ATTACHMENT X
Groundwater Monitoring Plan

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Groundwater Monitoring, Sampling, and Analysis Plan

Virginia Electric and Power Company
Possum Point Power Station
Coal Combustion Residual Surface Impoundment Closures
Dumfries, Virginia

GAI Project Number: C150132.00

December 2015

Prepared by: GAI Consultants, Inc.
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Prepared for: Virginia Electric and Power Company
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1.0 Introduction

This Groundwater Monitoring Plan (GWMP) for Virginia Electric and Power Company d/b/a Dominion Virginia Power's (Dominion) Possum Point Power Station (Station), was prepared in accordance with Virginia (VA) Administrative Code (VAC), Chapter 81, Solid Waste Management Regulations (9 VAC 20-81-250). The GWMP is meant to serve as the primary reference for monitoring groundwater after closure of the onsite CCR surface impoundments. The GWMP is consistent with the requirements of the VA Solid Waste Management Regulations (VSWMR), and also incorporates provisions of the United States Environmental Protection Agency (USEPA) Rule on the Disposal of Coal Combustion Residuals from Electric Utilities (CCR Rule).

2.0 Groundwater Monitoring Program

2.1 Site Location and Information

The Station is a Steam-Electric Power Station located on a 650-acre site in Dumfries, VA. The Facility lies within Prince William County and adjacent to the western bank of the Potomac River and the northern bank of Quantico Creek, approximately 25 miles south of Washington, D.C. Figure 1 presents the site location on a portion of the United States Geologic Survey 7.5-Minute Quadrangle Map of Quantico, VA.

2.2 Description of the Uppermost Aquifer

2.2.1 Geologic and Hydrogeological Setting

2.2.1.1 Regional Geologic Setting

The site lies within the Atlantic Coastal Plain Physiographic province, approximately two miles east of the Fall Line, which marks the boundary of the Atlantic Coastal Plain and Piedmont Physiographic provinces. The coastal plain is an eastward thickening wedge of marine and fluvial sedimentary deposits unconformably overlying crystalline basement rock. These deposits are composed primarily of unconsolidated gravels, sands, silts, and clay, with variable amounts of shells.

2.2.1.2 Site-Specific Geologic Setting

Based on an evaluation of site boring logs, this area is underlain by six roughly definable geologic strata. A Cross Section through the site showing the relative positions of the strata is provided on Figure 2. Stratum A is locally present on hilltops and likely represents clay-rich in-situ soils. Stratum C and E are both characterized as high plasticity clays and are likely to act as localized barriers to downward migration of groundwater flow. Stratum B and D represent poorly sorted sands and likely contain and transmit groundwater that is perched on units C and E. Stratum B outcrops on the upgradient side of surface impoundment E and just downgradient of surface impoundment D and is, therefore, limited in its lateral extent. Stratum D is laterally continuous across the site and underlies surface impoundment D.

2.2.2 Topography/Surface Drainage

Regionally, the site is located in the Atlantic Coastal Plain Physiographic province. This province slopes gently seaward and is transected by a series of broad, seaward-facing terraces that trend north to south. Locally, the site is located 200 to 600 feet northeast of the Quantico Creek and drains towards the creek.

Surface impoundment D is located in an area of moderate relief with land surface elevations ranging from approximately 30 to 160 feet above mean sea level.

2.2.3 Regional Hydrogeology and Groundwater

The regional hydrogeologic framework of the Coastal Plain is described by eight major aquifers, eight major confining units and an uppermost water table aquifer. The framework has been developed based on lithologic and hydrologic characteristics of the geologic formations. Major flow boundaries for the Coastal Plain groundwater flow system are the Fall Line to the west, fresh water/salt water sources to the east and crystalline basement rock. Groundwater movement through the unconfined and confined aquifers is generally lateral with flow towards a variety of waterbodies including the Atlantic Ocean. Some groundwater movement also occurs vertically from confining units into deeper confining aquifers. Recharge of the Coastal Plain groundwater system occurs in the aquifer outcrop zones along the Fall Line, where precipitation and surface water can infiltrate into unconfined and confined aquifers. Regionally, vertical leakage through confining units to underlying confined aquifers is an important mechanism for groundwater recharge.

2.2.4 Uppermost Aquifer

In the Coastal Plain physiographic province, groundwater flow within the water table aquifer generally follows topographic contours. Groundwater in the area of surface impoundment D generally flows south towards Quantico Creek. As noted in the geologic description, Stratum D is a poorly sorted sand aquifer that is laterally continuous across the site and underlies surface impoundment D. It is perched on Stratum E, which is a high plastic clay aquiclude. Stratum D has, therefore, been identified as the uppermost aquifer onsite.

Within the uppermost aquifer, the topographic high areas are expected to be recharge areas and the topographic low areas are expected to be decompression areas. That is, groundwater is recharged in topographic high areas, then flows horizontally towards the topographic low areas, and flows as seeps, springs, or as baseflow into streams.

As shown on the 2004 Potentiometric Surface Map (Figure 3) the slope of the water table at surface impoundment D is to the south toward Quantico Creek and generally mimics the ground surface slope.

2.3 Ground Water Monitoring System

2.3.1 Proposed Groundwater Monitoring System

The proposed Groundwater Monitoring System for surface impoundment D is to consist of four existing and three proposed groundwater monitoring wells at the locations shown on Figure 4. The proposed limit of the area to be capped is shown on Figure 4 and as a result of the limits covering a larger area the number of wells in the Groundwater Monitoirng System had to be increased. The changes to the system include:

- Installing three new monitoring wells, including: a new upgradient well (UP-1) on the ridge along the east side of the site; a backup upgradient well (UP-2) also to the east of the site along the same ridge; and, a downgradient well on the west side of the site (DWN-1).
- Eliminating existing wells ED-15 and ED-24, the current upgradient wells, and ED-32, a downgradient well, from the system.
- Adding existing well ES-1, a downgradient well to the southwest of the site, to the system.

Well construction data for the existing and proposed monitoring wells is presented in Table 1. The available monitoring well borings and construction logs for the existing wells are included in Appendix A.

Table 1

Proposed Groundwater Monitoring System Well Construction Data

	Gradient Position	Ground Surface Elevation (ftmsl)	Top of Well Casing Elevation (ftmsl)	Well Depth (ftbgs)	Well Construction	Screened Interval (ftbgs)	Completion Date	Purge/ Sample Method
ED-1	**Downgradient**	**57.1**	**58.2**	**48.0**	**2" PVC**	**38 to 48**	**09/19/85**	**Well Wizard**
ED-3	**Downgradient**	**34.0**	**35.67**	**27.5**	**2" PVC**	**17.5 to 27.5**	**09/23/85**	**Well Wizard**
ED-9R	**Downgradient**	**77.8**	**80.44**	**80.0**	**2" PVC**	**70 to 80**	**12/07/00**	**Well Wizard**
ES-1	**Downgradient**			**28**	**2" PVC**		**12-26-84**	**Well Wizard**
UP-1	**Upgradient**	**200**	**202**	**190**	**2" PVC**	**180 to 190**	**Proposed**	**N/A**
UP-2	**Upgradient**	**195**	**197**	**185**	**2" PVC**	**175 to 185**	**Proposed**	**N/A**
DWM-1	**Downgradient**	**170**	**172**	**160**	**2" PVC**	**150 to 160**	**Proposed**	**N/A**

Notes:

1. Wells shown in bold text are proposed and all information for them is assumed.
2. ftmsl = feet below mean sea level.
3. ftbgs = feet below ground surface.
4. Well wizard = dedicated, in-well bladder pump powered by gas generator and air compressor.
5. N/A = not available.
6. PVC = polyvinyl chloride pipe.

The existing monitoring wells in Table 1 are included in the existing compliance monitoring well network for the site and will continue to be used for this purpose throughout the post-closure care period. These wells will be operated and maintained in accordance with 9 VAC 20-81-250.A, so that they perform to their design specifications throughout the life of the monitoring program.

Samples withdrawn from the Facility's monitoring wells should be clay- and silt-free; therefore, wells may require redevelopment from time to time based upon observed turbidity levels during sampling activities. If redevelopment of a monitoring well is required, it will be performed and documented in a manner similar to that used for a new well.

2.3.2 Procedures for Drilling New Monitoring Wells

Monitoring wells will be installed in non-sampled boreholes that will be advanced using rotary drilling techniques. The borehole will have a minimum diameter of six inches in both unconsolidated materials and in rock.

2.3.2.1 Equipment Decontamination

If decontamination of drilling equipment is necessary during the monitoring well installation work, the following methods will be employed:

- Heavy Equipment: Drilling equipment, including auger flights, drill rod, water swivels, casing materials, wrenches, drill rigs, and other heavy equipment may be cleaned prior to drilling at each location by use of steam cleaning apparatus. In the event that tar or other material is so persistent that steam cleaning is ineffective, then sand blasting or kerosene may be used to remove the material and steam cleaning will follow. Decontamination fluids, soils, and materials shall be collected and disposed of in accordance with applicable regulations.
- Sampling Equipment: Sampling equipment (split spoons, Shelby tubes etc.) used to collect soil samples during drilling shall be decontaminated between each sample as follows:
- scrub sampling device with a non-phosphate, low sudsing detergent (e.g., Liquinox);
- rinse thoroughly with tap water;
- rinse a minimum of three times with distilled water;
- air dry; and
- dispose of decontamination fluids in accordance with applicable regulations.

2.3.2.2 Description of Drilling Fluids

Drilling fluids will consist of water and/or compressed air. Water used as drilling water will originate from a potable source and air will be forced through a filter prior to being placed in the borehole.

