Via Federal Express

August 6, 2019 Project No. 2018-3854

Maryland Department of the Environment
Solid Waste Operations Division
1800 Washington Boulevard
Baltimore, MD 21230

Attn: Ms. Martha Hynson/.Mr. Kassa Kabede

RE: REVISED PHASE II APPLICATION and RESPONSE TO COMMENTS LETTER
CHESAPEAKE TERRACE RUBBLE FILL
ANNE ARUNDEL COUNTY, MARYLAND

Dear Ms. Hynson and Mr. Kabede:

On behalf of National Waste managers, Inc., Advanced GeoServices Corp, a Montrose Environmental Group company (AGC/Montrose), is pleased to submit two (2) copies of the attached Revised Phase II Application for the Chesapeake Terrace Rubble Landfill located in Anne Arundel County, Maryland. This application is being submitted pursuant to the renewed activity at the project and to address your June 2019 comments to our April 2019 submission. One CD-ROM is also attached with the document in pdf format.

To aid you in your review, we are including a version of the text in redline-strikethrough format and a version of the Figures in 11x 17 format.

We appreciate your continued open dialogue throughout this process, to discuss nuanced aspects of this application and technically appropriate changes that AGC/Montrose proposed. Should you have any questions, or need additional information, please do not hesitate to contact me.

Very truly yours,

ADVANCED GEOSERVICES CORP,
a Montrose Environmental Group company

Veronica E. Foster, P.E.
Senior Project Consultant

Attachment

cc: Mr. Steve Fleischman, NWM

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PHASE II PERMIT APPLICATION
HYDROGEOLOGIC REPORT FOR
CHESAPEAKE TERRACE RUBBLE LANDFILL



PREPARED FOR:

National Waste Managers, Inc.
2900 Linden Lane
Silver Spring, MD 20910

PREPARED BY:

ADVANCED GeoServices
a Montrose Environmental Group company

1878 Marlton Pike East, Suite 10
Cherry Hill, NJ 08003

PROJECT No. 2018-3854 **JULY 2019**

PHASE II PERMIT APPLICATION
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EXECUTIVE SUMMARY

National Waste Managers, Inc. proposes to reclaim approximately 117.5 acres, formerly used for sand and gravel mining, with an engineered state-of-the-art rubble landfill that will provide air space for Anne Arundel County rubble waste disposal for approximately 15 years. The site consists of a 480-acre parcel located near Odenton, Maryland, as shown on Figure 1. The proposed landfill footprint is approximately 140 acres, as shown on Figure 3.

The landfill is proposed to have 16 cells, to allow sequential development. The landfill cells will be lined with a state-of-the-art, low permeability liner system to block leachate (water which contacted the waste) from contacting groundwater. Each cell will be equipped with a leachate collection and removal system, which will convey the leachate through a force main to one of the on-site leachate storage tanks.

As the landfill achieves filling grades, the closure cap will be constructed. By constructing the closure cap as grades are achieved, leachate is reduced and the cap area can manage stormwater through the series of terraces, downchute, perimeter channels; culverts, and stormwater retention basins.

While there is a general movement in stormwater management to promote infiltration, in the case of landfills, infiltration of stormwater through the waste is undesirable. However, the on-site stormwater controls will attenuate peak runoff rates, so as not to increase the runoff rate discharge leaving the site.

The geology of the site has been defined by field investigations during which the drilling and logging of sixty-two (62) soil borings to depths as great as 280 feet and installation of monitoring wells in thirty-nine (39) of the borings. The locations of the borings and wells are shown on Figure 4. Boring and well logs are provided in Appendix E for historical borings and Appendix F for SFI borings. A summary of the monitoring wells construction is provided in Table 1.

The Chesapeake Terrace site is regionally located in the Coastal Plain Physiographic Province in the outcrop area of the Patapsco Formation. Both sand and clay facies of the Potomac Group occur in the vicinity of the site according to the Geologic Map of Anne Arundel County (Glaser, 1976). This group includes the Patapsco Formation. Based on the information obtained during the field investigations, the hydrogeologic conditions in and around the site are complex. Simplistically, the site is location where these two hydrogeologic formations meet, defined as Area A and Area B, with transitions areas between them.

Monthly water level measurements in the on-site monitoring wells were conducted over four periods:

- Sept 1989 – August 1990
- August 2002 – November 2003
- May 2013 –June 2014
- November 2018, January, 2019 & February 2019

The wells were installed over the course of 30 years, and groundwater level readings were taken in the accessible wells in existence at the time of data collection. As wells were constructed, they were added to the list of wells being measured. Over time, several wells have been damaged and no new water level readings have been taken. The Well locations are shown on Figure 4 and depth to groundwater field measurements are shown on Table 3.

To establish existing condition of the groundwater quality, four consecutive quarters of groundwater samples were collected and analyzed for:

- Volatile Organic Carbons (VOCs),
- Metals,
- Chloride,
- Nitrate,
- Phosphate,
- Total Dissolved Solids (TDS),
- Sulfate,
- Total Alkalinity,
- Ammonia,
- Chemical Oxygen Demand (COD), and
- Hardness

Generally, the existing groundwater was good with the exception of some exceedances of Arsenic, Cadmium, and Chromium above the Maximum Contaminant Level (MCL).

This Phase II Hydrogeologic Report provides more detailed description and information regarding the on-site hydrogeologic conditions.

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1.0 INTRODUCTION

This Phase II Application - Hydrogeologic Report (Report) is being submitted in support of the proposed Chesapeake Terrace Rubble Landfill to be located along Patuxent Road in Odenton, Anne Arundel County, Maryland. This project is being developed by National Waste Managers, Inc. (NWM). This Report is the culmination of information compiled since the conception of the project in 1989 and has involved multiple environmental consultants, legal proceedings, and re-interpretations.

1.1 GENERAL PROJECT DESCRIPTION

National Waste Managers, Inc. proposes to reclaim approximately 117.5 acres, formerly used for sand and gravel mining, with an engineered state-of-the-art rubble landfill that will provide air space for Anne Arundel County rubble waste disposal for approximately 15 years. The site consists of a 480-acre parcel located near Odenton, Maryland, as shown on Figure 1. The proposed landfill footprint is approximately 140 acres, as shown on Figure 3.

The landfill is proposed to have 16 cells, to allow sequential development. The landfill cells will be lined with a state-of-the-art, low permeability liner system to block leachate (water which contacted the waste) from contacting groundwater. Each cell will be equipped with a leachate collection and removal system, which will convey the leachate through a force main to one of the on-site leachate storage tanks.

As the landfill achieves filling grades, the closure cap will be constructed. By constructing the closure cap as grades are achieved, leachate is reduced and the cap area can manage stormwater through the series of terraces, downchute, perimeter channels; culverts, and stormwater retention basins.

While there is a general movement in stormwater management to promote infiltration, in the case of landfills, infiltration of stormwater through the waste is undesirable. However, the on-site stormwater controls will attenuate peak runoff rates, so as not to increase the runoff rate discharge leaving the site.

The detailed engineering design will be presented in the Phase II Application to be submitted to MDE after approval of this Phase II Application.

1.2 PROJECT HISTORY

The first submission of the “Phase 2 Hydrogeologic Report” for the proposed Chesapeake Terrace Rubble Landfill was prepared by Mark Schultz Associate (MSA) and submitted to the Maryland Department of the Environment (MDE) on March 19, 1990. The MDE provided comments on the Phase 2 Report in a letter dated December 29, 1997. MSA responded to these comments in a detailed “*Response to Comments Report”* dated March 23, 1998. The MDE provided final comments on the Phase 2 report in a letter dated August 5, 2002.

The long period of time that elapsed between the first Phase II submission and subsequent revisions and submissions is attributable to the fact in December 1993, Anne Arundel County appealed the inclusion of the proposed landfill in the County's Solid Waste Plan. Without the required local approval, the MDE largely stopped processing the landfill permit application. The

Chesapeake Terrace Rubble Landfill was not included in the Anne Arundel County's Solid Waste Plan until April 2001, at which time the review process was reactivated. In the eight (8) years that the application was inactive, the MDE promulgated new regulations governing rubble landfills (COMAR 26.04.07.15).

Considerable field work was conducted in order to generate the data needed to provide comprehensive responses to the MDE's 2002 comments including:

- Fifteen (15) new monitoring wells were installed, surveyed, developed and tested.
- More than 12 months of consecutive water level measurements were taken.
- A numerical computer groundwater flow model (MODFLOW) was constructed for the perched groundwater zone that overlies clay in the southwest portion of the landfill area.
- Soil samples were collected for geotechnical and permeability testing.

Phase III Application, submitted in 2006, included the detailed engineering design of the proposed Chesapeake Terrace Rubble Landfill. MDE raised questions regarding the hydrogeology of the site during the review of the Phase III Application. Through a series of MDE comments and responses, the design team worked with MDE to identify outstanding questions regarding the site-specific hydrogeologic concerns, so that the Supplemental Field Investigations (SFI) was proposed by the design team. The SFI scope of work included the following:

- Advance five (5) boreholes along the approximate boundary between the geologic formations to better define the boundary.
- Advance seven (7) boreholes and install seven monitoring wells at locations designated as permanent perimeter monitoring wells, to provide further information regarding subsurface conditions – formation and groundwater levels.
- Obtain twelve consecutive monthly water level readings in all active wells on the property.
- Obtain at least twelve consecutive months of groundwater level readings
- Provide additional information in some data pockets in Area B, particularly near proposed Cells 5 and 9
- Install new wells to replace damaged Wells MW-12 & MW-13, to allow groundwater level readings to be taken for southeast portion of the site

Prior to the completion of the SFI field activities, Anne Arundel County denied renewal of the Special Exception Permit. With the denial of this permit extension, MDE could no longer review the applications. As such, a report summarizing the SFI activities was not submitted to MDE for review at that time. However, the work to obtain twelve consecutive months of groundwater levels readings and four quarters of groundwater quality data was continued in order to have the data requested by MDE, if the project were allowed to continue.

NWM challenged the denial in court and the denial was reversed on appeal in October 2018. Since that time, Advanced GeoServices Corp, a Montrose Environmental Group company (AGC/Montrose) has worked to compile this revised Phase II Application Report for submission to MDE to include the results of the SFI, and made necessary adjustments.

1.3 RECENT MDE ENGAGEMENT

The design team met with MDE on November 2, 2018 to review the project status and solicit input from MDE regarding the path forward. During that meeting, MDE representatives requested two months of additional groundwater level readings in the on-site wells, in light of the historically record-breaking high levels of rain recorded for 2018 in the region. That data is also included in this report.

Finally, a working meeting was held with MDE on February 11, 2019, to provide an update and discuss the design and data issues identified by AGC/Montrose with the previous reports. The issues discussed related to the following items

- Maximum Groundwater Levels – A discussion occurred regarding whether to use regional or site-specific wells. The water levels measured in United States Geological Survey (USGS) observation wells was previously used to develop maximum potentiometric groundwater levels in each hydrogeologic area of the site. Because of site-specific groundwater level readings coincided with wet years, including the last 6 months which are associated with record-breaking rainfall in the Mid-Atlantic region, we have utilized the maximum recorded groundwater levels from site-specific wells as the maximum potentiometric groundwater level.
- Lower Parapsco Groundwater Levels - Determination of the groundwater levels in the Lower Patapsco Aquifer beneath the site was previously estimated based upon USGS observation wells, screened in that formation and one private residential water supply well on a neighboring property, because no groundwater monitoring wells had been installed at the site, prior to 2012. As part of the SFI, four deep groundwater monitoring wells, which will be part of the future permanent perimeter groundwater quality monitoring, were installed and the groundwater level data collected from these wells have been used to determine the groundwater levels in the Lower Patapsco formation. Interestingly, the data collected from the new on-site wells is consistent with the previously projected groundwater levels in this nearby residential well.
- Perched Groundwater in Area B - The previous proposed method to address the perched water table in Hydrogeologic Area B was referred to as a “clay dam.” The purpose of this mechanism was to use on-site clayey soils to block groundwater from upgradient of the landfill cells from seeping beneath the low permeability liner system and compromising the stability of the liner system. A drain was also to be installed upgradient of the “clay dam” to provide some long-term control of the perched water. There are constructability challenges with this method. As such, we propose changing to use other materials and operational procedures, while still achieving the same goal of managing the upgradient perched groundwater to maintain liner system stability.
- Historic Groundwater Level Readings - Some of the historical groundwater level readings appear to be incorrect or erroneous, based on comparison of nearby water levels and increase/decrease in readings from month-to-month and historical responses to recorded monthly rainfall.
- Additional Groundwater Level Readings - The team also agreed to collect a 3rd month of groundwater level readings in February 2019, adding to the November 2018 and January 2019 groundwater level readings obtained at MDE’s earlier suggestion.

More detailed explanations for these changes are provided in this report.

1.4 DESIGN TEAM QUALIFICATIONS

The professionals who were the primary author is of this Report are:

- Paul G. Stratman, P.G., P.E., is the project geologist providing interpretation of the geologic logs and water levels readings to identify the hydrogeologic area boundaries and groundwater contour maps.
- Veronica E. Foster, P.E.., supervised the Supplemental Field Investigation (SFI), during the employ of Golder Associates Inc., prior to joining Advanced GeoServices and continues to be the project team leader and primary author.

The resumes of these personnel are provided in Appendix A.

2.0 GENERAL SITE DESCRIPTION

2.1 LOCATION

The Chesapeake Terrace Rubble Landfill is located in western Anne Arundel County between the Patuxent and Little Patuxent Rivers. Plate 1 includes a portion of the United States Geological Survey (USGS) Topographic Quadrangle showing the location of the property relative to the surrounding area. Plate 2 includes an aerial map of the parcel showing the parcel relative to the nearby and regional development.

The parcel of land which contains the Chesapeake Terrace Rubble Landfill is approximately 380 acres (see Figure 1). The parcel is bordered on the northeast by Patuxent Road, on the west by the Amtrak Railroad, and on the southwest by Conway Road. The boundary of the proposed rubble fill area within the property is shown on Figure 3. The total proposed fill area is approximately 140 acres.

2.2 TOPOGRAPHY, DRAINAGE AND FEATURES

2.2.1 On-Site

A topographic base map of the site is shown on Figure 1. This map shows natural drainage features, the 100-year flood plain, property lines, and forested areas. Extensive surface mining (i.e., sand and gravel) has taken place in the north-western portion of the proposed landfill area. The results of this past mining activity is the surface is uneven and barren, and there are a number of these areas have been delineated as wetlands. Further, less excavation of surface soils will be required in portions of the site in order to construct the landfill cells. There are no on-site structures, utility pipelines, storage tanks, or water supply wells.

A ridge with elevations up to 180 feet (ft) above mean sea level (amsl) is located on and adjacent to the southern property line. The land surface across the site slopes north from this ridge toward the Little Patuxent River which is at an elevation of approximately 60 ft amsl. The vast majority of surface water from the site drains to the northeast toward the Little Patuxent River. The extreme western corner of the property drains to the west toward the Patuxent River.

2.2.2 Localized

The topography beyond the property can be viewed on Figure 2, which shows profiles in four directions through the site. These profiles are taken from GoogleEarth® so the elevations are +/-5-ft msl. The value of these profiles is that they show the relative elevations of the site compared to the surrounding communities, from 3 to 5 miles from the site. The data shows that the site is located along a localized high-point, wherein the areas north, west and east are at lower elevations than the southern portions of the site. The elevations beyond the southern limits of the site generally slope downward to the Patuxent River. In general, this means that surface water is generally not running onto the site from off-site sources.

This localized high-point is separated from other areas of similar elevation by the Little Patuxent and Patuxent Rivers. As such, shallow groundwater from the area located across the rivers from the site leaves the localized high-spot isolated from the locations beyond the Rivers. Further, this

also means that shallow groundwater is not connected to shallow groundwater in other locations. Recharge to shallow groundwater is from the site and adjacent areas of similar elevation.

2.3 FLOODPLAIN ANALYSIS

2.3.1 Historical Floodplain Analysis

Mr. J.A. Chisholm, P.E. performed a detailed evaluation of the 100-year floodplain evaluation. His evaluation is described in a letter to the Applicant dated October 14, 2003 (see Appendix B for complete letter and attached exhibits). His evaluation is summarized below:

Mr. Chisholm noted that the site is not adjacent to the Patuxent River but rather the Little Patuxent River approximately 30,000 feet (approximately 5.7 miles) upstream from the confluence of the Little Patuxent River with the Patuxent River. The 100 year flood plain limit shown upon the exhibits submitted to the MDE with the March 1990 Phase II Report was derived from the FEMA (Federal Emergency Management Agency) Anne Arundel County FIRM Panels 24 and 25 dated May 2, 1983. These panels showed the Little Patuxent River adjacent to the Chesapeake Terrace site. The footprint of the landfill is located above elevation 80, approximately 5 feet above the influence of the 100-year floodplain.

The July 18, 1985 FEMA Flood Insurance Study for Anne Arundel County, Maryland provided additional insight as to the methodology utilized for determination of the water surface for the 100-year flood level. Specifically *"For the Little Patuxent River, flood-flow frequency data were based on a statistical analysis of stage-discharge records covering 31 and 45 year periods at gage stations operated by the USGS (reference 7).*" The closest upstream gage station is located at Savage, Maryland (USGS01594000). Also included in the Flood Insurance Study were various floodway data tables. Table 4 of the Little Patuxent River Flood Insurance Study provided cross section and velocity data for two points adjacent to the Chesapeake Terrace site, specifically cross sections H and I (Exhibit D in Appendix B).

Typically, proposed land use (Zoning) is used to determine 100-year flood plain impacts. In Mr. Chisholm's professional opinion, since the original 1983 study was prepared the zoning within the watershed has not significantly changed. Considerable construction and development has occurred within the watershed, however the original study parameters would likely have utilized zoning, not the land use, in developing the 100-year flood elevations.

Mr. Chisholm also sourced stream flow statistics (Exhibits B and C in Appendix B) for the Little Patuxent River at Savage, Maryland. (USGS 01594000). While not immediately adjacent to the Chesapeake Terrace site the data should be indicative of what is happening within the entire watershed. For instance, if the flows at Savage increased by "x" then it should be reasonable to assume the downstream response would be similar. Mr. Chisholm reviewed the annual mean stream flow rate (Exhibit B in Appendix B) in cfs from 1976 to 1990 versus the time period from 1991-2001 and determined that an increase of approximately 7 percent was indicated by the data. As a conservative approach Mr. Chisholm suggested a 50 percent increase in the potential 100 year storm event flows due to development within the last twenty years.

From cross sections H and I it was determined (utilizing the continuity equation: Q=AV) that a 100 year storm event resulted in a flow of approximately 22,000 - 23,000 cfs. Flow was projected through Cross Sections H and I by increasing the water surface elevation in 1-foot increments. It was found that an increase of two feet to the water surface elevation would provide an increase of

approximately 50 percent to base 100-year flow (see Exhibit A in Appendix B). A three-foot increase in elevation effectively doubles the capacity of the floodplain.

It was concluded that the proposed elevations for Chesapeake Terrace Rubble Landfill operations are located above the influence of any 100-year FEMA floodplain limits within the adjacent Little Patuxent River.

2.3.2 Updated FEMA Maps

In 2012, FEMA updated the National Flood Insurance Program, Flood Insurance Rate Maps (FIRM) for Anne Arundel County, as a result of increase in frequency and severity of recent storm events. Map number 24003C0136E shows the extent of the site and the flood boundaries near the site. Plate 3 includes excerpts of this map, amended to include the site boundary for the Chesapeake Terrace Rubble Landfill.

AGC/Montrose reviewed this map to discern whether it merits adjustment to the historical analysis performed by Mr. Chisholm, which also served as the basis for other permitting in Maryland. Zone AE, where base flood elevations were determined, is located along Patuxent Road and Little Patuxent River beyond it. The flood elevation in the vicinity of the site is designated between 72 and 73 ft msl, downgradient of location of Section I shown on the map.

While these elevations are higher than those identified in Mr. Chisholm's study, it does not affect the conclusion of his study: the landfill is being developed at elevations above 75 ft msl in the existing conditions. In the vicinity of Patuxent Road, the proposed elevations of the landfill perimeter access road range from 80 ft msl (in the eastern limits) to 100 ft msl (near the Amtrak rail lines).

The proposed landfill base (or bottom) grades are provided on Figure 3.

3.0 REGIONAL GEOLOGY

The Chesapeake Terrace site is located in the Coastal Plain Physiographic Province in the outcrop area of the Patapsco Formation. Both sand and clay facies of the Potomac Group occur in the vicinity of the site according to the Geologic Map of Anne Arundel County (Glaser, 1976). This group includes the Patapsco Formation. In particular, in lower Anne Arundel County,

> *"Couched in terms of the classical Potomac Group stratigraphy, the sand-gravel facies encompasses sandy portions of the Patapsco Formation whereon the silt-clay facies includes both the Arundel Clay and the silt-clay in the Patapsco…. Potomac clay is predominantly red, buff, and red-gray mottled, and contains considerable sand and silt. Moreover, it is frequently interbedded with or grades laterally into lenticular bodies of fine-grained muddy sand."*

The Patapsco aquifer is further defined in Maryland Geologic Survey (MGS) RI. No. 46 (Mack and Achmad, 1986). From this study, a generalized geologic Cross Section near the site is shown on Plates 5 and 6 (see Plate 4 for Cross Section location line relative to the site location), and is consistent with the elevation of the water-bearing sand that underlies the clay at the site. A massive clay unit underlies the western portion of the site. This clay appears to be the confining bed between the upper and lower Patapsco aquifers. The clay dips to the east and the eastern portion of the site is underlain by thick deposits of sand.

3.1 PROJECTED GROUNDWATER USE

The regional groundwater demand will differ from year-to-year based on numerous variables, including but not limited to, the following:

- Rainfall (e.g., wet year or dry year)
- Development (e.g., residential vs. commercial, increased development)
- Impervious surface coverage (i.e., affects recharge)
- Public utility wells (e.g., their continued viability)

Groundwater continues to be a primary source for drinking water in the coastal plains along the entire east coast. As a result, water utilities and state/county authorities monitor development and water allocation (i.e., maximum allowed withdrawal of groundwater) permitting.

In 2007, the MGS, in cooperation with the Anne Arundel County (AAC) Department of Public Works (DPW), conducted an evaluation of groundwater withdrawals through 2044. The study indicated that the water demand in the region had increased 20-fold since the early 1900s. Much of the water being used by AAC DPW comes from the Patapsco aquifers. Continued development could result in groundwater drawdown, which could make some of the water supply wells ineffective as they would be above the reduced groundwater levels.

Despite the foregoing, this Study concluded that the Patapsco Group aquifers could continue to provide water for consumption, but there may be the need to install new wells to reaching the lowered groundwater levels.

It should be noted that the landfill design will be based on highest predicted groundwater elevations, which are consistent with the highest observed water levels because the water level

readings were taken during periods of record-breaking rainfall. This is discussed further in Section 5.

3.2 RESIDENTIAL WELL SURVEY

A survey was conducted of the production wells within ½ mile of the site boundary. There is no public water service in this area; therefore, all of the residences within ½ mile of the property boundary obtain their water supply from wells, or, for a few residences, springs.

The well inventory included every address within ½ mile of the site. Locations of the wells are shown on Plate 7 and specifications for the wells are provided in Table 2. Geologic cross-sections depicting the lithology described on the driller's logs for the wells identified in 2003 and bordering the site were previously developed my Mark Schultz Associates (MSA) in 2003. These Cross Sections are provided in Appendix D. Grade elevations for the Cross Sections are estimated from county topographic maps (2-foot contour interval). The locations of the Cross Section lines are shown in Appendix D.

The well inventory was conducted by performing a well record search and door-to-door field survey in 1989. The field survey was updated in 2003 by reviewing MGS well records which were current through March 2001 and by physically checking for new residential construction (which implies a well installation). Wells installed prior to 1969 were not required to be permitted. No records of construction details are available for these wells. If the residents were home at the time of the field survey then they were asked the depth of their well. These reported depths are included in Table 2; however, it should be noted that these reported well depths were not verifiable.

In 2019, another well search was conducted through the AAC Health Department (HD) for all wells within ¾ mile of the center of the site. Some new wells were identified, but some previously identified wells were missing from the list provided by the AAC HD. Available well completion reports for all the wells located by the historical surveys and the 2019 data search are included as Appendix C. The information in the newly installed wells are consistent with the previous well information.

There is a new residential neighborhood south-southeast of the site and they appear to have a neighborhood-specific wells, designated as Wells 89 and 90, on Plate 7.

3.3 SITE WETLANDS

Wetlands were identified on the property during the initial field investigations, generally located along the floodplains and few are located within the proposed landfill footprint, as shown on the Map in Appendix M. The site, as described previously, was subject to historical surface mining activities, creating low spots where water ponded and wetlands were created. Those located within the limits of disturbance were delineated and a permit for filling those wetlands was obtained from the United States Army Corps of Engineers and MDE. Permit extensions have been obtained since October 2018. A copy of the extensions of the permits is provided in Appendix M.

4.0 SUMMARY OF SITE INVESTIGATIONS

Multiple site-specific hydrogeologic field investigations have been conducted since 1988 in support of the Chesapeake Terrace Rubble Landfill. The hydrogeologic investigations conducted prior to 2010 were performed under the direct supervision of an MSA geologist. The Supplemental Field Investigation (SFI) was conducted during 2013-2014, under the supervision of Veronica E. Foster, PE, while during the employ of Golder Associates Inc. and now with AGC/Montrose.

4.1 SOIL BORINGS AND MONITORING WELLS

The geology of the site has been defined through the drilling and logging of sixty-two (62) soil borings to depths as great as 280 feet and installation of monitoring wells in thirty-nine (39) of the borings. The locations of the borings and wells are shown on Figure 4. Boring and well logs are provided in Appendix E for historical borings and Appendix F for SFI borings. A summary of the monitoring wells construction is provided in Table 1.

Split spoon samples were collected at 2.5 and/or 5-foot intervals in each of the borings advanced prior to 2010. Split spoon samples were taken every 5-feet or every 10-feet in borings advanced as part of the SFI. Over 1,000 split spoon samples have been collected to date.

The field geologist for each investigation completed a boring log for each boring based on a visual and physical examination of the split-spoon samples in accordance with ASTM-D2488 (1962). To confirm visual-manual soil descriptions in borings developed before 2010, select soil samples with a variety of textures were submitted to a geotechnical laboratory (Hardin-Kight, Inc.) for testing for textural classification as well as determination of liquid limit, plastic limit and plasticity index. There was very good correlation between laboratory classification and the field descriptions of the soil samples. The laboratory testing results are provided in Appendix G.

Standard Penetration Tests (SPTs) were performed during the installation of all of the borings in accordance with ASTM-Dl586-84 (1984). The SPT blow counts are recorded on the boring logs in Appendices E and F.

4.2 GROUNDWATER LEVEL READINGS

Monthly water level measurements in the on-site monitoring wells were conducted over four periods:

- Sept 1989 – August 1990
- August 2002 – November 2003
- May 2013 –June 2014
- November 2018, January, 2019 & February 2019

The wells were installed over the course of 30 years, and groundwater level readings were taken in the accessible wells in existence at the time of data collection. As wells were constructed, they were added to the list of wells being measured. Over time, several wells have been damaged and no new water level readings have been taken. The Well locations are shown on Figure 4 and depth to groundwater field measurements are shown on Table 3. The Monitoring Well groundwater elevations summary for each hydrogeologic area are provided in Tables 4A through

4D. Tables 5A through 5D include the groundwater water elevations for each well within a hydrogeologic area plotted over time with the actual and average monthly rainfall data.

4.2.1 Minimum and Maximum Groundwater Elevations

One of the MDE requirements for landfill permitting is the "…development of three separate ground water contour maps shall be constructed for each distinct water bearing formation occurring within 50 feet of the anticipated lowest elevation of the refuse cell floor." These water surface elevations shall represent the following:

- An elevated groundwater condition
- A depressed groundwater condition
- The highest observed or predicted water elevations.

In order to develop these maps, we reviewed the bounty of the monthly water levels readings over the last thirty years for accuracy of the readings (i.e., checking for human error) and compared the data against the rainfall data during the same monitoring periods to discern whether the water levels readings were taken during periods of wet, dry or average precipitation.

4.2.2 Hydrogeologic Area A

Reviewing Table 4A, there are several water elevations (identified in red font) where we questioned the accuracy of the reading – often due to markedly different water elevations from month to month. Table 5A shows the water levels, actual monthly rainfall over time, with the in-question levels circled in red.

Each one was compared to the previous and following month's water level reading, then compared to the rain fall. For the wells in Hydrogreologic Area A; we are disregarding the following readings for the listed reasons:

Well	Date	Elevation	Reason
MW-3	04/21/14	79.92	The water level is more than 10 feet higher than the previous month (69.20) and more than 9 feet higher than the following month (70.12). We belief this is a human error in reading the tape.

4.2.3 Hydrogeologic Area B

Reviewing Table 4B, there are several water elevations (identified in red font) where we questioned the accuracy of the reading – often due to markedly different water elevations from month to month. Table 5B shows the water levels, actual monthly rainfall over time, with the in-question levels circled in red.

Each one was compared to the previous and following month's water level reading, then compared to the rain fall. For the wells in Hydrogreologic Area B; we are disregarding the following readings for the listed reasons:

Well	Date	Elevation	Reason
MW-16	5/28/13 3/24/14	116.75 98.38	This well routinely has less than a 1-foot elevation difference from month-to-month over the life of the water level readings. To have a 14-foot elevation difference in the May reading and a 2-foot difference in March is uncharacteristic. Further, the same elevation was reported in the field for MW-17 for the same date. IN reviewing the field notes, even the field person questioned the validity of the reading, sadly after returning from the field several weeks after-the-fact.

4.2.4 Hydrogeologic Area TB

Reviewing Table 4D, there are several water elevations (identified in red font) where we questioned the accuracy of the reading – often due to markedly different water elevations from month to month. Table 5D shows the water levels, actual monthly rainfall over time, with the in-question levels circled in red.

Each one was compared to the previous and following month's water level reading, then compared to the rain fall. For the wells in Hydrogreologic Area TB; we are disregarding the following readings for the listed reasons:

Well	Date	Elevation	Reason
MW-9	11/29/18 1/10/19 2/15/19	97.72 82.41 99.21	This well is located in an open area, where it is visible. Having water levels over 20 feet above previously established water levels, made us suspicious of the readings. In reviewing site photographs taken while at site, it is evident the well is located at the edge of a low spot which does fill water and the well cap is compromised. As such, surface water draining across this area is entering the well. As such, these water elevls readings were not considered representative of the groundwater condition..
PMW-18	5/28/14	46.55	A fifteen foot drop from the preceding month followed by a sixteen foot increase the following month, indicates an error in the field reading.

4.3 GROUNDWATER QUALITY SAMPLING & TESTING

As part of the 2013-2014 effort, four rounds of groundwater quality sampling and testing were conducted in order to understand the existing quality of the groundwater at the site. The data is summarized in Tables 8A – 8D. This data is discussed further in Section 6.0 of this Report.

4.4 FIELD SLUG TESTING

In April and May 2003, fifteen (15) monitoring wells were installed in order to address MDE concerns that were largely related to soil stability issues and potential impacts on the perched aquifer in the southern portion of the site during this phase of work. Fourteen (14) pumping tests and three (3) slug tests were conducted in order to define the hydraulic conductivity of the

subsurface materials, and are provided in Appendices G and H, respectively. Soil samples were collected for geotechnical analysis.

The data derived from the pumping and slug testing were further used to generate a computer flow model (MODFLOW) of the perched water table in the southwestern portion of the site. This analysis was performed by C.C. Johnson & Malhorta in 2003, and is provided in Appendix J.

This data is discussed further in Section 5.3 of this Report.

5.0 SITE HYDROGEOLOGY

5.1 INTRODUCTION

To better describe the variable subsurface materials we have divided the site into two main hydrogeologic areas (Areas A and B) separated by smaller transition areas (Areas TA and TB). The locations of these hydrogeologic areas are shown on Figure 4. The preliminary proposed base grades for the Landfill are shown on Figure 3. The hydrogeologic areas have the following general characteristics, which are discussed in detail in this section of this report:

Hydrogeologic Area	Description
A (Sand Subsurface)	Hydrogeologic Area A is located in the eastern portion of the site. It is underlain by permeable sand to at least 50 feet below the proposed base of the rubble fill. In Area A, the rubble landfill liner will be maintained a minimum of 3 feet above the highest predicted water table elevation.
B (Clay Subsurface)	Hydrogeologic Area B is underlain by a thick clay confining bed of very low permeability (<l x 10^{-8} cm/sec). The thick clay confining layer typically begins between elevation 75 and 100 ft amsl. The clay extends to greater than 50-feet below the proposed base of the landfill. Above the clay confining layer is a combination of clay, silt and sand. The sand unit overlying the confining bed contains a saturated zone (perched aquifer). The sand unit will be removed during landfill construction so that the landfill liner is in direct contact with the clay. The perched water table above the clay confining layer occurs around 90 to 118 ft amsl, which is about 40 feet higher than the water level in the water-bearing unit (lower Patapsco aquifer) underlying the clay. In Area B, the rubble landfill liner will be maintained a minimum of 3 feet above the highest predicted potentiometric surface in the water bearing sand underlying the clay.
TA (Transition from Clay to Sand)	Hydrogeologic Area TA is a transition area in which there is a facies change from the low permeability clay deposits in Area B to the sandy deposits in Area A. Over portions of Area TA (as in Area B), there is surficial sand with a thin perched water table that will be removed during construction of the rubble landfill. The facies change occurs below the surficial sand. In Area TA, the subbase of the rubble landfill liner will be maintained a minimum of three feet above the highest predicted potentiometric surface.
TB (Transition from Thick to Thinner Clay)	The surface of the confining bed across Hydrogeologic Area TB is continuous with the confining bed surface across Hydrogeologic Area B; however, the clay confining bed thins in Area TB and is underlain by permeable silt within 50 feet of the proposed base of the rubble fill. In Area TB, the rubble landfill liner will be maintained a minimum of three feet above the highest predicted potentiometric surface in the silt unit underlying the clay.

The groundwater elevation contour maps provide the three requested surfaces with maps for each Hydrogeologic Area (Figures 10-15) and Composite Maps for the entire site (Figures 16-18). For each Hydrogeologic Area, the groundwater elevations contours have been developed for the following:

- An elevated groundwater condition, specifically based on readings taken during May 2014.
- The highest observed groundwater elevations, which we also advocate represents the maximum predicted groundwater elevations, due to their occurrence during periods of record-breaking rainfall. These maps were developed by taking the maximum valid water level readings in each well.
- The depressed, or lowest, observed groundwater elevation contours were developed based upon the lowest valid measured water level readings in each well.

The following sections provide detailed discussion of each Hydrogeologic Area on-site.

5.2 HYDROGEOLOGIC AREA A (SAND DEPOSITS)

Hydrogeologic Area A encompasses the eastern portion of the site (see Figure 4) and is underlain by permeable sand deposits. The hydrogeology in Area A has been defined by the following six borings and monitoring wells:

Boring	Monitoring Well
B-7	MW-12
B-11	MW-13
B-12	MW-4
B-13	MW-3
B-14	MW-5
B-15	MW-6
PMW-6	PMW-6
PMW-28	PMW-28

Area A is characterized as generally sand, but there are lenses of silt and clay that were encountered during the field investigations. Lenses less than 1-foot thick were generally not identified in the Cross-Section as they were not consistently logged to be able to identify each one. However, in Cross-Section D-D; the dominant exposed surface is fine sand (grey shading) where not removed by previous mining activities and coarse to medium sand (yellow shading). Within the coarse-medium sand, there are lenses of silt and sand (green shading). It is Advanced GeoServices' opinion that the "sand and silt" layers are not of sufficient thickness or uniformity to act as semi-confining layers.

A layer of clay was located at depth (in MW-5 and MW-13), starting more than 50-feet below the proposed base grades of the landfill so it was not defined any further. From the borehole log for MW-5, this clay layer appears less than 5 feet in thickness beneath the eastern portion of the site.

The thickness of the permeable deposits in Area A is illustrated in Cross Section D-D' on Figure 8 (see Appendices E and F for individual boring logs). As shown on the Cross Section, the permeable deposits in Area A extend more than forty (40+) feet below the water table and consequently more than forty (40+) feet below the proposed base of the landfill liner.

In 2003, pumping tests were conducted on three of the monitoring wells in Area A, specifically, on wells MW-3, MW-4 and MW-5 (see Appendix H for pumping test data). Analyses of the test data

were performed by comparing recovery water level measurements to Cooper-Jacob type curves in the AQTESOLV 3.5 software package (Hydrosolve, 2003). Data plots and type curve matches are provided in Appendix H. Transmissivity values of 1,420, 1,415 and 1,110 ft^2/day were calculated from the analyses.

Water level elevation records for the Area A monitoring wells are shown in Table 4A. Table 4A includes a summary of the depressed, elevated, and observed/predicted maximum water level elevations based on highest measured water levels and the prediction technique described in Section 8.0. Generally, the elevated and predicted highest water levels are the same for this project, due to the groundwater level readings being taken during historically wet periods. Please refer to Section 8.0 for a more detailed discussion. Contour maps showing the observed maximum and minimum water table conditions are presented in Figures 14 though 18 for Hydrogeologic Area A.

In Area A, the elevation of the landfill liner will be maintained a minimum of three feet above the highest observed/predicted groundwater elevations shown on Figure 17.

Based on the water table contour maps, the average hydraulic gradient (*i*) across Area A ranges from 0.002 to 0.024, with an average of 0.009. The rate of groundwater flow can be calculated from Darcy's Law as given in the following equation:

$$V = [(T)(i)]/[(b)(n)]$$

Where: V = average linear velocity
T = transmissivity = 1,300 ft^2/day (average from MWs-3, 4, 5 pumping tests)
i= hydraulic gradient = 0.009
b = aquifer thickness = 25 feet (maximum)
n = effective porosity= 0.3 (typical value for fine-medium sand)

Using these input variables the average linear velocity of groundwater in the water-bearing zone in Area A is approximately 15.6 ft/day. This is equivalent to approximately one mile per year.

Only one residential well is located downgradient of Area A. This well (#27 on Plate 7) is an unpermitted dug well. It is located over 1,000 feet downgradient of the site (also see Section 7.0).

5.3 HYDROGEOLOGIC AREA B (CLAY LAYER)

5.3.1 General Description

Hydrogeologic Area B encompasses the southwestern portion of the site (see Figure 4). Area B is underlain by a thick (i.e., more than 100 feet) low-permeability clay. According to the regional geology described in MGS RI. No. 46 (Mack and Achmad, 1986), the clay underlying Area B is the confining unit between the upper and lower Patapsco aquifers (see Section 5.1). Subsurface materials under Area B are illustrated on regional geologic Cross Sections B-B' and C-C' from MGS RI No. 46, reproduced on Plates 5 and 6, respectively.

The surface of the clay under Area B slopes to the southeast and ranges in elevation from 110 ft msl on the north side of Area B to 85 ft msl on the southeast side (see Figure 19). The clay is overlain by an interlayered unit of sand, silt and clay, containing a perched zone (shallow perched water table) representing the upper Patapsco Aquifer. This perched zone will be isolated from the proposed landfill during construction.

The clay confining bed under Area B is over fifty feet thick. It is underlain by the water-bearing sands of the lower Patapsco aquifer. At least three feet of separation will be maintained between the rubble fill liner and the highest predicted potentiometric surface in the water-bearing sand under the clay.

5.3.2 Perched Water Table

5.3.2.1 General Description

The perched zone in the sand overlying the clay confining bed in Area B has the same general slope as the underlying clay surface, that is, it slopes to the southeast. Contour maps showing the elevation of the perched water table and the elevation of the clay surface are shown on Figures 11 and 19, respectively. The contour maps indicate that the perched water table was generally between *5* and 10 feet above the clay surface during the 2003, 2013/2014, and 2018/2019 monitoring period, a period of abnormally high precipitation. In fact, the 2018/2019 period aligned with record-breaking high precipitation levels in the Mid-Atlantic region. The perched water elevations is about 40 feet higher than the water level in the water-bearing zone (lower Patapsco aquifer) underlying the clay.

However, comparing the highest observed/predicted perched groundwater elevations with the top of the clay in Area B, it appears that the column of perched groundwater varies from as little as four feet to as much as eighteen feet above the top of clay. This variability can result in the extent of a perched water management system being extended or reduced, based upon actual water conditions encountered. Please refer to Section 5.3.2.2 for information on management of perched groundwater.

The sand containing the perched water table will be mined, so that the base of the rubble landfill will be in direct contact with the clay confining bed. It is recognized that some perched groundwater will remain in the sand outside the excavation area and that the potential exists for seepage of this groundwater into the excavation.

5.3.2.2 Management of Perched Groundwater

In previous submission of the Phase II Application, a “clay dam” (i.e., clay placed in layers and compacted to replace permeable soil in the landfill side slope subgrade) was proposed as the means of controlling perched groundwater from entering the active landfill cell or lying along the underside of the landfill liner system. We have several concerns about the use of a clay dam as follows:

- The clay dam was proposed on a 2 horizontal to 1 vertical (2H:1V) slopes, with a 100-foot elevation difference from top of slope to bottom of slope, without terracing or benching. Construction on a 3H:1V slope would pose similar challenges.
- Construction of a clay can prove challenging in order to attain appropriate compaction and uniformity of product (e.g., thickness, permeability, etc.).
- Perched groundwater weeping during placement and compaction can negatively impact strength and stability .
- Effectiveness of clay as a low-permeability barrier is dependent upon the clay remaining moist, so that the clay particles “swell” filling any voids and reducing the material porosity and saturated hydraulic conductivity.

Several concurrent methods may be used to control seepage of perched groundwater into the landfill excavation, as follows:

- Pumps can be installed in shallow groundwater wells along the perimeter road. Water can be pumped out of this area to temporarily drawdown the perched groundwater. The need for this will depend on the water levels in the area of cell construction, at the tie of construction.
- The excavation into this area will begin as an interceptor trench, along the proposed perimeter road and will advance southerly, to cutoff this water traveling across the cell. The trench will be keyed into the top of the clay along the road.
- A pipe will be installed in the trench to a low spot, or sump, along the southwestern edge of the excavation. A pump will be installed in the sump to remove the water into a stormwater basin to allow construction to advance. It is anticipated that the water will produce as much as 25 gallons per minute (gpm), or 36,000 gallons per day (gpd). Temporary frac-tanks with sediment filter bags may be mobilized initially during this trench construction.
- As the cell excavation proceeds, the operator is expected to excavate two cells, so that the 2nd cell floor can be used as a laydown area, and for management of stormwater during the construction effort, though the installation of a temporary sediment basin. The intercepted groundwater can also be management in this temporary sediment basin.
- Construction of each cell will advance similarly to extend the interceptor trench to the southwest corner of the cells and the low point of the upper clay survey in Hydrogeologic Area B. A pump will be operated from this low spot to remove accumulated water. This basin will also be used for management of precipitation which falls within the excavation. We anticipate that the amount of perched groundwater transmitted will be relatively small, likely much less than collected precipitation.
- As the landfill footprint in Hydrogeologic Area B increases, and the recharge area decreases, the amount of water actually collected in the interceptor trench is expected to decrease over time.
- It is anticipated that perched groundwater in the interceptor trench will no longer be pumped out after the landfill is filled.

The groundwater condition at the time of construction will determine the means needed to manage the perched groundwater. A field change or a minor permit modification will be pursued with MDE to define the means of addressing perched water, as the cell development advances into the cells located in the perched groundwater zone, which may not occur for ten (10) to fifteen (15) years after the time this Report is being prepared.

While the means of managing the perched groundwater has changed somewhat in materials and methods, the modeling previously developed for simulating the impact of the former “clay dam” concept on the perched groundwater remains effective, because of the following:

- It estimates the amount of water to be managed based upon free-flow of the water out of the formation.
- It assumes a barrier along the landfill, which will still be present with the liner system materials as opposed to the clay material.
- The free-flow of the perched groundwater will be conveyed out of the formation to a temporary sedimentation basin – allowing evaporation or pumpout to the proposed site stormwater ponds during dryer periods.

The previous groundwater modeling for the clay dam/perched groundwater management is described below.

5.3.2.3 Description of Numerical Flow Model

Donald Koch, P.E. of C.C. Johnson & Malhotra (CCJM), P.C., an experienced modeler, constructed a numerical flow model of the perched aquifer. The perched aquifer was simulated using MODFLOW. MODFLOW is the USGS modular three dimensional, finite difference groundwater flow model (McDonald and Harbaugh, 1988; Harbaugh and McDonald, 1996). It is the most widely used groundwater flow model in the U.S. The model generated by CCJM is described in detail in Appendix J, including input variables, boundary conditions, sensitivity analysis, calibration, and predictive simulations of the proposed methods for controlling perched groundwater.

Eleven monitoring wells were installed in the perched zone in April 2003. Clay surface and perched water level elevations from these wells and two previously installed perched zone wells (MW-15 and MW-16) were used in the model (see Table 4B for groundwater level data and Figure 4 for well locations). Long-term groundwater monitoring well data indicates that water level elevations used in the model were near their maximum since they were made utilizing data from during the abnormally wet spring and summer months of 2003. The water levels obtained during the 2013/2014 SFI and the Nov 2018 – Feb 2019 water levels readings (following the wettest year on record in 2018, confirmed the 2003 water level readings are consistent with the water levels after record-breaking annual rainfall and thus the likely maximum potential groundwater water elevations for the site and these hydrogeologic formations.

While new wells were installed during the 2013/2014 SFI, the purpose of these wells was to obtain site-specific information about the lower Patapsco water bearing aquifer and to better understand the locations of the hydrogeologic formation transitions. As such, the 2003 MODFLOW analysis was not re-worked.

In 2003, pumping tests were conducted on ten (10) of the perched zone wells in order to derive the hydraulic conductivity values used in the model. These values are listed in Appendix H (see Appendices H and I for pumping test and slug test data sheets and analysis).

The perched aquifer was modeled as a single layer with the surface of the clay unit representing the base of the perched zone.

Groundwater levels measured at the site were used as the calibration targets for the model. The model was calibrated by adjusting model parameters and comparing the target water levels to the water levels predicted by the model.

5.3.2.3 Predictive Simulations Using Flow Model

The calibrated model was used to predict excavation inflow and drawdowns in the perched water table aquifer for four scenarios, two operational and two post-closure. The following is an excerpt from the report, included in Appendix J.

> *"The calibrated model was used to predict pit (cell excavation) inflow and drawdowns in the perched water table aquifer for two scenarios. The first was the excavation of the pit to an elevation of 70 feet above mean sea level (MSL). The excavation on the east side of the*

property will be above the water table and outside the extent of the perched water table aquifer. The second was the pit plus a drain on the northwest side of the pit.

Two postclosure scenarios were also be simulated. The landfill will be lined with clay. There will be a leachate collection system above the clay liner. After the rubble is placed and the landfill is full, a clay cap will be constructed on the top of the fill. The hydrogeologic impact of the closed landfill is to create a virtually impermeable clay mass in the perched water table aquifer. The model of both postclosure scenarios included a noflow zone surrounding a perimeter drain which represented the leachate collection system. There was a low permeability wall (clay dam) that separated the aquifer from the leachate collection system which represents the clay liner and clay dams on the sides of the landfills. In one of the postclosure scenarios, the drain to the northwest of the landfill is removed, in the other it remained.

All of the predictive simulations were steady state simulations. The resulting predictions of drawdown around the pit are conservative relative to those predicted by a transient simulation, i.e. larger drawdowns than would actually occur. The predicted pit inflows are not conservative. One expects higher inflows as the pit is first excavated. Prediction of pit inflows using a transient groundwater model was not necessary for several reasons. The excavation sequence of the pit has not been determined; it is likely that portions of the excavation will be at the target depth for substantial periods of time allowing the groundwater to approach steady state. Given the shallow saturated thickness of the perched water table, the groundwater should approach steady state relatively rapidly, i.e. months, not years. With the available information, a transient model would overpredict pit inflows at early times because the model assumes the pit is excavated instantaneously. For these reasons, a steady state simulation was adequate.

The excavation was simulated as a series of drains around the perimeter of the pit. These drains were at an elevation of one foot above the clay layer that forms the bottom of the perched water table aquifer. Predicted pit inflow without the drain to the northwest was 27 gallons per minute (gpm). Predicted drawdowns are shown in Figure 7.

The second scenario was simulating a drain on the northwest side of the pit to intercept groundwater before it reaches the excavation. The drain was assumed to be at the same elevation as the clay that forms the bottom of the perched water table aquifer. The conductance of the drain was calculated using the Hooghoudt formula. The Hooghoudt formula is commonly used for calculating the spacing of agricultural drains. It accounts for the convergence of groundwater flow to a small diameter drain. The drain was assumed to have an effective radius of one foot and the ratio of horizontal to vertical hydraulic conductivity was ten. The resulting drain conductance was 127 sq ft/day. Predicted pit inflow was 11 gpm. Predicted drawdowns are shown in Figure 8. Predicted drain inflow (the drain on the northwest side of the pit) was 0.8 gpm.

The first postclosure scenario was a virtually impermeable closed landfill. A clay dam completely around the pit was assumed. The clay dam was assumed to be eight feet wide, extending the complete depth of the perched water table, and have a hydraulic conductivity of IE-8 cm/sec. The clay dam was simulated as reduced hydraulic conductivity one grid away from the drains that represent the leachate collection system. Assuming a eight foot wide clay dam in a 50 foot wide grid resulted in a hydraulic conductivity of 3.5E-4 ft/day. Predicted drawdowns are shown in Figure 9.

The second postclosure scenario was the drain on the northwest side of the pit and a clay dam around the remaining sides. The clay dam was.simulated as previously described. Predicted drawdowns are shown in Figure 10. Predicted drain inflow (the drain on the northwest side of the pit) was 3.5 gpm."

The figures referenced in the quoted text, are included in Appendix J.

5.3.2.4 Impact of Perched Water Control Measures on Residential Wells and Wetlands

There are thirty residential wells located south and east of the Chesapeake Terrace site (along Conway and Collins Roads), the downgradient direction of groundwater flow in the perched aquifer (see Plate 7). The vast majority of these wells (and all of the recently installed wells) are screened in the lower Patapsco aquifer (below the clay confining bed) rather than in the perched aquifer above the confining bed. Only two wells, installed prior to 1984, at 2944 and 2987 Conway Road, are screened in the perched aquifer. This indicates that the perched aquifer is a marginal water supply.

The drawdowns predicted by the model for the four scenarios described above are between 1.5 and 2.5 feet along the southern property line (see Figures 7, 8, 9 and 10 in Appendix J). There are at least two residential wells (Plate 7 locations #40 and #48) that are screened in the perched aquifer where these drawdowns are predicted. Under most circumstances this amount of drawdown would not be a concern; however, for a marginal well with little available drawdown, this could affect the water supply. The amount of available drawdown in these wells is not known. There is one (1) other old unpermitted wells near the southern end of the property along Conway and Collins Roads that are within the 1-foot drawdown contours for Scenarios 1 and 2 and may be screened in the perched aquifer.

The model indicates that drawdowns resulting from perched water table control measures will decrease rapidly away from the site in the direction of low areas along Patuxent Road where wetlands may depend on springs or nonpoint groundwater discharge. The model predicts little or no drawdown at the location of Patuxent Pond Park which is located east of Hydrogeologic Area A.

To address concerns associated with shallow residential wells, the applicant has installed perched zone monitoring wells along the southern side of Area B (wells MW-15 and MW-16 on Figure 4). The purpose of these wells is to establish baseline water levels prior to overburden removal in order to quantify the impact of site activities on the perched water table. These wells will be part of the perimeter groundwater monitoring network associated with this site, from which water level readings and water quality samples will be obtained.

The Phase III Application will include details for establishing a water level monitoring program, prior to the initiation of overburden removal, in conjunction with the Anne Arundel County Health Department (AACHD) to monitor water levels in the residential wells along Conway Road. The applicant is on the record as being willing to bear the cost of replacing impacted wells. Replacement wells would be screened below the clay confining bed in the lower Patapsco aquifer.

5.3.3 Clay Confining Bed

5.3.3.1 General Description

As indicated above, a significant clay unit underlies Hydrogeologic Area B. The extensive nature of the clay is illustrated in the regional geologic cross sections on Plates 5 and 6 (see Plate 4 for cross section lines).

Site-specific Cross Sections are shown on Figures 5 through 7. At Chesapeake Terrace, the surface of the clay ranges from 110 ft msl at the north end of Area B to 85 feet amsl at the southeast end (see Figure 19). The clay is very thick under Area B. To determine the site-specific depths of the clay, four deep borings were advanced and permanent groundwater monitoring wells were installed during the SFI in 2013/4. These wells were PMW-11, 12, 13, and 23, and are slated to be part of the permanent perimeter monitoring wells during the operation and post-closure periods of the landfill. From these borings, the bottom of the clay ranges from -20 ft amsl to -50 ft amsl in Area B. With the bottom of the proposed landfill being elevation 66 ft amsl or higher, including the bottom of cell sumps in Area B, the thickness of clay remaining beneath the bottom the landfill is at least 70 feet thick based on the observed thickness in the site boreholes.

Driller's logs for the residential wells along the south side of the property indicate that the clay extends to -60 ft msl along the southern edge of the site (see Plate 7 for well locations and Table 7 for Water Level readings in well AA94-3264 in 2003). The driller's logs for residential wells east of Area B (along Collins Avenue) show the presence of predominantly clayey units to -20 ft msl (see Cross Section BB-BB' in Appendix D).

Several hundred split spoon samples of the clay have been collected and described by a geologist with confirmatory laboratory testing for select samples. The material in the clay confining unit ranges from high plasticity clay (CH) to clay and silt mixtures (CL). N-values derived from SPT borings indicate that the clay is very dense. Geotechnical laboratory testing of the soil samples taken during the field investigations are provided in Appendix G.

5.3.3.2 Clay Permeability

Permeability values for the clay confining bed have been derived from three sources, a literature review, lab testing, and in-situ slug testing. The permeabilities derived fall in the same range:

- 3.5×10^{-9} cm/sec (derived from the literature)
- 4.2×10^{-9} cm/sec (derived from laboratory testing of site samples)
- 5.9×10^{-9} cm/sec (derived from in-situ slug tests)

The sources for these three permeability values are described below.

Literature Review

According to Mack and Achmad (1986), the vertical permeability of the confining bed between the upper and lower Patapsco aquifers is 3.5×10^{-9} cm/sec.

Lab Testing

Shelby tubes are typically used to collect undisturbed clay samples for permeability testing; however, the high density of the clay under Areas B, TA, and TB made it impossible to advance Shelby tubes into the clay. In order to conduct laboratory permeability tests, a hand-carved sample of clay was collected from Area TB where the top of the clay surface has been exposed by mining.

The hand-carved sample of the clay was collected by Hardin-Kight geotechnical engineers at the location of well MW-28 at a depth of two feet (see Figure 4). Lab tests classified the soil sample to be a CH clay, as defined by the Unified Soil Classification System (USCS) (see Appendix G). Based upon the grain size analysis of the sample, the material contains more than 95% fines, passing the #200 screen with 60% of the material smaller than 0.002 mm. With 60% clay and 35% silt, the soils is defined as a Clay per the United States Department of Agriculture (USDA) textural classification.

Samples taken during the SFI from the deep borings confirm the CL, CH, and CL-ML soil classification of the Patapsco clay collected of the Patapsco formation. The results of the geotechnical laboratory testing associated with samples obtained during the SFI are also provided in Appendix G.

The blow counts for the Soil Penetration Test (SPT) boring for well MW-28 showed the clay at 2-feet to have an N-value of 30 to 40 blows per foot indicating a hard condition. The SPT-values were recorded for the deep borings advanced during the SFI, as well. The N-values ranged from 30 to 67 in the SFI deep borings. The N-values in the clay near the proposed base of the landfill was less than the values in the deeper portions of the clay formation, to remain beneath the landfill.

A falling-head rising-tail permeability test was conducted on the sample collected from MW-28, according to American Society for Testing and Materials (ASTM) Method D-5084 protocols. This method is designed to measure the hydraulic conductivity of saturated porous material using a flexible wall permeameter. The permeameter test showed the clay sample to have a saturated hydraulic conductivity of 4.2×10^{-9} cm/sec (see final page of Appendix G).

In-Situ Slug Tests

Well MW-23 was installed in the approximate center of Area B and screened in the clay confining bed. The top of the sand filter pack for the 10-foot screen was set 25-feet below the top of the clay (see Appendix E for well log). Samples of the silty clay in the screened zone were analyzed by the Hardin-Kight geotechnical lab and determined to be Unified Soil Classification CL (a silt-clay mixture) by ASTM –D422- (see Appendix G for soil analysis).

Two similar wells (MW-26 and MW-31) were installed in silty clay in Area TA, near the boundary with Area B. The log for MW-26 indicates that the well was set in silty clay while the log for MW-31 indicates a silt-clay mixture.

Every effort was made to achieve direct contact between the well screen and the clay. The clay wells were drilled and flushed with clean water to eliminate borehole effects and immediately purged after installation to prevent fines from settling out in the screen zone.

Slug tests on the wells were begun on April 28, 2003 and the wells had still not fully recovered at the time of the most recent water level measurement on November 8, 2003. The water level data and slug test analysis input data are provided in Table 6. Analysis of the slug test data was performed with the AQTESOLV 3.5 software package (Hydrosolve, 2003) using the Hvdrosolve (1951) solution (see Appendix I). Hydraulic conductivities derived from analyses of the slug test data were as follows:

- MW-23: 5.9×10^{-9} cm/sec
- MW-26: 5.6×10^{-9} cm/sec

- MW-31: 9.1 x 10^{-9} cm/sec

In summary, several sources of information indicate that the hydraulic conductivity of the clay confining bed under Area B is less than 1.0 x 10^{-8} cm/sec. This is an order of magnitude less than the permeability requirement for landfill liners (10^{-7} cm/sec).

Rate of Migration

The rate of migration and time of travel for groundwater through the clay can be estimated from Darcy's Law according to the following equation:

$$V = [(K)\ (I)]/(n)]$$

Where: V = average linear velocity
K = hydraulic conductivity = 2.8xl0^{-5} ft/day (l xl0^{-8} cm/sec)
I = hydraulic gradient = 0.3 = 40 feet difference in maximum groundwater surface above and below the clay divided by 140-foot clay thickness
n = effective porosity= 0.5 (typical value for clay)

Using these conservative input variables the average linear velocity through the clay is on the order of 1.7 x 10^{-5} ft/day, or 0.006 ft/year. This translates into a time of travel of many hundreds of years for groundwater to migrate through the clay confining bed.

5.3.4 Water-Bearing Sand Under Clay Confining Bed (Lower Patapsco Aquifer)

The potentiometric surface in the water-bearing zone below the clay (lower Patapsco aquifer) was evaluated because the applicant is required to maintain the subbase of the rubble landfill liner least 3 feet above the potentiometric surface in this water-bearing layer. It should be noted that COMAR requires subsurface definition to 50-feet below the proposed base of the landfill. The water-bearing zone under the clay is greater than 50-feet below the proposed base of the landfill and therefore does not technically fall within COMAR requirements for definition.

Prior to 2013, water level measurements were made in a residential well adjacent to Area B (well AA943264) to determine the potentiometric surface in the Lower Patapsco aquifer at the site. This residential well is located approximately l00-feet east of the landfill property line and is assigned map location #68 on Plate 7 and Table 2, and is shown on residential well Cross Section AA-AA' in Appendix D. As shown on Table 7, the well is screened below the clay confining bed in the elevation interval from -68 to -73 feet msl. A series of water level measurements were made in well AA94-3264 from September through November 2003 (see Table 7). The highest elevation recorded was 61.32 feet msl. Historic high water levels and water levels in the period of record for well AA943264 (Sep-Nov 2003) are provided in Table 7

During the SFI conducted in 2013/2014, four deep wells were installed into the Lower Patapsco Aquifer. Twelve consecutive monthly water level readings were taken in these four wells from May 2013 through June 2014 and additional water level readings were taken between November 2018 and February 2019. These periods coincide with very wet periods, with the 2018/2019 readings occurring during a period of record-breaking rainfall. The water level readings are in Table 4B, with the readings plotted against time in Table 5B. The maximum and minimum groundwater elevations in these wells are 67.29 and 50.30, respectively.

As a result of the maximum water levels being recorded at the site wells during periods of record-breaking rainfall, it is our opinion that the maximum potentiometric groundwater level is consistent with the maximum composite groundwater table. The maximum (composite) groundwater surface at the site in the water-bearing unit under the clay is shown on Figures 17. As is usual for landfill design, the maximum groundwater surface is determined so that the bottom of the landfill maintains a minimum separation from the maximum water level. In Maryland, that separation is required to be 3 feet. The proposed bottom of the landfill grades meet this criteria.

Generally, the water in the lower sand layer of Area B flows from the north and south toward the middle of Area B, then from there toward the east and west. The potentiometric surface is approximately 30-40 feet below the perched groundwater elevations in the upper sand layer of Area B.

5.4 HYDROGEOLOGIC AREA TA- TRANSITION FROM CLAY TO SAND

In Hydrogeologic Area TA (as in Area B), there is a surficial sand with a thin perched water table that will be removed before construction of the rubble landfill. Under the surficial sand, there is a facies change from the low permeability clay deposits underlying Area B to the sandy deposits underlying Area A. This facies change occurs in a trough-like depression in the surface of the confining unit in the vicinity of borings B-19 and B-31. The deposits in the trough coarsen from west to east. Clay and silt were encountered in the westernmost boring (B-31), silt and sand in the east-central boring (B-19) and sand (at boring B-15 in Area A)(see Cross Section D-D' on Figure 8).

During the SFI in 2013-2014, three borings (B-103 through B-105) were advanced along the previously identified boundary between Areas B and TA, to better define the location of this boundary. While the boring logs show that the material composition is changing, there is not an abrupt change where all the soils types associated with Area B cease and the soils types in Area A commence. Transition Area A is the span over which clay composition begins to reduce and sand from Area A takes its place.

The groundwater in this area is connected to the perched groundwater from Area B, as it transitions to Area A. This perched groundwater also daylights into a few low spots, previously delineated as wetlands. These low spots are a result of previous surface mining that has occurred at the site, prior to the 1980s. The groundwater levels can be influence by the standing water in the floodplain along the northern edges of the proposed development.

The subbase of the landfill liner in Transition Area TA will be maintained a minimum of three feet above the highest composite groundwater surface in the materials remaining after the surficial sand has been removed. There is an increase in the maximum groundwater levels in Area B to Area TA. For that reason, proposed Cells 1-4 were raised to maintain the required groundwater separation.

The potentiometric surface under the surficial sand is defined by water level elevations in wells MW-26, MW-29, and MW-31. Water level elevations for the Area TA monitoring wells are summarized in Table 4C. For reference, water levels are also provided for wells MW-6 and MW- 25, which are located in Area A, just outside Area TA.

Table 4C includes a summary of Area TA minimum and maximum groundwater surface elevations based on measured water levels. These groundwater surfaces are also shown on Figures 16-18. As indicated previously, since the water levels readings were taken during wet years, including

record-breaking rainfall periods, the highest observed groundwater elevation is also defined as the highest predicted groundwater surface.

Pumping or slug tests were conducted on the three Area TA wells. Wells MW-26 and MW-31 are located on the low permeability soils along the Area B/Area TA transition. As such, the slug tests taken in these wells are associated with the Area B formation, and are described in Section 5.3.3. Well MW-29 is screened in silt and is more representative of Area TA, as a whole. Pump test data for MW-29 is included in Appendix H. The transmissivity in well MW-29 was calculated to be 1.8 ft^2/day. The hydraulic conductivity for well MW-29 was therefore used to estimate groundwater flow rates in Area TA.

Based on the water table contours maps, the average hydraulic gradient across Area TA is 0.005. The rate of groundwater flow can be calculated from Darcy's Law as given in the following equation:

$$V = [(T)(I)]/[(b)(n)]$$

Where:
V = average linear velocity
T = transmissivity = 1.8 ft^2/day (from MW-29 pumping test)
I = hydraulic gradient = 0.005
b = aquifer thickness = 20 feet
n = effective porosity= 0.4 (typical value for silt)

Using these input variables the average linear velocity of groundwater in the water-bearing zone in Area A is approximately 0.001 ft/day. This is equivalent to 0.4 feet per year, a flow rate that reflects the fine-grained subsurface materials in Area TA

There are no residential wells located downgradient of Area TA, that is, between Area TA and the Little Patuxent River, 2,000 feet to the northeast. As such, there are no wells screen in this formation that the proposed project could impact.

5.5 HYDROGEOLOGIC AREA TB - TRANSITION TO THINNER CLAY

Hydrogeologic Area TB is a transition area in which the confining bed under Area B thins and is underlain by permeable or semipermeable strata within 50 feet of the proposed base of the rubble landfill. The clay confining bed is exposed at the surface in limited areas or missing due to past mining over much of Area TB . For the area of the rubble landfill located in Area TB, the remaining surficial sand in Area TB will be removed prior to landfill construction. Control measures for any remaining perched groundwater include those measures described for Area B, under Section 5.3.2.2 of this report.

Groundwater elevation maps for the perched and confined zones are provided on Figures 14 & 15 and Figures 16 through 18. Generally, the groundwater in the perched zone ranges from elevation 114-118 ft msl, flowing north toward the floodplain at an elevation of 95+/- ft msl, depending upon the groundwater surface being considered. The groundwater I nthe confined zone is consistent with the levels in the Area B, sloping from 68 ft msl to 60 ft msl, flowing southern from the railroad tracks toward the boundary between Areas TA and A.

Clay samples collected from the borings made across Area TB indicate that it has the same characteristics as the massive clay under Area B. Permeameter testing of an undisturbed clay

sample collected in the center of Area TB (at well location MW-28) had a hydraulic conductivity of 4.2×10^{-9} cm/sec (see Section 5.3.3).

In Area TB, the surface of the confining bed slopes to the north and east. The elevation of the clay surface is approximately 110 feet msl on the west side of Area TB and 80 feet msl on the east side (see Cross Section A-A' on Figure 5).

The surface of the confining bed across Area TB is continuous with the confining bed surface across Area B; however, at an elevation of +40 to +50 feet msl the clay is underlain by clay with silt and sand lenses. The texture of the material underlying the clay and the elevation of the base of the clay at borings west, east, north and center of Area TB are as follows:

BORING	BASE OF CLAY	
	Elevation	**Description**
B-16 (west side)	+45 ft msl	Silt and clay
B-5 (east side)	+47 ft msl	Silt and very fine sand, some clay
B-3 (north side)	+49 ft msl	Sand, some silt and clay
MW-28 (center)	+41 ft msl	Silt

The subbase of the rubble landfill liner in Area TB will be maintained a minimum of three feet above the maximum groundwater surface in the permeable materials underlying the clay. This potentiometric surface is defined by water level elevations in wells MW-10, MW-11, MW-14, and MW-28.

Water level elevations for the Area TB monitoring wells are summarized in Table 4D. Table 4D includes a summary of the minimum and maximum observed groundwater elevations. Contour maps showing these water table conditions are presented in Figures 16-1811. It should be noted that the groundwater contours shown on Figures 14 through 18 are very different compared to previous groundwater contour maps provided for this area. This difference is because of the new data collected during the 2013-2014 SFI. It is also possible that some of the wellheads, particularly MW-1, may be under water during significant storm events, since they are located in the 100-year flood plain and they are aging. While the wells were not submerged during the field activities, it was not uncommon to delay field visits until a few days after rainfall to assure easier access to these wells. In 2018 and 2019 field inspections, Well MW-9, located adjacent to low spot in which water ponds, was discovered with a damaged watertight lid (whether by vandals or time, we will not speculate at this time), such that water from uplands or ponded water can enter the well uncontrolled. Data collected from this well after 2018 is not considered useable until repaired. Wells located in the floodplain are not within the proposed footprint of the landfill and, thus, are less representative of the groundwater levels in the vicinity of the future landfill cells. Despite these wells possibly being waterlogged, the water level readings from all wells, except those described as erroneous in Section 4.2 and shown in red on Tables 4A through 4D, were used to develop groundwater elevation contour maps, Figures 10 through 18.

Much of Area TB being located within the 100-year flood plain and the area experiencing record-breaking rainfall in the last year and a half, much of the flood plain was saturated. It is possible that the water level readings in Well MW-1/11 and PMW-18 are compromised so the readings may not truly representative of the groundwater table in this area. However, future landfill development is not proposed to occur in the vicinity of Wells MW-1/11. Our primary interest is the groundwater levels in the vicinity of the future rubble landfill to assure that bottom of landfill grades remain a

minimum of 3-feetabove maximum groundwater elevations in this area. Monitoring Wells MW-14, 17 and 28 are most representative of the groundwater conditions in the vicinity of the future landfill.

A pumping test was conducted on well MW-28 which is located in the center of Area TB. The pumping test data were analyzed by matching to the type curves in the AQTESOLV 3.5 software package (Hydrosolve, 2003). Pump test data plots and type curve matches are given in Appendices G and H. The transmissivity in well MW-28 was calculated to be 2.7 ft^2/day.

Based on the potentiometric surface contour maps, the average hydraulic gradient across Area TA is approximately 0.0025. The rate of groundwater flow can be calculated from Darcy's Law as given in the following equation:

$$V = [(T)(I)]/[(b)(n)]$$

Where: V = average linear velocity
T = transmissivity = 2.7 ft^2/day (MW-28 pumping test)
I = hydraulic gradient = 0.0025
b = aquifer thickness = 10 feet
n = effective porosity = 0.4 (typical value for silt)

Using these input variables the average linear velocity of groundwater in the water-bearing zone in Area TB is approximately 0.002 ft/day. This is equivalent to 0.6 feet per year.

Again, there are no residential wells located downgradient of Area TB, that is, between Area TB and the Little Patuxent River, 2,000 feet to the northeast. As such, there are no wells screen in this formation that the proposed project could impact.

6.0 GROUNDWATER QUALITY

6.1 GENERAL INFORMATION

Two groundwater sampling events have been conducted at the site, the first in 1989 during the initial Phase 2 investigation and the second in 1997 at the request of the MDE. The groundwater quality derived from these sampling events were forwarded to the MDE (MSA, 3/19/90, and MSA, 7/31/97).

However, MDE requires that four consecutive quarters of groundwater quality data be obtained and provided as part of the Hydrogeologic (Phase II) Report in support of a Landfill Permit Application. The previously collected and submitted data is old and may not be representative of current groundwater quality. As such, this 20+ year old data is not included or discussed further in this report.

As part of the SFI, four (4) rounds of groundwater sampling were conducted at the Site. 28 wells were sampled in May, July, and September of 2013 and January 2014. Samples were collected from all the wells that were included during the monthly groundwater elevation rounds except for MW-1 and MW-13. The table below presents the wells that were sampled and what each sample was analyzed for:

Monitoring Well		Parameters
MW-3	MW-24	Volatile Organic Carbons (VOCs), Metals, Chloride, Nitrate, Phosphate, Total Dissolved Solids (TDS), Sulfate, Total Alkalinity, Ammonia, Chemical Oxygen Demand (COD), and Hardness
MW-4	MW-25	
MW-5	MW-27	
MW-6	MW-28	
MW-10	MW-29	
MW-14	MW-30	
MW-15	PMW-6	
MW-16	PMW-11	
MW-17	PMW-12	
MW-18	PMW-13	
MW-19	PMW-18	
MW-20	PMW-19	
MW-21	PMW-23	
MW-22	PMW-28	

6.2 SAMPLING PROCEDURES

Groundwater samples were collected using a “low-flow sampling technique” outlined by the United States Environmental Protection Agency (USEPA) recommended procedures (i.e., Low Flow (Minimal Drawdown) Groundwater Sampling Procedures, EPA/540/S-95/504, April 1996, and Use of Low-Flow Methods for Groundwater Purging and Sampling: An Overview, US EPA Region 9, Quick Reference Advisory, December 1995). These procedures were used as a minimum level of compliance.

6.2.1 Well Purging

Monitoring wells generally were purged using the low-flow well purging and sampling techniques. The monitoring wells were purged using a decontaminated 2-inch diameter submersible pump (Grundfos® Rediflo2) and polyethylene tubing that was dedicated to each well. Wells were purged at a rate of approximately 200 to 500 milliliters per minute. Frequent monitoring of the water level and adjustments to the flow (when necessary) minimized drawdown during purging. A minimum of 3 feet of water was maintained over the pump intake to avoid trapping air in the pump. Pumping rate adjustments, if any, and depth(s) to water measurements were recorded on sample collection forms. All purged water was discharged to the ground surface in a manner that would avoid any groundwater being mixed into surface water body systems.

Alternative purging methods were utilized in the event low-flow purging and sampling techniques could not produce an adequate sample. Below is a description of the processes:

Condition	Alternate Method
Low-Yield	When water recharge was less than 200 ml/min (the lowest purge rate to sample by low-flow techniques) the low-yield sampling technique was implemented. These wells were purged a minimum of one (1) and up to five (5) pump and tubing volumes, and allowed to recharge without removing the pump. Following recharge, samples were collected.
Conventional Volume Removal	If the standing water column within the well was less than five (5) feet, a Teflon ® lined bailer was utilized. The well was purged using the bailer to a minimum of three (3) well volumes and then allowed to recharge. Samples were then collected using the bailer.
Other Method	A third alternative method was used in wells where the turbidity exceeded levels that could potentially affect the integrity of the readings given by the water quality meter and/or cause mechanical damage to the water quality meter. The well was allowed to purge without the water quality meter attached to the purge line until the groundwater cleared enough to where the water quality meter integrity would not be sacrificed. The meter would then be engaged to the purge line and groundwater purging would resume according to low-flow protocol.

Below is a list of wells that required alternative methods of purging per event:

- May 2013 Sampling Events
  - Monitoring Wells MW-10, MW-16, and MW-18 were purged and sampled using the conventional volume removal method.
  - Monitoring Wells MW-15, MW-17, MW-21, and MW-30 were purged and sampled using the low-yield technique.
- July 2013 Sampling Event
  - Monitoring Wells MW-10, MW-16, and MW-18 were purged and sampled using the conventional volume removal method.
  - Monitoring Wells MW-15, MW-17, MW-21, and MW-30 were purged and sampled using the low-yield technique.
  - Monitoring Well PMW-11 was allowed to purge for an extended duration of time before field parameters were measured because of high turbidity in the well. DTW was measured at all times to ensure significant drawdown was not occurring.
- September 2013 Sampling Event

  - Monitoring Wells MW-10, MW-16, and MW-18 were purged and sampled using the conventional volume removal method.
  - Monitoring Wells MW-15, MW-17, MW-21, and MW-30 were purged and sampled using the low-yield technique.
- January 2014 Sampling Event
  - Monitoring Wells MW-10, MW-16, and MW-18 were purged and sampled using the conventional volume removal method.
  - Monitoring Wells MW-15, MW-17, MW-21, and MW-30 were purged and sampled using the low-yield technique.
  - Monitoring Well PMW-11 was allowed to purge for an extended duration of time before field parameters were measured because of high turbidity in the well. DTW was measured at all times to ensure significant drawdown was not occurring.

6.2.2 Field Parameters

During low-flow purging, the field parameters were monitored in-line with a Horiba U-52® (Horiba) water quality meter. A flow-through cell device was used to minimize sample exposure to the atmosphere. Measurements were collected approximately every five (5) minutes until the parameters stabilized based on three consecutive readings within the following ranges:

- Temperature: +/- 10%
- pH: +/- 0.1 Standard Units
- Conductivity: +/- 3%
- ORP: +/- 10 mV
- DO: +/- 10% (or +/- 0.1 mg/L if less than 1.0 mg/L)
- Turbidity: +/- 10%

When low-yield and conventional volume removal purging methods were used, the Horiba was not attached to the purge line; however water quality was measured by filling the Horiba's sample cup with the purged groundwater and the Horiba sensors were placed into the cup. Temperature and DO readings were taken immediately because the initial readings are more representative of groundwater than if the readings were allowed to stabilize to background surface conditions. The rest of the parameters were allowed to stabilize and then recorded.

Table 8E summarizes the field parameter measurements (temperature, pH, specific conductance, turbidity, dissolved oxygen, and redox potential, volume purged, and DTW) for the monitoring wells for three quarters. Unfortunately, due to the time-lapse between data collection and this report being prepared, the field notes for the September 2013 event for the field parameter collection are missing

6.2.3 Sample Collection

Once the wells reached appropriate stabilization criteria, the purge line was detached from the water quality meter and the samples were collected in laboratory supplied containers. VOCs were collected first and the remaining samples were then collected. The following Quality Assurance/ Quality Control QA/QC samples were collected:

- Four (4) blind duplicates at a frequency of one (1) per 10 primary samples.
- Two (2) matrix spike/matrix spike duplicates (MS/MSD) were collected at a frequency of one (1) per 20 primary samples

- One (1) field equipment rinsate blank per sampling event
- One (1) trip blank per day of VOC sample shipment

The collected samples were preserved on ice in standard sample coolers at approximately four (4) degrees Celsius. All samples were shipped under chain-of-custody procedures via an overnight courier to laboratory for analysis.

6.3 SAMPLE ANALYSIS

All samples were shipped to Test America Analytical Laboratories and analyzed for the Site's parameters by the following methods:

- VOCs; 8260B
- TAL Metals (with Mercury); 6020
- Chloride/Sulfate; 300.028D – (MOD)
- Total Phosphate; 4500_P_E
- TDS; 2540C
- Total Alkalinity; 2320B
- Ammonia; SM4500_NH3_H
- COD; 5220D
- Hardness as Calcium Carbonate; 2340C

6.4 GROUNDWATER RESULTS

All data were check for completeness (all samples submitted for analysis were analyzed). Groundwater results were compared to Maryland Department of Environment (MDE) Maximum Contaminant Level (MCL) for Chemicals in Drinking Water. Tables 8A through 8D present the results of the groundwater sampling compared to the MDE MCLs. The following list is a summary of the data:

- May 2013 Sampling Event
  - There were no exceedances for VOCs during this event.
  - There were exceedances for:
    - Arsenic in monitoring wells MW-15 (10.2 ug/L), MW-18 (135 ug/L), and PMW-11 (26.8 ug/L).
    - Chromium in monitoring wells MW-18 (142ug/L), MW-21 (221 ug/L), and PMW-11 (173 ug/L).
    - Cadmium in PMW-11 of 9.85 ug/L.
  - All other detections were below the MCL or no standard exists in the state of Maryland.
- July 2013 Sampling Event
  - There were no exceedances for VOCs during this event.
  - There were exceedances for:
    - Arsenic in monitoring wells MW-17 (11.5 ug/L), MW-18 (166 ug/L), and MW-21 (30.7 ug/L).
    - Chromium in monitoring wells MW-18 (207 ug/L) and MW-21 (204 ug/L).
  - All other detections were below the MCL or no standard exists in the state of Maryland.
- September 2013 Sampling Event
  - There were no exceedances for VOCs during this event.

  - There were exceedances for:
    - Arsenic in monitoring wells MW-15 (14.8 ug/L), MW-17 (34.2 ug/L), MW-18 (104 ug/L), MW-21 (10.2 ug/L), and MW-30 (12.1 ug/L).
    - Cadmium in monitoring well MW-15 (13.7 ug/L).
    - Chromium in monitoring well MW-18 (186 ug/L).
  - All other detections were below the MCL or no standard exists in the state of Maryland.
- January 2014 Sampling Event
  - There were no exceedances for VOCs during this event.
  - There were exceedances for
    - Arsenic in monitoring wells MW-18 (62.3 ug/L) and MW-21 (20.3 ug/L).
    - Chromium in monitoring well MW-18 (112 ug/L).
  - All other detections were below the MCL or no standard exists in the state of Maryland.

Generally, the groundwater quality in the groundwater monitoring wells in 2013-2014 sampling and testing period was good, with few parameters detected. With the exception of Acetone, the Volatile Organic Compounds (VOCs) were all non-detected. Most metals were detected, but at levels below the MCLs, if one exists. Though a few parameters in select wells were detected, the list of exceedances was so small that they are listed above. With the exception of Arsenic in MW-18, the exceedances are the same order of magnitude as the MCL.

The following is a brief summary of the detected compounds and the levels/locations detected.

Charts showing the levels of parameters in all wells over the four rounds of water quality data obtained between June 2014 and January 2014 are provided in Appendix N. Where the compound was not-detected, half of the method detection limit was plotted on the chart. Where MDE does not publish an MCL for the compound, a secondary MCL was used where available. These charts were created for all parameters.

The SFI groundwater sampling and testing is provided in Tables 8A through 8D.

COMPOUND	WELLS WHERE DETECTED	MDE MCL	RANGE OF LEVELS DETECTED	COMMENTS
2-Butanone	MW-30	NS	ND-3.9	Detected in one samples collected at MW-30 in September 2013, just above the Method Detection Limit (MDL)
Acetone	MW-5, 14, 15, 17, 19, 21, 27-29 & 30 and PMW-11 & 19	NS	ND to 1700 ug/L	Concentrations in all wells, except MW-14, 15, & 30, were less than 44 ug/L
Benzene	MW-15	5 ug/L	ND-0.24	Three of four samples taken from MW-15 contained Benzene but at levels so close to the MDL that the values are estimates.
Bromodichloro-methane	PMW-28	80 ug/L	ND-0.28	Detected in the June 2013 samples from PMW-28 at level just above the MDL.
Chlorform	MW-16, MW-19, MW-20, & PMW-28	80 ug/L	ND-5.3	When detected, concentrations are at levels an order of magnitude below the MCL.
Dibromochloro-methane	PMW-28	80 ug/L	ND-0.21	Detected in the June 2013 samples from PMW-28 at level just above the MDL/
MTBE	MW-3, 4, 5, 6, 19, & 25 and PMW-28	NS	ND – 2.8 ug/L	When detected, concentrations are at levels an order of magnitude above MDL.
n-propyl-benzene	MW-30	NS	ND- 0.11 ug/L	Detected in the June 2013 samples from MW-30 at such a low level that it is an estimate.
PCE (tetra-chloroethene)	MW-15, MW-21 and PMW-28	0.5 ug/L	ND-0.21 ug/L	The levels detected are the same order of magnitude of the MDL and the MCL.
Toluene	MW-14,15, 17, & 21 and PMW-11-13	1000 ug/L	ND-0.66	The levels detected are the same order of magnitude of the MDL.
Metals				
Aluminum	All wells, except MW-6	0.2 ug/L*	52.6 - 48300 ug/L	Concentrations in all wells, except MW-15, 17, & 18 and PMW-11, were less than 17,500 ug/L
Arsenic	MW-10, 14 – 19, 21-22, & 29-30, and PMW-11, 18, 19, 23 & 28	10 ug/L	ND – 166 ug/L	Concentrations in all wells, except MW-15, 17, 21 and 30 and PMW-11, were less than the MCL
Barium	All wells	2000	7 - 386 ug/L	Detected at low levels
Beryllium	MW-10, 16-20, & 29 and PMW-11, 12, 18, 19, & 23	4 ug/L	ND -3.9 ug/L	Detected below the MCL in all samples

COMPOUND	WELLS WHERE DETECTED	MDE MCL	RANGE OF LEVELS DETECTED	COMMENTS
Metals (cont'd)				
Cadmium	MW-15	5 ug/L	ND -13.7 ug/L	The Method Detection Limit for the June 2013 sample at PMW-11 was 19.7 ug/l. As a result, plotting that sample point at half the detection limit shows an exceedance of the MCL.
Calcium	All wells	NS	454 - 658123 ug/L	Concentrations in all wells, except MW-6, 10, & 14-16 and PMW-11, were below 5200 ug/L
Chromium	All wells, except MW-6	100 ug/L	ND - 221	Concentrations in MW-18, MW-21 and PMW-11 exceeded the MCL.
Cobalt	MW-4, 5, 10, 14-21, 27, 29 & 30 and PMW-11-13, & 23	NS	ND - 44.6 ug/L	Detected concentrations are one order of magnitude above the MDL.
Copper	All wells, except MW-28 & PMW-6	1300 ug/L*	ND – 630 ug/L	Concentrations in all wells, except MW-18, are below 110 ug/L.
Iron	All wells, except MW-28 & MW-6	300 ug/L	ND- 255000 ug/L	Concentrations in all wells where detected, except MW-17 & 17 and PMW-11, were less than 50000 ug/L.
Lead	All wells, except MW-28	15 ug/L*	ND – 57.8 ug/L	Concentrations are below 15 ug/L, except in MW-15-17, 18, 21 & 30 and PMW-11
Magnesium	All wells.	NS	283 – 17400 ug/L	Concentrations in all wells, except MW-6, 17, 18 and PMW-11, were less than 4200 ug/L
Manganese	All wells.	50 ug/L*	8.2 - 965 ug/L	Concentrations are below 200 ug/L, except in MW-14,15, 17, & 18 and PMW-11
Mercury	MW-17 & MW-18	2 ug/L	ND-1.7	Detected below the MCL.
Nickel	All wells	NS	ND-156	Concentrations in all wells, except MW-21 and PMW-11, were less than 60 ug/L
Potassium	All wells	NS	654 – 24200 ug/L	Concentrations in all wells, except MW-6, 14, 18 and PMW-11, were less than 5000 ug/L
Selenium	MW-3, 4, 14, 16-21, 24, 25, 28-30 and PMW-6, 11, 18, 19, 23	50 ug/L	ND – 24.8 ug/L	All instances of detected selenium are below the MCL.
Sodium	All wells	NS	509 – 52500 ug/L	Several states have imposed an MCL of 50 mg/L (50000 ug/L) of sodium for safe drinking water. These levels are not unusual in coastal plain aquifers where salt-solutions are used for road treatment in the winter. It should also be noted that concentrations were highest in the June 2013 samples from MW-6, PMW-11 and PMW-28. All other samples had concentrations less than 10000 ug/L.

COMPOUND	WELLS WHERE DETECTED	MDE MCL	RANGE OF LEVELS DETECTED	COMMENTS
Metals (cont'd)				
Thallium	MW-18	2 ug/L	ND – 0.81 ug/L	Detected in the September 2013 sample at MW-18. The MDL was 7.9 for the June 2013 samples at MW-6 and PMW-11, so these levels are non-detected, but were plotted at half the MDL so they appear to be detected on the plot. Not detected in any other samples from any other wells.
Vanadium	MW-10, 14-18, 21, 24, 28-30, and PMW-11-13, 18, 19, & 23	NS	ND-685 ug/L	All instances of detected vanadium are below the 100 ug/L, except samples from MW-18, MW-21, and PMW-11.
Zinc	All wells, except MW-6 and MW-28.	5000 ug/L*	ND-359	Al detected concentrations are below 400 ug/L, an order of magnitude below the secondary MCL
Water Quality Parameters				
Alkalinity	All wells	NS	0 – 110 mg/L	Alkalinity is an indication of the acidity of the water.
Ammonia	MW-3, 14, 15, 17, 30 & PMW-11, 12, 13	NS	ND – 0.55 mg/L	Concentrations in all wells, except MW-15 and MW-30, were less than 0.14 mg/L
Chemical Oxygen Demand	All wells	NS	6.3-560 mg/L	Concentrations in all wells, except MW-18, were less than 150 mg/L
Chloride	All wells	250 mg/L*	ND – 33 mg/L	The chloride is far below the secondary standard.
Hardness	All wells	NS	2 – 208 mg/L	Hardness, measured as CaCO3, in drinking water is required to be 50-250 mg/l. IN most samples, the hardness was less than 50 mg/L. SO the water would be classified as "soft".
Nitrate as N	MW- 4, 5, 6, 14, 15, 16, 18, 21, 22, 24, 25, 27, 29, & 30 and PMW-6, 11, 12, 18, 23, & 28	10 mg/L	0.047 – 1.5 mg/L	Concentrations in all wells, except MW-18 and MW-27, were less than 0.69 mg/L
Phosphorus	All wells	NS	0.02 – 3.5 mg/L	These concentrations are low and are less than are naturally occurring in the human body.
Sulfate	All wells	250 mg/L*	1.3-295 mg/L	Concentrations in all wells, except MW-19, MW-20, and MW-27 are below 50 mg/L
Total Dissolved Solids	All wells	500 mg/L*	11-736 mg/L	Concentrations in all wells, except MW-27 and PMW-19 are below 200 mg/L

* Indicates a secondary standard or action level was used ND = non-detect

7.0 POTENTIAL FOR MOVEMENT OF POLLUTANTS INTO THE WATERS OF THE STATE

The landfill will have a low-permeability liner with a leachate collection system to allow collection and removal of water which has come in contact with the waste, also known as leachate. Further, the leachate is removed from the cells through a series of in-cell pipes, pumps and conveyance pipes to transfer the leachate from the landfill into on-site leachate storage tanks. This low permeability liner and leachate collection system is required by MDE regulations (see Section 12.0). This coupled with the system of monitoring wells shown on the cell base concept plan (Figure 3) will provide the hydraulic isolation and pollutant detection monitoring required by the Maryland Department of the Environment for rubble landfills.

The western portion of the site (Hydrogeologic Areas B and TB on Figure 4) is well-suited for a landfill. It is underlain by a thick deposit of clay with a permeability that is an order of magnitude less than that required for the low-permeability landfill liner. Much of Hydrogeologic Area TA is also underlain by low-permeability silty clay.

Downgradient of Area B (south and east of the site), most water supply wells are screened below the confining clay which affords them a very high degree of protection. The few wells screened in the perched zone above clay will be downgradient of proposed permanent monitoring wells.

Downgradient of Areas A, TA, and TB (northeast of the site) there appears to be only one domestic well located directly downgradient, specifically, an unpermitted dug well located over 1,000 feet downgradient. Monitoring wells will be located between this well and the landfill.

Stormwater at the site will be collected in stormwater detention basins. The proposed outfalls from the basins will drain to established waterways. Best Management Practices (BMP) water quality facilities will be provided for all storm water management discharge ponds.

These factors contribute to a high level of confidence that controls will be installed, that satisfy MDE-required protections, to prevent pollutants associated with the proposed landfill from entering waters of the state.

8.0 TECHNIQUE FOR PREDICTION OF HIGHEST POTENTIOMETRIC SURFACE ELEVATIONS

In the Phase 2 Addendum for Chesapeake Terrace Rubble Landfill (Phase 2 Addendum), prepared by MSA and dated December 5, 2003, long-term water level trends (hydrographs) for United States Geological Survey (USGS) observation wells in the vicinity of the site were reviewed in order to predict the highest on-site potentiometric surface elevations. The groundwater level data used in the Phase 2 Addendum were obtained from the USGS website and were current through October 2003.

For the Phase 2 Addendum, the USGS groundwater level database was searched for observation wells with the following characteristics:

- located within 10 miles of the Chesapeake Terrace site
- screened in the Patapsco aquifer
- well screen set within 100-feet of the ground surface
- period of record includes at least one of the three periods when water level measurements were made in the Chesapeake Terrace monitoring wells, that is, Sept 89-Aug 90 and/or Aug 02-Nov 03

Seven USGS observation wells were found with three of the four characteristics, however, they are all located approximately 10 miles from the site. The average difference between the historic high groundwater levels in the seven USGS observation wells and the highs during the Sep 89-Aug 90 and Aug 02-Nov 03 periods of record for the Chesapeake Terrace wells were 1.66 and 0.45 feet, respectively. In the 2003 Phase 2 Addendum, the predicted highest water level elevations for the Chesapeake Terrace monitoring wells were calculated to be the highest water level measured in each monitoring well plus 1.66 or 0.45 feet depending on whether the high measurement was made during the Sep 89-Aug 90 or the Aug 02-Oct 03 period of record.

After a review of the regional geology, it was determined that this technique is not an appropriate method of predicting the highest groundwater potentiometric surface at the Chesapeake Terrace site. The USGS observation wells used to predict the highest potentiometric surface in the 2003 Phase 2 Addendum are located approximately 10 miles from the Chesapeake Terrace site, and there are numerous streams and drainage divides separating the Chesapeake Terrace site from the USGS observation wells.

Using GoogleEarth Pro®, a land surface profile was created to show the land surface elevations from the Chesapeake Terrace site to the location of the USGS observation wells. As can be seen on the profile, the Chesapeake Terrace site is situated on a local high point and is hydrologically separated from the surrounding area by the Patuxent River to the south and the Little Patuxent River to the north. This suggests that the groundwater table beneath the Chesapeake Terrace site has a smaller, localized area of recharge that does not include the area where the USGS observation wells are located. Therefore, the groundwater elevation data from the USGS observation wells was not considered when predicting the highest potentiometric surface at the Chesapeake Terrace site. The GoogleEarth Pro® land surface profile is provided on Figure 2.

It should be noted that when the team re-engaged to develop this Report, a team meeting was held with MDE to provide an update that the project was again moving forward. During that meeting,

MDE suggested obtaining a few additional months of water level readings in light of the 2018 calendar year having record-breaking maximum rainfall over the entire year.

As discussed in Section 4.2 and as shown on Tables 5A through 5D, the ground water level readings were taken during periods of higher than average rainfall in 1989-1990, 2002-2003, 2013-2014, and 2018-2019. In fact, the rainfall during 2018 (for much of the eastern seaboard) was at record-breaking high levels. The table below provides annual rainfall with "normal" rainfall for the monitoring period (for Baltimore, Maryland):

Year	1989	2002/2003	2013/2014	2018
Actual Rainfall *	51.88	39.60/62.66	42.93/52.58	71.82
Normal Rainfall (1981-2010) *	41.88	41.88	41.88	41.88

*Based upon data obtained from NOAA.

Appendix K includes a table from NOAA, showing the monthly rainfall from 1871 through March 2019 for Baltimore, Maryland. The yellow-shaded months are those during which groundwater level readings were taken. The green-shaded values represent the "normal" monthly rainfall values.

Prior to 2018, 2003 was the wettest year on record for rainfall in the Baltimore area. The groundwater water level in the on-site monitoring wells was relatively consistent over the monitored periods. Having measured the water levels during the wettest two years on record, it is AGC/Montrose's' opinion that the highest observed groundwater levels represent the highest predicted groundwater surface.

9.0 GEOTECHNICAL CONSIDERATIONS

9.1 SOIL STABILITY AND DIFFERENTIAL SETTLEMENT

9.1.1 Considerations

The MDE letter of August 5, 2002 asked for an evaluation of the stability of the soils under the proposed landfill area, in particular, the stability of the clay layers that underlie the western portion of the site. The specific MDOE comments relating to stability were as follows:

- *There may be the need for specific information on "distinct strata" that underlie the site, in order to verify that the design of the landfill will remain stable after construction.*

- *Parts of the site, including areas TA and B in particular, are underlain by fine-grained materials of variable occurrence and consistency. Clays often exhibit greater porosity and plasticity than coarser sediment, and may subsequently be compressed to a greater extent than silt or sands when subjected to dewatering, vibration caused by traffic, and/or long- term increased loading such as would be expected under the proposed landfill area. Please evaluate the extent to which these areas may be subject to differential settlement due to these factors, model the extent to which differential settlement may occur, and include any necessary engineering correction in the final design for the landfill cell. In particular, please insure that the liner and leachate collection system will not be subject to undue deflective stress, suffer damage, or exhibit a decrease in performance due to changes in grade. Methods used to perform the requested analysis and all pertinent data should be included*

- *The subsurface evaluation should provide sufficient information for a stability analysis to be performed on the proposed design, if one has not already been performed*

9.1.2 Standard Penetration Testing

The geology of the site has been defined through advancing and logging of sixty-two soil borings, with Soil Penetration Testing (SPTs) to depths as great as 240 feet. Split-spoon samples were collected at 2.5, 5-foot, or 10-foot intervals in these borings. Over 1,000 SPT samples were collected and described by visual/physical examination in accordance with ASTM-D2488.

The split spoon samples were collected in accordance with the Standard Penetration Tests protocols in ASTM Specification DI586-84 (1984). The number of hammer blows required to drive the sampler is shown in the boring logs in Appendices D and E.

The SPT resistance (N) value is the sum of the middle two 6-inch blow counts for a 2-foot split spoon. At depth, in all of the hydrogeologic areas, the N-values ranged between 30 and 70, typically with values greater than 50. In hydrogeologic Area A where subsurface materials consist of sandy deposits these high blow counts indicate densities adequate for heavy loadings.

For saturated fine-gained soils (i.e. clay and silt), the N-blow counts can be used to estimate the relative firmness of the material. The following are approximate qualitative evaluations of fine-grained soil (USDI, 1974):

N	Consistency
2 to 4	Soft
4 to 8	Medium
8 to 15	Firm
15 to 30	Very firm
Above 30	Hard

Hardin-Kight Associates, Inc., a geotechnical engineering firm, was retained to evaluate the stability of the soils under the proposed landfill area (particularly in the areas underlain by clay) and to conduct soil engineering testing.

Prior to performance of laboratory geotechnical testing, Hardin-Kight, Inc. reviewed the Standard Penetration Test (SPT) borings data and the results of prior laboratory tests performed on samples of the clay. Hardin-Kight noted that N-values for the clay ranged from 40 to >100 blows/foot. Based on these data, Hardin-Kight concluded the clayey soils underlying the proposed base of the landfill were extremely dense and the high N-values indicated that settlement would not be an issue. Therefore, the rubble landfill would remain stable after construction. Jack Hardin, P.E. concluded that the character of the clay as indicated by the existing Standard Penetration Test Borings was adequate to *"insure that the liner and leachate collection system will not be subject to undue deflective stress, suffer damage, or exhibit a decrease in performance due to change in grade.*" (See Appendix G)

9.1.3 Consolidation and Unconfined Compressive Strength Testing

Consolidation and unconfined compressive strength tests were performed by Hardin-Kight in order to confirm conclusions based on SPT boring data. Shelby tubes are typically used to collect undisturbed clay samples for one-dimensional consolidation testing; however, the high density of the clay as well as the depth and drilling method under Areas A, TA, and TB made it impossible to advance Shelby tubes. There was almost no penetration before the tubes collapsed. In order to conduct laboratory tests, Hardin-Kight collected a hand-carved sample of clay at a location where the top of the clay surface had been exposed by mining.

The hand carved sample was collected at the location of well MW-28 at a depth of two feet (see Figure 4). The blow counts for the SPT boring for well MW-28 showed the clay at 2-feet to have an N-value of 30 to 40 blows per foot indicating a hard condition. This N-value was actually less than the N-values in borings advanced to the depth of the proposed base of the landfill. The "relatively" low N-value for the clay sample collected for consolidation testing indicated that it represented worst case conditions since the SPT boring data indicates that the clay becomes stronger with depth.

Hardin-Kight conducted one dimensional consolidation testing on the clay sample in accordance with ASTM D-2435 and unconfined compressive strength testing in accordance with ASTM D- 2166. In addition, Hardin Kight conducted grain size distribution and index test in accordance with ASTM methodologies (see Appendix G). The test results indicated the soil tested was CH (fat clay) in accordance with the unified Soil Classification System (ASTM D-2487). The one dimensional consolidation test results indicated that the clay had a pre-consolidation pressure of 5.4 tons per square foot. The initial void ratio and porosity were 0.499 and 0.333 respectively. The unconfined compressive strength was determined to be 10,594 pounds per square foot or 5.3 tons per square foot.

Hardin-Kight stated that the sample tested was a very hard clay. The test results showed that the clay soil would exhibit insignificant settlement when loaded to less than 5.4 tons pre- consolidation pressure. The unconfined compressive strength indicated that the clay soils will support the anticipated loads with a factor of safety of at least two against bearing failure. For a 100 foot thickness of rubble, Hardin-Kight estimated the loads to be roughly 4 tons per square foot.

Hardin-Kight stated in their report (see Appendix G) that the SPT boring data indicated that most of the clays present on site are harder than the clay represented by the lab tests. It was concluded that the test results indicate that the soils will be stable and are "ideal for the proposed use." Based on the SPT boring data it was expected that the materials at the base of the rubble fill would have load bearing characteristics that were superior to the clay tested.

9.2 IMPACT OF PERCHED GROUNDWATER ON LINER STABILITY

The MDE letter of August 5, 2002 asked for an evaluation of the potential impact of perched groundwater on liner stability. The geotechnical engineering firm of Hardin-Kight was retained to provide a conceptual design for a clay cut-off barrier, aka “the clay dam,” and to perform a stability analysis. According to the conceptual design, the dam was proposed be 10-feet thick and be constructed of the 10^{-8} cm/sec clay that is found in abundance on-site. The proposed dam height of 10-feet was anticipated by Hardin-Kight to be adequate based on measured perched water table thicknesses and the drawdowns predicted in the post-closure model simulations described in Section 5.3.2.3.

As discussed in Section 5.3.2.2, AGC/Montrose is proposing to eliminate the “clay dam” concept and defer to developing a means of managing perched water which may be present at the time of construction as the impacted cells are not slated for construction for at least ten (10) years, based on the current vision for the filling sequence, starting with the Cells in Area A, then advancing the cells in the transition areas. Once the nature and extent of perched groundwater is identified at that time, a proposal will be developed for MDE approval.

When the landfill is operational and the cell is open, the perched groundwater described in Section 5.3.2 will be intercepted. The method of interception will be more refined during the Phase III Application detailed design effort. The interceptor trench concept will prevent the buildup of any head against the liner system while the cell is in operation. More details regarding layout and construction methods and operational protocols will be included in the Phase III Application for the detailed landfill design.

Another impact on liner stability is the steep inclination of 2H:1V which had been included in previous Phase II and Phase III Applications. After consulting with NWM, AGC/Montrose is changing the subgrade side slope inclination to a reduced slope of 3H:1V. While some disposal volume is lost,

the increased stability provided by this changed side slope inclination will improve entire liner system stability for the entire project. In particular, for liner systems with long steep (i.e. 2H:1V) slopes, the protective cover atop the geosynthetic components of the liner system may not be placed on the upper slopes during cell construction, but may have to be constructed by operations as filling advances. This delay in placing protective cover could result in damage to the geosynthteic components of the liner system. By changing the side slope inclination to 3H:1V, it has been AGC/Montrose's experience that the protective cover can be placed along the entire length of the side slopes during initial cell construction, so that the protective cover is effective starting in the construction phase.

10.0 ECOLOGICAL CONSIDERATIONS

In its August 5, 2002 review letter the MDE made reference to comments received from other individuals and agencies related to endangered species that may be present near the site. The MDE stated that,

> *We anticipate that to properly address these issues, the occurrence of the identified species in the area will require further definition, and means to protect any species that exist in areas which may be impacted by the intended activities must be proposed. Please contact DNR concerning these issues, and keep us advised of your activities to address the issues raised*

On August 20, 2002, shortly after receipt of the MDE comment letter, McCarthy & Associates wrote a letter (for the applicant) to the Maryland Department of Natural Resources (DNR) Wildlife and Heritage Division requesting a meeting to discuss the proposed rubble landfill as it relates to endangered species and non-tidal wetlands of special state concern. A copy of the McCarthy & Associates letter is included in Appendix L.

Mr. McCarthy followed up the letter with numerous phone calls to the DNR requesting a meeting. DNR did not respond until October 21, 2003 more than a year after the initial request for a meeting. DNR's response letter is enclosed in Appendix L. The letter concludes that protection measures for rare species habitats should be addressed in the next phase, that is, Phase 3 engineering design. The applicant will therefore address the issue of endangered species during the next phase of work.

Comments from other individuals/agencies made reference to the Patuxent Ponds Park which is located immediately east of the property boundary along Patuxent Road. The ponds are located several hundred feet northeast of the proposed landfill boundary. According to the conceptual design, stormwater collected from the facility will be directed away from the ponds. BMP water quality facilities will be provided for storm water management ponds. The proposed outfalls will drain to established waterways which are not believed to be the habitat of species of concern.

The drainage area for the Patuxent Ponds is approximately 150 acres in extent. The landfill area will occupy less than 5 acres in this drainage area.

During operation of the landfill, water that formerly entered the perched zone and ultimately discharged to the Little Patuxent River will be collected in a drain system that will direct the flow to the Little Patuxent River after temporarily detaining the water in stormwater management ponds following storm events. The stormwater management ponds are designed to attenuate peak discharges from the site, spreading the discharge over a longer time-period than allowing direct, uncontrolled discharge. The groundwater flow model described in Section 5.3.2 indicates that the landfill will have negligible impact on the water table in the floodplain area.

11.0 GROUNDWATER APPROPRIATION PERMIT

The MDE's letter of August 5, 2002 asked whether landfill operations would require a groundwater appropriation permit, specifically, whether a groundwater appropriation permit would be needed to mine the thin layer of saturated sand (perched zone) that overlies the $1.0x10^{-8}$ cm/sec clay unit in Area B and to control groundwater remaining in the sand unit outside the excavation.

We contacted Mr. Mark Filar, the Chief of the MDE's Water Permit Section and described proposed landfill construction and operation. He indicated that MDE policy would not require a groundwater appropriation permit either for mining the saturated sand or for operating a perimeter drain that discharged to surface water. Mr. Filar said he would like to review site hydrogeology, the groundwater flow model, and the conceptual landfill design to confirm that permits would not be required for these operations.

Mr. Filar said that a permit would be needed to pump groundwater that is collected in the landfill excavation as a result of the management of perched groundwater (See Section 5.3.2). With the completion of the flow model, we are now in a position to quantify the appropriation request. In the next few weeks, we intend to submit an application for a groundwater appropriation permit for the amount of inflow predicted by the model.

Mr. Filar said that a surface water appropriation permit would be required to pump collected precipitation from the landfill cells. It is likely that the surface water component of the discharge from the pit will be substantially larger than the groundwater contribution. If this is the case Mr. Filar stated that the groundwater and surface water components would be combined into a single surface water appropriation permit.

The quantity of water specified in the appropriation permit will be dependent on landfill management, i.e. the number and the area of the cells that are open at any one time. We will submit the required water appropriation permit application after reviewing proposed landfill operation and management scenarios in order to determine the amount of pit area that will be open at any one time.

At this time, AGC/Montrose is not aware of whether an appropriation permit was obtained. We contacted the Water Supply Program office of MDE to ask if they had a record of issuing such a permit. After speaking with MDE, two applications were submitted in 2004: one for surface water and one for groundwater. However, in 2014, as a result of the Anne Arundel County declining to extend the special exceptions zoning permit, MDE withdrew the application. In speaking with MDE office of Water Supply Program, new applications would have to be submitted for both if dewatering effort were to occur at the site. As suggested elsewhere in this Report, the means of addressing perched groundwater will need to be addressed in more detail during the construction of the impacted cells as that construction effort is not expected to occur for at least ten (10) years after the preparation of this report. Conditions may change in the perched zone during that time, requiring alteration to any solution selected at this time.

12.0 CONCEPTUAL LANDFILL DESIGN

The conceptual landfill design is based on the predicted highest groundwater elevations described in previous sections of this report. In accordance with **COMAR** 26.04 .07.16, a liner system has been designed with a barrier to prevent liquid (i.e., leachate) from the landfill getting into the underlying substrate and groundwater. The liner system is anticipated to contain the following components:

- A subgrade preparation layer, with a thickness of 2-feet and a maximum permeability of 1×10^{-5} cm/sec
- A geosynthetic liner, with a minimum thickness of 50 mils and permeability not more than 1×10^{-10} cm/sec
- A leachate collection layer
- A 2-foot thick protective cover layer to protect the underlying materials from damage by equipment, vectors, or the elements.

The landfill will be separated into 16 cells. Each cell will be graded at 2 percent minimum slope to a sump where a submersible pump in a leachate riser pipe will be provided. Each sump elevation will be set as required to maintain at least 3 feet separation from the predicted highest groundwater elevations to the bottom of the subbase.

The preliminary subgrade grading plan is provided on Figure 3, and includes the orientation of the landfill cells and cell sumps. The perimeter access road, stormwater management ponds, leachate force main, and storage areas are also shown. Separate designations are provided for permanent groundwater monitoring wells depending upon whether they are screened above and below the clay confining bed.

The leachate collection and removal system includes the following components:

- Leachate collection layer across the floor of the landfill, with a minimum slope of 2%.
- Sump at the low spot in the landfill.
- Sump pumps located in the sump to convey water up the leachate riser pipe to a force main co-located with the perimeter road.
- Leachate storage tanks for holding the collected leachate before it is trucked off-site for treatment or treated on-site before discharge.

The Phase III Application will include detailed engineering drawings and supporting calculations for the design of the liner system and leachate collection and removal system.

Sediment control, perimeter ditches, and stormwater management pond design will be per AASCD requirements.

13.0 REFERENCES

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TABLES

TABLE 1
MONITORING WELL CONSTRUCTION SUMMARY

Well	Boring No.	Date Drilled	Status	Elevations (ft msl)		Screened Intervals	
				PVC	Ground	Depth (ft)	Elevation (ft msl)
MW-1	B-4	8/11/89	A	73.03	73.5	7.5 to 13	61 to 66
MW-3	B-13	8/14/89	I	84.89	85.1	45.3 to 55	30 to 40
MW-4	B-12	8/15/89	A	98.71	97.0	36 to 46	51 to 61
MW-5	B-14	8/16/89	A	104.51	104.7	44 to 54	51 to 61
MW-6	B-15	8/17/03	A	99.58	99.7	35.7 to 46	54 to 64
MW-9	B-5	8/21/03	I	99.50	99.8	53 to 63	37 to 47
MW-10	B-3	8/22/03	A	88.40	89.1	45 to 55	34 to 44
MW-11	B-4	8/23/03	I	73.82	74.0	28 to 38	36 to 46
MW-12	B-7	8/23/03	I	99.40	99.7	29 to 39	61 to 71
MW-13	B-11	8/24/03	I	149.01	147.9	63 to 73	75 to 85
MW-14	B-5	8/25/03	A	99.64	99.7	71 to 81	19 to 29
MW-15	B-28	4/19/91	A	169.07	169.0	73 to 83	86 to 96
MW-16	B-26	4/18/91	A	180.60	180.7	75 to 85	96 to 106
MW-17	-	4/8/03	A	118.24	118.0	3 to 8	110 to 115
MW-18	-	4/8/03	A	125.93	126.0	10.5 to 21	105 to 115
MW-19	-	4/10/03	A	133.03	133.6	20 to 30	104 to 114
MW-20	-	4/10/03	A	149.54	149.3	47.5 to 58	92 to 102
MW-21	-	4/14/03	A	153.64	153.7	52 to 62	92 to 102
MW-22	-	4/16/03	A	127.00	126.8	26 to 36	91 to 101
MW-23	-	4/16/03	I	124.36	124.3	60 to 70	54 to 64
MW-24	-	4/17/03	A	125.01	125.0	21 to 31	94 to 104
MW-25	-	4/21/03	A	114.14	114.4	37 to 47	67 to 77
MW-26	-	4/21/03	I	110.08	110.1	45 to 55	55 to 65
MW-27	-	4/21/03	A	110.02	109.9	3 to 8	102 to 107
MW-28	-	4/22/03	A	103.34	103.1	60 to 70	33 to 43
MW-29	-	4/23/03	A	99.69	99.9	13 to 23	77 to 87
MW-30	-	4/24/03	A	114.37	114.4	11 to 21	93 to 103
MW-31	-	4/23/03	I	115.04	115.0	48 to 58	57 to 67
PMW-6	-	5/14/13	A	81.50	81.50	10 to 30	51.5 to 71.5
PMW-11	-	4/22/13	A	143.50	143.50	200 to 220	-76.5 to -56.5
PMW-12	-	5/3/18	A	171.90	171.90	210 to 230	-58.1 to -38.1
PMW-13	-	5/15/13	A	158.40	158.40	250 to 270	-111.6 to -91.6
PMW-18	-	5/21/13	A	73.60	73.60	75 to 85	-11.4 to -1.4
PMW-19	-	4/18/13	A	103.30	103.30	80 to 90	13.3 to 23.3
PMW-23	-	6/5/13	A	164.10	164.10	208 to 228	-63.9 to -43.9
PMW-28	-	5/17/13	A	139.20	139.20	57 to 77	62.2 to 82.2

Status
A - active
I - inactive, casing broken off

Table 2
Residential Wells Within 1/2 Mile of Property Boundary

Well Permit	Map No.	Address	Completion Date	Total Depth	Screen				Pumping		Level		New 2019 Search
					Type	Top	Bot	Dia	Hrs	GPM	Before	After	
a	17	2805 5th Avenue	-	-	-	-	-	-	-	-	-	-	
AA742530	18	2811 5th Avenue	11/6/1980	130	PL	125	130	2	1	30	8	20	
AA943366	19	2815 5th Avenue	11/17/1998	137	PL	132	137	2	2	50	20	40	f
AA943176	20	2817 5th Avenue	10/2/1998	123	PL	116	123	2	2	50	10	40	f
AA819687	21	2821 5th Avenue	11/6/1988	125	PL	120	125	2	2	30	16	28	
a	22	2823 5th Avenue	-	-	-	-	-	-	-	-	-	-	
AA815356	23	2825 5th Avenue	9/25/1985	55	PL	50	55	2	1	10	13	20	
a	24	923 Patuxent	-	-	-	-	-	-	-	-	-	-	
AA819405	16	944 Patuxent	10/12/1987	122	PL	115	122	2	2	15	13	17	
a	15	946 Patuxent	-	160(b)	-	-	-	-	-	-	-	-	
a	13	955 Patuxent	-	12(b)	-	-	-	-	-	-	-	-	
AA947373	14	956 Patuxent	-	15(b)	-	-	-	-	-	-	-	-	f
AA742508	12	960 Patuxent	12/4/1980	149	PL	144	149	2	1	30	8	25	
AA887182	11	962 Patuxent	11/29/1991	84	PL	79	84	2	1	20	20	30	f
AA816858	8	963 Patuxent	-	-	-	-	-	-	-	-	-	-	f
a	9	966 Patuxent	-	-	-	-	-	-	-	-	-	-	
a	10	968 Patuxent	-	120(b)	-	-	-	-	-	-	-	-	
a	7	969 Patuxent	-	80(b)	-	-	-	-	-	-	-	-	
AA812032	5	976 Patuxent	8/5/1983	94	PL	89	94	2	1	25	20	30	
AA742841	4	977 Patuxent	3/9/1981	207	PL	202	207	2	1	25	8	15	f
a	6	980 Patuxent	-	375(b)			-						
AA942705	1	981 Patuxent	6/9/1998	87	PL	82	87	2	2	30	30	40	f
a	3	985 Patuxent	-	-	-	-	-	-	-	-	-	-	f
AA943612	2	987 Patuxent	2/5/1999	90	PL	80	90	2	3	20	65	80	f
a	27	1091 Patuxent	-	-	-	-	-	-	-	-	-	-	
a	25	1113 Patuxent	-	-	-	-	-	-	-	-	-	-	f
a	26	1117 Patuxent	-	-	-	-	-	-	-	-	-	-	
AA741300	29	1133 Patuxent	10/16/1979	160	PL	155	160	2	1	25	2	20	
a	28	1135 Patuxent		200(b)	-	-	-	-	-	-	-	-	
a	30	1166 Patuxent		25(b)	-	-	-	-	-	-	-	-	
AA731906	31	1170 Patuxent	8/25/1973	72	PL	67	72	2	1	10	40	48	
AA883690	32	1177 Patuxent	12/8/89	190	PL	185	190	2	1	50	10	30	f
a	34	1179 Patuxent	-	-	-	-	-	-	-	-	-	-	
a	33	1182 Patuxent	-	-	-		-	-	-	-	-	-	f
AA730145	80	1190 Patuxent	-	-	-		-	-	-	-	-	-	g
AA730145	35	1192 Patuxent	8/9/1972	193	PL	188	193	2	1	50	3	12	
AA953469	81	1194 Patuxent	-	-	-		-	-	-	-	-	-	g
AA818761	36	1196 Patuxent	7/30/1987	125	PL	120	125	2	1	10	25	40	
AA942136	37	1198 Patuxent	11/10/1997	115	PL	110	115	2	1	15	30	40	f
AA882615	38	1200 Patuxent	5/11/1989	114	PL	109	114	2	1	20	40	50	f
AA140211	82	1210 Patuxent	-	-	-		-	-	-	-	-	-	g
AA885118	83	1228 Patuxent	-	-	-		-	-	-	-	-	-	g
AA943297	84	1250 Patuxent	-	-	-		-	-	-	-	-	-	g
AA732071	d	? Patuxent	10/9/1973	70	PL	65	70	2	1	20	15	28	
AA810049	66	1122 Brager	1/20/1982	81	PL	76	81	2	1	12	40	50	f
Spring (c)	69A	1124 Brager	-	-	-	-	-	-	-	-	-	-	
Spring (c)	69B	1128 Brager	-	-	-	-	-	-	-	-	-	-	
Spring (c)	69C	1130 Brager	-	-	-	-	-	-	-	-	-	-	
AA816051	53	1201 Collins	4/7/1986	205	PL	200	205	2	1	15	110	130	
AA813754	52	1203 Collins	9/27/1984	182	PL	177	182	2	2	7	95	105	
AA819495	54	1207 Collins	-	-	-	-	-	-	-	-	-	-	
AA160439	85	1211 Collins	-	-	-	-	-	-	-	-	-	-	g
AA811194	55	1214 Collins	12/31/1982	205	PL	200	205	2	1	20	110	120	f
AA130846	86	1215 Collins	-	-	-	-	-	-	-	-	-	-	g
AA742573	56	1221 Collins	11/24/1980	262	PL	257	262	2	1	15	110	120	
AA817406	57	1227 Collins	10/31/1986	215	PL	208	215	2	6	40	140	180	
AA130378	87	1231 Collins	-	-	-	-	-	-	-	-	-	-	g
AA943264	68	1239 Collins	10/31/1998	260	PL	255	260	2	2	25	130	140	f
a	58	1245 Collins	-	-	-	-	-	-	-	-	-	-	f
AA881020	59	1254 Collins	10/26/1988	350	PL	345	350	2	1	30	160	180	f
a	60	254A Collins	-	-	-	-	-	-	-	-	-	-	
AA811176	61	1255 Collins	12/16/1982	300	PL	295	300	2	1	25	125	140	f
a	62	1257 Collins	-	-	-	-	-	-	-	-	-	-	
a	63	1259 Collins	-	-	-	-	-	-	-	-	-	-	
a	64	1261 Collins	-	-	-	-	-	-	-	-	-	-	
AA810820	65	1264 Collins	3/17/1983	238	PL	231	238	2	2	30	108	130	
AA812492	d	? Collins	3/22/1984	278	PL	271	278	2	2	30	110	130	
AA817406	88	2227 Collins	-	-	-	-	-	-	-	-	-	-	g/d
AA741350	51	2751 Conway	-	-	-	-	-	-	-	-	-	-	f
AA882979	67	2754 Conway	11/18/1989	283	PL	273	283	3	4	150	45	120	f
Spring (c)	70A	2762 Conway	-	-	-	-	-	-	-	-	-	-	f

Table 2
Residential Wells Within 1/2 Mile of Property Boundary

Well Permit	Map No.	Address	Completion Date	Total Depth	Screen				Pumping		Level		New 2019 Search
					Type	Top	Bot	Dia	Hrs	GPM	Before	After	
Spring (c)	70B	2764 Conway	-	-	-	-	-	-	-	-	-	-	
AA812350	50	2774 Conway	10/27/1983	245	PL	225	245	2	4	15	140	150	f
AA742104	89	2801 Conway	-	-	-	-	-	-	-	-	-	-	g
AA945923	90	2801 Conway	-	-	-	-	-	-	-	-	-	-	g
a	49	2860 Conway	-	-	-	-	-	-	-	-	-	-	
AA738073	48	2944 Conway	9/28/1977	105	PL	64	69	2	1	10	75	80	
a	46	2946 Conway	-	-	-	-	-	-	-	-	-	-	
AA733273	45	2947 Conway	8/23/1974	250	PL	240	250	2	4	15	60	80	
a	47	2948 Conway	-	315(b)	-	-	-	-	-	-	-	-	
AA888563	76	2966 Conway	11/24/1992	287	PL	280	287	2	2	60	125	160	f
a	44	2969 Conway	-	-	-	-	-	-	-	-	-	-	
AA819395	43	2973 Conway	-	e	-	-	-	-	-	-	-	-	f
AA739729	41	2975 Conway	10/26/1978	248	PL	243	248	2	1	15	55	60	
AA922014	42	2981 Conway	7/5/1988	240	PL	235	240	2	1	100	60	100	f
AA922014	77	2981 Conway	9/29/1994	250	PL	240	250	3	3	100	66	120	
AA811580	40	2987 Conway	4/15/1983	72	PL	60	72	4	3	18	40	51	
AA921911	78	2989 Conway	2/6/1995	245	PL	240	245	2	1	20	60	80	f
AA940320	39	2993 Conway	4/16/1996	229	PL	224	229	2	1	20	80	90	f
AA810820	91	1264 Lucinda Ln	-	-	-	-	-	-	-	-	-	-	g
AA954054	92	1222 Lucinda Ln.	-	-	-	-	-	-	-	-	-	-	g/d
AA732509	d	? PRIVATE	2/8/1974	140	PL	130	140	3	2	15	73		

Notes:

a. No permit tag on well.
b. Depth reported by resident.
c. Spring reported by resident when interviews were conducted in 1989 and 1990.
d. Well listed because it was idenified as being within 1/2 mile of the site based on a grid search of the MDE's well database; however, the well could not be located in the field, possibly because the grid was incorrectly entered on the completion report or in the database.
e. Depth of well reported to be 30 feet by owner Albert Rollins in 1990; however at the informational hearing on 12/3/01, Mr. Rollins states that his well is 335-feet deep. MDE files have no completion report for a well at 2973 Conway Road.

f. Wells that were found in 2002/2003 well search and found again in the 2019 well seach
g. New wells that have been found since the 2002/2003 well seach added to list and numbered 80 or higher

TABLE 3
CHESAPEAKE TERRACE MONITORING WELL DEPTH TO WATER MEASUREMENTS

Well ID	HYDRO-GEOLOGIC UNIT	HYDRO-GEOLOGIC AREA	TOP OF WELL CASING ELEVATION (FT MSL)[d]	09/14/89	10/30/89	11/20/89	12/27/89	01/22/90	02/26/90	04/13/90	05/13/90	06/01/90	07/11/90	08/24/90	08/19/02	09/26/02	10/25/02	11/25/02	12/23/02
MW-3	Water Table	A	84.89	17.98	17.54	17.52	17.78	17.58	17.39	17.24	16.54	NR	NR	NR	20.79	21.15	20.58	19.72	19.32
MW-4	Water Table	A	98.71	28.32	28.22	28.35	28.54	28.43	28.29	28.14	27.29	27.69	28.12	28.16	31.44	31.85	31.81	31.46	31.26
MW-5	Water Table	A	104.51	33.22	33.33	33.29	33.32	33.25	33.30	33.13	32.50	32.84	32.94	33.11	35.69	35.98	35.92	35.79	35.73
MW-6	Water Table	A	99.58	26.95	25.92	25.59	26.32	25.96	25.99	25.69	24.95	25.26	26.46	26.76	30.43	30.87	30.83	29.41	28.35
MW-12	Water Table	A	99.40	18.74	20.74	22.20	22.98	22.94	22.91	22.65	22.22	22.17	23.26	23.33	NR	NR	NR	NR	NR
MW-13	Water Table	A	149.01	73.38	73.38	73.48	73.47	73.42	73.44	73.39	73.21	73.00	72.43	70.35	NR	NR	NR	NR	NR
MW-25	Perched	A	114.14	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
PMW-6	Above Clay	A	75.50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
PMW-28	Above Clay	A	141.50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-15	Perched	B	169.07	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	80.45	80.54	80.58	80.67	80.65
MW-16	Perched	B	180.60	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	81.48	81.63	81.78	81.92	82.04
MW-17	Perched	B	118.24	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-18	Perched	B	125.93	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-19	Perched	B	133.03	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-20	Perched	B	149.54	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-21	Perched	B	153.64	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-22	Perched	B	127.00	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-23	Perched	B	124.36	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-24	Perched	B	125.01	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
PMW-11	Below Clay	B	145.50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
PMW-12	Below Clay	B	166.50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
PMW-13	Below Clay	B	166.50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
PMW-23	Below Clay	B	163.50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-26	Perched	TA	110.08	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-27	Perched	TA	110.02	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-29	Semi Confined	TA	99.69	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-30	Perched	TA	114.37	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-31	Perched	TA	115.04	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
MW-1	Perched	TB	73.03	6.08	2.89	2.27	3.78	2.77	3.06	2.33	2.23	2.18	5.44	4.90	8.13	8.88	8.29	3.08	1.67
MW-9	Perched	TB	99.50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	31.01	31.77	31.91	31.74	31.30
MW-10	Confined	TB	88.40	21.82	21.12	20.81	21.30	22.02	21.82	21.59	21.33	21.10	22.17	22.03	26.97	26.59	25.67	24.62	24.45
MW-11	Confined	TB	73.82	9.83	8.24	NR	10.69	6.34	6.26	5.94	5.93	5.97	6.69	6.85	10.83	10.85	10.35	9.87	9.14
MW-14	Confined	TB	99.64	34.16	33.53	33.10	33.56	34.22	33.27	33.39	33.29	33.09	34.20	34.37	39.51	39.52	38.69	37.90	37.45
MW-28	Confined	TB	103.34	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
PMW-18	Below Clay	TB	73.50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
PMW-19	Below Clay	TB	109.50	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

NOTES:

1.) DTW = Depth to water
2.) FT = Feet
3.) FT MSL = Feet mean sea level
4.) NR = No reading
5.) a = Value is believed to be erroneous due to significant deviation from historical average
6.) b = Well not accessible
7.) c = Assumed MW-1 based on depth to bottom of well. MW-11 not found
8.) d = MW TOP OF CASING FROM DEC. 5, 2003, ADDENDUM 2 REPORT BY SCHULTZ, TABLE 1;
PMW TOP OF CASING FROM FROM 2013 GOLDER ASSOCIATES INC. WELL LOGS;
PMW-19 AND PMW-23 TOP OF CASING ESTIMATED TO BE 0.5 FT BELOW GROUND ELEVATION BASED ON THE WELL CONSTRUCTION LOGS

TABLE 3
CHESAPEAKE TERRACE MONITORING WELL DEPTH TO WATER MEASUREMENTS

DTW (FT)

01/28/03	03/04/03	03/27/03	04/28/03	05/28/03	06/23/03	07/21/03	08/25/03	09/16/03	10/15/03	11/08/03	05/28/13	06/27/13	07/29/13	08/27/13	09/23/13	10/29/13	12/06/13	01/31/14	02/24/14 & 02/28/14
18.80	17.92	17.05	17.31	17.25	15.89	16.93	17.68	17.99	17.69	17.55	16.10	15.79	16.91	17.40	18.00	17.62	17.53	16.66	15.92
30.78	30.44	29.61	29.04	28.94	28.00	27.85	28.35	28.57	28.43	28.45	29.55	29.31	29.91	30.21	30.67	30.73	30.80	NR[b]	29.92
35.45	35.21	34.85	34.34	34.04	33.49	33.22	33.32	33.37	33.19	33.17	32.03	31.84	32.29	28.53	32.78	32.86	32.99	32.62	32.43
28.08	NR	25.68	25.77	25.23	24.15	24.70	25.88	25.74	25.04	24.67	26.84	26.80	28.51	29.09	29.73	29.68	29.53	27.80	26.45
NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	70.90	71.74	68.86	69.71	72.59	DRY	DRY	DRY
NR	NR	NR	35.97	35.36	35.21	34.79	34.55	34.43	34.01	34.35	35.68	35.51	35.82	33.22	36.02	36.14	36.24	36.06	36.19
NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	14.14	14.09	15.79	16.41	17.08	16.19	15.81	14.75	13.49
NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	65.62	65.49	66.08	66.07	66.54	66.76	67.03	66.46	66.32
NR	NR	80.70	80.76	80.70	80.53	80.39	80.02	79.58	78.92	79.07	80.24	80.36	80.47	80.47	80.59	80.49	80.56	80.57	80.26
82.13	82.24	81.96	82.43	81.91	81.54	80.79	79.66	79.02	78.48	78.39	63.85	79.91	80.21	80.02	80.11	80.00	79.87	79.80	80.07
NR	NR	NR	1.14	0.83	0.71	1.05	2.20	1.95	1.42	1.12	1.49	1.03	2.95	3.41	3.89	3.04	3.08	1.75	0.08
NR	NR	NR	11.04	11.15	9.70	9.65	10.78	11.37	11.41	11.75	14.22	13.65	13.93	14.28	14.57	14.87	15.20	14.46	14.09
NR	NR	NR	21.06	20.88	20.05	19.04	19.17	19.50	19.81	20.13	24.45	23.94	23.59	23.75	24.13	24.68	25.12	24.68	24.38
NR	NR	NR	44.50	43.65	42.93	41.68	41.17	41.31	41.40	41.69	45.41	NR[b]	44.95	44.81	44.93	45.21	45.45	45.66	45.65
NR	NR	NR	55.57	55.31	55.15	54.77	54.19	53.94	53.73	53.72	55.61	55.65	55.67	55.50	55.51	55.53	55.64	55.61	55.69
NR	NR	NR	26.39	26.10	25.40	25.20	25.53	25.74	25.64	25.94	27.59	27.45	27.42	27.51	27.69	27.91	28.17	28.03	27.78
NR	NR	NR	67.45	61.04	51.71	42.18	35.32	32.64	30.42	29.07	NR	NR	NR	NR	NR	NR	NR	NR	NR
NR	NR	NR	17.77	17.19	16.13	15.07	15.02	15.26	15.25	15.57	19.51	19.24	19.13	19.08	19.16	19.32	19.52	19.55	19.43
NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	82.46	82.48	84.13	84.09	85.47	84.65	85.68	84.73	81.97
NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	113.52	112.50	114.26	114.19	115.62	114.73	115.82	114.87	111.98
NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	99.87	99.95	101.76	101.65	103.19	102.23	103.37	102.42	99.31
NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	104.82	106.51	106.51	107.99	107.10	108.23	107.28	102.23
NR	NR	NR	51.26	44.21	33.61	28.25	23.47	21.00	18.92	17.67	NR	NR	NR	NR	NR	NR	NR	NR	NR
NR	NR	NR	0.96	0.84	0.81	0.72	1.15	1.19	0.99	0.84	2.19	1.57	2.09	1.49	3.70	1.92	2.71	3.15	1.64
NR	NR	NR	3.31	3.19	2.93	2.93	3.18	3.60	3.35	3.17	3.75	3.71	4.03	5.53	6.68	4.87	4.36	3.79	3.04
NR	NR	NR	9.27	9.45	6.71	8.23	10.47	11.32	10.88	11.15	12.88	12.21	12.94	13.41	13.74	13.82	13.83	13.09	12.62
NR	NR	NR	NR	51.87	43.38	32.14	25.39	23.43	21.78	21.24	NR	NR	NR	NR	NR	NR	NR	NR	NR
2.65	1.17	1.51	2.13	1.24	1.31	3.04	4.09	2.75	2.24	1.39	3.01	3.39	5.38	6.36	7.64	5.34	3.20	2.63	1.58
30.63	29.99	29.51	29.16	29.08	29.10	29.21	29.43	29.56	29.44	29.30	NR	NR	NR	NR	NR	NR	NR	NR	NR
23.85	23.18	23.15	23.43	23.00	22.44	22.78	23.17	22.98	21.95	21.82	24.32	24.30	25.37	23.78	27.02	26.21	27.06	26.17	23.74
8.29	7.61	6.14	6.23	6.74	7.18	7.47	7.57	7.42	7.12	6.41	NR	NR	NR	NR	NR	NR	NR	NR	NR
36.55	35.90	35.90	36.01	35.94	35.53	35.53	35.59	35.50	35.17	34.22	37.03	36.35	38.25	38.61	39.83	38.82	39.75	38.72	30.49
NR	NR	NR	39.15	38.79	38.20	38.53	38.91	38.74	37.53	37.53	40.08	40.00	41.62	41.73	42.97	42.18	43.07	42.17	39.62
NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	11.44	11.39	12.97	13.08	14.36	13.51	14.43	13.57	10.83
NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	40.28	40.20	41.64	41.66	42.79	42.43	43.11	42.34	39.71

TABLE 3
CHESAPEAKE TERRACE MONITORING WELL DEPTH TO WATER MEASUREMENTS

03/24/14	04/21/14	05/28/14	06/16/14	11/29/18
15.69	4.97	14.77	NR	NR
29.45	28.92	28.24	28.32	29.74
32.21	31.92	31.39	NR	32.70
26.33	25.51	24.97	NR	26.86
NR	NR	NR	NR	NR
DRY	DRY	72.35	71.47	NR
36.11	35.43	35.32	35.21	35.86
13.55	12.80	12.09	NR	12.84
66.12	68.42	64.80	NR	66.82
80.85	83.00	80.39	80.55	80.40
82.22	79.89	79.94	79.75	82.50
1.01	0.86	0.50	1.00	0.83
13.38	12.43	11.11	11.34	12.40
23.19	22.41	20.92	20.50	22.25
45.19	44.69	43.64	43.02	44.00
55.71	55.47	55.73	55.14	54.30
27.43	26.91	26.35	26.25	27.70
NR	NR	NR	NR	NR
19.05	18.54	17.55	17.08	17.75
81.85	83.05	81.90	82.27	85.85
111.20	113.13	112.94	112.34	116.20
99.21	100.58	99.31	99.77	104.00
104.13	105.47	104.24	104.65	109.80
NR	NR	NR	NR	NR
1.60	1.51	0.80	0.50	0.91
3.37	3.15	3.08	NR	3.34
11.98	10.77	9.68	10.07	NR
NR	NR	NR	NR	15.90
2.01	1.83	0.47	2.76	1.84
NR	NR	NR	NR	1.79
23.66	24.71	23.62	23.95	27.11
NR	NR	NR	NR	NR
34.05	35.71	30.85	NR	NR
39.49	40.58	39.52	39.89	43.56
10.85	11.92	26.95	11.17	14.67
39.66	40.69	39.66	40.00	43.25

TABLE 4A

Groundwater Elevation Data for Hydrogeologic Area A (FT MSL)

Date	MW-3	MW-4	MW-5	MW-6	MW-12	MW-13	MW-25	PMW-6	PMW-28
09/14/89	66.91	70.39	71.29	72.63	80.66	75.63	NR	NR	NR
10/30/89	67.35	70.49	71.18	73.66	78.66	75.63	NR	NR	NR
11/20/89	67.37	70.36	71.22	73.99	77.20	75.53	NR	NR	NR
12/27/89	67.11	70.17	71.19	73.26	76.42	75.54	NR	NR	NR
01/22/90	67.31	70.28	71.26	73.62	76.46	75.59	NR	NR	NR
02/26/90	67.50	70.42	71.21	73.59	76.49	75.57	NR	NR	NR
04/13/90	67.65	70.57	71.38	73.89	76.75	75.62	NR	NR	NR
05/13/90	68.35	71.42	72.01	74.63	77.18	75.80	NR	NR	NR
06/01/90	NR	71.02	71.67	74.32	77.23	76.01	NR	NR	NR
07/11/90	NR	70.59	71.57	73.12	76.14	76.58	NR	NR	NR
08/24/90	NR	70.55	71.40	72.82	76.07	78.66	NR	NR	NR
08/19/02	64.10	67.27	68.82	69.15	NR	NR	NR	NR	NR
09/26/02	63.74	66.86	68.53	68.71	NR	NR	NR	NR	NR
10/25/02	64.31	66.90	68.59	68.75	NR	NR	NR	NR	NR
11/25/02	65.17	67.25	68.72	70.17	NR	NR	NR	NR	NR
12/23/02	65.57	67.45	68.78	71.23	NR	NR	NR	NR	NR
01/28/03	66.09	67.93	69.06	71.50	NR	NR	NR	NR	NR
03/04/03	66.97	68.27	69.30	NR	NR	NR	NR	NR	NR
03/27/03	67.84	69.10	69.66	73.90	NR	NR	NR	NR	NR
04/28/03	67.58	69.67	70.17	73.81	NR	NR	78.17	NR	NR
05/28/03	67.64	69.77	70.47	74.35	NR	NR	78.78	NR	NR
06/23/03	69.00	70.71	71.02	75.43	NR	NR	78.93	NR	NR
07/21/03	67.96	70.86	71.29	74.88	NR	NR	79.35	NR	NR
08/25/03	67.21	70.36	71.19	73.70	NR	NR	79.59	NR	NR
09/16/03	66.90	70.14	71.14	73.84	NR	NR	79.71	NR	NR
10/15/03	67.20	70.28	71.32	74.54	NR	NR	80.13	NR	NR
11/08/03	67.34	70.26	71.34	74.91	NR	NR	79.79	NR	NR
05/28/13	68.79	69.16	72.48	72.74	NR	NR	78.46	61.36	75.88
06/27/13	69.10	69.40	72.67	72.78	NR	78.11	78.63	61.41	76.01
07/29/13	67.98	68.80	72.22	71.07	NR	77.27	78.32	59.71	75.42
08/27/13	67.49	68.50	75.98	70.49	NR	80.15	80.92	59.09	75.43
09/23/13	66.89	68.04	71.73	69.85	NR	79.30	78.12	58.42	74.96
10/29/13	67.27	67.98	71.65	69.90	NR	76.42	78.00	59.31	74.74
12/06/13	67.36	67.91	71.52	70.05	NR	+	77.90	59.69	74.47
01/31/14	68.23	NR	71.89	71.78	NR	+	78.08	60.75	75.04
02/24/14 & 02/28/14 (note 6)	68.97	68.79	72.08	73.13	NR	+	77.95	62.01	75.18
03/24/14	69.20	69.26	72.30	73.25	NR	+	78.03	61.95	75.38
04/21/14	**79.92**	69.79	72.59	74.07	NR	+	78.71	62.70	73.08
05/28/14	70.12	70.47	73.12	74.61	NR	76.66	78.82	63.41	76.70
06/16/14	NR	70.39	+	+	NR	77.54	78.93	+	+
11/29/18	NR	68.97	71.81	72.72	NR	NR	78.28	62.66	74.68
01/10/19	NR	69.95	72.44	73.56	NR	NR	78.72	62.88	76.20
02/15/19	NR	70.31	72.94	74.2	NR	NR	79.41	63.2	77.16
Highest Recorded	70.12	71.42	75.98	75.43	80.66	80.15	80.92	63.41	78.28
Lowest Recorded	63.74	66.86	68.53	68.71	76.07	75.53	77.90	58.42	73.08
Difference high to low	**6.38**	**4.56**	**7.45**	**6.72**	**4.59**	**4.62**	**3.02**	**4.99**	**5.20**
Average	67.65	69.45	71.24	72.75	77.21	76.76	78.82	61.24	75.36
Depressed (01/29/13)	67.27	67.98	71.65	69.9	NR	76.42	78	59.31	74.74
Elevated (03/24/14)	69.2	69.26	72.3	73.25	NR	NR	78.03	61.95	75.38

NOTES:

1.) FT MSL = Feet mean sea level

2.) NR = No reading because the well did not exist on the listed date.

+ = Prior to AGC involvement; data not collected by previous consultant.

NF = Well was not found in the field by the field team.

3.) Depressed values are the observed water level elevations on the day when the average water level elevations were lowest (10/29/13)

4.) Elevated values are the observed water level elevations on the day the average water level elevations were highest (3/24/14)

5) **Bold red** readings are disregarded because they are believed to contain errors as they are so significantly different than the readings the month before and after.

6) Readings were taken over two days. One reading was taaken at each well during the two day period.

