

COAL COMBUSTION RESIDUALS GROUNDWATER MONITORING SYSTEM DESIGN PLAN ASH FILTER PONDS AND ASH DISPOSAL SITE

Prepared for:



Keystone-Conemaugh Projects, LLC Keystone Generating Station Shelocta, Pennsylvania

Prepared by:

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October 2017 Rev. 01 August 2023

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Date of Review	Reviewer(s) Name(s)	If Amended: Rev. No., Section(s) Amended, and Reason(s)
October 2017	Mark Jacklin, GenOn Steve Frank, GenOn David Shott, APTIM Jim Kilburg, APTIM Richard Southorn, APTIM	Original Plan
August 2023	Nate Rozic, Keystone John Shimshock, Conemaugh David Shott, APTIM Robert Stolz, APTIM	Rev. 01: PE Certification (former PE no longer with APTIM); Sections 1.0 and 2.0 (administrative updates and added discussion of Ash Pond retrofits and Disposal Area closure); Section 3.0 (added additional justification for adequacy of monitoring well networks)

In accordance with §257.91(f) of the Rule, I hereby certify, based on a review of the information contained in the "Keystone CCR Groundwater Monitoring Network Design Report" (APTIM, October 2017) and other information made available to me, and my knowledge and understanding of accepted hydrogeological principles, that the groundwater monitoring systems associated with the Keystone CCR Units are adequate and appropriate. The construction and orientation of the respective groundwater monitoring systems are sufficient to satisfy the performance standards outlined in §257.91(a)(1-2) of the Rule. This certification further acknowledges the utilization of the required minimum number of monitoring wells as appropriate for the Keystone East Valley and West Valley Disposal Sites and the Ash Filter Ponds, and also the adoption of a multiunit monitoring system (per §257.91[d]) for the Ash Filter Ponds. Justification and basis for each respective monitoring network (including reliance on the minimum number of wells) is provided within the narratives of Sections 2.0 and 3.0 of this current document. These aspects address identification and characterization of the uppermost aquifer, well design and proximity to the CCR unit downgradient waste boundary, and groundwater flow directions.

Additionally, this certification recognizes confirmed operational upgrades (retrofit with composite liner systems per §257.72 and §257.70[c]) made to the Ash Filter Ponds from 2017 thru 2019, and the ongoing phased closure and final capping system installation (compliant with the performance standards of §257.102[d]) at the East Valley and West Valley Disposal Sites. The closure/capping of the disposal sites was initiated in early-2023, as a direct result of the Keystone Station's decision to permanently cease coal combustion no later than December 31, 2028, as a means to achieve compliance with the federal Effluent Limitation Guidelines Rule. Collectively, the pond upgrades and the ongoing closure/capping of the disposal sites represent measures to make each of these CCR units more robust and environmentally sound with respect to potential groundwater impacts during their remaining active life and into post-closure care (disposal sites only). The corresponding adequacy and effectiveness of the respective groundwater monitoring networks will be maintained by these actions.

Robert Stor

Date:

8/25/2023



1.0 Introduction

Title 40 Code of Federal Regulations §257.91 requires owners or operators of Coal Combustion Residuals (CCR) landfills and surface impoundments, also known as CCR units, to implement a groundwater monitoring system. These requirements are part of the overall CCR Rule (or Rule) which was published in the Federal Register on April 17, 2015, and which became effective on October 19, 2015. The referenced groundwater monitoring system for each defined CCR unit must consist of a sufficient number of wells (minimum of one upgradient and three downgradient per §257.91[c][1]). Moreover, and per the performance standards outlined in §257.91(a)(1-2), these wells must be installed at appropriate locations to provide an accurate characterization of background groundwater quality and to be capable of accurately representing the quality of groundwater passing the downgradient boundary of the CCR unit. The overall groundwater monitoring system's ability to satisfy these elements of the Rule must be documented and certified by a registered professional engineer in accordance with §257.91(f).

The Keystone Generating Station (Keystone) is a coal-fired power plant located in Shelocta, Pennsylvania. The Rule applies to this facility due to the management/disposal of CCR materials that are generated from the combustion of coal. CCR units associated with Station operations include the Keystone Ash Disposal Site (represented by the East Valley and West Valley Disposal Sites), and three Ash Filter Ponds (Ponds "A," "B," and "C") used for the management of bottom ash. Each of these CCR units has a dedicated groundwater monitoring system that was originally installed to comply with Commonwealth of Pennsylvania Residual Waste Regulations, and was subsequently evaluated and modified (as needed) for use under the CCR program. Additionally, in accordance with the provisions of §257.91(d) of the Rule, the groundwater monitoring system for the Ash Filter Ponds has been designated to provide coverage in the context of a multiunit system encompassing all three ponds collectively.

The original Plan (APTIM, 2017) was placed in the Station's operating record per §257.105(h)(3), noticed to the State Director per §257.106(h)(2), and posted to the publicly accessible internet site per §257.107(h)(2). This revised Plan (Rev. 01, APTIM, 2023) has again been prepared to comply with the requirements of §257.91(f), addressing the adequacy and ability of the groundwater monitoring systems to satisfy the performance standards mandated by §257.91(a)(1-2) of the Rule. The revised Plan also acknowledges operational upgrades and future closure plans for each of Keystone's CCR units. As required, the same record-keeping requirements will be applied to this revised Plan, relative to placement in the facility operating record, notification and website posting.

2.0 CCR Unit Descriptions

2.1 General Descriptions

Ash Filter Ponds

As noted above, three ponds are utilized to manage bottom ash at the Station. These ponds are located within the Station proper, are situated immediately adjacent to one another and are designated from south to north as Ash Filter Pond "A," "B," and "C" (see attached Figure 1). Following completion of the retrofit activities in November 2019, each of the ponds retained their approximate dimensions of 410 feet long by 90 feet wide (at the crest), with depth and crest elevations adjusted appropriately to maintain adequate processing/settling capacities and to increase the separation distance between the bottom of the ponds and the observed upper limit of the uppermost aquifer. No changes were made to the existing CCR groundwater monitoring network (further discussed in Section 3.0) as a result of the retrofit.

Ash Disposal Site

The Keystone Ash Disposal Site is comprised of the contiguous East Valley and West Valley areas (see attached Figure 2). Stage I of East Valley was constructed first and became operational in 1985. Stage I was initially constructed in the northern part of East Valley, with Stage II being later constructed in the southern half of East Valley and piggy-backed over the Stage I area. The East Valley area is underlain by a single synthetic liner system. West Valley comprises Stages III and IV of the overall disposal area and both of these stages serve as the currently active portions. West Valley began operations in 2002 and this area has a double-liner system with one component being a geosynthetic clay liner. As designed, West Valley piggybacks over the western part of the East Valley Disposal Site, with Stage IV being a horizontal and vertical expansion of the Stage III area. Beginning in early-2023, closure and final capping activities were initiated and will be conducted in a phased manner (starting with East Valley) over the next six to seven years (targeted completion in 2029-2030). No changes to the existing CCR groundwater monitoring networks (further discussed in Section 3.0) will be undertaken as a result of the closure/capping of East Valley and West Valley.

