7 NQ2 45.0

55.0



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-400** DATE **7/23/15** SHEET **3** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 3/18/86 STANDARD
PENETRATION PENETRATI HZ RQD SAMPLE SAMPLE NUMBER SAMPLE GRAPHIC LOG DEPTH S **DEPTH** SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO **GREENISH BROWN SANDY SHALE GREENISH BROWN COARSE GRAIN** SANDSTONE 50 55 NQ2 55.0 65.0 10.0 ∇ 60

65 **GRAY COARSE GRAIN SANDSTONE** NQ2 65.0 75.0 10.0 70 Continued Next Page

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-400 DATE 7/23/15 SHEET 4 OF 9

DROUGET MOUNTAINEED LIBERT AND EITH PORING START 3/12/86 PORING SINISH 3/18/86

PRO	JECT	MO	<u>JNTAI</u>	NEER LBR LA	ANDF	ILL			ВО	RING START 3/12/86 BORING FINI	SH <u>3</u>	3/18/86
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	NQ2	75.0	80.0		4.9		- - 75 —					
							-			GREENISH COARSE GRAIN SANDSTONE		
11	NQ2	80.0	85.0		5.0		80 —			MULTI COLOR CLAY SHALE		
							- -			GRAY CLAY SHALE		
12	NQ2	85.0	95.0		10.0		- 85 -					
							90 —					
(57) (72)							- - -			RED CLAY SHALE GRAY CLAY SHALE RED & GRAY CLAY SHALE		
M LBA LF FAA SI.GFJ AEF. GDJ 723/13	NQ2	95.0	105.0		10.0		95 — - -			GRAY CLAY SHALE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-400** DATE **7/23/15** SHEET **5** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 3/18/86 STANDARD
PENETRATION PENETRATI RQD RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK DRILLER'S SCS WELL IN FEET **IDENTIFICATION NOTES FEET** FROM TO 100 **RED CLAY SHALE GRAY CLAY SHALE GRAY SANDSTONE GRAY CLAY SHALE** 105 14 NQ2 105.0 110.0 4.8 **RED CLAY SHALE** 110 15 NQ2 110.0 115.0 5.0 **GRAY CLAY SHALE** 115 16 NQ2 115.0 125.0 10.0 **RED & GRAY CLAY SHALE GRAY CLAY SHALE RED & GRAY CLAY SHALE** 120 **GRAY CLAY SHALE** RED CLAY SHALE **GRAY CLAY SHALE MULTI COLOR CLAY SHALE**

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-400** DATE **7/23/15** SHEET **6** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 3/18/86 STANDARD
PENETRATION PENETRATI RQD RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO **GRAY SANDY SHALE** 125 -17 NQ2 125.0 9.9 135.0 GRAY SANDSTONE **GRAY SANDY SHALE GRAY SANDSTONE GRAY CLAY SHALE** 130 **RED CLAY SHALE** 135 **MULTI COLOR CLAY SHALE** 18 NQ2 135.0 139.8 140 **RED CLAY SHALE** 19 NQ2 139.8 145.0 5.1 145 -20 NQ2 145.0 155.0 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 9.9 **GRAY CLAY SHALE**

AEP MT LI



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-400 DATE 7/23/15 SHEET 7 OF 9

PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 3/18/86

PRO	JECT	MO	JNTAI	NEER LBR LA	ANDF	FILL			ВО	RING START 3/12/86 BORING FINISH	┨ _	3/18/86
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPH LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							-	× × × × × × × × × × × × × × × × × × ×		GRAY SILTSTONE		
							-	× × × × × ×		RED CLAY SHALE GRAY SILTSTONE		
							155 —	× × × × × × × × × ×		GRAY SILISTONE		
21	NQ2	155.0	165.0		10.0		100	×. ×.		GRAY SANDSTONE		
							-			GRAY CLAY SHALE		
							-			RED & GRAY CLAY SHALE		
							-			RED CLAY SHALE		
							160 –					
							-					
							-	-				
22	NQ2	165.0	175.0		9.7		165 -					
							-			GRAY CLAY SHALE		
							-			GRAY SANDSTONE		
							170 –			GRAY CLAY SHALE		
							_			RED CLAY SHALE		
							_	× × × × × × × ×		GRAY SILTSTONE		
							-	× × × × × × × × × ×		RED SILTSTONE		
23	NQ2	175.0	185.0		9.9		175 -	× × × × × ×		GRAY SILTSTONE GRAY SANDSTONE		
_0	. 102	170.0	100.0		0.5					C.S. GARBOTONE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-400** DATE **7/23/15** SHEET **8** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 3/18/86 STANDARD
PENETRATION PLOOP
SISTANCE RQD RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S SCS IN FEET **IDENTIFICATION NOTES FEET** FROM TO **GRAY SILTSTONE** 180 -GRAY SANDSTONE GRAY SILTSTONE **GRAY SANDSTONE** 185 24 NQ2 185.0 195.0 9.8 **GRAY FINE GRAIN SANDSTONE** 190 -195 25 NQ2 195.0 200.0 4.8 **GRAY SILTSTONE GRAY CLAY SHALE RED CLAY SHALE**

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15

26 NQ2 200.0

210.0

RED & GRAY CLAY SHALE

GRAY CLAY SHALE MULTI COLOR CLAY SHALE

200

9.8



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-400** DATE **7/23/15** SHEET **9** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 3/18/86 PENETRATION RESISTANCE BLOWS / 6" RQD W SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO **RED CLAY SHALE** 205 **GRAY CLAY SHALE** 210 Stopped boring @ 210.0' on 3/18/1986 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



		_					_				I BOKING						
								NY									_1_ OF5_
											ORING STAR						
		_															
GRC	UND				SY	STEM											
Wat	er Leve	el, ft	∑ 27	7.7	Ţ		Ā	-									
TIMI	Ξ						\perp										
DAT	E		5/2/	1986						FII	ELD PARTY	ROUSE	1/LAWBE	K I	_ RIG	6 <u>B</u>	5-61
SAMPLE NUMBER	SAMPLE	DEI IN F	MPLE PTH EET	PENET RESIS	IDARD RATION STANCE WS / 6"	TOTAL LENGTH ECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS			L / ROCK TIFICATION			WELL	DRILLER'S NOTES
		FROM 0.0	2.5	BLOV	VS / 6"	<u>«</u>					REDDISH	BROWN CL	ΔΥ				
1	SS	2.5	4.0	4-1	0-13	1.0					REDUSH	BROWN GE					
2	SS	7.5	9.0	3-	6-8	1.4		5 -			REDDISH	BROWN CL	LAYEY SAN	D			
3	SS	12.5	13.9	10-14	1-50/.5	1.3		10 -				ANDSTONI ANDSTONI	E IN END OF	F SPOON	ı		
4 5	SS NQ2	17.5 18.0	17.6 25.3	50	D/.1	0 7.3	100	15 -									Auger refusal @ 18.1'. Moved over 3.0', drilled casing to 18.0' and started coring.
		TYPE	OF C	ASING	USED	I			1	<u> </u>		Continue	d Next Pa	age			
X	(6" x 3.25 9" x 6.25	5 HSA					PIEZOM SLO			e: PT = 0 SCREEN, 0						PEN TUBE
		HW CAS		VANCE	₹	4" 3"	=	WELL T	YPE:	0	W = OPEN	I TUBE S	LOTTED	SCRE	EN, GN	1 = C	SEOMON
		SW CAS	SING			6"					RECORD	ER JC I	M				
	/	<u>AIR HAI</u>	MMER			8"											



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-401 DATE 7/23/15 SHEET 2 OF 5

DROUBET MOUNTAINEED LIBERT AND FILE PORING START 4/3/86 PORING SINISH 4/7/86

ارم		SAM	1PLE	STANDARD	>	ROD	DEDT:					
NUMBER	SAMPLE		PTH	STANDARD PENETRATION RESISTANCE	두뜻		DEPTH	GRAPHIC LOG	CS	SOIL / ROCK		DRILLER'S
Σ	AM	IN F	EET	RESISTANCE		%	IN	RA CI	N S	IDENTIFICATION	WELL	NOTES
Z	S	FROM	TO	BLOWS / 6"			FEET	Ō	ر			
							-					
							-	:::::		GRAY SANDSTONE		
							_					
										BROWN SANDSTONE	7	
							-	-		GRAY SANDSTONE		
							0.5					
6	NQ2	25.3	33.4		4.5	39	25 –	::::		BROWN SANDY SHALE		
6	INQZ	20.3	33.4		4.5	39	-			GRAY SANDY SHALE		
										BADLY BROKEN GRAY CLAY SHALE	/	
							-			BADLY BROKEN RED CLAY SHALE	- _	
											$ \nabla $	
							-					
							30 –					
							-					
							-					
_		00.4	05.0				-					
7	NQ2	33.4	35.3		1.6	52	=					
_	NOO	05.0	45.0		40	77	35 -			DED OLAY QUALE		
8	NQ2	35.3	45.3		10	77	-			RED CLAY SHALE		
							-					
							=					
							-			GRAY CLAY SHALE		
							40 -					
							_			RED CLAY SHALE		
							-			GRAY CLAY SHALE		
										GRAY SANDSTONE		
							-			GRAY CLAY SHALE	-	
							-					
										RED CLAY SHALE GRAY CLAY SHALE	4	
							45 -			GRAT CLAT SHALE		
9	NQ2	45.3	55.3		10	100						

AEP MT L



JOB NUMBER _____

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-401 DATE 7/23/15 SHEET 3 OF 5

PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START 4/3/86 BORING F	INISH _4	/7/86
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							50 - -			GRAY SANDY SHALE		
10	NQ2	55.3	65.3		9.9	88	55 - - - - -					
	NQ2	65.3	70.3		4.9	98	- - 65 — -			GRAY SANDSTONE RED & GRAY CLAY SHALE		
12	NQ2	70.3	75.3		4.6	76	- 70 - -	-		GRAY CLAY SHALE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-401** DATE **7/23/15** SHEET **4** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 4/3/86 BORING FINISH 4/7/86 STANDARD
PENETRATION PLOOP
SISTANCE RQD RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH **DEPTH** SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO **RED & GRAY CLAY SHALE** 75 13 NQ2 75.3 **RED CLAY SHALE** 84.3 3.9 **GRAY CLAY SHALE** 80 **GRAY SILTSTONE** 14 NQ2 84.3 9.9 **GRAY CLAY SHALE** 94.3 100 85 90 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 15 NQ2 94.3 100.0 5.6 95 95 **RED CLAY SHALE**

AEP MT LBR



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-401** DATE **7/23/15** SHEET **5** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 4/3/86 BORING FINISH 4/7/86 STANDARD
PENETRATION
RESISTANCE
BLOWS / 6"

RQD
RQD
W SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN IN FEET **IDENTIFICATION NOTES FEET** FROM TO Stopped boring @ 100.0' on 4/1/1986 100

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB	NUME	BER _					_		LO	00	DOMINE					
								<u>NY</u>								
										BC	RING START	3/19/	86	BORING F	INISH 3	3/24/86
COO	RDIN	ATES _	N 712	2,518.0	E 1,7	30,84	2.0			PII	EZOMETER T	YPE		WELL	TYPE _	
GRO	UND	ELEVAT	TON _	813.1	SY	'STEM				HC	ST. RISER AB	OVE GROU	ND		DIA _	
Wate	er Lev	el, ft	<u> </u>	2.7	lacksquare		T			DE	PTH TO TOP	OF WELL S	SCREEN _	BO	ттом _	
TIME		,					+-			WI	ELL DEVELO	PMENT		BACI	KFILL _	
DAT			5/2/	1986						FIE	ELD PARTY	ROUSH	/LAMBER	RT	RIG _E	3-61
			U,													
SAMPLE	SAMPLE	DEI	IPLE PTH EEET TO	STAN PENET RESIS	IDARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs			/ ROCK FICATION		WELL	DRILLER'S NOTES
		0.0	5.0	BEGI	1070				+							
									_							Drilled casing to 5.0' and started coring.
1	NQ2	5.0	14.4			9.4	82	5 -			BROWN S	HALE				
									-							
								10 -								
											BROWN S	ANDY SHAL	E			
									-		BROWN S	ANDSTONE				
2	NQ2	14.4	24.4			9.5	80				GREENISH	BROWN SA	ANDSTONE			
								15 -	1::::							
											BROWN C	LAY SHALE				
											CDEENICL	BROWN SA	NIDSTONE			
											GREENISF	I BROWN 3F	ANDSTONE			
<u>2</u>									- : : : :		CDEENISL	BROWN CL	AV SHALE	1		
-											GIVELINIO	DICOVIIICE	-AI SHALL			
5																
Į —											GRAY CLA					
5		TYPE	OF C	ASING	USED							Continued	Next Pag	ge		
2 X			OCK CO	RE				PIEZOM								PEN TUBE
		6" x 3.25 9" x 6.25						SLO	OTTE	ED S	SCREEN, C	G = GEON	IOR, P = I	PNEUMA	TIC	
				VANCER	₹	4"		WELL T	YPE:	O'	W = OPEN	TUBE SL	OTTED S	SCREEN	, GM = 0	GEOMON
<u> </u>		NW CAS SW CAS				3" 6"						ER JCM				
¥		AIR HAI				8"					. LOUIND	\	•			



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-402** DATE **7/23/15** SHEET **2** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/19/86 BORING FINISH 3/24/86 STANDARD
PENETRATION PLOOP
SISTANCE RQD RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO **GRAY SANDSTONE GRAY CLAY SHALE** 3 NQ2 24.4 34.4 8.5 83 **RED & GRAY CLAY SHALE** 25 30 **RED CLAY SHALE** 4 NQ2 34.4 44.4 9.9 88 35 **GRAY CLAY SHALE**

40 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 5 NQ2 44.4 **GREENISH BROWN SANDSTONE** 54.4 9.9 98 45 Continued Next Page



JOB NUMBER _______ BORING NO. B-402 DATE 7/23/15 SHEET 3 OF 10
PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/19/86 BORING FINISH 3/24/86

PRO	JECT	_MOL	JNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START 3/19/86 BORING FINIS	⊣ <u>3</u>	/24/86
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							- - - 50 —					
6	NQ2	54.4	64.4		10	100	- - - 55					
							- - 60 —					
7	NQ2	64.4	74.4		9.8	87	- - - 65			WHITE SANDSTONE GREENISH WHITE SANDSTONE GREENISH BROWN SHALE	∇	
							- - - - 70 –			GREENISH BROWN SANDSTONE GRAY SANDSTONE		
							-					

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. B-402 DATE 7/23/15 SHEET 4 OF 10

PRO.	JECT	MO	UNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START 3/19/86 BORING FINIS	SH <u>3</u>	3/24/86
SAMPLE	SAMPLE	DE	IPLE PTH EEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
8	NQ2	74.4	84.4		10.2	100	-			GRAY CLAY SHALE RED CLAY SHALE GRAY CLAY SHALE		Picked up 0.2' of
-	1102	74.4	04.4		10.2		75 - - - -			GIGH GEAT GRALE		recovery from previous run.
							80 -			RED & GRAY CLAY SHALE		
9	NQ2	84.4	94.4		10	100	- 85			GRAY SANDSTONE		
							- - -			GRAY CLAY SHALE RED & GRAY CLAY SHALE		
							90 -	× × × × × × × × × × × × × × × × × × ×		GRAY SILTSTONE		
10	NQ2	94.4	104.4		9.5	98	- 95 —	* *		GRAY CLAY SHALE		
10							-					

AEP MT LBF



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-402** DATE **7/23/15** SHEET **5** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/19/86 BORING FINISH 3/24/86 STANDARD
PENETRATION PLOOP
SISTANCE RQD RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK DRILLER'S USC WELL IN FEET **IDENTIFICATION NOTES FEET** FROM TO 100 **GRAY SANDSTONE GRAY CLAY SHALE** 11 NQ2 104.4 114.4 100 **RED CLAY SHALE** 10 105 **GRAY SANDY CLAY SHALE** 110 12 NQ2 114.4 124.4 9.8 98 115 **GRAY SANDSTONE GRAY CLAY SHALE** RED CLAY SHALE MULTI COLOR CLAY SHALE **GRAY CLAY SHALE** MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 120 **GRAY SANDSTONE**



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-402** DATE **7/23/15** SHEET **6** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/19/86 BORING FINISH 3/24/86 STANDARD
PENETRATION PENETRATI HAD ROD SAMPLE SAMPLE NUMBER GRAPHIC LOG DEPTH SAMPLE DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 13 NQ2 124.4 134.4 9.5 89 125 -**GRAY CLAY SHALE MULTI COLOR CLAY SHALE** 130 14 NQ2 134.4 **RED CLAY SHALE** 144.4 9.9 90 135 GRAY CLAY SHALE **GRAY SILTSTONE** 140 **GRAY SANDSTONE** 15 NQ2 144.4 154.4 9.5 94 145

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-402** DATE **7/23/15** SHEET **7** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/19/86 BORING FINISH 3/24/86 STANDARD
PENETRATION PLOOP
SISTANCE RQD RQD SAMPLE SAMPLE NUMBER SAMPLE GRAPHIC LOG DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES** FEET FROM TO **GRAY CLAY SHALE** RED CLAY SHALE 16 NQ2 154.4 164.4 9.9 80 155 160 **GRAY CLAY SHALE** 17 NQ2 164.4 174.4 10 100 165 170 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 **GRAY SANDSTONE** 18 NQ2 174.4 184.4 10 100 175

AEP MT L



JOB NUMBER _______ BORING NO. B-402 DATE 7/23/15 SHEET 8 OF 10

PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/19/86 BORING FINISH 3/24/86

			J. 1. 7. u	NEER LBR LA					ЪО	RING START 3/19/86	BORING FINISH		. /-00
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATIO	N	WELL	DRILLER'S NOTES
							-						
							180 –						
							-						
							-						
19 N	IQ2	184.4	194.4		9.2	98	185 -						
							-						
							190 –						
							-	× × × × × × × × × × × × × × × × × × ×		GRAY SILTSTONE			
							-			RED CLAY SHALE			
20 N	IQ2	194.4	204.4		10	79	195 –			RED & GRAY CLAY SHALE			
							-						
							200			GRAY CLAY SHALE			
							200 -			RED & GRAY CLAY SHALE			

AEP MT LB



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-402 DATE 7/23/15 SHEET 9 OF 10

PROJECT MOUNTAINEER LIBRIANDEIL BORING START 3/19/86 BORING FINISH 3/24/86

PRO	JECT			NEER LBR LA		ILL			во	RING START 3/19/86 BORING FINIS	н <u>3/</u>	24/86
SAMPLE	SAMPLE	DE	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
21	NQ2	204.4			9.9	98	- - 205 -			MULTI COLOR CLAY SHALE GRAY CLAY SHALE		
							210 —	* * * * * * * * * * * * * * * * * * *		GRAY SILTSTONE		
22	NQ2	214.4	224.4		10	100	-	× × × × × × × × × × × × × × × × × × ×		GRAY SANDSTONE		
							215 - - - -			GRAY CLAY SHALE		
							220 - - -			MULTI COLOR CLAY SHALE		
MTLBR LF FKA SI.GPJ AEP.GDT 7/23/15	NQ2	224.4	230.0		4.9	78	- 225 - -			MOLTI OCLOR GLAT GRALE		
AT LBR LF F							-					

AFD MTIR



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-402** DATE **7/23/15** SHEET **10** OF __ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/19/86 BORING FINISH 3/24/86 PENETRATION RESISTANCE BLOWS / 6" RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN IN FEET **IDENTIFICATION NOTES FEET** FROM TO Stopped boring @ 230.0' on 3/24/1986 230

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



	NUM 'NAN'		PALAC	CHIAN	POWE	R CO	MPA	NY		BO	RING NO. B-403 DATE 7/23/15 S	SHEET 1 OF 12
											RING START 2/5/86 BORING FINIS	
COC	RDIN	ATES _	N 709	9,726.8	E 1,7	31,75	7.6			PIE	ZOMETER TYPE WELL TYP	PE <u>GM</u>
GRC	UND	ELEVA	ΓΙΟΝ <u></u>	854.6	SY	'STEM				HG	T. RISER ABOVE GROUND 1.74-1.74 DI	IA <u>3"</u>
Wat	er Lev	el, ft	<u> </u>	4.0	Ā		$ar{ar{A}}$	-			PTH TO TOP OF WELL SCREEN BOTTOI	
TIMI	=										ELL DEVELOPMENT SEE NOTES BACKFIL	
DAT	E		02-0	6-86							ELD PARTY ROUSH/LAMBERT RI	IG B-61
SAMPLE	SAMPLE	DE	MPLE PTH EEET	PENET RESIS	IDARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	☐ DRILLER'S NOTES
1	NQ		14.7			7.5	92	- 10 -			BROWN CLAYSHALE	Wells MW-1 and MW-2 were installed in boring B-403.
2	NQ	14.7	24.7			10	90	15 -			BROWN SANDY SHALE BROWN CLAYSHALE BROWN SANDY SHALE BROWN SANDSTONE	
											GRAY SANDSTONE	
		TYPE	E OF C	ASING	USED						Continued Next Page	
X		NQ-2 R 6" x 3.2! 9" x 6.2!		RE				PIEZOM SL(E: PT = OPEN TUBE POROUS TIP, SS CREEN, G = GEONOR, P = PNEUMATIC	
X		HW CA		VANCEF	₹	4" 3"	=	WELL T	YPE:	0\	W = OPEN TUBE SLOTTED SCREEN, GN	M = GEOMON
		SW CAS	SING			6"				T	RECORDER JCM	
:		AIR HAI	MMER			8"						



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-403** DATE **7/23/15** SHEET **2** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START **2/5/86** BORING FINISH STANDARD
PENETRATION
RESISTANCE
OUNDARY
PENETRATION
PE SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO RED CLAYSHALE GRAY CLAYSHALE RED CLAYSHALE 3 NQ 24.7 34.7 10 100 GRAY CLAYSHALE 30 30.0 Top of seal. RED CLAYSHALE RED CLAYSHALE NQ 34.7 9.2 92 39.4 Top of gravel. 40 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 RED AND GRAY CLAYSHALE 5 NQ 44.7 50.8 6.1 96 45

AEP MT



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-403 DATE 7/23/15 SHEET 3 OF 12

PROJECT MOUNTAINEER LBR LANDFILL BORING START 2/5/86 BORING FINISH

PROJECT MOUNTAINEER LBR LANDFILL									ВО	RING START 2/5/86 BO	BORING FINISH	
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							-					
							-					
							-	-				
							50 -					
							50			RED CLAYSHALE		
6	NQ	50.8	52.3		1.3	77				NED OLATOTIALE		
7	NQ	52.3	54.7		2.0	83	-					
							-					
							-					
8	NQ	54.7	64.7		10	100	55 -					
							=					
							-					
							-					
							-			GRAY CLAYSHALE GRAY SANDY SHALE		
							60 –			CDAY CLAYCHALE		
							00			GRAY CLAYSHALE GRAY SANDY SHALE		
							-					
							-					
							-			GRAY CLAYSHALE		
							-			GRAY SANDY SHALE		
9	NQ	64.7	74.7		10	100	65 –					
							-					
							-			GRAY SANDSTONE		
							-			GRAY CLAYSHALE GRAY SANDY SHALE		
							-			SIMI CHIEL CHIALL		
							70 -					
							-					
										GRAY CLAYSHALE		

EP M



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-403** DATE **7/23/15** SHEET **4** OF PROJECT MOUNTAINEER LBR LANDFILL BORING START 2/5/86 **BORING FINISH** SAMPLE **STANDARD** RQD GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE S TOTAL LENGTH RECOVER **DEPTH** PENETRATION SOIL / ROCK WELL DRILLER'S USC IN FEET RESISTANCE **IDENTIFICATION NOTES FEET** FROM BLOWS / 6" TO **GRAY SANDSTONE** 10 NQ 74.7 9.6 96 75 GRAY SANDY SHALE **GRAY CLAYSHALE** 80 11 NQ 84.7 89.7 5.0 92 85 RED CLAYSHALE 12 NQ 89.7 5.0 100 90 GRAY CLAYSHALE AEP.GDT 7/23/15 13 NQ 94.7 104.7 9.9 99 95 MT LBR LF FKA SI.GPJ



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-403** DATE **7/23/15** SHEET **5** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START **2/5/86** BORING FINISH STANDARD
PENETRATION
RESISTANCE
BLOWS / 6"

RQD
RQD
W SAMPLE SAMPLE NUMBER GRAPHIC LOG SAMPLE DEPTH S WELL DEPTH SOIL / ROCK DRILLER'S USC IN FEET **IDENTIFICATION NOTES** FEET FROM TO

						100 -		
								RED CLAYSHALE
14	NQ	104.7	107.6	2.6	94	105 -		
15	NQ	107.6	114.7	7.0	100			GRAY CLAYSHALE
							 	GRAY SANDSTONE
						110		
						110 -		GRAY SANISTONE
								GRAY SANDSTONE
								GRAY SILTSTONE
								GRAY SANDSTONE
16	NQ	114.7	124.7	10	100	115 -	<u> </u>	
								GRAY SILTSTONE
						120 -		
								GRAY SANDSTONE
								Continued Next Page



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-403** DATE **7/23/15** SHEET **6** OF PROJECT MOUNTAINEER LBR LANDFILL BORING START 2/5/86 BORING FINISH STANDARD
PENETRATION PENETRATI SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK DRILLER'S USC WELL IN FEET **IDENTIFICATION NOTES FEET** FROM TO 17 NQ 124.7 134.7 9.8 98 125 -**GRAY CLAYSHALE** GRAY SILTSTONE 130 18 NQ 134.7 144.7 9.9 99 135 **GRAY SANDSTONE** 140

19 NQ 144.7 9.9 99 145 -**GRAY SILTSTONE** MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 145.6 Top of screen. RED CLAYSHALE 149.6 Bottom of Continued Next Page



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-403** DATE **7/23/15** SHEET **7** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 2/5/86 BORING FINISH STANDARD
PENETRATION ZEDA
PENETRATION ZEDA
PENETRATION ZEDA
PENETRATION ZEDA RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK DRILLER'S USC WELL IN FEET **IDENTIFICATION NOTES FEET** FROM BLOWS / 6" TO screen. 151.0 Bottom of gravel pack. **GRAY SILTSTONE** 20 NQ 154.7 161.5 6.3 77 155 RED CLAYSHALE 160 NQ 161.5 164.7 3.2 **GRAY SILTSTONE** 22 NQ 164.7 174.7 10 100 165 168.9 Top of gravel 170 **GRAY SANDSTONE** MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 GRAY SILTSTONE GRAY CLAYSHALE 23 NQ 174.7 184.7 9.8 97 175 RED CLAYSHALE



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-403** DATE **7/23/15** SHEET **8** OF PROJECT MOUNTAINEER LBR LANDFILL BORING START 2/5/86 BORING FINISH SAMPLE **STANDARD** RQD GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE S **DEPTH** PENETRATION SOIL / ROCK WELL DRILLER'S USC IN FEET RESISTANCE **IDENTIFICATION NOTES** FEET FROM BLOWS / 6" TO **GRAY SILTSTONE** 180 MULTI-COLORED CLAYSHALE 24 NQ 184.7 191.3 6.4 56 185 190 RED CLAYSHALE NQ 191.3 194.7 78 78 26 NQ 194.7 204.7 9.9 90 195 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 GRAY SANDSTONE 200

EP MT I



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-403** DATE **7/23/15** SHEET **9** OF PROJECT MOUNTAINEER LBR LANDFILL BORING START 2/5/86 BORING FINISH STANDARD
PENETRATION
PENETRATI SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK DRILLER'S USC WELL IN FEET **IDENTIFICATION NOTES FEET** FROM BLOWS / 6" TO 202.3 Top of screen. 27 NQ 204.7 214.7 10 205 GRAY CLAYSHALE **GRAY SANDSTONE** 206.3 Bottom of screen. GRAY CLAYSHALE RED CLAYSHALE RED AND GRAY CLAYSHALE 210 -RED CLAYSHALE GRAY CLAYSHALE RED CLAYSHALE 212.0 Bottom of gravel pack. 28 NQ 214.7 224.7 9.8 87 215 **GRAY CLAYSHALE** 220 RED CLAYSHALE GRAY CLAYSHALE AEP.GDT 7/23/15 29 NQ 224.7 234.7 9.8 95 225 MT LBR LF FKA SI.GPJ



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-403** DATE **7/23/15** SHEET **10** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 2/5/86 BORING FINISH STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 230 30 NQ 234.7 244.7 100 10 235 **GRAY SANDSTONE** 240 31 NQ 244.7 254.7 9.8 83 245 RED AND GRAY CLAYSHALE MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 250 GRAY CLAYSHALE

Continued Next Page

RED CLAYSHALE



JOB	NUM	BER						LOC	G O	F BORING		
			PALAC	CHIAN POWE	R CO	MPA	NY		ВС	DRING NO. B-403 DATE 7/23/15 S	HEET	11 OF12_
PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF	ILL			ВС	DRING START 2/5/86 BORING FINIS	н	
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	SOSO	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
32	NQ	254.7	264.7		10	92	255 -					
							260 -					
33	NQ	264.7	274.7		9.7	- 9 7	265 -			GRAY SANDSTONE		
							270 -			GRAY SILTSTONE		
AEP MI LBK LTTNA SI.GFU AEF.GDI 7723/13										BOTTOM OF BORING 274.7' WELLS MW-1 AND MW-2 WERE NESTED IN A 3" DIAMETER HOLE. WELL MW-1 N.709,726.78 E.1,731,757.61 GROUND ELEVATION 854.61 TOP OF PIPE ELEVATION 856.35 LATITUDE 38 56 43.00 LONGITUDE 81 56 33.09 1.25" DIAMETER POLETHYLENE SCREEN.		274.0 Bottom of boring.
₽										Continued Next Page		



JOB NUMBE	ER					
COMPANY	APPALACHIAN POWER COMPANY	BORING NO. B-403	DATE 7/23/15	SHEET 12	OF	12
DDO IECT	MOLINTAINEER I BR I ANDEIL I	BORING START 2/5/86	BORING FIN	MSH		

-						
NUMBER	SAMPLE DEPTH IN FEET	PENETRATION ZESS	RQD DEPTH IN BELL CO	SOIL / ROCK Didentification	WELL	DRILLER'S NOTES
δS NE	FROM TO	BLOWS / 6"	FEET ST	0.75" DIAMETER SCH. 80 PVC CASING. Hole was flushed with drill water until return dril water was visually clear. A geomon type monitoring well was installed and purged until a visually clear sample was obtaied. WELL MW-2 N.709,726.78 E.1,731,757.61 GROUND ELEVATION 854.61 TOP OF PIPE ELEVATION 856.35 LATITUDE 38 56 43.00 LONGITUDE 81 56 33.09 1.25 DIAMETER POLETHYLENE SCREEN. 0.75" SCH. 80 PVC RIZER Hole was flushed with drill water until return dril water was visually clear. A geomen type monitoring well was installed and purged until a visually clear sample was obtained.		NOTES



JO	B NU	JMBER					_		LO		DOMINO					
				CHIAN												_1_ OF6_
														BORING FINISH		
GR	ROUN	ND ELEV	ation _	756.7	SY	'STEM										"
W	ater L	_evel, ft	∇		Ī		Ā	-								
TII	ME													BACKFILL		
DA	ATE									FII	ELD PARTY _	ROUSH/	<u> LAMBEF</u>	RT RIG	} <u>B</u>	<u>8-61</u>
	\top		AMDLE	CTAN	IDADD		DOD		T							
SAMPLE	NUMBER	ء ا با	ample Depth		IDARD RATION	AF.A	RQD		GRAPHIC LOG	C S		SOIL	/ ROCK		4	DRILLER'S
AMF	UM Z	וו ל	N FEET	RESIS	TANCE		%	IN	RAP	ns (FICATION		WELL	NOTES
S	Z 0	FRC	м то	BLOV	VS / 6"	, <u></u>		FEET	g	1						
											BROWN CL	AY with roc	k fragments			
								-	[
									<u> </u>							
								-								
					0.0	4 00		-	+=-:							
1)	S 3.0	4.5	2-	3-3	1.33										
								-								
								5 -	<u> </u>							
								-	‡==							
									<u>}</u>							
2	$\left \cdot \right _{S}$	S 8.0	8.4	50	/0.1	0.1		-			BROWN SH	Al F sandy				
1		Q 8.4				5.0	61				Bitotitton	, in the same of				SEATED CASING -
								-								STARTED CORING
								10 -	-==		GRAY CLAY	SHALE				
								-								
								-								
								-								
2	2 N	Q 13.	4 20.5			6.4	84									
								15 -	+===							
								-								
									-							
23/15								-								
7/.																
P.G																
MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15		TY	PE OF	CASING	USED						C	ontinued	l Next Pa	ge		
S SI	X		ROCK C	ORE				PIEZOM	IETER	TYP	E: PT = 0	PEN TUE	BE PORC	OUS TIP, SS =	= OF	PEN TUBE
<u>Ė</u>	X		.25 HSA .25 HSA											PNEUMATIC		
HR H		HW (CASING A	DVANCER	₹	4"		WELL T	YPE:	O'	W = OPEN	TUBE SI	OTTED :	SCREEN, GM	1 = 0	SEOMON
	+		CASING CASING			3" 6"	\dashv			Ĭ						- 2
AEP			IAMMER			8"					RECORDE	K JUN	ı			



JOB NUMBER _____

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-404 DATE 7/23/15 SHEET 2 OF 6

	SAN	IPLE	STANDARD	>	ROD	DE5-::					
NUMBER	DEI IN F	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH	%	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
IN NQ	FROM	TO 25.5	BLOWS / 6"	9.6 9.6	92	25 -		8 n	gray siltstone lense 22.1 to 22.6 gray siltstone lense 22.7 to 23.8 gray siltstone lense 24.1 to 24.4 gray siltstone lense 24.9 to 25.5 gray sandstone lense 25.5 to 26.1 gray sandstone lense 26.3 to 26.6 red clayshale 31.3 to 34.8	M	NOTES
5 NQ	35.5	45.5		9.4	80	35 -					
						40 -			GRAY SANDSTONE GRAY CLAYSHALE		
						45 -					

AEP MT I



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-404** DATE **7/23/15** SHEET **3** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/25/86 BORING FINISH 3/26/86 STANDARD
PENETRATION | ALL | A SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 50 GRAY CLAYSHALE 7 NQ 54.6 55.5 0.9 46 55 NQ 55.5 65.5 10.0 91 RED CLAYSHALE **GRAY CLAYSHALE** 60 -RED CLAYSHALE 65 NQ 65.5 75.5 9.9 96 **GRAY CLAYSHALE** MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 70

Continued Next Page

MULTI-COLORED CLAYSHALE



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-404 DATE 7/23/15 SHEET 4 OF 6

		SAM	IPLE	STANDARD	>	ROD	DED=::					
NUMBER	SAMPLE		PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	무표비	TOOL	DEPTH	GRAPHIC LOG	CS	SOIL / ROCK	-	DRILLER'S
M	₹MF		EET	RESISTANCE		0/2	IN	Z Š Z Š Z Š	S	IDENTIFICATION	WELL	NOTES
ž	S)	FROM	TO	BLOWS / 6"		70	FEET	<u>β</u>	\supset	IDENTIFICATION		NOTES
				22011070								
							-	Ħ				
							-					
							75 -					
							75					
10	NQ	75.5	85.5		10	100	-			RED CLAYSHALE		
							-	橿				
							-	H				
							-					
							00					
							80 –					
							_			GRAY CLAYSHALE		
							-					
										GRAY SANDSTONE		
							-			OVAT GANDOTONE		
							-	1::::				
							85 -	::::				
11	NQ	85.5	94.9		9.4	100	_			GRAY SANDSTONE		
							-] <u></u>				
							_	<u> : : : : </u>				
							-	<u> </u>				
							-					
							90 –					
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]:::::				
							_]::::				
							_	囯		GRAY CLAYSHALE		
							95 –	H				
40	NC	05.5	404.5									
12	NQ	95.5	104.6		8.8	57	-	苣				
			I	I	1 1		I	\vdash			1	
							-			RED CLAYSHALE		

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JOB NUMBER ______ BORING NO. B-404 DATE 7/23/15 SHEET 5 OF 6
PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/25/86 BORING FINISH 3/26/86

SAMPLE	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							- 100 - -					
<u>13</u>	NQ NQ	104.6 105.5	105.5 115.5		0.9	93 89	- 105 -					
							-			GRAY CLAYSHALE		
							110 - - -			GRAY SILTSTONE		
15	NQ	115.5	125.5		10.0	100	115 —					
							- 120 - - -			GRAY SANDSTONE GRAY CLAYSHALE		
							-			Continued Next Pa		

AEP MT LB



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-404** DATE **7/23/15** SHEET **6** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/25/86 BORING FINISH 3/26/86 PENETRATION RESISTANCE BLOWS / 6" SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO **GRAY SANDSTONE** 125 -16 NQ 125.5 135.0 9.5 100 130 -RED AND GRAY CLAYSHALE 135 BOTTOM OF BORING 135.0' STOPPED BORING AT 135.0' MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



	B NUM	_					_				a Bortino		
				CHIAN							DRING NO. <u>B-405</u> DATE <u>7/23/15</u> SHEET <u>1</u> OF <u>11</u>		
				INEER							DRING START 3/12/86 BORING FINISH 4/2/86		
		_		9,173.3							EZOMETER TYPE WELL TYPE GM		
GF	ROUNE	ELEVAT	TON _	855.6	SY	STEM					GT. RISER ABOVE GROUND 2.0 DIA 3"		
W	ater Le	vel, ft	<u> </u>	7.0	Ī		Ā	-		DE	EPTH TO TOP OF WELL SCREEN 143.2BOTTOM 147.2		
TII	ME									WI	ELL DEVELOPMENT <u>SEE NOTES</u> BACKFILL <u>CONCRETE SAND</u>		
DA	ATE		5-2	2-86						FIE	ELD PARTY TLS-GB RIG CME-75		
삗	띪	1	1PLE PTH	1	DARD RATION	TER!	RQD	DEPTH	GRAPHIC LOG	S	SOIL / ROCK		
SAMPLE	NUMBER SAMPLE		EET	1	TANCE	TOTAL	%	IN	SAPI	SC	SOIL / ROCK ☐ DRILLER'S IDENTIFICATION NOTES		
S	Z S	FROM	TO	BLOV	VS / 6"	Lañ	,0	FEET	95	\supset	is Etam is an in the interest of the interest		
1	SS	3.2	4.7					5 —			LIGHT BROWN SANDSTONE weathered.		
3		7.8	8.1 15.3	50)/.3	.3 9.7	70	- 10 -			LIGHT BROWN SANDSTONE weathered. BROWN SANDSTONE fine grain, well cemented. Broken with clay on joints.		
MTLBR LF FKA SI.GPJ AEP.GDT 7/23/15	- NQ	15.3	25.3			10.0	81	- 15 - -			15.0 to 15.3 vertical cracks with red and brown clay on joint. BROWN SANDSTONE well graded,well cemented,grading to blue gray at 24.2 17.9 to 21.7 vertical cracks filled with red clay		
PJ AE		TVDE		ASING	IISED				1		Continued Nevt Page		
SI.GF	,				ט⊃בט				Continued Next Page				
FK	(NQ-2 R0 6" x 3.25		JKE					OMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC				
3R LF		9" x 6.25		OVANCER	<u> </u>	4"							
¥ H		NW CAS	SING	VAINCE	`	3"		WELL T	YPE:	O	W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON		
AEP N		SW CAS				6" 8"					RECORDER		
⋖ ∟		AIR HAN	VIIVIEK .			0				[



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-405 DATE 7/23/15 SHEET 2 OF 11

PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 4/2/86

~		SAM	PLE	STANDARD	_≿	RQD	DEPTH	0				
SAMPLE	SAMPLE	DEF IN F	PTH EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	OTAL SOVER	%	IN	GRAPHIC LOG	SCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
ñΞ	S)	FROM	ТО	BLOWS / 6"	REL	70	FEET	<u></u>	<u> </u>	IDENTITIONTON		//
5	NQ	25.3	35.3		9.6	93	25 -			GRAY/BLUE GREEN SANDSTONE V-fine grain, well cemented		
							30 - 30 -			27.5 TO 29.0 Fine grain		
6	NQ	35.3	40.3		3.8		35 -			RED AND GRAY CLAY SHALE V-soft RED CLAY SHALE Soft		34.7 Top of seal.
7	NQ	40.3	45.3		4.1	70	40 -					39.3 Top of grave pack.
							45 -			BLUE GRAY SILTY SHALE		
8	NQ	45.3	55.3		10.0	96	45					•••



JOB NUMBER _______ BORING NO. B-405 DATE 7/23/15 SHEET 3 OF 11 PROJECT MOUNTAINEER LANDELL BORING START 3/12/86 PORING START 4/2/86

PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF	ILL			ВС	PRING START 3/12/86 BORING FINI	ISH _ 4 /	2/86
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							-			BLUE GRAY SANDSTONE Fine grain, well sorted.		
							50 –			BLUE GRAY CLAY SHALE Soft,broken		
							-			BLUE GRAY SHALEY SANDSTONE		
9	NQ	55.3	65.3		10.0	96	55 - - - -					
							- 60 – -			BROWN SANDSTONE Fine grain, well sorted vertical cracks at 59.5 to 60.0 GRAY SANDSTONE Fine grain, well sorted.		
										GRAY SILTY SHALE Soft.		
10	NQ	65.3	70.3		5.0	96	- 65 - - -	-				
11	NQ	70.3	75.3		4.6		70 -			RED AND GRAY CLAY SHALE GRAY CLAY SHALE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START 3/12/86	BORING FINISH	4/2/86
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WEI	DRILLER'S NOTES
12	NQ	75.3	85.3		9.9		75 -			RED CLAY SHALE		
							80 –					
13	NQ	85.3	95.3		9.8		85 -					
							90 -					
14	NQ	95.3	105.3		10.0		95 -			GRAY SHALEY SANDSTONE		

EP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY DATE **7/23/15** SHEET **5** OF BORING NO. B-405 PROJECT MOUNTAINEER LBR LANDFILL 3/12/86 BORING FINISH 4/2/86 **BORING START** SAMPLE **STANDARD** RQD SAMPLE NUMBER DEPTH SAMPLE USCS **DEPTH** PENETRATION LOG SOIL / ROCK WELL DRILLER'S IN FEET RESISTANCE **IDENTIFICATION NOTES FEET** BLOWS / 6" FROM TO 100 **GRAY SANDSTONE** 105 15 NQ 105.3 115.3 96 110 GRAY CLAY SHALE 115 GRAY SANDY SHALE With clayshale lens NQ 115.3 125.3 10.0 16 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 120

AEP MT LE



PRO	JECT	NO	JNIAI	NEER LBR LA	ANDF	ILL			BORING START 3/12/86 BORING FINISH 4/2/86				
SAMPLE NUMBER	SAMPLE	SAM DEF IN F	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	- 1-1/41	WELL	DRILLER'S NOTES
17	NQ	125.3	135.3		9.8		125 -			GRAY SANDSTONE			
							-						
							130 — - -			RED AND GRAY SHALE			
18	NQ	135.3	145.1		9.8	100	135 -			GRAY SANDSTONE Course grain.			
							-			GRAY SILTSTONE			
							- 140 - -			GRAY CLAYSHALE	***************************************		
							- -			GRAY SANDSTONE			143.2 Top of screen.
19	NQ	145.1	150.1		4.6	91	145			GRAY CLAY SHALE RED CLAY SHALE			
19							-						147.2 Bottom of screen.

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-405** DATE **7/23/15** SHEET **7** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 4/2/86 SAMPLE **STANDARD** RQD GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE TOTAL LENGTH RECOVER DEPTH PENETRATION SOIL / ROCK WELL DRILLER'S USC IN FEET RESISTANCE **IDENTIFICATION NOTES FEET** FROM BLOWS / 6" TO NQ 150.1 155.1 5.0 150.4 Bottom of gravel pack. **GRAY CLAY SHALE** 155 RED AND GRAY CLAY SHALE Layers. NQ 155.1 165.1 10.0 100 160 165 10.0 **GRAY SILTSTONE** NQ 165.1 175.1 100 GRAY AND RED CLAY SHALE Layers.

170

175

10.0

100

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15

Continued Next Page

MULTI-COLORED CLAY SHALE

175.1

185.1

NQ



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-405** DATE **7/23/15** SHEET **8** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 4/2/86 STANDARD
PENETRATION PLOOP
SISTANCE RQD SAMPLE SAMPLE NUMBER GRAPHIC LOG SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES** FEET FROM TO 180 **GRAY CLAY SHALE** GRAY SANDSTONE 185 NQ 185.1 9.8 24 195.1 98

190

195

200

10.0

87

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15

25 NQ

195.1

205.1

Continued Next Page

GRAY AND GRAY CLAY SHALE



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-405** DATE **7/23/15** SHEET **9** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 4/2/86 STANDARD
PENETRATION PLOOP
SISTANCE RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 205 10.0 100 NQ 205.1 215.1 **GRAY SANDY SHALE** 210 **GRAY SILTSTONE** GRAY SANDY SHALE 215 NQ 215.1 225.1 10.0 100 GRAY CLAY SHALE 220 **GRAY SANDSTONE** MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 225 28 NQ 225.1 9.7 93 **GRAY SILTSTONE** 235.1 **GRAY SANDSTONE**

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LOG OF BORING JOB NUMBER BORING NO. <u>B-405</u> DATE <u>7/23/15</u> SHEET <u>10</u> OF _ COMPANY APPALACHIAN POWER COMPANY PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 4/2/86 STANDARD
PENETRATION PLOOP
SISTANCE RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK DRILLER'S USC WELL IN FEET **IDENTIFICATION NOTES FEET** FROM TO **GRAY SILTSTONE** 230 **GRAY SANDSTONE GRAY SILTSTONE** RED AND GRAY CLAY SHALE 235 NQ 235.1 245.1 10.0 36 240 245 NQ 245.1 255.1 10.0 100 GRAY SILTSTONE **GRAY SANDSTONE** MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 **GRAY SILTSTONE** 250 **GRAY SANDSTONE GRAY SILTSTONE GRAY CLAYSHALE GRAY SANDSTONE**

Continued Next Page

GRAY SILTSTONE GRAY SANDSTONE



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-405** DATE **7/23/15** SHEET **11** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 3/12/86 BORING FINISH 4/2/86 STANDARD
PENETRATION PENETRATI HAD ROD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S DEPTH SOIL / ROCK DRILLER'S WELL SC IN IN FEET % **IDENTIFICATION NOTES FEET** FROM TO GRAY SILTSTONE 255 255.1 5.0 100 NQ 260.1 **SANDSTONE GRAY SILTSTONE** GRAY SANDSTONE 260 GRAY CLAY SHALE 260.1 Bottom of boring. LATITUDE 38 56 37.25 LONGITUDE 81 57 09.95 WELL DEVELOPMENT Boring was flushed with drill water until drill water return was visually clean and a geomon type well was installed and purged until a visually clean sample was obtained. WELL MATERIAL 1.25" diameter polethylene screen. 0.75" diameter sch. 80 pvc casing

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBERCOMPANY APPALACHIAN POWER COMPANY																
CON	(IPAN	/ <u>AP</u>	PALA	CHIAN	POWE	R CO	MPA				RING NO. BFA-1					
PRC	JECT	_MO	UNTA	NEER	LBR L	ANDF	ILL			BC	RING START	BORING FII	NISH <u>8/</u>	25/92		
COC	RDIN	ATES _	N 710	0,550.0	E 1,7	30,36	5.0									
GRO	OUND	ELEVA	TION _	680.0	SY	STEM				HGT. RISER ABOVE GROUND DIA						
Wat	er Lev	el, ft	$\overline{\mathbb{V}}$		T		$ar{ar{A}}$	7 -		DE	PTH TO TOP OF WELL S	SCREEN BOT	TOM			
TIM										W	ELL DEVELOPMENT	BACK	FILL			
DAT	E									FII	ELD PARTY		RIG			
											T					
щЖ	Щ		/IPLE	1	DARD		RQD	DEPTH	2	S	2011	/ BOOK		DDII I EDIO		
SAMPLE	SAMPLE		PTH EET	RESIS	RATION TANCE	in Z U	0/	IN	GRAPHIC LOG	SC		/ ROCK	WELL	DRILLER'S		
S N	S S	FROM			VS / 6"		%	FEET	GR _	\supset	IDENTI	FICATION	>	NOTES		
		1110111		BEOT	1070				()		OVERBURDEN CLAY	AND SANDSTONE				
									7							
									-							
									-0							
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									ĬŎ							
									2							
								10 -	+2.							
									5							
1	NQ	14.0	25.1			11.1	65				SANDSTONE AND CLA	AY INTERBEDDED				
								15 -	- 5		000000000000000000000000000000000000000					
									::::		GRAY SANDSTONE fir 45 degree shears	ne to medium grained, two	٥			
									-::::		To dogree of loars					
									::::							
3/15									-::::							
7/23																
GDT									<u> </u>							
AEP									::::							
SI.GPJ AEP.GDT 7/23/15	TYPE OF CASING USED										Continued	l Next Page				
KA SI			OCK CO	RE						ER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE						
MT LBR LF FKA		6" x 3.2! 9" x 6.2!								TED SCREEN, G = GEONOR, P = PNEUMATIC						
LBR		HW CA	SING AD	VANCER	₹	4"		WELL T	YPE:	: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON						
SW CASING 6" AIR HAMMER 8"											RECORDER					



JOB NUMBER _______ BORING NO. BFA-1 DATE 7/23/15 SHEET 2 OF 9

PRO	DJECT MOUNTAINEER LBR LANDFILL									RING START BORING FINI	SH <u>8/</u>	8/25/92		
SAMPLE NUMBER	SAMPLE	DE	IPLE PTH EEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES		
2	NQ	25.1	35.1		10	27	- - - 25 –			MOTTLED GRAY AND MAROON CLAYSTONE badly broken in places, core loss 0.5' MAROON CLAYSTONE badly broken in places,				
							- - - - 30 –			includes core loss 1.30'				
3	NQ	35.1	45.1		10	81	- - - - 35			MAROON CLAYSTONE badly broken in places, includes 1.0' of core loss				
							- - - 40 -			GREENISH GRAY CLAYSTONE sandy MOTTLED GREEN AND MAROON CLAYSTONE GREENISH GRAY CLAYSTONE sandy in places				
							- - -							
4	NQ	45.1	55.1		10	63	45 -			GREENISH GRAY SANDSTONE with shale laminations				

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JOB NUMBER _______ BORING NO. BFA-1 DATE 7/23/15 SHEET 3 OF 9
PROJECT MOUNTAINEER LBR LANDFILL BORING START BORING FINISH 8/25/92

PRO	ROJECT MOUNTAINEER LBR LANDFILL								ВО	G START BORING FINISH <u>8/25/92</u>				
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES		
							- - 50 –			GREENISH GRAY CLAYSTONE few interbeds of sandstone, badly broken				
							-			GREENISH GRAY CLAYSTONE				
							55 -			GREENISH GRAY SANDSTONE medium grained, few shale laminations at top				
5	NQ	55.1	65.1		10	81	55 - - -			GREENISH GRAY SANDSTONE medium grained CLAYEY SANDSTONE medium grained	_			
							60 -			GREENISH GRAY SANDSTONE medium grained GREENISH GRAY CLAYSTONE soft GREENISH GRAY SANDSTONE medium to fine grained				
							65 –			VARIGATED MAROON AND GREENISH GRAY CLAYSTONE				
6	NQ	65.1	75.1		10	33				MAROON VAREGATED WITH GREEN CLAYSTONE broken				
							70 – -			BLACK CLAY hard, carbonaceous DK. GRAY UNDERCLAY soft, coaly lenses, includes 1.70' of core loss				

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **BFA-1** DATE **7/23/15** SHEET **4** OF PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 8/25/92 **BORING START** STANDARD
PENETRATION
PENETRATI SAMPLE SAMPLE NUMBER SAMPLE DEPTH DEPTH F0G SOIL / ROCK DRILLER'S SCS WELL IN FEET **IDENTIFICATION NOTES FEET** FROM TO MAROON CLAYSTONE soft, broken 75 MAROON, MOTTLED GREEN CLAYSTONE 10 NQ 75.1 85.1 85 broken at base GREEN CLAYSTONE shaley, sandy in places, mottled cream-colored blebs 80 GREEN SANDSTONE medium grained **GREEN CLAYSTONE sandy** NQ 85.1 95.1 10 85 GREEN CLAYSTONE shaley, cream-colored 90 DK. GREENISH GRAY CLAYSTONE sandy MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 MAROON MOTTLED WITH GREEN **CLAYSTONE** sandy 95 GREEN MOTTLED WITH MAROON NQ 95.1 105.1 10 52 **CLAYSTONE** sandy



JOB NUMBER	LUG OF BORING		
COMPANY APPALACHIAN POWER COMPANY	BORING NO. BFA-1	DATE 7/23/15	_ SHEET <u>5</u> OF <u>9</u>
PROJECT MOUNTAINEER LBR LANDFILL	BORING START	BORING F	FINISH <u>8/25/92</u>

PROJECT MOUNTAINEER LBR LANDFILL									BORING START BORING FINISH 8/25/92				
SAMPLE NUMBER SAMPLE	SAM DEI IN F	MPLE PTH EEET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES		
						100 -			MAROON WITH SOME GREEN MOTTLING CLAYSTONE badly broken in lower half				
10 NG	105.1	110.1		5	43	- 105 -			GREEN CLAYSTONE soft MAROON WITH GREEN MOTTLING CLAYSTONE badly broken, includes 2.0' of core loss - core barrel blocked				
						- - 110 —							
						- - 115 -			GREEN CLAYSTONE broken				
11 NG	115.1	125.1		10	96	-			GREEN SHALE sandy GREEN GRAY SANDSTONE fine grained, shaley GREEN SANDSTONE fine grained				
						120 - - -			GREEN SANDSTONE medium grained				
						-			GREEN SANDSTONE medium to coarse grained				

AEP MTLBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER	LUG OF BURING		1	
COMPANY APPALACHIAN POWER COMPANY	BORING NO. BFA-1	DATE 7/23/15	SHEET <u>6</u> OF <u>9</u>	
PROJECT MOUNTAINEER LBR LANDFILL	BORING START	BORING F	INISH <u>8/25/92</u>	

PRO	ROJECT MOUNTAINEER LBR LANDFILL							BORING START BORING FINISH 8/25/92					
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES	
12	NQ	125.1	135.1		10	100	125 — -			GREEN WITH BLACK MICACEOUS PARTINGS, SANDSTONE coarse grained			
							-						
							130 — - -						
13	NQ	135.1	145.1		10	97	- 135 —			GREEN SANDSTONE coarse to very coarse			
							- - -			grained, micaceous			
							140 —						
							- - -			GREEN SANDSTONE coarse to very coarse grained, green, micaceous DK. GRAY SANDSTONE fine grained DK. GREENISH GRAY CLAYSTONE DK. GRAY SHALE clayey			
14	NQ	145.1	155.1		10	98	145 — - -			GRAY CLAY soft GRAY SHALE solid			
14							-			GREENISH GRAY SANDSTONE coarse to very coarse, very competent, few granules of white quartz			

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **BFA-1** DATE **7/23/15** SHEET **7** OF BORING FINISH **8/25/92** PROJECT MOUNTAINEER LBR LANDFILL **BORING START** STANDARD
PENETRATION FENETRATION FOR STANCE HAD ROD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 155 GREENISH GRAY SANDSTONE very coarse NQ 155.1 165.1 10 100 grained, few granules of white quartz, very competent 160

165

170

175

10

10

100

100

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15

NQ

165.1

175.1

Continued Next Page

GREENISH GRAY SANDSTONE very coarse

grained, micaceous

SANDSTONE very coarse grained, few granules

of white quartz, very compenent

NQ 175.1

185.1



JOB NUMBER _______

COMPANY APPALACHIAN POWER COMPANY BORING NO. BFA-1 DATE 7/23/15 SHEET 8 OF 9

PROJECT MOUNTAINEER LBR LANDFILL BORING START BORING FINISH 8/25/92

PROJECT MOUNTAINEER LBR LANDFILL									BORING START BORING FINISH 8/25/92				
NUMBER	SAMPLE	DEF	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES	
							-			DK. GRAY SANDSTONE medium grained GREENISH GRAY SANDSTONE very coarse grained			
							180 –			DK. GREENISH GRAY SANDSTONE with black micaceous partings, medium to coarse grained			
							- -						
18	NQ	185.1	195.1		10	100	185 -			GREENISH GRAY SANDSTONE medium to coarse grained, with black micaceous partings			
							-			GREENISH GRAY SANDSTONE very coarse grained			
							190 – - - -						
19	NQ	195.1	205.2		10.10	60	195 – -			GREENISH GRAY SANDSTONE coarse grained CORE LOSS-TOOLS SANDED IN	-		
							- -			SANDSTONE WITH INTERBEDDED SHALE GREENISH GRAY SANDSTONE coarse grained, shale breccia at base GRAY SHALE DK. GRAY SHALE clayey and broken at top	-		
							200 -			DK. GRAY SHALE pyrite inclusions	_		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **BFA-1** DATE **7/23/15** SHEET **9** OF PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 8/25/92 **BORING START** STANDARD
PENETRATION PENETRATI SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH **DEPTH** SOIL / ROCK DRILLER'S WELL SC IN FEET **IDENTIFICATION NOTES FEET** BLOWS / 6" FROM TO CORE LOSS-COAL DK. GRAY SHALE 205 DK. GRAY SHALE NQ 205.2 212.0 6.8 0 CORE BED AS FOLLOWS bone coal, hard, somewhat bony bone coal, hard, somewhat bony coal, bright, hard coal, bright, thick pyrite lense near base coal, bright with sporadic pyrite, badly crushed coal, bright, thick, pyrite lense near base GRAY SHALE clayey GRAY SHALE clayey NQ 212.0 216.1 4.10 78 GRAY SHALE sandy with sandstone laminations 215 GRAY SHALE clayey, broken BOTTOM OF BORING 216.1' MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



AEP 1992, 2006, 2008

Boring Logs

MW-05 to MW-10, MW-12 to MW-21, MW-43, MW-44



JOB	NUMI	BER						LO	<i>3</i> O	FBORING			
COM	PAN		PALA	CHIAN POWE	R CO	MPA	NY		BORING NO. <u>MW-05</u> DATE <u>7/23/15</u> SHEET <u>1</u> OF <u>4</u>				
PRO	JECT	MO	UNTA	INEER LBR LA	ANDF	ILL				RING START <u>6/16/92</u> BORING FINISH <u>6/23/92</u>			
COO	RDIN	ATES	N 71	1,462.7 E 1,7	28,59	7.8			PIE	ZOMETER TYPE WELL TYPE			
										T. RISER ABOVE GROUND 2.52 DIA 1.0			
Wate	er Lev	el, ft	<u> </u>	3.9 ▼		I	, -		DE	PTH TO TOP OF WELL SCREEN 46.8 BOTTOM 48.8			
TIME 0715									WE	ELL DEVELOPMENT <u>SEE NOTES</u> BACKFILL <u>VOLCLAY GROUT</u>			
DAT	 E			7-92						ELD PARTY TJH-RLY RIG CME-75			
				1									
SAMPLE	SAMPLE		/IPLE PTH	STANDARD PENETRATION	AL STH VERY	RQD	DEPTH IN FEET	S B	C S	SOIL / ROCK 그 DRILLER'S			
SAM	SAM	IN F	EET	RESISTANCE		%	IN	IS A	S N	SOIL / ROCK ☐ DRILLER'S IDENTIFICATION NOTES			
0, 2	0,	FROM	ТО	BLOWS / 6"	REG		FEE1	0					
							-	╁═╡					
1	SS	2.3	3.8	4-5-6	.8			<u> </u>		RED CLAY			
'		2.0	0.0	400	.0		_	├ ─┤					
							_						
							5	7, 4					
								, , ,					
							_	[.0.]					
								. ó .					
	00	7.0	7.0	50/5	_		-	Ď. Ż		BROWN SANDY ROCK FRAGMENT			
2	SS	7.3	7.8	50/.5	.5		_			BIOWN GARDT ROOKT TO GWILLIAM			
1	NQ-2	8.7	12.6		3.8	27	-			RED AND BROWN SHALE			
							40						
							10 –						
							_						
							=						
2	NQ-2	12.6	14.8		1.5	0	_	::::		LIGHT BROWN SANDSTONE			
							-	-					
								::::					
3	NQ-2	14.8	24.8		6.8	32	15 -			LIGHT BROWN SANDYSHALE			
							_						
							-						
								<i></i>					
//23/15							_						
							_						
										RED SHALE			
TYPE OF CASING USED										Continued Next Page			
1									T) /= :	<u> </u>			
X 6" x 3.25 HSA SLOTT										E: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE CCREEN, G = GEONOR, P = PNEUMATIC			
9" X 0.25 H5A													
HW CASING ADVANCER 4" WELL TYPE: NW CASING 3"								/PE:	O/	N = OPEN TUBE SLOTTED SCREEN, GM = GEOMON			
SW CASING 5"										RECORDER			

AIR HAMMER

8"



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ____ DATE <u>7/23/15</u> SHEET <u>2</u> OF _ BORING NO. MW-05 PROJECT MOUNTAINEER LBR LANDFILL 6/16/92 BORING FINISH 6/23/92 **BORING START** SAMPLE **STANDARD** RQD SAMPLE NUMBER SAMPLE DEPTH USCS **DEPTH** PENETRATION LOG SOIL / ROCK WELL DRILLER'S IN FEET RESISTANCE **IDENTIFICATION NOTES FEET** FROM BLOWS / 6" TO 24.3 Top of bentonite 25 NQ-2 24.8 34.8 7.8 32 29.2 Top of gravel pack. 30 **GRAY SHALE** GRAY SHALE with oxidation throughout 5 NQ-2 34.8 10.0 67 35 44.8 40 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 **GRAY SANDSTONE** NQ-2 44.8 45 49.4 3.6 74



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>MW-05</u> DATE <u>7/23/15</u> SHEET <u>3</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL **BORING START** 6/16/92 BORING FINISH 6/23/92 STANDARD
PENETRATION PLOOP
SISTANCE RQD SAMPLE SAMPLE NUMBER SAMPLE GRAPHIC LOG DEPTH USCS DEPTH SOIL / ROCK WELL DRILLER'S IN FEET **IDENTIFICATION NOTES FEET** FROM TO 46.8 Top of screen. 48.8 Bottom of GRAY SHALE screen. 7 NQ-2 49.4 54.8 5.4 90 RED SHALE 50 -50.2 Bottom of gravel **RED SHALE** GRAY SHALE hard 55 8 NQ-2 54.8 10.0 95 64.8 60 -65 10.0 100 NQ-2 64.8 74.8 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 70



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ____ DATE <u>7/23/15</u> SHEET <u>4</u> OF _ BORING NO. MW-05 PROJECT MOUNTAINEER LBR LANDFILL **BORING START** 6/16/92 BORING FINISH 6/23/92 STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S **DEPTH** SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 75 10 NQ-2 74.8 83.5 8.7 45 RED SHALE soft 80 11 NQ-2 83.5 84.8 .8 0 85 12 NQ-2 84.8 89.8 100 **GRAY SHALE** 5.0 89.9 90.0 Bottom of boring. Well development Hole was flushed with drill water until return water appered visually clear. Geomon type monitoring well installed and purged untill a visually clear sample was obtained. WELL MATERIAL 1.25" Diameter 20 slot screen, 1" sch. 80 pvc casing.