TABLE 4B

Groundwater Elevation Data for Hydrogeologic Area B (FT MSL)

Date	MW-15	MW-16	MW-17	MW-18	MW-19	MW-20	MW-21	MW-22	MW-24	PMW-11	PMW-12	PMW-13	PMW-23
09/14/89	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
10/30/89	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
11/20/89	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
12/27/89	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
01/22/90	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
02/26/90	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
04/13/90	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
05/13/90	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
06/01/90	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
07/11/90	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
08/24/90	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
08/19/02	88.62	99.12	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
09/26/02	88.53	98.97	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
10/25/02	88.49	98.82	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
11/25/02	88.40	98.68	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
12/23/02	88.42	98.56	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
01/28/03	+	98.47	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
03/04/03	+	98.36	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
03/27/03	88.37	98.64	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
04/28/03	88.31	98.17	117.10	114.89	111.97	105.04	98.07	100.61	107.24	NR	NR	NR	NR
05/28/03	88.37	98.69	117.41	114.78	112.15	105.89	98.33	100.90	107.82	NR	NR	NR	NR
06/23/03	88.54	99.06	117.53	116.23	112.98	106.61	98.49	101.60	108.88	NR	NR	NR	NR
07/21/03	88.68	99.81	117.19	116.28	113.99	107.86	98.87	101.80	109.94	NR	NR	NR	NR
08/25/03	89.05	100.94	116.04	115.15	113.86	108.37	99.45	101.47	109.99	NR	NR	NR	NR
09/16/03	89.49	101.58	116.29	114.56	113.53	108.23	99.70	101.26	109.75	NR	NR	NR	NR
10/15/03	90.15	102.12	116.82	114.52	113.22	108.14	99.91	101.36	109.76	NR	NR	NR	NR
11/08/03	90.00	102.21	117.12	114.18	112.90	107.85	99.92	101.06	109.44	NR	NR	NR	NR
05/28/13	88.83	**116.75**	116.75	111.71	108.58	104.13	98.03	99.41	105.50	63.04	52.98	66.63	NR
06/27/13	88.71	100.69	117.21	112.28	109.09	+	97.99	99.55	105.77	63.02	54.00	66.55	58.68
07/29/13	88.60	100.39	115.29	112.00	109.44	104.59	97.97	99.58	105.88	61.37	52.24	64.74	56.99
08/27/13	88.60	100.58	114.83	111.65	109.28	104.73	98.14	99.49	105.93	61.41	52.31	64.85	56.99
09/23/13	88.48	100.49	114.35	111.36	108.90	104.61	98.13	99.31	105.85	60.03	50.88	63.31	55.51
10/29/13	88.58	100.60	115.20	111.06	108.35	104.33	98.11	99.09	105.69	60.85	51.77	64.27	56.40
12/06/13	88.51	100.73	115.16	110.73	107.91	104.09	98.00	98.83	105.49	59.82	50.68	63.13	55.27
01/31/14	88.50	100.80	116.49	111.47	108.35	103.88	98.03	98.97	105.46	60.77	51.63	64.08	56.22
02/24/14 & 02/28/14 (note 6)	88.81	100.53	+	111.84	108.65	103.89	97.95	99.22	105.58	63.53	54.52	67.19	61.27
03/24/14	88.22	98.38	117.23	112.55	109.84	104.35	97.93	99.57	105.96	63.65	55.30	67.29	59.37
04/21/14	86.07	100.71	117.38	113.50	110.62	104.85	98.17	100.09	106.47	62.45	53.37	65.92	58.03
05/28/14	88.68	100.66	117.74	114.82	112.11	105.90	97.91	100.65	107.46	63.60	53.56	67.19	59.26
06/16/14	88.52	100.85	117.24	114.59	112.53	106.52	98.50	100.75	107.93	63.23	54.16	66.73	58.85
11/29/18	88.67	98.10	117.41	113.53	110.78	105.54	99.34	99.30	107.26	59.65	50.30	62.50	53.70
01/10/19	88.88	101.10	117.45	114.10	111.17	106.47	98.67	100.36	107.89	59.95	51.11	63.44	55.16
02/15/19	89.41	101.84	117.54	114.87	113.19	107.38	99.24	101.55	108.91	62.21	52.91	65.37	57.55
Highest Recorded	90.76	104.51	117.74	116.28	113.99	108.46	100.38	101.80	109.99	63.65	55.30	67.29	61.27
Lowest Recorded	88.22	98.10	114.35	110.73	107.91	103.88	97.91	98.83	105.46	59.65	50.30	62.50	53.70
Difference high to low	**2.54**	**6.41**	**3.39**	**5.55**	**6.08**	**4.58**	**2.47**	**2.97**	**4.53**	**4.00**	**5.00**	**4.79**	**7.57**
Average	88.65	100.48	116.64	113.44	110.97	105.79	98.54	100.24	107.33	61.79	52.61	65.20	57.28
Depressed (02/24/14)	88.52	100.85	117.24	114.59	112.53	106.52	98.5	100.75	107.93	63.23	54.16	66.73	58.85
Elevated (06/16/14)	88.81	100.53	NR	111.84	108.65	103.89	97.95	99.22	105.58	63.53	54.52	67.19	61.27
	SHALLOWER FORMATION									DEEPER FORMATION			

NOTES:

1.) FT MSL = Feet mean sea level

2.) NR = No reading because the well did not exist on the listed date.

+ = Prior to AGC involvement; data not collected by previous consultant.

NF = Well was not found in the field by the field team.

3.) Depressed values are the observed water level elevations on the day when the average water level elevations were lowest (2/24/14)

4.) Elevated values are the observed water level elevations on the day the average water level elevations were highest (6/16/14)

5) **Bold red** readings are disregarded because they are believed to contain errors as they are so significantly different than the readings the month before and after.

6) Readings were taken over two days. One reading was taaken at each well during the two day period.

Table 4C

Groundwater Elevation Data for Hydrogeologic Area TA (FT MSL)

Date	MW-26	MW-27	MW-29	MW-30
09/14/89	NR	NR	NR	NR
10/30/89	NR	NR	NR	NR
11/20/89	NR	NR	NR	NR
12/27/89	NR	NR	NR	NR
01/22/90	NR	NR	NR	NR
02/26/90	NR	NR	NR	NR
04/13/90	NR	NR	NR	NR
05/13/90	NR	NR	NR	NR
06/01/90	NR	NR	NR	NR
07/11/90	NR	NR	NR	NR
08/24/90	NR	NR	NR	NR
08/19/02	NR	NR	NR	NR
09/26/02	NR	NR	NR	NR
10/25/02	NR	NR	NR	NR
11/25/02	NR	NR	NR	NR
12/23/02	NR	NR	NR	NR
01/28/03	NR	NR	NR	NR
03/04/03	NR	NR	NR	NR
03/27/03	NR	NR	NR	NR
04/28/03	58.82	109.06	96.38	105.10
05/28/03	65.87	109.18	96.50	104.92
06/23/03	76.47	109.21	96.76	107.66
07/21/03	81.83	109.30	96.76	106.14
08/25/03	86.61	108.87	96.51	103.90
09/16/03	89.08	108.83	96.09	103.05
10/15/03	91.16	109.03	96.34	103.49
11/08/03	92.41	109.18	96.52	103.22
05/28/13	+	107.83	95.94	101.49
06/27/13	+	108.45	95.98	102.16
07/29/13	+	107.93	95.66	101.43
08/27/13	+	108.53	94.16	100.96
09/23/13	+	106.32	93.01	100.63
10/29/13	+	108.10	94.82	100.55
12/06/13	+	107.31	95.33	100.54
01/31/14	+	106.87	95.90	101.28
02/24/14 & 02/28/14 (note 5)	+	108.38	96.65	101.75
03/24/14	+	108.42	96.32	102.39
04/21/14	+	108.51	96.54	103.60
05/28/14	+	109.22	96.61	104.69
06/16/14	+	109.52	+	104.30
11/29/18	NF	109.11	96.35	NF
01/10/19	NF	NF	96.62	104.32
02/15/19	97.64	109.48	96.68	104.23
Highest Recorded	98.26	109.52	96.76	105.10
Lowest Recorded	58.82	106.32	93.01	100.54
Difference high to low	**39.44**	**3.20**	**3.75**	**4.56**
Average	82.21	108.55	96.02	103.12
Depressed (05/28/03)	65.87	109.18	96.5	104.92
Elevated (11/08/03)	92.41	109.18	96.52	103.22

NOTES:

1.) FT MSL = Feet mean sea level

2.) NR = No reading because the well did not exist on the listed date.

+ = Prior to AGC involvement; data not collected by previous consultant.

NF = Well was not found in the field by the field team.

3.) Depressed values are the observed water level elevations on the day when the average water level elevations were lowest (5/28/03)

4.) Elevated values are the observed water level elevations on the day the average water level elevations were highest (11/08/03)

5) Readings were taken over two days. One reading was taaken at each well during the two day period.

Table 4D

Groundwater Elevation Data for Hydrogeologic Area TB (FT MSL)

Date	MW-1	MW-9	MW-10	MW-11	MW-14	MW-28	PMW-18	PMW-19
09/14/89	66.95	NR	66.58	63.99	65.48	NR	NR	NR
10/30/89	70.14	NR	67.28	65.58	66.11	NR	NR	NR
11/20/89	70.76	NR	67.59	+	66.54	NR	NR	NR
12/27/89	69.25	NR	67.10	63.13	66.08	NR	NR	NR
01/22/90	70.26	NR	66.38	67.48	65.42	NR	NR	NR
02/26/90	69.97	NR	66.58	67.56	66.37	NR	NR	NR
04/13/90	70.70	NR	66.81	67.88	66.25	NR	NR	NR
05/13/90	70.80	NR	67.07	67.89	66.35	NR	NR	NR
06/01/90	70.85	NR	67.30	67.85	66.55	NR	NR	NR
07/11/90	67.59	NR	66.23	67.13	65.44	NR	NR	NR
08/24/90	68.13	NR	66.37	66.97	65.27	NR	NR	NR
08/19/02	64.90	68.49	61.43	62.99	60.13	NR	NR	NR
09/26/02	64.15	67.73	61.81	62.97	60.12	NR	NR	NR
10/25/02	64.74	67.59	62.73	63.47	60.95	NR	NR	NR
11/25/02	69.95	67.76	63.78	63.95	61.74	NR	NR	NR
12/23/02	71.36	68.20	63.95	64.68	62.19	NR	NR	NR
01/28/03	70.38	68.87	64.55	65.53	63.09	NR	NR	NR
03/04/03	71.86	69.51	65.22	66.21	63.74	NR	NR	NR
03/27/03	71.52	69.99	65.25	67.68	63.74	NR	NR	NR
04/28/03	70.90	70.34	64.97	67.59	63.63	64.19	NR	NR
05/28/03	71.79	70.42	65.40	67.08	63.70	64.55	NR	NR
06/23/03	71.72	70.40	65.96	66.64	64.11	65.14	NR	NR
07/21/03	69.99	70.29	65.62	66.35	64.11	64.81	NR	NR
08/25/03	68.94	70.07	65.23	66.25	64.05	64.43	NR	NR
09/16/03	70.28	69.94	65.42	66.40	64.14	64.60	NR	NR
10/15/03	70.79	70.06	66.45	66.70	64.47	65.81	NR	NR
11/08/03	71.64	70.20	66.58	67.41	65.42	65.81	NR	NR
05/28/13	70.02	+	64.08	+	62.61	63.26	62.06	69.22
06/27/13	69.64	+	64.10	+	63.29	63.34	62.11	69.30
07/29/13	67.65	+	63.03	+	61.39	61.72	60.53	67.86
08/27/13	66.67	+	64.62	+	61.03	61.61	60.42	67.84
09/23/13	65.39	+	61.38	+	59.81	60.37	59.14	66.71
10/29/13	67.69	+	62.19	+	60.82	61.16	59.99	67.07
12/06/13	69.83	+	61.34	+	59.89	60.27	59.07	66.39
01/31/14	70.40	+	62.23	+	60.92	61.17	59.93	67.16
02/24/14 & 02/28/14 (note 7)	71.45	+	64.66	+	69.15	63.72	62.67	69.79
03/24/14	71.02	+	64.74	+	65.59	63.85	62.65	69.84
04/21/14	71.20	+	63.69	+	63.93	62.76	61.58	68.81
05/28/14	72.56	+	64.78	+	68.79	63.82	**46.55**	69.84
06/16/14	70.27	+	64.45	+	+	63.45	62.33	69.50
11/29/18	71.19	**97.71**	61.29	NF	NF	59.78	58.83	66.25
01/10/19	70.85	**82.41**	62.04	NF	61.21	59.88	59.72	66.93
02/15/19	71.43	**99.21**	63.52	NF	68.33	62.45	61.35	68.55
Highest Recorded	72.56	74.49	67.59	67.89	66.55	65.81	62.67	69.84
Lowest Recorded	64.15	67.59	61.29	62.97	59.81	59.78	58.83	66.25
Difference high to low	**8.41**	**6.90**	**6.30**	**4.92**	**6.74**	**6.03**	**3.84**	**3.59**
Average	69.71	69.37	64.69	66.05	63.95	63.00	59.93	68.19
Depressed (09/23/13)	65.39	NR	61.38	NR	59.81	60.37	59.14	66.71
Elevated (11/08/03)	71.64	70.2	66.58	67.41	65.42	65.81	NR	NR

NOTES:

1.) FT MSL = Feet mean sea level

2.) NR = No reading because the well did not exist on the listed date.

\+ = Prior to AGC involvement; data not collected by previous consultant.

NF = Well was not found in the field by the field team.

3.) Depressed values are the observed water level elevations on the day when the average water level elevations were lowest (9/23/13)

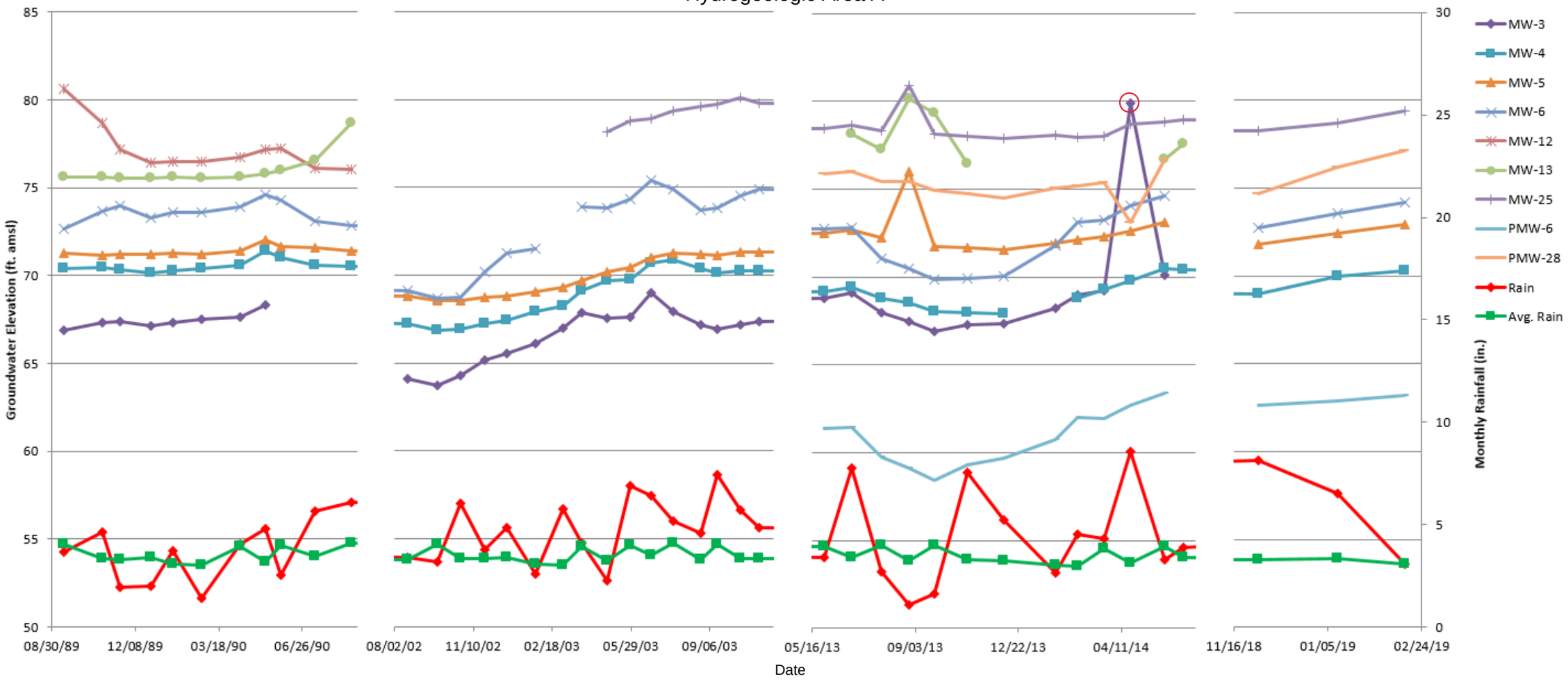
4.) Elevated values are the observed water level elevations on the day the average water level elevations were highest (11/08/03)

5) **Bold red** readings are disregarded because they are believed to contain errors as they are so significantly different than the readings the month before and after.

6) **Bold green** readings are disregarded because the wells were found to be water-logged due to lbeing located in areas where water frequently ponds and/or the water-tight caps are no longer water-tight, due to age or vandalism.

7) Readings were taken over two days. One reading was taaken at each well during the two day period.

Table 5A: Historic Groundwater Elevations
Hydrogeologic Area A



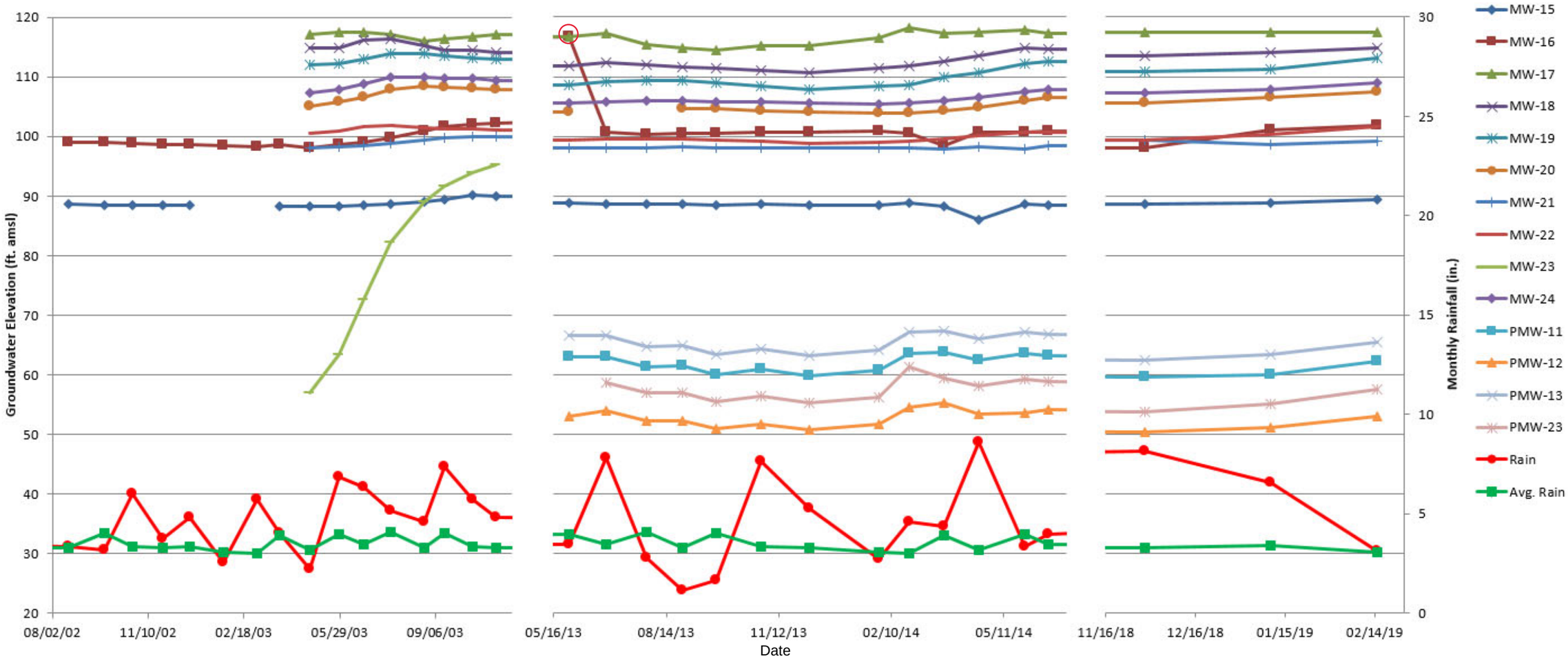
Notes:

1. Monthly rainfall data presented on this figure was obtained from the National Oceanic and Atmospheric Administration for the Baltimore, MD area and from Weather Underground - Baltimore-Washington International, MD weather station.

2. Average monthly rainfall data presented on this figure was obtained from the National Oceanic and Atmospheric Administration for the Baltimore, MD area.

3. Groundwater elevation data points circled in red are believed to be erroneous due to their significant deviation from historical average groundwater elevations and were not considered when determining the maximum potentiometric surface elevation for the Chesapeake Terrace Rubble Landfill site.

Table 5B: Historic Groundwater Elevations
Hydrogeologic Area B



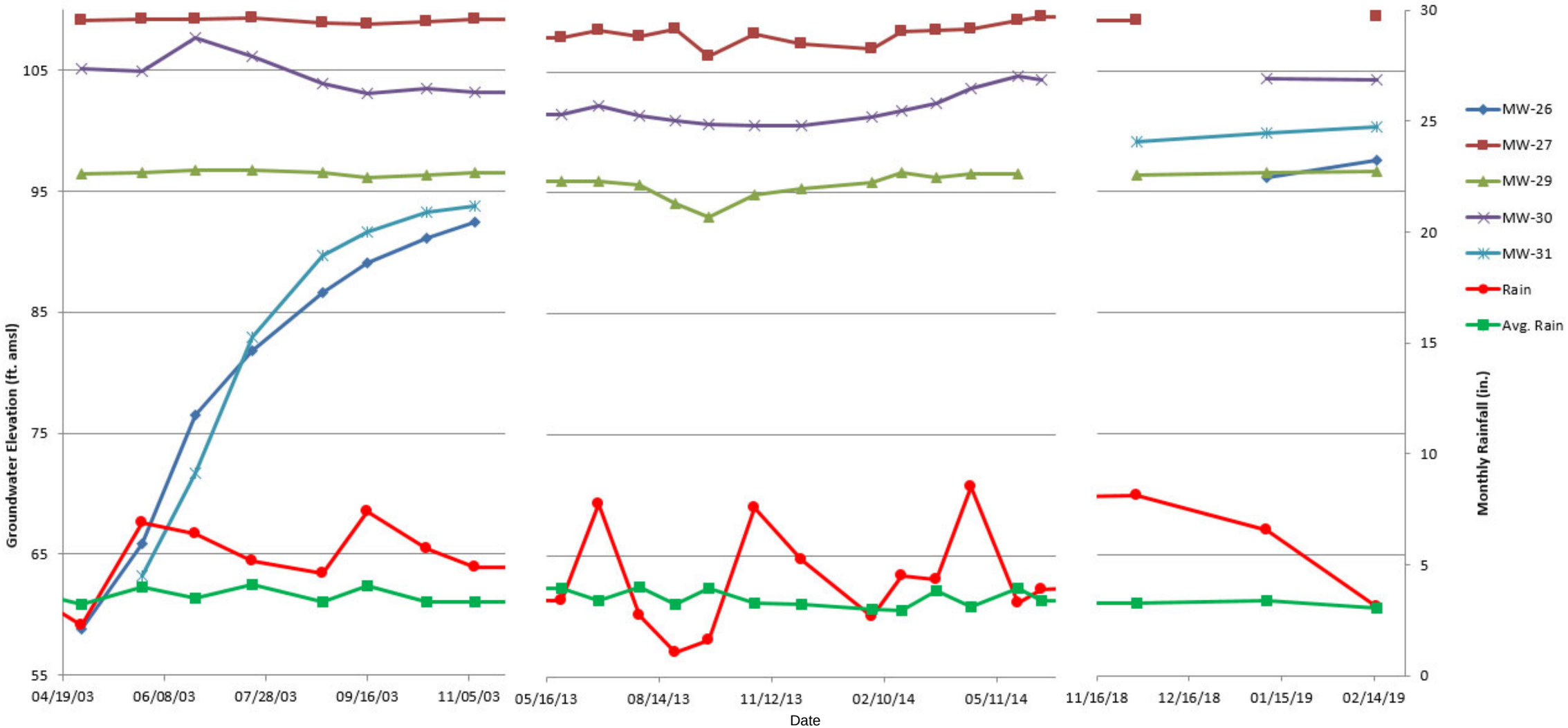
Notes:

1. Monthly rainfall data presented on this figure was obtained from the National Oceanic and Atmospheric Administration for the Baltimore, MD area and from Weather Underground - Baltimore-Washington International, MD weather station.

2. Average monthly rainfall data presented on this figure was obtained from the National Oceanic and Atmospheric Administration for the Baltimore, MD area.

3. Groundwater elevation data points circled in red are believed to be erroneous due to their significant deviation from historical average groundwater elevations and were not considered when determining the maximum potentiometric surface elevation for the Chesapeake Terrace Rubble Landfill site.

Table 5C: Historic Groundwater Elevations
Hydrogeologic Area TA



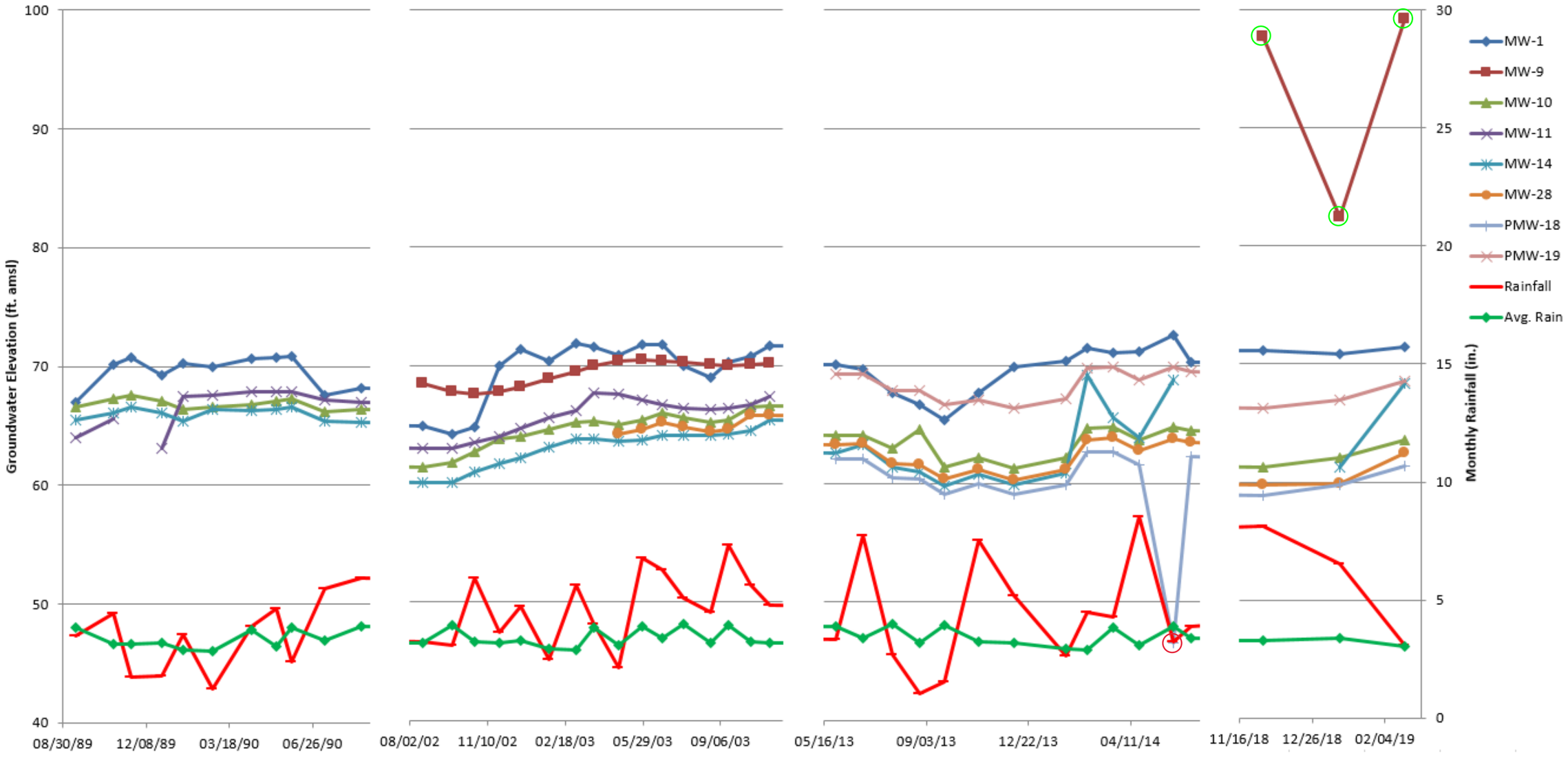
Notes:

1. Monthly rainfall data presented on this figure was obtained from the National Oceanic and Atmospheric Administration for the Baltimore, MD area and from Weather Underground - Baltimore-Washington International, MD weather station.

2. Average monthly rainfall data presented on this figure was obtained from the National Oceanic and Atmospheric Administration for the Baltimore, MD area.

3. Groundwater elevation data points circled in red are believed to be erroneous due to their significant deviation from historical average groundwater elevations and were not considered when determining the maximum potentiometric surface elevation for the Chesapeake Terrace Rubble Landfill site.

Table 5D: Historic Groundwater Elevations
Hydrogeologic Area TB



Notes:

1. Monthly rainfall data presented on this figure was obtained from the National Oceanic and Atmospheric Administration for the Baltimore, MD area and from Weather Underground - Baltimore-Washington International, MD weather station.

2. Average monthly rainfall data presented on this figure was obtained from the National Oceanic and Atmospheric Administration for the Baltimore, MD area.

3. Groundwater elevation data points circled in red are believed to be erroneous due to their significant deviation from historical average groundwater elevations and were not considered when determining the maximum potentiometric surface elevation for the Chesapeake Terrace Rubble Landfill site.

4. Groundwater elevation data points circled in green are believed to be erroneous based on field observations of broken well lids, and missing or improperly installed well plugs observed at the time of water level readings, and were not considered when determining the maximum potentiometric surface elevation for the Chesapeake Terrace Rubble Landfill site.

Slug Test Analysis Water Levels for Clay Unit Wells MW-23, MW-26, and MW-31

	PVC Elev.	Projected Statics	
		DTW	Elev.
MW-23	124.36	25	99.36
MW-26	110.08	14	96.08
MW-31	115.04	20	95.04

Date:		4/30/03	5/28/03	6/23/03	7/21/03	8/25/03	9/16/03	9/30/03	10/15/03	11/8/03
Days		0	28	54	82	117	139	153	168	192
MW-23	Elev.	56.91	63.32	72.65	82.18	89.04	91.72	92.83	93.94	95.29
	DTW	67.45	61.04	51.71	42.18	35.32	32.64	31.53	30.42	29.07
	Displacement	42.45	36.04	26.71	17.18	10.32	7.64	6.53	5.42	4.07
MW-26	Elev.	58.82	65.87	76.47	81.83	86.61	89.08	90.05	91.16	92.41
	DTW	51.26	44.21	33.61	28.25	23.47	21.00	20.03	18.92	17.67
	Displacement	37.26	30.21	19.61	14.25	9.47	7.00	6.03	4.92	3.67
MW-31	Elev.	56.24	63.17	71.66	82.90	89.65	91.61	92.42	93.26	93.80
	DTW	58.80	51.87	43.38	32.14	25.39	23.43	22.62	21.78	21.24
	Displacement	38.80	31.87	23.38	12.14	5.39	3.43	2.62	1.78	1.24

	MW-23	MW-26	MW-31
Well Depth	70	55	60
Initial Displacement [S(0)]=	42.45	37.26	38.8
Static Water Column Ht (H)=	45	41	40
Aquifer Sat. Thickness =	12	12	12
Screen Length (L) =	12	12	12
Total Depth Penetration (H)=	12	12	12
Casing Radius [r(c)] =	0.08	0.08	0.08
Well Radius [r(w)] =	0.25	0.25	0.25
Rad Well Skin [r(sk)] =	0.25	0.25	0.25
Por. Filter Pack (n) =	0.2	0.2	0.2

TABLE 7

Water Levels in Residential Well AA94-3264
-Screened Below Clay Confining Bed

Date	Depth to Water (feet)	Elevation (ft msl)
9/30/2003	128.57	60.37
10/15/2003	127.68	61.26
11/8/2003	127.95	60.99
11/21/2003	127.62	61.32

TOC Elevation:	188.94
Grade Elevation:	188
Screen Depth (ft):	255-260
Screen Elevation (ft msl	-68 to -73

Table 8A
Second Quarter 2013 Groundwater Analytical Results

Sample Location			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-20			MW-21			MW-22			MW-24			MW-25			MW-27			MW-28		
Sample Name			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			FDGW_053013			MW-21			MW-22			MW-24			MW-25			MW-27			MW-28		
Sample Date			6/12/2013			6/6/2013			5/29/2013			6/12/2013			5/30/2013			5/30/2013			6/4/2013			5/30/2013			5/30/2013			5/30/2013			5/30/2013			6/4/2013			5/31/2013			6/6/2013			6/4/2013		
N=Normal, FD=Field Duplicate			N			N			N			N			N			N			N			N			FD			N			N			N			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Volatile Organic Compounds																																															
1,1,1,2-Tetrachloroethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
1,1,1-Trichloroethane	200	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
1,1,2,2-Tetrachloroethane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
1,1,2-Trichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,1-Dichloroethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,1-Dichloroethene	7	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,1-Dichloropropene	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
1,2,3-Trichlorobenzene	NS	ug/L	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51
1,2,3-Trichloropropane	NS	ug/L	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42
1,2,4-Trichlorobenzene	70	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
1,2,4-Trimethylbenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,2-Dibromo-3-chloropropane	0.2	ug/L	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4
1,2-Dibromoethane	0.05	ug/L	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28
1,2-Dichlorobenzene	600	ug/L	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21
1,2-Dichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,2-Dichloropropane	5	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,3,5-Trimethylbenzene	NS	ug/L	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15
1,3-Dichlorobenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
1,3-Dichloropropane	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,4-Dichlorobenzene	75	ug/L	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23
2,2-Dichloropropane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
2-Butanone	NS	ug/L	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3
2-Chloroethyl Vinyl Ether	NS	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
2-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
2-Hexanone	NS	ug/L	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5
4-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
4-Methyl-2-pentanone	NS	ug/L	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99
Acetone	NS	ug/L	< 2.7	U	2.7	< 2.7	U	2.7	100		2.7	< 2.7	U	2.7	13		2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7
Acrolein	NS	ug/L	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3
Acrylonitrile	NS	ug/L	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68
Allyl Chloride	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Benzene	5	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Bromobenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Bromochloromethane	NS	ug/L	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27
Bromodichloromethane	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
Bromoform	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
Bromomethane	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Carbon Disulfide	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Carbon Tetrachloride	5	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
Chlorobenzene	100	ug/L	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11
Chloroethane	NS	ug/L	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17
Chloroform	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	1.8		0.08	< 0.08	U	0.08	< 0.08	U	0.08	0.87	J	0.08	4.5		0.08	4.4		0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chloromethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
cis-1,2-Dichloroethene	70	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
cis-1,3-Dichloropropene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Cymene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Dibromochloromethane	NS	ug/L	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2
Dibromomethane	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
Dichlorodifluoromethane	NS	ug/L	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22
Ethylbenzene	700	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Hexachlorobutadiene	NS	ug/L	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48
Iodomethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Isopropylbenzene	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
m,p-Xylenes	NS	ug/L	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25
Methyl tert-Butyl Ether	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	1		0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	0.19	J	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Methylene Chloride	5	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Naphthalene	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
n-Butylbenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
n-Propylbenzene	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
o-Xylene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
sec-Butylbenzene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Styrene	100

Table 8A
Second Quarter 2013 Groundwater Analytical Results

Sample Location			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-20			MW-21			MW-22			MW-24			MW-25			MW-27			MW-28		
Sample Name			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			FDGW_053013			MW-21			MW-22			MW-24			MW-25			MW-27			MW-28		
Sample Date			6/12/2013			6/6/2013			5/29/2013			6/12/2013			5/30/2013			5/30/2013			6/4/2013			5/30/2013			5/30/2013			5/30/2013			5/30/2013			6/4/2013			5/31/2013			6/6/2013			6/4/2013		
N=Normal, FD=Field Duplicate			N			N			N			N			N			N			N			N			FD			N			N			N			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Antimony	6	ug/L	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9
Arsenic	10	ug/L	< 1.8	U	1.8	1.8	J	1.8	10.2		1.8	2.3	J	1.8	3.2		1.8	135		1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	9		1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8
Barium	2000	ug/L	27.4		3.8	41.5		3.8	100		3.8	64.1		3.8	36.8		3.8	178		3.8	64.8		3.8	85.4		3.8	85.1		3.8	70.7		3.8	36.6		3.8	22.3		3.8	26.5		3.8	30.4		3.8	64.5		3.8
Beryllium	4	ug/L	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	2.6		0.8	1		0.8	1.5		0.8	2		0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8
Cadmium	5	ug/L	< 2	U	2	< 2	U	2	2.8		2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2
Calcium	NS	ug/L	18000		196	11300		196	5520		196	24100		196	2720		196	6150		196	1470		196	517		196	542		196	2610		196	2720		196	3820		196	2590		196	1290		196	5200		196
Chromium	100	ug/L	6.3		3.9	25.9		3.9	84.7		3.9	9.2		3.9	4.9	J	3.9	142		3.9	< 3.9	U	3.9	7.2		3.9	7.1		3.9	221		3.9	< 3.9	U	3.9	8.5		3.9	5.2		3.9	< 3.9	U	3.9	7.1		3.9
Cobalt	NS	ug/L	< 3.9	U	3.9	5.6		3.9	7.4		3.9	9.7		3.9	13.8		3.9	32.4		3.9	19.8		3.9	17.9		3.9	17.9		3.9	6.8		3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9
Copper	NS	ug/L	7.5		3.8	18.3		3.8	54.3		3.8	49		3.8	35		3.8	441		3.8	36.2		3.8	24.8		3.8	24.6		3.8	111		3.8	7.9		3.8	10.4		3.8	11.3		3.8	25.2		3.8	< 3.8	U	3.8
Iron	NS	ug/L	2030		119	1460		119	15500		119	4440		119	9460		119	163000		119	5550		119	379		119	354		119	17200		119	265		119	2030		119	239		119	3810		119	17000		119
Lead	NS	ug/L	3.8		1.2	5		1.2	19.1		1.2	2.7		1.2	9.6		1.2	51.9		1.2	1.5		1.2	2.9		1.2	2.8		1.2	11.4		1.2	< 1.2	U	1.2	1.5		1.2	4.7		1.2	< 1.2	U	1.2	< 1.2	U	1.2
Magnesium	NS	ug/L	383		197	1120		197	1990		197	1010		197	2500		197	10900		197	1320		197	844		197	843		197	2250		197	3210		197	4010		197	1590		197	999		197	1840		197
Manganese	NS	ug/L	36.4		8.1	102		8.1	202		8.1	42		8.1	202		8.1	315		8.1	155		8.1	83.1		8.1	83.8		8.1	81.3		8.1	100		8.1	36.5		8.1	21.6		8.1	77.6		8.1	117		8.1
Mercury	2	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	0.52		0.16	1.7		0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
Nickel	NS	ug/L	< 4.1	U	4.1	25.7		4.1	42.2		4.1	17.9		4.1	27.3		4.1	18.9		4.1	28.4		4.1	13.5		4.1	13.3		4.1	156		4.1	< 4.1	U	4.1	6.9		4.1	5.8		4.1	7.9		4.1	4.3	J	4.1
Potassium	NS	ug/L	1510		202	1210		202	3890		202	2270		202	764		202	5510		202	692		202	885		202	894		202	2930		202	1180		202	1140		202	1400		202	721		202	1380		202
Selenium	50	ug/L	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	9.9		1.5	1.6	J	1.5	< 1.5	U	1.5	2.3	J	1.5	< 1.5	U	1.5	< 1.5	U	1.5	1.6	J	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5
Silver	NS	ug/L	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1
Sodium	NS	ug/L	2010		193	1890		193	1240		193	2630		193	2620		193	1640		193	1580		193	1160		193	1150		193	1890		193	1760		193	1380		193	2380		193	1730		193	4840		193
Thallium	2	ug/L	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79
Vanadium	NS	ug/L	9.1		3.8	< 3.8	U	3.8	60.1		3.8	12		3.8	< 3.8	U	3.8	264		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	36.6		3.8	< 3.8	U	3.8	4.6	J	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8
Zinc	NS	ug/L	73.1		19.7	172		19.7	191		19.7	52.4		19.7	68.3		19.7	209		19.7	68.8		19.7	57.3		19.7	58.6		19.7	142		19.7	26.7		19.7	< 19.7	U	19.7	24.1		19.7	41.8		19.7	< 19.7	U	19.7
General Chemistry																																															
Alkalinity, Total	NS	mg/L	41.3		0.79	27.8		0.79	15.8		5	93.1		0.79	< 5	U	5	14		5	< 5	UH	5	< 5	U	5	< 5	U	5	22.3		5	8.2		5	13	H	5	8.8		5	< 0.79	UH	0.79	26.9	H	5
Ammonia	NS	mg/L	< 0.08	U	0.08	< 0.08	U	0.08	0.15		0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chemical Oxygen Demand	NS	mg/L	35.4		8.7	< 8.7	U	8.7	103		8.7	39.6		8.7	23.1		8.7	560		8.7	87.1		8.7	12.9		8.7	< 8.7	U	8.7	56		8.7	< 8.7	U	8.7	< 8.7	U	8.7	19		8.7	14.9		8.7	< 8.7	U	8.7
Chloride	NS	mg/L	2.3		0.28	1.5		0.28	0.93		0.28	2.6		0.28	1.5		0.28	1.9		0.28	3.1		0.28	2.3		0.28	2.3		0.28	2.8		0.28	2		0.28	1.8		0.28	4.4		0.28	2.1		0.28	0.9		0.28
Hardness, Calcium Carbonate	NS	mg/L	47.3		1.6	37.4		1.6	29.6	B	8.1	70.9		1.6	118	B	8.1	197	JB	162	13.8		1.6	7.9	B	1.6	5.9	B	1.6	19.7	B	3.2	19.7	B	1.6	33.5		1.6	13.8	B	1.6	15.8		1.6	27.6		1.6
Nitrate as N	10	mg/L	< 0.047	U	0.047	0.083	J	0.047	< 0.047	U	0.047	< 0.047	U	0.047	< 0.047	U	0.047	1.4		0.047	< 0.047	U	0.047	< 0.047	U	0.047	< 0.047	U	0.047	0.29		0.047	0.57		0.047	0.69		0.047	0.12		0.047	< 0.047	U	0.047	< 0.047	U	0.047
Phosphorus (as phosphate)	NS	mg/L	0.14		0.016	< 0.016	U	0.016	< 0.08	U	0.08	2.4		0.032	0.1		0.016	1.3		0.032	1.5		0.016	0.071		0.016	0.054		0.016	0.22		0.016	0.041		0.016	0.28		0.016	0.27		0.016	< 0.016	U	0.016	1.5		0.016
Sulfate	NS	mg/L	3.9	B	0.35	18		0.35	4.7		0.35	13.1	B	0.35	24.6		0.35	20.3		0.35	24.9		0.35	10.3		0.35	9.5		0.35	9		0.35	10.9		0.35	13.2		0.35	4.4	B	0.35	15		0.35	7.5		0.35
Total Dissolved Solids	NS	mg/L	51		8.1	57		8.1	42		8.1	68		8.1	50		8.1	84		8.1	57		8.1	23		8.1	22		8.1	18		8.1	38		8.1	77		8.1	18		8.1	45		8.1	54		8.1

Notes and Abbreviations:

1. Results greater than the MDE MCL are shaded.

* - laboratory sample recovery or precision outside QC limits
B - laboratory blank contamination
H - sample was prepped or analyzed beyond the specified holding time
J - result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value
LQual - Laboratory Qualifier
mg/L - milligrams per liter
MDE MCL - Maryland Department of the Environment Maximum Contaminant Level for Chemicals in Drinking Water, Code of Maryland Regulations, accessed at URLs http://www.dsd.state.md.us/comar/comarhtml/26/26.04.01.06.htm and http://www.dsd.state.md.us/comar/getfile.aspx?file=26.04.01.07.htm
QC - quality control
RDL - reporting detection limit
U - non-detect result
ug/L - micrograms per liter

Table 8A
Second Quarter 2013 Groundwater Analytical Results

Sample Location			MW-29			MW-30			MW-3			MW-4			MW-4			MW-5			MW-6			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			PMW-28			PMW-6		
Sample Name			MW-29			MW-30			MW-3			MW-4			FDGW-060513			MW-5			MW-6			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			PMW-28			PMW-6		
Sample Date			6/6/2013			5/31/2013			6/5/2013			6/5/2013			6/5/2013			5/31/2013			6/6/2013			6/4/2013			5/29/2013			5/30/2013			6/4/2013			6/4/2013			6/12/2013			6/5/2013			6/5/2013		
N=Normal, FD=Field Duplicate			N			N			N			N			FD			N			N			N			N			N			N			N			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Volatile Organic Compounds																																															
1,1,1,2-Tetrachloroethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
1,1,1-Trichloroethane	200	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
1,1,2,2-Tetrachloroethane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
1,1,2-Trichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,1-Dichloroethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,1-Dichloroethene	7	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,1-Dichloropropene	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
1,2,3-Trichlorobenzene	NS	ug/L	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51
1,2,3-Trichloropropane	NS	ug/L	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42
1,2,4-Trichlorobenzene	70	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
1,2,4-Trimethylbenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,2-Dibromo-3-chloropropane	0.2	ug/L	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4
1,2-Dibromoethane	0.05	ug/L	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28
1,2-Dichlorobenzene	600	ug/L	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21
1,2-Dichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,2-Dichloropropane	5	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,3,5-Trimethylbenzene	NS	ug/L	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15
1,3-Dichlorobenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
1,3-Dichloropropane	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,4-Dichlorobenzene	75	ug/L	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23
2,2-Dichloropropane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
2-Butanone	NS	ug/L	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3
2-Chloroethyl Vinyl Ether	NS	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
2-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
2-Hexanone	NS	ug/L	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5
4-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
4-Methyl-2-pentanone	NS	ug/L	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99
Acetone	NS	ug/L	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7
Acrolein	NS	ug/L	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3
Acrylonitrile	NS	ug/L	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68
Allyl Chloride	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Benzene	5	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Bromobenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Bromochloromethane	NS	ug/L	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27
Bromodichloromethane	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	0.28	J	0.12	< 0.12	U	0.12
Bromoform	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
Bromomethane	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Carbon Disulfide	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Carbon Tetrachloride	5	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
Chlorobenzene	100	ug/L	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11
Chloroethane	NS	ug/L	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U*	0.17	< 0.17	U*	0.17	< 0.17	U*	0.17	< 0.17	U*	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U*	0.17	< 0.17	U*	0.17
Chloroform	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	0.76	J	0.08	< 0.08	U	0.08
Chloromethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
cis-1,2-Dichloroethene	70	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
cis-1,3-Dichloropropene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Cymene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Dibromochloromethane	NS	ug/L	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	0.21	J	0.2	< 0.2	U	0.2
Dibromomethane	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
Dichlorodifluoromethane	NS	ug/L	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22
Ethylbenzene	700	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Hexachlorobutadiene	NS	ug/L	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48
Iodomethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Isopropylbenzene	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
m,p-Xylenes	NS	ug/L	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25
Methyl tert-Butyl Ether	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	1.5		0.14	0.51	J	0.14	0.41	J	0.14	0.68	J	0.14	0.77	J	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Methylene Chloride	5	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Naphthalene	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
n-Butylbenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
n-Propylbenzene	NS	ug/L	< 0.1	U	0.1	0.11	J	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
o-Xylene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13

Table 8A
Second Quarter 2013 Groundwater Analytical Results

Sample Location			MW-29			MW-30			MW-3			MW-4			MW-4			MW-5			MW-6			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			PMW-28			PMW-6		
Sample Name			MW-29			MW-30			MW-3			MW-4			FDGW-060513			MW-5			MW-6			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			PMW-28			PMW-6		
Sample Date			6/6/2013			5/31/2013			6/5/2013			6/5/2013			6/5/2013			5/31/2013			6/6/2013			6/4/2013			5/29/2013			5/30/2013			6/4/2013			6/4/2013			6/12/2013			6/5/2013			6/5/2013		
N=Normal, FD=Field Duplicate			N			N			N			N			FD			N			N			N			N			N			N			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Antimony	6	ug/L	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 19.1	U	19.1	< 19.1	U	19.1	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9
Arsenic	10	ug/L	2.7		1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 18.2	U	18.2	26.8		18.2	< 1.8	U	1.8	< 1.8	U	1.8	2	J	1.8	2.4	J	1.8	1.9	J	1.8	2.2	J	1.8	< 1.8	U	1.8
Barium	2000	ug/L	22.7		3.8	27.3		3.8	27.8		3.8	47		3.8	42.8		3.8	11		3.8	216		38.5	386		38.5	21.3		3.8	36.5		3.8	40.6		3.8	99.8		3.8	34.6		3.8	14.8		3.8	32.2		3.8
Beryllium	4	ug/L	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 8	U	8	< 8	U	8	< 0.8	U	0.8	< 0.8	U	0.8	1.3		0.8	2.6		0.8	1.2		0.8	< 0.8	U	0.8	< 0.8	U	0.8
Cadmium	5	ug/L	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 19.7	U	19.7	< 19.7	U	19.7	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2
Calcium	NS	ug/L	1070		196	2320		196	2120		196	2210		196	2080		196	2600		196	26100		1960	12100		1960	2090		196	1570		196	1570		196	2390		196	1060		196	4470		196	3180		196
Chromium	100	ug/L	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	4.2	J	3.9	4.2	J	3.9	< 38.7	U	38.7	173		38.7	16.6		3.9	14		3.9	9.8		3.9	43.9		3.9	14.7		3.9	11.4		3.9	< 3.9	U	3.9
Cobalt	NS	ug/L	4.3	J	3.9	< 3.9	U	3.9	< 3.9	U	3.9	4.7	J	3.9	4.7	J	3.9	< 3.9	U	3.9	< 38.8	U	38.8	44.6	J	38.8	< 3.9	U	3.9	8.7		3.9	10.8		3.9	5.2		3.9	7		3.9	< 3.9	U	3.9	< 3.9	U	3.9
Copper	NS	ug/L	9.7		3.8	< 3.8	U	3.8	8.1		3.8	13.7		3.8	14.3		3.8	10.8		3.8	63.5		38.4	107		38.4	17.3		3.8	13.7		3.8	9.8		3.8	18.5		3.8	8.7		3.8	< 3.8	U	3.8	< 3.8	U	3.8
Iron	NS	ug/L	1680		119	1700		119	< 119	U	119	208		119	227		119	166		119	< 1190	U	1190	132000		1190	3150		119	4210		119	5200		119	17300		119	4700		119	497		119	< 119	U	119
Lead	NS	ug/L	1.2	J	1.2	< 1.2	U	1.2	< 1.2	U	1.2	1.5		1.2	1.5		1.2	2.3		1.2	< 11.7	U	11.7	40.2		11.7	6.8		1.2	6.5		1.2	2.7		1.2	10.7		1.2	2.7		1.2	< 1.2	U	1.2	< 1.2	U	1.2
Magnesium	NS	ug/L	679		197	2590		197	2400		197	2940		197	2950		197	1470		197	17400		1970	6280		1970	871		197	761		197	738		197	1130		197	596		197	1040		197	2050		197
Manganese	NS	ug/L	19.8		8.1	25.2		8.1	13.4		8.1	20.9		8.1	22.1		8.1	11.2		8.1	111		80.5	445		80.5	46.2		8.1	41.4		8.1	64.9		8.1	85.1		8.1	46.6		8.1	55.6		8.1	62.3		8.1
Mercury	2	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
Nickel	NS	ug/L	12.2		4.1	< 4.1	U	4.1	5.1		4.1	7.7		4.1	5.9		4.1	4.5	J	4.1	48.6	J	41.2	113		41.2	12.9		4.1	11.8		4.1	12.1		4.1	13.6		4.1	9.8		4.1	9		4.1	< 4.1	U	4.1
Potassium	NS	ug/L	1340		202	1600		202	933		202	985		202	985		202	858		202	11000		2020	24200		2020	1520		202	1840		202	1610		202	4850		202	1830		202	706		202	1120		202
Selenium	50	ug/L	< 1.5	U	1.5	< 1.5	U	1.5	1.5	J	1.5	1.6	J	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 14.5	U	14.5	24.8	J	14.5	< 1.5	U	1.5	< 1.5	U	1.5	2	J	1.5	2.7		1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	1.5	J	1.5
Silver	NS	ug/L	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 40.7	U	40.7	< 40.7	U	40.7	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1
Sodium	NS	ug/L	5630		193	2680		193	2280		193	2370		193	2550		193	3930		193	25800		1930	13700		1930	2210		193	2890		193	2340		193	9300		193	2500		193	52500		193	1900		193
Thallium	2	ug/L	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 7.9	U	7.9	< 7.9	U	7.9	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79
Vanadium	NS	ug/L	< 3.8	U	3.8	4.4	J	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 38.4	U	38.4	231		38.4	< 3.8	U	3.8	14.2		3.8	13.8		3.8	74.8		3.8	13.3		3.8	< 3.8	U	3.8	< 3.8	U	3.8
Zinc	NS	ug/L	55.3		19.7	< 19.7	U	19.7	< 19.7	U	19.7	< 19.7	U	19.7	< 19.7	U	19.7	< 19.7	U	19.7	< 197	U	197	222		197	199		19.7	37.8		19.7	22.4		19.7	36.3		19.7	25.4		19.7	< 19.7	U	19.7	< 19.7	U	19.7
General Chemistry																																															
Alkalinity, Total	NS	mg/L	4	JH	0.79	21.4		5	< 5	U	5	5.1		5	< 5	U	5	9.3		5	7.7	H	0.79	< 5	UH	5	< 5	U	5	< 5	U	5	< 5	UH	5	5.4	H	5	2.4	J	0.79	75.4		5	7.1		5
Ammonia	NS	mg/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	0.14		0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chemical Oxygen Demand	NS	mg/L	12.9		8.7	37.5		8.7	< 8.7	U	8.7	29.3		8.7	23.1		8.7	31.3		8.7	8.8	J	8.7	10.8		8.7	21.1		8.7	8.8	J	8.7	< 8.7	U	8.7	41.6		8.7	17		8.7	< 8.7	U	8.7	14.9		8.7
Chloride	NS	mg/L	3.2		0.28	1.7		0.28	4.8		0.28	4.2		0.28	4.2		0.28	6.2		0.28	4.1		0.28	1.5		0.28	1.2		0.28	1.8		0.28	1.4		0.28	2.9		0.28	2.4		0.28	7		0.28	3.3		0.28
Hardness, Calcium Carbonate	NS	mg/L	7.9		1.6	17.7	B	1.6	19.7		1.6	19.7		1.6	21.7		1.6	13.8	B	1.6	17.7		1.6	98.5		16.2	17.7	B	1.6	7.9	JB	3.2	69		8.1	69		8.1	11.8		3.2	15.8		1.6	19.7		1.6
Nitrate as N	10	mg/L	< 0.047	U	0.047	< 0.047	U	0.047	0.28		0.047	0.15		0.047	0.16		0.047	0.46		0.047	0.25		0.047	< 0.047	U	0.047	< 0.047	U	0.047	< 0.047	U	0.047	0.25		0.047	< 0.047	U	0.047	0.45		0.047	0.35		0.047	< 0.047	U	0.047
Phosphorus (as phosphate)	NS	mg/L	< 0.016	U	0.016	< 0.032	U	0.032	0.92		0.016	< 0.016	U	0.016	< 0.016	U	0.016	1		0.016	0.02	J	0.016	2.9		0.16	0.43		0.016	0.088		0.016	0.5		0.016	3.5		0.16	1.9		0.032	< 0.016	U	0.016	0.029	J	0.016
Sulfate	NS	mg/L	11.8		0.35	7.6	B	0.35	11.2		0.35	12.7		0.35	13		0.35	4.3	B	0.35	6.4		0.35	4.4		0.35	11.7		0.35	10.2		0.35	7.4		0.35	14.1		0.35	1.9	JB	0.35	49.6		0.35	11.1		0.35
Total Dissolved Solids	NS	mg/L	35		8.1	< 8.1	U	8.1	26		8.1	27		8.1	31		8.1	22		8.1	39		8.1	123		8.1	12		8.1	27		8.1	45		8.1	418		8.1	28		8.1	181		8.1	18		8.1

Notes and Abbreviations:

1. Results greater than the MDE MCL are shaded.

* - laboratory sample recovery or precision outside QC limits
B - laboratory blank contamination
H - sample was prepped or analyzed beyond the specified holding time
J - result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value
LQual - Laboratory Qualifier
mg/L - milligrams per liter
MDE MCL - Maryland Department of the Environment Maximum Contaminant Level for Chemicals in Drinking Water, Code of Maryland Regulations, accessed at URLs http://www.dsd.state.md.us/comar/comarhtml/26/26.04.01.06.htm and http://www.dsd.state.md.us/comar/getfile.aspx?file=26.04.01.07.htm
QC - quality control
RDL - reporting detection limit
U - non-detect result
ug/L - micrograms per liter

Table 8B
Third Quarter 2013 Groundwater Analytical Results

Sample Location			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-22			MW-24			MW-25			MW-27			MW-28		
Sample Name			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-22FD			MW-24			MW-25			MW-27			MW-28		
Sample Date			7/30/2013			7/31/2013			8/5/2013			8/6/2013			8/5/2013			8/7/2013			8/2/2013			7/31/2013			8/5/2013			8/7/2013			8/7/2013			8/2/2013			8/7/2013			8/1/2013			8/1/2013		
N=Normal, FD=Field Duplicate			N			N			N			N			N			N			N			N			N			N			FD			N			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Volatile Organic Compounds																																																
1,1,1,2-Tetrachloroethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
1,1,1-Trichloroethane	200	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
1,1,2,2-Tetrachloroethane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
1,1,2-Trichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,1-Dichloroethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,1-Dichloroethene	7	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,1-Dichloropropene	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
1,2,3-Trichlorobenzene	NS	ug/L	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51
1,2,3-Trichloropropane	NS	ug/L	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42
1,2,4-Trichlorobenzene	70	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
1,2,4-Trimethylbenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,2-Dibromo-3-chloropropane	0.2	ug/L	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4
1,2-Dibromoethane	0.05	ug/L	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28
1,2-Dichlorobenzene	600	ug/L	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21
1,2-Dichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,2-Dichloropropane	5	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,3,5-Trimethylbenzene	NS	ug/L	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15
1,3-Dichlorobenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
1,3-Dichloropropane	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,4-Dichlorobenzene	75	ug/L	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23
2,2-Dichloropropane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
2-Butanone	NS	ug/L	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3
2-Chloroethyl Vinyl Ether	NS	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
2-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
2-Hexanone	NS	ug/L	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5
4-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
4-Methyl-2-pentanone	NS	ug/L	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99
Acetone	NS	ug/L	< 2.7	U	2.7	110		2.7	1000		2.7	< 2.7	U	2.7	44		2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	24		2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7
Acrolein	NS	ug/L	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3
Acrylonitrile	NS	ug/L	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68
Allyl Chloride	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Benzene	5	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	0.24	J	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Bromobenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Bromochloromethane	NS	ug/L	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27
Bromodichloromethane	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
Bromoform	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
Bromomethane	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U*	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U*	0.18	< 0.18	U*	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Carbon Disulfide	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Carbon Tetrachloride	5	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
Chlorobenzene	100	ug/L	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11
Chloroethane	NS	ug/L	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17
Chloroform	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	2.5		0.08	< 0.08	U	0.08	< 0.08	U	0.08	1.7		0.08	4.3		0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chloromethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
cis-1,2-Dichloroethene	70	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
cis-1,3-Dichloropropene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Cymene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Dibromochloromethane	NS	ug/L	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2
Dibromomethane	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
Dichlorodifluoromethane	NS	ug/L	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U*	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U*	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U*	0.22
Ethylbenzene	700	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Hexachlorobutadiene	NS	ug/L	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48
Iodomethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U*	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U*	0.13	< 0.13	U*	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Isopropylbenzene	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
m,p-Xylenes	NS	ug/L	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25
Methyl tert-Butyl Ether	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	0.21	J	0.14	< 0.14	U	0.14
Methylene Chloride	5	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Naphthalene	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
n-Butylbenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
n-Propylbenzene	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
o-Xylene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
sec-Butylbenzene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18

Table 8B
Third Quarter 2013 Groundwater Analytical Results

Sample Location			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-22			MW-24			MW-25			MW-27			MW-28		
Sample Name			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-22FD			MW-24			MW-25			MW-27			MW-28		
Sample Date			7/30/2013			7/31/2013			8/5/2013			8/6/2013			8/5/2013			8/7/2013			8/2/2013			7/31/2013			8/5/2013			8/7/2013			8/7/2013			8/2/2013			8/7/2013			8/1/2013			8/1/2013		
N=Normal, FD=Field Duplicate			N			N			N			N			N			N			N			N			N			N			FD			N			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Antimony	6	ug/L	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9
Arsenic	10	ug/L	< 1.8	U	1.8	< 1.8	U	1.8	7.2		1.8	7.7		1.8	11.5		1.8	166		1.8	< 1.8	U	1.8	< 1.8	U	1.8	30.7		1.8	2	J	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8
Barium	2000	ug/L	18.4		3.8	22.4		3.8	111		3.8	199		3.8	54.8		3.8	156		3.8	69.8		3.8	91		3.8	104		3.8	32.9		3.8	31.7		3.8	20.8		3.8	26.6		3.8	32.2		3.8	58.1		3.8
Beryllium	4	ug/L	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	2.2		0.8	0.82	J	0.8	3.9		0.8	1.9		0.8	2.3		0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8
Cadmium	5	ug/L	< 2	U	2	< 2	U	2	4.9		2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2
Calcium	NS	ug/L	16100		196	21300		196	19400		196	68200		196	4510		196	4940		196	1090		196	820		196	2430		196	2490		196	2360		196	4200		196	2670		196	3160		196	5690		196
Chromium	100	ug/L	< 3.9	U	3.9	12.4		3.9	46.2		3.9	46		3.9	12.3		3.9	207		3.9	10		3.9	18.3		3.9	204		3.9	7.3		3.9	< 3.9	U	3.9	< 3.9	U	3.9	7		3.9	< 3.9	U	3.9	5.5		3.9
Cobalt	NS	ug/L	< 3.9	U	3.9	14.8		3.9	22.1		3.9	15.9		3.9	12.1		3.9	30.3		3.9	22.1		3.9	24.8		3.9	8.7		3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9
Copper	NS	ug/L	< 3.8	U	3.8	7.4		3.8	51.1		3.8	68.8		3.8	16.4		3.8	630		3.8	37.9		3.8	22		3.8	84.7		3.8	17.4		3.8	8.3		3.8	5.2		3.8	7.8		3.8	4.3	J	3.8	< 3.8	U	3.8
Iron	NS	ug/L	754		119	3630		119	11100		119	24600		119	26300		119	255000		119	21000		119	247		119	50200		119	1210		119	232		119	407		119	227		119	432		119	17600		119
Lead	NS	ug/L	1.4	J	1.2	6.5		1.2	7.6		1.2	15.9		1.2	6.6		1.2	57.8		1.2	2.1		1.2	2.4		1.2	19.7		1.2	< 1.2	U	1.2	< 1.2	U	1.2	< 1.2	U	1.2	< 1.2	U	1.2	< 1.2	U	1.2	< 1.2	U	1.2
Magnesium	NS	ug/L	283		197	1940		197	1970		197	1450		197	2600		197	9390		197	1260		197	1160		197	2940		197	3010		197	3100		197	4200		197	1520		197	1150		197	2090		197
Manganese	NS	ug/L	16.8		8.1	410		8.1	689		8.1	97.4		8.1	186		8.1	223		8.1	181		8.1	76.2		8.1	88.6		8.1	81		8.1	80.5		8.1	32.3		8.1	21.6		8.1	81.7		8.1	126		8.1
Mercury	2	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	0.43		0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
Nickel	NS	ug/L	5.3		4.1	12.8		4.1	31.5		4.1	25.3		4.1	21.8		4.1	27.1		4.1	20.7		4.1	41.2		4.1	61.3		4.1	5.6		4.1	4.8	J	4.1	< 4.1	U	4.1	7.8		4.1	4.4	J	4.1	< 4.1	U	4.1
Potassium	NS	ug/L	817		202	3510		202	1770		202	3150		202	1100		202	5300		202	655		202	659		202	3790		202	1100		202	1040		202	963		202	1280		202	941		202	1320		202
Selenium	50	ug/L	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	1.7	J	1.5	< 1.5	U	1.5	8		1.5	2.2	J	1.5	< 1.5	U	1.5	2.7		1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5
Silver	NS	ug/L	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1
Sodium	NS	ug/L	1930		193	1100		193	1040		193	1750		193	2350		193	2080		193	1920		193	1630		193	2060		193	1820		193	1890		193	1940		193	2390		193	1850		193	4830		193
Thallium	2	ug/L	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79
Vanadium	NS	ug/L	4.7	J	3.8	< 3.8	U	3.8	18.7		3.8	64.2		3.8	15.3		3.8	385		3.8	< 3.8	U	3.8	< 3.8	U	3.8	130		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8
Zinc	NS	ug/L	25.1		19.7	118		19.7	178		19.7	96.9		19.7	59.4		19.7	218		19.7	121		19.7	72.6		19.7	69.8		19.7	26.4		19.7	< 19.7	U	19.7	21.6		19.7	< 19.7	U	19.7	47.7		19.7	< 19.7	U	19.7
General Chemistry																																															
Alkalinity, Total	NS	mg/L	36		5	63.5		5	58.5		5	110		5	< 5	U	5	21.4		5	< 5	U	5	< 5	U	5	< 5	U	5	9		5	8.6		5	11.5		5	8.7		5	5		5	32.9		5
Ammonia	NS	mg/L	< 0.08	U	0.08	0.14		0.08	0.55		0.08	< 0.08	U	0.08	0.08	J	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chemical Oxygen Demand	NS	mg/L	< 8.7	U	8.7	33.4		8.7	97		8.7	43.7		8.7	19		8.7	53.9		8.7	8.8	J	8.7	10.8		8.7	41.6		8.7	< 8.7	U	8.7	< 8.7	U	8.7	8.8	J	8.7	< 8.7	U	8.7	12.9		8.7	12.9		8.7
Chloride	NS	mg/L	2.3		0.28	0.72		0.28	1	B	0.28	2.5		0.28	1.9	B	0.28	2.3		0.28	2.7		0.28	2.6		0.28	2.9	B	0.28	1.9		0.28	2		0.28	2.8		0.28	4.3		0.28	2		0.28	1		0.28
Hardness, Calcium Carbonate	NS	mg/L	25.6		1.6	67.3		1.6	99		8.1	208		8.1	39.6		8.1	99	J	32.4	19.8		1.6	11.9		1.6	49.5		8.1	21.8		1.6	19.8		1.6	45.5		1.6	13.9		1.6	15.8		1.6	49.5		8.1
Nitrate as N	10	mg/L	< 0.047	U	0.047	0.09	J	0.047	< 0.047	U	0.047	0.058	J	0.047	< 0.047	U	0.047	0.6		0.047	< 0.047	U	0.047	< 0.047	U	0.047	0.41		0.047	0.3		0.047	0.3		0.047	0.49		0.047	0.07	J	0.047	0.05	J	0.047	< 0.047	U	0.047
Phosphorus (as phosphate)	NS	mg/L	0.02	J	0.016	< 0.016	U	0.016	0.26		0.016	0.74		0.016	0.86		0.016	0.29		0.016	1		0.016	1		0.016	0.54		0.016	1.1		0.016	0.57		0.016	2.1		0.032	1.1		0.016	< 0.016	U	0.016	0.75		0.016
Sulfate	NS	mg/L	3.3		0.35	4		0.35	3	B	0.35	12.9		0.35	20.2	B	0.35	18.4		0.35	14.7		0.35	12.5		0.35	7.6	B	0.35	12.7		0.35	13.1		0.35	12.8		0.35	5.6		0.35	9.3		0.35	7.9		0.35
Total Dissolved Solids	NS	mg/L	71		8.1	84		8.1	87		8.1	161		8.1	47		8.1	104		16.2	51		8.1	< 8.1	U	8.1	24		8.1	45		8.1	54		8.1	67		8.1	48		8.1	28		8.1	50		8.1

Notes and Abbreviations:

1. Results greater than the MDE MCL are shaded.

* - laboratory sample recovery or precision outside QC limits
B - laboratory blank contamination
H - sample was prepped or analyzed beyond the specified holding time
J - result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value
LQual - Laboratory Qualifier
MDE MCL - Maryland Department of the Environment Maximum Contaminant Level for Chemicals in Drinking Water, Code of Maryland Regulations, accessed at URLs http://www.dsd.state.md.us/comar/comarhtml/26/26.04.01.06.htm and http://www.dsd.state.md.us/comar/getfile.aspx?file=26.04.01.07.htm
mg/L - milligrams per liter
QC - quality control
RDL - reporting detection limit
U - non-detect result
ug/L - micrograms per liter

Table 8B
Third Quarter 2013 Groundwater Analytical Results

Sample Location			MW-29			MW-30			MW-3			MW-4			MW-5			MW-5			MW-6			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-19			PMW-23			PMW-28			PMW-6		
Sample Name			MW-29			MW-30			MW-3			MW-4			MW-5			FDGW_073013			MW-6			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			FDGW_080113			PMW-23			PMW-28			PMW-6		
Sample Date			7/31/2013			8/5/2013			7/30/2013			7/30/2013			7/30/2013			7/30/2013			7/31/2013			8/8/2013			8/6/2013			8/8/2013			8/1/2013			8/1/2013			8/1/2013			8/7/2013			7/31/2013			7/30/2013		
N=Normal, FD=Field Duplicate			N			N			N			N			N			FD			N			N			N			N			N			N			FD			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Volatile Organic Compounds																																																		
1,1,1,2-Tetrachloroethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
1,1,1-Trichloroethane	200	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
1,1,2,2-Tetrachloroethane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
1,1,2-Trichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,1-Dichloroethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,1-Dichloroethene	7	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,1-Dichloropropene	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
1,2,3-Trichlorobenzene	NS	ug/L	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51
1,2,3-Trichloropropane	NS	ug/L	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42
1,2,4-Trichlorobenzene	70	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
1,2,4-Trimethylbenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,2-Dibromo-3-chloropropane	0.2	ug/L	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4
1,2-Dibromoethane	0.05	ug/L	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28
1,2-Dichlorobenzene	600	ug/L	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21
1,2-Dichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,2-Dichloropropane	5	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,3,5-Trimethylbenzene	NS	ug/L	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15
1,3-Dichlorobenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
1,3-Dichloropropane	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,4-Dichlorobenzene	75	ug/L	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23
2,2-Dichloropropane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
2-Butanone	NS	ug/L	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3
2-Chloroethyl Vinyl Ether	NS	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
2-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
2-Hexanone	NS	ug/L	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5
4-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
4-Methyl-2-pentanone	NS	ug/L	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99
Acetone	NS	ug/L	< 2.7	U	2.7	10		2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	6.4		2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7
Acrolein	NS	ug/L	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3
Acrylonitrile	NS	ug/L	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68
Allyl Chloride	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Benzene	5	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Bromobenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Bromochloromethane	NS	ug/L	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27
Bromodichloromethane	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
Bromoform	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
Bromomethane	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U*	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U*	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Carbon Disulfide	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Carbon Tetrachloride	5	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
Chlorobenzene	100	ug/L	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11
Chloroethane	NS	ug/L	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17
Chloroform	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	0.14	J	0.08	< 0.08	U	0.08
Chloromethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
cis-1,2-Dichloroethene	70	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
cis-1,3-Dichloropropene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Cymene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Dibromochloromethane	NS	ug/L	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2
Dibromomethane	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
Dichlorodifluoromethane	NS	ug/L	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U*	0.22	< 0.22	U*	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22
Ethylbenzene	700	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Hexachlorobutadiene	NS	ug/L	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48
Iodomethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U*	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U*	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Isopropylbenzene	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
m,p-Xylenes	NS	ug/L	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25
Methyl tert-Butyl Ether	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	1.5		0.14	< 0.14	U	0.14	< 0.14	U	0.14	0.65	J	0.14	0.75	J	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	0.34	J	0.14	< 0.14	U	0.14
Methylene Chloride	5	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18

Table 8B
Third Quarter 2013 Groundwater Analytical Results

Sample Location			MW-29			MW-30			MW-3			MW-4			MW-5			MW-5			MW-6			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-19			PMW-23			PMW-28			PMW-6		
Sample Name			MW-29			MW-30			MW-3			MW-4			MW-5			FDGW_073013			MW-6			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			FDGW_080113			PMW-23			PMW-28			PMW-6		
Sample Date			7/31/2013			8/5/2013			7/30/2013			7/30/2013			7/30/2013			7/30/2013			7/31/2013			8/8/2013			8/6/2013			8/8/2013			8/1/2013			8/1/2013			8/1/2013			8/7/2013			7/31/2013			7/30/2013		
N=Normal, FD=Field Duplicate			N			N			N			N			N			FD			N			N			N			N			N			N			FD			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Antimony	6	ug/L	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9
Arsenic	10	ug/L	2.8		1.8	3.4		1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	3.9		1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8
Barium	2000	ug/L	32.2		3.8	40.1		3.8	30.4		3.8	47.1		3.8	9.8		3.8	9.6		3.8	22.5		3.8	75		3.8	21		3.8	13.8		3.8	39.9		3.8	24.1		3.8	26.1		3.8	10.6		3.8	35.1		3.8	31.6		3.8
Beryllium	4	ug/L	0.82	J	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	2.1		0.8	< 0.8	U	0.8	< 0.8	U	0.8	1.5		0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8
Cadmium	5	ug/L	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2
Calcium	NS	ug/L	2720		196	2890		196	2700		196	2290		196	2360		196	2370		196	3060		196	963		196	2550		196	1400		196	2440		196	2070		196	1990		196	1080		196	5500		196	3250		196
Chromium	100	ug/L	8.8		3.9	17.6		3.9	< 3.9	U	3.9	5.3		3.9	35.5		3.9	20.9		3.9	< 3.9	U	3.9	29.7		3.9	12		3.9	8.5		3.9	6.1		3.9	7.3		3.9	9.3		3.9	14.8		3.9	24.2		3.9	< 3.9	U	3.9
Cobalt	NS	ug/L	7.6		3.9	< 3.9	U	3.9	< 3.9	U	3.9	4.2	J	3.9	4.7	J	3.9	4.5	J	3.9	< 3.9	U	3.9	12.3		3.9	< 3.9	U	3.9	5.1		3.9	13.1		3.9	< 3.9	U	3.9	< 3.9	U	3.9	8.8		3.9	< 3.9	U	3.9	< 3.9	U	3.9
Copper	NS	ug/L	5.9		3.8	12.6		3.8	4.2	J	3.8	10.7		3.8	10.1		3.8	6.1		3.8	< 3.8	U	3.8	10.1		3.8	7.1		3.8	8.5		3.8	12.3		3.8	8.8		3.8	9.5		3.8	14.1		3.8	4.1	J	3.8	< 3.8	U	3.8
Iron	NS	ug/L	2820		119	8690		119	< 119	U	119	121	J	119	335		119	237		119	< 119	U	119	14800		119	4670		119	1820		119	2360		119	8540		119	8730		119	371		119	294		119	140	J	119
Lead	NS	ug/L	3.1		1.2	4.3		1.2	< 1.2	U	1.2	< 1.2	U	1.2	1.2	J	1.2	< 1.2	U	1.2	< 1.2	U	1.2	6.9		1.2	< 1.2	U	1.2	2.1		1.2	3.4		1.2	1.4	J	1.2	1.5		1.2	< 1.2	U	1.2	< 1.2	U	1.2	< 1.2	U	1.2
Magnesium	NS	ug/L	716		197	2700		197	2540		197	3010		197	1400		197	1390		197	1690		197	921		197	1020		197	605		197	1090		197	616		197	636		197	415		197	1090		197	2080		197
Manganese	NS	ug/L	17.4		8.1	64.3		8.1	14.9		8.1	23.4		8.1	11.6		8.1	12.4		8.1	9.1	J	8.1	40.2		8.1	50.8		8.1	28.3		8.1	84.9		8.1	102		8.1	102		8.1	45.4		8.1	171		8.1	28.8		8.1
Mercury	2	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
Nickel	NS	ug/L	17		4.1	< 4.1	U	4.1	5		4.1	9.8		4.1	52.7		4.1	26.4		4.1	< 4.1	U	4.1	21.4		4.1	7.2		4.1	15.9		4.1	15.9		4.1	< 4.1	U	4.1	4.3	J	4.1	22		4.1	16.8		4.1	< 4.1	U	4.1
Potassium	NS	ug/L	2160		202	1930		202	970		202	853		202	807		202	704		202	1070		202	4570		202	1260		202	768		202	1150		202	1100		202	1170		202	716		202	676		202	1160		202
Selenium	50	ug/L	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	1.8	J	1.5	< 1.5	U	1.5	< 1.5	U	1.5	1.5	J	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5
Silver	NS	ug/L	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1
Sodium	NS	ug/L	5400		193	2330		193	2550		193	2040		193	4050		193	3920		193	2430		193	1420		193	1980		193	1620		193	2500		193	5500		193	5530		193	1810		193	17900		193	1820		193
Thallium	2	ug/L	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79
Vanadium	NS	ug/L	7.5		3.8	16.3		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	40		3.8	< 3.8	U	3.8	< 3.8	U	3.8	6.4		3.8	10		3.8	12.1		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8
Zinc	NS	ug/L	176		19.7	36.7		19.7	< 19.7	U	19.7	42.1		19.7	< 19.7	U	19.7	20.4		19.7	< 19.7	U	19.7	44.3		19.7	35.3		19.7	20.2		19.7	23.8		19.7	35.1		19.7	36.8		19.7	38.8		19.7	< 19.7	U	19.7	< 19.7	U	19.7
General Chemistry																																																		
Alkalinity, Total	NS	mg/L	5.2		5	14.3		5	5.2		5	5.8		5	10.4		5	5.2		5	8.2		5	< 5	U	5	< 5	U	5	< 5	U	5	< 5	U	5	8.7		5	5.5		5	< 5	U	5	41.9		5	6.1		5
Ammonia	NS	mg/L	< 0.08	U	0.08	0.38		0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	0.13		0.08	0.11		0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chemical Oxygen Demand	NS	mg/L	14.9		8.7	27.2		8.7	< 8.7	U	8.7	< 8.7	U	8.7	< 8.7	U	8.7	< 8.7	U	8.7	< 8.7	U	8.7	14.9		8.7	< 8.7	U	8.7	< 8.7	U	8.7	12.9		8.7	29.3		8.7	23.1		8.7	< 8.7	U	8.7	< 8.7	U	8.7	< 8.7	U	8.7
Chloride	NS	mg/L	2.9		0.28	2.3	B	0.28	4.8		0.28	3.5		0.28	6.1		0.28	5.9		0.28	3.9		0.28	1.6		0.28	1.2		0.28	2		0.28	1.3		0.28	2.2		0.28	2.2		0.28	2.5		0.28	6.6		0.28	3.1		0.28
Hardness, Calcium Carbonate	NS	mg/L	11.9		1.6	29.7		8.1	19.7		1.6	19.7		1.6	33.5		1.6	13.8		1.6	17.8		1.6	9.9	J	8.1	13.9		1.6	7.9		1.6	19.8	J	8.1	29.7		8.1	29.7		8.1	7.9		1.6	25.7		1.6	21.7		1.6
Nitrate as N	10	mg/L	< 0.047	U	0.047	0.047	J	0.047	0.35		0.047	0.079	J	0.047	0.45		0.047	0.38		0.047	0.28		0.047	0.078	J	0.047	< 0.047	U	0.047	< 0.047	U	0.047	0.31		0.047	< 0.047	U	0.047	< 0.047	U	0.047	0.52		0.047	0.21		0.047	0.068	J	0.047
Phosphorus (as phosphate)	NS	mg/L	1.5		0.016	0.35		0.016	0.21		0.016	0.28		0.016	2.2		0.032	0.02	J	0.016	< 0.016	U	0.016	0.31		0.016	0.19		0.016	0.099		0.016	< 0.016	U	0.016	1.2		0.016	< 0.016	U	0.016	1.4		0.016	0.02	J	0.016	0.57		0.016
Sulfate	NS	mg/L	8.3		0.35	5.1	B	0.35	9.6		0.35	12.8		0.35	4.6		0.35	4.4		0.35	5		0.35	17.6		0.35	17		0.35	17		0.35	4.9		0.35	13.5		0.35	14		0.35	3.6		0.35	11.2		0.35	9.7		0.35
Total Dissolved Solids	NS	mg/L	22		8.1	40		8.1	45		8.1	36		8.1	41		8.1	14		8.1	32		8.1	127		8.1	32		8.1	15		8.1	30		8.1	161		8.1	143		8.1	34		8.1	57		8.1	23		8.1

Notes and Abbreviations:

1. Results greater than the MDE MCL are shaded.

* - laboratory sample recovery or precision outside QC limits
B - laboratory blank contamination
H - sample was prepped or analyzed beyond the specified holding time
J - result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value
LQual - Laboratory Qualifier
MDE MCL - Maryland Department of the Environment Maximum Contaminant Level for Chemicals in Drinking Water, Code of Maryland Regulations, accessed at URLs http://www.dsd.state.md.us/comar/comarhtml/26/26.04.01.06.htm and http://www.dsd.state.md.us/comar/getfile.aspx?file=26.04.01.07.htm
mg/L - milligrams per liter
QC - quality control
RDL - reporting detection limit
U - non-detect result
ug/L - micrograms per liter

Table 8C
Fourth Quarter 2013 Groundwater Analytical Results

Sample Location			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-24			MW-24			MW-25			MW-27			MW-28		
Sample Name			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-24			FDGW_93013			MW-25			MW-27			MW-28		
Sample Date			9/24/2013			9/24/2013			9/26/2013			10/1/2013			9/25/2013			9/25/2013			9/25/2013			9/26/2013			9/26/2013			10/1/2013			9/30/2013			9/30/2013			9/30/2013			9/25/2013			9/24/2013		
N=Normal, FD=Field Duplicate			N			N			N			N			N			N			N			N			N			N			N			FD			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Volatile Organic Compounds																																															
1,1,1,2-Tetrachloroethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
1,1,1-Trichloroethane	200	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
1,1,2,2-Tetrachloroethane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
1,1,2-Trichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,1-Dichloroethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,1-Dichloroethene	7	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,1-Dichloropropene	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
1,2,3-Trichlorobenzene	NS	ug/L	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51
1,2,3-Trichloropropane	NS	ug/L	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U*	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U*	0.42	< 0.42	U*	0.42	< 0.42	U*	0.42	< 0.42	U*	0.42	< 0.42	U	0.42	< 0.42	U	0.42
1,2,4-Trichlorobenzene	70	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
1,2,4-Trimethylbenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,2-Dibromo-3-chloropropane	0.2	ug/L	< 0.4	U*	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4
1,2-Dibromoethane	0.05	ug/L	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28
1,2-Dichlorobenzene	600	ug/L	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21
1,2-Dichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,2-Dichloropropane	5	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,3,5-Trimethylbenzene	NS	ug/L	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15
1,3-Dichlorobenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
1,3-Dichloropropane	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,4-Dichlorobenzene	75	ug/L	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23
2,2-Dichloropropane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
2-Butanone	NS	ug/L	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U*	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U*	2.3	< 2.3	U*	2.3	< 2.3	U*	2.3	< 2.3	U*	2.3	< 2.3	U	2.3	< 2.3	U	2.3
2-Chloroethyl Vinyl Ether	NS	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
2-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
2-Hexanone	NS	ug/L	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5
4-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
4-Methyl-2-pentanone	NS	ug/L	< 0.99	U*	0.99	< 0.99	U	0.99	< 0.99	U*	0.99	< 0.99	U	0.99	< 0.99	U*	0.99	< 0.99	U*	0.99	< 0.99	U*	0.99	< 0.99	U*	0.99	< 0.99	U*	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U*	0.99	< 0.99	U*	0.99
Acetone	NS	ug/L	< 2.7	U	2.7	1700		2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	19		2.7	42		2.7
Acrolein	NS	ug/L	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U*	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U*	1.3	< 1.3	U*	1.3	< 1.3	U*	1.3	< 1.3	U*	1.3	< 1.3	U	1.3	< 1.3	U	1.3
Acrylonitrile	NS	ug/L	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68
Allyl Chloride	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Benzene	5	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	0.18	J	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Bromobenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Bromochloromethane	NS	ug/L	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27
Bromodichloromethane	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
Bromoform	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
Bromomethane	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Carbon Disulfide	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Carbon Tetrachloride	5	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
Chlorobenzene	100	ug/L	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11
Chloroethane	NS	ug/L	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17
Chloroform	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	2		0.08	< 0.08	U	0.08	< 0.08	U	0.08	0.99	J	0.08	5.3		0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chloromethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
cis-1,2-Dichloroethene	70	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
cis-1,3-Dichloropropene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Cymene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Dibromochloromethane	NS	ug/L	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2
Dibromomethane	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
Dichlorodifluoromethane	NS	ug/L	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22
Ethylbenzene	700	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Hexachlorobutadiene	NS	ug/L	< 0.48	U	0.48	< 0.48	U*	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48
Iodomethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Isopropylbenzene	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
m,p-Xylenes	NS	ug/L	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25
Methyl tert-Butyl Ether	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	0.93	J	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	0.16	J	0.14	< 0.14	U	0.14
Methylene Chloride	5	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Naphthalene	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
n-Butylbenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
n-Propylbenzene	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
o-Xylene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
sec-Butylbenzene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.

Table 8C
Fourth Quarter 2013 Groundwater Analytical Results

Sample Location			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-24			MW-24			MW-25			MW-27			MW-28		
Sample Name			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-24			FDGW_93013			MW-25			MW-27			MW-28		
Sample Date			9/24/2013			9/24/2013			9/26/2013			10/1/2013			9/25/2013			9/25/2013			9/25/2013			9/26/2013			9/26/2013			10/1/2013			9/30/2013			9/30/2013			9/30/2013			9/25/2013			9/24/2013		
N=Normal, FD=Field Duplicate			N			N			N			N			N			N			N			N			N			N			N			FD			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Total Metals																																																
Aluminum	NS	ug/L	3480		43.8	646		43.8	14400		43.8	1920		43.8	47200		43.8	43800		43.8	1260		43.8	1660		43.8	5920		43.8	269		43.8	121		43.8	145		43.8	302		43.8	330		43.8	476		43.8
Antimony	6	ug/L	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9
Arsenic	10	ug/L	2	J	1.8	2	J	1.8	14.8		1.8	2.5		1.8	34.2		1.8	104		1.8	1.8	J	1.8	< 1.8	U	1.8	10.2		1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8
Barium	2000	ug/L	40.5		3.8	29.1		3.8	321		3.8	88.8		3.8	163		3.8	149		3.8	55.4		3.8	90.5		3.8	53.3		3.8	31.8		3.8	15.7		3.8	16.2		3.8	22.9		3.8	39.1		3.8	67.9		3.8
Beryllium	4	ug/L	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	1.1		0.8	2.4		0.8	2.8		0.8	0.97	J	0.8	2.6		0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8
Cadmium	5	ug/L	< 2	U	2	< 2	U	2	13.7		2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2
Calcium	NS	ug/L	31700		196	12700		196	43300		196	20900		196	4180		196	5660		196	1680		196	454		196	2150		196	2180		196	3250		196	3210		196	2340		196	1350		196	6010		196
Chromium	100	ug/L	6.2		3.9	< 3.9	U	3.9	74.5		3.9	6.6		3.9	60.5		3.9	186		3.9	< 3.9	U	3.9	< 3.9	U	3.9	32.7		3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	14.1		3.9	< 3.9	U	3.9
Cobalt	NS	ug/L	< 3.9	U	3.9	13.2		3.9	29.8		3.9	13		3.9	18.7		3.9	28.3		3.9	17.8		3.9	20.1		3.9	4.5	J	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	4.8	J	3.9	< 3.9	U	3.9
Copper	NS	ug/L	8		3.8	5.7		3.8	85.4		3.8	20.9		3.8	65.4		3.8	485		3.8	14.1		3.8	16.6		3.8	22.1		3.8	4.4	J	3.8	3.9	J	3.8	3.8	J	3.8	< 3.8	U	3.8	41.1		3.8	< 3.8	U	3.8
Iron	NS	ug/L	2570		119	6740		119	29400		119	3940		119	85400		119	207000		119	9430		119	479		119	17000		119	326		119	240		119	245		119	166		119	4980		119	18900		119
Lead	NS	ug/L	5.3		1.2	4.7		1.2	32.5		1.2	3.6		1.2	27.9		1.2	55		1.2	< 1.2	U	1.2	< 1.2	U	1.2	5.9		1.2	< 1.2	U	1.2	< 1.2	U	1.2	< 1.2	U	1.2	< 1.2	U	1.2	1.7		1.2	< 1.2	U	1.2
Magnesium	NS	ug/L	645		197	1320		197	2760		197	1110		197	6070		197	11300		197	1350		197	971		197	2160		197	2830		197	3240		197	3170		197	1410		197	864		197	2280		197
Manganese	NS	ug/L	46.4		8.1	325		8.1	965		8.1	55		8.1	272		8.1	235		8.1	130		8.1	73		8.1	61.9		8.1	71.9		8.1	24.5		8.1	24.8		8.1	19.8		8.1	99.7		8.1	135		8.1
Mercury	2	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	0.54		0.16	0.59		0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
Nickel	NS	ug/L	6.7		4.1	7.1		4.1	35.3		4.1	19.7		4.1	43.8		4.1	27.2		4.1	28.1		4.1	13.4		4.1	11.1		4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	14.7		4.1	< 4.1	U	4.1
Potassium	NS	ug/L	1380		202	2210		202	3750		202	1510		202	3500		202	5540		202	784		202	691		202	2110		202	1060		202	963		202	946		202	1210		202	1000		202	1480		202
Selenium	50	ug/L	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	2.1	J	1.5	7.3		1.5	8.4		1.5	2.8		1.5	1.9	J	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	3.4		1.5	2	J	1.5	< 1.5	U	1.5	1.8	J	1.5
Silver	NS	ug/L	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1
Sodium	NS	ug/L	2160		193	1940		193	1820		193	1400		193	2690		193	1850		193	1720		193	1380		193	2130		193	1590		193	1260		193	1230		193	2300		193	2260		193	5060		193
Thallium	2	ug/L	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	0.81	J	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79
Vanadium	NS	ug/L	10		3.8	4.2	J	3.8	88.6		3.8	10.7		3.8	96.4		3.8	333		3.8	< 3.8	U	3.8	< 3.8	U	3.8	37.6		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	4.5	J	3.8
Zinc	NS	ug/L	99.8		19.7	113		19.7	359		19.7	40		19.7	108		19.7	180		19.7	58.2		19.7	81.9		19.7	30		19.7	< 19.7	U	19.7	< 19.7	U	19.7	< 19.7	U	19.7	< 19.7	U	19.7	192		19.7	< 19.7	U	19.7
General Chemistry																																															
Alkalinity, Total	NS	mg/L	65		0.79	37.6		0.79	57.7		0.79	33.3		5	< 0.79	U	0.79	23.7		0.79	< 0.79	U	0.79	< 0.79	U	0.79	3.3	J	0.79	8.1		5	9.3		5	9.1		5	6.7		5	< 0.79	U	0.79	33.3		0.79
Ammonia	NS	mg/L	< 0.08	U	0.08	< 0.08	U	0.08	0.16		0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chemical Oxygen Demand	NS	mg/L	32.6		4.8	26.5		4.8	116		4.8	44.8		4.8	102		4.8	56.9		4.8	8.3	J	4.8	12.3		4.8	67.1		4.8	6.3	J	4.8	8.3	J	4.8	18.4		4.8	10.3		4.8	22.5		4.8	20.4		4.8
Chloride	NS	mg/L	2.2	B	0.28	0.98	B	0.28	1.4		0.28	2.4	B	0.28	1.9		0.28	1.9		0.28	2.9		0.28	2.3		0.28	2.9		0.28	1.9	B	0.28	1.8		0.28	1.8		0.28	4.2		0.28	2.4		0.28	1.1	B	0.28
Hardness, Calcium Carbonate	NS	mg/L	77.2		1.6	37.6		1.6	111		1.6	43.6		1.6	25.7		1.6	57.4		1.6	9.9		1.6	4	J	1.6	9.9		1.6	17.8		1.6	17.8		1.6	19.8		1.6	7.9		1.6	5.9		1.6	23.8		1.6
Nitrate as N	10	mg/L	< 0.047	U	0.047	< 0.047	U	0.047	0.19		0.047	0.093	J	0.047	< 0.047	U	0.047	1.1		0.047	< 0.047	U	0.047	< 0.047	U	0.047	0.089	J	0.047	0.28		0.047	< 0.047	UH	0.047	< 0.047	UH	0.047	0.092	JH	0.047	1.5		0.047	< 0.047	U	0.047
Phosphorus (as phosphate)	NS	mg/L	0.74		0.016	0.8		0.016	0.94		0.016	< 0.016	U	0.016	1.8		0.032	1		0.016	0.43		0.016	1.4		0.016	1.4		0.016	2.4		0.032	0.57		0.016	0.032		0.016	0.21		0.016	0.29		0.016	0.58		0.016
Sulfate	NS	mg/L	2.6		0.35	6.1		0.35	6.5		0.35	11.3		0.35	39.3		0.35	21.6		0.35	27		0.35	25.8		0.35	12.7		0.35	9.3		0.35	14		0.35	14		0.35	6.3		0.35	295		1.7	4.9		0.35
Total Dissolved Solids	NS	mg/L	100		8.1	70		8.1	135		8.1	71		8.1	68		8.1	100		8.1	41		8.1	48		8.1	49		8.1	40		8.1	43		8.1	47		8.1	41		8.1	736		16.2	43		8.1

Notes and Abbreviations:

1. Results greater than the MDE MCL are shaded.

* - laboratory sample recovery or precision outside QC limits
B - laboratory blank contamination
H - sample was prepped or analyzed beyond the specified holding time
J - result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value
LQual - Laboratory Qualifier
MDE MCL - Maryland Department of the Environment Maximum Contaminant Level for Chemicals in Drinking Water, Code of Maryland Regulations, accessed at URLs http://www.dsd.state.md.us/comar/comarhtml/26/26.04.01.06.htm and http://www.dsd.state.md.us/comar/getfile.aspx?file=26.04.01.07.htm
mg/L - milligrams per liter
QC - quality control
RDL - reporting detection limit
U - non-detect result
ug/L - micrograms per liter

Table 8C
Fourth Quarter 2013 Groundwater Analytical Results

Sample Location			MW-29			MW-30			MW-3			MW-3			MW-4			MW-5			MW-6			PMW-11			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			PMW-28			PMW-6		
Sample Name			MW-29			MW-30			MW-3			FDGW_92713			MW-4			MW-5			MW-6			PMW-11			FDGW_92513			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			PMW-28			PMW-6		
Sample Date			9/27/2013			10/2/2013			9/27/2013			9/27/2013			9/30/2013			9/30/2013			9/24/2013			9/25/2013			9/25/2013			10/1/2013			9/26/2013			9/30/2013			9/24/2013			10/1/2013			10/1/2013			9/30/2013		
N=Normal, FD=Field Duplicate			N			N			N			FD			N			N			N			N			FD			N			N			N			N			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Volatile Organic Compounds																																																		
1,1,1,2-Tetrachloroethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
1,1,1-Trichloroethane	200	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
1,1,2,2-Tetrachloroethane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
1,1,2-Trichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,1-Dichloroethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,1-Dichloroethene	7	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,1-Dichloropropene	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
1,2,3-Trichlorobenzene	NS	ug/L	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51
1,2,3-Trichloropropane	NS	ug/L	< 0.42	U	0.42	< 0.42	U*	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U*	0.42	< 0.42	U*	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U*	0.42	< 0.42	U	0.42	< 0.42	U*	0.42	< 0.42	U	0.42	< 0.42	U*	0.42	< 0.42	U*	0.42	< 0.42	U*	0.42
1,2,4-Trichlorobenzene	70	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
1,2,4-Trimethylbenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,2-Dibromo-3-chloropropane	0.2	ug/L	< 0.4	U	0.4	< 0.4	U*	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4	< 0.4	U*	0.4
1,2-Dibromoethane	0.05	ug/L	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28
1,2-Dichlorobenzene	600	ug/L	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21
1,2-Dichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,2-Dichloropropane	5	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,3,5-Trimethylbenzene	NS	ug/L	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15
1,3-Dichlorobenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
1,3-Dichloropropane	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,4-Dichlorobenzene	75	ug/L	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23
2,2-Dichloropropane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
2-Butanone	NS	ug/L	< 2.3	U	2.3	3.9	J*	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U*	2.3	< 2.3	U*	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U*	2.3	< 2.3	U	2.3	< 2.3	U*	2.3	< 2.3	U	2.3	< 2.3	U*	2.3	< 2.3	U*	2.3	< 2.3	U*	2.3
2-Chloroethyl Vinyl Ether	NS	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
2-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
2-Hexanone	NS	ug/L	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5
4-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
4-Methyl-2-pentanone	NS	ug/L	< 0.99	U*	0.99	< 0.99	U	0.99	< 0.99	U*	0.99	< 0.99	U*	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U*	0.99	< 0.99	U*	0.99	< 0.99	U*	0.99	< 0.99	U	0.99	< 0.99	U*	0.99	< 0.99	U	0.99	< 0.99	U*	0.99	< 0.99	U*	0.99	< 0.99	U*	0.99
Acetone	NS	ug/L	13		2.7	310		2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	17		2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7
Acrolein	NS	ug/L	< 1.3	U	1.3	< 1.3	U*	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U*	1.3	< 1.3	U*	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U*	1.3	< 1.3	U	1.3	< 1.3	U*	1.3	< 1.3	U	1.3	< 1.3	U*	1.3	< 1.3	U*	1.3	< 1.3	U*	1.3
Acrylonitrile	NS	ug/L	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68
Allyl Chloride	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Benzene	5	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Bromobenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Bromochloromethane	NS	ug/L	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27
Bromodichloromethane	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
Bromoform	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
Bromomethane	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Carbon Disulfide	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Carbon Tetrachloride	5	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
Chlorobenzene	100	ug/L	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11
Chloroethane	NS	ug/L	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17
Chloroform	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chloromethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
cis-1,2-Dichloroethene	70	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
cis-1,3-Dichloropropene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Cymene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Dibromochloromethane	NS	ug/L	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2
Dibromomethane	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
Dichlorodifluoromethane	NS	ug/L	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22
Ethylbenzene	700	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Hexachlorobutadiene	NS	ug/L	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U*	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48
Iodomethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Isopropylbenzene	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
m,p-Xylenes	NS	ug/L	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25
Methyl tert-Butyl Ether	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	1.8		0.14	< 0.14	U	0.14	0.23	J	0.14	0.56	J	0.14	0.6	J	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Methylene Chloride	5	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Naphthalene	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
n-Butylbenzene	NS

Table 8C
Fourth Quarter 2013 Groundwater Analytical Results

Sample Location			MW-29			MW-30			MW-3			MW-3			MW-4			MW-5			MW-6			PMW-11			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			PMW-28			PMW-6		
Sample Name			MW-29			MW-30			MW-3			FDGW_92713			MW-4			MW-5			MW-6			PMW-11			FDGW_92513			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			PMW-28			PMW-6		
Sample Date			9/27/2013			10/2/2013			9/27/2013			9/27/2013			9/30/2013			9/30/2013			9/24/2013			9/25/2013			9/25/2013			10/1/2013			9/26/2013			9/30/2013			9/24/2013			10/1/2013			10/1/2013			9/30/2013		
N=Normal, FD=Field Duplicate			N			N			N			FD			N			N			N			N			FD			N			N			N			N			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Total Metals																																																		
Aluminum	NS	ug/L	1170		43.8	9250		43.8	62.2		43.8	52.7		43.8	103		43.8	110		43.8	< 43.8	U	43.8	1830		43.8	2120		43.8	448		43.8	536		43.8	239		43.8	595		43.8	363		43.8	59		43.8	223		43.8
Antimony	6	ug/L	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9
Arsenic	10	ug/L	2.6		1.8	12.1		1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	2.2	J	1.8	2.2	J	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8
Barium	2000	ug/L	25.3		3.8	67.5		3.8	27.2		3.8	26.9		3.8	45.9		3.8	9		3.8	22.7		3.8	19.1		3.8	21.1		3.8	20.5		3.8	9.7		3.8	8		3.8	23.7		3.8	10.9		3.8	38.8		3.8	31.5		3.8
Beryllium	4	ug/L	0.9	J	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	0.85	J	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8
Cadmium	5	ug/L	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2
Calcium	NS	ug/L	1220		196	3190		196	2180		196	2310		196	2010		196	2450		196	2520		196	821		196	742		196	2320		196	1160		196	621		196	1800		196	860		196	4200		196	2340		196
Chromium	100	ug/L	6.4		3.9	46.2		3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	6.2		3.9	9		3.9	5.6		3.9	4.5	J	3.9	< 3.9	U	3.9	< 3.9	U	3.9	9.3		3.9	9.8		3.9	5.2		3.9
Cobalt	NS	ug/L	10.5		3.9	4.8	J	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	7.7		3.9	7.7		3.9	< 3.9	U	3.9	5.1		3.9	6.4		3.9	< 3.9	U	3.9	7.2		3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9
Copper	NS	ug/L	6.3		3.8	36.4		3.8	< 3.8	U	3.8	< 3.8	U	3.8	4	J	3.8	6.7		3.8	< 3.8	U	3.8	6.6		3.8	7.1		3.8	< 3.8	U	3.8	4.9	J	3.8	7.7		3.8	4.4	J	3.8	15		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8
Iron	NS	ug/L	1210		119	30700		119	< 119	U	119	< 119	U	119	< 119	U	119	< 119	U	119	< 119	U	119	3560		119	3780		119	5110		119	1290		119	230		119	7730		119	523		119	< 119	U	119	571		119
Lead	NS	ug/L	< 1.2	U	1.2	17.5		1.2	< 1.2	U	1.2	< 1.2	U	1.2	< 1.2	U	1.2	1.3	J	1.2	< 1.2	U	1.2	2		1.2	1.9		1.2	< 1.2	U	1.2	2.4		1.2	< 1.2	U	1.2	1.3	J	1.2	1.3	J	1.2	< 1.2	U	1.2	< 1.2	U	1.2
Magnesium	NS	ug/L	610		197	3370		197	2450		197	2510		197	2880		197	1370		197	1730		197	378		197	393		197	956		197	558		197	455		197	591		197	353		197	898		197	1910		197
Manganese	NS	ug/L	15.6		8.1	105		8.1	14.8		8.1	15.1		8.1	20.9		8.1	10		8.1	9.9	J	8.1	17.5		8.1	18.2		8.1	49.8		8.1	24.5		8.1	17.2		8.1	77.4		8.1	40.7		8.1	181		8.1	33.2		8.1
Mercury	2	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
Nickel	NS	ug/L	19.2		4.1	6.5		4.1	4.6	J	4.1	5		4.1	5.5		4.1	< 4.1	U	4.1	< 4.1	U	4.1	10.6		4.1	11.4		4.1	5.2		4.1	12.5		4.1	9.3		4.1	< 4.1	U	4.1	14.1		4.1	6.5		4.1	< 4.1	U	4.1
Potassium	NS	ug/L	1700		202	2930		202	961		202	1000		202	907		202	777		202	1100		202	1430		202	1460		202	1300		202	697		202	679		202	970		202	732		202	733		202	1270		202
Selenium	50	ug/L	1.6	J	1.5	2.8		1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	1.5	J	1.5	1.6	J	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5
Silver	NS	ug/L	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1
Sodium	NS	ug/L	4140		193	3390		193	2440		193	2520		193	2160		193	4020		193	2580		193	1480		193	1420		193	1630		193	1510		193	1020		193	3310		193	1580		193	5890		193	1710		193
Thallium	2	ug/L	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79
Vanadium	NS	ug/L	4	J	3.8	64.7		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	9.3		3.8	9.7		3.8	< 3.8	U	3.8	4.3	J	3.8	< 3.8	U	3.8	5.2		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8
Zinc	NS	ug/L	112		19.7	76.6		19.7	30.8		19.7	36.6		19.7	< 19.7	U	19.7	20.9		19.7	< 19.7	U	19.7	38.3		19.7	37.1		19.7	30.2		19.7	22.3		19.7	< 19.7	U	19.7	38.2		19.7	35.2		19.7	< 19.7	U	19.7	< 19.7	U	19.7
General Chemistry																																																	
Alkalinity, Total	NS	mg/L	2.8	J	0.79	22.8		5	3.7	J	0.79	2.4	J	0.79	5.3		5	6.5		5	7.9		0.79	1.3	J	0.79	1	J	0.79	< 5	U	5	< 0.79	U	0.79	< 5	U	5	6.1		0.79	< 5	U	5	12.4		5	< 5	U	5
Ammonia	NS	mg/L	< 0.08	U	0.08	< 0.08	U	0.08	0.11		0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chemical Oxygen Demand	NS	mg/L	6.3	J	4.8	138		4.8	10.3		4.8	< 4.8	U	4.8	12.3		4.8	< 4.8	U	4.8	< 4.8	U	4.8	18.4		4.8	26.5		4.8	< 4.8	U	4.8	< 4.8	U	4.8	< 4.8	U	4.8	14.4		4.8	< 4.8	U	4.8	6.3	J	4.8	8.3	J	4.8
Chloride	NS	mg/L	3.1		0.28	1.7		0.28	4.8		0.28	8.9		0.28	4		0.28	5.8		0.28	3.7	B	0.28	1.5		0.28	1.5		0.28	1.3	B	0.28	1.8		0.28	1.2		0.28	2	B	0.28	2.4	B	0.28	6	B	0.28	3.2		0.28
Hardness, Calcium Carbonate	NS	mg/L	4	J	1.6	19.8		1.6	11.9		1.6	13.9		1.6	15.8		1.6	9.9		1.6	13.9		1.6	2	J	1.6	< 1.6	U	1.6	17.8		1.6	5.9		1.6	4	J	1.6	5.9		1.6	2	J	1.6	17.8		1.6	11.9		1.6
Nitrate as N	10	mg/L	< 0.047	UH	0.047	< 0.047	UH	0.047	0.33	H	0.047	< 0.047	UH	0.047	0.073	JH	0.047	0.4	H	0.047	0.34		0.047	0.15		0.047	0.13		0.047	< 0.047	U	0.047	< 0.047	U	0.047	0.24	H	0.047	< 0.047	U	0.047	0.55		0.047	0.14		0.047	0.11	H	0.047
Phosphorus (as phosphate)	NS	mg/L	< 0.016	U	0.016	1.2		0.016	0.34		0.016	0.25		0.016	0.19		0.016	0.032		0.016	0.69		0.016	0.4		0.016	0.74		0.016	0.032		0.016	0.39		0.016	0.22		0.016	0.55		0.016	1.6		0.032	0.65		0.016	0.12		0.016
Sulfate	NS	mg/L	9.8		0.35	5.2		0.35	11.7		0.35	13		0.35	16		0.35	6		0.35	4.5		0.35	16.2		0.35	8.8		0.35	12.7		0.35	23.1		0.35	12.2		0.35	12.4		0.35	1.4	J	0.35	7.1		0.35	10.8		0.35
Total Dissolved Solids	NS	mg/L	35		8.1	25		8.1	40		8.1	43		8.1	55		8.1	31		8.1	40		8.1	26		8.1	21		8.1	39		8.1	43		8.1	13		8.1	57		8.1	24		8.1	47		8.1	30		8.1

Notes and Abbreviations:

1. Results greater than the MDE MCL are shaded.

* - laboratory sample recovery or precision outside QC limits
B - laboratory blank contamination
H - sample was prepped or analyzed beyond the specified holding time
J - result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value
LQual - Laboratory Qualifier
MDE MCL - Maryland Department of the Environment Maximum Contaminant Level for Chemicals in Drinking Water, Code of Maryland Regulations, accessed at URLs http://www.dsd.state.md.us/comar/comarhtml/26/26.04.01.06.htm and http://www.dsd.state.md.us/comar/getfile.aspx?file=26.04.01.07.htm
mg/L - milligrams per liter
QC - quality control
RDL - reporting detection limit
U - non-detect result
ug/L - micrograms per liter

Table 8D
First Quarter 2014 Groundwater Analytical Results

Sample Location			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-24			MW-25			MW-27			MW-28			MW-29		
Sample Name			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-24			MW-25			MW-27			MW-28			MW-29		
Sample Date			1/9/2014			1/10/2014			1/14/2014			1/8/2014			1/10/2014			1/9/2014			1/13/2014			1/13/2014			1/14/2014			1/13/2014			1/14/2014			1/13/2014			1/10/2014			1/9/2014			1/8/2014		
N=Normal, FD=Field Duplicate			N			N			N			N			N			N			N			N			N			N			N			N			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Volatile Organic Compounds																																															
1,1,1,2-Tetrachloroethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
1,1,1-Trichloroethane	200	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
1,1,2,2-Tetrachloroethane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
1,1,2-Trichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,1-Dichloroethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,1-Dichloroethene	7	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,1-Dichloropropene	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
1,2,3-Trichlorobenzene	NS	ug/L	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51
1,2,3-Trichloropropane	NS	ug/L	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42
1,2,4-Trichlorobenzene	70	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
1,2,4-Trimethylbenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,2-Dibromo-3-chloropropane	0.2	ug/L	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4
1,2-Dibromoethane	0.05	ug/L	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28
1,2-Dichlorobenzene	600	ug/L	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21
1,2-Dichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,2-Dichloropropane	5	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,3,5-Trimethylbenzene	NS	ug/L	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15
1,3-Dichlorobenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
1,3-Dichloropropane	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,4-Dichlorobenzene	75	ug/L	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23
2,2-Dichloropropane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
2-Butanone	NS	ug/L	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3
2-Chloroethyl Vinyl Ether	NS	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
2-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
2-Hexanone	NS	ug/L	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5
4-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
4-Methyl-2-pentanone	NS	ug/L	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99
Acetone	NS	ug/L	< 2.7	U	2.7	50		2.7	130		2.7	< 2.7	U	2.7	45		2.7	< 2.7	U	2.7	12		2.7	< 2.7	U	2.7	52		2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7
Acrolein	NS	ug/L	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3
Acrylonitrile	NS	ug/L	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68
Allyl Chloride	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Benzene	5	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	0.1	J	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Bromobenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Bromochloromethane	NS	ug/L	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27
Bromodichloromethane	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
Bromoform	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
Bromomethane	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Carbon Disulfide	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Carbon Tetrachloride	5	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
Chlorobenzene	100	ug/L	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11
Chloroethane	NS	ug/L	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17
Chloroform	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	1.6		0.08	< 0.08	U	0.08	< 0.08	U	0.08	0.25	J	0.08	1.3		0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chloromethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
cis-1,2-Dichloroethene	70	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
cis-1,3-Dichloropropene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Cymene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Dibromochloromethane	NS	ug/L	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2
Dibromomethane	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
Dichlorodifluoromethane	NS	ug/L	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22
Ethylbenzene	700	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Hexachlorobutadiene	NS	ug/L	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48
Iodomethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Isopropylbenzene	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
m,p-Xylenes	NS	ug/L	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25
Methyl tert-Butyl Ether	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	2.8		0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Methylene Chloride	5	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Naphthalene	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
n-Butylbenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
n-Propylbenzene	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
o-Xylene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
sec-Butylbenzene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Styrene	100	ug/L	< 0.12	U

Table 8D
First Quarter 2014 Groundwater Analytical Results

Sample Location			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-24			MW-25			MW-27			MW-28			MW-29		
Sample Name			MW-10			MW-14			MW-15			MW-16			MW-17			MW-18			MW-19			MW-20			MW-21			MW-22			MW-24			MW-25			MW-27			MW-28			MW-29		
Sample Date			1/9/2014			1/10/2014			1/14/2014			1/8/2014			1/10/2014			1/9/2014			1/13/2014			1/13/2014			1/14/2014			1/13/2014			1/14/2014			1/13/2014			1/10/2014			1/9/2014			1/8/2014		
N=Normal, FD=Field Duplicate			N			N			N			N			N			N			N			N			N			N			N			N			N			N			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Total Metals																																																
Aluminum	NS	ug/L	12300		43.8	233		43.8	1480		43.8	6300		43.8	8780		43.8	22300		43.8	535		43.8	1820		43.8	8290		43.8	111		43.8	455		43.8	237		43.8	434		43.8	1140		43.8	563		43.8
Antimony	6	ug/L	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9
Arsenic	10	ug/L	3.2		1.8	< 1.8	U	1.8	2.5		1.8	4.6		1.8	6.9		1.8	62.3		1.8	< 1.8	U	1.8	< 1.8	U	1.8	20.3		1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8
Barium	2000	ug/L	96.9		3.8	14.2		3.8	63.4		3.8	159		3.8	57		3.8	91.4		3.8	42.3		3.8	72.7		3.8	66.7		3.8	33.2		3.8	15.8		3.8	23.1		3.8	52		3.8	64.7		3.8	19.2		3.8
Beryllium	4	ug/L	1.9		0.8	< 0.8	U	0.8	< 0.8	U	0.8	2.3		0.8	0.96	J	0.8	1.8		0.8	< 0.8	U	0.8	1.9		0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8
Cadmium	5	ug/L	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2
Calcium	NS	ug/L	26000		196	19100		196	12800		196	35400		196	2080		196	4190		196	2220		196	695		196	2050		196	2750		196	3260		196	2320		196	3140		196	5460		196	1020		196
Chromium	100	ug/L	38.9		3.9	11		3.9	16.4		3.9	30.8		3.9	14.3		3.9	112		3.9	< 3.9	U	3.9	4.3	J	3.9	81.5		3.9	6.3		3.9	< 3.9	U	3.9	6		3.9	< 3.9	U	3.9	< 3.9	U	3.9	5.7		3.9
Cobalt	NS	ug/L	11.3		3.9	< 3.9	U	3.9	< 3.9	U	3.9	17.2		3.9	11.2		3.9	14.8		3.9	12.9		3.9	17		3.9	5.8		3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	9.7		3.9
Copper	NS	ug/L	22.4		3.8	< 3.8	U	3.8	7.5		3.8	48.7		3.8	31.2		3.8	287		3.8	5.1		3.8	18.6		3.8	65.9		3.8	11.2		3.8	4.5	J	3.8	4	J	3.8	32.3		3.8	< 3.8	U	3.8	< 3.8	U	3.8
Iron	NS	ug/L	7390		119	3810		119	4090		119	16100		119	17500		119	124000		119	604		119	828		119	45300		119	232		119	670		119	122	J	119	1700		119	18600		119	1040		119
Lead	NS	ug/L	13		1.2	7.2		1.2	3		1.2	12.1		1.2	10.3		1.2	31.8		1.2	3.1		1.2	3.9		1.2	12.8		1.2	2.9		1.2	1.2	J	1.2	1.5		1.2	15		1.2	< 1.2	U	1.2	6.1		1.2
Magnesium	NS	ug/L	964		197	2180		197	1360		197	1420		197	1730		197	8180		197	1380		197	876		197	2350		197	2960		197	2660		197	1520		197	1120		197	2160		197	608		197
Mercury	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
Manganese	2	ug/L	40.5		8.1	185		8.1	175		8.1	86.7		8.1	159		8.1	109		8.1	65.6		8.1	78.7		8.1	76.9		8.1	88.9		8.1	25.7		8.1	20.9		8.1	96.7		8.1	132		8.1	15.3		8.1
Nickel	NS	ug/L	19.9		4.1	6.6		4.1	18.8		4.1	27.8		4.1	20.9		4.1	15.4		4.1	45		4.1	10.9		4.1	25.7		4.1	8.2		4.1	< 4.1	U	4.1	6		4.1	< 4.1	U	4.1	< 4.1	U	4.1	16		4.1
Potassium	NS	ug/L	3960		202	5300		202	2100		202	2690		202	984		202	4320		202	926		202	856		202	2410		202	1080		202	918		202	1240		202	947		202	1560		202	1380		202
Selenium	50	ug/L	< 1.5	U	1.5	1.6	J	1.5	< 1.5	U	1.5	< 1.5	U	1.5	3.1		1.5	3.9		1.5	1.6	J	1.5	2.2	J	1.5	3.8		1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5
Silver	NS	ug/L	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1
Sodium	NS	ug/L	1990		193	509		193	1050		193	1490		193	6600		193	1780		193	1630		193	1000		193	2410		193	1710		193	974		193	2390		193	2620		193	4490		193	3880		193
Thallium	2	ug/L	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79
Vanadium	NS	ug/L	46.1		3.8	< 3.8	U	3.8	7.6		3.8	42.9		3.8	20.1		3.8	196		3.8	< 3.8	U	3.8	< 3.8	U	3.8	65.9		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	4.9	J	3.8	< 3.8	U	3.8
Zinc	NS	ug/L	107		19.7	107		19.7	102		19.7	113		19.7	66.5		19.7	117		19.7	22.9		19.7	52.1		19.7	51.9		19.7	< 19.7	U	19.7	25.4		19.7	< 19.7	U	19.7	55.1		19.7	< 19.7	U	19.7	102		19.7
General Chemistry																																															
Alkalinity, Total	NS	mg/L	34.9		5	63.8		5	45.1		5	78.3		5	< 5	U	5	20.8		5	< 5	U	5	< 5	U	5	< 5	U	5	9.3		5	9.7		5	8.2		5	< 5	U	5	31.9		5	< 5	U	5
Ammonia	NS	mg/L	< 0.08	U	0.08	0.11		0.08	< 0.8	U	0.8	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chemical Oxygen Demand	NS	mg/L	58.9		4.8	38.8		4.8	69		4.8	99.2		4.8	40.8		4.8	160		4.8	22.7		4.8	10.6		4.8	44.8		4.8	< 4.8	U	4.8	< 4.8	U	4.8	6.6	J	4.8	< 4.8	U	4.8	18.6		4.8	< 4.8	U	4.8
Chloride	NS	mg/L	2.1		0.28	0.6		0.28	1.1		0.28	2.3		0.28	1.3		0.28	1.9		0.28	33		2.8	18.9		2.8	3.2		0.28	2.2		0.28	1.7		0.28	4.2		0.28	1.9		0.28	0.77		0.28	2.9		0.28
Hardness, Calcium Carbonate	NS	mg/L	80		1.6	68		1.6	38		1.6	120		1.6	12		1.6	60		1.6	12		1.6	4	J	1.6	14		1.6	20		1.6	20		1.6	12		1.6	14		1.6	30		1.6	4	J	1.6
Nitrate as N	10	mg/L	< 0.047	U	0.047	< 0.047	U	0.047	< 0.047	U	0.047	< 0.047	U	0.047	< 0.047	U	0.047	0.65		0.047	< 0.047	U	0.047	< 0.047	U	0.047	0.35		0.047	0.31		0.047	0.5		0.047	0.077	J	0.047	< 0.047	U	0.047	< 0.047	U	0.047	0.095	J	0.047
Phosphorus (as phosphate)	NS	mg/L	0.14		0.016	0.023	J	0.016	0.2		0.016	0.4		0.016	0.36		0.016	0.67		0.016	< 0.016	U	0.016	< 0.016	U	0.016	0.55		0.016	< 0.016	U	0.016	0.17		0.016	< 0.016	U	0.016	< 0.016	U	0.016	0.77		0.016	0.12		0.016
Sulfate	NS	mg/L	2.7		0.35	1.3	J	0.35	2.5		0.35	9.7		0.35	20.1		0.35	9.5		0.35	221		3.5	161		3.5	11.7		0.35	11.8		0.35	10.3		0.35	4.8		0.35	17.9		0.35	5.7		0.35	8.2		0.35
Total Dissolved Solids	NS	mg/L	108		8.1	108		8.1	95		8.1	58		8.1	66		8.1	71		8.1	33		8.1	36		8.1	49		8.1	50		8.1	41		8.1	34		8.1	60		8.1	55		8.1	19		8.1

Notes and Abbreviations:

1. Results greater than the MDE MCL are shaded.

* - laboratory sample recovery or precision outside QC limits
B - laboratory blank contamination
H - sample was prepped or analyzed beyond the specified holding time
J - result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value
LQual - Laboratory Qualifier
MDE MCL - Maryland Department of the Environment Maximum Contaminant Level for Chemicals in Drinking Water, Code of Maryland Regulations, accessed at URLs http://www.dsd.state.md.us/comar/comarhtml/26/26.04.01.06.htm and http://www.dsd.state.md.us/comar/getfile.aspx?file=26.04.01.07.htm
mg/L - milligrams per liter
QC - quality control
RDL - reporting detection limit
U - non-detect result
ug/L - micrograms per liter

Table 8D
First Quarter 2014 Groundwater Analytical Results

Sample Location			MW-3			MW-30			MW-4			MW-5			MW-6			MW-6			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			PMW-23			PMW-28			PMW-28			PMW-6		
Sample Name			MW-3			MW-30			MW-4			MW-5			MW-6			FDGW-010814			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			FDGW_011314			PMW-28			FDGW_010614			PMW-6		
Sample Date			1/6/2014			1/14/2014			1/6/2014			1/6/2014			1/8/2014			1/8/2014			1/9/2014			1/8/2014			1/10/2014			1/8/2014			1/9/2014			1/13/2014			1/13/2014			1/6/2014			1/6/2014			1/6/2014		
N=Normal, FD=Field Duplicate			N			N			N			N			N			FD			N			N			N			N			N			N			FD			N			FD			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Volatile Organic Compounds																																																		
1,1,1,2-Tetrachloroethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
1,1,1-Trichloroethane	200	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
1,1,2,2-Tetrachloroethane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
1,1,2-Trichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,1-Dichloroethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,1-Dichloroethene	7	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,1-Dichloropropene	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
1,2,3-Trichlorobenzene	NS	ug/L	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51	< 0.51	U	0.51
1,2,3-Trichloropropane	NS	ug/L	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42	< 0.42	U	0.42
1,2,4-Trichlorobenzene	70	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
1,2,4-Trimethylbenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
1,2-Dibromo-3-chloropropane	0.2	ug/L	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4	< 0.4	U	0.4
1,2-Dibromoethane	0.05	ug/L	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28	< 0.28	U	0.28
1,2-Dichlorobenzene	600	ug/L	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21	< 0.21	U	0.21
1,2-Dichloroethane	5	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,2-Dichloropropane	5	ug/L	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09	< 0.09	U	0.09
1,3,5-Trimethylbenzene	NS	ug/L	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15	< 0.15	U	0.15
1,3-Dichlorobenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
1,3-Dichloropropane	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
1,4-Dichlorobenzene	75	ug/L	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23	< 0.23	U	0.23
2,2-Dichloropropane	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
2-Butanone	NS	ug/L	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3	< 2.3	U	2.3
2-Chloroethyl Vinyl Ether	NS	ug/L	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34	< 0.34	U	0.34
2-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
2-Hexanone	NS	ug/L	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5	< 0.5	U	0.5
4-Chlorotoluene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
4-Methyl-2-pentanone	NS	ug/L	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99	< 0.99	U	0.99
Acetone	NS	ug/L	< 2.7	U	2.7	37		2.7	< 2.7	U	2.7	14		2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7	< 2.7	U	2.7
Acrolein	NS	ug/L	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3	< 1.3	U	1.3
Acrylonitrile	NS	ug/L	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68	< 0.68	U	0.68
Allyl Chloride	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Benzene	5	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Bromobenzene	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Bromochloromethane	NS	ug/L	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27	< 0.27	U	0.27
Bromodichloromethane	NS	ug/L	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12	< 0.12	U	0.12
Bromoform	NS	ug/L	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19	< 0.19	U	0.19
Bromomethane	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Carbon Disulfide	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Carbon Tetrachloride	5	ug/L	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06	< 0.06	U	0.06
Chlorobenzene	100	ug/L	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11	< 0.11	U	0.11
Chloroethane	NS	ug/L	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17	< 0.17	U	0.17
Chloroform	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chloromethane	NS	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
cis-1,2-Dichloroethene	70	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
cis-1,3-Dichloropropene	NS	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Cymene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14
Dibromochloromethane	NS	ug/L	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2	< 0.2	U	0.2
Dibromomethane	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
Dichlorodifluoromethane	NS	ug/L	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22	< 0.22	U	0.22
Ethylbenzene	700	ug/L	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1	< 0.1	U	0.1
Hexachlorobutadiene	NS	ug/L	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48	< 0.48	U	0.48
Iodomethane	NS	ug/L	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13	< 0.13	U	0.13
Isopropylbenzene	NS	ug/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
m,p-Xylenes	NS	ug/L	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25	< 0.25	U	0.25
Methyl tert-Butyl Ether	NS	ug/L	1.6		0.14	< 0.14	U	0.14	0.58	J	0.14	0.67	J	0.14	0.76	J	0.14	0.81	J	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	0.38	J	0.14	0.36	J	0.14	< 0.14	U	0.14
Methylene Chloride	5	ug/L	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18	< 0.18	U	0.18
Naphthalene	NS	ug/L	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29	< 0.29	U	0.29
n-Butylbenzene	NS	ug/L	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14	U	0.14	< 0.14

Table 8D
First Quarter 2014 Groundwater Analytical Results

Sample Location			MW-3			MW-30			MW-4			MW-5			MW-6			MW-6			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			PMW-23			PMW-28			PMW-28			PMW-6		
Sample Name			MW-3			MW-30			MW-4			MW-5			MW-6			FDGW-010814			PMW-11			PMW-12			PMW-13			PMW-18			PMW-19			PMW-23			FDGW_011314			PMW-28			FDGW_010614			PMW-6		
Sample Date			1/6/2014			1/14/2014			1/6/2014			1/6/2014			1/8/2014			1/8/2014			1/9/2014			1/8/2014			1/10/2014			1/8/2014			1/9/2014			1/13/2014			1/13/2014			1/6/2014			1/6/2014			1/6/2014		
N=Normal, FD=Field Duplicate			N			N			N			N			N			FD			N			N			N			N			N			N			FD			N			FD			N		
Parameter	MDE MCL	Unit	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL	Result	LQual	RDL
Total Metals																																																		
Aluminum	NS	ug/L	201		43.8	7240		43.8	453		43.8	188		43.8	< 43.8	U	43.8	< 43.8	U	43.8	2180		43.8	9310		43.8	501		43.8	421		43.8	715		43.8	1500		43.8	1450		43.8	422		43.8	348		43.8	284		43.8
Antimony	6	ug/L	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9	< 1.9	U	1.9
Arsenic	10	ug/L	< 1.8	U	1.8	8.9		1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	2	J	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8	< 1.8	U	1.8
Barium	2000	ug/L	27.4		3.8	51.3		3.8	47.1		3.8	9.7		3.8	23.9		3.8	23		3.8	23.4		3.8	49.3		3.8	7		3.8	7.6		3.8	23.3		3.8	16.6		3.8	17.5		3.8	40.1		3.8	37.9		3.8	28.9		3.8
Beryllium	4	ug/L	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	1.1		0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8	< 0.8	U	0.8
Cadmium	5	ug/L	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2	< 2	U	2
Calcium	NS	ug/L	2140		196	2080		196	2750		196	2230		196	2550		196	2520		196	733		196	2470		196	1030		196	583		196	1450		196	856		196	848		196	3700		196	3650		196	2390		196
Chromium	100	ug/L	5.3		3.9	61.4		3.9	23.6		3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	40.1		3.9	20.1		3.9	< 3.9	U	3.9	5		3.9	9.1		3.9	9.4		3.9	8.7		3.9	47.5		3.9	30.9		3.9	11.5		3.9
Cobalt	NS	ug/L	< 3.9	U	3.9	< 3.9	U	3.9	3.9	J	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9	7.1		3.9	6.8		3.9	4.2	J	3.9	4.8	J	3.9	< 3.9	U	3.9	4.6	J	3.9	4.6	J	3.9	< 3.9	U	3.9	< 3.9	U	3.9	< 3.9	U	3.9
Copper	NS	ug/L	4	J	3.8	68.5		3.8	6		3.8	5.2		3.8	< 3.8	U	3.8	< 3.8	U	3.8	5.8		3.8	6.1		3.8	< 3.8	U	3.8	10.1		3.8	< 3.8	U	3.8	6.1		3.8	5.9		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8
Iron	NS	ug/L	143	J	119	23600		119	340		119	< 119	U	119	< 119	U	119	< 119	U	119	4170		119	7410		119	604		119	302		119	8380		119	2170		119	2020		119	623		119	407		119	393		119
Lead	NS	ug/L	4.6		1.2	14.3		1.2	3.4		1.2	5.8		1.2	1.3	J	1.2	1.2	J	1.2	5.1		1.2	4.2		1.2	1.8		1.2	2.3		1.2	2.1		1.2	2.2		1.2	2.2		1.2	2.6		1.2	2.1		1.2	4		1.2
Magnesium	NS	ug/L	2430		197	2540		197	2950		197	1430		197	1820		197	1870		197	409		197	1320		197	526		197	485		197	575		197	457		197	456		197	1050		197	1030		197	2080		197
Mercury	NS	ug/L	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16	< 0.16	U	0.16
Manganese	2	ug/L	13.8		8.1	49.6		8.1	25.5		8.1	9.5	J	8.1	8.2	J	8.1	8.7	J	8.1	20.3		8.1	54.2		8.1	13.1		8.1	13.8		8.1	72.6		8.1	31.3		8.1	31.1		8.1	182		8.1	178		8.1	21.6		8.1
Nickel	NS	ug/L	5.9		4.1	20.2		4.1	18.6		4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	27.8		4.1	15.4		4.1	8.1		4.1	6.5		4.1	8.2		4.1	9.7		4.1	9		4.1	31		4.1	19.5		4.1	8		4.1
Potassium	NS	ug/L	994		202	2570		202	1080		202	789		202	1220		202	1260		202	1640		202	3100		202	654		202	778		202	918		202	1190		202	1140		202	989		202	941		202	1180		202
Selenium	50	ug/L	< 1.5	U	1.5	1.8	J	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	1.5	J	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5	2.1	J	1.5	1.7	J	1.5	< 1.5	U	1.5	< 1.5	U	1.5	< 1.5	U	1.5
Silver	NS	ug/L	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1	< 4.1	U	4.1
Sodium	NS	ug/L	2490		193	4020		193	2400		193	4000		193	2510		193	2720		193	1260		193	1580		193	1320		193	956		193	2130		193	1530		193	1540		193	4030		193	3980		193	1660		193
Thallium	2	ug/L	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79	< 0.79	U	0.79
Vanadium	NS	ug/L	< 3.8	U	3.8	49.1		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	11.5		3.8	17.4		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	6.3		3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8	< 3.8	U	3.8
Zinc	NS	ug/L	< 19.7	U	19.7	56.9		19.7	< 19.7	U	19.7	< 19.7	U	19.7	< 19.7	U	19.7	< 19.7	U	19.7	27.1		19.7	41		19.7	< 19.7	U	19.7	< 19.7	U	19.7	< 19.7	U	19.7	< 19.7	U	19.7	< 19.7	U	19.7	26.6		19.7	23.9		19.7	21.4		19.7
General Chemistry																																																	
Alkalinity, Total	NS	mg/L	< 5	U	5	15.5		5	12.8		5	12.2		5	11.3		5	11.7		5	< 5	U	5	< 5	U	5	< 5	U	5	< 5	U	5	7.5		5	< 5	U	5	< 5	U	5	16		5	15.6		5	5.2		5
Ammonia	NS	mg/L	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08	< 0.08	U	0.08
Chemical Oxygen Demand	NS	mg/L	< 4.8	U	4.8	22.7		4.8	< 4.8	U	4.8	< 4.8	U	4.8	< 4.8	U	4.8	< 4.8	U	4.8	36.8		4.8	22.7		4.8	< 4.8	U	4.8	< 4.8	U	4.8	< 4.8	U	4.8	24.7		4.8	18.6		4.8	< 4.8	U	4.8	< 4.8	U	4.8	< 4.8	U	4.8
Chloride	NS	mg/L	4.7		0.28	0.77		0.28	4.3		0.28	5.8		0.28	3.8		0.28	3.8		0.28	1.3		0.28	0.93		0.28	3.5		0.28	1.1		0.28	1.8		0.28	2.5		0.28	3.3		0.28	5.3		0.28	5.3		0.28	2.9		0.28
Hardness, Calcium Carbonate	NS	mg/L	16		1.6	16		1.6	20		1.6	14		1.6	12		1.6	12		1.6	10		1.6	10		1.6	4	J	1.6	8		1.6	10		1.6	4	J	1.6	2	J	1.6	16		1.6	22		1.6	18		1.6
Nitrate as N	10	mg/L	0.32		0.047	< 0.047	U	0.047	0.17		0.047	0.49		0.047	0.35		0.047	0.29		0.047	0.13		0.047	0.055	J	0.047	< 0.047	U	0.047	0.26		0.047	< 0.047	U	0.047	0.52		0.047	0.54		0.047	0.17		0.047	0.17		0.047	0.083	J	0.047
Phosphorus (as phosphate)	NS	mg/L	< 0.016	U	0.016	0.28		0.016	0.04		0.016	< 0.016	U	0.016	0.023	J	0.016	< 0.016	U	0.016	< 0.016	U	0.016	0.25		0.016	< 0.016	U	0.016	< 0.016	U	0.016	0.1		0.016	0.23		0.016	< 0.016	U	0.016	0.04		0.016	0.044		0.016	0.032		0.016
Sulfate	NS	mg/L	9.4		0.35	9.7		0.35	11.4		0.35	4.3		0.35	4.8		0.35	4.8		0.35	3.4		0.35	14.2		0.35	12.6		0.35	6.1		0.35	13.9		0.35	1.7	J	0.35	2		0.35	6.9		0.35	6.9		0.35	9.2		0.35
Total Dissolved Solids	NS	mg/L	28		8.1	51		8.1	40		8.1	29		8.1	27		8.1	31		8.1	34		8.1	30		8.1	26		8.1	11		8.1	52		8.1	12		8.1	< 8.1	U	8.1	32		8.1	44		8.1	24		8.1

Notes and Abbreviations:

1. Results greater than the MDE MCL are shaded.

* - laboratory sample recovery or precision outside QC limits
B - laboratory blank contamination
H - sample was prepped or analyzed beyond the specified holding time
J - result is less than the reporting limit but greater than or equal to the method detection limit, and the concentration is an approximate value
LQual - Laboratory Qualifier
MDE MCL - Maryland Department of the Environment Maximum Contaminant Level for Chemicals in Drinking Water, Code of Maryland Regulations, accessed at URLs http://www.dsd.state.md.us/comar/comarhtml/26/26.04.01.06.htm and http://www.dsd.state.md.us/comar/getfile.aspx?file=26.04.01.07.htm
mg/L - milligrams per liter
QC - quality control
RDL - reporting detection limit
U - non-detect result
ug/L - micrograms per liter

TABLE 8E
CHESAPEAKE TERRACE
GROUNDWATER FIELD PARAMETERS

Well ID	Date Sampled	Hydogeological Zone	Sample Method	Temperature [° C]	pH [std]	Specific Conductance [mS/cm]	Turbidity [ntu]	Dissolved Oxygen [mg/L]	Redox Potential [mV]	Volume Purged [liters]	Depth to Water [ft-btoc]
MW-3	1/6/2014		Low Flow	11.28	4.38	0.061	13.9	4.40	350	15.5	16.79
MW-4	1/6/2014		Low Flow	11.89	4.40	0.065	9.5	4.62	356	20.0	30.41
MW-5	1/6/2014		Low Flow	12.79	4.59	0.058	3.7	5.51	345	20.0	32.61
MW-6	1/8/2014		Low Flow	12.29	4.77	0.061	0.3	8.44	362	16.0	27.81
MW-10	1/9/2014		Conventional - Bailer	9.84	6.46	0.140	>1000	4.03	139	14.1	25.93
MW-14	1/10/2014		Low Flow	7.95	6.82	0.163	0.8	1.21	-29	11.0	35.33
MW-15	1/14/2014		Low Yield	11.01	5.76	0.092	134.0	6.20	68	3.000	79.23
MW-16	1/8/2014		Conventional - Bailer	10.06	6.55	0.120	>1000	5.12	177	18.0	80.13
MW-17	1/10/2014		Low Yield	6.04	4.41	0.081	933.0	4.28	405	NM	1.85
MW-18	1/9/2014		Conventional - Bailer	10.58	5.54	0.106	>1000	5.02	253	12.0	14.71
MW-19	1/13/2014		Low Flow	13.95	4.12	0.108	6.2	2.59	411	NM	24.87
MW-20	1/13/2014		Low Flow	13.78	4.20	0.065	4.9	5.65	419	26.0	46.26
MW-21	1/14/2014		Low Yield	11.76	5.13	0.066	>1000	7.62	266	2.0	55.64
MW-22	1/13/2014		Low Flow	14.59	5.00	0.071	5.0	7.02	313	28.0	28.21
MW-24	1/14/2014		Low Flow	14.00	5.11	0.065	5.7	4.22	338	20.0	19.60
MW-25	1/13/2014		Low Flow	15.23	5.13	0.056	9.2	4.47	328	39.0	36.22
MW-27	1/10/2014		Low Flow	6.90	4.07	0.091	0.0	2.61	420	6.0	1.50
MW-28	1/9/2014		Low Flow	13.84	6.17	0.143	6.4	0.36	-37	35.0	41.42
MW-29	1/8/2014		Low Yield	12.79	4.91	0.053	13.4	0.45	212	26.6	4.63
MW-30	1/14/2014	TA	Low Yield	11.67	5.33	0.072	>1000	4.28	242	2.0	13.31
PMW-6	1/6/2014		Low Flow	12.86	4.52	0.053	5.1	4.03	341	22.0	14.36
PMW-11	1/9/2014		Low Flow	12.10	4.99	0.030	311.0	1.09	131	215.0	84.65
PMW-12	1/8/2014		Low Flow	13.28	5.00	0.062	197.0	0.32	150	62.0	114.59
PMW-13	1/10/2014		Low Flow	10.95	4.02	0.063	0.0	0.41	37	34.0	102.00
PMW -18	1/8/2014		Low Flow	12.06	4.14	0.037	24.7	5.25	443	30.0	13.24
PMW-19	1/9/2014		Low Flow	13.12	5.40	0.072	18.5	0.68	80	22.0	41.84
PMW-23	1/13/2014		Low Flow	13.41	4.60	0.032	24.9	4.61	350	47.0	106.45
PMW-28	1/6/2014		Low Flow	13.37	4.97	0.065	45.3	5.51	243	28.0	66.51

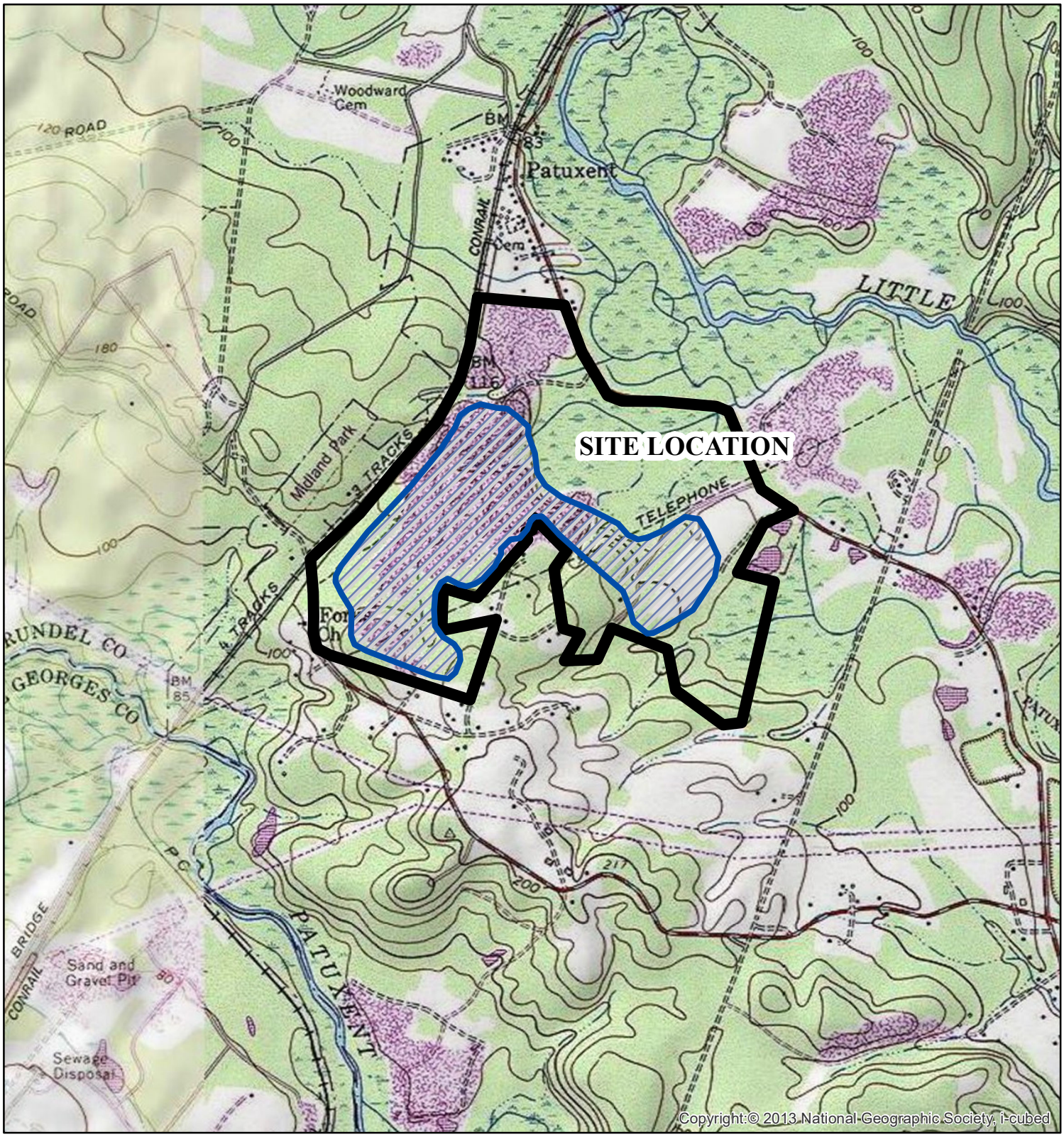
Notes:
NM = Not measured

Perched Aquifer Characteristics Used in Groundwater Flow Model

Well	Clay Elevation (ft msl)	Perched Water Table Elevation (ft msl)	Hydraulic Conductivity (ft/day)	Description
MW-15	84	88.4	a	Fn-med sand
MW-16	91	98.6	a	Med sand
MW-17	112	117.1	10.2	Fn-med sand
MW-18	105	115.1	94.2	Med-crs sand
MW-19	102	112.4	8.8	Med-crs sand
MW-20	94	105.6	75.6	Med-crs sand
MW-21	91	98.1	a	Med-crs sand
MW-22	92	100.8	72.8	Med-crs sand
MW-24	93	107.8	37.0	Crs sand
MW-25	66	78.6	12.7	Fn-med sand, tr silt & clay
MW-27	102	108.9	1.3	Silty, clayey fn-med sand
MW-30	94	105	1.7	Crs sand, some clay

a. Not tested, believed to have high K based on log

PLATES



Legend

FILL BOUNDARY

PROPERTY BOUNDARY

Miles

0 0.1 0.2 0.4 0.6 0.8

REFERENCE

1. MAP FROM U.S.G.S. 7.5 MINUTE QUADRANGLES

CHESAPEAKE TERRACE RUBBLE LANDFILL

4TH ASSESSMENT DISTRICT
ANNE ARUNDEL COUNTY, MARYLAND

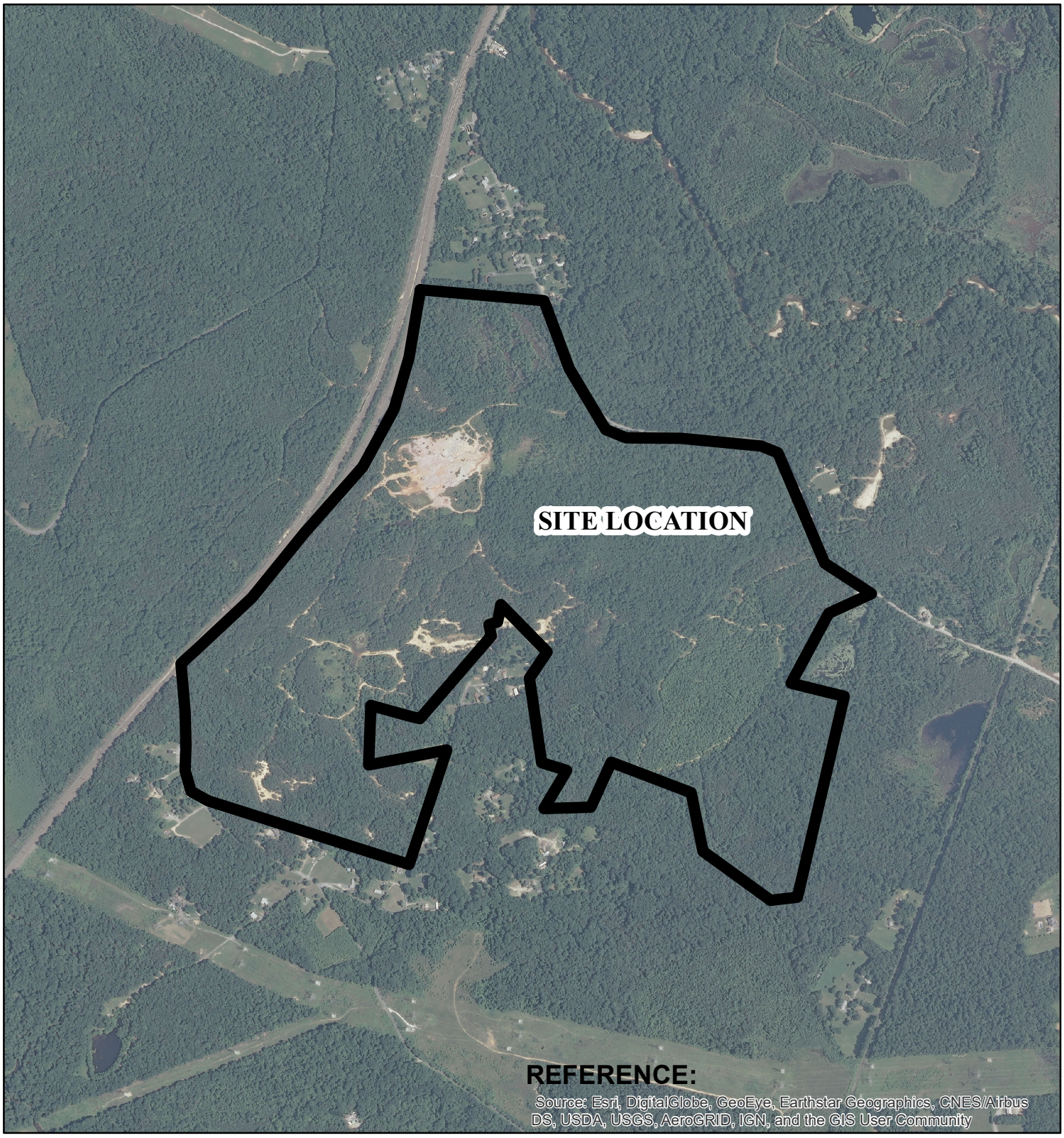
SITE LOCATION MAP

N W E S

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Scale:	
Drawn By:	GCR
Checked By:	VEF
Project Mgr.:	VEF
Originated By:	GCR
Project No.:	2018-3854
Drawing Date:	4/29/2019
Sheet No.:	1 of 2
Revision Number:	0

PLATE 1



Legend

Property Boundary

Miles

0 0.075 0.15 0.3 0.45 0.6

CHESAPEAKE TERRACE RUBBLE LANDFILL

4TH ASSESSMENT DISTRICT
ANNE ARUNDEL COUNTY, MARYLAND

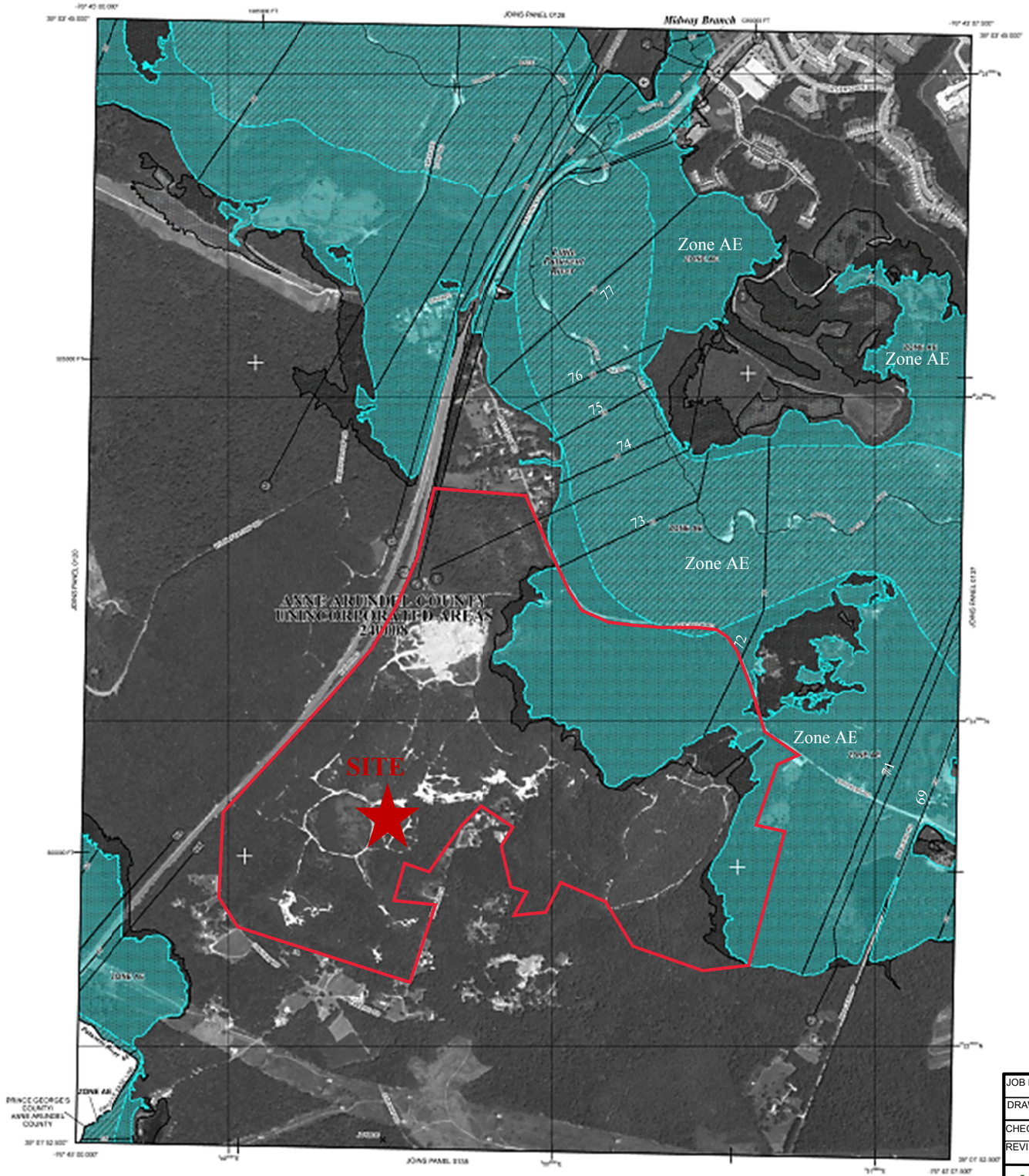
ORTHO LOCATION MAP

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Checked By:	VEF
Project Mgr.:	VEF
Originated By:	GCR
Project No.:	2018-3854
Drawing Date:	4/29/2019
Sheet No.:	1 of 2
Revision Number:	0

Plate 2



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0136E

FIRM
FLOOD INSURANCE RATE MAP

ANNE ARUNDEL COUNTY, MARYLAND
AND INCORPORATED AREAS

PANEL 136 OF 395
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ANNE ARUNDEL COUNTY	240008	0136	E

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
24003C0136E
EFFECTIVE DATE
OCTOBER 16, 2012

Federal Emergency Management Agency

JOB No.:	2018-3854	SCALE.:	Not to Scale
DRAWN BY.:	VEF	DATE.:	4/29/2019
CHECKED BY.:	VEF	FILE:	Plate 3
REVIEW BY.:	VEF		

Excerpts - 100-YEAR FLOODPLAIN (FEMA, 2012)

Advanced GeoServices

Chesapeake Terrace Rubble Landfill

Plate 3

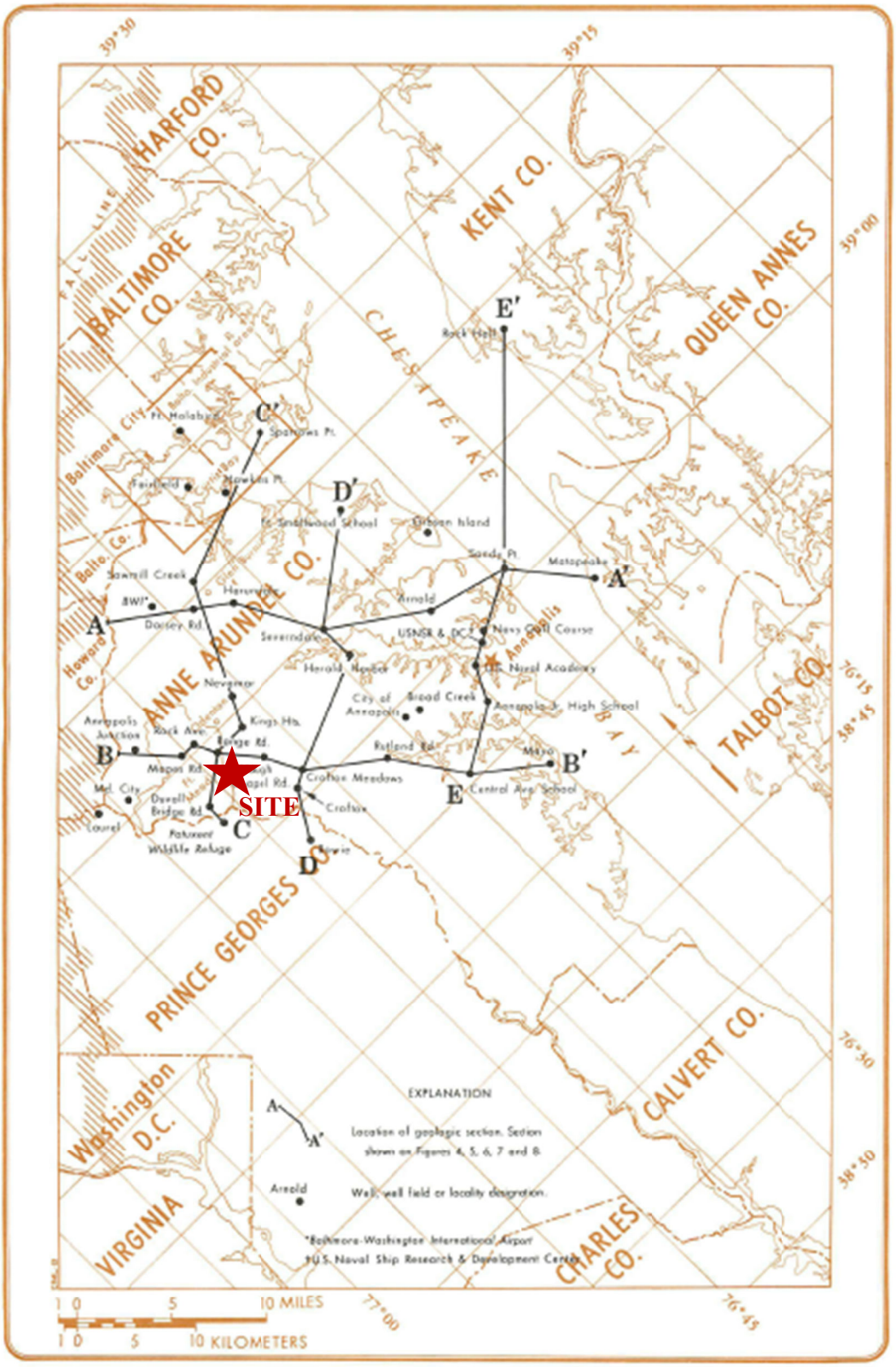


Figure 3. — Locations of geologic sections, key wells, test holes, and data-collection sites referred to in this report.