2.2 Site Geology and Hydrogeology

Ash Filter Ponds

The Ash Filter Ponds are underlain by the Carmichaels Formation (Carmichaels) of the Pleistocene Epoch. The Carmichaels is comprised of unconsolidated sediments consisting of sandy clayey silt with interbedded sand and gravel, particularly near the bottom of the formation. Formation thickness typically varies from 30 to 50 feet; however, in the immediate area of the Ash Filter Ponds, the Carmichaels is approximately 18 to 22 feet thick. The Carmichaels directly overlies siltstone, claystone, and shale bedrock of the Mahoning Sandstone member of the Glenshaw

Formation (Conemaugh Group). The Mahoning Sandstone is a basal member of the Glenshaw Formation and is commonly comprised of silty to clayey sandstone with some shale, siltstone, and claystone interbeds.

The Carmichaels is generally devoid of a persistent and laterally continuous groundwater table and infiltrating stormwater passing through this formation recharges groundwater within the underlying Mahoning Sandstone. Although a persistent and laterally continuous groundwater table does not appear to exist in the Carmichaels, some groundwater may be present intermittently (following prolonged or intense precipitation) in the lower part of this formation near its interface with the Mahoning Sandstone.

A continuous groundwater table does reside within the fractured zones of the Mahoning Sandstone in the immediate area of the Ash Filter Ponds. Correspondingly, this water-bearing zone represents the uppermost aquifer in this area, existing in an unconfined condition since it is recharged, at least in part, directly from the overlying Carmichaels.

Ash Disposal Site

East Valley

East Valley is underlain by rocks of the Glenshaw Formation (Conemaugh Group) of the Pennsylvanian System. The Glenshaw Formation is typically about 300 feet thick and comprised of interbedded sandstone, siltstone, shale, and claystone. Four thin marine limestone beds are present in the Glenshaw Formation including the Ames, Woods Run, Pine Creek, and Brush Creek. Claystone beds occurring in the Glenshaw Formation are important units because they commonly act as aquitards and aquicludes¹ between groundwater bearing units in sandstone and siltstone beds. The importance of the marine limestone beds is that they are key marker beds that allow for determining stratigraphic position within the Glenshaw Formation. Economically unimportant coal beds typically only a few inches thick are also present within the Glenshaw Formation. Significant groundwater bearing units within the Glenshaw Formation commonly include the Saltsburg Sandstone, Buffalo Sandstone, and Mahoning Sandstone. The Mahoning Sandstone is the basal member of the Glenshaw Formation. These geologic formations affect the groundwater gradient in this area such that the gradient follows the slope of the ground surface (rather than the dip of individual rock units), and thus resulting in groundwater flow being topographically controlled, i.e., essentially indicating that downgradient is downhill and upgradient is uphill through the valley.

¹ Aquitard - saturated, permeable geologic unit which cannot transmit significant quantities of water (but can transmit small quantities). Also called a semi-pervious formation or leaky formation. Aquiclude-geologic formation which may contain water, but is incapable of transmitting water.

Groundwater downgradient of East Valley resides within the fractured zones of the Mahoning Sandstone. The Mahoning Sandstone is the first geological unit and the uppermost groundwater bearing unit below ground surface in the area of the downgradient monitoring wells. Correspondingly, the Mahoning Sandstone represents the uppermost unconfined aquifer in the East Valley area.

West Valley

Considering the contiguous setting of the East Valley and West Valley areas, the geology and hydrogeology underlying both disposal sites are essentially the same. The Mahoning Sandstone is the first geological unit and the uppermost groundwater bearing unit below ground surface in the area of the downgradient monitoring wells. Correspondingly, the fractured zones of the Mahoning Sandstone represent the uppermost unconfined aquifer in the West Valley area. Groundwater flow in this valley is also topographically controlled, same as discussed above for the East Valley area.

The groundwater monitoring well systems for the Ash Filter Ponds and the Ash Disposal Site meet the requirements of §257.91 with respect to number and locations of wells and with respect to monitoring the same hydrostratigraphic interval. Provided below are tables showing details for the groundwater monitoring well systems for each of these CCR units. In support of development of the respective monitoring well systems, APTIM relied in part on information provided in the form of a third-party peer review conducted by GAI Consultants, Inc. (GAI, 2015).

3.1 Ash Filter Ponds

The groundwater monitoring system for the Ash Filter Ponds is comprised of four wells, including Well MW-5 (upgradient) and Wells MW-6, MP-29, and MP-30 (downgradient). This same grouping of wells also serves as the groundwater monitoring network for compliance with the Commonwealth of Pennsylvania Residual Waste regulations. The screened intervals of all four wells cross the interface between the Carmichaels Formation and the Mahoning Sandstone, previously noted as the horizon for the uppermost aquifer. The locations of the monitoring wells are shown on Figure 1 along with a depiction of the generalized and established groundwater flow direction, which is toward the southwest. As observed from Figure 1, each of the three downgradient wells is situated along the base of the dike adjacent to Pond "A," and in positions rendering them as close as practical to the downgradient CCR multi-unit waste boundary. With clear definition of groundwater flow direction in this area, three wells along this downgradient boundary are deemed to provide sufficient coverage over the approximate 400-foot lateral distance spanned by the ponds. Installation details and boring logs for the wells are contained in Appendix A of this document, with pertinent information summarized in Table 1. Screened intervals for the downgradient wells range from 25 to 30 feet, providing ample coverage of the uppermost aquifer (fractured zones of the Mahoning Sandstone), and effective monitoring for potential gross-level groundwater impacts.

Monitoring Well No.	Hydrologic Position	Casing Diameter (inches/Material)	Ground Surface Elevation (feet msl)	Top of PVC Casing Elevation (feet msl)	Well Depth (feet bgs)	Top/Bottom Elevations of Screened Interval (feet msl)
MW-5	Upgradient	4-inch/PVC	1,022.91	1,025.66	40.0	1,007.91/982.91
MW-6	Downgradient	4-inch/PVC	1,021.76	1,024.86	40.0	1,006.76/981.76
MP-29	Downgradient	4-inch/PVC	1,021.28	1,023.03	45.2	1,006.08/976.08
MP-30	Downgradient	4-inch/PVC	1,021.34	1,023.35	45.1	1,006.24/976.24

 Table 1: Ash Filter Ponds Groundwater Monitoring Well System

Notes: feet bgs = feet below ground surface; PVC = polyvinyl chloride

3.2 Ash Disposal Site

East Valley and West Valley are designated as separate CCR units, and each has a dedicated groundwater monitoring well system. However, they share a common background monitoring well (identified as Well MP-21), which is situated upgradient/cross-gradient to the overall disposal site, and offers a location that mimics the geology and hydrogeology at the downgradient monitoring wells for both East Valley and West Valley. Further discussion of the individual monitoring well systems for East Valley and West Valley is provided below in Sections 3.2.1 and 3.2.2, respectively.

3.2.1 East Valley

The groundwater monitoring system for East Valley is comprised of four wells, including Well MP-21 (upgradient/cross-gradient) and Wells MP-4, MP-17B, and MP-18 (downgradient). This same grouping of downgradient wells is used for the Commonwealth of Pennsylvania Residual Waste monitoring, plus an upgradient well designated as MP-19. Comparison of groundwater quality between MP-21 and MP-19 (available from PADEP Form 14R documentation) shows high similarity, so the single utilization of well MP-21 for the CCR upgradient/cross-gradient monitoring well is deemed reasonable. Although groundwater quality between MP-21 and MP-19 is generally similar, the screened interval for well MP-19 also spans some additional rock units when compared to well MP-21. The screened intervals of all four CCR monitoring wells (MP-21, MP-4, MP-17B, and MP-18) are in bedrock units, including the Mahoning Sandstone which is represented as the uppermost aquifer in this area.