2.3.2.3 Soil and Rock Sampling Techniques

Each of the previously drilled sampled boreholes was advanced to top of rock using hollow stem augers or casing that was advanced with rotary drilling techniques. Continuous soil samples were collected using a two-inch diameter split barrel soil sampler that was advanced in conjunction with standard penetration testing. Continuous high quality rock core samples were collected from top of rock to the finished depth of each borehole using water as a drilling fluid. All boreholes are logged throughout their entire length. The soils are classified in accordance with the Unified Soil Classification System and the rock was classified in accordance with standard practice.

2.3.3 Procedures for Installing New Monitoring Wells

2.3.3.1 Construction Materials

Construction materials will consist of:

- two-inch diameter threaded and flush-jointed PVC screen and riser pipe;
- locking protective steel covers (minimum three-inch diameter and minimum five feet long);
- inert silica sand;
- bentonite pellets, chips, and/or high solids bentonite grout; and
- concrete.

Each of these materials will be used during well construction as described below. They have been selected based on function and durability and they are considered state of practice for monitoring wells installed at similar facilities.

2.3.3.2 Casing and Screen Type

The monitoring wells will be constructed of two-inch-diameter threaded and flush-jointed PVC screen and riser pipe. The screen will have a maximum length of 10 feet and it will have 0.01-inch machined slots. The base of the screen will be fitted with a threaded PVC cap. The slot size has been selected to accommodate the filter pack to be placed in the annular space. These materials are normally used in this type of construction and no degradation due to intense well development is expected. It is understood that any non-functioning well will be replaced and/or abandoned.

2.3.3.3 Filter Pack

The filter pack will consist of inert silica sand and it will be of sufficient size to prevent large quantities of the filter pack material from entering the well through the screen slots.

2.3.3.4 Grouting Procedure

A hydrated bentonite pellet seal will be placed in the annular space above the sand pack and it will have a minimum thickness of four feet. Grout/bentonite slurry or bentonite chips will be placed in the annular space above the bentonite pellet seal to within four feet of the surface. Any grout that is placed in the well annulus will be placed from the bottom-up by pumping the grout into the annulus through a tremie pipe.

2.3.3.5 Surface Completion and Protective Measures

At the surface, a locking protective steel casing that has a minimum diameter of three inches and a minimum length of five feet will be placed over the PVC casing should extend a minimum of three-feet below the ground surface. Concrete will be placed above the annular seal materials and it will extend into a surface apron that has the nominal dimensions of two-feet by two-feet by four-inches thick. The concrete will be placed around the locking protective cover and it will be finished to slope away from the well's casing.

2.3.3.6 Dedicated Sampling Equipment

All of the wells are to be fitted with dedicated Bladder pumps. Wells equipped with dedicated bladder pumps operate by applying intermittent gas pressure to a bladder in the sampling device, forcing water to the surface through a discharge line.

2.3.4 Well Survey Methods

Upon completion of monitoring well installation, the ground surface and top of casing will be surveyed for x, y and z coordinates. These measurements will be within ± 0.5 feet on the horizontal plane and ± 0.01 feet vertically. The survey will be completed using a permanent and established benchmark and/or a global positioning system and will be conducted by a licensed or otherwise certified land surveyor.

2.3.5 Well Development

New wells will be developed to remove particulates that are present in the well casing, filter pack, and adjacent aquifer matrix due to construction activities so that natural hydraulic conditions are restored and representative formation water quality samples can be obtained. Development of new monitoring wells will be performed at least 24 hours after well construction. In low permeable bedrock or unconsolidated formations, turbidity is used as a preliminary indicator parameter of successful well development and completion. The well

development process is deemed complete as the well begins to yield a visually clear water sample and pH and conductivity stabilize within approximately 10 percent over the last two measurements in the well bore. All monitoring wells are tested for hydraulic characteristics (hydraulic conductivity), static water levels and for the field parameters of turbidity, temperature, pH and specific conductivity prior to water quality sampling.

Wells may be developed with disposable PVC bailers, a well development pump, or other approved method. Conventional monitoring wells are generally developed by pumping. A well development pump is raised in increments across the screened interval and pumped at the highest sustainable yield until a visually clear sample is produced. In general, a minimum of 10 casing volumes are removed. If there is insufficient yield or insufficient water depth, the well is allowed to recover before it is subsequently pumped or bailed repeatedly.

Samples withdrawn from the Facility's monitoring wells should be clay- and silt-free; therefore, wells may require redevelopment from time to time based upon observed turbidity levels during sampling activities. If redevelopment of a monitoring well is required, it will be performed and documented in a manner similar to that used for a new well.

2.3.6 Well Abandonment Procedures

The following abandonment procedures for all piezometers and groundwater wells will be followed:

1. VA Department of Environmental Quality (VDEQ) approval will be obtained prior to the removal of any well(s) from the active monitoring program.
2. The depth to water shall be measured and recorded. The sampling device (if any) shall be removed from the well.
3. A "dummy" probe shall be used to measure the depth of the well and note any obstructions within the well bore.
4. The depth of the well as measured by the "dummy" probe shall be compared to the recorded depth on the well log.
5. The well shall be grouted with bentonite-cement grout slurry and emplaced by a tremie pipe starting at the bottom of the hole. The entire length of the well bore shall be grouted to grade elevation. As an alternative, the well may be abandoned by pumping the well to dryness and placing bentonite pellets by hand. The pellets shall be hydrated in increments so that the entire well bore is filled. If bridging should occur and cannot be dislodged then the well shall be over-drilled its entire depth and the boring shall be grouted its entire depth.
6. The casing protector and casing shall be cut off at grade elevation.
7. The date of well abandonment shall be noted on the well log. The well log shall be retained on file until surface impoundment D is released from its post-closure monitoring requirements.
8. Well abandonment will be certified by a qualified groundwater professional within 30 days of well abandonment, and submittal of the documentation to VDEQ will occur within 14 days of certification.

The following abandonment data will be on file with the facility:

- surveyed well location;
- type and purpose of well abandonment;
- well abandonment method;

- well ID;
- copy of the well installation boring log;
- replacement materials used (quantities and placement methods); and
- name and address of firm performing abandonment.

2.3.7 Documentation

All information required to be recorded during monitoring well construction will be recorded in the field by a technician that monitors the drilling and installation procedure. Within 30 days of installation, monitoring wells will be certified by a qualified groundwater professional. This certification along with boring and construction logs for newly installed permitted wells shall be submitted to VDEQ within 14 days of certification. The information will, at a minimum, include the following:

- date/time of construction;
- drilling method and drilling fluid used;
- bore hole and well casing diameter;
- casing materials;
- screen materials and design;
- casing and screen joint type;
- screen size/length;
- filter pack material, size, and grain size analysis (D10);
- filter pack volume calculations;
- filter pack placement method;
- sealant materials (percent bentonite);
- sealant volume (pounds per gallon of cement);
- sealant placement method;
- surface seal design and construction;
- well development procedure;
- type of protective well cap;
- "as built" well diagram including dimensions;
- well location, specified to within 0.5-foot in horizontal plane;
- well depth, specified to within 0.01-foot;
- ground surface elevation, specified to within 0.01-foot;
- surveyor's pin elevation on concrete apron, specified to within 0.01-foot;
- top of monitoring well casing elevation, specified to within 0.01-foot;
- top of protective steel casing elevation, specified to within 0.001-foot; and
- drilling and lithologic logs.

2.3.8 Certification

Within 14 days of well completion, a letter prepared by a qualified groundwater scientist will be forwarded to VDEQ that acknowledges that the monitoring wells have been installed in accordance with this GWMP. Documents prepared during well installation will be attached to the letter.

2.4 Groundwater Analytical Parameters

As noted previously, this GWMP is being prepared for the post-closure period following closure of the onsite CCR surface impoundments. The VDEQ provided the parameter list to be used for surface impoundment D groundwater monitoring shown in Table 2.

Table 2

Parameter List and Groundwater Protection Standards for Groundwater Monitoring at Pond D

Common Parameter Names[1]	Groundwater Protection Standards
Alkalinity[2]	**Background**
Antimony[3]	**6 parts per billion (ppb)**
Arsenic	**10 ppb**
Barium	**2,000 ppb**
Beryllium	**4 ppb**
Boron	**Background**
Cadmium	**5 ppb**
Calcium	**Background**
Chloride	**Background**
Chromium	**100 ppb**
Cobalt	**Background**
Copper	**1,300 ppb**
Cyanide	**200 ppb**
Iron	**Background**
Fluoride	**Background**
Hardness	**Background**
Lead	**15 ppb**
Lithium	**Background**
Manganese	**Background**
Mercury	**2 ppb**
Molybdenum	**Background**
Nickel	**Background**
pH	**Background**
Radium 226/228	**5 picocuries per liter**
Selenium	**50 ppb**
Silver	**Background**
Sodium	**Background**
Sulfate	**Background**
Sulfide	**Background**
Thallium	**2 ppb**
Tin	**Background**
Total Dissolved Solids	**Background**
Total Organic Carbon	**Background**
Vanadium	**Background**
Zinc	**Background**

Notes:

1 Common names are those widely used in government regulations, scientific publications, and commerce; synonyms exist for many chemicals.

2 Unshaded parameters are from VADEQ.

3 Shaded parameters are from CCR Rule.

3.0 Groundwater Sampling and Analysis Plan

This GWMP includes consistent sampling and analysis procedures that are protective of human health, safety, and the environment, and ensure an accurate representation of groundwater quality data. Sampling and analysis procedures employed in the groundwater monitoring network shall be in accordance with USEPA-approved methods.