JOB No.:	2018-3854	SCALE:	Not to Scale
DR BY:	VEF	DATE:	4/29/2019
CHK BY:	VEF	FILE No.:	Plate 4
REV BY:		DIRECTORY:	

Regional Geology Section Locations (Mack & Achmed, 1986)

Advanced GeoServices | **Chesapeake Terrace Rubble Landfill** | **Plate 4**

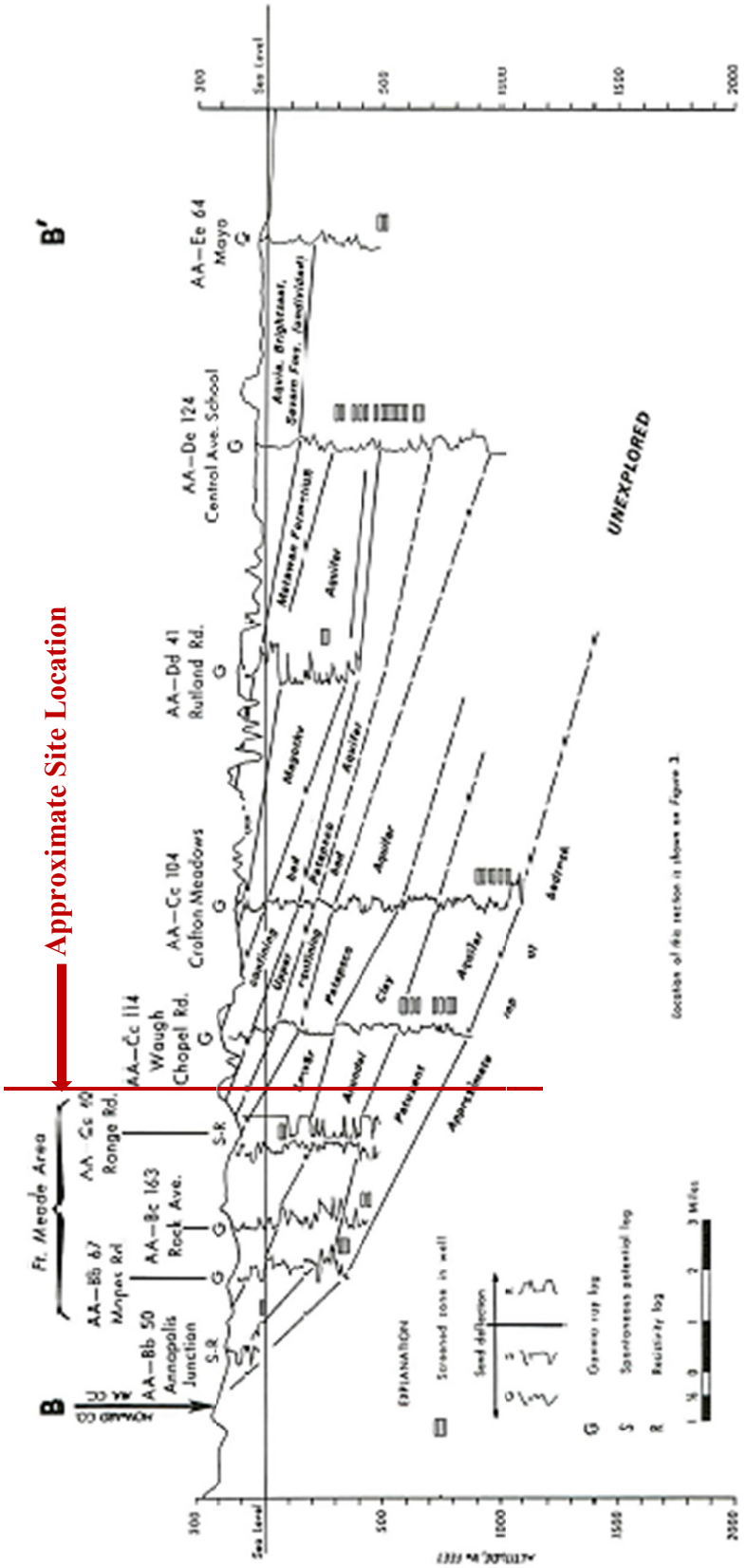


Figure 5. — Hydrogeologic section B-B', from north of Annapolis Junction to Mayo.

JOB No.:	2018-3854	SCALE:	Not to Scale
DR BY:	VEF	DATE:	4/29/2019
CHK BY:	VEF	FILE No.:	Plate 5
REV BY:	VEF	DIRECTORY:	

Regional Geology – Section B-B' (Mack & Achmed, 1986)

Advanced GeoServices | Chesapeake Terrace Rubble Landfill | Plate 5

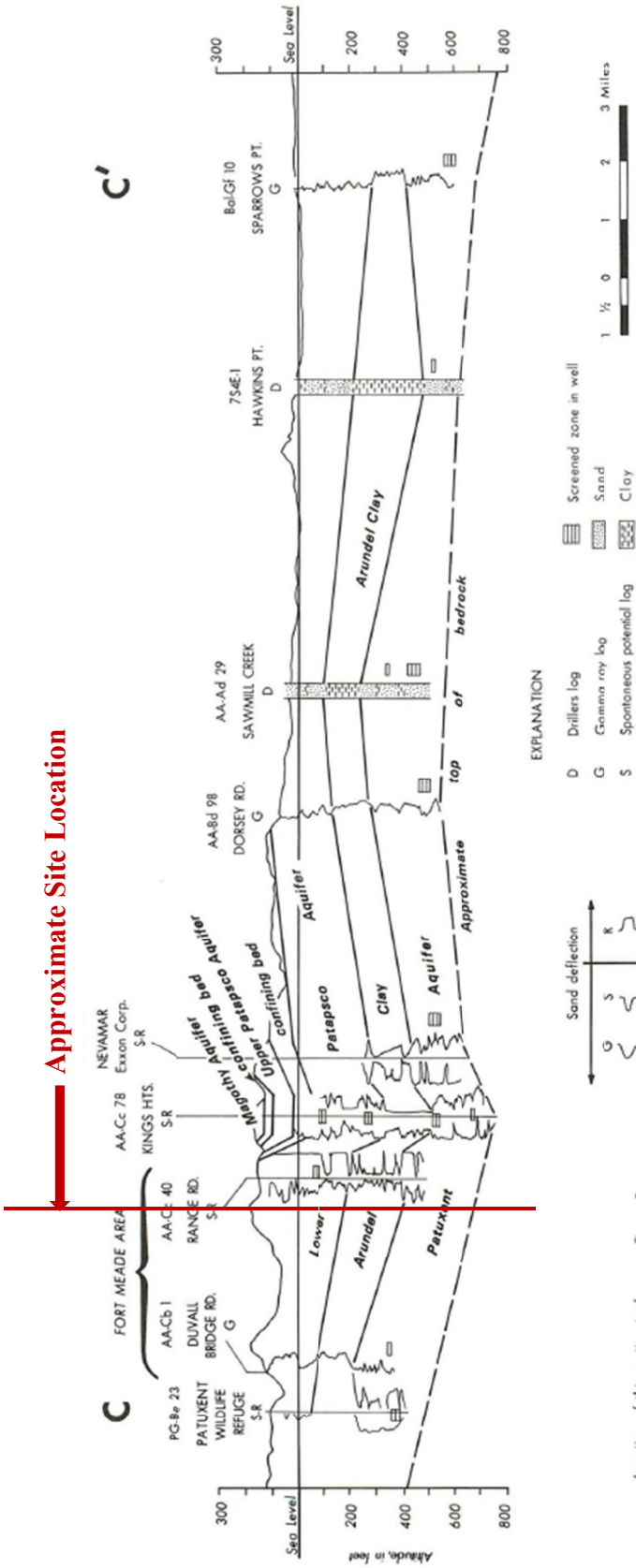


Figure 6. — Hydrogeologic section C-C', from the Patuxent Wildlife Refuge to Sparrows Point.

JOB No.:	2018-3854	SCALE:	Not to Scale
DR BY:	VEF	DATE:	4/29/2019
CHK BY:	VEF	FILE No.:	Plate 6
REV BY:	VEF	DIRECTORY:	

Regional Geology – Section C-C' (Mack & Achmed, 1986)

Advanced GeoServices | **Chesapeake Terrace Rubble Landfill** | **Plate 6**

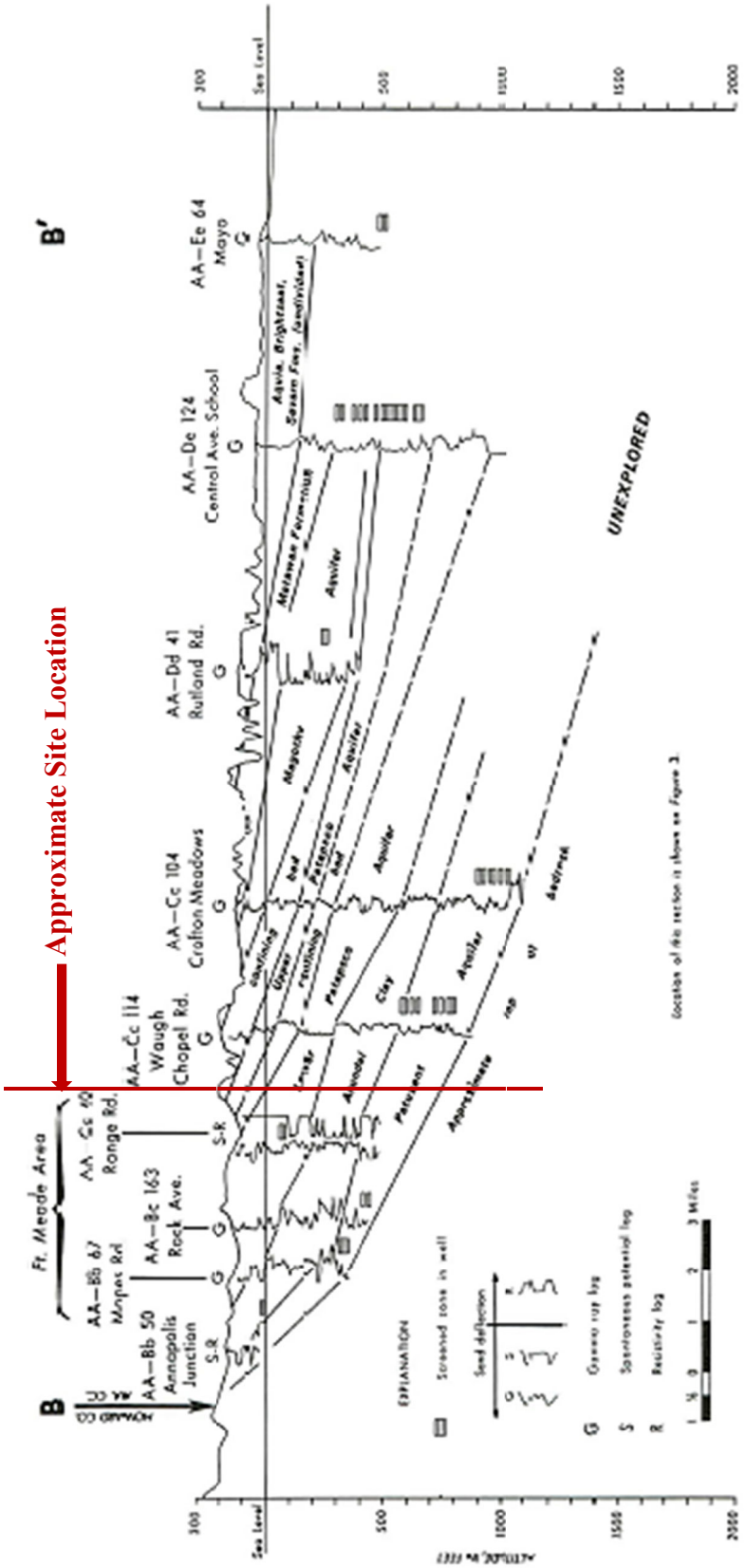


Figure 5. — Hydrogeologic section B-B', from north of Annapolis Junction to Mayo.

JOB No.:	2018-3854	SCALE:	Not to Scale
DR BY:	VEF	DATE:	02/04/2019
CHK BY:	VEF	FILE No.:	Plate 5
REV BY:	VEF	DIRECTORY:	

Regional Geology – Section B-B' (Mack & Achmed, 1986)

Advanced GeoServices | Chesapeake Terrace Rubble Landfill | Plate 5

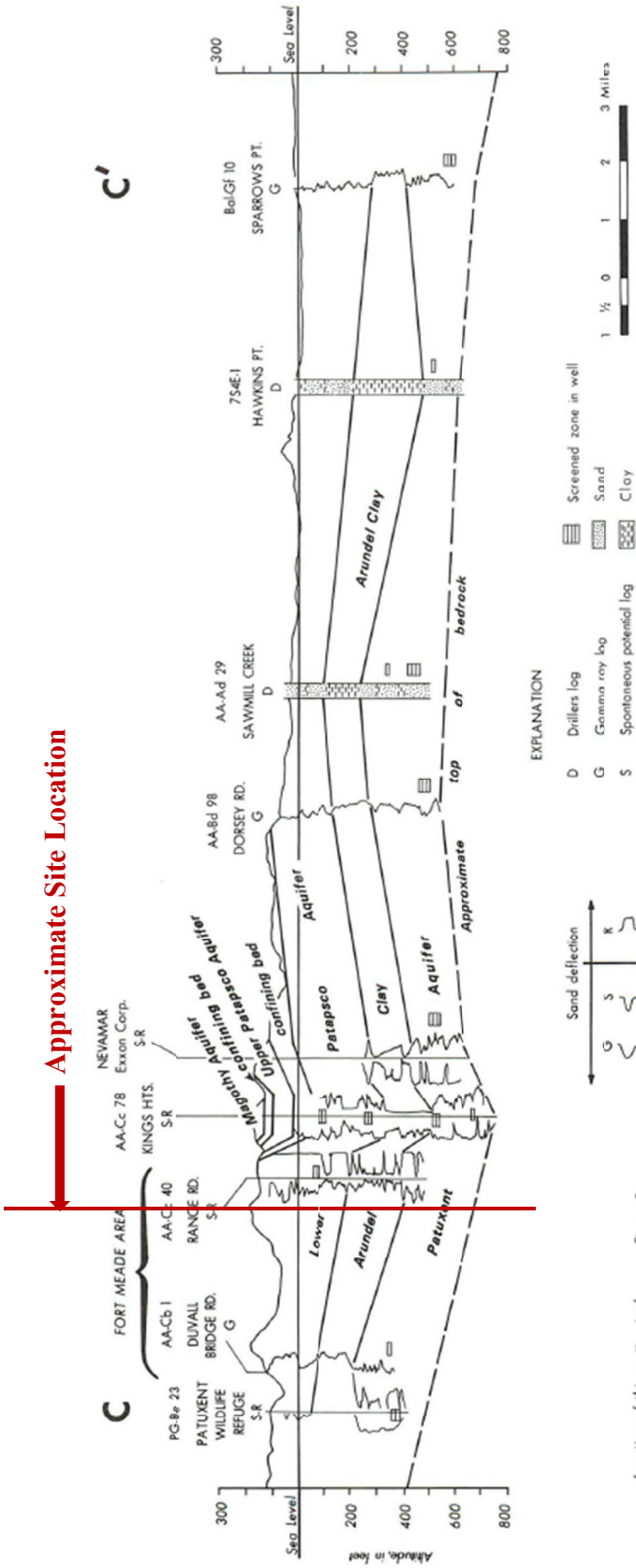
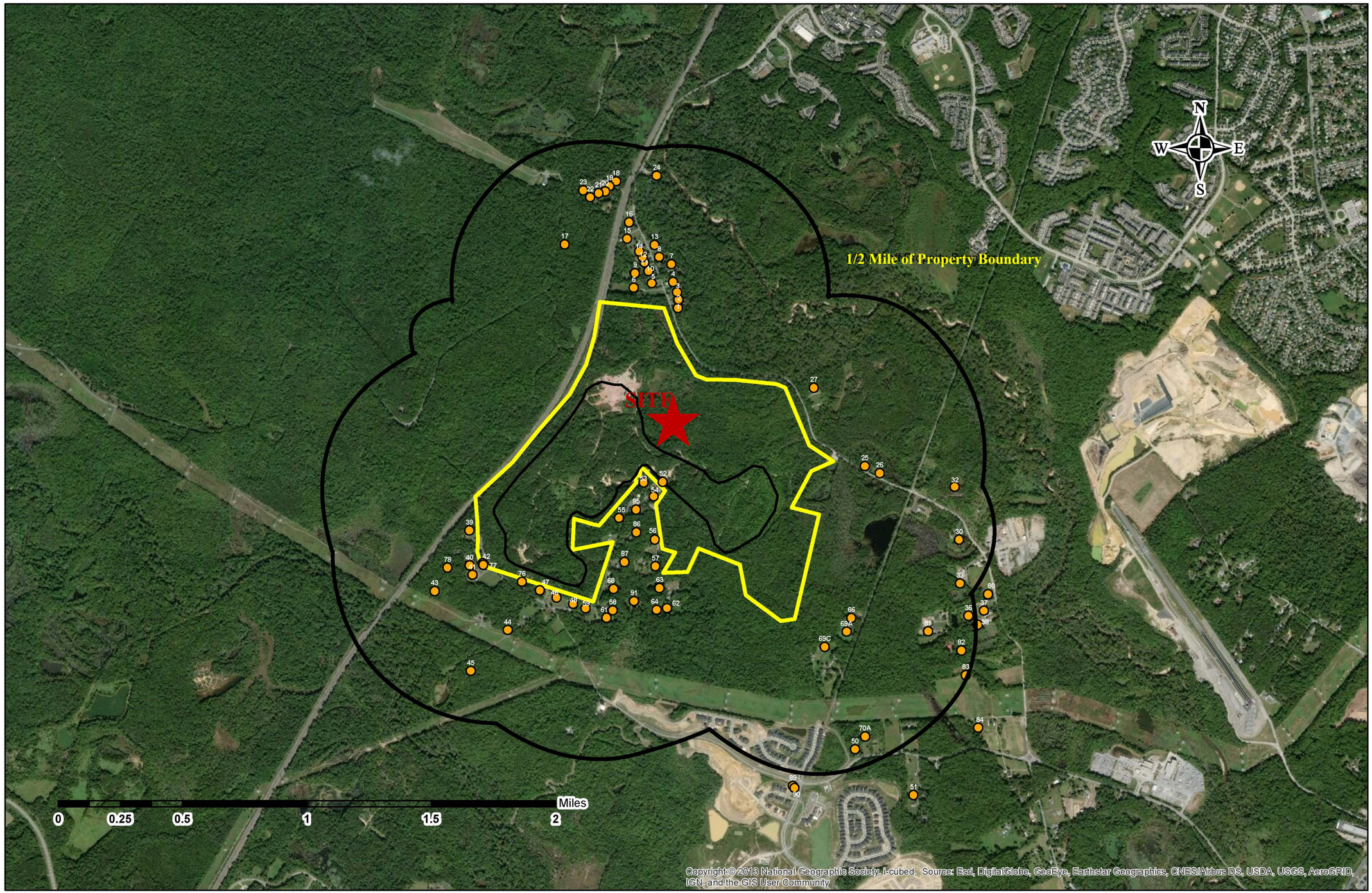


Figure 6. — Hydrogeologic section C-C', from the Patuxent Wildlife Refuge to Sparrows Point.

JOB No.:	2018-3854	SCALE:	Not to Scale
DR BY:	VEF	DATE:	02/04/2019
CHK BY:	VEF	FILE No.:	Plate 6
REV BY:	VEF	DIRECTORY:	

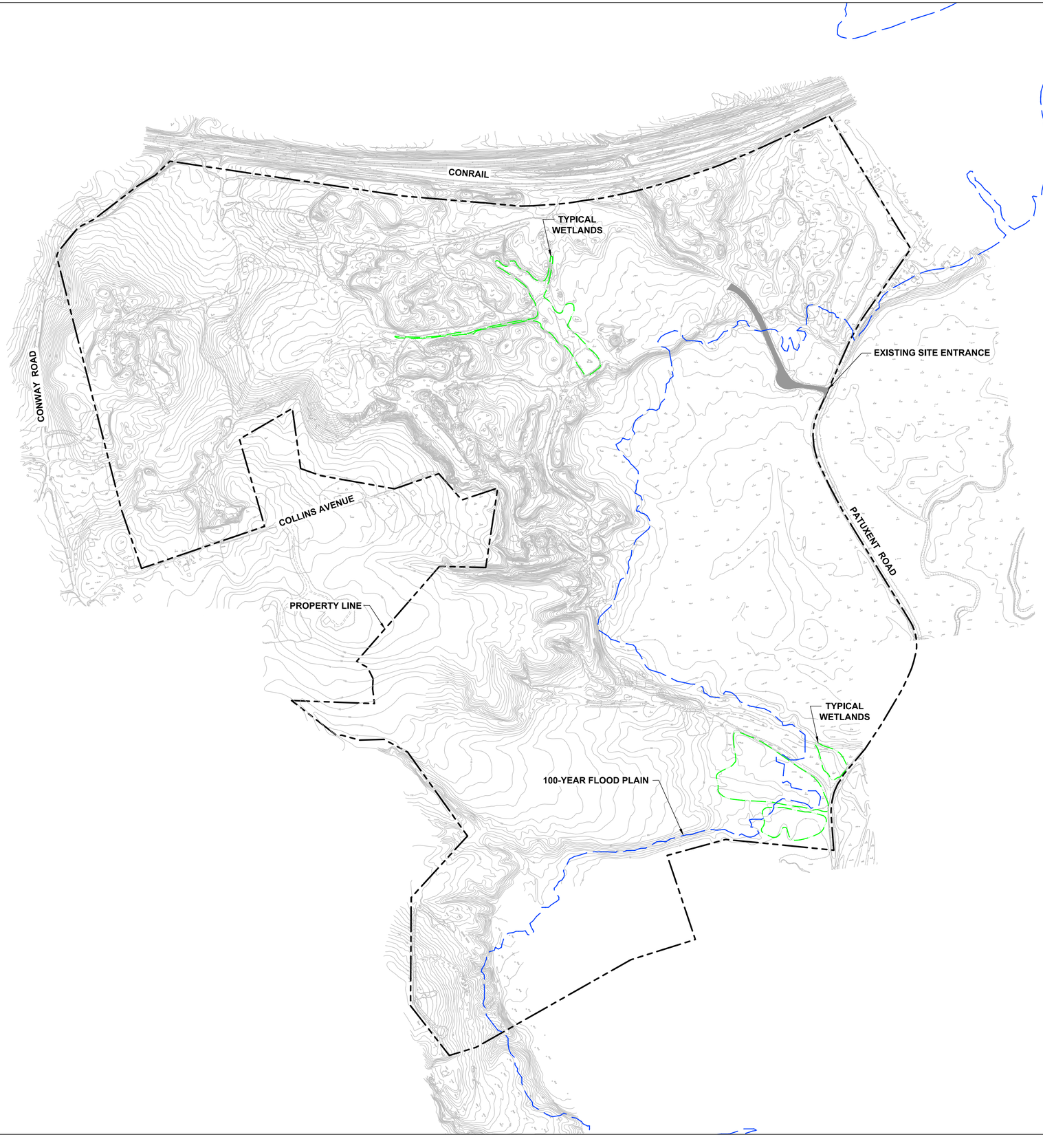
Regional Geology – Section C-C' (Mack & Achmed, 1986)

Advanced GeoServices | **Chesapeake Terrace Rubble Landfill** | **Plate 6**



JOB No.: 2018-3854	SCALE.: Not to Scale	**Residential Wells within ½ Miles of the property**	
DRAWN BY.: VEF	DATE.: 4/29/2019		
CHECKED BY.: VEF	FILE: PLATE 7		
REVIEW BY.: VEF			
Advanced GeoServices		Chesapeake Terrace Rubble Fill	Plate 7

FIGURES



LEGEND

- PROPERTY LINE
- SITE ENTRANCE
- WETLANDS BOUNDARY
- 100-YEAR FLOOD PLAIN (AFTER 2012) (SEE REFERENCE 2) (SEE NOTE 4)

REFERENCES

1.) BASEMAP SHOWN, INCLUDING TOPOGRAPHICAL INFORMATION, IS FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

2.) THE POST-2012 100-YEAR FLOOD PLAIN LIMITS SHOWN ARE BASED ON FEMA NATIONAL FLOOD INSURANCE PROGRAM MAP NUMBER 24003C0136E, DATED 10/16/2012, AND PROVIDED AS PLATE 3.

NOTES

1.) THE 100-YEAR FLOOD PLAIN LIMITS AND ASSOCIATED DEVELOPMENT PERMITTING HAS BEEN DEVELOPED BY OTHERS.

2.) THE CONRAIL TRACKS ARE ALSO SHARED WITH AMTRAK FOR HIGH-SPEED COMMUTER TRAINS BETWEEN BOSTON, MASSACHUSETTS AND WASHINGTON, D.C.

3.) THE PROPERTY WAS PREVIOUSLY USED FOR SAND AND GRAVEL MINING ACTIVITIES. PORTIONS OF THE SITE CURRENTLY HAVE NO VEGETATION AND ARE BARREN.

4.) THE PROPOSED LANDFILL PERIMETER ROAD BERM GRADES ARE PROPOSED A MINIMUM OF 5 FEET ABOVE THE FEMA BASE FLOOD ELEVATIONS.

NORTH

GRAPHIC SCALE

300 0 150 300 600 1200

(IN FEET)
1 inch =300 ft.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:

DATE:

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

ADVANCED GeoServices
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SITE MAP

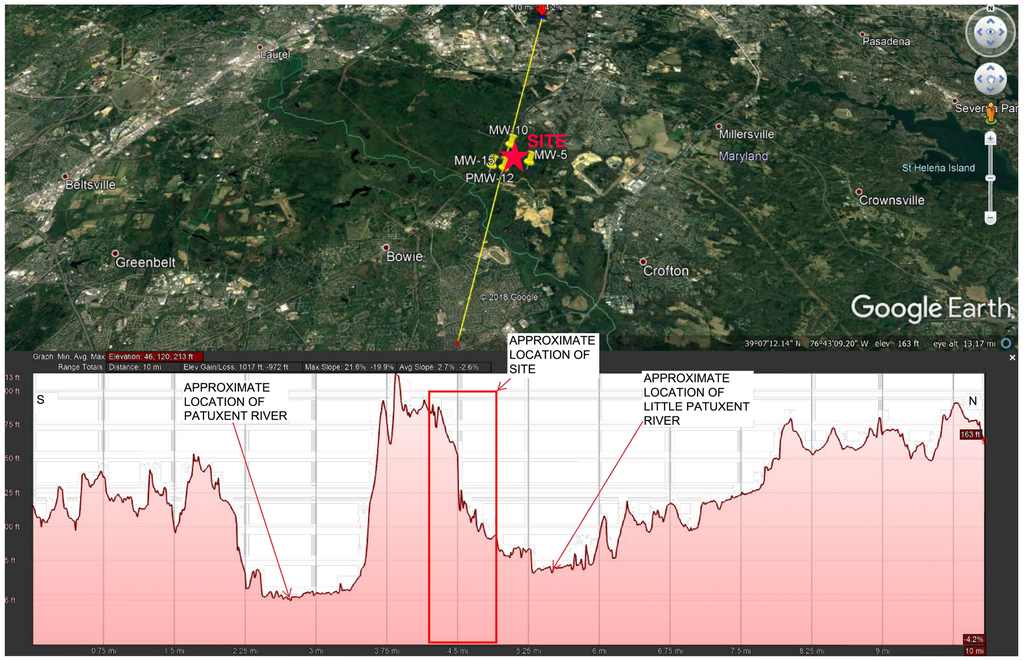
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PROJECT MANAGER: VEF	SCALE: AS NOTED
CHECKED BY: VEF	PROJECT NUMBER: 2018-3854
DRAWN BY: EEE	DATE: 4/1/2019

FIGURE 1

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A001 - Site Map.dwg, 7/31/2019 2:01:08 PM, DWG To PDF.pc3

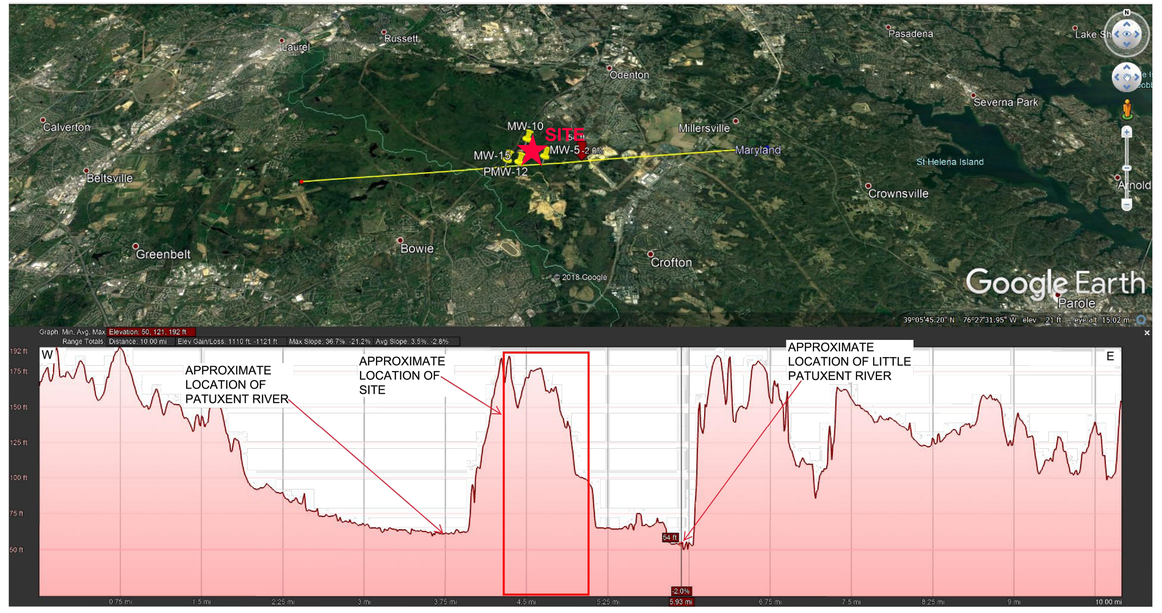
NOTES

1. TOPOGRAPHIC AND MAP DATA SHOWN IS FROM GOOGLE EARTH UPDATED 4/30/2018.
2. THE PROFILES SHOWN REPRESENT THE GROUND SURFACE ELEVATIONS OF 10-MILE SECTIONS THAT ARE ROUGHLY CENTERED UPON THE PROPOSED LOCATION OF THE CHESAPEAKE TERRACE RUBBLE LANDFILL.
3. THE GROUND SURFACE ELEVATIONS SHOWN ARE NOT EXACT. ELEVATIONS SHOWN ARE INTENDED TO DEMONSTRATE THAT THE LOCATION OF THE PROPOSED CHESAPEAKE TERRACE RUBBLE LANDFILL IS ON A LOCALIZED HILL WHICH IS SEPARATED TOPOGRAPHICALLY FROM THE SURROUNDING AREAS BY THE PATUXENT AND LITTLE PATUXENT RIVERS.

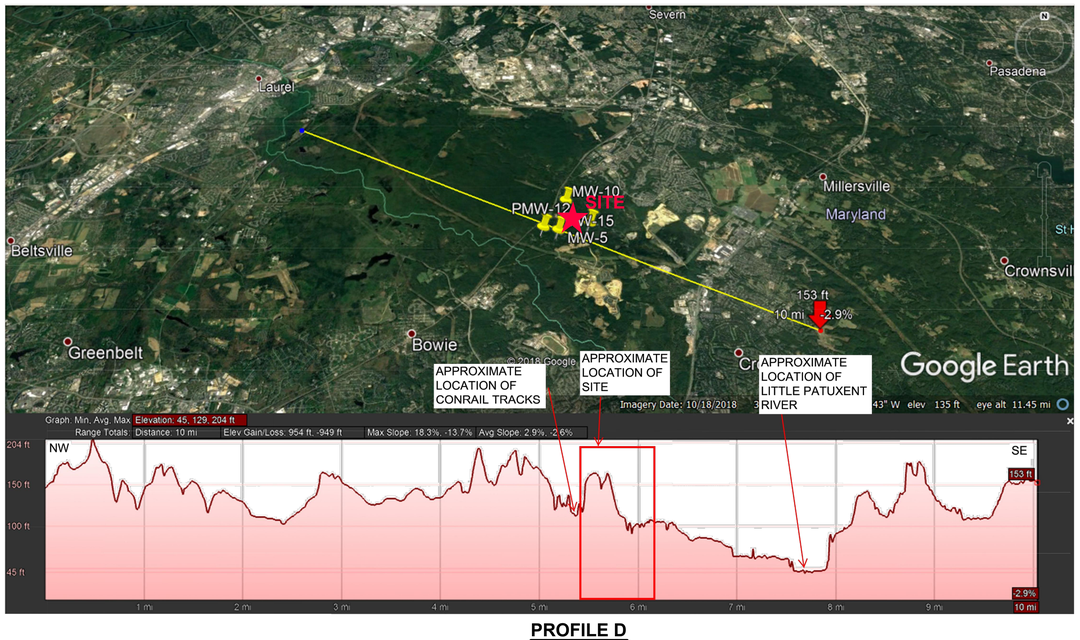


PROFILE A

PROFILE B



PROFILE C



PROFILE D

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:

DATE:

NATIONAL WASTE MANAGERS

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REGIONAL TOPOGRAPHIC PROFILES

REPORT CODE: A	FILE NAME: 20185385440D2		
PROJECT MANAGER: VEF	SCALE: N.T.S.	PROJECT NUMBER: 2018-3854	
CHECKED BY: VEF			
DRAWN BY: EEE		DATE:	4/1/2019

FIGURE 2

N:\Projects\2018\3854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20185854A004 - On-site Boring and Well Locations.dwg, 7/31/2019 3:18:00 PM, DWG To PDF.pc3

LEGEND

- PROPERTY LINE
- LANDFILL PERIMETER ACCESS ROAD (FUTURE)
- SITE ENTRANCE (FUTURE)
- LANDFILL CELL SEPARATION LINE (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
- 100-YEAR FLOOD PLAIN (AFTER TO 2012)
- 90 — PROPOSED 10-FOOT ELEVATION CONTOUR LINE
- 92 — PROPOSED 2-FOOT ELEVATION CONTOUR LINE
- A——A' GEOLOGIC CROSS SECTION ALIGNMENT (SEE FIGURES 5 AND 6)
- PMW-28 EXISTING PERIMETER GROUNDWATER MONITORING WELL SCREENED ABOVE CLAY CONFINING UNIT (SEE REFERENCE 2)
- PMW-18 EXISTING PERIMETER GROUNDWATER MONITORING WELL SCREENED BELOW CLAY CONFINING UNIT (SEE REFERENCE 2)
- PMW-21 PROPOSED PERIMETER GROUNDWATER MONITORING WELL SCREENED ABOVE CLAY CONFINING UNIT (SEE REFERENCE 2)
- PMW-27 PROPOSED PERIMETER GROUNDWATER MONITORING WELL SCREENED BELOW CLAY CONFINING UNIT (SEE REFERENCE 2)

REFERENCES

1.) BASEMAP SHOWN, INCLUDING TOPOGRAPHICAL INFORMATION, IS FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

2.) PERIMETER MONITORING WELL LOCATIONS DIGITIZED FROM HARD COPY OF DRAWING ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED MAY 2008.

NOTES

1.) THE FUTURE RUBBLE LANDFILL DEVELOPMENT FEATURES ARE INCLUDED TO SHOW THE PROPOSED LOCATION OF THE PROPOSED DEVELOPMENT. THE ACTUAL LIMITS OF FUTURE DEVELOPMENT MAY BE ADJUSTED AS PART OF THE DETAILED ENGINEERING DESIGN TO BE INCLUDED IN THE PHASE III PERMIT APPLICATION; WHICH IS CURRENTLY UNDERGOING REVISION.

2.) GEOLOGIC SECTIONS ARE PRESENTED ON FIGURES 3 AND 4.

3.) THE 100-YEAR FLOODPLAIN LIMITS AND ASSOCIATED DEVELOPMENT PERMITTING HAS BEEN DEVELOPED BY OTHERS.

4.) THE PROPOSED LANDFILL PERIMETER ROAD BERM GRADES ARE PROPOSED A MINIMUM OF 5 FEET ABOVE THE FEMA BASE FLOOD ELEVATIONS.

5.) THE LOCATIONS OF PMW-13 AND PMW-28 WERE SHIFTED IN THE FIELD AT THE TIME OF INSTALLATION BASED ON ACCESSIBILITY ISSUES. THESE WELLS MAY HAVE TO BE RELOCATED AS CONSTRUCTION ADVANCES TO THE CELLS WHERE THEY ARE LOCATED.

6.) THE GRADING SHOWN ON THIS FIGURE REFLECTS A CHANGE FROM A SIMILARLY NAMED DRAWING SUBMITTED PRIOR TO 2019 FOR THIS PROJECT. IN PARTICULAR, THE INCLINATION OF THE CELL SIDE SLOPES FROM THE PERIMETER ROAD TO THE CELL FLOOR HAVE BEEN CHANGED TO 3 HORIZONTAL TO 1 VERTICAL (3H:1V) AS OPPOSED TO THE PREVIOUSLY SHOWN INCLINATION OF 2H:1V.

NORTH

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch =200 ft.

VERONICA E. FOSTER
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NO. # 35645

REVISION:

DATE:

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

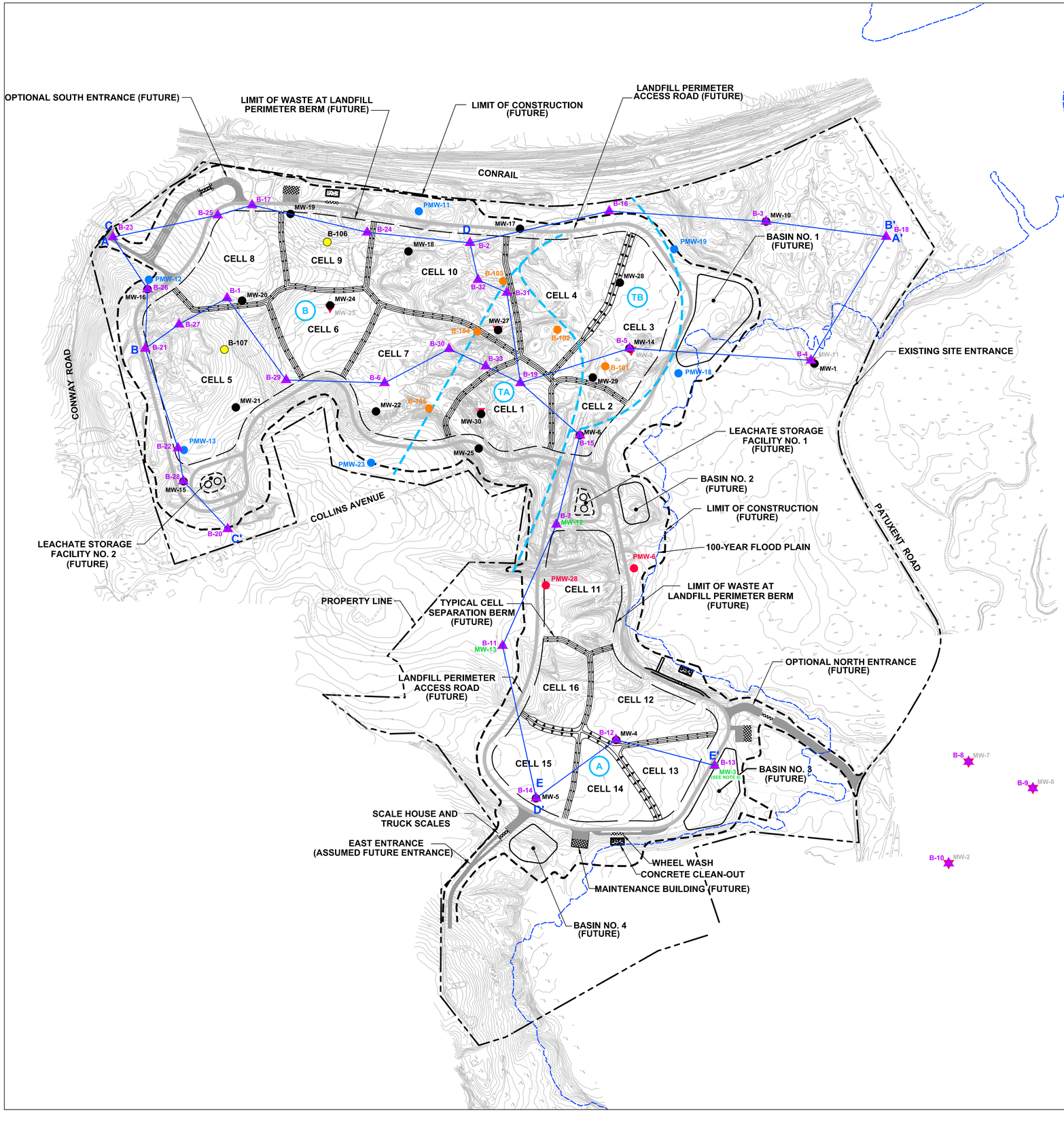
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PROPOSED LANDFILL BOTTOM ELEVATION CONTOUR MAP

REPORT CODE: A	FILE NAME: 20183854003
PROJECT MANAGER: VEF	SCALE: AS NOTED
CHECKED BY: VEF	PROJECT NUMBER: 2018-3854
DRAWN BY: EEE	DATE: 4/1/2019

FIGURE 3

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\Drawing2.dwg, 7/31/2019 4:22:13 PM, DWG To PDF.pc3



LEGEND

- PROPERTY LINE
- LANDFILL PERIMETER ACCESS ROAD (FUTURE)
- SITE ENTRANCE (FUTURE)
- LANDFILL LIMITS (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
- 100–YEAR FLOODPLAIN
- EXISTING MONITORING WELL (SEE REFERENCE 2)
- FORMER MONITORING WELLS DAMAGED BY VANDALS (NOT USEABLE) (SEE REFERENCE 2) (SEE NOTE 7)
- HISTORICAL BOREHOLES (SEE REFERENCE 3)
- EXISTING GROUNDWATER MONITORING WELLS THAT WERE UNABLE TO BE LOCATED (SEE NOTE 9)
- PERMANENT MONITORING WELL (SCREENED ABOVE CLAY CONFINING UNIT) (SEE REFERENCE 2)
- PERMANENT MONITORING WELL (SCREENED BELOW CLAY CONFINING UNIT) (SEE REFERENCE 2)
- BORING LOCATIONS ALONG TA/B/TB TRANSITION (B–101 TO B–105) COMPLETED APRIL/MAY 2013
- ADDITIONAL BORINGS LOCATIONS REQUESTED BY MDE (B–106 AND B–107) COMPLETED APRIL/MAY 2013
- HYDROGEOLOGIC AREA DIVIDE (SEE REFERENCE 2)
- A — HYDROGEOLOGIC AREA (SEE REFERENCE 2)
- A——A' GEOLOGIC CROSS SECTION ALIGNMENT (SEE FIGURES 5 THROUGH 9)

REFERENCES

1.) BASEMAP SHOWN, INCLUDING TOPOGRAPHICAL INFORMATION, IS FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

2.) HYDROGEOLOGIC AREAS AND MONITORING WELL LOCATIONS DIGITIZED FROM HARD COPY OF DRAWING ENTITLED "PERMANENT GROUNDWATER MONITORING WELL PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED MAY 2008.

3.) ADDITIONAL HISTORICAL BORING LOCATIONS FROM HARD COPY OF DRAWING ENTITLED "PLATE 2, CHESAPEAKE RUBBLE LANDFILL HYDROGEOLOGIC BASE MAP," DATED NOVEMBER 2003, CREATED BY MARK SCHULTZ ASSOCIATES, ANNAPOLIS, MARYLAND.

NOTES

1.) THE FUTURE RUBBLE LANDFILL DEVELOPMENT FEATURES ARE INCLUDED TO SHOW LOCATION OF THE BORINGS AND MONITORING WELLS RELATIVE TO THE PROPOSED DEVELOPMENT. THE ACTUAL LIMITS OF FUTURE DEVELOPMENT MAY BE ADJUSTED AS PART OF THE DETAILED ENGINEERING DESIGN TO BE INCLUDED IN THE PHASE III PERMIT APPLICATION; WHICH IS CURRENTLY UNDERGOING REVISION.

2.) GEOLOGIC CROSS SECTIONS ARE PRESENTED ON FIGURES 5 AND 6.

3.) HYDROLOGIC AREAS AND THEIR MAPPING IS BASED ON FORMATIONS MAPPED IN FIELD BOREHOLES, SURFACE OBSERVATION, HISTORICAL AERIAL PHOTOGRAPHS, AND REGIONAL GEOLOGIC MAPS.

4.) THE 100–YEAR FLOODPLAIN LIMITS AND ASSOCIATED DEVELOPMENT PERMITTING HAS BEEN DEVELOPED BY OTHERS.

5.)THE CONRAIL TRACKS ARE ALSO SHARED WITH AMTRAK FOR HIGH–SPEED COMMUTER TRAINS BETWEEN BOSTON, MASSACHUSETTS AND WASHINGTON, D.C.

6.) THE PROPERTY WAS PREVIOUSLY USED FOR SAND AND GRAVEL MINING ACTIVITIES. PORTIONS OF THE SITE CURRENTLY HAVE NO VEGETATION AND ARE BARREN.

7.) THE SITE IS NOT SECURE FROM TRESPASSERS. AS SUCH, SEVERAL MONITORING WELLS HAVE BEEN DAMAGED BY VANDALS.

8.) DURING A NOVEMBER 29, 2018 SITE VISIT BY ADVANCED GEOSERVICES, WATER LEVELS IN WELL MW–3 WERE NOT OBTAINED BECAUSE THE WELL RISER HAS BEEN REMOVED FROM THE GROUND, A MINIMUM OF 12" BELOW GRADE, BASED ON STAINING OF THE RISER FOUND LAYING ON THE GROUND WITHIN 10 FEET OF THE HISTORICALLY MAPPED LOCATION.

9.) WATER LEVELS IN WELLS MW–2, MW–7, MW–8, MW–9, MW–11, MW–23, MW–26, AND MW–31 WERE NOT OBTAINED DURING FIELD ACTIVITIES BY GOLDER ASSOCIATES IN 2014 AND ADVANCED GEOSERVICES IN 2019 AS THE WELLS COULD NOT BE LOCATED.

NORTH

GRAPHIC SCALE

300 0 150 300 600 1200

(IN FEET)
1 inch =300 ft.

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REVISION:

DATE:

NATIONAL WASTE MANAGERS

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PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

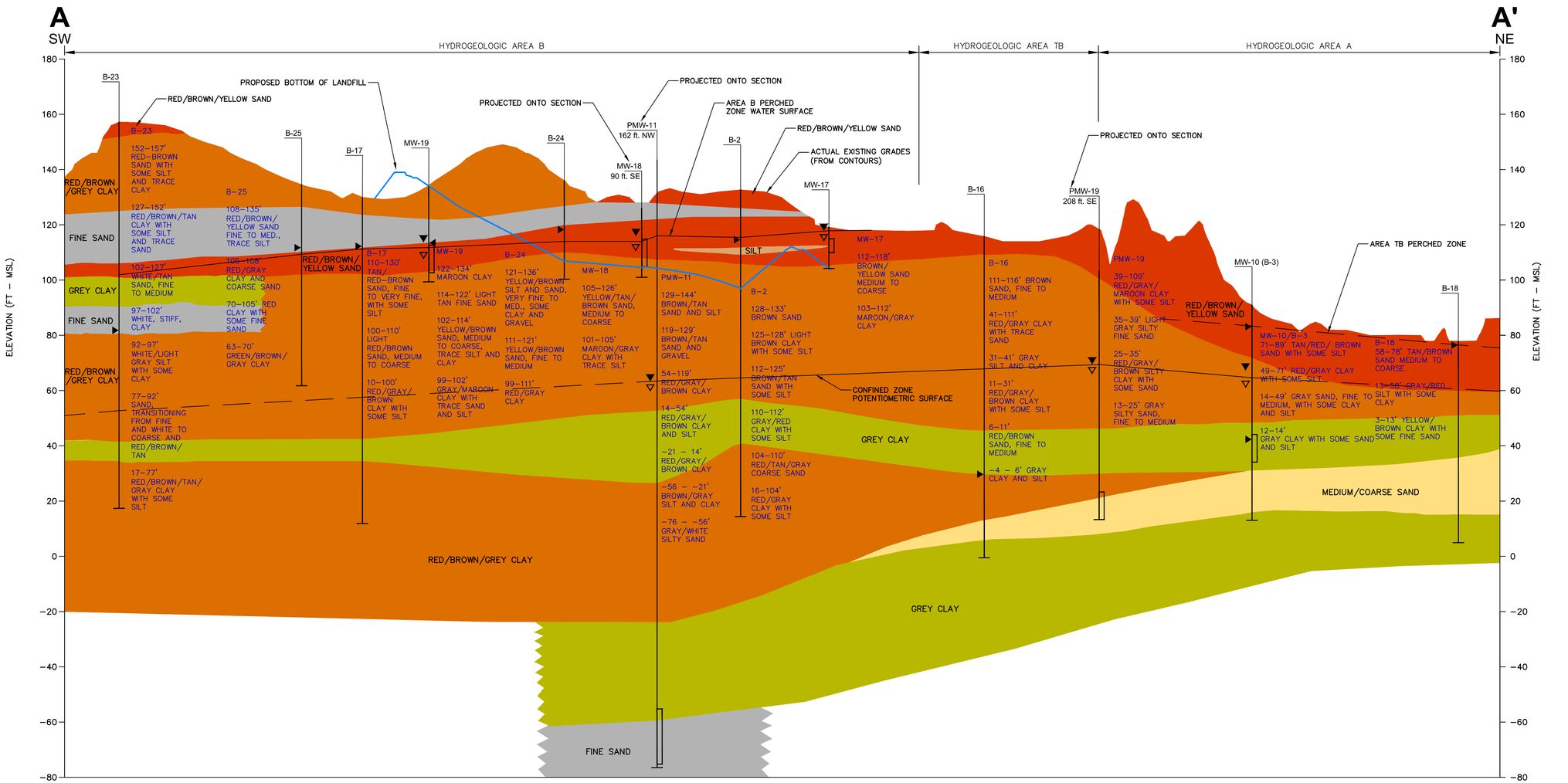
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ON–SITE BORING AND WELL LOCATIONS MAP

REPORT CODE: A		FILE NAME: 20183854A004	
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018–3854
DRAWN BY:	EEE	DATE:	4/1/2019

FIGURE 4

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A004 - On-site Boring and Well Locations.dwg, 8/2/2019 12:19:49 PM, DWG To PDF.pc3



LEGEND

- RED/BROWN/YELLOW SAND WITH SOME SILT AND CLAY
- GREY FINE SAND WITH CLAY LENSES/SOME SILT
- YELLOW/BROWN/GREY MEDIUM/COARSE SAND WITH CLAY LENSES/SILT
- GREY CLAY WITH SILT AND SAND
- BROWN/GREY/RED SILT WITH FINE SAND AND CLAY
- RED/BROWN/GREY CLAY WITH TRACE SILT/SAND
- GROUNDWATER MONITORING WELL SCREENED INTERVAL
- ▼ HIGHEST OBSERVED GROUNDWATER ELEVATION (SEE NOTE 2)
- ▽ LOWEST OBSERVED GROUNDWATER ELEVATION (SEE NOTE 2)
- PROPOSED BOTTOM OF LANDFILL
- ▶ WET/SATURATED ZONE NOTED DURING DRILLING

REFERENCES

1.) THE SURFACE GRADES SHOWN ARE FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

2.) BORING LOGS ARE PROVIDED IN APPENDICES E AND F IN PHASE II APPLICATION HYDROGEOLOGIC REPORT, DATED APRIL 2019, PREPARED BY ADVANCED GEOSERVICES CORP.

NOTES

1.) REFER TO FIGURE 4, ON–SITE BORING AND WELL LOCATIONS MAP, FOR THE GEOLOGIC CROSS SECTION LOCATIONS.

2.) REFER TO TABLES 4A – 4D FOR THE HIGHEST AND LOWEST OBSERVED GROUNDWATER ELEVATIONS.

3.) THE BOUNDARIES BETWEEN HYDROGEOLOGIC AREAS ARE BASED ON BORING DATA AND FIELD OBSERVATIONS. THE BOUNDARIES ARE NOT EVIDENCE OF THE END OF ONE FORMATION AND THE START OF ANOTHER, THE FORMATIONS TRANSITION ALONG THE BOUNDARIES.

4.) HYDROGEOLOGIC AREAS AND THEIR MAPPING IS BASED ON FORMATIONS MAPPED IN FIELD BOREHOLES, SURFACE OBSERVATION, HISTORICAL AERIAL PHOTOGRAPHS, AND REGIONAL GEOLOGIC MAPS.

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REVISION:

DATE:

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CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

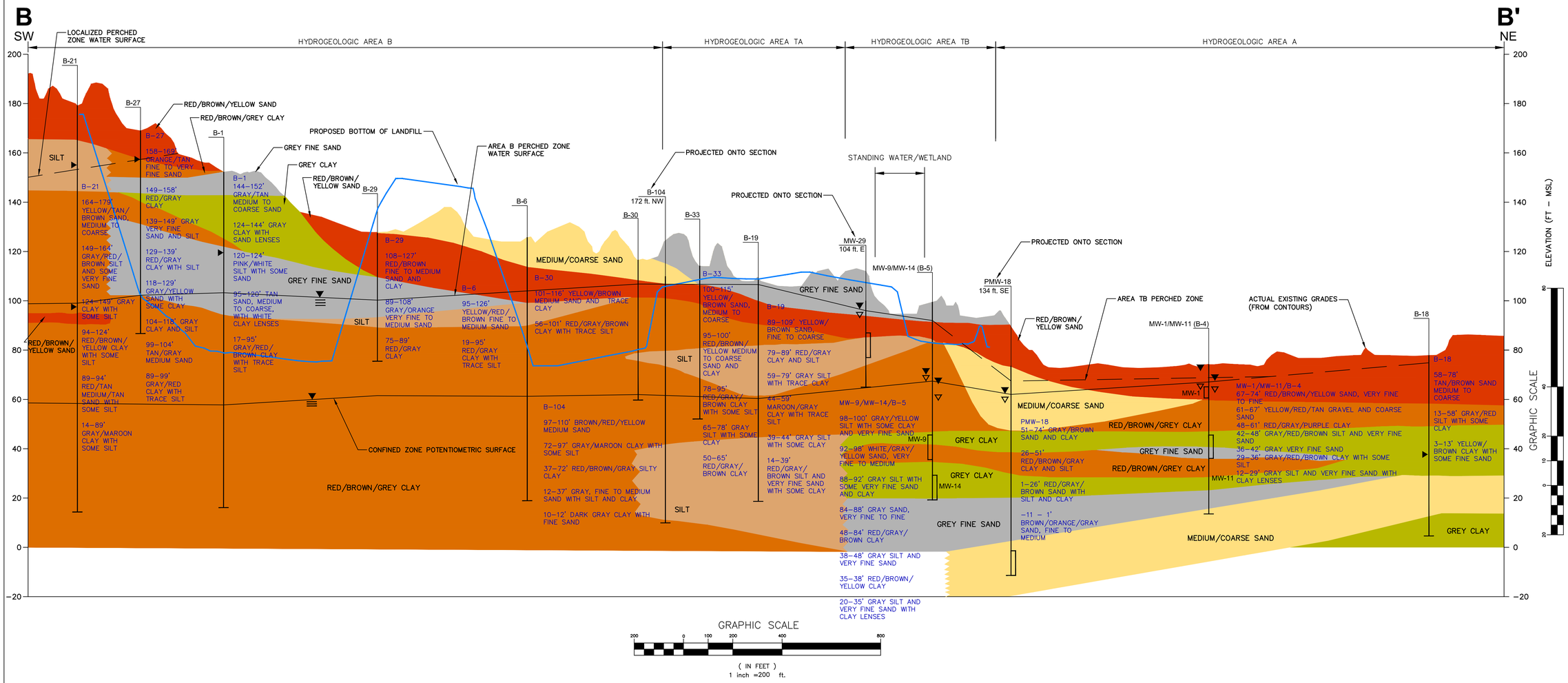
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GEOLOGIC CROSS SECTION A–A'

REPORT CODE: A	FILE NAME: 20183854A005		
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018–3854
DRAWN BY:	EEE	DATE:	4/1/2019

FIGURE 5

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A005 - Cross Sections.dwg, 8/2/2019 2:52:49 PM, DWG To PDF.pc3



GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch =200 ft.

LEGEND

- RED/BROWN/YELLOW SAND WITH SOME SILT AND CLAY
- GREY FINE SAND WITH CLAY LENSES/SOME SILT
- YELLOW/BROWN/GREY MEDIUM/COARSE SAND WITH CLAY LENSES/SILT
- GREY CLAY WITH SILT AND SAND
- BROWN/GREY/RED SILT WITH FINE SAND AND CLAY
- RED/BROWN/GREY CLAY WITH TRACE SILT/SAND
- GROUNDWATER MONITORING WELL SCREENED INTERVAL
- ▼ HIGHEST OBSERVED GROUNDWATER ELEVATION (SEE NOTE 2)
- ▽ LOWEST OBSERVED GROUNDWATER ELEVATION (SEE NOTE 2)
- PROPOSED BOTTOM OF LANDFILL
- ▶ WET/SATURATED ZONE NOTED DURING DRILLING

REFERENCES

1.) THE SURFACE GRADES SHOWN ARE FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

2.) BORING LOGS ARE PROVIDED IN APPENDICES E AND F IN PHASE II APPLICATION HYDROGEOLOGIC REPORT, DATED APRIL 2019, PREPARED BY ADVANCED GEOSERVICES CORP.

NOTES

1.) REFER TO FIGURE 4, ON–SITE BORING AND WELL LOCATIONS MAP, FOR THE GEOLOGIC CROSS SECTION LOCATIONS.

2.) REFER TO TABLES 4A – 4D FOR THE HIGHEST AND LOWEST OBSERVED GROUNDWATER ELEVATIONS.

3.) THE BOUNDARIES BETWEEN HYDROGEOLOGIC AREAS ARE BASED ON BORING DATA AND FIELD OBSERVATIONS. THE BOUNDARIES ARE NOT EVIDENCE OF THE END OF ONE FORMATION AND THE START OF ANOTHER, THE FORMATIONS TRANSITION ALONG THE BOUNDARIES.

4.) HYDROGEOLOGIC AREAS AND THEIR MAPPING IS BASED ON FORMATIONS MAPPED IN FIELD BOREHOLES, SURFACE OBSERVATION, HISTORICAL AERIAL PHOTOGRAPHS, AND REGIONAL GEOLOGIC MAPS.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:

DATE:

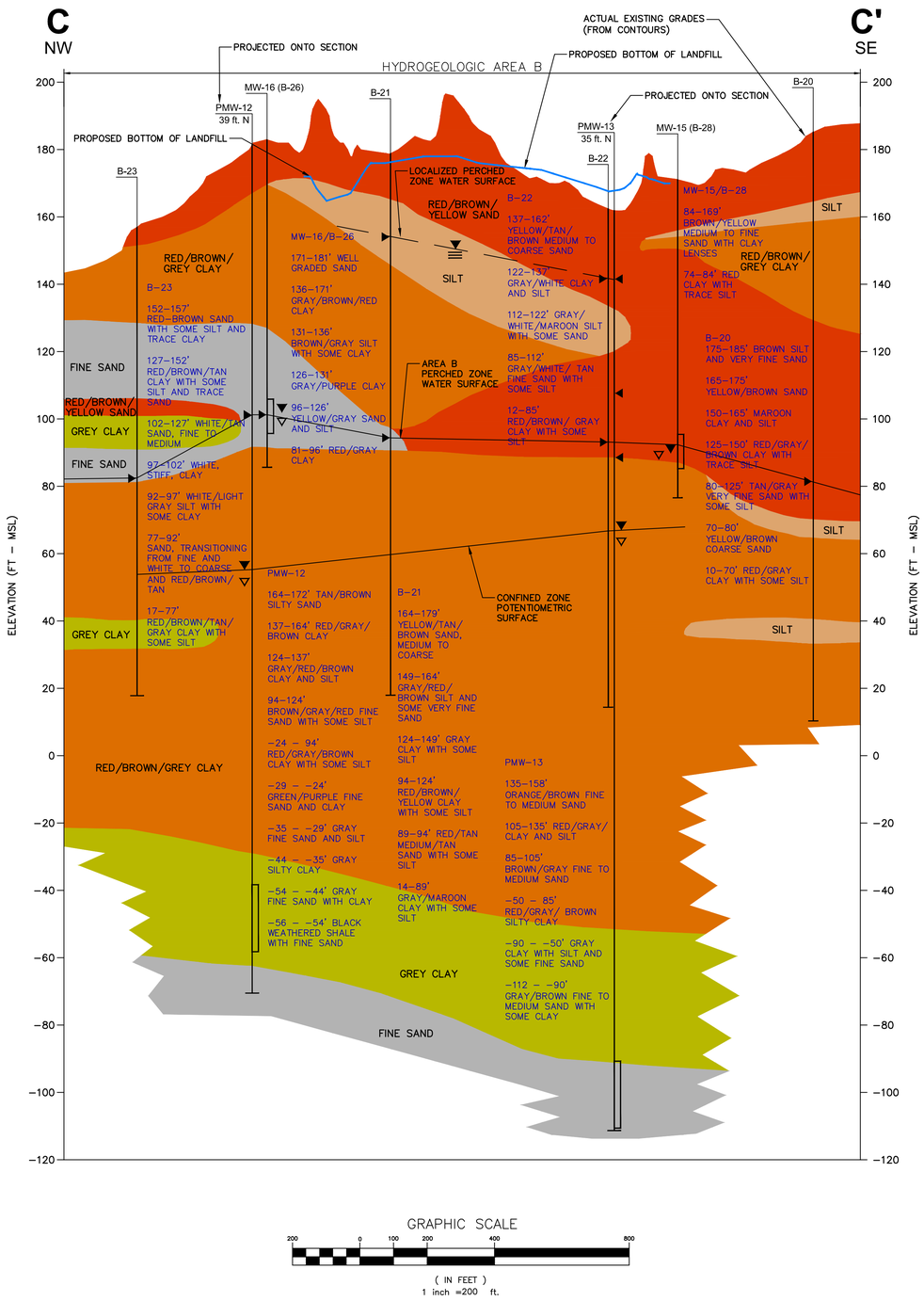
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PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

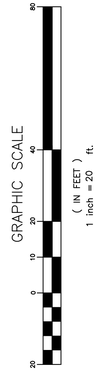
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tel: 610.429.0616 fax: 610.429.0618 www.advgeoservices.com

GEOLOGIC CROSS SECTION B–B'

REPORT CODE: A	FILE NAME: 20183854A006		
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018–3854
DRAWN BY:	EEE	DATE:	4/1/2019

FIGURE 6





LEGEND

- RED/BROWN/YELLOW SAND WITH SOME SILT AND CLAY
- GREY FINE SAND WITH CLAY LENSES/SOME SILT
- YELLOW/BROWN/GREY MEDIUM/COARSE SAND WITH CLAY LENSES/SILT
- GREY CLAY WITH SILT AND SAND
- BROWN/GREY/RED SILT WITH FINE SAND AND CLAY
- RED/BROWN/GREY CLAY WITH TRACE SILT/SAND
- GROUNDWATER MONITORING WELL SCREENED INTERVAL
- HIGHEST OBSERVED GROUNDWATER ELEVATION (SEE NOTE 2)
- LOWEST OBSERVED GROUNDWATER ELEVATION (SEE NOTE 2)
- PROPOSED BOTTOM OF LANDFILL
- WET/SATURATED ZONE NOTED DURING DRILLING

REFERENCES

1.) THE SURFACE GRADES SHOWN ARE FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

2.) BORING LOGS ARE PROVIDED IN APPENDICES E AND F IN PHASE II APPLICATION HYDROGEOLOGIC REPORT, DATED APRIL 2019, PREPARED BY ADVANCED GEOSERVICES CORP.

NOTES

1.) REFER TO FIGURE 4, ON–SITE BORING AND WELL LOCATIONS MAP, FOR THE GEOLOGIC CROSS SECTION LOCATIONS.

2.) REFER TO TABLES 4A – 4D FOR THE HIGHEST AND LOWEST OBSERVED GROUNDWATER ELEVATIONS.

3.) THE BOUNDARIES BETWEEN HYDROGEOLOGIC AREAS ARE BASED ON BORING DATA AND FIELD OBSERVATIONS. THE BOUNDARIES ARE NOT EVIDENCE OF THE END OF ONE FORMATION AND THE START OF ANOTHER, THE FORMATIONS TRANSITION ALONG THE BOUNDARIES.

4.) HYDROGEOLOGIC AREAS AND THEIR MAPPING IS BASED ON FORMATIONS MAPPED IN FIELD BOREHOLES, SURFACE OBSERVATION, HISTORICAL AERIAL PHOTOGRAPHS, AND REGIONAL GEOLOGIC MAPS.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:

DATE:

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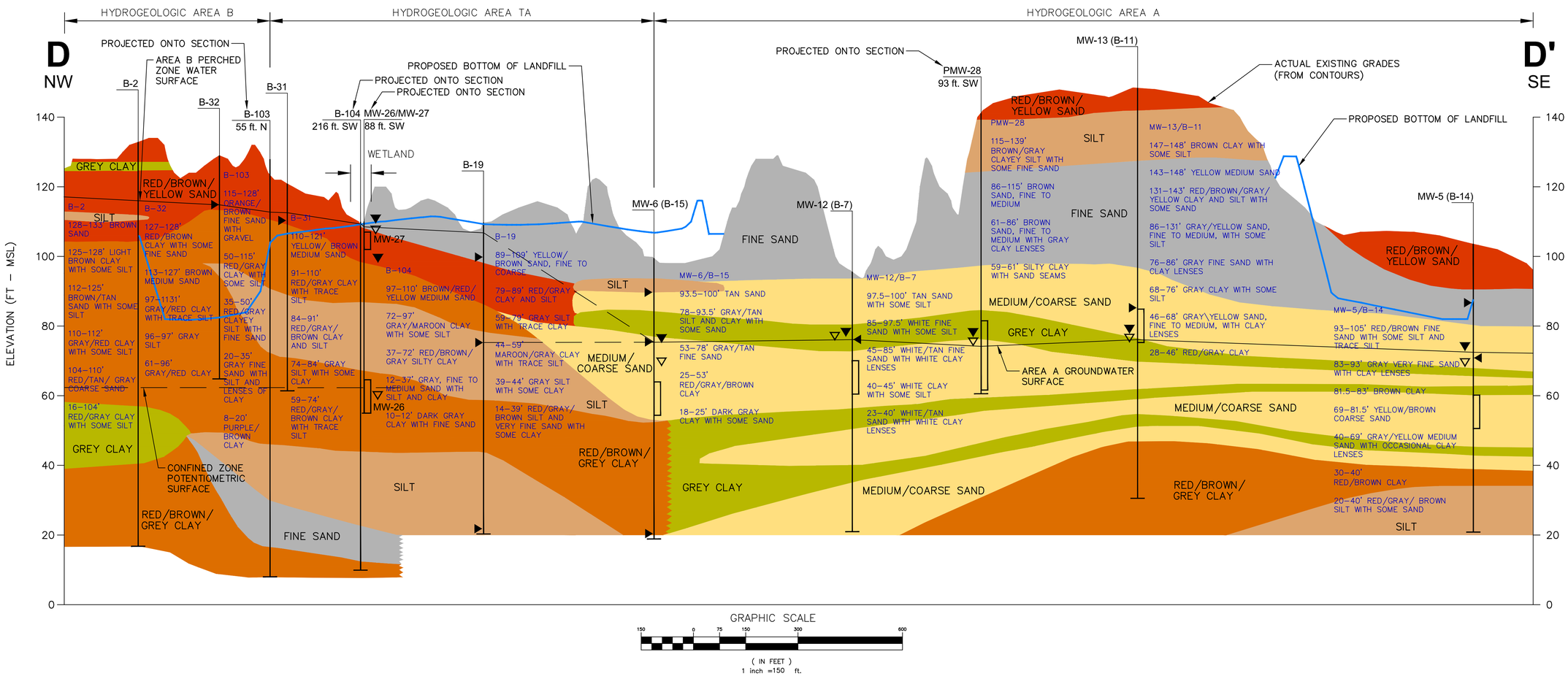
CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

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GEOLOGIC CROSS SECTION C–C'

REPORT CODE: A	FILE NAME: 20183854A007
PROJECT MANAGER: VEF	SCALE: AS NOTED
CHECKED BY: VEF	PROJECT NUMBER: 2018–3854
DRAWN BY: EEE	DATE: 4/1/2019

FIGURE 7



LEGEND

- RED/BROWN/YELLOW SAND WITH SOME SILT AND CLAY
- GREY FINE SAND WITH CLAY LENSES/SOME SILT
- YELLOW/BROWN/GREY MEDIUM/COARSE SAND WITH CLAY LENSES/SILT
- GREY CLAY WITH SILT AND SAND
- BROWN/GREY/RED SILT WITH FINE SAND AND CLAY
- RED/BROWN/GREY CLAY WITH TRACE SILT/SAND
- GROUNDWATER MONITORING WELL SCREENED INTERVAL
- ▼ HIGHEST OBSERVED GROUNDWATER ELEVATION (SEE NOTE 2)
- ▽ LOWEST OBSERVED GROUNDWATER ELEVATION (SEE NOTE 2)
- PROPOSED BOTTOM OF LANDFILL
- ▶ WET/SATURATED ZONE NOTED DURING DRILLING

REFERENCES

1.) THE SURFACE GRADES SHOWN ARE FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

2.) BORING LOGS ARE PROVIDED IN APPENDICES E AND F IN PHASE II APPLICATION HYDROGEOLOGIC REPORT, DATED APRIL 2019, PREPARED BY ADVANCED GEOSERVICES CORP.

NOTES

1.) REFER TO FIGURE 4, ON–SITE BORING AND WELL LOCATIONS MAP, FOR THE GEOLOGIC CROSS SECTION LOCATIONS.

2.) REFER TO TABLES 4A – 4D FOR THE HIGHEST AND LOWEST OBSERVED GROUNDWATER ELEVATIONS.

3.) THE BOUNDARIES BETWEEN HYDROGEOLOGIC AREAS ARE BASED ON BORING DATA AND FIELD OBSERVATIONS. THE BOUNDARIES ARE NOT EVIDENCE OF THE END OF ONE FORMATION AND THE START OF ANOTHER, THE FORMATIONS TRANSITION ALONG THE BOUNDARIES.

4.) HYDROGEOLOGIC AREAS AND THEIR MAPPING IS BASED ON FORMATIONS MAPPED IN FIELD BOREHOLES, SURFACE OBSERVATION, HISTORICAL AERIAL PHOTOGRAPHS, AND REGIONAL GEOLOGIC MAPS.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:

DATE:

NATIONAL WASTE MANAGERS
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PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

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GEOLOGIC CROSS SECTION D–D'

REPORT CODE: A	FILE NAME: 20183854A008		
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018–3854
DRAWN BY:	EEE	DATE:	4/1/2019

FIGURE 8

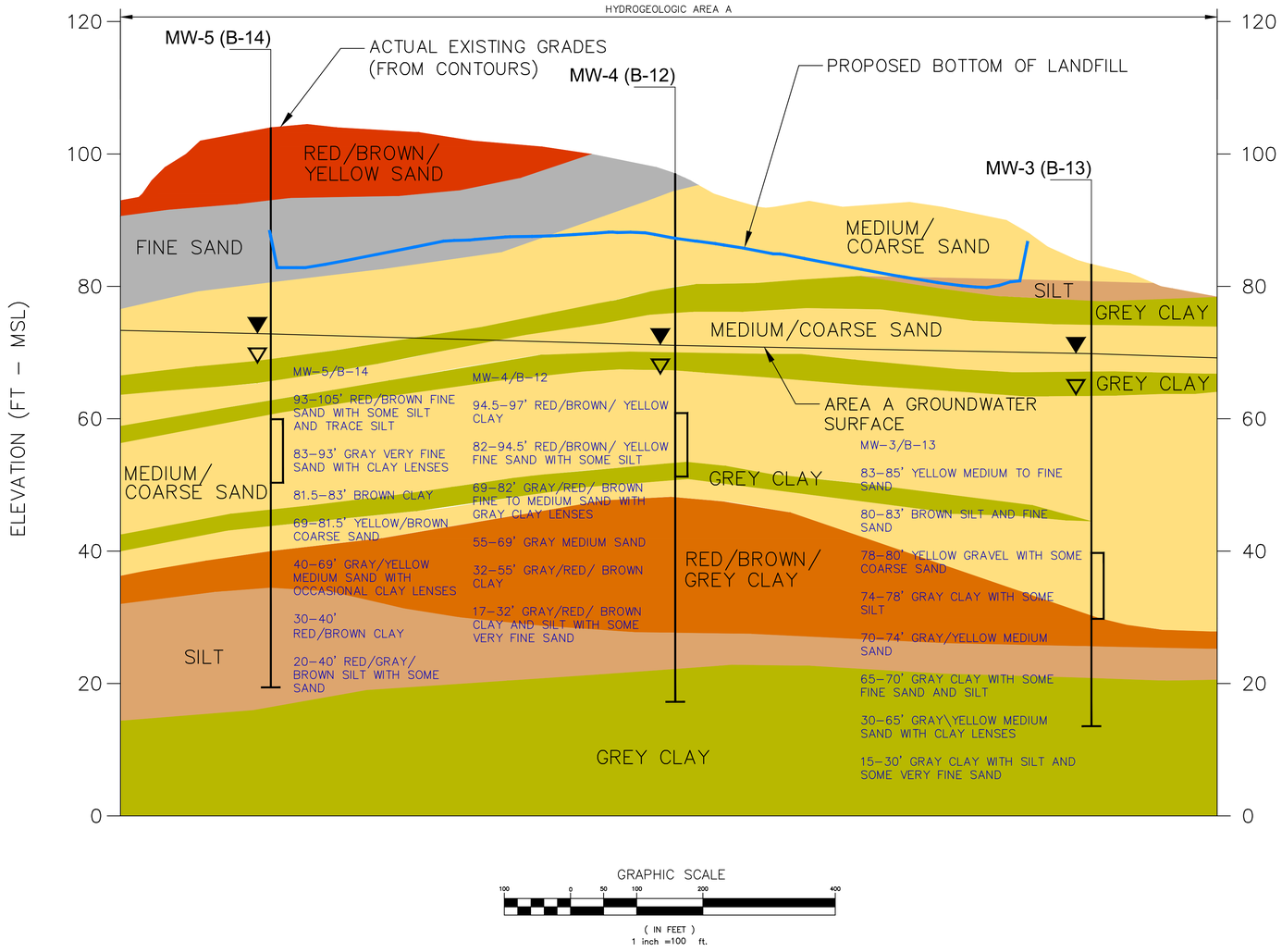
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E

SOUTH

E'

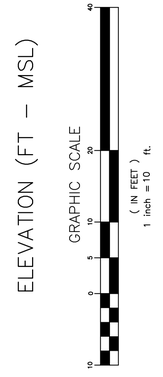
NORTH



GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch =100 ft.



LEGEND

- RED/BROWN/YELLOW SAND WITH SOME SILT AND CLAY
- GREY FINE SAND WITH CLAY LENSES/SOME SILT
- YELLOW/BROWN/GREY MEDIUM/COARSE SAND WITH CLAY LENSES/SILT
- GREY CLAY WITH SILT AND SAND
- BROWN/GREY/RED SILT WITH FINE SAND AND CLAY
- RED/BROWN/GREY CLAY WITH TRACE SILT/SAND
- GROUNDWATER MONITORING WELL SCREENED INTERVAL
- HIGHEST OBSERVED GROUNDWATER ELEVATION (SEE NOTE 2)
- LOWEST OBSERVED GROUNDWATER ELEVATION (SEE NOTE 2)
- PROPOSED BOTTOM OF LANDFILL

REFERENCES

1.) THE SURFACE GRADES SHOWN ARE FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

2.) BORING LOGS ARE PROVIDED IN APPENDICES E AND F IN PHASE II APPLICATION HYDROGEOLOGIC REPORT, DATED APRIL 2019, PREPARED BY ADVANCED GEOSERVICES CORP.

NOTES

1.) REFER TO FIGURE 4, ON–SITE BORING AND WELL LOCATIONS MAP, FOR THE GEOLOGIC CROSS SECTION LOCATIONS.

2.) REFER TO TABLES 4A – 4D FOR THE HIGHEST AND LOWEST OBSERVED GROUNDWATER ELEVATIONS.

3.) THE BOUNDARIES BETWEEN HYDROGEOLOGIC AREAS ARE BASED ON BORING DATA AND FIELD OBSERVATIONS. THE BOUNDARIES ARE NOT EVIDENCE OF THE END OF ONE FORMATION AND THE START OF ANOTHER, THE FORMATIONS TRANSITION ALONG THE BOUNDARIES.

4.) HYDROGEOLOGIC AREAS AND THEIR MAPPING IS BASED ON FORMATIONS MAPPED IN FIELD BOREHOLES, SURFACE OBSERVATION, HISTORICAL AERIAL PHOTOGRAPHS, AND REGIONAL GEOLOGIC MAPS.

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REVISION:

DATE:

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

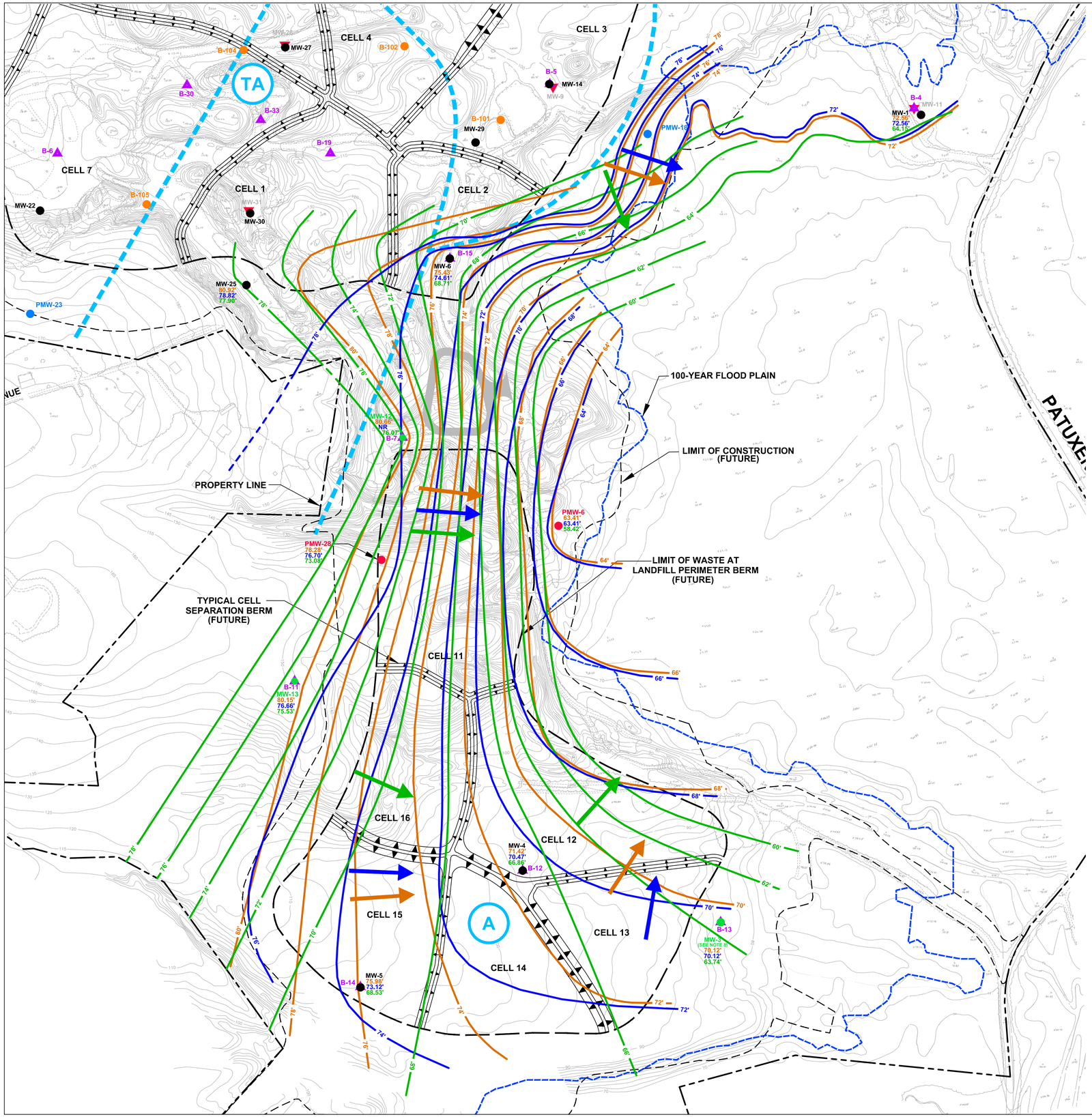
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GEOLOGIC CROSS SECTION E–E'

REPORT CODE: A	FILE NAME: 20183854A009		
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018–3854
DRAWN BY:	EEE	DATE:	4/1/2019

FIGURE 9

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A005 - Cross Sections.dwg, 8/2/2019 2:36:18 PM, DWG To PDF.pc3



LEGEND

- PROPERTY LINE
- SITE ENTRANCE (FUTURE)
- LANDFILL LIMITS (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
- 100–YEAR FLOOD PLAIN
- EXISTING MONITORING WELL (SEE REFERENCE 2)
- FORMER MONITORING WELLS DAMAGED BY VANDALS (NOT USEABLE) (SEE REFERENCE 2) (SEE NOTE 6)
- HISTORICAL BOREHOLES (SEE REFERENCE 3)
- EXISTING GROUNDWATER MONITORING WELLS THAT WERE UNABLE TO BE LOCATED (SEE NOTE 7)
- PERMANENT MONITORING WELL (SCREENED ABOVE CLAY CONFINING UNIT) (SEE REFERENCE 2)
- PERMANENT MONITORING WELL (SCREENED BELOW CLAY CONFINING UNIT) (SEE REFERENCE 2)
- BORING LOCATIONS ALONG TA/B/TB TRANSITION (B–101 TO B–105) COMPLETED APRIL/MAY 2013
- ADDITIONAL BORINGS LOCATIONS REQUESTED BY MDE (B–106 AND B–107) COMPLETED APRIL/MAY 2013
- HYDROGEOLOGIC AREA DIVIDE (SEE REFERENCE 2)
- (A) HYDROGEOLOGIC AREA (SEE REFERENCE 2)
- HIGHEST OBSERVED/PREDICTED GROUNDWATER ELEVATION CONTOUR LINE (SEE NOTE 10)
- DEPRESSED GROUNDWATER ELEVATION CONTOUR LINE
- ELEVATED GROUNDWATER ELEVATION CONTOUR LINE
- HIGHEST OBSERVED/PREDICTED GROUNDWATER FLOW DIRECTION (SEE NOTE 10)
- DEPRESSED GROUNDWATER FLOW DIRECTION
- ELEVATED GROUNDWATER FLOW DIRECTION

REFERENCES

1.) BASEMAP SHOWN, INCLUDING TOPOGRAPHICAL INFORMATION, IS FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

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NOTES

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2.) HYDROLOGIC AREAS AND THEIR MAPPING IS BASED ON FORMATIONS MAPPED IN FIELD BOREHOLES, SURFACE OBSERVATION, HISTORICAL AERIAL PHOTOGRAPHS, AND REGIONAL GEOLOGIC MAPS.

3.) THE 100–YEAR FLOOD PLAIN LIMITS AND ASSOCIATED DEVELOPMENT PERMITTING HAS BEEN DEVELOPED BY OTHERS.

4.)THE CONRAIL TRACKS ARE ALSO SHARED WITH AMTRAK FOR HIGH–SPEED COMMUTER TRAINS BETWEEN BOSTON, MASSACHUSETTS AND WASHINGTON, D.C.

5.) THE PROPERTY WAS PREVIOUSLY USED FOR SAND AND GRAVEL MINING ACTIVITIES. PORTIONS OF THE SITE CURRENTLY HAVE NO VEGETATION AND ARE BARREN.

6.) THE SITE IS NOT SECURE FROM TRESPASSERS. AS SUCH, SEVERAL MONITORING WELLS HAVE BEEN DAMAGED BY VANDALS.

7.) WATER LEVELS IN WELLS MW–2, MW–7, MW–8, MW–9, MW–11, MW–23, MW–26, AND MW–31 WERE NOT OBTAINED DURING FIELD ACTIVITIES BY GOLDER ASSOCIATES IN 2013/2014 AND ADVANCED GEOSERVICES IN 2018/2019 AS THE WELLS COULD NOT BE LOCATED.

8.) DURING A NOVEMBER 29, 2018 SITE VISIT BY ADVANCED GEOSERVICES, WATER LEVELS IN WELL MW–3 WERE NOT OBTAINED BECAUSE THE WELL RISER HAS BEEN REMOVED FROM THE GROUND, A MINIMUM OF 12" BELOW GRADE, BASED ON STAINING OF THE RISER FOUND LAYING ON THE GROUND WITHIN 10 FEET OF THE HISTORICALLY MAPPED LOCATION.

9.) GROUNDWATER CONTOUR LINES OUTSIDE OF THE CHESAPEAKE TERRACE RUBBLE LANDFILL PROPERTY LINE ARE SHOWN AS DASHED LINES AND ARE SHOWN FOR REFERENCE PURPOSES ONLY.

10.) SINCE FIELD WATER LEVEL READINGS WERE TAKEN DURING HISTORICALLY WET YEARS, INCLUDING RECORD–BREAKING HIGH RAINFALL PERIODS, THE HIGHEST OBSERVED AND PREDICTED HIGHEST GROUNDWATER ELEVATIONS ARE CONSIDERED THE SAME FOR THIS PROJECT.

NORTH

GRAPHIC SCALE
150 0 75 150 300 600
(IN FEET)
1 inch =150 ft.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:	DATE:
ADDED ELEVATED STATE GROUNDWATER ELEVATION CONTOUR LINES FROM 5/28/2014	6/17/2019
UPDATED MAX. AND MIN. GW ELEVATIONS PER JUNE 2019 DISCUSSION WITH MDE	6/17/2019

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
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ANNE ARUNDEL COUNTY, MARYLAND

ADVANCED GeoServices
a Montrose Environmental Group company
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tel 610.840.9500 fax 610.840.9592 www.montrose-env.com

HIGHEST OBSERVED/PREDICTED, DEPRESSED AND ELEVATED GROUNDWATER ELEVATION CONTOUR MAP HYDROGEOLOGIC AREA A

REPORT CODE: A	FILE NAME: 20183854A010		
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018–3854
DRAWN BY:	EEE	DATE:	7/31/2019

FIGURE 10

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A010 - Water Levels.dwg, 8/2/2019 9:54:02 AM, DWG To PDF.pc3

CONRAIL

CELL 9

CELL 10

CELL 8

CELL 6

CELL 4

CELL 5

CELL 7

CELL 1

B

TA

MW-19
113.99'
112.11'
107.91'

MW-17
117.74'
117.74'
114.35'

MW-18
116.28'
114.82'
110.73'

MW-16
104.51'
100.66'
98.10'

MW-20
108.46'
105.90'
103.88'

MW-24
109.99'
107.46'
105.46'

MW-23

MW-26

MW-27

MW-21
100.38'
97.91'
97.91'

MW-22
101.80'
100.65'
98.83'

MW-31

MW-30

MW-25

MW-15
90.76'
88.68'
86.07'

MW-12

PMW-11

PMW-12

PMW-13

PMW-23

B-17

B-25

B-106

B-24

B-2

B-32

B-103

B-31

B-104

B-23

B-26

B-1

B-27

B-21

B-107

B-29

B-6

B-30

B-33

B-19

B-105

B-22

B-28

B-20

COLLINS AVENUE

LIMIT OF WASTE AT LANDFILL PERIMETER BERM (FUTURE)

LIMIT OF CONSTRUCTION (FUTURE)

PROPERTY LINE

LEGEND

- PROPERTY LINE
- SITE ENTRANCE (FUTURE)
- LANDFILL LIMITS (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
- EXISTING MONITORING WELL (SEE REFERENCE 2)
- FORMER MONITORING WELLS DAMAGED BY VANDALS (NOT USEABLE) (SEE REFERENCE 2) (SEE NOTE 6)
- HISTORICAL BOREHOLES (SEE REFERENCE 3)
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- (A) HYDROGEOLOGIC AREA (SEE REFERENCE 2)
- HIGHEST OBSERVED/PREDICTED GROUNDWATER ELEVATION CONTOUR LINE (SEE NOTE 10)
- DEPRESSED GROUNDWATER ELEVATION CONTOUR LINE
- ELEVATED GROUNDWATER ELEVATION CONTOUR LINE
- HIGHEST OBSERVED/PREDICTED GROUNDWATER FLOW DIRECTION (SEE NOTE 10)
- DEPRESSED GROUNDWATER FLOW DIRECTION
- ELEVATED GROUNDWATER FLOW DIRECTION

REFERENCES

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9.) GROUNDWATER CONTOUR LINES OUTSIDE OF THE CHESAPEAKE TERRACE RUBBLE LANDFILL PROPERTY LINE ARE SHOWN AS DASHED LINES AND ARE SHOWN FOR REFERENCE PURPOSES ONLY.

10.) SINCE FIELD WATER LEVEL READINGS WERE TAKEN DURING HISTORICALLY WET YEARS, INCLUDING RECORD-BREAKING HIGH RAINFALL PERIODS, THE OBSERVED MAXIMUM AND PREDICTED MAXIMUM GROUNDWATER ELEVATIONS ARE CONSIDERED THE SAME FOR THIS PROJECT.

NORTH

GRAPHIC SCALE

120 0 60 120 240 480

(IN FEET)
1 inch =120 ft.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

DATE:	REVISION:
6/18/2019	ADDED ELEVATED STATE GROUNDWATER ELEVATION CONTOUR LINES FROM 5/28/2014
6/17/2019	UPDATED MAX. AND MIN. GW ELEVATIONS PER JUNE 2019 DISCUSSION WITH MDE

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

ADVANCED GeoServices
a Montrose Environmental Group company
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WWW.ADVANCEDGEO.COM 610.840.9100 INFO@ADVANCEDGEO.COM

HIGHEST OBSERVED/PREDICTED, DEPRESSED AND ELEVATED GROUNDWATER ELEVATION CONTOUR MAP
HYDROGEOLOGIC AREA B

REPORT CODE: A		FILE NAME: 20183854A011	
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018-3854
DRAWN BY:	EEE	DATE:	7/31/2019

FIGURE 11

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A010 - Water Levels.dwg, 8/2/2019 11:13:48 AM, DWG To PDF.pc3

LEGEND

- PROPERTY LINE
- SITE ENTRANCE (FUTURE)
- LANDFILL LIMITS (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
- EXISTING MONITORING WELL (SEE REFERENCE 2)
- FORMER MONITORING WELLS DAMAGED BY VANDALS (NOT USEABLE) (SEE REFERENCE 2) (SEE NOTE 6)
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- (A) HYDROGEOLOGIC AREA (SEE REFERENCE 2)
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- DEPRESSED GROUNDWATER ELEVATION CONTOUR LINE
- ELEVATED GROUNDWATER ELEVATION CONTOUR LINE
- HIGHEST OBSERVED/PREDICTED GROUNDWATER FLOW DIRECTION (SEE NOTE 10)
- DEPRESSED GROUNDWATER FLOW DIRECTION
- ELEVATED GROUNDWATER FLOW DIRECTION

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NORTH

GRAPHIC SCALE
120 0 60 120 240 480
(IN FEET)
1 inch =120 ft.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:	DATE:
ADDED ELEVATED STATE GROUNDWATER ELEVATION CONTOUR LINES FROM 5/28/2014	6/18/2019
UPDATED MAX. AND MIN. GW ELEVATIONS PER JUNE 2019 DISCUSSION WITH MDE	6/17/2019

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

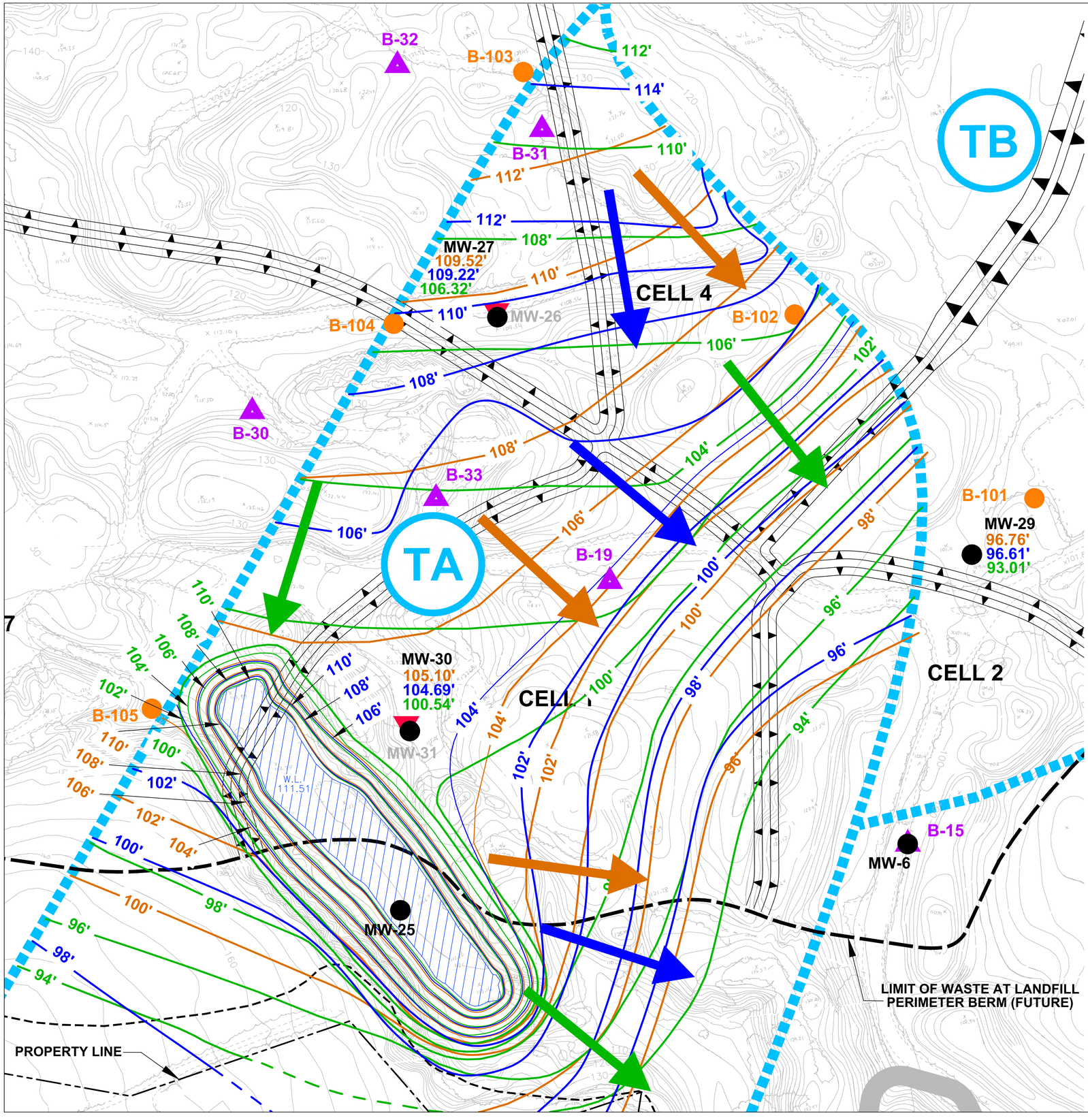
ADVANCED GeoServices
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tel 610.840.9100 fax 610.840.9199 www.advancedgeoservices.com

HIGHEST OBSERVED/PREDICTED, DEPRESSED AND ELEVATED GROUNDWATER ELEVATION CONTOUR MAP - CONFINED ZONE AQUIFER HYDROGEOLOGIC AREA B

REPORT CODE: A	FILE NAME: 20183854A012		
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018-3854
DRAWN BY:	EEE	DATE:	7/31/2019

FIGURE 12

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A010 - Water Levels.dwg, 8/2/2019 12:34:27 PM, DWG To PDF.pc3



LEGEND

- PROPERTY LINE
- SITE ENTRANCE (FUTURE)
- LANDFILL LIMITS (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
- EXISTING MONITORING WELL (SEE REFERENCE 2)
- FORMER MONITORING WELLS DAMAGED BY VANDALS (NOT USEABLE) (SEE REFERENCE 2) (SEE NOTE 6)
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- (A) HYDROGEOLOGIC AREA (SEE REFERENCE 2)
- HIGHEST OBSERVED/PREDICTED GROUNDWATER ELEVATION CONTOUR LINE (SEE NOTE 10)
- DEPRESSED GROUNDWATER ELEVATION CONTOUR LINE
- ELEVATED GROUNDWATER ELEVATION CONTOUR LINE
- HIGHEST OBSERVED/PREDICTED GROUNDWATER FLOW DIRECTION (SEE NOTE 10)
- DEPRESSED GROUNDWATER FLOW DIRECTION
- ELEVATED GROUNDWATER FLOW DIRECTION

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NORTH

GRAPHIC SCALE
60 0 30 60 120 240
(IN FEET)
1 inch = 60 ft.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

DATE:	REVISION:
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6/17/2019	UPDATED MAX. AND MIN. GW ELEVATIONS PER JUNE 2019 DISCUSSION WITH MDE

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

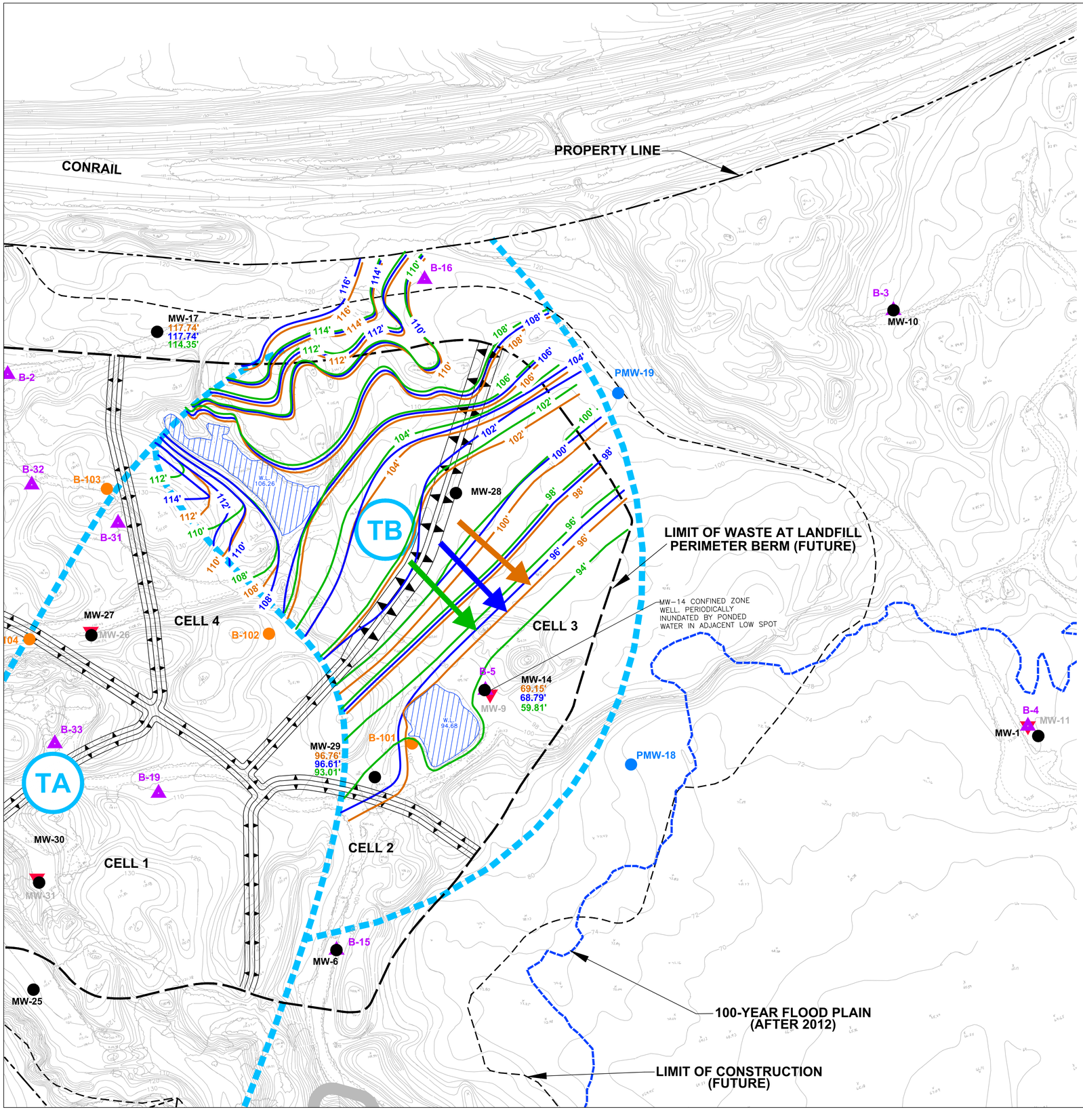
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tel 610.840.9500 fax 610.840.9599 www.advancedgeoservices.com

HIGHEST OBSERVED/PREDICTED, DEPRESSED AND ELEVATED GROUNDWATER ELEVATION CONTOUR MAP
HYDROGEOLOGIC AREA TA

REPORT CODE: A		FILE NAME: 20183854A013	
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018-3854
DRAWN BY:	EEE	DATE:	7/31/2019

FIGURE 13

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A010 - Water Levels.dwg, 8/2/2019 1:59:15 PM, DWG To PDF.pc3



LEGEND

- PROPERTY LINE
- SITE ENTRANCE (FUTURE)
- LANDFILL LIMITS (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
- 100–YEAR FLOOD PLAIN
- EXISTING MONITORING WELL (SEE REFERENCE 2)
- FORMER MONITORING WELLS DAMAGED BY VANDALS (NOT USEABLE) (SEE REFERENCE 2) (SEE NOTE 6)
- HISTORICAL BOREHOLES (SEE REFERENCE 3)
- EXISTING GROUNDWATER MONITORING WELLS THAT WERE UNABLE TO BE LOCATED (SEE NOTE 7)
- PERMANENT MONITORING WELL (SCREENED ABOVE CLAY CONFINING UNIT) (SEE REFERENCE 2)
- PERMANENT MONITORING WELL (SCREENED BELOW CLAY CONFINING UNIT) (SEE REFERENCE 2)
- BORING LOCATIONS ALONG TA/B/TB TRANSITION (B–101 TO B–105) COMPLETED APRIL/MAY 2013
- ADDITIONAL BORINGS LOCATIONS REQUESTED BY MDE (B–106 AND B–107) COMPLETED APRIL/MAY 2013
- HYDROGEOLOGIC AREA DIVIDE (SEE REFERENCE 2)
- TA — HYDROGEOLOGIC AREA (SEE REFERENCE 2)
- HIGHEST OBSERVED/PREDICTED GROUNDWATER ELEVATION CONTOUR LINE (SEE NOTE 10)
- DEPRESSED GROUNDWATER ELEVATION CONTOUR LINE
- ELEVATED GROUNDWATER ELEVATION CONTOUR LINE
- HIGHEST OBSERVED/PREDICTED GROUNDWATER FLOW DIRECTION (SEE NOTE 10)
- DEPRESSED GROUNDWATER FLOW DIRECTION
- ELEVATED GROUNDWATER FLOW DIRECTION

REFERENCES

1.) BASEMAP SHOWN, INCLUDING TOPOGRAPHICAL INFORMATION, IS FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

2.) HYDROGEOLOGIC AREAS AND MONITORING WELL LOCATIONS DIGITIZED FROM HARD COPY OF DRAWING ENTITLED "PERMANENT GROUNDWATER MONITORING WELL PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED MAY 2008.

3.) ADDITIONAL HISTORICAL BORING LOCATIONS FROM HARD COPY OF DRAWING ENTITLED "PLATE 2, CHESAPEAKE RUBBLE LANDFILL HYDROGEOLOGIC BASE MAP," DATED NOVEMBER 2003, CREATED BY MARK SCHULTZ ASSOCIATES, ANNAPOLIS, MARYLAND.

NOTES

1.) THE FUTURE RUBBLE LANDFILL DEVELOPMENT FEATURES ARE INCLUDED TO SHOW LOCATION OF THE BORINGS AND MONITORING WELLS RELATIVE TO THE PROPOSED DEVELOPMENT. THE ACTUAL LIMITS OF FUTURE DEVELOPMENT MAY BE ADJUSTED AS PART OF THE DETAILED ENGINEERING DESIGN TO BE INCLUDED IN THE PHASE III PERMIT APPLICATION; WHICH IS CURRENTLY UNDERGOING REVISION.

2.) HYDROLOGIC AREAS AND THEIR MAPPING IS BASED ON FORMATIONS MAPPED IN FIELD BOREHOLES, SURFACE OBSERVATION, HISTORICAL AERIAL PHOTOGRAPHS, AND REGIONAL GEOLOGIC MAPS.

3.) THE 100–YEAR FLOOD PLAIN LIMITS AND ASSOCIATED DEVELOPMENT PERMITTING HAS BEEN DEVELOPED BY OTHERS.

4.)THE CONRAIL TRACKS ARE ALSO SHARED WITH AMTRAK FOR HIGH–SPEED COMMUTER TRAINS BETWEEN BOSTON, MASSACHUSETTS AND WASHINGTON, D.C.

5.) THE PROPERTY WAS PREVIOUSLY USED FOR SAND AND GRAVEL MINING ACTIVITIES. PORTIONS OF THE SITE CURRENTLY HAVE NO VEGETATION AND ARE BARREN.

6.) THE SITE IS NOT SECURE FROM TRESPASSERS. AS SUCH, SEVERAL MONITORING WELLS HAVE BEEN DAMAGED BY VANDALS.

7.) WATER LEVELS IN WELLS MW–2, MW–7, MW–8, MW–9, MW–11, MW–23, MW–26, AND MW–31 WERE NOT OBTAINED DURING FIELD ACTIVITIES BY GOLDER ASSOCIATES IN 2013/2014 AND ADVANCED GEOSERVICES IN 2018/2019 AS THE WELLS COULD NOT BE LOCATED.

8.) DURING A NOVEMBER 29, 2018 SITE VISIT BY ADVANCED GEOSERVICES, WATER LEVELS IN WELL MW–3 WERE NOT OBTAINED BECAUSE THE WELL RISER HAS BEEN REMOVED FROM THE GROUND, A MINIMUM OF 12" BELOW GRADE, BASED ON STAINING OF THE RISER FOUND LAYING ON THE GROUND WITHIN 10 FEET OF THE HISTORICALLY MAPPED LOCATION.

9.) GROUNDWATER CONTOUR LINES OUTSIDE OF THE CHESAPEAKE TERRACE RUBBLE LANDFILL PROPERTY LINE ARE SHOWN AS DASHED LINES AND ARE SHOWN FOR REFERENCE PURPOSES ONLY.

10.) SINCE FIELD WATER LEVEL READINGS WERE TAKEN DURING HISTORICALLY WET YEARS, INCLUDING RECORD–BREAKING HIGH RAINFALL PERIODS, THE OBSERVED MAXIMUM AND PREDICTED MAXIMUM GROUNDWATER ELEVATIONS ARE CONSIDERED THE SAME FOR THIS PROJECT.

11.) THE JUNE 16, 2014 GROUNDWATER ELEVATION VALUE WAS SUBSTITUTED FOR THE MAY 28, 2014 GROUNDWATER ELEVATION VALUE FOR PERMANENT MONITORING WELL PMW–18 AS THE MAY 28, 2014 VALUE IS BELIEVED TO BE ERRONEOUS.

NORTH

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch =100 ft.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:	DATE:
ADDED ELEVATED STATE GROUNDWATER ELEVATION CONTOUR LINES FROM 5/28/2014	6/20/2019

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

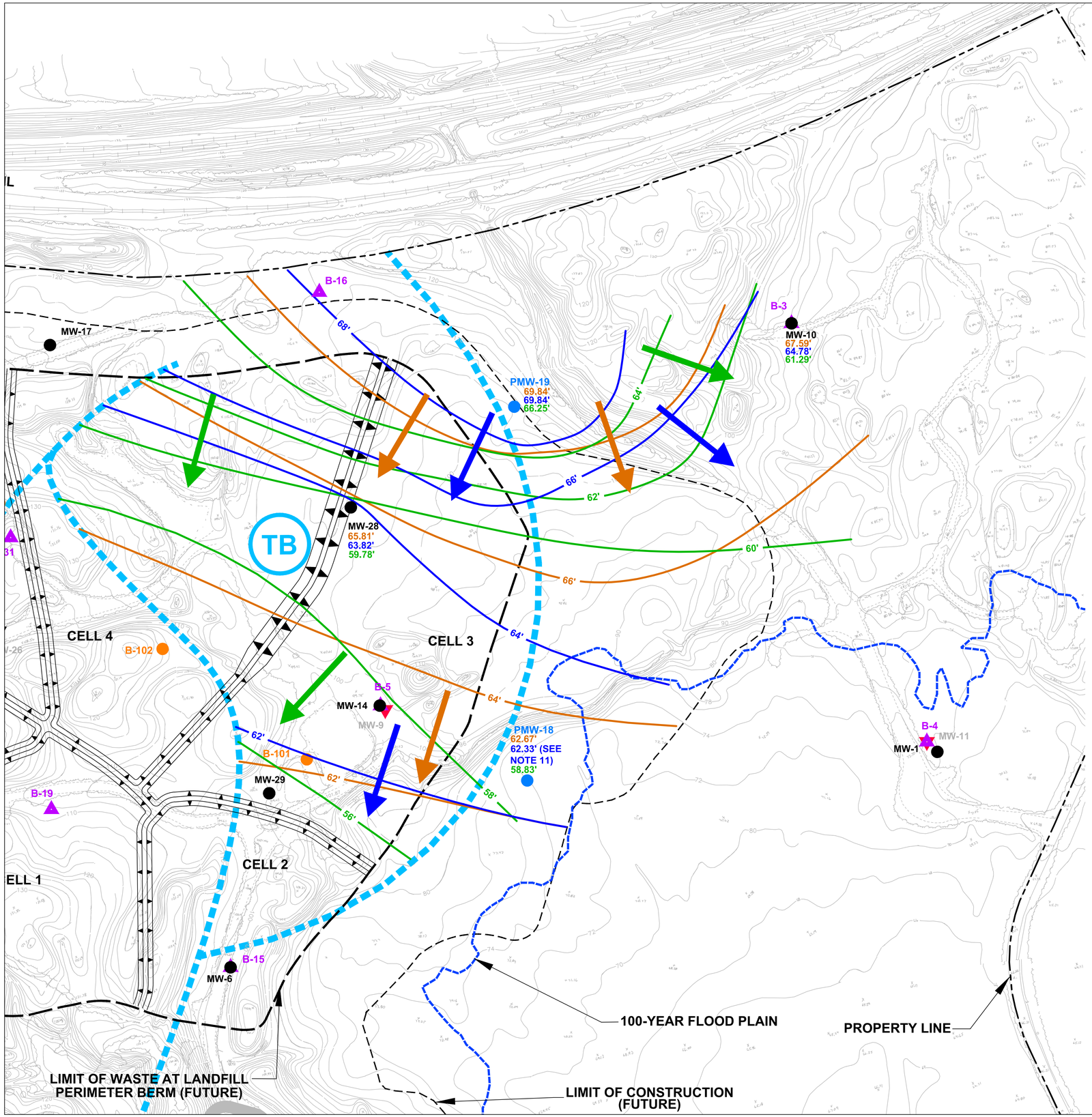
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a Montrose Environmental Group company

1055 ANDREW DRIVE, SUITE A, WEST CHESTER PA, 19380
tel: 610.840.9100 fax: 610.840.9199 www.advancedgeoservices.com

HIGHEST OBSERVED/PREDICTED, DEPRESSED AND ELEVATED GROUNDWATER ELEVATION CONTOUR MAP – PERCHED WATER AQUIFER HYDROGEOLOGIC AREA TB

REPORT CODE: A	FILE NAME: 20183854A014
PROJECT MANAGER: VEF	SCALE: AS NOTED
CHECKED BY: VEF	PROJECT NUMBER: 2018–3854
DRAWN BY: EEE	DATE: 7/31/2019

FIGURE 14



LEGEND

- PROPERTY LINE
- SITE ENTRANCE (FUTURE)
- LANDFILL LIMITS (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
- 100-YEAR FLOOD PLAIN
- EXISTING MONITORING WELL (SEE REFERENCE 2)
- FORMER MONITORING WELLS DAMAGED BY VANDALS (NOT USEABLE) (SEE REFERENCE 2) (SEE NOTE 6)
- HISTORICAL BOREHOLES (SEE REFERENCE 3)
- EXISTING GROUNDWATER MONITORING WELLS THAT WERE UNABLE TO BE LOCATED (SEE NOTE 7)
- PERMANENT MONITORING WELL (SCREENED ABOVE CLAY CONFINING UNIT) (SEE REFERENCE 2)
- PERMANENT MONITORING WELL (SCREENED BELOW CLAY CONFINING UNIT) (SEE REFERENCE 2)
- BORING LOCATIONS ALONG TA/B/TB TRANSITION (B-101 TO B-105) COMPLETED APRIL/MAY 2013
- ADDITIONAL BORINGS LOCATIONS REQUESTED BY MDE (B-106 AND B-107) COMPLETED APRIL/MAY 2013
- HYDROGEOLOGIC AREA DIVIDE (SEE REFERENCE 2)
- (A) HYDROGEOLOGIC AREA (SEE REFERENCE 2)
- HIGHEST OBSERVED/PREDICTED GROUNDWATER ELEVATION CONTOUR LINE (SEE NOTE 10)
- DEPRESSED GROUNDWATER ELEVATION CONTOUR LINE
- ELEVATED GROUNDWATER ELEVATION CONTOUR LINE
- HIGHEST OBSERVED/PREDICTED GROUNDWATER FLOW DIRECTION (SEE NOTE 10)
- DEPRESSED GROUNDWATER FLOW DIRECTION
- ELEVATED GROUNDWATER FLOW DIRECTION

REFERENCES

1.) BASEMAP SHOWN, INCLUDING TOPOGRAPHICAL INFORMATION, IS FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

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3.) ADDITIONAL HISTORICAL BORING LOCATIONS FROM HARD COPY OF DRAWING ENTITLED "PLATE 2, CHESAPEAKE RUBBLE LANDFILL HYDROGEOLOGIC BASE MAP," DATED NOVEMBER 2003, CREATED BY MARK SCHULTZ ASSOCIATES, ANNAPOLIS, MARYLAND.

NOTES

1.) THE FUTURE RUBBLE LANDFILL DEVELOPMENT FEATURES ARE INCLUDED TO SHOW LOCATION OF THE BORINGS AND MONITORING WELLS RELATIVE TO THE PROPOSED DEVELOPMENT. THE ACTUAL LIMITS OF FUTURE DEVELOPMENT MAY BE ADJUSTED AS PART OF THE DETAILED ENGINEERING DESIGN TO BE INCLUDED IN THE PHASE III PERMIT APPLICATION; WHICH IS CURRENTLY UNDERGOING REVISION.

2.) HYDROLOGIC AREAS AND THEIR MAPPING IS BASED ON FORMATIONS MAPPED IN FIELD BOREHOLES, SURFACE OBSERVATION, HISTORICAL AERIAL PHOTOGRAPHS, AND REGIONAL GEOLOGIC MAPS.

3.) THE 100-YEAR FLOOD PLAIN LIMITS AND ASSOCIATED DEVELOPMENT PERMITTING HAS BEEN DEVELOPED BY OTHERS.

4.)THE CONRAIL TRACKS ARE ALSO SHARED WITH AMTRAK FOR HIGH-SPEED COMMUTER TRAINS BETWEEN BOSTON, MASSACHUSETTS AND WASHINGTON, D.C.

5.) THE PROPERTY WAS PREVIOUSLY USED FOR SAND AND GRAVEL MINING ACTIVITIES. PORTIONS OF THE SITE CURRENTLY HAVE NO VEGETATION AND ARE BARREN.

6.) THE SITE IS NOT SECURE FROM TRESPASSERS. AS SUCH, SEVERAL MONITORING WELLS HAVE BEEN DAMAGED BY VANDALS.

7.) WATER LEVELS IN WELLS MW-2, MW-7, MW-8, MW-9, MW-11, MW-23, MW-26, AND MW-31 WERE NOT OBTAINED DURING FIELD ACTIVITIES BY GOLDER ASSOCIATES IN 2013/2014 AND ADVANCED GEOSERVICES IN 2018/2019 AS THE WELLS COULD NOT BE LOCATED.

8.) DURING A NOVEMBER 29, 2018 SITE VISIT BY ADVANCED GEOSERVICES, WATER LEVELS IN WELL MW-3 WERE NOT OBTAINED BECAUSE THE WELL RISER HAS BEEN REMOVED FROM THE GROUND, A MINIMUM OF 12" BELOW GRADE, BASED ON STAINING OF THE RISER FOUND LAYING ON THE GROUND WITHIN 10 FEET OF THE HISTORICALLY MAPPED LOCATION.

9.) GROUNDWATER CONTOUR LINES OUTSIDE OF THE CHESAPEAKE TERRACE RUBBLE LANDFILL PROPERTY LINE ARE SHOWN AS DASHED LINES AND ARE SHOWN FOR REFERENCE PURPOSES ONLY.

10.) SINCE FIELD WATER LEVEL READINGS WERE TAKEN DURING HISTORICALLY WET YEARS, INCLUDING RECORD-BREAKING HIGH RAINFALL PERIODS, THE OBSERVED MAXIMUM AND PREDICTED MAXIMUM GROUNDWATER ELEVATIONS ARE CONSIDERED THE SAME FOR THIS PROJECT.

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NORTH

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch =100 ft.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:

DATE:

NATIONAL WASTE MANAGERS

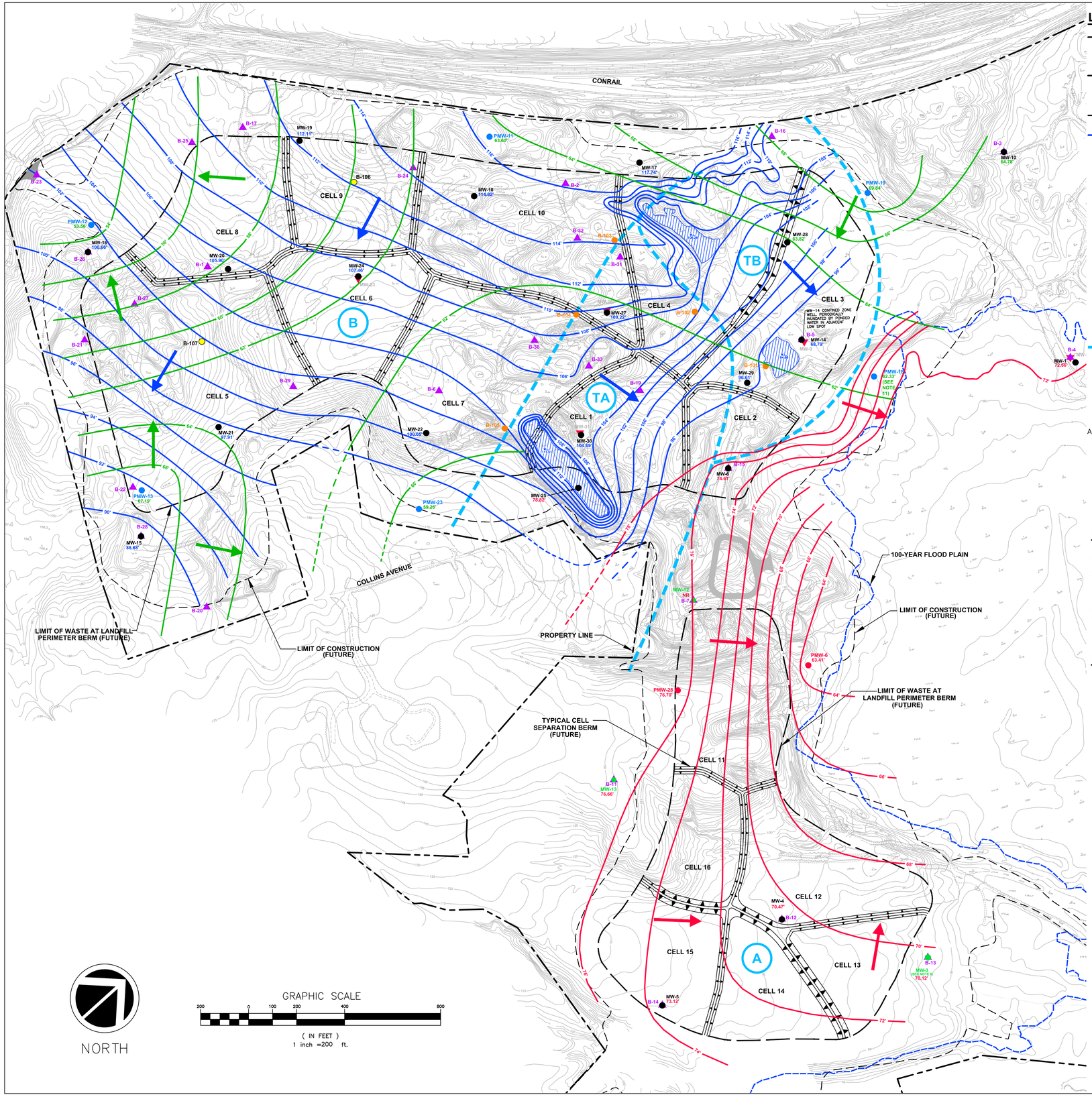
CHESAPEAKE TERRACE RUBBLE LANDFILL
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ANNE ARUNDEL COUNTY, MARYLAND

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1055 ANDREW DRIVE, SUITE A, WEST CHESTER PA, 19380
tel 610.840.9100 fax 610.840.9199 www.AdvancedGeoServices.com

HIGHEST OBSERVED/PREDICTED, DEPRESSED AND ELEVATED GROUNDWATER ELEVATION CONTOUR MAP - CONFINED ZONE AQUIFER HYDROGEOLOGIC AREA TB

REPORT CODE: A	FILE NAME: 20183854A015		
PROJECT MANAGER: VEF	SCALE: AS NOTED		
CHECKED BY: VEF	PROJECT NUMBER: 2018-3854		
DRAWN BY: EEE	DATE: 7/31/2019		

FIGURE 15



LEGEND

- PROPERTY LINE
- SITE ENTRANCE (FUTURE)
- LANDFILL LIMITS (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
- 100-YEAR FLOOD PLAIN
- EXISTING MONITORING WELL (SEE REFERENCE 2)
- FORMER MONITORING WELLS DAMAGED BY VANDALS (NOT USEABLE) (SEE REFERENCE 2) (SEE NOTE 6)
- HISTORICAL BOREHOLES (SEE REFERENCE 3)
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- ADDITIONAL BORINGS LOCATIONS REQUESTED BY MDE (B-106 AND B-107) COMPLETED APRIL/MAY 2013
- HYDROGEOLOGIC AREA DIVIDE (SEE REFERENCE 2)
- (A) HYDROGEOLOGIC AREA (SEE REFERENCE 2)

HYDROGEOLOGIC AREAS B, TA, AND TB
- ELEVATED PERCHED GROUNDWATER ELEVATION CONTOUR LINE
- ELEVATED PERCHED GROUNDWATER FLOW DIRECTION
- ELEVATED CONFINED ZONE GROUNDWATER ELEVATION CONTOUR LINE
- ELEVATED CONFINED ZONE GROUNDWATER FLOW DIRECTION

HYDROGEOLOGIC AREA A
- ELEVATED GROUNDWATER ELEVATION CONTOUR LINE
- ELEVATED GROUNDWATER FLOW DIRECTION

REFERENCES

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NOTES

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3.) THE 100-YEAR FLOOD PLAIN LIMITS AND ASSOCIATED DEVELOPMENT PERMITTING HAS BEEN DEVELOPED BY OTHERS.