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB	NUM	BER _					_		LO	J (r boring	,					
COM	PAN	Y AP	PALAC	CHIAN	POWE	R CO	MPA	MY		ВС	RING NO. M	IW-06	DATE	7/23/	′15 S⊦	HEET	_1_ OF6_
PRO	JECT	_MO	UNTAI	NEER	LBR L	ANDF	ILL			ВС	RING START	<u>7/2</u>	/92	_ BOF	RING FINISH	1 <u>7</u>	//16/92
COO	RDIN	IATES _	N 712	2,003.9	E 1,7	29,67	6.1				EZOMETER T						
GRO	UND	ELEVAT	ION	799.2	SY	STEM					ST. RISER AB						
Wate	er Lev	el, ft	<u> </u>	7.5	<u> </u>		$ar{ar{A}}$	-		DE	PTH TO TOP	OF WELI	L SCREEN	_12	5.8 BOTTOM	1 <u>1</u>	34.8
TIME			07	20						WI	ELL DEVELO	PMENT _	SEE NO	OTES	BACKFILL	\	OLCLAY GROUT
DATI	E		6-3	-92						FIE	ELD PARTY	TJH-R	RLY		RIG	<u> </u>	ME-75
비出	Ш	1	1PLE PTH	1	DARD RATION	FRY	RQD	DEPTH	<u></u> ⊆ _ (5	S		90	IL / ROCK			_	DRILLER'S
SAMPLE	SAMPLE	1	EET	1	TANCE	TOTAL ENGTH COVE	%	IN	GRAPHIC LOG	SC			ITIFICATIO			WELL	NOTES
S ≥	/S	FROM	TO	BLOW	VS / 6"	FEET	70	FEET	9	\supset		IDLIN	III IOAIIO	/1 N			NOTES
																	Reamed hole to 6"
								_	<u> </u>								and installed well.
									H								
								-									
								_	\vdash								
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								15 -	\vdash								
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								-									
10																	
23/1								_			BROWN C	LAY					
) 	NQ	18.7	24.7			3.4	20	_									
P.GE											RED CLAY	′ SHAI ⊑ ^	oft				
J AE		TVDF		ACINIO	HEED						1			Dogo	<u> </u>		·/
AEP MTLBRLF FKA SI.GPJ AEP.GDT 7/23/15 X X L	_			ASING	OSED								ed Next I		TID CO		DENI TUDE
X X		NQ-2 R0 6" x 3.25	5 HSA	rKE.				PIEZOME			E: PT = (SCREEN, (JHEN [)NOB b ORF 50	KUUS = PNF	TIP, SS = FUMATIC	= OF	PEN TUBE
3R LF		9" x 6.25		\/\\\\CEF	<u> </u>	4"											250101
M LE		NW CAS		VANCER	`	3"		WELL TY	/PE:	O'	W = OPEN	I I UBE	SLOTTE	ມ SCF	KEEN, GN	/I = C	JEOMON
<u>X</u>		SW CAS	SING			6"					RECORD	ER					
∢∟		AIR HAI	VIIVIEK			8"											



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. MW-06 DATE _7/23/15 SHEET _2 OF _6

PROJECT _MOUNTAINEER LBR LANDFILL BORING START _7/2/92 BORING FINISH _7/16/92

PRO	JECT	MO	UNTA	NEER LBR LA	ANDF	ILL			ВО	RING START 7/2/92	BORING FINISH	-	7/16/92
SAMPLE	SAMPLE		IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATIO		WELL	DRILLER'S NOTES
2	NQ	_24.7	34.7		10.0	47	25 —			GRAY SHALE soft			
3	NQ	34.7	40.0		5.3	94	30			GRAY SANDSTONE hard			
4	NQ	40.0	45.0		5.0	100							
5	NQ	45.0	55.0		10.0	78	45						

AEP MT LB



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>MW-06</u> DATE <u>7/23/15</u> SHEET <u>3</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 7/2/92 STANDARD
PENETRATION PLOOP
SISTANCE HAD ROD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH USCS DEPTH SOIL / ROCK WELL DRILLER'S IN FEET **IDENTIFICATION NOTES** FEET FROM TO 50 55 NQ 55.0 65.0 9.7 74 GRAY SHALE hard 60 -65 NQ 65.0 74.7 9.3 93 GRAY SANDSTONE

70

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-06 DATE 7/23/15 SHEET 4 OF 6

PROJECT MOUNTAINEER LBR LANDFILL BORING START 7/2/92 BORING FINISH 7/16/92

PRO	JECT	MOU		NEER LBR LA						RING START 7/2/92	BORING FINISH	_7	/16/92
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
8	NQ	74.7	84.7		10.0		- 75 - - - -			RED SHALE GRAY SHALE			
9	NQ	84.7	90.0		5.0	65	80 - - 85	-		GRAY SHALE hard with red lens GRAY SANDSTONE			
10	NQ	90.0	95.0		4.5	35	90 -			RED SHALE with high angle fracture	re		1
M LBR LF FKA SI.GPJ AEP.GDI 7/23/15	NQ	95.0	105.0		10.0	75	95 - - - -			GRAY SHALE hard GRAY SHALEY SANDSTONE hard			

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>MW-06</u> DATE <u>7/23/15</u> SHEET <u>5</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 7/16/92 STANDARD
PENETRATION PENETRATI SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 100 RED SHALE **GRAY SHALEY SANDSTONE**

105 12 NQ 105.0 115.0 10.0 82 GRAY SHALE hard RED SHALE GRAY SHALE hard 110 115 13 NQ 115.0 123.7 8.3 53 RED SHALE WITH HIGH ANGLE FRACTURE MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 119.2 Top of bentonite seal. 120 Continued Next Page



JOB NUMBER _____

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-06 DATE 7/23/15 SHEET 6 OF 6

				NEER LBR LA			<u></u>			RING NO. MW-06 DATE 1723/19 S RING START 7/2/92 BORING FINIS		
SAMPLE	SAMPLE	SAM DEF IN F FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	uscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
14	NQ	123.7	125.0		1.3	26						
15	NQ	125.0	134.3		9.3	97	125 -			GRAY SHALE GRAY SHALEY SANDSTONE		124.5 Top of gravel pack. 125.8 Top of screen.
							130 -			GRAY SANDSTONE hard		
16	NQ		135.0		.6	66	135 -	_				134.8 Bottom of
17	NQ	135.0	140.0		5.0					RED/GRAY SHALE		screen. 137.0 Bottom of screen.
MILBRILF FKA SI.GPJ AEP.GDI 7/23/15		140.0					140 -			WELL DEVELOPMENT Boring flushed with drill water until return drill water appeared visually clear. Boring bailed dry and a 2" diameter well installed. WELL MATERIAL 2" diameter 20 slot screen, 2" sch. 40 casing.		140.0 Bottom of boring.

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



						^ L	.г (ERING LAD	ORATOR	A I				
		_	DAL AC					ANY					7/00/4		4		
								<u>NY</u>			RING NO. <u>MW-07</u>						4
											RING START _					12	
											ZOMETER TYPE						
_											T. RISER ABOVE						
Wat	er Lev	∕el, ft	<u> </u>		₹ 28	3.0	Ā	_			PTH TO TOP OF V					N AV O	DOLLT
TIM	E			110		20					ELL DEVELOPMEN						KUU I
DAT	Έ		5-27	7-92	5-28	8-92					LD PARTY TJ	n/KL1		RIG	CME-	/5	
SAMPLE	SAMPLE	DE	MPLE PTH EEET TO	PENET RESIS	IDARD RATION TANCE VS / 6"		RQD %	DEPTH IN FEET	GRAPHIC	nscs	ı	SOIL / ROCI			WELL	DRILLER	
1	SS	2.3	3.8	11-1	12-18	.5	0	5 -			BROWN CLAY						
2	SS	7.3	8.8	12-1	17-21	1.3		- 10 -									
3	SS	12.3	13.8	14-3	39-47	1.0					BROWN SHALE	EY CLAY					
1	NQ	13.8	15.3			.5	0				BROWN CLAY						
2	NQ	15.3	21.7			4.4	14	15 -			RED SHALE						
J AEP.GDI																	
6F3		TYPI	E OF C	ASING	USED						Cont	tinued Next	t Page				
X		NQ-2 R 6" x 3.2	OCK CO	RE			-	PIEZOM				N TUBE PO			OPEN	TUBE	
HAY N		9" x 6.2	5 HSA					SLO	STTE	D S	CREEN, G = 0	JEONOR, I	P = PNE	UMATIC			
_		HW CA		OVANCER	?	4" 3"		WELL T	YPE:	0\	N = OPEN TUI	BE SLOTT	ED SCR	EEN, GM :	= GEON	MON	
<u> </u>		SW CA				6"					RECORDER						

RECORDER

AIR HAMMER



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. MW-07 DATE _7/23/15 SHEET _2 OF _4

DRO JECT _MOUNTAINFEED LRP LANDELL BORING START __5/21/92 _____ PORING START __5/21/92 _____ PORING START __5/21/92

PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START <u>5/21/92</u> BORING FINIS	SH _	6/19/92
SAMPLE	SAMPLE	SAM DEF IN F	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	NQ	21.7	24.8		2.5	55	-			BROWN SANDSTONE weathered oxidized lens	4	Lost water return.
4	NQ	24 .8	34.8		9.5	30	- 25 - -					24.0 Top of bentonite seal.
							30 -			GRAY SHALE hard some oxidized	• • • • • • • • • • • • • • • • • • • •	29.8 Top of gravel pack.
							- - -					
5	NQ	34.8	44.8		10.0	95	35 -			GRAY SANDSTONE hard		
							- 40 - - -					
6	NQ	44.8	54.8		10.0	84	- - 45 –				000000000000000000000000000000000000000	



PRO	JECT	_MOI	UNTA	NEER LBR LA	ANDF	ILL			ВС	RING START <u>5/21/92</u> BORING FINISH	_6	/19/92
SAMPLE	SAMPLE	SAM DEF IN F FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
7	NQ	54.8	64.8		10.0	67	50			GRAY SHALE soft with some red lens		53.2 Top of screen. 55.2 Bottom of screen. 57.0 Bottom of grave pack.
8	NQ.	64.8	74.8		10.0	98	60			GRAY SHALE hard some what sandy to 64.8 GRAY SHALE hard with red lens to 70.4		
							70 —					

AFP MT



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>MW-07</u> DATE <u>7/23/15</u> SHEET <u>4</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL **5/21/92** BORING FINISH **6/19/92 BORING START** STANDARD
PENETRATION PLOOP
SISTANCE RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO GRAY SANDSTONE hard 10.0 92 75 9 NQ 74.8 84.8 80 GRAY SHALE hard with red lens 85 10 NQ 84.8 91.0 6.2 74 GRAY SHALE hard GRAY SHALE soft RED SHALE medium hard 90 91.0 Bottom of 91.0 boring. WELL DEVELOPMENT Boring flushed with drill water until return water visually clear. Geomon type monitoring well was MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 installed and purged until visually clear sample was obtained. WELL MATERIAL 1.25" diameter 20 slot screen, 1" sch. 80 pvc casing.



X NQ-2 ROCK CORE X 6" x 3.25 HSA 9" x 6.25 HSA HW CASING ADVANCER NW CASING 9" x 6.25 HSA ON CASING ADVANCER SUBJECT: NO CASING ADVANCER ON CASING	10	R NI	IMREI	D				l	_OG (OF BORING
Depth Type					PAL AC	HIAN POW	ER COMP	ANY	F	BORING NO MW-08 DATE 7/23/15 SHEET 1 OF 5
COORDINATE N.710,780.9 E1,730,858.4 PIEZOMETER TYPE WELL TYPE OW			_							
CROUND ELEVATION 67.5.5 SYSTEM										
No.										
MELL DEVELOPMENT SEE NOTES BACKFILL VOLCLAY GROUT FIELD PARTY TJH-GCF RIG CME-75	W	ater L	Level,	ft	√ 6.	1	7	<u>V</u>		DEPTH TO TOP OF WELL SCREEN 44.0 BOTTOM 52.9
SAMPLE STANDARD									V	WELL DEVELOPMENT <u>SEE NOTES</u> BACKFILL <u>VOLCLAY GROUT</u>
1 SS 3.5 5.0 5-8-9 1.2	DA	ATE							F	FIELD PARTY TJH-GCF RIG CME-75
1 SS 3.5 5.0 5-8-9 1.2							1 120			
1 SS 3.5 5.0 5-8-9 1.2	삗	띪 교	۳					D DEPTH	0 0	SOIL / ROCK - DRILLER'S
1 SS 3.5 5.0 5-8-9 1.2	AMP	JMB	₹ 			RESISTANC		NI AP		DENTIFICATION S NOTES
1 SS 3.5 5.0 5-8-9 1.2 2 SS 8.5 10.0 6-11-14 1.3 BROWN/TAN CLAYEY SILT with rock fragments. BROWN/TAN SANDY CLAY with clay shale soft to medium throughout 10	Š	۶ ک	ر FF	ROM	TO	BLOWS / 6'		ਿ FEET ਹਿੱ	5 -	,
1 SS 3.5 5.0 5.8-9 1.2 2 SS 8.5 10.0 6-11-14 1.3 3 SS 13.5 15.0 6-10-12 1.5 TYPE OF CASING USED X NO_2 ROCK CORE X 6"x3.25 HSA 9"x6.25								<u> </u>	=	
2 SS 8.5 10.0 6-11-14 1.3 10								<u> </u>	\exists	and installed well
2 SS 8.5 10.0 6-11-14 1.3 10									=	
2 SS 8.5 10.0 6-11-14 1.3 10								1 1-	크	
2 SS 8.5 10.0 6-11-14 1.3 10									3	
2 SS 8.5 10.0 6-11-14 1.3 10	,	١١٥		3.5	5.0	5.8.0	12	_	=	BROWN/TAN CLAYEY SILT with rock fragments.
2 SS 8.5 10.0 6-11-14 1.3 BROWN/TAN SANDY CLAY with clay shale soft to medium throughout 10				0.5	5.0	3-0-3	1.2	1	3	
2 SS 8.5 10.0 6-11-14 1.3 10								5 -	3	
10								_	-3	
10								-[-	=	
10								-	=	
10									=	
10									크	
10		$\left \cdot \right _{S}$	s	8.5	10.0	6-11-14	13			BROWN/TAN SANDY CLAY with clay shale soft
3 SS 13.5 15.0 6-10-12 1.5 4 SS 18.5 18.7 50/.2 .2 TYPE OF CASING USED X NO-2 ROCK CORE	-				. 55			+-	<u>-</u> -	
3 SS 13.5 15.0 6-10-12 1.5 4 SS 18.5 18.7 50/.2 .2 TYPE OF CASING USED X NO-2 ROCK CORE								10 -		
TYPE OF CASING USED RED CLAY SHALE soft to hard									=	
TYPE OF CASING USED RED CLAY SHALE soft to hard								+-	<u>-</u> -	
TYPE OF CASING USED RED CLAY SHALE soft to hard								-		
TYPE OF CASING USED RED CLAY SHALE soft to hard								- T-		
TYPE OF CASING USED RED CLAY SHALE soft to hard									<u>-</u>	
TYPE OF CASING USED RED CLAY SHALE soft to hard	١,	3 5	S 1	13.5	15.0	6-10-12	1.5	<u>-</u>	-	
## SS 18.5 18.7 50/.2 .2 RED CLAY SHALE soft to hard	`				. 5. 5	0 .0		+		
## SS 18.5 18.7 50/.2 .2 RED CLAY SHALE soft to hard								15 -	<u>-</u>	
TYPE OF CASING USED Continued Next Page X NQ-2 ROCK CORE X 6" x 3.25 HSA 9" x 6.25 HSA HW CASING ADVANCER 4" NW CASING ADVANCER 4" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON NW CASING 3" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON OF SUMMER AND ADVANCE AND A										
TYPE OF CASING USED Continued Next Page X NQ-2 ROCK CORE X 6" x 3.25 HSA 9" x 6.25 HSA HW CASING ADVANCER 4" NW CASING ADVANCER 4" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON NW CASING 3" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON OF SUMMER AND ADVANCE AND A									-	
TYPE OF CASING USED Continued Next Page X NQ-2 ROCK CORE X 6" x 3.25 HSA 9" x 6.25 HSA HW CASING ADVANCER 4" NW CASING ADVANCER 4" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON NW CASING 3" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON OF SUMMER AND ADVANCE AND A								-	<u>-</u> -	
TYPE OF CASING USED Continued Next Page X NQ-2 ROCK CORE X 6" x 3.25 HSA 9" x 6.25 HSA HW CASING ADVANCER 4" NW CASING ADVANCER 4" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON NW CASING 3" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON OF SUMMER AND ADVANCE AND A								T-		
TYPE OF CASING USED Continued Next Page X NQ-2 ROCK CORE X 6" x 3.25 HSA 9" x 6.25 HSA HW CASING ADVANCER 4" NW CASING ADVANCER 4" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON NW CASING 3" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON OF SUMMER AND ADVANCE AND A	2							-[-		
TYPE OF CASING USED Continued Next Page X NQ-2 ROCK CORE X 6" x 3.25 HSA 9" x 6.25 HSA 9" x 6.25 HSA HW CASING ADVANCER 4" NW CASING ADVANCER 4" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON NW CASING 3"		ı s	S 1	18.5	18 7	50/2	2	-	-	RED CLAY SHALE soft to hard
TYPE OF CASING USED Continued Next Page X NQ-2 ROCK CORE X 6" x 3.25 HSA 9" x 6.25 HSA 9" x 6.25 HSA HW CASING ADVANCER 4" NW CASING 3" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON NW CASING 3"	_		· '			00/.2	-	1 1		
X NQ-2 ROCK CORE X 6" x 3.25 HSA 9" x 6.25 HSA HW CASING ADVANCER NW CASING 9" x 6.25 HSA ON CASING ADVANCER SUBJECT: NO CASING ADVANCER ON CASING	AEP.									
X 6" x 3.25 HSA SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC BY x 6.25 HSA SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON NW CASING	<u> </u>		T	YPE	OF C	ASING USE	D			Continued Next Page
9" x 6.25 HSA HW CASING ADVANCER NW CASING NW CASING STOTTED SCREEN, G = GEONOR, P = PNEUMATIC WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON						RE				
HW CASING ADVANCER 4" WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON WCASING WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON	5	<u> </u>						SLOT	TED	SCREEN, G = GEONOR, P = PNEUMATIC
NW CASING 3"	HE HE	1	HV	V CAS	ING AD	VANCER		WELL TYP	E: (OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
	<u> </u>									RECORDER

AIR HAMMER



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-08 DATE 7/23/15 SHEET 2 OF 5

PROJECT MOUNTAINEER LBR LANDFILL BORING START 7/22/92 BORING FINISH 7/29/92

PRO	JECT	_ MO	JNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START <u>7/22/92</u> BORING FINI	SH	_7/	/29/92
SAMPLE NUMBER	SAMPLE	SAM DEI IN F FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	į	WELL	DRILLER'S NOTES
5	NQ-2	20.5	24.7		2.8	25	-			RED CLAY SHALE soft to hard			
6	NQ-2	24.7	31.6		5.3	68	- 25 -						
7	NQ-2	31.6	34.7		2.8	45	30 -			GRAY CLAY SHALE medium to hard fine grain sandy shale 31.6 to 32.7			
8_	NQ-2	34.7	44.7		10.0		- - 35 -						
							40 -			BLUE/GRAY SHALE AND CLAYEY SANDSTONE			36.6 Top of bentonite seal.
_9	NQ-2	44.7	54.7		10.0	98	- - 45 -						42.6 Top of gravel pack. 44.0 Top of screen.



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>MW-08</u> DATE <u>7/23/15</u> SHEET <u>3</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL 7/22/92 BORING FINISH 7/29/92 **BORING START** SAMPLE **STANDARD** RQD SAMPLE NUMBER SAMPLE DEPTH GRAPHIC S **DEPTH** PENETRATION TOTAL LENGTH RECOVER LOG SOIL / ROCK WELL DRILLER'S USC IN FEET RESISTANCE **IDENTIFICATION NOTES FEET** FROM BLOWS / 6" TO GRAY SANDSTONE hard 50 GRAY CLAY SHALE AND CLAYEY SANDSTONE 52.9 Bottom of screen. 10 NQ-2 54.7 61.8 6.9 RED AND GRAY CLAY SHALE medium to hard 55 55.0 Bottom of gravel pack. 60 BLACK AND GRAY CLAY SHALE MEDIUM TO HARD WITH RUST STAIN. 61.5 TO 61.7 COAL GRAY AND GREEN LAYERED CLAY SHALE 11 NQ-2 61.8 64.7 2.7 soft to medium with rust stain, 61.5 to 61.7 RED CLAY SHALE 12 NQ-2 64.7 69.7 65 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 BLUE AND GRAY CLAY SHALE hard with calcite 13 NQ-2 69.7 74.7 5.0 100 70 throughout soft areas 72.7 TO 72.8 and 73.4 TO 73.5

AEP MT LE



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ____ DATE **7/23/15** SHEET **4** OF _ BORING NO. MW-08 PROJECT MOUNTAINEER LBR LANDFILL **BORING START** 7/22/92 BORING FINISH 7/29/92 STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE RQD SAMPLE NUMBER GRAPHIC LOG SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO GRAY/BLUE CLAY SHALE hard, soft lens 85.5 TO 85.7 14 NQ-2 92 75 80 15 NQ-2 84.7 9.7 97 94.7 85 90 RED CLAY SHALE hard gray/green seams, rust stains 92.1 TO 92.6 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 16 NQ-2 94.7 102.2 6.2 95



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ____ DATE **7/23/15** SHEET **5** OF _ BORING NO. MW-08 PROJECT MOUNTAINEER LBR LANDFILL 7/22/92 BORING FINISH 7/29/92 **BORING START** STANDARD
PENETRATION FENETRATION FOR STANCE SAMPLE **RQD** SAMPLE NUMBER GRAPHIC LOG SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 100 17 NQ-2 102.2 104.7 2.3 CLAY SHALE hard GRAY LIMESTONE ? hard 104.7 Bottom of WELL DEVELOPMENT Boring was flushed with boring. drill water until return water was visually clear. 2" diameter well was installed amd pumped until a visually clear sample was obtained. WELL MATERIAL 2" diameter 20 slot screen, 2" diameter sch. 40 casing. MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



						ALI	CIVIL			OF BORING		AIOKI				/41-15
		_														
							PANY									T 1 OF 3
							<u>.L</u>			ORING START			_			
							.4			EZOMETER T						
GRO	UND									GT. RISER ABO						
Wate	er Lev	el, ft	<u> </u>		▼ 0		Ā			EPTH TO TOP						
TIME				30		30				ELD PARTY _						VOLCLAY GROUT
DAT	E		7-29	9-92	7-30	0-92				ELD PARTY _	1311-0	осг		KI	G _	CME-75
SAMPLE	SAMPLE	DE	IPLE PTH EEET TO	PENET RESIS	DARD RATION TANCE VS / 6"	APP A	QD DEP IN FEE	GRAPHIC TO	S D S D		IDEN	DIL / ROCK	N		WELL	7
1	SS	3.8	5.3	5-∔	3-9	1.1				BROWN CL			wet			Hole was reamed to 6" and well installed.
2	SS	8.8	10.3	1-	1-1	1.3	10									
33,15	SS	13.8	15.3	3-	3-4	0	15								2	
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	SS	18.8	20.3	3-4	4-3	1.5		- <u>=</u>		BLUE SANI sand,satura		SHALE trac	ce of			
95. P.D.		TYPE	OF C	ASING	USED					(Continue	ed Next F	Page			
X			OCK CO	RE				OMETE								PEN TUBE
<u>X</u>		6" x 3.25 9" x 6.25					<u> </u>	LOTT	ED :	SCREEN, G						
¥		HW CAS	SING AD	VANCEF	}	4"	WELI	TYPE:	: 0	W = OPEN	TUBE :	SLOTTE	O SCF	REEN, GI	M =	GEOMON
-1	1	NW CAS	SING			3"										

RECORDER

SW CASING

AIR HAMMER



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-09 DATE 7/23/15 SHEET 2 OF 3

PROJECT MOUNTAINEER LBR LANDFILL BORING START 8/12/92 BORING FINISH 8/13/92

			JNTAI											/13/92
SAMPLE	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS		SOIL / ROCK	I	WELL	DRILLER'S NOTES
				550.1076										
5 6	SS NQ-2	23.8 24.0	24.0 25.3	50/.2	.2 .9	0	25 -			GREEN/GRAY	DY CLAY SHALE Y SANDY SHALE so racks 24.7 to 24.9	oft to medium		
7 1	NQ-2	25.3	35.3		9.3	31	-				STONE medium to h	nard		
							30 -			GRAY/RED C	LAY SHALE soft			
8 1	NQ-2	35.3	40.3		2.6	0	35 -							36.8 Top of benton seal.
9 1	NQ-2	40.3	43.4		2.1		40 -							
10	NQ-2	43.4	45.3		1.7		45					0 0 0 0 0		42.9 Top of gravel pack. 43.8 Top of screen
11	NQ-2	45.3	55.3		9.4		45 -			CPAY CLAY 9	SHALE medium to h	nard .		

AEP MT



JOB	NUM	BER _				_		LO	G O	FBORING		
COM	1PAN'	Y AP	PALAC	CHIAN POWE	R CO	MPA	NY		ВС	ORING NO. MW-09 DATE 7/23/15	SHEET	3_ OF3_
PRO	JECT	MOI	JNTAI	NEER LBR LA	ANDF	ILL			ВС	PRING START 8/12/92 BORING FINI	SH <u>8/</u>	13/92
		0414	IDI E	OTANDADD		DOD						
SAMPLE	PLE	SAM DEF		STANDARD PENETRATION	TOTAL LENGTH RECOVERY	RQD	DEPTH	GRAPHIC LOG	S C	SOIL / ROCK		DRILLER'S
SAM	SAMPLE	IN F		RESISTANCE		%	IN FEET	3RAF LO	S O	IDENTIFICATION	WELL	NOTES
_		FROM	TO	BLOWS / 6"	~~		FEET				 -,H-,	
								Ħ				
										SHALEY SANDSTONE medium to hard		
							5 0			SHALET SANDSTONE Medium to haid		
							50 -					
								- : : : :				
												52.9 Bottom of screen.
										GRAY CLAY SHALE medium to hard		
							55 -	-==				
												55.3 Bottom of gravel pack and bottom of
										WELL DEVELOPMENT Hole was flushed with drill water until drill water was visually clear. A 2"		boring.
										monitoring well was installed and pumped until visually clean and a sample was obtained.		
										WELL MATERIAL		
										2" diameter 20 slot screen pvc 2" diametet sch. 40 pvc casing.		
<u>0</u>												
1123												
25.												
J AE												
2.0 P												
M LBR LF FKA SI.GPJ AEP.GDI 7723/15												
저 고												
<u>-</u>												



ıc	nr N	II INAE	RER							LO	G O	F BORING			
			_		CHIAN		R COI	- MPA	NY		ВС	DRING NO. MW-10 DATE	7/23/15 S⊢	IEET	1 OF 7
												DRING START 6/23/92			
												EZOMETER TYPE			
												ST. RISER ABOVE GROUND <u>2.2</u>			
W	ater	Lev	el, ft	<u> </u>	1.7	▼ 31	1.6	Ā	58.4		DE	EPTH TO TOP OF WELL SCREEN	_ 87.1-139.8 0M	1 <u>8</u>	9.1-148.9
TI	ME			07	'05		10		0850			ELL DEVELOPMENT SEE NO			
D	ATE			6-24	4-92	6-2	5-92		7-1.92	2	FIE	ELD PARTY TJH\RLY	RIG	<u>C</u>	ME-75
			SΔN	//PLE	STAN	DARD	>	RQD	DEPTH IN FEET	1					
PLE	NUMBER	SAMPLE		PTH			AER.	INQU	DEPTH	HS	S	SOIL / ROCK		Ⅎ	DRILLER'S
SAM	Σ	SAM		EET	RESIS	RATION TANCE VS / 6"		%	IN	SRAF	S U	IDENTIFICATION	1	WELL	NOTES
L	_	-	FROM	ТО	BLOV	VS / 6"	_ 5		FEET	-					(D
	1	SS	2.2	3.7	8-12	2-15	1.2					RED SANDY CLAY			Reamed hole to 6"and installed wells MW-10 and MW-11.
2	2	SS	7.2	7.4	50	0/.2	.2		5 -			BROWN SAND			
	3	NQ	9.0	15.0			6.0	19	10 -			BROWN SANDSTONE			
											-	BROWN SANDY SHALE			
				05.5			10.5		15 -			BROWN SHALE hard			
(723/15	4	NQ	15.0	25.0			10.0	23				BROWN SANDSTONE BROWN SHALE soft			
AEP.GDI 7/23															
.GP			TYPE	E OF C	ASING	USED						Continued Next P	Page		
	X X			OCK CO	RE				PIEZOM					OF	PEN TUBE
ᇰ	^	,	6" x 3.2! 9" x 6.2!	5 HSA					SLO	OTTE	ED S	SCREEN, G = GEONOR, P =	= PNEUMATIC		
E LBR			HW CAS		VANCER	?	4" 3"		WELL T	YPE:	O)	W = OPEN TUBE SLOTTED	SCREEN, GM	1 = G	SEOMON
≥ —	Χ		SW CAS				6"					RECORDER			

RECORDER

AIR HAMMER



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. MW-10 DATE _7/23/15 SHEET _2 OF _____

DODING START ______ FORING START ______ 6/23/92 ______ PORING START ______ 7/8/92

		CVIV	1PLE	STANDADD	>	BUD		1. 1					
NUMBER	SAMPLE	DE	PTH EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	OTAL NGTH OVER	NQD	DEPTH IN	GRAPHIC LOG	SCS	SOIL / ROCK		WELL	DRILLER'S
\exists	SA	FROM		BLOWS / 6"		%	FEET	SR 1	\supset	IDENTIFICATION		>	NOTES
5	NQ	25.0	33.6		4.0	20	25 -			RED SHALE soft			
6	NQ	33.6	35.0		1.3	92	30 -			GRAY SHALE		X I	
7	NQ	35.0	45.0		10.0	64	35 - - - -			GRAY SANDSTONE with oxidized breaks			
							40 -			41.0-42.7 GRAY SHALE hard and medium from 49.2 to49	8		
							-						
В	NO	45.0	E		0.4	F.0	45 -						
ا ز	NQ	45.0	55.0	I	9.4	50					1//	1 1//	

AFP MT



63.5 Top of bentonite

71.3 Top of gravel

seal.

LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ____ DATE <u>7/23/15</u> SHEET <u>3</u> OF _ BORING NO. MW-10 PROJECT MOUNTAINEER LBR LANDFILL 6/23/92 BORING FINISH 7/8/92 **BORING START** SAMPLE **STANDARD** RQD SAMPLE NUMBER SAMPLE DEPTH **DEPTH** PENETRATION F0G SOIL / ROCK WELL DRILLER'S USC IN FEET RESISTANCE **IDENTIFICATION NOTES FEET** BLOWS / 6" FROM TO 50 **BROWN SANDSTONE BROWN SHALE** GRAY SHALE medium hard oxidized breaks some high angle fracture and calcite 55 NQ 55.0 65.0 10.0 50 60 -

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15

NQ

10

65.0

73.9

Continued Next Page

BROWN SANDSTONE with oxidation throughout

to 65.0 and course to 68.2

GRAY SANDSTONE

GRAY SHALE

65

70

8.9

50



PRO	JECT	MOL	JNTAI	NEER LBR LA	ANDF	ILL				RING START 6/23/92 BORING FI	IISH	7/	8/92
SAMPLE	SAMPLE	SAM DEF IN F	PLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
11	NQ NQ	73.9	75.0 85.0		1.1	100	- 75 - - -			BROWN SANDSTONE with oxidized fracture at 77.7 and changing to gray at78.0 to 85			pack.
13	NQ	85.0	95.0		10.0	79	80 - - 85			GRAY SANDY SHALE hard			
							90 —						87.1 Top of screen. 89.1 Bottom of screen. GEOMOND TIP
14EP.GD1 //23/15	NQ	95.0	105.0		10.0	68	- - - 95			BROWN SANDSTONE with oxidized fracture GRAY SANDY SHALE RED SHALE hard	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		92.1 Bottom of gravel pack.
M LBK LF FKA SI.GPJ AEP.GDI 7/23/15		33.3	.55.0		13.0		-			GRAY SHALE			

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



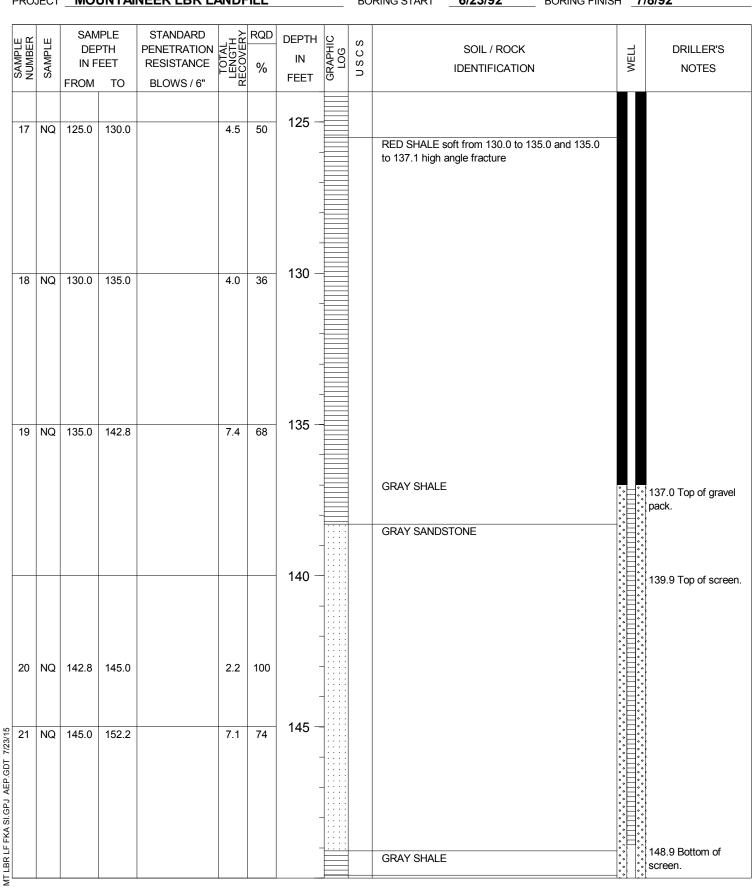
LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>MW-10</u> DATE <u>7/23/15</u> SHEET <u>5</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 6/23/92 BORING FINISH 7/8/92 STANDARD
PENETRATION PLOOP
SISTANCE RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO **GRAY SANDY SHALE** 100 RED SHALE soft from 105.0 to 107.0 105 15 NQ 105.0 115.0 9.6 54 **GRAY SHALE** 110 115 16 NQ 115.0 125.0 10.0 76 **RED SHALE** MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 120 **GRAY SHALE**



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-10 DATE 7/23/15 SHEET 6 OF 7

PROJECT MOUNTAINEER LBR LANDFILL BORING START 6/23/92 BORING FINISH 7/8/92





LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY DATE **7/23/15** SHEET **7** OF BORING NO. MW-10 PROJECT MOUNTAINEER LBR LANDFILL 6/23/92 BORING FINISH 7/8/92 **BORING START** STANDARD
PENETRATION FENETRATION FOR STANCE !E⊠ RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN IN FEET % **IDENTIFICATION NOTES FEET** FROM TO RED SHALE 150.0 Bottom of gravel pack. 152.2 Bottom of boring MONITORING WELL MW-11 IS NESTED IN THE SAME BORING HOLE WITH MW-10. MONITORING WELL MW-11 COORDINATES N.710,968.29 E.1,730,231.77 ELEVATION 810.83 CASING ELEVATION 813.63 2" DIAMETER 20 SLOT SCREEN. 2" DIAMETER SCH. 40 PVC. WELL DEVELOPMENT Hole was flushed with drill water until return water appeared visually clear. Hole was bailed dry and a geomon type monitoring well installed and purged.

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



IOR	NII IMI	RER							LO	G O	F BORING					
		_			POWFI	R CO	- MP∆	NY		BC	RING NO. MW-12 DATE	7/23/15 s	HEET	1 (⊃F 9	
								<u>u v i</u>			RING START <u>4/22/92</u>				л <u> </u>	_
											ZOMETER TYPE					_
											T. RISER ABOVE GROUND					_
			<u> </u>		<u>▼</u> 23			88.7			PTH TO TOP OF WELL SCREEN					_
		el, ft		30 30		710	<u> </u>	0720			ELL DEVELOPMENT <u>SEE NOT</u>				Y GROU	Т
TIMI				7-92		8-92	+	4-29-9			LD PARTY HOWWELL/YAT					Ī
DAT			4-2	1-92	4-20			4-23-3								
SAMPLE	SAMPLE	DE	MPLE PTH EEET TO	STAN PENET RESIS BLOW	DARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION		WELL		ILLER'S IOTES	
1	SS	4.0	5.4		-50/.4	1.4		5 -			BROWN SILTY SANDSTONE					
2 1	SS NQ	9.0 9.3	9.3 15.3	50	/.3	.3 6.0	82	- 10 -			YELLOW/BROWN SANDSTONE of clay seams 14.5 to 15.9	with red vertical		AUGER	REFUSAL	
AEP.GDI //23/15	NQ	15.3	25.3			9.8	58	- 15 -								
GPJ AE	1	TYPI	E OF C	ASING	USFD					ı	Continued Next Pa	age	<u> </u>	i		_
X X	_		OCK CO		5525			DIEZON	4CTCC	T/C			- OD	ENI TI II		_
X X		6" x 3.2	5 HSA	· · · · · · · · · · · · · · · · · · ·				PIEZON SLO			E: PT = OPEN TUBE POR(CREEN, G = GEONOR, P =			⊏IN IUI	⊃⊏	
LBK L		9" x 6.29 HW CA		VANCEF	2	4"									NI.	
Z		NW CA	SING		•	3"		WELL T	YPE:		W = OPEN TUBE SLOTTED	SUKEEN, GI	vı = G		IN	_
<u>.</u>	_	SW CA	SING			6"					RECORDER					

AIR HAMMER



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY

BORING NO. <u>MW-12</u> DATE <u>7/23/15</u> SHEET <u>2</u> OF _

PI	ROJ	JECT	MOL	<u>JNTAI</u>	NEER LBR LA	NDF	ILL				RING START 4/22/92 BORING F	INISH	5/6/92
SAMPLE	NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		☐ DRILLER'S
								- - -					
	3	NQ	25.3	35.3		10.0	72	25 — - - -					
								30			GRAY SANDSTONE		
		NQ NQ	35.3 36.3	36.3 40.3		.4	33	35	-		RED SHALE		
.GPJ AEP.GDI 7/23/15		NQ	40.3	44.0		45	45	40					
LBR LF FKA Si		NQ NQ	44.0	45.3 55.3		1.1	60 74	45 —	-		GRAY SHALE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-12 DATE 7/23/15 SHEET 3 OF 9

PROJECT MOUNTAINEER LIBRIANDELL BORING START 4/22/92 BORING FINISH 5/6/92

PRO	JECT	MOL	JNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START 4/22/92 BORING FIN	IISH	_5/	6/92
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
9	NQ	55.3	65.3		10.0	51	50			GRAY SANDY SHALE			0715 5-5-92 SWL 49.3 FT.
MI LBN LF FNA Silory AEF 601 (129/13)	NQ	65.3	75.3		10.0	51	65 -			GRAY SHALE RED SHALE			

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _____

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-12 DATE 7/23/15 SHEET 4 OF 9

PRC	JECT	MO	UNTAI	NEER LBR LA		ILL			ВО	RING START 4/22/92 BORING FIN	SH	5/	6/92
SAMPLE	SAMPLE	SAM DEF IN F FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
							- -						
11	NQ	75.3	85.3		9.4	66	75 - - -						
							80 -			RED AND GRAY SHALE			
							-						
12	NQ	85.3	95.3		10.0	68	85 -			GRAY SHALE			
							- - 90 —			RED SHALE		T	
7/23/15							- - -			GRAY SHALE			
MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15	NQ	95.3	105.3		10.0	85	95 - -						



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>MW-12</u> DATE <u>7/23/15</u> SHEET <u>5</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL 4/22/92 BORING FINISH 5/6/92 **BORING START** SAMPLE **STANDARD** RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S **DEPTH** PENETRATION SOIL / ROCK DRILLER'S USC WELL IN FEET RESISTANCE **IDENTIFICATION NOTES FEET** FROM BLOWS / 6" TO **GRAY SANDSTONE** 100 Momentary loss of water. 1450 5-4-92 SWL 96 HRS.100.0 105 NQ 105.3 115.3 10.0 100

115 NQ 115.3 125.3 9.3 74 GRAY SHALE soft 15 RED SHALE **GRAY SHALE hard** MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 120

Continued Next Page

110



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-12 DATE 7/23/15 SHEET 6 OF 9

DRO JECT MOUNTAINFER LRR LANDELL BORING START 4/22/92 PORING FINISH 5/6/92

PRO	JECT	MO	UNTAI	NEER LBR LA					ВС	RING START	4/22/92	BORING FINISH	_5/	6/92
SAMPLE	SAMPLE		IPLE PTH EEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs		SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
16	NQ	125.3	135.3		10.0	82	125 - - -			GRAY SANDS	STONE hard			
							130 – - -							
17	NQ	135.3	140.3		4.6	88	- 135 -			RED SHALE	: hard			
							- - - 140 –							
18	NQ	140.3	150.3		10.0	67	-	-						
							145 -			RED SHALE				
							-			NED OF IALE				



PRO	JECT	MO	JNTAI	NEER LBR LA	NDF					RING START 4/22/92 BORING	FINISH _5	/6/92
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	NQ	150.3	155.3		4.9	68	-					
20	NQ	155.3	165.3		10.0	82	155 - - -			GRAY SHALE hard		HOLE CASED TO 153.7 FT.
							- 160 –					
							- - 165					
21	NQ	165.3	170.3		4.6	89	-					166.0 Top of bentonite seal.
22	NQ	170.3	175.3		4.1	28	170 - -			RED SHALE with limestone nodules	0 0 0	172.0 Top of gravel pack.
23	NQ	175.3	185.3		9.9	54	175 -					172.0 Top of gravel pack.

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. MW-12 DATE _7/23/15 SHEET _8 OF _9

PROJECT _MOUNTAINEER LBR LANDFILL BORING START _4/22/92 BORING FINISH _5/6/92

PRO	JECT	NIO	JNIAI	NEER LBR LA	ANDF	ILL			BO	RING START <u>4/22/92</u> BC	RING FINISH <u>5</u>	16/92
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							180 -			GRAY SANDY SHALE		
24	NQ	185.3	195.3		10.0	83	185 -			GRAY SHALEY SANDSTONE GRAY SANDSTONE		
							190 -					190.6 Top of screen
25	NQ	195.3	200.3		4.6	45	195 -			GRAY SHALE medium hard GRAY SHALE hard		192.6 Bottom of screen. 194.0 Bottom of gravel pack.
							200 -			RED SHALE medium hard		
												200.3 Bottom of bornhole.



JOB NUMBE	=R					
COMPANY	APPALACHIAN POWER COMPANY	BORING NO. MW-12	DATE 7/23/15	SHEET 9	OF	9
DDO IECT	MOLINITAINEED I RD I ANDEIL I	PODING START 4/22/0	2 PODING EII	MICH 5/6/02		

ROJECT _	MOUNTAINE	EER LBR LANDFILL			BORING START 4/22/92 BORING FINISH	5/6/92
NUMBER	SAMPLE DEPTH IN FEET FROM TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	DEPTH IN FEET	후임	SOIL / ROCK Didentification	DRILLER'S NOTES
	-ROM TO	BLOWS / 6" LE			WELL DEVELOPMENT Hole was flushed with drill water until drill water was visually clear. Hole was bailed dry and a geomon type monitoring well was installed and purged until a visually clear sample was abtained. WELL MATERIAL 1.25" diameter 20 slot screen pvc. 1" sch. 80 pvc casing.	



IOR	NII IMI	RER							LO	GΟ	OF BORING	
		_				R CO	- MPA	NY		BC	ORING NO. <u>MW-13</u> DATE <u>7/23/15</u> SHEET <u>1</u> OF <u>7</u>	
											ORING START <u>5/7/92</u> BORING FINISH <u>5/13/92</u>	
											IEZOMETER TYPE WELL TYPE GM	
											GT. RISER ABOVE GROUND 3.04 DIA 1.0	
					<u>▼</u> 23			44.0			EPTH TO TOP OF WELL SCREEN	
TIME		OI, IT		36		50	-	0715		WE	VELL DEVELOPMENT SEE NOTES BACKFILL VOLCLAY GRO	UT
DAT			5-1 ⁻			2-92		5_13_9	2		ELD PARTY HOWELL\YATES RIG CME75	
D/ (1)	_		<u> </u>		U 12			0 10 0				
SAMPLE	SAMPLE	DE	MPLE PTH EEET TO	RESIS	RATION	TOTAL LENGTH RECOVERY		DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK	
	NQ-2	3.4	4.5			.6	0 62	5 -			BROWN SANDSTONE	
	NQ-2	14.5	24.5			8.0	27	- 10 - - 15 -			GRAY SHALE, soft	
AEP.GDI //23/15												
GPJ A		TYPI	E OF C	ASING	USED						Continued Next Page	
X		NQ-2 R	OCK CO	RE			_	PIEZOM	IFTFR	TYP	·	_
ž X		6" x 3.2 9" x 6.2	5 HSA								SCREEN, G = GEONOR, P = PNEUMATIC	
H H				VANCEF	?	4"		WELL T	YDE:	\cap	W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON	
<u> </u>		NW CA	SING			3"		VVELL I	IFE.			
ــــا ب	+	SW CA	SING			6"	-				RECORDER	

AIR HAMMER



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-13 DATE 7/23/15 SHEET 2 OF 7

BROWNEGT MOUNTAINFER LRP LANDELL BORING START 5/7/92 ROBING SINISH 5/13/92

1 COLO	I _IVIC	DUNTA	INEER LBR LA	ANDF	ILL			ВО	RING START <u>5/7/92</u>	BORING FINISH	5/13/92
SAMPLE NUMBER SAMPLE	IN	MPLE EPTH FEET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROC IDENTIFICATI		☐ DRILLER'S NOTES
4 NQ-2	2 24.5	33.4		2.9	14	25 - -			RED SHALE, soft		
						30 -					
5 NQ-2	2 33.4 2 34.5			1.1	59	35 -			GRAY SHALE hard GRAY SHALE medium hard		
7 NQ-2	2 415	54.5		10.0		40 -			DED CHALE#		
/ NQ-7	2 44.5	54.5		10.0	54	45 -			RED SHALE soft	<i>V</i>	

AEP MT LE



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>MW-13</u> DATE <u>7/23/15</u> SHEET <u>3</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL 5/7/92 BORING FINISH 5/13/92 **BORING START** STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE RQD SAMPLE NUMBER SAMPLE DEPTH **DEPTH** LOG SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO GRAY SANDY SHALE hard GRAY/BROWN SANDSTONE 50 **GRAY SHALE BROWN SHALEY SANDSTONE** YELLOW SHALE hard oxidation throughout 8 NQ-2 54.5 64.5 10.0 23 55 **GRAY SHALE soft BROWN SANDSTONE** 60 GRAY SANDSTONE hard **GRAY SHALEhard** 9 NQ-2 64.5 74.5 10.0 59 65 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 70

AEP MT.



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. MW-13 DATE _7/23/15 SHEET _4 OF _____

DROUGET _MOUNTAINFEED LRP LANDFILL BORING START _ 5/7/92 _____ PORING FINISH _5/13/92

	ROJECT MOUNTAINEER LBR LANDFILL SAMPLE STANDARD PENETRATION RESISTANCE IN FEED ROWS / 6" FROM TO BLOWS / 6" APPALACHIAN POWER COMPANY RQD DEPTH PENETRATION RESISTANCE NO SEED ROWS / 6" FROM TO BLOWS / 6"									RING NO. MW-13 DATE 7/23/15 S RING START 5/7/92 BORING FINIS		
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10	NQ-2	74.5	84.5		10.0	83	- 75 - - -					
11	NQ-2	84.5	94.5		10.0	74	80 - - - 85 -			GRAY SANDSTONE hard with oxidation and high angle fracture at 80.6 GRAY SHALE RED SHALE		PARTIAL LOSS OF DRILL WATER
MI LBK LF FKA SI.GFJ AEF.GDJ 7/25/13	NQ-2	94.5	104.5		10.0	76	90 - - - 95			GRAY SHALE GRAY SANDY SHALE hard		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-13 DATE 7/23/15 SHEET 5 OF 7

PROJECT MOUNTAINEER LBR LANDFILL BORING START 5/7/92 BORING FINISH 5/13/92

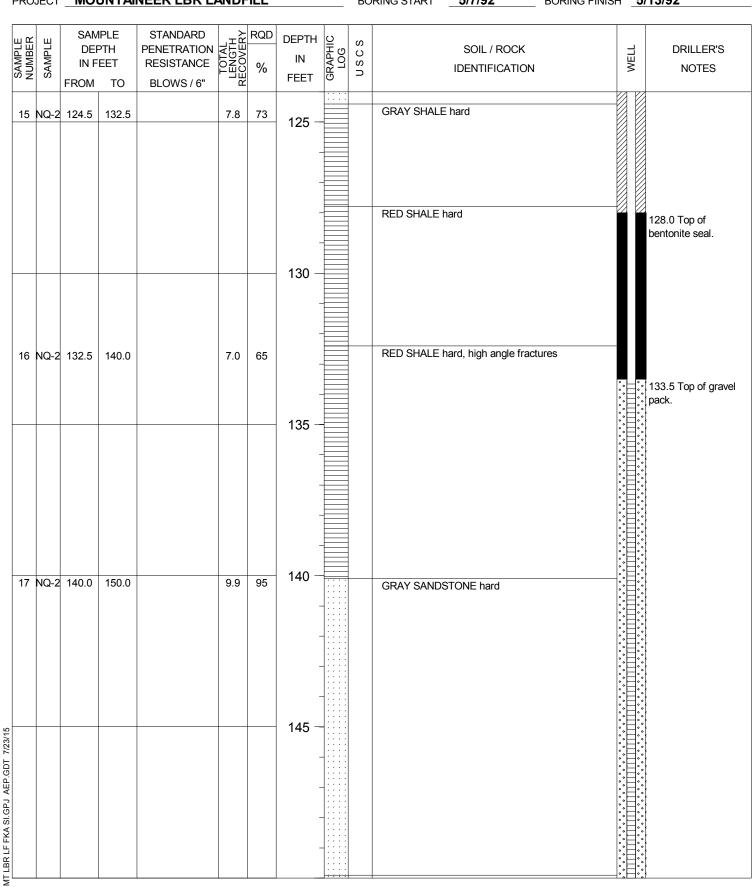
PRO	IECT	MOU	JNTAI	NEER LBR LA					ВО	RING START <u>5/7/92</u>	BORING FINISH	-	5/1	3/92
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	NSCS	SOIL / ROCK IDENTIFICATION		WELL		DRILLER'S NOTES
							100 -							
							- - -			RED SHALE medium hard				
13	NQ-2	104.5	114.5		10.0	79	105 -			GRAY SHALE hard				
							- - 110 – -							
14	NQ-2	114.5	124.5		10.0	87	- - 115 -			GRAY SANDSTONE				
							-			GRAY SHALE hard				
							- 120 - - -			RED SHALE hard GRAY SANDSTONE hard				
							-							



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-13 DATE 7/23/15 SHEET 6 OF 7

PROJECT MOUNTAINEER LBR LANDFILL BORING START 5/7/92 BORING FINISH 5/13/92





LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ____ DATE 7/23/15 SHEET 7 OF _ BORING NO. MW-13 PROJECT MOUNTAINEER LBR LANDFILL **BORING START** 5/7/92 BORING FINISH 5/13/92 STANDARD
PENETRATION PENETRATI SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE S DEPTH SOIL / ROCK WELL DRILLER'S USC IN IN FEET % **IDENTIFICATION NOTES FEET** FROM TO 18 NQ-2 150.0 155.0 5.0 88 GRAY SANDSTONE hard RED SHALE 151.4 Top of screen. 153.4 Bottom of screen. 155 155.0 Bottom of gravel pack and boring. WELL DEVELOPMENT Hole was flushed with drill water until return water was visually clear. Hole was bailed and a geomon type monitoring well was installed and purged until a visually clear sample was obtained. WELL MATERIAL 1.25" diameter 20 slot screen pvc. 1" sch. 80 casing pvc. 160

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB	NUM	RFR						LO	ĠΟ	F BORING		
				CHIAN POWE	R CO	- MPA	NY		ВО	RING NO. <u>MW-14</u> DATE <u>7/23</u> /	/ 15 SHE	ET 1 OF 3
				NEER LBR LA						RING START 8/6/92 BOF		
										ZOMETER TYPE		
				715.1 SY						T. RISER ABOVE GROUND 1.77		
			<u> </u>			T				PTH TO TOP OF WELL SCREEN45.		
TIME		Oi, it		'15		_	•		WE	ELL DEVELOPMENT SEE NOTES	BACKFILL	VOLCLAY GROUT
DAT				1-92					FIE	ELD PARTY TJH-TLS	RIG	CME-75
D/ (II	_		U-1	1-02								
щК	щ		1PLE	STANDARD		RQD	DEPTH IN FEET	೨	S	0011 (1700)		
SAMPLE	SAMPLE		PTH EET	PENETRATION RESISTANCE	AZ S S S S S	%	IN	AP- OG	SC	SOIL / ROCK	ļ	☐ DRILLER'S NOTES
S S	SA	FROM		BLOWS / 6"		%	FEET	GR	\supset	IDENTIFICATION	;	NOTES
		TTOW		BEOVICE				1-1				Hole was reamed to
							_					6" and well installed.
							-	[]				
							-					
1	SS	3.5	5.0	4-6-8	1.4		_	\vdash		BROWN AND GRAY SILTY CLAY		
								H				
							5 -					
							_	Ŀ				
								-				
							-					
							-					
2	SS	8.5	9.3	42-50/3			_	-==		RED CLAY SHALE weathered		
3	NQ-2	9.3	15.0		2.4	0				RED CLAY SHALE		
							10 –					
							_					
							-					
							-					
							_					
4	NQ-2	15.0	23.5		6.3	30	15 -					
							_					
							-					
								= =				
1/23/15							-					
							_					
AEP.GDI												
GPJ AE		TYPE	OF C	L ASING USED						Continued Next Page		<u>V</u> A
X X	Т		OCK CO				PIEZOMI	CTCD '	TVDI		TIP 99 -	OPEN TURE
<u> </u>		6" x 3.25	5 HSA	_						CREEN, G = GEONOR, P = PNE		OI LIN I UDL
LBK LBK		9" x 6.25 HW CAS		VANCER	4"	$\overline{}$				W = OPEN TUBE SLOTTED SCF		- GEOMON
=		NW CAS	SING	- : -	3"		WELL TY	iPE:			LEIN, GIVI =	- GEOIVION
<u> X</u>	+	SW CAS	SING		6"					RECORDER		

AIR HAMMER

8"



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. MW-14 DATE _7/23/15 SHEET _2 OF _3

PROJECT _MOUNTAINEER LBR LANDFILL BORING START _8/6/92 BORING FINISH _8/11/92

FIC	JECT	_ IVIO	JIN I AI	NEER LBR LA	ANDL	ILL			BC	RING START 8/6/92 BORING FIN	ISH	0/	11/92
SAMPLE	SAMPLE	SAM DEF IN F	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
5	NQ-2	23.5	25.0		.5	27	-						
6	NQ-2	25.0	35.0		9.9	85	- 25 -			GRAY SILTY CLAY SHALE well cemented			
7	NQ-2	35.0	43.2		6.0	12	- 35 -			GRAY CLAY SHALE v-soft RED AND GRAY CLAY SHALE soft			
2							- 40 -			RED CLAY SHALE soft			38.2 Top of bentonite seal,
MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15	NQ-2	43.2	45.0 55.0		1.5	46	- - 45 -			GRAY CLAY SHALE soft GRAY CLAY SHALE well cemented GRAY SANDY CLAY SHALE	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		44.0 Top of gravel pack. 45.4 Top of screen.



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ____ DATE **7/23/15** SHEET **3** OF _ BORING NO. MW-14 PROJECT MOUNTAINEER LBR LANDFILL 8/6/92 ___ BORING FINISH _**8/11/92 BORING START** STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE S DEPTH SOIL / ROCK DRILLER'S USC WELL IN FEET **IDENTIFICATION NOTES FEET** FROM TO GRAY SANDSTONE well cemented, fine grain 50 55 GRAY SHALEY SANDSTONE 10 NQ-2 55.0 59.0 3.7 45 54.9 Bottom of **GRAY SANDY SHALE** screen. RED AND GRAY CLAY SHALE 56.4 Bottom of gravel pack and boring. WELL DEVELOPMENT Hole was flushed with drill water until return water was visually clear. Hole was bailed dry and a 2" well installed and pumped until a visually clear and a sample obtained. WELL MATERIAL 2" diameter 20 slot screen pvc. 2" diameter sch. 40 pvc casing.

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



IOR	NII IMI	RED						LO	GΟ	FBORING
		_		CHIAN POWE		- MPA	NY		ВС	RING NO. <u>MW-15</u> DATE <u>7/23/15</u> SHEET <u>1</u> OF <u>3</u>
				NEER LBR L						RING START 7/13/92 BORING FINISH 7/22/92
										ZOMETER TYPE WELL TYPE OW
										T. RISER ABOVE GROUND 1.91 DIA 2.0
		el, ft					-			PTH TO TOP OF WELL SCREEN 44.9 BOTTOM 53.9
TIM		, oi, it		730 -		-	-		WE	ELL DEVELOPMENT SEE NOTES BACKFILL VOLCLAY GROUT
DAT			7-14						FIE	ELD PARTY TJH-RLY RIG CME-75
				1						
SAMPLE	SAMPLE	DEI	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION ☐ DRILLER'S NOTES
1	SS	2.7	4.2	24-22-21	1.4		5 -			RED CLAY BROWN SAND
2	SS	7.7	9.2	6-7-8	1.2		. 10 –			BROWN SANDY SILT
3	NQ-2	2 10.5	15.2		4.1	46	- 15 -			BROWN SANDY SHALE
AEP.GDI 7/23/15	NQ-2	15.2	23.2		7.6	20				BROWN SANDSTONE GRAY CLAY SHALE soft RED CLAY SHALE soft
GP.	1	TYPF	OF C	ASING USED			1			Continued Next Page
X X		NQ-2 R					DIEZON	ICTCC	T/C	<u> </u>
3		6" x 3.25	5 HSA				PIEZOM SLO			E: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE CCREEN, G = GEONOR, P = PNEUMATIC
LBK		9" x 6.25 HW CAS	SING AD	VANCER	4"					
Ξ		NW CAS	SING		3"		WELL T	YPE:		W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
<u> </u>	_	SW CAS	SING		6"					RECORDER

AIR HAMMER



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-15 DATE 7/23/15 SHEET 2 OF 3

PROJECT MOUNTAINEER LBR LANDFILL BORING START 7/13/92 BORING FINISH 7/22/92

1	щ	SAM	PLE	STANDARD PENETRATION RESISTANCE BLOWS / 6"	HH.	RQD	DEPTH	<u></u>	S	0011 (1000)			DDII I EDIO
NUMBER	SAMPLE	DEF IN F	EET	RESISTANCE	FOTA ENGT COVE	%	IN	GRAPHIC LOG	SC	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
θŻ	Š	FROM	ТО	BLOWS / 6"	LI	,,	FEET	<u>5</u>	<u> </u>	.52	//	- 1 V	
							_						
							-						
_							-	H					
5	NQ-2	23.2	25.2		1.4	70	-						
							25						
6	NQ-2	25.2	29.6		3.2	34	25 -						
							-						
							-						
							-						
							_						
7	NO-2	29.6	35.2		5.5	84				high angle fracture fracture at 29.2			
	140-2	20.0	00.2		0.0	- 04	30 –			GRAY CLAY SHALE			
							-						
							-						
							-						
							_						
3	NQ-2	35.2	45.2			74	35 -			GRAY CLAY SHALE hard			
							-						
							-						
							-						
													38.7 Top of bentor
													seal.
							40 -						
							-			GRAY SANDSTONE			
							-						
							-						
							_			GRAY CLAY SHALE	•		43.7 Top of gravel
											° •		pack.
		45.2	55.2			45	45 -	===		GRAY SANDSTONE hard			44.9 Top of screen



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ___ DATE <u>7/23/15</u> SHEET <u>3</u> OF _ BORING NO. MW-15 PROJECT MOUNTAINEER LBR LANDFILL 7/13/92 BORING FINISH 7/22/92 **BORING START** STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE **RQD** GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 50 53.9 Bottom of screen. 55 10 NQ-2 55.2 58.1 2.7 **GRAY SANDY SHALE** 56.0 Bottom of gravel pack. 58.1 Bottom of boring. WELL DEVELOPMENT Hole was flushed with drill water until drill water was visually clear. Boring was bailed and a 2" monitoring well was installed and pumped until visaully clear sample WELL MATERIAL 2"diameter 20 slot screen pvc. 2" diameter sch 80 pvc.

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



IOD	NII INAI	DED				/ \L	.1 (OF BORING
		BER V Ap	ΡΔΙ ΔΟ	CHIAN	POWFI	R COI	ИРД	NY		BO	ORING NO. MW-16 DATE 7/23/15 SHEET 1 OF 2
								<u> </u>			ORING START 5/20/92 BORING FINISH 5/21/92
											IEZOMETER TYPE WELL TYPE OW
											GT. RISER ABOVE GROUND 2.75 DIA 2.0
	er Lev		<u> </u>		T						EPTH TO TOP OF WELL SCREEN 11.0 BOTTOM 21.45
TIME		01, 11	<u> </u>	7.0	-		+	-			/ELL DEVELOPMENT SEE NOTES BACKFILL BENTONITE
DAT			5-20	0-92			+			FIE	IELD PARTY HOWELL/YATES RIG CME-75
								DEPTH IN FEET			
비띥	믜	1	/IPLE PTH		DARD RATION	HT-H	RQD	DEPTH	£ ′2	S	SOIL / ROCK ☐ DRILLER'S
SAMPLE	SAMPLE		EET	RESIS	RATION TANCE VS / 6"		%	IN	RAP	sc	SOIL / ROCK ☐ DRILLER'S IDENTIFICATION > NOTES
ωΞ	S	FROM	TO	BLOV	VS / 6"	, Ja	, -	FEET	ß	N	
											Volclay grout seal replaced with
									+=-		bentonite seal.
									<u></u>		
1	SS	2.0	3.5	2-4	1-5-	1.2			<u> </u>		BROWN AND GRAY CLAY with rock fragment
									+==		
								5 -	-		
2	SS	7.0	8.5	2-3	3-4-	1.3			-		BROWN SANDY SILT moist
-			0.0								
									-		
								10			
								10 -			10.0 Top of gravel
									-		
3	SS	12.0	13.5	3-	5-6	1.1					
									-		
								15 -	-		
									=		
									Ţ <u></u>		
4	SS	17.0	18.5	1.5	- G	1.2			-		GRAY CLAY moist
	33	17.0	10.5	4-0	5-6-	1.2					
723/15											
~									=		
AEP.GDI											
SI.GFJ A		TYPI	E OF C	ASING	USED						Continued Next Page
≶			OCK CO	RE				PIEZOM			
X		6" x 3.29 9" x 6.29						SLO	OTTE	ED S	SCREEN, G = GEONOR, P = PNEUMATIC
¥			SING AD	VANCEF	?	4" 3"	=	WELL T	YPE:	0\	OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON

RECORDER

SW CASING AIR HAMMER



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-16 DATE 7/23/15 SHEET 2 OF 2

PROJECT MOUNTAINEER LAR LANDELL BORING START 5/20/92 BORING FINISH 5/21/92

PROJECT MOUNTAINEER LBR LANDFILL BORING START 5/20/92 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5 BORING FINISH 5 BORING FINISH 5 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5 BORING FINISH 5 BORING START 5/20/92 BORING FINISH 5/20/92 BORING	DRILLER'S NOTES
SAMPLE STANDARD PENETRATION RESISTANCE FROM TO BLOWS / 6" STANDARD PENETRATION RESISTANCE BLOWS / 6" STANDARD PENETRATION RESISTANCE BLOWS / 6" STANDARD PENETRATION RESISTANCE BLOWS / 6" STANDARD PENETRATION PENETRATION RESISTANCE BLOWS / 6" STANDARD PENETRATION PENETRA	
5 SS 22.0 23.5 3-7-8 1.1 GRAY SHALE moist cemented	21.4 Bottom of screen.
6 SS 27.0 28.5 4-7-12 1.3 RED SHALE	
WELL DEVELOPMENT 6"casing was installed and flushed with drill water until visaully clear and a 2" monitoring well installed. Boring was pumped and a sample was obtained. Sample obtained was turbid. WELL MATERIAL 2" diameter 20 slot screen pvc. 2" diameter sch. 40 pvc screen.	28.5 Bottom of gravel pack and bottom of boring.