3.1 Background Monitoring

A minimum of eight independent samples shall be collected from each upgradient and downgradient compliance well utilizing the existing compliance sampling network during the background sampling period. The background sampling events will be performed approximately quarterly to account for both seasonal and spatial variability in groundwater quality for the constituents noted in Table 2. The background concentrations will be determined using data collected during the background sampling events from the upgradient monitoring wells described in Table 1, Section 2.3. Additionally, downgradient wells may also be monitored during these events.

Background monitoring will commence within 90 days of certifying surface impoundment D closure is complete and conclude two years from commencement.

After establishing Facility background concentrations as described above, the facility will enter into the Modified Assessment Monitoring Program.

3.2 Modified Assessment Monitoring Program

This Modified Assessment Monitoring Program (AMP) is designed to identify the presence and concentration of Table 2 constituents in the uppermost aquifer beneath the Facility, and to determine if those constituents are derived from the CCR unit(s). Components of the AMP, including analytical requirements, sampling frequency, and data evaluation are discussed in the following sections.

The AMP will involve purging and sampling the compliance monitoring wells for analysis of the Table 2 parameters within 180 days of triggering the AMP. Within 90 days of obtaining the results from the initial AMP sampling event, and on at least a semi-annual basis (once every 180 days plus or minus 30 days) thereafter during the active life and the post-closure period, Dominion will resample the compliance network wells and analyze for the Table 2 parameters. Required analytical methods and associated PQLs for these parameters are presented in Appendix B.

The proposed Groundwater Protection Standards (GPS) for the Facility will be developed based on the following criteria:

- For constituents for which a Maximum Contaminant Levels (MCL) has been promulgated under Section 1412 of the Safe Drinking Water Act (40CFR Part 141), the MCL for that constituent (the current MCLs are shown in Table 2);
- For constituents for which MCLs have not been promulgated (labeled as BKG in Table 2) , the background concentration, as approved by VDEQ, and established from the upgradient wells; or

- For constituents for which the background level is higher than the MCL, the background concentration, as approved by the VDEQ.

Table 2 contains numerical values for the GPS based upon the current MCLs. The numerical values for the other parameters in Table 2 and for any MCL values for which the background levels are higher than the current MCLs will be determined once the background levels have been established.

After each monitoring event, the Table 2 constituents detected in the downgradient compliance wells will be evaluated as follows:

- To determine if a release from the CCR unit(s) has occurred, the groundwater monitoring results will be compared to Facility background levels and the GPS;
- If no statistical exceedances over background are identified in any downgradient well for the Table 2 constituents, monitoring will continue under the AMP, with the sampling and analysis results reported with the statistical evaluation results in a semi-annual monitoring report to be submitted to the VDEQ within 120 days of completing the laboratory analyses for the sampling event;
- If there is a statistical significant increase (SSI) over the Facility-specific background concentrations in any downgradient well and the concentration is less than the Facility-specific GPS for that constituent, Dominion will notify the VDEQ of this finding in accordance with the VSWMR;
- If there is a SSI over the Facility-specific background concentration and the constituent-specific GPS for one or more constituents, Dominion will notify the VDEQ of the potential GPS exceedance within the VSWMR-required timeframe, and either notify the VDEQ that an Alternative Source Determination (ASD) will be submitted within the VSWMR-required timeframe, request to enter into a 12-month compliance agreement with the VDEQ to allow the collection of additional samples to perform a trend analysis, or move forward with the groundwater Corrective Action Program as described under 9 VAC 20-81-260.

3.3 Alternate Source Determination

Dominion may make an ASD to demonstrate that a source other than the CCR unit caused the contamination, or that a statistically significant detection or GPS exceedance resulted from an error in sampling procedures, analysis, statistical procedures, or natural variation in groundwater quality. The ASD will be submitted to the VDEQ for approval within 90 days of confirming the GPS exceedance (or longer as approved by VDEQ) to avoid advancing into the Corrective Action Program.

If the ASD is approved by the VDEQ, Dominion may continue with the AMP. If the ASD is not approved by the VDEQ, Dominion will continue to implement the AMP and initiate the Corrective Action Program if a GPS has been exceeded. The 90 day timeframe for submittal and approval of the ASD may be extended by the VDEQ at the request of Dominion.

3.4 Sample Collection

3.4.1 Static Water Level

The static water level will be measured in each groundwater monitoring well prior to purging and sampling. Well depth at the time of purging will be obtained from well construction data. An electronic water level measuring device will be used to determine the depth to standing water of each well. The measurement device will be decontaminated after each use to

prevent cross contamination between wells. All measurements will be recorded on the field sampling forms.

3.4.2 Well Evacuation

3.4.2.1 Well Purging and Sample Withdrawal

The monitoring wells in the network will be sampled using a micropurge technique. Low-flow purging, also referred to as low-stress purging, low-impact purging, minimal drawdown purging, or Micropurging®, is a method of well purging/sampling that does not require large volumes of water to be withdrawn. The term low-flow refers to the fact that water enters the pump intake with a low velocity. The objective is to minimize drawdown of the water column in the well, avoid disturbance of the stagnant water above the well screen, and draw fresh water through the screen at a rate that minimizes sample disturbance. Usually, this will be a rate less than 500 ml/min and may be as low as 100 ml/min. Once drawdown stabilizes, the sampled water is isolated from the stagnant water in the well casing, thus eliminating the need for its removal (Powell and Puls, 1993).

The goal in a Micropurging Technique is minimal drawdown (less than about four inches) in the well. To accomplish the goal, begin pumping the well at the lowest practical pumping rate for the dedicated equipment and check the water level periodically. Increase the pumping rate until the drawdown the discharge is sufficient for sampling and the drawdown is minimal. Once the drawdown has stabilized, begin monitoring temperature, pH, specific conductance and turbidity as indicator parameters at three to five minute intervals. Purging is completed when the indicator parameters have stabilized, which is determined based upon three relatively consistent readings over three to five-minute periods. The three successive readings should be within plus or minus 0.1 for pH, three percent for specific conductance, and 10 percent for turbidity (or a NTU value under 10). In some instances, the indicator parameters may not all stabilize in a reasonable period of time for sample collection. Such an occurrence is normally monitoring-well specific and after some history has been developed with the method and the wells, a determination of the well idiosyncrasies can be established. However, as provided in USEPA guidance, if stability has not been achieved after four hours of purging, a sample should be collected and the attempts to reach stabilization documented. While every effort should be taken to attain stabilization of all parameters prior to sample collection, pH, turbidity, and a stable drawdown of the well should be the primary indicator parameters of concern regarding stabilization.

Any measurements taken should be recorded on a Field Log or in the Field Book to document steady-state flow conditions during the purge. Sampling personnel will containerize and dispose of purge water generated during sampling activities in the Pond D permitted underdrain collection discharge or by another approved means.

3.4.2.2 Well Sampling Procedure

Each well will be sampled at the time when purging has been completed. Sampling will be conducted with the dedicated pump running at the same rate as it had been for the well purging utilizing a micropurge technique. Parameters to be analyzed for are listed in Section 2.4, Table 2.

Parameter specific appropriate sample bottles (polypropylene or glass) of sufficient quantity shall be pre-preserved using the preservatives outlined in Federal Register 40 CFR Part 136. In order to ensure that sample containers are free of contaminants, clean sample containers will be obtained directly from the laboratory for all wells, field blank and field duplicate. Water samples will be collected directly into the sample containers at afilling rate that minimizes

sample aeration and volatilization. Sample containers will be filled to their design capacity and promptly sealed. Sample containers will be labeled with appropriate identifying information (location, date, time, condition, preservative, etc.), and each sample will be logged on the field sampling sheets at the time of collection.

The appropriate parameters will be placed on ice, as necessary, and transported to the laboratory in appropriate sealed coolers and/or crates by the technicians in a manner that prevents breakage and/or cross-contamination. If the coolers are shipped via overnight mail, each sample cooler will be secured using strapping tape and custody seals to ensure that samples are not disturbed during transport. The Chain-of-Custody will be provided to the laboratory upon sample delivery.

3.4.3 Sampling Containers, Equipment, Supplies and Handling

3.4.3.1 Sample Containers

All sample containers must be new or pre-cleaned using standard cleaning protocols. Sample containers may be glass or plastic depending upon the particular constituent to be analyzed. Sample containers will be prepared in a laboratory setting prior to field activities including the necessary preservative. Care will be taken to not overfill or rinse sample bottles that contain preservative.

3.4.3.2 Sampling Equipment

All measurement, sampling, and analytical devices will be operated and maintained to perform to design specifications throughout the life of the groundwater monitoring program.

The list of equipment needed to fulfill the requirements of this GWMP includes, but is not limited to:

- portable air compressor and electric generator;
- pump controller;
- crescent wrench;
- squirt bottle;
- static water level meter;
- disposable sampling containers;
- water quality meter(s) which measure stabilization parameters (temperature, pH, conductivity, and turbidity);
- sample containers with preservatives and labels;
- cooler with ice;
- chain-of-custody forms;
- distilled water;
- field notebook with data sheets and pen; and
- calculator.

3.4.4 Sampling Order

In the event that non-dedicated sampling equipment would need to be used during sampling, the order in which the monitoring wells should be sampled on site would be determined based on groundwater gradient (upgradient to downgradient).

3.4.5 Sampling Measurements

Temperature, pH, specific conductance, and turbidity measurements will be made in the field before sample collection as a check on stability of the water during the purging and sampling period.

3.4.6 Decontamination and Calibration Procedures

All equipment used for purging and sampling that is neither disposable nor dedicated will be thoroughly decontaminated before and after use at each well to prevent the introduction of contaminants into the well and to allow for the collection of representative groundwater samples.