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5.) THE PROPERTY WAS PREVIOUSLY USED FOR SAND AND GRAVEL MINING ACTIVITIES. PORTIONS OF THE SITE CURRENTLY HAVE NO VEGETATION AND ARE BARREN.

6.) THE SITE IS NOT SECURE FROM TRESPASSERS. AS SUCH, SEVERAL MONITORING WELLS HAVE BEEN DAMAGED BY VANDALS.

7.) WATER LEVELS IN WELLS MW-2, MW-7, MW-8, MW-9, MW-11, MW-23, MW-26, AND MW-31 WERE NOT OBTAINED DURING FIELD ACTIVITIES BY GOLDER ASSOCIATES IN 2013/2014 AND ADVANCED GEOSERVICES IN 2018/2019 AS THE WELLS COULD NOT BE LOCATED.

8.) DURING A NOVEMBER 29, 2018 SITE VISIT BY ADVANCED GEOSERVICES, WATER LEVELS IN WELL MW-3 WERE NOT OBTAINED BECAUSE THE WELL RISER HAS BEEN REMOVED FROM THE GROUND, A MINIMUM OF 12" BELOW GRADE, BASED ON STAINING OF THE RISER FOUND LAYING ON THE GROUND WITHIN 10 FEET OF THE HISTORICALLY MAPPED LOCATION.

9.) GROUNDWATER CONTOUR LINES OUTSIDE OF THE CHESAPEAKE TERRACE RUBBLE LANDFILL PROPERTY LINE ARE SHOWN AS DASHED LINES AND ARE SHOWN FOR REFERENCE PURPOSES ONLY.

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VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:

DATE:

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
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COMPOSITE GROUNDWATER ELEVATION CONTOUR MAP FOR MAY 28, 2014

REPORT CODE: A		FILE NAME: 20183854A016	
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018-3854
DRAWN BY:	EEE	DATE:	7/31/2019

FIGURE 16

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A010 - Water Levels.dwg, 8/2/2019 8:36:11 AM, DWG To PDF.pc3

LEGEND

- PROPERTY LINE
- SITE ENTRANCE (FUTURE)
- LANDFILL LIMITS (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
- 100-YEAR FLOOD PLAIN
- EXISTING MONITORING WELL (SEE REFERENCE 2)
- FORMER MONITORING WELLS DAMAGED BY VANDALS (NOT USEABLE) (SEE REFERENCE 2) (SEE NOTE 6)
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- HYDROGEOLOGIC AREA DIVIDE (SEE REFERENCE 2)
- A — HYDROGEOLOGIC AREA (SEE REFERENCE 2)

HYDROGEOLOGIC AREAS B, TA, AND TB
- HIGHEST OBSERVED/PREDICTED PERCHED GROUNDWATER ELEVATION CONTOUR LINE
- HIGHEST OBSERVED/PREDICTED PERCHED GROUNDWATER SURFACE FLOW DIRECTION
- CONFINED ZONE HIGHEST OBSERVED/PREDICTED GROUNDWATER ELEVATION CONTOUR LINE
- CONFINED ZONE HIGHEST OBSERVED/PREDICTED GROUNDWATER SURFACE FLOW DIRECTION

HYDROGEOLOGIC AREA A
- HIGHEST OBSERVED/PREDICTED GROUNDWATER ELEVATION CONTOUR LINE
- HIGHEST OBSERVED/PREDICTED GROUNDWATER SURFACE FLOW DIRECTION

REFERENCES

1.) BASEMAP SHOWN, INCLUDING TOPOGRAPHICAL INFORMATION, IS FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

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NORTH

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch =200 ft.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:

DATE:

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

ADVANCED GeoServices
a Montrose Environmental Group company
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HIGHEST OBSERVED/PREDICTED COMPOSITE GROUNDWATER ELEVATION CONTOUR MAP

REPORT CODE: A	FILE NAME: 20183854A017
PROJECT MANAGER: VEF	SCALE: AS NOTED
CHECKED BY: VEF	PROJECT NUMBER: 2018-3854
DRAWN BY: EEE	DATE: 7/31/2019

FIGURE 17

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A010 - Water Levels.dwg, 8/2/2019 9:24:11 AM, DWG To PDF.pc3

LEGEND

- PROPERTY LINE
- SITE ENTRANCE (FUTURE)
- LANDFILL LIMITS (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
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- ADDITIONAL BORINGS LOCATIONS REQUESTED BY MDE (B-106 AND B-107) COMPLETED APRIL/MAY 2013
- HYDROGEOLOGIC AREA DIVIDE (SEE REFERENCE 2)
- (A) HYDROGEOLOGIC AREA (SEE REFERENCE 2)

HYDROGEOLOGIC AREAS B, TA, AND TB
- DEPRESSED PERCHED GROUNDWATER ELEVATION CONTOUR LINE
- DEPRESSED PERCHED GROUNDWATER SURFACE FLOW DIRECTION
- DEPRESSED CONFINED ZONE GROUNDWATER ELEVATION CONTOUR LINE
- DEPRESSED CONFINED ZONE GROUNDWATER SURFACE FLOW DIRECTION

HYDROGEOLOGIC AREA A
- DEPRESSED GROUNDWATER ELEVATION CONTOUR LINE
- DEPRESSED GROUNDWATER SURFACE FLOW DIRECTION

REFERENCES

1.) BASEMAP SHOWN, INCLUDING TOPOGRAPHICAL INFORMATION, IS FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

2.) HYDROGEOLOGIC AREAS AND MONITORING WELL LOCATIONS DIGITIZED FROM HARD COPY OF DRAWING ENTITLED "PERMANENT GROUNDWATER MONITORING WELL PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED MAY 2008.

3.) ADDITIONAL HISTORICAL BORING LOCATIONS FROM HARD COPY OF DRAWING ENTITLED "PLATE 2, CHESAPEAKE RUBBLE LANDFILL HYDROGEOLOGIC BASE MAP," DATED NOVEMBER 2003, CREATED BY MARK SCHULTZ ASSOCIATES, ANNAPOLIS, MARYLAND.

NOTES

1.) THE FUTURE RUBBLE LANDFILL DEVELOPMENT FEATURES ARE INCLUDED TO SHOW LOCATION OF THE BORINGS AND MONITORING WELLS RELATIVE TO THE PROPOSED DEVELOPMENT. THE ACTUAL LIMITS OF FUTURE DEVELOPMENT MAY BE ADJUSTED AS PART OF THE DETAILED ENGINEERING DESIGN TO BE INCLUDED IN THE PHASE III PERMIT APPLICATION; WHICH IS CURRENTLY UNDERGOING REVISION.

2.) HYDROLOGIC AREAS AND THEIR MAPPING IS BASED ON FORMATIONS MAPPED IN FIELD BOREHOLES, SURFACE OBSERVATION, HISTORICAL AERIAL PHOTOGRAPHS, AND REGIONAL GEOLOGIC MAPS.

3.) THE 100-YEAR FLOOD PLAIN LIMITS AND ASSOCIATED DEVELOPMENT PERMITTING HAS BEEN DEVELOPED BY OTHERS.

4.)THE CONRAIL TRACKS ARE ALSO SHARED WITH AMTRAK FOR HIGH-SPEED COMMUTER TRAINS BETWEEN BOSTON, MASSACHUSETTS AND WASHINGTON, D.C.

5.) THE PROPERTY WAS PREVIOUSLY USED FOR SAND AND GRAVEL MINING ACTIVITIES. PORTIONS OF THE SITE CURRENTLY HAVE NO VEGETATION AND ARE BARREN.

6.) THE SITE IS NOT SECURE FROM TRESPASSERS. AS SUCH, SEVERAL MONITORING WELLS HAVE BEEN DAMAGED BY VANDALS.

7.) WATER LEVELS IN WELLS MW-2, MW-7, MW-8, MW-9, MW-11, MW-23, MW-26, AND MW-31 WERE NOT OBTAINED DURING FIELD ACTIVITIES BY GOLDER ASSOCIATES IN 2013/2014 AND ADVANCED GEOSERVICES IN 2018/2019 AS THE WELLS COULD NOT BE LOCATED.

8.) DURING A NOVEMBER 29, 2018 SITE VISIT BY ADVANCED GEOSERVICES, WATER LEVELS IN WELL MW-3 WERE NOT OBTAINED BECAUSE THE WELL RISER HAS BEEN REMOVED FROM THE GROUND, A MINIMUM OF 12" BELOW GRADE, BASED ON STAINING OF THE RISER FOUND LAYING ON THE GROUND WITHIN 10 FEET OF THE HISTORICALLY MAPPED LOCATION.

9.) GROUNDWATER CONTOUR LINES OUTSIDE OF THE CHESAPEAKE TERRACE RUBBLE LANDFILL PROPERTY LINE ARE SHOWN AS DASHED LINES AND ARE SHOWN FOR REFERENCE PURPOSES ONLY.

10.) SINCE FIELD WATER LEVEL READINGS WERE TAKEN DURING HISTORICALLY WET YEARS, INCLUDING RECORD-BREAKING HIGH RAINFALL PERIODS, THE OBSERVED MAXIMUM AND PREDICTED MAXIMUM GROUNDWATER ELEVATIONS ARE CONSIDERED THE SAME FOR THIS PROJECT.

NORTH

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch =200 ft.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:

DATE:

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

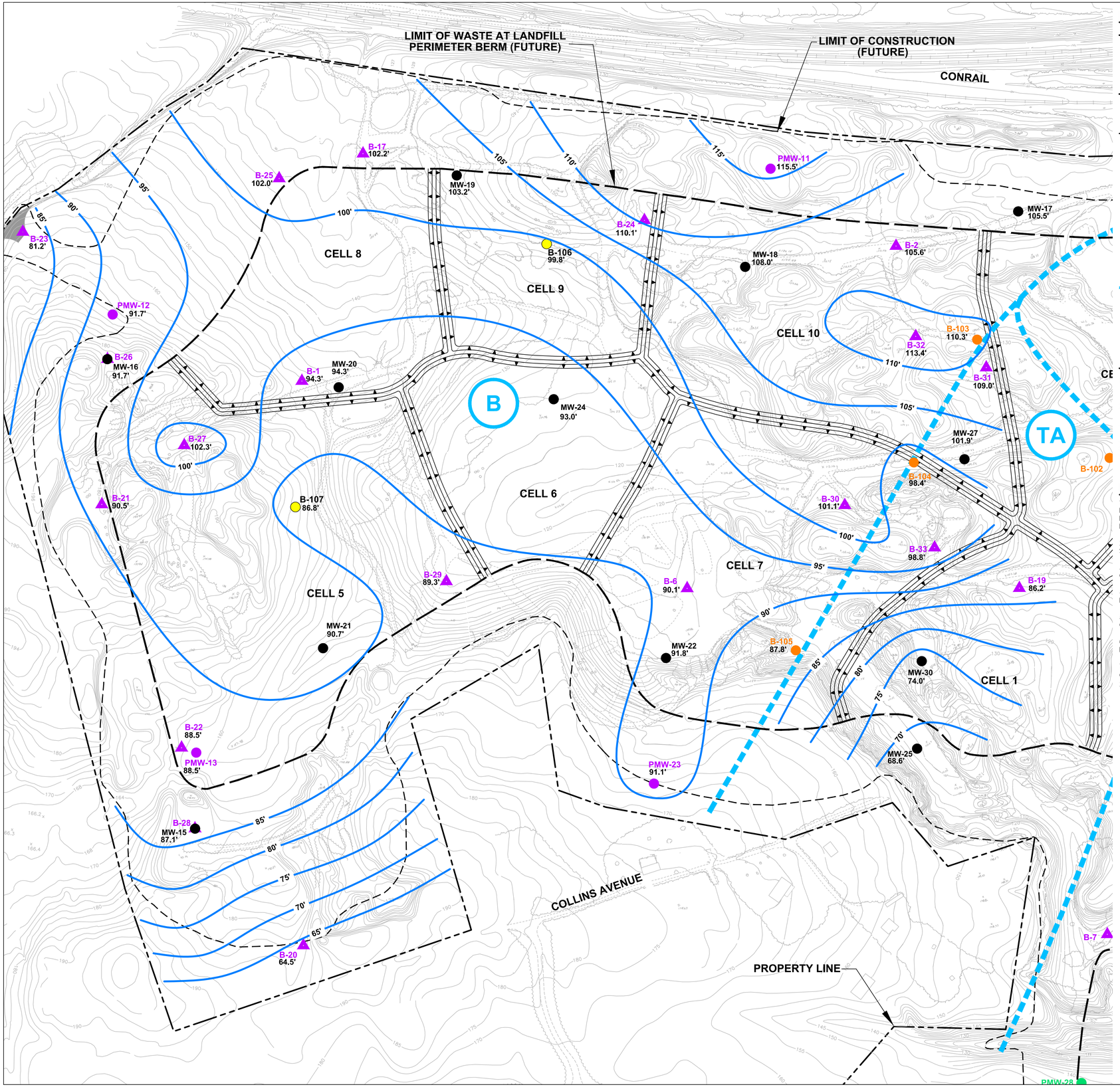
ADVANCED GeoServices
a Montrose Environmental Group company
1055 ANDREW DRIVE, SUITE A, WEST CHESTER, PA. 19380
tel 610.840.9100 fax 610.840.9199 www.advgeo.com

DEPRESSED COMPOSITE GROUNDWATER ELEVATION CONTOUR MAP

REPORT CODE: A	FILE NAME: 20183854A018		
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018-3854
DRAWN BY:	EEE	DATE:	7/31/2019

FIGURE 18

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A010 - Water Levels.dwg, 8/2/2019 8:24:22 AM, DWG To PDF.pc3



LEGEND

- PROPERTY LINE
- LANDFILL PERIMETER ACCESS ROAD (FUTURE)
- SITE ENTRANCE (FUTURE)
- LANDFILL LIMITS (FUTURE)
- LANDFILL CELL SEPARATION BERM (FUTURE)
- LIMIT OF DISTURBANCE (FUTURE)
- EXISTING GROUNDWATER MONITORING WELL (SEE REFERENCE 2)
- HISTORICAL BOREHOLES (SEE REFERENCE 3)
- EXISTING PERIMETER GROUNDWATER MONITORING WELL (SCREENED BELOW CLAY CONFINING UNIT) (SEE REFERENCE 2)
- EXISTING PERIMETER GROUNDWWATER MONITORING WELL (SCREENED ABOVE CLAY CONFINING UNIT) (SEE REFERENCE 2)
- BORING LOCATIONS ALONG TA/B/TB TRANSITION (B-101 TO B-105) COMPLETED APRIL/MAY 2013
- ADDITIONAL BORINGS LOCATIONS REQUESTED BY MDE (B-106 AND B-107) COMPLETED APRIL/MAY 2013
- HYDROGEOLOGIC AREA DIVIDE (SEE REFERENCE 2)
- A — HYDROGEOLOGIC AREA (SEE REFERENCE 2)
- 110' — TOP OF CLAY ELEVATION CONTOUR LINE

REFERENCES

1.) BASEMAP SHOWN, INCLUDING TOPOGRAPHICAL INFORMATION, IS FROM DIGITAL FILE (2 OF 68) SITE PLAN.DWG, ENTITLED "SITE PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED APRIL 12, 2010.

2.) HYDROGEOLOGIC AREAS AND MONITORING WELL LOCATIONS DIGITIZED FROM HARD COPY OF DRAWING ENTITLED "PERMANENT GROUNDWATER MONITORING WELL PLAN," PREPARED BY CENTURY ENGINEERING, INC., DATED MAY 2008.

3.) ADDITIONAL HISTORICAL BORING LOCATIONS FROM HARD COPY OF DRAWING ENTITLED "PLATE 2, CHESAPEAKE RUBBLE LANDFILL HYDROGEOLOGIC BASE MAP," DATED NOVEMBER 2003, CREATED BY MARK SCHULTZ ASSOCIATES, ANNAPOLIS, MARYLAND.

NOTES

1.) THE FUTURE RUBBLE LANDFILL DEVELOPMENT FEATURES ARE INCLUDED TO SHOW LOCATION OF THE BORINGS AND MONITORING WELLS RELATIVE TO THE PROPOSED DEVELOPMENT. THE ACTUAL LIMITS OF FUTURE DEVELOPMENT MAY BE ADJUSTED AS PART OF THE DETAILED ENGINEERING DESIGN TO BE INCLUDED IN THE PHASE III PERMIT APPLICATION; WHICH IS CURRENTLY UNDERGOING REVISION.

2.) HYDROLOGIC AREAS AND THEIR MAPPING IS BASED ON FORMATIONS MAPPED IN FIELD BOREHOLES, SURFACE OBSERVATION, HISTORICAL AERIAL PHOTOGRAPHS, AND REGIONAL GEOLOGIC MAPS.

3.) THE 100-YEAR FLOODPLAIN LIMITS AND ASSOCIATED DEVELOPMENT PERMITTING HAS BEEN DEVELOPED BY OTHERS.

4.)THE CONRAIL TRACKS ARE ALSO SHARED WITH AMTRAK FOR HIGH-SPEED COMMUTER TRAINS BETWEEN BOSTON, MASSACHUSETTS AND WASHINGTON, D.C.

5.) THE PROPERTY WAS PREVIOUSLY USED FOR SAND AND GRAVEL MINING ACTIVITIES. PORTIONS OF THE SITE CURRENTLY HAVE NO VEGETATION AND ARE BARREN.

6.) THE SITE IS NOT SECURE FROM TRESPASSERS. AS SUCH, SEVERAL MONITORING WELLS HAVE BEEN DAMAGED BY VANDALS.

7.) WATER LEVELS IN WELLS MW-2, MW-7, MW-8, MW-9, MW-11, MW-23, MW-26, AND MW-31 WERE NOT OBTAINED DURING FIELD ACTIVITIES BY GOLDER ASSOCIATES IN 2013/2014 AND ADVANCED GEOSERVICES IN 2018/2019 AS THE WELLS COULD NOT BE LOCATED.

NORTH

GRAPHIC SCALE

120 0 60 120 240 480

(IN FEET)
1 inch =120 ft.

VERONICA E. FOSTER
LICENSED PROFESSIONAL ENGINEER
MD # 35645

REVISION:

DATE:

NATIONAL WASTE MANAGERS

CHESAPEAKE TERRACE RUBBLE LANDFILL
PATUXENT ROAD, ODENTON
ANNE ARUNDEL COUNTY, MARYLAND

ADVANCED GeoServices
a Monroe Environmental Group company
1055 ANDREW DRIVE, SUITE A, WEST CHESTER PA, 19380
tel: 610.840.9100 fax: 610.840.9101 http://www.advancedgeoservices.com

TOP OF CLAY CONFINING LAYER
ELEVATION CONTOUR MAP
HYDROGEOLOGIC AREA B

REPORT CODE: A		FILE NAME: 20183854A019	
PROJECT MANAGER:	VEF	SCALE:	AS NOTED
CHECKED BY:	VEF	PROJECT NUMBER:	2018-3854
DRAWN BY:	EEE	DATE:	7/31/2019

FIGURE 19

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD\DWG\RC A_Phase II Application\20183854A019 - Top of Clay.dwg, 8/2/2019 12:48:21 PM, DWG To PDF.pc3

APPENDIX A

Resumes of Geologist and Engineer

PAUL G. STRATMAN
Consultant

Fields of Expertise
Environmental Engineering, Geotechnical Engineering, and Civil Engineering.

Education
Graduate Studies – Environmental Engineering: Drexel University; 1991
Bachelor of Science - Civil Engineering; Drexel University, 1990
Bachelor of Science - Geology; Bloomsburg University; 1984

Professional Registrations
Professional Engineer: AL, AZ, CA, DE, FL, GA, IA, IN, KS, LA, MD, MI, MO, MT, NC, NJ, OH, PA, TN, UT, VT & WV
Professional Geologist: DE, FL, IN, KS, MO, NC and PA
Registered Site Manager for NC

Present Duties & Responsibilities and Experience Summary
Mr. Stratman is Vice President of Environmental Operation for Advanced GeoServices and a Senior Project Consultant. As Vice President of Operations he is responsible for quality assurance, contracting, professional development, and risk management for six project managers engaged in Environmental Engineering, Geology, Wastewater Treatment and Ecological Services. As Consultant, Mr. Stratman is the Advanced GeoServices Client Relationship Manager/Project Manager to a wide range of large and small clients responsible for client interaction, task assignments, quality control, budgets, scheduling, subcontracting, invoicing and report writing. Mr. Stratman has been involved in the environmental consulting industry since 1984 and has extensive experience in Environmental, Geotechnical and Civil Engineering. Mr. Stratman's experience in the environmental field includes the siting, design, construction and closure of municipal, residual and hazardous waste landfills and surface impoundments; permitting and design of hazardous waste facilities; preparing and implementing environmental and geotechnical investigations; design and implementation of plans for stabilizing and remediating contaminated sites; facility closure and decommissioning; and installation and testing of geosynthetic materials. In addition to his technical experience, Mr. Stratman has also served as chairman for a community advisory panel, testified at public hearings, negotiated with regulators and consulted to Financial Advisors and Institutions.

Landfill and Surface Impoundment Project Experience

Waste Disposal Facilities. *Project Engineer and Project Manager.* Managed all activities pertaining to Municipal Residential and Industrial Waste Disposal Facilities in Pennsylvania, New Jersey, Delaware, Michigan, and Mexico.

Closure of Hazardous Waste Surface Impoundments. *Project Engineer.* Prepared design drawings and specifications for the stabilization and closure of two 5-million gallon hazardous waste surface impoundments. Designs required a composite geomembrane and soil cap system. Also performed QA/QC services required during construction for geosynthetics and plate load testing.

Waste Disposal Impoundments. *Project Engineer and Project Manager.* Designed and permitted two waste disposal impoundments in accordance with RCRA design standards for a dye stuffs manufacturer in central Pennsylvania. The impoundments covered 3.5 and 6.0 acres and were double lined with leachate detection and alarm systems. Construction specifications and quality assurance plans were also prepared as part of the projects. Provided technical QA support during construction.

Waste Landfill Design. *Staff Engineer.* Prepared design drawings, construction specifications, quality assurance plans and sequential development plans for a 130-acre construction waste landfill incorporating a clay liner, leachate collection system, and geosynthetic cap.

Hazardous Waste Landfill in Mexico. *Lead Designer.* Assisted with the siting and design efforts for a privately funded double lined hazardous waste landfill in Mexico that required the preparation of construction drawings and operation plans in Spanish and English.

Closure and Remediation of Surface Impoundments. *Staff Engineer.* Prepared construction drawings, specifications and CQA documents required for remediation and on-site closure of four surface impoundments containing 600,000 cubic yards of electroplating sludges (F006). The project included designing a leachate collection system to be constructed within the in-place sludges, wave protection along tidal areas of Lake Erie, slurry walls and a geocomposite cover system.

Design of Solar Panel Support System on Landfill Cover. *Senior Project Consultant.* Prepared design for 500 Kw solar panel center on a landfill cap at a Superfund Site in USEPA Region 3. Design included Engineering Design Drawings, Specification and Erosion and Sediment Control Plan for integrating panel foundations with landfill cover system. Design was reviewed and approved by the USEPA and Pennsylvania Department of Environmental Protection.

Remedial Design/Remedial Action Project Experience

Former Refinery Cleanup/Closure, Southcentral New York. *Project Manager.* Prepare the remedial design documents for a Superfund Site in Wellsville, New York. The project is a former oil refinery site situated along the Genesee River. The design included sediment excavation in the Genesee River, over a half a mile of funnel and gate treatment wall (soil bentonite/slurry and sheet pile walls), groundwater recovery system and Treatment Wetland System. Major project components include surface water diversion around areas of river excavation/dredging, surface water quality and turbidity management, excavation de-watering and restoration of wetland and riparian habitat.

RCRA Corrective Measures, Tampa, Florida. *Senior Project Consultant.* Retained during the remedial design process to review the preliminary design at a former Interim Status RCRA facility. Advanced GeoServices identified changes that were estimated to reduce implementation costs by $10 million based on contractor estimates. AGC assumed the remedial design role and revised/completed the design of the consolidation of approximately 250,000 cy of material, construction of a 3,000 foot slurry wall and in-situ groundwater treatment section for inorganics, and a RCRA cap system. A significant portion of the site consists of wetland areas that include high quality, tidally influenced salt marsh and mangrove areas. An estimated 15,000 cy of sediments will be excavated/dredged from the wetland areas.

Industrial Superfund Facility in Nesquehoning, Pennsylvania. *Assistant Project Manager and Lead Design Engineer.* Mr. Stratman was responsible for preparing and implementing a supplemental design investigation and remedial design to remediate areas within and surrounding a former secondary lead smelter. Critical design components included decontamination and demolition of the facility, consolidation and capping of a non-site landfill and remediation of soil and sediment. prepared design documents for a passive groundwater in-situ treatment wall for inorganics.

Stream Capping and Reconstruction Removal Action. *Senior Project Consultant.* Responsible for the design and construction quality assurance required for a stream liner system (geosynthetics, geomembranes and structural elements) at a former solvent recycling facility in northern Maryland. The project involved interaction and negotiation with United States Environmental Protection Agency, Department of Interior, Watershed Trusties, State and Local Agencies. The project required evaluation and interpretation of significant amounts of structural and hydrogeologic information in conjunction with hydrologic and hydraulic conditions which

resulted in a unique "one of a kind" design. The design utilized regulatory and technical guidance developed for a wide range of applications (such as dam safety, hydraulic modeling, sedimentology and contaminant fate and transport) to substantiate the unique application and gain regulatory and public acceptance. The $6 million design was built in 1998 and 1999 and has been successfully operated ever since. The success of the project is also a testimony to the importance of cooperation and communication between private, public and regulatory interests.

RFI Work Plan Preparation and Investigation. *Project Manager.* Prepared and implemented a RCRA facility investigation work plans for hazardous waste facilities in Pennsylvania, California, Indiana, Tennessee, Louisiana, Michigan, and Florida. Investigation activities included file reviews, soil sampling, sediment sampling, dust sampling, soil vapor sampling, soil gas sampling, monitoring well installation, groundwater sampling and data interpretation.

Stormwater Management System Design. *Project Manager.* Designed stormwater management system at a large chemical manufacturing plant in southeastern Pennsylvania capable of collecting and holding first flush stormwater runoff and allowing subsequent runoff to discharge through NPDES outfall. Design incorporated conventional hydraulic and hydrologic design procedures with an automated pumping system.

Remediation of PCB-Contaminated Soil. *Project Manager.* Developed design drawings and specifications for the remediation of over 10,000 tons of PCB-contaminated soil at an active chemical manufacturing facility in New Jersey. Project also included the design and construction of several above ground tank containment structures, a 5,000 square foot press pad and an extensive FRP piping system for product and wastewater. Provided full-time construction management services over three primary contractors and coordinated work to minimize disruption to plant activities.

Smelter Site Remedial Action. *Project Manager.* Provided resident engineering and construction quality assurance services for the demolition and remediation of a secondary lead smelter site in Alabama. Project included the excavation and stabilization of over 200,000 tons of lead contaminated soil, slag and battery casings; remediation of a residential property; and the decontamination and demolition of former smelter buildings.

Geophysical Investigations. Mr. Stratman utilized refraction and reflection seismic techniques to map subsurface conditions in karst topography in southeastern Pennsylvania as part of geotechnical investigations. Results of the survey were utilized to establish soil rock interface, identify solution cavities and supplement other subsurface investigation techniques. He was the primary field investigator during the mapping of a buried valley in Luzerne County Pennsylvania. The buried valley, observed in the present day Wapwallopen Creek valley represents a pre-glacial feature that was filled with Woodfordian Age Olean Drift of the late Wisconsian glacial period. Mr. Stratman has also utilized electromagnetic, resistivity and downhole video logging information to evaluate subsurface geologic conditions.

Rail Yard Superfund Site - *Project Manager.* For a $15 million PCB contaminated soil Remedial Design and Remedial Action Project at a former rail yard in Southeastern Pennsylvania. During the initial design efforts, Advanced GeoServices functioned as a subconsultant to larger consulting firm. Eventually, the PRPs (which included SEPTA and Amtrak) retained Advanced GeoServices directly to complete the design, interface with federal and state agencies, and manage several million dollars of specialty contractors and services. Mr. Stratman was remained the Project Manager throughout the Remedial Action and remains in charge of the long term operation and maintenance of the site.

Publications

"Cooperation Breeds Innovation," by W.K. Richardson and P.G. Stratman. Presented at the 16th Annual International Conference on Contaminated Soils, Sediments and Water Conference. Amherst, MA. September 2000.

"Development of a CERCLA Multimedia Containment Remedy Within an Active Stream Channel," by P.G. Stratman and W.K. Richardson. Presented at the 16th Annual International Conference on Contaminated Soils, Sediments and Water Conference. Amherst, MA. September 2000.

Continuing Education

- 8-Hour OSHA Refresher, 2018
- National Safety Council Emergency Care Adult CPR Course, 2011
- Ecological Risk Assessment: Practice and Protocols Seminar through Rutgers University, 2008
- Current Issues in Stormwater and Wetlands Regulations in Pennsylvania, 2006
- Developing and Implementing an ISO 14001 EMS, Philadelphia, PA 1996
- Risk Communication Workshop, Chemical Manufacturers Association, Atlanta, GA 1995
- Geotextile Design Seminar, Philadelphia, PA 1995
- Health Risk Assessment Workshop, Boston, MA, 1995
- GRI Seminar, Geosynthetics in Filtration, Drainage, and Erosion Control, Drexel University, 1991
- Landfill Design Seminar, University of Wisconsin, 1990
- GRI Seminar, Landfill Closure, Drexel University, 1990
- Hazardous Waste Site Manager/Supervisor, 1989
- 40-Hour OSHA Health & Safety Training, October 1987
- Nuclear Density Gauge Training, February 1985
- Computational Methods in Stormwater Management, Pennsylvania State University

VERONICA E. FOSTER
Senior Project Consultant

Fields of Expertise
Soils and Groundwater Field Investigations; Surface Water Management Design and Permitting (including Best Management Practices); Soil Erosion and Sediment Control; NPDES Permitting, Sampling and Reporting; State Environmental Permitting; Brownfield and Landfill Remediation; Construction Documents Preparation; Construction Bid; Construction Certifying Engineer; Municipal Solid Waste (MSW), Construction Demolition & Debris, Coal Combustion Residuals, and Incinerator MSW Landfill Design, Permitting and Construction; Local Zoning and Site Development Permitting; Emergency Response Planning/Spill Prevention Containment and Countermeasures (SPCC) Plan/Stormwater Pollution Prevention Plan (SWPPP)/Preparedness Prevention Contingency (PPC) Plan/Integrated Contingency Plan (ICP)

Education
Bachelor of Science - Civil Engineering; Drexel University, 1990

Professional Registrations
Professional Engineer: DE, MD, NJ, PA

Present Duties & Responsibilities and Experience Summary
Ms. Foster has over 30 years of experience in managing and executing civil and environmental engineering projects. She has experience with solid waste management, environmental compliance, aggregate surface mining, oil & gas well pad development, environmental restoration, traditional civil engineering, and state and local permitting for those projects. Her engineering includes the planning, grading and phasing, stormwater management systems, environmental remediation systems, field investigations, and post-construction management and maintenance systems in MD, NJ, DE, PA, NY, MA, MI, GA, FL, and VA. She performs as Project Manager for numerous projects by coordinating staffing resources with budget restrictions, providing technical oversight to the design team as well as technical oversight for multi-disciplinary projects, and performing as the primary contact with clients. She also serves as Peer Reviewer for a range of environmental compliance and monitoring projects, as well as field investigation projects.

Project Experience – Coal Ash/Incinerated MSW Management

NRG Energy, Indian River Generating Station, Millsboro, Delaware: Peer reviewer for design of conceptual coal ash monofill landfill and vertical expansion, including grading and surface water design system. Design engineer for detailed engineering design of system. Engineer-of-Record for the preparation of Sediment and Stormwater Management Plans for the Phase I and Phase II Landfills. Preparation of construction documents for the construction of Cells 1 and 2 and capping of the old, unlined Phase I Landfill. Project Manager and Certifying Engineer for the construction quality assurance of Cell 1. The Cell 1 construction effort included placement of 180,000 cubic yards of subbase fill, geosynthetics installation (geosynthetic clay layer, geomembrane, and geocomposite drainage layer), 12-inches of sand for leachate collection layer, and 4-foot thick protective cover layer using flyash. Additionally, Cell 1 being the first cell constructed for the newly-permitted lined expansion, the infrastructure items that were constructed two 150,000 gallon leachate storage tanks with secondary containment, the leachate conveyance dual-contained forcemain, related cleanout and valve vaults, and stormwater controls. Provided construction documentation report to regulators for review and approval within two weeks of the Cell 1 construction achieving substantial completion. This project was awarded to 2010 Project Excellence Award by the State of Delaware Office of Management and Budget in conjunction with the Delaware Contractors Association.

Performed as the Lead Engineer and Engineer-of–Record for the design, permitting and construction of the 40-acre cap over the old, unlined landfill, in which filling began in 1979.

Further, performed as the Lead Engineer and Engineer-of –Record for landfill Permit Renewal Application in 2011.

Coming off the successful construction of Cell 1 and the Phase I Closure cap, Ms. Foster was retained as the Engineer-of-Record supporting the construction of Cell 2. Again, this effort included the preparation of bidding documents, leading the pre-bid meeting with contractors, issuance of addenda, evaluating contractor bids, and interviewing the prospective

contractors. While under construction, performed construction quality assurance official and Engineer-of-Record for the sole-sourced construction of Cell 2.

Hartford Landfill Phase I Landfill Construction in Hartford, CT. *Project Manager, Certifying Engineer of Record, and Engineer-of-Record.* Oversaw the design of an 18-acre geosynthetic double-lined area to receive incinerator ash. The layout of the area was restricted to the west and north by delineated wetlands, to the east by an USACOE dike, and to the south by the existing landfill. In order to maximize available airspace, reviewed historical groundwater levels and prepared five conceptual landfill designs from which the client selected their preferred choice, including minimizing the distance between the liner system and high groundwater levels while still complying with regulatory requirements, maximizing slope inclination of the perimeter berms, and minimizing backfill volumes. Additionally, a portion of the Phase I Area overlapped the existing unlined facility and the USACOE dike. This overlapping required extensive slope stability analyses to demonstrate no adverse impacts upon the existing landfill and the USACOE dike from the Phase I activities. Also performed additional analyses in support of removing, or lifting, fill placement restrictions previously imposed for activities near the USACOE dike. These analyses were submitted with a detailed explanatory narrative to the USACOE and was approved within 30 days of submission. In addition to the landfill layout and grading, designed leachate collection and conveyance systems; leachate storage systems; leachate pre-treatment systems; stormwater collection, conveyance and management; permanent erosion control measures; wheel wash building and system; leachate secondary containment systems; permanent and temporary access roads; and electrical and controls connections and tie-ins. Compiled construction-level design drawings and technical specification for the Phase I Landfill, as well as operations and maintenance drawings and specifications. Project Manager and Engineer-of-Record for on-site, full-time construction quality assurance services as well as ongoing design support (including review of contractor submittals) during the construction of the Phase I Landfill from May to December of 1997. The liner system certification report for submittal to the CTDEP was provided to the client on November 17, 1997. Upon completion of the placement of the leachate collection layer and other appurtenances (drainage ditches, seeding, sedimentation basin, etc.), a certification letter for these items was provided. The liner certification report was required by the client to allow CTDEP time to review/approve the report such that filling of the Phase 1 Landfill could begin in January 1998. Served as the Certifying Engineer of Record for the design and CQA efforts.

Shelton Landfill Horizontal Expansion in Shelton, CT. *Project Manager and Engineer-of-Record.* Supervised the design of a 3-acre geosynthetic double-lined horizontal expansion to receive incinerator ash. The layout of this expansion included a portion piggy-backing over the existing unlined facility. This overlapping presented unique stability and settlement concerns which were addressed by the installation of reinforcing geogrid along the interface between the top of the existing refuse and the liner system for the expansion. Other aspects of the design included stormwater management, erosion and sediment control structures and ponds, and a leachate collection and conveyance system. As part of this effort, technical specifications and bidding documents corresponding to the design were developed. Compiled operations and maintenance drawings and technical specifications to assist the Operations contractor with the closure of the expansion. Provided review of Contractor submittals for geosynthetics, soils, leachate collection pipe, stormwater structures, and erosion control measures. Project Manager for the design engineer and quality assurance services provided during construction of the expansion. Upon completion of the construction, a report certifying the liner system was installed as designed was prepared for submission to the CTDEP. Due to available airspace limitations, during the construction of the Northeast Ash Area Expansion liner system, evaluated whether the final cover slope inclination could be increased from 3 horizontal to 1 vertical (3H:1V) to 2H:1V for the Northeast Ash Area Expansion and the Southeast Ash Area Expansion (designed by others and under operations). In order to determine this possibility, performed extensive slope stability (static and psuedo-static) and liquefaction analyses. The slope stability analyses indicated that benches, or terraces, were required to maintain the stability of the cover system. After determining that the inclination increase would remain stable under static and psuedo-static loading conditions, revised grading plans, fill sequence drawings, sections, and details were prepared. The stormwater and leachate management systems were reevaluated for the changed inclination. All supporting drawings and calculations were provided to the client, who added his financial data related to this change, and submitted the package to the CTDEP for a major permit modification. In June 1998, the CTDEP approved this modification. Served as Project Manager, overseeing field personnel, and Engineer of Record for the closure of the Northeast and Southeast Ash Area Expansions from April 1999 to May 2000. Provided engineering to field construction quality assurance personnel to adjust the original design due to field conditions encountered by the contractor. Due to the Contractor's scheduling and supply problems, the construction was not complete within the contracted time, and fines were imposed by the CTDEP. By contract, these fines were passed on to the contractor. Provided project history summaries from daily reports, meeting minutes and other information in project files, which contradict contractor claims.

Shelton Landfill MSW Closure in Shelton, CT. *Certifying Engineer of Record.* The old municipal solid waste landfill (which was used as an interim ash disposal area until the construction of the Southeast and Northeast Expansions) had been partially closed upon the construction of the Expansions. Performed a field investigation comprised of test pits and geotechnical soils testing to verify the presence of final cover soils, their depth, and their aerial extent. Upon completion of the field investigation, prepared a Closure Plan, using GIS to identify areas with adequate soil and vegetative cover, as well as outlining proposed remedies for areas requiring construction activity. This Closure Plan was approved without comment by the CTDEP within two weeks of submission. Upon completion of construction of the proposed remedies, provided a Certification Report indicating all activities had been completed as designed. Performed as Certifying Engineer of Record for Design and CQA efforts.

Brandywine Coal Ash Landfill, MD. *Remedial Design Engineer.* Project Manager and Lead Engineer for developing a closure cap for an inactive coal ash disposal area located within the power utility transmission right-of-way with 230keV overhead transmission lines and towers. Since the facility was inactive (i.e., no longer receiving coal ash) as of October 2015, the facility was exempt from the USEPA Coal Combustion Residuals regulations finalized in April 2015. As such, the Maryland residual waste landfill closure regulations were the governing regulations for the closure cap design. The challenge for this project was the sort-term challenges of constructing a closure cap beneath the high-voltage overhead wires, while the long-term performance of the cap had to assure the finished product maintained the 25-foot separation between the sag in the overhead wires and the finished grade of the cap, to avoid “fouling” the right-of-way. There was significant investment in providing the client with an understanding of the range of capping options which complied with Maryland regulations and the costs associated with each, as well as addressing concerns regarding maintenance and protection of the overhead wires in conjunction with construction worker safety. The client opted for a state-of-the-art closure cap with the engineered geosynthetic barrier materials overlain by natural soils for their protection and establishing a natural vegetative surface. Developed an engineering design package for submission to Maryland Department of the Environment (MDE), including design narrative, design drawings and details, technical specifications which could be used during construction, and stormwater management calculations and design.

Flue Gas Desulfurization Conversion for Coal Fire Power Plants Aquasco and Newberg, Maryland. *Site Design and Erosion Control Engineer-of-Record.* White a Design/Build company had been contracted for the design and permitting of the FGD system and stacks installation and the railroad reconfiguration, the permitting and construction of other on-site, support systems was contracted separately. These items included synthetic gypsum dewatering systems, limestone storage dome, gypsum storage dome, and associated access roads and stormwater management features. Our team worked with the owner and the officials at Prince Georges and Charles Counties to obtain the local site development and erosion control permits for the proposed additional site improvements. A condition of the erosion control permit with regular inspection and review by the permit application engineer to confirm compliance with the schedule and proposed erosion control measures included in the permit application. Ms. Foster served as Engineer-of Record for these applications and ongoing inspections.

CCR Rule Compliance for Location Restrictions in PA. *Lead Engineer and Reports Author*. The new CCR Rule requires that existing, active CCR surface impoundment demonstrate compliance with locations restrictions within 36 months of the effective date of the CCR Rule (i.e., October 17, 2018). These locations restrictions are identified as groundwater, wetlands, fault damage areas, seismic impact zones, and unstable areas. Worked with the client to review published and historical site-specific data to demonstrate compliance with these restrictions. Reports were prepared and reviewed by the client well in advance of the required date of publication to the site’s operating record and the publicly available website.

CCR Compliance for Groundwater Monitoring Program in PA. *Lead Engineer and Report Author*. Part of the NEW CCR Rule was that active CCR units were required to establish a groundwater monitoring network for sampling and testing to determine whether groundwater was being impacted. The Rule has specific requirements for the amount of sampling and the constituents required to be tested. Comparison of the test data was prescribed using statistical methods to discern whether there were Statistically Significant Increase (SSI) in the measured constituents above background levels had occurred. For both CCR Units at this site, SSIs were identified. One of the units was a state-of-the-art lined landfill constructed atop an old, unlined storage impoundment (or basin). The Rule allowed the review of whether an SSI could be caused by an Alternate Source and remain in ongoing detection monitoring. For this CCR Unit, this Alternate Source Demonstration was successful; thus, allowing the groundwater monitoring program to remain the detection monitoring

mode. For the other CCR Unit on-site – a surface impoundment, an alternate source was not identified, so the next step was upgraded groundwater monitoring – an assessment monitoring program (AMP), required collecting and testing samples for additional constituents to then identify if these are detected as Statistically Significant Levels (SSLs) above Groundwater Protection Standards (GWPS). For this second CCR Unit, SSLs were detected so that the AMP will continue while Corrective Measures Assessment (CMA) is performed. This CMA is ongoing.

Project Experience – Remediation – Federal and State Programs

CERCLA Remediation, Industri-Plex Site Remediation, Woburn, Massachusetts. *Lead Stormwater Deisgn Engineer*, The Industri-Plex Site in Woburn, Massachusetts was ranked 5th on the National Priority List. The 244-acre site has been the location of numerous industrial activities since the mid-1800's and contains soils and sediments contaminated with arsenic, lead, chromium and hide residue. Task Leader for the evaluation of potential flow rates for the 25, 50 and 100 year storm events of two rivers traveling through the Site. These rivers service a 5 square mile watershed which impacted the selection of the computer model to be used. HEC-1 was selected because of its ability to evaluate confluence, bifurcation and multiple storm events. The entire task was conducted to evaluate the potential flow rates and verify that the proposed remedy would not be adversely affected by these flows.

Supervised the functional assessment of existing wetlands being impacted by the remedy. This assessment identified the properties, which required replacement as a result of the remedy. Based upon this identification, mitigation (creation and enhancement) wetlands were designed, as well as revitalization of existing wetlands. Incorporated the design of mitigation wetlands into the hydrologic analysis to evaluate their hydrologic effectiveness.

Provided field engineer services during fall of 1993 for construction of the remedy in developed areas of the site. Provided technical support for modifications to soil, streams and wetlands remedies due to field conditions during construction.

Cap Evaluation and Remedial Cap Design & Permitting, Berks Landfill Superfund Site, Sinking Spring, Pennsylvania. *Lead Engineer.* Lead engineer for ancillary repairs and maintenance during the O&M (post-2000 remedy construction) period. Lead engineer in 1998 for the field investigation of existing stormwater management features in and around the Eastern Landfill during the Pre-Design Investigation (PDI). As part of this PDI effort, identified information requirements from surveyors so that the capacity and performance of these features could be verified during the remedial design. Prepared narrative and existing conditions drawings detailing these features for inclusion in the PDI report. Prepared narrative and supporting calculations for the proposed conceptual improvements/restoration of surface water management features. Lead Engineer for the remedial design (1999) stormwater management improvement/restoration features. Commended by EPA Project Manager for quality of design and report. Performed as the lead engineer (2000) for the construction quality oversight personnel for field adjustments to design based upon field conditions encountered by the contractor. Performed final review of constructed features for Completion Acceptance.

Lead Engineer in 1997 for the preparation of the Feasibility Study demonstrating the existing site conditions were protective of human health and the environment. Provided these demonstrations though a series of engineering analyses of infiltration through the existing cap using the EPA developed method defined as HELP, stormwater run-off calculations using TR-55 (SCS developed methods), and soil loss potential of the existing cover using the Universal Soil Loss Equation. Prepared construction and operations and maintenance costs estimates.

Prepared design and provided resident engineer services in 1996 for a channel washout repair consisting of gabion lining overlaying a geotextile to protect the native soils from further erosion. Provided field engineer services in 1991 during construction of two acres of new landfill cap over areas of existing cap which had undergone significant deterioration.

Landfill Remedial Components, Elizabethtown Landfill Superfund Site, Elizabethtown, Pennsylvania. *Project Manager, Lead and Certifying Engineer.* Lead designer for the proposed cover and stormwater management system upgrades. The property owner, as well as the local community, preferred a cover system that allowed beneficial reuse of the property. Therefore, an asphalt cover system was proposed for the former site operations management area, nearest the public roadway. This cover choice resulted in an increase in stormwater runoff from this cover, and the stormwater

management system was upgraded to accommodate this increase. The stormwater management system upgrades, include the design of stormwater culverts, cable-concrete lined channels, asphalt lined channels, and an enlarged stormwater detention basin. The proposed materials were selected based upon minimizing excavation into the existing downgradient clay cover in order to build the remedy, combined with minimizing the potential erosion of the existing clay cover. Lead designer and Engineer of Record for the Soil Erosion and Sediment Control Permit Equivalency from the Lancaster County Conservation District. Task leader for the preparation of bidding documents and technical specifications for the construction of the Landfill Remedial Components (LRC). Served as Engineer of Record and Remedial Designer during the construction of the LRC and performed as project manager for the Construction Quality Assurance personnel stationed at site full-time during the construction. This effort included review all contractor submittals; responding to contractor's requests for clarification/information; performing as a liaison between the contractor and the Owner/Construction Manager; served as a liaison between the contractor and the Agency oversight personnel; reviewed all daily reports of CQA personnel; lead weekly progress meetings with Contractor, Owner, and Agencies; and provided review of contractor's applications for payments and claims. Due to the large number of team members for the project, created and administered a project specific web-page to which field daily reports, contractor submittals, Remedial Designer review of submittals, progress meeting minutes, site photos, and Remedial Designer responses to contractor's requests for clarification were posted to allow all teams members instantaneous access to project documents. Served as Engineer of Record for the preparation of a Construction Documentation Report documenting the construction effort and any field adjustments to the Agency-approved design based upon encountered field conditions. This Construction Documentation Report will be submitted to the Agencies for review and approval.

Landfill Closure Investigation and Capping, Keystone Landfill Superfund Site, Littlestown, Pennsylvania. *Lead Engineer for Capping and Stormwater Management.* Lead Engineer for the pre-design investigation (PDI) field activities, including test pits to better define limits of waste, geoprobes to define locations with reduced existing cover thickness, and site inspection for erosion or stability concerns. Prepared the report and supporting documentation (i.e. graphics, logs, charts, photos) summarizing the PDI activities. Also, prepared the Preliminary and Final Design Reports summarizing the proposed remedies for the locations, requiring repair or upgrade, which were identified in the PDI. The remedies included minor adjustments in the ROD-negotiated remedy, based upon review of newly located historical evidence regarding the site. These adjustments reduced the PRP group's capital construction costs as much as sixty percent. Also prepared Permit Equivalencies for Soil Erosion and Sediment Control from the Adams County Conservation District and a Road Opening Permit from the local Township. Aided the PRP group in re-negotiation of one aspect of the Agency-approved design to address Township concerns, ultimately reducing PRP group's capital costs and improving the often adversarial relationship between the PRP group and the Township. Task leader for the preparation of bidding documents and technical specifications for the construction of the cover and stormwater management system upgrades.

Residual Waste Disposal Area Closure, Lukens Steel (formerly Bethlehem Steel), Coatesville, Pennsylvania. *Lead and Certifying Engineer.* Performed as lead designer and Engineer of Record for the design of a cover over an existing dust monofill, containing material resulting from the steel manufacturing process over the previous 40+ years. The dust was undergoing wind and water erosion. A soil cover was design to encapsulate the pile in order to protect it from these elements. A critical aspect of the design included flattening the existing side slopes of the pile to 2 horizontal to 1 vertical (2H:1V) or flatter, compared to the existing 1H:1V slope. Based upon slope stability calculations, a soil cover system required this inclination to be stable, with 5 foot wide benches every 25 vertical feet. In order to provide a constructable design, a cover system configuration was designed to provide 10 foot wide benches (to provide adequate width for an excavator or long-reach hoe) to function as a working platform for heavy earthmoving equipment during construction, with 20 feet vertical feet between benches, such that the length measured along the slope between benches was reachable using standard construction equipment. The benches served multiple purposes after construction including providing access for inspection of the cover, performing as drainage ditched to provide positive drainage off the cover system to reduce infiltration into the dust, and to provide adequate stability of the slopes. This voluntary effort was being performed under the supervision of the Pennsylvania Department of Environmental Protection (PaDEP).

Landfill Closure Design & Permitting, Bell Landfill Superfund Site, Towanda, Pennsylvania. *Lead Grading and Stormwater Designer.* Lead engineer for the design of layout, grading, and stormwater management system during the Remedial Design for the lined and unlined fills at Bell Landfill located in a rural community. Prepared construction level drawings detailing these designs. Provided engineering support services during construction. Also developed revegetation/visual screen recommendations to provide a natural visual barrier between the roadway and the Site.

Source Control Design and Permitting, Former Gas Works Site, Bordentown, New Jersey. *Lead and Certifying Engineer.* Lead design engineer for the design and construction specification for the regrading and capping of the existing tainted soils. Special considerations included the majority of the property was within the 100 year floodplain along a creek discharging into the Delaware River. Also, the municipal storm sewer discharged within the cap limits, requiring the design of significant erosion protection measures.

Landfill Closure, Sharkey Landfill Superfund Site, Parsippany, New Jersey. *Lead Cap Grading and Stormwater Designer*. As part of the preparation of the 95% Remedial Design Report, performed as lead engineer for the layout and grading plans for cap subgrade and top of cap proposed conditions for the South, Northwest-North, Northwest-South, and Southwest Fills. Designed layout and grading plans directly in AutoCad Release 14. Performed as task leader (supervising designers), and provided technical oversight/review of the design of stormwater management channels, benches, and basins, and temporary and permanent sediment control measures (such as hay bales, silt fences, seeding type and application rates, sediment basins, and slope armoring). Prepared design narrative describing measures and method of design. Developed details outlining the design and coordinated drafting efforts. Supervised drafting/designers utilizing SoftDesk's Civil Soft computer program to perform volume calculations for cut and fill quantities corresponding to the grading plans for the Fills.

Landfill Closure Design and Permitting, KL Landfill Superfund Site, Kalamazoo, Michigan. *Lead Designer*. Lead designer and task manager for the development of a Preliminary (30%) Design Report for the site remedial design to be developed in accordance with the Record of Decision (ROD) for the site. Lead designer and task manager for the preparation of the Pre-Final (95%) Design Report (PFDR) for the ROD remedy. The ROD remedy entailed the construction of an engineered, geosynthetics cap over the 60-acre landfill area. As with the design of any cap, analyses developed in support of the design included evaluation of the geosynthetics proposed for transmissivity, impermeability, veneer stability, local subsidence, differential settlement, stormwater management, and landfill gas management. As part of the PFDR, a borrow area investigation was performed for a vacant parcel near the landfill, as a source for grading fill and cover soil materials during the construction.

Industrial Waste Consolidation and Capping, Lemon Lane Landfill, Bloomington, Indiana. *Lead Site Design and Stormwater Egnineer***.** Lead engineer for the design of stormwater management features related to the waste regrading and final cap design also developed by Golder. The site was the location of past disposal of pesticide and PCB wastes. The PCB materials were excavated and disposed off site at an approved facility. The remaining waste on site was consolidated to reduce the surface area, capped with an impermeable geosynthetic barrier overlain by 2-feet of soil cover to provide positive drainage from the cap surface and sustain vegetation. Developed minimum temporary erosion and sediment control criteria for the contractor to satisfy during construction. Provided construction support to the contractor to adjust the design to account for field conditions encountered by the contractor during construction.

Project Experience – Oil & Gas – Shale Plays

Fracking Water Impoundments, International Oil & Gas Company (Confidential), multiple locations, Western Pennsylvania. *Certifying Engineer.* Oversaw the design and construction of geosynthetic-lined, fracking water impoundments on natural gas well pads in support of Shale Gas extraction. Recommended a liner exceeded the regulatory requirements and was more protective of the environment, helping the client manage risk, with nominal increase in cost. Oversaw the installation of nearly 5MM s.f. of barrier geosynthetics at over 60 well pads in 16 months. While some states are moving away from this option, this technology is applicable to reservoirs and landfill leachate evaporation options.

Emergency Response Planning, Shale Gas Pads, Regional Gas Development Company, Western Pennsylvania and Eastern Ohio. *Project Manager & Certifying Engineer.* Developed site management plans, including Prevention Preparedness & Contingency Plans and Emergency Response Plans, for more than forty-five shale gas pads.

Closed Vent Storage Vessel Release Control Reporting, Shale Gas Pads, Regional Gas Development Company, Western Pennsylvania and Eastern Ohio. *Project Manager & Certifying Engineer.* Developed Single Line-Diagram drawings, itemizing equipment installed at shale gas pads to prevent the release of gases into the environment. Visited

each site and developed site-specific maps detailing the on-site gas processing equipment. Confirmed the operating pressures at the site, and the emergency release pressure, vs, combustion of off-gas. Provide one drawing for each site meeting the requirements of 40 CFR 60, Subpart OOOOa.

Project Experience – Drinking Water Treatment

Water Treatment System, Stockton University, Galloway, New Jersey. *Project Manager & Certifying Engineer*. Certifying Engineer for the construction fa new water supply well (Well No. 3) at the New Jersey State Stockton University. This well was installed to serve as redundancy for the two existing wells installed in the 1970s.

Supervise Licensed Operator services also being provided per NJDEP requirements, Coordinate NJDEP-required water quality testing with outside laboratory. Provide ongoing environmental compliance planning and reporting for Lead and Copper Sampling Plan, Water Quality Parameter Sampling Plan, Revised Coliform sampling Plan for Stockton University and their on-site daycare facility, Free-to-Be Daycare.

Team leader for the development of an Asset Management Plan to document the current asset conditions and estimate replacement value of existing water system assets. Assets include water treatment plant, water supply wells, storage tank, fire hydrants, water values, and water mains.

Water Treatment System, Resorts Casino & Hotel, Atlantic City, New Jersey. *Project Manager.* Supervise Licensed Operator services providing semi-monthly water quality field testing, monitoring and reporting to NJDEP. Coordinate NJDEP-required water quality testing with outside laboratory.

Water Treatment Design & Permitting, Multiple Mobile Home Parks, New Jersey. *Lead Designer and Certifying Engineer.* Evaluate the regional hydrogeology and nearby public community well water quality to evaluate value and benefits to clients installing new wells vs. adding treatment for the increasingly impacted water quality in their existing wells. Water treatment design included adding treatment to address radium and gross alpha, water hardness, acidic water, and metals removal.

Water Treatment Engineer, City of Vineland, New Jersey. *Project Manager and Certifying Engineer.* Provide ongoing environmental compliance planning and reporting for Lead and Copper Sampling Plan, Water Quality Parameter Sampling Plan, Revised Coliform Sampling Plan, Annual Master Permit Renewal, Annual Water Audit required by the Delaware River Basin Commission, and Biennial Water Conservation Plan. Engineer-of-Record for the design of a water main replacement along Route 56 (Landis Avenue) prior to NJDOT repaving of the street.

Water Treatment Engineer, City of Bridgeton, New Jersey. *Project Manager and Certifying Engineer.* Provide ongoing environmental compliance planning and reporting for Lead and Copper Sampling Plan, Water Quality Parameter Sampling Plan, Revised Coliform Sampling Plan, annual Master Permit Renewal, and Biennial Water Conservation Plan. Team leader for the development of an Asset Management Plan to document and estimate replacement value of existing water system assets, including water treatment plants, water supply wells, storage tanks, fire hydrants, water values, and water mains. Team leader for the design and permitting for a radium removal water treatment plant for Wells 14 & 15, taken off-line between 1970s and 2000s due to elevated radiologicals. Supporting the City with obtaining NJDEP-loans for the construction.

Water Treatment Engineer, City of Wildwood, New Jersey. Project Manager and Certifying Engineer. Provide environmental compliance planning and reporting for Lead and Copper Sampling Plan, Water Quality Parameter Sampling Plan, Revised Coliform Sampling Plan.

Water Treatment Engineer, City of Millville, New Jersey. Project Manager and Certifying Engineer. Provide ongoing environmental compliance planning and reporting for Lead and Copper Sampling Plan, Water Quality Parameter Sampling Plan, Revised Coliform Sampling Plan. Support ongoing reporting and prepare Request to Reduce Sampling frequency to NJDEP in light of laboratory testing showing compliance with NJDEP standards.

Certifying Engineer for Water Main replacement along Route 49 prior to NJDOT repaving of the street. Provided training to new department heads on public bidding of the project and lead mandatory pre-bid meeting with prospective contractors. Lead the effort to issue Addenda during the bidding process.

Water Treatment Design & Permitting, Waterford Elementary, Waterford, NJ. *Project Manager & Certifying Engineer*. As a result of rising radiologicals one order of magnitude above the NJDEP maximum contaminant level (MCL), and poor water quality in the existing Well No. 1, Waterford Board of Education opted to install a new well into a deeper formation, consistent with the well at another school in the district where the water quality required no treatment before use. Well No. 2 was installed and provided water that met NJDEP Primary and Secondary Drinking Water Standards, but did not produce the desired pumping rate. New water storage tanks were added to the system to provide storage during peak demand periods. During the construction, the conveyance line between the well and the water storage in the water treatment room was discovered to have holes. The following summer, the conveyance line was replaced.

Project Experience – Other Services

Site Management Plans. *Project Manager & Certifying Engineer.* Developed site management plans in support of industrial and oil & gas clients, such as PPC Plans; SPCC Plans; SWPPP; and Erosion and Sediment Control Plans. Certifying Engineer for annual compliance monitoring and reporting.

Shoreline Improvements. *Project Director and Engineer-of-Record.* Managed field investigations and conceptual design for shoreline improvements along the Delaware River at a power plant.

Permitting. *Lead and Certifying Engineer.* Oversaw the preparation of permit applications for erosion and sediment control, discharges of surface water from construction activities, permanent discharges from commercial and industrial activities, landfill disruption, stream encroachment, and water diversion permitting.

Geotechnical Field Investigations. *Project Manager and Engineer-of-Record.* Directed geotechnical field investigations at multiple sites, including greenfield and brownfield sites. Obtained site information to develop site conceptual model relative to subsurface soils and bedrock conditions, in addition to groundwater flow information.

Remedial Designs and Construction Oversight. *Lead Design Engineer.* Designed closure cap, stormwater management systems, and post-construction management and maintenance systems for remedial actions in MD, NJ, PA, NY, MA, MI, and VA. Project materials involved earthworks, aggregate, beneficial reuse of byproduct materials (crushed concrete, coal ash, stabilized impacted soils), in-situ treatment to immobilize contaminants of concern, and/or geosynthetics and asphalt closure caps.

Landfill Expansions. *Lead Design Engineer.* Designed landfill expansions (horizontal and vertical) for municipal waste, residual waste, construction debris, and incinerator ash, focusing on layout, grading, surface water management, leachate management and sequencing, at sites in MD, GA, FL, OH, VA, DE, NJ, PA, CT, NY, MA, NH, ME, Puerto Rico, and the Bahamas. Developed construction specifications, operations plans, and groundwater monitoring programs.

Publications/Presentations

- Presentation: “Unconventional Soil Disposal Options,” USWAG, CCR Committee Meeting, May 2019.
- Presentation: “An Historical Perspective of State Adoption of CCR Rules,” USWAG Event, Coal Combustion Residuals Workshop, March 2019.
- Article: “Don’t Let Leachate Derail your CCR Landfill Plans.” Power Magazine, July 2015.
- Primary Speaker: “Summary of Final CCR Rule.” Webinar by Golder Associates, March 25, 2015.
- Article: “Summary of Final CCR Rules Affecting Power Companies.” Chronicle Magazine published by Southern New Jersey Development Council, February 2015.

- Article: “Technical Considerations for Beneficial Use of Coal Ash in Civil Engineering Applications.” Ash At Work Magazine published by the American Coal Ash Association, 2014.
- Presentation: “How to Optimally Locate and Design Frac Pits.” 5th Annual Shale Play Water Management, Dallas, November 2014.
- Presentation: “CCR Landfill Beneficial End Uses.” Midwest Energy Association, Energy Learnings Summit, Chicago, September 2014.
- Presentation: “CCR Landfill End Uses.” USWAG, Washington, DC, December 5, 2013.
- Presentation: “Liner Considerations at Unconventional Shale Gas Drilling Site Improvements.” WEFTEC Event, New Orleans, October 2012.
- Presentation: “Best Management Practices for Marcellus Shale Drill Pit/Water Improvement Lining Systems.” Winter PIOGA Event, Seven Springs, February 2012.
- Presentation: “Dry Ash Monofills: Permitting, Design, Construction & Operations.” Ash 101 Workshop, Atlanta, April 2011.
- Numerous private presentations to Power and Oil & Gas clients covering a range of topics

Continuing Education

- First Aid, AED and CPR Certified
- MSHA Part 48 Surface Miner Certification (for above-ground mines)
- NIMS/ICS 100, 200, 400
- OSHA 40-hour HAZWOPER with annual refresher training

Professional Affiliations

- Society of Women Environmental Professionals, Member
- Edison Electric Institute, Utilities Solid Waste Activities Group (USWAG), Member
- South Jersey Water Professionals, Member

APPENDIX B

J.A. Chisholm Floodplain Study

J.A. CHISHOLM, P.E. LLC

Land Development Consultant
Engineering Planning Surveying

2661 Riva Road, Suite 320
Annapolis, Md. 21401

October 14, 2003

National Waste Managers
2900 Linden Lane Suite 300
Silver Spring, Md.

Attn.: Mr. Steve Fleischman, V.P.

Gentlemen:

As requested please find our response to the following MDE comment:

"Floodplain Analysis- The 100-year floodplain was delineated in March 1990 for the Phase II Report as required under the Code of Maryland (COMAR) 26.04.07.07C (1) (b). However, since that time the area upstream of the Site has undergone substantial development, which can change the hydraulic response of the receiving stream. Therefor, you are required to reevaluate the 100-year floodplain for the Patuxent River on the site."

First we should note that the site is not adjacent to the Patuxent River but rather the Little Patuxent River approximately 30,000 feet upstream from the confluence with the Patuxent River.

The 100 year flood plain limits shown upon the exhibits submitted to MDE with the March 1990 Phase II report was derived from the FEMA (Federal Emergency Management Agency) Anne Arundel County FIRM Panels 24 and 25 dated May 2, 1983. These panels showed the Little Patuxent River adjacent to the Chesapeake Terrace site. One Hundred-year water surface elevations ranging from elevation 67 to elevation 71 shown upon Panel 24 and 25 were transferred to the aerial topography of the landfill site. The proposed landfill is located above the influence of the 100-year floodplain. The footprint of the landfill is located above elevation 75.

The July 18, 1985 FEMA Flood Insurance Study for Anne Arundel County, Maryland provided additional insight as to the methodology utilized for determination of water surface for the 100-year flood level. Specifically *"For the Little Patuxent River, flood-flow frequency data were based on a statistical analysis of stage-discharge records covering 31 and 45 year periods at gage stations operated by the USGS (reference 7)".* The closest upstream gage station is located at Savage, Md.(USGS 01594000). Also included in the Flood Insurance Study were various floodway data tables. Table 4 of the Little Patuxent River provided cross-section and velocity data for two points adjacent to the Chesapeake Terrace site. Specifically cross-section H and cross-section I (exhibit D).

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Email: newshuz@hotmail.com

This data was used as the basis for interpolation of increased flow impacts to Chesapeake Terrace site from the Little Patuxent River.

Typically proposed land use (Zoning) would be utilized in a determination of 100-year flood plain impacts. It is this writers opinion that since the original 1983 study was prepared that zoning within the watershed has not significantly changed. Significant construction and development has admittedly occurred within the watershed, however the original study parameters would likely have utilized zoning and not the then current land use in developing the 100-year flood elevations.

We also sourced stream flow statistics (Exhibit B and C) for the Little Patuxent River at Savage, Md. (USGS 01594000). While not immediately adjacent to the Chesapeake Terrace site the data should be indicative of what is happening within the entire watershed. For instance if the flows at Savage increased by x % then it should be reasonable to assume the downstream response would be similar. We reviewed the annual mean stream flow (exhibit B) in cfs from 1976 to 1990 versus the time period from 1991-2001 and determined that an increase of approximately 7% was indicated by the data.

As a conservative approach we suggested a 50% increase in the potential 100 year storm event flows due to development within the last twenty years.

From cross section H and I we determined (utilizing the continuity equation: Q=AV) that a 100 year storm event resulted in a flow of approximately 22,000 – 23,000cfs. We also determined the flow through cross section H and I by increasing the water surface elevation in 1-foot increments. We found that an increase of two feet to the water surface current 100 year water surface elevation would provide an increase of approximately 50% of the base 100- year flow (see Exhibit A). A three-foot increase in elevation effectively doubles the capacity of the floodplain.

In conclusion we submit that the proposed Chesapeake Terrace landfill operations as proposed are at an elevation that would be located above the influence of any 100-year FEMA floodplain limits within the adjacent Little Patuxent River.

Should you have any questions or require additional information please contact me.

Very truly yours

J.A. Chisholm, P.E.

100-year fp

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CHESAPEAKE TERRACE: FLOODPLAIN STUDY OF THE LITTLE PATUXENT RIVER

FP Elev.	Section Length	Velocity	Elevation Increased by 1 foot Increments							
			+ 0 ft		+ 1 ft		+ 2 ft		+ 3 ft	
			Q	Area	Q	Area	Q	Area	Q	Area
71	1,200 ft	6.4 fps	22,500 cfs	3,516 sf	30,180 cfs	4,716 sf	37,860 cfs	5,916 sf	45,540 cfs	7,116 sf
70	3,500 ft	1.7 fps	22,600 cfs	13,294 sf	28,550 cfs	16,794 sf	34,500 cfs	20,294 sf	40,450 cfs	23,794 sf

EXHIBIT A

EXHIBIT B

Water Resources

Data Category: Surface Water | Geographic Area: Maryland | GO

Calendar Year Streamflow Statistics for Maryland

USGS 01594000 LITTLE PATUXENT RIVER AT SAVAGE, MD

Available data for this site: Surface-water: Annual streamflow statistics | GO

Howard County, Maryland
Hydrologic Unit Code 02060006
Latitude 39°08'03.9", Longitude 76°48'58.2" NAD83
Drainage area 98.4 square miles
Gage datum 140 feet above sea level NGVD29

Output formats: HTML table of all data | Tab-separated data | Reselect output format

Year	Annual mean streamflow, in ft^3/s	Year	Annual mean streamflow, in ft^3/s	Year	Annual mean streamflow, in ft^3/s	Year	Annual mean streamflow, in ft^3/s
1940	93.4	1950	108	1978	135	1993	143
1941	62.4	1951	121	1979	230	1994	128
1942	81.2	1952	174	1986	65.7	1995	85.9
1943	89.2	1953	147	1987	89.5	1996	213
1944	75.3	1954	55.9	1988	85.1	1997	108
1945	129	1955	89.6	1989	150	1998	126
1946	87.8	1956	82.3	1990	115	1999	92.6
1947	72.0	1957	84.4	1991	81.6	2000	109
1948	119	1976	122	1992	94.0	2001	87.8
1949	113	1977	92.3				

Questions about data gs-w-md_NWISWeb_Data_Inquiries@usgs.gov Top
Feedback on this website gs-w-md_NWISWeb_Maintainer@usgs.gov Explanation of terms
Surface Water data for Maryland: Calendar Year Streamflow Statistics
http://waterdata.usgs.gov/md/nwis/annual/calendar_year?

Retrieved on 2003-10-14 10:36:32 EDT
Department of the Interior, U.S. Geological Survey
USGS Water Resources of Maryland
Privacy Statement || Disclaimer || Accessibility
0.7 0.64.nadww01

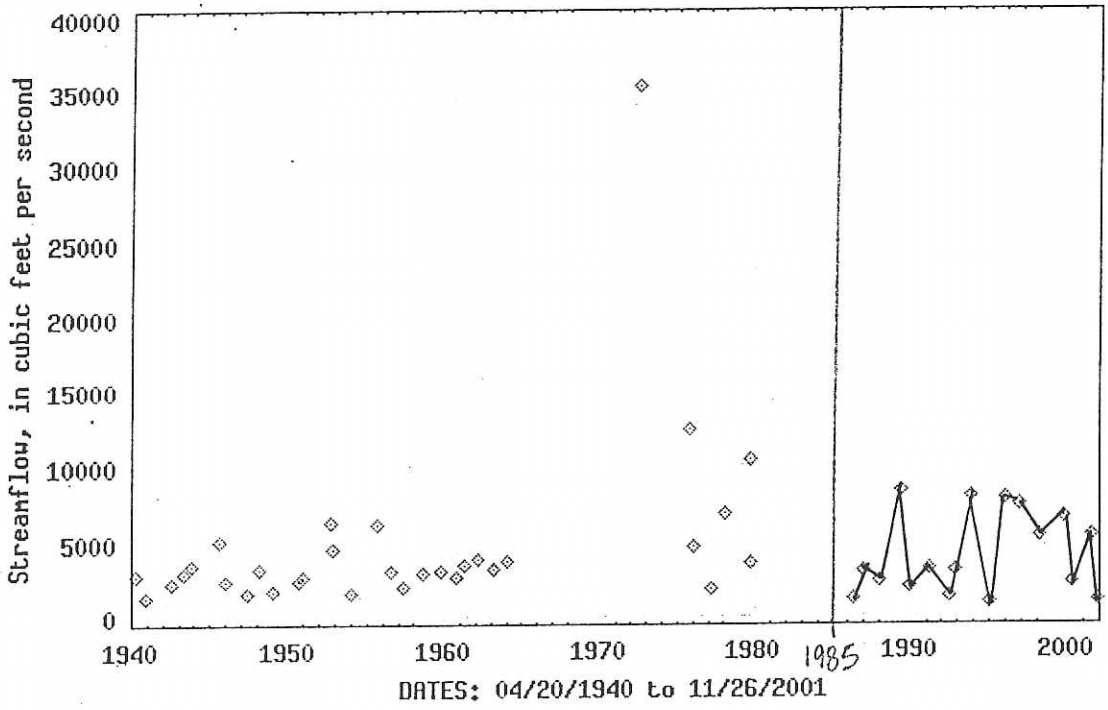
1976-1990/1991-200 = 1.07±
7%± Increase Avg.

1976-2001 Avg. = 117.7
1976-1990 Avg = 107.8
1991-2001 Avg = 115.4

EXHIBIT C

USGS

USGS 01594000 LITTLE PATUXENT RIVER AT SAVAGE, MD



DATES: 04/20/1940 to 11/26/2001

EXHIBIT D

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION				(Q=AV) Q_{100}
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE	
					(FEET NGVD)				
Little Patuxent River (continued)									
D	15,820	1,712	11,885	2.0	53.6	53.6	54.1	0.5	
E	15,956	1,706	14,731	1.6	55.1	55.1	55.9	0.8	
F	16,606	1,585	12,612	1.8	55.2	55.2	56.0	0.8	
G	23,866	329	2,293	9.9	58.1	58.1	58.4	0.3	
H	28,846	1,613	13,544	1.7	66.4	66.4	67.2	0.8	23,000 cfs
I	33,206	648	3,526	6.4	70.8	70.8	70.8	0.0	22,600 cfs
J	37,306	1,911	12,946	1.7	76.7	76.7	77.3	0.6	
K	37,546	590	2,998	7.5	76.8	76.8	77.3	0.5	
L	38,056	1,244	10,448	2.0	81.8	81.8	81.8	0.0	
M	39,456	1,583	9,741	2.2	82.0	82.0	82.1	0.1	
N	53,056	1,394	5,323	3.9	94.4	94.4	95.2	0.8	
O	54,656	600	4,105	5.1	99.1	99.1	99.1	0.0	
P	54,976	537	4,811	4.3	101.5	101.5	101.7	0.2	
Q	58,276	1,285	9,241	2.3	104.6	104.6	105.1	0.5	
R	59,876	210	2,315	9.0	105.0	105.0	105.4	0.4	
S	60,876	1,684	7,109	2.9	107.6	107.6	108.3	0.7	
T	62,083	720	4,407	4.7	108.6	108.6	109.2	0.6	

[1]Feet above confluence with Patuxent River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

ANNE ARUNDEL COUNTY, MD

(UNINCORPORATED AREAS)

FLOODWAY DATA

LITTLE PATUXENT RIVER

APPENDIX C

Residential Well Records

C 1 00304 — SEQUENCE NO. (DNR USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
DEPARTMENT OF WATER RESOURCES
STATE OFFICE BLDG., ANNAPOLIS, MARYLAND 21401
WELL COMPLETION REPORT

THIS REPORT MUST BE SUBMITTED WITHIN 30 DATES AFTER WELL COMPLETION
FILL IN THIS FORM COMPLETELY
COUNTY NUMBER

DATE RECEIVED (DNR USE ONLY) 13072
DATE WELL COMPLETED 8.9.72 (08/09/72)
DEPTH OF WELL 193 (TO NEAREST FOOT)
PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-DE-01/72
DRILLERS IDENTIFICATION NO. 735

OWNER LAST NAME Wist James
STREET OR RFD Box 376 Patuxent Rd POST OFFICE Odenton, Md.

WELL DESCRIPTION

WELL LOG
STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (USE ADDITIONAL SHEETS IF NECESSARY)	FEET FROM	FEET TO	CHECK IF WATER BEARING
Top Soil	0	1	
Gravel	1	30	
White Clay	30	81	
Fine Sand	81	92	
Red Clay	92	160	
White Clay	160	178	
Medium Sand			
Sand	178	193	

GROUTING RECORD
WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX) YES (V) NO (N)
TYPE OF GROUTING MATERIAL (CIRCLE BOX)
CEMENT (C M) BENTONITE CLAY (B C)
NO. OF BAGS ____ NO. OF POUNDS ____
GALLONS OF WATER ____
DEPTH OF GROUT SEAL (TO NEAREST FOOT)
FROM ____ FT. TO ____ FT.
(USE "0" IF FROM SURFACE)

CASING RECORD
TYP (INSERT APPROPRIATE CODE BELOW): (S T) STEEL (C O) CONCRETE (P L) PLASTIC (O T) OTHER

MAIN CASING TYPE	NOMINAL DIAMETER TOP (MAIN) CASING (NEAREST INCH)	TOTAL DEPTH OF MAIN CASING (NEAREST FOOT)
ST	4	188

OTHER CASING (IF USED)

DIAMETER (INCH)	DEPTH (FEET) FROM	TO

SCREEN RECORD
SCREEN TYPE OR OPEN HOLE (INSERT APPROPRIATE CODE BELOW): (S T) STEEL (B R) BRASS OR BRONZE (H O) OPEN HOLE (P L) PLASTIC (O T) OTHER

C 2 (SEQ. NO.)
DEPTH (NEAREST WHOLE FOOT) 178 193
SLOT SIZE 0.30
DIAMETER OF SCREEN 4 (NEAREST INCH)
FROM ____ TO ____
GRAVEL PACK ____
IF WELL DRILLED WAS A FLOWING WELL CIRCLE BOX (F)

DNR USE ONLY (NOT TO BE FILLED IN BY DRILLER)
TELESCOPE CASING | LOG INDICATOR | OTHER DATA AVAILABLE

PUMPING TEST
HOURS PUMPED (TO NEAREST HOUR) 1
PUMPING RATE GALLONS PER MINUTE TO NEAREST GALLON) 50
METHOD USED TO MEASURE PUMPING RATE Air Comp
WATER LEVEL: (DISTANCE FROM LAND SURFACE)
BEFORE PUMPING 3 (NEAREST FOOT)
WHEN PUMPING 12 (NEAREST FOOT)
TYPE OF PUMP USED (CIRCLE APPROPRIATE BOX FOR PUMPING TEST)
(A) AIR (P) PISTON (T) TURBINE (C) CENTRIFUGAL (R) ROTARY (O) OTHER (DESCRIBE BELOW) (J) JET (S) SUBMERSIBLE

PUMP INSTALLED
TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX → SEE ABOVE: A, C, J, P, R, S, T, O)
DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX) YES (V) NO (N)
CAPACITY: GALLONS PER MINUTE (TO NEAREST GALLON) Owners
PUMP HORSE POWER
PUMP COLUMN LENGTH (NEAREST FOOT)

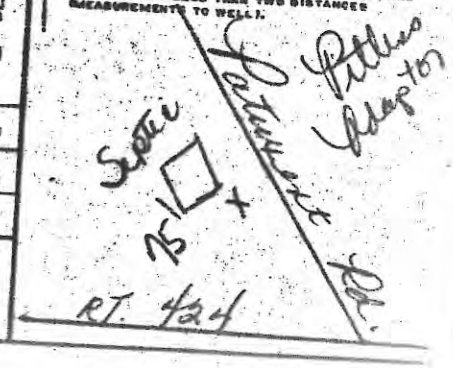
CASING HEIGHT
(CIRCLE APPROPRIATE BOX AND ENTER CASING HEIGHT) (+) ABOVE (−) BELOW LAND SURFACE (NEAREST FOOT) 1

CIRCLE APPROPRIATE BOXES
(A) A WELL WAS ABANDONED AND A NEW WELL DRILLED
(E) ELECTRIC LOG OBTAINED
(P) WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL CONDITIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE. INFORMATION AND BELIEF.

DRILLER'S NAME W. S. Green Drilling
SIGNED Everett E. Green
SIGNATURE Everett E. Green

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURES SUCH AS BUILDINGS, SEPTIC TANKS, AND/OR OTHER LAND MARKS AND INDICATE NOT LESS THAN TWO DISTANCES AND MEASUREMENTS TO WELL).



ORIGINAL

C L 9784

STATE OF MARYLAND
WATER RESOURCES ADMINISTRATION
TAWES STATE OFFICE BLDG., ANNAPOLIS, MD. 21401
WELL COMPLETION REPORT

THIS REPORT MUST BE SUBMITTED WITHIN 30 DAYS AFTER WELL COMPLETION

FILL IN THIS FORM COMPLETELY

DATE RECEIVED (DNR USE ONLY): 8 21 73

DATE WELL COMPLETED: 8-25-73 (08 25 73)

DEPTH OF WELL: 72 ft. (TO NEAREST FOOT)

COUNTY NUMBER

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-73-1966

OWNER: Jackson (LAST NAME) Dorothy (FIRST NAME)

STREET OR RFD: Rt 1, Box 520

POST OFFICE: Odenton, Md.

DRILLERS IDENTIFICATION NO.: 136

WELL LOG

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (USE ADDITIONAL SHEETS IF NECESSARY)	FEET FROM	FEET TO	CHECK IF WATER BEARING
Top soil	0	2	
Sandstone	2	15	
White clay	15	45	
Coarse brown sand	45	72	

WELL DESCRIPTION

GROUTING RECORD

WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX): YES (Y) NO (N)

TYPE OF GROUTING MATERIAL (CIRCLE ONE): CEMENT (CM) BENTONITE CLAY (BC)

NO. OF BAGS: NO. OF POUNDS:

GALLONS OF WATER:

DEPTH RECORDED IF OTHER (TO NEAREST FOOT): FROM FT. TO FT.

(ENTER 0 IF FROM SURFACE)

CASING RECORD

CASING TYPES (INSERT APPROPRIATE CODE BELOW): STEEL (ST), CONCRETE (CO), PLASTIC (PL), OTHER (OT)

MAIN CASING TYPE	NOMINAL DIAMETER TOP (MAIN) CASING (NEAREST INCH)	TOTAL DEPTH OF MAIN CASING (NEAREST FOOT)
PL	4	67

OTHER CASING (IF USED)

DIAMETER (INCH)	DEPTH (FEET) FROM	TO

SCREEN RECORD

SCREEN TYPE OR OPEN HOLE (INSERT APPROPRIATE CODE BELOW): STEEL (ST), BRASS OR BRONZE (BR), OPEN HOLE (HO), PLASTIC (PL), OTHER (OT)

C 2 (SEQ. NO.)

EACH SCREEN	TYPE	DEPTH (NEAREST WHOLE FOOT) FROM	TO
1	PL	67	72
2			
3			

SLOT SIZE: 1. 0.30 2. 3.

DIAMETER OF SCREEN: 2 (NEAREST INCH)

GRAVEL PACK: FROM TO

IF WELL DRILLED WAS A FLOWING WELL CIRCLE BOX: (F)

DNR USE ONLY (NOT TO BE FILLED IN BY DRILLER): TELESCOPE CASING; LOG INDICATOR; OTHER DATA AVAILABLE

C 3 (SEQ. NO.)

PUMPING TEST

HOURS PUMPED (TO NEAREST HOUR): 1

PUMPING RATE (GALLONS PER MINUTE TO NEAREST GALLON): 10

METHOD USED TO MEASURE PUMPING RATE: Air

WATER LEVEL (DISTANCE FROM LAND SURFACE)

BEFORE PUMPING: 40 (NEAREST FOOT)

WHEN PUMPING: 48 (NEAREST FOOT)

TYPE OF PUMP USED (FOR PUMPING TEST) (CIRCLE APPROPRIATE BOX): AIR (A), PISTON (P), TURBINE (T), CENTRIFUGAL (C), ROTARY (R), OTHER (DESCRIBE BELOW) (O), JET (J), SUBMERSIBLE (S)

PUMP INSTALLED

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX — SEE ABOVE: A, C, J, P, R, S, T, O): S

DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX): YES (Y) NO (N)

CAPACITY: GALLONS PER MINUTE (TO NEAREST GALLON): 8

PUMP HORSE POWER: 1/2

PUMP COLUMN LENGTH (NEAREST FOOT): 60

CASING HEIGHT (CIRCLE APPROPRIATE BOX AND ENTER CASING HEIGHT)

(+) ABOVE / (−) BELOW LAND SURFACE: 1 (NEAREST FOOT)

CIRCLE APPROPRIATE BOXES

(A) A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

(E) ELECTRIC LOG OBTAINED

(P) TEST WELL CONVERTED TO PRODUCTION WELL

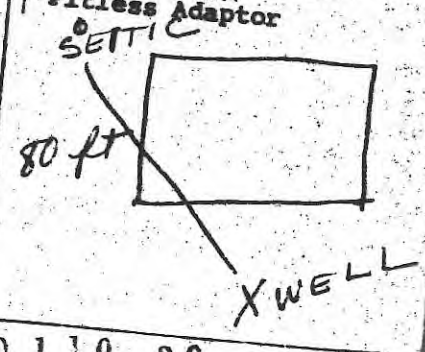
I HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL CONDITIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF.

DRILLER'S NAME (PLEASE PRINT): H. J. Greer Drilling Co Elmer L. Greer

SIGNATURE: Harold J. Greer

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDINGS, SEPTIC TANKS, AND/OR OTHER LAND MARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL).



ENTERED 1 10 29

ORIGINAL

ENTERED 1 10

EMERGENCY NO. (IF ANY)

B 1 3678 (SEQUENCE NO. - DWR USE ONLY)
1 2 3 (SEQ. NO.) 6
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
DEPARTMENT OF WATER RESOURCES
STATE OFFICE BLDG., ANNAPOLIS, MARYLAND 21401
APPLICATION FOR PERMIT TO DRILL WELL

AA 73-2071

DATE RECEIVED (DWR USE ONLY)
09 26 73

OWNER CARTER, (COL 15 LAST NAME)
STREET OR RFD RT 1, BOX 365 (COL 36)
POST OFFICE ODENTON, MD. 21113 (COL 57)

B 1 CONTINUED — DRILLER INFORMATION
DATE 9/25/73 LICENSE NUMBER 55 (77-80)
H. H. BUNKER & SONS INC
FIRST NAME DRILLER LAST NAME
SIGNATURE Donald R. Bunker

B 2 — WELL INFORMATION
MAXIMUM PUMPING RATE (GALLONS PER MINUTE) 10 (8-12)
AVERAGE DAILY QUANTITY NEEDED (GALLONS PER DAY) 300 (14-21)

USE FOR WATER (CIRCLE APPROPRIATE BOX)
(D) DOMESTIC, HOME (SINGLE OR DOUBLE HOUSEHOLD UNIT ONLY)
F FARMING, AGRICULTURE, IRRIGATION
I INDUSTRIAL, COMMERCIAL, STATE AND FEDERAL GOVERNMENT.
M MUNICIPAL WATER SUPPLY
P PRIVATE WATER COMPANY
} MUST HAVE STATE HEALTH DEPT. APPROVAL
T TEST

APPROXIMATE DEPTH OF WELL 80 FEET (24-26)
APPROXIMATE DIAMETER OF WELL 4 (NEAREST INCH)

METHOD OF DRILLING USED (CIRCLE APPROPRIATE METHOD)
BORED (OR AUGERED) JETTED DRIVEN
AIR-ROTARY AIR-PERCUSSION (ROTARY) HYDRAULIC ROTARY
CABLE REVERSE-ROTARY DRIVE-POINT
OTHER (DESCRIBE)

REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)
(N) THIS WELL WILL NOT REPLACE AN EXISTING WELL
Y THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
S THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY
D THIS WELL WILL DEEPEN AN EXISTING WELL
PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE) (41-52)

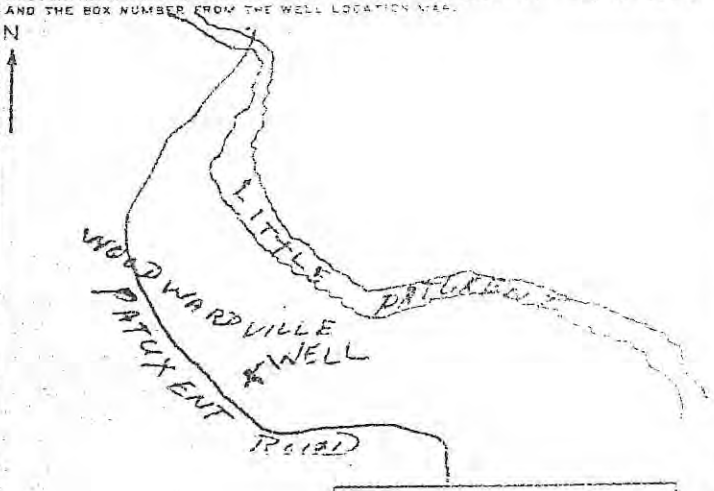
NOT TO BE FILLED IN BY DRILLER (DWR USE ONLY)
APPROPRIATION PERMIT NUMBER (54-63) ENGINEER REVIEW DISTRICT NO. (65)
FORCE (67-68) WRITE INITIALS IN BOX
CONDITIONS (70-79) A E N S G W Q C L U

B 4 CONTINUED — HEALTH DEPARTMENT APPROVAL
(S) STATE HEALTH (CIRCLE BOX) COUNTY NAME COUNTY NO.
DATE MO. 09 DAY 26 YR. 73 (43-48)
APPROVED BY

B 3 — LOCATION OF WELL
COUNTY ANNE ARUNDEL
SUBDIVISION (22)
SECTION (44-45)
NEAREST TOWN WOODWARDVILLE (50-53)
MILES FROM TOWN (54-55)

B 4 — DIRECTION FROM TOWN
(N) NORTH (E) EAST NE NORTHEAST SE
S SOUTH (W) WEST NW NORTHWEST SW
NEAR WHAT ROAD PATUXENT Road (11)
ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX) (N) S E (32)
DISTANCE FROM ROAD (ENTER DISTANCE AND CIRCLE APPROPRIATE BOX) 40 (34)

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO ROADS AND STREAMS WITH NORTH IN THE DIRECTION OF THE TOP OF THE SKETCH. ALSO SHOW, BY MEANS OF AN "X", THE WELL LOCATION AND BOX NUMBER FROM THE WELL LOCATION MAP.



BOX NUMBER E 870 N 440 (0/5)
NORTH COORDINATE 44000 (50-55)
EAST COORDINATE 08750 (57-62)
ELEVATION AT WELL HEAD (FEET) (65-68) (0/0)

B 5 SPECIAL CONDITIONS 6-63 (DWR USE ONLY) (SEQ. NO.)

ORIGINAL

ENTERED 10 9 73

WR-WA-0077

C | 1 | 4509 — SEQUENCE NO. (OFFICE USE ONLY) — (SEQ. NO.) — THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS

STATE OF MARYLAND
WATER RESOURCES ADMINISTRATION
TAWES STATE OFFICE BLDG., ANNAPOLIS, MD. 21401
WELL COMPLETION REPORT

DATE RECEIVED (OFFICE USE ONLY) 10237 — 8-13

DATE WELL COMPLETED 10/9/73 — 10 09 73 — 15 20

DEPTH OF WELL 70 (TO NEAREST FOOT) — 22 25

AA 73 2071

OWNER CARTER (LAST NAME) ERNEST

STREET OR RFD Rt. 1, Box 365 — POST OFFICE Chanlon, Md. 21111

1 hr
20 gpm

WELL DESCRIPTION

WELL LOG
STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (USE ADDITIONAL SHEETS IF NECESSARY)	FEET FROM	FEET TO	CHECK IF WATER BEARING
Sand & gravel	0	12	
Layers of red clay & sand	12	30	
Red & blue clay	30	52	
Rock & white clay	52	62	
Medium tan sand	62	70	

GROUTING RECORD
WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX) — 48 Y — 49 N

TYPE OF GROUTING MATERIAL (CIRCLE ONE) — CEMENT (C M) — BENTONITE CLAY (B C)

NO. OF BAGS 10 — NO. OF POUNDS 940

GALLONS OF WATER 60

DEPTH OF GROUT SEAL (TO NEAREST FOOT) — FROM 0 FT. TO 20 FT. — 48 52 54 58

(ENTER 0 IF FROM SURFACE)

CASING RECORD
CASING TYPES (INSERT APPROPRIATE CODE BELOW): STEEL (S T), CONCRETE (C O), PLASTIC (P L), OTHER (O -)

MAIN CASING TYPE	NOMINAL DIAMETER TOP (MAIN) CASING (NEAREST INCH)	TOTAL DEPTH OF MAIN CASING (NEAREST FOOT)
P L	4	65

60 61 — 63 64 — 66 70

EACH CASING — OTHER CASING (IF USED)

DIAMETER (INCH)	DEPTH (FEET) FROM	TO

SCREEN RECORD
SCREEN TYPE OR OPEN HOLE (INSERT APPROPRIATE CODE BELOW): STEEL (S T), BRASS OR BRONZE (B R), OPEN HOLE (H O), PLASTIC (P L), OTHER (O T)

C 2 — (SEQ. NO.)

EACH SCREEN — DEPTH (NEAREST WHOLE FOOT)

		FROM	TO
1	P L	65	70
2			
3			

8 9 — 11 15 — 17 21 — 23 24 — 26 30 — 32 36 — 38 39 — 41 45 — 47 51

SLOT SIZE 1. .030 2. ____ 3. ____

DIAMETER OF SCREEN 2 (NEAREST INCH) — 56 58

GRAVEL PACK — FROM 63 — TO 70

IF WELL DRILLED WAS A FLOWING WELL CIRCLE BOX — 68 F

FOR USE ONLY (NOT TO BE FILLED IN BY DRILLER): TELESCOPE CASING (T) 70; LOG INDICATOR (E.R.O.S.) 72; OTHER DATA AVAILABLE (W Q) 74 75 76

PUMP INSTALLED
J

TYPE OF PUMP (WRITE APPROPRIATE BOX + FILE ABOVE) — DRILLER HAS TO TEST (CIRCLE APPROPRIATE BOX) — 102 Y

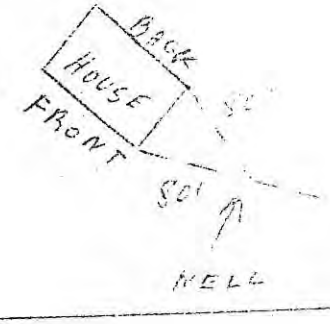
CAPACITY GALLONS PER MINUTE (TO NEAREST GALLON) 8

PUMP HORSE POWER 1/2

PUMP COLUMN LENGTH (NEAREST FOOT) 30

CASING HEIGHT
(CIRCLE APPROPRIATE BOX) — ABOVE + — BELOW − — LAND SURFACE — 49 — 7 — 51 56

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURES SUCH AS HOUSES, SEPTIC TANKS, AND DRIVEWAYS. ALSO INDICATE NOT LESS THAN TWO DISTANCE MEASUREMENTS TO WELL.



CIRCLE APPROPRIATE BOXES
A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E — ELECTRIC LOG OBTAINED

P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL CONDITIONS STATED ON THE ABOVE-CAPTIONED PERMIT TO DRILL WELL, AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF.

DRILLER'S NAME H. H. BUNKER & SONS, INC.

(PLEASE PRINT) Harold H. Bunker, Jr.

SIGNATURE Harold H. Bunker, Jr.

ORIGINAL

DNR-131 EMERGENCY NO. (If any) - AA 73 2509

B 1 5895 SEQUENCE NO. (DWR USE ONLY)
1 2 3 (SEQ. NO.) 6
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
DEPARTMENT OF WATER RESOURCES
STATE OFFICE BLDG., ANNAPOLIS, MARYLAND 21401
APPLICATION FOR PERMIT TO DRILL WELL

AA 73 2509

DATE RECEIVED (DWR USE ONLY) 8 12 73

OWNER McHenry Wilson (COL. 15 LAST NAME)

STREET OR RFD Rt 1 - Box 47 (COL. 57)

POST OFFICE Clear Spring Sevenmiles (COL. 57)

5-13

B 1 CONTINUED 1 2 3 (SEQ. NO.) 6

DRILLER INFORMATION

DATE 11-28-73 LICENSE NUMBER 234 (55)

John Bruce Houston
FIRST NAME DRILLER LAST NAME

SIGNATURE JB Houston

B 2 WELL INFORMATION

MAXIMUM PUMPING RATE (GALLONS PER MINUTE) 8 (8 12)

AVERAGE DAILY QUANTITY NEEDED (GALLONS PER DAY) 300 (14 20)

USE FOR WATER (CIRCLE APPROPRIATE BOX)

(D) DOMESTIC, HOME (SINGLE OR DOUBLE HOUSEHOLD UNIT ONLY)
(F) FARMING, AGRICULTURE, IRRIGATION
(I) INDUSTRIAL, COMMERCIAL, STATE AND FEDERAL GOVERNMENT
22
(M) MUNICIPAL WATER SUPPLY } MUST HAVE STATE HEALTH DEPT. APPROVAL
(P) PRIVATE WATER COMPANY
(T) TEST

APPROXIMATE DEPTH OF WELL 70 (24 28) FEET

APPROXIMATE DIAMETER OF WELL 4 (NEAREST INCH)

METHOD OF DRILLING USED (CIRCLE APPROPRIATE METHOD)

BORED (OR AUGERED) JETTED DRIVEN
30-37 AIR-ROTARY AIR-PERCUSSION (ROTARY) (HYDRAULIC ROTARY)
CABLE REVERSE-ROTARY DRIVE-POINT
OTHER (DESCRIBE)

REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)

(N) THIS WELL WILL NOT REPLACE AN EXISTING WELL
(X) THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
39
(S) THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY
(D) THIS WELL WILL DEEPEN AN EXISTING WELL
PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE)
(41 52)

NOT TO BE FILLED IN BY DRILLER (DWR USE ONLY)

APPROPRIATION PERMIT NUMBER G A P (54 63)
ENGINEER REVIEW DISTRICT NO. (65)
FORCE WRITE INITIALS IN BOX (67 68)
CONDITIONS A E N S G W Q C L U (70 71 72 73 74 75 76 77 78 79)

B 4 CONTINUED 1 2 3 (SEQ. NO.) 6

HEALTH DEPARTMENT APPROVAL

(41) (S) STATE HEALTH (CIRCLE BOX)
COUNTY NAME
02 COUNTY NO.
DATE MO. 1 DAY 2 YR. 8 (43 48)
APPROVED BY

B 5 SPECIAL CONDITIONS 8-63 (DWR USE ONLY)
1 2 3 (SEQ. NO.) 6 8

B 3
1 2 3 (SEQ. NO.) 8
COUNTY Allegany
SUBDIVISION Woodward (22)
SECTION (24)
NEAREST TOWN Woodwardville (32)
MILES FROM TOWN (40)

B 4
1 2 3 (SEQ. NO.) 8
DIRECTION FROM TOWN
(N) NORTH (E) EAST
(S) SOUTH (W) WEST
NEAR WHAT ROAD Private (42)
ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX) (52)
DISTANCE FROM ROAD (ENTER DISTANCE AND CIRCLE APPROPRIATE BOX) 46 (53)

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL WITH RESPECT TO ROADS AND STREAMS WITH NORTH AT THE TOP. INDICATE DISTANCE FROM WELL TO NEARBY ROADS. IF OFFSET, PROVIDE DISTANCE FROM SKETCH. ALSO SHOW BY ARROW OR AN "X" THE LANE AND THE BOX NUMBER FROM THE WELL LOCATOR MAP.

N
Private Rd
Well
Patuxent Rd

BOX NUMBER E 370 N 440

NORTH COORDINATE 445000 (60 61 62 63 64 65)
EAST COORDINATE 0815000 (57 58 59 60 61 62 63)
ELEVATION AT WELL HEAD (FEET) (66 67 68 70)

WR-W-4 9/71

C 1 9727 — SEQUENCE NO. (OWR USE ONLY)
1 2 3 (SEQ. NO.)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WATER RESOURCES ADMINISTRATION
TAWES STATE OFFICE BLDG., ANNAPOLIS, MD. 21401
WELL COMPLETION REPORT

AA 73 2509

DATE RECEIVED — (OWR USE ONLY) 31974 (11-13)

DATE WELL COMPLETED 2-8-74 (15-20) 020874

DEPTH OF WELL 140' (TO NEAREST FOOT) (22-26)

OWNER McHenry William (LAST NAME)

STREET OR RFD RT #1 BX 47 POST OFFICE SEVERN Md.

WELL DESCRIPTION

WELL LOG
STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (USE ADDITIONAL SHEETS IF NECESSARY)	FEET FROM	FEET TO	CHECK IF WATER BEARING
sand	0	8	
white clay	8	23	
sand	23	25	
red clay	25	80	
sand	80	84	
red clay	84	125	
water bearing sand	125	140	✓

GROUTING RECORD
WELL WAS BEING GROUTED (CIRCLE APPROPRIATE BOX) (N-41, Y-42)
TYPE OF GROUTING MATERIAL USED: CEMENT (C, M) (45, 46) BENTONITE CLAY (B, C) (47, 48)
NO. OF BAGS 6 NO. OF GALLONS 100
GALLONS OF WATER 70 gal
DEPTH OF GROUT SEAL (TO NEAREST FOOT)
FROM 3 (49-52) FT. TO 25' (54-57) FT.
(ENTER 0 IF FROM SURFACE)

CASING RECORD
CASING TYPES (INSERT APPROPRIATE CODE BELOW): STEEL (S, T); CONCRETE (C, O); PLASTIC (P, L); OTHER (O, T)

MAIN CASING TYPE	NOMINAL DIAMETER FOR MAIN CASING (NEAREST INCH)	TOTAL DEPTH OF MAIN CASING (NEAREST FOOT)
P L (60, 61)	4" (63, 64)	133' (65-70)

OTHER CASING (IF USED)
EACH CASING

DIAMETER (INCH)	DEPTH (FEET) FROM	TO

SCREEN RECORD
SCREEN TYPE OR OPEN HOLE (INSERT APPROPRIATE CODE BELOW): STEEL (S, T); BRASS OR BRONZE (B, R); OPEN HOLE (H, O); PLASTIC (P, L); OTHER (O, T)

C 2 (1-3) (SEQ. NO.) 6

DEPTH (NEAREST WHOLE FOOT)

EACH SCREEN

		FROM	TO
1	P L (8, 9)	130' (11-15)	140' (17-21)
2		(23, 24) (26-30)	(32-36)
3		(38, 39) (41-45)	(47-51)

SLOT SIZE 1 .025 2 3

DIAMETER OF SCREEN 3 (NEAREST INCH) (56, 57)

GRAVEL PACK FROM 128 TO 140

IF WELL DRILLED WAS A FLOWING WELL CIRCLE BOX (60) F

OWR USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (70) TELESCOPE CASING; (S.R.O.S.) (72) LOG INDICATOR; W Q (74, 75, 76) OTHER DATA AVAILABLE

CIRCLE APPROPRIATE BOXES
A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E — ELECTRIC LOG OBTAINED
P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL CONDITIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF.

DRILLERS NAME (PLEASE PRINT) VERGIL S. ERNSBERGER

SIGNATURE Vergil S Ernsberger

PUMP DATA
1½
15

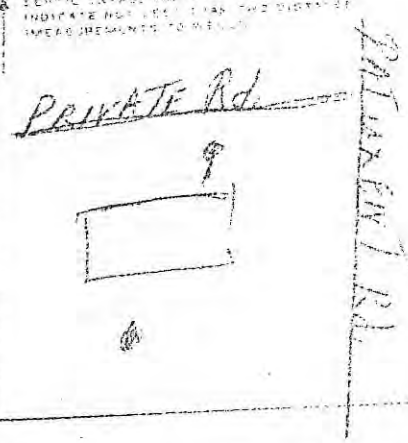
WATER LEVEL BEFORE PUMPING 73'
WHEN PUMPING ?

TYPE OF PUMP USED (FOR PUMPING TEST)

PUMP INSTALLED
TYPE OF PUMP INSTALLED (USE CODE ABOVE)
DRILLER WILL INSTALL PUMP (CIRCLE FROM SURFACE DATA)
CAPACITY
GALLONS PER MIN. TO NEAREST 25 GPM
PUMP HORSE POWER
PUMP COLUMN LENGTH (NEAREST FOOT)

CASING HEIGHT
(CIRCLE APPROPRIATE BOX) ABOVE / BELOW LAND SURFACE 1'

LOCATION OF WELL ON LOT
(N FROM PERMANENT STRUCTURE, OR IF NOT AVAILABLE, SEVERAL DIMENSIONS FROM TWO STREETS AND INDICATE NORTH) (MEASUREMENTS TO NEAREST FOOT)



ORIGINAL

TAWES STATE OFFICE BLDG., ANNAPOLIS, MARYLAND 21401

APPLICATION FOR PERMIT TO DRILL WELL

Ft. 73 3273

0716 7E

OWNER: Thomas, Leon H., Jr.

STREET OR RFD: Rt. 1, Box 394 X

POST OFFICE: Odenton

B 1 — DRILLER INFORMATION

DATE: 7/11/74 LICENSE NUMBER: 80

John E. Branham (FIRST NAME / DRILLER / LAST NAME)

SIGNATURE: John E Branham

B 2 — WELL INFORMATION

MAXIMUM PUMPING RATE (GALLONS PER MINUTE): 10

AVERAGE DAILY QUANTITY NEEDED (GALLONS PER DAY): 600

USE FOR WATER (CIRCLE APPROPRIATE BOX)

- D — ONE (SINGLE OR DOUBLE HOUSEHOLD UNIT ONLY)
- F — FARMING, AGRICULTURE, IRRIGATION
- I — INDUSTRIAL, COMMERCIAL, STATE AND FEDERAL GOVERNMENT
- M — MUNICIPAL WATER SUPPLY
- P — PRIVATE WATER COMPANY
- T — TEST

(M, P MUST HAVE STATE HEALTH DEPT. APPROVAL)

APPROXIMATE DEPTH OF WELL: 110 FEET

APPROXIMATE DIAMETER OF WELL: 4 (NEAREST INCH)

METHOD OF DRILLING USED (CIRCLE APPROPRIATE METHOD)

BORED (OR AUGERED) — JETTED — DRIVEN

AIR-ROTARY — AIR-PERCUSSION — ROTARY (HYDRAULIC ROTARY) — CABLE — REVERSE-ROTARY — DRIVE-POINT

OTHER (DESCRIBE):

REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)

- N — THIS WELL WILL NOT REPLACE AN EXISTING WELL
- Y — THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- S — THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY
- D — THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE)

NOT TO BE FILLED IN BY DRILLER (WRA USE ONLY)

APPROPRIATION PERMIT NUMBER — ENGINEER REVIEW DISTRICT NO.

FORCE — WRITE INITIALS IN BOX — CONDITIONS: A E N S G W Q C L U

B 3 — LOCATION OF WELL

COUNTY: Anne Arundel (DO NOT ABBREVIATE COUNTY NAME)

SUBDIVISION

SECTION — LOT

NEAREST TOWN: Conway

MILES FROM TOWN (ENTER 0 IF IN TOWN): 5 (M / T)

B 4 — DIRECTION FROM TOWN (CIRCLE APPROPRIATE BOX)

N NORTH — E EAST — NE NORTHEAST — SE SOUTHEAST

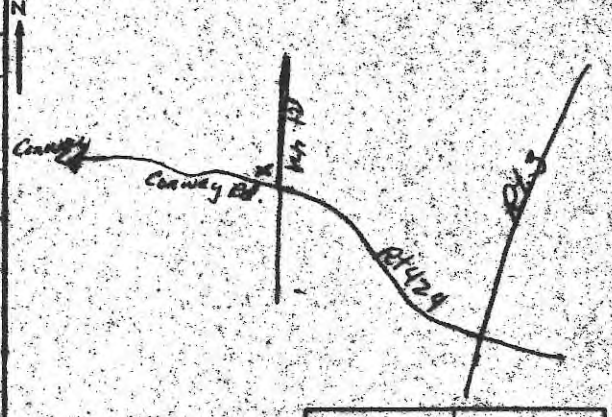
S SOUTH — W WEST — NW NORTHWEST — SW SOUTHWEST

NEAR WHAT ROAD: Conway Rd.

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX): NORTH (N) — SOUTH — EAST — WEST

DISTANCE FROM ROAD (ENTER DISTANCE AND CIRCLE APPROPRIATE BOX): 45 (F / T / M / L)

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS, ROADS AND STREAMS WITH NORTH IN THE DIRECTION OF THE ARROW, AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION OR STREAM CROSSING SHOWN ON THE SKETCH. ALSO SHOW, BY MEANS OF AN "X", THE WELL LOCATION IN THE BOX BELOW AND THE BOX NUMBER FROM THE WELL LOCATION MAP.



BOX NUMBER: E 880 N 430

NORTH COORDINATE: 435000

EAST COORDINATE: 0880000

ELEVATION AT WELL HEAD (FEET):

O/X — S/B — O/O — S/O

B 4 CONTINUED — HEALTH DEPARTMENT APPROVAL

STATE HEALTH (CIRCLE BOX): S

COUNTY NAME: AA — COUNTY NO.: 02

DATE: 07/12/74 (MO. DAY YR.)

APPROVED BY:

B — SPECIAL CONDITIONS (WRA USE ONLY)

ORIGINAL

ENTERED 11 53 !

(48)

120777

AA 73 8073

OWNER Tipton

STREET OR RFD Collins & Conway Rds

WELL DESCRIPTION

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING.

DESCRIPTION (use additional sheets, if necessary)	FEET FROM	FEET TO	CHECK IF WATER BEARING
Brown clay	0	4	
Brown sand	4	18	
Red & blue clay	18	67	
Medium brown sand	67	69	X

CIRCLE APPROPRIATE BOXES

A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL CONDITIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF.

DRILLER'S NAME (PLEASE PRINT) J.T. Greer Drilling Co.

SIGNATURE

GROUTING RECORD

WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX) Y N

TYPE OF GROUTING MATERIAL (CIRCLE) CEMENT C M BENTONITE CLAY B C

NO. OF BAGS 2 NO. OF POUNDS

DEPTH OF [illegible] 30

DEPTH OF [illegible] FROM 3 FT. TO 20 FT.

(ENTER 0 IF FROM SURFACE)

CASING RECORD

CASING TYPES (INSERT APPROPRIATE CODE BELOW)

STEEL S T CONCRETE C O PLASTIC P L OTHER O T

MAIN CASING TYPE	NOMINAL DIAMETER OF MAIN CASING (NEAREST INCH)	TOTAL DEPTH OF MAIN CASING (NEAREST FOOT)
P L	4"	64

OTHER CASING (IF USED)

DIAMETER (INCH)	DEPTH (FEET) FROM	TO

SCREEN RECORD

SCREEN TYPE OR OPEN HOLE (INSERT APPROPRIATE CODE BELOW)

STEEL S T BRASS OR BRONZE B R OPEN HOLE H O PLASTIC P L OTHER O T

C 2 (SEC. NO.)

EACH SCREEN: DEPTH (NEAREST WHOLE FOOT) FROM 64 TO 69

SLOT SIZE 1. 0.30 2.

DIAMETER OF SCREEN 2 (NEAREST INCH)

FROM TO

GRAVEL PACK

IF WELL DRILLED WAS A FLOWING WELL CIRCLE BOX F

WELL LOG ONLY (NOT TO BE FILLED IN BY DRILLER)

TOTAL SCREEN CASING | LOG INTERVALS | WELL USE

C 3 (SEC. NO.)

PUMPING TEST

HOURS PUMPED (TO NEAREST HOUR) 1

PUMPING RATE GALLONS PER MINUTE TO NEAREST GALLON 10

METHOD USED TO MEASURE PUMPING RATE air

WATER LEVEL (DISTANCE FROM LAND SURFACE)

BEFORE PUMPING 75

AFTER PUMPING 80

TYPE OF PUMP USED (CIRCLE APPROPRIATE BOX FOR PUMPING TEST)

A JET P PISTON T TURBINE C INTERNAL R ROTARY D DRIVEN J JET S SUBMERSIBLE

PUMP INSTALLED

TYPE OF PUMP INSTALLED (CIRCLE APPROPRIATE BOX - S.C. ABOVE)

DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX) Y N

CAPACITY:

GALLONS PER MINUTE (TO NEAREST GALLON) 7

PUMP HORSE POWER 1/3

PUMP COLUMN LENGTH (NEAREST FOOT) 65

CASING HEIGHT (CIRCLE APPROPRIATE BOX AND ENTER CASING HEIGHT)

+ ABOVE - BELOW LAND SURFACE 1 (NEAREST FOOT)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURES SUCH AS BUILDINGS, SEPTIC TANKS, AND/OR OTHER LAND MARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL).

Pitless Adaptor

N

Collins Rd

75 Ft. x Well

House

septic

C 1 3037 — RESOURCE NO. (WRA USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS) (SEQ. NO.)

STATE OF MARYLAND
WATER RESOURCES ADMINISTRATION
TAWES STATE OFFICE BLDG., ANNAPOLIS, MD. 21401
WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY

COUNTY NUMBER

DATE RECEIVED (WRA USE ONLY): DEC 05 1978

DATE WELL COMPLETED: 10-26-78

DEPTH OF WELL: 248 ft (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-13-9729

DRILLERS IDENTIFICATION NO.: 136

OWNER: Queen (LAST NAME) Harry C. (FIRST NAME)

STREET OR RFD: 396 Conaway Rd. POST OFFICE: Odenton, MD 21113

WELL LOG

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING (USE ADDITIONAL SHEETS IF NECESSARY)

DESCRIPTION	FEET FROM	FEET TO	CHECK IF WATER BEARING
rown clay	0	6	
Brown sand	6		
ite clay	35	68	
nd & white clay	68	225	
ium brown nd	225	248	x

WELL DESCRIPTION

GROUTING RECORD
WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX): YES (Y) / NO (N)

TYPE OF GROUT IN MATERIAL (CIRCLE APPROPRIATE BOX): CEMENT (C M) / BENTONITE CLAY (B C)

LBS. OF DRY BENTONITE CLAY: 300

GALLONS OF WATER: 250

DEPTH OF GROUT SEAL (TO NEAREST FOOT): FROM 3 FT. TO 35 FT. (ENTER 0 IF FROM SURFACE)

CASING RECORD
CASING TYPES (INSERT APPROPRIATE CODE BELOW): STEEL (S T) / CONCRETE (C O) / PLASTIC (P L) / OTHER (O T)

MAIN CASING TYPE	NOMINAL DIAMETER TOP (MAIN) CASING (NEAREST INCH)	TOTAL DEPTH OF MAIN CASING (NEAREST FOOT)
P L	4"	243

OTHER CASING (IF USED)
EACH CASING: DIAMETER (INCH) / DEPTH (FEET) FROM / TO

SCREEN RECORD
SCREEN TYPE OR OPEN HOLE (INSERT APPROPRIATE CODE BELOW): STEEL (S T) / BRASS OR BRONZE (B R) / OPEN HOLE (H O) / PLASTIC (P L) / OTHER (O T)

EACH SCREEN: DEPTH (NEAREST WHOLE FOOT) FROM 3 TO 248

SLOT SIZE 1. 0.30 2. 3.

DIAMETER OF SCREEN: 2 (NEAREST INCH)

GRAVEL PACK: FROM TO

IF WELL DRILLED WAS A FLOWING: CIRCLE BOX (F)

WRA USE ONLY (NOT TO BE FILLED IN BY DRILLER) (C.R.O.S.)

TELESCOPE CASING / LOG INDICATOR / 74 75 76 OTHER DATA AVAILABLE

C 3 (SEQ. NO.)

PUMPING TEST
HOURS PUMPED (TO NEAREST HOUR): 1

PUMPING RATE GALLONS PER MINUTE TO NEAREST GALLON: 15

METHOD USED TO MEASURE PUMPING RATE: air

WATER LEVEL (DISTANCE FROM LAND SURFACE)
BEFORE PUMPING: 55 (NEAREST FOOT)

WHEN PUMPING: 60 (NEAREST FOOT)

TYPE OF PUMP USED (CIRCLE APPROPRIATE BOX OR PUMPING TEST)
AIR (A) / PISTON (P) / TURBINE (T) / CENTRIFUGAL (C) / ROTARY (R) / OTHER (DESCRIBE BELOW) (O) / JET (J) / SUBMERSIBLE (S)

PUMP INSTALLED
TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX — SEE ABOVE: A, C, J, P, R, S, T, O): S

DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX): YES (Y) / NO (N)

CAPACITY:

GALLONS PER MINUTE (TO NEAREST GALLON): 12

PUMP HORSE POWER: 1/3

PUMP COLUMN LENGTH (NEAREST FOOT): 100

CASING HEIGHT (CIRCLE APPROPRIATE BOX AND ENTER CASING HEIGHT)
ABOVE (+) / BELOW (−) LAND SURFACE: 1 (NEAREST FOOT)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDINGS, SEPTIC TANKS, AND/OR OTHER LAND MARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL).

Pitless Adaptor

Conaway Rd

+ well

House

Septic

75 Ft.

CIRCLE APPROPRIATE BOXES
WELL WAS ABANDONED AND SEALED WHEN THIS WAS COMPLETED

GEOLOGIC LOG OBTAINED

EXISTING WELL CONVERTED TO PRODUCTION WELL

I CERTIFY THAT I HAVE COMPLIED WITH ALL REQUIREMENTS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE. INFORMATION AND BELIEF.

NAME: Green Drilling Co.

SIGNATURE: H. H. Green

DNR-814 (7-77)

C 1 1038 — SEQUENCE NO. (DNR USE ONLY) — (SEQ. NO.) — THIS NUMBER IS TO BE PUNCHED IN COLS. 3-8 ON ALL CARDS

STATE OF MARYLAND
WATER RESOURCES ADMINISTRATION
TAWES STATE OFFICE BLDG., ANNAPOLIS, MD. 21401
WELL COMPLETION REPORT

THIS REPORT MUST BE SUBMITTED WITHIN 30 DAYS AFTER WELL COMPLETION

FILL IN THIS FORM COMPLETELY

DATE RECEIVED (DNR USE ONLY): NOV 07 1979

DATE WELL COMPLETED: 10-30-79 (10 30 79)

DEPTH OF WELL: 127 ft. (TO NEAREST FOOT)

COUNTY NUMBER

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-174-1350

DRILLERS IDENTIFICATION NO.: 136

OWNER: Snyder (LAST NAME) Lawrence (FIRST NAME)

STREET OR RFD: 2751 Conway Rd. POST OFFICE: Odenton, MD 21113

WELL LOG

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (USE ADDITIONAL SHEETS IF NECESSARY)	FEET FROM	FEET TO	CHECK IF WATER BEARING
Brown sand & gravel	0	30	
White clay	30	41	
Red clay	41	120	
Medium brown sand	120	127	x

WELL DESCRIPTION

GROUTING RECORD
WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX): YES (Y) NO (N)
TYPE OF GROUTING MATERIAL (CIRCLE APPROPRIATE BOX): CEMENT (CM) BENTONITE CLAY (BC)
NO. OF BAGS: 3 NO. OF POUNDS: 300
GALLONS OF WATER: 200
FROM: 3 TO: 30 FT. (ENTER 0 IF FROM SURFACE)

CASING RECORD
CASING TYPES (INSERT APPROPRIATE CODE BELOW): STEEL (ST) CONCRETE (CO) PLASTIC (PL) OTHER (OT)

MAIN CASING TYPE	NOMINAL DIAMETER TOP (MAIN) CASING (NEAREST INCH)	TOTAL DEPTH OF MAIN CASING (NEAREST FOOT)
PL	4"	~~115~~ 122

OTHER CASING (IF USED)

DIAMETER (INCH)	DEPTH (FEET) FROM	TO

SCREEN RECORD
SCREEN TYPE OR OPEN HOLE (INSERT APPROPRIATE CODE BELOW): STEEL (ST) BRASS OR BRONZE (BR) OPEN HOLE (HO) PLASTIC (PL) OTHER (OT)

C 2 (SEQ. NO.)

EACH SCREEN	DEPTH (NEAREST WHOLE FOOT) FROM	TO
1 PL	122	127
2		
3		

SLOT SIZE: 1. 0.30 2. 3.

DIAMETER OF SCREEN: 2 (NEAREST INCH)

GRAVEL PACK: FROM TO

IF WELL DRILLED WAS A FLOWING WELL CIRCLE BOX: (F)

WRA USE ONLY (NOT TO BE FILLED IN BY DRILLER): (E.R.O.S.) TELESCOPE CASING; LOG INDICATOR; OTHER DATA AVAILABLE

C 3 (SEQ. NO.)

PUMPING TEST
HOURS PUMPED (TO NEAREST HOUR): 1
PUMPING RATE (GALLONS PER MINUTE TO NEAREST GALLON): 15
METHOD USED TO MEASURE PUMPING RATE: Air

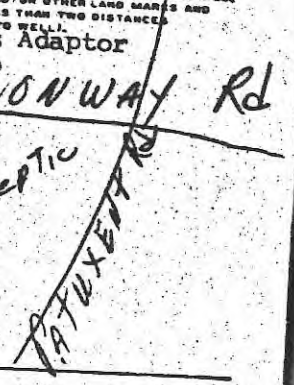
WATER LEVEL: (DISTANCE FROM LAND SURFACE)
BEFORE PUMPING: 40 (NEAREST FOOT)
WHEN PUMPING: 50 (NEAREST FOOT)

TYPE OF PUMPER USED (FOR PUMPING TEST) (CIRCLE APPROPRIATE BOX): AIR (A) PISTON (P) TURBINE (T) CENTRIFUGAL (C) ROTARY (R) OTHER (DESCRIBE BELOW) (O) JET (J) SUBMERSIBLE (S)

PUMP INSTALLER
TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE: A, C, J, P, R, S, T, O): S
DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX): YES (Y) NO (N)
CAPACITY:
GALLONS PER MINUTE (TO NEAREST GALLON): 10
PUMP HORSE POWER: 1/3
PUMP COLUMN LENGTH (NEAREST FOOT): 70

CASING HEIGHT
(CIRCLE APPROPRIATE BOX AND ENTER CASING HEIGHT): (+) ABOVE (-) BELOW LAND SURFACE: 1 (NEAREST FOOT)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDINGS, SEPTIC TANKS, AND/OR OTHER LAND MARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL).



CIRCLE APPROPRIATE BOXES
(A) A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
(E) ELECTRIC LOG OBTAINED
(P) TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL CONDITIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF.

DRILLERS NAME (PLEASE PRINT): H.J. Greer Drilling Co.

SIGNATURE: H.J. Greer

ORIGINAL

STATE OF MARYLAND
WATER RESOURCES ADMINISTRATION
TAWES STATE OFFICE BLDG., ANNAPOLIS, MD. 21401
WELL COMPLETION REPORT

8372 — SEQUENCE NO. (WRA USE ONLY) — (SEQ. NO.) (THIS NUMBER IS TO BE PUNCHED COLS. 3-6 ON ALL CARDS)

THIS REPORT MUST BE SUBMITTED WITHIN 30 DAYS AFTER WELL COMPLETION

FILL IN THIS FORM COMPLETELY

COUNTY NUMBER

DATE RECEIVED (WRA USE ONLY)

DATE WELL COMPLETED: 12-4-80

DEPTH OF WELL: 149 ft (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-74-2508

DRILLERS IDENTIFICATION NO.: 135

OWNER: Neal (LAST NAME) John C. & Mary (FIRST NAME)

STREET OR RFD: 960 Patuxent Rd. POST OFFICE: Odenton, MD 21113

WELL DESCRIPTION

WELL LOG

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (USE ADDITIONAL SHEETS IF NECESSARY)	FEET FROM	FEET TO	CHECK IF WATER BEARING
Brown sand & gravel	0	12	
Blue clay	12	128	
White clay	128	137	
Medium brown sand	137	149	x

GROUTING RECORD

WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX): YES (Y) NO (N)

TYPE OF GROUTING MATERIAL (CIRCLE BOX): CEMENT (C M) BENTONITE CLAY (B C)

NO. OF BAGS: 2 NO. OF POUNDS: 200

GALLONS OF WATER: 100

DEPTH OF GROUT SEAL (TO NEAREST FOOT)

FROM 3 FT. TO 20 FT.

(ENTER 0 IF FROM SURFACE)

CASING RECORD

CASING TYPES (INSERT APPROPRIATE CODE BELOW): STEEL (S T) CONCRETE (C O) PLASTIC (P L) OTHER (O T)

MAIN CASING TYPE	NOMINAL DIAMETER TOP (MAIN) CASING (NEAREST INCH)	TOTAL DEPTH OF MAIN CASING (NEAREST FOOT)
P L	4"	144

OTHER CASING (IF USED)

EACH CASING	DIAMETER (INCH)	DEPTH (FEET) FROM	TO

SCREEN RECORD

SCREEN TYPE OR OPEN HOLE (INSERT APPROPRIATE CODE BELOW): STEEL (S T) BRASS OR BRONZE (B R) OPEN HOLE (H O) PLASTIC (P L) OTHER (O T)

C 2 (SEQ. NO.)

DEPTH (NEAREST WHOLE FOOT)

EACH SCREEN		FROM	TO
1	P L	144	149
2			
3			

SLOT SIZE 1. 0.30 2. 3.

DIAMETER OF SCREEN: 2 (NEAREST INCH)

GRAVEL PACK: FROM TO

IF WELL DRILLED WAS A FLOWING WELL CIRCLE BOX: F

WRA USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T — TELESCOPE CASING; (E.R.O.S.) — LOG INDICATOR; W Q — OTHER DATA AVAILABLE

C 3 (SEQ. NO.)

PUMPING TEST

HOURS PUMPED (TO NEAREST HOUR): 1

PUMPING RATE (GALLONS PER MINUTE TO NEAREST GALLON): 30

METHOD USED TO MEASURE PUMPING RATE: air

WATER LEVEL: (DISTANCE FROM LAND SURFACE)

BEFORE PUMPING: 8 (NEAREST FOOT)

WHEN PUMPING: 25 (NEAREST FOOT)

TYPE OF PUMP USED (CIRCLE APPROPRIATE BOX) (FOR PUMPING TEST)

A AIR; P PISTON; T TURBINE; C CENTRIFUGAL; R ROTARY; O OTHER (DESCRIBE BELOW); J JET; S SUBMERSIBLE

PUMP INSTALLED

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX — SEE ABOVE: A, C, J, P, R, S, T, O): S

DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX): YES (Y) NO (N)

CAPACITY:

GALLONS PER MINUTE (TO NEAREST GALLON): 15

PUMP HORSE POWER: 1/3

PUMP COLUMN LENGTH (NEAREST FOOT): 25

CASING HEIGHT

(CIRCLE APPROPRIATE BOX AND ENTER CASING HEIGHT)

(+) ABOVE / (−) BELOW LAND SURFACE: 1 (NEAREST FOOT)

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDINGS, SEPTIC TANKS, AND/OR OTHER LAND MARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL).

N

Pitless Adaptor.

Well

Patuxent Rd.

CIRCLE APPROPRIATE BOXES

A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

ELECTRIC LOG OBTAINED

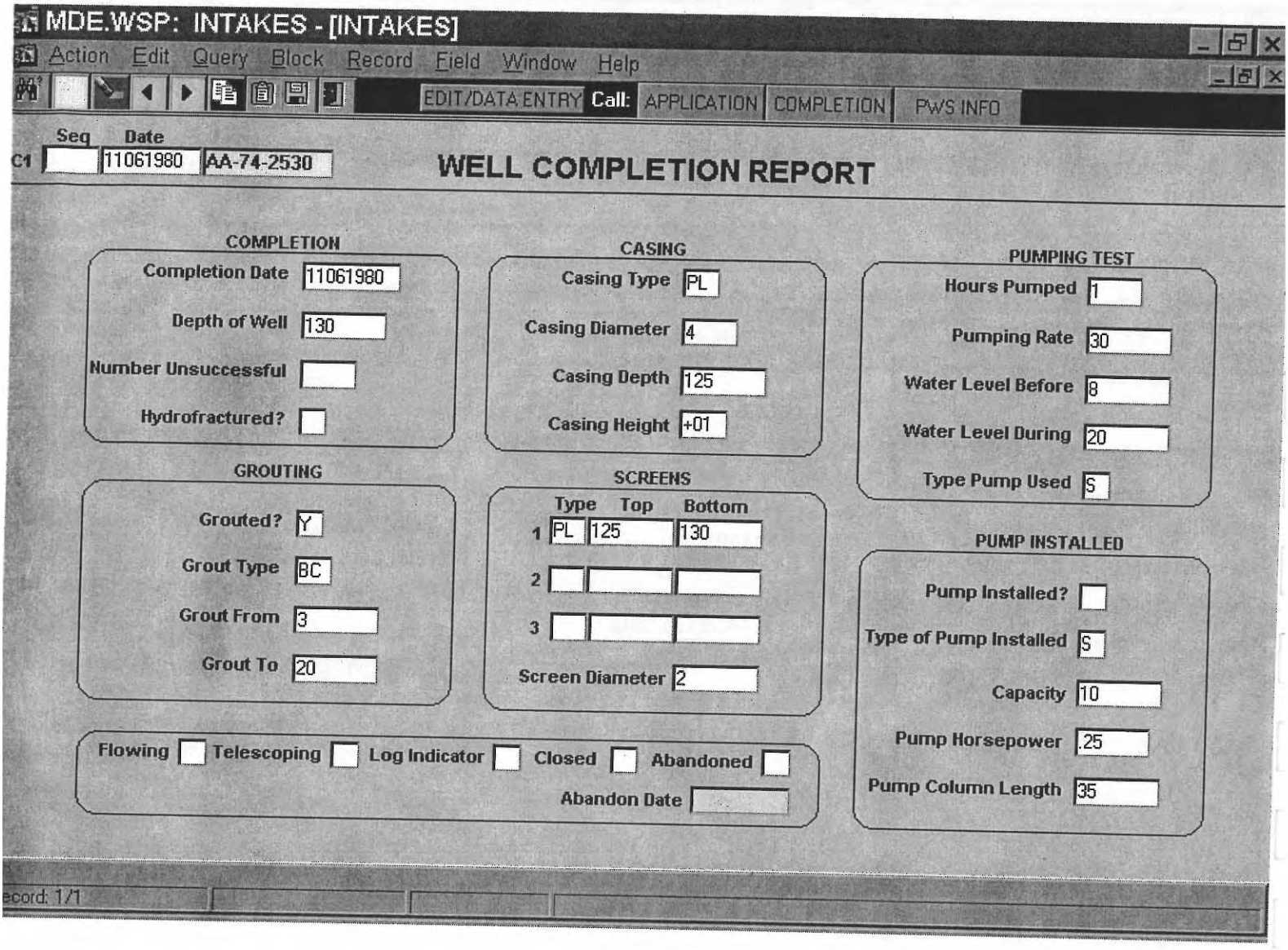
P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL REGULATIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF.

DRILLERS NAME (PRINT): HJ Greer Drilling Co.

SIGNATURE:

HEALTH


MDE.WSP: INTAKES - [INTAKES]
Action Edit Query Block Record Field Window Help
EDIT/DATA ENTRY Call: APPLICATION COMPLETION PWS INFO
Seq Date
C1 11061980 AA-74-2530
WELL COMPLETION REPORT
COMPLETION
Completion Date 11061980
Depth of Well 130
Number Unsuccessful
Hydrofractured?
CASING
Casing Type PL
Casing Diameter 4
Casing Depth 125
Casing Height +01
PUMPING TEST
Hours Pumped 1
Pumping Rate 30
Water Level Before 8
Water Level During 20
Type Pump Used S
GROUTING
Grouted? Y
Grout Type BC
Grout From 3
Grout To 20
SCREENS
Type Top Bottom
1 PL 125 130
2
3
Screen Diameter 2
PUMP INSTALLED
Pump Installed?
Type of Pump Installed S
Capacity 10
Pump Horsepower .25
Pump Column Length 35
Flowing Telescoping Log Indicator Closed Abandoned
Abandon Date
ecord: 1/1

8392 — SEQUENCE NO. (WRA USE ONLY) — (SEQ. NO.) — (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WATER RESOURCES ADMINISTRATION
TAWES STATE OFFICE BLDG., ANNAPOLIS, MD. 21401
WELL COMPLETION REPORT

THIS REPORT MUST BE SUBMITTED WITHIN 30 DAYS AFTER WELL COMPLETION

FILL IN THIS FORM COMPLETELY

COUNTY NUMBER

DATE RECEIVED (WRA USE ONLY)

DATE WELL COMPLETED: 11-24-80

DEPTH OF WELL: 262 ft. (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-74-2523

DRILLERS IDENTIFICATION NO.: 135

OWNER: Truesdale (LAST NAME) Philip & Bonita (FIRST NAME)

STREET OR RFD: 1221 Collins Rd. POST OFFICE: Odenton, MD 21113

WELL DESCRIPTION

WELL LOG

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (USE ADDITIONAL SHEETS IF NECESSARY)	FEET FROM	FEET TO	CHECK IF WATER BEARING
Top soil	0	2	
RED soil	2	80	
Medium brown sand	80	98	
Blue & red clay	98	178	
Fine brown sand	178	237	
White clay	237	251	
Medium brown sand	251	262	x

GROUTING RECORD

WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX): YES [Y] NO [N]

TYPE OF GROUTING MATERIAL (CIRCLE BOX): CEMENT [C M] BENTONITE CLAY [B C]

NO. OF BAGS: 2 NO. OF POUNDS: 200

GALLONS OF WATER: 100

DEPTH OF GROUT SEAL (TO NEAREST FOOT)

FROM 3 FT. TO 20 FT.

(ENTER 0 IF FROM SURFACE)

CASING RECORD

CASING TYPES (INSERT APPROPRIATE CODE BELOW): STEEL [S T] CONCRETE [C O] PLASTIC [P L] OTHER [O T]

MAIN CASING TYPE	NOMINAL DIAMETER TOP (MAIN) CASING (NEAREST INCH)	TOTAL DEPTH OF MAIN CASING (NEAREST FOOT)
P L	4"	257

OTHER CASING (IF USED)

EACH CASING	DIAMETER (INCH)	DEPTH (FEET) FROM	TO

SCREEN RECORD

SCREEN TYPE OR OPEN HOLE (INSERT APPROPRIATE CODE BELOW): STEEL [S T] BRASS OR BRONZE [B R] OPEN HOLE [H O] PLASTIC [P L] OTHER [O T]

C 2 (SEQ. NO.)

DEPTH (NEAREST WHOLE FOOT)

EACH SCREEN		FROM	TO
1	P L	257	262
2			
3			

SLOT SIZE 1. 0.30 2. ____ 3. ____

DIAMETER OF SCREEN: 2 (NEAREST INCH)

GRAVEL PACK: FROM ____ TO ____

IF WELL DRILLED WAS A FLOWING WELL CIRCLE BOX: [F]

CIRCLE APPROPRIATE BOXES

[A] A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

[E] ELECTRIC LOG OBTAINED

[P] TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL CONDITIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF.

DRILLERS NAME (PLEASE PRINT): HJ Greer Drilling Co.

SIGNATURE: Howard Greer

WRA USE ONLY. (NOT TO BE FILLED IN BY DRILLER)

TELESCOPE CASING	LOG INDICATOR (E.R.O.S.)	OTHER DATA AVAILABLE
T		W Q

C 3 (SEQ. NO.)

PUMPING TEST

HOURS PUMPED (TO NEAREST HOUR): 1

PUMPING RATE (GALLONS PER MINUTE TO NEAREST GALLON): 15

METHOD USED TO MEASURE PUMPING RATE: Air

WATER LEVEL: (DISTANCE FROM LAND SURFACE)

BEFORE PUMPING: 110 (NEAREST FOOT)

WHEN PUMPING: 120 (NEAREST FOOT)

TYPE OF PUMP USED (CIRCLE APPROPRIATE BOX) (FOR PUMPING TEST)

AIR [A] PISTON [P] TURBINE [T] CENTRIFUGAL [C] ROTARY [R] OTHER (DESCRIBE BELOW) [O] JET [J] SUBMERSIBLE [S]

PUMP INSTALLED

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX — SEE ABOVE: A, C, J, P, R, S, T, O): S

DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX): YES [Y] NO [N]

CAPACITY:

GALLONS PER MINUTE (TO NEAREST GALLON): 10

PUMP HORSE POWER: 1/2

PUMP COLUMN LENGTH (NEAREST FOOT): 140

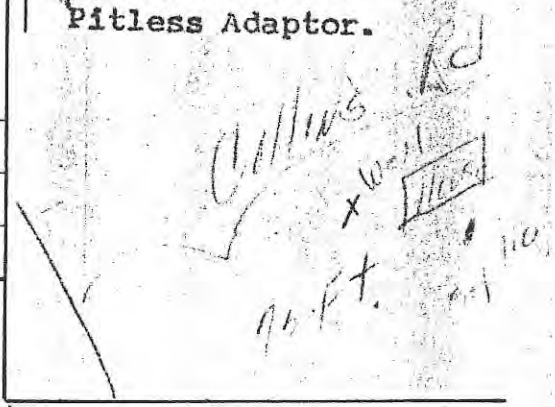
CASING HEIGHT (CIRCLE APPROPRIATE BOX AND ENTER CASING HEIGHT)

[+] ABOVE / [−] BELOW LAND SURFACE: 1 (NEAREST FOOT)

LOCATION OF WELL ON LOT

N ↑ SHOW PERMANENT STRUCTURE SUCH AS BUILDINGS, SEPTIC TANKS, AND/OR OTHER LAND MARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL).

Pitless Adaptor.



HEALTH

C 1 7166 SEQUENCE NO. (WRA USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 OF ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 30 DAYS AFTER WELL IS COMPLETED

COUNTY NUMBER

Date Received (WRA use only)

DATE WELL COMPLETED 3-9-81

Depth of Well 207 ft. (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-74-2847

OWNER Durham (last name) George B. & Ellen K. (first name)

STREET OR RFD 977 Patuxent Road TOWN Odenton, MD 21113

SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Sand & gravel	0	10	
Red clay	10	152	
Fine brown sand with thin layers of white clay.	152	187	
Blue clay	187	198	
Medium brown sand	198	207	x

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) YES [Y] NO [N]

TYPE OF GROUTING MATERIAL

CEMENT [C M] BENTONITE CLAY [B C]

NO. OF BAGS 2 NO. OF POUNDS 100

GALLONS OF WATER

DEPTH OF GROUT SEAL (to nearest foot) from 3 ft. to 20 ft.
(enter 0 if from surface)

CASING RECORD
casing types — insert appropriate code below

[S T] STEEL [C O] CONCRETE [P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter top(main)casing (nearest inch)	Total depth of main casing (nearest foot)
P L	4"	202

EACH CASING — OTHER CASING (if used)

	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below

[S T] STEEL [B R] BRASS, BRONZE [H O] OPEN HOLE [P L] PLASTIC [O T] OTHER

C 2 (seq. no.)

EACH SCREEN		DEPTH (nearest ft.)	
	P L	202	207
2			
3			

SLOT SIZE 0.30

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from to

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX [F]

C 3 (seq no)

PUMPING TEST
HOURS PUMPED (nearest hour) 1

PUMPING RATE (gal. per min. to nearest gal.) 25

METHOD USED TO MEASURE PUMPING RATE air

WATER LEVEL (distance from land surface)

BEFORE PUMPING 8

WHEN PUMPING 15

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX) YES [Y] NO [N]

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE) (A, C, J, P, R, S, T, O) [S]

CAPACITY:
GALLONS PER MINUTE (to nearest gallon) 15

PUMP HORSE POWER 1/3

PUMP COLUMN LENGTH (nearest ft) 40

CASING HEIGHT (circle appropriate box and enter casing height)
[+] above [−] below LAND SURFACE 1 (nearest foot)

CIRCLE APPROPRIATE BOX
[A] A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
[E] ELECTRIC LOG OBTAINED
[P] TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL CONDITIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF.