The locations of the monitoring wells are shown on Figure 2 along with a depiction of the generalized and established groundwater flow direction, which is toward the east. As observed from Figure 2, each of the three downgradient wells is situated along the eastern-most toe of the disposal area, and in positions rendering them essentially right at the downgradient CCR waste placement boundary. As previously noted, groundwater flow in this area is topographically controlled with flow in the downhill direction and ultimately being funneled through the valley to the toe of the disposal area where the downgradient monitoring wells are situated. This funneling effect further supports the utilization of only three downgradient wells as there is a confined and limited footprint represented at the toe of the disposal area.

Installation details and boring logs for the wells are contained in Appendix B of this document, with pertinent information summarized in Table 2. Screened intervals for the downgradient wells range from 10 to 20 feet, providing ample coverage of the uppermost aquifer (fractured zones of the Mahoning Sandstone), and effective monitoring for potential gross-level groundwater impacts.

Monitoring Well No.	Hydrologic Position	Casing Diameter (inches/Material)	Ground Surface Elevation (feet msl)	Top of PVC Casing Elevation (feet msl)	Well Depth (feet bgs)	Top/Bottom Elevations of Screened Interval (feet msl)
MP-21	Upgradient/ Cross-gradient	4-inch/PVC	1,123.39	1,125.70	152.0	1,106.39/971.39
MP-4	Downgradient	4-inch/PVC	1,037.30	1,039.28	27.0	1,020.30/1,010.30
MP-17B	Downgradient	4-inch/PVC	1,066.67	1,068.81	59.8	1,026.87/1,006.87
MP-18	Downgradient	4-inch/PVC	1,052.47	1,053.88	42.0	1,030.47/1,010.47

 Table 2: East Valley Ash Disposal Site Groundwater Monitoring Well System

3.2.2 West Valley

The groundwater monitoring system for West Valley is comprised of four wells, including Well MP-21 (upgradient/cross-gradient), and Wells MP-16, MP-23, and MP-24 (downgradient). This same grouping of wells is used for the Commonwealth of Pennsylvania Residual Waste monitoring, plus an additional downgradient well designated as MP-22 on the northern downslope and in a location measurably distant from the West Valley waste boundary. Considering the commonality of the wells between the Residual Waste and CCR programs, the single utilization of well MP-21 for the CCR upgradient/cross-gradient monitoring well is deemed reasonable. The screened intervals of Wells MP-16, MP-21, and MP-24 are in bedrock units (including the Mahoning Sandstone and its upper fracture zones), while the screened interval for Well MP-23 extends across the soil/bedrock interface.

The locations of the monitoring wells are shown on Figure 2 along with a depiction of the generalized and established groundwater flow direction, which is toward the south. As observed from Figure 2, each of the three downgradient wells is situated near the southern-most toe of the disposal area, and in positions rendering them in very close proximity to the downgradient CCR waste placement boundary. The construction and presence of the West Valley Equalization Pond (shown on Figure 2 and used to manage contact stormwater runoff) and associated infrastructure necessitated locating the downgradient wells a slight distance from the actual waste placement boundary. Accordingly, their locations are deemed reasonable and responsive to the CCR Rule obligations. As previously noted, groundwater flow in this area is topographically controlled with flow in the downhill direction and ultimately being funneled through the valley to the toe of the disposal area where the downgradient monitoring wells are situated. This funneling effect further supports the utilization of only three downgradient wells as there is a confined and limited footprint represented at the toe of the disposal area. Installation details and boring logs for the wells are contained in Appendix C of this document, with pertinent information summarized in Table 3. Screened intervals for the downgradient wells range from 50 to 90 feet, providing ample coverage of the uppermost aquifer (the Mahoning Sandstone and its fracture zones), and effective monitoring for potential gross-level groundwater impacts.

Monitoring Well No.	Hydrologic Position	Casing Diameter (inches/Material)	Ground Surface Elevation (feet msl)	Top of PVC Casing Elevation (feet msl)	Well Depth (feet bgs)	Top/Bottom Elevations of Screened Interval (feet msl)
MP-21	Upgradient/ Cross-gradient	4-inch/PVC	1,123.39	1,125.70	152.0	1,106.39/971.39
MP-16	Downgradient	4-inch/PVC	1,064.27	1,066.25	70.0	1,054.27/994.27
MP-23	Downgradient	4-inch/PVC	1,071.19	1,073.34	85.0	1,056.19/986.19
MP-24	Downgradient	4-inch/PVC	1,099.48	1,100.26	111.0	1,083.48/988.48

 Table 3: West Valley Ash Disposal Site Groundwater Monitoring Well System

4.0 Purging and Sampling Equipment

To support the collection of representative groundwater samples from the monitoring wells, the low-flow method has been adopted and utilized for sampling at each of the Keystone CCR units, and will remain in place for all subsequent CCR monitoring activities. The low-flow method is documented and accepted by the U.S. Environmental Protection Agency, and allows for purging/sampling of groundwater such that laminar flow (non-turbulent) conditions are maintained with corresponding minimal or no drawdown in the well. This, in turn, promotes continuous or near-continuous groundwater recharge of the well from the surrounding formation, and ensures that the subsequently collected samples are representative of fresh formation waters. Low-flow sampling can be performed using either dedicated or portable sampling equipment.

Dedicated air-operated bladder pumps manufactured by Geotech Environmental Equipment, Inc. (Geotech) have been installed in each of the groundwater monitoring wells at the Ash Filter Ponds and in each well at both the East Valley and West Valley Disposal Sites. Each of the dedicated pump intakes is set so that sediment from the bottom of the wells or stagnant water from the tops of the water columns is not drawn in during the groundwater purging/sampling. Table 4 provides a summary of the monitoring wells depths, the depth to the pump intakes, and the heights of the water column above the pump intakes (this information is based on actual field measurements).

Monitoring Well	Location	Measured Total Depth (feet below top of casing	Depth to Pump Intake (feet below top of casing)	Height of Water Column above Pump Intake (feet)
MW-5	Ash Filter Ponds	42.9	39.8	15.9
MW-6	Ash Filter Ponds	42.9	39.8	15.6
MP-29	Ash Filter Ponds	47.1	43.9	19.8
MP-30	Ash Filter Ponds	47.3	43.8	16.0
MP-21	East Valley/West Valley Disposal Sites	153.2	148.8	91.9
MP-4	East Valley Disposal Site	27.1	25.8	2.9
MP-17B	East Valley Disposal Site	62.1	56.8	12.3
MP-18	East Valley Disposal Site	44.6	38.8	2.1
MP-16	West Valley Disposal Site	72.2	64.8	48.6
MP-23	West Valley Disposal Site	86.8	80.8	66.9
MP-24	West Valley Disposal Site	112.9	105.8	72.8

Table 4: Well Depths and Sampling Pump Settings

Figures







LEGEND:

➡ MP-18 CCR GROUNDWATER (1016.17) MONITORING WELL WITH **GROUNDWATER ELEVATION** MEASURED BETWEEN NOVEMBER 10 AND NOVEMBER 14, 2022 GROUNDWATER GENERALIZED FLOW DIRECTION SCALE 1,200 FEET 600 REFERENCES: 1. GOOGLE AERIAL PHOTOGRAPH, DATED 9/26/2019. 500 Penn Center Boulevard, Suite 1000 Pittsburgh, Pennsylvania 15235 **APTIM** FIGURE 2 CCR COMPLIANCE GROUNDWATER MONITORING WELL LOCATION MAP EAST VALLEY AND WEST VALLEY ASH DISPOSAL SITES KEYSTONE GENERATING STATION PLUMCREEK TOWNSHIP, ARMSTRONG COUNTY, PA

Appendix A

Boring Logs and Construction Details— Ash Filter Ponds Groundwater Monitoring Wells

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Drilling Log

Monitoring Well MP-29

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Depth (ft.)	Well	(mqq)	ample I Recove	Graphic Log	CS Cla	(Color, Texture, Structu	ure)
	Ö		SIS 1	ŝä ^o	nsc	Geologic Descriptions are Based of	on the USCS.
-0 $--2$ $--4$ $--6$ $--10$ $--12$ $--12$ $--14$ $--12$ $--14$ $--16$ $--18$ $--1$					SFG CL SC SC SC SC SC	Topsoil and grass. Light brown FILL as POORLY GRADED S grained) WITH GRAVEL; gravel as sandst silty near base. Brownish gray CLAY WITH GRAVEL; som Light brown FILL as POORLY GRADED S grained) WITH GRAVEL; gravel as sandst silty near base. Gray CLAY; some silt and gravel; medium s with depth beginning at 4 feet bgs; moist. Brown SANDY CLAY; some silt and gravel Brown CLAYEY SILT WITH SAND; some coal fragments; moist.	AND (medium to fine one cobbles; loose; dry; ne silt; dry. AND (medium to fine one cobbles; loose; dry; stiff; becoming sandy ; moist. clay; trace gravel; trace
- 22 T				*****		moist.	
22				0.089		Continued Next Page	



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Drilling Log

Monitoring Well **MP-29** Page: 2 of 2 Project NRG Keystone Generating Station Owner _____NRG Shelocta, Pennsylvania 1009174008 Location Proj. No. <u>Sample ID</u> % Recovery Blow Count Recovery Well Completion USCS Class. Description Graphic Log (mqq) (ft.) (Color, Texture, Structure) Geologic Descriptions are Based on the USCS. Continued Sandy zone. 26 28 30 32 Water encountered; dust dissipates. 34 36 38 Hard zone. 40 Gray SANDSTONE BEDROCK (fine grained); wet. 42 44 46 8/20/13 NRG KEYSTONE CCR.GPJ IT_CORP.GDT 12/2/15 48 50 52 54 56 58



Drilling Log

Monitoring Well MP-30

Project Location Surface El Top of Cas Screen: Di Casing: Di Casing: Di Fill Materia Drill Co Driller Checked E	NRG Keysto Shelocta, F ev. 1021 sing 1023. a 4 in. a 4 in. a 4 in. a 4 in. b Hole Plu Duncan Brow Browell	ne Gen Pennsylv 341 ft. 35 ft. Ig Dthers D	erating Sta vania Total Hole Water Le Length Length rilling, Inc. Log By	tion e Deptivel Init 30 ft. 17 ft. Meth Dusti	h <u>45.</u> iial <u>V</u> nod <u>Air</u> <u>n Moore</u> License	01 Ri Ri : Rotal	wner NRG Proj. No	Page: 1 of 2
Depth (ft.)	Well Completion	(mqq)	Sample ID % Recovery	Blow Count Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Struct Geologic Descriptions are Based	ture) on the USCS.
						SM MH SC	Topsoil and grass. Light brown FILL as CLAYEY SILT WITH medium stiff; moist. Light brown SANDY CLAY; some gravel; i zone of gravel at 4.5 feet bgs. Medium brown CLAYEY SILT WITH SAN medium stiff; moist.	SAND; some gravel; medium stiff; moist; hard
- 20 20 22 22					****		Dark gray SILTSTONE BEDROCK; weath moist.	nered to 22 feet bgs;



Drilling Log

Monitoring Well

MP-30 Page: 2 of 2

Project NRG Keystone Generating Station Owner NRG Shelocta, Pennsylvania 1009174008 Location Proj. No. <u>Sample ID</u> % Recovery Blow Count Recovery Well Completion USCS Class. Description Graphic Log UIJ (mqq) (ft.) (Color, Texture, Structure) Geologic Descriptions are Based on the USCS. Continued 26 28 30 32 34 36 Water encountered; dust dissipates; slightly shaly. 38 40 42 Gray SANDSTONE BEDROCK (fine grained); wet. 44 ::: 46 12/2/15 48 NRG KEYSTONE CCR.GPJ IT_CORP.GDT 50 52 54 56 8/20/13 Rev 58 CB&I

Appendix B

Boring Logs and Construction Details— East Valley Ash Disposal Site Groundwater Monitoring Wells

Boreh	nole Diameter: <u>12</u> inch	ies,	From <u>0</u> To	o <u>5</u>		Drilled By: <u>Pa. Dr</u>	11/1ng - C	hris C	olter	(minte	
-		1es,	-rom <u>5</u> 10	5 155	(-	Drillers License N	lumber:		540	6	
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Dotto I		21 Le	Omo	(m)		County:	ARMSTRO.	NG	7,		
Date.	SVYL Measureu,	00.	2000	_(0)	m/uu/y	y) Township or Wu	nicipain	у _/	Lun	CREEK TWP,	
Depth _. (Ft)	Lithologic Description	Plot	Water* Observations	No.	Rec**	Comments	Well	/Piezo	met	er Construction	Depti (Ft)
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- 15									100	13.5	15-
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6 8 8 6	BROWN M. SOFT SILTSTONE					<i>k</i>			NAME OF T		
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- 35				••••••				1.2.2		••••••	35 —
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									11444		
-100	1										60 -