The following equipment will be used for decontamination:

- tap water;
- distilled water and de-ionized water;
- sprayer;
- five-gallon pails;
- non-phosphate detergent (laboratory grade);
- nylon scrub brushes;
- paper towels;
- trash receptacle;
- plastic sheeting; and
- disposable gloves.

The following steps will be used to decontaminate equipment between samples:

- wash and scrub equipment with non-phosphate detergent (laboratory grade);
- tap water rinse;
- distilled and deionized water rinse; and
- dry with paper towel.

Sample personnel will use and change disposable single use gloves (latex or nitrile) between wells and sampling points.

The sampling equipment will be calibrated per manufacture recommendations. If a procedure other than that recommended by the manufacturer is used for calibration, the procedure will be documented and included as part of this plan. The water quality meters will be calibrated prior to every sampling event. Equipment used for well purging and sample collection and analysis may change due to malfunction of existing equipment or the purchase of more efficient and advanced equipment.

3.5 Sample Preservation and Handling

3.5.1 Preservation, Handling and Chain-of-Custody

The following sample handling and Chain-of-Custody procedures will be used to document strict Chain-of-Custody from sample collection through data management to ensure the production of accurate results. The field sampling team will be responsible for sample custody from sample collection and preparation for transport, to mailing by overnight delivery or hand delivery to the laboratory. An example Chain-of-Custody (chemical analysis order - Laboratory Services) is included in Appendix C.

The laboratory reports will typically include the following information:

- chain-of-custody documentation;
- analytical results;
- Quality Assurance/Quality Control (QA/QC) results;
- field duplicate results; and
- field blank results.

3.5.2 Sample Labels

Each bottle shall be labeled in such a manner to provide information about: sample identification number; sample collection date, time, and place; sampler's initials; parameters to be analyzed. Labels shall be attached to the bottles securely so that they will not become detached during transport to the laboratory. The writing must be legible and indelible.

3.5.3 Sample Seal

When being shipped, a seal will be placed on the sample container to ensure that the samples were not tampered with during shipment.

3.5.4 Field Logbook

The QA/QC program includes the use of a field notebook. A record of the appearance of sample, odor, date of sampling, names of personnel sampling, , purge rate, field parameters, and other pertinent information shall be kept in a field notebook. The Field Notebook Data Sheets and records of sampling and analysis are kept for a minimum of three years. An example of a blank Field Notebook Data Sheet is included in Appendix C.

3.5.5 Chain-of-Custody Record

All protocol for collecting samples including using proper and adequate labeling and maintaining a correct and complete Chain-of-Custody will be followed. A Chain-of-Custody form shall be prepared which documents the Chain-of-Custody from the person taking the samples to the laboratory doing the analyses. See Appendix C for an example of a Chain-of-Custody Form.

3.5.6 Laboratory Analytical Procedures

All analyses will be performed at a VA certified laboratory. The sampler is responsible for measuring and recording static water levels in all groundwater wells and piezometers; and analyzing all wells for turbidity, pH, specific conductance, and temperature. Specific Conductance, temperature, pH, and static water levels are measured in the field.

The analytical procedures used will be USEPA approved methods in accordance with the most recent USEPA-approved version of SW-846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods Manual. For parameters not included in the SW-846, methods of analysis shall be taken from the most recent USEPA approved edition of Standard Methods, applicable ASTM International standards, or Methods for Chemical Analysis of Water and Wastes (EPA 600/4-79-020).

Laboratory detection limits and holding times vary depending upon the parameter being analyzed. Standard laboratory procedures are followed in determining the detection limits. The detection limits will be below the MCL for those parameters that have set MCLs.

3.6 Field and Laboratory QA/QC

3.6.1 Field QA/QC Program

Field QA/QC samples will be collected during each sampling event to verify the soundness of sample techniques, Chain-of-Custody, and the results of chemical analysis. The field QA/QC samples to be collected during each sampling event include the following types of samples:

- Duplicate Samples: One duplicate sample will be collected to check field and laboratory analytical accuracy. Duplicate samples are two separate samples taken from the same well at the same time. One field duplicate sample will be collected during each sampling event. The duplicate sample will be analyzed for the same parameters as its associated sample.

3.6.1.1 Submission of Trip Blank

A trip blank will be analyzed during each routine sampling event during which analysis is conducted for volatile organics. A trip blank will be prepared before entering the field. Containers will be filled with analyte-free deionized water, preserved and sealed. Containers will remain closed in the field. The blank will be taken into the field and handled along with collected samples. The blank will be analyzed for the same parameters as the monitoring wells.

3.6.2 Field Blank Laboratory QA/QC Program

One field blank sample will be collected during each sampling event. The field blank will be analyzed for the same parameters as samples collected. Field and laboratory quality control procedures shall be employed at all stages. Methods of analyzing for each parameter shall also be in accordance with the most recent methods in 40 CFR Part 136. Equipment used shall be calibrated routinely as recommended by the manufacturer.

Records of all analysis as well as copies of log book field data and Chain-of-Custody records shall be retained throughout the life of the facility and post-closure period and available upon request. The lab will use a method blank on at least five percent of the samples, prior to analysis. Analysis of prepared standards of known concentration shall be used to confirm the validity of the analysis.

Any commercial laboratories hired must exercise a QA/QC program that meets or exceeds that noted in the most current version of 40 CFR Part 136 methods.

3.7 Establishing Background

A minimum of eight independent samples shall be collected from each upgradient and downgradient compliance well during the background sampling period. The background sampling events will be performed approximately quarterly to account for both seasonal and spatial variability in groundwater quality. The samples will be analyzed for the Table 2 constituents specified above. The background sampling will commence within 90 days of certifying Pond D closure is complete and conclude two years from commencement. The background concentrations will be determined using data collected from the upgradient monitoring wells.

3.8 Techniques for Evaluating Groundwater Quality Data

3.8.1 Reporting of Low and Zero Values

Low and zero values will be reported as less than (<) the Method Detection Limit (MDL) reported by the laboratory. When these censored values are to be used in a calculation, they will be replaced by a concentration equal to one-half of the MDL.

3.8.2 Missing Data Values

If a sampling event results in missing values or concentrations, a re-sampling event shall take place. The re-sampling event will occur within the same compliance period and as close to the date of the original sampling as possible.

3.8.3 Outliers

The background dataset for each well will be screened for the existence of outliers using a method described by the USEPA or within VAC. Background observations that are considered outliers will not be included in the statistical analysis to preserve the power of the test to detect an actual release from the facility. If an outlier or extreme value is detected during a compliance sampling event, Dominion will collect a confirmatory sample (i.e., re sample) during the same compliance period to enable the facility to distinguish between an outlier and an indication of a release from the facility. If the results of the confirmatory sample show that the original result is an outlier, both results will be reported. The outlier will be reported as an outlier and it will not be an indication of a release. An attempt will be made to explain the cause of the outlier. If the confirmatory sample indicates that the original value is not an outlier, both results will be reported. In all situations, all data and all corrections to the data will be reported and documented in reports submitted to the VDEQ.

3.8.4 Statistical Tests

The following summarizes the methodology used for statistical analyses:

- Historical concentrations for background wells (inter-well) are compiled and screened for outliers using methods by Dixon (1953) for data sets less than 25 and for data sets larger than 25 or Rosner's Outlier Test (which follows the procedure described by Gilbert (1987). If statistical outliers are detected, they will be removed from the baseline dataset prior to statistical analysis.

Please note, analytical concentration between the MDL and the Practical Quantification Limit (PQL) will be noted in reports by "J" flagging. The result is, therefore, an estimated value without the required level of accuracy or precision to be considered quantifiable.

- Determination of the appropriate method for upper prediction limit (UPL) analyses will be determined based on the percent non-detects (%ND) for the data set and its distribution:
  - Datasets with 25 percent or less NDs - NDs of a data set will be replaced with one-half the PQL and then the data set will be tested for normality or lognormality. The parametric UPL approach will be used for normal or lognormal data sets. A non-parametric approach will be used for non-normal or non-lognormal data sets;
  - Datasets with %ND between 25 percent and 50 percent - the mean standard deviation of a data set will be adjusted using Aitchison's or Cohen's adjustments, and then the data set will be analyzed for normality or lognormality. The parametric UPL approach will be used for adjusted normal or lognormal data sets. A non-parametric UPL approach will be used for non-normal or non-lognormal data sets;
  - Data sets with %ND greater than 50 percent - these data sets will be considered non-parametric and, therefore, the non-parametric UPL approach will be used; and
  - 95 percent Prediction Interval Analysis will be performed.

3.8.5 Verification Sampling

In the event that Statistical Analysis of the test data identifies potential statistically significant increases in one or more parameters, the well or wells of concern will be re-sampled within 30 days of the completion of statistical analysis. Verification sampling must be performed within the same compliance period as the event being verified. Verification sampling shall be performed in accordance with the VDEQ "Data Analysis Verification Guidelines for Solid Waste Facilities Operating in VA." Verification sample(s) will be analyzed for the parameter or parameters of concern. If the verification sample remains statistically significant, then statistical significance will be considered verified and must be reported to the VDEQ within 14 days. If the verification sample is not statistically significant, then no statistical significance will be recorded for the monitoring event.

In accordance with the VSWMR, the operator may demonstrate that a source other than the CCR unit(s) caused the detection of a constituent or parameter at a concentration above Facility background, or that a statistically significant detection resulted from an error in sampling procedures, analysis, statistical procedures, or natural variation in groundwater quality. The ASD must be submitted to and approved by the VDEQ within 90 days of confirming the statistical exceedance, unless an extension for good cause is granted by the VDEQ.

3.8.6 Records and Reports

The field equipment calibration records, field sampling sheets, Chain-of-Custody, and analytical data will be maintained at Dominion.