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



	OR N	NI IME	BER				,	0		LO	G O	F BORING		
				PALAC	CHIAN	POWEI	R COI	- MPA	NY		ВС	PRING NO. MW-17 DATE 7/23/15 SH	IEET 1	OF 2
P	ROJ	IECT	MO	UNTAI	NEER	LBR LA	ANDF	ILL			ВС	RING START <u>5/20/92</u> BORING FINISH	5/20/9	2
C	001	RDIN	ATES _	N 714	4,833.5	E 1,7	33,26	0.6			PIE	ZOMETER TYPE WELL TYPE	OW	
G	RO	JND	ELEVAT	TION _	621.5	SY	STEM				HG	T. RISER ABOVE GROUND 1.82 DIA	2.0	
٧	Vate	r Lev	el, ft	<u> </u>	.1	Ţ		Ā			DE	PTH TO TOP OF WELL SCREEN18.55BOTTOM	1 <u>28</u>	
7	ΙΜΕ										WI	ELL DEVELOPMENT <u>SEE NOTES</u> BACKFILL	VOLC	LAY GROUT
Г	DATE			5-20	0-92							ELD PARTY HOWELL/YATES RIG	<u> CME-7</u>	75
Г			CAN	/IPLE	CTAN	IDARD	<u> </u>	DOD.	DEPTH IN FEET					
<u>-</u>	SAMPLE	SAMPLE		PTH			HT.	RQD	DEPTH	S HC	S	SOIL / ROCK		DRILLER'S
1 V V		SAMI	IN F	EET	RESIS	RATION TANCE	PNO PNO PNO PNO PNO PNO PNO PNO PNO PNO	%	IN	RAG	S O	IDENTIFICATION	WELL	NOTES
) Z	0)	FROM	ТО	BLOV	VS / 6"	그胐		FEET	g				
									-	+=-				
													4 6	
	,	00	2.4	2.0	4.0	10]:		RED AND BROWN CLAY	4 6	
	'	33	2.4	3.9	4-8	1-1 ∠	1.1		-	+=-			4 6	
													4 6	
									-	<u> </u>			4 6	
F									5 -	-			4 6	
													4 6	
									-	1			4 6	
													4 6	
	2	SS	7 4	8.9	3-	7-8	13			 		BROWN CLAY	4 4	
									-	==				
F									10 -	+=-				
]				
									-	-			12.0-	Ton of hentonite
	3	SS	12.4	13.9	2-:	2-4	1.4					BROWN SANDY SILT	seal.	rop or bentonite
									-			BROWN CLAY		
									-				AUGE	ER RETURN
										-				
									15 -	_			SILT.	
										<u> </u>				
										=			. 17.0 ⁻	Top of gravel
2	4	SS	17.4	18.9	2-	3-5	1.2						pack.	
1/23/15												GRAY CLAY	,	Top of coroon
٦										+=-			.: 10.3	Top or screen.
AEP.GUI										<u> </u>				
SI.GPJ /			TYPE	OF C	ASING	USED						Continued Next Page		
KA –					RE								OPEN T	UBE
느	X	1 SS 2.4 3.9 4-9-12 1.1 5												
HE			HW CAS	SING AD	VANCER	3			WELL T	YPE:	O'	W = OPEN TUBE SLOTTED SCREEN, GM	1 = GEON	MON
ฐ –														

AIR HAMMER



JOB NUMBER _______ BORING NO. MW-17 DATE 7/23/15 SHEET 2 OF 2

PRO				NEER LBR LA						RING START 5/20/92 BORING FINIS		/20/92
SAMPLE	SAMPLE	SAM DEF IN F	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	SS	22.4	23.9	2-4-5	1.1		- - - 25			GRAY SILTY CLAY moist GRAY CLAY moist with rock fragment throughout		* * * * * * * * * * * * * * * * * * *
6	SS	27.4	28.9	3-4-6	1.2		- - -			GRAY CLAY SHALE moist cemented		28.0 Bottom of screen.
IT LBR LF FKA SI.GPJ AEP.GDT 7/23/15	SS	30.0	30.5	75/.5	.5		30 -			TOP .4 GRAY CLAY SHALE BOTTOM .1 GRAY SHALE hard WELL DEVELOPMENT 6" diameter casing was installed and flushed with drill water was visually clear and a 2" diameter well installed. Well was pumped until a visually clear sample was obtained. WELL MATERIAL 2" diameter 20 slot screen pvc. 2" diameter sch. 40 pvc casing.		AUGER REFUSAL 30.5 Bottom of gravel pack and boring.

MTIBRIEFKASIGBIAFPGDT 7/



JOB	NUM	BER				,			LO	GΟ	F BORING	ĺ	
		_	PALA	CHIAN	POWE	R CO	MPA	NY		ВС	RING NO. MW-18 DATE 7/23/15 SI	HEET 1 OF	2
PRO	JECT	_MO	UNTA	NEER	LBR L	ANDF	ILL				RING START <u>5/19/92</u> BORING FINIS		
COC	RDIN	IATES _	N 714	4,922.0	E 1,7	33,25	7.8			PIE	ZOMETER TYPE WELL TYP	E OW	
GRO	UND	ELEVA	TION _	622.0	SY	STEM				HG	T. RISER ABOVE GROUND <u>1.83</u> DI.	A 2.0	
Wate	er Lev	el, ft	<u> </u>	3.3	Ţ		$ar{ar{arDelta}}$	-		DE	PTH TO TOP OF WELL SCREEN <u>15.1</u> BOTTOM	и 24.2	
TIME	Ξ									WE	ELL DEVELOPMENT <u>SEE NOTES</u> BACKFIL	L VOLCLAY	GROUT
DAT	E		5-19	9-92							ELD PARTY TJW/RLY RIG	G CME-75	
		CAN	ИPLE	CTAN	IDARD		POD.	DEPTH IN FEET					
SAMPLE	SAMPLE		PTH			ATA MEN	RQD	DEPTH	S S	S	SOIL / ROCK		_ER'S
N M	AME	IN F	FEET	RESIS	RATION TANCE		%	IN	RA CI	O S O	IDENTIFICATION	NO ⁻	TES
0, 2	0)	FROM	ТО	BLOV	VS / 6"	78		FEET	O				
								-	+==				
1.1	SS	2.4	3.9	0.1	0-12	1			<u> </u>		RED CLAY with rock fragment		
1.1	33	2.4	3.9	9-11	0-12	'		-					
								-					
								5 -	-				
								-					
.8	SS	7.4	8.9	1-:	2-2	2					GRAY SILT moist		
								-					
									F				
												9.0 Top of I seal.	bentonite
								10 -				ooai.	
									<u> </u>				
								-	-		BROWN AND GRAY CLAY		
1.0	SS	12.4	13.9	8-9	9-15	3					BROWN AND GRAT CLAT		
								-				\succeq	
								-	 			∴ 13.8 Top of	f gravel
												pack.	
								15 -				15.1 Top of	f screen.
_ 1.1	SS	17.4	18.9	4-6	6-12	4			<u> </u>				
11231													
2									 				
AEP.GDI							-						
Si.GPJ		TYPI	E OF C	ASING	USED						Continued Next Page		
≶ـــــ			OCK CO	RE				PIEZOM					Ξ
X		6" x 3.2: 9" x 6.2:						SLO	OTTE	ED S	CREEN, G = GEONOR, P = PNEUMATIC	•	
¥ E		HW CA	SING AD	VANCER	₹	4" 3"		WELL T	YPE:	O۱	W = OPEN TUBE SLOTTED SCREEN, GM	vi = GEOMON	
<u> </u>		NW CA				3" 6"					RECORDER		

AIR HAMMER



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-18 DATE 7/23/15 SHEET 2 OF 2

PROJECT MOUNTAINEER LBR LANDFILL BORING START 5/19/92 BORING FINISH 5/19/92

	JECT			NEER LBR LA						RING START 5/19/92 BORING FINIS		
SAMPLE	SAMPLE	SAM DEF IN F FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
1.2	SS	22.4	23.9	4-8-12	5		- - - 25 –			RED CLAY with rock fragment, bottom of sample changes from red to a green/brown shaley		24.2 Bottom of screen.
1.0	SS	25.9	26.9	39-54	6		-			TOP .9 S-1 GREEN/BROWN CLAY SHALE BOTTOM .1 S-2 GRAY SHALE hard TOP .9 S-1 GREENISH/BROWN CLAY SHALE with rock fragmentBOTTOM .1 S-2 HARD GRAY SHALE		26.2 Bottom of gravel pack and boring.
II LBK LF FKA SI.GFU AEF.GUI 7/23/10										WELL DEVELOPMENT 6" casing was installed and flushed with drill water until drill water return visually clear and a 2" monitoring well was installed. Well was pumped until visually clear sample was obtained. WELL MATERIAL 2" diameter 20 slot screen pvc. 2" diameter sch. 40 pvc casing.		

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOR	NUM	BER						LO	OF B	ORING			
				CHIAN POWE	R CON	/IPA	NY		BORIN	G NO. <u>MW-19</u> DATE_ 7/ 2	23/15 SH	EET	1 OF 2
				NEER LBR L						G START 8/12/92 E			
COC	ORDIN	IATES _	N 712	2,263.7 E 1,7	32,224	l.9			PIEZOI	METER TYPE	_ WELL TYPE	С	W
GRO	DUND	ELEVAT	TION _	643.2 SY	STEM _					RISER ABOVE GROUND 1.96			
Wat	er Lev	el. ft	<u>⊽</u> 2	.7 ▼		T			DEPTH	TO TOP OF WELL SCREEN	11.6 воттом	_2	0.5
TIM		-,	<u> </u>			-			WELL	DEVELOPMENT SEE NOTE	S BACKFILL	V	OLCLAY GROUT
DAT	ΓE		8-27	7-92					FIELD	PARTY TJH-TLS	RIG	C	ME-75
				1									T
Щ Н			/IPLE PTH	STANDARD		RQD	DEPTH IN FEET	2 €	S	SOIL / ROCK		_	DRILLER'S
SAMPLE	SAMPLE		EET	PENETRATION RESISTANCE	Single	%	IN	XAPI LOG	ပ	IDENTIFICATION		WELL	NOTES
∕s z	8	FROM	TO	BLOWS / 6"	L E E	70	FEET	9	⊃	IDENTIFICATION			NOTES
							-			TO 8.0 FT. AUGERED BEFORE			Volclay grout seal was
							-	<u> </u>	PI	ERFORMING FIRST SAMPLE			replaced with bentonite pellets.
													bentonite peneto.
							-						
							_					\succeq	
							-						
							_						
							5 -						
							_	<u> </u>					
							-	+					
													
1	SS	8.0	9.5	4-1-1	1.2		_		G	RAY SANDY CLAY with wood fragr	ment		
							-	<u> </u>					
2	SS	9.5	11.0	1-1-1	.9			<u></u>					
_		0.0					10 –						
							_			DOWN CANDY OLAY	•		10.5 Top of gravel
3	SS	11.0	12.5	4-12-7	1.4				В	ROWN SANDY CLAY	•		pack.
							=						11.6 Top of screen.
4	SS	12.5	14.0	4-5-7	0				G	RAY SANDY CLAY	•		
							_				•		
5	SS	14.0	15.5	2.2.2			-		BI	ROWN SILTY CLAY	•		
)	33	14.0	15.5	3-2-3	.2					town oler rock to			
							15 -				•		
6	SS	15.5	17.0	2-2-2	1.5		_						
													•
7	SS	17.0	18.5	1-1-1			-						
											•		•
23/15							-				•	밞	
8	SS	18.5	20.0	1-2-2			-		\	ROWN AND GRAY CLAYEY SAND			
AEP.GD								<u> </u>	— ⊟ Bi	ROWN AND GRAY SANDY CLAY ns	with .2'sand		
SI.GPJ AE		TYPE	OF C	ASING USED			<u> </u>	J.— -T		Continued Next Pag	e	∘∐ <u>`</u> ∘	·I
). 		NQ-2 R	OCK CO	RE			PIEZOMI	FTFR	YPF.	PT = OPEN TUBE PORO		OF	PEN TUBE
Ĭ		6" x 3.25	5 HSA							REEN, $G = GEONOR$, $P = P$		ر.	
		9" x 6.25 HW CAS		VANCER	4"		WELL TY			OPEN TUBE SLOTTED S		= 0	SEOMON
Σ		NW CAS	SING		3"	_	**LLL 1				CINCLIN, OIVI		JEOIVIOI V
<u>.</u>	_	SW CAS	SING		6"				F	RECORDER			

AIR HAMMER

8"



IOB	NII INAI	DED			ΛL	_1 C	/I V I L L			F BORING		/ : \ - -
	NUMI		ΡΔΙ ΔΟ	CHIAN POWE	R CO	_ Μ Ρ Δ	NY		R∩	RING NO. <u>MW-19</u> DATE <u>7/23/15</u>	SHEET	2 OF 2
				NEER LBR LA			14.1			RING START 8/12/92 BORING FINIS		
1110	JLUI	_11100	<u> </u>	NEEK EDIK EA	1101				ьо	MINO START OFFICE BORING FINIS	JII <u>U</u>	10/02
SAMPLE	SAMPLE	SAM DEF IN FI FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	SS	20.0	21.3	2-2-50/2						BROWN AND GRAY SANDY CLAY with sandstone fragment		20.5 Bottom of
							-			AUGER REFUSAL		screen.
										WELL DEVELOPMENT 6" casing was installed and flushed with drill water until drill water was visually clear and a 2" diameter well installed and pumped until a visually clear sample was obtained. WELL MATERIAL 2" diameter 20 slot screen pvc. 2" diameter sch. 40 pvc casing.		22.8 Bottom of gravel pack and boring.
23/15												

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/1



JOB COM			PALAC	CHIAN	POWE	R CO	MPA	NY		ВС	ORING NO. <u>MW-20</u> DATE <u>7/23/15</u> SHEET <u>1</u> OF <u>2</u>
											ORING START <u>8/18/92</u> BORING FINISH <u>8/18/92</u>
											EZOMETER TYPE WELL TYPE
GRO	UND			680.0		STEM					GT. RISER ABOVE GROUND 2.03 DIA 2.0
Wate	er Lev	el, ft	$\overline{\Delta}$		Ţ		Ā	-			EPTH TO TOP OF WELL SCREEN 8.9 BOTTOM 17.9
TIME	Ξ										VELL DEVELOPMENT SEE NOTES BACKFILL BENTONITE
DAT	E									FII	ELD PARTY TJH-TLS RIG CME-75
SAMPLE	SAMPLE	DE	MPLE PTH EEET TO	PENET RESIS	DARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK
								- 10 -			7.9 Top of gravel pack. 8.9 Top of screen.
	NQ-2	13.9	20.5			6.6	60	- 15 -			BROWN SANDY SHALE
//23/15											GRAY SHALE hard
GPJ AEP.GDI //2											streen.
<u> </u>		TYPE	OF C	ASING	USED						Continued Next Page
<u>i</u>			OCK CO	RE							PE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE
X X		6" x 3.25 9" x 6.25									SCREEN, G = GEONOR, P = PNEUMATIC
4		HW CAS	SING AD	VANCEF	₹	4" 3"		WELL T	YPE:	O	W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
X		NW CAS	SING			6"					RECORDER
¥		AIR HAI	MMER			8"					INCOMPLIA



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY DATE **7/23/15** SHEET **2** OF BORING NO. MW-20 PROJECT MOUNTAINEER LBR LANDFILL 8/18/92 BORING FINISH 8/18/92 **BORING START** PENETRATION RESISTANCE BLOWS / 6" RQD SAMPLE SAMPLE NUMBER GRAPHIC LOG SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN IN FEET **IDENTIFICATION NOTES FEET** FROM TO 20.5 Bottom of gravel pack and boring. WELL DEVELOPMENT 6" CASING WAS INSTALLED AND FLUSHED WITH DRILL WATER UNTIL DRILL WATER APPERED VISUALLY CLEAN. A 2" DIAMETER WELL WAS INSTALLED AND PUMPED UNTIL VISUALLY CLEAR AND A SAMPLE OBTAINED. WELL MATERIAL 2" diameter 20 slot screen pvc. 2" diameter sch 80 pvc casing.

P MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOE	NUM	BER _				_		LO	GO	FBORING	
COI	MPAN	Y AP	PALA	CHIAN POWE	R CO	MPA	NY		ВС	RING NO. <u>MW-21</u> DATE <u>7/23/15</u> SHEET <u>1</u> OF <u>1</u>	
PRO	DJECT	MO	UNTAI	NEER LBR L	ANDF	ILL			ВС	RING START 9/2/92 BORING FINISH 9/2/92	
CO	ORDIN	IATES _	N 710	0,790.4 E 1,7	30,87	2.3			PIE	ZOMETER TYPE WELL TYPE	
GR	DUND	ELEVAT	TION _	674.9 SY	STEM				HG	T. RISER ABOVE GROUND DIA	
Wa	ter Lev	el ft	∇	lacksquare		1			DE	PTH TO TOP OF WELL SCREEN BOTTOM	
TIM		0., 10					<u>'</u>		WE	ELL DEVELOPMENT BACKFILL VOLCLAY	
DA										ELD PARTY TJH-TLS RIG CME-75	
	· · · · · ·										
ша	∠ ш		1PLE	STANDARD	.±≿	RQD	DEPTH IN FEET	ပ	S		
SAMPLE	SAMPLE	I	PTH EET	PENETRATION	APP S		IN	F 9	SCS	SOIL / ROCK ☐ DRILLER'S IDENTIFICATION > NOTES	
SAI	SAI			PENETRATION RESISTANCE BLOWS / 6"		%	FEET	GR/ L	n	IDENTIFICATION NOTES	
		FROM	TO	BLOWS / 6"				-			
							-	<u> </u>		AUGERED TO 8.0 BEFORE FIRST SPT	
							_				
							-	ŧ			
								-			
							-	<u> </u>			
							5 -				
							-	ŧ			
							-	<u> </u>			
١.							_			DDOWN SILTY CLAY with condutors fragment	
1	SS	8.0	9.5	5-8-9	1.5					BROWN SILTY CLAY with sandstone fragment	
							-	[
2	SS	9.5	11.0	8-13-15	1.3		40	=		RED SILTY CLAY with sandstone fragment	
							10 –				
	00	44.0	40.5	7.0.44			_	 			
3	SS	11.0	12.5	7-8-11	.8						
							-	=			
4	SS	12.5	14.0	5-7-11	.7		_			RED CLAY	
										BROWN SANDSTONE weathered	
5	SS	14.0	15.5	3-4-7	1.1		-			RED CLAY	
	33	14.0	13.5	J-4-7	'-'					GREEN SANDSTONE weathered	
							15 –	-		OILLIN SANDSTONE Weathered	
6	SS	15.5	17.0	4-12-21	1.5		_			RED CLAY SHALE weathered	
7	SS	17.0	17.9	22/50.4	.6		-				
,			17.0	22/00.1	.					BROWN AND PURPLE CLAY SHALE weathered	
6											
=											
5											
Z		TVD		L ASING USED							
5			OCK CO		•	\dashv	DIC=			- DT - ODEN TUDE DODOUG TID CO. ODEN TUDE	_
{ x		6" x 3.25	5 HSA	'NE						E: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE CCREEN, G = GEONOR, P = PNEUMATIC	
בו בי		9" x 6.25		VANCER	4"	-					
=		NW CA		VANCER	4" 3"		WELL T	YPE:	0	N = OPEN TUBE SLOTTED SCREEN, GM = GEOMON	
		SW CAS			6"					RECORDER	

AIR HAMMER



	NUM	_						LO		I BOKING				
				CHIAN POWI										_1 OF3
				NEER LBR I						_		BORING FINISH		
				4,609.8 E 1,		C4-	te Plane usin	g				WELL TYPI		
GRO	UND	ELEVA		636.6 S	SYSTEM	NA	D27/29					5 DI/		
Wate	er Lev	el, ft	$\overline{\Delta}$	Ţ		$ar{ar{\Lambda}}$	-							
TIME	Ξ											<u>claime</u> rBACKFIL		
DAT	E								FI	ELD PARTY MO	CR / ZLR	RIC	∃ <u>D</u>)-120
		SAI	MPLE	STANDARD	>	RQD								
SAMPLE NUMBER	SAMPLE		PTH		AST FRY	I (QD	DEI 1111	GRAPHIC LOG	CS		SOIL / ROCK		╛	DRILLER'S
SAM	NAS	IN	FEET	PENETRATION RESISTANCE BLOWS / 6"		%	IN	RAPH LOG	S O		IDENTIFICATION	N	WELL	NOTES
		FROM	1 ТО	BLOWS / 6"	J.B.		FEET	9						
0 A	UGE	R 0.0	3.5							AUGER				GROUNDING PROCEDURE NOT
							-	-						IN USE ON THIS
														BORING
							-							DIGGING PERMIT REQUIRED
							-							DECONNED ALL
1	SPT	3.5	5.0	10-4-3	.6					LOOSE 5VR 3/4	MODERATE BI	ROWN		TOOLS USING
'	01 1	0.0	3.0	10-4-3	.0		-	- :		MEDIUM SAND		NOW!!		MOUNTAINEER FIRE PROTECTION
							5 -			w/little clay & sa	ndstone frag, dry	,		WATER AND
							3							LIQUI-NOX
							-							
							-							
							-							
2	SPT	8.5	10.0	3-4-5	1.5					STIFF 5YR 4/4	MODERATE BR	OWN CLAY		
_	.	0.0	10.0	0 4 0	1.0		-	-		1.25 tsf, w/trace		SWIT SEAT		
							10 -							
							10							
							-	+=-						
							-							
							-	+=-						
3	SPT	13.5	15.0	7-9-13	1.2					STIFF 5YR 4/4	MODERATE BR	OWN CLAY		
							-			3.0 tsf, w/trace f	fine sand, dry			
							15 -	-						
								_						
							-							
							_							
							-	┼═╌						
4	SPT	18.5	20.0	17-11-50/.2	1.0					HARD 5YR 6/4	LIGHT BROWN	CLAY		
							-			2.5 tsf, w/some	medium sand, dr	у		
		TYP	E OF C	ASING USE	D					Con	tinued Next F	Page		
			ROCK CO	RE			PIEZOM					ROUS TIP, SS		PEN TUBE
		6" x 3.2 9" x 6.2					SLC	OTTE	ED S	SCREEN, G = 0	GEONOR, P	= PNEUMATIC		
		HW CA		VANCER	4" 3"	\dashv	WELL T	YPE:	0	W = OPEN TU	BE SLOTTE	O SCREEN, GN	<u>/ =</u> G	SEOMON
		SW CA	SING		6"					RECORDER	MCR			
			MMER		8"					NEOONDEN				



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-43 DATE 7/23/15 SHEET 2 OF 3

		041	IDI E	OTANDADO		DOD					1	
NUMBER	SAMPLE	DEI	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	SPT	23.5	23.9	50/.4	.3		25 -			HARD 5GY 5/2 DUSKY YELLOW GREEN WEATHERED FINE GRAIN SANDY SHALE dry		
6	SPT	28.5	29.2	30-50/.2	.7		30 –	, ,		HARD 5YR 3/4 MODERATE BROWN CLAY SHALE dry		
7 1	SPT NQ	30.8 31.0	31.0 34.5	50/.2	.2 2.7	59	-			HARD 5G 4/1 DARK GREENISH GRAY CLAY SHALE dry MEDIUM HARD 5G 4/1 DARK GREENISH GRAY CLAY SHALE		STOPPED CASING ADVANCER @ 30 STARTED CORING @ 31.0'
2	NQ	34.5	44.5		6.5	22	35 -			VERY SOFT 10R 5/4 PALE REDDISH BROWN CLAY SHALE		
							40 -					
3	NQ	44.5	49.5		5.0	62	45 -			HARD 5B 7/1 LIGHT BLUISH GRAY SILTY CLAY SHALE .1 soft area @ 48.3'		

AFP MTIRE



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>MW-43</u> DATE <u>7/23/15</u> SHEET <u>3</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL 7/10/06 BORING FINISH 7/12/06 **BORING START** STANDARD
PENETRATION
RESISTANCE
BLOWS / 6"

RQD
RQD
W SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN IN FEET **IDENTIFICATION NOTES FEET** FROM TO STOPPED BORING @ 49.5' PLUGGED NQ **ROCK HOLE** W/BENTONITE **PELLETS PULLED HW** CASING & REDRILLED SAME BORE HOLE W/6.25" HSA'S TO SET 2" WELL

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOE	3 NUM	BER _						LO	G OF BORING	
СО	MPAN'	Y AP	PALAC	CHIAN POWE	R COM	PANY			BORING NO. MW-44 DATE 7/23/15 SHEET 1 OF 2	
PR	OJECT	_ MO	UNTAI	NEER LBR L	ANDFIL	L			BORING START 6/10/08 BORING FINISH 6/10/08	
СО	ORDIN	IATES _	N 714	1,697.9 E 1,7	33,351.	5			PIEZOMETER TYPE WELL TYPE	
GR	OUND	ELEVA	TION _	624.5 SY	STEM _	State Plan NAD27	e using		HGT. RISER ABOVE GROUND 2.642 DIA	
Wa	iter Lev	vel. ft	∇	V		V			DEPTH TO TOP OF WELL SCREEN BOTTOM	
TIN		., .,	_	-		_			WELL DEVELOPMENT N/A BACKFILL Quick Grout	
	TE							\neg	FIELD PARTY MCR / ZLR / RMP RIG D-120	
Щ.	у ш		/IPLE	STANDARD		QD DE	PTH N EET	೦	φ	
SAMPLE	SAMPLE	1	PTH EET	PENETRATION RESISTANCE	ESSS Y	, l	N	APH OG	SOIL / ROCK SOIL / ROCK DRILLER'S DRILLER'S NOTES	
SA SA	S S	FROM		BLOWS / 6"		% '	ET	GR, L	□ IDENTIFICATION > NOTES	
1	SPT		1.5	3-4-7	1.5			_	STIFF 10R 3/4 DARK REDDISH BROWN NO GROUNDING	_
	.	0.0							CLAY PROCEDURE IN	
							7		tsf 4.5, w/trace of silts and trace of weathered USE ON THIS BORING;	
2	SPT	1.5	3.0	4-7-10	1.5		-		STIFF 10R 3/4 DARK REDDISH BROWN DIGGING PERMIT	·IN
							-		CLAY	
3	SPT	3.0	4.5	3-4-7	1.5		-	==	tsf 4.0, w/trace of silts, dry	
							_		STIFF 10R 5/4 PALE REDDISH BROWN CLAY tsf 3.75, w/trace of silts and trace of weathered	
									coal, dry	
4	SPT	4.5	6.0	3-4-6	1.5		5 —		STIFF 10R 5/4 PALE REDDISH BROWN CLAY	
							-		tsf 3.0, w/ little silt, dry	
5	SPT	6.0	7.5	4-7-12	1.5		1		STIFF 10YR 6/6 DARK YELLOWISH ORANGE	
									CLAY	
	OPT			7.40			=	=	tsf 2.5, w/some sand and weathered fine grain	
6	SPT	7.5	9.0	7-4-6	1.4		=		STIFF 10YR 6/6 DARK YELLOWISH ORANGE	
							-		CLAY	
7	SPT	9.0	10.5	5-4-5	1.5		1		tsf 2.0, w/some sand and weather fine grain sandstone and coal, .2' medium grain sand at	
							10 –		bottom of spoon, moist	
8	SPT	10.5	12.0	3-5-7	1.5		. •	=	STIFF 10YR 6/6 DARK YELLOWISH ORANGE	
"	51 1	10.5	12.0	3-3-7	1.5		-		CLAY AND SAND tsf 1.75, coarse w/sandstone and coal fragments,	
							-		wet - water on outside of spoon	
9	SPT	12.0	13.5	4-5-9	1.5			=	STIFF 5 YR 6/4 LIGHT BROWN CLAY	
							1		tsf 2.25, dry	
10	SPT	13.5	15.0	7-7-11	1.5				STIFF 10YR 6/6 DARK YELLOWISH ORANGE	
'	0. 1	10.0	10.0		1.0		=		tsf 3.25, w/ little fine sand, moist	
							15 -		STIFF 10R 6/6 DARK YELLOWISH ORANGE	
11	SPT	15.0	16.5	6-7-11	1.5		13	==	CLAY tsf 3.75, w/some coarse sand w/sandstone	
							4		fragments, moist	
12	SPT	16.5	18.0	3-5-7	1.5			==	STIFF N5 MEDIUM GRAY CLAY	
							-	=	\tsf 2.5, w/ 2" silt seam, dry	
۵									STIFF N6 MEDIUM LIGHT GRAY CLAY tsf 1.5, w/some silts, dry	
[s] 13	SPT	18.0	19.5	3-4-6	1.4				STIFF N6 MEDIUM LIGHT GRAY CLAYEY	
ב ב							-		SILT	
의 발 14	SPT	19.5	21.0	3-5-7	1.3				tsf 1.5, dry to moist	
GPJ A	•		E OF C	ASING USED)				Continued Next Page	
- N			OCK CO			5:-	70145		•	
- FKA SI		6" x 3.2	5 HSA	TAL		_ PIE			TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE ED SCREEN, G = GEONOR, P = PNEUMATIC	
LBK L		9" x 6.2		VANCER	4"					
<u> </u>		NW CA		VAINOLIN	3"	WE	LL TY	PE:	OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON	
- -		SW CA	SING		6"	_			RECORDER	

AIR HAMMER



JOB NUMBER _____

COMPANY APPALACHIAN POWER COMPANY BORING NO. MW-44 DATE 7/23/15 SHEET 2 OF 2

PRO	DJECT	MO		NEER LBR LA		ILL				RING START 6/10/08 BORING FINISH	⊣ <u>6</u>	/10/08
SAMPLE	SAMPLE	DE	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
	SPT	21.0	22.5	4-6-12 4-12-16	1.5		-			STIFF N6 MEDIUM LIGHT GRAY CLAYEY SILT tsf 1.75, w/little medium sand w/sandstone fragments, moist VERY STIFF N6 MEDIUM LIGHT GRAY SILTY CLAY tsf 1.75, w/some medium sand and sandstone fragments, wet		
17	SPT	24.0	25.5	7-21-34	1.5		25 –			VERY STIFF 10YR 4/6 MEDIUM REDDISH BROWN CLAY tsf 1.75, w/little silts, dry to moist		
	SPT		27.0	16-36-50/3 20-38-50/2	1.4		-			VERY STIFF N6 MEDIUM LIGHT GRAY SILTY CLAY tsf 1.25, w/trace of fine sand and rock fragments, wet SOFT 5R 3/4 DUSKY RED SILT tsf 1.25 dry		
LBR LF FKA SLGFU AEP.GUI 7/23/10										tsf 1.25, dry VERY STIFF 5R 6/2 PALE RED CLAY tsf 2.25, w/trace of fine sand, wet SOFT 5R 3/4 DUSKY RED SILT tsf 2.25, dry VERY STIFF 5R 4/2 GRAYISH RED WEATHERED CLAYSHALE tsf 4.5, dry VERY STIFF 5R 4/2 GRAYISH RED WEATHERED CLAYSHALE tsf 3.25, dry VERY STIFF N7 LIGHT GRAY WEATHERED CLAYSHALE tsf 3.25, dry		STOPPED BORING @ 28.1', TREMIE GROUTED 28.1' TO GRADE USING 50 GALLONS OF QUICK GROUT; SWL 06/12/08 = 4.8', 16 hr READING

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



AEP 1996, 1997

Boring Logs

96-21 to 96-24, 96-27 to 96-33



JO	3 NU	MBER _				_		LO	G OF BORING					
CO	MPA	NY AP	PALA	CHIAN POWE	R CO	MPA	<u>NY</u>		ВС	RING NO. 96-21	DATE_ 7	7/23/15 SHE	ET <u>1</u> OF <u>3</u>	
PR	OJEC	T _ MO	UNTA	NEER LBR L	ANDF	ILL			ВС	RING START	9/17/96	BORING FINISH	9/18/96	
COORDINATES N 711,473.4 E 1,700,163.8										ZOMETER TYPE _		WELL TYPE	OW	
GROUND ELEVATION 658.0 SYSTEM										T. RISER ABOVE G	GROUND 1.9	DIA	2.0	
W	ater I	evel, ft	∇			T	•		DE	PTH TO TOP OF W	ELL SCREEN _	26.0 BOTTOM	35.0	
TIME							-		WI	ELL DEVELOPMENT	T YES	BACKFILL	QUICK GROUT	
DATE									LD PARTY MCI			BK-81		
SAMPLE	SAMPLE	SAM DE IN F	MPLE :PTH =EET	STANDARD PENETRATION RESISTANCE	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN	GRAPHIC LOG	SCS		SOIL / ROCK		☐ DRILLER'S	
S :	z o	FROM	TO	BLOWS / 6"	, 그삚		FEET	Ō	כ					
1 2			3.0	1-1-2 4-4-4	1.0				CL	BROWN SANDY	CLAY Fine grain.		Flushed boring with approximately 500 gallons of water.	
3			5.0	5-5-7-8	1.5								Rig was decon 1-23-97 potable water and Alconax.	
							5 -						Hole drilled with HSA.	
4	SS	5.0	7.0	4-6-8-10	1.5		3 -		CL	REDDISH BROW gravels.	'N CLAY With sm	all sandstone		
5	S ⁻	Г 7.0	9.0		1.3				CL	TAN SILTY CLAY PUSH 2.0 PSI 1000 TIME 8 SEC.	,			
6	SS	9.0	11.0	5-8-11-15			10 -		CL	REDDISH BROW gravels.	/N CLAY With sar	ndstone		
7	SS	5 11.0	13.0	4-6-7-8	1.5				CL	REDDISH GRAY	SANDY CLAY			
8	SS	3 13.0	15.0	3-3-5	1.5									
9			16.5	40-50/.2	1.3		15 -			REDDISH TAN CI PUSH 1.5 TIME 10 SEC. PSI 1200 UNTIL L GRAY SILTY CLA MEDIUM GRAY N	LIFTED RIG AYSHALE	With some		
VEP.GDT 7/23/15	l NO	ຊ 19.1	25.0		5.9	19		- = = = = = = = = = = = = = = = = = = =		fractures FE stain		V/.	18.3 Top of seal.	
JPJ /		TYPI	E OF C	ASING USED					Continued Next Page					
MT LBR LF FKA SI.GPJ AEP.GDT	(NQ-2 R 6" x 3.2 9" x 6.2	OCK CC 5 HSA 5 HSA		4"		PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC							
		NW CA		DVANCEK	3"		WELL T	YPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON						
AEP N		SW CA	SING		6"	\dashv				RECORDER _	LD			
₹I	AIR HAMMER 8"													



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-21 DATE 7/23/15 SHEET 2 OF 3

BROWNEGT MOUNTAINFER LRP LANDELL BORING START 9/17/96 PORING FINISH 9/18/96

PRO	JECT	MOL	<u>JNTAI</u>	NEER LBR LA	ANDF	ILL			ВО	RING START	9/17/96	BORING FINISH	IG FINISH 9/18/96		
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs		SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES	
							-			20.4 to 22.8' d	clay seams.	0 0	° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° °	24.0 Top of sand.	
12	NQ	25.0	35.0		9.9	56	25 - - -				AY N-5 SANDSTONE leisigang staining on			26.0 Top of screen.	
							30 -								
13	NQ	35.0	40.0		5.0	68	35 -				AY N-5 CLAYSHALE D 10R 4\2 CLAYSH/			35.0 Bottom of screen. 36.1 Bottom of sand.	
							40 -			1-30-97 SWL pH COND. T 8.66 652 56 2 8.17 633 56 6 7.83 661 56 1 8.42 653 56 1 9.02 653 56 1 8.98 644 56 1 8.95 616 56 2 8.88 666 56 2 8.94 645 56 2 9.07 642 56 6	EMP. GALLONS SV 2.0 9.3. 5.0 12.8. 0.0 14.8. 2.0 16.0. 2.0 16.9. 2.0 17.5. 20.0 21.1. 20.0 24.1. 20.0 26.2. 50.0 29.7.	VL.			

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-21 DATE 7/23/15 SHEE PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/17/96 BORING FINISH SAMPLE STANDARD TO BENETRATION	9/18/96
SAMPLE STANDARD RODE DEPTH OF SOUR POOK	DRILLER'S
SAMPLE STANDARD PENETRATION RESISTANCE NOT SOIL / ROCK IDENTIFICATION FEET FROM TO BLOWS / 6" FEET STANDARD NOT SOIL / ROCK IDENTIFICATION FEET STANDARD NOT SOIL / ROCK IDENTIFICATION	NOTES
STOPPED PUMP 2:19 SWL AT 2:29 12:9'. SWL 2-6-97 6.16'.	

AEP MTLBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER BORING NO. 96-22 DATE _7/23/15 SHEET _1 OF 10																
COMPANY APPALACHIAN POWER COMPANY PROJECT MOUNTAINEER LBR LANDFILL																
												BORING FINIS				
COORDINATES N 710,351.2 E 1,699,713.8												WELL TYP				
GROUND ELEVATION 803.1 SYSTEM										· · · · · · · · · · · · · · · · · · ·						
Water Level, ft $\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$																
TIME														QUICK GROUT		
DATE									FIE	ELD PARTY R	EB-RLY	RI	G <u>J</u>	OY 22		
CAMPLE CTANDARD NOOD																
SAMPLE NUMBER SAMPLE	DEF	IPLE PTH EEET TO		DARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs		SOIL / ROCK		WELL	DRILLER'S NOTES		
1 NQ		20.2	BLOV			34	10 -			BROWN SANE throughout.	DY CLAYSHALE	With red oxidation		Rig and tools decon 11-14-96 with potable water and Alconox. 11-19-96 Adavance boring to 160, blown dry, 11-20-96 14 hrs 18'. 11-20-96 Completed hole blown dry, water returning about 2-3 gpm		
TYPE OF CASING USED									<u> </u>	Cor	ntinued Next	Page		<u> </u>		
X NQ-2 ROCK CORE PIEZOMETER													- OF	DENI TI IDE		
Ĭ	6" x 3.25	5 HSA								CREEN. G =	GEONOR. P	ROUS TIP, SS = PNEUMATIC	– UF ;	LIN I UDE		
9" X 6.25 HSA														SEOMON		
<u> </u>	NW CAS	SING	., ., ., OLI	•	3"		WELL TY	YE:		vv = OPEN IL	DRE SLUTTE	D SCREEN, GN	vı = C	∍EUIVIUN		
<u> </u>	SW CAS				6" 8"	-				RECORDER	RLY					
٠. ــــــــــــــــــــــــــــــــــــ	<u>/ III / III / II</u>	VIIVILIT\			U											



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY DATE **7/23/15** SHEET **2** OF BORING NO. 96-22 PROJECT MOUNTAINEER LBR LANDFILL 9/4/96 BORING FINISH 9/6/96 **BORING START** SAMPLE **STANDARD** RQD SAMPLE NUMBER DEPTH SAMPLE S TOTAL LENGTH RECOVER **DEPTH** PENETRATION LOG SOIL / ROCK WELL DRILLER'S USC IN FEET RESISTANCE % **IDENTIFICATION NOTES FEET** FROM BLOWS / 6" TO GRAY SANDY SHALE 7.6 NQ 20.2 30.2 62 **BROWNISH GRAY CLAYSTONE** 30 30.2 RED CLAYSHALE NQ 40.2 8.8 73 GRAY CLAYSHALE Hard with limestone nodules. 35 40 Well cemented NQ 40.2 50.2 10.0 79 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15

AEP MT LB



JOB NUMBER _______ BORING NO. 96-22 DATE 7/23/15 SHEET 3 OF 10

PRO	JECT	MO	JNTAI	NEER LBR LA	ANDF	ILL		 ВО	RING START BC	ORING FINISH	9/6/96
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	nscs	SOIL / ROCK IDENTIFICATION		DRILLER'S NOTES
							- - 50 –				
5	NQ	50.2	60.2		10.0	80	-		GRAY SANDY SHALE Well cemented.		
							55 - -		GRAY CLAYSHALE		
6	NQ	60.2	70.2		10.0	90	60 –		OLIVE BROWN SANDY SHALE		
							- - 65				Y/X
7							- - -		GRAY CLAYSHALE		
7	NQ	70.2	80.2		10.0	64	70 -		- GRAY CLAY 70.2-70.4 GRAY SANDY SHALE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______ BORING NO. 96-22 DATE 7/23/15 SHEET 4 OF 10

PRO	JECT	MO	<u>UNTAI</u>	NEER LBR LA	ANDF	ILL			ВО	RING START	BORING FINISH	⊣ <u>9/</u>	6/96
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
							- 75 - - -						
8	NQ	80.2	90.2		10.0	90	80 - - - - 85 -			GRAY SANDSTONE Well cemented	d.		
9	NQ	90.2	100.2		10.0	100	- - - 90 –			RED CLAYSHALE GRAY SANDY SHALE Well cement nodules.	ted, limestone		
MI LBK LT TKA SI.GFO AEP.GDI 1/23/13							95 – -						

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _____

COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-22 DATE 7/23/15 SHEET 5 OF 10

PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF	ILL				RING START <u>9/4/96</u>	BORING FINISH	9/6	/96
SAMPLE	SAMPLE	DEF	IPLE PTH EEET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	uscs	SOIL / ROCK IDENTIFICATION	ı	WELL	DRILLER'S NOTES
							100 —						
10	NQ	100.2	110.2		10.0	90	-						
							-			RED CLAYSHALE			
							105 -						
							-			GRAY SANDY SHALE			
11	NQ	110.2	120.2		10.0	98	110 – -			DARK GREENISH GRAY 5G 4\1 CLAYSHALE Hard, well cemented some cross bedding.			
							-						
							115 -						
							-			DARK REDDISH BROWN 10R 3\ Soft.	4 CLAYSHALE		
12	NQ	120.2	130.2		9.0	90	120 –			MEDIUM GRAY N-5 SANDSTON cemented, silty, fine grain. GRAY SANDY SHALE Well ceme			
12 TEN LT FRA 31.GF3 AEP. GF3			.55.2		3.3	30	-						
II LBK LF FF							-						

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _______ BORING NO. 96-22 DATE 7/23/15 SHEET 6 OF 10

PROJECT MOLINTAINFER LBR LANDFILL BORING START 9/4/96 BORING FINISH 9/6/96

		SAM	1PLE	STANDARD	>	RQD	DEDT:						
NUMBER	SAMPLE		PTH	PENETRATION	뜌	יייייייייייייייייייייייייייייייייייייי	DEPTH	GRAPHIC LOG	CS	SOIL / ROCK			DRILLER'S
Ĭ	ΑMF		EET	PENETRATION RESISTANCE		%	IN	₹ V	S	IDENTIFICATION	WELL		NOTES
Ξ	S)	FROM	TO	BLOWS / 6"	REL	70	FEET	p	\supset	BERTIFICATION			NOTEO
							-				1		
							125 -	罩		RED AND GRAY MOTTLED CLAYSHALE			
							120						
							-						
							-	Ħ					
							-						
							130 -						
13	NQ	130.2	140.2		10.0	47	100			RED CLAYSHALE High angle fracture at			
							-	讍		135.0,140.2.			
							_						
							-						
							-						
							135 -						
							-						
							_						
							-						
							-						
							140 -						
4	NQ	140.2	150.2		10.0	93							
							-			LIGHT GRAY CLAYSHALE Interbedded with			
							-	H		sandstone.			
							-						
							_						
							145 -						
							-						
							-						
							-						
							_						
								=				//	

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PRO	JECT	MO	JNTAI	NEER LBR LA	ANDF	ILL				RING START	BORING FINISH	9	/6/96
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
15	NQ	150.2	160.2		10.0	59	- - 155 -			RED CLAYSHALE			153.0 Top of seal.
16	NQ	160.2	170.2		10.0	60	- - 160 - - -			GRAY CLAYSHALE Limestone nodu	olles.		
177 (1831)	NQ	170.2	180.2		10.0	100	165 - - 170 -			Interbedded sandstone			
M LBK LF FKA SI.GFJ AEP.GDI 7/23/15							175 -				0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _______ BORING NO. 96-22 DATE 7/23/15 SHEET 8 OF 10

PRO	JECT	_MO	<u>UNTAI</u>	NEER LBR LA	ANDF	ILL			BORING START 9/4/96	BORING FINISH	9/	(6/96
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	0 IDENTIFICATION	1	WELL	DRILLER'S NOTES
18	NQ	180.2	190.2		10.0	100	180 — -		GRAY SANDSTONE Massive.			
							185 - - -		GRAY CLAYSHALE Interbedded	sandstone.		
19	NQ	190.2	200.2		10.0	89	190 —		MEDIUM GRAY N-5 SANDSTON cross bedding. GRAYISH RED 10R 4\2 CLAYSH	0 0	0 0	192.0 Bottom of screen. 194.0 Bottom of sand.
20	NQ	200.2	210.2		10.0	87	 200					

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _______ BORING NO. 96-22 DATE 7/23/15 SHEET 9 OF 10 PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/4/96 BORING FINISH 9/6/96

PROJE	ECT	MOL	JNTAI	NEER LBR LA	ANDF				ВО	RING START 9/4/96 BORING FINISH	9/	6/96
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							205 -			LIGHT GRAY N-7 SANDSTONE Shale cross bedding.		
							- - -			Fine grain, massive.		
21 [NQ	210.2	220.2		10.0	90	210 -			Shale cross bedding. LIGHT GRAY SANDSTONE Hard, massive.		
							215 -			MEDIUM GRAY N-5 CLAYSHALE LIGHT GRAY SANDSTONE Massive, hard.		
							-			MEDIUM GRAY CLAYSHALE		
22 1	NQ	220.2	230.2		10.0	69	- 220 - - -			GRAYISH RED 10R 4\2 CLAYSHALE High angle fracture.		
							- - 225 -					
							-					

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER BORING NO. <u>96-22</u> DATE <u>7/23/15</u> SHEET <u>10</u> OF _ COMPANY APPALACHIAN POWER COMPANY PROJECT MOUNTAINEER LBR LANDFILL 9/4/96 BORING FINISH 9/6/96 **BORING START** PENETRATION RESISTANCE BLOWS / 6" SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S DEPTH SOIL / ROCK DRILLER'S WELL SC IN IN FEET **IDENTIFICATION NOTES FEET** FROM TO 230 SWL 1-7-97 109.55. 8L 10 MIN. SWL 136 Ph 8.39 COND. 2610. 9L 14.5 MIN. SWL151. 49L 30 MIN. SWL 167 pH 8.62 COND 2560 LIGHT RED. 76L 45 MIN. SWL 174. 92L 60 MIN. SWL 178.2 pH 8.51 COND 2570 REDDISH LIGHT RED. 108L 75 MIN. SWL 182.4. 135L 90 MIN. SWL 188.5 pH 8.48 COND 2520. 105 MIN. SWL 193.0. 1-8-97 22 HRS. SWL 191.48. pH 8.20 COND 2590. pH 8.43 COND. 2680. 2L DRY. 1-9-97 10:40 AM SWL 191.55. 2-6-97 SWL 183.03.

EP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB I			PALAC	CHIAN P	OWE	R CO	MPA	<u>NY</u>		ВС	ORING NO. <u>96-23</u> DATE <u>7/23/15</u> SHEET <u>1</u> OF <u>7</u>
											ORING START <u>10/9/96</u> BORING FINISH <u>10/15/96</u>
											IEZOMETER TYPE WELL TYPE
GRO	UND	ELEVA [*]	TION _	690.5	_ SY	STEM					GT. RISER ABOVE GROUND 2.05 DIA 2.0
Wate	er Lev	el, ft	$\overline{\Delta}$	-	<u> </u>		$ar{oldsymbol{\Lambda}}$, -			EPTH TO TOP OF WELL SCREEN 91.9 BOTTOM 111.0
TIME	Ξ										/ELL DEVELOPMENT YES BACKFILL QUICK GROUT
DATI	E									FII	IELD PARTY REB -LD RIG JOY 22
		241	MPLE	STANE	MPD	>	POD				
SAMPLE NUMBER	SAMPLE	DE IN F	PTH EET TO	PENETR RESIST BLOW		TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK
1	NQ	8.9	21.2			10.0		10 -			MEDIUM LIGHT GRAY N-6 SANDSTONE Fine to medium grain. MEDIUM LIGHT GRAY N-6 CLAYSHALE GRAYISH RED 10R 4\2 CLAYSHALE
		TYP	L F OF C	ASING	USFD	I				1	Continued Next Page
Х		NQ-2 R 6" x 3.2	OCK CO 5 HSA		USED			PIEZOM SLO			
			SING AD	VANCER		4"		WELL T			OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
		NW CA				3" 6"	_	** LLL	=.	\exists	
		SW CA AIR HA				8"					RECORDER LD



		SAM	IPLE	STANDARD	>	ROD	רבטדיי						
NUMBER	SAMPLE	DEI	PTH	PENETRATION	FEH VEH VEH VEH VEH VEH VEH VEH VEH VEH V	- NGD	DEPTH	GRAPHIC LOG	CS	SOIL / ROCK	=	1	DRILLER'S
3	, MY	IN F	EET	RESISTANCE		%	IN	RAI	S	IDENTIFICATION	-	∐ }	NOTES
) Z	0)	FROM	ТО	STANDARD PENETRATION RESISTANCE BLOWS / 6"			FEET	Ö				1//	
2	NQ	21.2	31.2		7.2	43	-			DARK REDDISH BROWN 10R 3\4 SILTY CLAYSHALE			
							25 –			MEDIUM LIGHT GRAY N-6 SANDSTONE Fine grain.			
							-			MEDIUM GRAY N-5 SANDSTONE Medium grain.			
							30 -						
3	NQ	31.2	41.2		9.8	60	-			MEDIUM LIGHT GRAY N-6 SANDSTONE Fine to medium grain.			
							35 -						
							40 -			MEDIUM LIGHT GRAY N-6 CLAYSHALE			
4	NQ	41.2	51.2		8.1	19	-			GRAYISH RED 10R\4\2 CLAYSHALE DARK REDDISH BROWN 10R 4\2 CLAYSHALE			
							45 -						

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JOB NUMBER COMPANY APPALACHIAN POWER COMPANY

	64	MPLE	STANDADD	>	B∪D					Т		
NUMBER	DI IN	EPTH FEET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	%	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	Į.	VVELL	DRILLER'S NOTES
5 NQ	FROM	61.2	BLOWS / 6"	9.4	60	50 -			MEDIUM LIGHT GRAY N-6 CLAYSHALE MEDIUM GRAY N-5 SANDY SHALE Fine grain.			
6 NQ	61.2	71.2		10.0	72	60 -			Well cemented			
7 NQ	71.2	81.2		9.6	76	65 - - - - 70			MEDIUM LIGHT GRAY N-6 SANDSTONE Fine to medium grain.			



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-23 DATE 7/23/15 SHEET 4 OF 7

PROJECT MOUNTAINEER LBR LANDFILL BORING START 10/9/96 BORING FINISH 10/15/96

PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START <u>10/9/96</u> BORING FIN	ISH	_10	0/15/96
SAMPLE NUMBER	SAMPLE	DEI	IPLE PTH EEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
							- 75 - -						
8	NQ	81.2	91.2		9.0	88	80 — -			GRAYISH RED 10R 4\2 CLAYSHALE MULTI COLORED DARK REDDISH BROWN, GRAY, GRAY BLACK 10R 3\4 CLAYSHALE			82.2 Top of seal.
							85 - -				0	•	
9	NQ	91.2	101.2		10.0		90 — - -						87.9 Top of sand. 91.9 Top screen.
							95 — - -			MEDIUM N-5 SANDY SHALE Fine grain.			

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LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ___ DATE **7/23/15** SHEET **5** OF _ BORING NO. 96-23 PROJECT MOUNTAINEER LBR LANDFILL 10/9/96 BORING FINISH 10/15/96 **BORING START** SAMPLE **STANDARD** RQD SAMPLE NUMBER SAMPLE DEPTH S DEPTH PENETRATION SOIL / ROCK WELL DRILLER'S LOG USC IN FEET RESISTANCE **IDENTIFICATION NOTES FEET** BLOWS / 6" FROM TO 100 10.0 NQ 101.2 111.2 85 105 110 GRAYISH RED 10R 4\2 CLAYSHALE 111.0 Bottom of GRAYISH RED 10R 4\2 MULTI COLORED NQ 111.2 121.2 96. 43 11 screen. GRAY MOTTLED BROWN, RED CLAYSHALE 112.1 Bottom of sand. 115 120 12 NQ 121.2 131.2 10.0 38

EP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-23 DATE 7/23/15 SHEET 6 OF 7

PROJECT MOUNTAINEER LBR LANDFILL BORING START 10/9/96 BORING FINISH 10/15/96

				NEER LBR LA						RING START	10/9/96	BORING FINISH		
NUMBER		SAMP DEPT IN FE	PLE TH ET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs		SOIL / ROCK		WELL	DRILLER'S NOTES
		OW		BLOW 7			125 -							
3 NG	Q 13 ⁻	1.2	141.2		10.0		130 -) 10R 4\2 CLAYSH			
							135 -			MEDIUM LIGH	IT GRAY N-6 SANE	DY SHALE		
4 NG	Q 14·	1.2	151.2		10.0		140 -			MEDIUM GRA	Y N\5 SANDY SHA	LE		
							145 -							
														149.0 Bottom of bottom seal.

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JOB NUM	BER				LO	G O	F BORING				1
COMPAN	Y APPALAC	CHIAN POWER	COMPA	NY		во	RING NO. <u>96-2</u>	3 DATE	7/23/15 S	HEET	7 OF 7
PROJECT	MOUNTAL	NEER LBR LAN	NDFILL					10/9/96			
SAMPLE NUMBER SAMPLE	SAMPLE DEPTH IN FEET FROM TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	RECOVERY W 4	DEPTH IN FEET	GRAPHIC LOG	nscs		SOIL / ROCK		WELL	DRILLER'S NOTES
WI LER LE FRA SIGES AET SEDI 7723/13							1-31-97 SWL pH COND. TE 10.07 1007 52 10.00 976 53 3 10.13 980 56 3 9.90 865 56 2 9.80 1004 56 10.20 994 56 10.12 990 56 10.07 995 56 9:30 SWL 11 10:00 112. 12:00 112. 2-6-97 SWL 1	MP. GALLONS S 2 2.0 49.4. 2.0 64.1. 2.0 77.9. 2.0 92.6. .0 95.8. 4.0 98.0. 4.0 103.0. 6.0 108.6. 5 DRY. 13.0 7.	WL.		



	NUM	_								-		_
				CHIAN P							PRING NO. 96-24 DATE 7/23/15 SHEET 1 OF 10)
				NEER L							PRING START 9/17/96 BORING FINISH 9/23/96	
		_		9,245.0							EZOMETER TYPE WELL TYPE WELL TYPE	
GRO	UND			825.5		STEM					ST. RISER ABOVE GROUND N/A DIA	
		el, ft	$\overline{\Delta}$		<u> </u>		Ī				PTH TO TOP OF WELL SCREEN N/A BOTTOM N/A	
TIME											ELL DEVELOPMENT <u>N/A</u> BACKFILL <u>QUICK GROUT</u> ELD PARTY REB-RLY RIG JOY 22	
DAT	E									ГІ	ELD PARTY RIG JUL 22	
SAMPLE	SAMPLE	DE	MPLE PTH EEET TO	STAND PENETR RESISTA	ATION ANCE	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK ☐ DRILLER'S IDENTIFICATION NOTES	
1	SS	0.0	1.5			.7			-	CL	BROWN SANDY CLAY	
2	SS	1.5	3.0			1.1						
3	SS	3.0	4.5			.9					BROWN SILTY CLAY SHALE	
4	SS	4.5	6.0			1.1		5 -			RED CLAY SHALE	
5	SS	6.0	7.5			.9			- = =			
6	SS	7.5	9.0			.8						
7	SS	9.0	10.5			1.1		10 -				
8	NQ	11.0	20.0			5.1	22				MODERATE REDDISH BROWN 10R 4\6 CLAYSHALE	
15								15 -			GRAYISH ORANGE 10YR 7\4 CLAYSHALE	
MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15												
.GPJ		TYPE	OF C	ASING I	USED						Continued Next Page	
X X X		NQ-2 R 6" x 3.25 9" x 6.25		RE				PIEZOM SLO			E: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SCREEN, G = GEONOR, P = PNEUMATIC	
TLB,		HW CAS		VANCER		4" 3"	\dashv	WELL T	YPE:	O\	W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON	
		SW CAS	SING			6"					RECORDER RLY	
AEP		AIR HAI	MMER			8"					<u> </u>	



JOB NUMBER _______ BORING NO. 96-24 DATE 7/23/15 SHEET 2 OF 10 PROJECT MOUNTAINEER LBR LANDELL BORING START 9/17/96 BORING FINISH 9/23/96

PRO	JECT	MO	<u>JNTAI</u>	NEER LBR LA	ANDF	ILL				RING START	9/17/96	BORING FINISH	9/	23/96
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs		SOIL / ROCK	ı	WELL	DRILLER'S NOTES
9	NQ	20.0	30.0		4.4	0	-				OLIVE GRAY CLA			
10	NQ	30.0	40.0		8.0	50	30 -							
MI LBK LF FKA SI.GFJ AEP.GDI 7/23/13	NQ	40.0	50.0		10.0	100	40 -			5B 5\1 MEDIUI	M BLUISH GRAY S	SANDY SHALE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _______ BORING NO. 96-24 DATE 7/23/15 SHEET 3 OF 10

PRO	JECT	MOU	JNTAI	NEER LBR LA	ANDF					ING START 9/17/96 BORING FIN	IISH <u>9</u>	/23/96
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							- 50 -					
12	NQ	50.0	60.0		10.0	80	-			5YR 4\1 BROWNISH GRAY CLAYSHALE 5B 5\1 MEDIUM BLUISH GRAY SANDSTONE With shale partings.		
13	NQ	60.0	70.0		10.0	30	60 -			5YR 4\1 BROWNISH GRAY CLAYSHALE 10R 4\6 MODERATE REDDISH BROWN CLAYSHALE With high angle fractures at 66.4'		
14							65 - - -			5B 5\1 MEDIUM BLUISH GRAY SHALE SANDSTONE Hard.		
14	NQ	70.0	80.0		10.0	100	70 -	, , ,		MEDIUM GRAY SANDY SHALE Limestone nodules.		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ____ DATE 7/23/15 SHEET 4 OF _ BORING NO. 96-24 PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/17/96 BORING FINISH 9/23/96 STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 75 80 5B 7\1 MEDIUM GRAY SANDY SHALE Hard. 85 N-7 LIGHT GRAY SANDSTONE 90 10.0 100 15 NQ 90.0 100.0 5B 7\1 LIGHT BLUISH GRAY SANDSTONE With shale partings, well cemented. 95

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER BORING NO. <u>96-24</u> DATE <u>7/23/15</u> SHEET <u>5</u> OF _ COMPANY APPALACHIAN POWER COMPANY PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/17/96 BORING FINISH 9/23/96 STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK DRILLER'S USC WELL IN FEET **IDENTIFICATION NOTES FEET** FROM TO 100 16 NQ 100.0 110.0 10.0 56 N\4 MEDIUM DARK GRAY SHALEY SANDSTONE Limestone nodules. 105 N\5 GRAY SANDSTONE 110 5B 5\1 MEDIUM BLUISH GRAY SANDSTONE NQ 110.0 120.0 10.0 100 115 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 120 18 NQ 120.0 130.0 10.0 67 5B 5\1 MEDIUM BLUISH GRAY CLAYSHALE 10R 5\4 PALE REDDISH BROWN CLAYSHALE



JOB NUMBER _______ BORING NO. 96-24 DATE 7/23/15 SHEET 6 OF 10

PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/17/96 BORING FINISH 9/23/96

PRO	JECT	MOU	<u>JNTAI</u>	NEER LBR LA	ANDF					RING START <u>9/17/96</u> BORING FINIS	H <u>9</u>	/23/96
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							125 -			5B 5\1 MEDIUM BLUISH GRAY CLAYSHALE Limestone nodules.		
19	NQ	130.0	140.0		10.0	40	130 -			N7 LIGHT GRAY SANDSTONE 10 5/4 PALE REDDISH BROWN CLAYSHALE		
							135 -			5B 5\1 MEDIUM BLUISH GRAY SANDY SHALE		
20	NQ	140.0	150.0		10.0	86	140 -			5b 5\1 MEDIUM BLUISH GRAY CLAYSHALE Limestone nodules. 5B 7\1 LIGHT BLUISH GRAY SANDSTONE	_	
							145 -			RED CLAYSHALE	_	

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-24</u> DATE <u>7/23/15</u> SHEET <u>7</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL 9/17/96 BORING FINISH 9/23/96 **BORING START** STANDARD
PENETRATION PENETRATI SAMPLE RQD SAMPLE NUMBER DEPTH SAMPLE **DEPTH** LOG SOIL / ROCK WELL DRILLER'S USC IN FEET % **IDENTIFICATION NOTES FEET** FROM TO NQ 150.0 160.0 9.5 87 5B 5\1 MEDIUM BLUISH GRAY SHALEY SANDSTONE N-6 MEDIUM LIGHT GRAY SANDY SHALE 155 N-4 MEDIUM DARK GRAY WITH RED LAYERS CLAYSHALE 160 RED, GRAY, BROWN MOTTLED CLAYSHALE 22 NQ 160.0 170.0 9.4 52 5R 3\4 DUSKY RED CLAYSHALE 165

170 RED, GRAY, BROWN MOTTLED CLAYSHALE 23 NQ 170.0 180.0 10.0 92 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 N\5 MEDIUM GRAY SANDY SHALE Fine to medium grain. 175 Continued Next Page



JOB NUMBER ______ BORING NO. 96-24 DATE 7/23/15 SHEET 8 OF 10

PF	ROJ	ECT	MOL		NEER LBR L						RING START 9/17/96 BOR	ING FINISH 9	/23/96
SAMPLE	NUMBER	SAMPLE	SAM DEF IN F	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
2	4	NQ	180.0	190.0		9.4	32	180 -			N-6 MEDIUM LIGHT GRAY SANDY SHA grain.	ALE Fine	
								185 -			RED, GRAY, BROWN MOTTLED CLAYS 10R 2/2 VERY DUSKY RED CLAYSHALI		
2	5	NQ	190.0	200.0		9.4	67	- - - 190 –			10R 3\4 DARK REDDISH, BROWN, RED		
							·	- - 195 –			N-5 MEDIUM GRAY SANDY SHALE		
LBR LF FKA SI.GPJ AEP.GDT 7/23/15	6	NQ	200.0	210.0		10.0	100	200 -			5R 4\2 GRAYISH RED CLAYSHALE Lim- nodules. N\4 MEDIUM DARK GRAY SANDY SHAI N-6 MEDIUM DARK GRAY SANDY SHAI	LE	
LBR LF FK								-					

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _______ BORING NO. 96-24 DATE 7/23/15 SHEET 9 OF 10
PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/17/96 BORING FINISH 9/23/96

PRO	JECT	_MOL	JNTAI	NEER LBR LA	ANDF	ILL			ВС	RING START 9/17/96 BORING FINISH	− 9	/23/96
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							205 –					
27	NQ	210.0	220.0		9.4	71	210 -			N-5 MEDIUM GRAY SANDSTONE With shale partings. Cross bedding		
							215 - - -					
	NQ	220.0	230.0		9.6	54	220 - - - -			N-4 MEDIUM DARK GRAY SANDY SHALE Fine grain N-5 MEDIUM GRAY SANDY SHALE Fine grain. RED, GRAY, BROWN MOTTLED CLAYSHALE		
							225 -			N-4 MEDIUM DARK GRAY, RED STREAKS CLAYSHALE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-24</u> DATE <u>7/23/15</u> SHEET <u>10</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START <u>9/17/96</u> BORING FINISH <u>9/23/96</u> PENETRATION RESISTANCE BLOWS / 6" RQD SAMPLE SAMPLE NUMBER SAMPLE GRAPHIC LOG DEPTH S DEPTH USC SOIL / ROCK WELL DRILLER'S IN FEET **IDENTIFICATION NOTES** FEET FROM TO 5R 3\4 DUSKY RED CLAYSHALE 230 235 240

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



			PALAC		POWE	R CO	MPA	<u>ANY</u>		В	DRING NO. <u>96-27</u> DATE <u>7/23/15</u>	_ SH	EET	
PRO	JECT	MC	UNTAI	NEER	LBR L	ANDF	ILL			В	DRING START <u>9/25/96</u> BORING F	INISH	_1	0/9/96
COC	RDIN	ATES	N 712	2,597.9	E 1,6	99,97	3.8			PI	EZOMETER TYPE WELL	TYPE)W
GRC	UND	ELEVA	TION	718.1	SY	'STEM				Н	GT. RISER ABOVE GROUND 1.43	_ DIA	_2	.0
Wat	er Lev	el, ft	$\overline{\Delta}$		Ī		$ar{ar{A}}$	7			EPTH TO TOP OF WELL SCREEN111.0BO			
TIMI	E										ELL DEVELOPMENT BAC			
DAT	Έ									FI	ELD PARTY REB-TLS-RLY	RIG	<u> </u>	OY 22
		CAI	MDLE	CTAN	DADD		DOD			1				
SAMPLE NUMBER	SAMPLE	DE IN	MPLE EPTH FEET I TO		DARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVER)	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
1	NQ	15.7	20.6	BLOV		4.9	37	- 10 - 15 - 15 - 15 - 15 - 15 - 15 - 15			PALE REDDISH BROWN 10R 5\4 SANDY SHALE Brown sandstone nodules.			Decon 1-15-97 potable water and Alconox. SWL 1-16-97 NQ hole 70.65 SWL 66.35 8" hole to 100' 500 gallons of water use to flush hole. SWL after installation 99.8. From 181.2 to 132 tremie backfill w/ bentonite pellets
		TVD	5 05 0	AONIO	HOED			-			Our firmed Month Page			
	_		E OF C		USED						Continued Next Page			
X		NQ-2 F 6" x 3.2 9" x 6.2		RE				PIEZOM SLC			PE: PT = OPEN TUBE POROUS TIP, SCREEN, G = GEONOR, P = PNEUMA		OF	PEN TUBE
		HW CA	SING AD	VANCER	2	4" 3"		WELL T	YPE:	0	W = OPEN TUBE SLOTTED SCREEN	, GM	I = C	SEOMON
		NW CA SW CA				6"					RECORDER TLS-RLY			
			MMER			8"					NEOUNDEN ILU-ILLI			



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. 96-27 DATE _7/23/15 SHEET _2 OF _8

DRO JECT _MOUNTAINFER LRP LANDFILL BORING START _9/25/96 ______ PORING FINISH _10/9/96

PF	ROJ	ECT	MOU	JNTAI	NEER LBR LA	NDF	ILL				RING START <u>9/25/96</u>	_ BORING FINISH	Η _	10/9	9/96
SAMPLE	NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	N	WELL		DRILLER'S NOTES
2	2	NQ	20.6	30.6		10.0		-							
								-			PALE YELLOWISH BROWN 10Y SANDSTONE Fine to medium gra				
											MEDIUM GRAY N-5 SILTY CLAY	YSHALE			
								25 – -			PALE YELLOWISH BROWN 10Y SHALE	/R 6\2 SANDY			
								-			MEDIUM LIGHT GRAY N\6 SAN	DSTONE			
								-	===		MEDIUM GRAY N-5 CLAYSHAL	E			
3	3	NQ	30.6	40.6		3.6	18	30 -			MEDIUM LIGHT GRAY N-6 SILT	Y CLAYSHALE			
								- - 35							
								-					//	V/.	
MILEK LF FKA SI.GPJ AEP.GDI 7/23/19	1	NQ	40.6	44.6		1.1	0	40 - - -			DUSKY RED 5R 3/4 SILTY CLAY	/SHALE			
II LBK LF FKA SI.	5	NQ	44.6	50.6		6.0	100	45 -			MEDIUM GRAY N-5 SANDSTON medium grain.				