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Bonding From S. To 153 Sinches, From S. To 153 Differs License Number: 0406 J Depth: 153 Fact (ft) Logged By: S.C. (Jurgen) - Gar Lowithwow, Twu. Depth of State Coround Water Level (SWU): 35.37 Comments 0406 Depth of State Coround Water Sampler: 0406 0406 Depth of State Coround Water Sampler: 0406 0406 Peth of State Coround Water Sampler: 0406 0406 Peth of State Coround Water Sampler: 0406 060 -60 GRAFF en Surf Statsmold Sampler: Comments WellPlecometer Construction 060 -65 Sampler: Comments WellPlecometer Construction 060 06 -65 GRAFF en Surf Statsmole Sampler: Comments WellPlecometer Construction 060 -65 Sampler: Comments WellPlecometer Construction 060 07 -66 Sampler: Comments WellPlecometer Construction 07 07 -70 Sampler: Comments WellPlecometer Construction 07 07 -70 Sampler: </th <th>Boreh Surfac Boreb</th> <th>ole Number: <u>KEY5701</u> ce Elevation (Ft/MSL): cole Diameter: 13 incl</th> <th>VE ST</th> <th>ATION WEST</th> <th>VALLE</th> <th><u>4 MP</u></th> <th>Drilling Method: ft) Date Drilled: Drilled By: Date</th> <th>Hollow STEM Auger/Down Holle Arin Ham June 26, 2000 (mm/c</th> <th>i<u>mer</u> id/yy)</th>	Boreh Surfac Boreb	ole Number: <u>KEY5701</u> ce Elevation (Ft/MSL): cole Diameter: 13 incl	VE ST	ATION WEST	VALLE	<u>4 MP</u>	Drilling Method: ft) Date Drilled: Drilled By: Date	Hollow STEM Auger/Down Holle Arin Ham June 26, 2000 (mm/c	i <u>mer</u> id/yy)
I Depth: 153 Fact (ft) Logged By: S.C. (DTGmJ - GAT Guide (ThAT: Exec.) Dets WL Measured: Two-ship or Municipality: County: Attristende Output: Attri: Attristende Output:	Bolen	8 incl	nes, I	From 5 T	o 153		Drillers License Nu	mber: 0406	
Depth to Static Ground Water Level (SWL): <u>25.79</u> (ft) County: <u>Arrssvid</u> Date SWL Measured: <u>Twe 22,2020</u> (mm/dd/yy) Township or Municipality: <u>Lum Clear Tur</u> Depth Uthologic Description Plot <u>County Man Backy</u> Comments WeltPlecometer Construction <u>Perth</u> (ft) Uthologic Description Plot <u>County Statis</u> GRAP (m.SAPT SELTSTARE Since CREARING STREES -65 -70 -75 SRAY SOFT CLARSTORE -80 -90 -90 -90 -90 -90 -90 -90 -9	C all	Depth:	53 Fee	:+		(ft) Logged By: S.C. (WIGHW - GAI CONSULTANTS, ID	vc.
Dets SWL Measured:	Depth	to Static Ground Wate	er Lev	rel (SWL):	25.	79 (ft) County: ARM	STRONG	
Depth (H) Lthologic Gescription Plot Ground Destrictions No. Barry Comments Well/Piezoneter Construction Pgth (H)	Date S	WL Measured:	e 28,	2000	(mr	n/dd/y	ry) Township or Muni	cipality: PLUM CREEK TWP.	
-60 GRAY IN: SAFT SELFSBARE Sime CALARING STRAIS -65 -70	Depth (Ft)	Lithologic Description	Plot	Ground Water* Observations	<u>Sam</u> No.	Rec**	Comments	Well/Piezometer Construction	Depth (Ft)
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Boreh	ole Number: KEYSTONE	STAT	ION WEST VA	LLEY ;	mP-21	Drillina Method: H	blow Stem Auger / Down Hole All Hamn	ner
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Boreh	ole Diameter: <u>12</u> incl	ies,	From <u>0</u> To	o <u>5</u>		Drilled By: PA. Drilli	19 - Chrin Colter/Earl Dyc	1.1.1.
1000	<u> </u>	ies,	From <u>5</u> To	0 <u>153</u>		Drillers License Nur	nber: 0406	
al	Depth:15	53 Fe	e7		(ft) Logged By: <u>S. C. C</u>	NIGTON - GAI GONSULTANTS, INC	<u>.</u>
Depth	to Static Ground Wate	er Lev	vel (SWL):	25.7	9(ft) County: <u>Arms</u>	TROAG	
Date S	SWL Measured:	2 28	,2000	(mr	n/dd/y	ry) Township or Munic	ipality: PLUM CREEK TWP.	
Depth (Ft)	Lithologic Description	Plot	Ground Water* Observations	<u>Sam</u> No.	Rec**	Comments	Well/Piezometer Construction	Depth (Ft)
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Totali	Dooth:	and and a second second	10	Drillers License N	lumber:	
Dooth	te Static Ground Wat		. 1975 (1		5111	
Datas		er Level (SVVL) オクリノタマ	(<u>)</u>	T) County: <u>Ary</u>	mstrong	
Dates		101103	(mm/aa/y	y) Township or Mur	nicipality: <u>Plum Creek</u>	
Depth (Ft)	Lithologic Description	Plot Ground Water Observati	No. Rec**	Comments	Well/Piezometer Construction)egth (Ft)
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Depth (Ft)	Lithologic Description	Plat	Ground Water* Observations	Sam No.	nles Rec*#	Comments	Well/Piezometer Construction (Fi	rth t)
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- 65	Silty Shale, Gray					Bottom of Boxing at 59.8 Ft.		Ĭ

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Deoth	to Static Ground Wate	erlev	AL (SWI)	23	23 1	t) County: Area	. Goul	<u>a</u>	
Date	SWL Measured:	131	94	(m	m/dd/v	v) Township or Muni	cinality:	Phy Creek	
Denth	1	7	Ground	520	nles		I I	TIMM OTEEK	1
(Ft)	Lithologic Description	Plat	Water* Observations	No.	Rec**	Comments	Well/Pie	zometer Construction	(Ft)
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Appendix C

Boring Logs and Construction Details— West Valley Ash Disposal Site Groundwater Monitoring Wells

Bore	hole Number: KEYSTONE	STA	TION WEST VA	HLLEY N	NP-21	Drillin	g Method: 占	OLLOW STER	AUGERS	Down Hule Alr Ham	mer
Surta	ice Elevation (Ft/MSL):		<u> </u>		(ft) Date D	Drilled: June	26,2000		(mm/	dd/yy)
Bore	hole Diameter: <u>la</u> ind	nes,		0 <u>5</u>		Drillec	By: <u>PA. Drilli</u>	ng - Chri	Colte	r/Earl Dyc	
100		hes,	From <u>5</u> 1	o <u>153</u>	×	Driller	s License Nur	nber:	04	06	
а	Depth:	3 Fee	t		(ft) Logge	d By: <u>S.C. h</u>	JIGTON - 1	SAI (ansultants. Inc.	
_ cpt	h to Static Ground Wat	er Lev	vel (SWL):	25.79	1(ft) Count	y:AR	MSTRONG			
Date	SWL Measured: June	- 28,	2000	(mm	1/dd/y	ry) Towns	hip or Munic	ipality:	PLUM	A CREEK TWP.	
Depth (Ft)	Lithologic Description	Plot	Ground Water* Observations	No.	Rec**	Comment	ts	Well/Pie	zome	ter Construction	Depth (Ft)
	а 	T						Locking Steel		Concrete PAN	
0			a .					Sover	Π	XXXXXX .	
-	BROWN/RED SILT SOME CLAY	i t	. N					200	11	CONCRETE	
E	LICACE TOCK HOUSS ATTOGRAM	ł						(Jxes		3.0	
L 5									17	4"Ø Sch, 40	5
E		1						1111		PVC Riser	
F	BROWN M. SOFT SILTSTINE	1								VOLCLAYCHIPS	
-10			i.							1010	10
E			75		1		1			Bentunite	10
-			- ×		1			3		Hellets 12 C	
- 15								L		13.3	15-
	· ·				1		10-00 0000 0000 0000 0000 0000 00000 00000 0000				1.5
-	GRAY M. SOFT SILTSTONE									17,0	1 -
E-20									THE .	5	20
E						2			E	3	-
F	Con i la Cirr Criteria								TE S		
-25	BROWN MIJOHI SILIJANE										25
								100	E		-
							1				
- 30	GRAY SOFT CLAYSTONE							100	E		30 -
C	GRAY M. SOPT SHALE			1					E	and the late	-
2								CI-X	E	PVC.Screen	
- 35									E		35 -
F	Die Coult of Call Children and							1.4	E		
-	DK. GKHY M. JOH JILIY CUMPINE							100	HI S		-
- 40	GRAY M. SOFT STLTSTINE							11	E	SAND	40 -
-	CUT IN COL - STORAGE							12	THE SA		
5								11			1
- 45	CON M SAFT STITSTANE I				······		••••••••••		E		45-
-	SAME CALCARIOUS STREAKS								E		5
F									E		
- 50							1	N.	E		50-
-	i							3	In the		3
F	1							100	E S		-
-55	······			·····	·····.				E		55-
									E		1
-		× 1									-
-60									111		6-
								li:	E		
-	^ ⊻ Encountered Gr	ound	Water 👿	Comp	osite.	Static Water Leve		** Reco	vere	d/Attempted	