3.9 Statistical Analysis of Subsequent Data

3.9.1 Comparison with Subsequent Well Data

The statistical tests used to evaluate the comparisons, including treatment of outliers, missing data, data below detection limits or quantification limits and treatment of non-normally distributed data, shall be performed in accordance with the version of the VDEQ "Data Analysis Guidelines for Solid Waste Facilities" in effect at the time of statistical analysis of the data.

At least annually, the permittee shall evaluate the data on static groundwater surface elevations to determine whether the requirements for locating the monitoring wells continue to be satisfied. If the evaluation shows that the requirements of the groundwater monitoring system are no longer satisfied, the permittee shall notify VDEQ for approval to immediately modify the number, location, or depth of the monitoring wells to bring the groundwater monitoring system into compliance with that requirement.

3.9.2 Required Response Actions

In accordance with 9VAC20-81-250.C.3(e) and modified based upon the use of the Table 2 parameters, the following actions will be taken for evaluating groundwater on a semi-annual basis:

- If Statistical Analysis indicates SSIs for the upgradient (background) wells, the concentrations will be reported in the Facility's Semi-Annual And Annual Report submission and the facility will remain in detection monitoring;
- If Statistical Analysis does not show SSIs for downgradient wells, the concentrations will be reported in the Facility's Semi-Annual And Annual Report submission and will remain in detection monitoring; and

- If Statistical Analysis reveals an SSI over Facility background or each well's background, the Facility will notify the Department within 14 days of noting the exceedance. The notification will indicate whether Dominion intends to initiate an AMP within 90 days, or prepare and submit an alternate source determination to the VDEQ for approval within 90 days, or longer as approved by VDEQ.

3.10 Groundwater Elevation Data Evaluation

The permittee shall determine the elevation of the groundwater surface at each well each time groundwater is sampled to the nearest 0.01-foot. Groundwater level measurements are to be made within a 24-hour period. A potentiomentric map based on one of these monitoring events shall be submitted to the VDEQ each year. The rate and direction of groundwater flow shall be determined and submitted with the Annual Groundwater Report. Additional potentiometric maps may need to be submitted in some cases, i.e., if seasonal or other variations in the groundwater surface are encountered.

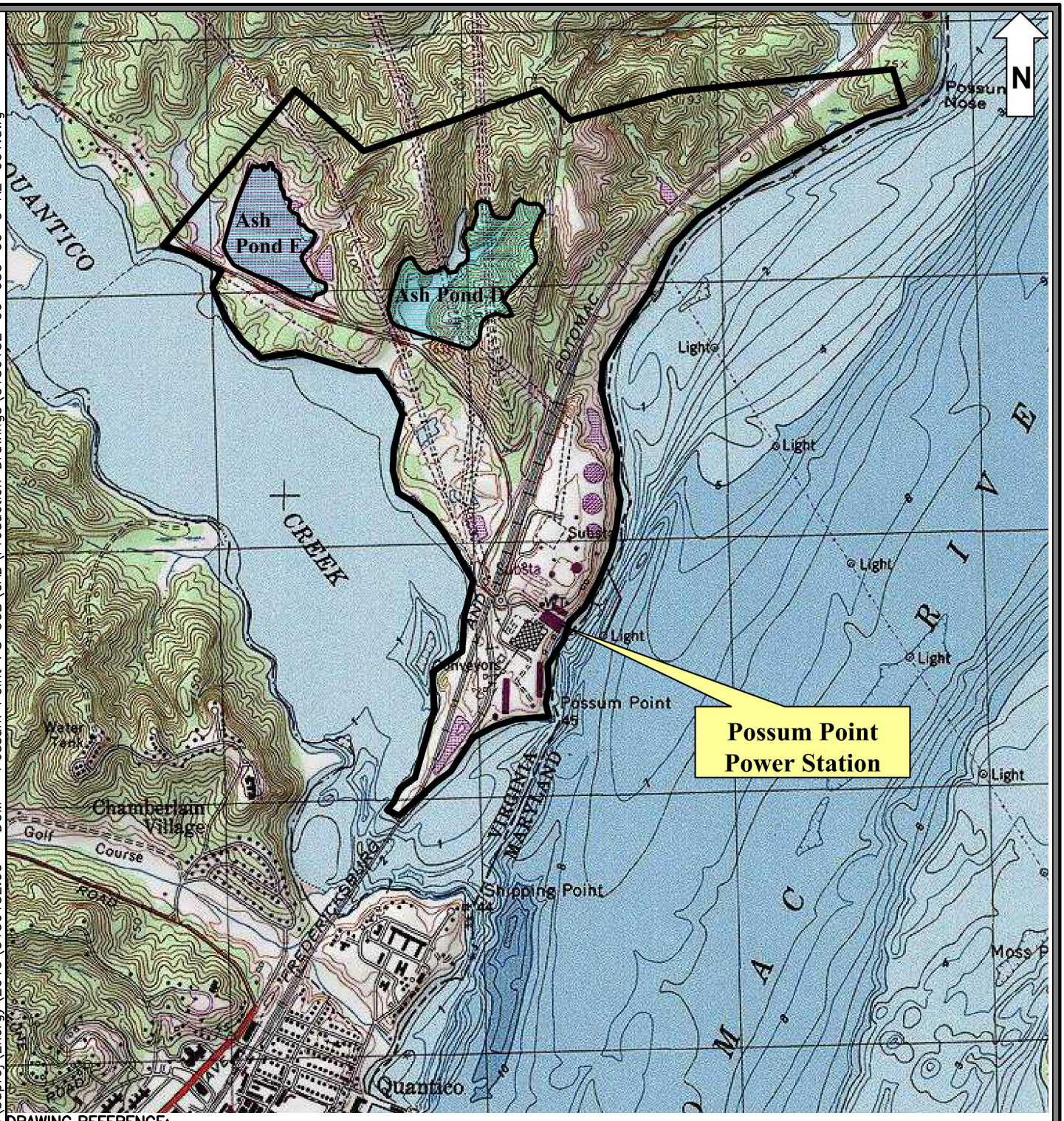
3.11 Recordkeeping and Reporting

The permittee shall retain all monitoring, testing, and analytical data obtained throughout the active life of the facility and the post-closure period.

The permittee shall report to the Director on a semi-annual and an annual basis, each calendar year:

- The concentrations or values of the parameters for each monitoring well along with appropriate evaluations required; and
- The results of the evaluation of groundwater surface elevations as required and a description of the response to these evaluations, where applicable. The results of the evaluation of the groundwater quality assessment program, to include, but not necessarily limited to, the calculated or measured rate of migration of solid waste constituents in groundwater during the reporting period.

FIGURES



DRAWING REFERENCE:
LOCATION MAP PROVIDED BY BY URS CORP. FIGURE 1 FACILITY LOCATION MAP DATED JULY 2004

DRAWING TITLE		GAI DRAWING NUMBER:	
FACILITY LOCATION MAP		**FIGURE 1**	
PROJECT		GAI FILE NUMBER:	
POSSUM POINT POWER STATION **COAL COMBUSTION BY-PRODUCT POND CLOSURES** **PRINCE WILLIAM COUNTY, VA**	gai consultants	**C150132-00-053-00-C-A2-001**	
		DRAWN BY:	CHECKED BY:	APPROVED BY:
		NEIMAJC	**KUZMKMW**	**TURKARJ**
CLIENT		SHEET NO.:	SCALE:	ISSUE DATE:
DOMINION **GLEN ALLEN, VA**		**1 OF 1**	**AS SHOWN**	**09/14/2015**

ISSUING OFFICE: Murrysville | 4200 Triangle Lane, Export, PA 15632-1358

PLOTTED ON: 9/14/2015 2:03:51 PM PLOTTED BY: Martin Kuzmkowski PLOT FILE: GAI.stb

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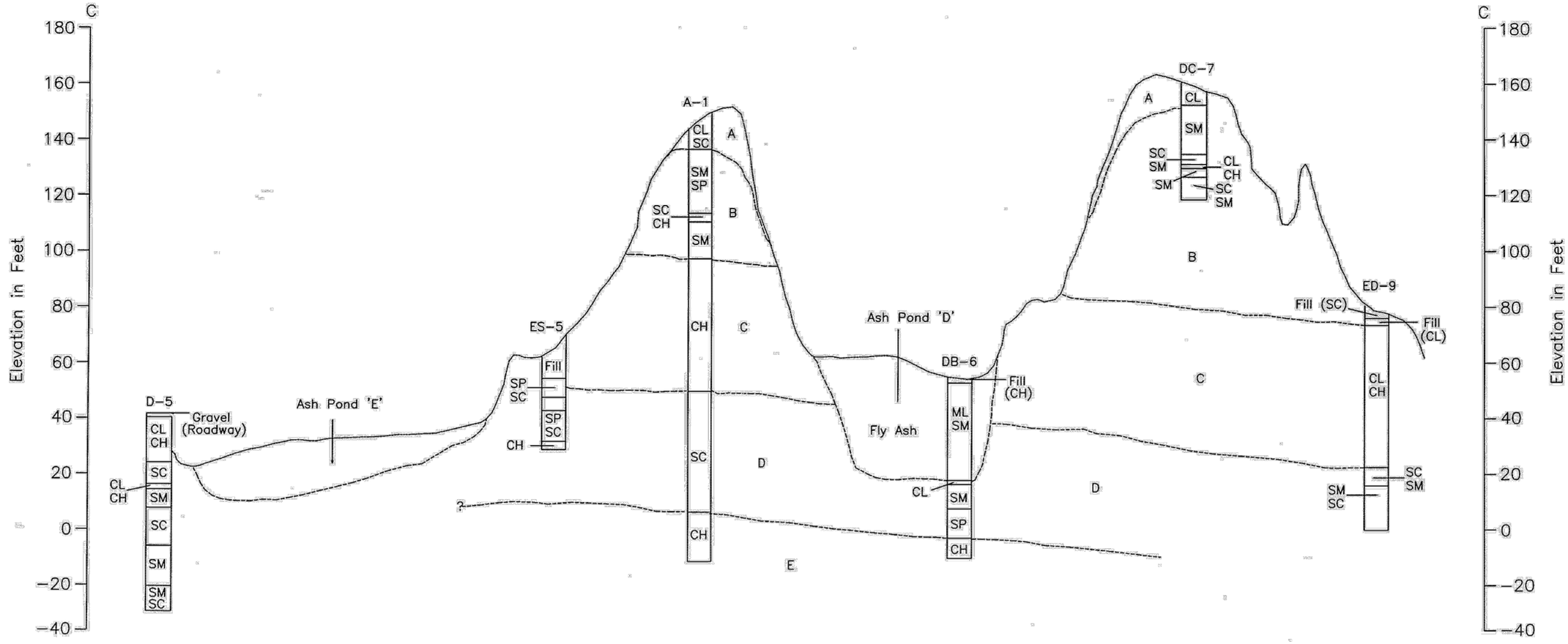