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. 96-27 DATE _7/23/15 SHEET _3 OF _8

PROJECT _MOUNTAINEER LBR LANDFILL BORING START _9/25/96 BORING FINISH _10/9/96

PROJE	ECT	MO	JNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START 9/25/96 BORING	FINISH _10/	9/96
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
7 1 7	NQ NQ	55.6	55.6 61.2		5.6	333 411	55			MEDIUM GRAY 5-N CLAYSHALE MEDIUM GRAY N-5 CLAYSHALE DUSKY RED 5R CLAYSHALE		
							- 65 - 70			MEDIUM GRAY N-5 CLAYSHALE		

AEP MT LBR L



PRO	JECT	MOU	<u>JNTAI</u>	NEER LBR LA	ANDF	ILL			ВО	RING START <u>9/25/96</u>	BORING FINIS	SH	10/9	9/96
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / F			WELL	DRILLER'S NOTES
							75 - -							
10	NQ	81.2	91.2		9.5	57	- 80 – -			DARK GRAY N-3 SILTY C vertical crack.	CLAYSHALE With			
							85 -			MEDIUM GRAY N-5 SANI bedding.	DSTONE With cross			
	NQ	91.2	101.2		6.2	29	90 -			Medium to fine grain.			\sim	
							95 - - -			DARK GRAY N-3 CLAYSH	HALE Trace of red.			

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-27</u> DATE <u>7/23/15</u> SHEET <u>5</u> OF _

~		SAM	1PLE	STANDARD	_≿	RQD	DEPTH	C				
NUMBER	SAMPLE	DEI	PTH	PENETRATION RESISTANCE	¥₽₽		IN	GRAPHIC LOG	C S	SOIL / ROCK	WELL	DRILLER'S
Ž	SAM	IN F	EET			%		ILC KAI	S N	IDENTIFICATION	WE	NOTES
_		FROM	ТО	BLOWS / 6"	, Jä		FEET					
							-					
							100 -					
							100					
	NO	101.0	444.0			40	-			MEDIUM DARK GRAY N-4 CLAYSHALE		
12	NQ	101.2	111.2		9.1	16	-			mesion state of the reservoir		
							-					102.6 Top of seal.
							-			DARK PERRIOL PROMIN 400 014 PER		
										DARK REDDISH BROWN 10R 3\4 RED, BROWN, GRAY MOTTLED CLAYSHALE		
							105 -					
							-					
							-	讍				
							-					
							-				·	109.0 Top of sand
							110 –					
							110					
13	NQ	111.2	121.2		9.9	75	-					111.0 Top of scree
13	INQ	111.2	121.2		9.9	75	-			MEDIUM GRAY N-5 SANDY SHALE		
							-					
							-					•
							115 -			MEDIUM GRAY N-5 SANDSTONE Medium to		
							-			fine grain, vertical fracture 119.2-120.0.		
							-	: : : : : : : :				
							-					
							-					
							120 –	: : : : : : : :				
							-	: : : : 		MEDIUM ODAYAL FOLAYOUT		
14	NQ	121.2	131.2		9.1	49	-			MEDIUM GRAY N-5 CLAYSHALE MEDIUM DARK GRAY N-4 CLAYSHALE		<u> </u>
	.10	121.2	101.2		"	70	-	Ħ		5 2. a a a a a a a a a a a a a a a a a		
							-	Ħ				



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-27</u> DATE <u>7/23/15</u> SHEET <u>6</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL 9/25/96 BORING FINISH 10/9/96 **BORING START** STANDARD
PENETRATION FENETRATION FOR STANCE SAMPLE RQD SAMPLE NUMBER SAMPLE DEPTH S DEPTH LOG SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO MEDIUM GRAY N-5 SANDY SHALE 125 -GRAYISH RED 5R 4\2 MOTTLED RED. BROWN, GRAY CLAYSHALE 130 130.0 Bottom of screen. DARK REDDISH BROWN 10R 3\4 MOTTLED 15 NQ 131.2 141.2 9.2 42 REDDISH BROWN GRAY CLAYSHALE 132.0 Bottom of sand. 135 140

NQ 141.2 151.2 8.9 53 MEDIUM LIGHT GRAY N-6 SANDSTONE 145 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 DARK REDDISH BROWN 10R 3\4 MOTTLED CLAYSHALE MEDIUM DARK GRAY N-4 SANDY SHALE Continued Next Page



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-27</u> DATE <u>7/23/15</u> SHEET <u>7</u> OF PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/25/96 BORING FINISH 10/9/96 STANDARD
PENETRATION PENETRATI HAD ROD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 17 NQ 151.2 161.2 10.0 97 MEDIUM LIGHT GRAY N-6 SANDSTONE Fine to medium grain. 155 160 18 NQ 161.2 171.2 10.0 100 165

170 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 NQ 171.2 181.2 8.3 59 175 DARK REDDISH BROWN 10R 3\4 MOTTLED RED, BROWN, GRAY CLAYSHALE Continued Next Page



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY DATE **7/23/15** SHEET **8** OF BORING NO. 96-27 PROJECT MOUNTAINEER LBR LANDFILL 9/25/96 BORING FINISH 10/9/96 **BORING START** FE RQD SAMPLE STANDARD PENETRATION E DO LESS TANCE SAMPLE NUMBER GRAPHIC LOG DEPTH SAMPLE S DEPTH SOIL / ROCK DRILLER'S WELL SC IN IN FEET % **IDENTIFICATION NOTES FEET** BLOWS / 6" FROM TO 180 pH COND TEMP. GALLONS SWL. 9.80 695 55 2.0 83.5. 9.81 699 56 2.0 84.8. 9.91 690 56 2.0 87.2. 9.94 685 57 2.0 88.8 9.88 682 58 2.0 90.6. 9.73 681 58 2.0 92.8. 9.75 680 58 2.0 95.5. 9.85 684 58 4.0 101.2. 9.82 694 58 4.0 106.7. 9.84 687 58 4.0 110.9. 9.86 698 58 4.0 114.6. 9.88 698 58 4.0 115.7. 9.85 702 58 4.0 117.1. 9.73 701 58 6.0 119.3. 9.73 701 58 6.0 122.3. 9.72 713 58 6.0 124.6. 9.85 704 58 +6.0 127.4. 9.83 719 58 6.0 131.6. 3:58 SWL DRY. 4:05 126.7. 4:15 123.3. 4:30 120.9 1-23-97 swl 8:38 AM 10.04 713 55 2.0 86.9. 9.91 703 56 4.0 92.3. 9.92 718 56 4.0 95.9.

9.86 705 56 4.0 101.4. 9.23 752 56 4.0 105.3. 9.07 56 6.0 111.5. 9 87 56 8.0 118.9. 9.78 56 8.0 122.0. 56 8.0 124.4. 9.85 9.88 56 8.0 129.1. 9.91 3.0 132.0. DRY 2-6-97 SWL 73.99.

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



		BER _ Y _AF	PALAC	CHIAN	POWE	R CO	- MPA	<u>NY</u>		ВС	DRING NO. <u>96-28</u> DATE <u>7/23/15 SHEET <u>1</u> OF</u>	10	
PRO	JECT	_MO	UNTA	NEER	LBR L	ANDF	ILL			BC	DRING START BORING FINISH		
COO	RDIN	IATES	N 708	3,701.0	E 1,6	97,04	3.0			PII	EZOMETER TYPE WELL TYPE		
GRO	UND	ELEVA	TION _	879.6	S\	'STEM				HC	GT. RISER ABOVE GROUND 1.7 DIA 2.0		
Water Level, ft $\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$					$ar{ar{\Lambda}}$, -		DE	EPTH TO TOP OF WELL SCREEN 69.8 BOTTOM 98.9				
TIME						WI	ELL DEVELOPMENT YES BACKFILL QUICK GRO	JT					
DATE	=									FIE	ELD PARTY TJH-RLY RIG CME-75		
		 		1									
SAMPLE NUMBER	SAMPLE	DE IN I	MPLE EPTH FEET TO		DARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK ☐ DRILLER IDENTIFICATION NOTES		
								-		CL	REDDISH BROWN CLAY Some water sh in cuttings.	owing	
								5			TAN TO BROWN CLAYSHALE SWL 9:30 12- possible exces		
								-	_		water. Boring flushed 300 to 500 pric well installation	or to	
								10 -			MODERATE REDDISH BROWN 10R 4\6 CLAYSHALE		
								- 15 - - -			GREENISH GRAY SILTY CLAYSHALE Medium hard.		
								-			MEDIUM GRAY N-5 SILTY CLAYSHALE Sandstone lens, 21.5, 24.8 vertical fractures.		
	TYPE OF CASING USED									Continued Next Page			
6" x 3.25 HSA 9" x 6.25 HSA SLOTTE								SLC	OTTE	TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE ED SCREEN, G = GEONOR, P = PNEUMATIC			
NW CASING 3" SW CASING 6"						3"		WELL T	TPE:		W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON RECORDER		



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ___ DATE <u>7/23/15</u> SHEET <u>2</u> OF _ BORING NO. 96-28 PROJECT MOUNTAINEER LBR LANDFILL BORING START BORING FINISH 12/10/96 STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH USCS DEPTH SOIL / ROCK WELL DRILLER'S IN FEET **IDENTIFICATION NOTES** FEET FROM TO 25 MEDIUM LIGHT GRAY N-6 SANDY CLAYSHALE Hard. 30 35 PALE OLIVE 10Y 6\2 SANDSTONE Hard, medium to large grain. 40 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 45

EP M



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. 96-28 DATE ______ DATE ______ SHEET _____ OF ______ 10

PROJECT __MOUNTAINEER LBR LANDFILL BORING START ______ BORING FINISH ______ 12/10/96

PROJEC	T _ MO	JNTAI	NEER LBR LA	ANDFILL			BORING START BORING		G FINISH <u>12/10/96</u>		
SAMPLE NUMBER SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY % QDS	DEPTH IN FEET	APF LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES	
					50 –			MEDIUM LIGHT GRAY N-6 SANDSTONE Hard, medium to large grain.			
					55 - - -			MEDIUM GRAY N-5 CLAYSHALE 57.9 TO 58.5 vertical fracture.			
					60			GRAYISH RED 10R 4\2 CLAYSHALE	-	58.9 Top of seal.	
					65 - - -			GRAYISH RED 10R 4\2 CLAYSHALE MEDIUM GRAY N-5 CLAYSHALE	**	65.0 Top of sand.	
					70 -					69.8 Top of screen.	

Continued Next Page

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



BORING NO. 96.28 DATE 77.23/16 SHEET 4 OF 10. PROJECT MOUNTAINEER LBR LANDFILL BORING START BORING NO. 16.28 DATE 17.23/16 SHEET 4 OF 10. PROJECT NO. 15. PROJ	JOB I						_		LOC	G O	F BORING			/ 1 7 2
SAMPLE DEPTH RESISTANCE CALLY STANDARD PORT OF STANDARD P								NY						
DEPTH PRINTER TO BELOWS / 6" N \$ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0			1010	OITIA		-1101				ьс	MINO STAICE	BOKING FII	121	10/30
80 - MEDIUM GRAY N-5 SILTY SANDSTONE Medium to large grain. 90 - MEDIUM GRAY N-5 CLAYSHALE 95 - MEDIUM DARK GRAY N-4 SILTY CLAYSHLE Hard.	SAMPLE NUMBER	SAMPLE	DEI IN F	PTH	PENETRATION RESISTANCE			IN	GRAPHIC LOG	S C			WELL	
85 - MEDIUM GRAY N-5 SILTY SANDSTONE Medium to large grain. 90 - MEDIUM GRAY N-5 CLAYSHALE MEDIUM DARK GRAY N-4 SILTY CLAYSHLE Hard.			FROM	ТО	BLOWS / 6"	<u> </u>							::	
85 - MEDIUM GRAY N-5 SILTY SANDSTONE Medium to large grain. 90 - MEDIUM GRAY N-5 CLAYSHALE MEDIUM DARK GRAY N-4 SILTY CLAYSHLE Hard.								-						
90 — MEDIUM GRAY N-5 CLAYSHALE 95 — MEDIUM DARK GRAY N-4 SILTY CLAYSHLE Hard.											MEDIUM GRAY N-5 S	SILTY SANDSTONE		
95 — MEDIUM DARK GRAY N-4 SILTY CLAYSHLE Hard.											Medium to large grain			
Continued Next Page								95 -			MEDIUM DARK GRA			
	<u>:</u>										Continue	ed Next Page	°.⊢°.·İ	



JOB	NUM	BER _						LO	G O	F BORING			
			PALAC	CHIAN POWE	R CO	MPA	NY		во	RING NO. 96-28	DATE 7/23/15 S	SHEET	5 OF 10
			UNTAI	NEER LBR L	ANDF	FILL			во		BORING FINIS		
SAMPLE	SAMPLE	1	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs		/ ROCK FICATION	WELL	DRILLER'S NOTES
		1 IXOIVI		BLOWS/0	_			==				1:4:	
							100 –			GRAYISH RED 5R 4\2 Medium hard.	SANDY CLAYSHALE	0 0 0 1	98.9 Bottom of screen.
							-						100.0 Bottom of sand.
							- 105 - -			DARK REDDISH BROV Well cemented.	VN 10R 3\4 CLAY SHALE		
							- - 110 – -			MEDIUM GRAY N-5 CL	LAYSHALE		
							- 115 - -			DARK REDDISH BROV CLAYSHALE MEDIUM DARK GRAY cemented.			
							120 - - - -						



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-28</u> DATE <u>7/23/15</u> SHEET <u>6</u> OF _ BORING START _____ BORING FINISH ________ 12/10/96 PROJECT MOUNTAINEER LBR LANDFILL STANDARD
PENETRATION PENETRATI SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES** FEET FROM TO 125 -MEDIUM DARK GRAY N-4 SANDSTONE Fine to medium grain, cross bedding. 130 135 DARK GREENISH GRAY 5G 4\12 CLAYSHALE Well cemented, broken are 140,142. 140 145 -MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 MEDIUM DARK GRAY N-4 SANDSTONE Fine to medium grain.



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-28</u> DATE <u>7/23/15</u> SHEET <u>7</u> OF _ BORING START ___ PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 12/10/96 STANDARD
PENETRATION PENETRATI SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH **DEPTH** SOIL / ROCK WELL DRILLER'S USC IN FEET IDENTIFICATION **NOTES FEET** FROM TO MEDIUM GRAY N-5 SANDSTONE Fine to medium grain, well cemented. 155 MEDIUM DARK GRAY N-4 SANDSTONE Fine to medium grain. MEDIUM GRAY N-5 CLAYSHALE GRAYISH RED 10R 4\2 CLAYSHALE 160 MEDIUM GRAY N-5 CLAYSHALE MEDIUM DARK GRAY N-4 SANDSTONE Fine to medium grain. 165 170 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 GRAYISH RED 10R 4\2 CLAYSHEL



JOB	NUM	BER						LO	G OI	BORING			
			PALAC	CHIAN POWE	R CO	MPA	NY		ВО	RING NO. <u>96-28</u>	DATE 7/23/15	SHEET	8 OF 10
PRO	JEC	MO	UNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START			
SAMPLE	SAMPLE	SAM DEF IN F	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS		/ ROCK FICATION	WELL	DRILLER'S NOTES
							- - 180 — - -			MEDIUM DARK GRAY SANDSTONE	N-4 CLAYEY		
							185 - -			GRAYISH RED 1-R 4\2	2 CLAYSHALE		
							190 -			MEDIUM GRAY N-5 CI	LAYSHALE		
							195 - - - - 200			LIGHT OLIVE GRAY 5°CLAYSHALE			
i							-						



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-28</u> DATE <u>7/23/15</u> SHEET <u>9</u> OF _ BORING START ___ PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 12/10/96 !END RQD SAMPLE STANDARD PENETRATION PENETRATION RESISTANCE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK DRILLER'S SCS WELL IN FEET **IDENTIFICATION NOTES FEET** FROM TO BLOWS / 6" GRAYISH PURPLE SANDY CLAYSHLAE 205 GRAYISH PURPLE 5P 4\2 CLAYSHALE Broken, medium hard. LIGHT GRAY N-7 SANDSTONE Hard, well cemented, cross bedding, medium to large grain. 210 -215 -220 MEDIUM LIGHT GRAY N-6 TO DARK REDDISH 10R 2\2 SILTY CLAYSHALE Medium hard. MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 225 1-8-97 SWL 98.0. L pH COM.SWL. 1 8.70 770 98.0. 2 8.60 859. 3 8.82 884. 4 8.93 906 99.2.



JOB NUMBER ______ BORING NO. 96-28 DATE 7/23/15 SHEET 10 OF 10 PROJECT MOUNTAINEER LBR LANDFILL BORING START BORING FINISH 12/10/96

PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF	ILL				RING START BORING FIN	SH <u>1</u>	2/10/96
SAMPLE NUMBER	SAMPLE	DEF IN F	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
	6	FROM	TO	BLOWS / 6"	L L		FEET			5 9.12 953. 6 9.13 912. 7 9.18 898. 8 9.17 877 100. 9 8.99 8.72. 10 9.13 8.59. 11 8.91 8.58 100.8. 12 9.11 8.73 101.5. VERY REDDISH BROWN. 2-6-97 DRY BAILER IN WELL.		

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB I		_					_		LO	00	1 Borning		
								NY			PRING NO. <u>96-29</u> DATE <u>7/23/15</u> SHE		
											PRING START BORING FINISH		
COO	RDIN	NATES .	N 70	8,701.2	E 1,6	97,04	3.2			PIE	EZOMETER TYPE WELL TYPE	OW	
GRO	UND	ELEVA	TION _	879.8	SY	STEM				HG	ST. RISER ABOVE GROUND 1.68 DIA	2.0	
Wate	er Lev	vel, ft	$\overline{\nabla}$		Ţ		Ā			DE	PTH TO TOP OF WELL SCREEN152.8BOTTOM	171.9	
TIME	:									WE	ELL DEVELOPMENT YES BACKFILL	QUICK	GROUT
DATE	E									FIE	ELD PARTY TJH-RLY RIG	CME-75	5
								<u> </u>					
ᄪᄣ	щ		/IPLE PTH		DARD	L'H'H	RQD	DEPTH	⊋	S	SOIL / ROCK		DILL EDIC
SAMPLE NUMBER	SAMPLE		EET	RESIS	RATION TANCE	OTA NG:	%	IN	GRAPHIC LOG	SC	JOENTIFICATION	ш	RILLER'S
S ⊃	SA	FROM			VS / 6"	FIN	70	FEET	GR _	⊃	IDENTIFICATION	> 1	NOTES
		TITOM		BLOV	.0,0				+	CL	LIGHT BROWN SILTY CLAY		
											REDDISH BROWN CLAY		
									-		REDDISTI BROWN CLAT	Well in	stalled in dry
												hole.	stalled in dry
									=		TAN TO BROWN CLAYSHALE		
									-==				
				+				5 -	-				
									_				
									-				
									==		MODERATE REDDISH BROWN 10R 4\6		
								10 -	-==		CLAYSHALE		
									+==				
									#=				
									揰				
								15 -					
								15			GREENISH GRAY SILTY CLAYSHALE Medium hard.		
									-==		True G.		
2											MEDIUM GRAY N-5 SILTY CLAYSHALE		
/23/1											Sandstone lens, 21.5, 24.8 vertical fractures.		
7 70									-				
EP.G													
MTLBRLF FKA SI.GPJ AEP.GDT 7/23/15	1	TYPI	E OF C	ASING	USED)				ı	Continued Next Page	1 1//1	
ξ × S			OCK CC	RE				PIEZOM	IETER	TYP	E: PT = OPEN TUBE POROUS TIP, SS =	OPEN TU	JBE
<u> </u>		6" x 3.2 9" x 6.2									SCREEN, G = GEONOR, P = PNEUMATIC		
LBR		HW CA	SING A	OVANCER	₹	4"		WELL T	YPE:	O۱	W = OPEN TUBE SLOTTED SCREEN, GM	= GEOMC	N
		NW CA				3" 6"	_						· -
AEP		AIR HA				8"					RECORDER		



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ___ DATE **7/23/15** SHEET **2** OF _ BORING NO. 96-29 PROJECT MOUNTAINEER LBR LANDFILL BORING START BORING FINISH 12/4/96 STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH USCS DEPTH SOIL / ROCK WELL DRILLER'S IN FEET **IDENTIFICATION NOTES** FEET FROM TO 25 MEDIUM LIGHT GRAY N-6 SANDY CLAYSHALE Hard. 30 35 PALE OLIVE 10Y 6\2 SANDSTONE Hard, medium to large grain. 40 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 45

AEP MT



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-29</u> DATE <u>7/23/15</u> SHEET <u>3</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 12/4/96 **BORING START** STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE **DEPTH** SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO MEDIUM LIGHT GRAY N-6 SANDSTONE Hard, medium to large grain. 50 55 MEDIUM GRAY N-5 CLAYSHALE 57.9 TO 58.5 vertical fracture. GRAYISH RED 10R 4\2 CLAYSHALE 60 65 GRAYISH RED 10R 4\2 CLAYSHALE MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 MEDIUM GRAY N-5 CLAYSHALE 70

AEP MT



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY ___ DATE <u>7/23/15</u> SHEET <u>4</u> OF _ BORING NO. 96-29 PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 12/4/96 **BORING START** STANDARD
PENETRATION | ALL | A SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES** FEET FROM TO 75 80 MEDIUM GRAY N-5 SILTY SANDSTONE 85 Medium to large grain. 90 MEDIUM GRAY N-5 CLAYSHALE MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 95 MEDIUM DARK GRAY N-4 SILTY CLAYSHLE Hard.

EP MT



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-29 DATE **7/23/15** SHEET **5** OF PROJECT MOUNTAINEER LBR LANDFILL **BORING START** BORING FINISH 12/4/96 STANDARD
PENETRATION FENETRATION FOR STANCE SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE **DEPTH** SOIL / ROCK WELL DRILLER'S SCS IN FEET **IDENTIFICATION NOTES FEET** FROM TO GRAYISH RED 5R 4\2 SANDY CLAYSHALE Medium hard. 100 105 DARK REDDISH BROWN 10R 3\4 CLAY SHALE Well cemented. MEDIUM GRAY N-5 CLAYSHALE 110 115 DARK REDDISH BROWN 10R 3\4 SILTY CLAYSHALE MEDIUM DARK GRAY N-4 CLAYSHALE Well cemented. MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 120



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-29</u> DATE <u>7/23/15</u> SHEET <u>6</u> OF PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 12/4/96 **BORING START** STANDARD
PENETRATION FENETRATION FOR STANCE SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES** FEET FROM TO 125 MEDIUM DARK GRAY N-4 SANDSTONE Fine to medium grain, cross bedding. 130 135 DARK GREENISH GRAY 5G 4\12 CLAYSHALE Well cemented, broken are 140,142. 140 144.1 Top seal. 145 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 MEDIUM DARK GRAY N-4 SANDSTONE Fine to medium grain.



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-29</u> DATE <u>7/23/15</u> SHEET <u>7</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 12/4/96 **BORING START** STANDARD
PENETRATION PENETRATI SAMPLE GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET IDENTIFICATION **NOTES FEET** FROM TO MEDIUM GRAY N-5 SANDSTONE Fine to 150.0 Top of sand. medium grain, well cemented. 152.8 Top of sreen. 155 MEDIUM DARK GRAY N-4 SANDSTONE Fine to medium grain. MEDIUM GRAY N-5 CLAYSHALE GRAYISH RED 10R 4\2 CLAYSHALE 160 MEDIUM GRAY N-5 CLAYSHALE MEDIUM DARK GRAY N-4 SANDSTONE Fine to medium grain. 165 170 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 GRAYISH RED 10R 4\2 CLAYSHEL 171.9 Bottom of screen 174.0 Bottom of sand. 175



JOE	NUN	IBER _						LO	G OI	BORING			
			PALAC	CHIAN POWEI	R CO	MPA	NY		ВО	RING NO. <u>96-29</u>	DATE 7/23/15	SHEET	8 OF 9
PRO	DJEC	_ MO I	UNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START			
SAMPLE	SAMPLE	1	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS		/ ROCK FICATION	WELL	DRILLER'S NOTES
							- - 180 - - -			MEDIUM DARK GRAY SANDSTONE	N-4 CLAYEY		
							185 - - -			GRAYISH RED 1-R 4\2	2 CLAYSHALE		
							190 -			MEDIUM GRAY N-5 C			
							195 - - - - 200			DARK GRAY N-3 CLAY LIGHT OLIVE GRAY 5' CLAYSHALE			
i							-						



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-29</u> DATE <u>7/23/15</u> SHEET <u>9</u> OF _ BORING START ___ PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 12/4/96 !EE RQD SAMPLE STANDARD GRAPHIC LOG PENETRATION PENETRATION RESISTANCE SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S SCS IN FEET **IDENTIFICATION** NOTES FEET FROM TO BLOWS / 6" GRAYISH PURPLE SANDY CLAYSHLAE 205 GRAYISH PURPLE 5P 4\2 CLAYSHALE Broken, medium hard. LIGHT GRAY N-7 SANDSTONE Hard, well cemented, cross bedding, medium to large grain. 210 -215 -220 -MEDIUM LIGHT GRAY N-6 TO DARK REDDISH 10R 2\2 SILTY CLAYSHALE Medium hard. MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 225 1-8-97 SWL DRY. 2-6-97 SWL DRY.



	NUMI VAAN		ΡΔΙ ΔΟ	CHIAN	POWE	R COI	ИРД	NY		BC	DRING NO. <u>96-30</u> DATE <u>7/23/15 SH</u>	FET 1 OF 10
				NEER							DRING START 9/5/96 BORING FINISH	
											EZOMETER TYPE WELL TYPE	
											GT. RISER ABOVE GROUND 1.71 DIA	
Wat	er Lev	el, ft	∑ DI	RY	▼ 3!	5.1	1	45.2		DE	PTH TO TOP OF WELL SCREEN	225.0
TIM		,					+-	14 hrs		WI	ELL DEVELOPMENT YES BACKFILL	QUICK GROUT
DAT	E		9-9	-96	9-1	0-96		9_11_96	2	FIE	ELD PARTY MCR-LD RIG	BK-81
						T						
SAMPLE	SAMPLE	DE	MPLE PTH EEET TO		IDARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	☐ DRILLER'S NOTES
1	SS	0.0	1.5	4-	4-3	1.3				CL	LIGHT BROWN SILTY CLAY	4.7=9.2 NO SAMPLES TAKEN
2	SS	1.5	3.0	3-	3-4	1.0		-			REDDISH BROWN CLAY	DRILL WATER BROWN TO RED CLAYSHALE. No water in well immediatly after
3	SS	3.0	4.5	9-1	8-37	1.0		-			TAN TO BROWN CLAYSHALE	installation 12-4-96 Decon rig and tools
4	SS	4.5	4.7	50	01.2	0		5 -	-			with potalbe water and alconox. BORING FLUSHED WITH APPROXIMATELY 700 GALLONS OF WATER.
5	NQ	9.2	15.0			2.8	0	10 -			MODERATE REDDISH BROWN 10R 4\6 CLAYSHALE	
P.GDI //23/15	NQ	15.0	25.0			8.8	0	15 -			GREENISH GRAY SILTY CLAYSHALE Medium hard. MEDIUM GRAY N-5 SILTY CLAYSHALE Sandstone lens, 21.5, 24.8 vertical fractures.	Boring grouted with approximately 100 gallons.
GPJ AEP.GDI		TYPI	F OF C	ASING	USFD				1::::		Continued Next Page	
N X			OCK CO		JUED	•		DIEZ C. :		T/=		ODEN TUDE
Ž		6" x 3.2	5 HSA	'I \L				PIEZOM SLO			E: PT = OPEN TUBE POROUS TIP, SS = SCREEN, G = GEONOR, P = PNEUMATIC	· OPEN TUBE
LBK L		9" x 6.2 HW CA		VANCER	₹	4"		WELL T			W = OPEN TUBE SLOTTED SCREEN, GM	= GEOMON
Σ		NW CA	SING			3"		VVELL I	ire:			- GEOIVIOIN
AE -		SW CA				6" 8"					RECORDER LD	



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-30 DATE 7/23/15 SHEET 2 OF 10

PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/5/96 BORING FINISH 9/11/96

KOJ	ECI		JINITAL	NEER LBR LA	ANDI	ILL			ьО	RING START	9/5/96	BORING FINISH	_3	/11/90
NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS		SOIL / ROCK		WELL	DRILLER'S NOTES
7	NQ	25.0	35.0		10.0	39	25 -				HT GRAY N-6 SANI	DΥ		
							30 -			CLAYSHALE H				
8	NQ	35.0	45.0		10.0	64	35 - - - 40			PALE OLIVE 1 medium to larg	10Y 6\2 SANDSTON ge grain.	NE Hard,	Y i	APPROXIMATEL' 1000 GALLONS (WATER USED.
9	NQ	45.0	55.0		10.0	96	45 -						Ψ	
1		- J.∪	55.0		10.0	30		::::						



TOOMPANY APPALACHIAN POWER COMPANY

PROJECT MOUNTAINEER LBR LANDFILL

BORING NO. 96-30

BORING START 9/5/96

BORING FINISH 9/11/96

PRO	JECT	_MOI	JNTAI	NEER LBR LA	ANDF	ILL			ВС	RING START 9/5/96 BORING FINISH	١ _	9/11/96	
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES	
							- - - 50 –			MEDIUM LIGHT GRAY N-6 SANDSTONE Hard, medium to large grain.			
10	NQ	55.0	65.0		9.9	58	- - - 55 -						
							60 -			MEDIUM GRAY N-5 CLAYSHALE 57.9 TO 58.5 vertical fracture. GRAYISH RED 10R 4\2 CLAYSHALE			
11 12	NQ NQ	65.0 66.5	66.5 75.0		1.3	53	- 65 -			GRAYISH RED 10R 4\2 CLAYSHALE			
							70 -			MEDIUM GRAY N-5 CLAYSHALE			

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-30 DATE 7/23/15 SHEET 4 OF 10

PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/5/96 BORING FINISH 9/11/96

PRO	JECT	MOU	JNTAI	NEER LBR LA	ANDF	ILL			во	RING START <u>9/5/96</u>	BORING FINISH	9	/11/96
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
13	NQ	75.0	85.0		9.9	95	75 - - - - 80 -						
14	NQ	85.0	95.0		10.0	78	85			MEDIUM GRAY N-5 SILTY SANDS Medium to large grain.	STONE		
753/15	NQ	95.0	105.0		10.0	20	90 - - - - 95			MEDIUM GRAY N-5 CLAYSHALE MEDIUM DARK GRAY N-4 SILTY (CLAYSHLE		
M LBK LF FKA SI.GFJ AEP.GDI 7/23/15							-			Hard.			

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



DOB NUMBER

COMPANY APPALACHIAN POWER COMPANY

PROJECT MOUNTAINEER LBR LANDFILL

BORING NO. 96-30

BORING FINISH 9/11/96

BORING START 9/5/96

BORING FINISH 9/11/96

NUMBER	SAMPLE	SAM DEF IN FI FROM	PLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							100 – -			GRAYISH RED 5R 4\2 SANDY CLAYSHALE Medium hard.		
16 N	IQ	105.0	115.0		10.0	50	105 -			DARK REDDISH BROWN 10R 3\4 CLAY SHALE Well cemented.		
							- - 110 – -			MEDIUM GRAY N-5 CLAYSHALE		
17 N	ΝQ	115.0	125.0		7.2	72	- 115 - - -			DARK REDDISH BROWN 10R 3\4 SILTY CLAYSHALE MEDIUM DARK GRAY N-4 CLAYSHALE Well cemented.		
							- 120 - - -					

AFP MTIBRI



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-30 DATE 7/23/15 SHEET 6 OF 10

BROWNING START 9/5/96 RORING SINISH 9/11/96

PROJEC	Τ <u>Μ</u> Ο	UNTAI	NEER LBR LA					ВО	RING START	9/5/96	BORING FINISH	9/11	/96
SAMPLE NUMBER SAMPLE	SA DE IN FROM	MPLE EPTH FEET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	uscs		SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
18 NQ	Q 125.0	135.0		9.7	83	125				RK GRAY N-4 SAND: cross bedding.	STONE Fine to		
						- 130 - - -							
19 NQ	Q 135.0	145.0		9.4	87	- 135 - -							
						- - 140 - - -				NISH GRAY 5G 4\12 d, broken are 140,14			
20 NQ	Q 145.0	155.0		10.0	96	- 145 -			MEDIUM DAR medium grain.	RK GRAY N-4 SAND	STONE Fine to		
						-							



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-30 DATE 7/23/15 SHEET 7 OF 10

BROWNEGT MOUNTAINFER LRR LANDELL BORING START 9/5/96 ROBING FINISH 9/11/96

PROJ	JECT	MOU	UNTAI	NEER LBR LA	ANDF	ILL			ВС	RING START	9/5/96	BORING FINISH	9/1	1/96
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs		SOIL / ROCK		WELL	DRILLER'S NOTES
21	NQ	155.0	165.0		10.0		155 -			medium grain,	Y N-5 SANDSTON well cemented. K GRAY N-4 SAND			
							- - -				Y N-5 CLAYSHALE) 10R 4\2 CLAYSH			
							160 -			MEDIUM GRA	Y N-5 CLAYSHALE	Ξ		
22	NQ	165.0	175.0		9.9	85	- 165 - - -			MEDIUM DAR medium grain.	K GRAY N-4 SAND	OSTONE Fine to		
							170 - -			GRAYISH RED) 10R 4\2 CLAYSH	EL		
23	NQ	175.0	185.0		10.0	71	- - 175 -							



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-30</u> DATE <u>7/23/15</u> SHEET <u>8</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/5/96 BORING FINISH 9/11/96 STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE S **DEPTH** SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO MEDIUM DARK GRAY N-4 CLAYEY SANDSTONE 180 184.1 Top of seal. 185 NQ 185.0 195.0 9.6 76 GRAYISH RED 1-R 4\2 CLAYSHALE APPROXIMATELY 42000 GALLONS OF WATER USED. MEDIUM GRAY N-5 CLAYSHALE 190 190.0 Top of sand. 195 DARK GRAY N-3 CLAYSHALE NQ 195.0 205.0 9.9 33 195.9 Top of screen. MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 LIGHT OLIVE GRAY 5Y 5\2 SANDY CLAYSHALE 200



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-30 DATE 7/23/15 SHEET 9 OF 10

PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/5/96 BORING FINISH 9/11/96

PRO	JECT	NO	JN I AI	NEER LBR LA	ANDF	ILL			ВО	RING START <u>9/5/96</u> BORING FINIS	SH <u>9</u>	/11/96
SAMPLE NUMBER	SAMPLE	SAM DEF IN F	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
										GRAYISH PURPLE SANDY CLAYSHLAE		* * * * * * * * * * * * * * * * * * *
26	NQ	205.0	215.0		9.9	88	205 -			GRAYISH PURPLE 5P 4\2 CLAYSHALE Broken, medium hard.		
							210 -			LIGHT GRAY N-7 SANDSTONE Hard, well cemented, cross bedding, medium to large grain.		
27	NQ	215.0	225.0		9.9	82	215 -					
							225 -			MEDIUM LIGHT GRAY N-6 TO DARK REDDISH 10R 2\2 SILTY CLAYSHALE Medium hard.		
								_		1-8-97 SWL 202.4 L pH COND SWL 5 8.26 2160 204.7 WATER LIGHT BROWN. 10 8.39 2140 205.75. 15 8.59 2002 207.0 20 8.80 2000 207.95 SLIGHTLY DARKER.		225.0 Bottom of screen. 227.0 Bottom of sand.

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______ BORING NO. 96-30 DATE 7/23/15 SHEET 10 OF 10

PROJECT	MOUNTA	INEER LBR LANDFILL		BORING S	TART <u>9/5/96</u>	BORING FINISH	9/	11/96
SAMPLE NUMBER SAMPLE	SAMPLE DEPTH IN FEET FROM TO	PENETRATION E S	GRAPHIC LEEST	N S C S	SOIL / ROCK		WELL	DRILLER'S NOTES
				30 8.5 35 8.6 40 8.5 45 8.4 50 8.5 55 8.6 60 8.5 70 8.6 75 8.6 80 8.5 82 8.4 82L W 1-9-97 pH C 8.58 2 8.63 2 8.67 2 8.65 2 8.72 2 8.56 2	2230. 2180. 2160.	N ABOVE.		



JOB	NUM	BER _							LO	GO	DF BORING
COM	IPAN'	AP	PALA	CHIAN	POWE	R CON	/IPA	<u>NY</u>		ВС	DRING NO. <u>96-31</u> DATE <u>7/23/15</u> SHEET <u>1</u> OF <u>7</u>
PRO	JECT	MO	UNTA	NEER	LBR L	ANDFI	LL			ВС	DRING START <u>9/11/96</u> BORING FINISH <u>9/12/96</u>
COC	RDIN	ATES	N 71′	1,108.2	E 1,6	96,404	8. l			PII	EZOMETER TYPE WELL TYPE
GRO	UND	ELEVA	TION _	826.6	SY	STEM .				HC	GT. RISER ABOVE GROUND <u>1.75</u> DIA <u>2.0</u>
Wate	er Lev	el, ft	∑ 5{	5.6	▼ 10	6.9	Ī	-		DE	EPTH TO TOP OF WELL SCREEN <u>55.8</u> BOTTOM <u>84.9</u>
TIME	=									WI	ELL DEVELOPMENT YES BACKFILL QUICK GROUT
DAT	E		9-5	5-96	9-1	7-96				FIE	ELD PARTY MCR-LD RIG BK-81
비유	Щ		/IPLE PTH	1	IDARD RATION		RQD	DEPTH IN FEET	<u>♀</u> "	S	SOIL / ROCK ☐ DRILLER'S
SAMPLE	SAMPLE		EET	RESIS	TANCE		%	IN	ZAPI LOC	SC	SOIL / ROCK ☐ ☐ DRILLER'S IDENTIFICATION NOTES
S Z	S	FROM	TO	1	VS / 6"	Lai	70	FEET	9	\supset	is in the first
1	SS	0.0	1.5	4-	6-5	.8				CL	RED CLAY Decon at fly ash site
									<u></u>		9-11-96 8:30 using potable water.
2	SS	1.5	3.0	8-8	3-12	.8					Hole grouted using
-									+==		100 gallons quick grout.
											Decon rig and tools
4	SS	3.0	4.5	10-1	12-16	8.					BROWN SHALEY CLAY 12-11-96 with potable
									#		water and Alconox. Bentonite seal
5	SS	4.5	6.0	15-1	19-19	1.0		5 -			GRAYISH BROWN CLAYSHALE hydroate 12-11-96
											grouting 12-12-96.
6	SS	6.0	6.8	25-	50/.3	.6			-		
		0.0	0.0	20-	307.3	.0					
									#		
7	NQ	9.0	15.0			5.5	8				DARK YELLOWISH ORANGE 10YR 6\6
								10 -			CLAYSHALE Soft.
								10			
									==		
									-		Silty
								15 -	-		GRAYISH BLACK N-2 SILTY CLAYSHALE
8	NQ	15.0	25.0			9.0	0				OVATION BEACK IV-2 SIETT CEATSTIALE
									揰		
7/23/15									-==		
3/											
AEP.GDI											
7											
Si.GPJ					USED						Continued Next Page
X		NQ-2 R 6" x 3.2	OCK CO 5 HSA	KE				PIEZOM SI (E: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SCREEN, G = GEONOR, P = PNEUMATIC
HAY -		9" x 6.2		VANCER	<u> </u>	4"					
<u> </u>		NW CA	SING	VAINCE	`	3"		WELL T	YPE:	_O'	W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
-	-	SW CA	SING			6"	-				RECORDER LD

AIR HAMMER

8"



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. 96-31 DATE _7/23/15 SHEET _2 OF __7

PROJECT _MOUNTAINEER LBR LANDFILL BORING START _9/11/96 BORING FINISH _9/12/96

NUMBER	SAMPLE	SAM DEF IN F	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	NQ	25.0	35.0		10.0	15	25 —			GRAYISH ORANGE 10R 7\4 CLAYSHALE MODERATE YELLOWISH BROWN 10YR 5\4 SANDSTONE Medium grain.		
							30 - - -			MEDIUM DARK GRAY N-4 SANDSTONE Fine to medium grain. LIGHT GRAY N-7 CLAYSHALE MEDIUM LIGHT GRAY N-6 SANDSTONE LIGHT GRAY N-7 CLAYSHALE MEDIUM GRAY N5 SANDSTONE Fine to medium grain, vertical fracture. LIGHT GRAY N/7 CLAYSHALE		
0	NQ	35.0	45.0		10.0	61	35			MEDIUM GRAY N-5 SANDSTONE Fine to medium grain. N-6		800 gallons water used.
							40 -			GRAYISH RED 5R 4\2 CLAYSHALE	- -	
1	NQ	45.0	55.0		9.9	59	45 -			MEDIUM GRAY N-5 TRACE OF RED CLAYSHALE		44.2 Top of sand



PRO	JECT MOUNTAINEER LBR LANDFILL								ВО	RING START 9/11/96 BORING F	INISH	9/	12/96
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	L	WELL	DRILLER'S NOTES
12	NQ	55.0	65.0		10.0	43	55 -			MEDIUM DARK GRAY N-4 CLAYSHALE GRAYISH RED 4-2 CLAYSHALE			55.8 Top of screen.
MI LBN LF FNA SLOF3 AEF GDI (723/13	NQ	65.0	75.0		10.0	85	65 -			MEDIUM GRAY N-5 CLAYSHALE MEDIUM DARK GRAY N-4 SILTY CLAYSHAL			

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>96-31</u> DATE <u>7/23/15</u> SHEET <u>4</u> OF ___ PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/11/96 BORING FINISH 9/12/96 SAMPLE STANDARD > ROD REPTURE

SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC	SOIL / ROCK DENTIFICATION		WELL	DRILLER'S NOTES
14	NQ	75.0	85.0		10.0	82	- - 75 –			MEDIUM GRAY N-5 SILTY SANDSTONE		
17	NQ	73.0	83.0		10.0	02	- - - 80 –			Medium to fine grain.		
							-					
15	NQ	85.0	95.0		10.0	95	85 - - - -			MEDIUM GRAY N-5 CLAYSHALE Stain 89.1. MEDIUM GRAY N-5 CLAYSHALE	*****	84.9 Bottom of screen. 86.0 Bottom of sand.
							90 -					
16	NQ	95.0	105.0		9.7	81	95 - - -			MEDIUM DARK GRAY N-4 CLAYSHALE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



TOOMPANY APPALACHIAN POWER COMPANY

PROJECT MOUNTAINEER LBR LANDFILL

BORING NO. 96-31

BORING START 9/11/96

BORING FINISH 9/12/96

PRO	JECT	IVIO	JINIAI	NEER LBR LA	ANDE	ILL			BC	RING START 9/11/96 BORING FINIS	∃ <u>9/</u>	12/96
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							100 -			MEDIUM GRAY N-5 SANDSTONE Fine to medium grain.		
17	NQ	105.0	115.0		10.0	68	- 105 - -			MEDIUM GRAY N-5 CLAYSHALE Well cemented.		
							110 -					
18	NQ	115.0	125.0		9.8	38	115 -			MEDIUM DARK GRAY N-4 CLAYSHALE Trace of red. DARK REDDISH BROWN 10R 3\4 CLAYSHALE		
							. 120 –			MEDIUM GRAY N-5 SANDSTONE Fine grain.		
							-			DARK REDDISH BROWN 10R 3\4 CLAYSHALE MEDIUM DARK GRAY N-4 CLAYSHALE MEDIUM GRAY N-5 SANDSTONE Fine grain.		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _______ BORING NO. 96-31 DATE 7/23/15 SHEET 6 OF 7

PRO	DJECT MOUNTAINEER LBR LANDFILL					ILL				RING START 9/11/96 BORING FINIS	H <u>9</u>	/12/96
SAMPLE	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
19	NQ	125.0	135.0		10.0	74	125 —			MEDIUM DARK GRAY N-4 SILTY SANDSTONE Fine grain.		
							_			MEDIUM DARK GRAY N-4 CLAYSHALE		
							-			DARK REDDISH BROWN 10R 3\4 CLAYSHALE		
							130 —					
							-			MEDIUM DARK GRAY N-5 SANDSTONE Fine to medium grain.		
20	NQ	135.0	145.0		10.0	39	135 -			MEDIUM DARK GRAY N-4 SANDSTONE Fine to		2400 gallons water
							_			medium grain. MEDIUM DARK GRAY N-4 CLAYSHALE		used.
							- - 140 —			GRAYISH RED 4-2 SILTY CLAYSHALE		
							-					
21	NQ	145.0	155.0		10.0	56	- 145			GRAYISH RED 5R 4\2 CLAYSHALE		
MILERALF FRA SI.GPJ AEP.GDI //23/15							-					
LBK LF FKA							_			MEDIUM LIGHT GRAY N-6 SANDSTONE Fine to medium grain.		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER		OG OF BOINING		_	
COMPANY APPALACHIAN PO	WER COMPANY	BORING NO. 96-31	DATE 7/23/15	SHEET OF	7
PROJECT MOUNTAINEER LB	R LANDFILL	BORING START 9/1	11/96 BORING FIN	IISH <u>9/12/96</u>	
SAMPLE STANDAR	RD > RQD DEDTU ()				

			JNTAI	NEER LBR LA	NDF	ILL			ВО	RING START 9/11/96 BORING FINIS		
SAMPLE	SAMPLE	SAM DEF IN FI FROM	PLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
22 N	NQ	155.0	165.0		9.9	99	155 — 160 — 165 —			MEDIUM DARK GRAY N-4 CLAYSHALE 1-29-97 SWL 85.85 DRY. 2-6-97 SWL 84.92.		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



		_	DAL AC	CLIAN	DOWE	B COI	MD A	NIV.			ODING NO. 0		D.4-	7	/22/4E CU		. 1 05 9
								<u>NY</u>							BORING FINISH		1 OF <u>8</u>
															WELL TYPE		
															WLLLTIFL DIA		
				045.5		SIEW									167.8 BOTTOM		
-		el, ft	∇		<u></u>		Ā										
TIME															BACKFILL RIG		QUICK GROUT
DAT	E									F	ELD PARTY _	KI	ED-KL I		RIG		DN-0 I
SAMPLE	SAMPLE	DE	MPLE PTH EEET TO	PENET RESIS	IDARD RATION STANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs			SOIL / ROC			WELL	DRILLER'S NOTES 7000 gallons of water
1	NQ	8.5	19.7			0		5 -									to drill hole. Rig and tools decon with potable water and Alconox. Cored hole from 8.5 to 19.7 soil sandy clay wash water.
LF FKA SI.GPJ AEP.GDT 7/23/15		NQ-2 R 6" x 3.2	OCK CO 5 HSA		USED			PIEZOM SLO			PE: PT = (OPE	tinued Nex	ORO	ge DUS TIP, SS =	: OF	PEN TUBE
느		9" x 6.2	5 HSA	N (A N 10 = 1		411											
MT LBR		<u>HW CA</u> NW CA		VANCE	₹	4" 3"	-	WELL T	YPE:	С	W = OPEN	I TU	BE SLOTT	ED S	SCREEN, GM	= (GEOMON
		SW CA	SING			6"					RECORD	ER	LD				
AEP		AIR HA	MMER			8"											-



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. 96-32 DATE _7/23/15 SHEET _2 OF _8

DROUGET _MOUNTAINEED | BR | ANDEN | PORING START _ 9/10/96 _____ PORING START _ 9/10/96

		SAM	1PLE	STANDARD	>	RQD	DECT:					
NUMBER	SAMPLE		TH	PENETRATION	FIT H	TIGE		GRAPHIC LOG	CS	SOIL / ROCK		DRILLER'S
JME	AMF		EET	PENETRATION RESISTANCE	PNO	%	IN	ΡĞ	S	IDENTIFICATION	WELL	NOTES
ž	Ś	FROM	TO	BLOWS / 6"	REG	/0	FEET	P.	\supset	ibertii 16/tii 16/ti		110120
2	NQ NQ	19.7 20.5	20.5 30.5		.8 9.8	0	-			LIGHT OLIVE GRAY 5Y 5\2 SANDSTONE Well cemented		
							- - -			MEDIUM BLUISH GRAY 5B 5\1 SANDSTONE Hard.		
							25 -	-===		DUSKY YELLOWISH 5Y6\4 CLAYSHALE		
							-			MEDIUM BLUISH GRAY 5B 5\1 SANDSTONE Hard.		
4	NQ	30.5	40.5		10.0	30	30 -			PALE REDDISH BROWN 10R 5/4 CLAYSHALE		
							35 -					
5	NQ	40.5	50.5		10.0		40 -			MODERATE REDDISH BROWN 10R 4\6 CLAYSHALE		
							- - 45 -					
								H		MEDIUM BLUISH GRAY CLAYSHALE		

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JOB NUMBER _______ BORING NO. 96-32 DATE 7/23/15 SHEET 3 OF 8

PROJECT MOUNTAINEER LBR LANDFILL BORING START 9/10/96 BORING FINISH 9/20/96

PRO	PROJECT MOUNTAINEER LBR LANDFILL							 BORING START 9/10/96 BORING FINISH 9/20/96			
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	USCS	SOIL / ROCK IDENTIFICATION	IIIM	DRILLER'S NOTES
6	NQ	50.5	60.5		10.0	90	50 -		MEDIUM LIGHT GRAY N-6 SANDY SHALE		
						55	55 -		MEDIUM LIGHT GRAY N-6 CLAYSHALE		
7	NQ	60.5	70.5		10.0	70	60 -		GRAYISH RED 10R 4\2 CLAYSHALE		
80	NQ	70.5	80.5		7.8	0	70 -		MIXED 5B 5\1 GRAY, RED CLAYSHALE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY DATE **7/23/15** SHEET **4** OF BORING NO. 96-32 PROJECT MOUNTAINEER LBR LANDFILL 9/10/96 BORING FINISH 9/20/96 **BORING START** SAMPLE **STANDARD** RQD SAMPLE NUMBER DEPTH SAMPLE USCS **DEPTH** PENETRATION LOG SOIL / ROCK WELL DRILLER'S IN FEET **RESISTANCE IDENTIFICATION NOTES FEET** BLOWS / 6" FROM TO 75 80 NQ 80.5 90.5 10.0 100 MEDIUM BLUISH GRAY 5B 5\1 SANDY SHALE 85 GRAY N-6 SANDSTONE Shale lens, well cemented. 90 Hard, massive NQ 90.5 100.5 10.0 100 95

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. 96-32 DATE _7/23/15 SHEET _5 OF _8

DROUGET _MOUNTAINFEED LBP LANDELL BORING START __9/10/96 _____ PORING START __9/10/96

PRO	JECT	MOL	UNTAI	NEER LBR LA					ВО	RING START <u>9/10/96</u> BORING FIN	ISH	9/2	20/96
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
11	NQ	100.5	110.5		10.0		100 —						
							- - 105						
12	NQ	110.5	120.5		8.6	20	- - 110 —			Limestone nodules.			
	110	110.0	120.0		0.0	20	- - - 115			MEDIUM BLUISH GRAY 5B 5\1 CLAYSHALE Badly broken, high angle fracture.		1 1//	
7/23/15							- - - - 120 —						
MI LBK LF FKA SI.GFJ AEP.GDI	NQ	120.5	130.5		10.0	97	-			MEDIUM GRAY N-5 CLAYSHALE LIGHT GRAY N-6 SANDSTONE Shale lens, soft gray clay seam 123.8-124.2.			

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY DATE **7/23/15** SHEET **6** OF BORING NO. 96-32 PROJECT MOUNTAINEER LBR LANDFILL 9/10/96 BORING FINISH 9/20/96 **BORING START** SAMPLE **STANDARD** RQD SAMPLE NUMBER DEPTH SAMPLE USCS **DEPTH** PENETRATION LOG SOIL / ROCK WELL DRILLER'S IN FEET RESISTANCE **IDENTIFICATION NOTES FEET** BLOWS / 6" FROM TO 125 130 LIGHT GRAY N-7 SANDSTONE Hard, coarse. NQ 130.5 140.5 10.0 100 MEDIUM LIGHT GRAY SANDSTONE Shale lens 135 LIGHT GRAY N-7 SANDSTONE Coarse grain, 140 15 NQ 140.5 150.5 10.0 100 145 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15

AEP MT L



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. 96-32 DATE _7/23/15 SHEET _7 OF _8

DROUGET _MOUNTAINFEED LBD LANDELL BORING START __9/10/96 _____ PORING START __9/10/96

		SAN	1PLE	STANDARD	>	BUD						
NUMBER	SAMPLE		" LL PTH	PENETRATION	뚩	TOOL	DEPTH	GRAPHIC LOG	CS	SOIL / ROCK	=	DRILLER'S
N	AME	IN F	EET	RESISTANCE		%	IN	RAP	n S (IDENTIFICATION	WELL	NOTES
) Z	S	FROM	то	STANDARD PENETRATION RESISTANCE BLOWS / 6"	. J#		FEET	Q				177
16	NQ	150.5	160.5		10.0							
							155 -			MEDIUM GRAY SANDY SHALE		
117	NQ	160.5	170.5		10.0	86	160 -					160.8 Top of seal.
							165 -			GRAY BLACK N-2 CLAYSHALE	6 ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° °	166.0 Top of sand.
18	NQ	170.5	180.5		10.0	59	170 -			BLACK COAL	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	167.8 Top of scree
										DARK GRAY N-3 CLAYSHALE		
							175 -	-E			i:E]. <u>.</u>

AED MT!B



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-32 DATE 7/23/15 SHEET 8 OF PROJECT MOUNTAINEER LBR LANDFILL 9/10/96 BORING FINISH 9/20/96 **BORING START** !E⊠ RQD SAMPLE STANDARD PENETRATION E DO LESS TANCE SAMPLE NUMBER GRAPHIC LOG DEPTH SAMPLE S DEPTH SOIL / ROCK DRILLER'S WELL SC IN IN FEET **IDENTIFICATION NOTES FEET** FROM BLOWS / 6" TO 176.9 Bottom of screen. 178.0 Bottom of sand. MEDIUM GRAY N-5 SANDSTONE Shale lens. 180 19 NQ 180.5 190.5 10.0 DARK GRAY CLAYSHALE 185 190 1-21-97 SWL 132.0 pH COND TEMP GALLONS SWL 7.96 1028 56 2.0 146.5. 8.75 960 27 2.0 154. 8.59 837 59 2.0 163.0. 8.78 829 60 2.0 164.5. 816 1283 58 2.0 170.0. 798 1421 57 2.0 -. WELL RECOVERED 2500 ML IN 20 MIN. 1-22-97 SWL 131.9. 8.12 2880 54 2.0 147.2. 8.00 2750 56 2.0 156.3. 7.85 3500 56 2.0 157.0. 1-23-97 SWL 132.1 PUMPED WELL TO 175' WITH ONE TEST pH 7.68 COND. 772 PUMP STOPPED RUNNING. 2-6-97 SWL 132.0'.

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



IOB	NII IM	RED							LO	GΟ	F BORING		
		_		CHIAN PO			- MPA	NY		ВС	RING NO. <u>96-33</u> DATE <u>7/23/15</u> S	HEET	1 OF 2
				NEER LE							RING START 1/21/97 BORING FINIS		
											ZOMETER TYPE WELL TYP		
GRO	DUND	ELEVA	TION _	669.8	SYS	STEM				HG	T. RISER ABOVE GROUND 1.94 DI	A 2 .	0
Wa	ter Lev	vel, ft		R T	<u> </u>		Ā	-		DE	PTH TO TOP OF WELL SCREEN	м <u>40</u>	0.0
TIM	E			:30						WE	ELL DEVELOPMENT YES BACKFIL	L <u>Q</u> l	UICK GROUT
DA	ΓΕ		1-22	2-97						FIE	ELD PARTY MCR-WEB RI	G <u>CI</u>	ME-75
		SAN	//PLE	STANDA	/BD	>	POD	DEPTH IN FEET					
SAMPLE	SAMPLE		PTH	STANDA PENETRA RESISTA	TION	독	RQD	DEPTH	HOHO	C S	SOIL / ROCK	╛	DRILLER'S
SAM	MA.	IN F	EET	RESISTA	NCE		%	IN	RA C	S O	IDENTIFICATION	WELL	NOTES
0, 2	- 07	FROM	ТО	BLOWS	/ 6"	78		FEET	Θ			24 12	
1	SS	3.2	4.7	7-7-8	3	1.4		5 -		CL	REDDISH BROWN SANDY CLAY Dry.		Drill & tools decon 1-21-97 prior to drilling with potable water
2	ss	8.2	9.7	7-11-1	18	1.4		- 10 -			GREENISH GRAY CLAY Dry.		
3	SS	13.2	14.7	3-3-8	3	1.3		- 15 -			LIGHT SILVER GRAY SANDY SHALE Moist to wet.		15.0 Top of seal.
AEP.GDI 7/23/15	SS NQ	18.2 18.8	18.7 20.2	50		.5 1.2	0				RED CLAYSHALE Weathered, dry. RED CLAYSHALE Soft hard in area.		
		TVD		ACINO	ISED					1	Continued Novt Page		
Si.GPJ				ASING U	i9EΩ						Continued Next Page		
X X		6" x 3.2		IKE				PIEZOM SI (E: PT = OPEN TUBE POROUS TIP, SS CREEN, G = GEONOR, P = PNEUMATIC		EN TUBE
¥ X		9" x 6.2		OVANCER		4"							FOMON
<u> </u>		NW CA	SING	VANUER		3"		WELL T	YPE:	0/	W = OPEN TUBE SLOTTED SCREEN, GI	vi = Gl	EUMUN
-		SW CAS	SING			6"					RECORDER WEB		

AIR HAMMER



JOB NUMBER _____

COMPANY APPALACHIAN POWER COMPANY BORING NO. 96-33 DATE 7/23/15 SHEET 2 OF 2

PRO	JECT	MOI	JNTAI	NEER LBR LA	ANDF	ILL				RING START 1/21/97 BORING FINI	SH <u>1</u>	/23/97
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
6	NQ	20.2	25.2		4.8	82	-			BLUISH GRAY CLAYSHALE Hard. BLUISH GRAY AND RED CLAYSHALE BLUISH GRAY CLAYSHALE Hard, fractures at 28.5, 30.6, 31.4, 32.8 soft, 30.8, 31.4 shaley sandstone.		20.0 Top of sand. 21.0 Top of screen.
7	NQ	25.2	35.2		10.0	92	30 -			BLUISH GRAY SANDY SHALE		
MILBRUFFKA SIGPU AEPGDI 7723/15	NQ	35.2	40.2		5.0	100	40 -			GRAY SANDY SHALE GRAY AND SILVER SANDSTONE Shale lens. GRAY SANDY SHALE GRAY AND SILVER SANDSTONE Shale lens. pH 8.68 COND. 635 TEMP. 56 HI. 2:40 4.04'. HI. 3:40 3.94. HI. 4:00 3.91. HI. 4:15 3.87. 1-30-97 1375 ML/MIN. ARTESIAN.		40.0 Bottom of screen. 41.1 Bottom of sand.