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Use additional sheets with this format as necessary



Surface Elevation (Ht/MSL): Borehole Diameter: [13, Inches, From	Bore	hole Number: KEYSTI	JF .ST	ATTON WEST	- VALU	y MP.	-21	Drilling Method: 1	Lation Sten Augu	/ Down Hole Air Hun	anter
Borehole Diameter: 12. Inches, From <u>C</u> To <u>S</u> <u>S</u> inches, From <u>S</u> To <u>IS3</u> i) Depth: <u>S3 feet</u> Depth: <u>IS3 feet</u> Depth: <u>IS3 feet</u> Depth: <u>IS3 feet</u> Depth: <u>IS3 feet</u> Depth: <u>IS3 feet</u> Depth: <u>Isto 28,200</u> (ft) Depth: <u>Isto 28,200</u> (ft) Dep	- Surfa	ice Elevation (Ft/MSL):				((ft)	Date Drilled:	June 2/ 200	/ mm/c	dd/yy)
IDepth: 153 Feet 000000000000000000000000000000000000	Bore	hole Diameter: 12 inch	ies,	From O T	05			Drilled By: PA Dr	Illing - Chris Co	Her/Earl Dye	
I Depth: 153 fact (ft) Logged By: S.C. (JISSNA/- GAS GuidelTMOT, ZUC.) Dets VUL Measured:		8 inch	ies.	From 5 T	0 153			Drillers License Nu	imber:	2406	
Depth to Static Ground Water Level (SWL): 25,74 (ft) County: AMSTERME Date SWL Measured:	1 1	Denth:	5.3 Fe	et.	<u></u>	('ft)	Logged By: SC	(1) = C mal = Cl	AT COALSULTIANTS T	M
Dete SVI. Measured: Time 22,2000 (mm/dd/yy) Tomyship or Municipality: Plum Cleast Tude Dete SVI. Measured: Towship or Municipality: Plum Cleast Tude 0	Dant	h to Static Ground Wate	arla	(SW/L).	25		(++)	Countr: Aga	COLGIUS C.		
Derth LithologicGeoription Plet Ground Watering Samples Towners Comments Well/Pletometer Construction Depth (F9) -CO GRAM IN SAM SETSTANDE Sime CALURDOU STRAIG 0<	Dete	SMI Moneurod:	51 LEN 28	0000	du.		20	Township on Muri	cinality O	Denk - P	
Deptin Uthologic Gescription Plot Gampaison Comments Weit/Piezometer Construction Depting (Pi) -60 GRAM IN SAFT SELTSTAME Sime Caluade Duo Site in Sector 60 55 -65 Sime Caluade Duo Site in Sector Sime Caluade Duo Site in Sector 55 55 -70 GRAM ISOFT CLANSINKE Sime Caluade Duo Site in Sector 55 55 -75 GRAM ISOFT CLANSINKE Sime Caluade Duo Site in Sector 55 55 -75 GRAM ISOFT CLANSINKE Sime Caluade Duo Site in Sector 55 55 -75 GRAM ISOFT CLANSINKE Sime Caluade Duo Site in Sector 55 55 -75 GRAM ISOFT CLANSINKE Sime Caluade Duo Site in Sector 55 55 -75 GRAM ISOFT CLANSINKE Sime Caluade Duo Site in Sector 55 55 -75 GRAM ISOFT CLANSINKE Sime Caluade Duo Site in Sector 55 55 -75 GRAM ISOFT CLANSINKE Sime Caluade Duo Site in Sector 55 55 -75 GRAM ISOFT CLANSINKE Sime Caluade Duo Site In Sector <td< td=""><td>Date</td><td>SWEINEASUIED</td><td>2 . 20. 1</td><td>2000</td><td></td><td>n/uu/j</td><td>yy)</td><td></td><td>icipality. <u>Pc</u></td><td>UM CREEK IWP,</td><td></td></td<>	Date	SWEINEASUIED	2 . 20. 1	2000		n/uu/j	yy)		icipality. <u>Pc</u>	UM CREEK IWP,	
-60 GRAY IN. SAFT SELTISTANE 50 -65 -65 -55 -70 -70 -70 -75 GRAY SOFT CLAISTINE 75 -80 -70 -70 -75 GRAY SOFT CLAISTINE 75 -80 -70 -70 -75 GRAY SOFT CLAISTINE 75 -80 -70 -70 -75 GRAY SOFT CLAISTINE 75 -76 -70 -70 -77 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 </td <td>Depth (Ft)</td> <td>Lithologic Description</td> <td>Plot</td> <td>Ground Water* Observations</td> <td><u>San</u> No.</td> <td>Rec**</td> <td></td> <td>Comments</td> <td>Well/Piezom</td> <td>eter Construction</td> <td>Depth (Ft)</td>	Depth (Ft)	Lithologic Description	Plot	Ground Water* Observations	<u>San</u> No.	Rec**		Comments	Well/Piezom	eter Construction	Depth (Ft)
-60 GRAM INISART SECTIONNE -65 -5- -70 -5- -70 -5- -75 GRAM SOFT CLANSINE -75 GRAM M. HARD SAN SOFT CLANSINE -76 GRAM M. HARD SAN SOFT CLANSINE -77 GRAM M. HARD SAN SOFT CLANSINE -78 GRAM M. HARD SAN SOFT CLANSINE -79 -700 -710 GRAM M. HARD SAN SOFT CLANSINE -710 GRAM M. HARD SAN SOFT CLANSING		* z	i							ž)	1
Sime CALARDRUS STRAIS 65 -65 -67 -70 -67 -75 GRAY SOFT CLARSTWE -75 GRAY SOFT CLARSTWE -76 -77 -78 -78 -79 -79 -79 -70 -70 -70 -75 GRAY SOFT CLARSTWE -70 -70 -75 -70 -70 -70 -75 -70 -75 -70 -75 -70 -75 -70 -75 -70 -75 -70 -75 -70 -75 -70 -75 -70 -75 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70 -70	-60	GRAY M. SOFT SILTSTONE	1	i a						· ·	60 -
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	E								() 周.		
- 75 GRAY SOFT CLAYSTINE - 55 - 5	-		1								-
-75 GRAV SOFT CLAXSTARE 75 -83 85 -96 85 -96 90 -97 85 -96 90 -97 85 -96 85 -97 85 -98 85 -96 85 -97 85 -98 85 -99 85 -90 85 -91 85 -92 85 -93 85 -94 85 -95 85 -96 85 -97 85 -98 85 -99 85 -90 85 -91 86 -92 85 -93 85 -94 96 -95 85 -96 86 -97 86 -98 87 -99 87 -90 88 -910 88 -92 98 -93 98 -94 98 -95 98 -96 98 -97 98	-70									SAND	70-
-75 GRAY SOFT CLANSTRATE 75 -80 80 80 -75	È			2			с. 			•	
75 GRAV SOFT CLANSTRUE 75 75 80 76 80 77 80 78 80 79 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 70 80 <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1997 - B</td>	-										1997 - B
-80 80 -90 -10 -90 -10 -90 -10 -90 -10 -10 GRAY M. HARD SAN BURNE -10 -10	-75					ļ				<u> </u>	75-
-80 80 -70	Ł	GRAY SOFT CLAYSTONE									1
= 80 = 55 = 90 = 90	F									6	-
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-1/0 GRAY M. HARD SAN D37DNE -1/15 -1/20 -1/20	-								No.	5	-
-1/0 GRAY M. HARD SAN D37DNE -1/5 -1/0 -1/0 -1/0 -1/0 -1/0 -1/0 -1/0 -1/0	F				0				111		1
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Boreh	ole Number: <u>Keyspare</u>	STAT	ION WEST VA	LLEY	mP-21	Drilling Method: <u>H</u>	blow Stem Auger / Down Hole All Hama	ner Id/yy)
Boreh	ole Diameter: <u>12</u> inch	ies,	From <u>0</u> To	o <u>5</u>		Drilled By: <u>PA. Drilli</u>	ing - Chris Colter / Earl Dyc	
e ⁸⁶	<u>_8_</u> inch	ies,	From <u>5</u> To	0 <u>153</u>	,	Drillers License Nun	nber: 0406	
ai i.	Depth: 75	5 re	et (SIMIL):	26.7	(tt) Logged By: <u>S. C.</u> C	NIGTON - GAI LONSULTANTS, IN	<u> </u>
Deptn Dete S	i to Static Ground Wate	er Lev Jag	2mm	7 ، 2 اور (mr	$\frac{7}{2}$	$\frac{10}{10} \qquad County: Aemst$	inality: Alwas CREEK THUP.	
Dates	SWEIWeasured	. 00	Capitad	(111			ipanty. PLONCELER TOT	
Depth (Ft)	Lithologic Description	Plot	Water* Observations	No.	Rec**	Comments	Well/Piezometer Construction	(Ft)
- 120 	GRAY M. HARD SANDSTONE							120-
-125					ļ			175 —
	GRAY INTERBEDDED SHALL, STLTSTONE, SANDSTONE		я: 7				4"B Sch 40 PVC SCREEN	130-
- 135	SOME CARBONACEOUS STITUARS							135 -
[]140			£.				SAND	140
= -)45								145-
-150	2						(53.0	150
F -	BOSTOM OF BURTONE 152'						XXX CAVE IN XXXXXXX CAVE IN XXXXXX ADDITION OF BORING 153 FT.	
-,55	Control of Control 199						Bounda Concert 22	155-
-								_
El								
-								
							r:	
								_
-								
l	* ∑ Encountered G	roun	d Water 🔄	🖉 Con	nposite	e Static Water Level	** Recovered/Attempted	l