DRAWING REFERENCE:
SECTION PROVIDED BY URS CORP./TAC, FIGURE 2 POSSUM POINT POWER STATION ASH PONDS D&E GROUNDWATER MONITORING PLAN DATED DEC. 2001

NO.:	DATE:	DWN:	CHK:	APV:	DESCRIPTION:

REVISION RECORD

DRAWING TITLE
GEOLOGIC CROSS SECTION

PROJECT
POSSUM POINT POWER STATION
COAL COMBUSTION BY-PRODUCT
POND CLOSURES
PRINCE WILLIAM COUNTY, VA

gai consultants

CLIENT
DOMINION
GLEN ALLEN, VA

DRAWN BY:	CHECKED BY:	APPROVED BY:
NEIMAJC	KUZMKMW	TURKARJ
REVISION A/0	SCALE: AS SHOWN	ISSUE DATE: 09/14/2015
	SHEET NO.: 1 OF 1	

GAI FILE NUMBER:
C150132-00-053-00-C-B2-001
GAI DRAWING NUMBER:
FIGURE 2

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GAI CAD FILE PATH: \\gaiconsultants.local\buproj\Energy\2015\C150132.00 – DOM – Possum Point PS CCB\CAD\Production Drawings\C150132–00–053–00–C–B2–001.dwg

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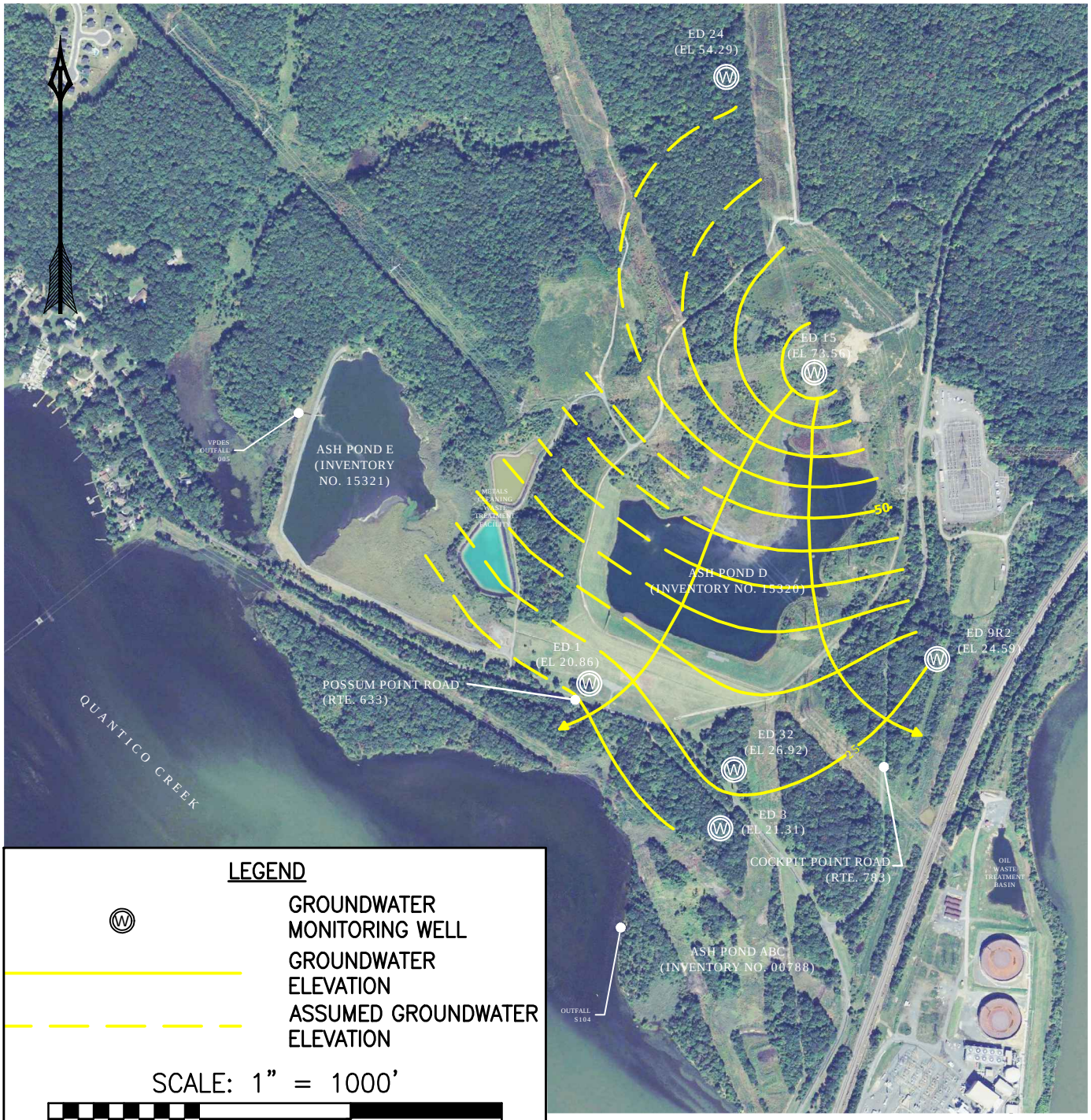

DRAWING REFERENCE:
POTENTOMETRIC SURFACE FROM URS CORP. FIGURE 3-6
GROUNDWATER POTENTIOMETRIC MAP DATED JULY 2004

DRAWING TITLE	GAI DRAWING NUMBER:
GROUNDWATER POTENTOMETRIC SURFACE MAP - 2004	**FIGURE 3**

PROJECT

POSSUM POINT POWER STATION
COAL COMBUSTION BY-PRODUCT POND CLOSURES
PRINCE WILLIAM COUNTY, VA

CLIENT

DOMINION
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GAI FILE NUMBER: **C150132-00-053-00-C-A2-005**

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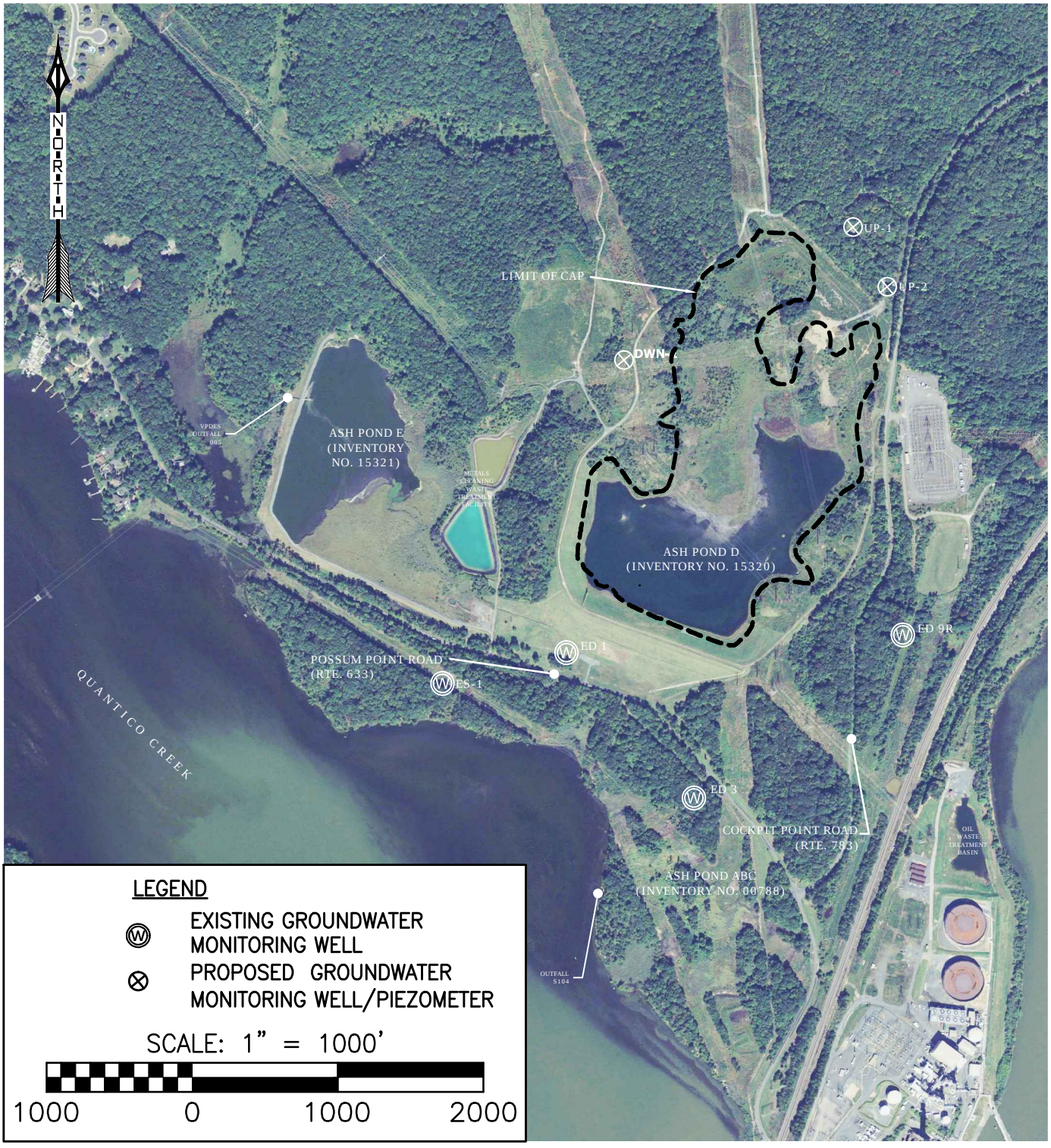