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



AEP 2005

Boring Logs

B0501 & B0502



JOB 1		_					_		LO		71 BOINING
				CHIAN							ORING NO. <u>B0501</u> DATE <u>7/23/15</u> SHEET <u>1</u> OF <u>14</u>
				INEER							DRING START <u>6/23/05</u> BORING FINISH <u>6/29/05</u>
		_		3,381.3			C4-	ite Plane using	<u> </u>		EZOMETER TYPE WELL TYPE
GRO	UND	ELEVAT	ION	797.6	S\	'STEM	NA	D27			GT. RISER ABOVE GROUND DIA
Wate	er Lev	el, ft	∇		Ī		Ā	-			EPTH TO TOP OF WELL SCREEN BOTTOM
TIME											ELL DEVELOPMENT BACKFILL QUICK GROUT
DATE	=									FIE	ELD PARTY MCR / CB RIG BK-81
SAMPLE		DEI	IPLE PTH EET TO	PENET RESIS	IDARD RATION TANCE VS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION Digging permit required and in hand. Grounding
1	SS	1.8	3.3	2-4	4-7	1.1		- - - 5			STIFF 10YR 6/6 DARK YELLOWISH ORANGE SILTY CLAY 3.0 tsf, Dry procedures not in use on this boring. Using well / fire protection water from Mountaineer Plant to drill with. Deconned on 06/23/05 using Mountaineer water and liqui-nox.
2	SS	6.8	7.1	50)/.3	0.2		-			HARD 10YR 7/4 GRAYISH ORANGE WEATHERED FINE GRAIN SANDY CLAY SHALE
	NQ2	15.1	25.1			6.9	7	- 10			10YR 7/4 GRAYISH ORANGE SILTY CLAY SHALE Iron Staining @ 11.2'-11.4' Broken Area @ 17.2'-17.8' Auger & spoon refusal @ 9.6'
5		TYPE	OF C	ASING	USED						Continued Next Page
X	9	NQ-2 R0 6" x 3.25 9" x 6.25	HSA HSA			4"			OTTE	D S	SCREEN, G = GEONOR, P = PNEUMATIC
		<u>HW CAS</u> NW CAS		OVANCER	≺	4" 3"	_	WELL TY	YPE:	0	W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
<u> </u>		SW CAS	SING			6"					RECORDER CB
ــــــا ۲		<u>AIR HAN</u>	<u>vimer</u>			8"					



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B0501 DATE 7/23/15 SHEET 2 OF 14

PROJECT MOUNTAINEER LBR LANDFILL BORING START 6/23/05 BORING FINISH 6/29/05

PRO	JECT	MO	JNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START 6/23/05 BORING FINISH	<u>6</u>	/29/05
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							-	-				SWL @ 22.4' on 6/24/05 w/ NQ hole to 60.1'
5	NQ2	25.1	30.1		2.3	48	25 - - -			5B 7/1 LIGHT BLUISH GRAY CLAY SHALE Broken Area @ 27.1'		
6	NQ2	30.1	40.1		5.8	9	30 -			SOFT 5YR 8/4 MODERATE BROWN CLAY		
							-			5B 5/1 MEDIUM BLUISH GRAY CLAY SHALE		
							35					
	NQ2	40.1	50.1		9.7	96	40 - - -			10YR 6/2 PALE YELLOWISH BROWN FINE to MEDIUM GRAIN SANDSTONE		
							- 45 -					

AFP MTIR



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. B0501 DATE 7/23/15 SHEET 3 OF 14

PROJECT MOUNTAINEER LBR LANDFILL BORING START 6/23/05 BORING FINISH 6/29/05

PRO	ECT	MO	JNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START	6/23/05	BORING FINISH	_6	/29/05
SAMPLE	SAMPLE	SAM DEF IN F FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS		SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
							-							
8	NQ2	50.1	60.1		9.6	80	50 –	=						
							-			SHALE 10YR 6/1 PAL	MEDIUM BLUISH G E YELLOWISH BRO IN SANDSTONE			
							55 -							
							-							
9	NQ2	60.1	70.1		9.5	100	60 –				E YELLOWISH BRO	OWN FINE to		1500 gallons of wa
							-			w/ coal streaks	sthroughout			60.1' SWL @ 62.2' on 6/27/05 w/ NQ hole
							65 –	-						120.1'
							-							
							70 –							SWL @ 68.2' on 6/28/05 w/ NQ hole 180.1'; 12 hr readi
10	NQ2	70.1	80.1		9.6	74	-			5Y 6/1 LIGHT SANDSTONE	OLIVE GRAY COA	RSE GRAIN		

AED MT I BD



JOB NUMBER ______ BORING NO. B0501 DATE 7/23/15 SHEET 4 OF 14

PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF					RING START <u>6/23/05</u> BORING FINISH <u>6/29/05</u>
SAMPLE	SAMPLE	DEF	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC	USCS	SOIL / ROCK ☐ DRILLER'S ☐ NOTES
							75 –			5B 5/1 MEDIUM BLUISH GRAY CLAY SHALE High angle fracture @ 73.9' - 70 degrees from horizontal w/ iron staining Soft area @ 74.6'-75.8' w/ iron staining
							-			
11	NQ2	80.1	90.1		9.0	61	80 -			High angle fracture @ 81.3' -80 degrees from horizontal
							85 -			Broken area w/ iron staining @ 85.2'-86.9'
										High angle fracture @ 86.9' - 40 degrees from horizontal High angle fracture @ 86.9' - 85 degrees from
	NQ2	90.1	100.1		9.8	91	90 -			horizontal
MI EBN EF FNA SLGFU AEF GUI (125) 13							95 -			Broken area w/ iron staining @ 94.8'
							-			

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. B0501 DATE _7/23/15 SHEET _5 OF ___14

PRO	JECT	MO	JNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START <u>6/23/05</u> BO	ORING FINISH _	5/29/05
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
13	NQ2	100.1	110.1		9.2	88	100 -					
							- - 105			SOFT 5YR 4/4 MODERATE BROWN SHALE	CLAY	
							- - -			5B 5/1 MEDIUM BLUISH GRAY CLAY	Y SHALE	
14	NQ2	110.1	120.1		9.3	84	110 - - - -			High angle fracture @ 112.6' - 50 degr horizontal High angle fracture @ 113.5' - 50 degr		
							- 115 - - -			horizontal High angle fracture @ 115.2' - 85 degr horizontal 5YR 4/4 MODERATE BROWN CLAY	rees from	
61/67/1	NQ2	120.1	130.1		9.6	88	- 120 —			5B 5/1 MEDIUM BLUISH GRAY CLAY		SWL @ 119.8' on
15	INQZ	120.1	130.1		9.6	σσ	-					6/29/05 w/ NQ hole to 310.1' 3500 gallons of water used to this point - 120.1'

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



TOOMPANY APPALACHIAN POWER COMPANY

PROJECT MOUNTAINEER LBR LANDFILL

BORING NO. B0501

BORING NO. B0501

BORING START 6/23/05

BORING FINISH 6/29/05

PROJECT	_ MOI	JNTAI	NEER LBR LA	ANDF	ILL				RING START <u>6/23/05</u> BORING FINISH	_6/	29/05
SAMPLE NUMBER SAMPLE	SAM DEF IN F FROM	PLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
						125 - - -			5YR 4/1 BROWNISH GRAY CLAY SHALE		
16 NQ2	130.1	140.1		9.4	70	- - 130 –			High angle fracture @ 129.2' - 40 degrees from horizontal High angle fracture @ 129.8' - 35 degrees from horizontal		
						-					
						135 -			High angle fracture @ 134.9' - 40 degrees from horizontal High angle fracture @ 136.1' - 40 degrees from horizontal		
						140 -			Horizontal soft area @ 138.1' 5B 5/1 MEDIUM BLUISH GRAY CLAY SHALE High angle fracture @ 139.4' - 35 degrees from		
17 NQ2	140.1	150.1		9.7	100	-	-		horizontal 5B 5/1 MEDIUM BLUISH GRAY SILTY CLAY SHALE		
						145 -			High angle fracture @ 143.9' - 75 degrees from horizontal		
						-					

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>B0501</u> DATE <u>7/23/15</u> SHEET <u>7</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 6/23/05 BORING FINISH 6/29/05 STANDARD
PENETRATION FENETRATION FOR STANCE RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE **DEPTH** SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES** FEET FROM TO 9.0 NQ2 150.1 160.1 SOFT 5B 5/1 BROWNISH GRAY CLAY SHALE 155 Broken area @ 157.2' 160 19 NQ2 160.1 170.1 9.6 79 5B 5/1 MEDIUM BLUISH GRAY SILTY CLAY **SHALE** 165 170 20 NQ2 170.1 180.1 9.9 100 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 175

AEP MT LB



JOB NUMBER _______ BORING NO. B0501 DATE 7/23/15 SHEET 8 OF 14

PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF					RING START <u>6/23/05</u>	BORING FINISH	6/	/29/05
SAMPLE NUMBER	SAMPLE	DEI	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
21	NQ2	180.1	190.1		9.6	96	180 -			Lligh angle freeture @ 104.21, CE d	logroop from		5500 gallons of water used to this point - 180.1'
22	NQ2	190.1	195.1		3.7	54	185 —			High angle fracture @ 184.2' - 65 de horizontal High angle fracture @ 187.7' - 55 de horizontal 5R 4/2 GRAYISH RED CLAY SHAL Soft area @ 190.2'	legrees from		
	NQ2	195.1	205.1		10	79	- - 195 - - -			Soft area @ 192.6'			
							200 – -	-		High angle fracture @ 198.7' - 40 do horizontal High angle fracture @ 199.1' - 40 do horizontal High angle fracture @ 200.1' - 40 do horizontal	legrees from		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _______ BORING NO. B0501 DATE 7/23/15 SHEET 9 OF 14

PROJECT MOUNTAINEER LBR LANDFILL BORING START 6/23/05 BORING FINISH 6/29/05

				I	ı									
NUMBER	SAMPLE	DEF IN F	IPLE PTH EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS		SOIL / ROCK IDENTIFICATIO		WELL	DRILLER'S NOTES
24 N		205.1	TO 215.1	BLOWS/6	8.2	100	205 -			SHALE	M BLUISH GRAY			
							210 -							
25 N	IQ2	215.1	223.1		9.2	64	215 - -			5R 4/2 GRAYIS	SH RED CLAY SH	I ALE		Picked up 1.1' fro previous run.
							220 -							
26 N	IQ2	223.1	230.1		6.2	47	225 –			horizontal	cture @ 224.6' - 2			
							-			horizontal High angle frac horizontal High angle frac	cture @ 225.7' - 36 cture @ 226.7' - 46 cture @ 227.1' - 46 ntinued Next I	0 degrees from 5 degrees from		

AEP MT LBF



TOB NUMBER _______ BORING NO. B0501 DATE 7/23/15 SHEET 10 OF 14

PROJECT MOUNTAINEER LBR LANDFILL BORING START 6/23/05 BORING FINISH 6/29/05

					NEER LBR LA		ILL			ВО	RING START 6/23/05 BORING FINIS		
SAMPLE	NUMBER	SAMPLE	SAM DEF IN F	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
2	27	NQ2	230.1	240.1		8.9	64	230 -	-		horizontal		7500 gallons of water used to this point - 230.1'
								235 -			5B 5/1 MEDIUM BLUISH GRAY SILTY CLAY SHALE		
								-	-		236.9'-239.7' - Clayey Limestone w/ secondary calcite fractures		
2	28	NQ2	240.1	250.1		9.9	100	240 - - - -			5B 5/1 MEDIUM BLUISH GRAY FINE GRAIN SILTY SANDSTONE Fine laminar bedding, grading to current ripple bedding w/ increasing depth		
								245					
MI LBK LF FKA SI.GPJ AEP.GDI 7/23/15	29	NQ2	250.1	260.1		10.0	83	250 - - -					
M													

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER
BORING NO. B0501
DATE 7/23/15
SHEET 11 OF 14

PROJECT MOUNTAINEER LBR LANDFILL
BORING START 6/23/05
BORING FINISH 6/29/05

PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START 6/23/05 BORING FINIS	H <u>6</u>	/29/05
SAMPLE	SAMPLE	DE	IPLE PTH EEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION 5R 4/2 GRAYISH RED CLAY SHALE	WELL	DRILLER'S NOTES
							255 - - -			5B 5/1 MEDIUM BLUISH GRAY FINE GRAIN SILTY SANDSTONE laminar to current ripple cross bedding, micaceous nodular limestone w/ maroon mottles		
30	NQ2	260.1	270.1				260 -			5B 5/1 MEDIUM BLUISH GRAY FINE GRAIN SANDSTONE		
							265 -			Broken area @ 263.5'-264.1' 5R 4/2 GRAYISH RED SILTY CLAY SHALE		
31	NQ2	270.1	280.1		9.7	80	270 - -	-				
							- - 275 –			5B 5/1 MEDIUM BLUISH GRAY FINE GRAIN SANDSTONE High angle fracture @ 272.9' - 45 degrees from horizontal Broken area @ 273.8'-274.9'		
							- - -					

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _______ BORING NO. B0501 DATE 7/23/15 SHEET 12 OF 14

PRO	JECT	MO	UNTAI	NEER LBR LA	NDF	ILL			ВС	RING START 6/23/05 BORING FINIS	SH <u>6</u>	/29/05
SAMPLE NUMBER	SAMPLE	DEI	IPLE PTH EEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
32	NQ2		290.1		9.7	100	- - 285 — - -			5B 7/1 LIGHT BLUISH GRAY FINE to MEDIUM GRAIN SANDSTONE Coal streaks throughout		9500 gallons of water used to this point - 280.1'
33	NQ2	290.1	300.1		10.0	100	290 — - - - - 295 —					
	NQ2	300.1	310.1		9.0	96	300 -					
							305 —			5B 7/1 LIGHT BLUISH GRAY SILTY CLAY SHALE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _______ BORING NO. B0501 DATE 7/23/15 SHEET 13 OF 14

DROUGET MOUNTAINEER LIBR LANDELL BORING START 6/23/05 BORING FINISH 6/29/05

Second S	PRO	JECT	MO	UNTAI	NEER LBR L	ANDF	ILL			BOF	RING START _	6/23/05	BORING FINISH	6	29/05
See No. See	SAMPLE NUMBER	SAMPLE	DEI IN F	PTH EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	SC				WELL	
36 NQ2 320.1 330.1 9.9 100 320 — SB 7/1 LIGHT BLUISH GRAY FINE to MEDIUM GRAIN SANDSTONE Coal streaks throughout 325 — 0.05' Clay Shale lense @ 326.9' 37 NQ2 330.1 340.1 10.0 67 330 — 5B 7/1 LIGHT BLUISH GRAY FINE to MEDIUM	35	NQ2						-			5B 7/1 LIGHT E	BLUISH GRAY FIN	E to MEDIUM		
36 NQ2 320.1 330.1 9.9 100 5B 7/1 LIGHT BLUISH GRAY FINE to MEDIUM GRAIN SANDSTONE Coal streaks throughout 325 - 0.05' Clay Shale lense @ 326.9' 37 NQ2 330.1 340.1 10.0 67 5B 7/1 LIGHT BLUISH GRAY FINE to MEDIUM								315 - - -							
37 NQ2 330.1 340.1 10.0 67 0.05' Clay Shale lense @ 326.9'	36	NQ2	320.1	330.1		9.9	100	320 — - -			GRAIN SANDS	STONE	E to MEDIUM		
37 NQ2 330.1 340.1 10.0 67 58 7/1 LIGHT BLUISH GRAY FINE to MEDIUM								325 — - - -			0.05' Clay Shale	e lense @ 326.9'			
	37	NQ2	330.1	340.1		10.0	67	330 —					E to MEDIUM		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B0501 DATE 7/23/15 SHEET 14 OF 14

BROWNEGT MOUNTAINEER LARD ANDELL BORING START 6/23/05 RORING FINISH 6/29/05

PROJE	CT .	MOL	JNTAI	NEER LBR LA	NDF	ILL			ВС	RING START 6/23/05 BORING FINIS	H <u>6</u>	/29/05
SAMPLE	SAMPLE	SAM DEF IN F	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							335 -			N1 BLACK COAL		
										337.8'-338.1' - Fractures w/ calcite fill HARD CLAY SHALE		
38 NO	Q2	340.1	350.1		9.8	100	340 -			5B 5/1 MEDIUM BLUISH GRAY CLAY SHALE Carbonaceous, fossil stems, pyrite		
							345 -					
							350 -					Stopped boring @ 350.1' on 6/29/05. Flushed boring with approx. 1000 gallons of water. Boring geo-physical logged on 6/29/05. Installation of 1" geomon well (MW-41) will be donat a later date.

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



							ALI	- 0	IVIL			ERING LABORAT F BORING	IORI			/11-12
		NUME	_							LO	00	DOMINO				
(COM	PANY	<u>AP</u>	PALAC	CHIAN	POWE	R COM	IPAI	NY		ВС	RING NO. <u>B0502</u>	DATE 7/23/15	_ SHE	ET _	1 OF 11
I	PROJ	JECT	MO	UNTAI	NEER	LBR L	ANDFIL	L_			BC	RING START	BORING	FINISH	6/	23/05
(COOI	RDIN	ATES _	N 713	3,726.5	E 1,7	32,783		- Dii			ZOMETER TYPE				
(GRO	UND	ELEVA	TION _	627.7	SY	STEM _	NAD	e Plane usin 27		HC	T. RISER ABOVE GROUN	D	_ DIA	_1"	
	Wate	r Lev	el, ft	<u> </u>	.8	▼ 3	.8	Ā	4.1			PTH TO TOP OF WELL SO				
Ī	TIME			8:00	0AM	12:3	0PM		8:30AN	1		ELL DEVELOPMENT				
Ī	DATE	Ξ		1/5	/05	1/1	1/05		1/13/0	5		LD PARTY MCR / CE	3	RIG	B	K-81
Γ			2/1	ИPLE	STAN	DARD	> p	QD	DEPTH IN FEET	Т						
	SAMPLE NUMBER	SAMPLE		PTH			ATT PER	UQD	DEPTH) 	CS	SOIL /	ROCK		-	DRILLER'S
	M M	AMF.	IN F	FEET	RESIS	RATION TANCE /S / 6"		%	IN	RAG	O S O	IDENTIF	ICATION		WELL	NOTES
	n z		FROM	ТО	BLOV	/S / 6"			FEET	Ö						
	1	SS	0.0	1.5	2-3	3-3	0.8					MEDIUM STIFF 5YR 5/6 SILTY CLAY	LIGHT BROWN			Grounding procedures not in use
										+=-		3.5 tsf, moist				on this boring. Using
	2	SS	1.5	3.0	2-2	2-3	0.6					MEDIUM STIFF 5YR 5/6	LIGHT BROWN			well / fire protection water from
]==		SILTY CLAY 1.5 tsf, w/ trace of fine sa	and moist			Mountaineer Plant to
	3	ss	3.0	4.5	1_4	2-2	0.5			ŧ		1.5 tsi, w/ trace or fine sa	and, moist			drill with. Deconned
			0.0	7.5	1-2	L- L	0.5							7	,	on 01/04/05 using Mountaineer water
															_	and liqui-nox with drill
	4	SS	4.5	6.0	2-	5-7	1.5		5 -	ŧ		STIFF 5YR 5/6 LIGHT BI 1.75 tsf, moist	ROWN CLAY			pump. SWL @ 3.8' on
										-		1.75 (51, 111015)				1/5/05 with HSA's to
	5	SS	6.0	7.5	2-	5-7	1.5			E						24.0' SWL @ 3.8' on
										<u> </u>						1/11/05 with HSA's
	6	ss	7.5	9.0	1_4	3-5	1.5					STIFF 5YR 5/6 LIGHT BI	ROWN CLAY			on bedrock. SWL @ 4.1' on
			7.5	3.0		J-3	1.5			==		1.25 tsf, moist	NOWIN OLAT			1/13/05 with NQ hole
																to 183.2'
	7	SS	9.0	10.5	2-4	4-5	1.5			E		STIFF 5YR 5/6 LIGHT BI 2.0 tsf, moist	ROWN CLAY			SWL @ 7.1' on 6/23/05 with NQ hole
									10 -	+=-		2.0 tor, motor				to 230.2'
	8	SS	10.5	12.0	2-3	3-6	1.5					STIFF 10YR 6/2 PALE Y	ELLOWISH BROWN	l		
										<u> </u>		CLAY 1.75 tsf, moist				
	9	ss	12.0	13.5	2-4	4-6	1.4			ŧ		STIFF 10YR 6/2 PALE Y	ELLOWISH BROWN			
										<u>}-</u> -		CLAY				
		00	40.5	45.0								1.5 tsf, moist	E 0.4/1011 DD014/11			
	10	SS	13.5	15.0	2-:	5-6	1.5			-		STIFF 10YR 6/2 PALE Y	ELLOWISH BROWN			
									4.5	E		2.25 tsf, moist				
Ī	11	SS	15.0	16.5	3-3	3-5	1.4		15 -	-		STIFF 5G 6/1 GREENISH				
										==		1.75 tsf, w/ trace of fine s	sand, moist			
	12	SS	16.5	18.0	3-	5-7	1.0					STIFF 10YR 6/6 DARK Y	ELLOWISH ORANG	Ε		
												CLAY				
2	12	ss	10.0	10.5	٠,		1.0			⇇		1.5 tsf, moist STIFF 5YR 4/4 MODERA	ATE PROMINICIAY			
11231	13	33	18.0	19.5	Z-\	3-6	1.2					1.5 tsf, moist	ATE BROWN CLAT			
פַרַ																
Ž.	14	SS	19.5	21.0	4-	5-6	0.9		_			STIFF 5YR 4/4 MODERA	ATE BROWN CLAY			
5			TYPE	E OF C	ASING	USED						Continued	Next Page			
5	X			OCK CO	RE				PIEZOM						DPI	EN TUBE
	Х		6" x 3.2! 9" x 6.2!	5 HSA					SLO	OTTE	ED S	CREEN, G = GEONG	DR, P = PNEUM	ATIC		
			HW CA	SING AD	VANCER	?	4" 3"	\dashv	WELL T	YPE:	_O	W = OPEN TUBE SLO	OTTED SCREEN	N, GM =	G -	EOMON
≥ -			SW CA				6"					RECORDER MCR	/ CB			

RECORDER MCR/CB

AIR HAMMER



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. B0502 DATE _7/23/15 SHEET _2 OF ____1

PRO.				NEER LBR LA			<u> </u>			RING NO. <u>B0502</u> DATE <u>7/23/15</u> S RING START 1/4/05 BORING FINIS		
											·· <u> </u>	
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
15	SS	21.0	22.5	4-5-7	1.2		-			1.75 tsf, moist STIFF 5GY 4/1 DARK GREENISH GRAY CLAY 1.5 tsf, moist		
16	SS	22.5	24.0	2-5-7	1.2		-			STIFF 5GY 4/1 DARK GREENISH GRAY CLAY 1.5 tsf, w/ trace of fine sand, moist	-	
17	SS	24.0	25.5	1-3-4	1.3		25 –			MEDIUM STIFF 10YR 6/6 DARK YELLOWISH ORANGE CLAY 2.25 tsf, w/ some shale fragments, moist		
18	SS	25.5	27.0	3-5-12	1.2		-			VERY STIFF 10G 6/2 PALE GREEN SHALEY CLAY 2.0 tsf, moist	_	
19	SS SS	27.0	27.3	50/.3	0.2		-			HARD 10G 6/2 PALE GREEN SHALEY CLAY Moist		
	NQ2		35.7	307.4	5.3	100	30 -			5B 5/1 MEDIUM BLUISH GRAY CLAY SHALE Soft broken area from 37.0' to 37.4'	_	Auger refusal @ 29.5'; started coring.
							-	-				
22	NQ2	35.7	45.7		9.3	90	35 - -					
							40 -			5R 4/2 GRAYISH RED CLAY SHALE		
							-	-				
							45 -					

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER _______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B0502 DATE 7/23/15 SHEET 3 OF 11

PROJECT MOUNTAINEER LBR LANDFILL BORING START 1/4/05 BORING FINISH 6/23/05

PRO	JECT	MO	UNTAI	NEER LBR LA	ANDF				ВО	RING START	BORING FINISH	6	/23/05
SAMPLE	SAMPLE	DEI	MPLE PTH EEET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
23	NQ2		55.7	BLOWOTE	4.4	30	50 — - - - - - 55 —						Reason for poor recovery - Core lifter stuck in end of inner tube and washed core away
24	NQ2	55.7	65.7		9.8	87	60 -			5B 5/1 MEDIUM BLUISH GRAY CL	LAY SHALE		
MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15	NQ2	65.7	75.7		10.0	100	65 — 70 —			5R 7/4 I IGUT DI HIGU GDAV FINE	T to MEDILIM		
AT LBR										5B 7/1 LIGHT BLUISH GRAY FINE GRAIN SANDSTONE	to MEDIUM		

AFP MTIBEL



JOB NUMBER _______ BORING NO. B0502 DATE 7/23/15 SHEET 4 OF 11 PROJECT MOUNTAINEER LBR LANDELL BORING START 1/4/05 RODING SINISH 6/23/05

PRO	JECT	MOL	<u>JNTAI</u>	NEER LBR L	ANDF	ILL				RING START <u>1/4/05</u> BORING FINISH	_6/	/23/05
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							- - 75 –					
26	NQ2	75.7	85.7		10.0	100	-					
							- 80 –					
							-					
27	NQ2	85.7	95.7		10.0	100	85 — - -					
							90 —					
							- - -			5B 5/1 MEDIUM BLUISH GRAY CLAY SHALE Area w/ numerous calcite deposits @ 92-93.6'		
28	NQ2	95.7	105.7		10.0	91	95 -			5B 7/1 LIGHT BLUISH GRAY FINE to MEDIUM GRAIN SANDSTONE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>B0502</u> DATE <u>7/23/15</u> SHEET <u>5</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 1/4/05 BORING FINISH 6/23/05 STANDARD
PENETRATION PLOOP
SISTANCE HAD ROD SAMPLE SAMPLE NUMBER GRAPHIC LOG SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 100 105 5B 5/1 MEDIUM BLUISH GRAY CLAY SHALE 10.0 5B 7/1 LIGHT BLUISH GRAY FINE to MEDIUM 29 NQ2 105.7 115.7 100 **GRAIN SANDSTONE** 110

115

120

10.0

100

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15

30 NQ2 115.7

125.7

Continued Next Page

5B 7/1 LIGHT BLUISH GRAY COARSE GRAIN

SANDSTONE

w/ cross bedding throughout



JOB NUMBER _______ BORING NO. B0502 DATE 7/23/15 SHEET 6 OF 11 PROJECT MOUNTAINEER LANDELL BORING START 1/4/05 RODING SINISH 6/23/05

PRO	JECT	_MO	UNTAI	NEER LBR LA	ANDF	ILL			ВО	RING START 1/4/05 BORING FINIS	H <u>6</u>	/23/05
SAMPLE	SAMPLE	SAM DEI IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
31	NQ2	125.7	135.7		10.0	85	125 — - -					
							- 130 — -					
32	NQ2	135.7	145.7		10.0	97	- 135 - -					
							- 140 — - -			High angle fracture @ 142.2' w/ clay shale		
33	NQ2	145.7	155.7		10.0	83	- - 145 — -					
LEDA LET TRANSILIGES AEET GES							-					

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B0502 DATE 7/23/15 SHEET 7 OF 11

PROJECT MOUNTAINEER LBR LANDFILL BORING START 1/4/05 BORING FINISH 6/23/05

		044	יחו ר	OTANDADD		DOD							
NUMBER	SAMPLE		IPLE PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	ATH MER)	RQD	DEPTH	GRAPHIC LOG	S	SOIL / ROCK		\exists	DRILLER'S
N	W W	IN F	EET	RESISTANCE		%	IN	RA CI	nsc	IDENTIFICATION	N	WELL	NOTES
Z	0)	FROM	ТО	BLOWS / 6"	RL		FEET	O	_				
								4		COAL			
							-						
							-	3					
							=	2					
							155 -	K					
84	NQ2	155.7	165.7		10.0	100	-			N4 MEDIUM DARK GRAY CLAY	SHALE		
							-						
							-						
							160 -						
							-						
							-						
							-						
							405						
							165 -						
35	NQ2	165.7	175.7		10.0	84	-			5B 5/1 MEDIUM BLUISH GRAY	CLAY SHALE		
							-						
							-						
							170 -						
							-						
							-						
							-						
\dashv							175 -						

AFP MT



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. B0502 DATE _7/23/15 SHEET _8 OF _____11

PRO	JECT			NEER LBR LA						RING START 1/4/05 BORING FINIS		
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
36	NQ2	175.7	183.2		7.5	91	180 -			5G 4/1 DARK GREENISH GRAY CLAY SHALE		
37	NQ2	183.2	185.2		2.2	64	-			5B 5/1 MEDIUM BLUISH GRAY CLAY SHALE Fracture @ 184.2'	-	Flushed boring with approx. 1000 gallons of water when boring stopped @ 183.2' on 1/12/05. SWL @ 8.8' on 6/22/05 with NQ hole to 183.2' Hole open
38	NQ2	185.2	191.2		3.9	85	185 - - -					to 175' Deconned rig & tools on 6/21/05 with water and liqui-nox. Resumed drilling on 6/22/05
39	NQ2	191.2	200.2		9.2	78	190 -			Fracture @ 189.7'		Picked up 0.2' of core from previous run.
40							195 -			Soft area @ 196.1' to 196.9'		
40	NQ2	200.2	210.2		9.8	76	200 -			5B 5/1 MEDIUM BLUISH GRAY CLAY SHALE w/ 5R 4/2 GRAYISH RED LENSES		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>B0502</u> DATE <u>7/23/15</u> SHEET <u>9</u> OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 1/4/05 BORING FINISH 6/23/05 STANDARD
PENETRATION PENETRATI SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO Fracture @ 203.1' 205 5B 5/1 MEDIUM BLUISH GRAY SILTY CLAY SHALE Hard 210 41 NQ2 210.2 10 96 220.2 5B 5/1 MEDIUM BLUISH GRAY SILTY FINE **GRAIN SANDSTONE** 215 220 42 NQ2 220.2 230.2 9.7 93 Soft area @ 224.3' 225 5B 5/1 MEDIUM BLUISH GRAY CLAY SHALE Hard

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY DATE **7/23/15** SHEET **10** OF BORING NO. B0502 PROJECT MOUNTAINEER LBR LANDFILL <u>1/4</u>/05 BORING FINISH 6/23/05 **BORING START** STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE RQD SAMPLE NUMBER DEPTH GRAPHIC SAMPLE S **DEPTH** F0G SOIL / ROCK DRILLER'S SCS WELL IN FEET **IDENTIFICATION NOTES FEET** FROM TO 230 NQ2 230.2 240.2 10.1 70 5B 5/1 MEDIUM BLUISH GRAY SILTY CLAY Picked up 0.1' of core SHALE from previous run. Hard

Soft area @ 232.0' 235 240 5B 5/1 MEDIUM BLUISH GRAY CLAY SHALE NQ2 240.2 250.2 9.9 96 Hard 5B 7/1 LIGHT BLUISH GRAY MEDIUM GRAIN SANDSTONE w/ COAL STREAKS **THROUGHOUT** 245 CLAY SHALE AREA @ 248.3 - 248.4 **5B 7/1 LIGHT BLUISH GRAY MEDIUM GRAIN** MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 SANDSTONE w/ COAL STREAKS THROUGHOUT 250 Stopped boring @ 250.2' on 6/23/05. Flushed boring with approx. 700 gallons of water. Boring was geo-physical logged on 6/29/05. Installation of 1" geomon well



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. <u>B0502</u> DATE <u>7/23/15</u> SHEET <u>11</u> OF __ PROJECT MOUNTAINEER LBR LANDFILL BORING START 1/4/05 BORING FINISH 6/23/05 PENETRATION RESISTANCE BLOWS / 6" RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH S DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO (MW-42) will be done at a later date.

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



AEP 2010, 2012

Boring Logs

B-0901 to B-0903, B-1201



JOB	NUM	BER _					_		LO		DOMINO							
				CHIAN				MY			DRING NO. B-0							OF
PROJECT MOUNTAINEER LBR LANDFILL											ORING START	1/5/	/10	_ BOF	RING FINI	SH _	1/7/10	
COC	ORDIN	IATES _	N 708	3,953.7	E 1,7	29,00				PII	EZOMETER TY	PE _ N	/A		WELL TY	PE _	OW	
GROUND ELEVATION 852.2 SYSTEM NA								te Plane usin D27/29	g 	HC	GT. RISER ABO	VE GRO	OUND	60	[DIA _2	2.0	
Water Level, ft				Z <u>¥</u>				-		DE	EPTH TO TOP C	OF WELL	SCREEN	98.	1 _ вотто	OM _	133.1	
TIME											ELL DEVELOPI	MENT _	YES		BACKF	ILL _	QUICK (ROUT
DATE											FIELD PARTY ZLR / MWJ RIG D-120							
				1			DOD	1			T							
当 任	: Ш		/IPLE PTH		DARD		RQD	DEPTH	<u>≥</u> .,	S		90	IL / ROCK				DD.	ILLER'S
SAMPLE	SAMPLE		EET	PENETRATION RESISTANCE BLOWS / 6"		TOT/ LENG RECOV	%	IN FEET	GRAPHIC LOG	nsc		ENTIFICATION			WELL		NOTES	
S Z	Ŝ	FROM	TO													.,		
											GROUNDING							
								-			DOZED A PAD ~1' OF FILL / CORE RUNNING DOWN 4" CASING TO 8.9' / WATER FROM MT							
											FIRE SYSTE							
								-										
								-	-									
								_										
								5 -										
								-										
								-										
1	NQ	8.9	14.6			1.6		-			LIGHT BROV	NN 5YR	5/6 SAND	STONE		_		
								10 -										
								-										
								-										
								-										
		440	04.0				0.4				LIGHT PROM	A() E) (D)						
2	NQ	14.6	24.6			9.4	64	15 -	1::::		LIGHT BROV		5/6 HARD	FINE				
											MODERATE				R 5/4			
								-			HARD FINE	GRAIN S	SANDSTOR	NE				
23/15								-										
7/2																		
EP.GD											MEDIUM BLI GRAIN SANI				FINE			
MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15	TYPE OF CASING USED										C	ontinue	ed Next I	Page		•	•	
X NQ-2 ROCK CORE PIEZOMETER											TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE							
6" x 3.25 HSA SLO											SCREEN, G							
LBR		HW CA	SING AD	VANCEF	}	4"		WELL T	YPE:	O'	W = OPEN T	TUBE S	SLOTTE	D SCF	REEN, G	6M = 0	GEOMO	N
		NW CAS				3" 6"												
AEP	MMER			8"		RECORDER												



LOG OF BORING JOB NUMBER ____ DATE **7/23/15** SHEET **2** OF _ COMPANY APPALACHIAN POWER COMPANY BORING NO. B-0901 PROJECT MOUNTAINEER LBR LANDFILL <u> 1/5/</u>10 BORING FINISH 1/7/10 **BORING START** STANDARD
PENETRATION PLOOP
SISTANCE SAMPLE RQD GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH **DEPTH** SOIL / ROCK WELL DRILLER'S SCS IN FEET **IDENTIFICATION NOTES FEET** FROM TO 3 NQ 24.6 34.6 8.8 **MEDIUM GRAY N5 HARD COARSE** 17 25 **SANDSTONE** w/fractures MEDIUM GRAY N5 COARSE SANDSTONE w/crossbeddings throughout **BROWNISH GRAY 5YR 4/1 HARD COARSE SANDSTONE** 30 w/fractures MEDIUM GRAY N5 HARD COARSE **SANDSTONE** w/crossbeddings throughout 4 NQ 34.6 MEDIUM LIGHT GRAY N6 SOFT SILTY 44.6 3.9 100 CLAYSHALE **DUSKY RED 5R 3/4 SOFT CLAYSHALE** MEDIUM BLUISH GRAY 5B 5/1 HARD **CLAYSHALE** 40 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15

10.0 60

5 NQ 44.6

54.6

Continued Next Page

MEDIUM BLUISH GRAY 5B 5/1 CLAYSHALE



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-0901** DATE **7/23/15** SHEET **3** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 1/5/10 BORING FINISH 1/7/10 SAMPLE STANDARD RQD PENETRATION PENETRATION RESISTANCE SAMPLE NUMBER GRAPHIC LOG SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S SC IN FEET **IDENTIFICATION NOTES FEET** FROM TO BLOWS / 6" MEDIUM BLUISH GRAY 5B 5/1 SOFT 50 **CLAYSHALE** MEDIUM BLUISH GRAY 5B 5/1 HARD **CLAYSHALE** 6 NQ 54.6 64.6 10.0 **MEDIUM GRAY N5 SANDSTONE** 55 **MEDIUM GRAY N5 COARSE HARD** SANDSTONE 60 -MEDIUM DARK GRAY N4 SILTY HARD SHALE 7 NQ 64.6 74.6 8.8 **MEDIUM DARK GRAY N4 SHALE** 65 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 **GRAYISH RED 5R 4/2 HARD SHALE** MEDIUM GRAY N5 SOFT SHALE 70 DARK REDISH BROWN 10R 2/2 SOFT SILTY

Continued Next Page

CLAYSHALE



JOB NUMBER ______

COMPANY _APPALACHIAN POWER COMPANY BORING NO. B-0901 DATE 7/23/15 SHEET _4 OF _7

PROJECT _MOUNTAINEER LBR LANDFILL BORING START _1/5/10 BORING FINISH _1/7/10

PROJECT	OJECT MOUNTAINEER LBR LANDFILL							BOI	RING START	_ BORING FINISH	1/7	/10
SAMPLE NUMBER SAMPLE	DEI	MPLE PTH EEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK	N	WELL	DRILLER'S NOTES
						-						
8 NQ	74.6	84.6		10.0	48	75 - -			VERY DARK RED 5R 2/6 SOFT	SHALE		
						-			MODERATE BLUISH GRAY 5B SHALE			
						80 -			VERY DARK RED 5R 2/6 SOFT	SHALE		
						-			MODERATE BLUISH GRAY 5B SHALE	5/1 HARD		
9 NQ	84.6	94.6		9.7	47	85 -			DARK GREENISH GRAY 5G 4/1	I HARD SHALE		
						-			DARK REDISH BROWN 10YR 3 SHALE	/4 SOFT		
						90 -			DARK GREENISH GRAY 5G 4/1	HARD SHALE		
						-						
10 NQ	94.6	104.6		10.0	63	95 - - -			DARK GREENISH GRAY 5G 4/1	HARD SHALE		

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



<u> </u>	MPLE EPTH FEET M TO	STANDARD PENETRATION RESISTANCE	AL STH VERY	RQD	DEPTH					
		BLOWS / 6"	TOTAL LENGTH RECOVERY	%	IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
					100 —					
					-			MEDIUM GRAY N5 COARSE HARD SANDSTONE w/crossbeddings throughout		
Q 104.	3 114.6		10.0	70	105			MEDIUM GRAY N5 COARSE HARD SANDSTONE w/crossbedding throughout		
					110 —					
					-			MEDIUM DARK GRAY N4 SOFT SHALE GRAYISH RED 10R 4/2 SOFT SILTY		
Q 114.	6 124.6		9.6	96	115 - -			CLAYSHALE DARK GREENISH GRAY 5G 4/1 HARD SHALE DARK GREENISH GRAY 5G 4/1 HARD SHALE w/fine sandstone		
					- - 120 —			GRAYISH RED 5R 4/2 HARD SHALE DARK GREENISH GRAY 5G 4/1 HARD SHALE		
					-					
			114.6 124.6			110	114.6 124.6 9.6 96 115 -	114.6 124.6 9.6 96 115	SANDSTONE w/crossbeddings throughout MEDIUM GRAY N5 COARSE HARD SANDSTONE w/crossbedding throughout MEDIUM DARK GRAY N4 SOFT SHALE GRAYISH RED 10R 4/2 SOFT SILTY CLAYSHALE DARK GREENISH GRAY 5G 4/1 HARD SHALE w/fine sandstone GRAYISH RED 5R 4/2 HARD SHALE DARK GREENISH GRAY 5G 4/1 HARD SHALE GRAYISH RED 5R 4/2 HARD SHALE DARK GREENISH GRAY 5G 4/1 HARD SHALE GRAYISH RED 5R 4/2 HARD SHALE DARK GREENISH GRAY 5G 4/1 HARD SHALE	SANDSTONE w/crossbeddings throughout MEDIUM GRAY N5 COARSE HARD SANDSTONE w/crossbedding throughout 110

AFP MTIR



JOB NUMBER _______ BORING NO. B-0901 DATE 7/23/15 SHEET 6 OF 7

PROJECT MOUNTAINEER LBR LANDFILL BORING START 1/5/10 BORING FINISH 1/7/10

		OJECT MOUNTAINEER LBR LANDFILL									RING NO. <u>B-0901</u> DATE <u>1/23/19</u> S RING START <u>1/5/10</u> BORING FINIS		
_													
SAMPLE	NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
_1	3	NQ	124.6	134.6		10.0	96	125 -			MEDIUM BLUISH GRAY 5B 5/1 HARD SHALE		
								130 -			BROWNISH GRAY 5YR 4/1 HARD SHALE		
											BROWNISH GRAY 5YR 4/1 HARD SHALE w/fine grain sandstone		
1	4	NQ	134.6	144.6		10.0	76	135 -			MEDIUM DARK GRAY N4 HARD SHALE GRAYISH RED 5R 4/2 HARD SHALE MEDIUM GRAY N5 HARD LIMESTONE		
								140 -					
WT LBR LF FKA SI.GPJ AEP.GDT 7/23/15	5	NQ	144.6	154.6		10.0	56	145 -			GRAYISH RED 5R 4/2 SOFT SHALE DARK REDDISH BROWN 10R 3/4 SOFT CLAYSHALE 145.0' - 146.8 and 147.8' - 151.0' fractures throughout	-	
IT LBR LF													

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-0901** DATE **7/23/15** SHEET **7** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING FINISH 1/7/10 STANDARD
PENETRATION PENETRATI HAD ROD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH **DEPTH** SOIL / ROCK WELL DRILLER'S SC IN FEET **IDENTIFICATION NOTES FEET** FROM TO **BROWNISH GRAY 5YR 4/1 HARD CLAYSHALE** w/limestone nodules throughout 16 NQ 154.6 159.6 4.9 73 **MEDIUM GRAY N4 HARD SHALE** 155 w/limestone nodules MEDIUM GRAY N4 SOFT SHALE w/limestone nodules **BROWNISH GRAY 5YR 4/1 HARD** LIMESTONE w/some hard clayshale STOPPED BORING @ 159.6' / PACKER TESTED BOREHOLE / BENTONITE PELLETS FROM 159.6' - 137.0' / PULLED 4" CASING / DECONNED 01/14/10 / DRLLED 6" CASING TO 9.5' / AIR HAMMER TO 136.0'

AEP MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



IOP	NII INAE	DED						LO	G O	FBORING
		_		CHIAN POWE	R COI	- MPA	NY		BC	ORING NO. B-0902 DATE 7/23/15 SHEET 1 OF 2
				NEER LBR L						DRING START 1/19/10 BORING FINISH 1/19/10
				9,192.0 E 1,7						EZOMETER TYPE N/A WELL TYPE OW
GRO	UND	ELEVA ⁻	ΓΙΟΝ [808.8 SY	STEM	Stat	e Plane usin 027/29	ng		BT. RISER ABOVE GROUND 3.04 DIA 2.0
	er Lev		${\nabla}$	T						PTH TO TOP OF WELL SCREEN 55.6 BOTTOM 80.4
TIM		Ci, it				-				ELL DEVELOPMENT YES BACKFILL QUICK GROUT
DAT										ELD PARTY ZLR / MWJ RIG D-120
щк	щ		/IPLE	STANDARD		RQD	DEPTH IN FEET	೦	S	2011/2004
SAMPLE	SAMPLE		PTH EET	RESISTANCE	NGTA NGTA	0/	IN	APH OG	SC	SOIL / ROCK ☐ DRILLER'S IDENTIFICATION NOTES
SA	SA	FROM		PENETRATION RESISTANCE BLOWS / 6"		%	FEET	GR	\supset	IDENTIFICATION ≥ NOTES
1	SPT	0.0	2.0	3-4-10-19	1.6		_	***		VERY STIFF MEDIUM DARK GRAY N4
								* * *		FLYASH
								* \$		moist
2	SPT	2.0	4.0	3-6-14-22	2.0			* \$		HARD MEDIUM GRAY N5 FLYASH
-		2.0		001122				* *		moist
								* *		
3	SPT	4.0	6.0	2 2 2 47	2.0			* \$		VERY STIFF MEDIUM GRAY N5 FLYASH
3	3P1	4.0	6.0	3-2-8-17	2.0			* \$		moist
							5 -	* *		
								* \$		
4	SPT	6.0	8.0	4-2-9-15	2.0			* *		VERY STIFF N4 FLYASH moist
								* *		moist
								* *		
5	SPT	8.0	10.0	4-7-13-27	2.0			*		HARD MEDIUM LIGHT GRAY N6 FLYASH
								* *		moist
								\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\		
6	SPT	10.0	12.0	2-4-10-25	2.0		10 -	☆		HARD MEDIUM DARK GRAY N4 FLYASH
								* * - * .		moist
								☆∴☆		
7	SPT	12.0	14.0	1-5-7-13	1.6			* \$		VERY STIFF MEDIUM DARK GRAY N4
								* *		FLYASH
								☆		1.0 tsf, moist, wet
8	SPT	14.0	16.0	1-6-8-13	1.8			* \$		VERY STIFF N4 MEDIUM DARK GRAY
							15	¥ \$		FLYASH
							15 -	***		1.5 tsf, moist, wet
9	SPT	16.0	18.0	2-3-4-6	1.4			* \$		MEDIUM STIFF N4 MEDIUM DARK GRAY
		10.0	10.0	2-3-4-0	1.4			* *		FLYASH
								**		2.5 tsf, moist/wet, trace of clay in end of spoon
2 40	ОРТ	40.0	00.0	0.0040	, _			* *		VEDVOTIES LIQUE PROMINENT PARAMETER
2 10	SPT	18.0	20.0	2-2-6-12	1.5					VERY STIFF LIGHT BROWN 5YR 5/6 STIFF CLAY
2								1		2.25 tsf, w/some fine sand, moist
Į.							_			
2		TYP	E OF C	ASING USED						Continued Next Page
X			OCK CO	RE			PIEZON			
X		6" x 3.2 9" x 6.2					SLO	OTTE	ED S	SCREEN, G = GEONOR, P = PNEUMATIC
Ä .		HW CA	SING AD	VANCER	4"		WELL T	YPE:	O'	W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
Ē		NW CA SW CA			3" 6"					RECORDER

RECORDER

AIR HAMMER



JOB NUMBER _____

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-0902 DATE 7/23/15 SHEET 2 OF 2

PRO	JECT	MOUNTAINEER LBR LANDFILL			ВС	DRING START 1/19/10 BORING FINISH 1/19/10					
SAMPLE	SAMPLE	DEF	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION □ DRILLER' NOTES	
11	SPT		22.0	2-10-19-30	1.8		-			HARD LIGHT BROWN 5YR 5/6 HARD CLAY w/trace of fine sand, dry	
12	SPT	22.0	24.0	7-11-15-27	2.0		-			HARD LIGHT BROWN 5YR 5/6 SILTY CLAY 3.5 tsf, w/trace of weathered sandstone fragments, dry	
13	SPT	24.0	26.0	4-11-19-30	2.0		25 –			HARD LIGHT BROWN 5YR 5/6 SILTY CLAY 3.0 tsf, w/trace of weathered sandstone fragments, dry	
14	SPT	26.0	28.0	6-8-10-22	1.8		-			VERY STIFF LIGHT BROWN 5YR 5/6 SILTY CLAY 3.5 tsf, w/trace of weathered sandstone fragments, moist	
15	SPT	28.0	30.0	3-8-12-31	1.2		-			VERY STIFF DARK REDDISH BROWN 10R 3/4 CLAY 2.5 tsf, moist HARD DRAK REDDISH BROWN 10R 3/4	
16	SPT	30.0	30.6	35-50/1	.6		30 –			CLAY dry HARD DRAK REDDISH BROWN 10R 3/4 WEATHERED CLAYSHALE 3.5 tsf, dry	
										HARD PALE YELLOWISH BROWN 10YR 6/2 CLAYSHALE dry SPOON REFUSAL @ 30.6' / FINISHED SPLIT SPOONING 01/19/10 / NOTICED ALOT OF RUST/IRON IN DRILL & DECON WATER / DRILLED 6" ROLLER BIT W/WATER TO 30.0' / PLACED 3/8" HOLE PLUG FROM 30.0' TO 26.5' / PULLED 6.25" HSA'S AND INSERTED 6" SW CASING TO 30.' / CLEANED BENTONITE FROM INSIDE OF 6' SW CASING W/6" ROLLER BIT & WATER TO CORE / STARTED CORING @ 30.2'	
I LBK LF FKA SI.GPJ AEP.GDT 7/23/15											

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-0903** DATE **7/23/15** SHEET **1** OF PROJECT MOUNTAINEER LBR LANDFILL BORING START **2/2/10** BORING FINISH **2/2/10** COORDINATES N 710,168.6 E 1,728,017.3 PIEZOMETER TYPE N/A WELL TYPE OW SYSTEM State Plane using NAD27/29 GROUND ELEVATION 793.0 HGT. RISER ABOVE GROUND 2.88 DIA 2.0 DEPTH TO TOP OF WELL SCREEN 59.6 BOTTOM 79.4 Water Level, ft WELL DEVELOPMENT YES BACKFILL QUICK GROUT TIME FIELD PARTY **ZLR / MWJ** RIG **D-120** DATE ± ≱ RQD SAMPLE **STANDARD** GRAPHIC LOG SAMPLE NUMBER DEPTH SAMPLE PENETRATION ZED **DEPTH** SOIL / ROCK WELL DRILLER'S S IN IN FEET RESISTANCE S IDENTIFICATION NOTES **FEET FROM** BLOWS / 6" TO SPT 0.0 2.0 11-5-5-11 .7 **VERY STIFF GRAYISH RED 5R 4/2 CLAY GROUNDING** 4.5 tsf, dry PROCEDURE NOT IN USE ON THIS BORING. VERY STIFF GRAYISH RED 5R 4/2 CLAY 2 SPT 2.0 4.0 6-7-8-12 1.0 3.75 tsf, dry **VERY STIFF LIGHT BROWNISH GRAY 5YR** 6/1 CLAY dry SPT 4.0 6.0 3-4-8-17 1.6 3 ÷ ¢ **VERY STIFF MEDIUM GRAY N5 FLYASH** ⊹ 5 1.0 tsf, moist ☆ ÷. SPT HARD LIGHT GRAY N6 FLYASH 6.0 8.0 9-8-12-20 17 ☆ 1.75 tsf ☼ **MEDIUM DARK GRAY N4 FLYASH** ☆ ☆ SPT 8.0 10.0 4-5-12-19 1.0 **MEDIUM LIGHT GRAY N6 FLYASH** 1.25 tsf HARD LIGHT BROWN 5YR 5/6 SANDSTONE AND CLAY 10 moist SPT 10.0 12.0 5-5-11-18 1.3 **: MEDIUM LIGHT GRAY N6 FLYASH** 1.0 tsf, moist DARK REDDISH BROWN 10R 3/4 HARD SPT 12.0 14.0 1-8-17-38 1.2 7 Ċ. \w/little red gravels/sand, moist ¢ ġ. **MEDIUM GRAY N5 FLYASH** ☆ 1.5 tsf. moist ⊹ HARD MEDIUM GRAY N5 FLYASH SPT 14 0 16.0 3-10-23-39 16 **:** ÷. 1.0 tsf, dry ÷. 15 -₩ Ċ. SPT HARD MEDIUM GRAY N5 FLYASH 9 16.0 18.0 3-10-17-20 1.0 Ö ÷. 1.5 tsf. moist Ö. ⊹ Ċ. ģ 10 SPT 18.0 **VERY STIFF MEDIUM GRAY N5 FLYASH** 20.0 3-6-7-12 1.4 ⊹ ÷. .5 tsf, moist ☼ AEP.GDT ÷. ÷Ċ: LF FKA SI.GPJ TYPE OF CASING USED Continued Next Page NQ-2 ROCK CORE PT = OPEN TUBE POROUS TIP. SS = OPEN TUBE PIEZOMETER TYPE: X 6" x 3.25 HSA SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC 9" x 6.25 HSA MTLBRI **HW CASING ADVANCER** OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON **NW CASING** 3" SW CASING 6"

RECORDER

AIR HAMMER



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-0903 DATE 7/23/15 SHEET 2 OF 4

PROJECT MOUNTAINEER LBR LANDFILL BORING START 2/2/10 BORING FINISH 2/2/10

FNO	JECI		UNIA	NEEK LBK LA	-INDI	ILL			ьО	RING START <u>2/2/10</u> BORING FINISH	7 <u>4</u>	12/10
SAMPLE NUMBER	SAMPLE		IPLE PTH EEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
	SPT	20.0	22.0	3-3-6-7	1.6		-			STIFF MODERATE YELLOWISH BROWN 10YR 5/4 CLAY .75 tsf, moist		
	SPT	22.0	24.0	4-4-12-20	1.7		-			HARD DARK YELLOWISH ORANGE 10YR 6/6 CLAY 3.0 tsf, moist		
	SPT		26.0	5-7-10-17	1.9		25 -			VERY STIFF HARD DARK YELLOWISH ORANGE 10YR 6/6 CLAY 2.75 tsf, moist		
14	SPT	26.0	28.0	4-5-8-12	1.6		-			VERY STIFF HARD DARK YELLOWISH ORANGE 10YR 6/6 CLAY 3.0 tsf, moist		
15	SPT	28.0	30.0	3-3-4-7			-			STIFF YELLOWISH ORANGE 10YR 6/6 CLAY 1.0 tsf, moist		
16	SPT	30.0	32.0	4-6-9-13	1.4		30 —			VERY STIFF MODERATE YELLOWISH BROWN 10YR 5/4 CLAY .75 tsf, w/little sand, moist		
	SPT	32.0 34.0	33.8 34.8	4-7-27-50/.3 40-50/.3	1.6		-			HARD DARK YELLOWISH BROWN 10YR 5/4 CLAY 2.5 tsf, w/weathered sandstone, moist		
1	NQ	35.0	39.0		2.5	0	35 - - -			DARK YELLOWISH ORANGE 10YR 6/6 SOFT CLAYSHALE		STOPPED SPLIT SPOONING @ 34.8' / PLACED 4.6' of SEAL IN BOTTOM OF BORING / PULLED AUGERS / DECONNED TOOLS ON 02/02/10 / SET 6"
2	NQ	39.0	49.0		10.0	18	40 -					CASING TO 34.8' in 4.6' SEAL / WASHED PLUG OUT OF 6" CASING
AET. GDI 7759/13							-			MEDIUM LIGHT GRAY SHALE		
VI LBK LF FKA SI.GFJ AEP.GDI 7/23/15							45 -			MEDIUM LIGHT GRAY SHALE w/iron staining MEDIUM GRAY N5 SHALE w/iron staining @ 45.6' and 47.1'		

AEP MT LBR



JOB NUMBER _______ BORING NO. B-0903 DATE 7/23/15 SHEET 3 OF 4

PROJECT MOUNTAINEER LBR LANDFILL BORING START 2/2/10 BORING FINISH 2/2/10

PRO	JECT	MO	JNIAI	NEER LBR LA					ВО	RING START 2/2/10 BORING FINISH	2/2	2/10
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	NQ	49.0	59.0		10.0	70	- - - 50 —			MEDIUM DARK GRAY N4 SOFT CLAYSHALE		
							- - - 55 —			MEDIUM BLUISH GRAY 5B 5/1 HARD SANDY CLAYSHALE w/high angle fracture 58.3' to 59.0'		
4	NQ	59.0	69.0		10.0	56	- - - 60 —			MEDIUM BLUISH GRAY 5B 5/1 CLAYSHALE		
							-			MEDIUM GRAY N5 WELL CEMENTED FINE GRAIN SANDSTONE MEDIUM GRAY N5 HARD SHALE		
							65 — - - -			BROWNISH GRAY 5YR 4/1 HARD SHALE BROWNISH GRAY 5YR 4/1 FINE GRAIN SANDSTONE		
5	NQ	69.0	79.0		10.0	64	70 -			MEDIUM BLUISH GRAY 5B 5/1 HARD FINE GRAIN SANDSTONE BROWNISH GRAY 5YR 4/1 HARD SHALE		

AFP MTIBR



LOG OF BORING JOB NUMBER COMPANY APPALACHIAN POWER COMPANY BORING NO. **B-0903** DATE **7/23/15** SHEET **4** OF _ PROJECT MOUNTAINEER LBR LANDFILL BORING START 2/2/10 BORING FINISH 2/2/10 STANDARD
PENETRATION PENETRATI HZ RQD SAMPLE GRAPHIC LOG SAMPLE NUMBER SAMPLE DEPTH DEPTH SOIL / ROCK WELL DRILLER'S USC IN FEET **IDENTIFICATION NOTES FEET** FROM TO 75 MEDIUM GRAY N5 HARD FINE GRAIN SANDSTONE MEDIUM GRAY N5 HARD FINE GRAIN NQ 79.0 85.8 5.4 33 SANDSTONE 80 -MEDIUM LIGHT GRAY SOFT CLAYSHALE DARK REDDISH BROWN SOFT CLAYSHALE 85 MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



10	וא סו	1 IN 1E	DED						LO	GΟ	F BORING		المنشان
			_		CHIAN POWEI	R COI	- MPA	NY		BC	PRING NO. B-1201 DATE 7/23/15 SI	HEET	1 OF 2
					NEER LBR LA			<u> </u>			PRING START BORING FINISI		
					4,832.4 E 1,7						EZOMETER TYPE WELL TYPI		
GF	ROU	ND	ELEVA ⁻	TION (621.6 SY	STEM	Stat NAI	e Plane usin 027/29	g		ST. RISER ABOVE GROUND 2.132 DIA		
				∇							PTH TO TOP OF WELL SCREEN 18.4 BOTTON		
	ME	LCV	Ci, it		<u></u>		-				ELL DEVELOPMENT Yes BACKFIL		
-	ATE						+		$\overline{}$	FIE)-120
SAMPLE	NUMBER	SAMPLE	DE	MPLE PTH FEET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	본눈빛	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
-	ı s	SPT	0.0	TO 1.5	4-2-4	.2					GRAVEL ROAD BASE		Grounding
	2 S			3.0	4-2-4	.2		-			MEDIUM STIFF MODERATE BROWN 5YR 4/4 CLAY		procedures in use. Drilling w/ 3.25" augers and split spoon sampling. Used high pressure
3	s s	SPT	3.0	4.5	2-4-5	.53		-			SOFT MODERATE BROWN 5YR 3/4 CLAY		and steam cleaning at plant.
4	ı s	SPT	4.5	6.0	2-1-1	1.3		_			SOFT MODERATE BROWN 5YR 4/4 CLAY		
Ę	5 S	SPT	6.0	7.5	4-3-3	1.1		5 -			.5 tsf SOFT DUSKY BROWN 5YR 2/2 CLAY .5 tsf MEDIUM STIFF PALE BROWN 5YR 5/2 CLAY		
6	S	SPT	7.5	9.0	4-5-6	.54		-			1.0 tsf STIFF GRAYISH BROWN 5YR 3/2 CLAY		
7	7 S	SPT	9.0	10.5	3-4-9	1.5		10 -			STIFF LIGHT BROWN 5YR 5/6 CLAY 2.0 tsf		
3	s s	SPT	10.5	12.0	3-4-4	1.5					STIFF LIGHT BROWN 5YR 5/6 CLAY .5 tsf		
9	s	SPT	12.0	13.5	2-3-2	1.5		-			MEDIUM STIFF LIGHT BROWN 5YR 5/6 CLAY .5 tsf		
1	0 S	SPT	13.5	15.0	5-7-15	1.5					VERY STIFF MODERATE BROWN 5YR 4/4 CLAY 3.0 tsf		
1	1 S	SPT	15.0	16.5	3-4-7	1.5		15 -			STIFF PALE BROWN 5YR 5/2 CLAY 2.5 tsf, wet		
1	2 S	SPT	16.5	18.0	3-3-4	1.5		-			MEDIUM STIFF MEDIUM LIGHT GRAY N6 CLAY 1.0 tsf, moist		
GDI //Z	3 S		18.0	19.5	3-3-14	1.4		-			VERY STIFF MEDIUM GRAY N5 CLAY 1.0 tsf, wet		
<⊢	4 S	SPT	19.5	21.0	3-3-4	1.2			E		MEDIUM STIFF MEDIUM LIGHT GRAY N6		
SI.GP.			TYP	E OF C	ASING USED						Continued Next Page		
H PKA	X	(NQ-2 R 6" x 3.2 9" x 6.2		RE			PIEZOM SLO			E: PT = OPEN TUBE POROUS TIP, SS CCREEN, G = GEONOR, P = PNEUMATIC		PEN TUBE
¥_	\exists		HW CA	SING AD	VANCER	4"		WELL T	YPE:	O	W = OPEN TUBE SLOTTED SCREEN, GN	/I = G	SEOMON
<u> </u>			NW CA SW CA			3" 6"					RECORDER		

RECORDER

AIR HAMMER



JOB NUMBER ______

COMPANY APPALACHIAN POWER COMPANY BORING NO. B-1201 DATE 7/23/15 SHEET 2 OF 2

BROWNEGT MOUNTAINFER LRR LANDFILL BORING START 1/10/12 PORING FINISH 1/10/12

PRO	JECT	_MOI	UNTAI	NEER LBR LA	ANDFILL				RING START	BORING FINISH	_1/	10/12
SAMPLE NUMBER	SAMPLE	DEF	IPLE PTH EEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCH		WELL	DRILLER'S NOTES
15	SPT	21.0	22.5	3-4-7	1.4	-			CLAY 1.0 tsf, wet STIFF MEDIUM GRAY N5 SAI 1.0 tsf, wet	NDY CLAY		
16	SPT	22.5	24.0	4-4-10	1.2	-			STIFF MODERATE BROWN 5 1.5 tsf, wet	YR 4/4 CLAY		
	SPT	24.0	25.5	5-15-24	1.5	25 –			HARD GREENISH GRAY 5GY CLAYSHALE wet w/rock fragments througho	out		
	SPT	25.5 27.0	27.0	17-47-50/.3 5-45-50/.3	1.3	-			HARD GREENISH GRAY 5GY CLAYSHALE wet HARD DUSKY YELLOW GREE			
20	SPT	28.5	30.0	8-27-50/.3	1.3	-			CLAYSHALE wet HARD DUSKY YELLOW GRE CLAYSHALE	EN 5GY 5/2		
						30 -			wet			

MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15



Arcadis 2016

Boring Logs

MW-1611, MW-1612, SB-1602, SB-1609R, SB-1610, SB-1619R, SB-1619R ALT

СОМ	PAN'	Y <u>An</u>	nericar	5976.0009 Electric Pow		-				ORING NO. MW-1611 DATE 09/22/16 SHEET 1 OF 3
										DRING START 06/02/16 BORING FINISH 06/02/16
				I, 948.8 E 1,73 654.0 SY						EZOMETER TYPE NA WELL TYPE
					STEIN			=		ST. RISER ABOVE GROUND 2.89 DIA DIA
		el, ft	$\overline{\Delta}$	<u> </u>		Ā				
TIME										ELL DEVELOPMENT BACKFILL BACKFILL BACKFILL BACKFILL
DATI									FIE	ELD PARTY NA RIG Hollow Stem Auge
SAMPLE	SAMPLE	DE IN F	MPLE PTH EEET	STANDARD PENETRATION RESISTANCE	COVE	RQD %	DEPTH IN FEET	RAPHIC LOG	uscs	SOIL / ROCK ☐ DRILLER'S IDENTIFICATION NOTES
		FROM		BLOWS / 6"	L J Ä		FEET	0		
0	NR	0.0	10.0		0		5 -			Straight drilled to 10 feet, boring was pre-drilled for utility clearance; no samples were taken.
1 2	SS	10.0	12.0	2-3-3-3 0-0-2-3	0.3		- 10 - -		CL	FILL, brown, very soft, slightly silty fill. Clay; some silt; moist; soft; medium plasticity; medium tough; (5Y 4/1).
		TYP	E OF C	ASING USED						Continued Next Page
NA NA		6" x 3.2	OCK CO 5 HSA 5 HSA	DRE						PE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SCREEN, G = GEONOR, P = PNEUMATIC
NA		HW CA	SING A	DVANCER	4"		WELL T	YPE:	O۱	W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON
NA NA		<u>NW CA</u> SW CA			3" 6"	\dashv				
NA			MMER		8"					RECORDER J. Wanner

JOR NOMB	ER							
COMPANY	American Electric Power	BORING NO. MW-	-1611	DATE 09/22/16	SHEET	2	OF _	3
PROJECT	Mountaineer Plant	BORING START	06/02/	16 BORING FII	vish 06	/02/1	6	

PR	PROJECT Mountaineer Plant									ВС	RING START <u>06/02/16</u> BORING FINISH	- <u>(</u>	06/02/16
SAMPLE	NOMBER	SAMPLE	SAM DEF IN F	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
3	S	SS	14.0	16.0	0-0-1-2	24		15 —					
4	5	SS	16.0	18.0	0-0-0-0	24		-		CL	Clay with silt; little to some sand, fine to medium; soft; low plasticity; low toughness; moist; color 5GY 6/1 (greenish gray); bottom 0.5 feet includes 10% gravel.		
5	\$	SS	18.0	20.0	3-4-3-5	19		-					
R.GPJ	3	SS	20.0	22.0	21-22-24-31	12		20 -			Note: From 20 to 22 feet moist; color grades to (5/56-1).		
REVAEP MOUNTAINEER.GPJ	\$	SS	22.0	24.0		0.3		-			Weathered shale; dry; fine pastes; weak plates; very faint iron staining. Straight drilled using a tricone bit, weathered bedrock.		
IOUNTAINEER 7-2016	5	SS	24.0	26.0		24		25 –					
AEP.GDT - 09/22/16 10:24 - C:\CHERYL\PROJECTS\AEP MOUNTAINEER 7-2016 CO CO CO CO CO CO CO CO CO C	F	RC	26.0	30.5		60	60	- - -			Sandstone; field strength strong; color 10YR 6/3 to 10YR 5/2; texture medium grained; structure thinly bedded; decomposition slight; disintegration slight; fracture density intensely slight to very intense.		