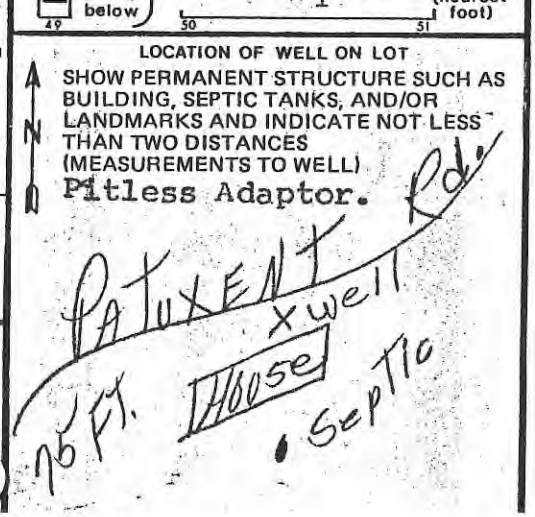
DRILLERS IDENT. NO. 135

DRILLERS SIGNATURE Elmer W. Greer
MUST MATCH SIGNATURE ON APPLICATION

HJ Greer Drilling
SITE SUPERVISOR (sign of driller or journeyman responsible for sitework if different from permittee)

WRA USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
[ ] TELESCOPE CASING [ ] LOG INDICATOR [ ] OTHER D

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



SEQUENCE NO. (OEP USE ONLY)

NUMBER IS TO BE PUNCHED COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

Date Received (OEP use only)

DATE WELL COMPLETED: 1 20 32

Depth of Well: 81 ft. (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-81-0049

OWNER: Zuknick (last name) Ernest (first name)

STREET OR RFD: 1122 Bragers Rd. TOWN: Odenton, MD 21113

SUBDIVISION: SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown sand	0	16	
White clay	16	25	
Red clay	25	48	
Blue clay	48	60	
tan sand	60	81	x

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y / no N

TYPE OF GROUTING MATERIAL

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 2 NO. OF POUNDS 100

GALLONS OF WATER 50

DEPTH OF GROUT SEAL (to nearest foot) from 0 ft. (enter 0 if from surface) to 20 ft.

CASING RECORD
casing types — insert appropriate code below

ST STEEL; CO CONCRETE; PL PLASTIC; OT OTHER

MAIN CASING TYPE	Nominal diameter top(main)casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4"	76

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below

ST STEEL; BR BRASS, BRONZE; HO OPEN HOLE; PL PLASTIC; OT OTHER

C 2 (seq. no.)

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	76	81
2			
3			

SLOT SIZE 0.30

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from to

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX F

C 3 (seq no.)

PUMPING TEST
HOURS PUMPED (nearest hour) 1

PUMPING RATE (gal. per min. to nearest gal.) 12

METHOD USED TO MEASURE PUMPING RATE: air

WATER LEVEL (distance from land surface)

BEFORE PUMPING 40

WHEN PUMPING 50

TYPE OF PUMP USED (for test)

A air; P piston; T turbine; C centrifugal; R rotary; O other (describe below); J jet; S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX) YES Y / NO N

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE): (A, C, J, P, R, S, T, O) S

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10

PUMP HORSE POWER 1/3

PUMP COLUMN LENGTH (nearest ft.) 60

CASING HEIGHT (circle appropriate box and enter casing height)

+ above; − below — LAND SURFACE 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N

Well

CIRCLE APPROPRIATE BOX

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 136

Harold W Greer

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

IJ Greer Drilling Co.

SITE SUPERVISOR (sign of driller or journeyman responsible for sitework if different from permittee)

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.)

TELESCOPE CASING; LOG INDICATOR; W Q OTHER DATA

HEALTH

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

45 DAYS AFTER WELL IS COMPLETED

COUNTY NUMBER 00

Date Received (OEP use only)

DATE WELL COMPLETED 3-17-83

Depth of Well 238 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-81-0820

OWNER Cher Chris Construction Co.

STREET OR RFD 10519 York Rd. TOWN Cockeysville, MD. 21030

SUBDIVISION Wilson Town SECTION 1264 Lucinda Lane LOT 2

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown clay	0	6	
White clay	6	25	
Gravel	25	40	
Red, white clay	40	75	
White sand	75	100	
Red clay	100	170	
Gray clay	170	225	
White sand	225	238	X

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) YES (Y) NO (N)

TYPE OF GROUTING MATERIAL

CEMENT (CM) BENTONITE CLAY (BC)

NO. OF BAGS 1 NO. OF POUNDS 100

GALLONS OF WATER 50

DEPTH OF GROUT SEAL (to nearest foot) from 3 ft. to 30 ft.
(enter 0 if from surface)

CASING RECORD
casing types - insert appropriate code below

(ST) STEEL (CO) CONCRETE (PL) PLASTIC (OT) OTHER

MAIN CASING TYPE: PL

Nominal diameter top(main)casing (nearest inch): 4

Total depth of main casing (nearest foot): 231

EACH CASING — OTHER CASING (if used)

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or openhole - insert appropriate code below

(ST) STEEL (BR) BRASS, BRONZE (HO) OPEN HOLE (PL) PLASTIC (OT) OTHER

C 2 (seq. no.)

EACH SCREEN

	DEPTH (nearest ft.)	
PL	231	238

SLOT SIZE 030

DIAMETER OF SCREEN 2" (NEAREST INCH)

GRAVEL PACK from 226 to 238

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX (F)

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING LOG INDICATOR OTHER DATA

C 3 (seq. no.)

PUMPING TEST
HOURS PUMPED (nearest hour) 2½

PUMPING RATE (gal. per min. to nearest gal.) 30

METHOD USED TO MEASURE PUMPING RATE AIR

WATER LEVEL (distance from land surface)

BEFORE PUMPING 108

WHEN PUMPING 130'

TYPE OF PUMP USED (for test)

(A) air (P) piston (T) turbine

(C) centrifugal (R) rotary (O) other (describe below)

(J) jet (S) submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX) YES (Y) NO (N)

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE: (A, C, J, P, R, S, T, O) S

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 7

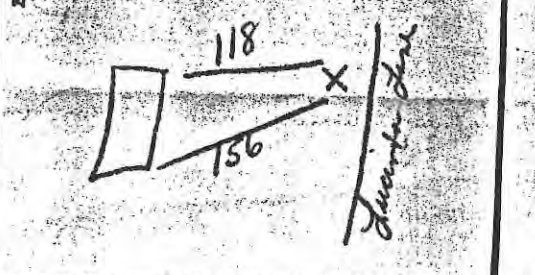
PUMP HORSE POWER 1/3

PUMP COLUMN LENGTH (nearest ft.) 140

CASING HEIGHT (circle appropriate box and enter casing height)

(+) above (−) below LAND SURFACE 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



CIRCLE APPROPRIATE BOX

(A) A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

(E) ELECTRIC LOG OBTAINED

(P) TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 288

DRILLERS SIGNATURE Denton J. Wolford

MUST MATCH SIGNATURE ON APPLICATION

Denton J. Wolford

SITE SUPERVISOR (sign of driller or journeyman responsible for sitework if different from permittee)

HEALTH

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER

DATE WELL COMPLETED: 12/16/82

Depth of Well: 300 ft. (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-81-1176

OWNER: Contee, Lucinda (last name, first name)

STREET OR RFD: 1255 Collins Ave. TOWN: Odenton, MD 21113

SUBDIVISION: SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown sand	0	6	
Brown clay	6	10	
Brown sand	10	21	
White clay	21	45	
Brown sand	45	75	
Red clay	75	122	
White clay	122	180	
Red clay	180	227	
White clay	227	250	
Fine brown sand	250	277	
Coarse brown sand	277	300	x

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box): YES (Y) NO (N)

TYPE OF GROUTING MATERIAL: CEMENT (CM) BENTONITE CLAY (BC)

NO. OF BAGS: 2 NO. OF POUNDS: 100

GALLONS OF WATER: 50

DEPTH OF GROUT SEAL (to nearest foot): from 3 ft. (enter 0 if from surface) to 25 ft.

CASING RECORD
casing types — insert appropriate code below: STEEL (ST), CONCRETE (CO), PLASTIC (PL), OTHER (OT)

MAIN CASING TYPE	Nominal diameter (top/main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4"	295

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below: STEEL (ST), BRASS, BRONZE (BR), OPEN HOLE (HO), PLASTIC (PL), OTHER (OT)

C 2 (seq. no.)

EACH SCREEN	TYPE	DEPTH (nearest ft.)	
1	PL	295	300
2			
3			

SLOT SIZE: 0.30

DIAMETER OF SCREEN: 2 (NEAREST INCH)

GRAVEL PACK: from to

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX: (F)

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING | LOG INDICATOR | OTHER DATA

C 3 (seq no)

PUMPING TEST
HOURS PUMPED (nearest hour): 1

PUMPING RATE (gal. per min. to nearest gal.): 25

METHOD USED TO MEASURE PUMPING RATE: air

WATER LEVEL (distance from land surface)

BEFORE PUMPING: 125

WHEN PUMPING: 140

TYPE OF PUMP USED (for test)

(A) air (P) piston (T) turbine (C) centrifugal (R) rotary (O) other (describe below) (J) jet (S) submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX): YES (Y) NO (N)

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE): (A, C, J, P, R, S, T, O) S

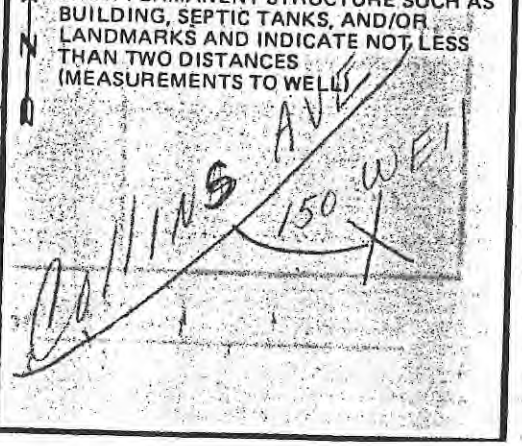
CAPACITY: GALLONS PER MINUTE (to nearest gallon): 15

PUMP HORSE POWER: 1/2

PUMP COLUMN LENGTH (nearest ft.): 200'

CASING HEIGHT (circle appropriate box and enter casing height): (+) above (−) below LAND SURFACE: 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



CIRCLE APPROPRIATE BOX
(A) A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

(E) ELECTRIC LOG OBTAINED

(P) TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 331

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION): John H. Greer

HJ Greer Drilling Co.

SITE SUPERVISOR (sign of driller or journeyman responsible for sitework if different from permittee)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 36 ON ALL CARDS) 5221

FILL IN THIS FORM COMPLETELY PLEASE PRINT OR TYPE

COUNTY NUMBER

Date Received (OEP use only) MAY 31 1983

DATE WELL COMPLETED 12 31 82

Depth of Well 205 (TO NEAREST FOOT)

PERMIT NUMBER FROM PERMIT TO DRILL AA-81-1194

OWNER Chidley Marcus (last name, first name)

STREET OR RFD 1284 Collins Ave. TOWN Gibsonia

SUBDIVISION SECTION LOT

WELL LOG

Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown clay	0	11	
Brown sand	11	23	
Red clay	23	50	
Brown sand	50	90	
White clay	90	125	
Red clay	125	177	
White clay	177	190	
Medium brown sand	190	205	x

GROUTING RECORD

WELL HAS BEEN GROUTED (Circle Appropriate Box) (Y) N

TYPE OF GROUTING MATERIAL

CEMENT [C M] BENTONITE CLAY [B C]

NO. OF BAGS ____ NO. OF POUNDS ____

GALLONS OF WATER 50

DEPTH OF GROUT SEAL (to nearest foot)

from 3 ft. to 25 ft.

(enter 0 if from surface)

CASING RECORD

casing types (insert appropriate code below)

[S T] STEEL [C O] CONCRETE [P L] PLASTIC [O T] OTHER

MAIN CASING TYPE	Nominal diameter (main casing) (nearest inch)	Total depth of main casing (nearest foot)
P L	4"	200

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD

screen type or open hole (insert appropriate code below)

[S T] STEEL [B R] BRASS, BRONZE [H O] OPEN HOLE [P L] PLASTIC [O T] OTHER

C 2 (seq no.)

EACH SCREEN	DEPTH (nearest ft.)	
	from	to
P L	200	205

SLOT SIZE 0.30

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from ____ to ____

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX [F]

C 3 (seq no.)

PUMPING TEST

HOURS PUMPED (nearest hour) 1

PUMPING RATE (gal. per min. to nearest gal.) 20

METHOD USED TO MEASURE PUMPING RATE

WATER LEVEL distance from land surface

BEFORE PUMPING 110

WHEN PUMPING 120

TYPE OF PUMP USED (or test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet (S) submersible

PUMP INSTALLED

DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX) (YES) Y NO N

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE (A, C, J, P, R, S, T, O) [S]

CAPACITY - GALLONS PER MINUTE (to nearest gallon) 10

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.) 160

CASING HEIGHT (circle appropriate box and enter casing height) (+) above LAND SURFACE (−) below (nearest foot)

CIRCLE APPROPRIATE BOX

[A] A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

[E] ELECTRIC LOG OBTAINED

[P] TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO 33?

John C Greer

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

HJ Greer Drilling Co.

SITE SUPERVISOR (sign of driller or journeyman responsible for sitework if different from permittee)

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W

TELESCOPE CASING LOG INDICATOR OTHER DATA

LOCATION OF WELL ON LOT

SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N

X Well

Driveway

ORIGINAL

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER: 02

WELL COMPLETED: 04 15 83

Depth of Well: 72' (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-81-158C

last name: ROLLING, George — first name

STREET OR RFD: 2987 Conway Rd. TOWN: Odenton

SUBDIVISION: SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Top Soil	0	2	
Red Sand, Gravel	2	12	
White Clay	12	18	
Red Clay	18	34	
Gray Sand Fine	34	60	
Coarse Red Sand	60	72	

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box): YES (Y) NO (N)

TYPE OF GROUTING MATERIAL

CEMENT [CM] BENTONITE CLAY [BC]

NO. OF BAGS 3 NO. OF POUNDS 150

GALLONS OF WATER 175

DEPTH OF GROUT SEAL (to nearest foot) from 3 ft. to 30 ft.
(enter 0 if from surface) TOP BOTTOM

CASING RECORD
casing types — insert appropriate code below:
[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top(main)casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4"	67

OTHER CASING (if used)
EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below:
[ST] STEEL [BR] BRASS, BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2 (seq no)

EACH SCREEN

	TYPE	DEPTH (nearest ft.)
1	PL	60 to 72
2		
3		

SLOT SIZE .030

DIAMETER OF SCREEN 4" (NEAREST INCH)

GRAVEL PACK from 58 to 72

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX [F]

C 3 (seq no)

PUMPING TEST
HOURS PUMPED (nearest hour) 3

PUMPING RATE (gal. per min. to nearest gal.) 18

METHOD USED TO MEASURE PUMPING RATE: Air

WATER LEVEL (distance from land surface)

BEFORE PUMPING 40

WHEN PUMPING 51

TYPE OF PUMP USED (for test)
[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX): YES (Y) NO (N)

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE: (A, C, J, P, R, S, T, O): 6

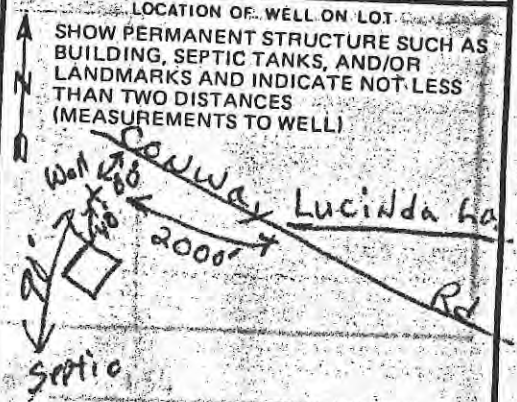
CAPACITY:
GALLONS PER MINUTE (to nearest gallon) 10

PUMP HORSE POWER 1.5

PUMP COLUMN LENGTH (nearest ft.) 72

CASING HEIGHT (circle appropriate box and enter casing height)
[+] above [−] below LAND SURFACE (nearest foot) 1

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



CIRCLE APPROPRIATE BOX
- WELL WAS ABANDONED AND SEALED
- WHEN THIS WELL WAS COMPLETED
- ELECTRIC LOG OBTAINED
- TEST WELL CONVERTED TO PRODUCTION WELL

I CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 134

DRILLERS SIGNATURE
MUST MATCH SIGNATURE ON APPLICATION

SUPERVISOR (sign of driller or journeyman responsible for sitework if different from permittee)

OEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING | LOG INDICATOR | OTHER DATA

HEALTH

C 1 4195 SEQUENCE NO (OEP USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

COUNTY NUMBER 02

PERMIT NO. FROM HDPW TO DPW HA-81-2032

DATE Received SEP 8 1983

DATE WELL COMPLETED 8 5 83

Depth of Well 94 ft (TO NEAREST FOOT)

OWNER Blackman (last name) Earl (first name)

STREET OR RFD Rt.1 Box 363 TOWN Odenton, MD 21113

SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown sand and gravel	0	23	
Red clay	23	40	
White clay	40	55	
Gray clay	55	85	
Coarse brown sand	85	94	x

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) (Y) N

TYPE OF GROUTING MATERIAL

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 2 NO. OF POUNDS 100

GALLONS OF WATER 50

DEPTH OF GROUT SEAL (to nearest foot)

from 3 ft. (TOP) to 24 ft. (BOTTOM)

(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	84

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	84	94
2			
3			

SLOT SIZE 0.30

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from _____ to _____

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 1

PUMPING RATE (gal. per min to nearest gal.) 25

METHOD USED TO MEASURE PUMPING RATE _____

WATER LEVEL (distance from land surface)

BEFORE PUMPING 20

WHEN PUMPING 30

TYPE OF PUMP USED (for test)

A air P piston T turbine

C centrifugal R rotary O other (describe below)

J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10

PUMP HORSE POWER .33

PUMP COLUMN LENGTH (nearest ft.) 50

CASING HEIGHT (circle appropriate box and enter casing height)

(+) above / (−) below LAND SURFACE 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN COMPLIANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREON IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS INITIAL NO. _____

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

BJ Greer Drilling Co.

SITE SUPERVISOR (sign, if driller or journeyman responsible for sitework if different from permittee)

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) WQ

TELESCOPE CASING LOG INDICATOR OTHER DATA

1 7305 SEQUENCE NO. (OEP USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

DATE Received

DATE WELL COMPLETED 10 2 7 83

Depth of Well 215 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-81-2350

OWNER mack John (last name, first name)

STREET OR RFD Conway Road TOWN Crofton

SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
brown clay	0	6	
brown sand	6	25	
red clay	25	68	
white clay	68	88	
red clay	88	110	
rock	110	111	
red clay	111	190	
white clay	190	237	
med brown sand	237	245	x

140

CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

F ELECTRIC LOG OBTAINED

TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 337

John E Green
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 2 NO. OF POUNDS 100

GALLONS OF WATER 50

DEPTH OF GROUT SEAL (to nearest foot)

from 4 ft. TOP to 27 ft. BOTTOM

(enter 0 if from surface)

CASING RECORD
casing types — Insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	225

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — Insert appropriate code below

ST STEEL BR BRASS BRONZE PL PLASTIC HO OPEN HOLE OT OTHER

C2

EACH SCREEN	DEPTH (nearest ft.)	
1	PL	225 to 245
2		
3		

SLOT SIZE 1 .020 2 3

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 225 to 245

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

OEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T TELESCOPE CASING

(E.R.O.S.) LOG INDICATOR

WQ OTHER DATA

C3

PUMPING TEST
HOURS PUMPED (nearest hour) 8

PUMPING RATE (gal. per min. to nearest gal.) 15

METHOD USED TO MEASURE PUMPING RATE AIR

WATER LEVEL (distance from land surface)

BEFORE PUMPING 140

WHEN PUMPING 150

TYPE OF PUMP USED (for test)

A air P piston T turbine

C centrifugal R rotary O other (describe below)

J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 45

PUMP HORSE POWER .50

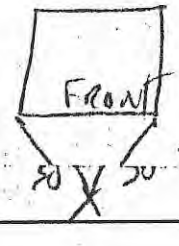
PUMP COLUMN LENGTH (nearest ft.) 180

CASING HEIGHT (circle appropriate box and enter casing height)

+ above / − below LAND SURFACE 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N



AA-81 2492

B 1 3147 SEQUENCE NO (DEP USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 1-5 ON ALL CARDS)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL A WELL

(PRINT OR TYPE)

Date Received: 11/2/83

OWNER INFORMATION

Ward Chris Adams
Last Name First Name

7654 Lucinda Lane
Number & Street

Glen Burnie MD 21061
Town State Zip

B 3

Anne Arundel
County

SW 1/4 of SW 1/4 of Sec. 15

SECTION 15 LOT 24

Glen Burnie
Nearest Town

MILES FROM TOWN (nearest town)

DRILLER INFORMATION

Denton J. Wolford 38
Driller's Name (Driller's License No.)

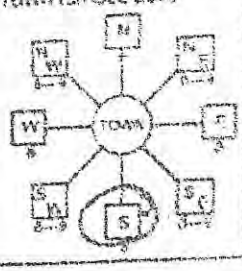
Wolford's Well & Pump Service, Inc.
Firm Name

M29 Mountain Rd., Pasadena, MD. 21122
Address

Denton J. Wolford 12-26-83
Signature Date

S 4

DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



(IN WHICH SIDE OF ABOVE SQUARE IS WELL LOCATED)

B 2

WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN.) 20

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY) 300

USE FOR WATER (CIRCLE APPROPRIATE BOX)

D HOME (SINGLE OR DOUBLE HOUSEHOLD UNIT ONLY)
F FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION)
I INDUSTRIAL, COMMERCIAL, STATE AND FEDERAL GOV. OTHER (REQUIRES APPROPRIATION PERMIT)
P PUBLIC OR PRIVATE WATER COMPANY (REQUIRES APPROPRIATION PERMIT AND STATE HEALTH DEPARTMENT APPROVAL)
T TEST, OBSERVATION, MONITORING (MAY REQUIRE APPROPRIATION PERMIT)

NOT TO BE FILLED IN BY (PUBLIC) HEALTH DEPARTMENT APPROVAL

Anne Arundel
COUNTY NAME

OSP SIGNATURE

DATE ISSUED 11/8/83

NORTH GRID 42600 EAST GRID 57600

APPROXIMATE DEPTH OF WELL 250 feet

APPROXIMATE DIAMETER OF WELL 6 inches

METHOD OF DRILLING (CIRCLE ONE)

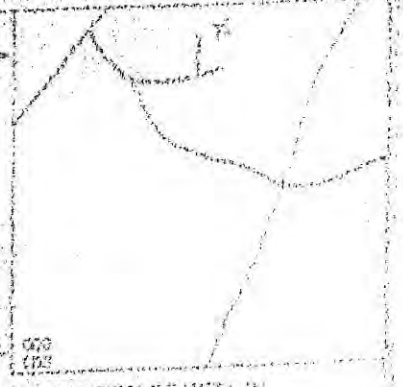
BORED (or Augered) JETTED Jetted & DRIVEN
AIR-ROTary AIR-Percussion ROTARY (Hydraulic Rotary)
CABLE REVerse-ROTary DRIVE-POINT
Other

SHOW MAJOR FEATURES ON BOX & LOCATE WELL WITH AN X

SOURCES OF DRILLING WATER
1. A.A.-81-0360
2. County Water
3.

WRITE THE BOX NUMBER FROM THE MAP HERE

E 870
N 430

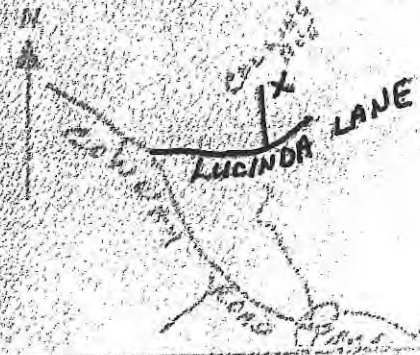


REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)

N THIS WELL WILL NOT REPLACE AN EXISTING WELL
R THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
S THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY
D THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE)

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



(TO BE FILLED IN BY WATER APPROPRIATION PERMIT SECTION ONLY)

APPROP. PERMIT NUMBER

POWER (HP) WATER APPROP. PERMIT NO.

SPECIAL CONDITIONS

C1 6330 SEQUENCE NO. (DEP USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT IS DUE 15 DAYS AFTER DRILLING

COUNTY NUMBER 03

FROM PERMIT NO. AA-81-2492

DATE Received: MAY 14 84

DATE WELL COMPLETED: 03 22 84

Depth of Well: 278 (TO NEAREST FOOT)

OWNER Cher Chris Construction (last name) (first name) TOWN Cockeysville, MD

STREET OR RFD 10519 York Rd.

SUBDIVISION Odenton SECTION LOT 38

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown clay	0	4	
Brown sand	4	10	
White clay	10	23	
Red & white clay mixed	23	30	
Brown sand	30	41	
Red, white & gray clay mixed	41	60	
Red clay	60	94	
White, brown sand	94	110	
White clay	110	121	
Red, white, gray clay mixed	121	265	
Brown & white sand mixed	265	278	X

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box): (Y) N

TYPE OF GROUTING MATERIAL

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 1 NO. OF POUNDS 180

GALLONS OF WATER 50

DEPTH OF GROUT SEAL (to nearest foot)

from 3 ft. to 36 ft. (enter 0 if from surface)

CASING RECORD
(casing types - insert appropriate code below)

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	271

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
(screen type or open hole - insert appropriate code below)

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

EACH SCREEN	DEPTH (nearest ft.)	
1	PL 271	278
2		
3		

SLOT SIZE .032

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 246 to 278

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 58

CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH GOOD SANITARY WELL CONSTRUCTION AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE SYNOPSIZED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLER'S AGENT, NO. 250

DRILLER'S SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION) Denton T. Ballard

BUT SUBMISSION OF WRONG LOG OF DRILLER OR FOREMAN RESPONSIBLE FOR DRILLING IF DIFFERENT FROM PERMITTEE

DEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

(E.R.O.S.) WO

TELESCOPE CASING | LOG INDICATOR | OTHER DATA

C3

PUMPING TEST

HOURS PUMPED (nearest hour) 1

PUMPING RATE (GPM) AND METHOD (nearest gal.) 50 BAIL

METHOD USED TO MEASURE PUMPING RATE BAIL

WATER LEVEL (distance from land surface)

BEFORE PUMPING 110

WHEN PUMPING 136

TYPE OF PUMP USED (for test)

A air P piston T hydraulic

C centrifugal R rotary O other (explain below)

J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (YES) NO (CIRCLE) (YES or NO)

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE:

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10

PUMP HORSE POWER .50

PUMP COLUMN LENGTH (nearest ft.) 190

CASING HEIGHT (circle appropriate box and enter casing height)

(+) above } LAND SURFACE (-) below } 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



ORIGINAL

SEQUENCE NO. (OEP USE ONLY)

6

ER IS TO BE PUNCHED 6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

DATE Received (8–13)

DATE WELL COMPLETED 09/28/89 (15–20)

Depth of Well (TO NEAREST FOOT) 182 (22–26)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-81-3754 (28–37)

OWNER Queen C. Andrew.
last name first name

STREET OR RFD P.O. Box 351 TOWN GAMBRILLS. MD 2105

SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
BROWN CLAY	0	7	
RED CLAY	7	14	
BROWN SAND	14	26	
Red CLAY	26	60	
BROWN SAND	60	100	
RED CLAY	100	150	
white CLAY	150	162	
MEDIUM BROWN SAND	162	182	X

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) (yes) Y (44) · no N (44)

TYPE OF GROUTING MATERIAL

CEMENT CM (45–46) BENTONITE CLAY BC (45–46)

NO. OF BAGS 6 NO. OF POUNDS 300

GALLONS OF WATER 150

DEPTH OF GROUT SEAL (to nearest foot)

from 3 (48) ft. TOP (52) to 21 (54) ft. BOTTOM (58)

(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

ST STEEL · CO CONCRETE · PL PLASTIC · OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
DL (60–61)	4 (63–64)	177 (66–70)

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below

ST STEEL · BR BRASS BRONZE · HO OPEN HOLE · PL PLASTIC · OT OTHER

C 2 (1–2)

EACH SCREEN		DEPTH (nearest ft.)	
1	DL (8–9)	177 (11–15)	182 (17–21)
2	(23–24)	(26–30)	(32–36)
3	(38–39)	(41–45)	(47–51)

SLOT SIZE 1 .020 2 3

DIAMETER OF SCREEN 2 (56–60) (NEAREST INCH)

GRAVEL PACK from to

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 (68)

C 3 (1–2)

PUMPING TEST
HOURS PUMPED (nearest hour) 2 (8–9)

PUMPING RATE (gal. per min. to nearest gal.) 17 (11–15)

METHOD USED TO MEASURE PUMPING RATE AIR

WATER LEVEL (distance from land surface)

BEFORE PUMPING 95 (17–20)

WHEN PUMPING 105 (22–25)

TYPE OF PUMP USED (for test)

A air (27) · P piston (27) · T turbine (27)

C centrifugal (27) · R rotary (27) · O other (describe below) (27)

J jet (27) · S submersible (27)

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX-SEE ABOVE: S (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 17 (31–35)

PUMP HORSE POWER 3.0 (37–41)

PUMP COLUMN LENGTH (nearest ft.) 130 (43–47)

CASING HEIGHT (circle appropriate box and enter casing height)

+ above (49) · – below (49) — LAND SURFACE

1 (50–51) (nearest foot)

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 337

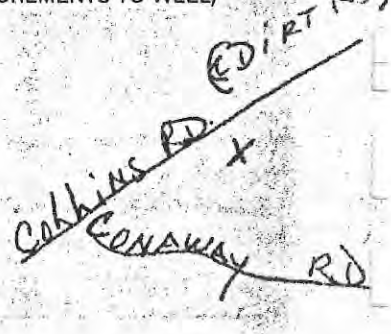
John E. Green

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N



OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (70) (E.R.O.S.) (72) WQ (74–76)

TELESCOPE CASING · LOG INDICATOR · OTHER DATA

C 1 06582 SEQUENCE NO. (OEP USE ONLY)
1 2 3 6
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

DATE Received 8 13

DATE WELL COMPLETED 0 9 2 5 8 5 (15 20)

Depth of Well 22 5 5 ~ 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-181-1535 (28 29 30 31 32 33 34 35 36 37)

OWNER BOTTS (last name) PEARL (first name)

STREET OR RFD 2825 5th Avenue TOWN Odenton

SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Sand & Gravel	0	8	
Brown Sand	8	23	
Red Clay	23	45	
Medium Brown Sand	45	55	X

CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 337

X _____
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y (44) no N (44)
TYPE OF GROUTING MATERIAL
CEMENT C M (45 46) BENTONITE CLAY B C (45 46)
NO. OF BAGS 4 NO. OF POUNDS 250
GALLONS OF WATER 100
DEPTH OF GROUT SEAL (to nearest foot)
from 3 (48) ft. TOP (52) to 25 (54) ft. BOTTOM (58)
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
S T STEEL; C O CONCRETE; P L PLASTIC; O T OTHER

MAIN CASING TYPE: P L (60 61)
Nominal diameter top (main) casing (nearest inch): 4 (63 64)
Total depth of main casing (nearest foot): 50 (66 70)

EACH CASING — OTHER CASING (if used)

	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — Insert appropriate code below
S T STEEL; B R BRASS BRONZE; H O OPEN HOLE; P L PLASTIC; O T OTHER

C 2 (1 2)

EACH SCREEN		DEPTH (nearest ft.)	
1	P L (8 9)	50 (11 15)	55 (17 21)
2	(23 24)	(26 30)	(32 36)
3	(38 39)	(41 45)	(47 51)

SLOT SIZE 1 0 2 20 3
DIAMETER OF SCREEN 2 (56 60) (NEAREST INCH)

GRAVEL PACK from 45 to 55
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 (68)

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (70) TELESCOPE CASING
(E.R.O.S.) (72) LOG INDICATOR
WQ (74 75 76) OTHER DATA

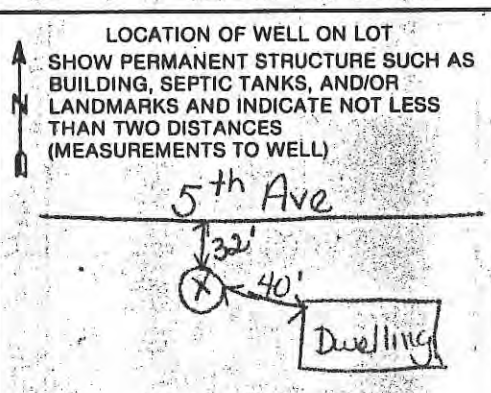
C 3 (1 2)

PUMPING TEST
HOURS PUMPED (nearest hour) 1 (8 9)
PUMPING RATE (gal. per min. to nearest gal.) 10 (11 15)
METHOD USED TO MEASURE PUMPING RATE Air
WATER LEVEL (distance from land surface)
BEFORE PUMPING 13 (17 20)
WHEN PUMPING 20 (22 25)

TYPE OF PUMP USED (for test)
A air (27); P piston (27); T turbine (27)
C centrifugal (27); R rotary (27); O other (describe below) (27)
J jet (27); S submersible (27)

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S (29)
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10 (31 35)
PUMP HORSE POWER 3.5 (37 41)
PUMP COLUMN LENGTH (nearest ft.) 40 (43 47)
CASING HEIGHT (circle appropriate box and enter casing height)
+ above (49); − below (49)
LAND SURFACE 1 (50 51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



...ORT
...M COMPLETELY
...LEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

...MPLETED 04 07 86 (15–20)

Depth of Well 205 (22–26) (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-81-6051 (28–37)

OWNER REVIES last name SALLY first name

STREET OR RFD 1201 Collins Road TOWN Odenton

SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
rown Clay	0	7	
and	7	24	
ed Clay	24	60	
rown Sand	60	82	
hite Clay	82	100	
ed Clay	100	152	
ray Clay	152	180	
edium Brown Sand	180	205	X

CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
ELECTRIC LOG OBTAINED
TEST WELL CONVERTED TO PRODUCTION WELL

BY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN IDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" I CONFORMANCE WITH ALL CONDITIONS STATED IN THE CAPTIONED PERMIT, AND THAT THE INFORMATION NTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST KNOWLEDGE.

...ERS IDENT. NO. 337

...ERS SIGNATURE
MATCH SIGNATURE ON APPLICATION)

...UPERVISOR (sign. of driller or journeyman ...sible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y (44) no N (44)
TYPE OF GROUTING MATERIAL
CEMENT CM (45–46) BENTONITE CLAY BC (45–46)
NO. OF BAGS ____ NO. OF POUNDS 100
GALLONS OF WATER 100
DEPTH OF GROUT SEAL (to nearest foot)
from 3 (48–52) ft. to 26 (54–58) ft. (TOP / BOTTOM)
(enter 0 if from surface)

CASING RECORD
casing types — insert appropriate code below
ST STEEL; CO CONCRETE; PL PLASTIC; OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL (60–61)	4 (63–64)	200 (66–70)

OTHER CASING (if used) — EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below
ST STEEL; BR BRASS BRONZE; HO OPEN HOLE; PL PLASTIC; OT OTHER

C2 (1–2)

EACH SCREEN		DEPTH (nearest ft.)	
1	PL (8–9)	200 (11–15)	205 (17–21)
2	(23–24)	(26–30)	(32–36)
3	(38–39)	(41–45)	(47–51)

SLOT SIZE 1 0 2 20 3
DIAMETER OF SCREEN 2 (56–60) (NEAREST INCH)

GRAVEL PACK from 195 to 205
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 (68)

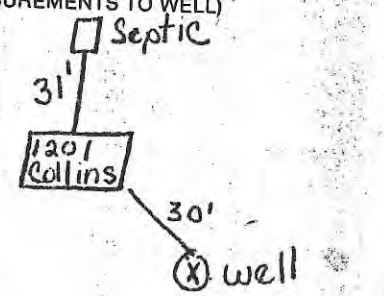
OEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)
T (70) TELESCOPE CASING
(E.R.O.S.) (72) LOG INDICATOR
WQ (74–76) OTHER DATA

C3 (1–2)

PUMPING TEST
HOURS PUMPED (nearest hour) 1 (8–9)
PUMPING RATE (gal. per min. to nearest gal.) 15 (11–15)
METHOD USED TO MEASURE PUMPING RATE Air
WATER LEVEL (distance from land surface)
BEFORE PUMPING 110 (17–20)
WHEN PUMPING 130 (22–25)
TYPE OF PUMP USED (for test)
A air (27); P piston (27); T turbine (27); C centrifugal (27); R rotary (27); O other (describe below) (27); J jet (27); S submersible (27)

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX-SEE ABOVE: S (29)
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 7 (31–35)
PUMP HORSE POWER .50 (37–41)
PUMP COLUMN LENGTH (nearest ft.) 160 (43–47)
CASING HEIGHT (circle appropriate box and enter casing height)
+ above (49); – below (49) LAND SURFACE
(nearest foot) (50–51)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



HEALTH

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 07

DATE WELL COMPLETED 6/8/86

Depth of Well 150 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-81-85

OWNER Bill Seuss (last name) (first name)

STREET OR RFD 183 12th Street TOWN Pasadena, Md. 21122

SUBDIVISION Woodwardville SECTION 963 Patuxent Rd. LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown/White Sand and Gravel	0	109	
Red/White Clay	10	40	
Gray Clay	40	70	
Brown /White SAnd	70	87	
REd/White Sand	87	130	
Brown/White Sand	130	150	X

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes (Y) no (N)

TYPE OF GROUTING MATERIAL

CEMENT (CM) BENTONITE CLAY (BC)

NO. OF BAGS 4 1/2 NO. OF POUNDS 225

GALLONS OF WATER 112 1/2

DEPTH OF GROUT SEAL (to nearest foot)

from 30 ft. (TOP) to 50 ft. (BOTTOM)

(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

STEEL (ST) CONCRETE (CO) PLASTIC (PL) OTHER (OT)

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	143

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole: insert appropriate code below

STEEL (ST) BRASS BRONZE (BR) OPEN HOLE (HO) PLASTIC (PL) OTHER (OT)

C 2

EACH SCREEN	DEPTH (nearest ft.)	
1	PL	
2		
3		

SLOT SIZE 1 .020 2 3

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 138 to 150

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 2

PUMPING RATE (gal. per min. to nearest gal.) 50

METHOD USED TO MEASURE PUMPING RATE AIR

WATER LEVEL (distance from land surface)

BEFORE PUMPING 15

WHEN PUMPING 35

TYPE OF PUMP USED (for test)

A air P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10

PUMP HORSE POWER .5

PUMP COLUMN LENGTH (nearest ft.) 50

CASING HEIGHT (circle appropriate box and enter casing height)

+ above / − below LAND SURFACE (nearest foot)

CIRCLE APPROPRIATE LETTER

A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

T TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 288

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

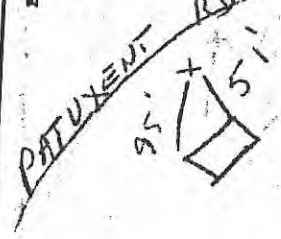
WELL SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee) EASTON E. WOLFORD

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING LOG INDICATOR OTHER DATA

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES. (MEASUREMENTS TO WELL)



STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED

COUNTY NUMBER 02

Received [ ] (8–13)

DATE WELL COMPLETED 10/18/16 (15–20)

Depth of Well 215 (22–26) (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-81-7406 (28–37)

OWNER Garland (last name) Thomas A. (first name)

STREET OR RFD 2227 Collins Ave. TOWN Odenton

SUBDIVISION Old Wilsontown SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown sand	0	6	
Rainbow clay	6	95	
White sand	95	100	
White clay	100	110	
Red clay	110	190	
White sand	190	215	✓

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y (43) no N (44)

TYPE OF GROUTING MATERIAL

CEMENT CM (45 46) BENTONITE CLAY BC (45 46)

NO. OF BAGS 3 NO. OF POUNDS 150

GALLONS OF WATER 75

DEPTH OF GROUT SEAL (to nearest foot)

from 0 (48 TOP 52) ft. to 23 (54 BOTTOM 58) ft.

(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL (60 61)	4 (63 64)	208 (66 70)

EACH CASING — OTHER CASING (if used)

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below

ST STEEL BR BRASS BRONZE PL PLASTIC HO OPEN HOLE OT OTHER

C 2 (1 2)

EACH SCREEN

	DEPTH (nearest ft.)	
1	PL (8 9)	208 (11 15) — 215 (17 21)
2	(23 24)	(26 30) — (32 36)
3	(38 39)	(41 45) — (47 51)

SLOT SIZE 1 0 2 2 3 0

DIAMETER OF SCREEN 2 (56 60) (NEAREST INCH)

GRAVEL PACK from 201 to 215

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 (68)

C 3 (1 2)

PUMPING TEST
HOURS PUMPED (nearest hour) 6 (8 9)

PUMPING RATE (gal. per min. to nearest gal.) 40+ (11 15)

METHOD USED TO MEASURE PUMPING RATE Air

WATER LEVEL (distance from land surface)

BEFORE PUMPING 140 (17 20)

WHEN PUMPING 180 (22 25)

TYPE OF PUMP USED (for test)

A air (27) P piston (27) T turbine (27)

C centrifugal (27) R rotary (27) O other (describe below) (27)

J jet (27) S submersible (27)

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 12 (31 35)

PUMP HORSE POWER 7.5 (37 41)

PUMP COLUMN LENGTH (nearest ft.) 180 (43 47)

CASING HEIGHT (circle appropriate box and enter casing height)

+ above (49) / − below (49) LAND SURFACE 1 (60 51) (nearest foot)

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

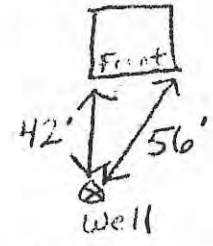
DRILLERS IDENT. NO. 80

John E Branham (KB)
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

(KB)
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N



OEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T	(E.R.O.S.)	WQ
(70)	(72)	(74 75 76)
TELESCOPE CASING	LOG INDICATOR	OTHER DATA

HEALTH

C T 8244 SEQUENCE NO. (OEP USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

DATE Received

DATE WELL COMPLETED 07 30 87

Depth of Well 125 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-48-8761

OWNER NOWOTNICK, P.L. JR.

STREET OR RFD 1196 Patuxent Road TOWN Odenton

SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Gravel & Clay	0	10	
Gravel Clay	10	15	
Sand & Gravel	15	27	
White Clay	27	53	
Brown Sand & Wood	53	65	
Red Clay	65	110	
Coarse Brown Sand	110	125	X

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 3 NO. OF POUNDS 150

GALLONS OF WATER 150

DEPTH OF GROUT SEAL (to nearest foot)

from 4 ft. TOP to 30 ft. BOTTOM (enter 0 if from surface)

CASING RECORD
casing types Insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	120

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole Insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	120	125
2			
3			

SLOT SIZE 1 0 2 20

DIAMETER OF SCREEN 3 (NEAREST INCH)

GRAVEL PACK from 115 to 125

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

OEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T TELESCOPE CASING (E.R.O.S.) LOG INDICATOR WQ OTHER DATA

C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 1

PUMPING RATE (gal. per min. to nearest gal.) 10

METHOD USED TO MEASURE PUMPING RATE Air

WATER LEVEL (distance from land surface)

BEFORE PUMPING 25

WHEN PUMPING 40

TYPE OF PUMP USED (for test)

A air P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10

PUMP HORSE POWER 3/4

PUMP COLUMN LENGTH (nearest ft.) 60

CASING HEIGHT (circle appropriate box and enter casing height)

+ above – below LAND SURFACE 1 (nearest foot)

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

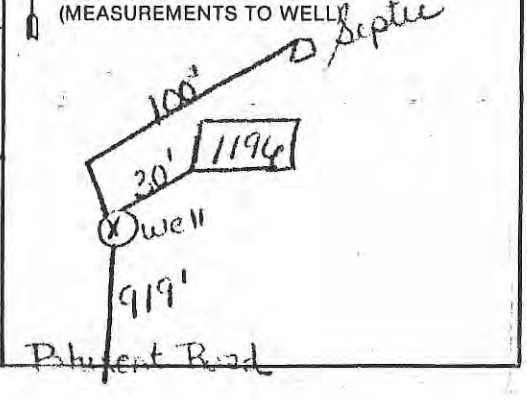
I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 337

X DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



IC|1| 2637 SEQUENCE NO. (OEP USE ONLY)

NUMBER IS TO BE PUNCHED COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER

DATE Received

DATE WELL COMPLETED 01 05 88

Depth of Well 240 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-81-9395

OWNER Rollins, Nathan

STREET OR RFD 2981 Conway Road (last name / first name) TOWN Odenton

SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown Clay	0	6	
Red Clay	6	35	
Sand & Gravel	35	62	
Red Clay	62	90	
White Clay	90	127	
Fine Brown Sand	127	144	
Pink Clay	144	180	
Coarse Brown Sand	180	240	X

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 6 NO. OF POUNDS 300

GALLONS OF WATER 150

DEPTH OF GROUT SEAL (to nearest foot)

from 4 ft. (TOP) to 70 ft. (BOTTOM)

(enter 0 if from surface)

CASING RECORD
casing types — Insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	235

OTHER CASING (If used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — Insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C2

EACH SCREEN	DEPTH (nearest ft.)	
1	PL 235	240
2		
3		

SLOT SIZE 1 0 2 20 3

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 230 to 240

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

C3

PUMPING TEST
HOURS PUMPED (nearest hour) 7

PUMPING RATE (gal. per min. to nearest gal.) 700

METHOD USED TO MEASURE PUMPING RATE Air

WATER LEVEL (distance from land surface)

BEFORE PUMPING 60

WHEN PUMPING 100

TYPE OF PUMP USED (for test)

A air P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX-SEE ABOVE: S

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10

PUMP HORSE POWER .50

PUMP COLUMN LENGTH (nearest ft.) 130

CASING HEIGHT (circle appropriate box and enter casing height) + above / − below LAND SURFACE 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N

Pipe

2981

Conway Road

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 337

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) WQ

TELESCOPE CASING — LOG INDICATOR — OTHER DATA

C1 0597 SEQUENCE NO. (OEP USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

DATE Received

DATE WELL COMPLETED 10 12 87

Depth of Well 122 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-81-9405

OWNER RIDEN (last name) DONALD (first name)

STREET OR RFD 946 Patuxent Rd. TOWN Odenton, Md. 21113

SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Sand & gravel	0	10	
Rock	10	11	
Red clay	11	31	
Sand, white clay & gravel	31	68	
Red & gray clay	68	110	
Tan sand & shell	110	122	X

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 4 NO. OF POUNDS 200

GALLONS OF WATER 100

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. (TOP) to 23 ft. (BOTTOM)

(enter 0 if from surface)

CASING RECORD
casing types — Insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	117

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — Insert appropriate code below

ST STEEL BR BRASS BRONZE PL PLASTIC HO OPEN HOLE OT OTHER

C2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	115	122
2			
3			

SLOT SIZE 1 030 2 _____ 3 _____

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 112 to 122

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

C3

PUMPING TEST
HOURS PUMPED (nearest hour) 2

PUMPING RATE (gal. per min. to nearest gal.) 15

METHOD USED TO MEASURE PUMPING RATE Bucket

WATER LEVEL (distance from land surface)

BEFORE PUMPING 13

WHEN PUMPING 17

TYPE OF PUMP USED (for test)

A air P piston T turbine

C centrifugal R rotary O other (describe below)

J jet S submersible

Bailer

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE:

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height)

+ above / − below LAND SURFACE (nearest foot) 1

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

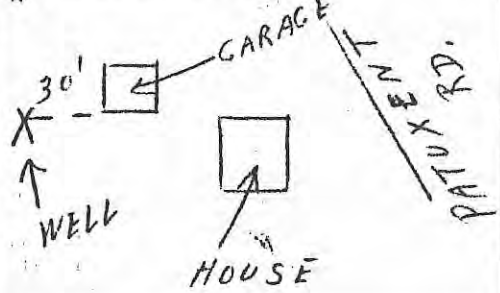
I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 56

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



OEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T (TELESCOPE CASING) (E.R.O.S.) (LOG INDICATOR) WQ (OTHER DATA)

C 1 1621 SEQUENCE NO. (OEP USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

DATE Received

DATE WELL COMPLETED 10 08 87

Depth of Well 199 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" A-K11-949

OWNER ROBINSON (last name) DANIEL (first name)

STREET OR RFD 11370 Cherry Hill Rd. TOWN Beltsville, Md. 20705

SUBDIVISION _____ SECTION _____ LOT _____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Sand & gravel	0	15	
Red clay	15	40	
Red & white clay & sand	40	80	
White clay & sand	80	140	
Red clay	140	190	
Sand	190	199	X

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 3 NO. OF POUNDS 150

GALLONS OF WATER 75

DEPTH OF GROUT SEAL (to nearest foot)

from 0 ft. (TOP) to 23 ft. (BOTTOM)

(enter 0 if from surface)

CASING RECORD
casing types Insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	194

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole Insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	192	199
2			
3			

SLOT SIZE 030

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 189 to 199

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 1

PUMPING RATE (gal. per min. to nearest gal.) 20

METHOD USED TO MEASURE PUMPING RATE Bucket

WATER LEVEL (distance from land surface)

BEFORE PUMPING 100

WHEN PUMPING 110

TYPE OF PUMP USED (for test)

A air P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE:

CAPACITY: GALLONS PER MINUTE (to nearest gallon)

PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.)

CASING HEIGHT (circle appropriate box and enter casing height) + above / − below LAND SURFACE (nearest foot) 1

CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 56

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T TELESCOPE CASING (E.R.O.S.) LOG INDICATOR WQ OTHER DATA

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N

COLLINS RD.

WELL → X 30'

HOUSE → [ ]

C 1 5830 — SEQUENCE NO. (OEP USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

DATE Received

DATE WELL COMPLETED 1 1 1 2 8 8

Depth of Well 1 2 3 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-811-9687

OWNER MILTON CHARLES (last name / first name)

STREET OR RFD 2321 5TH AVENUE TOWN OCEAN

SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown Sand	0	15	
White Clay	15	45	
Gravel	45	56	
Blue White clay	56	105	
TAN SAND	105	125	—

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y / no N
TYPE OF GROUTING MATERIAL
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS 3 NO. OF POUNDS 150
GALLONS OF WATER 125
DEPTH OF GROUT SEAL (to nearest foot)
from 0 ft. to 35 ft.
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	120

OTHER CASING (if used) — EACH CASING

diameter Inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below
ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

C 2

	DEPTH (nearest ft.)	
1	PL	120 — 125
2		
3		

SLOT SIZE 1 .030 2 3
DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 100 to 125

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 2
PUMPING RATE (gal. per min. to nearest gal.) 30
METHOD USED TO MEASURE PUMPING RATE Bucket
WATER LEVEL (distance from land surface)
BEFORE PUMPING 16
WHEN PUMPING 29

TYPE OF PUMP USED (for test)
A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES / NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10
PUMP HORSE POWER 1.5
PUMP COLUMN LENGTH (nearest ft.) 80
CASING HEIGHT (circle appropriate box and enter casing height) + above / − below LAND SURFACE 1 (nearest foot)

CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

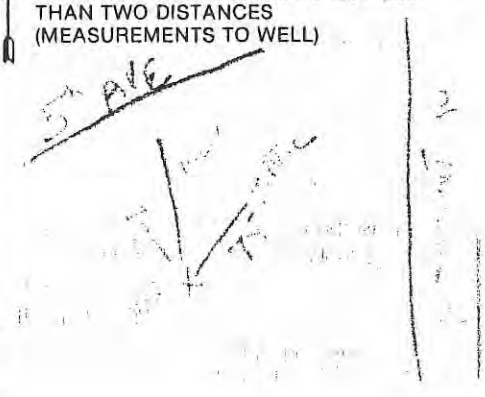
I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 121

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



OEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T	(E.R.O.S.)	WQ
70	72	74 75 76
TELESCOPE CASING	LOG INDICATOR	OTHER DATA

CT 7552 — SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

DATE Received

DATE WELL COMPLETED 10 6 8 8

Depth of Well 350 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" A1-38-1020

OWNER Harris, Ellsworth (last name, first name)

STREET OR RFD 1254 Collins Avenue TOWN Odenton

SUBDIVISION ____ SECTION ____ LOT ____

C 3

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown Sand	0	8	
White Clay	8	15	
Brown Sand	15	30	
Red Clay	30	210	
White Clay	210	255	
Fine Brown Sand	255	330	
Coarse Brown Sand	330	350	X

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL

CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 4 NO. OF POUNDS 200

GALLONS OF WATER 100

DEPTH OF GROUT SEAL (to nearest foot)

from 4 ft. to 40 ft. (enter 0 if from surface)

CASING RECORD
casing types — Insert appropriate code below

ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
P 1	4	345

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — Insert appropriate code below

ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2

EACH SCREEN	DEPTH (nearest ft.)	
1	11	345 to 360
2		
3		

SLOT SIZE 1 0 2 20 3 ____

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 340 to 350

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

PUMPING TEST
HOURS PUMPED (nearest hour) 1

PUMPING RATE (gal. per min. to nearest gal.) 30

METHOD USED TO MEASURE PUMPING RATE Air

WATER LEVEL (distance from land surface)

BEFORE PUMPING 160

WHEN PUMPING 180

TYPE OF PUMP USED (for test)

A air P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 15

PUMP HORSE POWER .75

PUMP COLUMN LENGTH (nearest ft.) 210

CASING HEIGHT (circle appropriate box and enter casing height) + above / − below LAND SURFACE 1 (nearest foot)

CIRCLE APPROPRIATE LETTER

A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 337

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

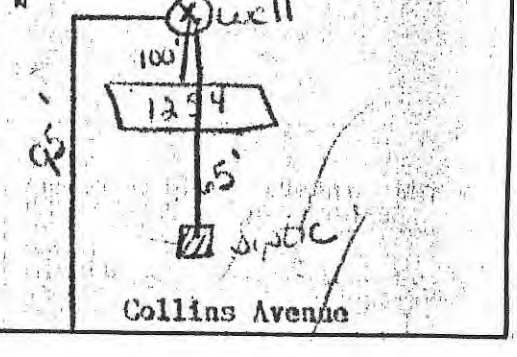
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) WQ

70 TELESCOPE CASING — 72 LOG INDICATOR — 74 75 76 OTHER DATA

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



C 1 4951 SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-8 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

SWCO USE ONLY
DATE Received

DATE WELL COMPLETED 05 11 89

Depth of Well 114 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-SB-2615

OWNER
STREET OR RFD Corzone, Wendy (last name) 1200 Patuxent Road (first name) TOWN Odenton
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells
STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Sand & Gravel	0	10	
White Clay	10	15	
Gray Clay	15	25	
Brown Sand	25	40	
Red Clay	40	85	
Medium Brown Sand	85	114	

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N
TYPE OF GROUTING MATERIAL
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS 3 NO. OF POUNDS 150
GALLONS OF WATER 75
DEPTH OF GROUT SEAL (to nearest foot)
from 4 ft. (TOP) to 45 ft. (BOTTOM) (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	109

OTHER CASING (If used)

EACH CASING	diameter inch	depth (feet) from	to
1			
2			

SCREEN RECORD
screen type or open hole
Insert appropriate code below
ST STEEL BR BRASS BRONZE PL PLASTIC HO OPEN HOLE OT OTHER

C 2

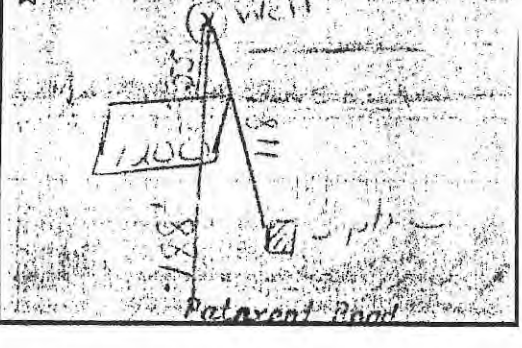
EACH SCREEN	DEPTH (nearest ft.)	
1	109	114
2		
3		

SLOT SIZE 1 0 2 20 3
DIAMETER OF SCREEN 5 (NEAREST INCH)
from to
GRAVEL PACK 104 - 115
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

PUMPING TEST
C 3
HOURS PUMPED (nearest hour) 1
PUMPING RATE (gal. per min. to nearest gal.) 20
METHOD USED TO MEASURE PUMPING RATE Air
WATER LEVEL (distance from land surface)
BEFORE PUMPING 40
WHEN PUMPING 50
TYPE OF PUMP USED (for test)
A air P piston T turbine
C centrifugal R rotary O other (describe below)
J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10
PUMP HORSE POWER 5
PUMP COLUMN LENGTH (nearest ft.) 90
CASING HEIGHT (circle appropriate box and enter casing height)
+ above
- below
LAND SURFACE
1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



CIRCLE APPROPRIATE LETTER
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 337
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

OEP USE ONLY
(NOT TO BE FILLED IN BY DRILLER)
T (TELESCOPE CASING) (E.R.O.S.) (LOG INDICATOR) W Q (OTHER DATA)

C 1 6453 SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER

ST/CO USE ONLY
DATE Received NOV 2 9 1989

DATE WELL COMPLETED 11/18/89

Depth of Well 283 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-88-2979

OWNER Stachitas Frank (last name, first name)
STREET OR RFD 2754 Conway Rd TOWN Odenton, Md.
SUBDIVISION ____ SECTION ____ LOT ____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown sandy clay	0	6	
Grey sandy clay	6	10	
Grey soft clay w/ fine white sd	10	30	
Brown sand, grits and gravel	30	70	
Red clay w/white clay & clay	70	83	
Solid red clay	83	97	
Grey soft clay	97	103	
Grey clay w/Brown Sand	103	109	
Grey soft clay	109	125	
Solid grey clay	125	136	
White soft clay	136	142	
Layers of Multi colored clay & sd	142	150	
Solid red & white clay	150	187	
Grey soft clay	187	205	
Fine sand w/white clay	205	222	
Clay white & fine Sand layers	222	262	
Sand fine	262	270	
Sand Med Brown	270	283	

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 173
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes (Y) no (N)
TYPE OF GROUTING MATERIAL
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS 10 NO. OF POUNDS 940
GALLONS OF WATER 50
DEPTH OF GROUT SEAL (to nearest foot)
from 4 ft. to 30 ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below: ST STEEL, CO CONCRETE, PL PLASTIC, OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	6 5	2 7 3

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below: ST STEEL, BR BRASS BRONZE, HO OPEN HOLE, PL PLASTIC, OT OTHER

EACH SCREEN	screen type	DEPTH (nearest ft.)	
1	PL	273	283
2			
3			

SLOT SIZE .030
DIAMETER OF SCREEN 3 (NEAREST INCH)

GRAVEL PACK from 265 to 283
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

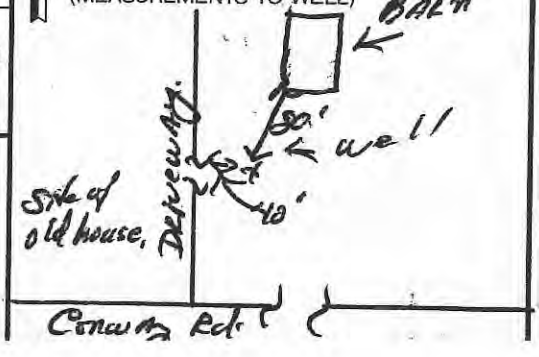
T	(E.R.O.S.)	W Q
		A
TELESCOPE CASING	LOG INDICATOR	OTHER DATA

PUMPING TEST
HOURS PUMPED (nearest hour) 4
PUMPING RATE (gal. per min. to nearest gal.) 150
METHOD USED TO MEASURE PUMPING RATE bucket
WATER LEVEL (distance from land surface)
BEFORE PUMPING 45
WHEN PUMPING 120

TYPE OF PUMP USED (for test)
A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 12
PUMP HORSE POWER .7
PUMP COLUMN LENGTH (nearest ft.) 90
CASING HEIGHT (circle appropriate box and enter casing height) (+) above / (−) below LAND SURFACE 2 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



SEND --WHITE-Health Dept.-A.A.Co.
YELLOW - State Health Dept.
PINK - Well Driller

MAY 1 1 1990

ANNE ARUNDEL COUNTY

OFFICE OF ENVIRONMENTAL PROGRAMS

WELL ABANDONMENT REPORT

Date 25 Jan 90

Permit Number of abandoned well (if any) None

Permit Number of replacement well AA-88-2979

Driller's Name Kwiatkowski, Stanley
Last First

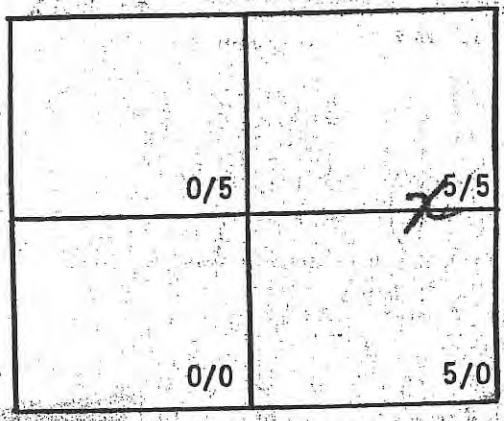
Owner's Name Stachias, Frank
Last First

Well Location:

County Anne Arundel
Subdivision
Section Lot
Nearest Town Crofton
Maryland Grid Location:

E 870
N 430

Box Number



Show well location by (X) within box

Type of Well

___ Drilled
___ Jetted
X Bored or Augered
___ Other, specify

Depth of Well 12 feet

Type of Casing

___ Steel
___ Plastic
X Concrete
___ Other, specify

Size of Casing 36 inches.

Was any case removed ☐ Yes ☐ No
If yes amount removed ____ feet

Was casing ripped or perforated ☐ Yes ☐ No

Log of Sealing Material

Material	Feet From	Feet To
Mixture of Bentonite and Select Fill	0	12

Driller [signature]
(Signature)

License Number 173

AADH-778 (1781)

C 1 7130 SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

ST/CO USE ONLY
DATE Received JAN 11 1990

DATE WELL COMPLETED 12089

Depth of Well 190 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-88-3690

OWNER BR G & H Partnership (last name) (first name)
STREET OR RFD 1177 Patuxent Road TOWN Gambrills
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Gravel	0	3	
Gray Clay	3	10	
Brown Sand	10	25	
Red Clay	25	140	
White Clay	140	~~122~~ 172	
Coarse Brown Sand	~~122~~ 172	190	

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 337
X [signature]
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N
TYPE OF GROUTING MATERIAL
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS 3 NO. OF POUNDS 150
GALLONS OF WATER 75
DEPTH OF GROUT SEAL (to nearest foot)
from 4 ft. to 30 ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	185

EACH CASING — OTHER CASING (if used)

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below
ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2

EACH SCREEN

		DEPTH (nearest ft.)	
1	PL	185	190
2			
3			

SLOT SIZE 1 0 2 20 3
DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 180 to 190
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
TELESCOPE CASING LOG INDICATOR OTHER DATA

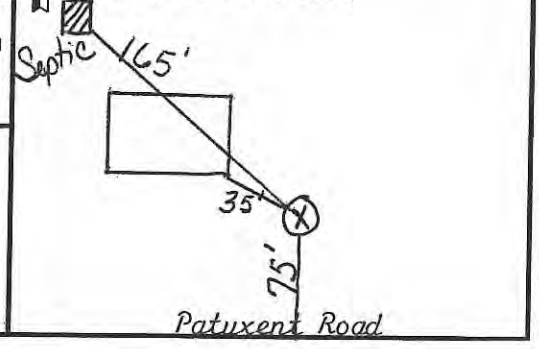
C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 1
PUMPING RATE (gal. per min. to nearest gal.) 50
METHOD USED TO MEASURE PUMPING RATE Air
WATER LEVEL (distance from land surface)
BEFORE PUMPING 10
WHEN PUMPING 30

TYPE OF PUMP USED (for test)
A air P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 12
PUMP HORSE POWER .50
PUMP COLUMN LENGTH (nearest ft.) 60
CASING HEIGHT (circle appropriate box and enter casing height) + above / − below LAND SURFACE 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



C 1 8849 SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER

ST/CO USE ONLY
DATE Received JAN 23 1992

DATE WELL COMPLETED 11 29 91

Depth of Well 84 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-88-7182

OWNER Smith, Melvin (last name) (first name)

STREET OR RFD 962 Patuxent Road TOWN Odenton

SUBDIVISION Woodwardville SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Top Soil	0	2	
ravel	2	19	
Brown Sand	19	26	
ed Clay	26	55	
Gray Clay	55	72	
ed. Brown Sand	72	84	X

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N
TYPE OF GROUTING MATERIAL
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS 4 NO. OF POUNDS 200
GALLONS OF WATER 100
DEPTH OF GROUT SEAL (to nearest foot)
from 4 ft. to 30 ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
ST STEEL CO CONCRETE PL PLASTIC OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	79

EACH CASING — OTHER CASING (if used)

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below
ST STEEL BR BRASS BRONZE HO OPEN HOLE PL PLASTIC OT OTHER

C 2

EACH SCREEN

		DEPTH (nearest ft.)	
1	PL	79	84
2			
3			

SLOT SIZE 1 0 2 20 3
DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 74 to 84
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T TELESCOPE CASING (E.R.O.S.) LOG INDICATOR W Q OTHER DATA

C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 1
PUMPING RATE (gal. per min. to nearest gal.) 20
METHOD USED TO MEASURE PUMPING RATE AIR
WATER LEVEL (distance from land surface)
BEFORE PUMPING 20
WHEN PUMPING 30
TYPE OF PUMP USED (for test)
A air P piston T turbine C centrifugal R rotary O other (describe below) J jet S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10
PUMP HORSE POWER .50
PUMP COLUMN LENGTH (nearest ft.) 50
CASING HEIGHT (circle appropriate box and enter casing height) + above / − below LAND SURFACE 1 (nearest foot)

CIRCLE APPROPRIATE LETTER
A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
TEST WELL CONVERTED TO PRODUCTION WELL

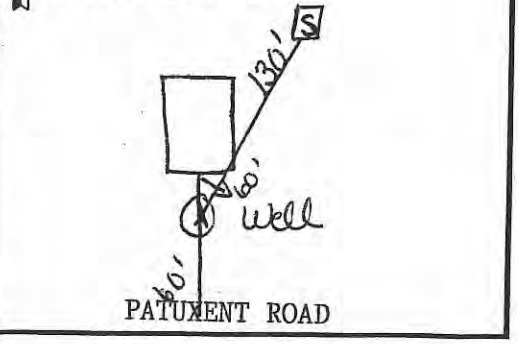
HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 337

SIGNATURE (MATCH SIGNATURE ON APPLICATION)

SUPERVISOR (sign. of driller or journeyman doing the work if different from permittee)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



SEND --WHITE-Health Dept.-A.A.Co.
YELLOW - State Health Dept.
PINK - Well Driller

DEC X 6 1991

ANNE ARUNDEL COUNTY

OFFICE OF ENVIRONMENTAL PROGRAMS

WELL ABANDONMENT REPORT

Date Dec. 4, 1991

Permit Number of abandoned well (if any) (dog well)

Permit Number of replacement well AA-88-7182

Driller's Name Greer, JOHN
Last First

Owner's Name Smith, Melvin
Last First

Well Location: 962 PATUXENT RD.
County ANNE ARUNDEL
Subdivision WOODWARDVILLE
Section Lot
Nearest Town ODENTON
Maryland Grid Location:
E 870
N 440
Box Number

	0/5 5/5
X	
0/0	5/0

Show well location by (X) within box

Type of Well
- ___ Drilled
- ___ Jetted
- ✓ Bored or Augered
- ___ Other, specify

Depth of Well 10 feet

Type of Casing
- ___ Steel
- ___ Plastic
- ✓ Concrete
- ___ Other, specify

Size of Casing 24 inches.

Was any case removed ☐ Yes ☑ No
If yes amount removed ____ feet

Was casing ripped or perforated ☐ Yes ☑ No

Log of Sealing Material

Material	Feet From	Feet To
Sand	10	5
Portland Cement	5	0

Driller (Signature)

License Number 337

AADH-778 11/81

C 1 | 1341 | SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

ST/CO USE ONLY
DATE Received DEC X 3 1992

DATE WELL COMPLETED 11 24 92

Depth of Well 287 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-88-8563

OWNER Mandrin COnstruction (last name / first name)
STREET OR RFD 8174 Ritchie Highway TOWN Pasadena, Maryland 21122
SUBDIVISION _____ SECTION 2966 Conway Road LOT _____

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Top Soil	0	2	
Brown Sand & Gravel	2	17	
White Clay	17	25	
Brown Sand	25	35	
Gray Clay	35	55	
Red White Clay	55	70	
Brown Sand & White - Clay	70	100	
Red Clay	100	198	
White Clay	198	210	
White Red Clay	210	250	
Brown White Sand	250	287	X

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 288

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION) Denton J. Wolford

DENTON J. WOLFORD

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y / no N
TYPE OF GROUTING MATERIAL
CEMENT CM BENTONITE CLAY BC
NO. OF BAGS 14 NO. OF POUNDS 700
GALLONS OF WATER 350
DEPTH OF GROUT SEAL (to nearest foot)
from 3 ft. to 150 ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
- ST STEEL
- CO CONCRETE
- PL PLASTIC
- OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	280

OTHER CASING (if used) — EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below
- ST STEEL
- BR BRASS BRONZE
- HO OPEN HOLE
- PL PLASTIC
- OT OTHER

C 2

EACH SCREEN	DEPTH (nearest ft.)	
1	PL 280	287
2		
3		

SLOT SIZE 1 020 3 _____
DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 275 to 287
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

OEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T | (E.R.O.S.) | W Q
TELESCOPE CASING | LOG INDICATOR | OTHER DATA

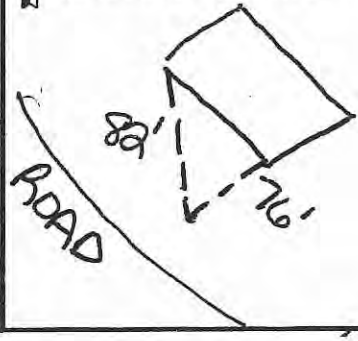
C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 2
PUMPING RATE (gal. per min. to nearest gal.) 60
METHOD USED TO MEASURE PUMPING RATE AIR
WATER LEVEL (distance from land surface)
BEFORE PUMPING 125
WHEN PUMPING 160

TYPE OF PUMP USED (for test)
- A air
- P piston
- T turbine
- C centrifugal
- R rotary
- O other (describe below)
- J jet
- S submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES / NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 15
PUMP HORSE POWER .75
PUMP COLUMN LENGTH (nearest ft.) 175
CASING HEIGHT (circle appropriate box and enter casing height)
+ above / − below LAND SURFACE 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



C 1 | 4302 — SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER: 02

ST/CO USE ONLY
DATE Received: APR X 7 1995

DATE WELL COMPLETED: 02 06 95

Depth of Well: 245 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-92-1911

OWNER: HARRIS, JOEL (last name, first name)
STREET OR RFD: 2989 CONWAY ROAD TOWN: ODENTON
SUBDIVISION: SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
TOP SOIL	0	4	
BROWN SAND	4	18	
WHITE CLAY	18	30	
BROWN SAND	30	62	
RED CLAY	62	140	
WHITE CLAY	140	200	
MEDIUM BROWN SAND	200	220	
COARSE BROWN SAND	220	245	XXX

IN HARD ROCK AREAS, IDENTIFY SPECIFICALLY WHERE SATURATED FRACTURES WERE OBSERVED.

WELL HYDROFRACTURED: yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO.: 086

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box): yes [X] no [N]
TYPE OF GROUTING MATERIAL
CEMENT [CM] BENTONITE CLAY [BC]
NO. OF BAGS 8 NO. OF POUNDS 400
GALLONS OF WATER 200
DEPTH OF GROUT SEAL (to nearest foot)
from 4 ft. to 70 ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	240

OTHER CASING (if used)
EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below
[ST] STEEL [BR] BRASS BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	240	245
2			
3			

SLOT SIZE 1 .0 2 .20 3
DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 235 to 245

IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
TELESCOPE CASING — LOG INDICATOR — OTHER DATA

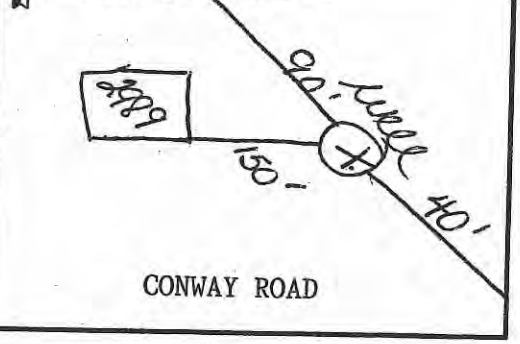
C 3

PUMPING TEST
HOURS PUMPED (nearest hour): 1
PUMPING RATE (gal. per min. to nearest gal.): 20
METHOD USED TO MEASURE PUMPING RATE: AIR
WATER LEVEL (distance from land surface)
BEFORE PUMPING: 60
WHEN PUMPING: 80

TYPE OF PUMP USED (for test)
[A] air [P] piston [T] turbine
[C] centrifugal [R] rotary [O] other (describe below)
[J] jet [S] submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO): ~~YES~~ NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S
CAPACITY: GALLONS PER MINUTE (to nearest gallon): 10
PUMP HORSE POWER: .75
PUMP COLUMN LENGTH (nearest ft.): 120
CASING HEIGHT (circle appropriate box and enter casing height): [X] above [—] below LAND SURFACE: 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



C 1 4620 — SEQUENCE NO. (DENV USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

ST/CO USE ONLY
DATE Received JAN X 4 1995

DATE WELL COMPLETED 09 29 94

Depth of Well 250 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-92-2014

OWNER Cook Donald (last name / first name)
STREET OR RFD 12703 Magnolia Ln TOWN Bowie Md.
SUBDIVISION Wilson Town SECTION 2881 Cmun md LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown sand	0	6	
White clay	6	7	
Red sand	7	38	
Fine sand	38	54	
Red clay	54	60	
Multi color clay	60	205	
Sand and clay layers	205	210	
Fine sand Brown w/ clay	210	235	
Red Sand Fine	235	250	X

IN HARD ROCK AREAS, IDENTIFY SPECIFICALLY WHERE SATURATED FRACTURES WERE OBSERVED.

WELL HYDROFRACTURED — yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E — ELECTRIC LOG OBTAINED
P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS IDENT. NO. 173

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] no [N]
TYPE OF GROUTING MATERIAL
CEMENT [CM] BENTONITE CLAY [BC]
NO. OF BAGS 9 NO. OF POUNDS 900
GALLONS OF WATER 200
DEPTH OF GROUT SEAL (to nearest foot)
from 4 ft. to 75 ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	6 5/8	240

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below
[ST] STEEL [BR] BRASS BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	240	250
2			
3			

SLOT SIZE .020 3
DIAMETER OF SCREEN 3 5/8 (NEAREST INCH)

GRAVEL PACK from 235 to 250
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T [70] TELESCOPE CASING
(E.R.O.S.) [72] LOG INDICATOR
W Q [74 75 76] OTHER DATA

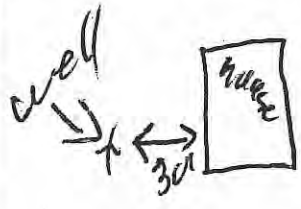
C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 3
PUMPING RATE (gal. per min. to nearest gal.) 100
METHOD USED TO MEASURE PUMPING RATE Funnel
WATER LEVEL (distance from land surface)
BEFORE PUMPING 66
WHEN PUMPING 120

TYPE OF PUMP USED (for test)
[A] air [P] piston [T] turbine
[C] centrifugal [R] rotary [O] other (describe below)
[J] jet [S] submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX - SEE ABOVE: S
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 12
PUMP HORSE POWER .7
PUMP COLUMN LENGTH (nearest ft.) 110
CASING HEIGHT (circle appropriate box and enter casing height) [+] above / [−] below LAND SURFACE 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



C 1 4433 · SEQUENCE NO. (MDE USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

ST/CO USE ONLY
DATE Received JUN 10 1996

DATE WELL COMPLETED 04 16 96

Depth of Well 229 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-94-0320

OWNER ST. JOHN'S CHURCH (last name / first name)
STREET OR RFD 2993 CONWAY ROAD TOWN ODENTON 21113
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
SAND & CLAY	0	15	
BROWN SAND	15	36	
RED CLAY	36	45	
WHITE CLAY	45	60	
BROWN SAND	60	75	
RED CLAY	75	185	
WHITE CLAY	185	200	
FINE BROWN SAND	200	215	
MED BROWN SAND	215	229	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
(A) A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

TYPE: MWD (MSD) MGD
DRILLERS LIC. NO. 086
(X)
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO.

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] no [N]
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT [CM] BENTONITE CLAY [BC]
NO. OF BAGS 6 NO. OF POUNDS 300
GALLONS OF WATER 162
DEPTH OF GROUT SEAL (to nearest foot)
from 4 ft. to 100 ft. (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	4	224

OTHER CASING (if used)
EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below
[ST] STEEL [BR] BRASS BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	224	229
2			
3			

SLOT SIZE 1 0 2 20 3
DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK from 219 to 229
IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

MDE USE ONLY
(NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 72 74 75 76 A
TELESCOPE CASING LOG INDICATOR OTHER DATA

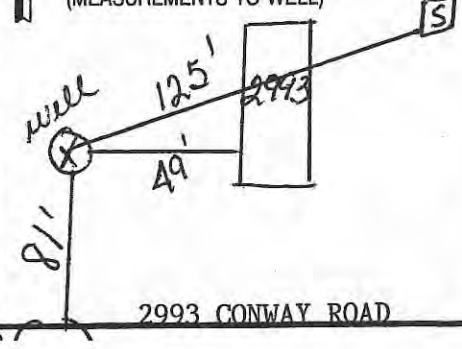
C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 1
PUMPING RATE (gal. per min.) 20.
METHOD USED TO MEASURE PUMPING RATE AIR
WATER LEVEL (distance from land surface)
BEFORE PUMPING 80 ft.
WHEN PUMPING 90 ft.

TYPE OF PUMP USED (for test)
[A] air [P] piston [T] turbine
[C] centrifugal [R] rotary [O] other (describe below)
[J] jet [S] submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. S
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10
PUMP HORSE POWER .50
PUMP COLUMN LENGTH (nearest ft.) 130
CASING HEIGHT (circle appropriate box and enter casing height)
[+] above [–] below LAND SURFACE (nearest) foot 1

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

JUN 1996 Received Ind. Septic Systems & Wells Program

SUBMIT COPIES OF COMPLETED FORM TO:
- COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
- * WELL OWNER
- * MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 04-16-96 (month/day/year)

PERMIT NUMBER OF ABANDONED WELL (if any) AA-74-2547

* PERMIT NUMBER OF REPLACEMENT WELL * AA-94-0320

PERSON ABANDONING WELL: John E. Greer

WELL DRILLERS LICENSE NUMBER: 086
CIRCLE: MWD (MSD) MGD

* OWNER'S NAME: ST. JOHN'S CHURCH

WELL LOCATION: 2993 CONWAY ROAD

COUNTY: ANNE ARUNDEL
NEAREST TOWN: ODENTON
TAX MAP 36 BLOCK 07 PARCEL 0174
SUBDIVISION:
SECTION: LOT:

MARYLAND GRID COORDINATES
BOX NUMBER E 870 N 430 <

X	
000 000	

SHOW WELL LOCATION BY X WITHIN BOX

* TYPE OF WELL BEING ABANDONED:

X DRILLED ____ JETTED
____ BORED/AUGUERED ____ HAND DUG
____ OTHER (specify) ____

USE CODE:

____ DOMESTIC ____ MUNICIPAL/PUBLIC
____ IRRIGATION X INDUSTRIAL
____ TEST/OBSERVATION

* TYPE OF CASING:

____ STEEL X PLASTIC
____ CONCRETE ____ OTHER (specify)

SIZE OF CASING: 4 INCHES IN DIAMETER

* DEPTH OF WELL: 72 FEET DEEP

WAS ANY CASING REMOVED? X YES ____ NO
if yes, length removed, in feet: 2

WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
Sand	72	45
Bentonite Clay	45	3
Backfill	3	0

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN | 086 LICENSE # | MWD/(MSD)/MGD CIRCLE ONE | 4-16-96 DATE

)ENV 828 JULY 1993

1) MDE

C 1 05989 — SEQUENCE NO. (MDE USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

ST/CO USE ONLY
DATE Received SEP DD 2 1998

DATE WELL COMPLETED MM 11 DD 10 YY 97

Depth of Well 115 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-94-2136

OWNER DARNICK (last name) MARY (first name)
STREET OR RFD 1198 Patuxent Rd TOWN
SUBDIVISION Odenton SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Sand & Gravel	0	6	
Brown Clay	6	15	
Brown Sand	15	24	
Red Clay	24	61	
Brown Sand	61	74	
Red Clay	74	97	
Grey Clay	97	105	
Medium Brown Sand	105	115	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
(A) A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M S D 086 1
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. 1 M __ D ____ 1

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] no [N]
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT [CM] BENTONITE CLAY [BC]
NO. OF BAGS 6 NO. OF POUNDS 330
GALLONS OF WATER 150
DEPTH OF GROUT SEAL (to nearest foot)
from 4 ft. (TOP) to 80 ft. (BOTTOM)
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	4	110

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	depth (feet) to

SCREEN RECORD
screen type or open hole insert appropriate code below
[ST] STEEL [BR] BRASS BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	110	115
2			
3			

SLOT SIZE 1 0 2 2 3 0
DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to
105	115

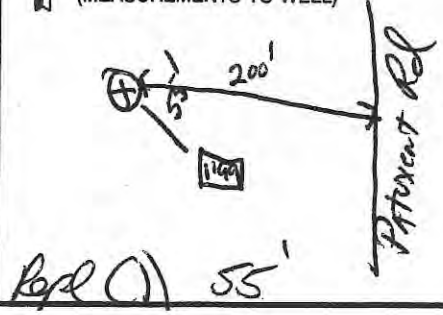
MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
TELESCOPE CASING ____ LOG INDICATOR ____ OTHER DATA A

C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 1
PUMPING RATE (gal. per min.) 15.
METHOD USED TO MEASURE PUMPING RATE BARREL
WATER LEVEL (distance from land surface)
BEFORE PUMPING 30 ft.
WHEN PUMPING 40 ft.
TYPE OF PUMP USED (for test)
[A] air [P] piston [T] turbine
[C] centrifugal [R] rotary [O] other (describe below)
[J] jet [S] submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. S
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10
PUMP HORSE POWER .50
PUMP COLUMN LENGTH (nearest ft.) 80
CASING HEIGHT (circle appropriate box and enter casing height)
[+] above [−] below LAND SURFACE 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SEP 1998
Received
Ind. Septic
Systems & Wells
Program

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: _____ (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) — —

* PERMIT NUMBER OF REPLACEMENT WELL AA - 94 - 2136

* PERSON ABANDONING WELL: John Greer

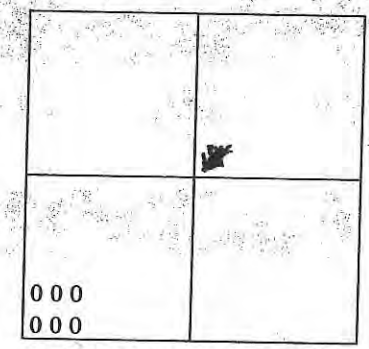
WELL DRILLERS LICENSE NUMBER: 086

CIRCLE: MWD/MSD/MGD

* OWNER'S NAME: Mary Alice Warnick

* WELL LOCATION:
COUNTY: Anne Arundel
NEAREST TOWN: Odenton
TAX MAP 36 BLOCK 15 PARCEL 0025
SUBDIVISION: _____
SECTION: _____ LOT: _____
NEAREST ROAD: Patuxent Rd

MARYLAND GRID COORDINATES
BOX NUMBER E 880 N 430 <———



SHOW WELL LOCATION
BY X WITHIN BOX

TYPE OF WELL BEING ABANDONED:

_____ DRILLED _____ JETTED
_____ BORED/AUGUERED _____ HAND DUG
_____ OTHER (specify) _____

LOG OF SEALING MATERIAL

MATERIAL	FEET	
	FROM	TO

USE CODE:

_____ DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
_____ TEST/OBSERVATION

* TYPE OF CASING:

_____ STEEL _____ PLASTIC
_____ CONCRETE _____ OTHER (specify)
_____

* SIZE OF CASING: 4 INCHES IN DIAMETER

DEPTH OF WELL: 115 FEET DEEP

* WAS ANY CASING REMOVED? ___ YES _____ NO
if yes, length removed, in feet: _____

* WAS CASING RIPPED OR PERFORATED? ___ YES _____ NO

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN LICENSE # MWD/MSD/MGD CIRCLE ONE DATE

C 1 | 08339 | SEQUENCE NO. (MDE USE ONLY)

1 2 3 6 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

ST/CO USE ONLY
DATE Received JUL 8 1998
NM DD YY (8 13)

DATE WELL COMPLETED MM 6 DD 9 YY 98 (15 20)

Depth of Well 87 (22 26) (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-94-2705 (28 29 30 31 32 33 34 35 36 37)

OWNER Crouch (last name) 981 (first name) PATUXENT Rd TOWN

STREET OR RFD

SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Sand + Gravel	0	26	
Red CLAY	26	60	
White CLAY	60	76	
Coarse Brown Sand	76	87	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER
- (A) A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. M 5 D 086 1

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO. 1 M __ D ___ 1

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y (44) no N (44)

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT CM (45 46) BENTONITE CLAY BC (45 46)

NO. OF BAGS 6 NO. OF POUNDS 300

GALLONS OF WATER 160

DEPTH OF GROUT SEAL (to nearest foot)

from 4 (48 52) TOP ft. to 70 (54 58) BOTTOM ft.

(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

ST STEEL | CO CONCRETE | PL PLASTIC | OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL (60 61)	4 (63 64)	82 (66 70)

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole insert appropriate code below

ST STEEL | BR BRASS BRONZE | HO OPEN HOLE | PL PLASTIC | OT OTHER

C 2 (1 2)

DEPTH (nearest ft.)

EACH SCREEN			
1	PL (8 9)	82 (11 15)	87 (17 21)
2	(23 24)	(26 30)	(32 36)
3	(38 39)	(41 45)	(47 51)

SLOT SIZE 1 0 2 2 3 0

DIAMETER OF SCREEN 2 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68 — from 77 to 87

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (70) (E.R.O.S.) (72) W Q A (74 75 76)

TELESCOPE CASING | LOG INDICATOR | OTHER DATA

C 3 (1 2)

PUMPING TEST
HOURS PUMPED (nearest hour) 2 (8 9)

PUMPING RATE (gal. per min.) 30. (11 15)

METHOD USED TO MEASURE PUMPING RATE Bailer

WATER LEVEL (distance from land surface)

BEFORE PUMPING 30 (17 20) ft.

WHEN PUMPING 40 (22 25) ft.

TYPE OF PUMP USED (for test)

A (27) air | P (27) piston | T (27) turbine | C (27) centrifugal | R (27) rotary | O (27) other (describe below) | J (27) jet | S (27) submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. S (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10 (31 35)

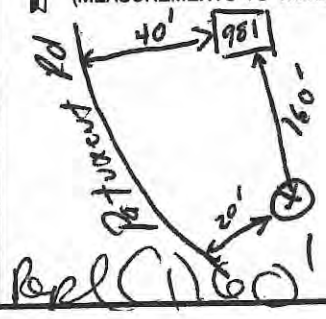
PUMP HORSE POWER .50 (37 41)

PUMP COLUMN LENGTH (nearest ft.) 60 (43 47)

CASING HEIGHT (circle appropriate box and enter casing height)

+ (49) above | – (49) below — LAND SURFACE 1 (50 51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

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WATER WELL ABANDONMENT-SEALING REPORT FORM

****

Received
JUL 1998
Ind. Septic Systems & Wells Program

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 6/12/98 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) — —

* PERMIT NUMBER OF REPLACEMENT WELL AA-94-2705

* PERSON ABANDONING WELL: John Greer

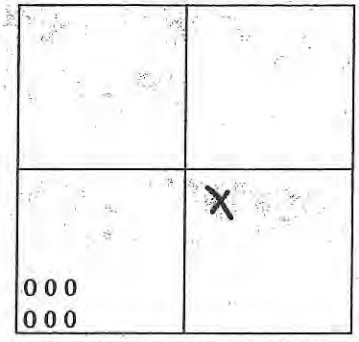
WELL DRILLERS LICENSE NUMBER: 086

CIRCLE: MWD/MSD/MGD

* OWNER'S NAME: Holly Groves

* WELL LOCATION:
COUNTY: Anne Arundel
NEAREST TOWN: Odenton
TAX MAP 36 BLOCK 2 PARCEL 127
SUBDIVISION: Woodwardville
SECTION: LOT:
NEAREST ROAD: 981 Patuxent Rd

MARYLAND GRID COORDINATES
E 870
BOX NUMBER 440
N



SHOW WELL LOCATION BY X WITHIN BOX

* TYPE OF WELL BEING ABANDONED:

X DRILLED ____ JETTED
____ BORED/AUGUERED ____ HAND DUG
____ OTHER (specify) ____

* USE CODE:

X DOMESTIC ____ MUNICIPAL/PUBLIC
____ IRRIGATION ____ INDUSTRIAL
____ TEST/OBSERVATION

* TYPE OF CASING:

____ STEEL X PLASTIC
____ CONCRETE ____ OTHER (specify)

* SIZE OF CASING: 4 INCHES IN DIAMETER

* DEPTH OF WELL: 80 FEET DEEP

* WAS ANY CASING REMOVED? X YES ____ NO
if yes, length removed, in feet: 4

* WAS CASING RIPPED OR PERFORATED? ____ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
Bentonite Clay	80	4
Backfill	4	—

John Greer — 086 — MWD/MSD/MGD — 6/20/98

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN — LICENSE # — CIRCLE ONE — DATE

C 1 6922 — SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED AFTER WELL IS COMPLETED.

COUNTY NUMBER: 02

ST/CO USE ONLY
DATE Received: OCT 30 1998

DATE WELL COMPLETED: MM 10 DD 29 YR 98

Depth of Well: 123 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-94-3176

OWNER: Pridgen, Micheal (last name / first name)
STREET OR RFD: 2815 5TH Avenue — TOWN: Odenton, Md 21113
SUBDIVISION: — SECTION: — LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Top Soil	0	2	
White Sand & Gravel	2	15	
Red Clay	15	20	
Gravel	20	40	
Red & White Clay	40	65	
Rock	65	70	
White Clay & Gravel	70	95	
White Sand	95	123	XX

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED: yes Y / no N

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: MWD 288
Denton Wolford
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO.: MWD 288
Denton J. Wolford
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box): yes Y / no N
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM — BENTONITE CLAY BC
NO. OF BAGS: 10 — NO. OF POUNDS: 500
GALLONS OF WATER: 27
DEPTH OF GROUT SEAL (to nearest foot): from 3 ft. (TOP) to 100 ft. (BOTTOM) (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below:
ST STEEL — CO CONCRETE — PL PLASTIC — OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	4	116

OTHER CASING (if used) — EACH CASING

	diameter inch	depth (feet) from	depth (feet) to

SCREEN RECORD
screen type or open hole — insert appropriate code below:
ST STEEL — BR BRASS/BRONZE — HO OPEN HOLE — PL PLASTIC — OT OTHER

C 2 — DEPTH (nearest ft.) — EACH SCREEN

		DEPTH from	DEPTH to
1	PL	116	123
2			
3			

SLOT SIZE 1: 020 2: ____ 3: ____
DIAMETER OF SCREEN: 2 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68: from 108 to 123

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T ____ (E.R.O.S.) ____ W Q ____
TELESCOPE CASING ____ LOG INDICATOR ____ OTHER DATA ____

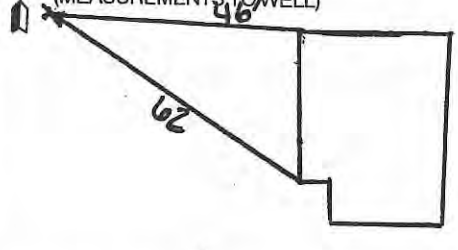
C 3

PUMPING TEST
HOURS PUMPED (nearest hour): 2
PUMPING RATE (gal. per min.): 50.
METHOD USED TO MEASURE PUMPING RATE: AIR
WATER LEVEL (distance from land surface)
BEFORE PUMPING: 10 ft.
WHEN PUMPING: 40 ft.

TYPE OF PUMP USED (for test)
A air — P piston — T turbine — C centrifugal — R rotary — O other (describe below) — J jet — S submersible

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO): YES / NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29: S
CAPACITY: GALLONS PER MINUTE (to nearest gallon): 12
PUMP HORSE POWER: .5
PUMP COLUMN LENGTH (nearest ft.): 50'
CASING HEIGHT (circle appropriate box and enter casing height): + above / − below LAND SURFACE: 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURES AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

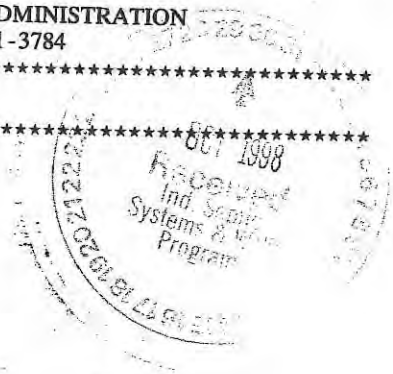


MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

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WATER WELL ABANDONMENT-SEALING REPORT FORM

****



SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: _____ (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) — —

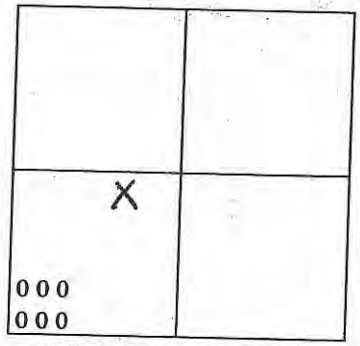
* PERMIT NUMBER OF REPLACEMENT WELL AA -94-3176

* PERSON ABANDONING WELL: _____ WELL DRILLERS LICENSE NUMBER: _____

* OWNER'S NAME: MICHAEL PRIDGEN CIRCLE: MWD/MSD/MGD

* WELL LOCATION: 2815 5TH AVE
COUNTY: ANNE ARUNDEL
NEAREST TOWN: ODENTON
TAX MAP _____ BLOCK _____ PARCEL _____
SUBDIVISION: _____
SECTION: _____ LOT: _____
NEAREST ROAD: _____

MARYLAND GRID COORDINATES
BOX NUMBER E 870 N 440 <_____



SHOW WELL LOCATION BY X WITHIN BOX

* TYPE OF WELL BEING ABANDONED:

_____ DRILLED _____ JETTED
_____ BORED/AUGUERED _____ HAND DUG
_____ OTHER (specify) _____

* USE CODE:

_____ DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
_____ TEST/OBSERVATION

* TYPE OF CASING:

_____ STEEL _____ PLASTIC
_____ CONCRETE _____ OTHER (specify)
_____

* SIZE OF CASING: _____ INCHES IN DIAMETER

DEPTH OF WELL: _____ FEET DEEP

* WAS ANY CASING REMOVED? ___ YES _____ NO
if yes, length removed, in feet: _____

* WAS CASING RIPPED OR PERFORATED? ___ YES ___ NO

LOG OF SEALING MATERIAL

MATERIAL	FEET	
	FROM	TO
OWNER IS ABANDONING HIS OWN WELL.		

Denton Michael 288 MWD/MSD/MGD 10-27-98
SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN LICENSE # CIRCLE ONE DATE

B 1 | 3261 (1 2 3 6) SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL
please type

STATE PERMIT NUMBER: AA -94 - 3264 (70 79) fill in this form completely

Date Received (APA): 10-19-98 (8 MM DD YY 13)

OWNER INFORMATION

Turner (15 Last Name) B (Owner) Eugene (First Name 34)

1117 Patuxent Road (35 Street or RFD 55)

Odenton (57 Town) MD (70 State) 21113 (72 Zip 76)

DRILLER INFORMATION

John Green (Driller's Name) MSD086 (76 License No. 81)

H.O. Green Drilling Co, Inc. (Firm Name)

P.O. Drawer A, Gambrills MD 21054 (Address)

Signature: [signature] Date: 10/19/98

B 2 (1 2) **WELL INFORMATION**

APPROX. PUMPING RATE (GAL. PER MIN.): 10 (8 12)

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY): 500 (14 20)

USE FOR WATER (CIRCLE APPROPRIATE BOX)

(D) DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
[F] FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION
22 [I] INDUSTRIAL, COMMERICIAL, DEWATERING
[P] PUBLIC WATER SUPPLY WELL
[T] TEST, OBSERVATION, MONITORING
[G] GEO-THERMAL

APPROXIMATE DEPTH OF WELL: 160 FEET (24 28)

APPROXIMATE DIAMETER OF WELL: 4 NEAREST INCH

METHOD OF DRILLING (circle one)

BORED (or Augered) JETTED Jetted & DRIVEN
30 AIR-ROTary AIR-PERcussion (ROTARY (Hydraulic Rotary))
37 CABLE REVerse-ROTary DRive-POINT
other

REPLACEMENT OR DEEPENED WELLS
(CIRCLE APPROPRIATE BOX)

(N) THIS WELL WILL NOT REPLACE AN EXISTING WELL
[Y] THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
39 [S] THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
[D] THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE) 41 — — - — — — 52

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER: GAP (54 63)

PERMIT No. AA-94-3264 (70 71 72 73 74 75 76 77 78 79)

B 3 **LOCATION OF WELL**

Anne Arundel (8 COUNTY 21)

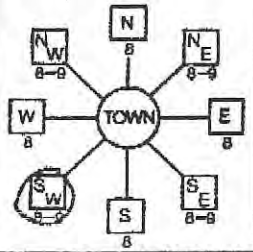
23 SUBDIVISION 42

SECTION (44 46) LOT (48 50)

Odenton (52 NEAREST TOWN 71)

MILES FROM TOWN (enter 0 if in town): 6 M I (73 76 77 78)

B 4 (1 2) DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



1239 Collins Ave (11 NEAR WHAT ROAD 30)

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)



34 92 37 DISTANCE FROM ROAD

ENTER FT OR MI (38 39): ft

TAX MAP: 36 BLK: 07 PARCEL 0017

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

Anne Arundel (COUNTY NAME) 02 (COUNTY NO.)

STATE SIGNATURE _____ INSERT $ → (41)

DATE ISSUED 10 21 98 (43 MM DD YY 48) Barry D. Adams (CO SIGNATURE) 10 21 99 (EXP. DATE)

NORTH GRID 437 000 (50 55) EAST GRID 0875 000 (57 63)

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X

SOURCES OF DRILLING WATER
1. Well Drillers
2. TAX# 4000-0167-1600
3. T0820145600

93 c Duckett, Lane

WRITE THE BOX NUMBER, FROM THE MAP HERE

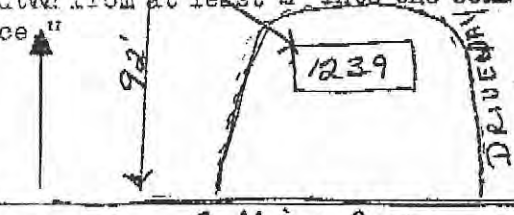
E 870

N 430

000 000

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION

The well must be drilled into a confined aquifer, with the bottom of the confining bed at a minimum depth of 40 feet. The confining bed must be no less than 5' thick. The annular space must be grouted from at least 2' into the confining bed to the land surface.



SPECIAL CONDITIONS: Radium Sampling Req Collins Ave

09/25/2003 07:55 4105373613 MDE WMA PAGE 01/02

C 1 5518 SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

ST/CO USE ONLY
DATE Received MM 11 DD 17 YY 1998

DATE WELL COMPLETED MM 10 DD 31 YY 98

Depth of Well 260 (TO NEAREST FOOT) GRADE ELE. 187' MSL

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-94-3262

OWNER Turner, B Eugene (last name, first name)
STREET OR RFD M-39 Collins Ave TOWN Odenton
SUBDIVISION SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Brown Sand	0	37	
Red Clay	37	50	
White Clay	50	62	
Brown Sand	62	80	
Red Clay	80	165	
Gray Clay	165	180	
White Clay	180	235	
Mixed Brown Sand	235	260	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER
- A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: M S D 0 8 6

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: __ D ___

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y no N

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT CM BENTONITE CLAY BC

NO. OF BAGS 8 NO. OF POUNDS 402

GALLONS OF WATER 200

DEPTH OF GROUT SEAL (to nearest foot)
from 4 ft. TOP to 85 ft. BOTTOM
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	255

STEEL ST, CONCRETE CO, PLASTIC PL, OTHER OT

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	depth (feet) to

SCREEN RECORD
screen type or open hole — insert appropriate code below

STEEL ST, BRASS BRONZE BR, OPEN HOLE HO, PLASTIC PL, OTHER OT

EACH SCREEN		DEPTH (nearest ft.)	
1	PL	255	260
2			
3			

SLOT SIZE 1 020 2 ___ 3 ___

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to
250	260

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q

70 ___ 72 ___ 74 75 76
TELESCOPE CASING LOG INDICATOR OTHER DATA

PUMPING TEST
HOURS PUMPED (nearest hour) 2

PUMPING RATE (gal. per min.) 25

METHOD USED TO MEASURE PUMPING RATE Bucket

WATER LEVEL (distance from land surface)
BEFORE PUMPING 130' ft.
WHEN PUMPING 140' ft.

TYPE OF PUMP USED (for test)
A air, P piston, T turbine, C centrifugal, R rotary, O other (describe below), J jet, S submersible

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. S

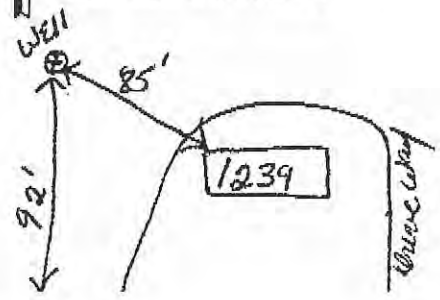
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10

PUMP HORSE POWER .75

PUMP COLUMN LENGTH (nearest ft.) 200'

CASING HEIGHT (circle appropriate box and enter casing height)
+ above / − below LAND SURFACE (nearest) foot

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURES AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



C 1 | 8702 (1 2 3 6) SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED AFTER WELL IS COMPLETED.

COUNTY NUMBER: 02

ST/CO USE ONLY
DATE Received: JAN 19 1999 (8 13)

DATE WELL COMPLETED: MM 11 DD 17 YY 98 (15 20)

Depth of Well: 137 (TO NEAREST FOOT) (22 26)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-94-3366 (28 29 30 31 32 33 34 35 36 37)

OWNER: Hogsboom (last name) Milton (first name)
STREET OR RFD: 2815 5th Ave TOWN: Odenton
SUBDIVISION: Woodwardville SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Sand + Gravel	0	14	
Red Clay	14	50	
Brown Sand	50	62	
Red Clay	62	95	
White Clay	95	114	
Fine Brown Sand	114	130	
Med Brown Sand	130	137	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED: yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: MSD086

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: __ D ___

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box): yes [Y] (44) no [N] (44)

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT [C M] (45 46) BENTONITE CLAY [B C] (45 46)

NO. OF BAGS: 8 NO. OF POUNDS: 400

GALLONS OF WATER: 200

DEPTH OF GROUT SEAL (to nearest foot)
from 4 (48 TOP 52) ft. to 70 (54 BOTTOM 58) ft.
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below:
- [S T] STEEL
- [C O] CONCRETE
- [P L] PLASTIC
- [O T] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL (60 61)	4 (63 64)	132 (66 70)

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	depth (feet) to

SCREEN RECORD
screen type or open hole — insert appropriate code below:
- [S T] STEEL
- [B R] BRASS BRONZE
- [P L] PLASTIC
- [H O] OPEN HOLE
- [O T] OTHER

EACH SCREEN	DEPTH (nearest ft.)	
1	PL (8 9) 132 (11 15)	137 (17 21)
2	(23 24) (26 30)	(32 36)
3	(38 39) (41 45)	(47 51)

SLOT SIZE 1: 020 2: ___ 3: ___

DIAMETER OF SCREEN: 2 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68: from 127 to 137 (68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (70) (E.R.O.S.) (72) W Q: A (74 75 76)
TELESCOPE CASING | LOG INDICATOR | OTHER DATA

PUMPING TEST
C 3 (1 2)

HOURS PUMPED (nearest hour): 2 (8 9)

PUMPING RATE (gal. per min.): 50 (11 15)

METHOD USED TO MEASURE PUMPING RATE: Barrel

WATER LEVEL (distance from land surface)
BEFORE PUMPING: 20' (17 20) ft.
WHEN PUMPING: 40' (22 25) ft.

TYPE OF PUMP USED (for test) (27)
- [A] air
- [P] piston
- [T] turbine
- [C] centrifugal
- [R] rotary
- [O] other (describe below)
- [J] jet
- [S] submersible

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO): (YES) NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29: S (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon): 10 (31 35)

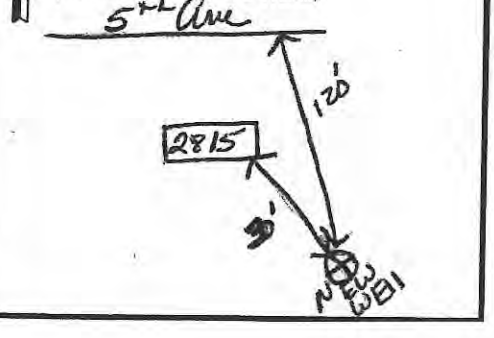
PUMP HORSE POWER: .50 (37 41)

PUMP COLUMN LENGTH (nearest ft.): 60' (43 47)

CASING HEIGHT (circle appropriate box and enter casing height)
- [+] above (49) LAND SURFACE
- [−] below (49)

(nearest) foot: 1 (50 51)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURES AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

JAN 1999
Received
Ind. Septic
Systems & Wells
Program

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 11-15-98 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) — —

* PERMIT NUMBER OF REPLACEMENT WELL AA -94- 3366

* PERSON ABANDONING WELL: John Grew

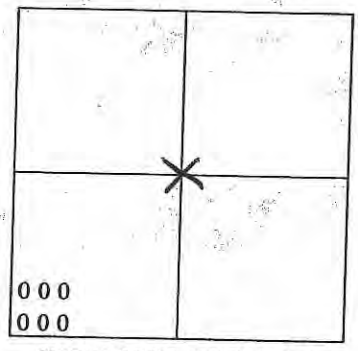
WELL DRILLERS LICENSE NUMBER: 086

CIRCLE: MWD (MSD) MGD

* OWNER'S NAME: Melton Hogeboom

* WELL LOCATION:
COUNTY: Anne Arundel
NEAREST TOWN: Odenton
TAX MAP 29 BLOCK 19 PARCEL 020
SUBDIVISION: Woodward ville
SECTION: _____ LOT: _____
NEAREST ROAD: ~~Elm~~ 2815 5th Ave

MARYLAND GRID COORDINATES
BOX NUMBER
E 870
N 440



SHOW WELL LOCATION BY X WITHIN BOX

TYPE OF WELL BEING ABANDONED:

X DRILLED _____ JETTED
_____ BORED/AUGUERED _____ HAND DUG
_____ OTHER (specify) _____

USE CODE:

X DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
_____ TEST/OBSERVATION

* TYPE OF CASING:

_____ STEEL X PLASTIC
X CONCRETE _____ OTHER (specify)

SIZE OF CASING: 36 INCHES IN DIAMETER

DEPTH OF WELL: 18 FEET DEEP

WAS ANY CASING REMOVED? ___ YES X NO
if yes, length removed, in feet: _____

WAS CASING RIPPED OR PERFORATED? ___ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
Sand	18	5
Bentonite Clay	5	2
Backfill	2	—

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN | 086 LICENSE # | MWD/MSD/MGD CIRCLE ONE | 11-15-98 DATE

ENV 828 WWM 1999

C 1 | 8674 (1 2 3 6) SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

ST/CO USE ONLY
DATE Received NOV 13 2000 (8 13)

DATE WELL COMPLETED MM 7 DD 5 YY 99 (15 20)

Depth of Well 22 90 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-94-3612 (28 29 30 31 32 33 34 35 36 37)

OWNER GREG LANE (last name / first name)

STREET OR RFD 987 PATUXENT Rd TOWN PINEY ORCHARD

SUBDIVISION WOODWARD VIEW SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
RED GRAVEL + SAND	0	15	
WHITE CLAY	15	22	
WHITE SAND	22	27	X
RED + WHITE CLAY	27	70	
WHITE SAND	70	90	X

NUMBER OF UNSUCCESSFUL WELLS: 0

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
- (A) A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: M W D 4437
Joseph J. Cunningham
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: __ D ___

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] no [N] (44 44)

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT [CM] (45 46) BENTONITE CLAY [BC] (47)

NO. OF BAGS 6 NO. OF POUNDS 300

GALLONS OF WATER 200

DEPTH OF GROUT SEAL (to nearest foot)
from 0 (48 TOP 52) ft. to 70 (54 BOTTOM 58) ft.
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
- [ST] STEEL
- [CO] CONCRETE
- [PL] PLASTIC
- [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL (60 61)	4 (63 64)	80 (66 70)

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	depth (feet) to
PL			

SCREEN RECORD
screen type or open hole — insert appropriate code below
- [ST] STEEL
- [BR] BRASS BRONZE
- [HO] OPEN HOLE
- [PL] PLASTIC
- [OT] OTHER

EACH SCREEN	C 2	DEPTH (nearest ft.)	
1	PL (8 9)	80 (11 15)	90 (17 21)
2		(23 24)	(26 30) (32 36)
3		(38 39)	(41 45) (47 51)

SLOT SIZE 1 ~~0.10~~ 2 0.02 3

DIAMETER OF SCREEN 2 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68: from 70 to 90 (68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
70 ___ 72 ___ A (74 75 76)
TELESCOPE CASING | LOG INDICATOR | OTHER DATA

C 3 (1 2)

PUMPING TEST
HOURS PUMPED (nearest hour) 3 (8 9)

PUMPING RATE (gal. per min.) 20.0 (11 15)

METHOD USED TO MEASURE PUMPING RATE Bucket + Timer

WATER LEVEL (distance from land surface)

BEFORE PUMPING 65 (17 20) ft.

WHEN PUMPING 80 (22 25) ft.

TYPE OF PUMP USED (for test)
- [A] air (27)
- [P] piston (27)
- [T] turbine (27)
- [C] centrifugal (27)
- [R] rotary (27)
- [O] other (describe below) (27)
- [J] jet (27)
- [S] submersible (27)

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) (YES) NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. S (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 7 (31 35)

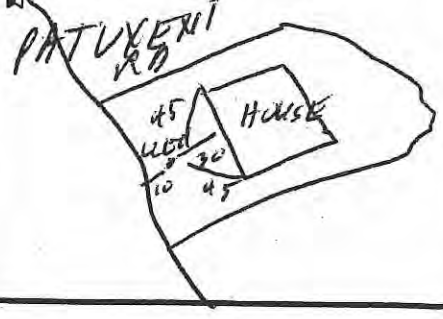
PUMP HORSE POWER 1/2 (37 41)

PUMP COLUMN LENGTH (nearest ft.) 85 (43 47)

CASING HEIGHT (circle appropriate box and enter casing height)
- (+) above (49)
- (–) below (49)

LAND SURFACE 1 (50 51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURES AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

NOV 2000
Received
Onsite Septic
Systems & Wells
Program

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: FEB. 6, 1999 (month/day/year)

PERMIT NUMBER OF ABANDONED WELL (if any) — —

* PERMIT NUMBER OF REPLACEMENT WELL AA - 94-3612

PERSON ABANDONING WELL: JOE GRIMSHAW

WELL DRILLERS LICENSE NUMBER: _____

CIRCLE: MWD/MSD/MGD

* OWNER'S NAME: GREG LANE

WELL LOCATION:
COUNTY: AA
NEAREST TOWN: PINEY ORCHARD
TAX MAP 36 BLOCK 02 PARCEL 140
SUBDIVISION: WOODLAND VILLE
SECTION: _____ LOT: _____
NEAREST ROAD: PATUXENT

MARYLAND GRID COORDINATES
E 160
BOX NUMBER
N 440 <———

X 000 000	

SHOW WELL LOCATION BY X WITHIN BOX

TYPE OF WELL BEING ABANDONED:

_____ DRILLED _____ JETTED
_____ BORED/AUGUERED _____ HAND DUG
X OTHER (specify) DRIVE PT. ~~3~~ 3"

USE CODE:

X DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
_____ TEST/OBSERVATION

* TYPE OF CASING:

X STEEL _____ PLASTIC
_____ CONCRETE _____ OTHER (specify)
_____

* SIZE OF CASING: 3 INCHES IN DIAMETER

DEPTH OF WELL: 23 FEET DEEP

WAS ANY CASING REMOVED? ___ YES X NO
if yes, length removed, in feet: _____

WAS CASING RIPPED OR PERFORATED? ___ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
BENTONITE CLAY	0	23

Joel J Grimshaw 437 (MWD)/MSD/MGD APR 10 1999
SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN LICENSE # CIRCLE ONE DATE

MDENV 828 JULY 1993

107-25

STATE OF MARYLAND
DEPARTMENT OF WATER RESOURCES
STATE OFFICE BUILDING
ANNAPOLIS, MARYLAND 21401

PERMIT TO DRILL WELL

ISSUE DATE- 08/07/72
MO DA YR

****
* PERMIT NUMBER- AA-73-0145 *
****

ISSUED TO DRILLER-

GREER, H J DRLG CO
P O DRAWER A
GAMBRILLS MD 21054

DRILLER
ID. NUMBER- 136

THE ABOVE NAMED DRILLER IS HEREBY AUTHORIZED TO DRILL A WELL TO BE OWNED BY-

WIST, JAMES
BX 376A PATUXENT RD
ODENTON MD 21113

THIS WELL IS TO BE LOCATED IN ANNE ARUNDEL COUNTY, NEAR THE TOWN OF ODENTON

THE WATER IS TO BE USED FOR A DOMESTIC SUPPLY.

THIS WELL WILL REPLACE A WELL WHICH WILL BE ABANDONED & SEALED.

****SPECIAL CONDITIONS****

THIS PERMIT IS SUBJECT TO THE FOLLOWING SPECIAL CONDITIONS-

NONE.

THIS PERMIT IS VALID UNTIL 02/07/73. A WELL COMPLETION REPORT MUST BE SUBMITTED TO THE DEPARTMENT WITHIN 30 DAYS AFTER COMPLETION OF THE WELL

PAUL W. MCKEE
DIRECTOR, MARYLAND
DEPARTMENT OF WATER
RESOURCES

DWR COPY

WR-WW 5/81

EMERGENCY NO. (If any) - AA 23-82 -

B 1 05021 — SEQUENCE NO. (DWR USE ONLY)
1 2 3 (SEQ. NO.) 5
(THIS NUMBER TO BE PUNCHED IN COLS. 3-5 ON ALL CARDS)

STATE OF MARYLAND
DEPARTMENT OF WATER RESOURCES
STATE OFFICE BLDG., ANNAPOLIS, MARYLAND 21401
APPLICATION FOR PERMIT TO DRILL WELL

DWR PERMIT NUMBER: AA-23-0145
FILL IN THIS FORM COMPLETELY

DATE RECEIVED (DWR USE ONLY): 08 07 82

OWNER: WIST, JAMES (COL 15 LAST NAME / FIRST NAME COL. 34)
STREET OR RFD: Box 376A Patuxent Rd. (COL 36 / COL. 58)
POST OFFICE: Odenton, Maryland 21113 (COL 57 / COL. 76)

B 1 CONTINUED — DRILLER INFORMATION
DATE: 8-4-82 — LICENSE NUMBER: 136
H. J. Greer Drilling Co. Inc.
FIRST NAME / DRILLER / LAST NAME
SIGNATURE: Harold J Greer

B 2 — WELL INFORMATION
MAXIMUM PUMPING RATE (GALLONS PER MINUTE): 10
AVERAGE DAILY QUANTITY NEEDED (GALLONS PER DAY): 500

USE FOR WATER (CIRCLE APPROPRIATE BOX)
(D) DOMESTIC, HOME (SINGLE OR DOUBLE HOUSEHOLD UNIT ONLY)
(F) FARMING, AGRICULTURE, IRRIGATION
(I) INDUSTRIAL, COMMERCIAL, STATE AND FEDERAL GOVERNMENT
(M) MUNICIPAL WATER SUPPLY } MUST HAVE STATE HEALTH DEPT. APPROVAL
(P) PRIVATE WATER COMPANY
(T) TEST

APPROXIMATE DEPTH OF WELL: 100 FEET
APPROXIMATE DIAMETER OF WELL: 4 (NEAREST INCH)

METHOD OF DRILLING USED (CIRCLE APPROPRIATE METHOD)
BORED (OR AUGERED) — JETTED — DRIVEN
AIR-ROTARY — AIR-PERCUSSION — (ROTARY) (HYDRAULIC ROTARY)
CABLE — REVERSE-ROTARY — DRIVE-POINT
OTHER (DESCRIBE)

REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)
(N) THIS WELL WILL NOT REPLACE AN EXISTING WELL
(Y) THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
(S) THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY
(D) THIS WELL WILL DEEPEN AN EXISTING WELL
PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE)

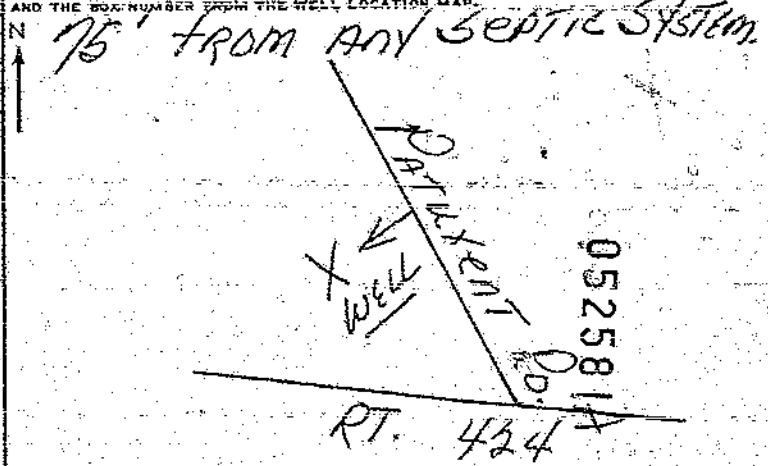
NOT TO BE FILLED IN BY DRILLER (DWR USE ONLY)
APPROPRIATION PERMIT NUMBER (G A P) — ENGINEER REVIEW DISTRICT NO.
FORCE — WRITE INITIALS IN BOX — CONDITIONS (A E N S G W Q C L U)

B 4 CONTINUED — HEALTH DEPARTMENT APPROVAL
(S) STATE HEALTH (CIRCLE BOX)
COUNTY NAME: AA — COUNTY NO.: 02
DATE: MO. 08 DAY 04 YR. 82 — APPROVED BY

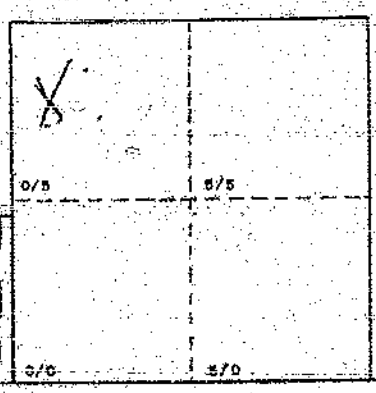
B 3 — LOCATION OF WELL
COUNTY: ANNE ARUNDEL (DO NOT ABBREVIATE COUNTY NAME)
SUBDIVISION
SECTION
NEAREST TOWN: Odenton
MILES FROM TOWN (ENTER 0 IF IN TOWN): 6 (M) (I)

B 4 — DIRECTION FROM TOWN (CIRCLE APPROPRIATE BOX)
(N) NORTH (E) EAST (NE) NORTHEAST (SE) SOUTHEAST
(S) SOUTH (W) WEST (NW) NORTHWEST (SW) SOUTHWEST
NEAR WHAT ROAD: Patuxent Rd.
ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX): NORTH (N) SOUTH (S) EAST (E) WEST (W)
DISTANCE FROM ROAD (ENTER DISTANCE AND CIRCLE APPROPRIATE BOX): 40 (FT) (MI)

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS, ROADS AND STREAMS. PUT NORTH IN THE DIRECTION OF THE ARROW, AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION OR STREAM CROSSING SHOWN ON THE SKETCH. ALSO SHOW, BY MEANS OF AN "X", THE WELL LOCATION IN THE BOX BELOW, AND THE BOX NUMBER FROM THE WELL LOCATION MAP.



BOX NUMBER: E 880 N 430



NORTH COORDINATE: 435000
EAST COORDINATE: 0860000
ELEVATION AT WELL HEAD (FEET)

B 5 — SPECIAL CONDITIONS B-63 (DWR USE ONLY)

107-25

ORIGINAL

WR - WC 9/71

C 1 C0304 — SEQUENCE NO. (OWR USE ONLY) — (SEQ. NO.) — (THIS NUMBER IS TO BE PUNCHED IN COLS. 9-6 ON ALL CARDS)

STATE OF MARYLAND
DEPARTMENT OF WATER RESOURCES
STATE OFFICE BLDG., ANNAPOLIS, MARYLAND 21401
WELL COMPLETION REPORT

THIS REPORT MUST BE SUBMITTED WITHIN 30 DAYS AFTER WELL COMPLETION

FILL IN THIS FORM COMPLETELY

COUNTY NUMBER

DATE RECEIVED (OWR USE ONLY) 8-13

DATE WELL COMPLETED 8-9-72

DEPTH OF WELL 193 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" PA-PE-0145

DRILLING CONTRACTOR NO. 130

OWNER Wist James (LAST NAME)

STREET OR RFD Box 316 Patuxent Rd. POST OFFICE Croton, Md. (POST NAME)

WELL DESCRIPTION

WELL LOG

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (USE ADDITIONAL SHEETS IF NECESSARY)	FEET FROM	FEET TO	CHECK IF WATER BEARING
Top Soil	0	1	
Gravel	1	30	
White Clay	30	80	
Fine Sand	80	92	
Red Clay	92	160	
White Clay	160	178	
Medium Fine Sand	178	193	

GROUTING RECORD
WELL HAS BEEN GROUTED (CIRCLE APPROPRIATE BOX) YES [Y] NO [N] (44)

TYPE OF GROUTING MATERIAL (CIRCLE BOX)

CEMENT [C M] (45 46) BENTONITE CLAY [B C] (45 46)

NO. OF BAGS _____ NO. OF POUNDS _____

GALLONS OF WATER _____

DEPTH OF GROUT SEAL (TO NEAREST FOOT)

FROM _____ FT. TO _____ FT. (48 52 54 58)

(ENTER 0 IF FROM SURFACE)

CASING RECORD
CASING TYPES (INSERT APPROPRIATE CODE BELOW)

STEEL [S T] CONCRETE [C O] PLASTIC [P L] OTHER [O T]

MAIN CASING TYPE	NOMINAL DIAMETER TOP (MAIN) CASING (NEAREST INCH)	TOTAL DEPTH OF MAIN CASING (NEAREST FOOT)
S T (60 61)	4 (63 64)	188 (66 70)

OTHER CASING (IF USED)

EACH CASING	DIAMETER (INCH)	DEPTH (FEET) FROM	TO

SCREEN RECORD
SCREEN TYPE OR OPEN HOLE (INSERT APPROPRIATE CODE BELOW)

STEEL [S T] BRASS OR BRONZE [B R] OPEN HOLE [H O] PLASTIC [P L] OTHER [O T]

C 2 (1 2 3 SEQ. NO. 6)

EACH SCREEN		DEPTH (NEAREST WHOLE FOOT) FROM	TO
1	P L (8 9)	188 (11 15)	193 (17 21)
2	(23 24)	(26 30)	(32 36)
3	(38 39)	(41 45)	(47 51)

SLOT SIZE 1, .030 2, _____ 3, _____

DIAMETER OF SCREEN 4 1/2 (56 60) (NEAREST INCH)

GRAVEL PACK FROM _____ TO _____

IF WELL DRILLED WAS A FLOWING WELL CIRCLE BOX 68 [F]

OWN USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (70) TELESCOPE CASING — (E.R.O.S.) (72) LOG INDICATOR — W Q (74 75 76) OTHER DATA AVAILABLE

C 3 (1 2 3 SEQ. NO. 6)

PUMPING TEST
HOURS PUMPED (TO NEAREST HOUR) 1 (8 9)

PUMPING RATE (GALLONS PER MINUTE TO NEAREST GALLON) 50 (11)

METHOD USED TO MEASURE PUMPING RATE Gen. Comp.

WATER LEVEL: (DISTANCE FROM LAND SURFACE)

BEFORE PUMPING 3 (17 20) (NEAREST FOOT)

WHEN PUMPING 12 (22 25) (NEAREST FOOT)

TYPE OF PUMP USED (CIRCLE APPROPRIATE BOX) (FOR PUMPING TEST)

AIR [A] (27) PISTON [P] (27) TURBINE [T] (27)

CENTRIFUGAL [C] (27) ROTARY [R] (27) OTHER (DESCRIBE BELOW) [O] (27)

JET [J] (27) SUBMERSIBLE [S] (27)

PUMP INSTALLED
TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE: A, C, J, P, R, S, T, O) (29)

DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX) YES [Y] NO [N]

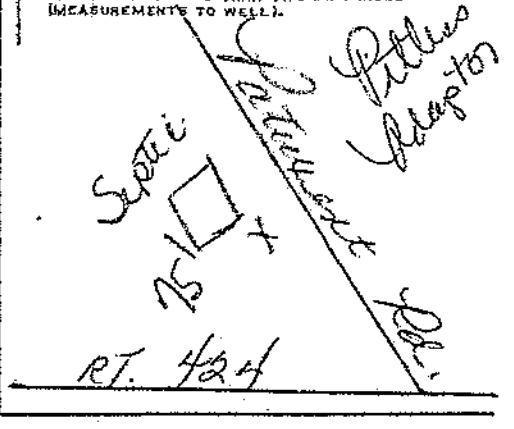
CAPACITY: GALLONS PER MINUTE (TO NEAREST GALLON) Owners (31 35)

PUMP HORSE POWER (37 41)

PUMP COLUMN LENGTH (NEAREST FOOT) (43 47)

CASING HEIGHT (CIRCLE APPROPRIATE BOX AND ENTER CASING HEIGHT)
ABOVE [A] BELOW [B] LAND SURFACE 1 (NEAREST FOOT) (49 50 51)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDINGS, SEPTIC TANKS, AND/OR OTHER LAND MARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL).



CIRCLE APPROPRIATE BOXES
A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

E ELECTRIC LOG OBTAINED

P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT I HAVE COMPLIED WITH ALL CONDITIONS STATED ON THE ABOVE-CAPTIONED "PERMIT TO DRILL WELL", AND THAT INFORMATION CONTAINED IN THIS REPORT IS TRUE, ACCURATE, AND COMPLETE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF.

DRILLER'S NAME H. J. Green Drilling

(PLEASE PRINT) Elmer E. Green

SIGNATURE Harold J. Green

ORIGINAL

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
1800 Washington Blvd., Baltimore, Maryland 21230 (410) 537-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:
* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

rec'd 4-22-14
4816-9023-8255
Tax#00578502

DATE WELL ABANDONED: 4/10/14 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any): AA — 74 — 2104

* PERMIT NUMBER OF REPLACEMENT WELL: NONE — —

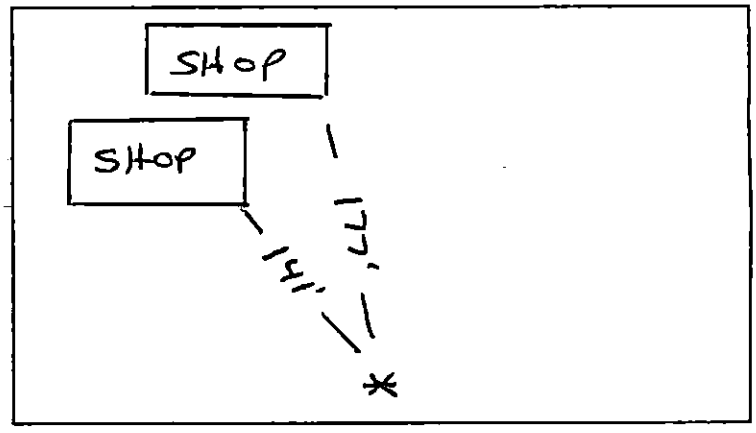
* PERSON ABANDONING WELL: Randall Melson

WELL DRILLERS LICENSE NUMBER: WD 385
CIRCLE: ~~MWD/MSD/MGD~~

* OWNER'S NAME: Two Rivers LLC

* WELL LOCATION:
COUNTY: Anne Arundel
NEAREST TOWN: Crofton
TAX MAP 36 ~~BLOCK~~ 20 PARCEL ~~110~~ 0105
SUBDIVISION: grid
SECTION: _____ LOT: _____
NEAREST ROAD: 2801 Conway Rd.

SITE LOCATION MAP



GPS 02080
Lat 39.~~118100°~~
Long 76.~~439540°~~ 73237

* TYPE OF WELL BEING ABANDONED:

x DRILLED _____ JETTED
_____ BORED/AUGERED _____ HAND DUG
_____ OTHER (specify) _____

* USE CODE:

x DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
_____ TEST/OBSERVATION _____ GEOTHERMAL

* TYPE OF CASING:

_____ STEEL x PLASTIC
_____ CONCRETE _____ OTHER (specify)

LOG OF SEALING MATERIAL

MATERIAL	FEET	
	FROM	TO
Bentonite	120'	0

VOLUME OF MATERIAL USED
500 lbs. Bentonite
250 gal H20

* SIZE OF CASING: 4 INCHES IN DIAMETER

* DEPTH OF WELL: 120 FEET DEEP

* WAS ANY CASING REMOVED? x YES _____ NO
if yes, length removed, in feet: 120

* WAS CASING RIPPED OR PERFORATED? ___ YES x NO

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN | LICENSE # 517 | MWD/MSD/MGD CIRCLE ONE | DATE 4/11/14

DENV 828 JULY 1997 1) MDE

EMERGENCY/TEMP. NO. IF ANY

B 1 6255 SEQUENCE NO. (OEP USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL
please print or type

OEP PERMIT NUMBER: AA-81-0830
fill in this form completely

Date Received: SEP 7 1982 (OEP Use Only)

OWNER INFORMATION
WASHINGTON DEMETRIUS
Last Name 15 — Owner — 35 Name

12614 VIRGINIA LN
36 — Street or RFD — 55

WILSONTOWN MD
Town 57 — State — 76 Zip

B 1 Continued — DRILLER INFORMATION
DENTON J. WOLFORD — 2 8 8 — Driller's License — 77 License No. 80

Firm Name: WOLFORD'S WELL AND PUMP SERVICE INC.
685 DUVALL HIGHWAY, PASADENA, MARYLAND 21122
Address

Signature: Denton J. Wolford — 8-24-82 — Date

B 2 — WELL INFORMATION
APPROX. PUMPING RATE (GAL. PER MIN.) 8
AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY) 300

USE FOR WATER (CIRCLE APPROPRIATE BOX)
(D) HOME (SINGLE OR DOUBLE HOUSEHOLD UNIT ONLY)
[F] ~~FARMING~~ (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION)
22 [I] INDUSTRIAL, COMMERCIAL, STATE AND FEDERAL GOV. OTHER (REQUIRES APPROPRIATION PERMIT)
[P] ~~PUBLIC OR PRIVATE WATER COMPANY~~ (REQUIRES APPROPRIATION PERMIT AND STATE HEALTH DEPARTMENT APPROVAL)
[T] TEST, OBSERVATION, MONITORING (MAY REQUIRE APPROPRIATION PERMIT)

APPROXIMATE DEPTH OF WELL 150 FEET
APPROXIMATE DIAMETER OF WELL 4" NEAREST INCH

METHOD OF DRILLING (circle one)
~~BORED (OR AUGERED)~~ JETTED JETTED & DRIVEN
30 AIR ROTARY AIR PERCUSSION (ROTARY (HYDRAULIC ROTARY))
37 CABLE REVERSE ROTARY DRIVE POINT
other ROTARY

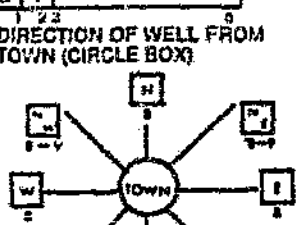
REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)
(N) THIS WELL WILL NOT REPLACE AN EXISTING WELL
[Y] THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
39 [S] THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY
[D] THIS WELL WILL DEEPEN AN EXISTING WELL
PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE) 41 ____ 52

Not to be filled in by driller (OEP USE ONLY)
APPROP. PERMIT NUMBER ____ 54 ____ 62

FORCE [ ] WRITE INITIALS IN BOX 64 65 — PERMIT No. AA-81-0830 70 71 72 73 74 75 76 77 78 79

B 3 — LOCATION OF WELL
COUNTY 6 ANNE ARUNDEL 21
SUBDIVISION 23 WILSONTOWN 42
SECTION 44 ____ 45 LOT 49 ____ 50
NEAREST TOWN 52 DENTON
MILES FROM TOWN (enter 0 if in town) 73 3.7 76 77 78 (M) I

B 4
DIRECTION OF WELL FROM TOWN (CIRCLE BOX)

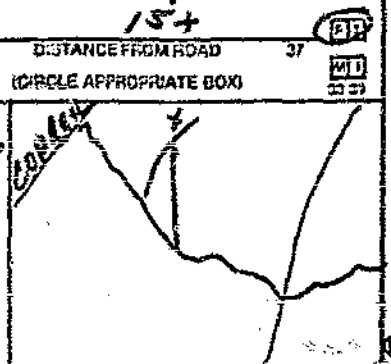


COLLINS RD 30
11 NEAR WHAT ROAD

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)
NORTH (N) WEST (W) EAST (E) SOUTH (S)

15' + 37
34 DISTANCE FROM ROAD (CIRCLE APPROPRIATE BOX) (S) (W) (D)

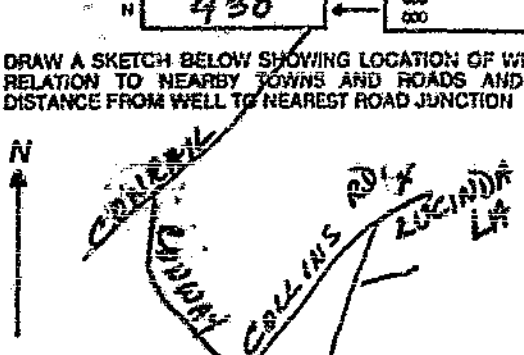
SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X



SOURCES OF DRILLING WATER
1. AA-74-3901
2. COUNTY WATER
3.

WRITE THE BOX NUMBER FROM THE MAP HERE
E 870
N 430

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



B 4
NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

Anne Arundel — 02
COUNTY NAME — COUNTY NO.

OEP SIGNATURE ____ STATE HEALTH CIRCLE BOX (S) 41

DATE ISSUED 9/3/82 — OEP SIGNATURE E Tofts

NORTH GRID 439 — EAST GRID 0074 — EXPIRES ____

B 5 — SPECIAL CONDITIONS 9-63
1 2 3 — 9

9/3/82

C 1 3147 — SEQUENCE NO. (DEP USE ONLY)

THIS NUMBER IS TO BE PUBLISHED IN CSA 1986 ON ALL CARDS

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED

COUNTY NUMBER 02

Date Rec'd by DEP MAY 4 1983

DATE WELL COMPLETED 3-7-83 (031783)

Depth of Well 235 (TO NEAREST FOOT)

PERMIT NO. FROM PERMIT TO DRILL WELL AA-81-82

OWNER Sher Chris Construction Co. (last name)

STREET OR RFD 10519 York Rd. (first name) TOWN Cockeysville, Md. 21030

SUBDIVISION Wilson Town SECTION 1264 Lucinda Lane LOT 2

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	Check if water bearing
Brown clay	0	6	
White clay	6	25	
Gravel	25	40	
Red, white clay	40	75	
White sand	75	100	
Red clay	100	170	
Gray clay	170	225	
White sand	225	238	X

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) YES (Y) NO (N)

TYPE OF GROUTING MATERIAL

CEMENT (CM) BENTONITE CLAY (BC)

NO. OF BAGS 1 NO. OF POUNDS 100

GALLONS OF WATER 50

DEPTH OF GROUT SEAL (to nearest foot) from 3 ft. (enter 0 if from surface) to 20 ft. BOTTOM

CASING RECORD
Casing types (insert appropriate code below): STEEL (ST), CONCRETE (CO), PLASTIC (PL), OTHER (OT)

MAIN CASING TYPE	Nominal diameter top/main casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	231

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or openhole (insert appropriate code below): STEEL (ST), BRASS, BRONZE (BR), OPEN HOLE (HO), PLASTIC (PL), OTHER (OT)

C 2 (seq no.)

DEPTH (nearest ft.)

EACH SCREEN			
1	PL	231	238
2			
3			

SLOT SIZE 050

DIAMETER OF SCREEN 2" (NEAREST INCH)

GRAVEL PACK from 226 to 238

IF WELL DRILLED WAS FLOWING WELL CIRCLE BOX (F)

C 3 (seq no.)

PUMPING TEST
HOURS PUMPED (nearest hour) 2½

PUMPING RATE (gal. per min. to nearest gal.) 30

METHOD USED TO MEASURE PUMPING RATE AIR

WATER LEVEL (distance from land surface)

BEFORE PUMPING 105

WHEN PUMPING 130'

TYPE OF PUMP USED (for test)

(A) air (P) piston (T) turbine (C) centrifugal (R) rotary (O) other (describe below) (J) jet (S) submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE APPROPRIATE BOX) YES (Y) NO (N)

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS EXCEPT HOME USE

TYPE OF PUMP (WRITE APPROPRIATE LETTER IN BOX - SEE ABOVE: (A, C, J, P, R, S, T, O)) S

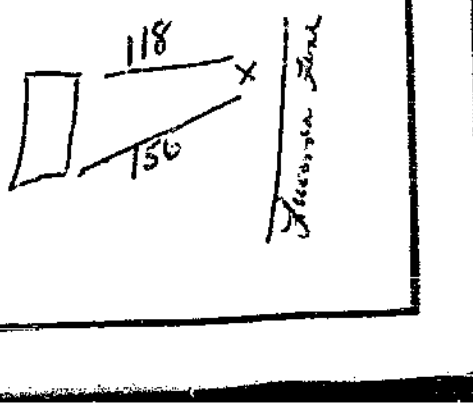
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 7

PUMP HORSE POWER ~~33~~ ¾

PUMP COLUMN LENGTH (nearest ft.) 140

CASING HEIGHT (circle appropriate box and enter casing height): (+) above / (−) below LAND SURFACE 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



CIRCLE APPROPRIATE BOX
(A) A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED

(E) ELECTRIC LOG OBTAINED

(P) TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 10.17.13 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE

DRILLERS IDENT NO 288

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION) Denton J. Walford

SITE SUPERVISOR signature driller or journeyman responsible for sitework if different from permittee

DEP USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

TELESCOPE CASING (70) LOG INDICATOR (75) OTHER DATA (76 77 78)

ORIGINAL

EMERGENCY/TEMP NO. IF ANY

B 1 | 3268 | SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL
please type

STATE PERMIT NUMBER: AA-94-3297

fill in this form completely

Date Received (APA): 10-28-98 DOE

OWNER INFORMATION

Last Name: Lanham | Owner: V | First Name: Alice

Street or RFD: 1250 Patuxent Road

Town: Odenton | State: MD | Zip: 21113

DRILLER INFORMATION

Driller's Name: John Greer | License No.: MSD086

Firm Name: JG Greer Drilling Co, Inc.