DRAWING TITLE

PROPOSED GROUNDWATER MONITORING SYSTEM

GAI DRAWING NUMBER: **FIGURE 4**

PROJECT

POSSUM POINT POWER STATION
COAL COMBUSTION BY-PRODUCT POND CLOSURES
PRINCE WILLIAM COUNTY, VA

CLIENT

DOMINION
GLEN ALLEN, VA

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GAI FILE NUMBER: **C150132-00-053-00-C-A2-006**

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APPENDIX A
Boring and Monitoring Well Logs

gai consultants
transforming ideas into reality®

Form No. 500

BORING LOG

FROEHLING & ROBERTSON, INC.
FULL SERVICE LABORATORIES • ENGINEERING CONSULTANTS
"ONE HUNDRED YEARS OF SERVICE"
1881

Report No. M-55-227

DATE November 14, 1985

Client: Virginia Power

Project: Possum Point Ash Pond D Expansion

Boring No.: ED-1 | Total Depth: 50.5' | Elevation: 57.1 | Location: N 322715.0 E 2346800.8

Type of Boring: Hollow Stem Auger | Started: 9-19-85 | Completed: 9-19-85 | Driller: England

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	Sample Blows	Sample Depth (Feet)	Well Pipe	Back Fill
57.1	0.0					
56.6	0.5	NOTE (1)	2			
		Medium-Dense Brown Silty Fine SAND, Some Clay	4 8	1.5		
54.1	3.0	(SC-SM)				
		Red-Brown Silty CLAY, Trace Fine Sand & Shell Fragments		4.0		
52.1	5.0	(CL)	9 8 17	5.5		
				7.0		
			17 20 21	8.5		
		Medium-Dense to Dense Brown Fine		9.0		
		SAND, Trace to Some Silt, Trace	18 24 24	10.5		
		Clay & Shell Fragments				
		(SM)				
				14.0		
			16 16 19	15.5		
					SOLID	GROUT
				19.0		
			10 13 17	20.5		
33.1	24.0					
		Dense Gray & Brown Silty Fine to Medium SAND, with Pockets of Clay & Gravel		24.0		
			10 13 21	25.5		
30.1	27.0	(SM)				
		Medium-Dense to Dense Brown Fine		29.0		
		to Medium SAND, Trace Clay	13 16 16	30.5		30.0 Ben-tonite 33.0
		(SP-SC)				
				34.0		
			14 12 14	35.5		
20.1	37.0					
		Hard Green Gray Fine Sandy CLAY		38.0		
				39.0	SCREEN	SAND
17.1	40.0	(CH)	11 16			

REMARKS
Page 1 of 2

GROUNDWATER DATA

Water Stood @ 47.0' with 49.0' of Auger in the Ground.

Water Stood @ 40.0' & Cave-in was @ 47. Upon Auger Removal.

10.0' of 2" Diamete 0.010 Slotted PVC Well Screen was Set @ 48.0'.

NOTE (1)
Brown Silty Fine t
Medium SAND, with
Organic Matter
(Topsoil)

WATER LEVEL IN OBSERVATION WELL

Top of Pipe at Elevation 58.5

Date	Depth	Elev
9-19-85	40.0'	

*No. of blows req'd. for a 140 lb. hammer dropping 30 in. to drive 2 in O.D. 1.375 in I.D. sampler a total of 18 inches in three 6 in. increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

Scale 1"=5' unless otherwise no

BORING LOG

FROEHLING & ROBERTSON, INC.
EARTH SCIENCE LABORATORIES • ENGINEERING CHEMICAL
"ONE HUNDRED YEARS OF SERVICE"
1881

Report No M-55-227 DATE November 14, 1985

Client Virginia Power

Project Possum Point Ash Pond D Expansion

Boring No ED-1 Cont. | Total Depth 50.5' | Elevation 57.1 | Location N 322715.0 E 2346800.8

Type of Boring Hollow Stem Auger | Started 9-19-85 | Completed 9-19-85 | Driller England

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	Sample Blows	Sample Depth (Feet)	Well Pipe	Back Fill	REMARKS
17.1	40.0		17	40.5			Page 2 of 2
		Medium-Dense to Dense Brown Fine to Medium SAND, Trace Clay (SP-SC)	8 13 16	44.0 45.5	SCREEN	SAND	GROUNDWATER DATA
				48.0			
			7 13 20	49.0 50.5			
6.6	50.5	Boring Terminated @ 50.5'					

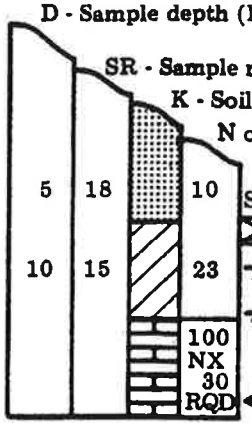
No. of blows required for a 140 lb. hammer dropping 30 in. to drive 2 in O.D. 1 3/8 in I.D. sampler a total of 18 inches in three 6 in. increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

Scale 1"=5' unless otherwise

LAW ENGINEERING TEST BORING RECORD

ELEV.	STRATUM DEPTH	VISUAL SOIL DESCRIPTION	D	SR	K	N or CR/RQD	REMARKS
25.6	0.0						
	0.2	TOPSOIL					
	2.0	Very loose gray-brown silty fine SAND (SM), some roots	1	7		3	
		Firm tan medium SAND (SP-SC), trace fine gravel and clay	3.5	18		15	
20	5.7						
	7.0	Firm tan organic silty medium SAND (SM), little fine gravel	6	16		18	
		Firm gray-tan fine sandy CLAY (CL), trace mica	8.5	18		6	
15	10.5						
		Firm gray-tan clayey coarse SAND (SC), little fine gravel	11	18		10	
	12.5						
		Firm gray mottled clayey fine to medium SAND and GRAVEL (SC-GC)	13.5	12		13	⏤ 14.0'
	14.0						
10		Firm gray-tan clayey medium SAND (SC), wet	16	18		10	
			19.5	18		10	
5	20.5						
		Firm gray silty fine SAND (SM), trace clay	21	18		21	
	22.0						
		Dense gray-tan fine to medium SAND (SC) some clay and silt					
0			26	15		41	
	29.0						
		Very stiff green-gray coarse sandy CLAY (CL)					
- 5			31	18		22	
	31.5						
		Boring Terminated @ 31.5', 12-27-85					
-10							NOTE: Monitoring well installed 16 to 28 feet, bentonite seal 13 to 16 feet.

D - Sample depth (Ft.)



SYMBOLS:
- Undisturbed Sample
- Water level, time of drilling
- Water level
- C Caved depth of boring
- Loss of Water

N - Penetration in blows per foot (ASTM D-1586)

CR - % core recovery; NX or BX designates bit size (ASTM D-2113)

RQD - Rock Quality Designation

BORING NUMBER ES-1 PP1

DATE DRILLED 12-26-84

JOB NUMBER W4-4744

VEPCO ASH PONDS
POSSUM POINT POWER STATION
DUMFRIES, VIRGINIA

PIETENPOL & ROBERTSON, INC.
SOIL SERVICE LABORATORIES • ENGINEERING CHEMICAL
"ONE HUNDRED YEARS OF SERVICE"
1881

Report No M-55-227

DATE November 14, 1985

Client Virginia Power

Project Possum Point Ash Pond D Expansion

Boring No ED-3 | Total Depth: 40.5' | Elevation: 34.0 | Location N 322177.6, E 2347701.9

Type of Boring Hollow Stem Auger | Started: 9/23/85 | Completed: 9/23/85 | Driller England

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	Sample Blows	Sample Depth (Feet)
34.0	0.0	Medium-Dense Brown & Gray Silty Fine to Medium SAND, with Clay (SC)	5 7 9	1.5
31.0	3.0	Stiff to Very Stiff Gray Fine Sandy CLAY (CL)	5 7 9	4.0
				5.5
			5 9 11	6.0
				7.5
26.0	8.0	Medium-Dense to Dense Brown & Gray Fine to Medium SAND, Little Clay (SC)		9.0
			5 12 21	10.5
				14.0
			5 7 9	15.5
				19.0
			7 12 19	20.5
				24.0
			5 12 22	25.5
				29.0
			10 14 31	30.5
1.0	33.0	Very Dense Gray Clayey Fine to Medium SAND (SC)		34.0
			7 25 50	35.5
				39.0
			10 30 40	40.5
6.5	40.5	Boring Terminated @ 40.5'		

Well Pipe	Back Fill
	GROUT
SOLID	
9.0	9.0
	Bentonite
17.5	13.0
SCREEN	
27.5	SAND

REMARKS

GROUNDWATER DATA

10.0' of 2" Diameter 0.010 Slotted PVC Well Screen was Set @ 27.5'

WATER LEVEL IN OBSERVATION WELL

Top of Pipe at Elevation 36.1

Date	Depth	Elev.
9/23/85	22.2'	13.9

No. of blows required for a 140 lb. hammer dropping 30 in. to drive 2 in O.D. 1 3/8 in I.D. sampler a total of 18 inches in three 6 in. increments. The sum of the last two increments of penetration is termed the standard penetration resistance, N.