JOB NUMBER OH015976.0009

COMPANY American Electric Power BORING NO. MW-1611 DATE 09/22/16 SHEET 3 OF 3

PROJECT MOUNTaineer Plant BORING START 06/02/16 RORING FINISH 06/02/16

				er Plant	<u> </u>					PRING NO. MW-1611 DATE 09/22/16 SIPRING START 06/02/16 BORING FINISH		
SAMPLE	SAMPLE	SAM DEF IN F FROM		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
10						58	-			Sandstone; field strength strong; color N 3/ (very dark gray) to N 6/ (gray); texture medium grained; structure thinly bedded, cross-bedded; decomposition fresh; disintegration competent; fracture density none unfractured.		
EVAEP MOUNTAINEER.GPJ	RC	35.5	40.7							Shale; field strength very weak to moderate; color N5/ (gray) to 10Y 5/1 (greenish gray); texture medium grained; structure thinly bedded; decomposition slightly; disintegration slightly; fracture density moderate to intense. Claystone/Mudstone; field strength; moderate to strong; color 7.5R 3/3; texture fine grained; structure thinly bedded; decomposition slightly; disintegration slightly; fracture density moderate to intensely. Muddy shale; field strength strong; color 10BG 4/1 (dark greenish gray) to 5BG 4/1 (dark greenish gray); texture fine grained; structure thinly bedded; decomposition slightly; disintegration slightly; fracture density moderately to intensely.		
76 X	12 RC 40.7 46.0 57.6 39 -						-		CL	Claystone/Mudstone; field strength strong; color N 2.5/ (black) to 5GY 4/1 (dark greenish gray); texture fine grained; structure massive; decomposition moderately; disintegration slightly to moderately; fracture density intensely. Claystone/Mudstone; field strength strong; color 5GY 4/1 (dark greenish gray); texture fine grained; structure massive; decomposition slightly; disintegration slightly; fracture density moderately.		
AEP.GDI - UE							-	<i>Y////</i>		End of boring at 46 feet.		

AMERICAN ELECTRIC POWER SERVICE CORPORATION

							ΑE	PC	IVIL E			ERING LABORATORY		
J	ОВ	NUM	BER	OH01	5976.00	09				LO	GΟ	F BORING		
					Electri		er	_			ВС	ORING NO. <u>MW-1612</u> DATE <u>09/22/16</u> S	HEET	_1OF9
P	RO	JECT	Mou	untaine	er Plar	nt					ВС	DRING START BORING FINIS	н <u>о</u>	7/14/16
C	00	RDIN	IATES _	N 709	,978.5	E 1,72	27,983	3.1			PIE	EZOMETER TYPE NA WELL TYP	E <u>O</u>	W
G	RO	UND	ELEVA	TION_7	780.7	SY	'STEM				HG	GT. RISER ABOVE GROUND 2.57 DI	A <u>2</u> '	
٧	Vate	er Lev	/el, ft	$\overline{\mathbb{V}}$		Ţ		Ī	-		DE	PTH TO TOP OF WELL SCREEN 101 BOTTO	и <u>1</u> 2	21
7	IME	<u> </u>										ELL DEVELOPMENT NA BACKFIL		
[DAT	E									FIE	ELD PARTY NA RI	в <u>Н</u>	ollow Stem Auge
	NUMBER	SAMPLE	DEI	MPLE PTH EEET	STAN PENETI RESIS	DARD RATION TANCE /S / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
AINEER. GPJ	0	NR	0.0	8.0			0		5 -	-		Straight drilled to 8 feet, boring was pre-drilled for utility clearance; no samples were taken.		
KEVWEP MOUNIAIN	1	SS	8.0	10.0	2-6-	9-12	21		40		CL	Clay; trace silt; medium to high plasticity; no dilatancy; moist; stiff; yellowish red (5YR 4/6).	-	
LIPROJECTS/AEP MOUNTAINEER 7-2016	3	SS	10.0	12.0	6-7- 3-6-	-9-9	23		- 10 -	-	CL	Clay; little silt; trace very fine sand; medium plasticity; no dilatancy; moist; very stiff; yellowish brown (10YR 5/4) with trace stone brown and light gray (75YR 5/8).		
30 - C:\CHERYL\PROJE	4	ss	14.0	16.0	2-6-	9-10	28			-		Note: At 13 feet color changes to strong brown (7.5YR 4/6). Note: At 13.1 feet lens of poorly sorted sand, fine to very coarse; and granules; angular, black. Note: From 14 to 16 feet strong brown; 10%		
TYPE OF CASING USED												Continued Next Page		
1777											R TYF	PE: PT = OPEN TUBE POROUS TIP. SS	S = 0	PEN TUBE

- AEP.GDT - 09/22 NA NA NA NA NA NA NA

6" x 3.25 HSA

9" x 6.25 HSA

NW CASING

SW CASING

AIR HAMMER

HW CASING ADVANCER

3"

6"

8"

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

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

RECORDER K. Eldridge

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1612

BORING START 07/12/16

BORING EINISH 07/14/16

PRC	JECT Mountaineer Plant SAMPLE STANDARD RQD DE								ВС	RING START <u>07/12/16</u> BORING FINISH	− 0	7/14/16
SAMPLE	SAMPLE	DEF	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
5	SS	16.0	18.0	3-5-7-8	26		-			light gray; 1% black; no sand.		
6	SS	18.0	20.0	3-6-7-8	25		-		CL	Clay; trace silt; some very fine sand; low		
									OL	plasticity; moist; very stiff; strong brown with approximately 3% light gray (7.5YR 5/6).		
7	SS	20.0	22.0	4-6-7-6 2-6-17-18	19		20 -		CL	Clay, little silt; trace fine sand; trace weathered fragments sandstone, olive (5Y 5/3); medium plasticity; very stiff; moist; strong brown (7.5YR 4/6) with 10% black (7.5YR 2 5/1).		
9	SS	24.0	26.0	50/4-7	2		-		CL	Clay; some silt; low to medium plasticity; no dilatancy; dry; yellowish brown (10YR 5/6) with 10% dark brown (10YR 3/3). Weathered shale; dry; (10YR 5/6).		
10	RC	26.5	27.7		14.4		25 - - -			Sandstone; field strength weak; color 2.5 Y 5/4 light olive brown with orange oxidize lamination; texture fine grained; structure laminated; decomposition slight; disintegration slight; fracture density intense.		
11	RC	27.7	32.6		59		30 —			Sandstone; field strength strong; color 5Y 4/2, (olive gray) to 5B 5/1 (bluish gray) with orange oxidize lamination; texture fine grained; structure laminated; decomposition slight; disintegration slight; fracture density moderate.		
10	RC	32.6	36.2 43		- - -							

LOG OF BORING JOB NUMBER **OH015976.0009** COMPANY American Electric Power BORING NO. MW-1612 DATE 09/22/16 SHEET 3 OF 9 PROJECT Mountaineer Plant BORING START 07/12/16 BORING FINISH 07/14/16 STANDANL PENETRATION RESISTANCE **SAMPLE** RQD SAMPLE NUMBER DEPTH SAMPLE DEPTH SOIL / ROCK DRILLER'S LOG SCS WELL IN FEET **IDENTIFICATION NOTES** FEET **FROM** TO 35 Shale; field strength very strong; color 10Y 4/1 (dark greenish gray) to 5GY 5/1 (greenish gray) with trace oxidize lamination; texture fine 13 RC 36.2 41.9 68 grained; structure laminated; decomposition high; disintegration slight; fracture density intense. Claystone/Mudstone; field strength very weak; color 5R 3/2 (dusky red) and 10BG 4/1 (dark greenish gray); texture fine grained; structure massive; decomposition high; disintegration slight; fracture density intense. RC 41.9 46.9 60 Shale; field strength very weak; color 10G 4/1 (dark greenish gray); texture fine grained; structure laminated; decomposition slight; disintegration slight; fracture density moderate. AEP.GDT - 09/22/16 10:30 - C.\CHERYL\PROJECTS\AEP MOUNTAINEER 7-2016 REV\AEP MOUNTAINEER.GPJ 45 Sandstone; field strength strong; color 10BG 5/1 (greenish gray); texture fine grained; structure massive; decomposition fresh; disintegration slight; fracture density moderate. 15 RC 46.9 51.5 55 Shale trace calcite fossil; field strength moderate to strong; color 10G 4/1 (dark greenish gray) to 5B 4/1 (dark bluish gray); texture fine grained; structure laminated; 50 decomposition slight; disintegration slight; fracture density moderate. 16 RC 51.5 57.9 60.36 Shale; field strength strong; color 5B 4/1 (dark bluish gray); texture fine grained; structure laminated; decomposition slight; disintegration slight; fracture density moderate.

JOB NUMBER OH015976.0009 LC											BORING	
					Electric Pow	er	_			BO	RING NO. <u>MW-1612</u> DATE <u>09/22/16</u> SHEET <u>4</u> OF <u>9</u>	
					er Plant	<u>. </u>					RING START 07/12/16 BORING FINISH 07/14/16	
SAMPLE	NUMBER	SAINIPLE	SAM DEF IN F FROM	PTH EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES	
								55 -				
								-				
17 RC 57.9 60.8 34.8								-				
								-			Sandstone with some shale; field strength very strong; color 5B 4/1 (dark bluish gray); texture	
11	3 R	C	60.8	126.3		54		60 -			fine grained; structure massive; decomposition slight to fresh; disintegration competent; fracture density moderate. Sandstone some shale; field strength strong to	
			00.0	120.5		54					very strong; color 5B 4/1 (dark bluish gray); texture fine grained; structure medium to laminated; decomposition slight to fresh; disintegration competent; fracture density slight.	
								_	=			
19	9 R	.C	65.5	67.5		31.56		65 -			Sandstone; field strength very strong; color 5B 5/1 (bluish gray); texture fine grained; structure	
20) R	ıc.	67.5	71.6		59.76		-			laminated with x-bedding; decomposition fresh; disintegration competent; fracture density none.	
								70 –		CL	Claystone/Mudstone; field strength very weak; color 5R 3/4 (dusky red) and 5BG 4/1 (dark greenish gray); texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density moderate.	
2	1 R	a.c	71.6	77.6		58.92				CL	Claystone/Mudstone; field strength very weak;	
77760 - 1	21 RC 71.6 77.6 58.92										color 10R 3/4; texture fine grained; structure massive; decomposition fresh to slight; disintegration slight; fracture density moderate.	

JOB NUMBER OH015976.0009

COMPANY American Electric Power BORING NO. MW-1612 DATE 09/22/16 SHEET 5 OF 9

PROJECT Mountaineer Plant BORING START 07/12/16 BORING FINISH 07/14/16

PR	DJEC.	T_ Mοι	ıntaine	eer Plant					ВС	RING START <u>07/12/16</u> BORING FINISH	Η_	07/14/16
SAMPLE	SAMPLE		IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							- 75 –					
22	RC	77.6	7.6 81.6 58.8						CL	Claystone/Mudstone with cal fossil; field strength very strong; color 5BG 3/1 (very dark greenish gray); texture fine grained; structure massive; decomposition fresh to slight; disintegration slight; fracture density moderate. Shale; field strength very weak; color 5BG 4/1 (dark greenish gray); texture fine grained;		
23	RC	81.6	86.4							structure laminated; decomposition fresh; disintegration competent; fracture density intense. Sandstone with trace calc. fossil; field strength very strong; color 5BG 4/1 (dark greenish gray); texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density slight.		
REVAEP MOUNTAINEER.GPJ							- - 85 —		CL	Claystone/Mudstone; field strength moderate; color 2.5R 2.5/3 and trace 10G 4/1 (dark greenish gray); texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density moderate.		
	RC	86.4	92.4		59.52		-					
CHERYL/PROJECTS							90 –			Shale and sandstone transition; field strength strong; color 5BG 6/1 (greenish gray); texture fine grained; structure laminated; decomposition fresh; disintegration competent; fracture density moderate.		
AEP GDT - 09/22/16 10:30 - C:\CHERYL\PROJECTS\AEP MOUNTAINEER 7-2016							-			Sandstone; field strength very strong; color 5B 5/1 (bluish gray); texture fine grained; structure laminated and x-bedding; decomposition fresh; disintegration competent; fracture density none.		

JOB	NI II/	IRFR	OH01!	5976.0009				LO	GΟ	F BORING		
				Electric Pow	er	_			ВС	PRING NO. MW-1612 DATE 09/22/16 SH	HEET	6 OF 9
PRC	JEC	Mou	ıntaine	eer Plant						PRING START 07/12/16 BORING FINISH		
SAMPLE	SAMPLE	DE	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
26	RC	95.4	100.5		34.8		95 -		CL	Claystone/Mudstone; field strength moderate; color 10R 2.5/2 and 10BG 4/1 (dark greenish gray); texture fine grained; structure massive; decomposition high; disintegration competent to slight; fracture density moderate to intense.		
28	RC	103.7	106.5		32.04		105 -	-		Sandstone with calc. fossil; field strength very strong; color 10B 5/1 (bluish gray); texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density none to moderate.		
29	RC	106.5	111.5		57.6		-					
30	RC	111.5	115.8		54		110 -	-				

AEP - AEP.GDT - 09,

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. MW-1612

DATE 09/22/16

SHEET 7 OF 9

PROBING START 07/12/16

ROPING START 07/12/16

PRC	JEC1	Γ_Moι	ıntaine	er Plant					ВС	PRING START 07/12/16 BORING FINISI	н _	07/14/16
SAMPLE	SAMPLE		IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							115 –					
31	31 RC 115.8 119.8 46.8											
							-			Shale; field strength moderate; color 5BG 4/1 (dark greenish gray) to 2.5 YR 2.5/4; texture fine grained; structure laminate; decomposition fresh; disintegration competent; fracture density slight.		
REVAEP MOUNTAINEER.GPJ	RC	119.8	124.2		46.8		120 - - -		CL	Shale; field strength moderate; color 2.5 YR 2.5/4; texture fine grained; structure laminate; decomposition fresh; disintegration competent; fracture density intense to moderate. Claystone/Mudstone; field strength strong; color 10G 5/1 (greenish gray) and 10 R 3/4; texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density intense to moderate.		
	RC	124.2	126.7		26.4		125 -		CL	Claystone/Mudstone; field strength strong; color 10 R 3/4 trace 10G 5/1 (greenish gray); texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density slight.		
AEP. GD1 - 09/22/16 10:30 - C:ICHERYLIPROJEC ISNAEP MOUN I AINEER 7-2016	RC	126.7	131.6		59.28		- 130 –		CL	Claystone/Mudstone; field strength strong; color 10 R 3/4 from 126.7 to 130.8 feet and 5BG 4/1 (dark greenish gray) from 130.8 to 131.6 feet; texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density moderate.		
4EP.GDI - 09/22/16 10	RC	131.6	135.0		42.48		-			Sandstone and shale with some calc. fossil;	-	

EP - AEF

JOB NUMBER OH015976.0009

COMPANY American Electric Power BORING NO. MW-1612 DATE 09/22/16 SHEET 8 OF 9

PROJECT MOUNTaineer Plant POPING START 07/12/16 RODING FINISH 07/14/16

PROJ	ECT	ECT Mountaineer Plant SAMPLE STANDARD → RQD F							ВО	RING START _	07/12/16	_ BORING FINISH	_07	/14/16
SAMPLE	DEPTH PENETRATION 25 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					DEPTH IN FEET	GRAPHIC LOG	nscs	IC	SOIL / ROCK	N	WELL	DRILLER'S NOTES	
							-		CL	field strength ver greenish gray); t massive; decom competent; fract Claystone/Mudsi color 10 R 3/4; to massive; decom competent; fract	texture fine grain position fresh; of ture density slight tone; field stren- exture fine grain position fresh; of ture density slight	ned; structure disintegration ht. gth very strong; ned; structure disintegration ht.		
36	RC	135.0	140.2		60.24		135 — - -			Sandstone with the very strong; color texture fine grain decomposition from fracture density is andstone with the very strong; color texture fine grain x-bedding; decorposition competent; fractive frac	or 5B 4/1 (dark bened; structure la resh; disintegrat slight. trace calc. fossi or 5B 4/1 (dark bened; structure la mposition fresh;	oluish gray); minated; tion competent; I; field strength oluish gray); minated and t; disintegration		
37	RC	140.2	145.3		60.6		140 — - -			Sandstone with a strong; color 5B grained; structur decomposition fr fracture density s	5/1 (bluish gray re laminated cro resh; disintegrat slight.	y); texture fine ss bedding; tion competent;		
38	RC	145.3	150.2		59.64		145 — -			Shale with calc. strong; color 5B texture fine grain decomposition from fracture density shale with calc. very strong; colo gray); texture findecomposition from fracture density in the strong fracture density in the s	3/1 (very dark bened; structure la resh; disintegrat slight. fossil; field street or 5B 3/1 (very de grained; structuresh; disintegrat	oluish gray); minate; tion competent; ngth strong to dark bluish tture laminated;		
39	RC	150.2	154.7		52.8		150 —			Sandstone; field 10B 5/1 (bluish g structure laminal disintegration co moderate.	gray); texture fin te; decomposition pretent; fracture	ne grained; on fresh; re density		
							-			10B 5/1 (bluish of structure laminal disintegration co	gray); texture fin ite; decomposition	ne grained; on fresh;		

				5976.0009					1 BONNO
				Electric Powe er Plant	er				ORING NO. <u>MW-1612</u> DATE <u>09/22/16</u> SHEET <u>9</u> OF <u>9</u> ORING START 07/12/16 BORING FINISH 07/14/16
PRU	JECI	IVIOL	ınıanıe	el Pialit				ВС	DRING START
SAMPLE	SAMPLE	DEF	IPLE PTH EEET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES
AEP - AEP.GDT - 09/22/16 10:30 - C.\CHERYLIPROJECTS\AEP MOUNTAINEER 7-2016 REVAEP MOUNTAINEER.GPJ	RC	154.7			55.2	- 155 -		CL	Sandstone; field strength very strong; color 10B 5/1 (bluish gray); texture medium grained; structure massive; decomposition fresh; disintegration competent; fracture density none. Claystone/Mudstone; field strength very strong; color 2.5YR 2.5/3; texture medium grained; structure massive; decomposition fresh; disintegration slight; fracture density intense. Shale; field strength very strong; color 5BG 4/1 (dark greenish gray); texture medium grained; structure laminated; decomposition fresh; disintegration slight; fracture density none. Claystone/Mudstone; field strength very strong; color 10B 5/1 (bluish gray); texture medium grained; structure massive; decomposition fresh; disintegration slight; fracture density intense. End of boring at 159.5 feet.

JOB	NUM	BER _	OH01	5976.0009		_		LO	ان ی	BORING	
				Electric Pow	er					RING NO. <u>SB-1602</u> DATE <u>09/22/16</u> SHEE	
PRO	JECT	_ Mo	untain	eer Plant						RING START <u>05/20/16</u> BORING FINISH _	
000	RDIN	IATES								ZOMETER TYPE NA WELL TYPE	
GRO	UND	ELEVA	ATION_	NA S	STEM	l				T. RISER ABOVE GROUND DIA _	
Wate	er Lev	vel, ft	∇	<u></u>		$ar{ar{ar{\Lambda}}}$	-		DE	PTH TO TOP OF WELL SCREENBOTTOM _	
TIME	•									ELL DEVELOPMENT BACKFILL _	
DAT	E								FIE	LD PARTY NA RIG _	CME75
		041	4D) F	OTANDADD.		- -					
SAMPLE NUMBER	밀		MPLE PTH	STANDARD PENETRATION		RQD	DEPTH IN FEET	£	c s	SOIL / ROCK	DRILLER'S
AME	SAMPLE		EET	RESISTANCE		%	IN	ZAP LOC	081	SOIL / ROCK IDENTIFICATION	NOTES
ωΞ	S	FROM	ТО	BLOWS / 6"		/	FEET	5	n		
0	SS	0.0	12.5		0	NA				Straight drilled to 12.5 feet, boring was	
							_	-		pre-drilled for utility clearance; no samples wer taken.	
										taken.	
							-	1			
							_				
							-	1			
							_				
							5 –				
							_				
							-				
							-				
							_				
							10 -				
							_				
							_	-			
1	RC	12.5	15.7		37.2	25%		: : : :		Sandstone; field strength strong; color 5Y 5/4	
	110	12.0	10.7		07.2	2070	-			grades to 5Y 4/2; texture fine grained; structure	
										thinly bedded to massive; decomposition slight;	
										disintegration slight; fracture density intense.	
							15 -	: : : :			
_	DO	45.7	04.5		00.0	400/				One debagge field stress the stress to a less EV EV.	
2	RC	15.7	24.5		99.6	49%	-			Sandstone; field strength strong; color 5Y 5/4; texture fine grained; structure massive;	
							_			decomposition fresh; disintegration slight;	
										fracture density very intense.	
							-	-			
										Note: Color grades to 2.5Y 5/3 down to 20.3	
							-			feet.	
						<u> </u>		:::: <u>:</u>			
		TYP	E OF C	ASING USED						Continued Next Page	
			OCK CO	ORE			PIEZOM	ETEF	RTYF	E: PT = OPEN TUBE POROUS TIP, SS =	OPEN TUBE
NA NA		6" x 3.2 9" x 6.2								CREEN, G = GEONOR, P = PNEUMATIC	
NA		HW CA	SING A	DVANCER	4"		WEILT	YPF.	O۱	V = OPEN TUBE SLOTTED SCREEN, GM :	= GEOMON
NA NA		NW CA SW CA			3" 6"	-		·· <u>-</u> ·	Ť		3_0011
NA			MMER		8"					RECORDER J. Wanner	

JOB NUMBER OH015976.0009

COMPANY American Electric Power BORING NO. SB-1602 DATE 09/22/16 SHEET 2 OF 10

PROJECT Mountaineer Plant BORING START 05/20/16 BORING FINISH 05/26/16

PRO	JECT	Mou	ıntaine	er Plant					ВС	DRING START BORING FINISH	H _0	5/26/16
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							-			Sandstone inter layered with red bed; field strength moderate; color 7.5 R 4/2; texture fine grained; structure massive; decomposition fresh; disintegration slight; fracture density very intense.		
3	RC	24.5	25.2		8.4	100%	25 –			Shale; field strength strong; color 5GY 3/1		
4					-			(very dark greenish gray) grades to 10GY 5/1 (greenish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration slight; fracture density intense. Note: From 25 to 25.2 feet field strength is moderate.				
	30						- 30 —			Claystone/Mudstone; field strength moderate; color 7.5 R 3/2; texture fine grained; structure massive; decomposition fresh; disintegration slight; fracture density moderate.		
5	RC	31.0	36.0		50.4	72%	-			Note: At 25. 2 feet contact, clear. Shale; field strength strong; color 10GY 6/1 (greenish gray); texture fine grained; structure massive to thinly bedded; decomposition fresh; disintegration slight; fracture density moderate.		
PEVMEP MOUNTAINEER. GFJ							35 —			Note: At 27 to 34 feet clear boundary into shale (blue). Shale; field strength strong; color 5GY 5/1 (greenish gray); texture fine grained; structure massive to thinly bedded; decomposition fresh;		
EEK 7-2016 KEVAEF	RC	36.0	39.9		50.4	21%	-	_		disintegration slight; fracture density intense to moderate. Claystone/Mudstone; field strength moderate; color 7.5 Y 5/2; texture fine grained; structure massive; decomposition fresh; disintegration slight; fracture density intense to moderate.		
SVAET MOON FAIN	BC	20.0	41.0		0	09/	40 —	-		Claystone/Mudstone; field strength weak; color 7.5 Y 5/2 grades to 7.5 Y 4/2; texture fine grained; structure massive; decomposition fresh; disintegration slight; fracture density very intense.		
7	RC	39.9	41.0		0	0%	70			No recovery inner barrier split.		
AET.GDT - 09/22/10 10:40 - C./CHENT LITROJEC 10:AET IN/OUNTRINGEN 7-20 10	8 RC 41.0 46.0 58.8 93%					93%	- - -	-		Claystone/Mudstone; field strength moderate; color 7.5 YR 5/2 grades to 7.5 R 3/3 to 4/4; texture fine grained; structure thinly bedded; decomposition fresh; disintegration slight; fracture density intense to moderate.		
30 - 109							45 —	-				

JOB NUMB	ER OH015976.0009								
COMPANY	American Electric Power	BORING NO. SB-1	602	DATE 09/22/16	SHEET_	3	OF _	10	
PROJECT	Mountaineer Plant	BORING START	05/20/	16 BORING FI	NISH 05	/26/1	6		

PRO	JECT	Mou	ıntaine	er Plant					ВС	DRING START <u>05/20/16</u> BORING FINISH	⊣ <u>05</u>	26/16
SAMPLE NUMBER	SAMPLE	SAM DEF IN F	PLE PTH EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
9	RC RC	46.0	48.0		19.2		- - -			Claystone/Mudstone; field strength moderate; color grades to 7.5 R 5/1 to 3/2; texture fine grained; structure thinly bedded; decomposition fresh; disintegration slight; fracture density very intense. Claystone/Mudstone; field strength weak; color grades to 2.5 Y 5/3; texture fine grained; structure 48 to 50 feet thinly bedded at 50 to 51		
11	RC	51.0	56.0		31.2	32%	50 — - - -			feet massive; decomposition fresh to slight; disintegration slight; fracture density intense to moderate. Claystone/Mudstone; field strength strong; color 7.5 R 3/2 with 20% coarse mottles 10B 6/1; texture fine grained; structure massive; decomposition fresh; disintegration slight; fracture density intense to moderate.		
12	RC	56.0	61.0		58.8	92%	55 — - -	-		Claystone/Mudstone; field strength strong; color 7.5 R 3/3; texture fine grained; structure massive; decomposition fresh; disintegration slight; fracture density slightly fractured.		
							60 —			Transition. Sandstone; field strength strong; color 5B 5/1 (bluish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration slight; fracture density slightly fractured.		
13	RC	61.0	66.0		58.2	81%	- - -			Sandstone; field strenth strong; color 5B 5/1 (bluish gray) grades to 5B 4/1 (dark bluish gray); texture fine grained; structure thinly bedded; decomposition slight to fresh; disintegration slight; fracture density moderate.		
14	RC	66.0	71.0		60	97%	65 — - -			Sandy Shale; field strenth strong; color 5B 5/1 (bluish gray) grades to 5B 4/1 (dark bluish gray); texture fine grained; structure thinly bedded; decomposition slight to fresh; disintegration slight; fracture density moderate. Shaly sandstone; field strength strong; color 10B 4/1 (dark bluish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration competent; fracture density from 66 to 68 feet moderate from 69 to 71 feet intense.		
15	RC	71.0	76.0		60	93%	70 — -			Note: From 68 to 69 feet fracture density very intense. Sandstone with interbedded shale, clear boundaries; field strength very strong; color 5B		

P - AEP.

JOB NUMBER OH015976.0009

COMPANY American Electric Power BORING NO. SB-1602 DATE 09/22/16 SHEET 4 OF 10

PROJECT Mountaineer Plant BORING START 05/20/16 BORING FINISH 05/26/16

PRO	JECT	Mou	ıntaine	er Plant					ВС	RING START <u>05/20/16</u> BORING FINISH	⊣ <u>05/</u>	/26/16
SAMPLE NUMBER	SAMPLE	DEF	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
							- - 75 –			5/1 (bluish gray) and 5B 4/1 (dark bluish gray); texture fine grained; structure thinly bedded; cross bedded throughout; decomposition fresh; disintegration competent; fracture density moderate. Note: At 72 to 73 feet fresh undecomposed plant roots up to 3mm observed paleosol.		
16	RC	76.0	81.0		61.2	98%	- - - 80 —			Sandstone with interbedded shale, gradual to diffuse boundaries; field strength very strong; color 5B 5/1 (bluish gray) and 5B 4/1 (dark bluish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration competent; fracture density moderate.		
17	RC	81.0	86.0		55.8	58%	- - -			Shale weakling developed; field strength strong; color 81 to 82.5 feet 5B 4/1 (dark bluish gray) then at 82.5 to 84 feet 7.5 R 3/2; texture fine grained; structure thinly bedded; decomposition slight; disintegration slight; fracture density moderate grades to intense. Claystone/Mudstone; field strength moderate;		
18	RC	86.0	91.0		60	78%	85			color 10Y 5/1 (greenish gray) to N 3/ (very dark gray); texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density moderate grades to intense. Transition. Note: From 86 to 92.9 feet sandy fine paleosol. Claystone/Mudstone; field strength strong; color 7.5 R 3/4; texture fine grained; structure massive; decomposition fresh; disintegration slight; fracture density moderate to intense.		
19	RC	91.0	96.0		61.2	99%	90 — - - - 95 —			Claystone/Mudstone; field strength strong; color 7.5 R 4/3; texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density moderate to slight. Shale; field strength strong; color 10BG 4/1 (dark greenish gray) to 10BG 6/1 (greenish gray); texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density moderate to slight.		
20	RC	96.0	101.0		55.8	92%	95 - -			nacial o denoity moderate to diigni.		

JOB	NUM	BER _	OH01	5976.0009		_		LO	30	- BORING
COM	1PAN	Y _ A m	erican	Electric Power	er				ВС	RING NO. <u>SB-1602</u> DATE <u>09/22/16</u> SHEET <u>5</u> OF <u>10</u>
PRO	JEC1	Mou	ıntaine	er Plant					ВС	RING START 05/20/16 BORING FINISH 05/26/16
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES
							100 -			
21	RC	101.0	106.0		60	64%	-			Shale; field strength strong; color 5B 6/1 (bluish gray) to 10B 2.5/1 (bluish black); texture fine grained; structure thinly bedded and massive; decomposition slight; disintegration slight; fracture density intense.
							105 –	_		Claystone/Mudstone; field strength strong; color 7.5 R 3/2 to 7.5 R 3/3; texture fine grained; structure massive; decomposition
22	RC	106.0	111.0		62.4	71%	- - -			slight; disintegration slight; fracture density intense. Claystone/Mudstone; field strength strong; color 7.5 R 3/2; texture fine grained; structure massive; decomposition fresh; disintegration slight to competent; fracture density intense to very intense.
23	RC	111.0	116.0		56.4	83%	110 -			Shale; field strength strong; color 10BG 4/1 (dark greenish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration slight to competent; fracture density intense to very intense.
							-			Shale; field strength strong; color 10BG 6/1 (greenish gray to 5BG 3/1 (very dark greenish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration competent; fracture density moderate to very intense.
24	RC	116.0	121.0		56.4	92%	115 -			Sandstone; field strength strong; color 10BG 6/1 (greenish gray to 5BG 3/1 (very greenish gray); texture medium grained; structure massive; decomposition fresh; disintegration competent; fracture density moderate to very intense.
							-	=		Shale; field strength strong; color 10BG 6/1 (greenish gray to 5BG 3/1 (very dark greenish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration competent; fracture density moderate to very intense.
25	RC	121.0	126.0		62.4	98%	120 -			Sandstone; field strength strong; color 10BG 4/1 (dark greenish gray) to 5G 5/1 (greenish gray); texture fine grained; structure thinly bedded; cross bedding evident at 16 to 120 feet; decomposition fresh; disintegration competent; fracture density moderate. Shale grades to sandstone; field strength
							-			strong; color 10BG 4/1 (dark greenish gray) to 5G 5/1 (greenish gray); texture fine grained;

JOB NUMBER **OH015976.0009** COMPANY American Electric Power BORING NO. <u>SB-1602</u> DATE <u>09/22/16</u> SHEET <u>6</u> OF <u>10</u> BORING START **05/20/16** PROJECT Mountaineer Plant BORING FINISH 05/26/16

DEI IN F	PTH EET		TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK ☐ DRILLER'S IDENTIFICATION NOTES
126.0	131.0	BLOWETT	54	74%	- 125 - - - - -			structure thinly bedded; cross bedded at 122 to 126 feet; decomposition fresh; disintegration competent; fracture density very intense at 121 to 121.3 feet and unfractured at 121.3 to 126 feet. Shale; field strength strong; color 5B 4/1 (dark bluish gray) and 5B 7/1 (light bluish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration competent; fracture density unfractured to slight.
131.0	136.0		57.6	92%	130 -			Sandstone; field strength strong; color 7.5YR 5/2 (brown) and 5B 4/1 (dark bluish gray); texture fine grained; structure thinly bedded; decomposition slight; disintegration slight; fracture density very intense; horizontal and up to 70 degrees. Sandstone; bottom 2 feet shaly; field strength strong; color 10BG 4/1 (dark greenish gray); texture fine grained; structure massive to thinly bedded; decomposition fresh; disintegration competent; fracture density slight.
136.0	141.0		61.2	102%	-			Sandstone grades to shale; field strength strong; color 5B 4/1 (dark bluish gray) to 5B 5/1 (bluish gray); texture fine grained; structure massive grades to thinly bedded; decomposition fresh; disintegration competent; fracture density unfractured.
141.0	146.0		55.2	92%	-			
146.0	151.0		58.8	68%	- 145 - - - -			
	DEIN F FROM 126.0 131.0	131.0 136.0 136.0 141.0 141.0 146.0	DEPTH RESISTANCE FROM TO BLOWS / 6"	DEPTH PENETRATION RESISTANCE BLOWS / 6" STANCE BLOWS /	DEPTH PENETRATION RESISTANCE BLOWS / 6" State Stat	DEPTH PENETRATION RESISTANCE SUBJECT SUBJECT	DEPTH PENETRATION 250 % FEET 8 6 125	DEPTH IN FEET RESISTANCE RESISTAN

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. SB-1602

BORING START 05/20/16

BORING FINISH 05/26/16

JECI	_ IVIOU	IIIIaiiie	er Piani					во	PRING START <u>05/20/16</u> BORING FINIS	H <u>U</u>	5/26/16
SAMPLE	DEF	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
RC	151.0	156.0		60	46%	-			Claystone/Mudstone; field strength strong; color 7.5 R 3/3; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density intense to very intense.		
RC	156.0	161.0		62.4	83%	- 155 — - -			Shale; field strength strong; color 5B 4/1 (dark bluish gray) to 10B 3/1 (very dark bluish gray); texture fine grained; structure thinly bedded, weakly developed; decomposition slight; disintegration slight; fracture density intense.		
RC	161.0	166.0		48	56%	160 - - - -			Claystone/Mudstone; field strength strong; color 7.5R 3/3 (dusty red); texture fine grained; structure massive; decomposition fresh to slight; disintegration competent to slight; fracture density intense to very intense.		
RC	166.0	171.0		74.4	96%	- 165 - - -					
RC	171.0	176.0		62.4	104%	- 170 - - - - 175 -			Shale; field strength strong; color 10G 6/1 (greenish gray) to 5B 3/1 (very dark bluish gray); texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density intense to very intense. Note: From 170 to 171 driller ran cleanout as part of this run. Shaly sandstone inter layered with sandy shale; gradual boundary; field strength strong; color 10B 6/1 (bluish gray) to 10BG 4/1 (dark greenish gray); texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density unfractured.		
	RC RC RC	SAM DEF IN F FROM	SAMPLE DEPTH IN FET FROM TO	SAMPLE DEPTH IN FEET RESISTANCE BLOWS / 6"	SAMPLE STANDARD NESISTANCE NESIST	SAMPLE DEPTH PENETRATION RESISTANCE FROM TO HENOTO RESISTANCE BLOWS / 6" 60 46%	SAMPLE STANDARD FENTAL PENETRATION STEET PENETRATION	SAMPLE DEPTH PENETRATION SESSITANCE PENETRATION PENETRATION	SAMPLE DEPTH PENETRATION STANDARD RESISTANCE DEPTH RESISTANCE RESISTANCE DEPTH RESISTANCE RES	RC 151.0 156.0 161.0 62.4 83% 156. RC 171.0 176.0 176.0 62.4 104% 170. RC 171.0 176.0 176.0 170. RC 171.0 170.0 17	RC 151.0 156.0 161.0 166.0 48 56% 170 170 176.0 176.0 176.0 177.0 176.0 176.0 176.0 177.0 176.0

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. SB-1602

BORING NO. SB-1602

BORING START 05/20/16

BORING FINISH 05/26/16

PRO	PROJECT Mountaineer Plant									BORING START				
SAMPLE	SAMPLE	SAM DEF IN F	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES		
36	RC		181.0		60	87%	- - - 180 —			Claystone/Mudstone finger interbed of weakly developed; field strength strong; color 10BG 5/1 (greenish gray); texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density slight. Sandy shale; field strength strong; color 10BG 5/1 (greenish gray); texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density				
377	RC	181.0	186.0		55.8	85%	- - - 185 —			slight. Sandy shale; field strength strong; color 10G 5/1; texture fine to medium grained; structure massive grades to thinly bedded; decomposition fresh; disintegration competent; fracture density slight.				
REVVAEP MOUNTAINEER.GPJ	RC	186.0	191.0		55.2	33%	- - - 190 —		CL	Claystone/Mudstone; field strength strong; color 7.5R 4/2 (weak red) with 5Y 6/3 (pale olive); texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density moderate.				
P MOUNTAINEER 7-2016 REVAEP MC	RC	191.0	196.0		62.4	71%	- - - 195 —		CL	Claystone/Mudstone; field strength strong; color 7.5 R 3/3; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density moderate to intense.				
AEP.GDT - 09/22/16 10:40 - C:\CHERYL\PROJECTS\AEP MOUNTAINEER 7-2016 15	RC	196.0	201.0		61.2	88%	-		CL	Claystone/Mudstone; field strength strong; color 7.5 R 3/3; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density moderate. Shaly sandstone; field strength strong; color				
AEP.GDT - 09/22/16	RC	201.0	206.0		60	100%	200 -			10B 4/1 (dark bluish gray) to 5B 6/1 (bluish gray); texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density moderate.				

JOB	NUM	IBER _	OH01	5976.0009		_		LO	G O	or boring
COM	1PAN	Y A m	ericar	Electric Pow	er				ВС	ORING NO. <u>SB-1602</u> DATE <u>09/22/16</u> SHEET <u>9</u> OF <u>10</u>
PRO	JEC ⁻	Γ <u>Μοι</u>	ıntaine	eer Plant						ORING START
SAMPLE	SAMPLE	DEI	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES
42 43 44	RC RC	206.0	211.0 213.5 216.0		56.4	96% 74%	210 -			Claystone/Mudstone; field strength strong; color 7.5 R 3/3; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density moderate grades to very intense.
46	RC	221.0	235.4		175.2	96%	220 -			Shaly sandstone grades to sandy shale very fine; field strength strong; color 10G 4/1 (dark greenish gray); texture fine grained; structure massive grades to thinly bedded, weakly developed; decomposition fresh; disintegration slight; fracture density slight. Sandy shale; field strength strong; color 5BG 3/1 (very dark greenish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration competent to slight; fracture density slight to moderate. Claystone/Mudstone; field strength strong; color 7.5R 3/3 (dusky red); texture fine grained; structure massive; decomposition fresh; disintegration competent to slight; fracture density slight to moderate. Shale; field strength strong; color 5BG 3/1 (year, dark greenish gray); toyture fine grained;

JOB	NUM	RFR	OH01!	5976.0009				LO	G O	F BORING
				Electric Pow	er	_			ВС	ORING NO. <u>SB-1602</u> DATE <u>09/22/16</u> SHEET <u>10</u> OF <u>10</u>
	ROJECT Mountaineer Plant				DRING START					
SAMPLE	SAMPLE	DEI IN F	IPLE PTH EET	STANDARD PENETRATION RESISTANCE	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES
		FROM	ТО	BLOWS / 6"	<u> </u>		230 -			structure thinly bedded grades with massive; decomposition fresh; disintegration competent to slight; fracture density slight to moderate.
							- - - - 235 –			Shaly sandstone; field strength strong; color 5BG 3/1 (very dark greenish gray); texture fine grained; structure thinly bedded, cross bedded from 232 to 234 feet; decomposition fresh; disintegration competent to slight; fracture density slight to moderate.
47	RC	235.4	241.0		56.4	84%	233 - - - - 240 –			Shale grades with sandy shale (sand fraction is fine to medium); field strength strong; color 5B 5/1 (bluish gray); texture fine grained; structure thinly bedded with some cross bedding; decomposition fresh; disintegration competent; fracture density unfractured.
7-2016 REVVAEP MOUNTAINEER.GPJ 8	RC	241.0	246.0		61.8	102%	240 - - -			Sandy shale grades to sandstone; field strength strong; color 10G 4/1 (dark greenish gray) to 10B 5/1 (bluish gray); texture fine grained grades to medium grained; structure massive grades to thinly bedded; decomposition fresh; disintegration competent; fracture density 241 to 241.4 feet very intensely fractured and from 241.4 to 246 feet unfractured.
PROJECTS/AEP MOUNTAINEER 7	RC	246.0	251.0		44.4	68%	-	-		Claystone/Mudstone; field strength strong; color 7.5 R 3/2 to 7.5 R 3/3; texture fine grained; structure massive with faint layered appearance; decomposition fresh; disintegration competent; fracture density intense
AEP - AEP.GDT - 09/22/16 10:40 - C.\CHERYL\PROJECTS\AEP MOUNTAINEER 7-2016 REVAEP M 6							250 -	-		End of boring at 251 feet.
ÆP - AE	1	l	1	ı	1		<u> </u>	1 1	<u> </u>	

JOB	NUM	BER _	OH01	5976.0009		_		LO	G O	FBORING						
СОМ	PAN	Y A m	nericar	Electric Pow	er		_		ВС	RING NO. <u>SB-1609R</u> DATE <u>09/22/16</u> SHEET <u>1</u> OF <u>3</u>						
PRO	JEC1	_ Mou	untaine	eer Plant					ВС	RING START <u>05/11/16</u> BORING FINISH <u>05/11/16</u>						
coo	RDIN	IATES _							PIE	ZOMETER TYPE NA WELL TYPE						
GRO	UND	ELEVA	TION_	NA SY	STEM				HG	T. RISER ABOVE GROUND DIA						
Wate	er Lev	vel, ft	$\overline{\nabla}$	▼		1			DE	PTH TO TOP OF WELL SCREENBOTTOM						
TIME		-,				-			WE	ELL DEVELOPMENT BACKFILL						
DAT									FIE	ELD PARTY NA RIG Hollow Stem Auge						
SAMPLE NUMBER	SAMPLE	DEI IN F	MPLE PTH EEET	STANDARD PENETRATION RESISTANCE	TOTAL LENGTH RECOVERY	RQD D	EPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES						
0	NR	FROM 0.0	TO 6.0	BLOWS / 6"	0					Straight drilled to 6 feet, boring was pre-drilled						
1	SS	6.0	8.0	1-0-0-2	24		- - 5 — -		ML	for utility clearance; no samples were taken. Backfill; silt and sand. Clayey silt; most; low plastic; low tough;						
۷	33	0.0	10.0	0-0-6-9	12		-		ML CL	\text{yellowish brown (10YR 5/4).} Clayey silt; trace to little sand; trace to little fine gravel; dry; low plastic; medium toughness; color grades to reddish brown (5YR 4/4);						
3	SS	10.0	12.0	4-4-5-4	20		10 -	-		massive; firm. Note: From 8 to 13.5 feet includes some coal fragments.						
4	SS	12.0	14.0	3-4-5-5	13		-									
5	SS	14.0	16.0	7-7-8-6	18		- 15		0.0	Note: From 13.5 to 13.6 feet sand lens, fine to medium; loose; dry. Note: From 14 to 16 feet includes <20% mottles; <15 mm in size; distinct contrast; very						
6	SS	16.0	18.0	21		-	-	SP ML CL	dark bluish gray (10B 3/1), and dark reddish gray (5R 4/1). Sand with silt; dry; loose; sand is fine to medium; brown (10YR 5/3). Silt with clay; little sand, fine to coarse; little							
7	SS	18.0	20.0	1-2-4-4	24		-			grave, fine to coarse; dry; firm; reddish brown (5YR 4/4). Note: From 16 to 20 feet gradual increase in						
				ASING USED				•		Continued Next Page						
NA NA NA		6" x 3.2 9" x 6.2	5 HSA	DVANCER	4"		SLC	OTTE	ED S	PE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SCREEN, G = GEONOR, P = PNEUMATIC						
NA		NW CA	SING	DVAINCER	3"	W	/ELL T	YPE:	0	W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON						
NA		SW CA			6" 8"					RECORDER J. Wanner						
NA		AIR HA	<u>IVIIVIER</u>		Ø				NEGOTABLIX OF TYAINIGE							

JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. SB-1609R

BORING NO. SB-1609R

BORING START 05/11/16

BORING FINISH 05/11/16

PRO	ROJECT Mountaineer Plant SAMPLE STANDARD DEPTH PENETRATION HERESISTANCE FROM TO BLOWS / 6" ROJECT MOUNTAINEER RQD PARTICIPATION HERESISTANCE PROM TO BLOWS / 6" MOUNTAINEER RQD PARTICIPATION HERESISTANCE PROM TO BLOWS / 6"							BORING START BORING F				<u>U5/</u>	11/16
SAMPLE NUMBER	SAMPLE	DEF	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	SOSO	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
8	SS	20.0	22.0	0-2-4-5	24		20 –			the abundance and size of mottles.			
9	SS	22.0	24.0	1-2-4-4	24		-		SM GM	Silt with sand; some gravel; some clay; moist; firm; massive; sand is fine to coarse; gravel is fine to coarse, angular dominant.; dark yellowish brown (10YR 4/4).			
10	SS	24.0	26.0	1-2-7-29	24		25 —		SM	Silt with very fine sand; some clay; dry; firm; massive; includes trace fine to medium, subangular gravel; very dark bluish gray (10B			
11	SS	26.0	28.0	23-24-41-50/3	13		-		ML CL	3/1). Note: From 25.5 to 26 feet broken gravel or rock; dry. Silt with clay; moist; soft; yellowish brown			
12	RC	28.0	30.0		24		-			(10YR 5/4). Weathered shale; weak plates to 5mm; light brownish gray (2.5Y 6/2) with very dark gray (5YR 3/1) on plate surface. Shale; strong field strength; 10B 5/1 (bluish			
13	RC	30.0	31.0		3	0	30 –			gray); aphanitic texture; laminated structure; fresh (undecomposed); cross-bedding is prominent 31.0 to 36.0 feet.			
14	RC	31.0	36.0		60	69	-			Interbedded "Red bed" and blue-gray shale; decreasing shale with depth; intensely fractured to very intensely fractured.			
15	RC	36.0	41.0		63.6	74	35 — -						
							40						
16	RC	41.0	44.5		30.6	14	40			Red clay stone or mudstone; weak to very weak field strength, with some recovery having moderate strength; 7.5R 4/2 (weak red); massive to laminated structure; (regionally known as a so-called 'red bed'); intensely fractured to very intensely fractured.			
							_			Interbedded "red bed" and blue-gray shale; increasing shale with depth; intensely fractured			

	IOB	DE NUMBER OH015976.0009 DIMPANY American Electric Power BORING NO. SB-1609R BORING NO. SB-1609R BORING START 05/11/16 BORING FINISH 05/11/16													
						er	_			ВС	RING NO. <u>SB-1609R</u> DATE <u>09/22/16</u> SHEET <u>3</u> OF _	3			
F	PRO	JECT	_ Mou	ıntaine	eer Plant					ВС	RING START <u>05/11/16</u> BORING FINISH <u>05/11/16</u>				
	SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION DRILLEI NOTE:				
_	17	RC	44.5	46.0		3.6	0	45 -			to very intensely fractured.				
	18	RC	46.0	51.0		56.4	40								
								50 -							
	19	RC RC	51.0 52.0	52.0 56.0		5.4	0 46								
								55 -			Shale, strong field strength; 10B 5/1 (bluish gray): aphanitic texture; laminated structure; fresh (undecomposed); cross-bedding is prominent.				
P MOUNTAINEER.GPJ	21	RC	56.0	65.0		102	81								
AEP - AEP.GDT - 09/22/16 10:43 - C.\CHERYL\PROJECTS\AEP MOUNTAINEER 7-2016 REVAEP MOUNTAINEER.GPJ								60 -							
43 - C:\CHERYL\PROJECTS\AEF								65 -			End of boring at 65 feet.				
EP - AEP.GDT - 09/22/16 10:															

JOB	NUM	BER _	OH015	5976.0009		_		LO	G O	F BORING		
СОМ	PAN	Y <u>Am</u>	nerican	Electric Pow	er				во	RING NO. SB-1610 DATE 09/22/16 S	HEET	1 OF1
PRO	JECT	_ Mou	untaine	er Plant					ВО	RING START <u>06/14/16</u> BORING FINIS	н <u>0</u> 6	6/16/16
									PIE	ZOMETER TYPE NA WELL TYP	E	
GRO	UND	ELEVA	TION_	NA SY	STEM					T. RISER ABOVE GROUND DI		
Wate	er Lev	/el, ft	$\overline{\nabla}$	<u></u>		$ar{ar{\Lambda}}$	_		DE	PTH TO TOP OF WELL SCREENBOTTOI	М	
TIME									WE	ELL DEVELOPMENT BACKFIL	.L	
DAT	E								FIE	ELD PARTY NA RIG	G <u>C</u>	ME75
				I			T					
LE ER	Щ		IPLE PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"		RQD	DEPTH IN FEET	E C	S	SOIL / ROCK	ا بـ	DRILLER'S
SAMPLE NUMBER	SAMPLE		EET	RESISTANCE		%	IN	3AP LOC	SC	IDENTIFICATION	WELL	NOTES
S Z	Ś	FROM	TO	BLOWS / 6"		/0	FEET	G	n	ibertii fortiiett		110120
0	NR	0.0	9.5		0					Straight drilled to 9.5 feet, boring was		
										pre-drilled for utility clearance; no samples were taken.		
										were taken.		
							-	1				
							-					
							_					
								-				
							5 -					
							-	1				
							-	1				
							-					
							_					
											<u> </u>	
1	RC	9.5	11.2		12	29		: : : :		Sandstone; field strength moderate to strong;		
							10 -	::::		color 10 YR 5/4; texture medium grained;		
										structure massive; decomposition slight;		
								[::::]		disintegration slight; fracture density moderate		
										to intense.		
							-	 ::::				
2	RC 11.2 15.9 57.6 52			52		: : : :		Sandstone; field strength strong except at 15.6	1			
_	RC 11.2 15.9								to 15.8 feet is weak; color 10 YR 5/4 with 10			
										YR 3/4; texture medium grained; structure		
	TYPE OF CASING USED NQ-2 ROCK CORE									•		
										Continued Next Page		
NA						-				E: PT = OPEN TUBE POROUS TIP, SS		PEN TUBE
NA							SLC	OTTED SCREEN, G = GEONOR, P = PNEUMATIC				
NA			SING AI	4"	WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON						GEOMON	
NA NA		NW CASING 3" SW CASING 6"					RECORDER J. Wanner					
NA		AIR HA			8"					NLOUNDER J. WAIIIIEI		

JOB	NUM	BER _	OH01	5976.0009		_		LO	J ()	F BORING
CON	OB NUMBER OH015976.0009 OMPANY American Electric Power ROJECT Mountaineer Plant								ВС	ORING NO. <u>SB-1610</u> DATE <u>09/22/16</u> SHEET <u>2</u> OF <u>14</u>
PRC	Mountaineer Plant								ВС	RING START
SAMPLE	SAMPLE	DEF	PTH EET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES
	3 RC 15.9 20.9 62.4 58							-		thinly bedded; decomposition slight; disintegration slight; fracture density moderate to intense.
3	RC	15.9	20.9		62.4	58	- 20 –			Sandstone; field strength strong; color 5PB 5/1 with 10 YR 3/4, and with 20% 5/5 PB; texture medium grained; structure thinly bedded, dipped non-horizontal; decomposition slight; disintegration slight; fracture density very intensely. Sandstone; field strength strong; color 5B 4/1 (dark bluish gray) to 5PB 5/1 (bluish gray); texture medium grained; structure thinly bedded, dipped non-horizontal; decomposition slight; disintegration slight; fracture density very intensely.
4	RC	20.9	25.9		58.8	78	- 25 -			
5	RC	25.9	30.9		57.6	41	-			

JOB	NIIM	IRER	OH01!	5976.0009				LO	G OI	BORING					
				Electric Pow	er	_			RΩ	RING NO. SB-1610 DATE 09/22/16 S	HEET	3 OF 14			
				er Plant	<u> </u>					RING START 06/14/16 BORING FINIS					
	020								ВО		·· <u> </u>	,, 10, 10			
SAMPLE	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	uscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES			
										Sandy shale grades with shale; strong field					
										strength; color 10BG 2.5/1 (greenish black) to 5PB 4/1 (dark bluish gray); fine grained texture;					
										thinly bedded structure; slight decomposition;					
										intensely fractured.					
	30														
6	RC	30.9	35.9		54	85	-			Sandstone; field strength strong; color 10B 6/1 (bluish gray) to 5B 4/1 (dark bluish gray); texture medium grained; structure thinly bedded; decomposition fresh; disintegration competent; fracture density slight.					
							35 —								
7	RC	35.9	40.9		61.2	88	-			Sandstone; field strength very stong; color 10B 6/1; texture medium grained; structure massive; decomposition fresh; disintegration competent; fracture density slight.					
8	RC	40.9	45.9		60	65	40 -		CL	Claystone/Mudstone; field strength weak to moderate; color 10B 6/1; texture fine; structure massive; decomposition moderate; disintegration slight; fracture density none. Sandstone; field strength strong; color 10B 6/1 (bluish gray to 5B 4/1 (dark bluish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration competent; fracture density none.					

JOB NUMBER OH015976.0009

COMPANY American Electric Power BORING NO. SB-1610 DATE 09/22/16 SHEET 4 OF 14

PROJECT Mountaineer Plant BORING START 06/14/16 BORING FINISH 06/16/16

PRO	SAMPLE STANDARD PENETRATION PENETRATION RESISTANCE FROM TO BLOWS / 6" RQD %								ВО	RING START <u>06/14/16</u> BORING FINISH <u>06/16/16</u>
SAMPLE	SAMPLE	DEF	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES
							- 45 –			Shaly sandstone; field strength strong; color 5BG 4/1 (dark greenish gray) to 5B 5/1 (bluish gray); texture fine grained; structure massive; decomposition slight to moderate; disintegration slight; fracture density none. Claystone/Mudstone; field strength strong; color 5BG 5/1 (greenish gray) to 7.5R 3/2 (dusky red); texture fine grained; structure massive; decomposition slight to moderate;
9	RC	45.9	50.9		63.6 44				CL	massive; decomposition slight to moderate; disintegration slight; fracture density none. Shale; field strength strong; color 7.5 R 3/2 to 7.5 R 5/2; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density moderate. Claystone/Mudstone; field strength strong; color 5BG 4/1 (dark greenish gray) to 5B 5/1 (bluish gray); texture fine grained; structure massive; decomposition slight; disintegration
			9 55.9			- 50 –			slight; fracture density intense to very intense. Sandy shale grades to sandstone; field strength strong; color 7.5 R 3/2 to 7.5 R 5/2; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density moderate.	
10 RC		50.9		55.9		55.8	83	-		
							- 55 —	-		Claystone/Mudstone; field strength strong to moderate; color 7.5 R 3/2 to 7.5 R 5/2; texture fine grained; structure massive; decomposition fresh to slight; disintegration slight; fracture density very intense.
11	RC	55.9	60.9		61.2	63	- - -			Shale; field strength strong; color 3.5 B to 4/10 BG; texture fine grained; structure massive; decomposition fresh to slight; disintegration slight; fracture density moderate. Claystone/Mudstone; field strength strong; color 7.5 R 3/2 to 7.5 R 5/2; texture fine grained; structure massive; decomposition fresh to slight; disintegration slight; fracture density moderate to very intense.
							-			Sandstone grades with Shaly sandstone; field

JOB NUMB	ER <u>OH015976.0009</u>							
COMPANY	American Electric Power	BORING NO. SB-16	10 D	ATE 09/22/16	SHEET_	5	OF _	14
PROJECT	Mountaineer Plant	BORING START	06/14/16	BORING FII	NISH 06 /	16/1	6	

PRO	SAMPLE STANDARD RQD DEF						ВС	DRING START <u>06/14/16</u> BORING FINISH <u>06/16/16</u>		
SAMPLE NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES
							60 —			strength strong; color 5BG 4/1 (dark greenish gray) to 5B 5/1 (bluish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration competent; fracture density slight.
12	RC	60.9	65.9		62.4	103	-			Grades to shaly sandstone; field strength strong; color 4/5 BG to 5/5 B; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density moderate grades to slight.
							- 65			Shale and claystone/mudstone; field strength weak to moderate; color 2.5 Y 5/2; texture fine grained; structure massive; decomposition moderate; disintegration moderate; fracture density moderate to very intense.
13	RC	65.9	70.9		58.8	83	-			Shale; field strength moderate to strong; color 5BG 4/1 (dark greenish gray) to 5B 5/1 (bluish gray); texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density slight.
							70 —			Grades to sandstone; field strength strong; color 4/5 BG to 5/5 B; texture fine grained; structure thin bedded cross bedded; decomposition fresh; disintegration competent; fracture density slight.
14	RC	70.9	75.9		60	100	- -			
							-			

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JOB NUMBER OH015976.0009

COMPANY American Electric Power

BORING NO. SB-1610

BORING START 06/14/16

BORING FINISH 06/16/16

PRO	DJECT Mountaineer Plant SAMPLE STANDARD TERROR DEI									RING START	BORING FINISH		<u>06/16/16</u>			
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCH		WELL	DRILLER'S NOTES			
15	RC	75.9	80.9		58.8	65	75 — - -									
16	RC	80.9	85.9		58.8	98	- 80 —		CL	Claystone/Mudstone; field street color 5B 3/1 (very dark bluish grained; structure thinly bedde slight; disintegration slight; fraintense. Shaly sandstone grades with strength strong; color 5BG 4/2	gray); texture fine ed; decomposition acture density sandy shale; field I (dark greenish					
							- - - 85 —			gray) to 5B 5/1 (bluish gray); t grained; structure massive; de fresh; disintegration slight; fra slight.	ecomposition					
17	RC	85.9	90.9		60	97	-									

JOB NUMBER OH015976.0009

COMPANY American Electric Power BORING NO. SB-1610 DATE 09/22/16 SHEET 7 OF 14

BORING START 06/14/16 BORING FINISH 06/16/16

F	PRO	JECT	<u>Mou</u>	ıntaine	er Plant						RING START 06/14/16 BORING FINI	sн <u>06</u>	6/16/16
	SAMPLE	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
-	18	RC	90.9	95.9		52.8	80	-			Sandy shale; strong field strength; color 10Y 4/1 (dark greenish gray) to 5GY 5/1 (greenish gray); texture fine grained; massive structure; slight decomposition; moderately fractured.		
REVAEP MOUNTAINEER.GPJ	19	RC	95.9	100.9		61.2	98	95			Muddy shale; field strength strong; color 10Y 4/1 (dark greenish gray) to 5GY 5/1 (greenish gray); texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density slight.		
AEP.GDT - 09/22/16 10:45 - C.\CHERYL\PROJECTS\AEP MOUNTAINEER 7-2016 R	20	RC	100.9	105.9		57.6	72	100 -			Note: At 102 feet slickenside. Shaly sandstone; field strength strong; color 10BG 3/1 (very dark greenish gray); texture		
NEP.GDT - 09/22/16 10:								105 —			fine grained; structure massive; decomposition fresh; disintegration competent; fracture density none to slight.		