Address: P.O. Drawer A Gambrills, MD 21054

Signature: [signature] | Date: 10-28-98

B 2 WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN.): 10

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY): 500

USE FOR WATER (CIRCLE APPROPRIATE BOX)

- (D) DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
- [F] FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION
- [I] INDUSTRIAL, COMMERICIAL, DEWATERING
- [P] PUBLIC WATER SUPPLY WELL
- [T] TEST, OBSERVATION, MONITORING
- [G] GEO-THERMAL

APPROXIMATE DEPTH OF WELL: 100 FEET

APPROXIMATE DIAMETER OF WELL: 4 NEAREST INCH

METHOD OF DRILLING (circle one)

BORED (or Augered) | JETTED | Jetted & DRIVEN
AIR-ROTary | AIR-PERcussion | ROTARY (Hydraulic Rotary)
CABLE | REVerse-ROTary | DRive-POINT
other

REPLACEMENT OR DEEPENED WELLS
(CIRCLE APPROPRIATE BOX)

- [N] THIS WELL WILL NOT REPLACE AN EXISTING WELL
- (Y) THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- [S] THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
- [D] THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE):

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER: GAP

PERMIT No. AA-~~94~~ 52-3297

SPECIAL CONDITIONS: Radium Sampling Rqd

NOTE - APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED

B 3 LOCATION OF WELL

COUNTY: Anne Arundel

SUBDIVISION: Woodwardville

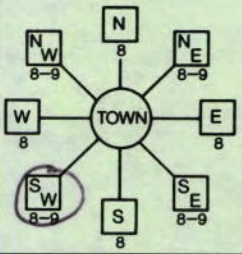
SECTION | LOT

NEAREST TOWN: Odenton

MILES FROM TOWN (enter 0 if in town): 4 M I

B 4

DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



1250 Patuxent Road — NEAR WHAT ROAD

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)



DISTANCE FROM ROAD: 401 FT (ENTER FT OR MI)

TAX MAP: 36 BLK: 15 PARCEL: 0023

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

COUNTY NAME: Anne Arundel | COUNTY NO.: 02

STATE SIGNATURE: _____ INSERT S

DATE ISSUED: 10 28 98 | CO SIGNATURE: Barry D. Adams 102899 | EXP. DATE

NORTH GRID: 436 000 | EAST GRID: 0881 000

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X

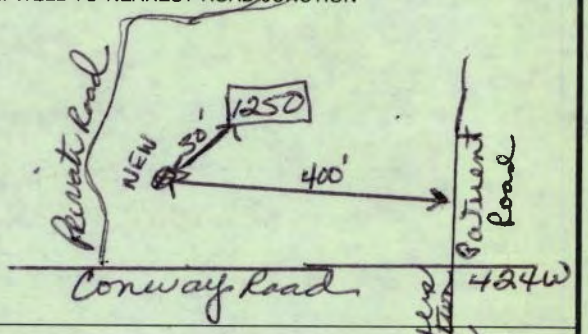
SOURCES OF DRILLING WATER
1. Well Drillers
2. TAN 145 225
3. 4000-0103-3000

WRITE THE BOX NUMBER FROM THE MAP HERE

E 880 (000)

N 430 (000)

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



DENV-Permit 97

① ORIGINAL

C 1 | 5550 (1 2 3 6) | SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED AFTER WELL IS COMPLETED.

COUNTY NUMBER: 02

ST/CO USE ONLY
DATE Received (MM DD YY) (8 13): NOV 9 1998

DATE WELL COMPLETED (MM DD YY) (15 20): 11 4 98

Depth of Well (22 26): 37 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" (28 29 30 31 32 33 34 35 36 37): AA-94-3297

OWNER (last name, first name): Lanham V Alice

STREET OR RFD: 1250 Patuxent Road TOWN: Odenton

SUBDIVISION: Woodward Villa SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Brown Clay	0	10	
Sand + Gravel	10	24	
White Clay	24	31	
Med Brown Sand	31	37	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED (yes / no): no

CIRCLE APPROPRIATE LETTER
- (A) A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: MSD086

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: __D___

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) (yes / no): yes (44)

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT (CM) BENTONITE CLAY (BC) (45 46)

NO. OF BAGS: 3 NO. OF POUNDS: 150 (45 46)

GALLONS OF WATER: 75

DEPTH OF GROUT SEAL (to nearest foot)

from: 4 (48 TOP 52) ft. to: 30 (54 BOTTOM 58) ft.

(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

MAIN CASING TYPE: PL (60 61)

Nominal diameter top (main) casing (nearest inch)!: 4 (63 64)

Total depth of main casing (nearest foot): 32 (66 70)

STEEL (ST) CONCRETE (CO) PLASTIC (PL) OTHER (OT)

OTHER CASING (if used)
EACH CASING

diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below

STEEL (ST) BRASS BRONZE (BR) OPEN HOLE (HO) PLASTIC (PL) OTHER (OT)

C 2

DEPTH (nearest ft.)

EACH SCREEN

		from (8 9)	to (11 15)	(17 21)
1	PL	32	37	
2				
3				

SLOT SIZE 1: 020 2: ____ 3: ____

DIAMETER OF SCREEN: 2 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to (68)
27	37

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (70) (E.R.O.S.) (72) W Q

TELESCOPE CASING | LOG INDICATOR | OTHER DATA (74 75 76): A

C 3

PUMPING TEST
HOURS PUMPED (nearest hour) (8 9): 2

PUMPING RATE (gal. per min.) (11 15): 15

METHOD USED TO MEASURE PUMPING RATE: Barrel

WATER LEVEL (distance from land surface)

BEFORE PUMPING (17 20): 15' ft.

WHEN PUMPING (22 25): 20' ft.

TYPE OF PUMP USED (for test) (27)
- (A) air
- (P) piston
- (T) turbine
- (C) centrifugal
- (R) rotary
- (O) other (describe below)
- (J) jet
- (S) submersible

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO): (YES) NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29: S (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) (31 35): 15

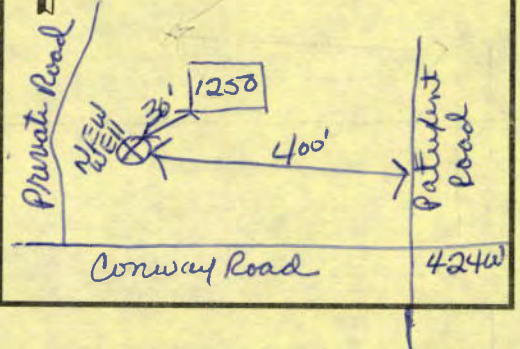
PUMP HORSE POWER (37 41): .50

PUMP COLUMN LENGTH (nearest ft.) (43 47): 30'

CASING HEIGHT (circle appropriate box and enter casing height) (49)
- (+) above LAND SURFACE
- (–) below

(nearest foot) (50 51): 1

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURES AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR97

① ORIGINAL

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 11/4/98 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) — —

* PERMIT NUMBER OF REPLACEMENT WELL AA -94-3297

* PERSON ABANDONING WELL: John Grew

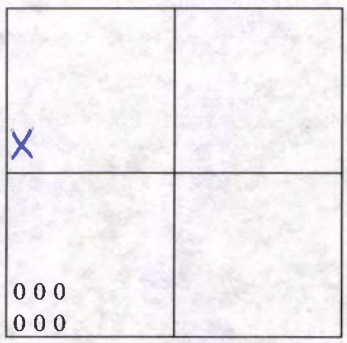
WELL DRILLERS LICENSE NUMBER: 086

CIRCLE: MWD/MSD/MGD

* OWNER'S NAME: Alice I Lanham

* WELL LOCATION:
COUNTY: Anne Arundel
NEAREST TOWN: Odenton
TAX MAP 36 BLOCK 15 PARCEL 0033
SUBDIVISION: Wood Wardville
SECTION: _____ LOT: _____
NEAREST ROAD: 1250 Patuxent Road

MARYLAND GRID COORDINATES
BOX NUMBER
E 880
N 430



SHOW WELL LOCATION BY X WITHIN BOX

* TYPE OF WELL BEING ABANDONED:

X DRILLED _____ JETTED
_____ BORED/AUGUERED _____ HAND DUG
_____ OTHER (specify) _____

* USE CODE:

X DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
_____ TEST/OBSERVATION

* TYPE OF CASING:

_____ STEEL X PLASTIC
_____ CONCRETE _____ OTHER (specify)

* SIZE OF CASING: 4 INCHES IN DIAMETER

* DEPTH OF WELL: 37 FEET DEEP

* WAS ANY CASING REMOVED? ___ YES X NO
if yes, length removed, in feet: _____

* WAS CASING RIPPED OR PERFORATED? ___ YES X NO

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
Bentonite CLAY	37	—

JC 086 MWD/MSD/MGD 11-5-98

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN — LICENSE # — CIRCLE ONE — DATE

DENV 828 JULY 1993

1) MDE

EMERGENCY/TEMP NO. IF ANY

B 1 06805 (1 2 3 6) SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL
please type

STATE PERMIT NUMBER: AA-94-5923 (70 79)

fill in this form completely

Date Received (APA): 10/31/00 (8 MM DD YY 13)

OWNER INFORMATION

Campbell Sand & Gravel Ltd. Partnership (15 Last Name Owner First Name 34)

2126 Espey Court Suite F (36 Street or RFD 55)

Crofton (57 Town) Md (70 State) 21114-2425 (72 Zip 76)

DRILLER INFORMATION

Larry Wooster (Driller's Name 76) M S D 062 (License No. 81)

Wooster Drilling Co (Firm Name)

10930 Bridle Path Cr. Waldorf, Md 20601 (Address)

Larry Wooster (Signature) Oct 29, 2000 (Date)

B 2 WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN.): 50 (8 12)

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY): 6800 (14 20)

USE FOR WATER (CIRCLE APPROPRIATE BOX)

- D DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
- F FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION
- (22) (I) INDUSTRIAL, COMMERICIAL, DEWATERING
- P PUBLIC WATER SUPPLY WELL
- T TEST, OBSERVATION, MONITORING
- G GEO-THERMAL

APPROXIMATE DEPTH OF WELL: 330 (24 28) FEET

APPROXIMATE DIAMETER OF WELL: 4½ NEAREST INCH

METHOD OF DRILLING (circle one)

(30) BORED (or Augered) JETTED Jetted & DRIVEN
AIR-ROTary AIR-PERcussion ROTARY (Hydraulic Rotary)
(37) CABLE REVerse-ROTary DRive-POINT
other

REPLACEMENT OR DEEPENED WELLS
(CIRCLE APPROPRIATE BOX) Back-up Well

- XXX THIS WELL WILL NOT REPLACE AN EXISTING WELL
- Y THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- (39) S THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
- D THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE) (41 52)

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER: AA98 G A P013 (01) (54 63)

PERMIT No. AA-94-5923 (70 71 72 73 74 75 76 77 78 79)

B 3 LOCATION OF WELL

Anne Arundel (8 COUNTY 21)

(23 SUBDIVISION 42)

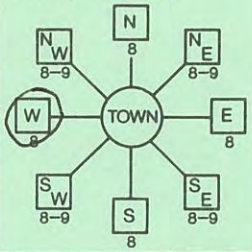
SECTION (44 46) LOT (48 50)

Conway (52 NEAREST TOWN 71)

MILES FROM TOWN (enter 0 if in town): 2.4 MI (73 76 77 78)

B 4

(1 2) DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



2801 Conway Road (11 NEAR WHAT ROAD 30)

Off Bragers Rd ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)



(34 .7 37) DISTANCE FROM ROAD: Mi (ENTER FT OR MI 38 39)

TAX MAP: 36 BLK: 20 PARCEL 110

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

ANNE ARUNDEL (COUNTY NAME) 02 (COUNTY NO.)

STATE SIGNATURE _____ INSERT S → (41)

DATE ISSUED: 10/31/00 (43 MM DD YY 48) JTbm (CO SIGNATURE) EXP. DATE

NORTH GRID: 433 000 (50 55) EAST GRID: 0876 000 (57 63)

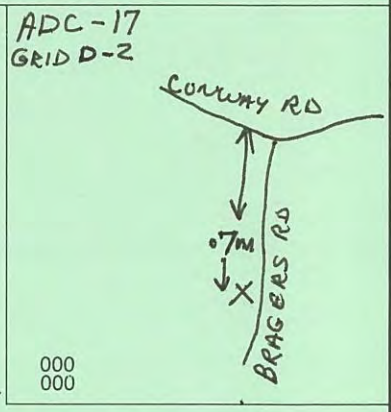
SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X →

SOURCES OF DRILLING WATER
1. Drilled Well
2.
3. 3314-595

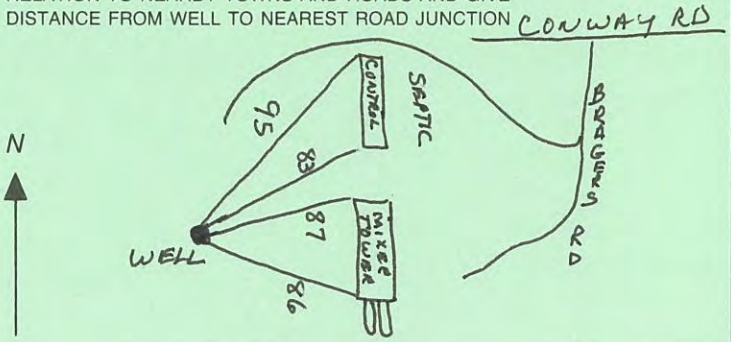
WRITE THE BOX NUMBER FROM THE MAP HERE

E 876

N 433



DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



SPECIAL CONDITIONS
NOTE = APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED =

Radium Sampling Req.

DENV-Permit 97

① ORIGINAL

C 1 | 09097 | SEQUENCE NO. (MDE USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER

ST/CO USE ONLY
DATE Received: JAN 24 2001

DATE WELL COMPLETED: 12 / 18 / 00 (MM / DD / YY)

Depth of Well: 396 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA - 94 - 5923

OWNER: Campbell Sand & Gravel Ltd. Partnership

STREET OR RFD: 2801 Conway Road TOWN: Conway

SUBDIVISION: SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Brown Clay	0	5	
White + Tan Sandy Clay	5	59	
Iron Rock	59	60	
Red Clay	60	91	
Gummy Clay	91	121	
White Sand + Clay	121	147	
Red Clay	147	164	
Sandy Red Clay	164	183	
Gummy Clay	183	189	
Brown + White Sand	189	210	
White Sandy Clay	210	225	
Red Clay	225	316	
White Sand	316	319	
Gummy Clay	319	331	
Fine White Sand	331	348	
Gummy Clay	348	351	
White Sand	351	395	✓
Red Clay	395	396	

NUMBER OF UNSUCCESSFUL WELLS: 0

WELL HYDROFRACTURED: yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: MSD062

Larry Wooster
DRILLERS SIGNATURE
(MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: MSD061

Frederick S. Schultz
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box): yes [Y] no [N]

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT [CM] BENTONITE CLAY [BC]

NO. OF BAGS 10 NO. OF POUNDS 500

GALLONS OF WATER 250

DEPTH OF GROUT SEAL (to nearest foot)

from 4 ft. to 120 ft.
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

[ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	4½	311

OTHER CASING (if used) — EACH CASING

	diameter inch	depth (feet) from	to
ST	2	306	366

SCREEN RECORD
screen type or open hole — insert appropriate code below

[ST] STEEL [BR] BRASS BRONZE [HO] OPEN HOLE [PL] PLASTIC [OT] OTHER

C 2

DEPTH (nearest ft.)

EACH SCREEN

1	ST	366	386
2	ST	386	396
3			

SLOT SIZE 1 10 2 15 3

DIAMETER OF SCREEN 3 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68	from	to

MDE USE ONLY
(NOT TO BE FILLED IN BY DRILLER)

T (E.R.O.S.) W Q

70 T — TELESCOPE CASING

72 — LOG INDICATOR

74 75 76 — OTHER DATA

C 3

PUMPING TEST
HOURS PUMPED (nearest hour): 4

PUMPING RATE (gal. per min.): 300

METHOD USED TO MEASURE PUMPING RATE: Bucket

WATER LEVEL (distance from land surface)

BEFORE PUMPING: 105 ft.

WHEN PUMPING: 118 @ 85 GPM ft.

TYPE OF PUMP USED (for test)

[A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO): YES

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29: S

CAPACITY: GALLONS PER MINUTE (to nearest gallon): 85

PUMP HORSE POWER: 5.0

PUMP COLUMN LENGTH (nearest ft.): 275

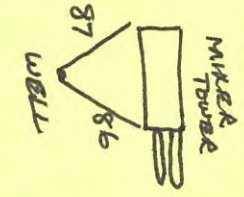
CASING HEIGHT (circle appropriate box and enter casing height)

[+] above [–] below LAND SURFACE

2 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)

N



ORIGINAL - STATE

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
1800 Washington Blvd., Baltimore, Maryland 21230 (410) 537-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM rec'd 4-22-14

****

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

New Tax #
4816-9023-8255
~~4200-~~
Tax# 00578502

DATE WELL ABANDONED: 4/10/14 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) AA — 94 — 5923

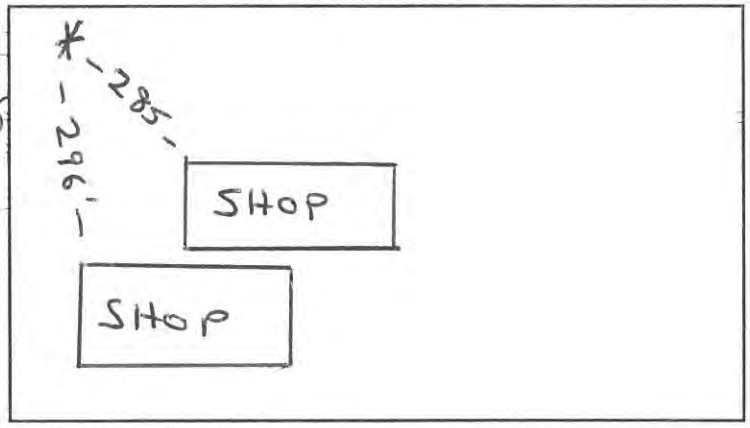
* PERMIT NUMBER OF REPLACEMENT WELL NONE — —

* PERSON ABANDONING WELL: Randall Melson

WELL DRILLERS LICENSE NUMBER: ~~JWD~~ 385
CIRCLE: MWD/MSD/MGD

* OWNER'S NAME: ~~Two Rivers LLC~~

SITE LOCATION MAP



* WELL LOCATION:
COUNTY: Anne Arundel
NEAREST TOWN: Crofton
TAX MAP 36 ~~BLOCK xxxxx~~ 20 PARCEL ~~110~~ 0105
SUBDIVISION: Grid
SECTION: _____ LOT: _____
NEAREST ROAD: 2801 Conway Rd.

GPS - Lat 39.~~018768°~~ 02117
Long 76.~~732283°~~ 73219

* TYPE OF WELL BEING ABANDONED:

x DRILLED _____ JETTED
_____ BORED/AUGERED _____ HAND DUG
_____ OTHER (specify) _____

* USE CODE:

x DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
_____ TEST/OBSERVATION _____ GEOTHERMAL

* TYPE OF CASING:

_____ STEEL x PLASTIC
_____ CONCRETE _____ OTHER (specify)

* SIZE OF CASING: 4 ½ INCHES IN DIAMETER

* DEPTH OF WELL: 390 FEET DEEP

* WAS ANY CASING REMOVED? ___ YES x NO
if yes, length removed, in feet: 2'

* WAS CASING RIPPED OR PERFORATED? x YES ___ NO

LOG OF SEALING MATERIAL

MATERIAL	FEET	
	FROM	TO
Bentonite	390	0

VOLUME OF MATERIAL USED
900 lbs. Bentonite
450 gal H20

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN | LICENSE # 517 | MWD/MSD/MGD CIRCLE ONE | DATE 4/11/14

DENV 828 JULY 1997

1) MDE

EMERGENCY/TEMP NO. IF ANY

B 1 | 06805 | SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL

please type

STATE PERMIT NUMBER: AA-94-5923

fill in this form completely

Date Received (APA): 10/31/00

OWNER INFORMATION

Campbell Sand & Gravel Ltd. Partnership
15 Last Name Owner First Name 34

2126 Espey Court Suite F
36 Street or RFD 55

Crofton | Md | 21114-2425
57 Town 70 State 72 Zip 76

DRILLER INFORMATION

Larry Wooster | M S D 062
Driller's Name 76 License No. 81

Wooster Drilling Co
Firm Name

10930 Bridle Path Cr. Waldorf, Md 20601
Address

Larry Wooster | Oct 29, 2000
Signature Date

B 2 WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN.): 50 (8 12)

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY): 6800 (14 20)

USE FOR WATER (CIRCLE APPROPRIATE BOX)

- D DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
- F FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION
- 22 (I) INDUSTRIAL, COMMERICIAL, DEWATERING
- P PUBLIC WATER SUPPLY WELL
- T TEST, OBSERVATION, MONITORING
- G GEO-THERMAL

APPROXIMATE DEPTH OF WELL: 330 (24 28) FEET

APPROXIMATE DIAMETER OF WELL: 4½ NEAREST INCH

METHOD OF DRILLING (circle one)

BORED (or Augered) JETTED Jetted & DRIVEN
30 AIR-ROTary AIR-PERcussion (ROTARY (Hydraulic Rotary))
37 CABLE REVerse-ROTary DRive-POINT
other

REPLACEMENT OR DEEPENED WELLS

(CIRCLE APPROPRIATE BOX) Back-up Well

- XXX THIS WELL WILL NOT REPLACE AN EXISTING WELL
- Y THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- 39 S THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
- D THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE) 41 — — - — — - — — — — 52

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER: AA98 GA P013 (01) (54 63)

PERMIT No. AA-94-5923 (70 71 72 73 74 75 76 77 78 79)

B 3 LOCATION OF WELL

Anne Arundel
8 COUNTY 21

23 SUBDIVISION 42

SECTION (44 46) LOT (48 50)

Conway
52 NEAREST TOWN 71

MILES FROM TOWN (enter 0 if in town): 2.4 MI (73 76 77 78)

B 4

1 2 DIRECTION OF WELL FROM TOWN (CIRCLE BOX)



2801 Conway Road
11 NEAR WHAT ROAD 30

Off Bragers Rd
ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)



34 .7 37 DISTANCE FROM ROAD: Mi
ENTER FT OR MI 38 39

TAX MAP: 36 BLK: 20 PARCEL 110

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

ANNE ARUNDEL | 02
COUNTY NAME COUNTY NO.

STATE SIGNATURE _____ INSERT S → 41

DATE ISSUED 10/31/00 | CO SIGNATURE | EXP. DATE
43 MM DD YY 48

NORTH GRID 433 000 (50 55) EAST GRID 0876 000 (57 63)

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X →

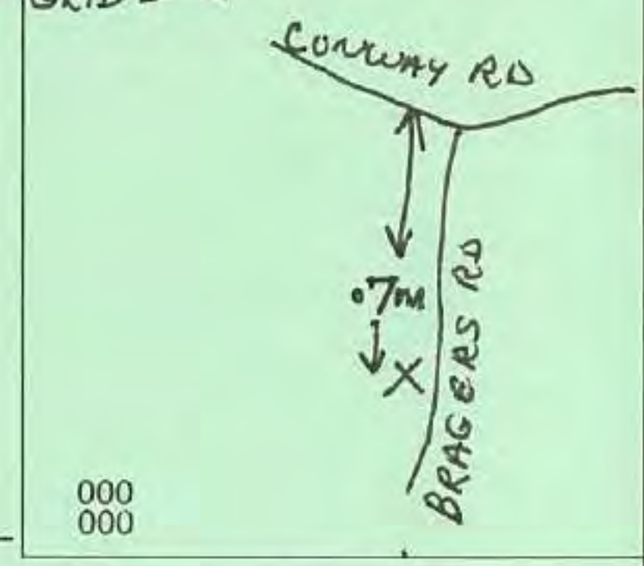
SOURCES OF DRILLING WATER
1. Drilled Well
2.
3. 3314-595

WRITE THE BOX NUMBER FROM THE MAP HERE

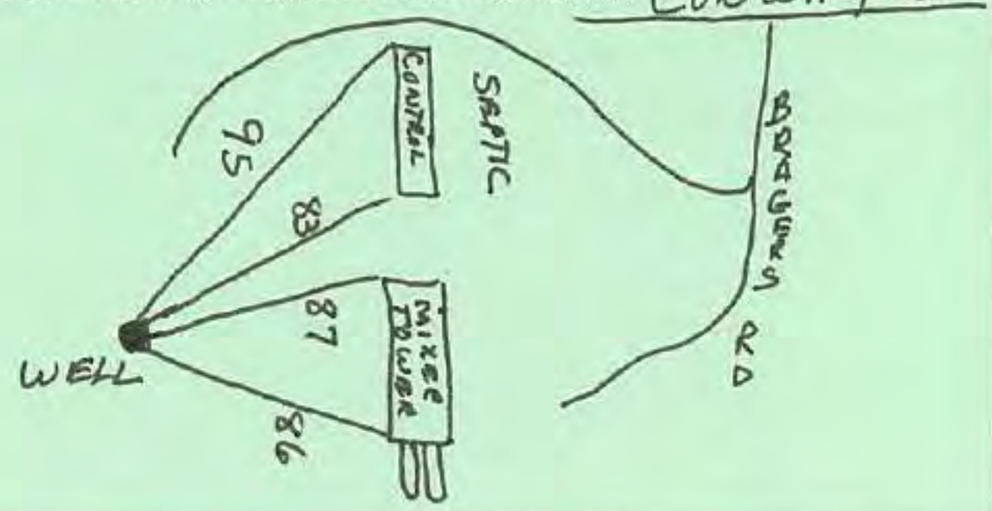
E 876

N 433

ADC-17
GRID D-2



DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



SPECIAL CONDITIONS
NOTE - APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED -

Radium Sampling Req.

DENV-Permit 97

① ORIGINAL

C 1 09097 — SEQUENCE NO. (MDE USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT

FILL IN THIS FORM COMPLETELY
PLEASE PRINT OR TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER

ST/CO USE ONLY
DATE Received: JAN 24 2001

DATE WELL COMPLETED: 12 / 18 / 00 (MM / DD / YY)

Depth of Well: 396 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA - 94 - 5923

OWNER: Campbell Sand & Gravel Ltd. Partnership

STREET OR RFD: 2801 Conway Road (last name / first name) TOWN: Conway

SUBDIVISION: SECTION: LOT:

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Brown Clay	0	5	
White + Tan Sandy Clay	5	59	
Iron Rock	59	60	
Red Clay	60	91	
Gummy Clay	91	121	
White Sand + Clay	121	147	
Red Clay	147	164	
Sandy Red Clay	164	183	
Gummy Clay	183	189	
Brown + White Sand	189	210	
White Sandy Clay	210	225	
Red Clay	225	316	
White Sand	316	319	
Gummy Clay	319	331	
Fine White Sand	331	348	
Gummy Clay	348	351	
White Sand	351	395	
Red Clay	395	396	

NUMBER OF UNSUCCESSFUL WELLS: 0

WELL HYDROFRACTURED: yes [Y] no (N)

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: MSD062
Larry Waters
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: MSD061
Frederick S. Schutt
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box): yes [Y] no [N]

TYPE OF GROUTING MATERIAL (Circle one): CEMENT [CM] BENTONITE CLAY [BC]

NO. OF BAGS: 10 NO. OF POUNDS: 500

GALLONS OF WATER: 250

DEPTH OF GROUT SEAL (to nearest foot): from 4 ft. (TOP) to 120 ft. (BOTTOM) (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below: [ST] STEEL [CO] CONCRETE [PL] PLASTIC [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	4½	311

OTHER CASING (if used) — EACH CASING

	diameter inch	depth (feet) from	depth (feet) to
ST	2	306	366

SCREEN RECORD
screen type or open hole, insert appropriate code below: [ST] STEEL [BR] BRASS [HO] OPEN HOLE [BZ] BRONZE [PL] PLASTIC [OT] OTHER

C 2 — DEPTH (nearest ft.) — EACH SCREEN

1	ST	366	386
2	ST	386	396
3			

SLOT SIZE 1: 10 2: 15 3:

DIAMETER OF SCREEN: 3 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T	(E.R.O.S.)	W Q
T		

TELESCOPE CASING — LOG INDICATOR — OTHER DATA

C 3

PUMPING TEST
HOURS PUMPED (nearest hour): 4

PUMPING RATE (gal. per min.): 300

METHOD USED TO MEASURE PUMPING RATE: Bucket

WATER LEVEL (distance from land surface)

BEFORE PUMPING: 105 ft.

WHEN PUMPING: ~~118~~ @ 85 G.P.M. ft.

TYPE OF PUMP USED (for test): [A] air [P] piston [T] turbine [C] centrifugal [R] rotary [O] other (describe below) [J] jet [S] submersible

PUMP INSTALLED
DRILLER WILL INSTALL PUMP (CIRCLE) (YES or NO): (YES) NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29: S

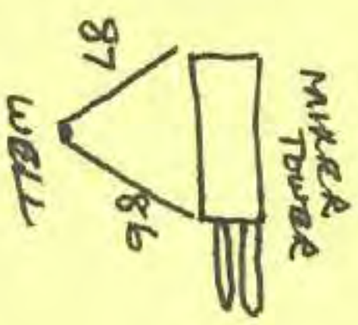
CAPACITY: GALLONS PER MINUTE (to nearest gallon): 85

PUMP HORSE POWER: 5.0

PUMP COLUMN LENGTH (nearest ft.): 275

CASING HEIGHT (circle appropriate box and enter casing height): [+] above [−] below LAND SURFACE: 2 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



ORIGINAL - STATE

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
1800 Washington Blvd., Baltimore, Maryland 21230 (410) 537-3784

****

WATER WELL ABANDONMENT-SEALING REPORT FORM rec'd 4-22-14

****

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

New Tax #
4816-9023-8255
~~4800-~~

DATE WELL ABANDONED: 4/10/14 (month/day/year)

Tax# 00578502

* PERMIT NUMBER OF ABANDONED WELL (if any) AA — 94 — 5923

* PERMIT NUMBER OF REPLACEMENT WELL NONE — —

* PERSON ABANDONING WELL: Randall Melson

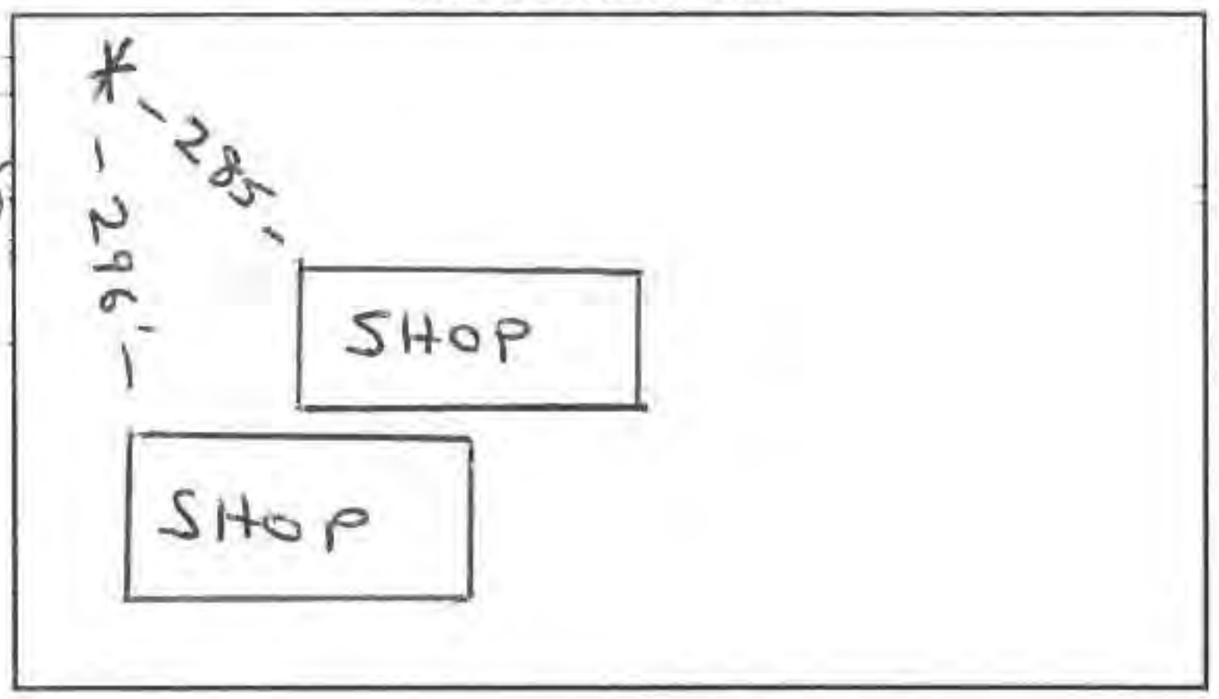
WELL DRILLERS LICENSE NUMBER: ~~JWD~~ 385
CIRCLE: MWD/MSD/MGD

* OWNER'S NAME: ~~Two Rivers LLC~~

* WELL LOCATION:
COUNTY: Anne Arundel
NEAREST TOWN: Crofton
TAX MAP 36 ~~BLOCK~~ xxxxx 20 PARCEL ~~110~~ 0105
SUBDIVISION: Grid
SECTION: _____ LOT: _____
NEAREST ROAD: 2801 Conway Rd.

GPS - Lat 39.~~018768°~~ 02117°
Long 76.~~732283°~~ 73219

SITE LOCATION MAP



* TYPE OF WELL BEING ABANDONED:

x DRILLED _____ JETTED
_____ BORED/AUGERED _____ HAND DUG
_____ OTHER (specify) _____

* USE CODE:

x DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
_____ TEST/OBSERVATION _____ GEOTHERMAL

* TYPE OF CASING:

_____ STEEL x PLASTIC
_____ CONCRETE _____ OTHER (specify)

* SIZE OF CASING: 4 1/2 INCHES IN DIAMETER

* DEPTH OF WELL: 390 FEET DEEP

* WAS ANY CASING REMOVED? ___ YES x NO
if yes, length removed, in feet: 2'

* WAS CASING RIPPED OR PERFORATED? x YES ___ NO

LOG OF SEALING MATERIAL

MATERIAL	FEET	
	FROM	TO
Bentonite	390	0

VOLUME OF MATERIAL USED

900 lbs. Bentonite
450 gal H20

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN — LICENSE # 517 — MWD/MSD/MGD — CIRCLE ONE — DATE 4/11/14

DENV 828 JULY 1997

() MDE

EMERGENCY/TEMP NO. IF ANY

B 1 | 7983 | SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL
please type

STATE PERMIT NUMBER: AA-95-3469

fill in this form completely

4000-9006-9850

Date Received (APA): 11-26-07 sak

OWNER INFORMATION

Burchell, Candace L (Last Name, First Name)

1194 Patuxent Rd.

Odenton, MD 21113 (Town, State, Zip)

DRILLER INFORMATION

Robert P Copsey MD SD 161

Wolford's well + Pump Svc.

4429 Mountain Rd - 21122

Robert P. Copsey 11/19/07 (Signature, Date)

B 2 WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN.): 8

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY): 300

B 3 LOCATION OF WELL

Anne Arundel (COUNTY)

Mary A. Warnick Prop. (SUBDIVISION)

SECTION: LOT: 2

Odenton (NEAREST TOWN)

MILES FROM TOWN (enter 0 if in town): 3 M I

B 4

DIRECTION OF WELL FROM TOWN (CIRCLE BOX): NW 8-9, N 8, NE 8-9, W 8, TOWN, E 8, SW 8-9, S 8, SE 8-9

1194 Patuxent Rd. (NEAR WHAT ROAD)

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX): NORTH, WEST, EAST, SOUTH

18322 2 366

DISTANCE FROM ROAD: 15 ENTER FT OR MI: Ft

TAX MAP: 36 BLK: 15 PARCEL: 0318

USE FOR WATER (CIRCLE APPROPRIATE BOX)

(D) DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION

[F] FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION

[I] INDUSTRIAL, COMMERICIAL, DEWATERING

[P] PUBLIC WATER SUPPLY WELL

[T] TEST, OBSERVATION, MONITORING

[G] GEO-THERMAL

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL

COUNTY NAME: AA COUNTY NO.: 02

STATE SIGNATURE: INSERT S

DATE ISSUED: 11/28/07 Julianna Smith 11/28/08 (CO SIGNATURE, EXP. DATE)

NORTH GRID: 439000 EAST GRID: 0881000

APPROXIMATE DEPTH OF WELL: 250 FEET

APPROXIMATE DIAMETER OF WELL: 4 NEAREST INCH

METHOD OF DRILLING (circle one)

BORED (or Augered) JETTED Jetted & DRIVEN

AIR-ROTary AIR-PERcussion (ROTARY (Hydraulic Rotary))

CABLE REVerse-ROTary DRive-POINT

other

REPLACEMENT OR DEEPENED WELLS
(CIRCLE APPROPRIATE BOX)

(N) THIS WELL WILL NOT REPLACE AN EXISTING WELL

[Y] THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED

[S] THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS

[D] THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE)

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X

X

SOURCES OF DRILLING WATER
1. AA-81-0490
2. AA-81-9800
3.

TO 20 34896 06 C

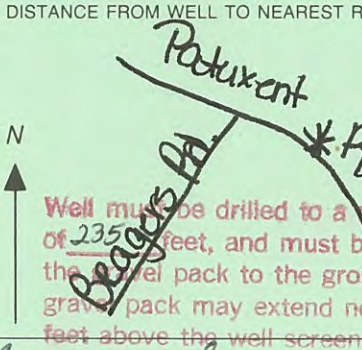
WRITE THE BOX NUMBER FROM THE MAP HERE

E 880

N 430

000 000

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



Well must be drilled to a minimum depth of 235 feet, and must be grouted from the gravel pack to the ground surface. The gravel pack may extend no greater than 10 feet above the well screen level.

12 F12

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER: ------G---

PERMIT No. AA-95-3469

SPECIAL CONDITIONS
NOTE - APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED

Radium Testing Required

DENV-Permit 97

ORIGINAL

C 1 | 3485 — SEQUENCE NO. (MDE USE ONLY)

(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

ST/CO USE ONLY
DATE Received MAR 0 4 2008

DATE WELL COMPLETED: MM 01 DD 23 YY 08

Depth of Well: 275 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL": AA-95-3469

OWNER Burchell (last name) Candace L. (first name)

STREET OR RFD 1194 Patuxent Road TOWN Odenton, MD 21113

SUBDIVISION Mary A Warnick Prop. SECTION _____ LOT 2

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Brown White Sand & Gravel	0	15	
White Clay	15	20	
Black White Sand	20	38	
Red White Clay	38	60	
Red Gray Clay	60	90	
Red Clay	90	110	
White Clay	110	122	
Red Gray Clay	122	140	
Red Clay	140	160	
Brown White Sand	160	190	
Red White Clay	190	215	
Brown White Sand	215	240	
White Clay	240	248	
Brown White Sand	248	275	****

NUMBER OF UNSUCCESSFUL WELLS: _____

WELL HYDROFRACTURED: yes Y / no N

CIRCLE APPROPRIATE LETTER
- A — A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E — ELECTRIC LOG OBTAINED
- P — TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: M 3D 1161
Robert D. Cosey
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: JS D028
Michael Sweeney
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box): yes Y / no N

TYPE OF GROUTING MATERIAL (Circle one): CEMENT CM / BENTONITE CLAY BC

NO. OF BAGS 14 NO. OF POUNDS 700

GALLONS OF WATER 350

DEPTH OF GROUT SEAL (to nearest foot): from 0 ft. (TOP) to 260 ft. (BOTTOM)

(enter 0 if from surface)

CASING RECORD
(casing types insert appropriate code below)

ST STEEL / CO CONCRETE / PL PLASTIC / OT OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL	4	225

OTHER CASING (if used) — EACH CASING

	diameter inch	depth (feet) from	to
PL	2	225	265

SCREEN RECORD
(screen type or open hole — insert appropriate code below)

ST STEEL / BR BRASS BRONZE / PL PLASTIC / HO OPEN HOLE / OT OTHER

C 2 — DEPTH (nearest ft.) — EACH SCREEN

1 PL	265	275
2		
3		

SLOT SIZE 1 .010 2 _____ 3 _____

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68: from 260 to 275

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T _____ (E.R.O.S.) _____ W Q _____

TELESCOPE CASING _____ LOG INDICATOR _____ OTHER DATA _____

C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 2

PUMPING RATE (gal. per min.) 60

METHOD USED TO MEASURE PUMPING RATE AIR

WATER LEVEL (distance from land surface)

BEFORE PUMPING 45 ft.

WHEN PUMPING 63 ft.

TYPE OF PUMP USED (for test)

A air / P piston / T turbine / C centrifugal / R rotary / O other (describe below) / J jet / S submersible

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO): YES / NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29: S

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10

PUMP HORSE POWER .75

PUMP COLUMN LENGTH (nearest ft.) 100

CASING HEIGHT (circle appropriate box and enter casing height): + above / – below LAND SURFACE: 1 (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



ROAD, N-Ra 235

DENV-CR00

ORIGINAL

EMERGENCY/TEMP NO. IF ANY

B 1 **24223** SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL
please type

STATE PERMIT NUMBER: AA - 14 - 0211

fill in this form completely

Date Received (APA) 06/11/15

OWNER INFORMATION

Connor Sr James M.
Last Name Owner First Name

1200 Patuxent Rd.
Street or RFD

Owenton MD 21113
Town State Zip

DRILLER INFORMATION

John Grier MD 5D 0826
Driller's Name License No.

H.J. Grier & Sons Drilling Co Inc
Firm Name

PO Box 1 Gamber MD 21754
Address

Signature 6-1-15 Date

B 2 WELL INFORMATION

APPROX. PUMPING RATE (GAL. PER MIN.) 10

AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY) 500

B 3 LOCATION OF WELL

Anne Arundel Co.
COUNTY

Bragers Station
SUBDIVISION

SECTION LOT

Owenton
NEAREST TOWN

B 4 SOURCES OF DRILLING WATER

Well Driller
TA04000-9004565.1

1200 Patuxent Rd
STREET ADDRESS

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)
NORTH N, WEST W, E EAST, S SOUTH

1000 DISTANCE FROM ROAD FT.

ENTER FT OR MI

TAX MAP 0036 BLK 005 PARCEL 019

USE FOR WATER (CIRCLE APPROPRIATE BOX)

D DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
F FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION)
I INDUSTRIAL, COMMERCIAL, DEWATERING
P PUBLIC WATER SUPPLY WELL
T TEST, OBSERVATION, MONITORING
O OPEN LOOP GEOTHERMAL
C CLOSED LOOP GEOTHERMAL

NOT TO BE FILLED IN BY DRILLER HEALTH DEPARTMENT APPROVAL

Anne Arundel 02
COUNTY NAME COUNTY NO.

STATE SIGNATURE INSERT S

DATE ISSUED 06/11/15 DO SIGNATURE 6/11/16
EXP. DATE

APPROXIMATE DEPTH OF WELL 150 FEET

APPROXIMATE DIAMETER OF WELL 4 NEAREST INCH

METHOD OF DRILLING (circle one)

BORED (or Augered) JETTED Jetted & DRIVEN
AIR-ROTary AIR-PERcussion ROTARY (Hydraulic Rotary)
CABLE REVerse-ROTary DRive-POINT
other

REPLACEMENT OR DEEPENED WELLS (CIRCLE APPROPRIATE BOX)

N THIS WELL WILL NOT REPLACE AN EXISTING WELL
Y THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
S THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
D THIS WELL WILL DEEPEN AN EXISTING WELL

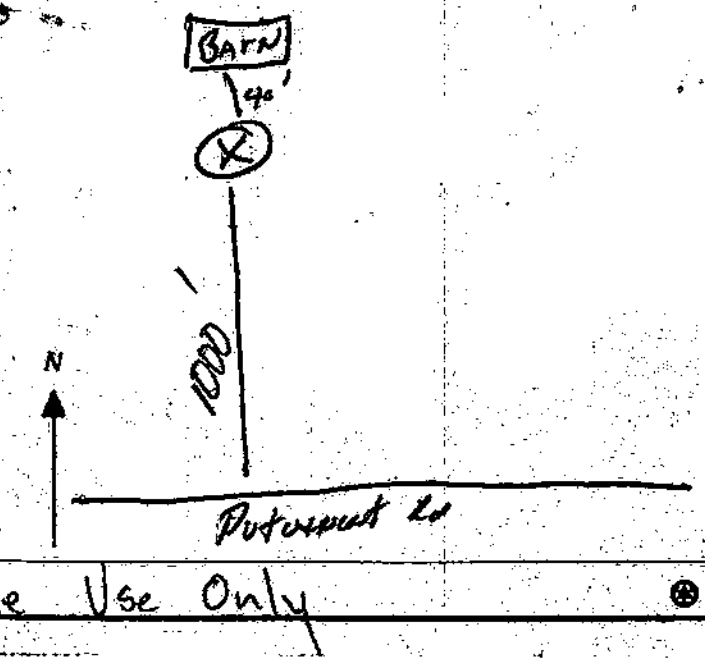
PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE)

Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER _____G_____

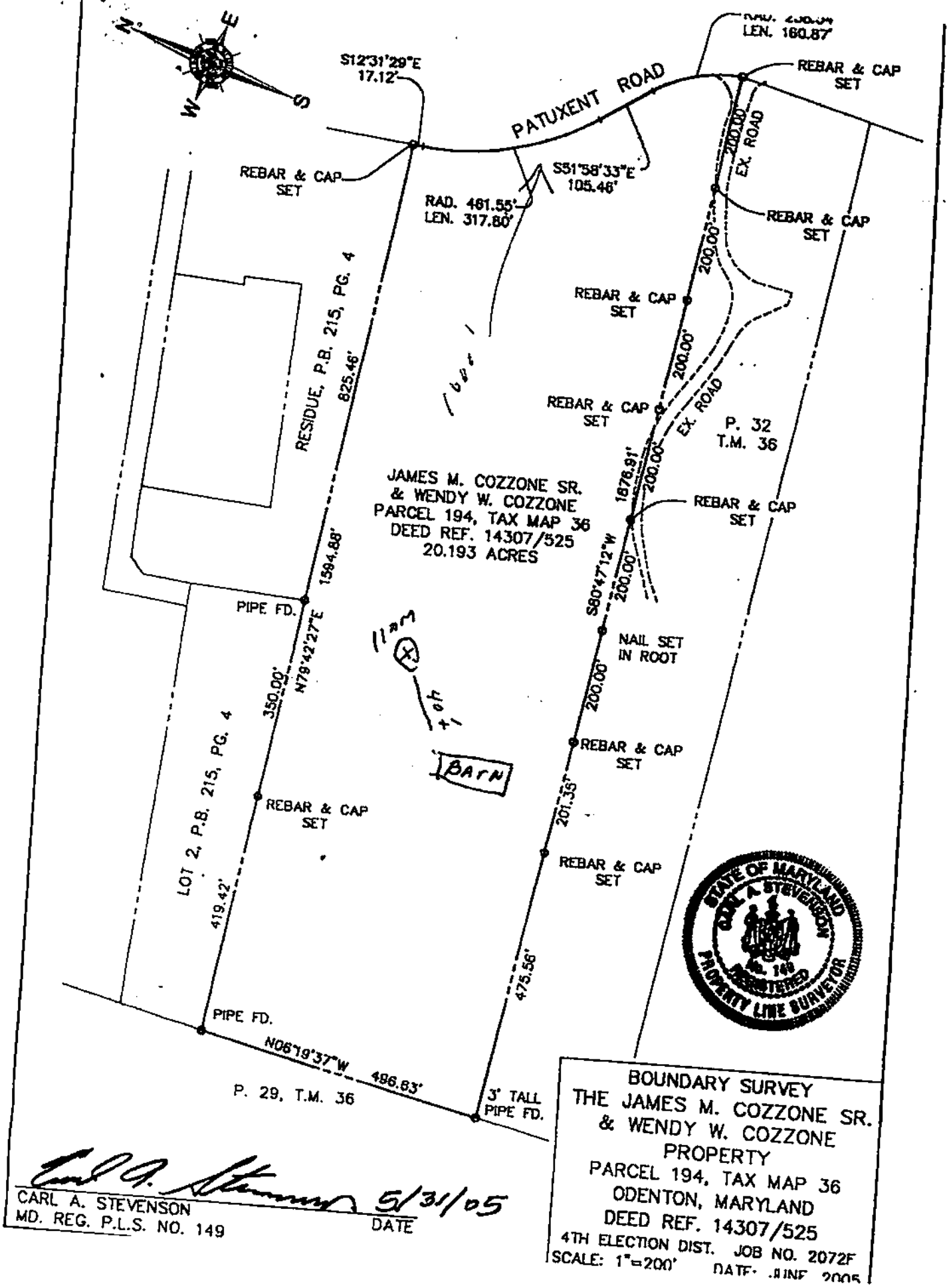
PERMIT No. AA-14-0211

PROPOSED LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURES SUCH AS BUILDINGS, SEPTIC SYSTEM, ROADS AND/OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCE MEASUREMENTS TO WELL



SPECIAL CONDITIONS
NOTE: APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED

Non Potable Use Only



Carl A. Stevenson 5/31/05

CARL A. STEVENSON
MD. REG. P.L.S. NO. 149

DATE

BOUNDARY SURVEY
THE JAMES M. COZZONE SR.
& WENDY W. COZZONE
PROPERTY
PARCEL 194, TAX MAP 36
ODENTON, MARYLAND
DEED REF. 14307/525
4TH ELECTION DIST. JOB NO. 2072F
SCALE: 1"=200' DATE: JUNE 2005

C 1 32963 — SEQUENCE NO. (MDE USE ONLY)
(THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

ST/CO USE ONLY DATE Received 08/19/15

DATE WELL COMPLETED 09/01/15

Depth of Well 134 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-14-0211

OWNER Cozzone Sr. James M.

WELL SITE ADDRESS 210 Patuxent Rd TOWN Edenton

SUBDIVISION Bragers Station SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
		22	
White Clay	22	41	
Brown Sand	41	65	
Red Clay	65	110	
White Clay	110	121	
Med. Brown sand	121	134	

Cat #10102

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes [Y] no [N]

CIRCLE APPROPRIATE LETTER
- A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: MD 0086

DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: ___ D ___

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes [Y] no [N]

TYPE OF GROUTING MATERIAL (Circle one)
CEMENT [CM] BENTONITE CLAY [BC]

NO. OF BAGS 7 NO. OF POUNDS 350

GALLONS OF WATER 175

DEPTH OF GROUT SEAL (to nearest foot)
from 4 ft. (TOP) to 70 ft. (BOTTOM) (enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
- [ST] STEEL
- [CO] CONCRETE
- [PL] PLASTIC
- [OT] OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)	Total depth of main casing (nearest foot)
PL	4	129

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	to

SCREEN RECORD
screen type or open hole — insert appropriate code below
- [ST] STEEL
- [BR] BRASS
- [BZ] BRONZE
- [PL] PLASTIC
- [HO] OPEN HOLE
- [OT] OTHER

C 2

EACH SCREEN	DEPTH (nearest ft.)		
1	31	129	134
2			
3			

SLOT SIZE 1 0 2 20 3 0

DIAMETER OF SCREEN 2 (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68: from 124 to 134

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (E.R.O.S.) W Q
TELESCOPE CASING (70) LOG INDICATOR (72) OTHER DATA (74 75 76)

C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 2

PUMPING RATE (gal. per min.) 20

METHOD USED TO MEASURE PUMPING RATE Bailer

WATER LEVEL (distance from land surface)

BEFORE PUMPING 35 ft.

WHEN PUMPING 45 ft.

TYPE OF PUMP USED (for test)
- [A] air
- [P] piston
- [T] turbine
- [C] centrifugal
- [R] rotary
- [O] other (describe below)
- [J] jet
- [S] submersible

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. S

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10

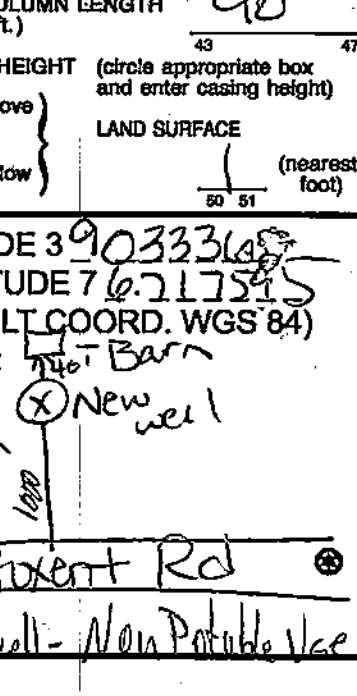
PUMP HORSE POWER

PUMP COLUMN LENGTH (nearest ft.) 90

CASING HEIGHT (circle appropriate box and enter casing height) [+] above [−] below LAND SURFACE (nearest foot)

LATITUDE 39.033364
LONGITUDE 76.217515
(DEFAULT COORD. WGS 84)

NOTES:



Farmwell - Non Potable Use

MDE/WMA/PER.071

COUNTY

C 1 5550 (1 2 3 6)

SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED AFTER WELL IS COMPLETED.

COUNTY NUMBER 02

ST/CO USE ONLY
DATE Received MM 11 DD 5 YY 98 (8 13)

DATE WELL COMPLETED MM 11 DD 4 YY 98 (15 20)

Depth of Well 22 37 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-94-3297 (28 29 30 31 32 33 34 35 36 37)

OWNER Lanham V Alice (last name / first name)
STREET OR RFD 1250 Patuxent Road TOWN Odenton
SUBDIVISION Woodward Villa SECTION LOT

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Brown Clay	0	10	
Sand & Gravel	10	24	
White Clay	24	31	
Med Brown Sand	31	37	

NUMBER OF UNSUCCESSFUL WELLS:

WELL HYDROFRACTURED yes [ ] no [N]

CIRCLE APPROPRIATE LETTER
(A) A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
E ELECTRIC LOG OBTAINED
P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO. MSD086
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)
LIC. NO. ___D___

SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes (Y) no (N) (44)
TYPE OF GROUTING MATERIAL (Circle one)
CEMENT (CM) BENTONITE CLAY (BC) (45 46)
NO. OF BAGS 3 NO. OF POUNDS 250
GALLONS OF WATER 75
DEPTH OF GROUT SEAL (to nearest foot)
from 4 (48 TOP 52) ft. to 30 (54 BOTTOM 58) ft.
(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below
(ST) STEEL (CO) CONCRETE (PK) PLASTIC (OT) OTHER

MAIN CASING TYPE	Nominal diameter top (main) casing (nearest inch)!	Total depth of main casing (nearest foot)
PL (60 61)	4 (63 64)	32 (66 70)

OTHER CASING (if used)

EACH CASING	diameter inch	depth (feet) from	depth (feet) to

SCREEN RECORD
screen type or open hole — insert appropriate code below
(ST) STEEL (BR) BRASS (HO) OPEN HOLE (BRONZE) (PK) PLASTIC (OT) OTHER

C 2 (1 2)

EACH SCREEN	DEPTH (nearest ft.)	
1 PL	32 (8 9 11 15)	37 (17 21)
2	(23 24 26 30)	(32 36)
3	(38 39 41 45)	(47 51)

SLOT SIZE 1 020 2 ___ 3 ___
DIAMETER OF SCREEN 2 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to
27	37

(68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)
T (70) (E.R.O.S.) (72) W Q (74 75 76)
TELESCOPE CASING LOG INDICATOR OTHER DATA

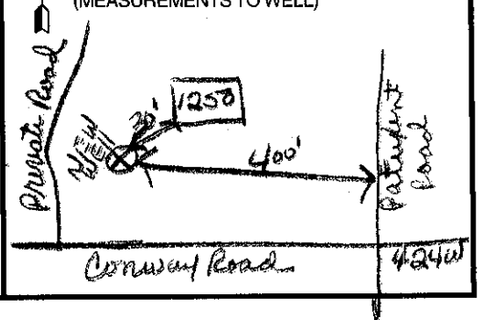
C 3 (1 2)

PUMPING TEST
HOURS PUMPED (nearest hour) 2 (8 9)
PUMPING RATE (gal. per min.) 15 (11 15)
METHOD USED TO MEASURE PUMPING RATE Bazail
WATER LEVEL (distance from land surface)
BEFORE PUMPING 15' (17 20) ft.
WHEN PUMPING 20' (22 25) ft.

TYPE OF PUMP USED (for test)
(A) air (P) piston (T) turbine (C) centrifugal (R) rotary (O) other (describe below) (J) jet (S) submersible (27)

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) (YES) NO
IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.
TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. S (29)
CAPACITY: GALLONS PER MINUTE (to nearest gallon) 15 (31 35)
PUMP HORSE POWER .50 (37 41)
PUMP COLUMN LENGTH (nearest ft.) 30' (43 47)
CASING HEIGHT (circle appropriate box and enter casing height)
(+) above (−) below (49) LAND SURFACE (nearest) foot (50 51)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURES AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



DENV-CR97

② COUNTY R; (−)

EMERGENCY/TEMP NO. IF ANY

B 1 | 3268 | SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL
please type

STATE PERMIT NUMBER: AA-94-3297
fill in this form completely

Date Received (ARA): 10-28-98 DOE

OWNER INFORMATION
Last Name: Lanham | Owner: V | First Name: Alice
Street or RFD: 1250 Patuxent Road
Town: Odenton | State: MD | Zip: 21113

DRILLER INFORMATION
Driller's Name: John Greer | License No.: MSD086
Firm Name: J.G. Greer Drilling Co., Inc.
Address: P.O. Drawer A Sandills, MD 21754
Signature: [signature] | Date: 10-20-98

B 2 — WELL INFORMATION
APPROX. PUMPING RATE (GAL. PER MIN.): 10
AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY): 500

USE FOR WATER (CIRCLE APPROPRIATE BOX)
(D) DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
F FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION
I INDUSTRIAL, COMMERICIAL, DEWATERING
P PUBLIC WATER SUPPLY WELL
T TEST, OBSERVATION, MONITORING
G GEO-THERMAL

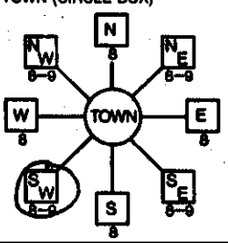
APPROXIMATE DEPTH OF WELL: 100 FEET
APPROXIMATE DIAMETER OF WELL: 4 NEAREST INCH

METHOD OF DRILLING (circle one)
BORED (or Augered) | JETTED | Jetted & DRIVEN
AIR-ROTary | AIR-PERcussion | ROTARY (Hydraulic Rotary)
CABLE | REVerse-ROTary | DRIve-POINT
other

REPLACEMENT OR DEEPENED WELLS
(CIRCLE APPROPRIATE BOX)
N THIS WELL WILL NOT REPLACE AN EXISTING WELL
(Y) THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
S THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY-CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
D THIS WELL WILL DEEPEN AN EXISTING WELL
PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE)

Not to be filled in by driller (MDE OR COUNTY USE ONLY)
APPROP. PERMIT NUMBER
PERMIT No. AA-94-3297

B 3 — LOCATION OF WELL
COUNTY: Anne Arundel
SUBDIVISION: Woodwardville
SECTION | LOT
NEAREST TOWN: Odenton
MILES FROM TOWN (enter 0 if in town): 4 M

B 4
DIRECTION OF WELL FROM TOWN (CIRCLE BOX)


NEAR WHAT ROAD: 1250 Patuxent Road
ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX)

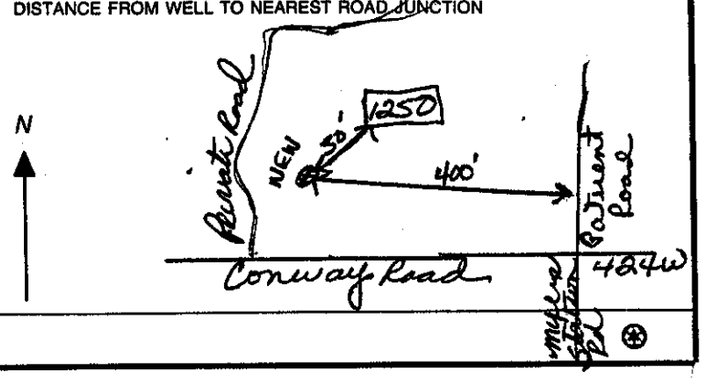

DISTANCE FROM ROAD: 401 FT
ENTER FT OR MI
TAX MAP: 36 BLK: 15 PARCEL: 0023

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL
COUNTY NAME: Anne Arundel | COUNTY NO.: 02
STATE SIGNATURE | INSERT S
DATE ISSUED: 10 28 98 | CO SIGNATURE: Barry D. Adams 102899 | EXP. DATE
NORTH GRID: 436 000
EAST GRID: 0881 000

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X
SOURCES OF DRILLING WATER
1. Well Drillers
2. TAN 145 225
3. 4000-0108-3600

WRITE THE BOX NUMBER FROM THE MAP HERE
E: 880
N: 430
000 000

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



SPECIAL CONDITIONS
NOTE - APPROVING AUTHORITIES SHOULD USE SEPARATE SHEET IF NEEDED -

Lakeham

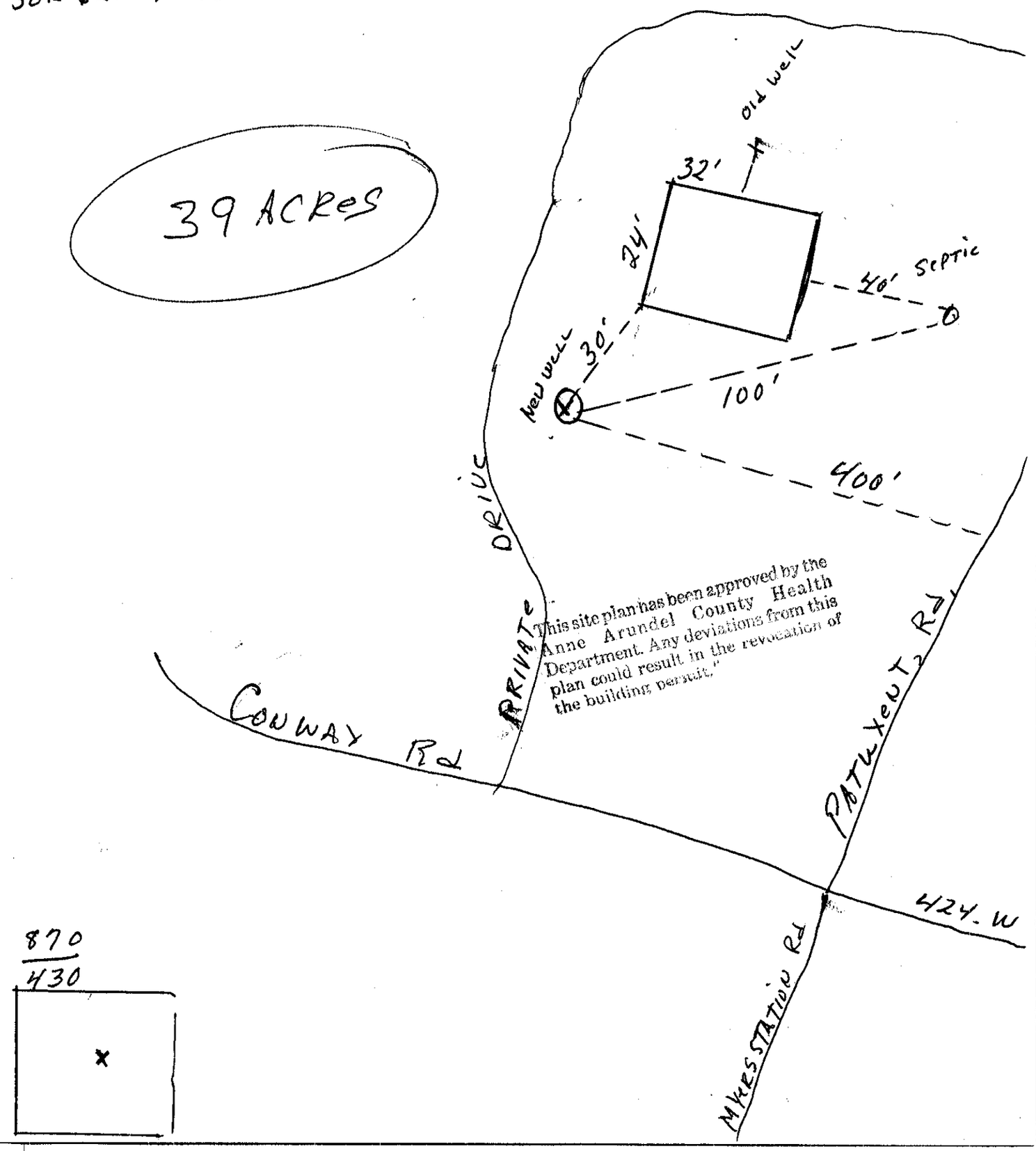
ALICE V. CHOWANETZ

1250 PATUXENT RD

ODENTON, Md.

301-621-7743

TAX Acc # 145225



870
430

MARYLAND DEPARTMENT OF THE ENVIRONMENT, WATER MANAGEMENT ADMINISTRATION
2500 BROENING HIGHWAY, BALTIMORE, MARYLAND 21224, (410) 631-3784

****

11/5/98 WATER WELL ABANDONMENT-SEALING REPORT FORM

****

SUBMIT COPIES OF COMPLETED FORM TO:

* COUNTY ENVIRONMENT AGENCY (contact MDE, WMA if address needed)
* WELL OWNER
* MDE, WATER MANAGEMENT ADMINISTRATION, WELL PROGRAM

DATE WELL ABANDONED: 11/4/98 (month/day/year)

* PERMIT NUMBER OF ABANDONED WELL (if any) — —

* PERMIT NUMBER OF REPLACEMENT WELL AA -94-3297

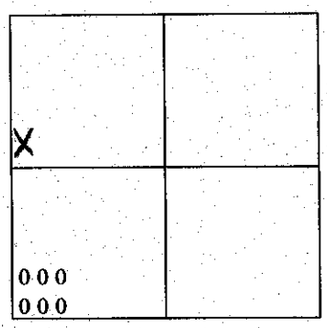
* PERSON ABANDONING WELL: John Green

WELL DRILLERS LICENSE NUMBER: 086
CIRCLE: MWD/MSD/MGD

* OWNER'S NAME: Alice V Lanham

* WELL LOCATION:
COUNTY: Anne Arundel
NEAREST TOWN: Odenton
TAX MAP 36 BLOCK 15 PARCEL 0033
SUBDIVISION: Wood Wardville
SECTION: _____ LOT: _____
NEAREST ROAD: 1250 Patuxent Road

MARYLAND GRID COORDINATES
E 880
BOX NUMBER
N 430



SHOW WELL LOCATION
BY X WITHIN BOX

* TYPE OF WELL BEING ABANDONED:

X DRILLED _____ JETTED
_____ BORED/AUGUERED _____ HAND DUG
_____ OTHER (specify) _____

LOG OF SEALING MATERIAL

MATERIAL	FEET FROM	FEET TO
Bentonite Clay	37	—

* USE CODE:

X DOMESTIC _____ MUNICIPAL/PUBLIC
_____ IRRIGATION _____ INDUSTRIAL
_____ TEST/OBSERVATION

* TYPE OF CASING:

_____ STEEL X PLASTIC
_____ CONCRETE _____ OTHER (specify)

* SIZE OF CASING: 4 INCHES IN DIAMETER

* DEPTH OF WELL: 37 FEET DEEP

* WAS ANY CASING REMOVED? ___ YES X NO
if yes, length removed, in feet: _____

* WAS CASING RIPPED OR PERFORATED? ___ YES X NO

SIGNATURE-MASTER WELL DRILLER OR SUPERVISING SANITARIAN | 086 LICENSE # | MWD/MSD/MGD CIRCLE ONE | 11-5-98 DATE

DENV 828 JULY 1993 2) COUNTY ENVIRONMENTAL AGENCY

ANNE ARUNDEL COUNTY
MARYLAND

DEPARTMENT OF HEALTH
J. HOWARD BEARD HEALTH SERVICES BUILDING
3 HARRY S. TRUMAN PARKWAY
ANNAPOLIS, MARYLAND 21401
410-222-7274
FAX 410-222-7294
TDD FOR THE HEARING IMPAIRED 410-222-7153
www.health.co.anne-arundel.md.us/

FRANCES B. PHILLIPS, R.N., M.H.A.
Health Officer

July 12, 1999

CHOWANETZ, ALICE
1250 PATUXENT RD
ODENTON, MD 21113

CERTIFICATE OF POTABILITY

This letter certifies that the requirements of COMAR 26.04.04 "WELL CONSTRUCTION REGULATIONS" have been met for the water supply system installed under permit number AA-94-3297 at the above referenced location.

The Anne Arundel County Department of Health has conducted an evaluation of this system and has tested the water produced by the well to determine if it met the standards set for the following parameters: coliform bacteria, nitrates, turbidity, sand, and radionuclides. The analyses indicate that the water does meet the applicable standards set for these parameters and has satisfied the review requirements of this department.

The well driller's signature on the completion report is his certification that well construction as performed under his supervision conforms to State of Maryland requirements.

Sincerely,

Kerry Topovski
Sanitary Engineering
Division of Community & Environmental Health

EMERGENCY/TEMP NO. IF ANY

B 1 | 7983 | SEQUENCE NO. (MDE USE ONLY)

STATE OF MARYLAND
APPLICATION FOR PERMIT TO DRILL WELL
please type

STATE PERMIT NUMBER: AA-95-3469

fill in this form completely

Date Received (APA): 11-26-07 JSak

OWNER INFORMATION
Burchell, Candace L (Last Name, First Name)
1194 Patuxent Rd. (Street or RFD)
Odenton, MD 21113 (Town, State, Zip)

DRILLER INFORMATION
Robert P Copsey M Sd 1161 (Driller's Name, License No.)
Wolford's well + Pump Svc. (Firm Name)
4429 Mountain Rd - 21122 (Address)
Robert P. Copsey 11/19/07 (Signature, Date)

B 2 WELL INFORMATION
APPROX. PUMPING RATE (GAL. PER MIN.): 8
AVERAGE DAILY QUANTITY NEEDED (GAL. PER DAY): 300

B 3 LOCATION OF WELL
COUNTY: Anne Arundel
SUBDIVISION: Mary A. Warnick Prop.
SECTION: ____ LOT: 2
NEAREST TOWN: Odenton
MILES FROM TOWN (enter 0 if in town): 3

B 4
DIRECTION OF WELL FROM TOWN (CIRCLE BOX): NW 8-9, N 8, NE 8-9, W 8, TOWN, E 8, SW 8-9, S 8, SE 8-9

1194 Patuxent Rd. (NEAR WHAT ROAD)

ON WHICH SIDE OF ROAD (CIRCLE APPROPRIATE BOX): NORTH, WEST, EAST, SOUTH

DISTANCE FROM ROAD: 1832 ft (ENTER FT OR MI)

TAX MAP: 36 BLK: 15 PARCEL: 0318

USE FOR WATER (CIRCLE APPROPRIATE BOX)
- (D) DOMESTIC POTABLE SUPPLY & RESIDENTIAL IRRIGATION
- [F] FARMING (LIVESTOCK WATERING & AGRICULTURAL IRRIGATION
- [I] INDUSTRIAL, COMMERICIAL, DEWATERING
- [P] PUBLIC WATER SUPPLY WELL
- [T] TEST, OBSERVATION, MONITORING
- [G] GEO-THERMAL

NOT TO BE FILLED IN BY DRILLER
HEALTH DEPARTMENT APPROVAL
COUNTY NAME: AA
COUNTY NO.: 02
STATE SIGNATURE
INSERT S
DATE ISSUED: 11/28/07 CO SIGNATURE: Julianna Smith EXP. DATE: 11/28/08
NORTH GRID: 434000
EAST GRID: 0881000

APPROXIMATE DEPTH OF WELL: 250 FEET
APPROXIMATE DIAMETER OF WELL: 4 NEAREST INCH

METHOD OF DRILLING (circle one)
BORED (or Augered) | JETTED | Jetted & DRIVEN
AIR-ROTary | AIR-PERcussion | ROTARY (Hydraulic Rotary)
CABLE | REVerse-ROTary | DRive-POINT
other

SHOW MAJOR FEATURES OF BOX & LOCATE WELL WITH AN X: X

SOURCES OF DRILLING WATER
1. AA-81-0490
2. AA-81-9800
3. TD20348906

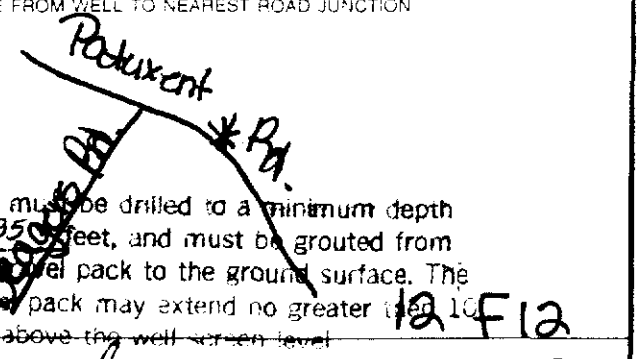
WRITE THE BOX NUMBER FROM THE MAP HERE: 06C

E 880 000
N 430 000

REPLACEMENT OR DEEPENED WELLS
(CIRCLE APPROPRIATE BOX)
- (N) THIS WELL WILL NOT REPLACE AN EXISTING WELL
- [Y] THIS WELL WILL REPLACE A WELL THAT WILL BE ABANDONED AND SEALED
- [S] THIS WELL WILL REPLACE A WELL THAT WILL BE USED AS A STANDBY CONTACT LOCAL APPROVING AUTHORITY FOR POLICY ON STANDBY WELLS
- [D] THIS WELL WILL DEEPEN AN EXISTING WELL

PERMIT NUMBER OF WELL TO BE REPLACED OR DEEPENED (IF AVAILABLE): ____-____-____

DRAW A SKETCH BELOW SHOWING LOCATION OF WELL IN RELATION TO NEARBY TOWNS AND ROADS AND GIVE DISTANCE FROM WELL TO NEAREST ROAD JUNCTION



Not to be filled in by driller (MDE OR COUNTY USE ONLY)

APPROP. PERMIT NUMBER: ------G---

PERMIT No. AA-95-3469

SPECIAL CONDITIONS: Radium Testing Required

12 F 12

DENV-Permit 97

ORIGINAL

4003-1016-4980

ANNE ARUNDEL COUNTY
MARYLAND
County Executive John R. Leopold

Department of Health
Division of Environmental Health
3 Harry S. Truman Parkway
Annapolis, MD 21401
Phone 410-222-7024 www.aahealth.org
Fax 410-222-7678

Frances B. Phillips, R.N., M.H.A.
Health Officer

April 11, 2008

CANDACE BURCHELL
1194 PATUXENT RD.
ODENTON, MD 21113

Re: BURCHELL, CANDACE
1194 PATUXENT RD
ODENTON, MD 21113

CERTIFICATE OF POTABILITY

This letter certifies that the requirements of COMAR 26.04.04 "WELL CONSTRUCTION REGULATIONS" have been met for the water supply system installed under permit number AA-95-3469 at the above referenced location.

The Anne Arundel County Department of Health has conducted an evaluation of this system and has tested the water produced by the well to determine if it met the standards set for the following parameters: coliform bacteria, nitrates, turbidity, sand, and radionuclides. The analyses indicate that the water does meet the applicable standards set for these parameters and has satisfied the review requirements of this department.

The well driller's signature on the completion report is his certification that well construction as performed under his supervision conforms to State of Maryland requirements.

Sincerely,

Brian Chew

Brian Chew, Program Supervisor
Sanitary Engineering Program
Division of Environmental Health

C 1 | 3485 | SEQUENCE NO. (MDE USE ONLY)

1 2 3 6 (THIS NUMBER IS TO BE PUNCHED IN COLS. 3-6 ON ALL CARDS)

STATE OF MARYLAND
WELL COMPLETION REPORT
FILL IN THIS FORM COMPLETELY
PLEASE TYPE

THIS REPORT MUST BE SUBMITTED WITHIN 45 DAYS AFTER WELL IS COMPLETED.

COUNTY NUMBER 07

ST/CO USE ONLY
DATE Received MM DD YY
MAR 11 5 2008 13

DATE WELL COMPLETED MM 01 DD 23 YY 08 (15 20)

Depth of Well 22 275 26 (TO NEAREST FOOT)

PERMIT NO. FROM "PERMIT TO DRILL WELL" AA-95-3469 (28 29 30 31 32 33 34 35 36 37)

OWNER Burchell (last name) Candace L. (first name)

STREET OR RFD 1194 Patuxent Road TOWN Odenton, MD 21113

SUBDIVISION Mary A Warnick Prop. SECTION LOT 2

WELL LOG
Not required for driven wells

STATE THE KIND OF FORMATIONS PENETRATED, THEIR COLOR, DEPTH, THICKNESS AND IF WATER BEARING

DESCRIPTION (Use additional sheets if needed)	FEET FROM	FEET TO	check if water bearing
Brown White Sand & Gravel	0	15	
White Clay	15	20	
Black White Sand	20	38	
Red White Clay	38	60	
Red Gray Clay	60	90	
Red Clay	90	110	
White Clay	110	122	
Red Gray Clay	122	140	
Red Clay	140	160	
Brown White Sand	160	190	
Red White Clay	190	215	
Brown White Sand	215	240	
White Clay	240	248	
Brown White Sand	248	275	****

NUMBER OF UNSUCCESSFUL WELLS: ____

WELL HYDROFRACTURED yes Y no N

CIRCLE APPROPRIATE LETTER
- A A WELL WAS ABANDONED AND SEALED WHEN THIS WELL WAS COMPLETED
- E ELECTRIC LOG OBTAINED
- P TEST WELL CONVERTED TO PRODUCTION WELL

I HEREBY CERTIFY THAT THIS WELL HAS BEEN CONSTRUCTED IN ACCORDANCE WITH COMAR 26.04.04 "WELL CONSTRUCTION" AND IN CONFORMANCE WITH ALL CONDITIONS STATED IN THE ABOVE CAPTIONED PERMIT, AND THAT THE INFORMATION PRESENTED HEREIN IS ACCURATE AND COMPLETE TO THE BEST OF MY KNOWLEDGE.

DRILLERS LIC. NO.: M 3D 1161
Robert D. Cooper
DRILLERS SIGNATURE (MUST MATCH SIGNATURE ON APPLICATION)

LIC. NO.: JS 9028
Michael Donovan
SITE SUPERVISOR (sign. of driller or journeyman responsible for sitework if different from permittee)

GROUTING RECORD
WELL HAS BEEN GROUTED (Circle Appropriate Box) yes Y 43 no N 44

TYPE OF GROUTING MATERIAL (Circle one)

CEMENT CM (45 46) BENTONITE CLAY BC (47 48)

NO. OF BAGS 14 NO. OF POUNDS 700

GALLONS OF WATER 350

DEPTH OF GROUT SEAL (to nearest foot)

from 0 (48 TOP 52) ft. to 260 (54 BOTTOM 58) ft.

(enter 0 if from surface)

CASING RECORD
casing types insert appropriate code below

ST STEEL; CO CONCRETE; PL PLASTIC; OT OTHER

MAIN CASING TYPE (60 61)	Nominal diameter top (main) casing (nearest inch)! (63 64)	Total depth of main casing (nearest foot) (66 70)
PL	4	225

EACH CASING

OTHER CASING (if used)	diameter (inch)	depth (feet) from	to
PL	2	225	265

SCREEN RECORD
screen type or open hole insert appropriate code below

ST STEEL; BR BRASS; BRONZE; PL PLASTIC; HO OPEN HOLE; OT OTHER

C 2

EACH SCREEN	TYPE	DEPTH (nearest ft.)		SLOT SIZE
1	PL	265 (11 15)	275 (17 21)	.010 (8 9)
2		(23 24)	(26 30) (32 36)	
3		(38 39)	(41 45) (47 51)	

DIAMETER OF SCREEN 2 (56 60) (NEAREST INCH)

GRAVEL PACK IF WELL DRILLED WAS FLOWING WELL INSERT F IN BOX 68

from	to
260	275

(68)

MDE USE ONLY (NOT TO BE FILLED IN BY DRILLER)

T (70) (E.R.O.S.) (72) W Q (74 75 76)

TELESCOPE CASING; LOG INDICATOR; OTHER DATA

C 3

PUMPING TEST
HOURS PUMPED (nearest hour) 2 (8 9)

PUMPING RATE (gal. per min.) 60 (11 15)

METHOD USED TO MEASURE PUMPING RATE AIR

WATER LEVEL (distance from land surface)

BEFORE PUMPING 45 (17 20) ft.

WHEN PUMPING 63 (22 25) ft.

TYPE OF PUMP USED (for test)

A air (27); P piston (27); T turbine (27); C centrifugal (27); R rotary (27); O other (describe below) (27); J jet (27); S submersible (27)

PUMP INSTALLED
DRILLER INSTALLED PUMP (CIRCLE) (YES or NO) YES / NO

IF DRILLER INSTALLS PUMP, THIS SECTION MUST BE COMPLETED FOR ALL WELLS.

TYPE OF PUMP INSTALLED PLACE (A,C,J,P,R,S,T,O) IN BOX 29. S (29)

CAPACITY: GALLONS PER MINUTE (to nearest gallon) 10 (31 35)

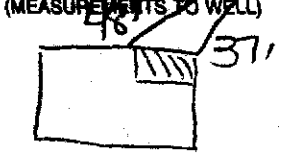
PUMP HORSE POWER .75 (37 41)

PUMP COLUMN LENGTH (nearest ft.) 100 (43 47)

CASING HEIGHT (circle appropriate box and enter casing height)

+ above; − below (49) LAND SURFACE 1 (50 51) (nearest foot)

LOCATION OF WELL ON LOT
SHOW PERMANENT STRUCTURE SUCH AS BUILDING, SEPTIC TANKS, AND /OR LANDMARKS AND INDICATE NOT LESS THAN TWO DISTANCES (MEASUREMENTS TO WELL)



ROAD, N-Rd 255

DENV-CR00

COUNTY

(SEE PLAT @ 481/810 M.S. 85-324)
AREA = 2.335 Ac.±

PAUL L. & ANGELA F. NOWOTTNICK, JR.
217/227

LOT 1

P-96

#1192

Undeveloped Area

N 75° 44' 40" E 702.15'

LOD 11,550 ±

N 77° 04' 09" E 40.00'

1" I.P.C.P.S.

I.P.C.P.S.

S 12° 55' 51" W 150.00'

S 12° 55' 51" W 86.24'

S 51° 10' E 35.91

EX.

P-

Existing Driveway

S 15° 39' 02" E 99.46'

LOD

PROP. 10,000 S.F. SEPTIC AREA

100'

100'

270'

40' B.R.L.

PROP. DRIVEWAY

PARCEL B
AREA = 0.6301 Ac ±

P-321

S 79° 41' 42" W

Septic Area

Inv. Out 85±

Dist Box Inv. 86±

Tank

Pump Pit Inv. 83±

For Crawl 86± Septic Tank Inv. 84±

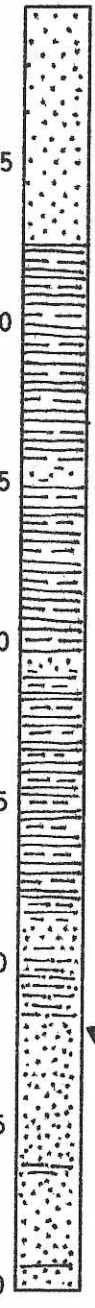
APPENDIX D

Historical Boring Logs

BORING NUMBER: B-1

DATE INSTALLED: 8-1-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: MUD ROTARY
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

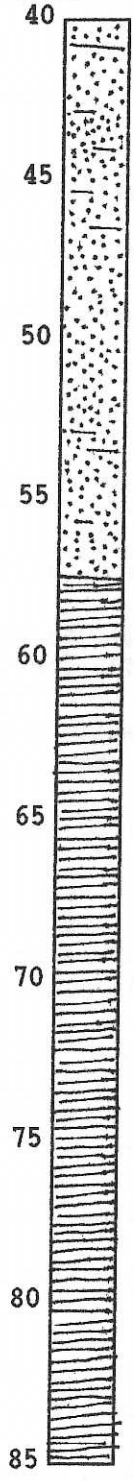
Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	2-2-3-4 (10)	SAND, med to coarse, tan
2	2.5-4.5	3-5-11-13 (0)	No recovery - cuttings indicate sand
3	5 - 7	4-6-10-10 (19)	SAND, med to coarse, some silt and clay, gray-tan
4	7.5-9.5	4-8-12-13 (20)	CLAY, some silt, tr lignite, gray
5	10-12	9-12-13-14 (21)	CLAY, some silt, dark gray
6	12.5-14.5	7-12-16-17 (21)	17" CLAY, as above 4" SAND, some clay, gray
7	15-17	6-8-10-11 (23)	CLAY, some silt, with occasional thin silt lenses, gray
8	17.5-19.5	6-8-10-14 (23)	CLAY, some silt, dark gray
9	20-22	5-6-12-13 (21)	6" SAND, med, some silt, tr clay, gray 16" CLAY, some silt, tr sand, gray
10	22.5-24.5	6-7-15-17 (23)	7" CLAY, some silt, tr sand, gray 16" CLAY, some silt and thin silt lenses, red
11	25-27	17-24-30-51/5" (20)	CLAY, some silt and silt lenses, red with white streaks
12	27.5-29.5	16-24-30-51/5" (23)	6" CLAY, as above 10" SAND, some silt, tr clay, pink and white 7" SILT, some clay, white
13	30-32	21-41-51/6" (20)	SILT, some clay, tr sand, white to tan
14	32.5-34.5	21-30-46-45 (18)	SAND, med to fn, tr silt, tan, saturated
15	35-37	20-21-51/4" (22)	17" SAND, as above 5" SILT, some clay, white
16	37.5-39.5	51/5" (5)	SAND, med, tan, with 2.5" white CLAY lens



BORING NUMBER: B-1 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
17	40-42	28-50/5" (11)	SAND, med, tan, with 2"white CLAY lens
18	42.5-44.5	28-51/3" (9)	SAND, fn, some clay & silt, lt gray, saturated
19	45-47	25-51/4" (12)	SAND, as above
20	47.5-49.5	51/4" (4)	SAND, med to coarse, tr silt, tan, saturated
21	50-52	34-51/3" (9)	SAND, as above
22	52.5-54.5	51/5" (5)	SAND, med to coarse, some clay, tr silt, tan
23	55-57	13-51/5" (11)	SAND, med-coarse, some silt, tan, 1" clay lens
24	57.5-59.5	40-51/5" (11)	CLAY, tr silt, hard, rd-br with black streaks
25	60-62	40-40-51/5" (15)	CLAY, as above
26	65-67	33-51/5" (18)	CLAY, tr silt, mottled gray-red
27	70-72	31-44-51/4" (0)	No recovery - drilled like clay
28	75-77	28-51/5" (5)	CLAY, tr silt, mottled gray-red
29	80-82	25-40-51/4" (0)	No recovery - drilled like clay

Graphic Log



BORING NUMBER: B-1 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
30	85-87	32-51/5" (0)	85	No recovery - drilled liked clay
31	90-92	46-51/4" (0)	90	No recovery - drilled like clay
32	95-97	44-51/4" (12)	95	CLAY, tr silt, gray with red mottles
33	100-102	46-51/2" (5)	100	CLAY, as above, gray with white streaks
34	105-107	36-51/4" (0)	105	No recovery - drilled like clay
35	110-112	42-51/4" (12)	110	CLAY, some silt, tr sand, blue-gray
36	115-117	51/5" (14)	115	CLAY, as above, mottled gray and red
37	120-122	51/4" (0)	120	No recovery - drilled like clay
38	125-127	51/4" (12)	125	CLAY, some silt, tr sand, mottled gray-red
			130	

BORING NUMBER: B-1 continued

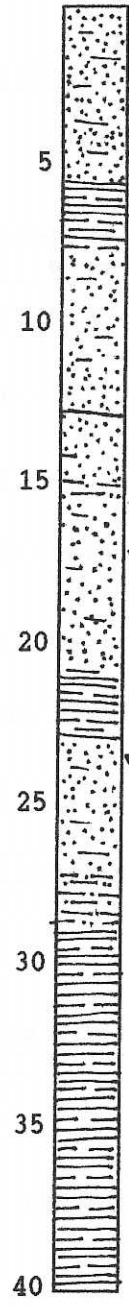
Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
			130	
39	130-132	51/5" (11)		CLAY, as above
40	133-135	44-51/4" (10)	135	CLAY, as above

Groundwater encountered above the clay at 32.5 feet.

BORING NUMBER: B-2

DATE INSTALLED: 8-8-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	3-3-3-4 (10)	SAND, some clay, silt and gravel, brown
2	2.5-4.5	3-3-4-5 (12)	SAND, as above
3	5 - 7	2-3-4-6 (12)	CLAY, some silt, tr sand and organic matter, lt brown
4	7.5-9.5	2-4-8-10 (20)	6" CLAY, as above 14" SAND, some silt, tr clay, brown-tan
5	10-12	7-5-3-7 (20)	3" SAND, as above 17" SAND, some silt, tr clay, brown
6	12.5-14.5	6-4-5-10 (12)	6" SAND, as above, red-brown 6" SAND, some clay and silt, gray
7	15-17	28-51/5" (10)	4" SILT, some clay and sand, blue-gray 6" SAND, some gravel and silt, tan
8	17.5-19.5	28-17-25-32 (14)	6" SAND, v crs, some silt, tr clay, tan, wet 8" SAND, v crs, some clay and silt, tan, moist
9	20-22	10-9-12-16 (19)	7" SAND, as above, red to gray 12" CLAY, some silt, gray and red
10	22.5-24.5	28-51/5" (16)	6" CLAY, as above 10" SAND, coarse, some silt, red-tan, wet with 3 " silt layer at top
11	25-27	9-19-31-43 (20)	SAND, some silt and clay, gray, v moist
12	27.5-29.5	15-18-16-23 (16)	12" SILT, some sand, tr clay, red-tan, moist 4" CLAY, some silt, red and gray
13	30-32	10-15-23-24 (23)	CLAY, some silt, gray with red silt lenses
14	35-37	10-20-23-43 (0)	No recovery - drilled like clay



BORING NUMBER: B-2 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
15	40-42	13-28-32-40 (0)	40	No recovery - drilled like clay
16	45-47	16-20-28-36 (20)	45	CLAY, slightly silty, red and gray mottled
17	50-52	13-11-32-40 (24)	50	CLAY, with sporadic v thin silt lenses, mottled red and gray
18	55-57	27-30-51/6" (0)	55	No recovery - drilled like clay
19	60-62	22-30-42-51/5" (0)	60	No recovery - drilled like clay
20	65-67	28-30-51/5" (10)	65	CLAY, stiff, mottled red and gray
21	70-72	17-28-35-45 (21)	70	CLAY, as above
22	75-77	34-38-51/5" (8)	75	CLAY and (to some) silt, mottled red and gray
23	80-82	40-44-51/5" (20)	80	CLAY, as above
			85	

BORING NUMBER: B-2 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
24	85-87	30-45-51/4" (20)	85	CLAY, as above
25	90-92	19-34-51/4" (10)	90	3" SAND, some clay and silt, blue-gray, wet 7" CLAY, little silt, hard, red and gray
26	95-97	38-45-48-51/1 (16)	95	CLAY, as above
27	100-102	33-51/6" (0)	100	No recovery - drilled like clay
28	105-107	30-40-51/5" (18)	105	CLAY, tr silt, hard, red and gray
29	110-112	30-51/2" (0)	110	No recovery
30	115-117	38-51/2" (22)	115	CLAY, some silt, red and gray with yellow-brown streaks

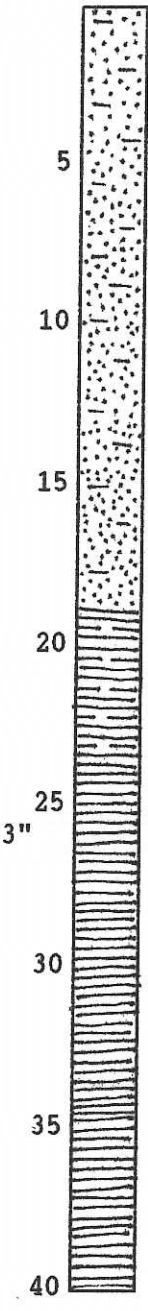
Groundwater encountered above the clay at 18 feet.

BORING NUMBER: B-3

MONITOR WELLS: MW-10

DATE INSTALLED: 8-7-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

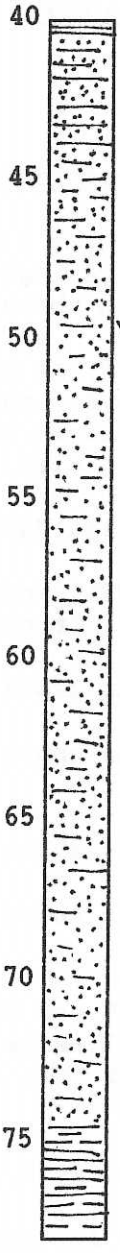
Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
1	0 - 2	2-2-3-8 (20)		SAND, some silt, little gravel, tr clay, tan-brown
2	2.5-4.5	5-4-3-8 (21)		SAND, as above
3	5 - 7	7-8-13-14 (17)		SAND, as above
4	7.5-9.5	12-16-17-18 (8)		SAND, as above, saturated
5	10-12	7-12-8-9 (20)		SAND, some silt, tan and red-tan, saturated
6	12.5-14.5	1-2-2-3 (15)		SAND, as above
7	15-17	7-8-13-41 (18)		SAND, as above
8	17.5-19.5	18-24-34-36 (18)		6" SAND, as above 12" CLAY, some silt, mottled red and gray
9	20-22	9-28-32-49 (6)		CLAY, some silt, mottled red and gray
10	25-27	26-34-38-51/3" (24)		CLAY, tr silt, hard, mottled red and gray
11	30-32	38-43-51/3" (22)		CLAY, as above
12	35-37	38-51/4" (15)		CLAY, as above



BORING NUMBER: B-3 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
13	40-42	51/6" (6)	2" CLAY, as above 4" SAND, some (to and) clay, dense, gray
14	45-47	42-51/5" (10)	SAND, fn, some clay, gray, v moist
15	47.5-49.5	42-51/4" (10)	SAND, fn, some silt, trace clay, gray, v moist
16	50-52	48-51/4" (10)	SAND, as above, saturated
17	52.5-54.5	51/6" (6)	SAND, as above
18	55-57	35-51/5" (15)	SAND, fine, some clay and silt, dense, gray, slightly moist
19	57.5-59.5	45-51/5" (7)	SAND,as above, with 1" clay lens
20	60-62	40-51/5" (11)	SAND, med, some silt and clay, gray
21	62.5-64.5	44-51/4" (3)	SAND, med, some silt and clay, gray, saturated
22	65-67	51/5" (5)	SAND, as above (tr clay)
23	67.5-69.5	48-51/3" (12)	SAND, fn, some silt and clay, gray
24	70-72	51/6" (0)	No recovery
25	75-77	51/5" (5)	CLAY, gray, some sand and silt

Graphic Log



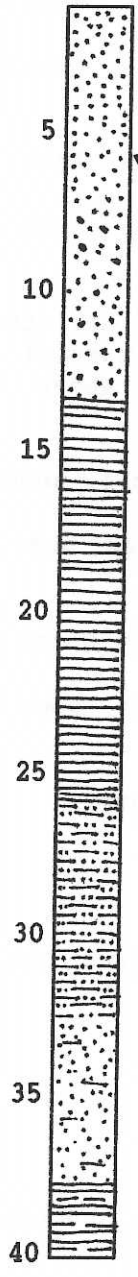
Groundwater encountered above the clay at 8 feet and below the clay at 50 feet.

BORING NUMBER: B-4

MONITOR WELLS: MW-1 and MW-11

DATE INSTALLED: 7-13-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0-1.5	2-4-8 (15)	SAND, fn to v fn, ltl med, tr silt and clay, red-br-yell-gr-blk
2	2.5-4	2-2-3 (18)	SAND, as above
3	5 - 7	3-6-7-6 (17)	▼ 15" SAND, as above, red-orange 2" GRAVEL, some sand, saturated
4	7.5-9.5	7-10-13-12 (17)	SAND, coarse,and GRAVEL, some finer sand, tr silt and clay, tan-red-gray-yellow
5	10-12	6-12-21-24 (15)	GRAVEL and SAND, fine to coarse, tr silt yellow
6	12.5-14.5	5-21-34-36 (11)	3" GRAVEL, some coarse sand, tr silt, yellow 8" CLAY, tr silt, mottled red-gray-purple
7	15-17	22-29-31-35 (9)	CLAY, as above
8	17.5-19.5	21-31-49-51 (12)	CLAY, as above
9	20-22	25-27-49-50 (17)	CLAY, as above
10	22.5-24.5	15-31-44-42 (15)	CLAY, as above
11	25-27	5-15-19-25 (22)	10" CLAY, as above 12" SILT, some clay, mottled gray-red
12	27.5-29.5	12-17-16-28 (22)	SILT and SAND, v fn, tr clay mottled gray-red-brown
13	30-32	15-22-25-28 (20)	SILT and SAND, v fn, as above
14	32.5-34.5	15-22-28-35 (22)	SAND, v fn, some silt, tr clay, gray, moist
15	35-37	19-21-34-35 (17)	SAND, v fn, as above
16	37.5-39.5	21-28-40-41 (21)	CLAY, some silt, tr sand, mottled red-gray



BORING NUMBER: B-4 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
			40	
17	40-42	20-28-38-42 (18)		CLAY, some silt, tr sand, mottled red-gray
18	42.5-44.5	21-41-51/5" (18)		CLAY, as above, brown-gray
			45	
19	45-47	15-27-41-45 (24)		12" SILT and SAND, v fn, CLAY stringers, gray 12" CLAY, some silt, tr sand, brown-gray
20	47.5-49.5	15-22-31-34 (17)		SILT, some v fn sand, tr clay with CLAY stringers, gray
			50	
21	50-52	20-33-44-45 (22)		SILT, some v fn sand, tr clay, gray
22	52.5-54.5	19-44-51/3" (21)		SILT, as above
			55	
23	55-57	30-50/5" (12)		SILT, as above
24	57.5-59.5	30-50-51/3" (18)		SILT and SAND, v fn, tr clay and coarser sand, gray, saturated
			60	
25	60-62	34-51/5" (12)		SILT and SAND, as above, mottled gray-red

Groundwater encountered above clay at 7 feet and below clay at 57 feet.
The sample from 32.5 to 34.5 feet was moist.

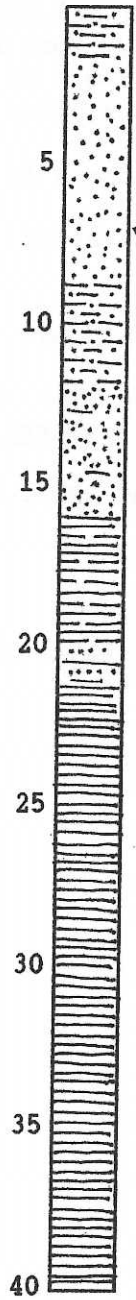
El. 100±

BORING NUMBER: B-5

MONITOR WELLS: MW-9 and MW-14

DATE INSTALLED: 7-14-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	8-15-18-21 (17)	SILT, some clay and v fn sand, gray-yellow
2	2.5-4.5	5-7-8-10 (20)	14" SAND, v fn to fn, little med and clay, gray 3" SAND, med, little fn and coarse, tr clay, white-gray-yellow
3	5 - 7	5-7-8-10 (17)	SAND, as above
4	7.5-9.5	6-3-7-7 (18)	5" SAND, as above, saturated 13" SILT, little v fn sand and clay, gray
5	10-12	21-19-11-17 (15)	SILT, as above
6	12.5-14.5	7-9-12-13 (24)	SAND, fn and v fn, little silt, tr clay, gray, saturated
7	15-17	9-21-27-30 (24)	13" SAND vf and SILT, gray-red-brown, saturated 11" CLAY, little silt, tr sand, mottled red-brown-gray
8	17.5-19.5	4-18-31-34 (17)	CLAY, as above
9	20-22	8-18-24-25 (18)	CLAY, some lenses vf sand, gray
10	22.5-24.5	5-10-19-17 (24)	CLAY, little silt, tr sand, mottled red-brown-gray
11	25-27	2-6-12-20 (21)	CLAY, as above
12	27.5-29.5	5-11-16-17 (21)	CLAY, as above
13	30-32	10-17-18-20 (23)	CLAY, as above
14	32.5-34.5	10-13-20-17 (18)	CLAY, as above
15	35-37	10-15-17-22 (20)	CLAY, as above
16	37.5-39.5	12-17-21-23 (23)	CLAY, as above



BORING NUMBER: B-5 continued

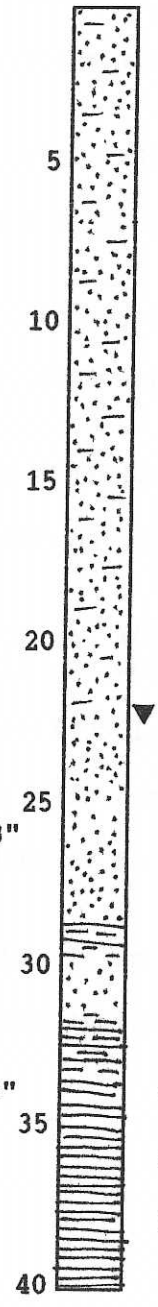
Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
17	40-42	9-11-17-14 (16)	40	CLAY, little silt, tr sand, mottled brown-gray
18	42.5-44.5	13-19-21-22 (24)		CLAY, as above
19	45-47	12-13-14-17 (24)	45	CLAY, as above, lower 12" mottled red-gray
20	47.5-49.5	16-30-51/6" (18)		CLAY, as above, mottled red-gray
21	50-52	16-32-31-40 (22)	50	CLAY, as above
22	52.5-54.5	11-21-32-41 (22)		SILT, some vf sand, little clay, mottled gray-red
23	55-57	14-28-38-40 (23)	55	SILT, as above, gray
24	57.5-59.5	16-24-31-37 (23)		SILT and SAND, v fn, little clay, gray
25	60-62	12-20-28-38 (19)	60	SILT and SAND, as above, some CLAY lenses, gray
26	62.5-64.5	12-18-22-32 (17)		CLAY, trace silt and sand, mottled red-brown-yellow
27	65-67	24-34-51/5" (18)	65	2" CLAY, as above 16" SAND, vf, ltl fn sand, silt and clay, gray
28	67.5-69.5	14-20-28-32 (13)		CLAY, little silt, tr sand, gray
29	70-72	14-28-35-38 (24)	70	SILT and SAND, vf, little clay, gray
30	72.5-74.5	13-26-37-42 (24)		SILT and vf SAND, as above
31	75-77	4-22-30-35 (19)	75	SILT and vf SAND, as above
32	77.5-79.5	25-35-51/5" (12)		SILT and vf SAND, as above
			80	

Groundwater encountered above clay at 7.5 feet.

BORING NUMBER: B-6

DATE INSTALLED: 7-28-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON
DRILLING METHOD: HOLLOW STEM AUGER AND MUD ROTARY
DRILLER: HARDIN-HUBER, INC.
LOGGED BY: GREG ADAMSON

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	4-9-10-12 (11)	SAND, fn to med, little vf sand and clay, tr silt, yellow
2	2.5-4.5	3-3-3-3 (22)	SAND, as above, yellow-red-brown
3	5 - 7	2-2-2-2 (14)	SAND, as above, yellow-red-brown
4	7.5-9.5	5-6-6-6 (9)	SAND, as above
5	10-12	3-4-6-8 (23)	SAND, as above
6	12.5-14.5	2-2-3-3 (18)	SAND, as above, tan-red-brown
7	15-17	4-5-6-6 (17)	SAND, as above, red-brown
8	17.5-19.5	3-3-3-5 (16)	SAND, as above
9	20-22	3-3-3-6 (20)	SAND, as above
10	22.5-24.5	22-36-51/3" (16)	9" SAND, fn, some vf, little med to coarse, tr silt and clay, gray-tan, saturated 7" SAND, crs, ltl med, tr silt & clay, tan-br
11	25-27	21-36-33-51/3" (18)	SAND, as above, saturated
12	27.5-29.5	7-12-21-36 (24)	14" SAND, as above 10" SILT & CLAY, tr sand, mottled red-gray
13	30-32	8-21-51/3" (24)	14" SAND, coarse, ltl med, tr silt & clay, tan 10" SILT & CLAY, tr sand, 1" crs SAND layer at bottom, red-gray
14	32.5-34.5	20-31-36-51/3" (10)	CLAY, tr to little silt, tr sand, dark red
15	35-37	19-24-39-35 (0)	No recovery - drilled like clay
16	37.5-39.5	21-28-35-43 (0)	No recovery - drilled like clay

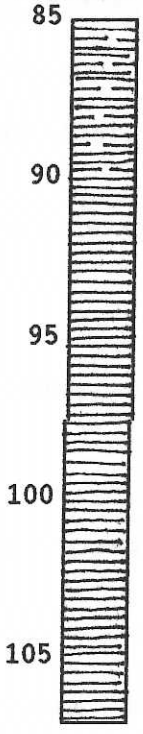


BORING NUMBER: B-6 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
			40	
17	40-42	18-25-51/3" (0)		No recovery, drilled like clay
18	42.5-44.5	16-30-40-51/4" (0)		No recovery, drilled like clay
			45	
19	45-47	16-30-40-51/4" (16)		CLAY, tr silt and sand, mottled red-purple and gray
			50	
20	50-52	18-20-30-43 (19)		CLAY, as above
			55	
21	55-57	16-30-51/3" (0)		No recovery - drilled like clay
			60	
22	60-62	22-43-51/4" (17)		CLAY, as above
			65	
23	65-67	20-51-5" (11)		CLAY, as above
			70	
24	70-72	30-51/5" (11)		CLAY, as above
			75	
25	75-77	24-36-46-50 (18)		CLAY, as above
			80	
26	80-82	35-42-51/5" (16)		CLAY, as above, with occasional very thin streaks of silt
			85	

BORING NUMBER: B-6 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
27	85-87	30-38-51/5" (4)	85	CLAY, as above
28	90-92	37-51/3" (9)	90	CLAY, tr silt and sand, purple-gray
29	95-97	42-51/4" (8)	95	CLAY, as above
30	100-102	40-51/5" (8)	100	CLAY, as above
31	105-107	36-42-51/3" (0)	105	No recovery - drilled like clay



Groundwater encountered above the clay at 22.5 feet.

BORING NUMBER: B-7

MONITOR WELLS: MW-12

DATE INSTALLED: 8-3-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	2-2-4-6 (10)	SAND, some silt, tan
2	2.5-4.5	14-27-28-30 (14)	4" SAND, some gravel and silt, wet 6" CLAY, some silt, white 4" SAND, fn, some silt, white, slightly moist
3	5 - 7	22-46-51/5" (12)	SAND, fn, some silt, white
4	7.5-9.5	28-51/4" (11)	SAND, as above
5	10-12	27-51/4" (10)	SAND, as above
6	12.5-14.5	28-51/4" (12)	SAND, as above
7	15-17	26-28-51/5" (12)	2" SAND, as above 10" SAND, some silt, tr clay, tan
8	17.5-19.5	17-23-36-24 (18)	SAND, as above, with 2 thin white clay lenses
9	20-22	17-30-37-51/3" (20)	SAND, vf, some silt, tan, saturated, with 1" clay layer at top
10	22.5-24.5	12-17-30-51/2" (22)	4" SAND, fn, some clay, white 10" CLAY, some silt, gray-white 8" SAND, some silt, tr clay, white
11	25-27	17-18-8-26 (23)	SAND, med, some silt, white and tan , saturated
12	27.5-29.5	51/5" (18)	SAND, fn, some silt, tan, saturated
13	30-32	10-51/5" (11)	SAND, as above, white-tan
14	32.5-34.5	18-27-51/5" (18)	SAND, vf,some silt, white-tan, saturated
15	35-37	29-51/4" (18)	SAND, fn, some silt, white-tan, saturated, with 2" white clay lens
16	37.5-39.5	21-51/4" (10)	SAND, fn, some silt, tr clay, white-tan saturated with 3" clay lens



BORING NUMBER: B-7 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
17	40-42	36-51/4" (11)	40	SAND, med, some silt, white-tan, saturated
18	42.5-44.5	51/5" (5)		SAND, as above
19	45-47	38-44-51/4" (12)	45	2" SAND, some silt, tr clay, red and white 10" CLAY, some silt, tr sand, hard, tan-white
20	47.5-49.5	33-33-51/4" (4)		SAND, some silt, tan, wet, 2" clayey
21	50-52	38-51/2" (5)	50	SAND, med-coarse, some silt, tan, saturated
22	52.5-54.5	51/3" (0)		No recovery
23	55-57	51/6" (6)	55	2" SAND, some clay, white-tan 4" CLAY, some silt, hard, white
24	57.5-59.5	51/3" (3)		CLAY, tr to some silt and sand, white
25	60-62	38-51/5" (10)	60	2" SAND, some clay, white-gray 8" CLAY, some silt, tr sand, gray-white
26	62.5-64.5	51/4" (4)		SAND, little clay, white-tan
27	65-67	51/4" (4)	65	SAND, some silt, tan-brown, wet
28	67.5-69.5	51/3" (4)		SAND, some silt, tr clay, tan-white, wet
29	70-72	51/3" (3)	70	SAND, as above, tan
30	72.5-74.5	51/5" (5)		SAND, as above
31	75-77	100/3" (3)	75	SAND, as above
32				Omitted
33	80-82	100/3" (0)	80	No recovery

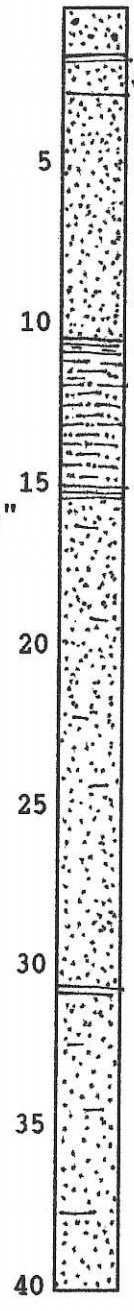
Groundwater encountered at 20 feet.

BORING NUMBER: B-8 OFFSITE BORING & WELL

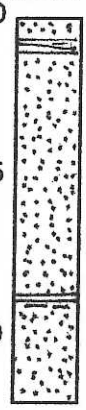
MONITOR WELLS: MW-7

DATE INSTALLED: 7-27-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	1-2-2-3 (13)	9" GRAVEL and coarse SAND, some fn, brn-yellow 4" CLAY and SILT, tr sand, gray
2	2.5-4.5	15-30-33-48 (24)	SAND, fn and vf, little med, tr silt and clay, 2" CLAY layer at top, tan-yellow, saturated
3	5 - 7	15-41-51/5" (17)	SAND, fn to vf, little med, tr silt and clay, gray-tan, saturated
4	7.5-9.5	30-51/5" (11)	SAND, as above
5	10-12	15-51/5" (11)	5" CLAY and SILT, some sand, gray 6" SAND, vf and SILT, little clay, gray
6	15-17	25-36-29-51/5" (23)	3" CLAY, little silt, tr sand, gray 20" SAND, vf to fn. little silt and clay, gray
7	20-22	21-29-51/5" (17)	SAND, vf to fn, some silt, little clay, gray
8	25-27	49-51/4" (10)	SAND, fn, some vf, little med, tr silt and clay, tan-yellow
9	30-32	48-51/4" (10)	SAND, med, little fn sand, tr silt and clay, tan, with 2" CLAY layer
10	35-37	21-51/5" (11)	SAND, as above, with clay stringers



BORING NUMBER: B-8 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
11	40-42	22-51/4" (10)		SAND, as above, with 2" clay layer
12	45-47	24-51/4" (10)		SAND, med, little fn sand, tr silt & sand, tan
13	48-50	26-34-51/4" (16)		13" SAND, as above 3" CLAY, little silt, tr sand, mottled gray-red
14	50-52	10-31-51/5" (17)		SAND, med, little fn sand, tr silt and clay, tan

Groundwater encountered at 3 feet.

BORING NUMBER: B-9

OFFSITE BORING & WELL

MONITOR WELLS: MW-8

DATE INSTALLED: 7-27-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
1	0 - 2	1-2-2-2 (3)		SAND, coarse, some gravel, tr silt and clay, red-brown
2	2.5-4.5	1-3-3-2 (14)		SAND, coarse, little med, tr silt and clay, 2" clayey layer at bottom, tan-red-brown, saturated
3	5 - 7	2-10-8-16 (12)	5	8" SAND, coarse, ltl med & ltl clay, yel-red-br with 1.5" gray CLAY layer at bottom 4" SAND, med, tr silt and clay, gray
4	7.5-9.5	12-24-16-17 (6)		CLAY, tr silt and sand, mottled gray-red
5	10-12	8-19-20-21 (22)	10	CLAY, as above
6	12.5-14.5	5-9-23-33 (0)		No recovery - drilled like clay
7	15-17	8-13-20-28 (0)	15	No recovery - drilled like clay
8	17.5-19.5	12-22-26-30 (16)		CLAY, as above
9	20-22	12-20-25-27 (14)	20	CLAY, as above
10	22.5-24.5	12-22-26-30 (21)		SILT and CLAY, tr sand, gray
11	25-27	12-22-28-30 (23)	25	CLAY, tr silt and sand, gray
12	27.5-29.5	10-16-19-29 (21)		CLAY, as above, mottled gray-red
13	30-32	6-19-20-24 (23)	30	CLAY, as above
14	32.5-34.5	Shelby Tube		CLAY, as above
15	35-37	12-17-25-28 (24)	35	CLAY, as above with white nodules of coarse sand size
16	37.5-39.5	20-26-46-51/4" (24)		CLAY, as above
			40	

BORING NUMBER: B-9 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
17	40-42	8-14-24-32 (20)	40	CLAY, as above
18	42.4-44.5	12-14-23-28 (22)		CLAY, as above
19	45-47	16-24-28-30 (24)	45	10" CLAY, as above 14" SILT, some clay, little sand mottled gray-red
20	47.5-49.5	30-31-51/3" (22)		SAND, vf and fn, little silt and clay, gray
21	50-52	28-44-51/5" (17)	50	SAND, as above
22	52.5-54.5	19-27-51/3" (19)		13" SAND, as above 6" CLAY, little silt, tr sand, gray-yellow-green
			55	

Groundwater encountered at 2.5 feet.

BORING NUMBER: B-10

OFFSITE BORING & WELL

MONITOR WELLS: MW-2

DATE INSTALLED: 7-26-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
1	0 - 2	1-1-1-1 (15)		SAND, med, little fn, yellow
2	2.5-4.5	3-3-3-5 (12)		SAND, coarse, some med, tr silt and clay, tan-yellow, saturated
3	5 - 7	8-30-51/5" (17)	5	SAND, as above
4	7.5-9.5	22-32-31-44 (24)		SAND, as above
5	10-12	16-23-51/5" (24)	10	9" SAND, as above, some thin clay lenses 15" SILT, some sand, tr clay, gray, moist
6	12.5-14.5	15-30-51/4" (21)		7" CLAY & SILT, tr sand, gray, moist 14" SAND, fn-vf, tr silt & clay, tn-gray, wet
7	15-17	21-27-36-51/5" (23)	15	SAND, as above
8	17.5-19.5	14-27-51/4" (16)		9" SAND, as above 7" CLAY and SILT, little sand, gray
9	20-22	19-22-51/5" (17)	20	SAND, fn to vf, tr silt and clay, gray
10	22.5-24.5	22-36-51/3" (15)		SAND, as above
11	25-27	9-43-51/3" (15)	25	3" SAND, as above 7" SILT and CLAY, little sand, gray 5" SAND, vf to fn, little silt and clay, gray
12	27.5-29.5	30-27-51/5" (17)		SAND, as above
13	30-32	43-51/5" (11)	30	SAND, fn, some vf, tr silt and clay, gray-tan
14	32.5-34.5	36-51/5" (11)		SAND, med, some fn, tr silt and clay, gray
15	35-37	30-40-51/5" (17)	35	SAND, as above
16	37.5-39.5	48-51/3" (9)		SAND, fn to med, some vf, tr silt and clay, tan
			40	

BORING NUMBER: B-10 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
			40	
17	40-42	23-24-51/5" (17)		SAND, as above, yellow
18	42.5-44.5	18-24-51/4" (16)		SAND, med, some fn, tr silt & clay, yellow-gray-tan
			45	
19	45-47	51/4" (4)		SAND, as above, gray-tan
20	47.5-49.5	51/5" (5)		SAND, as above, tan
			50	
21	50-52	35-51/5" (11)		CLAY, some silt, tr sand, mottled gray-red-br
22	52.5-54.5	41-51/5" (11)		SAND, f to vf, some silt, tr clay, gray
			55	
23	55-57	34-51/5" (11)		SAND, as above
24	57.5-59.5	37-42-51/3" (15)		8" SAND, as above 7" SILT and CLAY, some sand, little clay, mottled gray-red-brown
			60	

Saturated below 2.5 feet.

BORING NUMBER: B-11

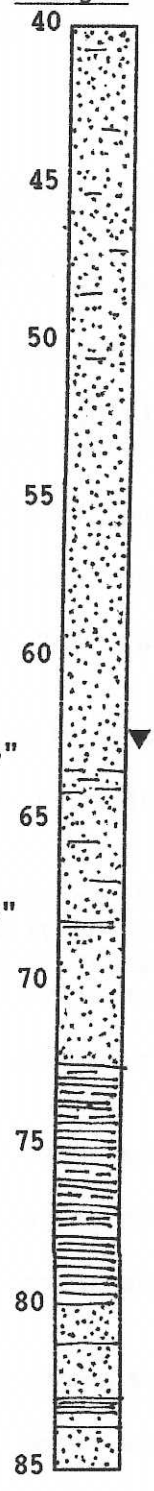
MONITOR WELLS: MW-13

DATE INSTALLED: 7-20-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
1	0 - 2	2-5-10-14 (17)		8" CLAY, some silt, tr sand, brown 9" SAND, fn to vf, tr silt and clay, brown
2	2.5-4.5	10-21-23-36 (15)	5	SAND, med, some fn, tr silt and clay, yellow
3	5 - 7	8-16-12-16 (20)		9" SILT and vf SAND, red-br-gray 11" CLAY and SILT, tr sand and gravel, red-br
4	7.5-9.5	8-9-13-13 (21)	10	CLAY and SILT, little sand, red-br-gray
5	10-12	6-8-11-11 (15)		CLAY and SILT, as above, gray-yellow
6	12.5-14.5	6-11-18-22 (14)		CLAY and SILT, as above, gray-red-yellow
			15	
7	15-17	6-8-7-6 (20)		SILT, some vf to fn sand, tr clay, gray-yellow
8	17.5-19.5	4-5-6-5 (22)		SAND, vf to fn, ltl silt, tr clay, gray-yellow
			20	
9	20-22	5-8-12-16 (19)		4" SAND, as above 7" SILT and vf SAND, ltl fn and clay, gray 8" SAND, vf to fn, tr silt and clay, gray
10	22.5-24.5	12-11-9-8 (20)	25	SAND, as above
11	25-27	9-24-31-38 (18)		SAND, vf to fn, little silt, tr clay, gray-yellow
12	27.5-29.5	18-26-26-36 (19)	30	SAND, as above
13	30-32	8-12-18-18 (22)		SAND, as above
14	32.5-34.5	18-23-13-17 (19)		SAND, as above
			35	
15	35-37	5-15-9-12 (21)		SAND, as above, some layers contain little clay
16	37.5-39.5	12-23-51/6" (18)		SAND, as above
			40	

BORING NUMBER: B-11 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
17	40-42	27-35-51/5" (15)	SAND, vf to fn, little silt, tr clay, gray-yellow
18	42.5-44.5	34-51/3" (9)	SAND, as above
19	45-47	27-51/5 (11)	SAND, as above
20	47.5-49.5	30-51/5" (11)	SAND, as above
21	50-52	31-37-51/2" (14)	7" SAND, as above 7" SAND, med, little fn, yellow-gray
22	52.5-54.5	30-50-51/3" (15)	SAND, as above
23	55-57	47-51/3" (9)	SAND, as above
24	57.5-59.5	49-51/2" (13)	SAND, as above
25	60-62	28-41-51/5" (18)	SAND, as above, tr silt and clay
26	62.5-64.5	14-27-38-51/5" (21)	7" SAND, as above, saturated 8" SAND, vf,and SILT, little clay, gray 6" SAND, fn to vf, tr silt and clay, gray
27	65-67	18-26-34-49 (24)	SAND, fn to vf, little clay, tr silt, gray
28	67.5-69.5	27-38-30-51/5" (23)	SAND, as above, 2" clay layer at bottom
29	70-72	36-51/3" (9)	SAND, f to vf, some med, tr silt, gray-yellow
30	72.5-74.5	20-33-51/4" (16)	CLAY, little silt and sand, gray
31	75-77	33-37-51/5" (17)	CLAY, as above
32	77.5-79.5	23-27-51/3" (15)	CLAY, tr sand silt, gray
33	80-82	23-28-51/5" (17)	SAND, fn, some vf, ltl med, tr silt and clay, few thin lenses clay, gray
34	82.5-84.5	24-31-51/7" (8)	7" CLAY, ltl silt, tr sand, gray 1" SAND, fn, tr silt and clay, gray-yellow



BORING NUMBER: B-11 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
			85	
35	85-87	51/5" (5)		SAND, med, some fn, tr silt and clay, gray-yellow
36	87.5-89.5	23-32-51/4" (16)		10" CLAY, tr sand and silt, gray-yellow-red 6" SAND, fn to vf, tr silt and clay, lt tan
			90	
37	90-92	52/3" (0)		No recovery (probably sand - lost circulation drilling with mud)
38	92.5-94.5	134/1" (1)		SAND, med, some fn, tr silt and clay, lt tan
			95	
39	95-97	37-51/5" (10)		4" CLAY, tr silt and sand, gray-yellow 6" SAND, med, some fn, tr silt & clay, tan
40	97.5-99.5	49-49-49 (9)		SAND, as above, lt tan-yellow
			100	
41	100-102	38-35-51/2" (14)		SAND, as above
42	102.5-104.5	100/4" (4)		CLAY, tr sand, v dense, gray-red-yellow
			105	
43	105-107	101/5" (5)		CLAY, tr silt, v dense, red, some gray streaks
44	107.5-109.5	85-100/3" (9)		CLAY, as above
			110	
45	110-112	45-45-51/3" (0)		No recovery - drilled like clay
46	112.5-114.5	45-51/3" (0)		No recovery - drilled like clay
			115	
47	115-117	47-51/4" (10)		CLAY, as above
48	117.5-119.5	50-51/2" (8)		CLAY, as above
			120	

Groundwater encountered at 63 feet.

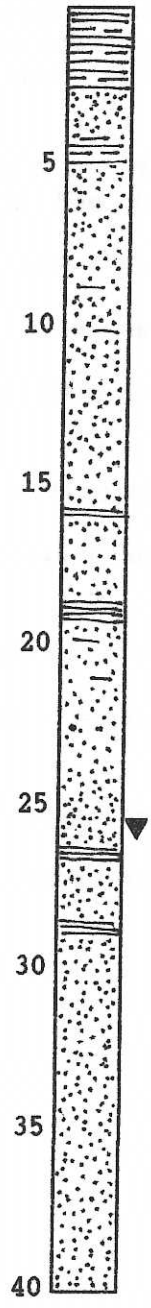
BORING NUMBER: B-12

MONITOR WELLS: MW-4

DATE INSTALLED: 7-22-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER and MUD
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	3-3-4-6 (16)	CLAY, little silt and sand, red-br-yellow
2	2.5-4.5	3-7-9-11 (21)	16" SAND, fn & vf, tr silt & clay, rd-br-yellow 5" SILT and CLAY, little sand, yellow-red
3	5 - 7	9-19-19-30 (17)	SAND, med, some fn, tr silt and clay, red-brown-lt tan
4	7.5-9.5	6-18-21-26 (20)	8" SAND, as above 12" SAND, fn to vf, some silt, tr clay, lt tan-red-brown
5	10-12	7-13-13-16 (19)	SAND, med, some fn, tr silt, lt tan-red-brown
6	12.5-14.5	6-10-11-13 (21)	SAND, fn and vf, little med, tr silt and clay, lt tan-red-brown
7	15-17	3-3-5-3 (20)	SAND, as above, gray and red-brown, with 2" clay layer
8	17.5-19.5	3-5-11-24 (18)	5" SAND, as above 13" CLAY, some silt, tr sand, gray
9	20-22	3-5-16-24 (17)	SAND, med, some fn, some silt and clay stringers,gray-red-brown-yellow
10	22.5-24.5	30-33-27-18 (17)	8" GRAVEL, some sand, tr silt, red-brown 9" SAND, fn to vf, tr silt & clay, red-br-gray
11	25-27	5-20-41-51/5" (24)	6" SAND, as above 6" CLAY, ltl silt, thin sand lenses, gray 8" SAND, med-fn, gray-rd-br, saturated
12	27.5-29.5	20-24-30-38 (20)	10" CLAY, ltl sand and silt, gray-rd-br 10" SAND, med, ltl fn, tr silt & clay, gray
13	30-32	22-28-36-40 (20)	SAND, as above, saturated
14	32.5-34.5	27-38-43-51 (24)	SAND, as above
15	35-37	33-51/6" (12)	SAND, as above
16	37.5-39.5	15-51/6" (12)	SAND, as above

Graphic Log



BORING NUMBER: B-12 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
			40	
17	40-42	4-14-51/5" (8)		SAND, as above
18	42.5-44.5	45-51/3" (8)		CLAY, little silt and sand, with thin sand lenses, mottled red-gray
			45	
19	45-47	14-45-48 (18)		11" SAND, med and coarse, tr silt & clay, gray 7" CLAY, tr silt and sand, dense, gray
20	47.5-49.5	35-47-51/4" (16)		CLAY, as above
			50	
21	50-52	33-51/4" (0)		No recovery - drilled like clay
22	52.5-54.5	29-51/6" (12)		CLAY, as above, mottled gray-red-br-purple
			55	
23	55-57	43-51/5" (11)		CLAY, as above
24	57.5-59.5	34-51/5" (0)		No recovery, drilled like clay
			60	
25	60-62	36-51/5" (11)		CLAY, as above
26	62.5-64.5	41-33-42-47 (21)		6" CLAY, as above 15" CLAY and SILT, little sand, gray
			65	
27	65-67	45-51/5" (0)		No recovery
28	67.5-69.5	37-45-47-51/5" (15)		CLAY, some silt, tr sand, red-br-gray
29	70-72	19-29-33-42 (21)	70	10" CLAY, as above 5" CLAY & SILT, tr sand, mottled red-br-gray 6" SAND, vf, some silt, tr clay, gray
30	72.5-74.5	10-27-36-49 (0)		No recovery
			75	
31	75-77	19-29-38-51/5" (21)		7" SILT & vf SAND, tr clay, mott rd-br-gray 14" SILT & CLAY, little vf sand, red-br-gray
32	77.5-79.5	21-28-51/5" (17)	80	SILT and CLAY, as above

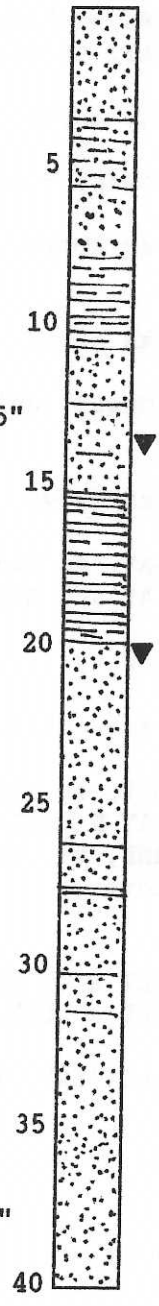
Groundwater on the drill rods at 34 feet.

BORING NUMBER: B-13

MONITOR WELLS: MW-3

DATE INSTALLED: 7-18-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	2-2-2-2 (18)	SAND, med, some v fn, tr silt and clay, yellow
2	2.5-4.5	2-2-3-4 (24)	SILT and fn SAND, tr clay, brown
3	5 - 7	2-12-17-22 (15)	2" SILT and fn SAND, as above 9" GRAVEL, little coarse sand, yellow
4	7.5-9.5	15-11-11-15 (19)	CLAY, little silt, with lenses of SILT, gray
5	10-12	8-8-12-14 (12)	6" CLAY, as above 6" SAND, med, some fn, yellow
6	12.5-14.5	17-34-51-51/5" (16)	SAND, as above with thin CLAY lenses, gray, saturated
7	15-17	12-12-14-22 (24)	CLAY, little fn sand and silt, gray
8	17.5-19.5	7-12-17-17 (19)	CLAY, little vf sand and silt, gray
9	20-22	30-51/7" (9)	SAND, med, little fn, tr silt and clay, gray-yellow, saturated
10	22.5-24.5	32-34-51/5" (18)	SAND, as above
11	25-27	22-34-51/5" (18)	SAND, as above, clay stringers in lower 11"
12	27.5-29.5	17-35-51/5" (18)	SAND, as above, with 3" CLAY layer
13	30-32	9-13-51/5" (18)	SAND, as above, some thin lenses of clay, gray
14	32.5-37.5	40-51/3" (0)	No recovery
15	35-37	13-25-51/5" (18)	SAND, vf to med, tr silt and clay, yellow-gray, saturated and CLAY layers 2 and 4" thick
16	37.5-39.5	17-28-40-51/5"	SAND, med, some fine, tr silt, lt tan, (24) saturated, with a 2" CLAY layer



BORING NUMBER: B-13 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
			40	
17	40-42	17-24-51/5" (18)		SAND, med and fn, little vf, tr silt and clay, few thin clay lenses, lt tan-gray
18	42.5-44.5	10-30-51/5" (18)		SAND, med and fn, little vf, tr silt, few thin clay lenses, tan, saturated
			45	
19	45-47	12-30-51/6" (18)		SAND, as above
20	47.5-49.5	45-51/2" (12)		SAND, as above, no clay lenses
			50	
21	50-52	45-51/6" (12)		SAND, as above
22	52.5-54.5	51/4" (4)		SAND, as above
			55	
23	55-57	25-51/5" (10)		CLAY, little silt, tr sand, mottled red-gray
24	57.5-59.5	51/5" (6)		SILT and CLAY, some sand, gray
			60	
25	60-62	28-46-51/2" (14)		SILT and vf SAND, little clay, gray
26	62.5-64.5	18-31-51/5" (17)		CLAY, some silt, tr sand, gray
			65	
27	65-67	31-51/5" (11)		7" CLAY, as above 2" SAND, vf, little silt, gray 2" CLAY and SILT, tr sand, brown-gray
28	67.5-69.5	45-51/5" (12)	70	CLAY and SILT, some sand, gray

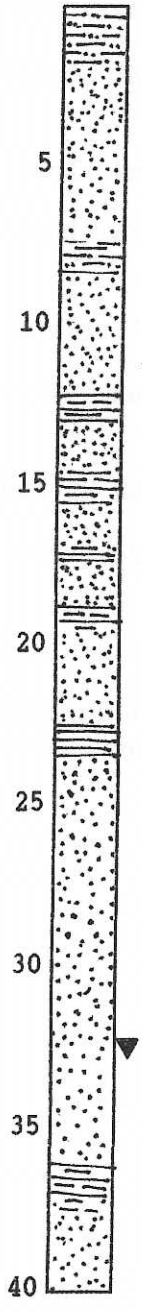
Groundwater encountered at 14 feet.

BORING NUMBER: B-14

MONITOR WELLS: MW-5

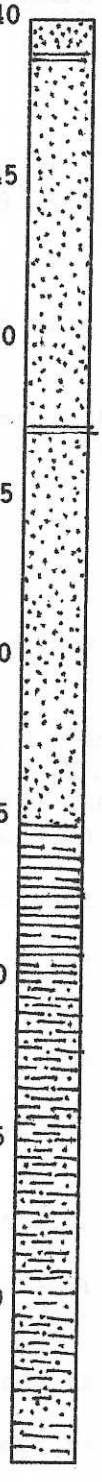
DATE INSTALLED: 7-25-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	2-2-4-5 (18)	SAND, vf, and SILT, tr clay, red-brown
2	2.5-4.5	14-18-18-37 (17)	SAND, fn, some vf and med, tr silt and clay, red-brown-yellow
3	5 - 7	51/2" (2)	SAND, med, some grvel, tr silt & clay, red-br
4	7.5-9.5	11-19-27-36 (19)	5" SILT, CLAY, and SAND, vf, gray-red-brown 14" SAND, fn and med, tr silt & clay, red-br
5	10-12	18-20-21-18 (16)	SAND, med, some fn, tr silt & clay, red-brown
6	12.5-14.5	4-8-10-14 (14)	11" CLAY, ltl silt, few thin sand lenses, gray 3" SAND, fn to vf, some silt, tr clay, gray
7	15-17	7-7-5-6 (24)	6" CLAY, little silt , tr sand, gray 13" SAND, fn, some vf, tr silt & clay, yl-gry 5" CLAY and SILT, tr sand, gray
8	17.5-19.5	5-7-8-9 (20)	13" CLAY and SILT, as above 7" SAND, fn to vf, tr silt and clay, gray
9	20-22	3-5-7-3 (23)	SAND, as above, tan-gray, 3" CLAY layer at top
10	22.5-24.5	41-51/4" (22)	16" CLAY, tr silt and sand, brown 6" SAND, crs, & GRAVEL, tr silt & cly, yl-br
11	25-27	42-51/1" (7)	SAND, med and coarse, little gravel, tr silt and clay, yellow-brown
12	27.5-29.5	20-21-18-19 (6)	GRAVEL and coarse SAND, tr fn sand, yellow
13	30-32	19-22-25-21 (12)	SAND, med and coarse, little gravel, tr fn sand, silt, and clay, yellow
14	32.5-34.5	31-51/5" (9)	SAND, coarse, little med, tr fn sand, silt and clay, yellow, saturated
15	35-37	8-10-16-18 (24)	14" SAND, as above 10" CLAY and SILT, tr sand, gray
16	37.5-39.5	9-29-51/3" (15)	SAND, fn to med, tr silt and clay, gray



BORING NUMBER: B-14 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
17	40-42	9-15-51/5" (17)	13" SAND, as above, saturated 4" CLAY, little silt, tr sand, gray
18	42.5-44.5	32-51/5" (11)	SAND, med, some fn, gray, saturated
19	45-47	21-34-51/4" (16)	SAND, as above
20	47.5-49.5	15-23-40-51/3" (21)	SAND, as above
21	50-52	51/5" (5)	SAND, med & crse, ltl fn, tr silt & clay, yel
22	52.5-54.5	8-51/5" (11)	9" SAND, as above with 2" CLAY layer at bottom 2" SAND, med some fn, tr silt and clay, gray
23	55-57	32-51/2" (8)	SAND, as above, saturated
24	57.5-59.5	33-51/4" (10)	SAND, med, little fn, tr silt and clay, lt tan, saturated
25	60-62	25-51/3" (9)	SAND, as above
26	62.5-64.5	15-35-51/5" (17)	SAND, as above (flowing)
27	65-67	34-51/5" (11)	CLAY, some silt, tr sand, red-brown
28	67.5-69.5	51/5" (5)	CLAY, as above
29	70-72	34-51/5" (11)	SILT, little clay and sand, red-brown-gray
30	72.5-74.5	51/5" (0)	No recovery
31	75-77	42-51/4" (0)	No recovery
32	77.5-79.5	39-37-51/4" (16)	SILT, some sand, little clay, gray
33	80-82	28-35-51/5" (17)	SILT, as above, saturated
34	82.5-84.5	22-36-51	7" SAND, md, ltl crs, tr silt & clay rd-br 11" SILT, some sand, tr clay, gray



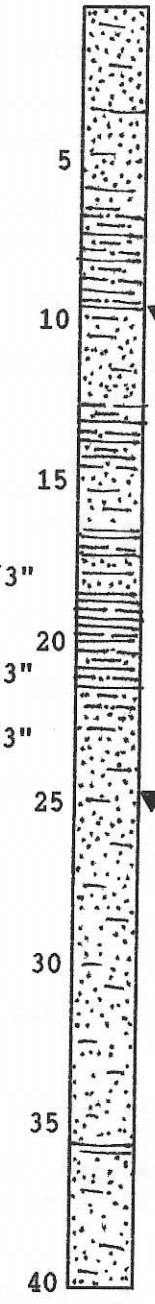
Groundwater encountered at 33 feet and noted on drill rods at 18 feet.

BORING NUMBER: B-15

MONITOR WELLS: MW-6

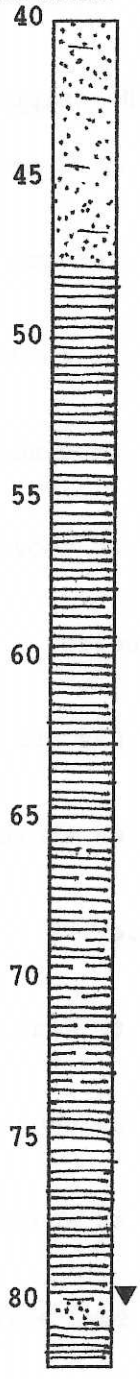
DATE INSTALLED: 8-10-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: GREG ADAMSON DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	5-7-10-12 (19)	SAND, some silt, tr gravel, tan
2	2.5-4.5	9-11-13-5 (20)	SAND, some clay, tan
3	5 - 7	6-9-9-13 (24)	18" SAND, as above 6" SILT, some clay, tr sand, tan to gray
4	7.5-9.5	7-14-21-16 (17)	SILT, some clay, tr sand, gray
5	10-12	8-17-25-32 (17)	SAND, fn, some silt, tr clay, gray-tan, wet
6	12.5-14.5	7-19-25-38 (21)	SILT, some clay, gray, with 2" silty sand lens
7	15-17	7-15-24-32 (16)	11" SAND, some silt and clay, tan, wet to moist 5" CLAY, some silt, gray
8	17.5-19.5	17-25-40-51/3" (21)	5" SAND with thin clay lenses, gray 16" CLAY, some silt, gray
9	20-22	15-25-40-51/3" (20)	SILT, some clay, gray with 2 v thin sand lenses
10	22.5-24.5	12-22-38-51/3" (22)	SAND, fn, some clay and silt, gray, v moist
11	25-27	25-40-51/3" (18)	SAND, med-coarse some silt, tan, wet
12	27.5-29.5	51/5" (14)	SAND, as above (running sand)
13	30-32	51/6" (17)	SAND, as above
14	32.5-34.5	25-36-51/5" (13)	SAND, fn, some silt, with thin clay layers, gray, wet
15	35-37	33-40-51/3" (15)	SAND, as above, with 2" clay lens
16	37.5-39.5	10-51/5" (10)	SAND, as above



BORING NUMBER: B-15 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
17	40-42	20-51/3" (9)	SAND, as above
18	42.5-44.5	30-40-51/5" (5)	SAND, as above
19	45-47	40-51/5" (6)	SAND, as above, tr clay
20	47.5-49.5	20-51/5" (20)	CLAY, tr silt, red-brown and gray
21	50-52	51/5" (20)	CLAY, as above
22	55-57	38-51/6" (20)	CLAY, as above
23	60-62	45-51/5" (3)	CLAY, as above
24	65-67	40-51/5" (15)	CLAY, some silt, red-brown-gray with occasional yellow-brown streaks
25	70-72	30-51/6" (10)	CLAY, as above
26	75-77	25-32-51/5" (10)	CLAY, tr silt, charcoal gray
27	80-82	36-42-51/6" (17)	2" SAND, some clay, gray, wet 15" CLAY, tr silt, charcoal gray



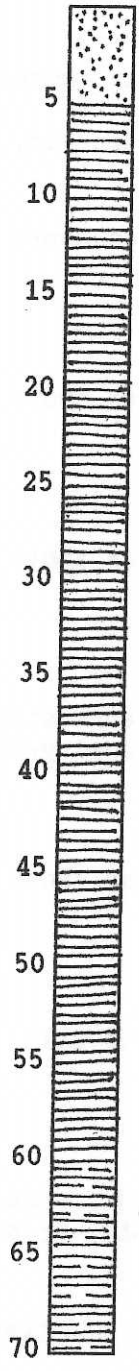
Groundwater encountered above the clay at 10 feet and then definitively at 25 feet. Wet layer encountered below the clay at 80 feet.