Scale 1"=5' unless otherwise noted

BORING LOG/WELL CONSTRUCTION DIAGRAM (Page 1 of 2)

Identification:		Location: Possum Point Power Station	Project No.: 95058.36
Drilling Contractor: Fishburne		Name of Logger: Martin Harris	Date: December 7, 2000
Type: HSA	Total Depth: ~80 ft	Screen/Casing Type: 0.010 Slot 2" PVC	Screened Interval: 80' to 70'

Sample Description				Well Construction Detail
Sample ID. Depth, feet	Blow Counts	Recovery (inches)	Description of Material	Depth
0-2	2-3-4-4	18	Brown sandy SOIL.	0'
3-5	3-3-3-5	18	Brown sandy SOIL.	
8-10	3-4-6-9	24	Gray-green and brown CLAY.	
13-15	5-6-8-12	24	Gray-green and brown CLAY.	
18-20	4-7-10-13	24	Gray-green and brown CLAY.	
23-25	5-8-11-11	24	Gray-green and brown CLAY.	
28-30	10-16-14-25	24	Gray-green and brown CLAY.	
33-35	8-16-17-21	24	Gray-green and brown CLAY.	
38-40	12-15-20-27	24	Gray-green and brown CLAY.	

Notes:

1. PVC Well Riser set in locked metal riser cover in formed concrete pad.

WELL LEGEND

- PVC Riser
- PVC Screen
- Cement Grout
- Bentonite
- No. 2 Morie Sand

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Identification:	ED-9R	Location:	Possum Point Power Station	Project No.:	95058.36
Drilling Contractor:	Fishburne	Name of Logger:	Martin Harris	Date:	December 7, 2000
Type: HSA	Total Depth: ~80 ft	Screen/Casing Type:	0.010 Slot 2" PVC	Screened Interval:	80' to 70'

Sample Description				Well Construction Detail
Sample ID. Depth, feet	Blow Counts	Recovery (inches)	Description of Material	Depth
43-45	10-18-16-31	24	Gray-green and brown CLAY.	
48-50	15-21-24-40	24	Gray-green and brown CLAY.	
53-55	12-20-28-31	24	Gray-green and brown CLAY.	
58-60	11-18-22-22	24	Gray-green medium to fine SAND.	
Water at ~59'				61'
63-65	11-18-25-30	24	Gray-green coarse SAND.	65'
68-70	12-21-40-50/4"	22	Gray-green coarse SAND.	70'
73-75	16-27-40-45	24	Gray-green medium to fine SAND.	
78-80	20-28-50/3"	15	Gray-green fine SAND.	80'

Notes:

1. PVC Well Riser set in locked metal riser cover in formed concrete pad.

WELL LEGEND

- PVC Riser
- PVC Screen
- Cement Grout
- Bentonite
- No. 2 Morie Sand

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Soil Boring Log

PROJECT INFORMATION		DRILLING INFORMATION	
ROJECT:	**Dominion - Possum Point Power Station**	DRILLING CO.:	**Parratt Wolff, Inc.**
TE LOCATION:	**Dumfries, Virginia**	DRILLER:	**Kevin White, George Martincic**
)B NAME:	**Possum Point Well Installation**	RIG TYPE:	**Diedrich Drill Rig**
)GGED BY:	**Kevin Goerger**	METHOD OF DRILLING	**Hollow-stem Auger**
:OJECT MANAGER:	**Montgomery Bennett**	SAMPLING METHODS:	**Soil cuttings; 5 foot intervals**
ATES DRILLED:	**9/12/2006**	HAMMER:	**None**
)REHOLE NO.:	**ED-24R**	TOTAL DEPTH:	**63**
)TES:	Overcast & 65 degrees F	▼ Water level in completed well	NM = Not measured

EPTH	SOIL/ROCK SYMBOLS	SOIL DESCRIPTION	PID	WELL CONSTRUCTION	NOTES
0		TOPSOIL	0.0		GES hand cleared to 4 feet below ground surface
-5		Red and brown fine grained SAND with some SILT, loose, dry	0.0		Well construction: 10 feet of 2" 10-slot schedule 40 PVC and 53' of 2" schedule 40 riser. 3' stick-up protective riser with 2' diameter circular concrete well pad.
10		Red and brown fine grained SAND with some SILT, loose, dry	0.0		
15		Brown fine grained SAND with some SILT, loose, dry	0.0		
20		Brown fine grained SAND with some SILT, loose, dry to 23', wet after 23'	0.0		
25 ▼		Brown fine grained SAND and SILT, sticky, moist	0.0		
30		Brown medium grained SAND and SILT, sticky, moist	0.0		
35		Brown medium to fine grained SAND, loose, wet	0.0		
40		Brown medium to fine grained SAND, loose, wet	0.0		
45		Brown medium to fine grained SAND, loose, wet	0.0		
50		Brown medium to fine grained SAND, loose, wet	0.0		
55		Brown medium to fine grained SAND, loose, wet	0.0		
60		Brown medium to fine grained SAND, loose, wet	0.0		
		Brown CLAY, firm, wet			

APPENDIX B
Analytical Methods and Practical Quantification Limits, Table 2 Parameters

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Methods and Practical Quantification Limits,
Table 2 Parameters

Parameters	Method	PQL
Alkalinity	ASTM D1067-06	5
Antimony	EPA 200.8	0.001
Arsenic	EPA 200.8	0.001
Barium	EPA 200.7	0.01
Beryllium	EPA 200.7	0.001
Boron	EPA 200.7	0.05
Cadmium	EPA 200.8	0.0002
Calcium	EPA 200.7	0.1
Chloride	EPA 300.0	1
Chromium	EPA 200.7	0.01
Cobalt	EPA 200.8	0.0005
Copper	EPA 200.7	0.05
Cyanide	EPA 335.4	0.005
Iron	EPA 200.7	0.2
Fluoride	EPA 300.0	0.1
Hardness	EPA 200.7	1
Lead	EPA 200.8	0.001
Lithium	EPA 200.7	0.01
Manganese	EPA 200.7	0.005
Mercury	SM 3112B	0.0002
Molybdenum	EPA 200.7	0.02
Nickel	EPA 200.7	0.01
pH	SM 4500 H+B	0
Radium 226/228	EPA 903.1/ EPA 904.0	1/1
Selenium	EPA 200.8	0.001
Silver	EPA 200.7	0.005
Sodium	EPA 200.7	0.2
Sulfate	EPA 300.0	2
Sulfide	SM 4500-S2-D	0.1
Thallium	EPA 200.8	0.0002
Tin	EPA 200.7	0.1
Total Dissolved Solids	SM 2450C	20
Total Organic Carbon	SM 5310C	0.5
Vanadium	EPA 200.7	0.005
Zinc	EPA 200.7	0.01

Note: Units are milligrams/liter except for pH, which is S.U. and radium, which is in picocuries/liter.

APPENDIX C
Examples of Groundwater Monitoring Sampling Forms

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Form C1
Static Water Level Data Sheet

Well ID	Date	TOC Elevation	Depth to SWL	SWL

Date: _____ **Sampler:** _____

Form C2
Example Groundwater Monitoring Field Notebook Data Sheet
Possum Point

POSSUM POINT GROUNDWATER SAMPLING
Follow Low Flow sampling protocol

INFORMATION

well # _____
date _____
sampled by _____

MEASUREMENT

	a) well depth _____	benchmark elevation	_____
PVC	b) depth to water _____	b) depth to water	_____
	standing water _____	Groundwater elevation	_____

(subtract b from a to get standing water)

Field Readings Stabilization = 3 consecutive readings pH ± .1 Cond ± 3% turb ± 10%

Time	Drawdown	Temperature (°C)	Conductivity (µS/cm)	pH	Turbidity (NTU)

BOTTLES

	Bottle	**Volume**	**type**	**Lab**	**preservative**
Filtered					
Unfiltered					

CLOSURE

Equipment decon _____
WELL LOCKED _____

Purge volume	low flow	**Well Condition**	Check indicates satisfactory condition
Pumping Rate		condition of protective casing	
time well purged		condition of outer casing	
IMISCIBLE LAYER	y n	condition of locking cap and lock	
EQUIP. DECON	y n	condition of protective pad	
Weather/Field Observations		condition of survey benchmark	
		condition of surrounding area	
		evidence of contamination	y n

Form C3
Example Chain-Of-Custody Form

CHAIN OF CUSTODY RECORD

PROJECT NO.							PROJECT NAME							
SAMPLERS: (SIGNATURES)							PROJECT CONTACT NAME/TELEPHONE No.							
MONITORING POINT NO.	SAMPLE MATRIX	DATE	TIME	COMPOSITE	GRAB	No./TYPE OF CON-TAINERS	REQUESTED ANALYSES							REMARKS
Relinquished by: (signature)			Date/Time			Received by: (signature)					Date/Time			
Relinquished by: (signature)			Date/Time			Received by: (signature)					Date/Time			
Relinquished by: (signature)			Date/Time			Received by Laboratory: (signature)					Date/Time			

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