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			(#)	F	ORM 6R	Sheet 1 of 2 I.D. Number 300 837	
Poreh <i>r</i> fac Joreh Total Depth Date S	ole Number: <u>MP</u> ce Elevation (Ft/MSL): _ ole Diameter: <u>77/8</u> "i i Depth: <u>70</u> to Static Ground Wate SWL Measured: <u>9</u>	- 16 1064 nches, Fra nches, Fra r Level (SV 122/93	、 27 27 27 27 27 27 27 27 27 27	To To(.3(nm/dd/y	Drilling Method: 7ft)Date Drilled: 97oDrilled By: 1.6Drillers License Nurft)Logged By: 5.6ft)County: 48mstryy)Township or Munic	7/8" Air Rotany (Truck Monsted) 22/93 (mm/dd/yy) Hetager nber: 1728 Gould ong ipality: <u>PLUM CREEK</u>	
Depth (Ft)	Lithologic Description	Plot Wa Obser	ter No. vations	Rec**	Comments	Well/Piezometer Construction (Ft)	
	Silty - Clay, Ten Sandstone, Tan		2				0
	Clayey Sandstone and shale, Tan/Gray Shale, gray				Highly viewthered		0
- - - - - - - - - - - - - - - 	Shele, grow Cool, Black Clayey Sandstone, Gro	2			medium 50ft To medium Hard		20
, , , , , , , , , , , , , , , , , , ,						0 30 30	3c
40	Classey sindle, Gray Sandstone, Gray	X			mediun Hand Hard	4° -	чс
- 20	Shald Block Clayer sondstore, gray Clayer siltstone, gray Clayer Sondstore 2800		- *		•)	50-	50
68	Sandstone, growy * V Encountered C	iround Wa	57.3 		te Static Water Level	** Recovered/Attempted	60

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			4		FOR	M 6R	Sheet 2 of 2 I.D. Number	
	a.						300 837	
nreh fac	ole Number:Mf	<u>- 16</u>	+ 27		(ft)	Drilling Method: 7	7/8" Air Rotary (Truck M	ounted)
doreh	ole Diameter: 778	inches,	From D	To		Drilled By: 1.6.1	tetager	սս/уу)
,		inches,	From	To		Drillers License Nun	nber: 1728	
Total	Depth:				(ft)	Logged By: <u>S.E.</u>	Gould	
Depth	to Static Ground Wat	er Level	(SWL): _5	7.3	(ft)	County: ARMS	TRONG	
Dates	SWL Measured:9	122/93		_(mm/	aa/yy)	i ownship or Munic	Ipality: <u>PLUM CREER</u>	
Depth (Ft)	Lithologic Description	Plat	Ground Water T servations	No. Re		Comments	Well/Piezometer Construction	Depti (Ft)
60	re L						<i>t</i> .	60
	Sand Stone, gray					540 -	N N	
			·····		- 		0	-
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-			282					_
	* 17 Encountered	Ground	Water 👿	Com	osite St	atic Water Level	** Recovered/Attempted	