JOB NUMBI	ER OH015976.0009							
COMPANY	American Electric Power	BORING NO. SB-10	610	DATE 09/22/16	SHEET 8	_ OF _	14	
PROJECT	Mountaineer Plant	BORING START	06/14/	16 BORING FIR	NISH 06/16/	16		

PROJE	ECT	_ Mou	ıntaine	er Plant					ВС	DRING START
SAMPLE	SAMPLE	SAM DEF IN FI		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION SOIL / ROCK IDENTIFICATION DRILLER'S NOTES
21 F	RC	105.9	110.4		58.8	59	-			Sandy shale; field strength strong; color 5BG 4/1 (dark greenish gray) to 5B 5/1 (bluish gray); texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density very intense grades to slight.
22 F	RC	110.4	115.4		62.4	55	110 -		CL	Claystone/mudstone; field strength strong; color 7.5 R 3/2 to 7.5 R 5/2; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density very intense.
23 F	RC	115.4	121.0		62.4	98	- 115 - -			Sandy shale; field strength strong; color 10B 4/1 (dark bluish gray); texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density slight. Muddy shale grades to claystone/mudstone; field strength strong; color 10B 4/1)dark bluish gray) grades to 7.5 R 3/3; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density intense.
							- 120 -			Sandstone; field strength strong; color 10B 4/1 (dark bluish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration competent; fracture density moderate to intense.

JOB NUMBER OH015976.0009

COMPANY American Electric Power BORING NO. SB-1610 DATE 09/22/16 SHEET 9 OF 14

PROJECT Mountaineer Plant BORING START 06/14/16 BORING FINISH 06/16/16

PRO	JECT	Mou	ıntaine	er Plant					ВС	ORING START 06/14/16 BORING FINISH	⊢ _	06/16/16
SAMPLE NUMBER	SAMPLE	1	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
24	RC	121.0	126.0		39.6	34				Shale; field strength strong; color 10B 4/1 (dark bluish gray); texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density slight to intense.		
							125 –		CL	Claystone/mudstone; field strength strong; color 7.5 R 3/3; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density slight to intense.		
25	RC	126.0	131.3		81.6	101	-					
							130 -			Transition; field strength strong; color 7.5 R 3/3 and 4/10 BG; texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density slight. Sandstone; field strength strong; color 10B 4/1 (dark bluish gray); fine grained; structure massive; decomposition fresh; disintegration competent; fracture density slight.		
26	RC	131.3	136.3		51.6	78	-			Sandstone grades to shale; field strength strong; color 10B 4/1 (dark bluish gray); texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density slight.		
							135 -			Muddy shale grades to claystone/mudstone; field strength strong; color 10B 4/1 (dark bluish gray) and 7.5 R 4.2; texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density moderate.		
27	RC	136.3	141.3		54	60	-		CL	Claystone/mudstone; field strength strong; color 7.5 R 3/2 and 5/N grades to 2/5 y 5/4		

JOB NUMBER OH015976.0009

COMPANY American Electric Power BORING NO. SB-1610 DATE 09/22/16 SHEET 10 OF 14

PROJECT Mountaineer Plant BORING START 06/14/16 ROPING FINISH 06/16/16

PRC	JECT	Mou	ıntaine	eer Plant					ВС	ORING START
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES
28	RC		146.3		62.4	90	140 -			grades to 7.5 R 3/3; texture fine grained; structure massive; decomposition fresh to slight; disintegration slight; fracture density intense to very intense.
29	RC	146.3	151.3		61.8	103	- 145 - - -			Sandstone; field strength strong to very strong; color 10B 5/1 (bluish gray) to 10B 6/1 (bluish gray); texture medium grained; structure massive; decomposition fresh; disintegration competent; fracture density none. Sandstone; field strength strong to very strong; color 5/10 B to 6/10 B; texture medium grained; structure massive; decomposition fresh; disintegration competent; fracture density none.
30	RC	151.3	156.3		61.8	103	150 - - -			

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LOG OF BORING JOB NUMBER **OH015976.0009** COMPANY American Electric Power BORING NO. **SB-1610** DATE **09/22/16** SHEET **11** OF **14** PROJECT Mountaineer Plant BORING START **06/14/16** BORING FINISH 06/16/16 STANDARD SAMPLE RQD SAMPLE NUMBER DEPTH SCS PENETRATION RESISTANCE BLOWS / 6" DEPTH SOIL / ROCK DRILLER'S LOG WELL IN FEET **IDENTIFICATION NOTES** FEET BLOWS / 6" **FROM** TO 155 RC 156.3 160.7 51.6 85 Sandy shale grades to shale; field strength strong; color 5B 5/1 (bluish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration competent to slight; fracture density slight. 160 AEP.GDT - 09/22/16 10:45 - C.\CHERYL\PROJECTS\AEP MOUNTAINEER 7-2016 REV\AEP MOUNTAINEER.GPJ Muddy shale; field strength strong; color 7.5 R 4/3; texture fine grained; structure thinly bedded; decomposition fresh; disintegration 32 RC 160.7 165.7 61.2 44 competent to slight; fracture density slight. Claystone/mudstone; field strength strong; color 7.5 R 3/3; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density very intense. SHALE; field strength strong; color 5B 5/1 (bluish gray); texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density none. Claystone/mudstone; field strength strong; color 7.5 R 3/2 to 7.5 R 5/2; texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density intense to very intense. 165 33 RC 165.7 170.7 56.4 66

JOE	RNUN	MRFR	OH01	5976.0009				LOC	3 OI	F BORING	
	COMPANY American Electric Power					_			RΩ	RING NO. <u>SB-1610</u> DATE <u>09/22/16</u> SHEET <u>12</u> OF <u>1</u>	4
				er Plant	<u> </u>					RING START 06/14/16 BORING FINISH 06/16/16	-
1 10	JULO								ь	MING OTAKL	
SAMPLE	SAMPLE	1	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION □ DRILLER'S NOTES	
34	RC	170.7	175.7		58.8	95	- 170 – -			Sandstone; field strength strong; color 7.5 R 3/3 and 5B 5/1 (bluish gray); texture fine grained; structure massive; decomposition slight; disintegration slight; fracture density moderate to intense.	
35	RC	175.7	180.7		60	92	- 175 – -		CL	Claystone/mudstone; field strength strong; color 7.5 R 3/3; texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density slight. Sandy shale; field strength strong; color 5B 4/1 (dark bluish gray); structure thinly bedded; decomposition fresh; disintegration competent; fracture density none.	
36	RC	180.7	185.7		58.8	98	180 -			Sandy shale grades to shaly sandstone; field strength strong; color 5B 4/1 (dark bluish gray); structure thinly bedded; decomposition fresh; disintegration competent; fracture density	
							-			none.	

.1	OB	NUM	RFR	OH015	5976.0009				LO	G OI	BORING
					Electric Pow	er	_			BO	RING NO. <u>SB-1610</u> DATE <u>09/22/16</u> SHEET <u>13</u> OF <u>14</u>
					er Plant	<u>. </u>					RING START
•											BOTAIN GOTTAIN
	NUMBER	SAMPLE	SAM DEF IN F FROM	IPLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES
								-			
	37	RC	185.7	190.7		62.4	99	185 -			Shale; field strength strong; color 5B 4/1 (dark bluish gray); texture fine grained; structure
								-			thinly bedded; decomposition fresh; disintegration competent; fracture density slight.
								-			Sandstone; field strength strong; color 5B 4/1
								190 –			(dark bluish gray); texture fine grained; structure thinly bedded; decomposition fresh; disintegration competent; fracture density slight.
	38	RC	190.7	195.7		60	100	-			Muddy shale field strongth strong ages 4000
								195			Muddy shale; field strength strong; color 10BG 3/1 (very dark greenish gray and 7.5 R 3/2; texture fine grained; structure massive; decomposition fresh; disintegration competent; fracture density none.
	39	RC	195.7	200.7		55.2	90	-			
								-			

JOB	JOB NUMBER								ال ق	FBORING	
				Electric Power	er	_			ВО	ORING NO. SB-1610 DATE 09/22/16 SHEET 14 OF 1	14
				er Plant						PRING START	
SAMPLE	SAMPLE	SAM DEF IN F FROM	PLE PTH EET TO	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES	3
							200 —				
							200				
40	RC	200.7	205.1		51.6	67	-			Sandstone; field strength strong; color 5PB 4/1 (dark bluish gray) with 20% 7.5 R 4/3; texture fine grained; structure thinly bedded; decomposition slight; disintegration slight; fracture density moderate.	
							205 –			End of boring at 205.1 feet.	

		_		5976.0009 n Electric Pow	er	-			ВС	RING NO. <u>SB-1619R (ALT)</u> DATE <u>09/22/16</u> SHEET <u>1</u> OF <u>2</u>				
PRO	JECT	_Mo	untain	eer Plant						RING START <u>05/12/16</u> BORING FINISH <u>05/12/16</u>				
										ZOMETER TYPE NA WELL TYPE				
3ROI	UND	ELEVA	TION_	NA SY	STEM			_		T. RISER ABOVE GROUND DIA				
Vate	r Lev	/el, ft	∇	<u></u>		Ā	-			PTH TO TOP OF WELL SCREENBOTTOM				
TIME										ELL DEVELOPMENT BACKFILL				
DATI	=								FIE	ELD PARTY NA RIG Hollow Stem Auge				
SAMPLE	SAMPLE	DE	MPLE PTH EEET	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	USCS	SOIL / ROCK ☐ DRILLER'S NOTES				
	NR	0.0	6.0	BLOWER	0		- 5 -			Straight drilled to 6 feet, boring was pre-drilled for utility clearance; no samples were taken.				
1 2	SS	6.0 8.0	8.0	2-3-3-3	16		-		CL ML	Silt with clay; some sand, fine to coarse; trace gravel, fine to medium, subrounded, dry; firm; yellowish brown (10YR 5/4). Note: From 6 to 8 feet material was non-plastic. Note: From 7 to 8 feet includes some coal fragments.				
							- 10 –		ML CL ML CL ML	Sand with gravel; some silt; wet; loose; sand is fine to coarse; grave is fine, subrounded. Silt with clay; trace fine to medium sand; dry; firm; non-plastic.				
4	SS	12.0	12.0	NM	24		-		CL ML	Silt; some clay; some fine sand; moist; soft; N 7/ (light gray). Clayey silt; moist; soft; medium plastic; low toughness; massive, N 5/ (gray). Note: At 10.5 feet trace coarse subangular gravel.				
5	SS	14.0	16.0	NM	24		-			Note: At 14.5 feet trace subrounded gravel, 22				
		TYP	E OF C	ASING USED				MM	1	Continued Next Page				
NQ-2 ROCK CORE NA 6" x 3.25 HSA						PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC								
NA 9" x 6.25 HSA														
NA		NW CA	SING		3"	_	VVELL I	IPE:		W = OPEN TUBE SLOTTED SCREEN, GM = GEOMON				
	NA SW CASING 6" NA AIR HAMMER 8"						RECORDER J. Wanner							

JOB NUMBER <u>OH015976.0009</u>

COMPANY American Electric Power BORING NO. SB-1619R (ALT)DATE 09/22/16 SHEET 2 OF 2

PROJECT Mountaineer Plant BORING START 05/12/16 BORING FINISH 05/12/16

NUMBER	SAMPLE	SAM DEF IN F		STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL ENGTH COVERY	RQD %	DEPTH IN FEET	RAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION	WELL	DRILLER'S NOTES
, _	0)	FROM	ТО	BLOWS / 6"			FEE1	100 1000		to all a superior		
6	SS	16.0	18.0	0-0-0-3	24		-			mm in size, white quarts.		
7	SS	18.0	20.0	1-1-2-3	13		-		SM GM	Grades to silt; some sand, fine to coarse; some gravel, fine to medium, angular; little clay; dry; firm massive; non-plastic; non-dilatancy; 10B 4/1 (dark bluish gray). Note: At 18 to 20 feet dry; driller comments spoon had water in it.		
8	SS	20.0	22.0	1-4-5-3	14		20 -	-				
9	SS	22.0	24.0	3-5-5-6	20		-	_				
10	SS	24.0	26.0	3-5-7-7	13		- 25 –	_		Note: At 23 feet increase in common i.e. 10% area; medium; mottles; brown (7.5 YR 4/3).		
11	SS	26.0	28.0	4-8-10-6	13		-	-				
12	SS	28.0	30.0	3-5-8-6	13		-	_				
							30 -					
13	SS	30.0	32.0	4-23-30-41	0.7		-		CH	Clay; some silt; dry; hard to very hard; high plasticity; high toughness: dark reddish brown (2.5YR 3/4).		
14	SS	32.0	46.0	13-50/2	0.3		-			Weathered shale, no distinct plates; very hard; dry; 5G 3/1 (very dark greenish gray).		
										End of boring at 33.2 feet refusal bedrock.		

, tel Olvie	ENGINEERING ENGOVERN	
JOB NUMBER <u>OH015976.0009</u>	LOG OF BORING	
COMPANY American Electric Power	BORING NO. <u>SB-1619R</u> DATE <u>09/22/16</u> SHEI	ET_1_ OF2
PROJECT Mountaineer Plant	BORING START 05/11/16 BORING FINISH	05/11/16
COORDINATES	PIEZOMETER TYPE NA WELL TYPE	
GROUND ELEVATION NA SYSTEM	HGT. RISER ABOVE GROUND DIA	
Water Level, ft 🖳 🕎	DEPTH TO TOP OF WELL SCREENBOTTOM	
TIME	WELL DEVELOPMENT BACKFILL	
DATE	FIELD PARTY NA RIG	Hollow Stem Auger
SAMPLE STANDARD RQD DEP	TH U S SOII / ROCK -	- DRILLER'S

TIME										ELL DEVELOPMENT			
DATE	Ξ								FIE	LD PARTY NA	RIG	• <u>Hc</u>	ollow Stem Au
SAMPLE NUMBER	SAMPLE	DE	MPLE PTH EEET	STANDARI PENETRATI RESISTANO BLOWS / 6	TOTAL COVET- COVET-	%	DEPTH IN FEET	GRAPHIC LOG	nscs	SOIL / ROCK IDENTIFICATION		WELL	DRILLER'S NOTES
0	NR	0.0	6.0	BLOWER	0		-			Straight drilled to 6 feet, boring was prefor utility clearance; no samples were t			
	SS	6.0	8.0	1-0-0-2	24		5 — -			Backfill; silt and sand.			
2	SS	8.0	10.0	6-6-8-9	12		-		CL ML CL ML	Clayey silt; moist; low plasticity; low too yellowish brown (10YR 5/4). Clayey silt; trace to little sand; trace to gravel; dry; low plasticity; medium toug massive; firm; color grades to reddish (5YR 4/4).	little fine hness;		
	SS	10.0	12.0	4-4-5-4 3-4-5-5	13		10			Note: From 8 to 10 feet includes some fragments. Note: From 10 to 11 feet includes som fragments.			
5	SS	14.0	16.0	7-7-8-6 ASING USE	18		-			Note: From 13.5 to 13.6 feet sand lens coarse; loose; dry. Note: From 14 to 16 feet increase <20 mottles; <15 mm in size; distinct contra	%		

- AEP.GDT - 09/22/16 10:47 -TYPE OF CASING USED Continued Next Page NQ-2 ROCK CORE PIEZOMETER TYPE: PT = OPEN TUBE POROUS TIP, SS = OPEN TUBE NA 6" x 3.25 HSA SLOTTED SCREEN, G = GEONOR, P = PNEUMATIC NA 9" x 6.25 HSA **HW CASING ADVANCER** 4" NA WELL TYPE: OW = OPEN TUBE SLOTTED SCREEN, GM = GEOMON 3" **NW CASING** NA NA SW CASING 6" NA NA RECORDER J. Wanner 8" AIR HAMMER

JOB NUMBER OH015976.0009

COMPANY American Electric Power BORING NO. SB-1619R DATE 09/22/16 SHEET 2 OF 2

PROJECT Mountaineer Plant BORING START 05/11/16 BORING FINISH 05/11/16

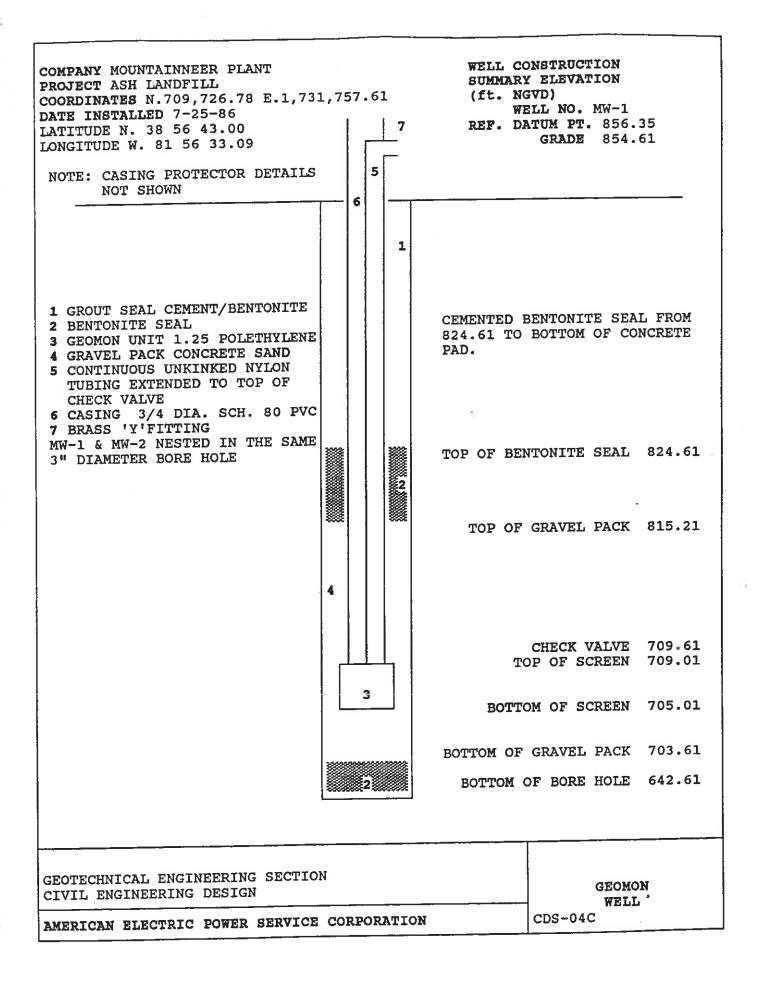
PRC	JEC1	Mou	ıntaine	er Plant					ВС	RING START
SAMPLE	SAMPLE	SAM DEF IN F FROM	PTH	STANDARD PENETRATION RESISTANCE BLOWS / 6"	TOTAL LENGTH RECOVERY	RQD %	DEPTH IN FEET	GRAPHIC LOG	uscs	SOIL / ROCK IDENTIFICATION DRILLER'S NOTES
6	SS	16.0	18.0	3-3-6-6	21		-		SP CL ML	dark bluish gray (10B 3/1 (very dark bluish gray) and 5R 4/1 (dark bluish gray). Sand with silt; dry; loose; sand is fine to coarse; brown (10YR 5/3). Silt with clay; little sand, fine to coarse; little gravel; dry; firm; reddish brown (5YR 4/4).
7	SS	18.0	20.0	1-2-4-4	24		-			Note: From 16 to 20 feet granules increase in abundance and size of mottles.
8	SS	20.0	22.0	0-2-4-5	24		20 -			
9	SS	22.0	24.0	1-2-4-4	24		-		SP SM	Silt with sand; some gravel; some clay; moist; firm; massive; sand is fine to coarse; gravel is fine to coarse, ingush dominant; dark yellowish brown (10YR 4/4).
10	SS	24.0	26.0	1-2-7-29	24		25 –		SM	Silt with very fine sand; some clay; dry; firm; massive; incluse trace fine to medium subangular gravel; 10B 3/1 (very dark bluish gray).
11	SS	26.0	28.0	23-24-41-50/3	13		-		CL ML	Broken gravel or rock; dry. Silt with clay; moist; soft; yellowish brown (10YR 5/4). Weathered shale; up to 5 mm; light brownish gray (2.5Y 6/2) to very dark brown (5YR 3/1) at plate surfaces. End of boring at 27.9 feet top of rock.

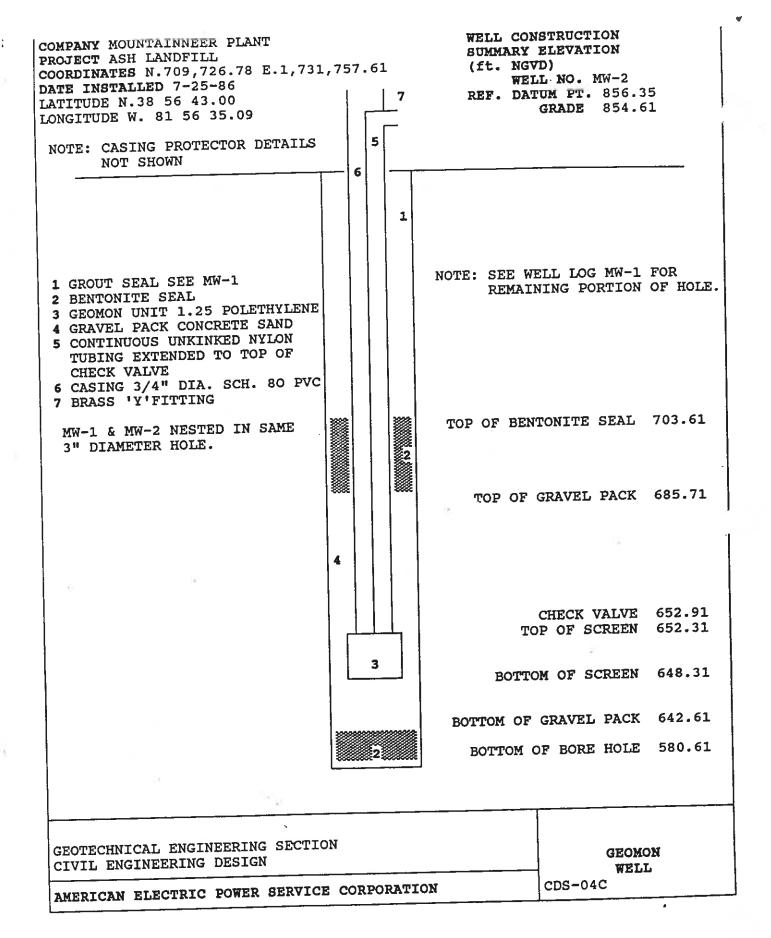


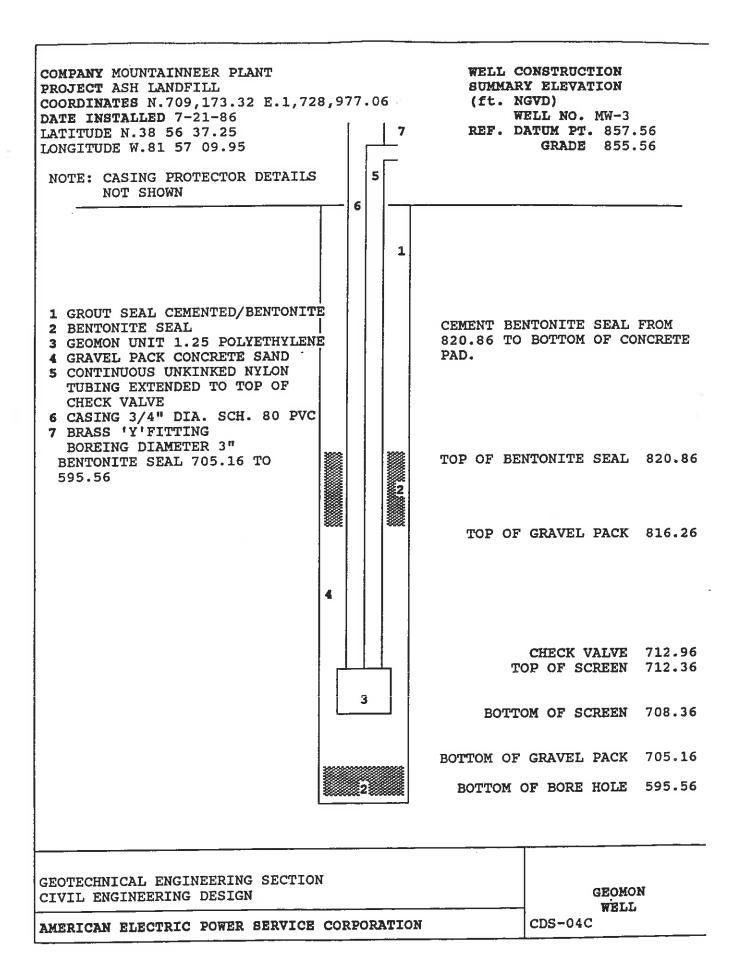
AEP 1986, 1992

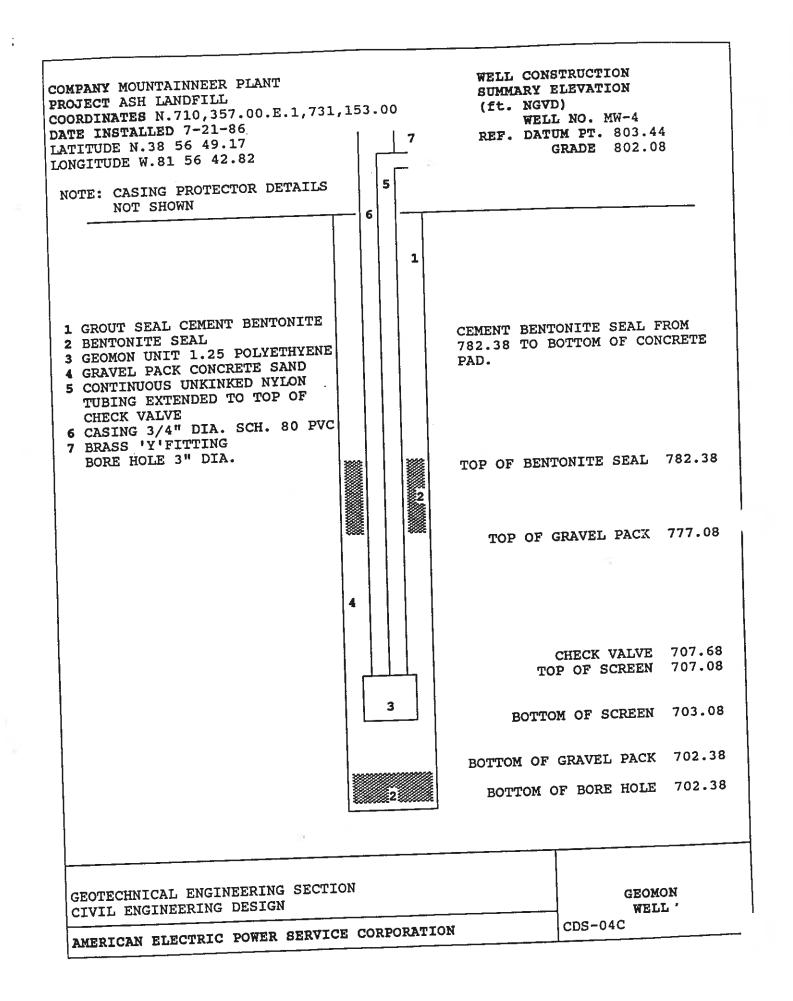
Monitoring Well Construction Diagrams

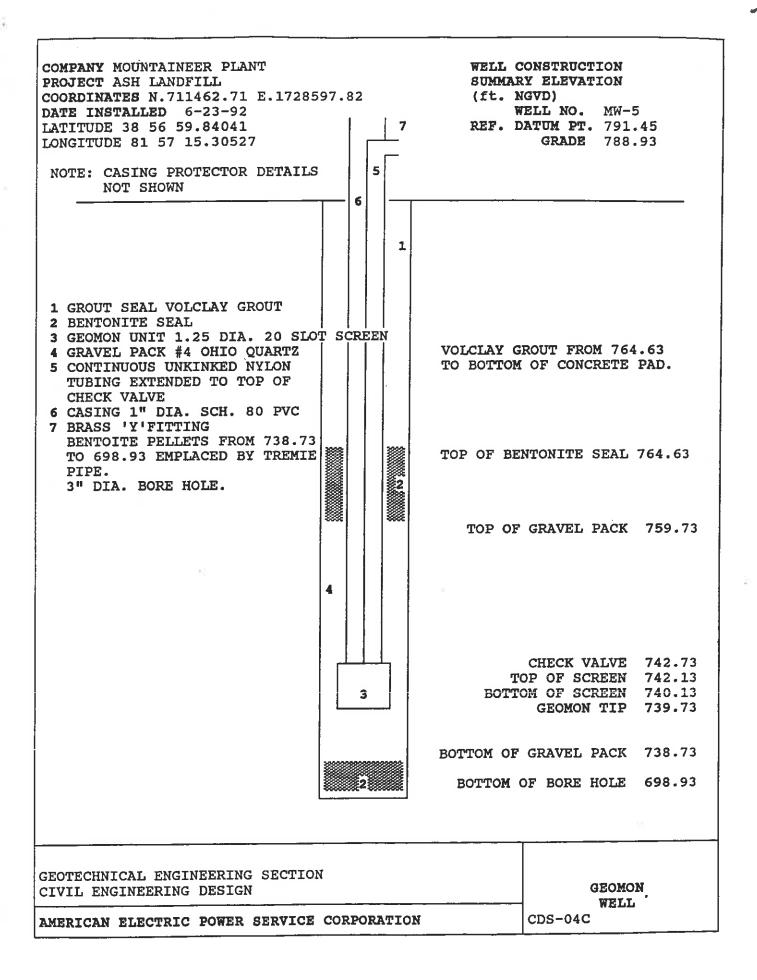
MW-1 to MW-20

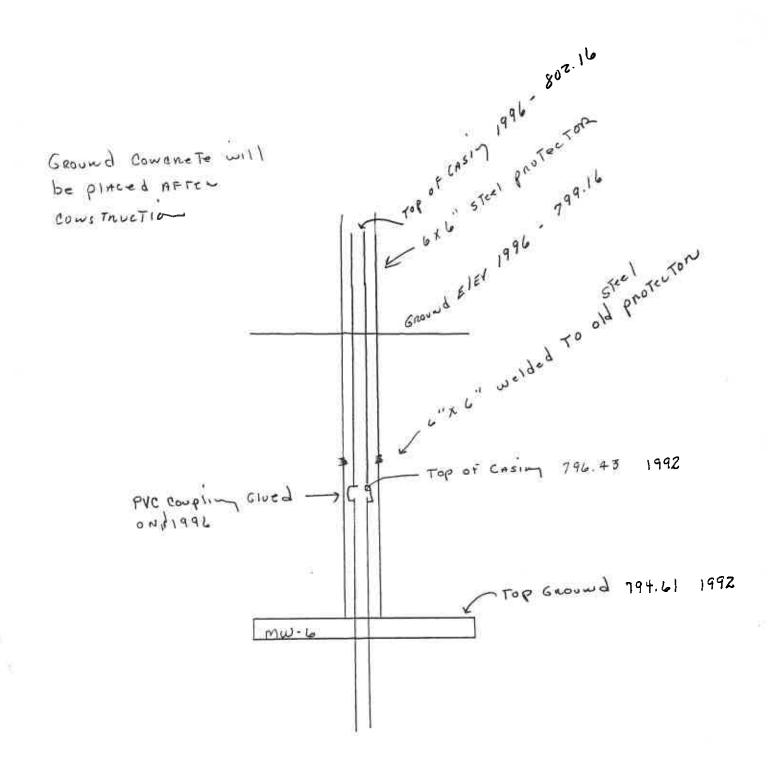




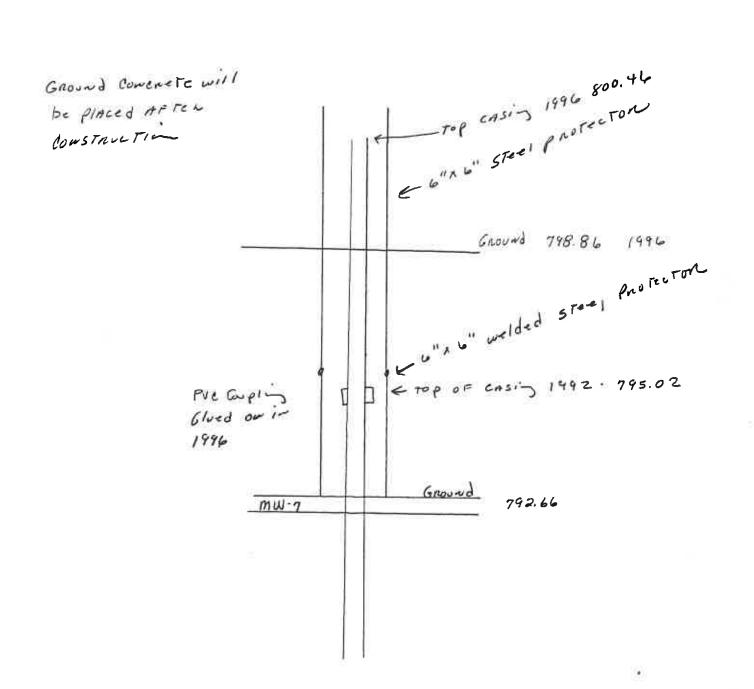


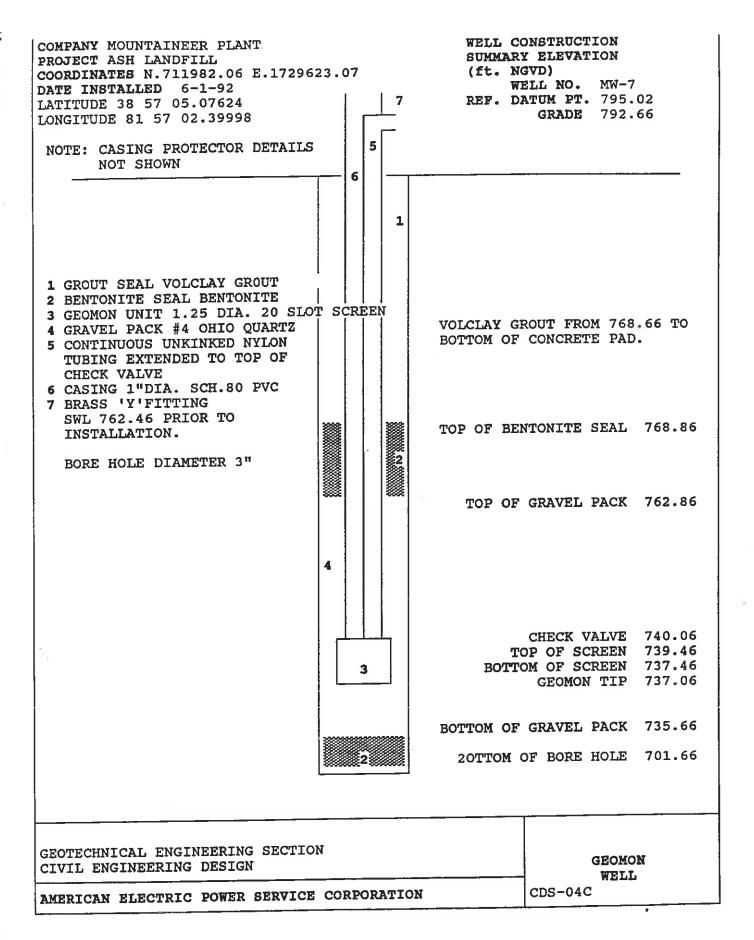






WELL CONSTRUCTION COMPANY APCO MOUNTAINEER PLANT SUMMARY ELEVATION PROJECT ASH LANDFILL (ft. NGVD) COORDINATES N.712003.88 E.1729676.15 WELL NO. MW-6 DATE INSTALLED 6-16-92 **REF. DATUM PT.** 796.43 LATITUDE 38 57 05.29684 **GRADE** 794.61 LONGITUDE 81 57 01.72920 NOTE: CASING PROTECTOR DETAILS NOT SHOWN 1 1 GROUT SEAL VALCLAY GROUT 2 BENTONITE SEAL PELLETS SEAL 3 SCREEN 20 SLOT SIZE 2" DIA. VOLCLAY GROUT FROM 675.41 4 GRAVEL PACK #4 OHIO QUARTZ TO BOTTOM OF CONCRETE PAD. 5 N.A. 6 6 RISER PIPE 2" DIA. SCH. 40 6-15-92 BAILED HOLE DRY. 6-16-92 SWL 663.71 6-16-92 AFTER INSTALLATION BAILED WELL TO 664.61 TOP OF BENTONITE SEAL 675.41 BORE HOLE 6"DIAMETER TOP OF GRAVEL PACK 670.11 TOP OF SCREEN 668.81 **∰3**§ BOTTOM OF SCREEN 659.81 BOTTOM OF BLANK SECTION 658.91 BOTTOM OF GRAVEL PACK 657.61 BOTTOM OF BORE HOLE 654.61 **777**5 GEOTECHNICAL ENGINEERING SECTION OBSERVATION CIVIL ENGINEERING DESIGN WELL CDS-04 AMERICAN ELECTRIC POWER SERVICE CORPORATION





WELL CONSTRUCTION COMPANY APCO MOUNTAINEER PLANT SUMMARY ELEVATION PROJECT ASH LANDFILL (ft. NGVD) COORDINATES N.710780.86 E.1730856.45 WELL NO. MW-8 DATE INSTALLED 7-29-92 REF. DATUM PT. 677.23 LATITUDE 38 56 53.33134 **GRADE** 675.49 LONGITUDE 81 56 46.63136 NOTE: CASING PROTECTOR DETAILS NOT SHOWN 1 GROUT SEAL VOLCLAY GROUT VOLCLAY GROUT FROM 638.89 2 BENTONITE SEAL BENTONITE TO BOTTOM OF CONCRETE PAD. 3 SCREEN 2" DIA. 20 SLOT SCREEN GRAVEL PACK #4 OHIO QUARTZ 5 N.A. 6 RISER PIPE 2"DIA SCH 40 PVC BAILED WATER FROM COMPLETED WELL. WATER LEVEL WOULD NOT DROP BELOW 663.49 TOP OF BENTONITE SEAL 638.89 ELEVATION. RECOVERED TO 669.49 ELEVATION WITH IN MINUTES. BORE HOLE 6"DIAMETER TOP OF GRAVEL PACK 632.89 BENTONITE PELLETS EMPLACED THROUGH TREMIE PIPE FROM 620.49 TO 570.79. TOP OF SCREEN 631.49 **≋**3 BOTTOM OF SCREEN 622.59 BOTTOM OF BLANK SECTION 621.49 BOTTOM OF GRAVEL PACK 620.49 BOTTOM OF BORE HOLE 570.79 **5** GEOTECHNICAL ENGINEERING SECTION OBSERVATION CIVIL ENGINEERING DESIGN

AMERICAN ELECTRIC POWER SERVICE CORPORATION

WELL

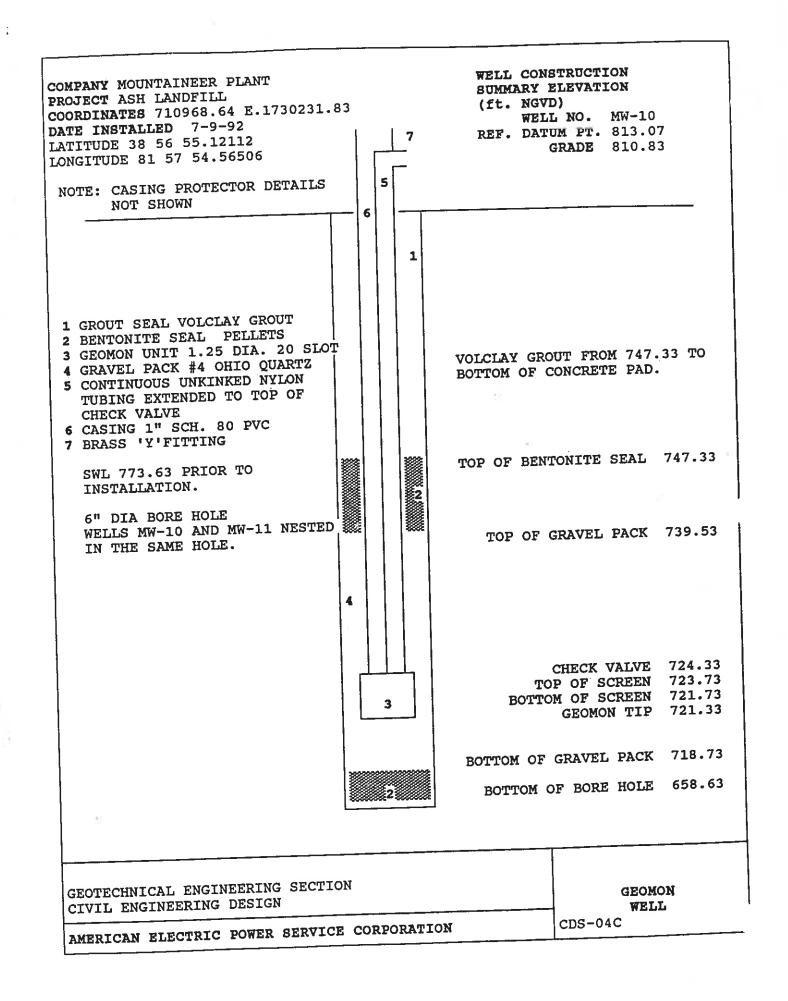
CDS-04

COMPANY APCO MOUNTAINEER PLANT
PROJECT ASH LANDFILL
COORDINATES N.712268.45 E.1732217.43
DATE INSTALLED 8-6-92
LATITUDE 38 57 08.17104
LONGITUDE 81 56 29.59950
NOTE: CASING PROTECTOR DETAILS
NOT SHOWN

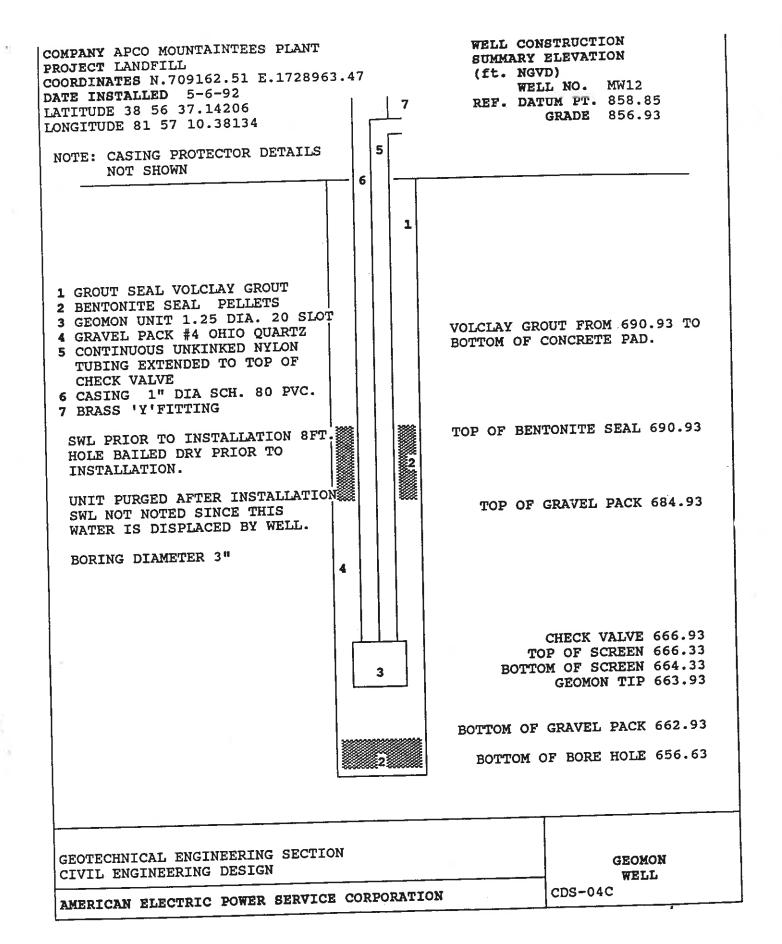
WELL CONSTRUCTION
SUMMARY ELEVATION
(ft. NGVD)
WELL NO. MW-9
REF. DATUM PT. 644.9
GRADE 643.0

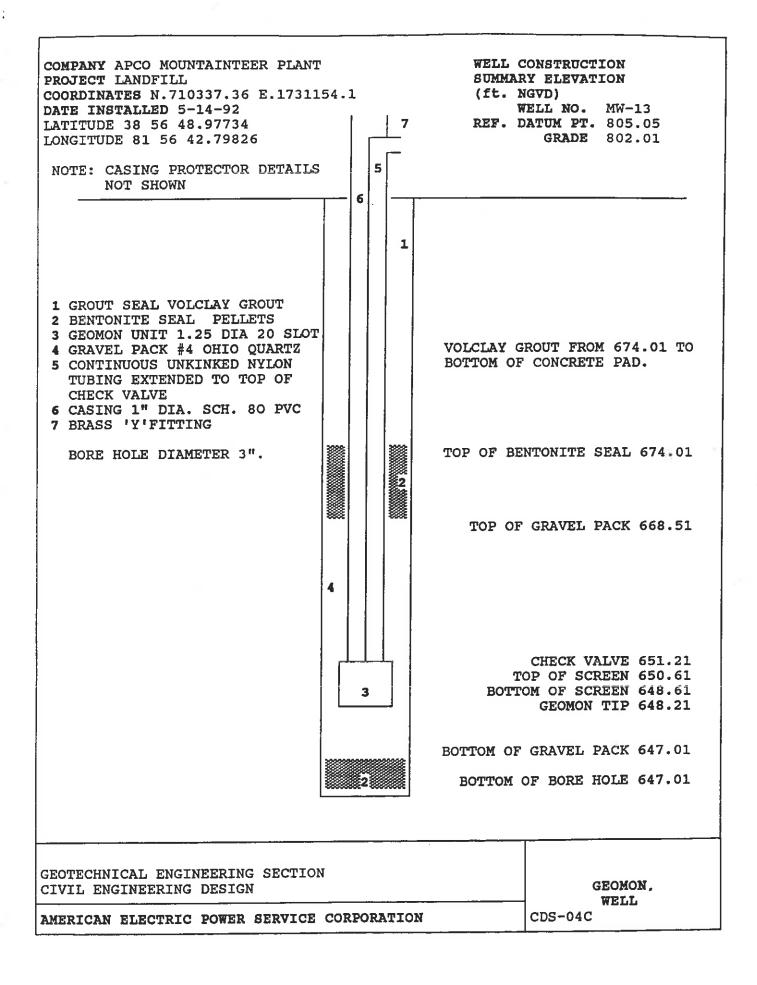
1 GROUT SEAL VOLCLAY GROUT 1 VOLCLAY GROUT FROM 607.0 TO 2 BENTONITE SEAL BOTTOM OF CONCRETE PAD. 3 SCREEN 2"DIA 20 SLOT SCREEN 4 GRAVEL PACK #4 OHIO QUARTZ 5 N.A. 6 RISER PIPE 2" DIA. SCH. 40 6 BAILED WELL AFTER INSTALLATION SWL RECOVERED TO APPROX. 6 FT. FROM TOP OF BENTONITE SEAL 607.0 GRADE. BORE HOLE 6" DIAMETER TOP OF GRAVEL PACK 600.1 TOP OF SCREEN 599.2 3 BOTTOM OF SCREEN 590.1 BOTTOM OF BLANK SECTION 589.0 BOTTOM OF GRAVEL PACK 587.7 BOTTOM OF BORE HOLE 587.7

GEOTECHNICAL ENGINEERING SECTION CIVIL ENGINEERING DESIGN	OBSERVATION WELL
AMERICAN ELECTRIC POWER SERVICE CORPORATION	CDS-04



COMPANY APCO MOUNTAINEER PLANT WELL CONSTRUCTION PROJECT ASH LANDFILL SUMMARY ELEVATION COORDINATES N.710968.29 E.1730231.77 (ft. NGVD) DATE INSTALLED 7-8-922 WELL NO. MW-11 **REF. DATUM PT. 813.63** LATITUDE 38 56 55.12004 LONGITUDE 81 56 54.56455 GRADE 810.83 NOTE: CASING PROTECTOR DETAILS NOT SHOWN BENTONITE PELLETS FROM 673.83 1 GROUT SEAL BENTONITE PELLETS 2 BENTONITE SEAL TO 718.13. 3 SCREEN 2"DIA. 20 SLOT PVC 4 GRAVEL PACK #4 OHIO QUARTZ 5 N.A. 6 RISER PIPE 2" DIA SCH. 40 PVC 6 SWL BAILED HOLE DRY PRIOR TO INSTALLATION. MW-10 AND MW-11 NESTED IN TOP OF BENTONITE SEAL 718.73 THE SAME 6" DIA HOLE. TOP OF GRAVEL PACK 673.83 TOP OF SCREEN 670.93 **₩3**{ BOTTOM OF SCREEN 661.93 BOTTOM OF BLANK SECTION 660.83 BOTTOM OF GRAVEL PACK 659.83 BOTTOM OF BORE HOLE 658.63 5 GEOTECHNICAL ENGINEERING SECTION CIVIL ENGINEERING DESIGN OBSERVATION WELL AMERICAN ELECTRIC POWER SERVICE CORPORATION CDS-04





SUMMARY ELEVATION PROJECT ASH LANDFILL COORDINATES N.710272.6 E.1729225.46 (ft. NGVD) WELL NO. MW-14 DATE INSTALLED 8-11-92 REF. DATUM PT. 716.87 LATITUDE 38 56 48.14330 GRADE 715.1 LONGITUDE 81 57 07.20934 NOTE: CASING PROTECTOR DETAILS NOT SHOWN 1 GROUT SEAL VOLCLAY VOLCLAY GROUT FROM 676.9 TO 2 BENTONITE SEAL PELLETS BOTTOM OF CONCRETE PAD. 3 SCREEN 2" DIA. 20 SLOT PVC 4 GRAVEL PACK #4 OHIO QUARTZ 5 N.A. 6 RISER PIPE 2" DIA. SCH 40 PVC 6 WELL BAILED DRY AFTER INSTALLATION. TOP OF BENTONITE SEAL 676.9 BOREHOLE DIAMETER 6" TOP OF GRAVEL PACK 671.1 TOP OF SCREEN 669.7 4 BOTTOM OF SCREEN 660.2 BOTTOM OF BLANK SECTION 659.7 BOTTOM OF GRAVEL PACK 658.7 BOTTOM OF BORE HOLE 658.7 GEOTECHNICAL ENGINEERING SECTION OBSERVATION CIVIL ENGINEERING DESIGN WELL CDS-04 AMERICAN ELECTRIC POWER SERVICE CORPORATION

COMPANY APCO MOUNTAINEER PLANT

WELL CONSTRUCTION

COMPANY APCO MOUNTAINEER PLANT WELL CONSTRUCTION PROJECT ASH LANDFILL SUMMARY ELEVATION COORDINATES N.710943.81 E.1730886.18 (ft. NGVD) DATE INSTALLED 7-22-92 WELL NO. MW-15 LATITUDE 38 56 54.94387 REF. DATUM PT. 681.2 LONGITUDE 81 56 46.27894 GRADE 679.29 NOTE: CASING PROTECTOR DETAILS NOT SHOWN 1 GROUT SEAL VOLCLAY GROUT 1 2 BENTONITE SEAL PELLETS VOLCLAY GROUT FROM 640.59 TO BOTTOM OF CONCRETE PAD. 3 SCREEN 2" DIA. 20 SLOT PVC 4 GRAVEL PACK #4 OHIO QUARTZ 5 N.A. 6 RISER PIPE 2" DIA. SCH. 40 PVC BORE HOLE 6" TOP OF BENTONITE SEAL 640.59 TOP OF GRAVEL PACK 635.59 TOP OF SCREEN 634.39 3 BOTTOM OF SCREEN 625.39 BOTTOM OF BLANK SECTION 624.29 BOTTOM OF GRAVEL PACK 623.29 BOTTOM OF BORE HOLE 621.19 **5** GEOTECHNICAL ENGINEERING SECTION **OBSERVATION** CIVIL ENGINEERING DESIGN WELL CDS-04 AMERICAN ELECTRIC POWER SERVICE CORPORATION

WELL CONSTRUCTION COMPANY APCO MOUNTAINEER PLANT SUMMARY ELEVATION PROJECT ASH LANDFILL (ft. NGVD) COORDINATES N.714546.94 E.1733259.19 WELL NO. MW-16 DATE INSTALLED 5-21-92 REF. DATUM PT. 628.78 LATITUDE 38 57 30.79416 GRADE 626.03 LONGITUDE 81 56 16.70491 NOTE: CASING PROTECTOR DETAILS NOT SHOWN 1 1 GROUT SEAL VOLCLAY GROUT 2 BENTONITE SEAL PELLETS 3 SCREEN 2" DIA. 20 SLOT PVC BENTONITE PELLETS FROM 621.03 4 GRAVEL PACK #4 OHIO QUARTZ TO BOTTOM OF CONCRETE PAD. BENTONITE PELLETS WERE HYDRATED 5 N.A. 6 RISER PIPE 2" DIA. SCH. 40 6 DURING INSTALLATION. BORE HOLE 6" TOP OF BENTONITE SEAL 621.03 TOP OF GRAVEL PACK 616.03 TOP OF SCREEN 615.03 BOTTOM OF SCREEN 604.58 BOTTOM OF BLANK SECTION 604.03 BOTTOM OF GRAVEL PACK 597.53 BOTTOM OF BORE HOLE 597.53 **5** GEOTECHNICAL ENGINEERING SECTION OBSERVATION CIVIL ENGINEERING DESIGN WELL

AMERICAN ELECTRIC POWER SERVICE CORPORATION

CDS-04

WELL CONSTRUCTION COMPANY APCO MOUNTAINEER PLANT SUMMARY ELEVATION PROJECT ASH LANDFILL COORDINATES N.714833.45 E.1733260.67 (ft. NGVD) WELL NO. MW-17 DATE INSTALLED 5-20-92 REF. DATUM PT. 623.29 LATITUDE 38 57 33.62858 GRADE 621.47 LONGITUDE 81 56 16.72503 NOTE: CASING PROTECTOR DETAILS NOT SHOWN 1 1 GROUT SEAL VOLCLAY GROUT 2 BENTONITE SEAL PELLETS 3 SCREEN 2" DIA. 20 SLOT PVC VOLCLAY GROUT TO BOTTOM OF 4 GRAVEL PACK #4 OHIO QUARTZ CONCRETE PAD. 6 RISER PIPE 2" DIA. SCH. 40 PVC 6 BORE HOLE DIAMETER 6" TOP OF BENTONITE SEAL 609.47 TOP OF GRAVEL PACK 604.47 TOP OF SCREEN 602.92 3 BOTTOM OF SCREEN 593.47 BOTTOM OF BLANK SECTION 592.47 BOTTOM OF GRAVEL PACK 590.97 BOTTOM OF BORE HOLE 590.97 **5** GEOTECHNICAL ENGINEERING SECTION OBSERVATION CIVIL ENGINEERING DESIGN WELL CDS-04 AMERICAN ELECTRIC POWER SERVICE CORPORATION

WELL CONSTRUCTION COMPANY APCO MOUNTAINEER PLANT SUMMARY ELEVATION PROJECT ASH LANDFILL (ft. NGVD) COORDINATES N.714922.00 E.1733257.86 WELL NO. MW-18 DATE INSTALLED 5-19-92 REF. DATUM PT. 623.78 LATITUDE 38 57 34.50337 **GRADE** 621.95 LONGITUDE 81 56 16.77161 NOTE: CASING PROTECTOR DETAILS NOT SHOWN 1 1 GROUT SEAL VOLCLAY GROUT 2 BENTONITE SEAL PELLETS 3 SCREEN 2" DIA. 20 SLOT PVC VOLCLAY GROUT FROM 612.95 TO 4 GRAVEL PACK #4 OHIO QUARTZ BOTTOM OF CONCRETE PAD. 5 N.A. 6 RISER PIPE 2" DIA. SCH. 40 PVC 6 SWL PRIOR TO INSTALLATION 608.65 BAILED TO 20.0 DURING TOP OF BENTONITE SEAL 612.95 INSTALLATION. BORE HOLE DIAMETER 6" TOP OF GRAVEL PACK 608.15 TOP OF SCREEN 606.85 3 BOTTOM OF SCREEN 597.75 BOTTOM OF BLANK SECTION 596.75 BOTTOM OF GRAVEL PACK 595.75 BOTTOM OF BORE HOLE 595.75 **5** GEOTECHNICAL ENGINEERING SECTION OBSERVATION CIVIL ENGINEERING DESIGN WELL AMERICAN ELECTRIC POWER SERVICE CORPORATION CDS-04

WELL CONSTRUCTION PROJECT ASH LANDFILL SUMMARY ELEVATION COORDINATES N.712263.69 E.1732224.97 (ft. NGVD) DATE INSTALLED 8-13-92 WELL NO. MW-19 LATITUDE 38 57 08.12124 REF. DATUM PT. 645.14 LONGITUDE 81 56 29.50359 GRADE 643.18 NOTE: CASING PROTECTOR DETAILS NOT SHOWN 1 GROUT SEAL BENTONITE PELLETS 1 2 BENTONITE SEAL PELLETS 3 SCREEN 2" DIA. 20 SLOT PVC. 4 GRAVEL PACK #4 OHIO QUARTZ 5 N.A. 6 RISER PIPE 2" DIA. SCH. 40 PVC BORE HOLE DIAMETER 6" CLUSTERED WELL SITE WITH MW-9. TOP OF BENTONITE SEAL BOTTOM OF CONCRETE PAD. PELLETS WERE HYDRATED DURING INSTALLATION. TOP OF GRAVEL PACK 632.68 TOP OF SCREEN 631.58 [3] 4 BOTTOM OF SCREEN 622.68 BOTTOM OF BLANK SECTION 621.58 BOTTOM OF GRAVEL PACK 620.38 **5** BOTTOM OF BORE HOLE 620.38 GEOTECHNICAL ENGINEERING SECTION CIVIL ENGINEERING DESIGN **OBSERVATION** WELL AMERICAN ELECTRIC POWER SERVICE CORPORATION CDS-04

COMPANY APCO MOUNTAINEER PLANT

WELL CONSTRUCTION COMPANY APCO MOUNTAINEER PLANT SUMMARY ELEVATION PROJECT ASH LANDFILL (ft. NGVD) COORDINATES N.710956.09 E.1730893.81 WELL NO. MW-20 DATE INSTALLED 8-18-92 REF. DATUM PT. 682.03 LATITUDE 38 56 55.06653 GRADE 679.99 LONGITUDE 81 56 46.18349 NOTE: CASING PROTECTOR DETAILS NOT SHOWN 1 1 GROUT SEAL BENTONITE PELLETS 2 BENTONITE SEAL 3 SCREEN 2" DIA. 20 SLOT PVC 4 GRAVEL PACK #4 OHIO QUARTZ 5 N.A. 6 RISER PIPE 2" DIA. SCH. 40 6 BORE HOLE DIAMETER 6" CLUSTERED WELL SITE WITH MW-15. BENTONITE SEAL FROM 632.68 TO BOTTOM OF CONCRETE PAD. BENTONITE PELLETE WERE HYDRATED DURING INSTALLATION. TOP OF GRAVEL PACK 672.09 TOP OF SCREEN 671.09 **§3** 4 BOTTOM OF SCREEN 662.09 BOTTOM OF BLANK SECTION 660.99 BOTTOM OF GRAVEL PACK 659.49 BOTTOM OF BORE HOLE 659.49 **......**5 GEOTECHNICAL ENGINEERING SECTION OBSERVATION CIVIL ENGINEERING DESIGN MELL CDS-04 AMERICAN ELECTRIC POWER SERVICE CORPORATION



AEP 1992, 2005, 2006, 2008

Monitoring Well Construction Diagrams

MW-05 to MW-22, MW-24 to MW-26, MW-34 to MW-44, MW-44D, MW-44I, MW-44S



JOB NUMBER		, WLLL C	ONSTINOC	TION	
COMPANY APPALACHIAN POW	ER COMPANY	WELL No	0	BORING No. MW-05	INSTALLED 6/23/92
PROJECT MOUNTAINEER LBR	LANDFILL				
COORDINATES N 711,462.7 E 1,	728,597.8				
SYSTEM					
		4		TOP RISER: 791.45 FT.	
GROUND ELEVATION 788.93 FT.					
ONOGNO ELLEVATION 700.9311.					
>					
GROUT SEAL:					
BENTONITE SEAL:				TOP BENTONITE SEAL:	FT.
<u>==</u>					
SCREEN: dia., ,					
GRAVEL PACK:				TOP GRAVEL PACK: FT.	
				TOP GRAVEL PACK. FT.	
RISER PIPE: , dia.,				TOP SCREEN: 742.13 FT	
TAIGERT II E. , did.,				101 001 LEN. 142.101 1	,
SPACERS, DEPTH:					
2					
				BOTTOM SCREEN: 740.1	13 FT
				DOTTOW GOTTLEN. 140.1	V. I.
				BOTTOM WELL: FT.	
i	(:-: 			BOTTOM GRAVEL PACK	: FT.

BOTTOM BORING: 699.03 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY INSTALLED **7/16/92** WELL No. _____ BORING No. MW-06 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 712,003.9 E 1,729,676.1 SYSTEM TOP RISER: 800.96 FT. GROUND ELEVATION 799.16 FT. GROUT SEAL: TOP BENTONITE SEAL: FT. BENTONITE SEAL: SCREEN: dia.,, **GRAVEL PACK:** TOP GRAVEL PACK: FT. TOP SCREEN: 673.36 FT. RISER PIPE: , dia., SPACERS, DEPTH: WV00019 Well abandoned 8/18/99 - Pulled PVC casing, drilled 5.25"roller bit to bottom of hole, flushed with water, & triemie grouted with approx. 80 gallons of Quick BOTTOM SCREEN: 664.36 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT. BOTTOM BORING: 659.16 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY INSTALLED <u>6/19/92</u> WELL No. 9621 BORING No. MW-07 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 711,982.1 E 1,729,623.0 SYSTEM TOP RISER: 802.76 FT. GROUND ELEVATION 800.46 FT. GROUT SEAL: 50 GALLONS QUICK GROUT TOP BENTONITE SEAL: FT. BENTONITE SEAL: 50 # BENTONITE CHIPS SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.0 GRAVEL PACK: 175# No.4 OHIO QUARTZ TOP GRAVEL PACK: FT. TOP SCREEN: 747.26 FT. RISER PIPE: 2.0, dia., PVC SCH 40 SPACERS, DEPTH: 25', 26' WV00019 Well abandoned 8/17/99 - Pulled PVC casing, drilled 2.875"roller bit to bottom of hole, flushed with water, & triemie grouted with approx. 50 gallons of Quick BOTTOM SCREEN: 745.26 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 709.46 FT.