BORING NUMBER: B-16

DATE INSTALLED: 11-22-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

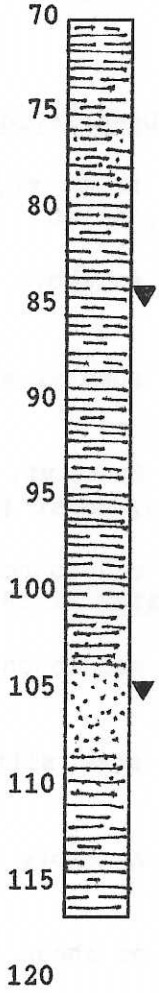
Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	5-1-1-1 (14)	SAND, fn to med, tr silt and clay, brown, moist
2	5 - 7	3-6-10-11 (11)	CLAY, red and gray, moist
3	10-12	4-7-9-11 (4)	CLAY, as above
4	15-17	4-7-12-14 (17)	CLAY, tr sand, red and gray, moist
5	20-22	4-7-10-13 (4)	CLAY, as above
6	25-27	5-10-12-9 (0)	No recovery - drilled like clay
7	30-32	9-13-21-27 (20)	CLAY, red and gray, moist
8	35-37	10-16-23-50 (17)	CLAY, as above
9	40-42	18-36-51/4" (0)	No recovery - drilled like clay
10	45-47	24-39-51/4" (12)	CLAY, tr sand, red and gray, moist
11	50-52	29-39-51/4" (10)	CLAY, as above
12	55-57	28-42-51/5" (12)	CLAY, as above
13	60-62	30-41-51/5" (12)	CLAY, some silt and sand, red and gray, moist
14	65-67	36-45-51/4" (15)	CLAY, as above

Graphic Log



BORING NUMBER: B-16 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
15	70-72	29-32-51/5" (9)	CLAY, silt and sand, red and gray, moist
16	75-77	29-35-51/5" (15)	SILT, some clay and vf sand, gray, moist
17	80-82	25-36-51/5" (14)	SILT and CLAY, dark gray, slightly moist
18	85-87	15-25-34-51/5 (11)	CLAY and SILT, mottled lt gray and red-brown, wet
19	90-92	33-45-51/4" (0)	No recovery
20	95-97	51/4" (4)	CLAY, some silt, mottled gray and dk maroon, slightly moist
21	100-102	51/3" (0)	No recovery
22	105-107	51/3" (2)	SAND, fn to med, red-brown, wet
23	110-112	51/4" (0)	No recovery
24	115-117	51/3" (5)	CLAY and SILT, gray, moist

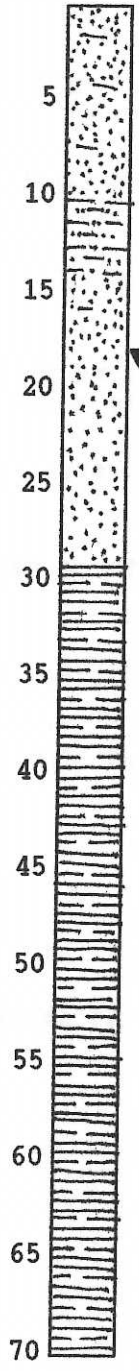


Wet layers encountered below the clay beginning at about 85 feet.

BORING NUMBER: B-17

DATE INSTALLED: 11/20/89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	2-4-4-5 (18)	SAND, fn to vf, some silt, tr clay, lt red-brown, moist
2	5 - 7	3-3-2-3 (24)	SAND, as above, tan
3	10-12	7-9-13-19 (24)	SILT, some vf sand, tan
4	15-17	13-9-9-9 (24)	SAND, fn to vf, some silt, tr to little clay, lt tan, moist (soft clay in tip)
5	20-22	5-8-10-11 (24)	SAND, med to coarse, clean, lt red-brown, saturated at 19 feet
6	25-27	5-4-5-8 (12)	SAND, med to coarse, tr clay, lt red-brown
7	30-32	9-11-14-16 (12)	CLAY, some silt, variegated red-gray-brown, moist
8	35-37	6-8-12-17 (24)	CLAY, as above
9	40-42	12-20-33-39 (20)	CLAY, as above
10	45-47	10-17-25-39 (20)	CLAY, as above
11	50-52	13-20-29-40 (17)	CLAY, as above
12	55-57	12-20-31-45 (20)	CLAY, as above
13	60-62	12-17-31-49	CLAY, as above, dry
14	65-67	26-39-59-59	CLAY, as above, slightly moist



BORING NUMBER: B-17 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
15	70-72	12-18-39-51		CLAY, as above
16	75-77	20-31-51-56		CLAY, mottled red-gray-brown, moist
17	80-82	21-37-51-51		CLAY, as above
18	85-87	51/5" (5)		CLAY, some silt and sand, pink, moist
19	90-92	19-40-51-56 (24)		CLAY, some silt and sand, mottled red-gray-brown, moist
20	95-97	31-51/5" (11)		CLAY, tr sand, red and gray
21	100-102	28-42-51/3" (15)		CLAY, as above
22	105-107	31-43-51/4" (8)		CLAY, as above
23	110-112	39-41-51/4" (12)		CLAY, as above
24	115-117	36-43-51/5" (15)		CLAY, as above

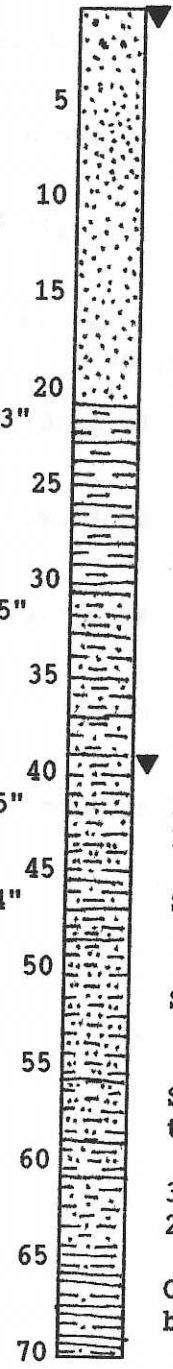


Groundwater encountered above the clay at 19 feet.

BORING NUMBER: B-18

DATE INSTALLED: 11-27-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: PHYLLIS BUFF DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	3-3-4-5 (8)	GRAVEL and SAND, coarse, brown, saturated
2	5 - 7	6-9-10-13 (24)	SAND, med to vf, lt tn, saturated
3	10-12	30-81-100/5" (19)	SAND, coarse to med, lt tan, saturated
4	15-17	37-81/6" (12)	SAND, as above
5	20-22	17-22-37-51/3" (20)	SILT and CLAY, gray to red, slightly moist
6	25-27	45-51/4" (12)	SILT and CLAY, gray, slightly moist
7	30-32	21-35-44-51/5" (23)	SILT, some clay, mottled lt gray and brown, slightly moist
8	35-37	18-51/4" (11)	SILT, some clay, lt gray, slightly moist
9	40-42	16-24-33-51/5" (22)	12" SILT, as above, wet 10" SILT, and SAND, vf, dark gray, wet
10	45-47	21-27-33-51/4" (22)	SILT, some clay, little vf sand, dark gray, wet
11	50-52	28-51/4" (10)	SILT, and SAND, vf, some clay, gray, wet
12	55-57	51/5" (5)	SILT, CLAY, and SAND, vf, gray, slightly moist to dry
13	60-62	51/4" (4)	3" as above 2" SILT, lt red-brown
14	65-67	38-51/4" (10)	CLAY, interlayered with some fn sand, yellow-brown, moist



BORING NUMBER: B-18 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
15	70-72	51/1.5"-200/5" (6)		CLAY, as above

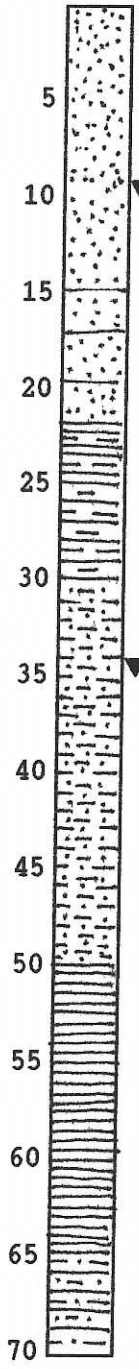
Groundwater encountered above the clay at 40 feet.

BORING NUMBER: B-19

DATE INSTALLED: 11-28-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	1-2-3-6 (4)	SAND, fn to med, some clay, yellow-brown
2	5 - 7	14-17-18-20 (17)	SAND, as above, tr to little clay
3	10-12	3-3-2-3 (18)	SAND, coarse, yellow-brown, wet
4	15-17	3-5-9-12 (20)	SAND, as above with clay layers
5	20-22	9-11-16-20 (17)	2" SAND, as above 15" CLAY, some silt, moist, top 4" dark red, bottom 11" dark gray
6	25-27	13-19-28-40 (18)	SILT and CLAY, mottled red and gray, moist
7	30-32	12-14-18-22 (24)	SILT, tr clay, gray, moist
8	35-37	13-19-21-35 (24)	SILT, as above, wet
9	40-42	14-19-26-32 (18)	SILT, as above, wet
10	45-47	28-36-51/5" (23)	SILT, as above, wet
11	50-52	12-16-21-27 (12)	CLAY, tr silt, mottled maroon and gray, slightly moist
12	55-57	10-14-20-25 (24)	CLAY, as above
13	60-62	12-22-33-40 (24)	CLAY, as above
14	65-67	28-35-51/5" (17)	SILT, some clay, gray, moist

Graphic Log



BORING NUMBER: B-19 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
15	70-72	18-33-38-45 (6)		SILT and SAND, vf, some clay, mottled gray-pink-yellow-brown, moist (not water bearing)
16	75-77	30-45-51/5" (17)		SILT, vf SAND, and CLAY, mottled as above
17	80-82	24-30-38-46 (22)		CLAY and SILT, mottled as above, slightly moist
18	85-87	22-47-51/5" (24)		SILT, tr to some clay, maroon at top and dark gray at bottom (not water bearing)
19	90-92	23-57-51/3" (15)		SILT and SAND, vf, tr clay, dark gray, wet

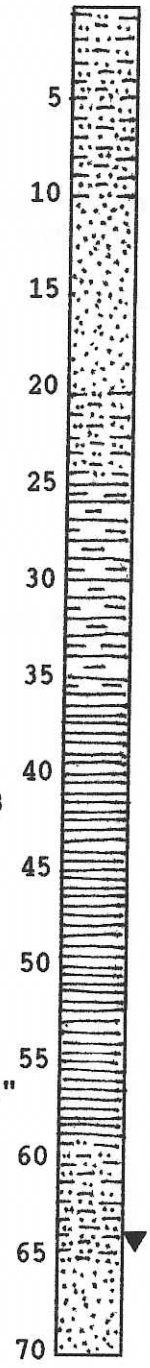
Shallow perched water at 10 feet.

Groundwater encountered above the clay at 35 feet and below the clay at 90 feet.

BORING NUMBER: B-20

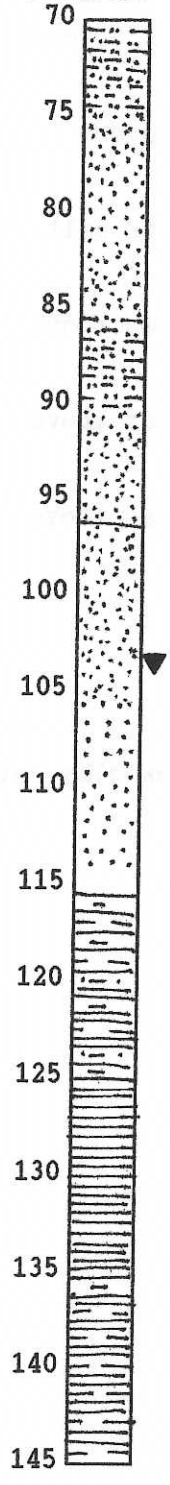
DATE INSTALLED: 11-28-89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
1	0 - 2	2-3-3-4 (15)		SAND, vf, and SILT, tr clay, brown, moist
2	5 - 7	1-3-5-7 (12)		SILT and vf SAND, little clay, brown, moist
3	10-12	4-6-9-10 (16)		SAND, med to coarse, little clay, lt yellow-brown, moist
4	15-17	12-11-19-22 (14)		SAND, fine, lt tan, moist
5	20-22	5-8-13-13 (15)		SILT and SAND, vf, little clay, variegated mostly maroon, slightly moist
6	25-27	9-12-18-25 (18)		SILT and CLAY, variegated, mostly maroon, slightly moist
7	30-32	9-15-21-24 (18)		CLAY and SILT, as above
8	35-37	11-17-24-29 (15)		CLAY, tr silt, variegated maroon with some gray, sightly moist
9	40-42	22-36-43-51/3 (13)		CLAY, as above
10	45-47	23-39-51/5" (16)		CLAY, tr silt, yellow-olive, slightly moist
11	50-52	27-37-51/5" (17)		CLAY, tr silt, mottled gray-brown, slightly moist
12	55-57	17-33-44-51/4" (16)		CLAY, tr silt, mottled red and gray, slightly moist
13	60-62	27-25-30-41 (17)		SILT and vf SAND, with some occasional clay, lt tan with some red, slightly moist
14	65-67	33-51/5"		SAND, vf, some silt, tr clay, lt tan, saturated



BORING NUMBER: B-20 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
15	70-72	39-51/5" (15)	SILT and vf SAND, tr clay, lt tan, wet
16	75-77	51/4" (1.5)	SAND, fn to vf, tr silt and clay, lt tan-yellow, wet
17	80-82	51/3" (0)	No recovery
18	85-87	51/3" (4)	SAND, vf and SILT, lt gray-white, moist
19	90-92	51/3" (1)	SAND, fn to vf, tr silt, lt red-tan, wet
20	95-97	12-27-51/5" (8)	SAND, fn to vf, clay inclusion, lt tan-gray, v moist to wet
21	100-102	51/2" (0)	No recovery
22	105-107	43-45-51/3" (3)	SAND, coarse, tr fines, lt yellow-brown, saturated
23	110-112	38-44-51/3" (6)	SAND, as above
24	115-117	30-48-51/5" (12)	SILT, some clay, gray, moist
25	120-122	34-47-51/4" (17)	CLAY, some thin fn sand and silt lenses, stiff, gray, moist
26	125-127	30-40-51/3"	CLAY, tr silt, mottled red and gray, moist
27	130-132	30-40-51/5"	CLAY, tr silt, stiff, red and gray, moist
28	135-137	38-44-51/4" (14)	CLAY, red and gray, stiff with some thin silt lenses, slightly moist
29	140-142	32-46-51/4" (11)	CLAY, as above



BORING NUMBER: B-20 continued

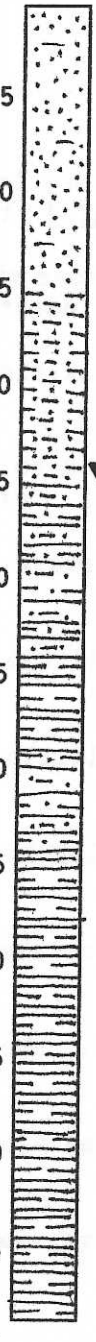
Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
			145	
30	145-147	30-40-51/4" (11)		SILT, some clay, tr sand, gray, moist
			150	
31	150-152	37-51/5" (0)		No recovery
			155	
32	155-157	39-49-51/3" (15)		CLAY, tr silt, v stiff, red and gray, moist
			160	
33	160-162	47-51/5" (11)		CLAY, as above
			165	
34	165-167	51/4" (11)		CLAY, as above
			170	
35	170-172	48-51/3"		CLAY, as above
			175	

Groundwater encountered at 65 feet between thick clay units.

BORING NUMBER: B-21

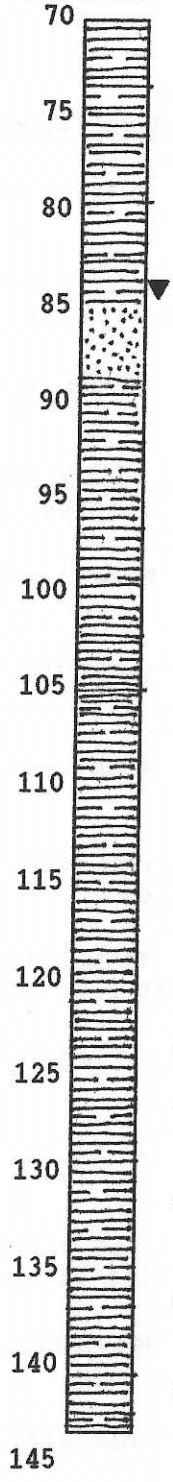
DATE INSTALLED: 12/1/89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: PHYLLIS BUFF DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	3-5-8-4 (14)	SAND, coarse, some silt, yellow-brown, moist
2	5 - 7	5-6-9-15 (13)	SAND, med to coarse, little silt, tan, slightly moist
3	10-12	5-7-12-19 (14)	SAND, as above
4	15-17	7-11-15-17 (17)	SILT, some v fn sand, gray-tan with yellow-brown mottles, moist
5	20-22	4-5-16-15 (23)	SILT, some vf sand, tan with red-brown mottles, moist
6	25-27	9-10-14-18 (24)	SILT, some clay, tr sand, gray and maroon, very moist, (2" lens wet silt)
7	30-32	7-9-11-13 (21)	SILT, some clay, lt gray, v moist
8	35-37	9-15-17-20 (20)	CLAY, some silt, lignitic, gray, moist, (2" wet silt lens)
9	40-42	18-20-33-51/4" (22)	SILT, some clay, hard, gray, slightly moist, (4" wet silt lens)
10	45-47	15-31-37-45 (24)	CLAY, little to some silt, dark gray, slightly moist
11	50-52	14-23-36-41 (24)	CLAY, as above, 1" lignite lens
12	55-57	31-41-51/5" (24)	CLAY, some silt, stiff, red-brown and pink, v thin silt lenses throughout
13	60-62	25-31-37-45 (24)	CLAY, some silt, mottled yellow-brown and red-brown, moist
14	65-67	15-25-35-51/2 (24)	CLAY, some silt, stiff, red-brown, moist



BORING NUMBER: B-21 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
15	70-72	70/6" (6)		CLAY, little silt, stiff, tan and pink, moist
16	75-77	35-51/5" (3)		CLAY, as above
17	80-82	100/4" (4)		CLAY, as above
18	85-87	51/6" (4)		SAND, med to coarse, some silt, red and tn, saturated, thin clay lens
19	90-92	51/5" (5)		CLAY, some silt, lt gray, yellow-brown and red-brown, moist
20	95-97	44-36-51/6" (24)		CLAY, little silt, lt gray and maroon, moist
21	100-102	33-41-51/6" (18)		CLAY, tr to little silt, lt gray and maroon, v stiff, moist
22	105-107	22-33-51/4" (0)		No recovery - drilled like clay
23	110-112	41-51/5" (11)		CLAY, little silt, lt gray and maroon, v stiff, moist
24	115-117	45-51/5" (11)		CLAY, little silt, v stiff, lt gray and maroon, moist
25	120-122	37-51/5" (9)		CLAY, little silt, v stiff, lt gray and maroon, moist
26	125-127	48-51/5" (11)		CLAY, as above
27	130-132	47-51/6" (10)		CLAY, as above
28	135-137	41-51/5" (18)		CLAY, as above, slightly moist
29	140-142	47-51/6" (15)		CLAY, as above



BORING NUMBER: B-21 continued

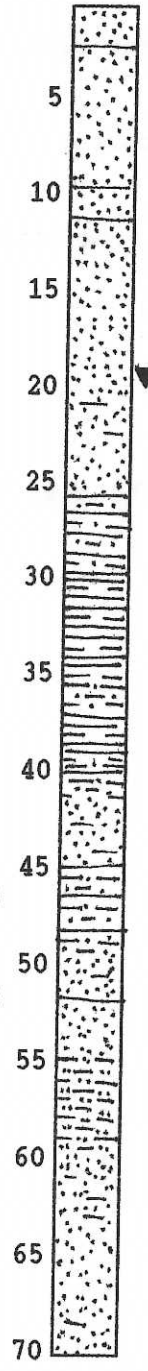
Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
			145	
30	145-147	42-51/5" (11)		CLAY and SILT, v stiff, lt gray and maroon, slightly moist
			150	
31	150-152	42-51/4" (9)		CLAY and SILT, as above
			155	
32	155-157	36-51/5" (0)		No recovery
			160	
33	160-162	47-51/5" (12)		CLAY, some silt, red-brown and lt gray, moist
			165	

Groundwater encountered in silt lenses above the clay beginning at 25 feet and in a sand bed in the clay at 85 feet.

BORING NUMBER: B-22

DATE INSTALLED: 12/6/89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: PHYLLIS BUFF DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	3-4-3-3 (11)	SAND, med-coarse, some clay, tr silt, lt brown, v moist
2	5 - 7	8-5-7-8 (11)	SAND, med-coarse, tr clay and silt, yellow-brown, moist
3	10-12	8-14-17-21 (17)	SAND, med-coarse, some clay, tr silt, lt brown, v moist
4	15-17	8-12-14-20 (13)	SAND, fn to med-coarse, tr silt, tan and yellow-brown, slt moist
5	20-22	15-25-22-41 (11)	SAND, fn, some silt, 2" white clay lens, wet
6	25-27	18-23-34-41 (17)	SILT, some clay, firm, gray-white, moist, not water bearing
7	30-32	10-24-30-41 (24)	CLAY, some silt, v firm, lt gray-white
8	35-37	4-11-32-40 (24)	10" SILT, ltl clay, lt gry w/ maroon motls, mst 14" CLAY, some silt, lt gray
9	40-42	15-15-23-43 (21)	4" SILT, tr clay, lt gray and maroon 17" SAND, fn-crs, some silt, yl-br-gry, v mst
10	45-47	15-24-34-51/3 (24)	SILT, some to little clay, lt gray-white, mst, with 2" white sand-silt lens
11	50-52	14-27-39-51/2 (20)	SAND, fn, some silt, thin clay lenses, lt gray-white, v moist
12	55-57	35-41-51/4" (16)	SAND, fn and silt, gray-white, v moist to wet
13	60-62	15-34-51/5" (17)	SAND, fn, some silt, tr clay, gray-white, moist
14	65-67	51/6" (6)	SAND, fn, little silt, white-tan, slt mst



BORING NUMBER: B-22 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
15	70-72	24-25-36-51/4 (20)	70	SAND, med-coarse, some silt and clay, red-tan, wet
16	75-77	34-51/4" (10)	75	2" SAND, as above, red, v moist 8" CLAY, with some silt, firm, red-brown and lt gray
17	80-82	41-45-51/4" (7)	80	CLAY, tr silt, v firm, maroon and lt gray, mst
18	85-87	47-49-51/5" (5)	85	CLAY, as above
19	90-92	33-41-51/4" (11)	90	CLAY, as above
20	95-97	30-41-51/5" (16)	95	CLAY, as above, tr to little silt
21	100-102	41-49-51/5" (17)	100	CLAY, as above
22	105-107	39-42-51/4" (15)	105	CLAY, little silt, v stiff, lt gray and maroon, moist
23	110-112	43-49-51/3" (15)	110	CLAY, tr silt, v stiff, red-brown, moist
24	115-117	45-47-51/4" (13)	115	CLAY, little to some silt, v stiff, lt gray and red-brown, mst
25	120-122	28-34-51/5 (14)	120	CLAY, tr silt, v stiff, lt bluish gray-maroon, moist
26	125-127	31-43-51/3" (9)	125	CLAY, as above
27	130-132	47-50-51/3" (9)	130	CLAY and (to some) SILT, v firm, red-br to lt gray, moist
28	135-137	45-49-51/4" (13)	135	CLAY, as above
29	140-142	37-49-51/3" (11)	140	CLAY, little to some silt, v stiff, red-br and lt gray, moist
			145	

BORING NUMBER: B-22 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
			145	
30	145-147	43-49-51/3" (7)		CLAY, as above
			150	

Thin layers of perched groundwater encountered at 20 feet and 55 feet and then, above the clay, at 70 feet.

BORING NUMBER: B-23

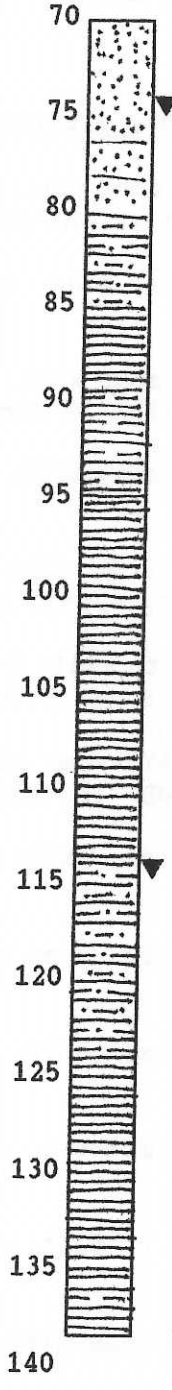
DATE INSTALLED: 12/12/89
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: PHYLLIS BUFF DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
1	0 - 2	4-3-6-7 (12)		SAND, some silt, tr clay, some organic matter, red-brown, moist
2	5 - 7	7-9-11-11 (15)	5	CLAY, tr silt, red-brown and tan, moist
3	10-12	7-14-14-17 (12)	10	CLAY, some silt, tr fn sand, red-brown and tan with thin fn sand lenses
4	15-17	1-2-10-11 (22)	15	CLAY, some silt, tr sand, tan-lt brown, moist
5	20-22	5-10-17-13 (12)	20	CLAY, some silt, tr sand, with v thin silt lenses, tan-lt br to red, moist
6	25-27	5-51/5" (9)	25	CLAY, tr silt, v stiff, red br to lt gray, 1"-2" sand and silt lenses, moist
7	30-32	51/5" (5)	30	2" CLAY, some silt, red-br and tan, moist 3" SAND, fn, some silt, white, slt moist
8	35-37	41-51/5" (11)	35	SAND, fn, white and tan, slt moist
9	40-42	51/4" (4)	40	SAND, fn, some silt, slt moist
10	45-47	51/5" (5)	45	SAND, as above
11	50-52	15-32-51/5" (16)	50	SAND, med-crs, some silt, slt moist
12	55-57	11-12-15-37 (20)	55	CLAY, tr silt, stiff, white
13	60-62	23-35-51/4" (14)	60	SILT, some clay, dense, white-lt gray, moist
14	65-67	15-24-40-51/4" (21)	65	SAND, fn, some silt, white, slt moist
			70	

BORING NUMBER: B-23 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
15	70-72	51/3" (3)	SAND, fn to med, tan, moist
16	75-77	41-51/3" (14)	SAND, med-crs, with clay and silt lenses, red-br-tan, wet
17	80-82	34-51/4" (14)	SILT, some clay, tr sand, tan with red-br mottles, moist
18	85-87	51/5" (5)	CLAY, tr silt, red-br and lt gray, moist
19	90-92	51/5" (5)	CLAY, some to little silt, thin silt lenses, red-br, maroon and lt gray, moist
20	95-97	51/5" (5)	CLAY, tr silt, v hard, red-br and lt gray, moist
21	100-102	51/4" (4)	CLAY, as above
22	105-107	49-51/4" (10)	CLAY, as above
23	110-112	31-49-51/4" (13)	CLAY, as above
24	115-117	51/5" (4)	SILT, some clay, lt gray, dense, wet
25	120-122	51/4" (0)	No recovery
26	125-127	97-51/3" (9)	CLAY, tr silt, maroon with some gray mottling
27	130-132	49-51/5" (11)	CLAY, as above
28	135-137	51/6" (6)	CLAY, little silt and sand, maroon with some gray mottling

Graphic Log



Groundwater encountered at 75 feet above the clay and in a silt layer in the clay at 115 feet.

BORING NUMBER: B-24[a]

DATE INSTALLED: 4-16-91
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	3-2-2-1 (4)	SAND, fn to med, tr silt and clay, yellow-brown, moist
2	2.5-4.5	2-3-2-3 (6)	SILT and fn SAND, some clay, yellow-brown, moist
3	5 - 7	3-2-3-3 (16)	CLAY and (to some) SILT, with thin clay and silt stringers, yellow-brown, moist
4	7.5-9.5	2-4-4-6 (12)	SILT and vf SAND, some clay, some large gravel, brown, moist with saturated planes
5[a]	10-12	1-2-2-2 (7)	SILT and CLAY, some vf SAND, wet - probably because of clay plug in tip
6	12.5-14.5	2-1-1-1 (4)	SILT and (to some) CLAY, little sand and large pieces gravel, near saturation but rods dry
7	15-17	2-2-5-5 (15)	SAND, fn to med, clean, yellow-brown, moist
8	17.5-19.5	3-2-3-3 (15)	SAND, fn, clean, wet
9	20-22	11-19-25-38 (24)	SAND, med to crs, tr silt and clay, yellow-brown, wet
10	22.5-24.5	19-48-25-27 (24)	SAND, as above. In tip - 2" red clay overlain by 1" black sand
S	24.2-25.8		**Shelby Tube Pushed**
11	26-28	10-18-21-28 (20)	CLAY, red and gray, mottled
12	30-32	14-18-27-49 (18)	CLAY, as above
13	35-37	10-23-50-60 (18)	CLAY, as above



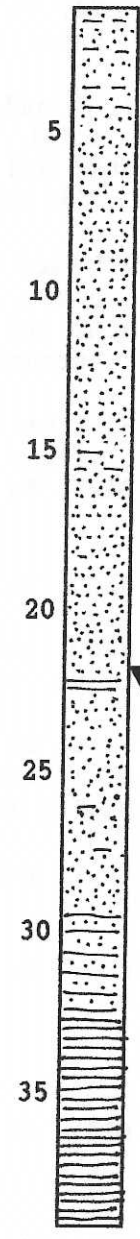
a. B-24A was drilled 5' away and Shelby was pushed from 11 to 13 feet.

DTW is 20.3 feet below grade in open augers after 2 hours

BORING NUMBER: B-25

DATE INSTALLED: 4-17-91
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	2-2-3-5 (18)	SAND, fn, some silt, yellow-brown, moist
2	2.5-4.5	9-15-28-25 (20)	SAND, med and SILT, 2" indurated layer, red-brown, moist
3	5 - 7	6-6-7-8 (18)	SAND, med, lt red, moist
4	7.5-9.5	3-4-5-8 (15)	SAND, fn to med, tr silt, mottled red-beige, moist
5	10-12	5-8-13-26 (18)	SAND, as above
6	12.5-14.5	14-14-14-17 (16)	SAND, as above with silt stringers
7	15-17	6-11-16-28 (16)	SAND, as above, with fewer silt stringers
8	17.5-19.5	6-10-17-20 (14)	SAND, as above
9	20-22	5-12-18-17 (16)	SAND, as above w/ some wet clay in tip
S	22-24	**SHELBY**	**Shelby Tube Pushed**
10	25-27	3-4-5-9 (18)	SAND, crs, little clay, light red, wet (sample not retained)
11	27.5-29.5	3-4-7-9 (12)	CLAY, and SAND, crs, red and gray, wet
12	30-32	7-13-14-20 (6)	CLAY, some fn sand, wet to moist, bottom 5" is pure clay
13	32.5-34.5	5-9-13-22 (14)	CLAY, red, moist
14	35-37	6-10-15-22 (16)	CLAY, as above



BORING NUMBER: B-25 continued

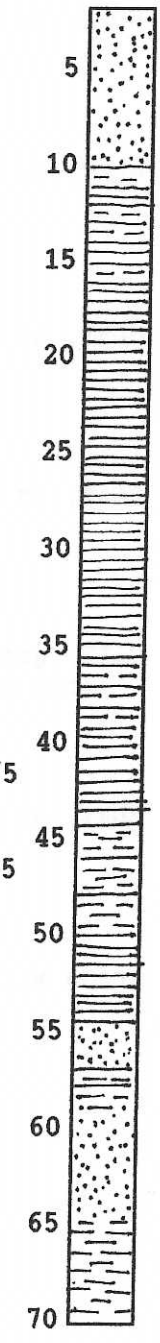
Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
15	40-42	15-26-44-60 (24)	40	CLAY, red, v slightly moist
16	45-47	11-21-50/5 (12)	45	CLAY, as above
17	50-52	15-25-50/6 (15)	50	CLAY, as above, slightly moist
18	55-57	7-14-23-29 (24)	55	CLAY, as above
19	60-62	7-11-20-29 (22)	60	CLAY, as above
20	65-67	14-25-37-40 (24)	65	CLAY, green-brown-gray, v slightly moist (like candle wax)
21	70-72	8-14-40-49 (18)	70	CLAY, as above

DTW after one hour is at 27.2 feet below grade with bottom of augers at 42 feet.

BORING NUMBER: B-26 (MW-16)

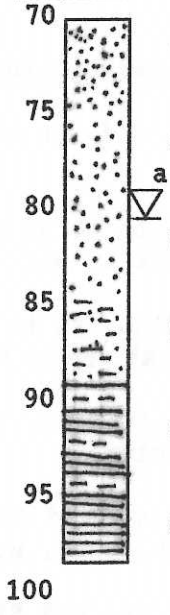
DATE INSTALLED: 4-18-91
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	10-7-8-7 (6)	SAND, med to v crs, some gravel and silt, moist
2	5 - 7	3-3-3-4 (16)	SAND, med to vf, tr clay
3	10-12	10-9-11-16 (18)	CLAY, little silt, mottled red and gray, moist
4	15-17	9-13-19-24 (18)	CLAY, as above
5	20-22	8-12-15-20 (15)	CLAY, red, moist
6	25-27	7-11-15-25 (18)	CLAY, red and gray mottled, moist
7	30-32	11-20-32-45 (24)	CLAY, tr silt, gray-green, moist
8	35-37	20-25-45-45 (24)	CLAY, tr to little silt, dk green-brown, v slightly moist, waxy consistency
9	40-42	18-25-35-50/5 (20)	CLAY, mottled brown and gray, moist to slightly moist
10	45-47	17-31-34-50/5 (22)	4" SILT, some (to and) clay 18" SILT, tr clay and vf sand
11	50-52	22-55/6 (12)	CLAY, tr silt, purple and gray, v slightly moist to dry
12	55-57	12-32-49 (18)	10" SAND, med, litl silt, tr cl, yellow, moist 8" SILT and CLAY with 1" mottled moist clay
13	60-62	30-80/6 (9)	SAND, vf, some silt, little clay, moist
14	65-67	30-100/2 (2)	SILT, some clay and vf sand, lt gray, moist



BORING NUMBER: B-26 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
15	70-72	100/6 (6)		SAND, f to vf, tr silt, moist to wet
16	75-77	100/6 (3)		SAND, med to crs, yellow, moist to wet
17	80-82	52-80/6 (4)		SAND, med, yellow/tan, moist
18	85-87	28-31-55/6 (16)		SILT and SAND, vf, no to some clay, moist to slightly moist
19	90-92	40-50-75/6 (18)		CLAY, tr to little silt and vf sand, moist
20	95-97	12-30-40-50 (24)		CLAY, red and gray, moist

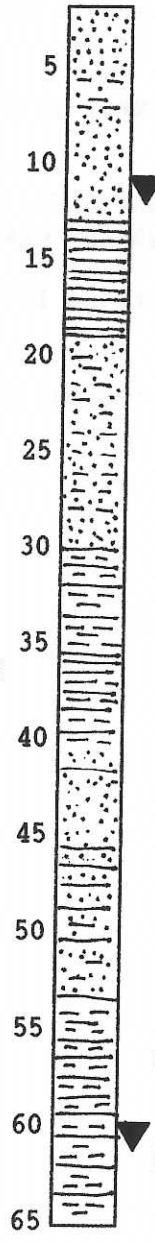


a. Water level measured in monitoring well MW-16.

BORING NUMBER: B-27

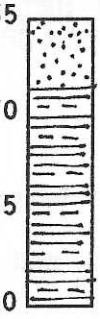
DATE INSTALLED: 4-24-91
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	3-5-5-12 (20)	SAND, med, tr to little clay, orange, dry
2	5 - 7	13-13-10-10 (20)	SAND, fn to vf and SILT, gray-brown-red, moist to wet
3	10-12	9-11-10-10 (15)	11" SAND, fn to vf, tr silt, tan, wet[a] 4" CLAY, tr to ltl silt, rd-gry mottled, moist
4	15-17	15-17-20-22 (24)	CLAY, tr silt, red, moist layered with SILT, tr clay
5	20-22	5-9-15-22 (24)	SAND, vf and SILT, layered with CLAY, some silt, gray, moist
6	25-27	9-14-21-25 (24)	SAND, vf, and SILT, gray, moist to wet
7	30-32	12-24-40-56 (20)	16" CLAY, some silt, red, moist 4" SILT, some clay, gray w/red-orange, moist
8	35-37	23-33-38-50/5 (16)	12" CLAY, tr silt, red, slightly moist 4" SILT and CLAY, gray, slightly moist
9	40-42	14-19-9-17 (5)	SAND, fn, little clay, yellow-tan, wet
10	45-47	15-16-19-27 (24)	SAND, med, and CLAY varying to CLAY, some sand, gray-orange, moist to wet
11	50-52	32-64-100/3 (16)	14" SAND, vf, some silt and clay, gray, moist 2" CLAY and SILT, gray, moist
12	55-57	36-65/6 (12)	CLAY and SILT, gray, v slightly moist
13	60-62	40-85-50/2 (4)	Silt, some clay, gray, moist to wet



a. Rods wet at 11 feet.

BORING NUMBER: B-27 continued

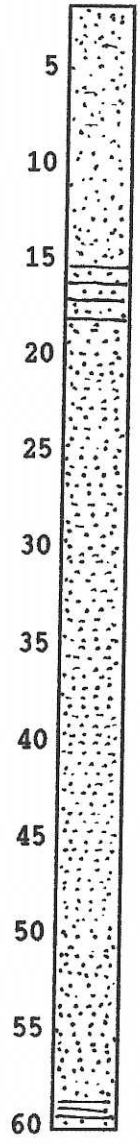
Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
14	65-67	200/5 (4)		SAND, med, tr clay, tan and gray, wet
15	70-72	75-100/5 (7)		CLAY, tr to little silt, red with gray, v slightly moist
16	75-77	52-75-80/6 (14)		CLAY, tr silt, red with gray mottles, slightly moist

BORING NUMBER: B-28

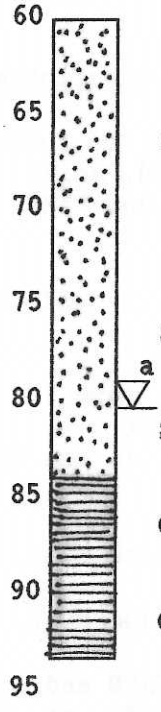
MONITOR WELL: MW-15

DATE INSTALLED: 4-22-91
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: LEWIS CRONIN DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
		Cuttings		SAND, med to fn, tr silt and clay, brown, moist
1	5 - 7	10-13-11-15 (12)		SAND, med, tr clay, brown, moist to wet
2	15-17	9-10-20-35 (18)		14" CLAY and SAND, fn to vf 4" SAND, fn, little clay
3	25-27	10-10-9-10 (18)		SAND, fn, some to little clay, yellow-brown, moist to wet
4	35-37	45-41-60/6 (11)		SAND, med to fn, tr clay
5	45-47	43-84-100/5 (12)		SAND, fn, little vf, tr clay, moist
6	55-57	37-37-36-50/5 (18)		12" SAND, med, little to some clay, moist 6" CLAY, little silt and med sand, moist



BORING NUMBER: B-28 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
7	65-67	83-150/4 (5)		SAND, fn, little vf, tr clay, moist
8	75-77	150-150/4 (8)		SAND, fn to vf, tr clay, gray, moist
9	80-82	81-150/4 (7)		SAND, med, some fn, tr clay, red, moist
10	85-87	50-150/6 (7)		CLAY, tr to little silt, red, v slightly moist
11	90-92	31-46-51-66 (18)		CLAY, tr silt, red, v slightly moist

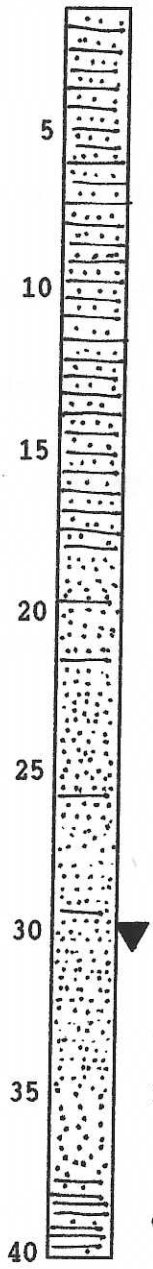
Change from silt to clay probably occurs at 83 feet since the drillers noted a change in the resistance to drilling at this depth.

1a. Water level measured in monitoring well MW-15.

BORING NUMBER: B-29

DATE INSTALLED: 4-23-91
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	3-4-5-5 (10)	SAND, med, some (to and) CLAY, little fine sand, moist
2	2.5-4.5	6-6-7-7 (8)	CLAY and SAND, fn, red-br, dry
3	5 - 7	5-6-7-8 (15)	SAND, fn and CLAY, dry
4	7.5-9.5	5-7-10-10 (16)	CLAY, same (to and) SAND, fn to med, dry moist
5	10-12	3-3-3-3 (14)	SAND, fn and CLAY, red-brown, dry
6	12.5-14.5	3-3-2-2 (13)	SAND and CLAY, as above, slightly moist
7	15-17	2-3-3-3 (16)	SAND and CLAY, as above, brown
8	17.5-19.5	3-3-3-3 (16)	14" SAND and CLAY, as above 2" SAND, vf, little to some clay, moist
9	20-22	2-3-3-4 (18)	SAND, fn, tr to little clay, gray-orange, dry, 1" clay layer near bottom
10	22.5-24.5	2-3-4-5 (15)	SAND, fn to vf, tr clay, lt gray-orange
11	25-27	3-5-10-25 (18)	SAND, fn tr to little clay, gray with orange, moist, 1.5" clay layer near bottom
12	27.5-29.5	15-45-51/5 (16)	SAND, med, tr clay, lt gray with orange, slightly moist
13[a]	30-32	17-44-50/5 (14)	SAND, med to crs, tr to little clay in lenses, gray and red-br, wet[a]
S	32-33.5	Shelby	No recovery
S	34-35	Shelby	No recovery
14	35-37	15-35-33-51/5 (15)	SAND, coarse, tr to little clay, gray, wet
S	38-40	Shelby	CLAY, some sand



a. Rods wet at ≈31 feet

BORING NUMBER: B-29 continued

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
			40	
15	45-47	25-33-51/6 (22)	45	CLAY, tr silt, mottled red-gray, moist
16	50-52	30-35-40-45 (24)	50	CLAY, as above

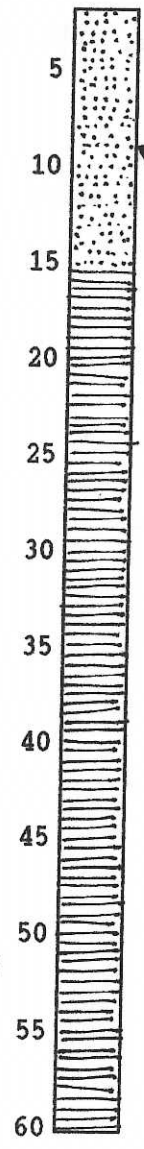


65 EL. 116 ±

BORING NUMBER: B-30

DATE INSTALLED: 4-25-91
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	2-3-4-5 (10)	SAND, med, little fn, tr clay, yellow-brown, moist
2	5 - 7	15-23-25-30 (15)	SAND, as above
3	10-12	9-24-32-30 (24)	SAND, med, little fn and little clay, yellow-brown, wet[a]
4	15-17	11-17-23-28 (22)	CLAY, tr silt, red, moist
5	20-22	10-18-22-26 (24)	CLAY, tr silt, gray-purple, moist
6	25-27	9-15-22-30 (24)	CLAY, tr silt, red-gray, moist
7	30-32	15-17-19-25 (24)	CLAY, tr silt, gray w/red, moist
8	35-37	10-14-18-20 (20)	CLAY, tr silt, red w/gray mottles, slightly moist
9	40-42	30-45-70 (18)	CLAY (no silt), gray w/red mottles, slightly moist
10	45-47	50-60-65 (18)	CLAY, brown-red, slightly moist
11	50-52	14-35-45-51/5 (18)	CLAY, brown, slightly moist
12	55-57	8-20-35-45 (20)	CLAY, brown w/red, slight to tr moist



a. Rods wet at 10 feet.

GS EL. 121±

BORING NUMBER: B-31

DATE INSTALLED: 4-29-91
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Graphic Log	Description
1	0 - 2	3-8-8-9 (16)		7" SAND, med and CLAY, brown, dry to slt moist 9" SAND, med to fn, tr clay, tan-red, moist
2	5 - 7	5-7-7-6 (18)		SAND, med, yellow-tan, bottom 6" wet[a]
3	11-13	5-8-10-14 (6)		CLAY, tr to little silt, variegated-gray-yellow, moist
4	15-17	5-9-13-18 (24)		CLAY, tr silt, variegated red-gray, moist to wet
5	20-22	5-10-13-14 (24)		CLAY, tr silt, variegated red-gray, moist HPWT
6	25-27	6-10-10-15 (24)		CLAY, tr silt, variegated red-gray, moist
7	30-32	15-15-25-27 (6)		CLAY and SILT, variegated red-gray, moist to wet
8	35-37	11-13-19-22 (6)		CLAY, some (to and) silt, red-brown-gray, moist
9	37-39	10-12-20-27		SILT, some (to and) clay, gray, moist (24" rec)
10	40-42	8-13-23-26 (14)		SILT, some (to and) clay, gray w/green-brown, moist
11	45-47	21-16-26-34 (20)		18" SILT, some clay, green-gray, moist 2" CLAY, some silt, brown, moist
12	50-52	26-41-63-80 (18)		CLAY, tr silt, brown-red, slightly moist
13	55-57	19-28-31-42 (24)		CLAY, tr silt, variegated purple-red-blue-gray, moist
14	60-62	24-34-47-74 (14)		CLAY, tr to little silt, variegated red-purple-gray, moist

a. Rods wet at 11 feet.

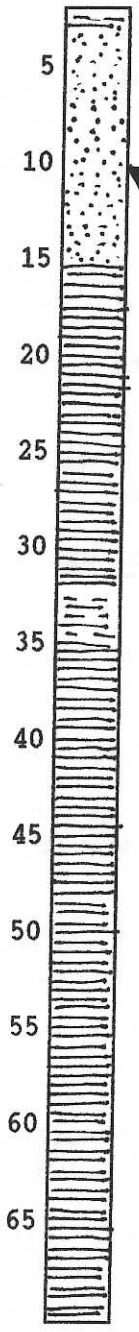
GSEL.128+

BORING NUMBER: B-32

DATE INSTALLED: 5-1-91
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	7-10-10-8 (18)	10" CLAY, little fn sand, red-brown, moist 8" SAND, med-fn, little clay, brown, sl moist
2	5 - 7	4-3-3-4 (6)	SAND, med, some crs, little clay, brown, moist
3	10-12	2-3-2-3 (16)	SAND, med, little fn, lt brown, moist to wet[a]
4	15-17	7-10-13-16 (13)	CLAY, tr silt, red-br-gray, sl moist
5	20-22	9-13-17-20 (16)	CLAY, tr silt, red and gray, moist
6	24-26	12-14-20-23 (14)	CLAY, tr silt, gray w red-purple mottles, moist
7	30-32	12-14-15-14 (18)	6" CLAY, tr silt, mottled gray-red, moist 12" SILT, little to some clay, gray, moist
8	35-37	7-10-13-16 (16)	CLAY, tr silt, mottled red-purple-gray, moist
9	40-42	13-20-43-51 (12)	CLAY, tr silt, red-gray, moist
10	45-47	14-13-21-25 (18)	CLAY (no silt), gray-red, moist
11	50-52	21-30-35-50 (16)	CLAY, as above
12	55-57	29-40-51-72 (18)	CLAY, as above
13	60-62	21-34-52-60 (22)	CLAY, as above
14	65-67	23-29-33-40 (24)	CLAY, as above

Graphic Log



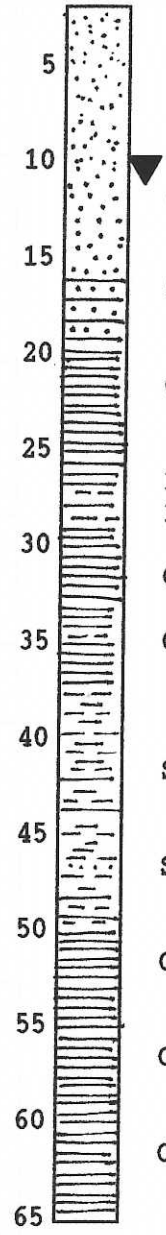
a. Rods wet at 11.8 feet.

GSEL.1151

BORING NUMBER: B-33

DATE INSTALLED: 5-2-91
PROJECT: CHESAPEAKE RUBBLE FILL
SAMPLE METHOD: SPLIT SPOON DRILLING METHOD: HOLLOW STEM AUGER AND MUD
LOGGED BY: MARK SCHULTZ DRILLER: HARDIN-HUBER, INC

Sample No.	Depth (ft)	Blows per 6 inches (recovery in inches)	Description
1	0 - 2	3-3-4-5 (10)	SAND, med, some (to and) clay, little fn sand, moist, brown
2	5 - 7	52-70/1 (16)	SAND, med, yellow, moist
3	10-12	25-36-44-50 (18)	SAND, crs, little med, tr clay, yellow, wet
4	15-17	13-21-15-12 (17)	SAND, med-crs layered with CLAY in 3-4" layers, yellow-red-brown; sand wet, clay moist
5	20-22	13-16-21-28 (15)	CLAY, tr silt, gray-purple, sl moist
6	25-27	15-27-30-50 (20)	10" CLAY, some silt, red-gray, moist 10" CLAY, some silt, tr sand, red-gray, sl mst
7	30-32	10-15-22-30 (12)	CLAY, tr silt, gray, v slightly moist wet
8	34.5-36.5	8-15-28-40 (20)	CLAY, little silt, red-br-gray grading into SILT, tr clay, v slt moist
9	40-42	13-24-23-46 (12)	SILT, little to some clay, with increasing clay at bottom, gray, moist
10	45-47	23-19-18-24 (24)	SILT, some vf sand grading into SILT and CLAY, gray, moist
11	50-52	24-40-50/5 (12)	CLAY, tr silt, brown w gray mottles, sl moist
12	55-57	25-30-30-40 (24)	CLAY (no silt), red-brown, slightly moist
13	60-62	20-33-32-51 (24)	CLAY (no silt), red w gray, slightly moist



MW-17

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Hollow Stem
Geologist	Mark Schultz	Ground Elevation	118. Feet
Date Drilled	4-8-03	Total Depth of Borehole	15 Feet
Borehole Diameter	8 Inches	Depth to Water	1.14 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
	Sand, med-crs, tr fines, yellow-brn, wet	5		17	6-7-9-4	
	Clay, maroon and gray mottled, plastic, moist to wet	10		16	5-8-9-15	
		15		18	7-8-8-8	
		20				
		25				
		30				
		35				
		40				
		45				

Notes:

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

Mark Schultz Associates

MW-18

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Hollow Stem
Geologist	Mark Schultz	Ground Elevation	126 Feet
Date Drilled	4-8-03	Total Depth of Borehole	23 Feet
Borehole Diameter	8 Inches	Depth to Water	11.24 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
	Sand, med-crs, tr fines, yellow-brn-tan, moist to wet	5		14	3-5-4-5	
		10		15	4-5-8-10	
		15		17	3-4-5-7	
		20		18	3-5-7-9	
	Clay, tr silt, maroon and gray mottled, plastic, moist to wet	25		16	6-8-10-30	
		30				
		35				
		40				
		45				

Notes:

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-19

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Hollow Stem
Geologist	Mark Schultz	Ground Elevation	
Date Drilled	4-10-03	Total Depth of Borehole	35 Feet
Borehole Diameter	8 Inches	Depth to Water	21.56 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
	Clay, maroon, moist	5		16	6-9-12-17	
		10		17	6-9-11-15	
	Sand, fn. lt tan, slt moist	15		12	15-27-20-21	
		20		16	15-25-31-37	
	Sand, med-crs, tr silt and clay, yellow-brn, wet	25		6	15-23-27-35	
		30		18	21-20-27-50/6	
	Clay, tr sand and silt, gray with maroon partings, moist	35		16	5-25-28-34	
		40				
		45				

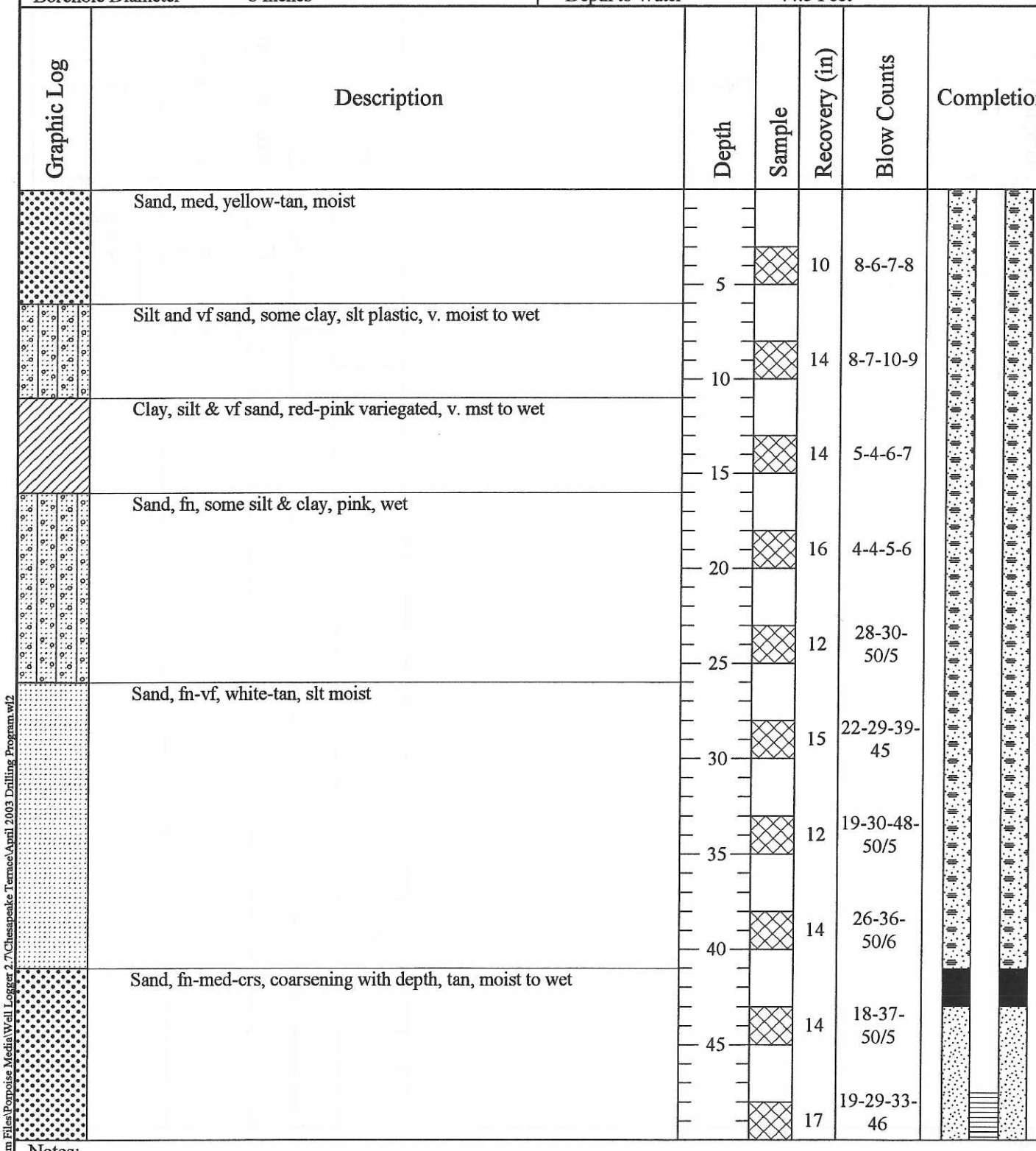
Notes:

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-20

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Hollow Stem
Geologist	Mark Schultz	Ground Elevation	149 Feet
Date Drilled	4-10-03	Total Depth of Borehole	60 Feet
Borehole Diameter	8 Inches	Depth to Water	44.5 Feet



Notes:

C:\Program Files\Pompoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program wl2

Mark Schultz Associates

MW-20

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Hollow Stem
Geologist	Mark Schultz	Ground Elevation	149 Feet
Date Drilled	4-10-03	Total Depth of Borehole	60 Feet
Borehole Diameter	8 Inches	Depth to Water	44.5 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
	Clay, tr silt, plastic, maroon and gray, moist	55		12	12-19-32	
		60		15	16-28-34-42	
		65				
		70				
		75				
		80				
		85				
		90				
		95				

Notes:

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-21

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Mud rotary
Geologist	Mark Schultz	Ground Elevation	
Date Drilled	4-14-03	Total Depth of Borehole	70.0 Feet
Borehole Diameter	6 Inches	Depth to Water	55.77 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
	Silt, some clay, yell-brn, v. moist to wet	5		14	1-1-2-3	
	Sand, vf & silt, some clay, tan-red-brn, moist	10		16	9-14-18-18	
	Interlayered sand, f-vf & clay, yellow-brn, wet	15		14	5-7-5-6	
	Silt & vf sand, tan-brn, moist	20		18	8-14-22-34	
	Silt & clay, maroon and lt gray, slt moist	25		16	10-19-37-50/5.5	
	Sand, f-vf, some silt, tan-yellow-brown, moist, wet at 45 ft	30		16	14-24-39-50/5	
		35		14	16-21-19-22	
		40		14	19-37-50/5	
		45		6	50/6	
	Sand, fn-crs, coarsening w/depth, tr silt, red-yel-brn			8	40-50/45	

Notes: Drilling fluid was not removed from the casing after the well was installed. Th mud penetrated the formation, reducing the yield of the well. Water level data from this well are accurate.

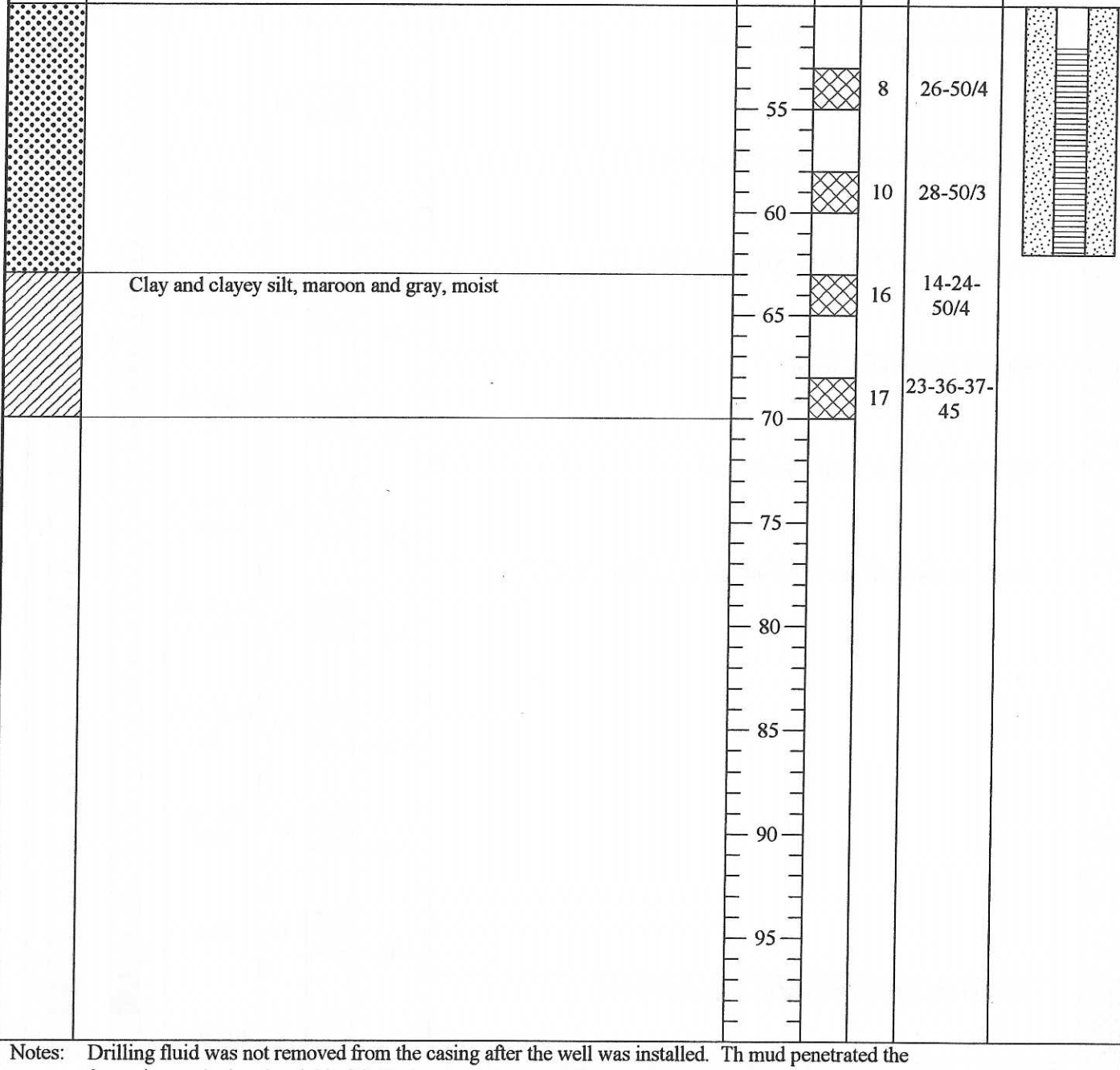
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Mark Schultz Associates

MW-21

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Mud rotary
Geologist	Mark Schultz	Ground Elevation	
Date Drilled	4-14-03	Total Depth of Borehole	70.0 Feet
Borehole Diameter	6 Inches	Depth to Water	55.77 Feet



Notes: Drilling fluid was not removed from the casing after the well was installed. Th mud penetrated the formation, reducing the yield of the well. Water level data from this well are accurate.

C:\Program Files\Pompoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-22

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Hollow Stem
Geologist	Mark Schultz	Ground Elevation	127 Feet
Date Drilled	4-10-03	Total Depth of Borehole	40 Feet
Borehole Diameter	8 Inches	Depth to Water	26.49 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
	Sand and gravel, some silt & clay, red-brown, moist med, yellow-tan, moist	5		14	4-6-5-6	
		10		10	2-2-2-3	
		15		14	2-2-1-2	
		20		16	1-1-2-2	
	Sand, med to crs, tan, moist to wet	25		15	1-2-10-13	
		30		16	15-14-10-7	
	Clay, maroon and gray, moist	35		16	10-14-17-21	
		40		16	14-20-23-28	
		45				

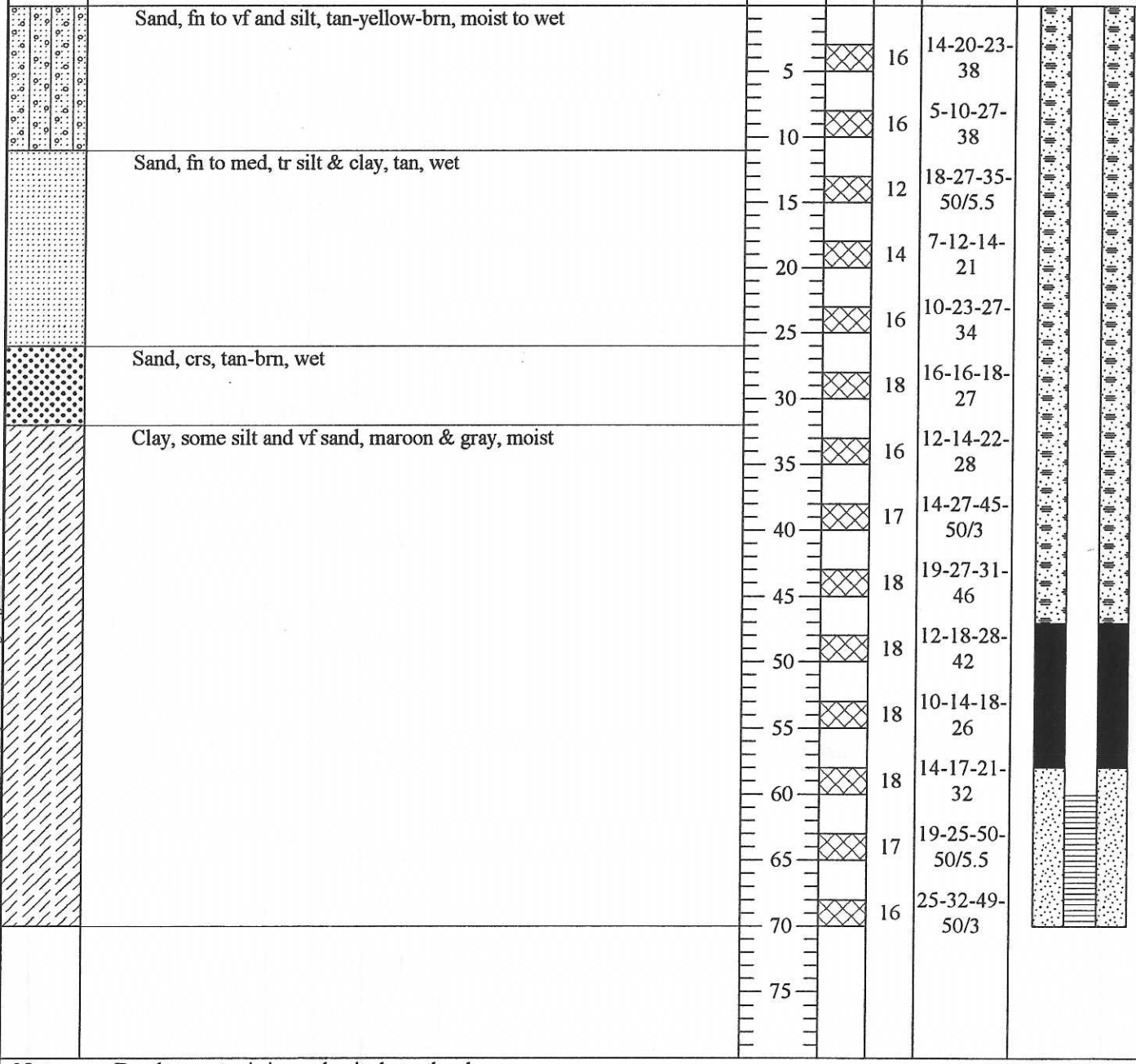
Notes:

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-23

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Mud rotary
Geologist	Mark Schultz	Ground Elevation	124 Feet
Date Drilled	4-16-03	Total Depth of Borehole	70 Feet
Borehole Diameter	6 Inches	Depth to Water	18(a) Feet



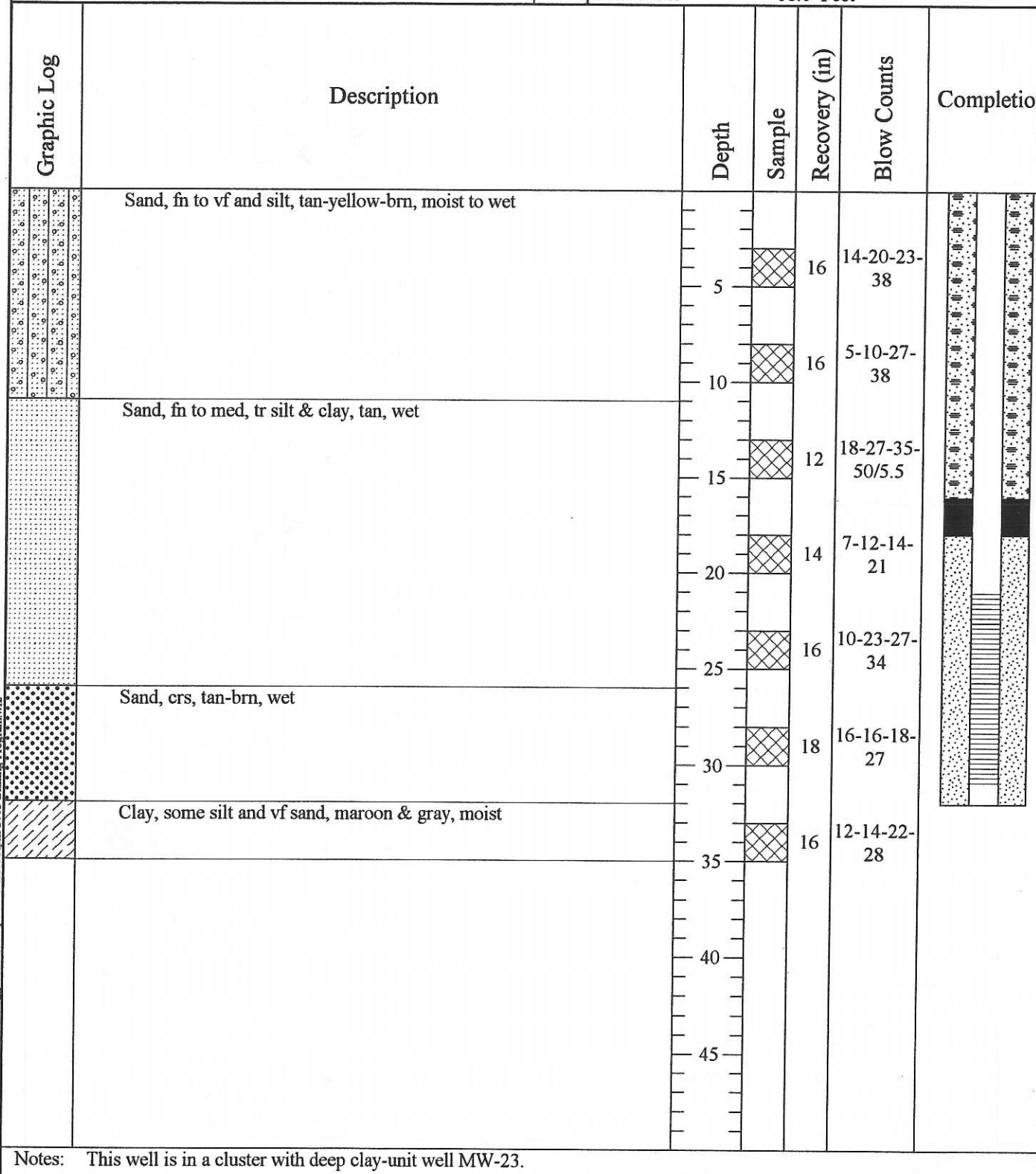
Notes: a. Depth to water is in sand unit above the clay.
This well is in a cluster with shallow sand-unit M

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-24

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Hollow stem auger
Geologist	Mark Schultz	Ground Elevation	125 Feet
Date Drilled	4-17-03	Total Depth of Borehole	32.0 Feet
Borehole Diameter	8 Inches	Depth to Water	18.0 Feet



Notes: This well is in a cluster with deep clay-unit well MW-23.

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

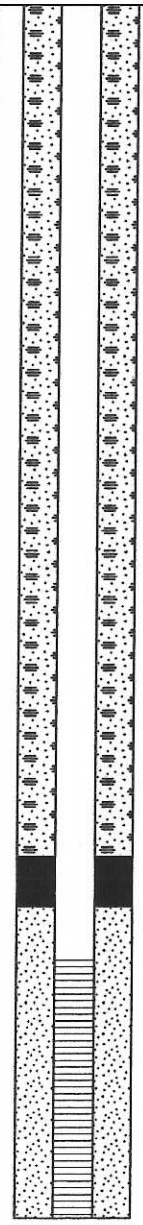
MW-25

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Hollow stem
Geologist	Mark Schultz	Ground Elevation	114 Feet
Date Drilled	4-21-03	Total Depth of Borehole	55 Feet
Borehole Diameter	8 Inches	Depth to Water	36.27 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts
	Sand, fn-med & silt & clay, sticky, brown, wet	5		14	1-1-1-1
		10		15	1-2-2-2
		15		14	3-10-10-11
	Sand, med-crs, tan-brn, wet	20		14	19-24-37-40
	Silt, some to & clay, gray-white, plastic, v. moist	25		16	8-11-17-33
	Silt, some clay, gray-white, v moist, not plastic	30		17	12-22-31-50/5.5
	Sand, vf & silt, gray-tan-white, moist	35		16	9-13-26-50/3
	Interlayered silty vf sand, clay and med sand, tan-gray-white, wet	40		16	7-12-21-25
	Sand, fn-med, tr silt and clay, wet	45		14	13-14-33-50/3
	Clay & silt in thin layers, lt gray and maroon, moist			16	15-37-50/5.5

Completion



Notes: a. Depth to water is in sand unit above clay.
This well is in a cluster with shallow sand-unit well

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-25

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Hollow stem
Geologist	Mark Schultz	Ground Elevation	114. Feet
Date Drilled	4-21-03	Total Depth of Borehole	55 Feet
Borehole Diameter	8 Inches	Depth to Water	36.27 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
	Clay, dk gray, moist	55		16	19-33-50/5	

60 65 70 75 80 85 90 95

Notes: a. Depth to water is in sand unit above clay.
This well is in a cluster with shallow sand-unit well

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

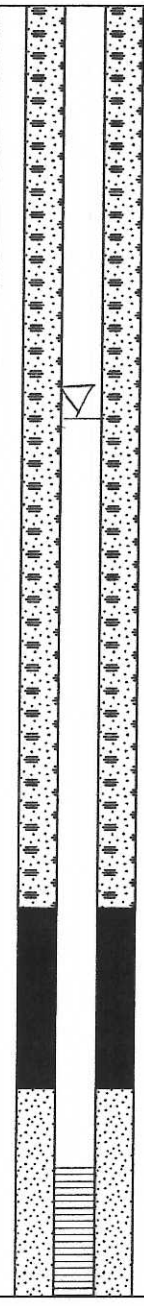
MW-26

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Mud rotary
Geologist	Mark Schultz	Ground Elevation	110. Feet
Date Drilled	4-21-03	Total Depth of Borehole	55 Feet
Borehole Diameter	6 Inches	Depth to Water	1.16(a) Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts
	Sand, fn-med, tr to some silt & clay, yellow-red-brn, wet	5		14	12-20-15-20
	Clay, tr silt & clay, maroon and gray, moist	10		17	3-8-13-19
		15		16	3-9-14-22
	Clay & vf sand & silt, maroon and gray, slt moist	20		17	6-10-14-16
		25		18	7-14-21-23
		30		18	9-13-14-22
	Silt & clay, gray-green, plastic, slt moist	35		18	16-23-25-41
		40		16	15-21-26-30
	Clay, some silt, brn-grn-gray, slt moist	45		17	16-21-32-35
				16	11-16-19-24

Completion



Notes: a. Depth to water is in sand unit above clay.
This well is in a cluster with shallow sand-unit well

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-26

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Mud rotary
Geologist	Mark Schultz	Ground Elevation	110 Feet
Date Drilled	4-21-03	Total Depth of Borehole	55 Feet
Borehole Diameter	6 Inches	Depth to Water	1.16(a) Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
		55		18	6-11-18-21	
		60				
		65				
		70				
		75				
		80				
		85				
		90				
		95				

Notes: a. Depth to water is in sand unit above clay.
This well is in a cluster with shallow sand-unit well

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-27

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Hollow stem
Geologist	Mark Schultz	Ground Elevation	110 Feet
Date Drilled	4-21-03	Total Depth of Borehole	8 Feet
Borehole Diameter	8 Inches	Depth to Water	1.16 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
	Sand, fn-med, tr to some silt & clay, yellow-red-brn, wet	5		14	12-20-15-20	
	Clay, tr silt & clay, maroon and gray, moist	10		17	3-8-13-19	
		15		16	3-9-14-22	
		20				
		25				
		30				
		35				
		40				
		45				

Notes: This well is in a cluster with deep clay-unit well MW-26.

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-28

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Mud Rotary
Geologist	Mark Schultz	Ground Elevation	103 Feet
Date Drilled	4-22-03	Total Depth of Borehole	70 Feet
Borehole Diameter	6 Inches	Depth to Water	39.15 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
	Clay, trace to some silt and sand, plastic, maroon and gray, moist	5		4	9-17-14-16	
				18	9-8-10-15	
				12	9-12-22-28	
				14	4-16-24-21	
		10		6	9-12-15-20	
		15		11	5-11-12-14	
		20		24	17-22-30-40	
		25		24	13-19-35-35	
		30		20	17-25-33-37	
		35		24	15-23-43-40	
		40		24	16-18-25-30	
		45		17	20-32-50/3	
				24	15-22-28-32	

Notes: Intalled in area in which clay is exposed at the surface.

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

Mark Schultz Associates

MW-28

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Mud Rotary
Geologist	Mark Schultz	Ground Elevation	103 Feet
Date Drilled	4-22-03	Total Depth of Borehole	70 Feet
Borehole Diameter	6 Inches	Depth to Water	39.15 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
		55		13	15-28-50/4	
	Clay and silt, maroon and gray, moist	60		24	9-20-26-30	
	Silt, some v fn sand, trace clay, white-gray, wet	65		24	27-22-27-50/4	
	Silt, some clay, white-gray, mod plastic, wet	70		16	20-30-50/<1	
		75				
		80				
		85				
		90				
		95				

Notes: Intalled in area in which clay is exposed at the surface.

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

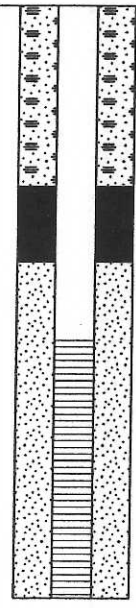
MW-29

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Hollow Stem
Geologist	Mark Schultz	Ground Elevation	100 ±
Date Drilled	4-24-03	Total Depth of Borehole	35 Feet
Borehole Diameter	8 Inches	Depth to Water	3.61 Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts
	Sand, med-crs, tr to some silt and clay, yellow-brn, wet	5		18	6-5-5-3
	Clay and silt, gray, plastic, moist	10		12	5-5-6-7
	Sand, v. fn and silt, dk gray, wet	15		22	5-9-9-7
	Silt, tr clay, dk gray, wet	20		24	5-5-7-5
	Silt and clay, mod plastic, dk gray, moist	25		24	5-5-7-8
	Clay, dk gray, plastic, moist	30		24	4-6-11-13
	Clay and silt in seams, dk gray, wet	35		18	8-11-20-22
		40			
		45			

Completion



Notes:

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-30

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Mud rotary
Geologist	Mark Schultz	Ground Elevation	115 Feet
Date Drilled	4-21-03	Total Depth of Borehole	60 Feet
Borehole Diameter	6 Inches	Depth to Water	9.47(a) Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
	Sand, vf-m, lt tan-brn, moist	5		11	2-1-3-2	
		10		12	1-1-1-2	
	Sand, crs, zero to little clay, tan-brown, wet	15		16	14-17-22-18	
		20		15	12-15-16-20	
	Silt, tr to little clay, slt plastic, gray, moist	25		16	12-19-28-31	
		30		16	19-22-26-37	
	Silt, some clay, plastic, gray, slt moist	35		17	6-8-14-21	
		40		18	5-6-10-15	
	Clay & silt, plastic when moistened, gray-brn, slt moist	45		18	5-6-10-15	
				18	7-14-24-30	

Notes: a. Depth to water is in sand unit above clay.
This well is in a cluster with shallow sand-unit well

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-31

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Mud rotary
Geologist	Mark Schultz	Ground Elevation	
Date Drilled	4-21-03	Total Depth of Borehole	60 Feet
Borehole Diameter	6 Inches	Depth to Water	9.47(a) Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
	Sand, vf-m, lt tan-brn, moist	5		11	2-1-3-2	
		10		12	1-1-1-2	
	Sand, crs, zero to little clay, tan-brown, wet	15		16	14-17-22-18	
		20		15	12-15-16-20	
	Silt, tr to little clay, slt plastic, gray, moist	25		16	12-19-28-31	
		30		16	19-22-26-37	
	Silt, some clay, plastic, gray, slt moist	35		17	6-8-14-21	
		40		18	5-6-10-15	
	Clay & silt, plastic when moistened, gray-brn, slt moist	45		18	5-6-10-15	
				18	7-14-24-30	

Notes: a. Depth to water is in sand unit above clay.
This well is in a cluster with shallow sand-unit well

C:\Program Files\Porpoise Media\Well Logger 2.7\Chesapeake Terrace\April 2003 Drilling Program.wl2

MW-31

Chesapeake Terrace

Client	National Waste Managers	Drill Rig	Mud rotary
Geologist	Mark Schultz	Ground Elevation	
Date Drilled	4-21-03	Total Depth of Borehole	60 Feet
Borehole Diameter	6 Inches	Depth to Water	9.47(a) Feet

Graphic Log	Description	Depth	Sample	Recovery (in)	Blow Counts	Completion
		55		18	7-8-21-25	
		60		18	7-11-24-34	
		65				
		70				
		75				
		80				
		85				
		90				
		95				

Notes: a. Depth to water is in sand unit above clay.
This well is in a cluster with shallow sand-unit well

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APPENDIX E

Historical Boring and Well Logs

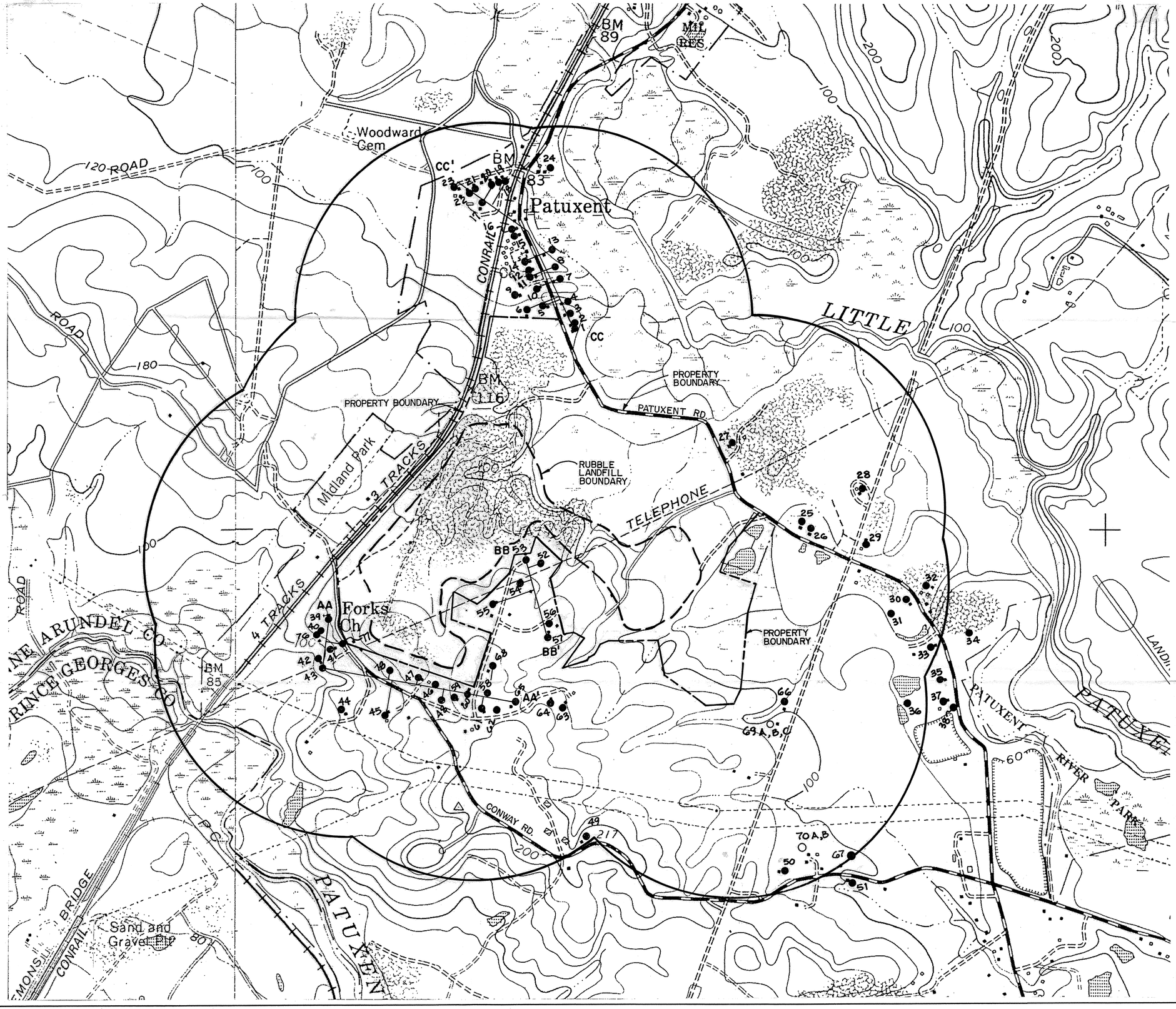
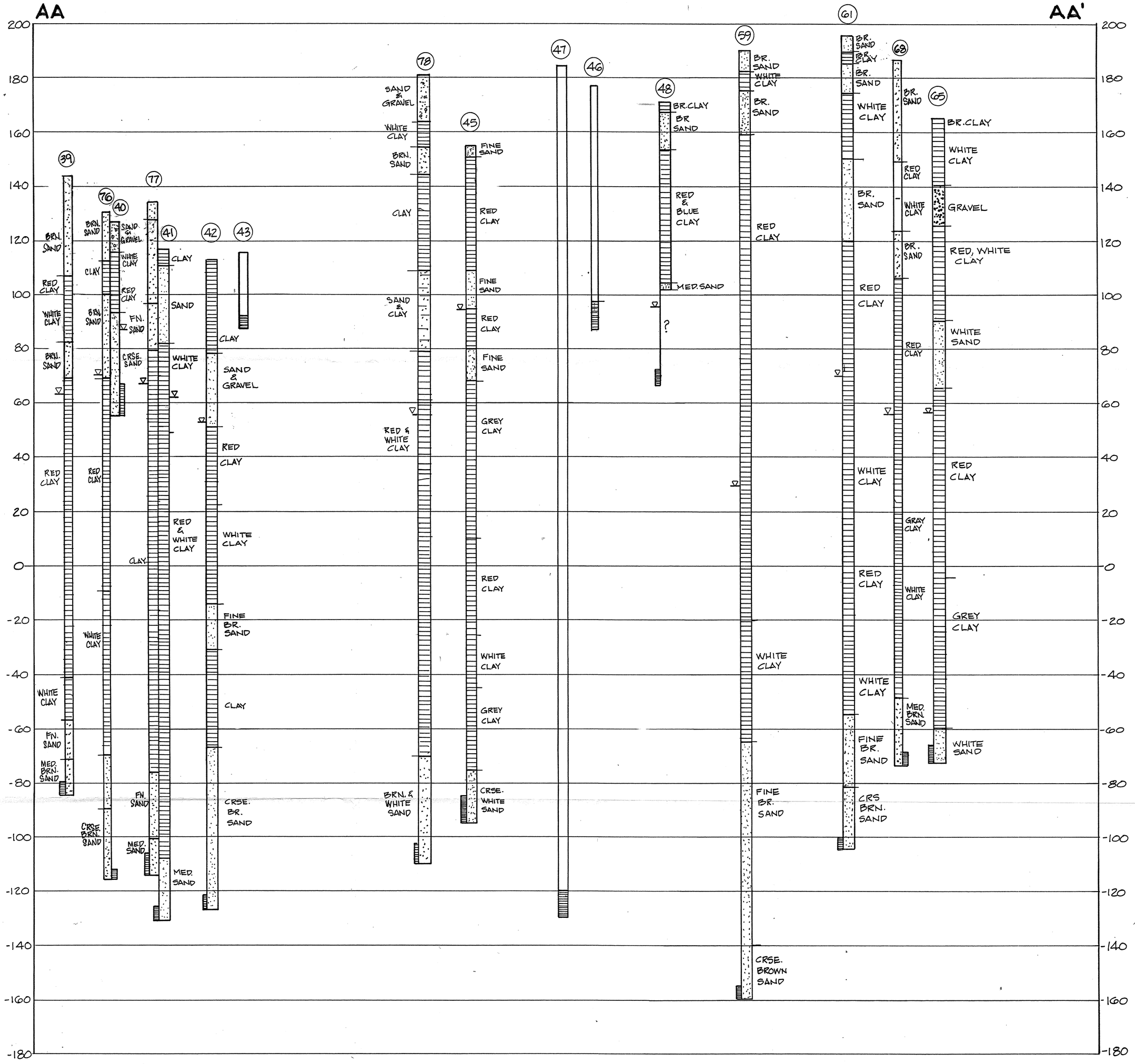


PLATE 9

CHESAPEAKE RUBBLE LANDFILL
WATER WELLS & SPRINGS WITHIN
1/2 MILE OF PROPERTY BOUNDARY

NOVEMBER 2003

GROUNDWATER CONSULTANTS
MARK SCHULTZ ASSOCIATES
ANNAPOLIS, MARYLAND 21401



20 FEET

0 200 FEET

SCALE

(1) NUMBER REFERENCED ON WELL INVENTORY TABLE & MAP

WATER LEVEL ON COMPLETION REPORT

CLAY / SAND — LITHOLOGIC DESCRIPTION FROM WELL COMPLETION REPORT

WELL SCREEN INTERVAL FROM COMPLETION REPORT

WELL SCREEN INTERVAL REPORTED BY OWNER (NOT VERIFIED)

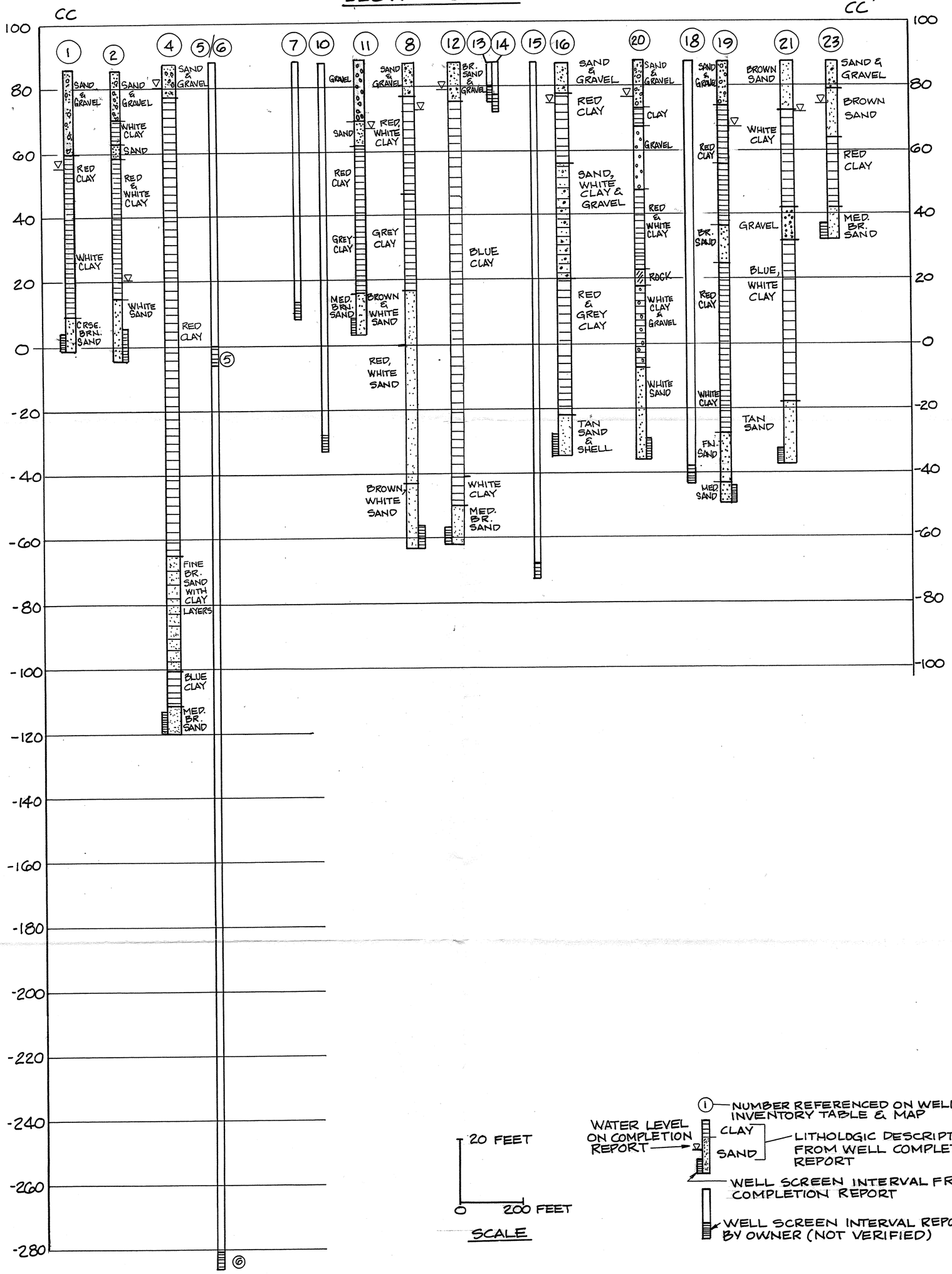
PLATE 10

GEOLOGIC SECTION AA-AA'
RESIDENTIAL WELLS

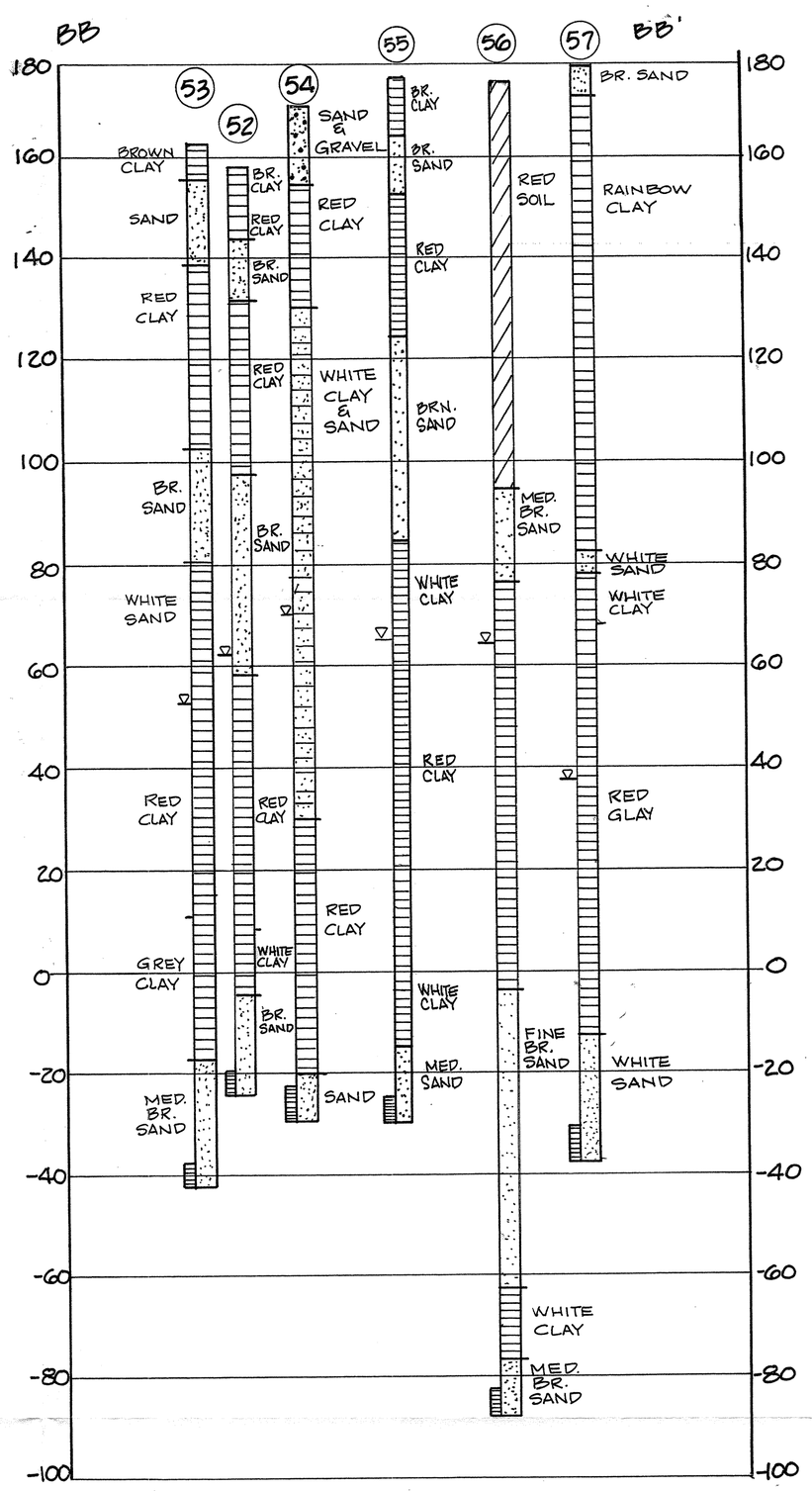
CHESAPEAKE RUBBLE LANDFILL

NOVEMBER 2003

SECTION CC-CC'



SECTION BB-BB'



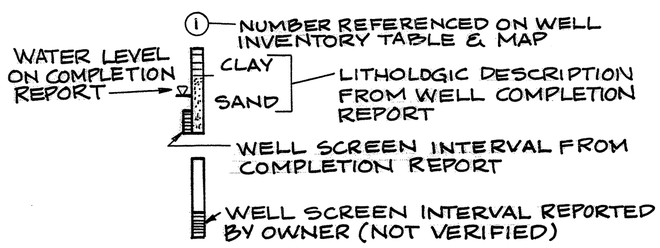


PLATE 11

GEOLOGIC SECTIONS BB-BB', CC-CC'
RESIDENTIAL WELLS

CHESAPEAKE RUBBLE LANDFILL

NOVEMBER 2003

APPENDIX F

SFI Borings and Well Logs

RECORD OF BOREHOLE B-101

SHEET 1 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 100.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 4/18/13
DATE COMPLETED: 4/19/13
WEATHER: Overcast

DATUM:
INCLINATION: -90
COORDS: N: 501,626.8 E: 1,387,224.4 DEPTH W.L.: NA
GS ELEVATION: 97.8 ft
TOC ELEVATION: NA
TEMPERATURE: 60 F

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0	95	0.0 - 2.0 GRAVELLY SAND; fine to medium; ~15% fine to coarse rounded gravel; yellowish brown; trace organics (plant roots); noncohesive; moist; loose.	SP		95.8	S1	DO	3 -3 -3 -3	6	1.0 / 2.0	
5	90	3.0 - 5.0 GRAVELLY SAND; medium to coarse, well graded; ~20% fine to coarse subrounded gravel; yellowish brown; moist; loose.	SW		92.8	S2	DO	3 -4 -4 -2	8	0.6 / 2.0	
10	85	8.0 - 10.0 GRAVELLY SAND; medium to coarse, well graded, subrounded; ~50% fine to coarse rounded gravel; brownish grey, some organics (plant matter); noncohesive; wet; compact.	SW		87.8	S3	DO	2 -6 -8 -10	14	0.6 / 2.0	
15	80	13.0 - 15.0 GRAVELLY SAND; medium to coarse, poorly graded, subrounded; ~30% fine to coarse subrounded gravel; brown, noncohesive; wet; loose.	SP		82.8	S4	DO	4 -4 -4 -5	8	0.6 / 2.0	
20	75	18.0 - 20.0 CLAY; medium to high plasticity; lenses of fine grey sand, some nonplastic fines; dark grey; cohesive; w~PL; stiff.	CH		77.8	S5	DO	5 -5 -7 -9	12	1.4 / 2.0	
25	70	23.0 - 25.0 SILTY CLAY; medium to high plasticity; lenses of grey fine silty sand; grey; trace organics; cohesive; w~PL; stiff.	CL		72.8	S6	DO	5 -7 -9 -8	16	1.6 / 2.0	
30	65	28.0 - 30.0 CLAY; high plasticity; trace of fine grey sand; grey; trace organics (plant); cohesive; w>PL; soft; 28-28.7 ft very soft.	CH		67.8	S7	DO	3 -3 -4 -5	7	1.9 / 2.0	
35	60	33.0 - 35.0 CLAY; high plasticity; some nonplastic fines, pockets of fine grey sand; grey, shiny; trace organics; cohesive; w>PL; stiff.	CH		62.8	S8	DO	4 -7 -11 -14	18	1.6 / 2.0	
40	55	38.0 - 40.0 SILTY CLAY; medium plasticity; lenses of fine grey sand; grey, slightly shiny; cohesive; w~PL; stiff.	CL		57.8	S9	DO	9 -18 -50/5"	N/A	1.4 / 2.0	Drilled w/o sampling. (39.4'-40')
45	50	43.0 - 45.0 CLAY; medium to high plasticity; trace nonplastic fines, pockets of fine grey sand; light grey mottled yellow, shiny; cohesive; w<PL; stiff.	CH		52.8	S10	DO	11 -16 -18 -30	34	1.7 / 2.0	
50		48.0 - 50.0 NO RECOVERY			47.8	S11	DO	12 -16 -23 -28	39	0.0 / 2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-101

SHEET 2 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 100.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 4/18/13
DATE COMPLETED: 4/19/13
WEATHER: Overcast

DATUM:
COORDS: N: 501,626.8 E: 1,387,224.4
GS ELEVATION: 97.8 ft
TOC ELEVATION: NA
TEMPERATURE: 60 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
55	45	53.0 - 55.0 SILTY CLAY; medium plasticity; dark red mottled light grey, slightly shiny; cohesive; w~PL; stiff.	CL		42.8	S12	DO	13 -18 -26 -30	44	1.2 / 2.0	
60	40	58.0 - 60.0 CLAYEY SILT; low to medium plasticity; pockets of fine sand; light grey mottled dark grey and yellowish brown; cohesive; w<PL; stiff. 58.0-58.3 ft: (CH) CLAY; dark red mottled light grey; very soft.	ML		37.8	S13	DO	18 -18 -35 -40	53	0.9 / 2.0	
65	35	63.0 - 65.0 CLAYEY SAND; fine, poorly graded (uniform), subrounded; pockets of grey clay; light grey; cohesive; moist; dense; 63-63.2 ft: (CH) CLAY; red; soft.	SC		32.8	S14	DO	23 -23 -23 -44	46	1.9 / 2.0	
70	30	68.0 - 70.0 CLAY; medium to high plasticity; some non-plastic fines, lenses of fine grey sand; dark red, shiny; cohesive; w~PL; stiff.	CH		27.8	S15	DO	16 -23 -43 -35	66	0.9 / 2.0	
75	25	73.0 - 75.0 SILTY CLAY and SAND; nonplastic to low plasticity; ~40% fine sand, lenses of fine sand; dark red; cohesive; stiff.	CL/SW		22.8	S16	DO	N/A		1.8 / 2.0	
80	20	78.0 - 80.0 CLAY and SAND; low plasticity; ~50% fine grey sand, lenses of fine silty sand; rust red mottled light grey; cohesive; stiff.	SC		17.8	S17	DO	30 -50/4"	N/A	0.8 / 2.0	Drilled w/o sampling. (78.8'-80')
85	15	83.0 - 85.0 CLAY and SAND; low plasticity; ~50% fine grey sand, pockets of light grey and dark red clay; rust red mottled light grey; cohesive; stiff.	CH		12.8	S18	DO	50/5"	N/A	0.5 / 2.0	Drilled w/o sampling. (83.4'-85')
90	10	88.0 - 90.0 SILTY SAND; fine to medium; brownish grey; noncohesive; moist; very dense. ~88-88.1 ft: dark red silty clay; very soft.	SM		7.8	S19	DO	50/3"	N/A	0.3 / 2.0	Drilled w/o sampling. (88.3'-90')
95	5	93.0 - 95.0 SAND; fine to medium; yellowish brown; lens of very soft dark red clay; noncohesive; moist; very dense.	SP		2.8	S20	DO	50/3"	N/A	0.3 / 2.0	Drilled w/o sampling. (93.3'-95')
100	0	98.0 - 100.0 SAND; fine to medium, poorly graded, subrounded; trace nonplastic fines; greyish brown; noncohesive; moist; very dense.	SP		-2.2	S21	DO	50/3"	N/A	0.3 / 2.0	Drilled w/o sampling. (98.3'-100')
		Boring completed at 100.0 ft									

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-102

SHEET 1 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 100.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 5/6/13
DATE COMPLETED: 5/6/13
WEATHER: Overcast

DATUM:
COORDS: N: 501,516.4 E: 1,386,869.9
GS ELEVATION: 113.2 ft
TOC ELEVATION: NA
TEMPERATURE: 45 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0											
5	110	3.0 - 5.0 GRAVELLY SAND; fine to medium, well-graded, subrounded; some nonplastic fines, ~15% fine subangular gravel; brown; noncohesive; moist; loose.	SW		108.2	S1	DO	3 -5 -5 -4	10	0.6 / 2.0	
10	105	8.0 - 10.0 GRAVELLY SAND; fine to medium, well-graded, subrounded; some plastic fines, ~15% fine subrounded gravel; brown; some organics (plant matter); noncohesive; moist; loose.	SW		103.2	S2	DO	3 -4 -2 -3	6	0.4 / 2.0	
15	100	13.0 - 15.0 SAND; fine to medium; well-graded, subrounded; some fine subrounded gravel; brown; lens of firm dark red clay; ~50% organics (wood fragments); noncohesive; moist; loose.	SW		98.2	S3	DO	3 -4 -3 -1	7	0.5 / 2.0	
20	95	18.0 - 20.0 CLAY; high plasticity; trace nonplastic fines; dark red and white mottled maroon, shiny; thinly laminated; some yellow staining; cohesive; w~PL; firm.	CH		93.2	S4	DO	3 -5 -10 -14	15	0.7 / 2.0	
25	90	23.0 - 25.0 CLAY; high plasticity; some nonplastic fines, trace fine to coarse subangular gravel; dark red and white mottled maroon, shiny; thinly laminated; some yellow staining; cohesive; w~PL; stiff.	CH		88.2	S5	DO	7 -16 -28 -32	44	1.3 / 2.0	
30	85	28.0 - 30.0 CLAY; high plasticity; trace nonplastic fines; light grey mottled maroon, shiny; thinly laminated; some yellow-brown staining; cohesive; w>PL; stiff.	CH		83.2	S6	DO	7 -10 -15 -18	25	1.6 / 2.0	
35	80										
40	75	38.0 - 40.0 SILTY CLAY; low to medium plasticity; trace fine sand; dark brownish red mottled light grey, slight to shiny; cohesive, w<PL, stiff.	CL		73.2	S7	DO	15 -20 -33 -34	53	1.5 / 2.0	
45	70										
50	65	48.0 - 50.0 SILTY CLAY; low to medium plasticity; trace fine sand; dark brownish red mottled light grey, slight to shiny; cohesive, w<PL, stiff; 48.5-48.7 ft: soft clay.	CL		63.2	S8	DO	18 -28 -47 -32	75	0.7 / 2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-102

SHEET 2 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 100.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 5/6/13
DATE COMPLETED: 5/6/13
WEATHER: Overcast

DATUM:
COORDS: N: 501,516.4 E: 1,386,869.9
GS ELEVATION: 113.2 ft
TOC ELEVATION: NA
TEMPERATURE: 45 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
		SOIL PROFILE				SAMPLES					
55	60										
60	55	58.0 - 60.0 CLAY; medium to high plasticity; trace nonplastic fines, seams of fine sand; light grey and dark red mottled maroon, shiny; thinly laminated; cohesive; w~PL; stiff.	CH		53.2	S9	DO	15 -28 -30 -24	58	1.8 / 2.0	
65	50										
70	45	68.0 - 70.0 SILTY CLAY; low to medium plasticity; trace nonplastic fines, seams of fine sand; light grey and dark red mottled maroon, slightly shiny; thinly laminated; some yellow-brown staining; cohesive; w~PL; stiff.	CL		43.2	S10	DO	15 -26 -34 -39	60	1.9 / 2.0	Resumed standard 5 ft. sampling intervals.
75	40	73.0 - 75.0 CLAYEY SILT; low plasticity; some fine sand, pockets of fine sand, lens of very soft dark red clay; dark red mottled yellow-brown and light grey, dull; cohesive; w~PL; stiff.	ML		38.2	S11	DO	19 -35 -50/5"	N/A	1.5 / 2.0	Drilled w/o sampling. (74.4'-75')
80	35	78.0 - 80.0 CLAYEY SILT; low to medium plasticity; some fine sand, pockets of fine sand; grey mottled dark red and yellow-brown, slightly shiny; cohesive; w<PL; stiff.	MH		33.2	S12	DO	21 -32 -40 -42	72	2.0 / 2.0	
85	30	83.0 - 85.0 CLAYEY SILT; low plasticity; some fine sand, pockets of fine sand; grey, dull to slightly shiny; cohesive; w<PL; stiff.	ML		28.2	S13	DO	10 -29 -40 -50	69	1.9 / 2.0	
90	25	88.0 - 90.0 CLAYEY SILT; medium plasticity; some fine sand, seams of fine sand; dark grey, slightly shiny; cohesive; w<PL; stiff.	MH		23.2	S14	DO	30 -30 -43 -44	73	2.0 / 2.0	
95	20	93.0 - 95.0 CLAYEY SILT; low to medium plasticity; some fine sand, lenses of fine sand; grey mottled dark red, dull; cohesive; w<PL; stiff. 94.6-94.9 ft: very soft clay.	ML		18.2	S15	DO	27 -27 -35 -50	62	1.9 / 2.0	
100	15	98.0 - 100.0 CLAYEY SAND; fine, poorly graded, subrounded; lenses of firm clay; light grey mottled dark red; noncohesive; moist to wet; very dense.	SC		13.2	S16	DO	23 -30 -50/5"	N/A	1.6 / 2.0	Drilled w/o sampling. (99.4'-100')
		Boring completed at 100.0 ft									

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-103

SHEET 1 of 3

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 120.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 4/23/13
DATE COMPLETED: 4/24/13
WEATHER: Overcast

DATUM:
COORDS: N: 501,415.4 E: 1,386,432.0
GS ELEVATION: 127.9 ft
TOC ELEVATION: NA
TEMPERATURE: 50 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0	125	0.0 - 2.0 GRAVELLY SAND; fine to medium, well graded, subrounded, some plastic fines; ~30% coarse, subrounded gravel, lens of clayey sand; orangeish brown; trace of organics; noncohesive; moist; compact.	SW		125.9	S1	DO	6 -9 -8 -8	17	1.0 / 2.0	
		3.0 - 5.0 NO RECOVERY			122.9	S2	DO	4 -3 -3 -3	6	0.0 / 2.0	
5	120	8.0 - 10.0 SAND; fine, poorly graded, subrounded; trace fine gravel, lens of medium sand, very thin bed of soft dark red and grey clay; tan to orangeish brown; thinly laminated; noncohesive; moist; compact.	SP		117.9	S3	DO	3 -4 -9 -7	13	1.4 / 2.0	
10	115	13.0 - 15.0 SILTY CLAY; low to medium plasticity; lens of fine to med sand and coarse gravel, lens of soft dark red and grey clay; rust red mottled white, slightly shiny; trace organics; cohesive; w<PL; stiff.	CL		112.9	S4	DO	3 -10 -16 -21	26	1.3 / 2.0	
15	110	18.0 - 20.0 SILTY CLAY; low to medium plasticity; lens of fine sand; light grey mottled red; thinly laminated; cohesive; w<PL; stiff.	CL		107.9	S5	DO	10 -16 -17 -21	33	1.2 / 2.0	
20	105	23.0 - 25.0 CLAY; high plasticity; some nonplastic fines; light grey mottled maroon, shiny; thinly laminated; cohesive; w<PL; stiff.	CH		102.9	S6	DO	10 -13 -16 -29	29	0.5 / 2.0	
25	100	28.0 - 30.0 NO RECOVERY			97.9	S7	DO	5 -12 -18 -22	30	0.0 / 2.0	
30	95	33.0 - 35.0 CLAY; high plasticity; some nonplastic fines; dark red mottled light grey, shiny; thinly laminated; cohesive; w<PL; stiff.	CH		92.9	S8	DO	10 -10 -12 -12	22	1.2 / 2.0	
35	90	38.0 - 40.0 CLAY; high plasticity; some nonplastic fines, trace fine sand; light grey and dark red, shiny; thinly laminated; cohesive; w~PL; stiff.	CH		87.9	S9	DO	5 -9 -11 -15	20	1.8 / 2.0	
40	85	43.0 - 45.0 SILTY CLAY; low to medium plasticity; trace fine sand; light grey mottled dark red; thinly laminated; cohesive; w~PL; stiff.	CL		82.9	S10	DO	9 -11 -18 -25	29	0.7 / 2.0	
45	80	48.0 - 50.0 CLAY; medium to high plasticity; some nonplastic fines, trace fine sand; light to dark grey mottled maroon, shiny; cohesive; w~PL; stiff.	CH		77.9	S11	DO	14 -18 -20 -26	38	1.5 / 2.0	
50		Log continued on next page									

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-103

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 120.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 4/23/13
DATE COMPLETED: 4/24/13
WEATHER: Overcast

DATUM:
COORDS: N: 501,415.4 E: 1,386,432.0
GS ELEVATION: 127.9 ft
TOC ELEVATION: NA
TEMPERATURE: 50 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
55	75	53.0 - 55.0 CLAY; medium to high plasticity; some nonplastic fines, trace fine sand; light to dark grey mottled maroon, shiny; cohesive; w~PL; stiff.	CH		72.9	S12	DO	15 -21 -18 -22	39	1.3 / 2.0	
60	70	58.0 - 60.0 CLAY; high plasticity; some nonplastic fines; dark gray to mottled reddish brown, shiny; cohesive; w~PL; very stiff.	CH		67.9	S13	DO	18 -20 -30 -43	50	1.2 / 2.0	
65	65	63.0 - 65.0 CLAY; high plasticity; some nonplastic fines; dark gray to mottled reddish brown, shiny; cohesive; w~PL; very stiff.	CH		62.9	S14	DO	14 -26 -37 -48	63	2.0 / 2.0	
70	60	68.0 - 70.0 CLAY; high plasticity; mottled light grey and dark red, shiny; cohesive; w~PL; very stiff. 69.5-69.7 ft: very soft.	CH		57.9	S15	DO	10 -18 -22 -30	40	1.7 / 2.0	
75	55	73.0 - 75.0 CLAY; high plasticity; light grey mottled dark red, shiny; thinly laminated; cohesive; w~PL; very stiff.	CH		52.9	S16	DO	14 -15 -22 -26	37	1.9 / 2.0	
80	50	78.0 - 80.0 CLAYEY SILT; low to medium plasticity; some fine sand, lenses of clay, pockets of fine sand; light grey mottled dark red, dull; slightly fissured, thinly laminated; cohesive; w>PL; stiff.	ML		47.9	S17	DO	18 -22 -30 -50	52	1.8 / 2.0	
85	45	83.0 - 85.0 CLAYEY SILT and SAND; low plasticity; ~40% fine sand, lens of soft clay; light grey mottled dark red, dull; cohesive; w~PL; firm.	ML		42.9	S18	DO	14 -15 -17 -25	32	2.0 / 2.0	
90	40	88.0 - 90.0 CLAYEY SILT and SAND; low plasticity; ~50% fine sand, lenses of fine sand; light grey mottled dark red, dull; cohesive; w~PL; firm.	ML		37.9	S19	DO	12 -20 -23 -30	43	2.0 / 2.0	
95	35	93.0 - 95.0 CLAYEY SAND; fine; lenses of silty clay; grey; cohesive; moist; dense.	SC		32.9	S20	DO	15 -16 -17 -45	33	2.0 / 2.0	
100	30	98.0 - 100.0 SILTY SAND; some plastic fines, lenses of stiff silty clay, lens of very soft grey and dark red clay; grey; noncohesive; moist; dense.	SM		27.9	S21	DO	25 -26 -23 -50/5"	49	2.0 / 2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-103

SHEET 3 of 3

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 120.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 4/23/13
DATE COMPLETED: 4/24/13
WEATHER: Overcast

DATUM:
COORDS: N: 501,415.4 E: 1,386,432.0
GS ELEVATION: 127.9 ft
TOC ELEVATION: NA
TEMPERATURE: 50 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
	25										
105		103.0 - 105.0 CLAYEY SAND; none to low plasticity; lenses of stiff dark grey clay; dark grey; trace organics, trace thin, soft, black, shiny material: possibly coal; cohesive; wet; very dense.	SC		22.9	S22	DO	25 -50/3"	N/A	0.7 / 2.0	Drilled w/o sampling. (103.8'-105')
	20										
110		108.0 - 110.0 CLAY; medium to high plasticity; trace coarse gravel, thin bed of fine to medium sand, pockets of fine sand; purplish grey, shiny; trace organics, lens of organics: possibly coal; cohesive; w<PL; very stiff.	CH		17.9	S23	DO	35 -35 -43 -50/5"	78	1.9 / 2.0	
	15										
115		113.0 - 115.0 CLAY; high plasticity; some nonplastic fines, trace coarse sand, purplish brown pockets of silt; shiny; cohesive; w~PL; very stiff.	CH		12.9	S24	DO	22 -41 -50/5"	N/A	1.5 / 2.0	Drilled w/o sampling. (114.4'-115')
	10										
120		118.0 - 120.0 CLAY; high plasticity; some nonplastic fines, trace fine sand, pockets of silt; purplish brown, shiny; cohesive; w~PL; very stiff.	CH		7.9	S25	DO	34 -50/5"	N/A	0.9 / 2.0	Drilled w/o sampling. (118.9'-120')
		Boring completed at 120.0 ft									
	5										
125											
	0										
130											
	-5										
135											
	-10										
140											
	-15										
145											
	-20										
150											
	-25										

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-104

SHEET 1 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 100.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 4/22/13
DATE COMPLETED: 4/22/13
WEATHER: Partly Sunny

DATUM:
COORDS: N: 501,106.0 E: 1,386,593.8
GS ELEVATION: 109.9 ft
TOC ELEVATION: NA
TEMPERATURE: 55 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0		0.0 - 2.0 SAND; fine to medium, poorly graded, subrounded; lens of brown silty clay; yellowish brown; noncohesive; moist; compact.	SP		107.9	S1	DO	3 -5 -7 -9	12	0.9 / 2.0	
		3.0 - 5.0 SAND; medium to coarse, poorly graded, subrounded; some nonplastic fines; reddish brown; noncohesive; moist to wet; very dense.	SP		104.9	S2	DO	26 -27 -27 -30	54	1.3 / 2.0	
5	105	8.0 - 10.0 CLAYEY SAND; medium to coarse, poorly graded; some medium to coarse subrounded gravel; yellowish brown to dark grey; cohesive to noncohesive; moist; dense.	SC		99.9	S3	DO	18 -25 -12 -12	37	0.8 / 2.0	
10	100	13.0 - 15.0 CLAY; high plasticity; light grey mottled maroon, shiny; thinly laminated; cohesive; w>PL; stiff.	CH		94.9	S4	DO	18 -12 -25 -28	37	1.2 / 2.0	
15	95	18.0 - 20.0 CLAY; high plasticity; light grey mottled maroon, shiny; thinly laminated; cohesive; w<PL; stiff.	CH		89.9	S5	DO	10 -12 -25 -28	37	1.3 / 2.0	
20	90	23.0 - 25.0 SILTY CLAY; medium plasticity; lens of fine to medium yellow-brown sand, pockets of fine grey sand; light grey mottled dark red, slightly shiny; thinly laminated; cohesive; w<PL; stiff.	CL		84.9	S6	DO	13 -26 -26 -33	52	1.5 / 2.0	Clay possibly swelling in borehole. Clay swelled enough to close borehole and refuse rods- used 15' of 4'1/4" HSAs to support hole and resumed drilling and sampling through augers from 0-15 ft bgs.
25	85	28.0 - 30.0 SILTY CLAY; medium plasticity; trace of coarse angular gravel, pockets of fine yellowish brown sand; light grey mottled dark red, slightly shiny; thinly laminated; cohesive; w<PL; stiff.	CL		79.9	S7	DO	10 -12 -24 -24	36	1.2 / 2.0	
30	80	33.0 - 35.0 CLAY; medium to high plasticity; some nonplastic fines; dark red mottled light grey, shiny; cohesive; w~PL; stiff.	CH		74.9	S8	DO	9 -12 -22 -31	34	2.0 / 2.0	
35	75	38.0 - 40.0 SILTY CLAY; low to medium plasticity; trace fine sand, pockets of fine sand; brownish red mottled light grey, slightly shiny; slightly fissured; cohesive; w<PL; very stiff.	CL		69.9	S9	DO	12 -22 -37 -40	59	1.4 / 2.0	
40	70	43.0 - 45.0 SILTY CLAY; low to medium plasticity; trace fine sand; brownish red, slightly shiny; cohesive; w>PL; stiff.	CL		64.9	S10	DO	12 -26 -35 -45	61	2.0 / 2.0	
45	65	48.0 - 50.0 SILTY CLAY; low to medium plasticity; trace fine sand; brownish red, slightly shiny; cohesive; w>PL; stiff.	CL		59.9	S11	DO	20 -30 -35 -40	65	0.1 / 2.0	
50	60										

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-104

SHEET 2 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 100.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 4/22/13
DATE COMPLETED: 4/22/13
WEATHER: Partly Sunny

DATUM:
COORDS: N: 501,106.0 E: 1,386,593.8
GS ELEVATION: 109.9 ft
TOC ELEVATION: NA
TEMPERATURE: 55 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
55	55	53.0 - 55.0 CLAY; high plasticity; purplish grey, mottled light grey, shiny; cohesive, w<PL, very stiff.	CH		54.9	S12	DO	20 -20 -35 -40	55	1.1 / 2.0	
60	50	58.0 - 60.0 SILTY CLAY; medium plasticity; pockets of fine yellow-brown sand; mottled light grey and dark red; some yellow-brown staining; cohesive; w~PL; stiff. 58.8-59 ft: soft clay.	CL		49.9	S13	DO	14 -30 -35 -42	65	1.0 / 2.0	
65	45	63.0 - 65.0 CLAY; medium to high plasticity; some nonplastic fines, trace fine sand, lens of fine to medium yellowish brown sand; dark red mottled grey, shiny; thinly laminated; cohesive; w~PL; very stiff.	CH		44.9	S14	DO	12 -20 -30 -30	50	2.0 / 2.0	
70	40	68.0 - 70.0 SILTY CLAY; low to medium plasticity; some fine sand, pockets of fine grey sand; light grey mottled dark red, slightly shiny; cohesive; w<PL; very stiff.	CL		39.9	S15	DO	13 -23 -31 -39	54	0.4 / 2.0	
75	35	73.0 - 75.0 SILTY CLAY and SAND; low to medium plasticity; fine, grey, poorly graded, subrounded sand; grey and reddish brown; cohesive; w~PL; stiff.	CL		34.9	S16	DO	11 -17 -17 -50	34	1.7 / 2.0	
80	30	78.0 - 80.0 SILTY CLAY and SAND; low plasticity; fine, grey, poorly graded, subrounded sand, lenses of grey clay, lenses of fine to medium grey sand; light grey; cohesive; w~PL; firm.	CL		29.9	S17	DO	16 -22 -25 -50/5"	47	1.9 / 2.0	
85	25	83.0 - 85.0 CLAYEY SILTY SAND; fine, poorly graded, subrounded; lenses of grey clay, lenses of fine to medium grey sand; noncohesive; moist to wet; dense.	SM		24.9	S18	DO	31 -17 -33 -50/3"	50	1.8 / 2.0	Drilled w/o sampling. (84.6'-86')
90	20	88.0 - 90.0 SILTY SAND; fine to medium, poorly graded, subrounded; some plastic fines, lens of grey clay; light grey; noncohesive; moist; very dense.	SM		19.9	S19	DO	27 -43 -50/3"	N/A	1.0 / 2.0	Drilled w/o sampling. (89.3'-90')
95	15	93.0 - 95.0 SILTY SAND; fine to medium, well graded, subrounded; lens of soft dark red clay; light grey; trace thin, black, soft, shiny material: possibly coal; noncohesive; moist to wet; very dense.	SM		14.9	S20	DO	50/5"	N/A	0.5 / 2.0	Drilled w/o sampling. (93.4'-95')
100	10	98.0 - 100.0 CLAY; medium to high plasticity; some nonplastic fines, seams of fine dark grey sand; dark grey, shiny; cohesive; w<PL; very stiff. Boring completed at 100.0 ft	CH		9.9	S21	DO	16 -35 -35 -40	70	2.0 / 2.0	

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-105

SHEET 1 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 100.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 5/2/13
DATE COMPLETED:
WEATHER: Partly Cloudy

DATUM:
COORDS: N: 500,589.1 E: 1,386,809.5
GS ELEVATION: 115.7 ft
TOC ELEVATION: NA
TEMPERATURE: 50 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0	115										
		3.0 - 5.0 SAND; fine to medium, well-graded, subrounded; trace plastic fines, trace fine gravel; light brown; noncohesive; moist; loose.	SW		110.7	S1	DO	2 -3 -3 -3	6	0.6 / 2.0	
5	110										
		8.0 - 10.0 SAND; fine, poorly graded, subrounded; some plastic fines, trace coarse subangular gravel, lenses of soft red and white clay; light brown; noncohesive; moist; loose.	SP		105.7	S2	DO	2 -3 -4 -3	7	1.0 / 2.0	
10	105										
		13.0 - 15.0 SAND; fine to medium, well-graded, subrounded; some nonplastic fines, trace subangular coarse gravel, seams of light grey clay, lenses of clayey sand; light grey to light brown; trace organics; noncohesive; moist; compact.	SW		100.7	S3	DO	3 -4 -8 -14	12	1.5 / 2.0	
15	100										
		18.0 - 20.0 SILTY CLAY; medium plasticity; seams of fine dark grey sand; dark red, slightly shiny; cohesive; w<PL; stiff.	CL		95.7	S4	DO	11 -19 -22 -23	41	1.6 / 2.0	
20	95										
		23.0 - 25.0 SILTY CLAY; medium plasticity; mottled dark grey and brownish red, slightly shiny; cohesive; w<PL; very stiff.	CL		90.7	S5	DO	17 -39 -45 -45	84	1.8 / 2.0	
25	90										
		28.0 - 30.0 CLAY; high plasticity; grey mottled dark red and maroon, shiny; thinly laminated; trace black material: possibly organics; cohesive; w~PL; stiff.	CH		85.7	S6	DO	12 -16 -16 -32	32	1.9 / 2.0	
30	85										
		33.0 - 35.0 CLAY; high plasticity; grey mottled dark red and maroon, shiny; thinly laminated; trace black material: possibly organics; cohesive; w~PL; stiff.	CH		80.7	S7	DO	11 -13 -15 -25	28	2.0 / 2.0	
35	80										
		38.0 - 40.0 SILTY CLAY; medium plasticity; some fine sand; light grey mottled dark red, slightly shiny; thinly laminated; cohesive;, w~PL; stiff.	CL		75.7	S8	DO	12 -15 -20 -22	35	1.0 / 2.0	
40	75										
		43.0 - 44.0 CLAYEY SILT, low to medium plasticity; some fine sand, trace of fine gravel; light grey, dull; cohesive; stiff.	ML CH		71.7 44.0 70.7	S9	DO	12 -15 -18 -23	33	2.0 / 2.0	
45	70	44.0 - 45.0 CLAY; medium to high plasticity; brown and purple mottled yellowish brown, shiny; thinly laminated; cohesive; stiff.									
		48.0 - 50.0 SILTY CLAY; medium to high plasticity; trace fine sand, pockets of fine yellow-brown sand; light grey, slightly shiny; cohesive; w~PL; stiff.	CL		65.7	S10	DO	17 -26 -38 -40	64	0.7 / 2.0	
50	65										

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-105

SHEET 2 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 100.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 5/2/13
DATE COMPLETED:
WEATHER: Partly Cloudy

DATUM:
COORDS: N: 500,589.1 E: 1,386,809.5
GS ELEVATION: 115.7 ft
TOC ELEVATION: NA
TEMPERATURE: 50 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
55	60	53.0 - 55.0 SILTY CLAY; medium plasticity; seams of fine sand; reddish brown mottled light grey, slightly shiny; cohesive; w~PL; stiff.	CL		60.7	S11	DO	21 -37 -47 -50/5"	84	1.2 / 2.0	
60	55	58.0 - 60.0 SILTY CLAY; medium to high plasticity; trace fine sand; light grey mottled reddish brown, lightly shiny; cohesive; w~PL; firm.	CL		55.7	S12	DO	16 -18 -22 -30	40	1.7 / 2.0	
65	50	63.0 - 65.0 SILTY CLAY; low to medium plasticity; light grey mottled reddish brown, slightly shiny; cohesive; w~PL; stiff.	CL		50.7	S13	DO	21 -33 -36 -42	99	0.7 / 2.0	
70	45	68.0 - 70.0 CLAY; high plasticity; purplish grey mottled dark red, shiny; cohesive; w<PL; very stiff.	CH		45.7	S14	DO	18 -24 -27 -30	51	2.0 / 2.0	
75	40	73.0 - 75.0 CLAY; high plasticity; some nonplastic fines, pockets of fine sand; grey and purple mottled dark red, shiny; thinly laminated; cohesive; w~PL; stiff to very stiff.	CH		40.7	S15	DO	17 -21 -31 -34	52	2.0 / 2.0	
80	35	78.0 - 80.0 SILTY CLAY; low to medium plasticity; trace fine sand, pockets of fine sand; light grey mottled dark red, slightly shiny; thinly laminated; cohesive; w~PL; stiff to very stiff.	CL		35.7	S16	DO	24 -26 -40 -50	76	1.9 / 2.0	
85	30	83.0 - 83.8 SILTY CLAY; medium to high plasticity; trace of fine sand; mottled light grey and dark red; cohesive; w~PL; stiff to very stiff.	CL / CH		31.9 / 30.9	S17	DO	22 -22 -23 -35	45	1.8 / 2.0	
		83.8 - 84.8 CLAY; medium to high plasticity; some nonplastic fines, trace of fine sand; dark red mottled light grey; cohesive; w~PL; firm to stiff.									
90	25	88.0 - 90.0 CLAYEY SILT and SAND; low to medium plasticity; ~35% fine sand, pockets of fine sand, lens of soft red clay; light grey mottled dark red and brown, slightly shiny; cohesive; w<PL; stiff.	MH		25.7	S18	DO	15 -22 -38 -39	60	2.0 / 2.0	
95	20	93.0 - 95.0 CLAYEY SILT; low to medium plasticity; some fine sand, pockets of fine sand, seams of clay and fine sand; light grey mottled dark red and brown, slightly shiny; cohesive; w<PL; stiff.	MH		20.7	S19	DO	30 -40 -50/5"	N/A	1.5 / 2.0	Drilled w/o sampling. (94.4'-95')
100	15	98.0 - 100.0 SILTY CLAY; medium to high plasticity; lenses of fine clayey sand; purplish brown, slightly shiny; cohesive; w<PL; stiff.	CL		15.7	S20	DO	19 -22 -37 -42	59	1.6 / 2.0	
		Boring completed at 100.0 ft									

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-106

SHEET 1 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 95.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 4/25/13
DATE COMPLETED: 4/26/13
WEATHER: Sunny

DATUM:
COORDS: N: 500,667.9 E: 1,385,608.6
GS ELEVATION: 132.7 ft
TOC ELEVATION: NA
TEMPERATURE: 60 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0	130	0.0 - 2.0 SAND; fine to medium, well-graded, subrounded; some fine to coarse subangular gravel, some nonplastic fines; orangeish brown; trace organics (plants); noncohesive; moist; loose.	SW		130.7	S1	DO	3 -5 -5 -6	10	1.1/2.0	
5	125	3.0 - 5.0 SAND; fine to medium, well-graded, subrounded; some plastic fines; orange to grey-brown; thinly laminated; trace organics (plants); noncohesive; moist; loose.	SW		127.7	S2	DO	3 -3 -4 -3	7	1.5/2.0	
10	120	8.0 - 10.0 CLAYEY SAND; fine to medium, well-graded, subrounded; lenses of light grey clay, lens of soft dark red clay; orange and brown; noncohesive; moist; loose.	SC		122.7	S3	DO	5 -5 -5 -7	10	1.3/2.0	
15	115	13.0 - 15.0 SAND; fine to medium, well-graded, subrounded; some plastic fines, thin beds of firm light grey silty clay; light to dark brown; trace organics. 14-14.3 ft: CLAY; dark red; noncohesive; moist; loose, very soft.	SW		117.7	S4	DO	3 -3 -4 -5	7	1.3/2.0	
20	110	18.0 - 20.0 CLAY; high plasticity; light grey; seams of fine grey and brown sand, thin bed of fine to medium wet light brown sand, trace organics; cohesive; w>PL; firm.	CH		112.7	S5	DO	3 -3 -3 -4	6	1.2/2.0	
25	105	23.0 - 25.0 SAND; fine to medium, poorly graded, subrounded; lens of soft light grey clay; reddish brown; noncohesive; moist to wet; very dense.	SP		107.7	S6	DO	45 -50/5"	N/A	1.0/2.0	Drilled w/o sampling. (23.9'-25')
30	100	28.0 - 30.0 SAND; fine to coarse, well-graded, subrounded; some nonplastic fines; light brown; wet; very dense.	SW		102.7	S7	DO	25 -30 -50/5"	N/A	1.6/2.0	Drilled w/o sampling. (29.4'-30')
35	95	33.0 - 35.0 CLAY; high plasticity; mottled light grey and maroon, shiny; thinly laminated; cohesive; w<PL; very stiff.	CH		97.7	S8	DO	15 -16 -30 -37	46	2.0/2.0	
40	90	38.0 - 40.0 CLAY; high plasticity; mottled light grey and maroon, shiny; thinly laminated; cohesive; w<PL; very stiff.	CH		92.7	S9	DO	20 -30 -40 -50/5"	70	1.7/2.0	
45	85	43.0 - 45.0 SILTY CLAY; medium to high plasticity; light grey mottled maroon, slightly shiny; thinly laminated; cohesive; w<PL; very stiff.	CL		87.7	S10	DO	20 -33 -37 -50	70	1.7/2.0	
50		48.0 - 50.0 CLAY; high plasticity; light grey mottled maroon, shiny; thinly laminated; cohesive; w<PL; stiff.	CH		82.7	S11	DO	14 -28 -40 -42	68	1.3/2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-106

SHEET 2 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 95.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 4/25/13
DATE COMPLETED: 4/26/13
WEATHER: Sunny

DATUM:
COORDS: N: 500,667.9 E: 1,385,608.6
GS ELEVATION: 132.7 ft
TOC ELEVATION: NA
TEMPERATURE: 60 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
55	80	53.0 - 55.0 CLAY; high plasticity; trace nonplastic fines; light grey mottled maroon and dark red, shiny; cohesive; w<PL; stiff. 54.2-54.4 ft: CLAY; dark red; soft.	CH		77.7	S12	DO	14 -28 -37 -40	65	1.4 / 2.0	
60	75	58.0 - 60.0 CLAY; high plasticity; trace medium sand, thinly laminated pockets of silt; light grey mottled maroon and dark red, shiny; thinly laminated; some yellow-brown staining; cohesive; w<PL; stiff.	CH		72.7	S13	DO	15 -26 -35 -50/5"	61	1.8 / 2.0	
65	70	63.0 - 65.0 CLAY; high plasticity; some nonplastic fines; brown mottled dark red and grey, shiny; cohesive; w<PL; stiff.	CH		67.7	S14	DO	15 -26 -35 -45	61	1.9 / 2.0	
70	65	68.0 - 70.0 CLAY; high plasticity; some nonplastic fines, trace fine sand, pockets of silt; brownish red mottled light grey, shiny; cohesive; w<PL; stiff.	CH		62.7	S15	DO	16 -29 -30 -30	59	1.9 / 2.0	
75	60	73.0 - 75.0 CLAY; high plasticity; pockets of fine sand; dark grey mottled maroon, shiny; thinly laminated; cohesive; w<PL; stiff.	CH		57.7	S16	DO	16 -20 -29 -35	49	2.0 / 2.0	
80	55	78.0 - 80.0 CLAY; high plasticity; trace fine sand; light grey mottled dark red and maroon, shiny; cohesive; w<PL; very stiff.	CH		52.7	S17	DO	18 -21 -31 -37	52	2.0 / 2.0	
85	50	83.0 - 85.0 SILTY CLAY; medium to high plasticity; trace fine sand, lens of clayey silt, pockets of fine sand; light grey mottled dark red, slightly shiny; cohesive; w<PL; stiff.	CL		47.7	S18	DO	14 -21 -31 -43	52	1.5 / 2.0	
90	45	88.0 - 90.0 SILTY CLAY; medium plasticity; pockets of fine sand; mottled light grey and dark red, slightly shiny; cohesive; w<PL; very stiff.	CL		42.7	S19	DO	14 -31 -40 -50	71	1.9 / 2.0	
95	40	93.0 - 95.0 CLAY; high plasticity; trace nonplastic fines; light grey mottled dark red, shiny; cohesive; w<PL; very stiff.	CH		37.7	S20	DO	15 -28 -33 -45	61	0.6 / 2.0	
100	35	Boring completed at 95.0 ft									

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-107

SHEET 1 of 3

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 140.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 5/9/13
DATE COMPLETED: 5/10/13
WEATHER: Overcast

DATUM:
COORDS: N: 499,767.4 E: 1,385,785.1
GS ELEVATION: 164.8 ft
TOC ELEVATION: NA
TEMPERATURE: 60 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0											
		3.0 - 5.0 CLAYEY SAND; fine, poorly graded, subrounded; light brown to grey; noncohesive to cohesive; moist; compact.	SC		159.8	S1	DO	2 -4 -9 -6	13	1.3/2.0	
5	160										
		8.0 - 10.0 SAND; fine, poorly graded, subrounded; some plastic fines, seams of light grey clay; light brown to orange; noncohesive; moist; compact.	SP		154.8	S2	DO	4 -6 -7 -8	13	1.5/2.0	Longer time to drill than average.
10	155										
		13.0 - 15.0 CLAYEY SAND; fine, poorly graded, subrounded; trace of coarse elongated gravel (1"), seams of soft clay; light brown to orange-brown; wood fragments; noncohesive to cohesive; moist.	SC		149.8	S3	DO	N/A	N/A	0.6/2.0	SPT N value may have been affected by wood fragments. Drilled w/o sampling. (13.9'-15')
15	150										
		18.0 - 20.0 SAND; fine to medium, poorly graded, subrounded; pockets of light grey clay; light brown; very thinly bedded; noncohesive; moist to wet; dense.	SP		144.8	S4	DO	15 -16 -16 -17	32	1.2/2.0	
20	145										
		23.0 - 25.0 SAND; poorly graded, subrounded; some plastic fines, lens of light grey firm clay; light brown; noncohesive; moist; compact.	SP		139.8	S5	DO	5 -6 -9 -14	15	1.3/2.0	
25	140										
		28.0 - 30.0 SAND; fine to medium, poorly graded, subrounded; lenses of very soft light grey clay; light brownish grey; noncohesive; wet; very dense.	SP		134.8	S6	DO	30 -50/4"	N/A	0.8/2.0	Drilled w/o sampling. (28.9'-30')
30	135										
		33.0 - 35.0 SAND; medium, poorly graded, subrounded; trace fine sand, pockets of light grey clay; light brown and grey; noncohesive; moist to wet; very dense.	SP		129.8	S7	DO	26 -40 -26 -27	66	1.2/2.0	
35	130										
		38.0 - 40.0 SAND; fine, poorly graded, subrounded; trace nonplastic fines, lens of clayey silt; light brownish grey; noncohesive; moist; very dense.	SP		124.8	S8	DO	13 -23 -45 -50	68	1.1/2.0	
40	125										
		43.0 - 45.0 CLAYEY SAND; fine, poorly graded, subrounded; light grey. 43.0-43.3 ft: orange-brown fine sand; noncohesive to cohesive; wet; very dense.	SC		119.8	S9	DO	16 -31 -50/5"	N/A	1.3/2.0	Drilled w/o sampling. (44.4'-45')
45	120										
		48.0 - 50.0 SAND; fine, poorly graded, subrounded; some plastic fines, trace fine gravel, pocket of orange-brown fine sand; light grey; noncohesive; moist to wet; very dense.	SP		114.8	S10	DO	33 -43 -50/5"	N/A	1.2/2.0	
50	115										

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-107

SHEET 2 of 3

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 140.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 5/9/13
DATE COMPLETED: 5/10/13
WEATHER: Overcast

DATUM:
COORDS: N: 499,767.4 E: 1,385,785.1
GS ELEVATION: 164.8 ft
TOC ELEVATION: NA
TEMPERATURE: 60 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
55	110	53.0 - 55.0 SAND; fine, poorly graded, subrounded; trace nonplastic fines; light brown; noncohesive; moist to wet; very dense.	SP		109.8	S11	DO	50/4"	N/A	0.3 / 2.0	Drilled w/o sampling. (53.5'-55')
60	105	58.0 - 60.0 SAND; fine, poorly graded, subrounded; trace nonplastic fines; light brown; noncohesive; moist to wet; very dense.	SP		104.8	S12	DO	50/3"	N/A	0.3 / 2.0	Drilled w/o sampling. (58.25'-60')
65	100	63.0 - 65.0 SAND; fine, poorly graded, subrounded; trace of nonplastic fines; light brown; noncohesive; moist to wet; very dense.	SP		99.8	S13	DO	50/4"	N/A	0.4 / 2.0	Drilled w/o sampling. (63.3'-65')
70	95	68.0 - 70.0 SAND; fine, poorly graded, subrounded; trace nonplastic fines; light brown; noncohesive; moist to wet; very dense.	SP		94.8	S14	DO	50/3"	N/A	0.3 / 2.0	Drilled w/o sampling. (68.25'-70')
75	90	73.0 - 75.0 SAND; fine to coarse, well-graded, subrounded; some fine to coarse, subangular gravel; light brown to orange-brown; noncohesive; wet; very dense.	SW		89.8	S15	DO	50/5"	N/A	0.5 / 2.0	Drilled w/o sampling. (73.4'-75')
80	85	78.0 - 80.0 SILTY CLAY; low to medium plasticity; trace fine sand, blocky, pockets of fine sand; dark red mottled light grey and white, slightly shiny; cohesive; w<PL; very stiff to hard.	CL		84.8	S16	DO	31 -50/5"	N/A	1.0 / 2.0	Drilled w/o sampling. (78.4'-80')
85	80	83.0 - 85.0 CLAY; high plasticity; trace nonplastic fines, pockets of fine sand; light grey mottled maroon and dark red, shiny; thinly laminated; cohesive; w~PL; stiff to very stiff.	CH		79.8	S17	DO	21 -34 -41 -45	75	1.7 / 2.0	
90	75	88.0 - 90.0 CLAY; high plasticity; trace nonplastic fines, pockets of fine sand; light grey mottled maroon and dark red, shiny; thinly laminated; cohesive; w~PL; stiff to very stiff.	CH		74.8	S18	DO	19 -21 -31 -41	52	2.0 / 2.0	
95	70										
100	65	98.0 - 100.0 SILTY CLAY; medium to high plasticity; trace of fine sand; mottled grey, maroon to dark red, slightly shiny; thinly laminated; cohesive; w~PL; stiff.	CL		64.8	S19	DO	14 -24 -34 -45	58	1.9 / 2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE B-107

SHEET 3 of 3

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 140.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 5/9/13
DATE COMPLETED: 5/10/13
WEATHER: Overcast

DATUM:
COORDS: N: 499,767.4 E: 1,385,785.1
GS ELEVATION: 164.8 ft
TOC ELEVATION: NA
TEMPERATURE: 60 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
105	60										
		108.0 - 110.0 SILTY CLAY; medium to high plasticity; trace fine sand; reddish brown and light grey mottled, shiny; cohesive; w<PL; stiff to very stiff.	CL		54.8	S20	DO	19 -50/5"	N/A	1.0 / 2.0	Drilled w/o sampling. (108.9'-110')
110	55										
115	50										
		118.0 - 120.0 SILTY CLAY; medium to high plasticity; trace fine sand; reddish brown and light grey mottled, shiny; cohesive; w<PL; stiff to very stiff.	CL		44.8	S21	DO	21 -31 -50/5"	N/A	1.5 / 2.0	Drilled w/o sampling. (119.4'-120')
120	45										
125	40										
		128.0 - 130.0 SILTY CLAY; medium to high plasticity; trace of fine sand; light grey and dark red; thinly laminated; cohesive; w<PL; stiff to very stiff. Bottom 0.3 ft.: very soft.	CL		34.8	S22	DO	36 -46 -50/5"	N/A	2.0 / 2.0	Drilled w/o sampling. (129.4-130')
130	35										
135	30										
		138.0 - 140.0 SILTY CLAY; medium to high plasticity; dark and mottled light grey, shiny; cohesive; w<PL; stiff to very stiff.	CL		24.8	S23	DO	36 -46 -50/5"	N/A	1.6 / 2.0	Drilled w/o sampling. (139.4'-130')
140	25	Boring completed at 140.0 ft									
145	20										
150	15										

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-6

SHEET 1 of 1

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 30.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 5/14/13
DATE COMPLETED: 5/14/13
WEATHER: Sunny

DATUM:
COORDS: N: 501,052.6 E: 1,388,345.3
GS ELEVATION: 81.5 ft
TOC ELEVATION: NA
TEMPERATURE: 50 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0	80										
		3.0 - 5.0 GRAVELLY SAND; fine, poorly graded, subrounded; ~30% fine to coarse angular to subangular gravel; brown to dark brown; trace organics (plant matter); noncohesive; moist; compact.	SP		76.5	S1	DO	6 -4 -6 -3	10	0.8 / 2.0	
5	75										
		8.0 - 10.0 GRAVELLY SAND; fine, poorly graded, subrounded; ~40% fine to coarse subrounded gravel, trace nonplastic fines; brown; noncohesive; moist; compact.	SP		71.5	S2	DO	6 -8 -7 -10	15	0.5 / 2.0	
10	70										
		13.0 - 15.0 SAND; fine to medium, poorly graded, subrounded; some nonplastic fines, seams of soft light grey clay; light brown to orangeish brown; noncohesive; moist to wet; loose.	SP		66.5	S3	DO	4 -4 -3 -3	7	1.9 / 2.0	Spoon is wet.
15	65										
		18.0 - 20.0 SAND; fine to coarse, poorly graded, subrounded; some fine to coarse subrounded gravel, trace nonplastic fines, seams of soft light grey clay; light brown to orangeish brown; noncohesive; wet; compact.	SP		61.5	S4	DO	3 -5 -7 -8	12	1.5 / 2.0	End HSAs. Drilled w/ 3" mud rotary bit.
20	60										
		23.0 - 25.0 SAND; fine, poorly graded, subrounded; some nonplastic fines, trace coarse gravel >1" dia., seams of soft light grey clayey sand; light brown to orangeish brown; noncohesive; moist to wet; compact.	SP		56.5	S5	DO	3 -10 -13 -27	23	0.7 / 2.0	
25	55										
		28.0 - 30.0 SAND; fine to medium, poorly graded, subrounded; trace fine rounded gravel; light brown; noncohesive; wet.	SP		51.5	S6	DO	8 -20 -50/4"	N/A	1.3 / 2.0	SPT N value may have been affected by coarse gravel fall-in. Drilled w/o sampling. (29.3'-30')
30	50	Boring completed at 30.0 ft									
	45										
35	40										
40	35										
45											
50											

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-11

SHEET 1 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 220.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Hydraulic Hammer- 140 lb, 30 in. HSAs
DRILL RIG: Simco 2800
DATE STARTED: 4/16/13
DATE COMPLETED: 4/19/13
WEATHER: Partly Cloudy

DATUM: NAD83
COORDS: N: 501,239.1 E: 1,385,779.8
GS ELEVATION: 143.5 ft
TOC ELEVATION: NA
TEMPERATURE: 68 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0											
5	140	3.0 - 5.0 SILTY SAND; fine sand to 1.1 ft.; then SILTY SAND; fine to coarse, nonplastic; trace of subrounded to subangular coarse to fine gravel, 5-12% clay content; dark brown to light brown; trace of organics (roots); moist.	SM		138.5	S1	DO	2 -4 -8 -10	12	1.4 / 2.0	
10	135	8.0 - 10.0 SILTY SAND; trace nonplastic fines and subrounded coarse gravel, fine to medium sand, some thin clay seams (~5mm); brown to mottled light brown; moderate to very moist; compact.	SM		133.5	S2	DO	2 -1 -1 -2	2	0.8 / 2.0	Installed 6" steel (SW) casing to approx. 9 ft. into silty clay (hydraulically pushed). Foaming of drill water from chlorine that was added to acquire drill water in mud tank. Switched to mud-rotary drilling using a 5-7/8" dia. bit (Oray bit).
15	130	13.0 - 15.0 SANDY SILT to SILT; nonplastic; brown to tan brown; trace organics; very moist. After 14.8 ft: coarse, fine to coarse gravelly SILT, subrounded; quartz; moderate to very moist; compact.	ML		128.5	S3	DO	2 -3 -5 -9	8	1.1 / 2.0	
20	125	18.0 - 20.0 SAND; medium; gravelly sandy slough, occasional coarse subangular gravel, quartz derived gravel; tan to pale brown; very moist; loose.	SP		123.5	S4	DO	4 -5 -7 -9	12	0.6 / 2.0	
25	120	23.0 - 25.0 GRAVEL and SAND; fine to coarse, subrounded, loose; fine to coarse sand grains, trace of fines; tan brown; wet.	SP		118.5	S5	DO	3 -3 -5 -9	8	0.8 / 2.0	
30	115	28.0 - 30.0 CLAY; low to medium plasticity; tan brown silty sand (slough) and fine to coarse gravel; maroon red to grey to mottled red-brown; thinly laminated; slightly varved; moderate to very moist.	CL		113.5	S6	DO	2 -2 -3 -5	5	0.6 / 2.0	
35	110	33.0 - 35.0 CLAY; maroon-grey to pale purple-brown; thinly laminated; firm.	CL		108.5	S7	DO	4 -9 -10 -13	19	1.3 / 2.0	
40	105	38.0 - 40.0 CLAY; maroon-grey to pale purple-brown; thinly laminated; firm.	CL		103.5	S8	DO	3 -5 -8 -12	13	1.5 / 2.0	
45	100	43.0 - 45.0 CLAY; low to medium plasticity; maroon red grey; thinly laminated, varved; stiff.	CL		98.5	S9	DO	4 -6 -9 -12	15	1.2 / 2.0	
50	95	48.0 - 50.0 CLAY; low to medium plasticity; maroon red grey, mottled color; thinly laminated at top 0.2 ft., blocky structure; moist; stiff to very stiff.	CL		93.5	S10	DO	6 -12 -18 -27	30	2.0 / 2.0	Drilling getting harder, hard clay.