Use additional sheets with this format as necessary

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Boreh	ole Diameter: <u>12</u> inch	es, F	From O To	5		Drilled By: <u>PA</u> , D	RELLENG -	-Chris	s Cola	ter / Earl Dye
\sim	<u> </u>	es, f	-rom <u>5</u> To	86	,	Drillers License No	imper:		04	
11	Depth:8	6 Fee	+		(ft) Logged By: <u>5.C.</u>	WI GTON	- GA.	LLON	
Depth	to Static Ground Wate	er Lev	rel (SWL): _	18.1	(ft) County: <u>Ara</u>	STRONG	. 0	,	1 Acres - 77 0
Date S	WL Measured:	14	2000	(mi	n/dd/y	ry) Township or Mun	истранту		Lum	CREEK TWP.
Depth (Ft)	Lithologic Description	Plot	Ground Water* Observations	<u>San</u> No.	Rec**	Comments	Well/	Piezo	mete	r Construction
	Kar		v				Activity of the second		7 28	CONT .
	YELLOW/BROWN SILT SOME CLAY, ORGANICS TOP TWO FEET.		0						1//// (Sec.2)	-CONCRETE 3.0 VOLCLAY CHI
- 5						5			All Will	4"& Sch. 4 "PVC Riser 9.5
10										13.0
/S						-				
D	GRAY SOFT CLAYSTONE (WEATHERD)					U.			CALCULAR DATE	
- 35										
	GRAY SILTY CLATSIONC			_				1947-22		4 ¹¹ Ø sch. PVC Sch
- 					ļ					
40		t t 1							HUHUHU S	
-									MDHHR	
				e.					NUMBER OF	
50 							-	1. Con	TATINATION DE CONTRACTOR	
55 	(CARBINACEOUS 54-55)								11111111111111111111111111111111111111	· • • • •
								1.1	111	

(mm/dd/yy)

Depth

(Ft)

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Boreh	ole Number: <u>KEYSTONE</u>	STAT	ION WEST VA	ULEY N	nP-23	Drilling Method: H	ULLOW STEM Augers / Down Hole Air Ham	mer [/yy)
Surfac	e Elevation (Ft/MSL):		rom () Tr	5	¹	Drilled By: Do Drilli	an- Chris Catter/Earl Dyc	
Boreh	ole Diameter: <u>Id</u> incl	ies, i	rom 5 Tr			Drillers License Nun	nber: 0406	
6	<u>_0</u> inci	ies, i	Cont	<u> </u>	(-	ft) Logged By: S.C.	WITGTON - GAT CONSULTANTS, INC.	
90 - B	Depth:	16	I CINILY	18 1	1 (ft) County: Admster	ak-	
Depth	to Static Ground Wall	er rev Fred	er (Swrite -	(mr	n/dd/	() Township or Munic	ipality: Plum CREEK TWP.	
Date S	WL Measured:	19 19	aao	_ (111	intuary			Denth
Depth _. (Ft)	Lithologic Description	Plot	Ground Water* Observations	No.	Rec**	Comments	Well/Piezometer Construction	(Ft)
60	GRAY SILTY CLAYSTONE		*					40
			4 2				4"ØSch,4Q PVC Screen	45
75	GRAY M. HARD SANDY SHALE						SAND	80
							TXXY CAND-IN XXXXXXXX CANE-IN XXXXXX	- 85'
(BOTTOM OF BORING 86.0 FORT	1					Bottom OF BARENG 86.0 Feat	
90	ac t							90
. ا ا			,					
-							2	
	* V Encountered	Grou	nd Water	V Co	mposi	te Static Water Level	** Recovered/Attempted	
-	<u>v</u> encountered							

Recycled Paper

Boreh	ole Number: <u>KEY57001</u>	<u>e Sta</u>	TION WEST N	IALLEY	MP-24	Drilling Method: <u>H</u>	LOLLOW STEM ANGER / DOWN HOLE ARE H	AMMER
Surfac	e Elevation (Ft/MSL):		š		(1	t) Date Drilled: <u>Jun</u>	<u>ve 22, 2000 (mm/</u>	аатуу)
Boreh	ole Diameter: <u>12</u> inch	nes, F	rom <u>0</u> To	o <u> 5 </u>		Drilled By: <u>PA. OR</u> T	UING - Chris Colter / Earl Dye	
1 march	<u>_8</u> inct	nes, F	rom <u>5</u> T	0 <u>112</u>		Drillers License Nur	mber: <u>0406</u>	
1 .1	Depth:	112 F	eet		(1	ft) Logged By: <u>S.C. (</u>	WIGTON - GAI CONSULTANTS. TA	<i>K</i> ,
Depth	to Static Ground Wate	erLev	el (SWL):	36.3	9(1	ft) County: <u>ARms</u>	TRONG	·
Date S	SWL Measured:	ne 28	,2000	(mr	n/dd/y	y) Township or Munic	cipality: <u>PLum CREEK TWP</u> ,	
Depth (Ft)	Lithologic Description	Plot	Ground Water* Observations	<u>Sam</u> No.	ples Rec** Att	Comments	Well/Piezometer Construction	(Ft)
	*						Protective Control Concrete Pad	
10	BROWN SILT TRACE ORCANICS	1					Coursere	
F	YELLOW/BROWN SILT SOME	1					3.0	
	CLAY I KALE MER I MILLS						VOLCLAY CHEPS	5_
-5	BROWN M. JOFT SILTSTONE	1	•••••	1				Ĩ
-		1					PVC Riser	
F							10.0	10-
- 10		1					Bertanite	
-			а С				13.0	-
- 15								15 -
-13			nd 1000-1001.38600000				16.0	
E .							「「「「「「「」」「「」」	
- 20	GRAY/BROWN M. HARD SILTSTOME	1						20-
F							SAND	
-	*							
E 25								. 25-
F								
-30	et.	E I					H"ØSch, 40	30 -
E							SEX POUNDER	
-	GRAY M. HARD CLAYSTONE	Î.		1				
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F	DK. GRAY M. HARD SILTY SHALE	1						
F,	SLIGHTY CARBONACEDUS							1-1-
-60		1						φ
<u> </u>	* V Encountered	Grour	nd Water	W Cou	mosit	e Static Water Level	** Recovered/Attempter	d
		JUQU	IG WYDICI	<u> </u>				

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urfac	e Elevation (Ft/MSL):			5 5	(ft)	Date Drilled:	TUNE 22. 2000 (MINT	au/y
oreh	ole Diameter: <u>12</u> inch	es, F	rom <u>0</u> 10	5		Driller Liconso N	lumber: 0406	
	<u> </u>	es, F	rom <u>ک</u> اد	<u> 112</u>	(++)		LITETIN - GAT CAMENITATION	TAK
, [Depth:	IId F	eet		(10)	Loggeu by. <u>5.c</u>	as trans	
)epth	to Static Ground Wate	er Lev	el (SWL):	36.39	(TT)	County: <u>AKA</u>	Distrolity: Plum (REEK THUP.	
ate S	WL Measured:	- 28 ,	2000	_(mm/	aa/yy)	I ownship or Mu	flicipanty: <u>100m dr 200</u>	TDe
epth. (Ft)	Lithologic Description	Plot	Ground Water* Observations	Sample No. R	25 20** 111	Comments	Well/Piezometer Construction	(F
-60	DK. GRAY M. HARD SELTY SHALE SLIGHTLY CARBONACEOUS		2					60
	GRAY M. SOFT CLAYSTONE							- 65
- 65	GRAY M. HARDCALCAREOUS CLAYSTONE							
	GRAY M. HARD SICTSTEINE						E SAND	- 70
- 70	Some CALCARGOUS BONES		8		1			1
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	GRAY HARD LIMESTONE	1	1	1 1				
- 105		.j					<u></u>	#
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-110		1					SE 11.0	~~ /
							RATTATOF BORTNE 112 FT.	<u>AA</u>
	BOTTOM UF BORING 112 FT.	1						
-115								···· /
8		1	1					
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Recycled Paper

(mm/dd/yy)

Depth (Ft)

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- 70 75

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..... 105

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