COMPANY PAPALACHIAN POWER COMPANY PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 710,780.9 E 1,730,856.4 SYSTEM GROUND ELEVATION 675.49 FT. BENTONITE SEAL: GRAVEL PACK: GRAVEL PACK: RISER PIPE: da. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM BORING: 570.79 FT.	JOB NUMBER	WONITORII'	NG WELL (JONSTRUC	JION	
GROUND ELEVATION 675.49 FT. GROUND ELEVATION 675.49 FT. GROUND SEAL: BENTONITE SEAL: GRAVEL PACK RISER PIPE: dia., SPACERS, DEPTH: SPACERS, DEPTH: GROUND SEAL: BOTTOM SCREEN: 631.49 FT. BOTTOM WELL: FT.	COMPANY APPALACHIAN PO	WER COMPANY	WELL N	No	BORING No. MW-08	INSTALLED 7/29/92
GROUND ELEVATION 675.49 FT. GROUND ELEVATION 675.49 FT. BENTONITE SEAL: GRAVEL PACK RISER PIPE: dia., SPACERS, DEPTH TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM MELL: FT. BOTTOM MELL: FT. BOTTOM MELL: FT.	PROJECT MOUNTAINEER LBF	R LANDFILL	_			
GROUND ELEVATION 675.49 FT. GROUND ELEVATION 675.49 FT. GROUND SEAL: BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: RISER PIPE:, dia, SPACERS, DEPTH: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM MELL: FT.	COORDINATES N 710,780.9 E	1,730,856.4				
GROUND ELEVATION 675.49 FT. GROUT SEAL: BENTONITE SEAL: GRAVEL PACK: GRAVEL PACK: RISER PIPE: , dia., SPACERS, DEPTH: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. BOTTOM SCREEN: 622.59 FT. BOTTOM GRAVEL PACK: FT. BOTTOM GRAVEL PACK: FT. BOTTOM GRAVEL PACK: FT.	SYSTEM					
GROUND ELEVATION 675.49 FT. GROUT SEAL: BENTONITE SEAL: GRAVEL PACK: GRAVEL PACK: RISER PIPE: , dia., SPACERS, DEPTH: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. BOTTOM SCREEN: 622.59 FT. BOTTOM GRAVEL PACK: FT. BOTTOM GRAVEL PACK: FT. BOTTOM GRAVEL PACK: FT.				7		
GROUT SEAL: BENTONITE SEAL: GRAVEL PACK: GRAVEL PACK: FISER PIPE: , dia, SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.				J	TOP RISER: 677.22 FT.	
GROUT SEAL: BENTONITE SEAL: GRAVEL PACK: GRAVEL PACK: FISER PIPE: , dia, SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	GROUND ELEVATION 675 49 ET					
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	ondone Elevanon drond in					
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.		Y//\\\/\\\\/\\\\/\\\\/\\\\/\\\\/\\\\/\			///>///////////////////////////////////	
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	GROUT SEAL:					
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	SHOOT SELE					
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.					TOP BENTONITE SEAL:	FT.
GRAVEL PACK: ———————————————————————————————————	BENTONITE SEAL:					
GRAVEL PACK: ———————————————————————————————————						
TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	SCREEN: dia.,,					
TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
TOP GRAVEL PACK: FT. TOP SCREEN: 631.49 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	GRAVEL PACK:					
SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.			(/////	<i>/////</i>	TOP GRAVEL PACK: FT.	
SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	DICED DIDE. 45-				TOD CODEEN, C24, 40 FT	-
SPACERS, DEPTH: BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	RISER PIPE: , dia.,				10P SCREEN: 031.49 FT	
BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	SPACERS, DEPTH:					
BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.			$ \cdot,\cdot,\cdot ==$			
BOTTOM SCREEN: 622.59 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BOTTOM SCREEN: 622.59 FT. — BOTTOM WELL: FT. — BOTTOM GRAVEL PACK: FT.						
BOTTOM SCREEN: 622.59 FT. — BOTTOM WELL: FT. — BOTTOM GRAVEL PACK: FT.						
— BOTTOM SCREEN: 622.59 FT. — BOTTOM WELL: FT. — BOTTOM GRAVEL PACK: FT.	2					
BOTTOM SCREEN: 622.59 FT. — BOTTOM WELL: FT. — BOTTOM GRAVEL PACK: FT.						
— BOTTOM WELL: FT. — BOTTOM GRAVEL PACK: FT.					BOTTOM SCREEN: 622.5	59 FT.
BOTTOM GRAVEL PACK: FT.	į					
					BOTTOM WELL: FT.	
						· ET
BOTTOM BORING: 570.79 FT.	i				BUTTUM GRAVEL PACK	. гі.
					BOTTOM BORING: 570.7	9 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. ______ BORING No. **MW-09** INSTALLED **8/13/92** PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 712,268.5 E 1,732,217.4 SYSTEM TOP RISER: 644.90 FT. GROUND ELEVATION 643.00 FT. GROUT SEAL: TOP BENTONITE SEAL: FT. BENTONITE SEAL: SCREEN: dia.,, GRAVEL PACK: TOP GRAVEL PACK: FT. RISER PIPE: , dia., TOP SCREEN: 599.20 FT. SPACERS, DEPTH: BOTTOM SCREEN: 590.10 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 587.70 FT.



JOB NUMBER		WELL	. 001101			
COMPANY APPALACHIAN PO	WER COMPANY	WEL	L No	ا	BORING No. MW-10	INSTALLED 7/8/92
PROJECT MOUNTAINEER LB	R LANDFILL					
COORDINATES N 710,968.6 E	1,730,231.8					
SYSTEM						
			\neg			
		Ļ	\dashv		TOP RISER: 810.30 FT.	
CDOLIND ELEVATION 040 02 ET						
GROUND ELEVATION 810.83 FT.						
GROUT SEAL:						
					TOP BENTONITE SEAL:	FT.
BENTONITE SEAL:						
SCREEN: dia.,,						
GRAVEL PACK:						
GIVINE TAGIC			(/////		TOP GRAVEL PACK: FT.	
RISER PIPE: , dia.,					TOP SCREEN: 583.93 FT	
SPACERS, DEPTH:						
			=			
			= [3,3,5,6]			
			= 0.000.00			
					BOTTOM SCREEN: 572.8	3 FT.
5					BOTTOM WELL: FT.	
		7777777777	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		BOTTOM GRAVEL PACK	: FT.
					BOTTOM BORING: 658.6	3 FT.



JOB NUMBER _ COMPANY APPALACHIAN POWER COMPANY WELL No. BORING No. MW-11 INSTALLED PROJECT MOUNTAINEER LBR LANDFILL COORDINATES SYSTEM TOP RISER: FT. GROUND ELEVATION FT. GROUT SEAL: TOP BENTONITE SEAL: FT. BENTONITE SEAL: SCREEN: dia.,, GRAVEL PACK: TOP GRAVEL PACK: FT. RISER PIPE: , dia., TOP SCREEN: FT. SPACERS, DEPTH: BOTTOM SCREEN: FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: FT.



JOB NUMBER		ING WLLL	CONS	111001	ON	
COMPANY APPALACHIAN PO	WER COMPANY	WELL	No		BORING No. MW-12	INSTALLED <u>5/6/92</u>
PROJECT MOUNTAINEER LB	R LANDFILL					
COORDINATES N 709,162.5 E	1,728,963.4					
SYSTEM						
			7	_	TOP RISER: 858.88 FT.	
GROUND ELEVATION 856.93 FT.						
	<i>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>			///>\//		
GROUT SEAL:						
SKOOT BEAL.						
					TOP BENTONITE SEAL:	FT.
BENTONITE SEAL:						
SCREEN: dia.,,						
GRAVEL PACK:						
		(/////	(/////		TOP GRAVEL PACK: FT.	
RISER PIPE: , dia.,					TOP SCREEN: 666.33 FT	
SPACERS, DEPTH:						
0						
					DOTTOM CODEEN, 664 3	92 FT
 L U					BOTTOM SCREEN: 664.3	JII.
					BOTTOM WELL: FT.	
					BOTTOM GRAVEL PACK	: FT.
		V/////////////////////////////////////			BOTTOM BORING: 656.6	3 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. 9622 BORING No. MW-13 INSTALLED 5/13/92 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 710,337.4 E 1,731,154.1 SYSTEM TOP RISER: 805.05 FT. GROUND ELEVATION 802.01 FT. GROUT SEAL: 300 GALLONS QUICK GROUT TOP BENTONITE SEAL: FT. BENTONITE SEAL: 150# BENTONITE CHIPS SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 29' GRAVEL PACK: 1000# No.4 OHIO QUARTZ TOP GRAVEL PACK: FT. RISER PIPE: 2.0, dia., PVC SCH 40 TOP SCREEN: 650.61 FT. SPACERS, DEPTH: 180, 170, 120, 70, 30 ???? BOTTOM SCREEN: 648.61 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 642.01 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. 9623 BORING No. MW-14 INSTALLED 8/11/92 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 710,272.6 E 1,729,225.4 SYSTEM TOP RISER: 716.87 FT. GROUND ELEVATION 715.10 FT. GROUT SEAL: 400 GALLON QUICK GROUT TOP BENTONITE SEAL: FT. BENTONITE SEAL: 120# BENTONITE CHIPS SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 19.1 GRAVEL PACK: 700# No.4 OHIO QUARTZ TOP GRAVEL PACK: FT. RISER PIPE: 2.0, dia., PVC SCH 40 TOP SCREEN: 669.70 FT. SPACERS, DEPTH: 110, 90, 40 ???? BOTTOM SCREEN: 660.20 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 656.10 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. ______ BORING No. **MW-15** INSTALLED **7/22/92** PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 710,943.8 E 1,730,886.1 SYSTEM TOP RISER: 681.20 FT. GROUND ELEVATION 679.29 FT. GROUT SEAL: TOP BENTONITE SEAL: FT. BENTONITE SEAL: SCREEN: dia.,, GRAVEL PACK: TOP GRAVEL PACK: FT. RISER PIPE: , dia., TOP SCREEN: 634.39 FT. SPACERS, DEPTH: BOTTOM SCREEN: 625.39 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 621.19 FT.



COMPANY PAPALACHIAN POWER COMPANY PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 714,546.9 E 1,733,259.1 SYSTEM GROUND ELEVATION 626.03 FT. GROUND ELEVATION 626.03 FT. GROUND ELEVATION 626.03 FT. GROUND ELEVATION 626.03 FT. TOP RISER: 628.78 FT. TOP BENTONITE SEAL: TOP GRAVEL PACK: TOP SCREEN: 616.03 FT. TOP SCREEN: 615.03 FT. BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM BORING: 597.53 FT.	JOB NUMBER	WONTORII	NG WELL (JONSTRUC	TION	
GROUND ELEVATION 626 03 FT. TOP BENTONITE SEAL: FT. TOP BENTONITE SEAL: FT. TOP GRAVEL PACK: FT. TOP GRAVEL PACK: FT. TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM MELL: FT. BOTTOM MELL: FT. BOTTOM MELL: FT.	COMPANY APPALACHIAN PO	WER COMPANY	WELL N	No	BORING No. MW-16	INSTALLED <u>5/21/92</u>
GROUND ELEVATION 626.03 FT. GROUND ELEVATION 626.03 FT. BENTONITE SEAL: SCREEN: dia.,, GRAVEL PACK: RISER PIPE., dia., SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM MELL: FT. BOTTOM MELL: FT. BOTTOM MELL: FT.	PROJECT MOUNTAINEER LBF	R LANDFILL	<u> </u>			
GROUND ELEVATION 628.03 FT. GROUND ELEVATION 628.03 FT. GROUND SEAL: BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: RISER PIPE:, dia., SPACERS, DEPTH: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM WELL: FT.	COORDINATES N 714,546.9 E	1,733,259.1				
GROUND ELEVATION 628.03 FT. GROUT SEAL: BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: RISER PIPE: , dia., SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	SYSTEM					
GROUND ELEVATION 628.03 FT. GROUT SEAL: BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: RISER PIPE: , dia., SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.				٦		
GROUT SEAL: BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: FISER PIPE: , dia., SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM GRAVEL PACK: FT. BOTTOM GRAVEL PACK: FT.			4	┦	TOP RISER: 628.78 FT.	
GROUT SEAL: BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: FISER PIPE: , dia., SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM GRAVEL PACK: FT. BOTTOM GRAVEL PACK: FT.	GROUND FLEVATION 626 03 FT					
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	ONO ONE ELEVATION DECISO 1 11					
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.		Y//\\\/\\\\/\\\\/\\\\/\\\\/\\\\\/\\\\\/\\\\				
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	GROUT SEAL:					
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	SHOOT SELE					
BENTONITE SEAL: SCREEN: dia., GRAVEL PACK: TOP GRAVEL PACK: FT. TOP SCREEN: 615.03 FT. SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.					TOP BENTONITE SEAL:	FT.
GRAVEL PACK: ———————————————————————————————————	BENTONITE SEAL:					
GRAVEL PACK: ———————————————————————————————————						
RISER PIPE: , dia., SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	SCREEN: dia.,,					
RISER PIPE: , dia., SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
RISER PIPE: , dia., SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	GRAVEL PACK:					
SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.			(/////	<i></i>	TOP GRAVEL PACK: FT.	
SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	DICED DIDE. 45-				TOD CODEEN, 045 02 FT	-
SPACERS, DEPTH: BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	RISER PIPE: , dia.,				10P SCREEN: 615.03 F1	
BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.	SPACERS, DEPTH:					
BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BOTTOM SCREEN: 604.58 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.						
BOTTOM SCREEN: 604.58 FT. — BOTTOM WELL: FT. — BOTTOM GRAVEL PACK: FT.						
— BOTTOM SCREEN: 604.58 FT. — BOTTOM WELL: FT. — BOTTOM GRAVEL PACK: FT.						
— BOTTOM SCREEN: 604.58 FT. — BOTTOM WELL: FT. — BOTTOM GRAVEL PACK: FT.	2					
BOTTOM SCREEN: 604.58 FT. — BOTTOM WELL: FT. — BOTTOM GRAVEL PACK: FT.						
— BOTTOM WELL: FT. — BOTTOM GRAVEL PACK: FT.					BOTTOM SCREEN: 604.5	58 FT.
BOTTOM GRAVEL PACK: FT.	į					
					BOTTOM WELL: FT.	
					POTTOM CDAVIEL DACK	· ET
BOTTOM BORING: 597.53 FT.	i				DOTTOM GRAVEL PACK	. гі.
					BOTTOM BORING: 597.5	3 FT.



JOB NUMBER COMPANY APPALACHIAN PO	WER COMPANY	WELL No.	BORING No. MW-17	INSTALLED 5/20/92
PROJECT MOUNTAINEER LE COORDINATES N 714,833.5 I SYSTEM	BR LANDFILL		 5014110 11 <u>0. 11111 17</u>	WOWLEED GIZOUZ
			 TOP RISER: 623.29 FT.	
GROUND ELEVATION 621.47 FT.				
GROUT SEAL:				
BENTONITE SEAL:			TOP BENTONITE SEAL:	FT.
SCREEN: dia.,,				
GRAVEL PACK:			TOP GRAVEL PACK: FT.	
RISER PIPE: , dia.,			TOP SCREEN: 602.92 FT.	
SPACERS, DEPTH:				
			BOTTOM SCREEN: 593.4	7 FT.
			BOTTOM WELL: FT.	
			BOTTOM GRAVEL PACK:	FT.
			BOTTOM BORING: 590.9	7 FT.



JOB NUMBER		NO WELL CONO.	THE CHER	
COMPANY APPALACHIAN P	OWER COMPANY	WELL No	BORING No. MW-18	INSTALLED <u>5/19/92</u>
PROJECT MOUNTAINEER L COORDINATES N 714,922.0 SYSTEM		_		
			— TOP RISER: 623.78 FT.	
GROUND ELEVATION 621.95 FT.				
GROUT SEAL:				
BENTONITE SEAL:			TOP BENTONITE SEAL:	FT.
SCREEN: dia.,,				
GRAVEL PACK:			— TOP GRAVEL PACK: FT.	
RISER PIPE: , dia.,			— TOP SCREEN: 606.85 FT	· ·
SPACERS, DEPTH:				
			— BOTTOM SCREEN: 597.7	'5 FT.
			— BOTTOM WELL: FT.	
			— BOTTOM GRAVEL PACK	: FT.
			— BOTTOM BORING: 595 0	5 FT

BOTTOM BORING: 595.05 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. ______ BORING No. **MW-19** INSTALLED **8/13/92** PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 712,263.7 E 1,732,224.9 SYSTEM TOP RISER: 645.14 FT. GROUND ELEVATION 643.18 FT. GROUT SEAL: TOP BENTONITE SEAL: FT. BENTONITE SEAL: SCREEN: dia.,, GRAVEL PACK: TOP GRAVEL PACK: FT. RISER PIPE: , dia., TOP SCREEN: 631.58 FT. SPACERS, DEPTH: BOTTOM SCREEN: 622.68 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 620.38 FT.



JOB NUMBER		WELL	. 001101			
COMPANY APPALACHIAN PO	WER COMPANY	WELI	_ No	ا	BORING No. MW-20	INSTALLED <u>8/18/92</u>
PROJECT MOUNTAINEER LB	R LANDFILL					
COORDINATES N 710,956.1 E	1,730,893.8					
SYSTEM						
			\neg			
		L	_		TOP RISER: 682.00 FT.	
CDOLIND ELEVATION CZO 07 ET						
GROUND ELEVATION 679.97 FT.						
KTTTTV						
GROUT SEAL:						
					TOP BENTONITE SEAL:	FT.
BENTONITE SEAL:						
SCREEN: dia., ,						
GRAVEL PACK:					TOP GRAVEL PACK: FT.	
RISER PIPE: , dia.,					TOP SCREEN: 671.07 FT	
ODAOFDO DEDTIL						
SPACERS, DEPTH:						
			=			
			= 4 (4)			
2						
					BOTTOM SCREEN: 662.0	17 FT
L L				-	DOTTOW SUNCEN. 002.0	1.1.
					BOTTOM WELL: FT.	
,					DOTTOW WLLL. FT.	
2 L L					BOTTOM GRAVEL PACK	: FT.
Z Z						
-		V/////////////////////////////////////			BOTTOM BORING: 659.4	7 FT.



JOB NUMBER		NG WELL	CONS	INOCI	ION	
COMPANY APPALACHIAN PO	WER COMPANY	WELL	No		BORING No. MW-21	INSTALLED 9/2/92
PROJECT MOUNTAINEER LBI						
COORDINATES N 710,790.4 E	1,730,872.3					
SYSTEM						
			\neg			
			_		TOP RISER: FT.	
GROUND ELEVATION 674.90 FT.						
	Y//\X//\X//\X//			///>>//	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	
GROUT SEAL:						
SKOOT SEAL.						
					TOP BENTONITE SEAL:	FT
BENTONITE SEAL:					TOT BEITTOTHTE GETTE.	• • •
SCREEN: dia.,,						
ODAVEL BACK						
GRAVEL PACK:					TOP GRAVEL PACK: FT.	
RISER PIPE: , dia.,					TOP SCREEN: FT.	
SPACERS, DEPTH:						
9				—	BOTTOM SCREEN: FT.	
					BOTTOM WELL: FT.	
		<i>,,,,,,,,,,,</i>	7777777		BOTTOM GRAVEL PACK	: FT.
7 K						
					BOTTOM BORING: 657.0	00 FT.



JOB NUM	BER		NING WELL CONSTR	COCTION	
COMPAN	Y APPALACHIAN PO	OWER COMPANY	WELL No	BORING No. MW-22	INSTALLED 7/1/92
PROJECT	MOUNTAINEER LE	BR LANDFILL			
COORDIN	IATES				
SYSTEM					
				TOP RISER: FT.	
GROUND	ELEVATION FT.				
		<i>Y//\\\/\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>			
	GROUT SEAL:				
	OROGI OLAL.				
				— TOP BENTONITE SEAL	: FT.
	BENTONITE SEAL:				
	SCREEN: dia.,,				
	GRAVEL PACK:				
	0.022			— TOP GRAVEL PACK: F	Т.
	RISER PIPE: , dia.,			TOP SCREEN: FT.	
	SPACERS, DEPTH:				
				— BOTTOM SCREEN: FT.	
				BOTTOWI GOINELIN. TT.	
				— BOTTOM WELL: FT.	
					. FT
				— BOTTOM GRAVEL PAC	K: F1.
				— BOTTOM BORING: FT.	



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 8/17/05 WELL No. MW-24 BORING No. MW-24 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 709,346.7 E 1,732,174.7 SYSTEM State Plane using NAD27 TOP RISER: 822.20 FT. GROUND ELEVATION 820.30 FT. GROUT SEAL: 250 Gallons Quick Grout TOP BENTONITE SEAL: 739.00 FT. BENTONITE SEAL: 100 lbs Bentonite Pellets SCREEN: 2.0" dia., PVC 20 SLOT, 29.0' GRAVEL PACK: 1250 lbs #4 sand / 100 lbs #7 sand TOP GRAVEL PACK: 734.50 FT. RISER PIPE: 2.0, dia., PVC TOP SCREEN: 731.10 FT. SPACERS, DEPTH: 115', 65', 20' NOTES:
- SWL = Dry @ installation
- Drilled with 8" air hammer
- Hydrated pellets
- Bladder pump set @ 117.0' GEOMCNST MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 BOTTOM SCREEN: 702.10 FT. BOTTOM WELL: 701.20 FT. BOTTOM GRAVEL PACK: 700.00 FT. BOTTOM BORING: 700.00 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 8/15/05 BORING No. MW-25 WELL No. MW-25 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 709,352.0 E 1,732,176.8 SYSTEM State Plane using NAD27 TOP RISER: 822.60 FT. GROUND ELEVATION 820.30 FT. GROUT SEAL: 500 Gallons Quick Grout TOP BENTONITE SEAL: 606.10 FT. BENTONITE SEAL: 100 lbs Bentonite Pellets SCREEN: 2.0" dia., PVC 20 SLOT, 48.0' GRAVEL PACK: 1750 lbs #4 sand / 100 lbs #7 sand TOP GRAVEL PACK: 601.50 FT. RISER PIPE: 2.0, dia., PVC TOP SCREEN: 596.70 FT. SPACERS, DEPTH: 270', 210', 150', 100', 50' NOTES:
- SWL = Dry @ installation
- Drilled with 8" air hammer
- Hydrated pellets
- No pump installed BOTTOM SCREEN: 549.24 FT. BOTTOM WELL: 547.80 FT. BOTTOM GRAVEL PACK: 546.50 FT. BOTTOM BORING: 546.50 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 8/24/05 BORING No. MW-26 WELL No. MW-26 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 712,549.0 E 1,731,434.9 SYSTEM State Plane using NAD27 TOP RISER: 720.70 FT. GROUND ELEVATION 718.20 FT. GROUT SEAL: 50 Gallons Quick Grout TOP BENTONITE SEAL: 701.10 FT. BENTONITE SEAL: 100 lbs Bentonite Pellets SCREEN: 2.0" dia., PVC 20 SLOT, 29.0' GRAVEL PACK: 900 lbs #4 sand / 100 lbs #7 sand TOP GRAVEL PACK: 695.00 FT. RISER PIPE: 2.0, dia., PVC TOP SCREEN: 690.90 FT. SPACERS, DEPTH: 55', 20' NOTES:
- SWL = Dry @ installation
- Drilled with 8" air hammer
- Hydrated pellets
- Bladder pump set @ 55.3' BOTTOM SCREEN: 661.90 FT. BOTTOM WELL: 660.90 FT. BOTTOM GRAVEL PACK: 660.00 FT. BOTTOM BORING: 660.00 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 8/4/05 BORING No. MW-34 WELL No. MW-34 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 712,520.8 E 1,730,800.7 SYSTEM State Plane using NAD27 TOP RISER: 818.10 FT. GROUND ELEVATION 815.60 FT. GROUT SEAL: 300 Gallons Quick Grout TOP BENTONITE SEAL: 685.30 FT. BENTONITE SEAL: 75 lbs Bentonite Pellets SCREEN: 2.0" dia., PVC 20 SLOT, 29.0' GRAVEL PACK: 900 lbs #4 sand / 50 lbs #7 sand TOP GRAVEL PACK: 681.50 FT. RISER PIPE: 2.0, dia., PVC TOP SCREEN: 676.30 FT. SPACERS, DEPTH: 165', 110', 50' NOTES:
- SWL = 162.4' @ installation
- Drilled with 8" air hammer
- Hydrated pellets
- Bladder pump set @ 167.0' BOTTOM SCREEN: 647.30 FT. BOTTOM WELL: 646.60 FT. BOTTOM GRAVEL PACK: 645.40 FT. BOTTOM BORING: 645.40 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 8/25/05 WELL No. MW-35 BORING No. MW-35 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 713,097.6 E 1,734,440.0 SYSTEM State Plane using NAD27 TOP RISER: 792.70 FT. GROUND ELEVATION 790.10 FT. GROUT SEAL: 100 Gallons Quick Grout TOP BENTONITE SEAL: 750.20 FT. BENTONITE SEAL: 100 lbs Bentonite Pellets SCREEN: 2.0" dia., PVC 20 SLOT, 29.0' GRAVEL PACK: 1000 lbs #4 sand / 75 lbs #7 sand TOP GRAVEL PACK: 746.10 FT. RISER PIPE: 2.0, dia., PVC TOP SCREEN: 742.60 FT. SPACERS, DEPTH: 75', 25' NOTES:
- SWL = Dry @ installation
- Drilled with 8" air hammer
- Hydrated pellets
- Bladder pump set @ 75.5' BOTTOM SCREEN: 713.60 FT. BOTTOM WELL: 712.60 FT. BOTTOM GRAVEL PACK: 711.50 FT. BOTTOM BORING: 711.50 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 7/14/05 WELL No. MW-36 BORING No. MW-36 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 713,372.6 E 1,733,667.3 SYSTEM State Plane using NAD27 TOP RISER: 800.40 FT. GROUND ELEVATION 797.60 FT. GROUT SEAL: 75 Gallons Quick Grout TOP BENTONITE SEAL: 746.90 FT. BENTONITE SEAL: 100 lbs Bentonite Pellets SCREEN: 2.0" dia., PVC 20 SLOT, 29.0' GRAVEL PACK: 1150 lbs #4 sand / 50 lbs #7 sand TOP GRAVEL PACK: 743.00 FT. RISER PIPE: 2.0, dia., PVC TOP SCREEN: 738.50 FT. SPACERS, DEPTH: 85', 40' NOTES:
- SWL = 87.3' @ installation
- Drilled with 8" air hammer
- Hydrated pellets
- Bladder pump set @ 87.0' BOTTOM SCREEN: 709.50 FT. BOTTOM WELL: 708.60 FT. BOTTOM GRAVEL PACK: 707.40 FT. BOTTOM BORING: 707.40 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 7/12/05 BORING No. MW-37 WELL No. MW-37 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 713,377.0 E 1,733,669.5 SYSTEM State Plane using NAD27 TOP RISER: 800.40 FT. GROUND ELEVATION 797.60 FT. GROUT SEAL: 200 Gallons Quick Grout TOP BENTONITE SEAL: 688.20 FT. BENTONITE SEAL: 50 lbs Bentonite Pellets SCREEN: 2.0" dia., PVC 20 SLOT, 19.0' GRAVEL PACK: 1300 lbs #4 sand / 100 lbs #7 sand TOP GRAVEL PACK: 682.80 FT. RISER PIPE: 2.0, dia., PVC TOP SCREEN: 668.10 FT. SPACERS, DEPTH: 140', 90', 40' NOTES:
- SWL = 144.4' @ installation
- Drilled with 8" air hammer
- Hydrated pellets
- Bladder pump set @ 147.4' BOTTOM SCREEN: 649.10 FT. BOTTOM WELL: 648.20 FT. BOTTOM GRAVEL PACK: 646.30 FT. BOTTOM BORING: 646.30 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 9/8/05 BORING No. MW-38 WELL No. MW-38 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 713,736.0 E 1,732,795.5 SYSTEM State Plane using NAD27 TOP RISER: 630.40 FT. GROUND ELEVATION 627.70 FT. GROUT SEAL: Hole Plug TOP BENTONITE SEAL: 623.90 FT. BENTONITE SEAL: 125 lbs Bentonite Pellets SCREEN: 2.0" dia., 15' Prepacked Screen, 20 SLOT, 15.0'GRAVEL PACK: 750 lbs #4 sand / 50 lbs #7 sand TOP GRAVEL PACK: 621.30 FT. RISER PIPE: 2.0, dia., PVC TOP SCREEN: 619.40 FT. SPACERS, DEPTH: 23' NOTES:
- SWL = Dry @ installation
- Drilled with 6.25" HSA's
- Hydrated pellets
- Bladder pump set @ 22.4'
- Hole plug from 3.8' to grade GEOMCNST MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 BOTTOM SCREEN: 603.70 FT. BOTTOM WELL: 603.30 FT. BOTTOM GRAVEL PACK: 601.50 FT. BOTTOM BORING: 601.50 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY **INSTALLED 9/7/05** WELL No. MW-39 BORING No. MW-39 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 713,734.6 E 1,732,787.2 SYSTEM State Plane using NAD27 TOP RISER: 630.00 FT. GROUND ELEVATION 627.70 FT. GROUT SEAL: 50 Gallons Quick Grout TOP BENTONITE SEAL: 600.00 FT. BENTONITE SEAL: 50 lbs Bentonite Pellets SCREEN: 2.0" dia., PVC 20 SLOT, 19.0' GRAVEL PACK: 300 lbs #4 sand / 35 lbs #7 sand TOP GRAVEL PACK: 594.70 FT. RISER PIPE: 2.0, dia., PVC TOP SCREEN: 591.90 FT. SPACERS, DEPTH: 50', 20' NOTES: - SWL = 12.4' @ installation - Drilled with 6" rotary wash - Bladder pump set @ 53.5' BOTTOM SCREEN: 572.90 FT. BOTTOM WELL: 572.20 FT. BOTTOM GRAVEL PACK: 571.60 FT. BOTTOM BORING: 571.60 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 9/6/05 BORING No. MW-40 WELL No. MW-40 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 713,730.4 E 1,732,785.1 SYSTEM State Plane using NAD27 TOP RISER: 630.40 FT. GROUND ELEVATION 627.70 FT. GROUT SEAL: 150 Gallons Quick Grout TOP BENTONITE SEAL: 525.90 FT. BENTONITE SEAL: 80 lbs Bentonite Pellets SCREEN: 2.0" dia., PVC 20 SLOT, 29.0' GRAVEL PACK: 550 lbs #4 sand / 80 lbs #7 sand TOP GRAVEL PACK: 521.10 FT. RISER PIPE: 2.0, dia., PVC TOP SCREEN: 516.90 FT. SPACERS, DEPTH: 135', 75', 25' NOTES: - SWL = 16.8' @ installation - Drilled with 6" rotary wash - Bladder pump set @ 138.5' GEOMCNST MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 BOTTOM SCREEN: 487.90 FT. BOTTOM WELL: 487.20 FT. BOTTOM GRAVEL PACK: 486.40 FT. BOTTOM BORING: 486.40 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 8/1/05 WELL No. MW-41 BORING No. MW-41 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 713,381.3 E 1,733,671.6 SYSTEM State Plane using NAD27 TOP RISER: 800.40 FT. GROUND ELEVATION 797.60 FT. GROUT SEAL: 200 Gallons Quick Grout TOP BENTONITE SEAL: 522.10 FT. BENTONITE SEAL: 40 lbs Bentonite Pellets SCREEN: 1.0" dia., 1" Geomon, 20 SLOT, 2.0' GRAVEL PACK: 250 lbs #4 sand / 50 lbs #7 sand TOP GRAVEL PACK: 516.50 FT. RISER PIPE: , dia., TOP SCREEN: 459.30 FT. SPACERS, DEPTH: NOTES:
- SWL = NA @ installation
- Drilled with NQ Rock Core
- Bottom of hole backfilled with #4 sand BOTTOM SCREEN: 457.30 FT. BOTTOM WELL: 457.20 FT. BOTTOM GRAVEL PACK: 447.50 FT. BOTTOM BORING: 447.50 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 9/8/05 WELL No. MW-42 BORING No. MW-42 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 713,726.5 E 1,732,783.6 SYSTEM State Plane using NAD27 TOP RISER: 630.00 FT. GROUND ELEVATION 627.70 FT. GROUT SEAL: 100 Gallons Quick Grout TOP BENTONITE SEAL: 483.60 FT. BENTONITE SEAL: 30 lbs Bentonite Pellets SCREEN: 1.0" dia., 1" Geomon, 20 SLOT, 2.0' GRAVEL PACK: 150 lbs #4 sand TOP GRAVEL PACK: 478.00 FT. RISER PIPE: , dia., TOP SCREEN: 475.80 FT. SPACERS, DEPTH: NOTES:
- SWL = 14.8 @ installation
- Drilled with NQ Rock Core
- Bottom of hole backfilled with #4 sand BOTTOM SCREEN: 473.80 FT. BOTTOM WELL: 473.70 FT. BOTTOM GRAVEL PACK: 377.50 FT. BOTTOM BORING: 377.50 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 7/12/06 BORING No. MW-43 WELL No. MW-43 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 714,609.8 E 1,733,558.2 SYSTEM State Plane using NAD27/29 TOP RISER: 640.08 FT. GROUND ELEVATION 636.58 FT. GROUT SEAL: TOP BENTONITE SEAL: 636.58 FT. BENTONITE SEAL: Bentonite Pellets SCREEN: 2.0" dia., 20' #10 Slot Fine Prepacked Screen, 18.8' GRAVEL PACK: #4 Quartz Sand TOP GRAVEL PACK: 628.98 FT. RISER PIPE: 2.0, dia., PVC TOP SCREEN: 625.68 FT. SPACERS, DEPTH: NOTES:
- Installed w/6.25" HSA's
- SWL = 8.2' @ installation
- Drill & Decon Water from Mountaineer Fire Protection
- Bentonite Pellets from 49.5' to 31.1'
- Hydrated Upper Seal
- Well Development Performed BOTTOM SCREEN: 606.88 FT. BOTTOM WELL: 606.48 FT. BOTTOM GRAVEL PACK: 605.48 FT. BOTTOM BORING: 587.08 FT.

AMERICAN ELECTRIC POWER SERVICE CORPORATION AEP CIVIL ENGINEERING LABORATORY



MONITORING WELL CONSTRUCTION JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. ______ BORING No. MW-44 INSTALLED 6/10/08 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 714,697.9 E 1,733,351.5 SYSTEM State Plane using NAD27 TOP RISER: 627.14 FT. GROUND ELEVATION 624.49 FT. GROUT SEAL: TOP BENTONITE SEAL: FT. BENTONITE SEAL: SCREEN: dia.,, GRAVEL PACK: TOP GRAVEL PACK: FT. RISER PIPE: , dia., TOP SCREEN: FT. SPACERS, DEPTH: BOTTOM SCREEN: FT. BOTTOM WELL: FT.

BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 596.39 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY WELL No. MW-44D BORING No. MW-44D INSTALLED 6/18/08 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 714,697.9 E 1,733,351.5 SYSTEM State Plane using NAD27 TOP RISER: 627.14 FT. GROUND ELEVATION 624.49 FT. GROUT SEAL: NA TOP BENTONITE SEAL: 608.99 FT. BENTONITE SEAL: 3/8" Coated Bentonite Pellets SCREEN: 1.77" dia., Multiport Pipe, 0.5' GRAVEL PACK: #4 Quartz Sand TOP GRAVEL PACK: 603.59 FT. RISER PIPE: 1.77", dia., Multiport Pipe TOP SCREEN: 601.49 FT. SPACERS, DEPTH: NOTES: Abandoned 11/22/10
THIS WELL IS PART OF THE MULTI PORT
MONITORING WELL.
- Drilled with 4" HW Casing
- Decon & drill water from fire protection system at
Mountaineer Plant
- Sampling Channel #7 BOTTOM SCREEN: 600.99 FT. BOTTOM WELL: 600.49 FT. BOTTOM GRAVEL PACK: 600.49 FT. BOTTOM BORING: 600.49 FT.

AMERICAN ELECTRIC POWER SERVICE CORPORATION AEP CIVIL ENGINEERING LABORATORY



MONITORING WELL CONSTRUCTION JOB NUMBER COMPANY APPALACHIAN POWER COMPANY INSTALLED 6/18/08 ____ BORING No. **MW-44I**___ WELL No. MW-44I PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 714,697.9 E 1,733,351.5 SYSTEM State Plane using NAD27 TOP RISER: 627.14 FT. GROUND ELEVATION 624.49 FT. GROUT SEAL: NA TOP BENTONITE SEAL: 613.79 FT. BENTONITE SEAL: 3/8" Coated Bentonite Pellets SCREEN: 1.77" dia., Multiport Pipe, 0.5' GRAVEL PACK: #4 Quartz Sand TOP GRAVEL PACK: 612.69 FT. RISER PIPE: 1.77", dia., Multiport Pipe TOP SCREEN: 610.49 FT. SPACERS, DEPTH: NOTES: Abandoned 11/22/10
THIS WELL IS PART OF THE MULTI PORT
MONITORING WELL.
- Drilled with 4" HW Casing
- Decon & drill water from fire protection system at
Mountaineer Plant
- Sampling Channel #3

BOTTOM SCREEN: 609.99 FT. BOTTOM WELL: 600.49 FT. BOTTOM GRAVEL PACK: 600.49 FT. BOTTOM BORING: 600.49 FT.

AMERICAN ELECTRIC POWER SERVICE CORPORATION AEP CIVIL ENGINEERING LABORATORY



MONITORING WELL CONSTRUCTION JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. MW-44S BORING No. MW-44S INSTALLED 6/18/08 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 714,697.9 E 1,733,351.5 SYSTEM State Plane using NAD27 TOP RISER: 627.14 FT. GROUND ELEVATION 624.49 FT. GROUT SEAL: NA TOP BENTONITE SEAL: 624.49 FT. BENTONITE SEAL: 3/8" Coated Bentonite Pellets SCREEN: 1.77" dia., Multiport Pipe, 0.5' GRAVEL PACK: #4 Quartz Sand TOP GRAVEL PACK: 618.49 FT. RISER PIPE: 1.77", dia., Multiport Pipe TOP SCREEN: 614.99 FT. SPACERS, DEPTH: NOTES: Abandoned 11/22/10
THIS WELL IS PART OF THE MULTI PORT
MONITORING WELL.
- Drilled with 4" HW Casing
- Decon & drill water from fire protection system at
Mountaineer Plant
- Sampling Channel #1

BOTTOM SCREEN: 614.49 FT. BOTTOM WELL: 600.49 FT. BOTTOM GRAVEL PACK: 600.49 FT. BOTTOM BORING: 600.49 FT.



AEP 1996, 1997

Monitoring Well Construction Diagrams

9623, 9624, 9627 to 9633



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY INSTALLED 10/15/96 WELL No. 9623 BORING No. 96-23 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 708,450.6 E 1,698,953.5 SYSTEM TOP RISER: 692.50 FT. GROUND ELEVATION 690.45 FT. GROUT SEAL: 400 GALLONS QUICK GROUT TOP BENTONITE SEAL: 608.25 FT. BENTONITE SEAL: 120# BENTONITE CHIPS SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 19.1 GRAVEL PACK: 700# No.4 OHIO QUARTZ TOP GRAVEL PACK: 602.55 FT. RISER PIPE: 2.0, dia., PVC SCH 40 TOP SCREEN: 598.55 FT. SPACERS, DEPTH: 110', 90', 40' SWL @ COMPLETION - 32.0' 90# BENTONITE CHIPS USED FROM 149.0' to 112.1' BOTTOM SCREEN: 579.45 FT. BOTTOM WELL: 578.35 FT. BOTTOM GRAVEL PACK: 540.45 FT.

BOTTOM BORING: 539.25 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. ______ BORING No. 96-24 INSTALLED 9/23/96 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 709,245.0 E 1,732,142.0 SYSTEM TOP RISER: 0.00 FT. GROUND ELEVATION 825.49 FT. GROUT SEAL: TOP BENTONITE SEAL: FT. BENTONITE SEAL: SCREEN: dia.,, GRAVEL PACK: TOP GRAVEL PACK: FT. RISER PIPE: , dia., TOP SCREEN: 0.00 FT. SPACERS, DEPTH: BOTTOM SCREEN: 0.00 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 585.49 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. 9627 BORING No. 96-27 INSTALLED 10/9/96 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 712,597.9 E 1,699,973.8 SYSTEM TOP RISER: 719.49 FT. GROUND ELEVATION 718.06 FT. GROUT SEAL: 350 GALLONS QUICK GROUT TOP BENTONITE SEAL: 615.46 FT. BENTONITE SEAL: 150# BENTONITE CHIPS SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 19.0 GRAVEL PACK: 650# No. 4 OHIO QUARTZ TOP GRAVEL PACK: 609.06 FT. RISER PIPE: 2.0, dia., PVC SCH 40 TOP SCREEN: 607.06 FT. SPACERS, DEPTH: 130', 110', 60 SWL @ COMPLETION - 99.8' BOTTOM SCREEN: 588.06 FT. BOTTOM WELL: 586.96 FT. BOTTOM GRAVEL PACK: 586.06 FT.

BOTTOM BORING: 536.86 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. 9628 BORING No. 96-28 INSTALLED 12/10/96 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 708,701.0 E 1,697,043.0 SYSTEM TOP RISER: 881.26 FT. GROUND ELEVATION 879.56 FT. GROUT SEAL: 150 GALLONS QUICK GROUT TOP BENTONITE SEAL: 820.66 FT. BENTONITE SEAL: 150# BENTONITE CHIPS SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 29.1 GRAVEL PACK: 1200# No.4 OHIO QUARTZ TOP GRAVEL PACK: 814.56 FT. RISER PIPE: 2.0, dia., PVC SCH 40 TOP SCREEN: 809.76 FT. SPACERS, DEPTH: 99', 85', 40' BOTTOM SCREEN: 780.66 FT. BOTTOM WELL: 780.66 FT. BOTTOM GRAVEL PACK: 779.56 FT.

BOTTOM BORING: 654.56 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. 9629 BORING No. 96-29 INSTALLED 12/4/96 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 708,701.2 E 1,697,043.2 SYSTEM TOP RISER: 881.43 FT. GROUND ELEVATION 879.75 FT. GROUT SEAL: 300 GALLONS QUICK GROUT TOP BENTONITE SEAL: FT. BENTONITE SEAL: 150# BENTONITE CHIPS SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 19.1 GRAVEL PACK: 750# No.4 OHIO QUARTZ TOP GRAVEL PACK: FT. RISER PIPE: 2.0, dia., PVC SCH 40 TOP SCREEN: 726.95 FT. SPACERS, DEPTH: 171', 151', 100', 50' ???? BOTTOM SCREEN: 707.85 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 654.75 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. 9630 BORING No. 96-30 INSTALLED **9/11/96** PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 708,701.0 E 1,697,043.0 SYSTEM TOP RISER: 881.54 FT. GROUND ELEVATION 879.83 FT. GROUT SEAL: 500 GALLONS QUICK GROUT TOP BENTONITE SEAL: FT. BENTONITE SEAL: 150# BENTONITE CHIPS SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 21.9 GRAVEL PACK: 1000# No.4 OHIO QUARTZ TOP GRAVEL PACK: FT. RISER PIPE: 2.0, dia., PVC SCH 40 TOP SCREEN: 683.93 FT. SPACERS, DEPTH: 225' 210' 156' 106' 40' ???? BOTTOM SCREEN: 654.83 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 652.83 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. 9631 BORING No. 96-31 INSTALLED 9/12/96 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 711,108.2 E 1,696,404.8 SYSTEM TOP RISER: 828.31 FT. GROUND ELEVATION 826.56 FT. GROUT SEAL: 150 GALLON QUICK GROUT TOP BENTONITE SEAL: FT. BENTONITE SEAL: 150# BENTONITE CHIPS SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 29.1 GRAVEL PACK: 1000# No.4 OHIO QUARTZ TOP GRAVEL PACK: FT. RISER PIPE: 2.0, dia., PVC SCH 40 TOP SCREEN: 770.76 FT. SPACERS, DEPTH: 85' 70' ???? BOTTOM SCREEN: 741.66 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 661.56 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. 9632 BORING No. 96-32 INSTALLED 9/20/96 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 712,296.3 E 1,700,787.8 SYSTEM TOP RISER: 645.52 FT. GROUND ELEVATION 643.91 FT. GROUT SEAL: 500 GALLONS QUICK GROUT TOP BENTONITE SEAL: FT. BENTONITE SEAL: 100# BENTONITE CHIPS SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 9.1 GRAVEL PACK: 450# No.4 OHIO QUARTZ TOP GRAVEL PACK: FT. RISER PIPE: 2.0, dia., PVC SCH 40 TOP SCREEN: 476.11 FT. SPACERS, DEPTH: 177' 167' 117' 67' 40' ???? BOTTOM SCREEN: 467.01 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 452.81 FT.



JOB NUMBER COMPANY APPALACHIAN POWER COMPANY WELL No. 9633 BORING No. 96-33 INSTALLED 1/23/97 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 710,919.6 E 1,699,640.4 SYSTEM TOP RISER: 671.75 FT. GROUND ELEVATION 669.81 FT. GROUT SEAL: 100 GALLONS QUICK GROUT TOP BENTONITE SEAL: FT. BENTONITE SEAL: 150# BENTONITE CHIPS SCREEN: 2.0 dia., PVC SCH 40 20 SLOT, 10.0 GRAVEL PACK: 300# NO4 OHIO QUARTZ TOP GRAVEL PACK: FT. RISER PIPE: 2.0, dia., PVC SCH 40 TOP SCREEN: 648.81 FT. SPACERS, DEPTH: 40', 21' ???? BOTTOM SCREEN: 629.81 FT. BOTTOM WELL: FT. BOTTOM GRAVEL PACK: FT.

BOTTOM BORING: 628.61 FT.



AEP 2010, 2012

Monitoring Well Construction Diagrams

MW-17A, MW-45, MW-46, MW-46s, MW-47, MW-47s



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 1/7/10 WELL No. MW-45 BORING No. B-0901 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 708,953.7 E 1,729,008.3 SYSTEM State Plane using NAD27/29 TOP RISER: 854.83 FT. GROUND ELEVATION 852.23 FT. GROUT SEAL: Volclay 200 Gal TOP BENTONITE SEAL: 764.83 FT. BENTONITE SEAL: 3/8" Coated Bentonite Pellets 100# SCREEN: 2.0" dia., Sch 40 20 Slot, 35.0' GRAVEL PACK: #5 Quartz Sand 750# TOP GRAVEL PACK: 756.23 FT. RISER PIPE: 2.0", dia., Sch 40 TOP SCREEN: 754.13 FT. SPACERS, DEPTH: 89',49',9' NOTES: -Drill & decon water coming from MT fire protection system
-Decon drill & tools 01/14/10 -SWL @ installation 16.1' -136.0' - 134.2' cuttings -Drilled w/6" air hammer BOTTOM SCREEN: 719.13 FT. BOTTOM WELL: 718.53 FT. BOTTOM GRAVEL PACK: 718.03 FT. BOTTOM BORING: 692.63 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED 1/19/10 BORING No. **B-0902** WELL No. MW-46 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 709,192.0 E 1,728,205.5 SYSTEM State Plane using NAD27/29 TOP RISER: 811.81 FT. GROUND ELEVATION 808.77 FT. GROUT SEAL: Volclay 75 Gal TOP BENTONITE SEAL: 763.67 FT. BENTONITE SEAL: 3/8" Coated Bentonite Pellets 100# SCREEN: 2.0" dia., Sch 40 20 Slot, 25.0' GRAVEL PACK: #5 Quartz Sand 475# TOP GRAVEL PACK: 757.77 FT. RISER PIPE: 2.0", dia., Sch 40 TOP SCREEN: 753.17 FT. SPACERS, DEPTH: 45', 20' NOTES: -Drill & decon water coming from MT fire protection system
-Decon drill & tools 01/28/10 -SWL @ installation 29.2' -82.0' - 81.4' cuttings -Washed cuttings out w/drill mud then flushed w/water BOTTOM SCREEN: 728.37 FT. BOTTOM WELL: 727.77 FT. BOTTOM GRAVEL PACK: 727.37 FT. BOTTOM BORING: 778.17 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY WELL No. MW-46s BORING No. B-0902A INSTALLED 1/27/10 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 709,195.5 E 1,728,209.3 SYSTEM State Plane using NAD27/29 TOP RISER: 811.46 FT. GROUND ELEVATION 808.77 FT. GROUT SEAL: Hole Plug 3/8" TOP BENTONITE SEAL: 807.77 FT. BENTONITE SEAL: 3/8" Coated Bentonite Pellets 150# SCREEN: 2.0" dia., Sch 40 PrePacked 7 Slot 40/60 Sand, 5.0' GRAVEL PACK: #5 Quartz Sand 200# TOP GRAVEL PACK: 800.17 FT. RISER PIPE: 2.0", dia., Sch 40 TOP SCREEN: 798.47 FT. SPACERS, DEPTH: 4' NOTES: -Drill & decon water coming from MT fire protection system
-Decon drill & tools 01/29/10 -SWL @ installation 13.8' -Drilled w/6.25" HSA's & stainless steel plate BOTTOM SCREEN: 793.77 FT. BOTTOM WELL: 793.17 FT. BOTTOM GRAVEL PACK: 792.77 FT. BOTTOM BORING: 719.27 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY INSTALLED **2/2/10** WELL No. MW-47 BORING No. B-0903 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 710,168.6 E 1,728,017.3 SYSTEM State Plane using NAD27/29 TOP RISER: 795.89 FT. GROUND ELEVATION 793.01 FT. GROUT SEAL: Volclay 75 Gal TOP BENTONITE SEAL: 743.31 FT. BENTONITE SEAL: 3/8" Coated Bentonite Pellets 100# SCREEN: 2.0" dia., Sch 40 20 Slot, 20.0' GRAVEL PACK: #5 Quartz Sand TOP GRAVEL PACK: 737.21 FT. RISER PIPE: 2.0", dia., Sch 40 TOP SCREEN: 733.41 FT. SPACERS, DEPTH: 49', 10' NOTES: -Drill & decon water coming from MT fire protection system
-Decon drill & tools 02/2/10
-SWL @ installation 30.8'
-Drilled w/6" air hammer BOTTOM SCREEN: 713.61 FT. BOTTOM WELL: 713.01 FT. BOTTOM GRAVEL PACK: 711.41 FT. BOTTOM BORING: 707.21 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY WELL No. MW-47s BORING No. B-0903s INSTALLED 2/2/10 PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 710,163.9 E 1,728,017.9 SYSTEM State Plane using NAD27/29 TOP RISER: 796.03 FT. GROUND ELEVATION 793.01 FT. GROUT SEAL: Hole Plug 3/8" 150# TOP BENTONITE SEAL: 792.01 FT. BENTONITE SEAL: 3/8" Coated Bentonite Pellets 100# SCREEN: 2.0" dia., Sch 40 PrePacked 8 Slot 40/60 Sand, 5.0' GRAVEL PACK: #5 Quartz Sand 325# TOP GRAVEL PACK: 782.21 FT. RISER PIPE: 2.0", dia., Sch 40 TOP SCREEN: 780.11 FT. SPACERS, DEPTH: 5' NOTES: -Drill & decon water coming from MT fire protection system
-Decon drill & tools 02/4/10 GEOMCNST MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 -SWL @ installation 18.1' -Drilled w/6.25" HSA's & stainless steel plate BOTTOM SCREEN: 775.51 FT. BOTTOM WELL: 775.01 FT. BOTTOM GRAVEL PACK: 774.01 FT. BOTTOM BORING: 707.21 FT.



JOB NUMBER

COMPANY APPALACHIAN POWER COMPANY WELL No. **MW-17A** BORING No. **B-1201** INSTALLED **1/10/12** PROJECT MOUNTAINEER LBR LANDFILL COORDINATES N 714,832.4 E 1,733,268.2 SYSTEM State Plane using NAD27/29 TOP RISER: 623.77 FT. GROUND ELEVATION 621.63 FT. GROUT SEAL: 150 lbs Holeplug Chips TOP BENTONITE SEAL: 608.33 FT. BENTONITE SEAL: 150 lbs Coated Bentonite Pellets SCREEN: 2.0" dia., PVC .010 Slot, 9.6' GRAVEL PACK: #5 Quartz Sand - 525 lbs TOP GRAVEL PACK: 604.63 FT. RISER PIPE: 2.0", dia., PVC TOP SCREEN: 603.23 FT. SPACERS, DEPTH: N/A GEOMCNST MT LBR LF FKA SI.GPJ AEP.GDT 7/23/15 BOTTOM SCREEN: 593.63 FT. BOTTOM WELL: 593.03 FT. BOTTOM GRAVEL PACK: 591.63 FT. BOTTOM BORING: 591.63 FT.



Arcadis 2016

Monitoring Well Construction Diagrams

MW-1611, MW-1612



WELL CONSTRUCTION LOG (Unconsolidated)

1 1		Project AEP - Mo	ountaineer	Well <u>MW-1611</u>
\Box	6 inch diameter of secondary casing	Town/City	New Haven	
	26 ft bottom of secondary casing	County	Mason County	State WV
	6inch diameter	Permit No.	N/A	
И	drilled hole	Land-Surface (LS) El	evation and Datum:	
И		654.01	feet	Surveyed
И	Well casing,			Estimated
И	2 inch diameter,	Installation Date(s)	6/23	/2016
И	Schedule 40	Drilling Method	Hollow Stem A	uger
И	X 3/8-inch chips			
	Grout	Drilling Contractor	DLZ Ohio, Inc.	
		Drilling Fluid	None	
4	ft* Top of pellets			
	Top of secondary Bentonite Slurry			
	X pellets (100 pounds)		nent Technique(s) and	
	Top of global #6 secondary filter sand (2 126 ft* Top of global #5 primary filter sand (250 ft*)		and Submersible Pum	p (7/7 thru 7/8/16)
	Top of Primary			
	29.0 ft*	Fluid Loss During Dri	Iling N/A	gallons
	(Top of screen)	Water Removed Duri	ing Development	70.7 gallons
		Static Depth to Water	r 14.10	feet below M.P.
	Well Screen. 2 inch diameter	Pumping Depth to Wa	ater42	feet below M.P.
	PVC , 0.10 slot Total screen length 9.6'	Pumping Duration	NM hours	
		Yield N/A		7/7 thru Date 7/8/16
	Gravel Pack	Specific Capacity	N/A gpm/f	t
	x Sand Pack			
	Formation Collapse	Well Purpose	Monitoring wel	<u> </u>
	44ft*	Remarks		
	Magazzina Doint ic			
	Measuring Point is Top of Well Casing			
	Unless Otherwise Noted. * Depth Below Land Surface	Prepared by	Judd Wanner	

WELL CONSTRUCTION LOG (Unconsolidated)



↑ft	Project AEP - Mountaineer	Well	MW-1612			
LAND SURFACE	Town/City New Haver	1				
	County Mason	State	WV			
inch diameter	Permit No.					
Direct push hole	Land-Surface (LS) Elevation and Datum:					
	780.70	feet x Surveye	d			
Well casing,		Estimate	ed			
2 inch diameter,	Installation Date(s)7/	19/2016				
	Drilling Method					
Backfill Bentonite quick Grout 2.5 bags	Drilling ContractorDLZ					
(125 lbs)	Drilling Fluid Pota	ble water				
<u>87</u> ft						
Bentonite Slurry	Development Technique(s) and	Date(s)				
97 ft X pellets 3/8" (2 buckets)	Surging and submersible pump					
98 ft (#7 Sand 1/2 bag-25 lbs)						
((Canta ii 2 22g 22 ii 2)						
101 #	Fluid Loss During Drilling	NM	gallons			
ft	Water Removed During Develo	pment 67	gallons			
	0. ii					
Well Screen.	Static Depth to Water	86.20 feet below	w M.P.			
2 inch diameter PVC , 0.10 slot	Pumping Depth to Water	118 feet below	w M.P.			
	Pumping Duration NM	hours				
	Yield NA gpm	Date	8/26/16			
Gravel Pack	Specific Capacity	gpm/ft				
x Sand Pack #6 (5 bags-250 lbs)						
Formation Collapse	Well PurposeMon	toring well				
121 ft* Bottom of Screen						
122 ft (Bentonite pellets 3 buckets (3/8")	Remarks					
156ft						
Measuring Point is						
Top of Well Casing Unless Otherwise Noted.						
* Depth Below Land Surface	Prepared by Kari	Eldridge				

APPENDIX B Banks Well Inventory Report

Prepared for:

ARCADIS U.S., INC.-Columbus 630 Plaza Drive, Suite 600 Highlands Ranch, CO 80129



Water Well Invent MOUNTAINEER PLANT 1347 GRAHAM STATIC

AEP Water Well Inventory

1347 GRAHAM STATION ROAD

NEW HAVEN, WV

MASON County

PO #: OH015976.0004

ES-112028

Monday, September 08, 2014

Table of Contents AEP Water Well Inventory



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

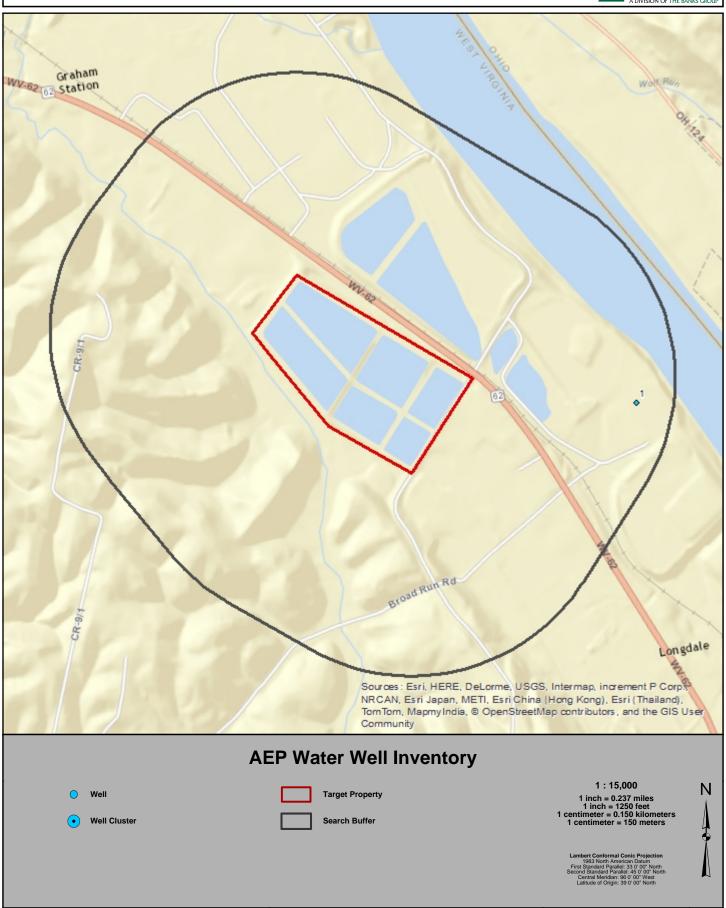
Elevation		
NA		

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)

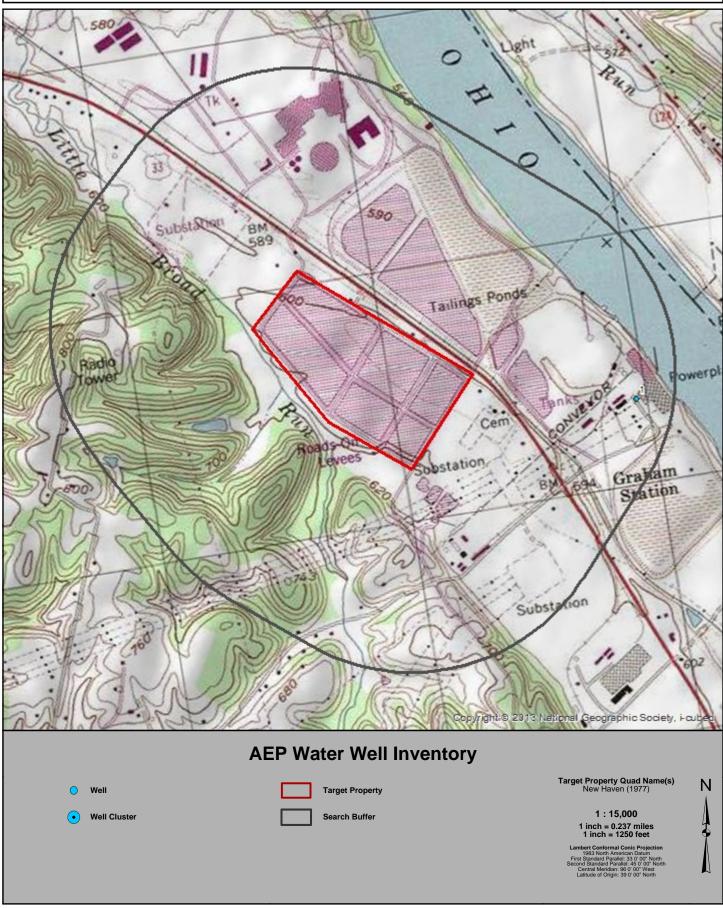
Summary Map - 0.5 Mile Buffer





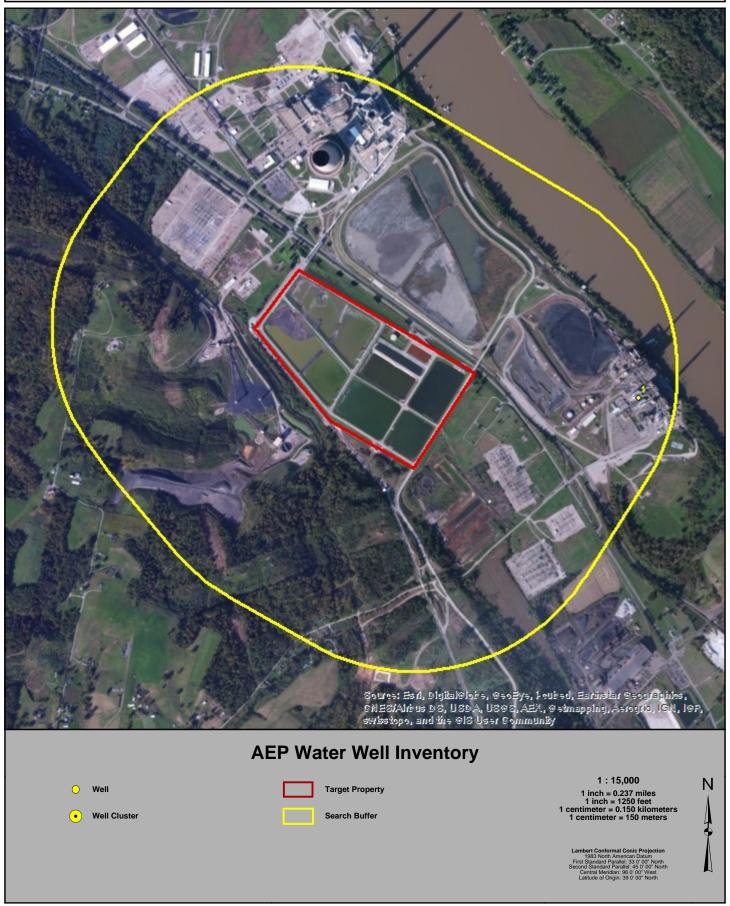
Topographic Overlay Map - 0.5 Mile Buffer





Current Imagery Overlay Map - 0.5 Mile Buffer





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- 385802081 552602	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.