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-11

SHEET 2 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 220.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Hydraulic Hammer- 140 lb, 30 in. HSAs
DRILL RIG: Simco 2800
DATE STARTED: 4/16/13
DATE COMPLETED: 4/19/13
WEATHER: Partly Cloudy

DATUM: NAD83 MD
COORDS: N: 501,239.1 E: 1,385,779.8
GS ELEVATION: 143.5 ft
TOC ELEVATION: NA
TEMPERATURE: 68 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
55	90	53.0 - 55.0 CLAY; trace silt; mottled pinkish grey to maroon red; slightly laminated; moist; stiff.	CL		88.5	S11	DO	6 -8 -12 -26	20	2.0 / 2.0	Borehole taking drill water. Two-330 gal tanks already used up. Still taking drill water. Possible causes: Clay has formed a collar up to sand/clay interface at shallower depth and water is being forced into a shallower sand unit (20-30ft).
60	85	58.0 - 60.0 CLAY; trace silt; mottled pinkish grey to maroon red; slightly laminated; moist; stiff.	CL		83.5	S12	DO	7 -10 -16 -18	26	2.0 / 2.0	
65	80	63.0 - 65.0 CLAY; trace silt; low to medium plasticity; mottled brown, grey and maroon to red and purple; moist; stiff.	CL		78.5	S13	DO	13 -17 -26 -21	43	2.0 / 2.0	
70	75	68.0 - 70.0 CLAY; high to medium plasticity; red to brown to grey to tan brown mottled; massive structure; moist; stiff.	CL		73.5	S14	DO	7 -16 -26 -34	42	2.0 / 2.0	
75	70	73.0 - 75.0 CLAY; high to medium plasticity; purple-grey, 0.2 ft of rust orange at top of interval; massive structure; moist; stiff to hard.	CL		68.5	S15	DO	6 -9 -14 -21	23	2.0 / 2.0	
80	65	78.0 - 80.0 CLAY; high plasticity; grey to purple to mottled brown; massive structure; stiff to hard.	CL		63.5	S16	DO	6 -11 -17 -19	28	2.0 / 2.0	
85	60	83.0 - 85.0 CLAY; high plasticity; trace silt, fine sand grains throughout; purple to gray to red brown mottled; moist; stiff to hard.	CL		58.5	S17	DO	8 -16 -22 -29	38	2.0 / 2.0	
90	55	88.0 - 90.0 CLAY; high plasticity; trace silt, fine sand grains throughout; occasional tan to brown silty clay pockets, especially near the bottom; moist.	CL		53.5	S18	DO	10 -20 -28 -36	48	2.0 / 2.0	
95	50	93.0 - 95.0 CLAYEY SILT to SILT; trace fine sand; pale grey; moderate to very moist; firm.	CL		48.5	S19	DO	31 -28 -29 -33	57	1.3 / 2.0	
100	45	98.0 - 100.0 SILTY CLAY to CLAY; maroon red to gray to light brown mottled; massive structure; moist; stiff.	CL		43.5	S20	DO	8 -18 -26 -23	44	2.0 / 2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-11

SHEET 3 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 220.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Hydraulic Hammer- 140 lb, 30 in, M15 HSAs
DRILL RIG: Simco 2800
DATE STARTED: 4/16/13
DATE COMPLETED: 4/19/13
WEATHER: Partly Cloudy

COORDS: N: 501,239.1 E: 1,385,779.8 DATUM:
GS ELEVATION: 143.5 ft
TOC ELEVATION: NA
TEMPERATURE: 68 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
105	40	103.0 - 105.0 CLAY to SILTY CLAY; high plasticity; occasional pockets of dark red, dense Clayey SILT; maroon red to grey, mottled; thinly laminated at top 0.2 ft.; dry to moist; stiff to hard.	CL		38.5	S21	DO	10 -15 -25 -32	40	2.0/2.0	
110	35	108.0 - 110.0 CLAY to SILTY CLAY; high plasticity; occasional pockets of dark red, dense Clayey SILT; maroon red to grey, mottled; thinly laminated at top 0.2 ft.; moist; stiff to hard.	CL		33.5	S22	DO	12 -16 -21 -28	37	2.0/2.0	
115	30	113.0 - 115.0 CLAYEY SILT; trace to some fine sand; grey maroon mottled; firm. Below 118.1 ft: CLAYEY SILT; nonplastic; trace of fine sand and some fines; pink to grey to marron red mottled; moderate to very moist.	CL		28.5	S23	DO	8 -16 -19 -23	35	2.0/2.0	
120	25	118.0 - 120.0 CLAYEY SILT; nonplastic; 20-30% fines, occassional dark brown clay silt pockets, trace fine sand; grey to red mottled brown; moist; tight to compact.	CL		23.5	S24	DO	10 -12 -25 -32	37	2.0/2.0	
125	20	123.0 - 125.0 CLAY; mottled purple to grey to old brown to pink; slightly laminated at top; massive structure; moist; stiff.	CL		18.5	S25	DO	12 -17 -26 -33	43	2.0/2.0	Color changes.
130	15	128.0 - 130.0 SILTY CLAY to CLAY; old brown to grey to red brown mottled; slightly laminated; moist; firm.	CL		13.5	S26	DO	8 -10 -20 -33	30	1.7/2.0	
135	10	133.0 - 135.0 CLAY; low to medium plasticity; trace silt; old brown to grey to reddish brown, slightly mottled towards the bottom; moist; stiff to hard.	CL		8.5	S27	DO	13 -19 -26 -34	45	2.0/2.0	
140	5	138.0 - 140.0 CLAY; low to medium plasticity; silty clay pockets; red brown to grey brown, occassional brown; moist; stiff to hard. (Collected geotech sample).	CL		3.5	S28	DO	9 -20 -31 -48	51	2.0/2.0	Hard drilling.
145	0	143.0 - 145.0 CLAY; medium to high plasticity; brown to dark brown, mottled grey to purple to brown at top 0.4 ft.; slightly laminated; moist; hard.	CL		-1.5	S29	DO	12 -23 -34 -43	57	1.9/2.0	
150	-5	148.0 - 150.0 CLAY; low to medium plasticity; brown to dark brown; moist; stiff to hard.	CL		-6.5	S30	DO	9 -18 -31 -42	49	2.0/2.0	
		Log continued on next page									When drilled to interval 156 ft., drilling was

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-11

SHEET 4 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 220.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Hydraulic Hammer- 140 lb, 30 in, HSAs
DRILL RIG: Simco 2800
DATE STARTED: 4/16/13
DATE COMPLETED: 4/19/13
WEATHER: Partly Cloudy

DATUM: NAD83
COORDS: N: 501,239.1 E: 1,385,779.8
GS ELEVATION: 143.5 ft
TOC ELEVATION: NA
TEMPERATURE: 68 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
		SOIL PROFILE				SAMPLES					
155	-10	153.0 - 155.0 CLAY; low to medium plasticity; olive brown and grey mottled at bottom 0.7 ft.; thinly laminated.	CL		-11.5	S31	DO	15 -28 -42 -50/4.5"	N/A	2.0 / 2.0	less difficult and felt different. Lost approx. 20 -30 gals of drill water.
160	-15	158.0 - 160.0 CLAY; medium to high plasticity; trace medium sand, trace to some silt content; green to red mottled brown.	CL		-16.5	S32	DO	15 -25 -23 -50/6"	48	2.0 / 2.0	
165	-20	163.0 - 165.0 CLAY; occasional silt partings; red to brown to grey; blocky structure, slightly dessicated matrix; dry to moist; hard.	CL		-21.5	S33	DO	15 -27 -40 -50/5.5"	67	1.8 / 2.0	
170	-25	168.0 - 170.0 CLAY to SILTY CLAY; grey SILTY CLAY with trace fine sand, lustruous fine sand grains; brown to grey; slightly laminated, slightly varved; moist; hard.	CL		-26.5	S34	DO	12 -22 -36 -50/5.5"	58	2.0 / 2.0	
175	-30	173.0 - 175.0 CLAYEY SILT to SILTY CLAY; trace to some fine sand, blocky Clayey SILT; brown grey to brown; cohesive; moist; firm; softens towards the bottom.	CL		-31.5	S35	DO	8 -12 -19 -25	31	2.0 / 2.0	
180	-35	178.0 - 180.0 SILTY CLAY to occassional SILT; grey to dark grey; slightly varved; moderate to very moist. Below 179.5 ft: sandy SILT; very moist.	ML-SM		-36.5	S36	DO	10 -17 -23 -50/5.5"	40	2.0 / 2.0	Transition Zone.
185	-40	183.0 - 185.0 CLAYEY SANDY SILT; intermitten thin (<0.1 ft.) fine to medium silty sand seams (wet), low plasticity fines with inner fine to medium sand towards the bottom; grey to dark grey; dense.	CL-SM		-41.5	S37	DO	13 -17 -46 -50/3"	63	2.0 / 2.0	
190	-45	188.0 - 190.0 SILTY CLAY; slightly plastic; occassional thin (~5 mm) fine, light grey sand lenses and pockets; dark grey; moist to very moist; hard.	CL-ML		-46.5	S38	DO	20 -31 -50/5"	N/A	1.6 / 2.0	
195	-50	193.0 - 195.0 SILT-SILTY CLAY; nonplastic; trace of fine sand, hardpan silt at bottom; maroon to red to pinkish purple, olive mottled brown; dry to moist.	CL-ML		-51.5	S39	DO	42 -50/4"	N/A	0.9 / 2.0	~141 ft. MSL elevation @ PMW-11 (Phone GPS).
200	-55	198.0 - 200.0 CLAYEY SILT; trace fine sand; pinkish purple to grey to maroon red, dark to deep red to rust orange; varved; moist; dense.	CL-ML		-56.5	S40	DO	17 -50/4"	N/A	1.2 / 2.0	
	-60		SM			S41	DO	26 -50/4"	N/A	0.6	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-11

SHEET 5 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 220.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Hydraulic Hammer- 140 lb, 30 in. HSAs
DRILL RIG: Simco 2800
DATE STARTED: 4/16/13
DATE COMPLETED: 4/19/13
WEATHER: Partly Cloudy

DATUM: NAD83
COORDS: N: 501,239.1 E: 1,385,779.8
GS ELEVATION: 143.5 ft
TOC ELEVATION: NA
TEMPERATURE: 68 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
205	-65	203.0 - 205.0 SILTY SAND; poorly graded; 5-12% fines, occasional thin clay lenses; pale grey-white; dilatently wet; compact. *(Continued)*	SM		-61.5	S41	DO	26 -50/4"	N/A	2.0	
210	-70	208.0 - 210.0 SILTY SAND; poorly graded; coarsening with depth; occasional thin clay lenses; pale grey-white; compact.	SM		-66.5	S42	DO	37 -50/5"	N/A	0.7 / 2.0	Approx. 50 gals drill water lost during interval drilling.
215	-75	213.0 - 215.0 SAND; fine to medium; trace fines; brown.	SP		-71.5	S43	DO	50/5"	N/A	0.6 / 2.0	Drove spoon to ~10 in. to acquire enough sample.
220	-80	218.0 - 220.0 NO RECOVERY, white sand in shoe of spoon.			-76.5	S44	DO	50/5"	N/A	0.0 / 2.0	
225	-85	Boring completed at 220.0 ft									
230	-90										
235	-95										
240	-100										
245	-105										
250	-110										
255											

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-12

SHEET 1 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 240.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA
DRILL RIG: Simco 2800
DATE STARTED: 4/23/13
DATE COMPLETED: 5/3/13
WEATHER: Cloudy

DATUM:
COORDS: N: 499,635.2 E: 1,385,163.9
GS ELEVATION: 171.9 ft
TOC ELEVATION: NA
TEMPERATURE: 52 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE: DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0	170	3.0 - 5.0 SILTY SAND; fine to medium grained; occasional white grey SILTY CLAY seams (~10-20 mm); tan to pale brown; moist; loose.	SM		166.9	S1	DO	1 -2 -4 -6	6	0.5 / 2.0	Poor recovery
5	165	8.0 - 10.0 CLAY; low plasticity; occasional white to grey SILTY CLAY stringers; dark red to maroon red and brown; blocky structure; w<PL; firm to stiff.	CL		161.9	S2	DO	3 -8 -7 -9	15	1.7 / 2.0	Approx. 30 gals of drill fluid lost.
10	160	13.0 - 15.0 CLAY; low plasticity; pockets and stringers of white to grey silty clay throughout; mottled color; thinly laminated; moist; firm.	CL		156.9	S3	DO	4 -6 -11 -12	17	1.7 / 2.0	
15	155	18.0 - 20.0 CLAY; low to medium plasticity; trace of silt near bottom; maroon red to brown to brown grey, becomes grey from 19.3-19.6 ft.; platy structure, thinly laminated; cohesive; moist, w<PL.	CL		151.9	S4	DO	5 -8 -12 -15	20	1.6 / 2.0	
20	150	23.0 - 25.0 CLAY; low plasticity; trace silt; olive green to pale grey to pale purple; blocky structure, slightly laminated; cohesive; moist, w<PL.	CL		146.9	S5	DO	4 -6 -10 -12	16	1.3 / 2.0	
25	145	28.0 - 30.0 CLAY; low plasticity; trace silt; olive brown to brown, lustrous; firm to stiff at bottom; moist, w<PL.	CL		141.9	S6	DO	6 -9 -12 -20	21	1.7 / 2.0	
30	140	33.0 - 34.6 CLAY; low plasticity; trace silt; 12-25% silt.	CL		137.3	S7	DO	8 -14 -23 -25	37	2.0 / 2.0	
35	135	34.6 - 35.0 CLAYEY SILT; grey and tan; dark maroon red to pale brown; blocky structure; moist.	CL-MH								
40	130	38.0 - 38.4 CLAYEY SILT; trace very fine sand; pale grey; moist.	MH		38.4	S8	DO	17 -25 -50/5.5"	N/A	1.9 / 2.0	
		38.4 - 40.0 SILTY CLAY; some very fine sand; purple to maroon red, grey and orange; highly varved, thinly bedded, blocky structure; cohesive; blocky.	MH		131.9						
45	125	43.0 - 44.8 CLAYEY SILT to SILTY CLAY; intermittent fine to medium SILTY SAND seams, silt seams; white grey and maroon red; very moist; dense to firm.	CL		127.1	S9	DO	17 -28 -30 -31	58	2.0 / 2.0	
		44.8 - 45.0 SILTY CLAY; pale brown to pink brown; deformed at bottom.	CL-ML								
50		48.0 - 50.0 SANDY SILT; very fine; trace fines and occasional orange brown silt seams; white-grey; moist; soft, compact.	ML		121.9	S10	DO	37 -50/5"	N/A	1.0 / 2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-12

SHEET 2 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 240.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA
DRILL RIG: Simco 2800
DATE STARTED: 4/23/13
DATE COMPLETED: 5/3/13
WEATHER: Cloudy

DATUM:
COORDS: N: 499,635.2 E: 1,385,163.9
GS ELEVATION: 171.9 ft
TOC ELEVATION: NA
TEMPERATURE: 52 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
55	115	53.0 - 55.0 SILTY SAND; fine to very fine, nonplastic; 12% fines, very fine sand lenses at 53.6-54.2 ft; orange brown and grey; very moist; compact.	SM		116.9	S11	DO	36 -47 -50/5"	N/A	1.3 / 2.0	
60	110	58.0 - 60.0 SAND; nonplastic, fine to very fine; trace fines, some silt fines (12-15%); tan brown to light brown; very moist; compact.	SM		111.9	S12	DO	46 -50/3"	N/A	0.4 / 2.0	
65	105	63.0 - 65.0 SAND; fine to medium; some fines (5-12%); grey brown to tan brown; very moist.	SW		106.9	S13	DO	43 -50/4"	N/A	0.7 / 2.0	
70	100	68.0 - 70.0 SAND; fine to medium; some fines (5-12%); grey brown to tan brown; wet (water table).	SW		101.9	S14	DO	43 -50/4"	N/A	0.4 / 2.0	Poor recovery. Water table.
75	95	73.0 - 75.0 SILTY SAND; fine, nonplastic; some fines; grey to red to brown; moist.	SM		96.9	S15	DO	20 -17 -31 -50/5"	48	2.0 / 2.0	
80	90	78.0 - 80.0 CLAY; low plasticity; some CLAY SILT pockets; maroon red to brown to pale purple; slightly laminated, blocky structure; cohesive; w<PL; very stiff to hard. (Collected goetech sample).	CL		91.9	S16	DO	12 -31 -41 -47	72	2.0 / 2.0	
85	85	83.0 - 85.0 CLAY to SILTY CLAY; pockets of fine sand especially @ 84.1-84.7 ft.; grey with maroon red; cohesive; w<PL; stiff at top 0.7 ft. then hard down to the bottom.	CH		86.9	S17	DO	12 -18 -24 -27	42	2.0 / 2.0	
90	80	88.0 - 90.0 CLAY; high plasticity; trace fine sand, some silt; maroon red to grey brown mottled; blocky structure; w<PL.	CH		81.9	S18	DO	7 -16 -19 -24	35	2.0 / 2.0	
95	75	93.0 - 95.0 SILTY CLAY; some fine sand, occasional tan brown silt stringers, trace medium sand; maroon red to grey to brown mottling; blocky structure; cohesive; w<PL.	CL-ML		76.9	S19	DO	12 -18 -24 -34	42	2.0 / 2.0	
100	70	98.0 - 100.0 SILTY CLAY to CLAY; occasional tan brown silt pockets; maroon red to grey, pale purple and mottled; friable to blocky, slightly laminated at top 0.2 ft.; w<PL-w~PL.	CL-CH		71.9	S20	DO	10 -21 -23 -32	42	2.0 / 2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-12

SHEET 3 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 240.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA
DRILL RIG: Simco 2800
DATE STARTED: 4/23/13
DATE COMPLETED: 5/3/13
WEATHER: Cloudy

DATUM:
COORDS: N: 499,635.2 E: 1,385,163.9
GS ELEVATION: 171.9 ft
TOC ELEVATION: NA
TEMPERATURE: 52 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
105	65	103.0 - 105.0 CLAY to SILTY CLAY; pale purple to grey mottled; slightly laminated and varved, blocky to slightly friable. Below 104.1 ft: w<PL-w~PL; stiff to very stiff.	CL-CH		66.9	S21	DO	11 -23 -28 -35	51	2.0/2.0	Shelby Tube (S-22) from 106 to 108 ft. bgs
110	60	108.0 - 110.0 CLAY to SILTY CLAY; medium plasticity; maroon red to grey mottled brown, lustrous; moderately cohesive; w<PL; stiff to very stiff. (Collected geotech sample).	CL-CH		61.9	S23	DO	11 -25 -31 -34	56	2.0/2.0	
115	55	113.0 - 115.0 CLAY; some grey silty clay stringers throughout; brown to olive brown; blocky structure, slightly laminated; cohesive; w<PL, moist; very stiff.	CH		56.9	S24	DO	11 -19 -28 -35	47	2.0/2.0	
120	50	118.0 - 120.0 SILTY CLAY to CLAY; brown to grey; very stiff to hard.	CL-CH		51.9	S25	DO	14 -22 -32 -38	54	2.0/2.0	Set sample interval to 10 ft. centers.
125	45										
130	40	130.0 - 132.0 CLAY; high plasticity; maroon grey mottled; thinly laminated; w<PL; hard to very hard.	CH		39.9	S26	DO	17 -24 -30 -33	54	2.0/2.0	SS extraction was difficult. Break down rods to pull up sample screen.
135	35										
140	30	138.0 - 140.0 CLAY to SILTY CLAY; pale purple to maroon red mottled to olive brown; blocky structure; cohesive; w<PL; stiff to hard.	CL-CH		31.9	S27	DO	8 -10 -11 -18	21	1.6/2.0	
145	25										
150	20	148.0 - 150.0 CLAY to SILTY CLAY; medium to high plasticity; pale purple to maroon red mottled to olive brown; w~PL.	CL-CH		21.9	S28	DO	19 -23 -32 -42	55	2.0/2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-12

SHEET 4 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 240.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA
DRILL RIG: Simco 2800
DATE STARTED: 4/23/13
DATE COMPLETED: 5/3/13
WEATHER: Cloudy

DATUM:
COORDS: N: 499,635.2 E: 1,385,163.9
GS ELEVATION: 171.9 ft
TOC ELEVATION: NA
TEMPERATURE: 52 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
155	15										
		158.0 - 160.0 CLAY to SILTY CLAY; trace fine sand; grey to brown; cohesive; hard.	CL-CH		11.9	S29	DO	13 -21 -32 -50/5.5"	53	2.0/2.0	
160	10										
		163.0 - 165.0 SILTY CLAY to CLAY; medium to high plasticity; grey to maroon, mottled at bottom 1 ft.; blocky structure; yellow stained; cohesive; w~PL; stiff to hard.	CL-CH		6.9	S30	DO	15 -23 -30 -45	53	2.0/2.0	
165	5										
		168.0 - 170.0 CLAY to SILT; trace to little bit of fine sand, pockets of fine sand; pale purple to maroon red to old green to maroon mottled red; blocky structure and slightly laminated near the top; cohesive; w<PL-w~PL.	CL-CH		1.9	S31	DO	15 -22 -31 -46	53	2.0/2.0	
170	0										
		173.0 - 175.0 SILTY CLAY to CLAY; medium to high plasticity; grey to brown red; blocky to friable; w<PL; stiff to hard.	CL-CH		-3.1	S32	DO	14 -21 -30 -41	51	2.0/2.0	
175	-5										
		178.0 - 180.0 SILTY CLAY to CLAY; medium to high plasticity; grey to maroon red mottled; blocky to friable; w<PL; hard.	CL-CH		-8.1	S33	DO	14 -20 -29 -40	49	2.0/2.0	
180	-10										
		183.0 - 185.0 SILTY CLAY to CLAY; medium to high plasticity; maroon red to olive brown; blocky to friable, slightly laminated, lustrous; w<PL; hard.	CL-CH		-13.1	S34	DO	13 -23 -35 -50/5.5"	58	2.0/2.0	Drillers note: hard drilling through interval (185 ft. to 188 ft.)
185	-15										
		188.0 - 190.0 SILTY CLAY to CLAY; medium to high plasticity; mottled grey to pale purple to maroon red to olive brown; friable, slightly laminated, lustrous; w~PL; hard.	CL-CH		-18.1	S35	DO	14 -23 -34 -39	57	2.0/2.0	Drillers note: quick drilling through interval (190 ft. to 193 ft.)
190	-20										
		193.0 - 195.0 SILTY CLAY to CLAY; medium to high plasticity; mottled grey to red brown; blocky, friable, thinly laminated, lustrous; w<PL; hard.	CL-CH		-23.1	S36	DO	15 -19 -38 -50/5"	57	2.0/2.0	
195	-25										
		198.0 - 200.0 CLAY to SILT; with some fine SAND and SANDY SILT; grey to green to red brown; very stiff.	CL-ML		-28.1	S37	DO	18 -20 -21 -28	41	2.0/2.0	Transition zone.
200	-30										
			CL-ML			S38	DO	8 -10 -12 -14	22	2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-12

SHEET 5 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 240.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA
DRILL RIG: Simco 2800
DATE STARTED: 4/23/13
DATE COMPLETED: 5/3/13
WEATHER: Cloudy

DATUM:
COORDS: N: 499,635.2 E: 1,385,163.9
GS ELEVATION: 171.9 ft
TOC ELEVATION: NA
TEMPERATURE: 52 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
205	-35	203.0 - 205.0 SILTY CLAY to SANDY CLAY to SANDY CLAY; some SILT, some medium SAND; cohesive; brown to olive brown; w~PL to w>PL; blocky; firm to soft. *(Continued)*	CL-ML		-33.1	S38	DO	8 -10 -12 -14	22	2.0	
210	-40	208.0 - 210.0 CLAYEY SAND to SANDY CLAY to CLAYEY SAND; with fine SAND; cohesive; olive green to pale purple; w~PL to w>PL; very moist to wet.	SC-CL		-38.1	S39	DO	8 -12 -18 -24	30	0.8 / 2.0	
215	-45	213.0 - 215.0 CLAYEY SILT with fine SAND; very moist; soft.	CL		-43.1	S40	DO	11 -24 -33 -50/3"	57	1.8 / 2.0	Poor recovery.
220	-50	218.0 - 219.0 SILTY SAND; fine to medium; some low plasticity fines; cohesive to non-cohesive; grey.	SM		-47.1	S41	DO	36 -31 -36 -50/4.5"	67	2.0 / 2.0	Drillers note: starting to take water.
			CL		219.0 -48.1						
		219.0 - 220.0 SILTY CLAY; seams of fine SILTY SAND; cohesive; w~PL.									
225	-55	223.0 - 225.0 SILTY CLAY with fine SAND; silty SAND and layered CLAY seams; cohesive; dark grey; thinly stratified; w~PL; wet.	CL		-53.1	S42	DO	10 -50/5.5"	NA	1.0 / 2.0	
230	-60	228.0 - 230.0 SAND; fine to medium; trace fines; brown grey to grey; dense.	SP		-58.1	S43	DO	50/4.5"	NA	0.3 / 2.0	Drilled down to 240 ft. bgs for well installation.
235	-65	233.0 - 235.0 CLAYEY SAND; fine; some soft sand seams, firm clay partings, and dirty sand; dark grey to grey; cohesive; w~PL to w>PL.	SC		-63.1	S44	DO	18 -28 -50/5"	NA	1.7 / 2.0	
240	-70	238.0 - 238.3 CLAYEY SAND; fine; some soft sand seams, firm clay partings, and dirty sand; dark grey to grey; cohesive; w~PL to w>PL.	SC		238.3 -68.1	S45	DO	17 -37 -50/3"	NA	1.3 / 2.0	
		238.3 - 240.0 Weathered soft shale; with fine SAND; black to dark grey.									
		Boring completed at 240.0 ft									
245	-75										
250	-80										
255											

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-13

SHEET 1 of 6

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 270.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 75
DATE STARTED: 5/6/13
DATE COMPLETED: 5/14/13
WEATHER: Sunny

DATUM:
COORDS: N: 499,205.1 E: 1,386,147.4
GS ELEVATION: 158.4 ft
TOC ELEVATION: NA
TEMPERATURE: 59 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0	155	3.0 - 5.0 Topsoil to 3.2 ft.; dark brown; organics; moist. Below 3.2 ft: SAND; fine to medium, coarsening to bottom; 12-15% fines; orange brown and rust brown; noncohesive; moist; compact.	SM		153.4	S1	SS	7 -12 -15 -16	27	1.7 / 2.0	
5	150	8.0 - 10.0 As above to 8.5 ft; orange brown to tan brown to pale grey. Below 8.5 ft: Silty SAND to SAND; fine; some to trace of noncohesive silt, fine to medium sand, occasional loose CLAY silt seams; moist; compact.	SM		148.4	S2	SS	8 -8 -12 -11	20	1.7 / 2.0	
10	145	13.0 - 15.0 As above. SAND; fine to medium; 5-12% fines; pale brown to orange brown; layered, moist to very moist; loose.	SW-SP		143.4	S3	SS	5 -6 -5 -9	11	1.5 / 2.0	
15	140	18.0 - 20.0 SAND to SILTY SAND; fine; occasional hardpan silt seams; orange brown to pale brown to brown; layered; noncohesive; moist; loose to compact.	SM		138.4	S4	SS	7 -7 -9 -8	16	1.4 / 2.0	
20	135	23.0 - 25.0 To 23.6 ft: Sandy CLAY; fine; grey to pale brown; cohesive; very moist; soft. Below 23.6 ft: CLAY SILT; pale red grey; layered and friable; cohesive; w<PL; stiff.	SC-MH		133.4	S5	SS	8 -11 -17 -22	28	1.7 / 2.0	
25	130	28.0 - 30.0 CLAY SILT; 12-15% fine sand; pale grey; dilatent, blocky structure; cohesive; moist to wet; dense.	MH		128.4	S6	SS	9 -16 -19 -34	35	2.0 / 2.0	
30	125	33.0 - 35.0 As above to 34 ft. Below 34 ft.: SILTY CLAY; low plasticity; pale red grey; friable; moist.	MH		123.4	S7	SS	9 -12 -15 -26	27	2.0 / 2.0	
35	120	38.0 - 40.0 CLAY SILT to SILTY CLAY; occasional thin silt lenses, fine silty sand at bottom 0.2 ft.; maroon red to pale grey to pale mottled purple to tan brown; thinly laminated, layered; cohesive; very moist to wet, w>PL.	CL		118.4	S8	SS	10 -15 -16 -29	31	2.0 / 2.0	
40	115	43.0 - 45.0 Silty SAND to CLAYEY SILTY SAND, becoming CLAY SILT from 44 ft. downward; 12-15% fines; grey; trace of hard rust brown concrete; cohesive; w~PL; compact to dense.	SM		113.4	S9	SS	13 -14 -42 -42	N/A	2.0 / 2.0	
45	110	48.0 - 50.0 SILTY CLAY to 48.5 ft.; low plasticity; some fine sand; pale grey; cohesive; w>PL; stiff. Below 48.5 ft.: SILTY SAND; fine; some low plastic fines; cohesive; wet. (Water table @ approx. 48.5	CL		108.4	S10	SS	6 -13 -31 -33	44	2.0 / 2.0	
50		Log continued on next page									

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-13

SHEET 2 of 6

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 270.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 75
DATE STARTED: 5/6/13
DATE COMPLETED: 5/14/13
WEATHER: Sunny

DATUM:
COORDS: N: 499,205.1 E: 1,386,147.4
GS ELEVATION: 158.4 ft
TOC ELEVATION: NA
TEMPERATURE: 59 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
		ft.)									
55	105	53.0 - 55.0 SILTY SAND; fine; low plastic fines; pale grey to tan brown; layered; wet; dense.	SM		103.4	S11	SS	24 -47 -50/4	N/A	0.8 / 2.0	
60	100	58.0 - 60.0 SAND; fine to medium; trace of fines; grey brown to tan brown; noncohesive; moist; dense to stiff.	SW		98.4	S12	SS	33 -50/4	N/A	0.6 / 2.0	
65	95	63.0 - 65.0 SAND; fine to medium; moist to wet. As above.	SW		93.4	S13	SS	50 -50/3	N/A	0.7 / 2.0	
70	90	68.0 - 70.0 SAND; medium; trace of fine and coarse sand, 15-20% silt; brown to pale brown; wet to saturated; dense.	SP		88.4	S14	SS	21 -20 -31 -32	51	1.7 / 2.0	
75	85	73.0 - 75.0 SILTY CLAY to CLAY; 0.2 ft of silty fine sand seam near top (73.3-73.5 ft.); red brown to grey to maroon red and mottled grey; blocky and friable structure; possible deformed clay; w>PL; hard.	CL		83.4	S15	SS	14 -33 -38 -48	71	1.9 / 2.0	Transition zone. Have to retrieve more water due to the sand drilling.
80	80	78.0 - 80.0 CLAY; low to medium plasticity; grey maroon to mottled red, lustrous; blocky structure, waxy; cohesive; w>PL; stiff to hard.	CL		78.4	S16	SS	7 -18 -28 -38	16	2.0 / 2.0	
85	75	83.0 - 85.0 As above. CLAY; waxy; cohesive; w>PL; hard.	CH		73.4	S17	SS	14 -19 -25 -34	44	2.0 / 2.0	
90	70	88.0 - 90.0 CLAY to SILTY CLAY; low to medium plasticity; maroon red to mottled grey to 89 ft., then grey with slight pale red mottling; cohesive; w>PL; stiff to hard.	CL-CH		68.4	S18	SS	10 -19 -29 -37	48	2.0 / 2.0	
95	65	93.0 - 95.0 SILTY CLAY to CLAY; medium plasticity; trace of fine sand; maroon red to redish grey to mottled purple to brown; cohesive; w>PL; stiff.	CL-CH		63.4	S19	SS	9 -13 -18 -25	31	2.0 / 2.0	
100	60	98.0 - 100.0 As above. Medium to high plasticity; maroon to mottled grey; thinly laminated; stiff to hard.	CL-CH		58.4	S20	SS	9 -17 -22 -34	39	2.0 / 2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-13

SHEET 3 of 6

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 270.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 75
DATE STARTED: 5/6/13
DATE COMPLETED: 5/14/13
WEATHER: Sunny

DATUM:
COORDS: N: 499,205.1 E: 1,386,147.4
GS ELEVATION: 158.4 ft
TOC ELEVATION: NA
TEMPERATURE: 59 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
	55	103.0 - 105.0 As above. Blocky, becomes friable near bottom 0.9 ft.; cohesive; w>PL.	CL-CH		53.4	S21	SS	14 -21 -37 -50	58	2.0 / 2.0	
105						S22	SH	N/A -N/A -N/A -N/A	N/A	N/A / 2.0	SHELBY TUBE collected.
	50	108.0 - 110.0 SILTY CLAY to CLAY SILT, becomes CLAY SILT @ 109.4 ft.; brown to pale purple to grey brown; cohesive; w<PL to w~PL; stiff. Below 109.4 ft.: medium plasticity; trace of fine sand; grey brown; soft.	CL-ML		48.4	S23	SS	17 -16 -30 -34	46	2.0 / 2.0	Drilled without sampling.
110											
	45	113.0 - 114.5 CLAY to SILTY CLAY; medium to high plasticity; some grey silt spots; brown red mottling; blocky structure, friable, slightly laminated near the top; cohesive; w~PL; stiff.	CH		43.9	S24	SS	17 -24 -32	56	1.7 / 2.0	Drove 1.5 ft interval since rods sank 0.5 ft.
115											
	40	118.0 - 120.0 CLAY; trace of fine sand with pockets of navy blue clay @ 119.2-119.4 ft.; grey pale purple to maroon red; blocky structure, slightly laminated, waxy; w>PL; stiff to hard.	CH		38.4	S25	SS	10 -16 -22 -26	38	2.0 / 2.0	
120											
	35										
125											
	30	128.0 - 130.0 CLAY TO SILTY CLAY; trace to some fine sand, silt towards bottom; maroon red brown to rust brown to mottled grey to pale purple; cohesive; w<PL; stiff to hard.	CL-ML		28.4	S26	SS	16 -24 -35 -44	59	2.0 / 2.0	
130											
	25										
135											
	20	138.0 - 140.0 SILTY CLAY; trace of fine sand; grey; massive structure; cohesive; w<PL.	ML		18.4	S27	SS	16 -30 -50/5	>50	1.4 / 2.0	
140											
	15										
145											
	10	148.0 - 150.0 CLAY; some nonplastic silt, trace of fine sand; maroon red to mottled grey to pale purple; cohesive; w<PL; hard.	CH		8.4	S28	SS	15 -22 -29 -37	51	N/A / 2.0	
150											

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-13

SHEET 4 of 6

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 270.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 75
DATE STARTED: 5/6/13
DATE COMPLETED: 5/14/13
WEATHER: Sunny

DATUM:
COORDS: N: 499,205.1 E: 1,386,147.4
GS ELEVATION: 158.4 ft
TOC ELEVATION: NA
TEMPERATURE: 59 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
155	5										
	0	158.0 - 160.0 As above.	CH		-1.6	S29	SS	11 -19 -28 -36	47	2.0 / 2.0	Hard drilling interval.
160	-5										
165	-10	168.0 - 170.0 CLAY to SILTY CLAY; medium to high plasticity; maroon red to olive brown and mottled grey; blocky structure, waxy; cohesive; w<PL; very hard.	CH-ML		-11.6	S30	SS	20 -32 -50/5	>50	2.0 / 2.0	
170	-15										
175	-20	178.0 - 180.0 As above to 178.7 ft., then: CLAY SILT; medium plasticity; trace to some fine sand; pale purple to grey to dark green; friable; cohesive; friable; w<PL; stiff to hard.	CH-ML		-21.6	S31	SS	13 -22 -31 -38	53	1.8 / 2.0	
180	-25										
185	-30	188.0 - 190.0 SILTY CLAY and SILT; some fine sand, layered intermittent clay seams; pale red to brown to red brown to grey to old brown; slightly laminated, shiny; cohesive; w~PL; stiff to firm.	ML-SC		-31.6	S32	SS	12 -23 -34 -35	57	2.0 / 2.0	Transition zone.
190	-35										
195	-40	198.0 - 200.0 CLAYEY SILT to CLAYEY SAND; fine; fines with occasional firm clay lenses and seams; cohesive; w~PL, very moist.	MH-SC		-41.6	S33	SS	11 -14 -26 -39	40	2.0 / 2.0	
200	-45										

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-13

SHEET 5 of 6

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 270.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 75
DATE STARTED: 5/6/13
DATE COMPLETED: 5/14/13
WEATHER: Sunny

DATUM:
COORDS: N: 499,205.1 E: 1,386,147.4
GS ELEVATION: 158.4 ft
TOC ELEVATION: NA
TEMPERATURE: 59 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
205											
	-50	208.0 - 210.0 CLAYEY SILT to CLAYEY SAND; grey to dark grey; dry; soft to firm.	ML-SC		-51.6	S34	SS	14 -18 -24 -33	42	2.0 / 2.0	
210											
	-55										
215											
	-60	218.0 - 220.0 CLAYEY SAND to SILTY SAND; fine sand, stif clay; dark grey; cohesive; moist to very moist.	SC		-61.6	S35	SS	10 -17 -21 -23	38	2.0 / 2.0	Switched back to 5 ft samples.
220											
	-65	223.0 - 225.0 SILTY CLAY; occasional fine sand pockets, silt seams, @ 223.6 ft.: black shale-like seam (00.5 mm); dark grey; layered; cohesive; stiff.	CL		-66.6	S36	SS	17 -20 -24 -32	44	1.9 / 2.0	
225											
	-70	228.0 - 230.0 SILTY CLAY to CLAYEY SILT; trace of fine sand; dark grey; cohesive; w<PL to w~PL; stiff to hard.	CL		-71.6	S37	SS	13 -24 -32 -50/5	56	2.0 / 2.0	
230											
	-75	233.0 - 235.0 CLAY SAND; same SILTY CLAY as intermitten layered seams; dark grey; dilatent; moist to wet; firm to soft, compact.	SC		-76.6	S38	SS	33 -50/3	>50	0.6 / 2.0	Drilling hard @ 232 ft. for approx. 8 in. Already used up to 350 gals of drill water that morning.
235											
	-80	238.0 - 240.0 CLAYEY SILT, SILTY CLAY @ top 0.2 ft.; low plasticity; excess peat; hard maroon red to dark grey; massive structure; cohesive; w<PL.	ML		-81.6	S39	SS	43 -50/4	N/A	1.0 / 2.0	Hard drilling to rest of interval, used 80 gals of water.
240											
	-85	243.0 - 245.0 As above. SILTY CLAY to CLAY; hardpan silt; grey brown with maroon mottled red; in shape of spoon; stiff.	ML-CL		-86.6	S40	SS	32 -50/5	>50	1.0 / 2.0	
245											
	-90	248.0 - 250.0 CLAYEY SAND, dark red SILTY CLAY @ top 0.1 ft.; fine to medium; occasional CLAYEY SILT seams; grey to pale grey; blocky structure; cohesive; w~PL, very moist; dense to stiff.	SC		-91.6	S41	SS	WOR -16 -25 -50/4	41	1.6 / 2.0	
250											
	-95	253.0 - 255.0 SAND; fine; some silts and fines (12-15%); trace of medium sand; tan brown; very moist; dense.	SP		-96.6	S42	SS	50/3+50/4	>50	0.6 / 2.0	
255		Log continued on next page									

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-13

SHEET 6 of 6

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 270.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 75
DATE STARTED: 5/6/13
DATE COMPLETED: 5/14/13
WEATHER: Sunny

DATUM:
COORDS: N: 499,205.1 E: 1,386,147.4
GS ELEVATION: 158.4 ft
TOC ELEVATION: NA
TEMPERATURE: 59 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
255											
	-100	258.0 - 260.0 NO RECOVERY; fine to medium sand with brown wet residue.			-101.6	S43	SS	50/2	N/A	N/A / 2.0	
260											
	-105	263.0 - 265.0 SAND; medium grained, subrounded; 12-15% clay fines, trace of fine sand, occasional think soft clay lenses; pale grey to pale brown; noncohesive; very moist to wet; dense.	SP	△ △ △ △ △ △	-106.6	S44	SS	45 -50/3+100/4	>50	0.6 / 2.0	
265											
	-110	268.0 - 270.0 CLAYEY SAND; fine to medium grained, subrounded; trace of coarse, subangular to subrounded sand, frequent thin silty clay seams throughout (~5-10 mm); pale grey; cohesive to noncohesive; very moist to wet; dense to firm.	SC		-111.6	S45	SS	50/1		0.6 / 2.0	Drill rods @ ~250 ft. slipped down borehole and into unit approx. 12 in.
270		Boring completed at 270.0 ft									
	-115										
275											
	-120										
280											
	-125										
285											
	-130										
290											
	-135										
295											
	-140										
300											
	-145										
305											

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-18

SHEET 1 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 85.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 55- ATV
DATE STARTED: 5/20/13
DATE COMPLETED: 5/20/13
WEATHER: Overcast

DATUM:
COORDS: N: 501,971.0 E: 1,387,520.4
GS ELEVATION: 73.6 ft
TOC ELEVATION: NA
TEMPERATURE: 65 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0	70	3.0 - 5.0 SANDY LOAM to 1.0 ft., then CLAYEY SILT; fine graded; fine sand with fines; pale grey to brown and pale brown; some organic matter; very moist; soft to firm.	CL-ML		68.6	S1	SS	3 -6 -6 -9	12	1.4 / 2.0	No camera for first 3 intervals.
5	65	8.0 - 10.0 CLAYEY SAND; fine graded; trace subrounded coarse gravel; dark brown; cohesive; very moist to wet; soft.	SC		63.6	S2	SS	10 -10 -12 -8	22	1.2 / 2.0	Encountered gravel layer @ ~6 ft bgs.
10	60	13.0 - 15.0 Down to 13.9 ft.: SAND; medium to coarse, subrounded; intermitten CLAY seams (up to 0.2 ft thick); pale grey; wet; loose to firm. Below 13.9 ft.: CLAYEY SAND; fine to medium; trace orange brown soil; pale grey to tan and dark brown; wet; compact.	SP		58.6	S3	SS	4 -8 -12 -18	20	1.7 / 2.0	
15	55	18.0 - 20.0 SAND; fine to medium, uniformly graded; trace of fines occasional hardpan silt lenses; brown to tan brown, dark red to brown; wet; compact.	SP		53.6	S4	SS	15 -17 -19 -21	36	1.8 / 2.0	
20	50	23.0 - 25.0 SILTY CLAY; pale purple to dark mottled red to pale grey; slightly laminated @ bottom 0.2 ft; cohesive; w>PL.	CL		48.6	S5	SS	13 -28 -50/4	>50	1.2 / 2.0	
25	45	28.0 - 30.0 SILTY CLAY to CLAYEY SILT; low plasticity; trace fine sand; pale purple to pin to grey and maroon mottled red; cohesive; moist, w>PL; firm to stiff.	CL		43.6	S6	SS	14 -26 -36 -48	62	2.0 / 2.0	
30	40	33.0 - 35.0 SILTY CLAY to CLAYEY SILT; low plasticity; trace fine sand; brown to yellow brown to pale grey to marron mottled red; thinly laminated at top 0.4 ft.; friable; cohesive; moist, w>PL; firm to stiff.	CL-ML		38.6	S7	SS	20 -28 -32 -40	60	2.0 / 2.0	
35	35	38.0 - 40.0 SILTY CLAY to CLAYEY SILT; low to medium plasticity; pockets of grey CLAY SILT; brown to maroon red and grey; laminated at top 0.3 ft., friable; cohesive; w>PL; firm to stiff.	CL-ML		33.6	S8	SS	10 -18 -26 -34	44	2.0 / 2.0	
40	30	43.0 - 45.0 SILTY CLAY to CLAY; low to medium plasticity; trace of silt and grey silt stringers; red brown to brown to dark brown; massive structure, varved at top 0.3 ft.; cohesive; w>PL; stiff to hard.	CL-MH		28.6	S9	SS	11 -20 -28 -36	48	2.0 / 2.0	
45	25	48.0 - 50.0 CLAY to SILTY CLAY; low plasticity; dark grey; slightly friable; cohesive; w>PL; stiff to hard.	CL		23.6	S10	SS	12 -18 -28 -34	46	2.0 / 2.0	
50		Log continued on next page									

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE:

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-18

SHEET 2 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 85.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 55- ATV
DATE STARTED: 5/20/13
DATE COMPLETED: 5/20/13
WEATHER: Overcast

DATUM:
COORDS: N: 501,971.0 E: 1,387,520.4
GS ELEVATION: 73.6 ft
TOC ELEVATION: NA
TEMPERATURE: 65 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
											Transition zone.
55	20	58.0 - 60.0 CLAYEY SAND to SILTY SAND, SILTY CLAY at top 0.3 ft.; fine grained; intermitten firm clay seams throughout; dark brown to pale brown to pale grey, dark grey; cohesive to noncohesive; moist; very dense.	SC-SM		13.6	S11	SS	10 -19 -28 -50/4	47	1.9 / 2.0	
60	15	63.0 - 65.0 SILTY SAND to CLAYEY SILT; fine; pockets of SILTY fine SAND, intermitten SILTY CLAY seams, occasional wet sand seams (up to 0.1 ft thick); compact. SILTY CLAY: CLAYEY SILT stringers at bottom 0.3 ft.; pale grey to grey with red; cohesive; w>~PL; firm.	SM-MH		8.6	S12	SS	15 -26 -50/5	>50	1.7 / 2.0	
65	10	68.0 - 70.0 SILTY CLAYEY SAND; fine; pink brown to orange brown to maroon red and pink mottled grey; cohesive to noncohesive; w~PL. SAND: medium; occasional wet seams, trace of fine grey gravel, trace of clay at bottom of spoon (0.1 ft); maroon red fine sandy silt.	CL-ML		3.6	S13	SS	18 -36 -39 -50/4	75	1.9 / 2.0	
70	5	73.0 - 75.0 SAND; fine to medium; trace to some fines, occasional soft, pale grey SILTY CLAY pockets, sand; tan brown to brown, orange to brown; slightly shiny, layered; very moist; compact to dense.	SP		-1.4	S14	SS	44 -50/4	>50	0.7 / 2.0	
75	0	78.0 - 80.0 SAND; fine to medium, poorly gaded; brown to pale grey with orange brown; layering at bottom half; moist to wet; dense.	SP		-6.4	S15	SS	50/4+50/3	N/A	0.6 / 2.0	
80	-5	83.0 - 85.0 SAND; medium, poorly graded, subrounded; trace fines, some fine sand; tan brown to brown; wet; dense.	SP		-11.4	S26	SS	50/6	N/A	0.5 / 2.0	
85	-10	Boring completed at 85.0 ft									
90	-15										
95	-20										
100	-25										

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE:

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-19

SHEET 1 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 90.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 4/16/13
DATE COMPLETED: 4/17/13
WEATHER: Overcast

DATUM:
COORDS: N: 502,391.0 E: 1,386,879.8
GS ELEVATION: 103.3 ft
TOC ELEVATION: NA
TEMPERATURE: 56 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0		0.0 - 2.0 CLAY; medium to high plasticity; reddish purple mottled white, shiny; trace organics; cohesive; w<PL; stiff.	CH		101.3	S1	DO	4 -8 -12 -17	20	1.2 / 2.0	
5	100	3.0 - 5.0 CLAY; medium to high plasticity; red to maroon mottled grey, shiny; yellowish brown staining at ~3 to 4 ft bgs, cohesive; stiff.	CH		98.3	S2	DO	4 -13 -19 -20	32	1.0 / 2.0	
10	95	8.0 - 8.6 SILTY CLAY; low to medium plasticity; mottled red and white; thinly laminated; yellow staining; cohesive; w~PL; stiff.	CL CL CH		94.7 93.7	S3	DO	5 -10 -16 -17	26	1.6 / 2.0	
		8.6 - 9.0 SILTY CLAY; low to medium plasticity; light grey; w<PL; stiff.									
15	90	9.0 - 9.6 CLAY; red to maroon mottled white; thinly laminated; cohesive; stiff.	CH		89.7	S4	DO	6 -10 -15 -16	25	1.2 / 2.0	
		13.0 - 13.6 CLAY; medium to high plasticity; purplish grey, shiny; cohesive; w~PL; stiff.	CH		13.6 88.3						
		13.6 - 15.0 CLAY; medium to high plasticity; trace gravel, lens of fine to medium yellowish brown sand; light grey mottled maroon; cohesive; stiff.									
20	85	18.0 - 20.0 CLAY; medium to high plasticity; trace of coarse rounded gravel (~25 mm.); rust red; cohesive; w>PL; soft.	CH		83.3	S5	DO	5 -11 -12 -16	23	0.3 / 2.0	
25	80	23.0 - 25.0 CLAY; medium to high plasticity; rust red and grey; cohesive; w>PL; very soft.	CH		78.3	S6	DO	5 -11 -13 -15	24	0.7 / 2.0	
30	75	28.0 - 30.0 CLAY; medium to high plasticity; lenses of fine grey silty sand; greyish brown, shiny; some thin lamination; noncohesive to cohesive; moist; stiff.	CH		73.3	S7	DO	10 -12 -20 -30	32	1.9 / 2.0	
35	70	33.0 - 35.0 SILTY CLAY; low to medium plasticity; lens of fine grey sand; grey mottled maroon, slightly shiny; some thin laminations; noncohesive to cohesive; moist; stiff.	CL		68.3	S8	DO	8 -12 -18 -25	30	1.9 / 2.0	
40	65	38.0 - 40.0 SILTY CLAY; low to medium plasticity; trace fine sand; slightly fissured throughout; grey mottled maroon, slightly shiny; some thin laminations; noncohesive to cohesive; moist; stiff.	CL		63.3	S9	DO	10 -14 -20 -26	34	0.8 / 2.0	
45	60	43.0 - 45.0 CLAY; medium to high plasticity; grey mottled maroon, shiny; slightly fissured throughout; cohesive; stiff.	CH		58.3	S10	DO	10 -16 -22 -23	38	1.9 / 2.0	
50	55	48.0 - 50.0 SILTY CLAY; low to medium plasticity; some fine light grey sand; mottled light grey and maroon; cohesive; stiff.	CL		53.3	S11	DO	10 -13 -20 -23	33	1.9 / 2.0	

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-19

SHEET 2 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 90.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: Mud Rotary- 3 in.
DRILL RIG: Simco 2800
DATE STARTED: 4/16/13
DATE COMPLETED: 4/17/13
WEATHER: Overcast

DATUM:
COORDS: N: 502,391.0 E: 1,386,879.8
GS ELEVATION: 103.3 ft
TOC ELEVATION: NA
TEMPERATURE: 56 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
50	53	53.0 - 55.0 SILTY CLAY; low to medium plasticity; mottled grey and dark red, dull; cohesive; stiff. 53.6-54.0 ft w>PL; soft.	CL		48.3	S12	DO	19 -20 -37 -40	57	0.9 / 2.0	
55	48										
45	43	58.0 - 60.0 CLAY; medium to high plasticity; some silt; mottled grey and maroon, shiny; cohesive; w~PL; stiff.	CH		43.3	S13	DO	12 -14 -21 -22	35	0.7 / 2.0	
60	38	60.0 - 62.0 SILTY CLAY; low to medium plasticity; some fine sand; dark grey mottled brown; cohesive;, stiff.	CL		60.0 41.3	S14	DO	12 -14 -24 -28	38	2.0 / 2.0	
40	33	62.0 - 64.0 SILTY CLAY; low plasticity; lenses of fine grey silty sand, pockets of fine grey sand; light grey, shiny; cohesive; stiff.	CL		62.0 39.3	S15	DO	15 -16 -24 -28	40	2.0 / 2.0	
65	28	64.0 - 66.0 SILTY SAND; nonplastic, fine; some plastic fines, lenses of fine grey sand; light grey, shiny; noncohesive to cohesive; trace black material-soft, shiny, possibly organic; moist.	SM		64.0 37.3	S16	DO	15 -18 -24 -45	42	1.9 / 2.0	
			SM		66.0 35.3	S17	DO	25 -39 -50/4	N/A	1.7 / 2.0	Drilled w/o sampling. (67.3'-68')
35	23	66.0 - 68.0 SILTY SAND; fine, nonplastic; pockets of fine grey sand; light grey; noncohesive; moist; very dense.	CL		68.0 33.3	S18	DO	14 -23 -30 -45	53	1.8 / 2.0	
70	18	68.0 - 70.0 SILTY CLAY; low to medium plasticity; lenses of fine to medium sand; dark grey, slightly shiny; cohesive; stiff.	CL		70.0 31.3	S19	DO	23 -50/5	N/A	0.9 / 2.0	Drilled w/o sampling. (70.9'-72')
30	13	70.0 - 72.0 SILTY CLAY; low to medium plasticity; pockets of fine grey sand, lens of fine to med reddish brown sand; dark grey; cohesive; very stiff.	CL		72.0 29.3	S20	DO	24 -35 -50/5	N/A	1.8 / 2.0	Drilled w/o sampling. (73.4'-74')
75	8	72.0 - 74.0 SILTY CLAY; low to medium plasticity; lenses of fine to medium light grey sand; light grey mottled rust red, slightly shiny; cohesive; stiff.	CL		74.0 27.3	S21	DO	27 -40 -50/5	N/A	0.9 / 2.0	Drilled w/o sampling. (75.4'-76')
			ML		76.0 25.3	S22	DO	16 -30 -50/5	N/A	0.9 / 2.0	Drilled w/o sampling. (77.4'-78')
25	3	74.0 - 76.0 SILTY CLAY; low to medium plasticity; pockets of fine to medium light grey sand; light grey mottlled browish red, slightly shiny; cohesive; w~PL; stiff.	SM		78.0 23.3	S23	DO	22 -32 -37 -50/3	69	1.5 / 2.0	
80	-2	76.0 - 78.0 CLAYEY SILT; low plasticity; light grey mottled brownish red; lens of fine to medium light grey sand; slightly fissured; cohesive; w<PL; stiff.									
20	-7	78.0 - 80.0 SILTY SAND; fine to medium, nonplastic; lenses of light grey mottled brownish red clayey silt; light grey; noncohesive; moist to wet; very dense.	SM		18.3	S24	DO	49 -37 -50/4	N/A	1.3 / 2.0	Drilled w/o sampling. (89.4'-85')
85	-12	83.0 - 85.0 SILTY SAND; fine to medium, nonplastic; light grey; noncohesive; moist to wet; very dense.									
15	-12	88.0 - 90.0 SILTY SAND, transition into very soft CLAY; ~0.4 ft. of fine to medium sand, nonplastic; grey; moist; very dense. ~0.9 ft. of CLAY; high plasticity; grey and red; cohesive; w>PL; very soft.	SP		13.3	S25	DO	50/5	N/A	1.3 / 2.0	Drilled w/o sampling.
90	-17	Boring completed at 90.0 ft									
10	-17										
95	-22										
5	-22										
100	-27										

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: Earth Matters Inc.
DRILLER: D. Taylor

GA INSPECTOR: KMC
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-23

SHEET 1 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 230.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 75
DATE STARTED: 5/29/13
DATE COMPLETED: 5/30/13
WEATHER: Partly Cloudy

DATUM:
COORDS: not surveyed
GS ELEVATION:
TOC ELEVATION: NA
TEMPERATURE: 68 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0		3.0 - 3.3 SANDY SILT; dark red brown; organics; moist; firm.	SM ML-CL		3.3	S1	SS	5 -8 -10 -16	18	1.3 2.0	
5		3.3 - 5.0 CLAYEY SILT, SILTY CLAY; clay seams; dark red brown; blocky; cohesive; w>PL; stiff.									
		8.0 - 10.0 CLAYEY SILT, SILTY CLAY; low plasticity; clay seams; trace fine gravel; dark red brown; blocky; cohesive; w>PL; stiff to hard.	ML-CL			S2	SS	9 -13 -19 -26	32	1.9 2.0	
10		13.0 - 15.0 CLAYEY SILT, SILTY CLAY; low plasticity; clay seams; trace fine gravel; marron red-grey-brown mottling; blocky; cohesive; w>PL; hard.	ML-CL			S3	SS	8 -14 -19 -27	33	1.9 2.0	
15		18.0 - 20.0 CLAYEY SILT, SILTY CLAY; low plasticity; clay seams; trace fine gravel; marron red-grey-brown mottling; friable, blocky; cohesive; w>PL; stiff.	ML-CL			S4	SS	7 -12 -14 -23	26	1.8 2.0	Clay possibly swelling in borehole.
20		23.0 - 25.0 CLAYEY SILT; trace fine to medium sand; maroon; friable, blocky structure; cohesive; w>PL.	MH			S5	SS	8 -13 -17 -23	30	2.0 2.0	Clay swelled enough to close borehole and refuse rods- used 15' of 4'1/4" HSAs to support hole and resumed drilling and sampling through augers from 0-15 ft bgs.
25		28.0 - 30.0 SILTY SAND; trace fines; clay seams; pale brown grey; cohesive; moist.	SM			S6	SS	19 -27 -25 -50/5"	52	1.9 2.0	
30		33.0 - 35.0 SILTY SAND; occasional pockets of fine sand, clay seams; pale brown grey; cohesive; moist.	SM			S7	SS	26 -40 -41 -50/4"	81	1.8 2.0	
35		38.0 - 40.0 SILTY SAND; fine, poorly graded; grey brown to tan brown; moist.	SM			S8	SS	22 -31 -50/5"	81	1.2 2.0	
40		43.0 - 45.0 SAND; fine to medium, poorly graded; trace silt; grey brown to tan brown; moist.	SP			S9	SS	34 -50/4.5"	N/A	0.9 2.0	
45		48.0 - 50.0 SAND; fine to medium; some fines; tan brown to brown; moist; dense.	SP			S10	SS	34 -50/6"	N/A	0.8 2.0	
50		Log continued on next page									

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY:
DATE:

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 8/28/13

RECORD OF BOREHOLE PMW-23

SHEET 2 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 230.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 75
DATE STARTED: 5/29/13
DATE COMPLETED: 5/30/13
WEATHER: Partly Cloudy

DATUM:
COORDS: not surveyed
GS ELEVATION:
TOC ELEVATION: NA
TEMPERATURE: 68 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
55		53.0 - 55.0 SAND; fine to medium; trace fines; grey brown; moist; compact to dense.	SP			S11	SS	27 -50/5"	N/A	0.9/2.0	
60		58.0 - 60.0 SAND; fine to medium; trace pale green clay seams; brown to tan brown; moist to wet; dense.	SP			S12	SS	33 -50/5.5"	N/A	0.9/2.0	
65		63.0 - 65.0 SAND; fine to medium; occasional soft clay pale green; brown to tan brown; moist to fry; dense.	SP			S13	SS	27 -40 -50/4"	90	1.1/2.0	
70		68.0 - 70.0 SAND; fine to medium, poorly graded; some coarse sand; tan brown; moist to wet.	SP			S14	SS	39 -50/4"	N/A	0.7/2.0	
75		73.0 - 75.0 SAND; medium to coarse; trace fines, some dirty sand; tan brown; dilatent, subrounded; dense to compact.	SP			S15	SS	18 -21 -27 -50/5"	48	1.8/2.0	
80		78.0 - 80.0 SILTY SAND to SANDY CLAY; maroon red clay seams; maroon red to pale green; cohesive; w>PL; moist.	SM-SC			S16	SS	10 -13 -20 -28	33	2.0/2.0	
85		83.0 - 85.0 CLAYEY SAND; some silt pockets and seams, trace charcoal-like matter; cohesive to noncohesive; w>PL; moist.	SC			S17	SS	14 -24 -50/4"	74	1.7/2.0	
90		88.0 - 90.0 CLAYEY SILT to SILTY CLAY; trace fine sand; dark grey; cohesive; blocky, slightly friable; w>PL; stiff.	ML-CL			S18	SS	8 -13 -22 -30	35	1.9/2.0	
95		93.0 - 95.0 CLAYEY SILT to SILTY CLAY; dark grey; cohesive; w>PL; stiff.	ML-CL			S19	SS	10 -14 -24 -28	35	2.0/2.0	
100		98.0 - 100.0 SILTY CLAY to CLAYEY SILT; soft clay seams; low plasticity; dark grey; cohesive; blocky; stiff.	ML-CL			S20	SS	4 -9 -12 -21	21	2.0/2.0	
		Log continued on next page									

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY:
DATE:

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 8/28/13

RECORD OF BOREHOLE PMW-23

SHEET 3 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 230.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 75
DATE STARTED: 5/29/13
DATE COMPLETED: 5/30/13
WEATHER: Partly Cloudy

DATUM:
COORDS: not surveyed
GS ELEVATION:
TOC ELEVATION: NA
TEMPERATURE: 68 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
105		103.0 - 105.0 SILTY CLAY to CLAYEY SILT; soft clay seams; low plasticity; dark grey; cohesive; blocky; w>PL; moist; stiff.	ML-CL			S21	SS	5 -14 -19 -30	33	2.0/2.0	
110		108.0 - 110.0 SILTY CLAY to CLAYEY SILT; low plasticity; dark grey to brown; cohesive; massive structure.	ML-CL			S22	SS	9 -16 -26 -31	42	2.0/2.0	
115		113.0 - 115.0 SILTY CLAY to CLAYEY SILT; dark grey to brown; low plasticity; massive structure; cohesive; w>PL.	ML-CL			S23	SS	9 -15 -18 -25	33	2.0/2.0	
120		118.0 - 120.0 SILTY CLAY to CLAYEY SILT; some fine sand lenses, pockets of cemented sandy silt pockets and occasional black coal pockets; dark grey to brown; cohesive; w>PL.	ML-CL			S24	SS	9 -18 -26 -40	44	2.0/2.0	
125		123.0 - 125.0 CLAY; low to medium plasticity; maroon red to dark brown; cohesive; w>PL; hard.	CH			S25	SS	8 -10 -17 -23	27	2.0/2.0	
130		128.0 - 130.0 Shelby tube collected	ML			S26	SS	N/A		1.6/2.0	
135		138.0 - 140.0 CLAY; medium to high plasticity; pale purple to brown grey to maroon red mottled yellow btown; cohesive; blocky and friable; w>PL; very hard.	CH			S27	SS	16 -22 -30 -47	52	2.0/2.0	
145		148.0 - 150.0 CLAY; trace silt; tan brown grey to grey brown; cohesive; blocky and friable; w>PL; hard.	CH			S28	SS	13 -21 -28 -38	49	2.0/2.0	Drilled w/o sampling. (150'-158'). Drillers note materials feels like hard clay.
150		Log continued on next page									

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY:
DATE:

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 8/28/13

RECORD OF BOREHOLE PMW-23

SHEET 4 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 230.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 75
DATE STARTED: 5/29/13
DATE COMPLETED: 5/30/13
WEATHER: Partly Cloudy

DATUM:
COORDS: not surveyed
GS ELEVATION:
TOC ELEVATION: NA
TEMPERATURE: 68 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
155											
		158.0 - 160.0 CLAY to SILTY CLAY; some fine sand and silt seams; dark grey; cohesive; w~PL; stiff.	CH-ML			S29	SS	11 -14 -19 -27	33	2.0 / 2.0	
160											Drilled w/o sampling. (160'-168'). Drillers note coarse material.
165											
		168.0 - 170.0 SILTY CLAY to SILTY SAND; some sandy silty seams, trace coarse gravel; dark grey; cohesive; w~PL; stiff.	ML-SM			S30	SS	11 -11 -19 -29	30	2.0 / 2.0	
170											
		173.0 - 175.0 SILTY CLAY to SILTY SAND; fine to medium sand seams, trace silt stone or mudstone fragments; dark grey; cohesive; w~PL; stiff.	ML-SM			S31	SS	14 -28 -42 -50/3.5"	70	2.0 / 2.0	
175											Drilled w/o sampling. (175'-178'). Drillers note materials feel like sand.
						S32	SS	13 -31 -25 -60/4"	56	1.9 / 2.0	
180											Drilled w/o sampling. (180'-183').
		183.0 - 185.0 SILTY CLAY and SAND; fine to medium; cohesive to non-cohesive; dark grey to grey; w~PL, wet.	CL-SP			S33	SS	13 -41 -27 -50/4"	68	2.0 / 2.0	
185											Drilled w/o sampling. (185'-188').
		188.0 - 190.0 SANDY CLAY; fine silty sand lenses throughout; cohesive; strongly cemented, irregular; w<PL to w~PL; stiff.	SC			S34	SS	9 -16 -20 -27	36	2.0 / 2.0	
190											Drilled w/o sampling. (190'-193').
		193.0 - 195.0 SILTY SAND to CLAY; fine to medium; some coarse sand; low plasticity; grey silty stringers; pale brown to brown; cohesive; blocky and friable; w<PL; very moist to wet; hard.	SM-CL			S35	SS	28 -29 -40 -50/4.5"	69	2.0 / 2.0	
195											Drilled w/o sampling. (195'-198'). Drillers note materials feel like hard clay.
		198.0 - 200.0 SILTY CLAY to CLAY; medium plasticity; occasional grey silty stringers and lenses; maroon red to red brown; blocky; hard.	CH-ML			S36	SS	18 -33 -44 -50/4.5"	77	2.0 / 2.0	
200											Drilled w/o sampling. (200'-208'). Drillers note materials feel like hard clay.

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY:
DATE:

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 8/28/13

RECORD OF BOREHOLE PMW-23

SHEET 5 of 5

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 230.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 75
DATE STARTED: 5/29/13
DATE COMPLETED: 5/30/13
WEATHER: Partly Cloudy

DATUM:
COORDS: not surveyed
GS ELEVATION:
TOC ELEVATION: NA
TEMPERATURE: 68 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	SOIL PROFILE DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	SAMPLES NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
205											
						S37	SS	31 -50/5"	N/A	0.9 / 2.0	Drilled w/o sampling. (210'-218'). Drillers note materials feel like hard clay.
210											
215											
		218.0 - 220.0 No Recovery.				S38	SS	50/5.5"	N/A	0.5 / 2.0	Drilled w/o sampling. (220'-223'). Drillers note materials feel like sand.
220											
		223.0 - 225.0 No Recovery.				S39	SS	50/5"	N/A	NR / 2.0	Drilled w/o sampling. (225'-228'). Drillers note materials feel like sand.
225											
		228.0 - 230.0 CLAY; some fine to coarse sand, trace silt; white.	CL			S40	SS	33 -32 -50/5"	82	1.4 / 2.0	
230		Boring completed at 230.0 ft									
235											
240											
245											
250											
255											

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY:
DATE:

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 8/28/13

RECORD OF BOREHOLE PMW-28

SHEET 1 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 80.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 55- ATV
DATE STARTED: 5/16/13
DATE COMPLETED: 5/18/13
WEATHER: Sunny

DATUM:
COORDS: N: 500,547.9 E: 1,388,117.0
GS ELEVATION: 139.2 ft
TOC ELEVATION: NA
TEMPERATURE: 50 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
0											
	135	3.0 - 5.0 CLAYEY SILT; some fine sand; brown to olive brown; cohesive; moist; firm.	SC		134.2	S1	SS	6 -9 -11 -10	20	1.8/2.0	
5											
	130	8.0 - 10.0 SILTY GRAVEL with sand; fine to coarse, subrounded gravel, medium to coarse sand, trace fine subrounded sand; brown to tan brown; quartz gravel; moist; loose to compact.	GM		129.2	S2	SS	4 -5 -6 -8	11	1.3/2.0	
10											
	125	13.0 - 15.0 CLAYEY SILT to SILTY SAND; clay at seams and SILTY SAND seams, loose fine sand at bottom 0.1 ft.; pale grey; layered; cohesive to noncohesive; moist to wet; soft to firm.	MH-SM		124.2	S3	SS	2 -2 -3 -5	5	2.0/2.0	
15											
	120	18.0 - 20.0 SAND; poorly, uniformly graded, fine; trace fines; brown to tan brown; layered; moist to wet; loose.	SP		119.2	S4	SS	4 -3 -4 -7	7	1.9/2.0	At approx. 19 ft. bgs: wet. Install 6" steel temporary casing.
20											
	115	23.0 - 23.7 CLAYEY SILT; fine sand, occasional low plasticity clay pockets; pale grey; cohesive; very moist; compact.	SC SM SP		115.5 114.8 114.2	S5	SS	4 -6 -13 -25	19	1.9/2.0	
25		23.7 - 24.4 CLAYEY SAND; occasional clay pockets; cohesive; moist; compact.									
	110	24.4 - 25.0 SAND; fine, poorly graded; trace fine; tan pale to pale brown; noncohesive; very moist; compact. 28.0 - 30.0 SAND; trace of fines; brown to pale brown to tan brown; layered; moist, occasional thin wet zones; compact.	SP		109.2	S6	SS	15 -18 -21 -27	39	1.8/2.0	
30											
	105	33.0 - 35.0 SAND; fine to medium, poorly graded; trace of fines; tan brown to pale brown; moist to wet; dense.	SP		104.2	S7	SS	18 -30 -39 -50/4"	69	1.7/2.0	
35											
	100	38.0 - 40.0 SAND; fine to medium; poorly graded; trace fines; tan brown to pale brown; wet to moist; dense.	SP		99.2	S8	SS	21 -30 -41 -50/3"	N/A	1.5/2.0	
40											
	95	43.0 - 45.0 SAND; pale brown to tan brown; moist to wet.	SP		94.2	S9	SS	32 -50/5"	N/A	0.6/2.0	
45											
	90	48.0 - 50.0 SAND; medium, uniformly graded; some fine sand; pale brown to tan brown; wet; dense.	SP		89.2	S10	SS	50/5"	N/A	0.8/2.0	
50											

Log continued on next page

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

RECORD OF BOREHOLE PMW-28

SHEET 2 of 2

PROJECT: Chesapeake Terrace SFI
PROJECT NUMBER: 063-1431-003
DRILLED DEPTH: 80.0 ft
AZIMUTH: N/A
LOCATION: Odenton, MD

DRILL METHOD: HSA/Mud Rotary
DRILL RIG: CME 55- ATV
DATE STARTED: 5/16/13
DATE COMPLETED: 5/18/13
WEATHER: Sunny

DATUM:
COORDS: N: 500,547.9 E: 1,388,117.0
GS ELEVATION: 139.2 ft
TOC ELEVATION: NA
TEMPERATURE: 50 F

INCLINATION: -90
DEPTH W.L.: NA

DEPTH (ft)	ELEVATION (ft)	DESCRIPTION	USCS	GRAPHIC LOG	ELEV. / DEPTH (ft)	NUMBER	TYPE	BLOWS per 6 in	N	REC / ATT	COMMENTS
55	85	53.0 - 55.0 SAND, becoming medium sand with 20-30% fines; fine to medium, subrounded; occasional soft grey clay pockets; wet; dense.	SP		84.2	S11	SS	43 -50/5"	>50	0.9 / 2.0	
60	80	58.0 - 60.0 SAND; uniformly graded; trace of fines, 0.1 ft. of SILTY CLAY with fine sand; very moist; dense, firm at top of interval.	SP		79.2	S12	SS	36 -50/3"	>50	0.7 / 2.0	
65	75	63.0 - 65.0 SAND; uniformly graded; 0.4 ft. of SILTY CLAY seam; pale grey, from 64.2-64.6 ft.: brown to pale brown; dilatent wet; compact.	SP		74.2	S13	SS	11 -24 -50/4"	>50	1.0 / 2.0	Comparable to boring log for MW-13.
70	70	68.0 - 70.0 SAND; poorly graded, fine to medium; trace fines; brown to tan brown; slightly stratified; wet; dense.	SP		69.2	S14	SS	9 -27 -33 -50/4"	60	1.3 / 2.0	
75	65	73.0 - 75.0 SAND; poorly graded, fine to medium; trace clay pockets, trace fines; brown to tan brown; "clean"; wet; dense.	SP		64.2	S15	SS	50/4.5"+100/2"	N/A	0.8 / 2.0	
80	60	78.0 - 80.0 SILTY CLAY to CLAYEY SILT; intermitten CLAYEY fine SAND seams (up to 0.2' thick); blocky structure; cohesive; moist thoughout, clay=w~PL; soft to stiff.	CL-MH		59.2	S16	SS	10 -16 -30 -50/5"	46	1.9 / 2.0	
		Boring completed at 80.0 ft									
85	55										
90	50										
95	45										
100	40										

LOG SCALE: 1 in = 6.5 ft
DRILLING COMPANY: FSD
DRILLER: J. Scribellito

GA INSPECTOR: RJM
CHECKED BY: VEF
DATE: 8/8/13

Golder Associates

AA GEOTECH LOG NO PID CHESAPEAKE SFI.GPJ GOLDER NJ-PA 05-24-06.GDT 9/27/13

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-06 SHEET 1 of 2

GA INSP. KMC DRILLING METHOD 6¼" HSAs & 5 7/8" MUD ROTARY GROUND ELEV. ~76-FT. WATER DEPTH 14.59 FT. BTOR

WEATHER SUNNY DRILLING COMPANY EARTH MATTERS INC. COLLAR ELEV. ~75.5-FT. DATE/TIME 0800 05/15/13

TEMP. 50° F DRILL RIG SIMCO 2800 DRILLER D. TAYLOR STARTED 1045 05/14/13 (TIME / DATE) COMPLETED 1315 05/14/13 (TIME / DATE)

LOCATION / COORDINATES N, E (EAST OF CELL 11)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 10 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL MEDIUM BENTONITE CHIPS-FOUR (4) BAGS

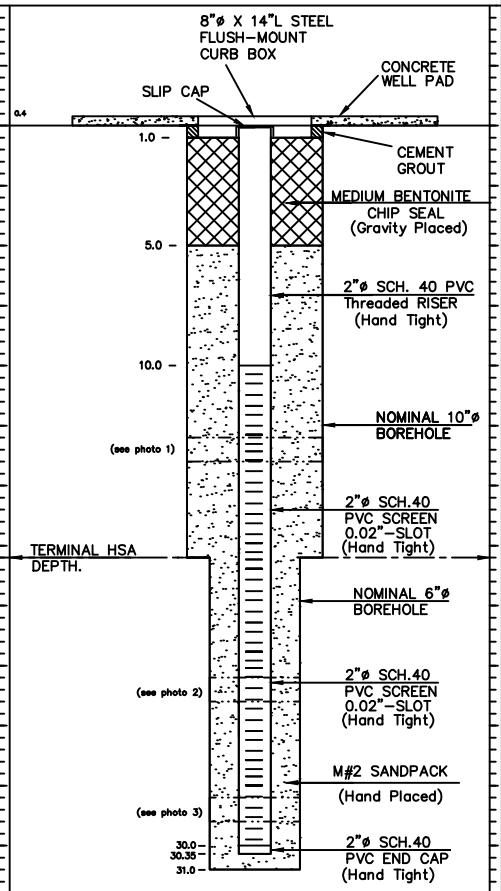
CASING TYPE SCHEDULE 40 PVC SCREEN TYPE SCHEDULE 40 PVC INSTALLATION METHOD GRAVITY

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 20 BAGS

GROUT QUANTITY N/A CENTRALIZERS NOT USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE MEDIUM BENTONITE CHIPS DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD GRAVITY

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
~76.0	EXISTING GROUND SURFACE*
0.0	INTERPRETED SUB-SURFACE* Gravelly SAND
5.0	(SP) Gravelly f-SAND, poorly graded, up to 40% fine to coarse gravel, some plastic fines, brown, non-cohesive, moist, compact.
66.0	
10.0	SAND
15.0	(SP) Fine to coarse SAND, poorly graded, some fine to coarse gravel, occasional seams of soft, sandy clay, light brown to orange brown, non-cohesive, moist to wet, compact.
66.0	
18.0	
20.0	
25.0	
30.0	
45.0	
31.0	EOB @ 31.0 FT. bgs.



INSTALLATION NOTES

AUGERED WITH 6¼" I.D. HOLLOW STEM AUGERS (HSAs) TO 18.0 FT. BELOW GROUND SURFACE (bgs) WITH STANDARD SAMPLING FROM 3-30 FT. bgs. USING 2⅞" DRAG BIT. REAMED OUT BOREHOLE USING 5⅞" DRAG BIT FROM 18.0-31.0 FT. bgs. TO SET WELL. BOREHOLE FLUSHED WITH CLEAN WATER PRIOR TO REMOVING DRILL RODS & DRILL BIT. WELL MATERIALS PLACED IN BOREHOLE USING 20.0 FT. WELL SCREEN, FLAT-END THREADED END CAP, 10.0 FT. OF RISER AND J-PLUG CAP FOR OVERALL LENGTH OF 30.35 FT. WELL MATERIALS PLACED TO 30.35 FT. bgs. AND SECURED AT DRILLING DECK WITH CHAIN BRACE WITH TEMPORARY 3.0 FT. STICKUP. M#2 SANDPACK PLACED THROUGH AUGERS 31.0-5.0 FT. bgs. HSAs REMOVED AND BENTONITE CHIP SEAL PLACED 5.0-0.0 FT. bgs. TEMPORARY RISER STICKUP REMOVED ON 5/15/13 TO APPROX. 0.5 FT bgs. CEMENT GROUT ADDED APPROX. 1.0 FT TO 0.5 FT bgs. WHILE PUSHING 8" DIAMETER, 14" LONG STEEL FLUSH- MOUNTED SURFACE CASING SET TO 4" ABOVE GROUND SURFACE (ags). 2 FT. X 2 FT. CONCRETE WELL PAD POURED AT GROUND SURFACE TO 4" ags.

*MEASUREMENTS REFERENCED FROM FIELD-MODIFIED GROUND SURFACE AS OF INSTALLATION DATE (05/14/13).

WELL DEVELOPMENT NOTES

DATE DEVELOPED: 05/15/13

DEVELOPMENT METHOD: SUPERTWISTER SUBMERSIBLE PUMP

VOLUME PURGED: 476 GALS.

FOR FURTHER DETAILS SEE ACCOMPANYING WELL DEVELOPMENT FIELD RECORD.

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-06 SHEET 2 of 2

GA INSP. KMC DRILLING METHOD 6 1/4" HSAs & 5 7/8" MUD ROTARY GROUND ELEV. ~76-FT. WATER DEPTH 14.59 FT. BTOR

WEATHER SUNNY DRILLING COMPANY EARTH MATTERS INC. COLLAR ELEV. ~75.5-FT. DATE/TIME 0800 05/15/13

TEMP. 50° F DRILL RIG SIMCO 2800 DRILLER D. TAYLOR STARTED 1045 05/14/13 (TIME / DATE) COMPLETED 1315 05/14/13 (TIME / DATE)

LOCATION / COORDINATES N, E (EAST OF CELL 11)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 10 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL MEDIUM BENTONITE CHIPS-FOUR (4) BAGS

CASING TYPE SCHEDULE 40 PVC SCREEN TYPE SCHEDULE 40 PVC INSTALLATION METHOD GRAVITY

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 20 BAGS

GROUT QUANTITY N/A CENTRALIZERS NOT USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE MEDIUM BENTONITE CHIPS DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD GRAVITY

	INSTALLATION PHOTOS**	INSTALLATION NOTES
PHOTO 1 Photo of sample interval portion from screened section of PMW-6 (screen set from 10-30-ft. bgs).		**SEE PHOTO LOG IN REPORT FOR ADDITIONAL CONSTRUCTION PHOTOS
PHOTO 2 Photo of sample interval portion from screened section of PMW-6 (screen set from 10-30-ft. bgs).		
PHOTO 3 Photo of sample interval portion from screened section of PMW-6 (screen set from 10-30-ft. bgs).		

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-11 SHEET 1 of 2

GA INSP. RJM DRILLING METHOD 3¼"I.D. H.S.A's & 5⅞"MUD ROTARY GROUND ELEV. ~146 FT. WATER DEPTH 82.56 FT.BTOR

WEATHER SUNNY DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. ~145.5 FT. DATE/TIME 05/20/2013 0750

TEMP. 50° F DRILL RIG CME-75 DRILLER J. SCRIBELLITO STARTED 0900 04/22/13 (TIME / DATE) COMPLETED 1300 04/22/13 (TIME / DATE)

LOCATION / COORDINATES N, E . (WEST OF CELL 10 AREA)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 200 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

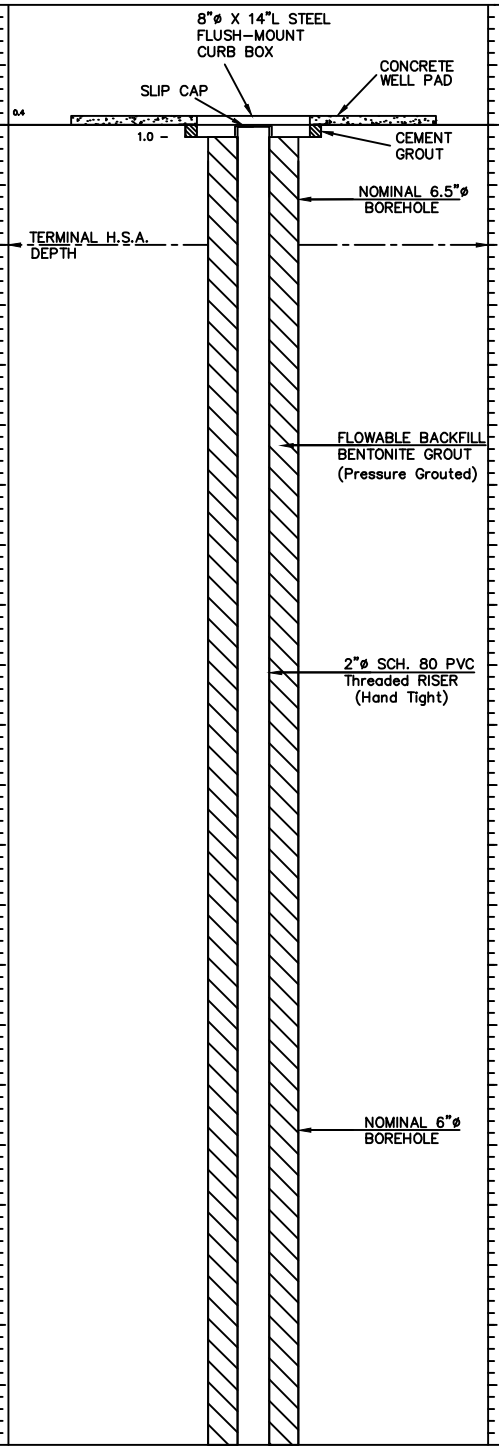
CASING TYPE SCHEDULE 80 PVC SCREEN TYPE SCHEDULE 80 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 8 BAGS

GROUT QUANTITY ~280-300 GALLONS CENTRALIZERS 2-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD TREMIE-WASHED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
~146.0	EXISTING GROUND SURFACE*
0.0	INTERPRETED SUB-SURFACE*
	SILTY SAND to SILT to SAND
	(SM-SW to ML) Silty f-m SAND, brown-tan br. to pale br., non-plastic, some plastic fines, occasional sub-rounded gravelly fines, trace organic material, non-cohesive, moist to wet, loose to CP.
10.0	
20.0	
118.0	
28.0	
30.0	CLAY TO SILTY CLAY
	(CH-CL) CLAY to SILTY CLAY, light grey & maroon-dk. maroon to red-purple, pale purple-white mottled to dark grey, low to high plasticity, trace gravel, trace to some fine sand & silt lenses, trace silty sand lenses, occasionally fissured and blocky, cohesive, w<PL to w>PL, stiff to hard.
40.0	
50.0	
60.0	
70.0	
80.0	
90.0	
100.0	
110.0	



INSTALLATION NOTES

AUGERED WITH 3¼"I.D. HOLLOW STEM AUGERS (HSAs) TO 10.0 FT. BELOW GROUND SURFACE (bgs) WITH STANDARD SAMPLING 3-5 FT AND 8-10 FT. AUGERS REMOVED. TEMPORARY 6" STEEL SURFACE CASING HYDRAULICALLY PUSHED TO 9 FT. bgs. RESUMED STANDARD SAMPLING USING 5⅞"DRAG BIT FROM 13.0-65.0 FT. bgs. DUE TO SIGNIFICANT DRILLING FLUID LOSS AT SHALLOW DEPTH IN BOREHOLE ON 04/16/13, ADDITIONAL TEMPORARY 6" STEEL SURFACE CASING ADVANCED TO 31.0 FT bgs. ON 04/17/13. RESUMED STANDARD SAMPLING FROM 68.0 FT bgs. ON 04/17/13. SAMPLED TO 220 FT bgs. ON 04/19/13. DRILLED BOREHOLE ON 04/22/13 TO 221 FT bgs. TO SET WELL. BOREHOLE FLUSHED WITH CLEAN WATER PRIOR TO REMOVING DRILL RODS & DRILL BIT. 1" DIAMETER SCH 40 PVC TREMIE PIPE INSERTED TO DEPTH THROUGH TEMPORARY 6" SURFACE CASING. WELL MATERIALS PLACED IN BOREHOLE USING 20.0 FT. WELL SCREEN, FLAT-END THREADED END CAP, 205.0 FT. OF RISER AND J-PLUG CAP FOR OVERALL LENGTH OF 225.75 FT. WELL MATERIALS PLACED TO 220.75 FT. bgs. AND SECURED AT DRILLING DECK WITH CHAIN BRACE WITH TEMPORARY 3.0

SEE SHEET 2 FOR ADDITIONAL NOTES

*MEASUREMENTS REFERENCED FROM FIELD-MODIFIED GROUND SURFACE AS OF INSTALLATION DATE (04/22/13).

WELL DEVELOPMENT NOTES

DATE DEVELOPED: 05/20/13

DEVELOPMENT METHOD: AIR LIFT

VOLUME PURGED: 780 GALS.

FOR FURTHER DETAILS SEE ACCOMPANYING WELL DEVELOPMENT FIELD RECORD.

Golder Associates

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MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-11 SHEET 2 of 2

GA INSP. RJM DRILLING METHOD 3 1/4" I.D. H.S.A's & 5 7/8" MUD ROTARY GROUND ELEV. ~146 FT. WATER DEPTH 82.56 FT.BTOR

WEATHER SUNNY DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. ~145.5 FT. DATE/TIME 05/20/2013 0750

TEMP. 50° F DRILL RIG CME-75 DRILLER J. SCRIBELLITO STARTED 0900 04/22/13 (TIME / DATE) COMPLETED 1300 04/22/13 (TIME / DATE)

LOCATION / COORDINATES N, E . (WEST OF CELL 10 AREA)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 200 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

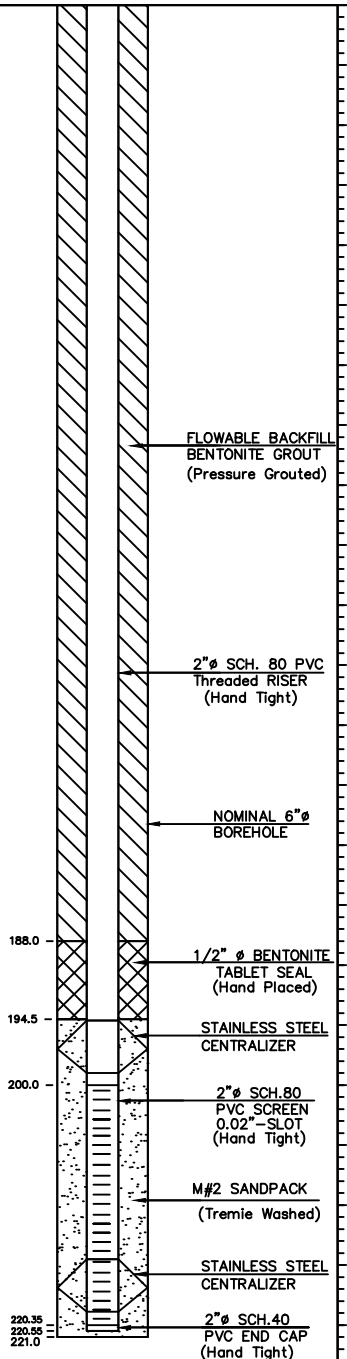
CASING TYPE SCHEDULE 80 PVC SCREEN TYPE SCHEDULE 80 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 8 BAGS

GROUT QUANTITY ~280-300 GALLONS CENTRALIZERS 2-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD TREMIE-WASHED

110.0	CLAY TO SILTY CLAY See Sheet 1 for Details
120.0	
130.0	
140.0	
150.0	
160.0	
170.0	
-32.0 178.0	
180.0	
190.0	SILTY CLAY to CLAYEY SILT
200.0	
-57.0 203.0	SILTY SAND to SAND
210.0	(SM-SP) Silty f-m SAND, pale grey & white, non-plastic, non-cohesive, trace low plasticity fines and occasional thin clay lenses, wet, dense.
220.0 -74.0	
221.0 -75.0	EOB @ 221.0 FT. bgs.



INSTALLATION NOTES

FT. STICKUP. M#2 SANDPACK TREMIE-WASHED 221.0-194.5 FT. bgs. 1/2" COATED BENTONITE TABLET SEAL PLACED BY HAND 194.5-188.0 FT. bgs. TABLETS ALLOWED TO HYDRATE 30 MINUTES. BENTONITE SLURRY TREMIED 188.0 FT. bgs. TO GROUND SURFACE WHILE REMOVING TEMPORARY 6" STEEL SURFACE CASING. GROUT LEVEL WAS MEASURED AT APPROX. 5.0 FT. bgs. ON 04/23/13 AFTER SETTLING, AND ADDITIONAL GROUT PLACED TO WITHIN 1-FT. OF GROUND SURFACE. TEMPORARY RISER STICKUP REMOVED TO APPROX. 0.5 FT bgs. CEMENT GROUT ADDED APPROX. 1.0 FT TO 0.5 FT bgs. WHILE PUSHING 8" DIAMETER, 14" LONG STEEL FLUSH-MOUNTED SURFACE CASING SET TO 4" ABOVE GROUND SURFACE (ags). 2 FT. X 2 FT. CONCRETE WELL PAD POURED AT GROUND SURFACE TO 4" ags.

Golder Associates

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MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-12 SHEET 1 of 2

GA INSP. RJM DRILLING METHOD 4 1/4" I.D. H.S.A's & 5 7/8" MUD ROTARY GROUND ELEV. ~167 FT. WATER DEPTH 111.56 FT.BTOR

WEATHER SUNNY DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. ~166.5 FT. DATE/TIME 05/20/13 10:10

TEMP. 48-62° F DRILL RIG CME-75 DRILLER J. SCRIBELLITO STARTED 0800 05/03/13 TIME / DATE COMPLETED 1320 05/03/13 TIME / DATE

LOCATION / COORDINATES N, E (WEST OF CELL 5/8 INTERFCELL BERM AREA)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 220 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

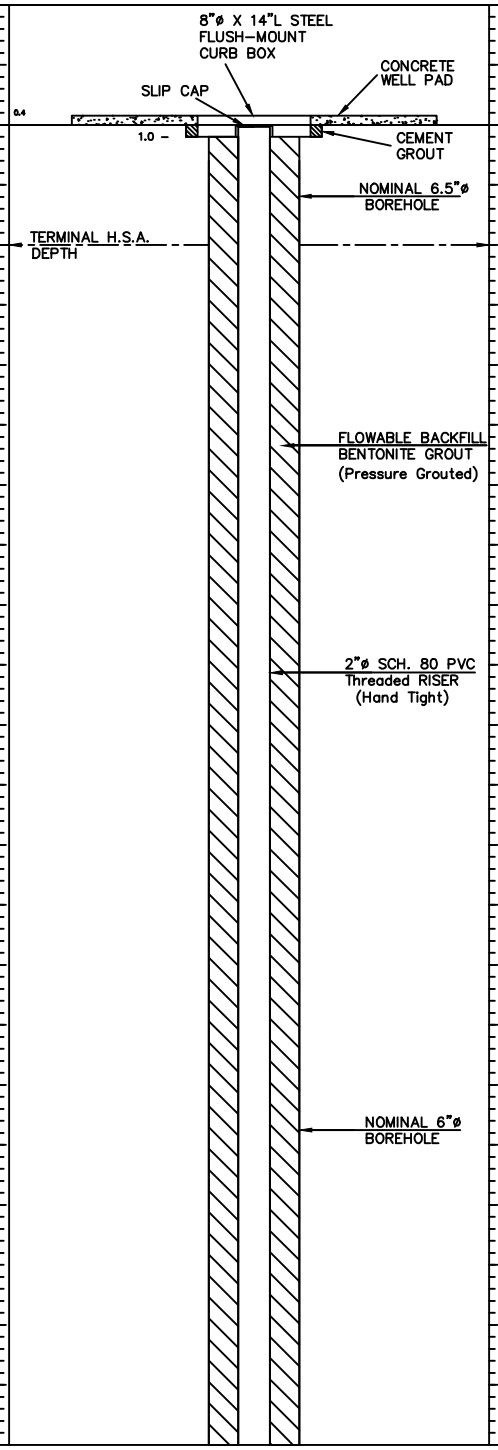
CASING TYPE SCHEDULE 80 PVC SCREEN TYPE SCHEDULE 80 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 10 BAGS

GROUT QUANTITY ~320-340 GALLONS CENTRALIZERS 2-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD TREMIE-WASHED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
~167.0	EXISTING GROUND SURFACE*
	INTERPRETED SUB-SURFACE*
	SILTY SAND
159.0	(SM) Silty f-m SAND, tan br. to pale br., non-plastic, non-cohesive to cohesive, loose, trace plastic fines, occasional white-gray silty CLAY seams, moist to wet,
8.0	
10.0	
20.0	CLAY TO SILTY CLAY
	(CH-CL) CLAY to SILTY CLAY, light grey & maroon-dk. maroon to red-purple, pale purple-white mottled to dark grey, low to high plasticity, trace gravel, trace to some fine sand & silt lenses, trace silty sand lenses, occasionally fissured and blocky, cohesive, w<PL to w>PL, stiff to hard.
30.0	
40.0	
119.0	
48.0	
50.0	SILTY SAND
	(SM) SILTY fine-SAND, white-grey to to tan-br. to light br., non-cohesive to cohesive, some low plasticity fines, moist, compact to dense.
60.0	
70.0	
91.0	
76.0	
80.0	CLAY TO SILTY CLAY
	(CH-CL) CLAY to SILTY CLAY, light grey & maroon-dk. maroon to red-purple, pale purple-white mottled to dark grey, low to high plasticity, trace gravel, trace to some fine sand & silt lenses & seams, occasionally thinly laminated, occasionally fissured and blocky, cohesive, w<PL to w>PL, stiff to v. hard.
90.0	
100.0	
110.0	



INSTALLATION NOTES

AUGERED WITH 3¼"I.D. HOLLOW STEM AUGERS (HSAs) TO 10.0 FT. BELOW GROUND SURFACE (bgs) WITH STANDARD SAMPLING 3-5 FT AND 8-10 FT. AUGERS REMOVED. TEMPORARY 6" STEEL SURFACE CASING HYDRAULICALLY PUSHED TO 9 FT. bgs. RESUMED STANDARD SAMPLING USING 5⅞"DRAG BIT FROM 13.0-240.0 FT. bgs. DRILLED BOREHOLE ON 05/03/13 TO 241 FT bgs. TO SET WELL. BOREHOLE FLUSHED WITH CLEAN WATER PRIOR TO REMOVING DRILL RODS & DRILL BIT. 1" DIAMETER SCH 40 PVC TREMIE PIPE INSERTED TO DEPTH THROUGH TEMPORARY 6" SURFACE CASING. WELL MATERIALS PLACED IN BOREHOLE USING 10.0 FT. SOLID RISER SUMP, FLAT-END THREADED END CAP, 20.0 FT. WELL SCREEN, 210.0 FT. OF RISER AND J-PLUG CAP FOR OVERALL LENGTH OF 240.55 FT. WELL MATERIALS PLACED TO 240.55 FT. bgs. AND SECURED AT DRILLING DECK WITH CHAIN BRACE WITH TEMPORARY 3.0 FT. STICKUP. M#2 SANDPACK TREMIE-WASHED 241.0-204.0 FT. bgs. 1/2" COATED BENTONITE TABLET SEAL PLACED BY HAND 204.0-192.0 FT. bgs. TABLETS ALLOWED TO HYDRATE 30 MINUTES. BENTONITE SLURRY TREMIED 192.0 FT. bgs. TO GROUND SURFACE WHILE...

SEE SHEET 2 FOR ADDITIONAL NOTES

*MEASUREMENTS REFERENCED FROM FIELD-MODIFIED GROUND SURFACE AS OF INSTALLATION DATE (05/15/13).

WELL DEVELOPMENT NOTES

DATE DEVELOPED: 05/20/13

DEVELOPMENT METHOD: AIR LIFT

VOLUME PURGED: 1435 GALS.

FOR FURTHER DETAILS SEE ACCOMPANYING WELL DEVELOPMENT FIELD RECORD.

Golder Associates

N:\Projects\2018\20183854 - Chesapeake Terrace LF\CAD Files for Well Logs\Deep Wells\PMW-12 well log.dwg

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-12 SHEET 2 of 2

GA INSP. RJM DRILLING METHOD 4 1/4" I.D. H.S.A's & 5 7/8" MUD ROTARY GROUND ELEV. ~167 FT. WATER DEPTH 111.56 FT.BTOR

WEATHER SUNNY DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. ~166.5 FT. DATE/TIME 05/20/13 10:10

TEMP. 48-62° F DRILL RIG CME-75 DRILLER J. SCRIBELLITO STARTED 0800 05/03/13 (TIME / DATE) COMPLETED 1320 05/03/13 (TIME / DATE)

LOCATION / COORDINATES N, E (WEST OF CELL 5/8 INTERFCELL BERM AREA)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 220 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

CASING TYPE SCHEDULE 80 PVC SCREEN TYPE SCHEDULE 80 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 10 BAGS

GROUT QUANTITY ~320-340 GALLONS CENTRALIZERS 2-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD TREMIE-WASHED

110.0

CLAY TO SILTY CLAY

See Sheet 1 for Details

120.0

140.0

160.0

180.0

190.0

-33.0

200.0

CLAYEY SAND to SILTY SAND

(SC-SM) Silty f-m SAND, pale grey-white to olive br.-br. to tan-br., non-plastic, non-cohesive to cohesive, some low plasticity fines and occasional thin, gray clay seams, moist to wet, dense to v. dense.

210.0

220.0

230.0

WEATHERED BEDROCK

Completely weathered SHALE, bl. to dk. gray, with occasional thin, dk. gray clay lenses and soft, f-sand seams, wet, dense.

210.0

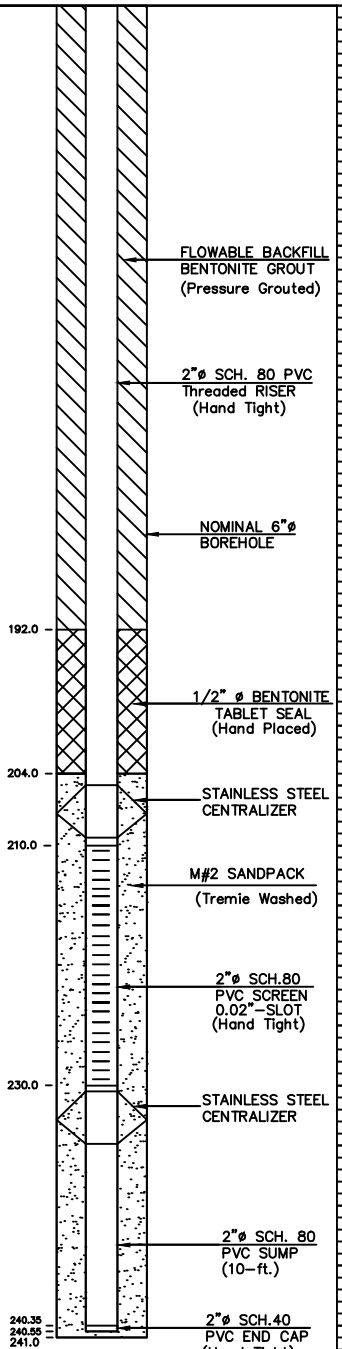
-71.0

238.0

240.0-73.0

241.0-74.0

EOB @ 241.0 FT. bgs.



INSTALLATION NOTES

REMOVING TEMPORARY 6" STEEL SURFACE CASING. GROUT LEVEL WAS MEASURED AT APPROX. 5.0 FT. bgs. ON 05/06/13 AFTER SETTLING, AND ADDITIONAL GROUT PLACED TO WITHIN 1-FT. OF GROUND SURFACE. TEMPORARY RISER STICKUP REMOVED TO APPROX. 0.5 FT bgs. CEMENT GROUT ADDED APPROX. 1.0 FT TO 0.5 FT bgs. WHILE PUSHING 8" DIAMETER, 14" LONG STEEL FLUSH-MOUNTED SURFACE CASING SET TO 4" ABOVE GROUND SURFACE (ags). 2 FT. X 2 FT. CONCRETE WELL PAD POURED AT GROUND SURFACE TO 4" ags. AND SURFACE CASING LID REPLACED AND SECURED WITH GALVANIZED STEEL SCREWS.

Golder Associates

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MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-13 SHEET 1 of 2

GA INSP. RJM DRILLING METHOD 3¼"I.D. H.S.A's & 5⅞"MUD ROTARY GROUND ELEV. ~167 FT. WATER DEPTH 103.35 FT.BTOR

WEATHER P.CLOUDY DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. ~166.5 FT. DATE/TIME 05/21/13 0935

TEMP. 56-65° F DRILL RIG CME-75 DRILLER J. SCRIBELLITO STARTED 0800 05/15/13 (TIME / DATE) COMPLETED 1320 05/15/13 (TIME / DATE)

LOCATION / COORDINATES N, E (SOUTHWEST OF LEACHATE STORAGE FACILITY No. 2)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 255 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

CASING TYPE SCHEDULE 80 PVC SCREEN TYPE SCHEDULE 80 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

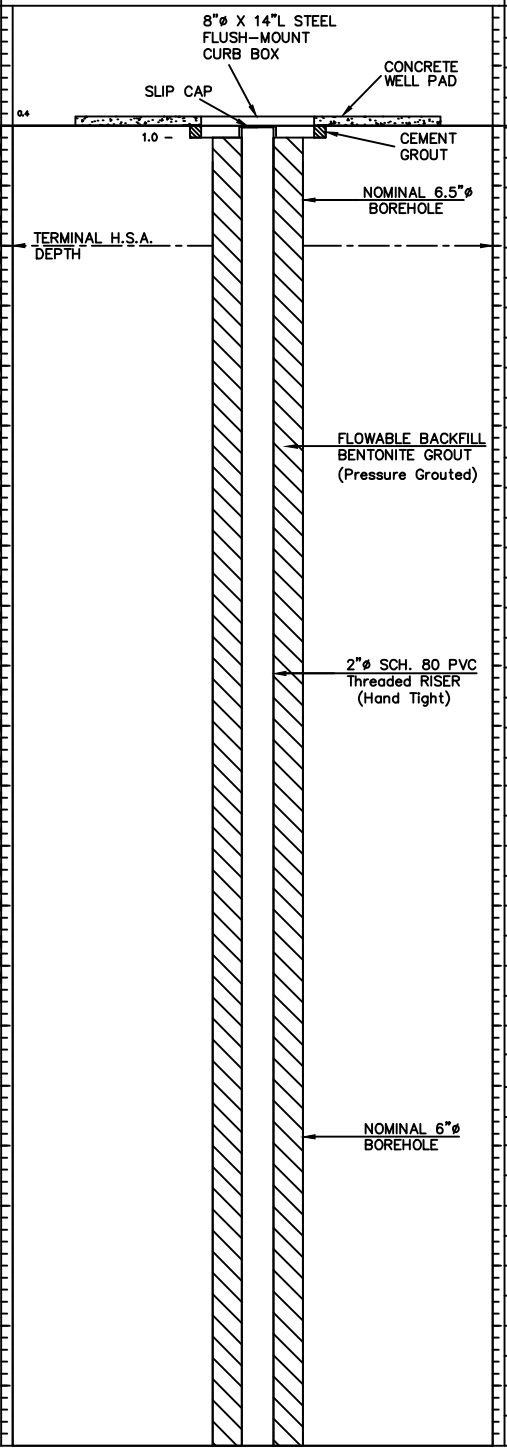
JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 13 BAGS

GROUT QUANTITY ~360-380 GALLONS CENTRALIZERS 2-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD TREMIE-WASHED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
~167.0	EXISTING GROUND SURFACE*
	INTERPRETED SUB-SURFACE*
10.0	SILTY SAND (SM) Silty f-m SAND, tan br. to pale br., non-plastic, non-cohesive to cohesive, loose, trace plastic fines, occasional white-gray silty CLAY seams, moist to wet,
20.0	
30.0	
40.0	
50.0	
60.0	
70.0	
94.0	
73.0	CLAY TO SILTY CLAY (CH-CL) CLAY to SILTY CLAY, light grey & maroon-dk. maroon to red-purple, pale purple-white mottled to dark grey, low to high plasticity, trace gravel, trace to some fine sand & silt lenses, trace silty sand lenses, occasionally fissured and blocky, cohesive, w<PL to w>PL, stiff to hard.
80.0	
90.0	
100.0	
110.0	

WELL SKETCH



INSTALLATION NOTES

AUGERED WITH 3¼"I.D. HOLLOW STEM AUGERS (HSAs) TO 10.0 FT. BELOW GROUND SURFACE (bgs) WITH STANDARD SAMPLING 3-5 FT AND 8-10 FT. AUGERS REMOVED. TEMPORARY 6" STEEL SURFACE CASING HYDRAULICALLY PUSHED TO 9 FT. bgs. RESUMED STANDARD SAMPLING USING 5⅞"DRAG BIT FROM 13.0-240.0 FT. bgs. DRILLED BOREHOLE ON 05/03/13 TO 241 FT bgs. TO SET WELL. BOREHOLE FLUSHED WITH CLEAN WATER PRIOR TO REMOVING DRILL RODS & DRILL BIT. 1" DIAMETER SCH 40 PVC TREMIE PIPE INSERTED TO DEPTH THROUGH TEMPORARY 6" SURFACE CASING. WELL MATERIALS PLACED IN BOREHOLE USING 10.0 FT. SOLID RISER SUMP, FLAT-END THREADED END CAP, 20.0 FT. WELL SCREEN, 210.0 FT. OF RISER AND J-PLUG CAP FOR OVERALL LENGTH OF 240.55 FT. WELL MATERIALS PLACED TO 240.55 FT. bgs. AND SECURED AT DRILLING DECK WITH CHAIN BRACE WITH TEMPORARY 3.0 FT. STICKUP. M#2 SANDPACK TREMIE-WASHED 241.0-204.0 FT. bgs. 1/2" COATED BENTONITE TABLET SEAL PLACED BY HAND 204.0-192.0 FT. bgs. TABLETS ALLOWED TO HYDRATE 30 MINUTES. BENTONITE SLURRY TREMIED 192.0 FT. bgs. TO GROUND SURFACE WHILE...

SEE SHEET 2 FOR ADDITIONAL NOTES

*MEASUREMENTS REFERENCED FROM FIELD-MODIFIED GROUND SURFACE AS OF INSTALLATION DATE (05/15/13).

WELL DEVELOPMENT NOTES

DATE DEVELOPED 05/21/13:

DEVELOPMENT METHOD: AIR LIFT

VOLUME PURGED: 1280 GALS.

FOR FURTHER DETAILS SEE ACCOMPANYING WELL DEVELOPMENT FIELD RECORD.

Golder Associates

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MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-13 SHEET 2 of 2

GA INSP. RJM DRILLING METHOD 3 1/4" I.D. H.S.A's & 5 7/8" MUD ROTARY GROUND ELEV. ~167 FT. WATER DEPTH 103.35 FT.BTOR

WEATHER P.CLOUDY DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. ~166.5 FT. DATE/TIME 05/21/13 0935

TEMP. 56-65° F DRILL RIG CME-75 DRILLER J. SCRIBELLITO STARTED 0800 05/15/13 (TIME / DATE) COMPLETED 1320 05/15/13 (TIME / DATE)

LOCATION / COORDINATES N, E (SOUTHWEST OF LEACHATE STORAGE FACILITY No. 2)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 255 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

CASING TYPE SCHEDULE 80 PVC SCREEN TYPE SCHEDULE 80 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 13 BAGS

GROUT QUANTITY ~360-380 GALLONS CENTRALIZERS 2-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD TREMIE-WASHED

110.0	CLAY to SILTY CLAY/ CLAYEY SILT See Sheet 1 for Details		
120.0		2"ø SCH. 80 PVC Threaded RISER (Hand Tight)	
140.0			
160.0		NOMINAL 6"ø BOREHOLE	
180.0			
200.0			
220.0			
230.0		232.0 — 1/2" ø BENTONITE TABLET SEAL (Hand Placed)	
240.0			
-81.0 / 248.0		245.0 — STAINLESS STEEL CENTRALIZER	
250.0	SAND to CLAYEY SAND (SC-SM) Silty f-m SAND, pale grey-white to olive br.-br. to tan-br., non-plastic, non-cohesive to cohesive, some low plasticity fines and occasional thin, gray clay seams, moist to wet, dense to v. dense.	250.0 — M#2 SANDPACK (Tremie-Washed)	
260.0		2"ø SCH.80 PVC SCREEN 0.02"-SLOT (Hand Tight)	
270.0		270.0 — STAINLESS STEEL CENTRALIZER	
		275.0 — 2"ø SCH. 80 PVC SUMP (5-ft.)	
-110.0 / 277.0	EOB @ 277.0 FT. bgs.	275.15 / 277.0 — 2"ø SCH. 80 PVC END CAP	

INSTALLATION NOTES

REMOVING TEMPORARY 6" STEEL SURFACE CASING. GROUT LEVEL WAS MEASURED AT APPROX. 5.0 FT. bgs. ON 05/06/13 AFTER SETTLING, AND ADDITIONAL GROUT PLACED TO WITHIN 1-FT. OF GROUND SURFACE. TEMPORARY RISER STICKUP REMOVED TO APPROX. 0.5 FT bgs. CEMENT GROUT ADDED APPROX. 1.0 FT TO 0.5 FT bgs. WHILE PUSHING 8" DIAMETER, 14" LONG STEEL FLUSH-MOUNTED SURFACE CASING SET TO 4" ABOVE GROUND SURFACE (ags). 2 FT. X 2 FT. CONCRETE WELL PAD POURED AT GROUND SURFACE TO 4" ags.

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-18 SHEET 1 of 2

GA INSP. RJM DRILLING METHOD 3¼"I.D. H.S.A.'s & 5⅞" MUD ROTARY GROUND ELEV. ~74 FT. WATER DEPTH 12.21 FT.BTOR

WEATHER OVERCAST DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. ~73.5 FT. DATE/TIME 0715 05/22/13

TEMP. 71-79° F DRILL RIG CME-55 ATV DRILLER J. SCRIBELLITO STARTED 0830 05/21/13 (TIME / DATE) COMPLETED 1200 05/21/13 (TIME / DATE)

LOCATION / COORDINATES N, E (SOUTHEAST BASIN No. 1 AREA)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 75 l.f. WELL SCREEN 2.0 in. dia. 10.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

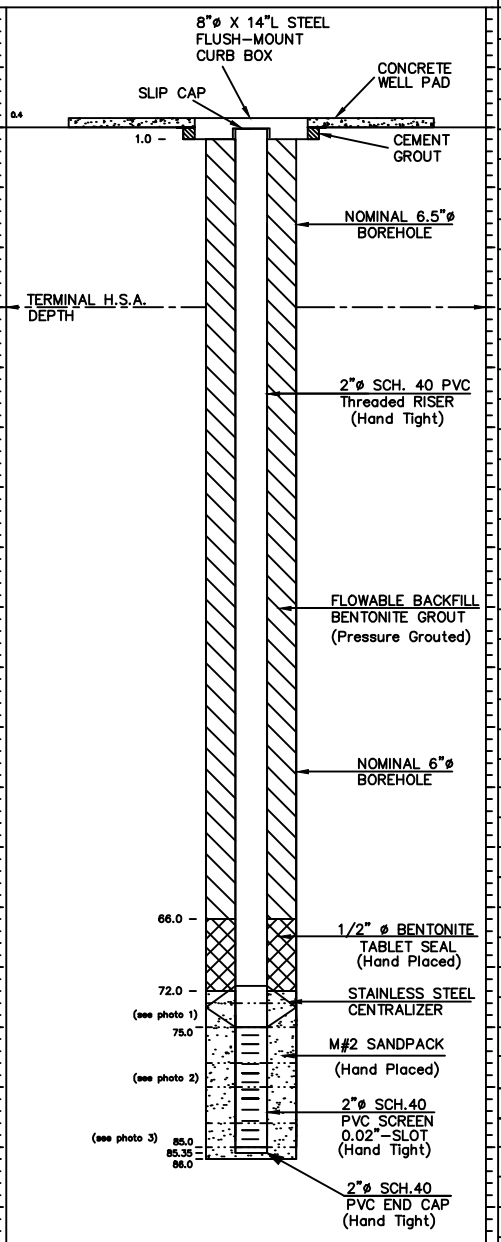
CASING TYPE SCHEDULE 40 PVC SCREEN TYPE SCHEDULE 40 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 5 BAGS

GROUT QUANTITY ~120 GALLONS CENTRALIZERS 1-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD GRAVITY THROUGH CASING

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
~74.0	EXISTING GROUND SURFACE*
0.0	INTERPRETED SUB-SURFACE*
70.0 / 4.0	SANDY LOAM
10.0	Clayey SILT to Clayey SAND (ML-SC) Clayey SILT and f-m SAND, poorly graded, some c-gravel in seams, occasional soft clay seams, pale grey to dk. brown, cohesive, moist to wet, compact.
59.0 / 15.0	
54.0 / 20.0	Silty CLAY to Clayey SILT to CLAY (ML-CL) Silty CLAY to Clayey SILT, trace to some fine sand lenses, pale purple to red-purple & maroon red-grey mottled, low-medium plasticity, occasional silt stringers, occasionally friable, occasionally laminated and varved, non-cohesive to cohesive, w<PL to w~PL, firm to hard, grading to (CL) CLAY, dk. grey, low plasticity, cohesive, w<PL, stiff to hard.
30.0	
40.0	
50.0	
16.0 / 58.0	
60.0 / 6.0	Clayey SAND to Silty SAND (SC-SM) Silty f-m SAND, dk. grey-pale grey to orange-br. and pale grey mottled, intermittent firm dk. grey SLY CLAY seams, occasional red-br silt stringers, cohesive to non-cohesive, moist to wet, CP to dense.
68.0 / 70.0	
80.0	SAND (SM-SP) Silty f-m SAND grading to m-SAND, poorly graded, some to tr. fines, non-plastic, sl. stratified, tan br-br, non-cohesive, occasional silty clay pockets, moist to wet, dense to v. dense.
-12.0 / 86.0	EOB @ 86.0 FT. bgs.



INSTALLATION NOTES

AUGERED WITH 3¼"I.D. HOLLOW STEM AUGERS (HSAs) TO 15.0 FT. BELOW GROUND SURFACE (bgs) WITH STANDARD SAMPLING 3-15 FT. bgs. ON 05/20/13. AUGERS REMOVED. TEMPORARY 6" STEEL SURFACE CASING HYDRAULICALLY PUSHED/HAMMERED TO 13.5 FT. bgs. RESUMED STANDARD SAMPLING USING 5⅞"DRAG BIT FROM 18.0-85.0 FT. bgs. DRILLED BOREHOLE TO 86 FT. bgs. TO SET WELL. BOREHOLE FLUSHED WITH CLEAN WATER PRIOR TO REMOVING DRILL RODS & DRILL BIT. 1" DIAMETER SCH 40 PVC TREMIE PIPE INSERTED TO DEPTH THROUGH TEMPORARY 6" SURFACE CASING. WELL MATERIALS PLACED IN BOREHOLE USING 10.0 FT. WELL SCREEN, FLAT-END THREADED END CAP, 75.0 FT. OF RISER AND J-PLUG CAP FOR OVERALL LENGTH OF 85.35 FT. WELL MATERIALS PLACED TO 85.0 FT. bgs. AND SECURED AT DRILLING DECK WITH CHAIN BRACE WITH TEMPORARY 3.0 FT. STICKUP. M#2 SANDPACK GRAVITY FED 86.0-72.0 FT. bgs. 1/2" COATED BENTONITE TABLET SEAL PLACED BY HAND 72.0-66.0 FT. bgs. TABLETS ALLOWED TO HYDRATE 30 MINUTES. BENTONITE SLURRY TREMIED 66.0 FT. bgs. TO GROUND SURFACE WHILE REMOVING TEMPORARY 6" STEEL

SEE SHEET 2 FOR ADDITIONAL NOTES

*MEASUREMENTS REFERENCED FROM FIELD-MODIFIED GROUND SURFACE AS OF INSTALLATION DATE (05/21/13).

WELL DEVELOPMENT NOTES

DATE DEVELOPED: 5/22/13

DEVELOPMENT METHOD: AIR LIFT

VOLUME PURGED: 970-gals.

FOR FURTHER DETAILS SEE ACCOMPANYING WELL DEVELOPMENT FIELD RECORD.

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-18 SHEET 2 of 2

GA INSP. RJM DRILLING METHOD 3 1/4" I.D. H.S.A.'s & 5 7/8" MUD ROTARY GROUND ELEV. ~74 FT. WATER DEPTH 12.21 FT.BTOR

WEATHER OVERCAST DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. ~73.5 FT. DATE/TIME 0715 05/22/13

TEMP. 71-79° F DRILL RIG CME-55 ATV DRILLER J. SCRIBELLITO STARTED 0830 05/21/13 (TIME / DATE) COMPLETED 1200 05/21/13

LOCATION / COORDINATES N, E (SOUTHEAST BASIN No. 1 AREA)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 75 l.f. WELL SCREEN 2.0 in. dia. 10.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

CASING TYPE SCHEDULE 40 PVC SCREEN TYPE SCHEDULE 40 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 5 BAGS

GROUT QUANTITY ~120 GALLONS CENTRALIZERS 1-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD GRAVITY THROUGH CASING

		INSTALLATION PHOTOS**	INSTALLATION NOTES
	PHOTO 1 Photo of sample interval portion from screened section of PMW-18 (screen set from 75-85-ft. bgs).		SURFACE CASING. GROUT LEVEL WAS MEASURED AT APPROX. 5.0 FT. bgs. ON 05/22/13 AFTER SETTLING, AND ADDITIONAL GROUT PLACED TO WITHIN 1-FT. OF GROUND SURFACE. TEMPORARY RISER STICKUP REMOVED TO APPROX. 0.5 FT bgs. CEMENT GROUT ADDED APPROX. 1.0 FT TO 0.5 FT bgs. WHILE PUSHING 8" DIAMETER, 14" LONG STEEL FLUSH-MOUNTED SURFACE CASING SET TO 4" ABOVE GROUND SURFACE (ags). 2 FT. X 2 FT. CONCRETE WELL PAD POURED AT GROUND SURFACE TO 4" ags.
	PHOTO 2 Photo of sample interval portion from screened section of PMW-18 (screen set from 75-85-ft. bgs).		**SEE PHOTO LOG IN REPORT FOR ADDITIONAL CONSTRUCTION PHOTOS
	PHOTO 3 Photo of sample interval portion from screened section of PMW-18 (screen set from 75-85-ft. bgs).		

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-19 SHEET 1 of 2

GA INSP. KMC DRILLING METHOD 4 1/4" HSAs & 5 7/8" MUD ROTARY GROUND ELEV. ~110-FT. WATER DEPTH 40.57 FT. BTOR

WEATHER SUNNY DRILLING COMPANY EARTH MATTERS INC. COLLAR ELEV. FT. DATE/TIME 1440 05/15/13

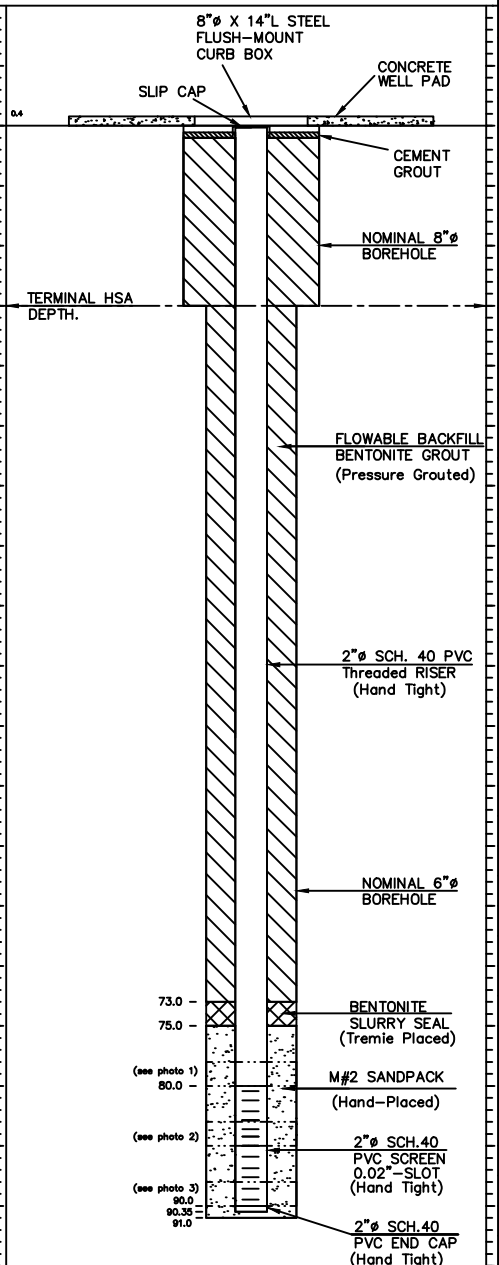
TEMP. 70° F DRILL RIG SIMCO 2800 DRILLER D. TAYLOR STARTED 1530 04/17/13 (TIME / DATE) COMPLETED 0835 04/18/13 (TIME / DATE)

LOCATION / COORDINATES N, E (BASIN No. 1 AREA)

MATERIALS INVENTORY

WELL CASING	2.0 in. dia.	80 l.f.	WELL SCREEN	2.0 in. dia.	10.0 l.f.	BENTONITE SEAL	BENTONITE SLURRY
CASING TYPE	SCHEDULE 40 PVC		SCREEN TYPE	SCHEDULE 40 PVC		INSTALLATION METHOD	TREMIE
JOINT TYPE	FLUSH THREADED		SLOT SIZE	0.02"-SLOT		FILTER PACK QTY.	10 BAGS
GROUT QUANTITY	~70-80 GALLONS		CENTRALIZERS	NOT USED		FILTER PACK TYPE	M#2-SIZE SAND
GROUT TYPE	BENTONITE CLAY SLURRY		DRILLING MUD TYPE	USED		INSTALLATION METHOD	GRAVITY

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
~110.0	EXISTING GROUND SURFACE*
0.0	INTERPRETED SUB-SURFACE*
	CLAY (CH-CL) CLAY to SILTY CLAY, light grey & maroon to red-purple white mottled to dark grey, low to high plasticity, trace gravel, trace to some fine sand lenses, trace silty sand lenses, occasionally fissured, non-cohesive to cohesive, w<PL to w>PL, stiff to hard.
10.0	
95.0	
15.0	
20.0	
30.0	
	SILTY SAND (SM) Silty f-SAND, light grey, non-plastic, some plastic fines, occasional fine sand lenses & pockets, trace black organic material, non-cohesive to cohesive, moist, dense to v. dense.
40.0	
50.0	
	CLAY to SILTY CLAY (CH-CL) CLAY to SILTY CLAY, light grey & maroon to red-purple white mottled to dark grey, low to high plasticity, trace gravel, trace to some fine sand lenses, trace silty sand lenses, occasionally fissured, non-cohesive to cohesive, w<PL to w>PL, stiff to hard.
60.0	
46.0	
64.0	
42.0	
68.0	
80.0	
27.0	
83.0	**SILTY SAND** (SM) Silty f-m SAND, light grey & mottled brown-red, non-plastic, non-cohesive to cohesive, moist to wet, v. dense, grading to (CH) CLAY, high plasticity, grey - red, cohesive, w>PL, v. soft.
19.0	
91.0	EOB @ 91.0 FT. bgs.
100.0	
110.0	



INSTALLATION NOTES

AUGERED WITH 4¼"I.D. HOLLOW STEM AUGERS (HSAs) TO 15.0 FT. BELOW GROUND SURFACE (bgs) WITH STANDARD SAMPLING FROM 0-2 FT, 3-5 FT, 8-10 FT. AND 13-15 FT. bgs. RESUMED STANDARD SAMPLING USING 2⅞"DRAG BIT FROM 13.0-60.0 FT. bgs. GOLDER GEOLOGIST SHORTENED SAMPLE INTERVALS TO CONTINUOUS SAMPLING FROM 60-80 FT. bgs, THEN STANDARD SAMPLING FROM 80-90 FT. bgs. REAMED OUT BOREHOLE ON 04/18/13 USING 5⅞" DRAG BIT FROM 0.0-91.0 FT. bgs. TO SET WELL. BOREHOLE FLUSHED WITH CLEAN WATER PRIOR TO REMOVING DRILL RODS & DRILL BIT. WELL MATERIALS PLACED IN BOREHOLE USING 10.0 FT. WELL SCREEN, FLAT-END THREADED END CAP, 85.0 FT. OF RISER AND J-PLUG CAP FOR OVERALL LENGTH OF 95.75 FT. WELL MATERIALS PLACED TO 90.75 FT. bgs. AND SECURED AT DRILLING DECK WITH CHAIN BRACE WITH TEMPORARY 3.0 FT. STICKUP. M#2 SANDPACK PLACED THROUGH AUGERS 91.0-75.0 FT. bgs. 1" DIAMETER SCH 40 PVC TREMIE PIPE INSERTED TO DEPTH THROUGH HSAs. BENTONITE SLURRY SEAL TREMIED 75.0-73.0 FT. bgs. BENTONITE GROUT TREMIED 73.0 TO TO GROUND SURFACE WHILE REMOVING HSAs. GROUT LEVEL WAS

SEE SHEET 2 FOR ADDITIONAL NOTES

*MEASUREMENTS REFERENCED FROM FIELD-MODIFIED GROUND SURFACE AS OF INSTALLATION DATE (04/17-04/18/13).

WELL DEVELOPMENT NOTES

DATE DEVELOPED: 05/15/13

DEVELOPMENT METHOD: SUPERTWISTER SUBMERSIBLE PUMP

VOLUME PURGED: 290 GALS.

FOR FURTHER DETAILS SEE ACCOMPANYING WELL DEVELOPMENT FIELD RECORD.

Golder Associates

G:\Projects\2018\20183854 - Chesapeake Terrace LF\Work Documents\Info from Golder\CAD\~Misc\Well Logs\CAD Files for Well Logs\Shallow Wells\PMW-19 well log.dwg

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-19 SHEET 2 of 2

GA INSP. KMC DRILLING METHOD 4 1/4" HSAs & 5 7/8" MUD ROTARY GROUND ELEV. ~110-FT. WATER DEPTH 40.57 FT. BTOR

WEATHER SUNNY DRILLING COMPANY EARTH MATTERS INC. COLLAR ELEV. FT. DATE/TIME 1440 05/15/13

TEMP. 70° F DRILL RIG SIMCO 2800 DRILLER D. TAYLOR STARTED 1530 04/17/13 (TIME / DATE) COMPLETED 0835 04/18/13 (TIME / DATE)

LOCATION / COORDINATES N, E (BASIN No. 1 AREA)

MATERIALS INVENTORY

WELL CASING	2.0 in. dia. 80 l.f.	WELL SCREEN	2.0 in. dia. 10.0 l.f.	BENTONITE SEAL	BENTONITE SLURRY
CASING TYPE	SCHEDULE 40 PVC	SCREEN TYPE	SCHEDULE 40 PVC	INSTALLATION METHOD	TREMIE
JOINT TYPE	FLUSH THREADED	SLOT SIZE	0.02"-SLOT	FILTER PACK QTY.	10 BAGS
GROUT QUANTITY	~70-80 GALLONS	CENTRALIZERS	NOT USED	FILTER PACK TYPE	M#2-SIZE SAND
GROUT TYPE	BENTONITE CLAY SLURRY	DRILLING MUD TYPE	USED	INSTALLATION METHOD	GRAVITY

	INSTALLATION PHOTOS**	INSTALLATION NOTES
PHOTO 1 Photo of sample interval portion from screened section of PMW-19 (screen set from 80-90-ft. bgs).		MEASURED AT APPROX. 4.0 FT. bgs. ON 04/19/13 AFTER SETTLING, AND ADDITIONAL GROUT PLACED TO WITHIN 1-FT. OF GROUND SURFACE. TEMPORARY RISER STICKUP REMOVED TO APPROX. 0.5 FT bgs. CEMENT GROUT ADDED APPROX. 1.0 FT TO 0.5 FT bgs. WHILE PUSHING 8" DIAMETER, 14" LONG STEEL FLUSH-MOUNTED SURFACE CASING SET TO 4" ABOVE GROUND SURFACE (ags). 2 FT. X 2 FT. CONCRETE WELL PAD POURED AT GROUND SURFACE TO 4" ags. AND SURFACE CASING LID REPLACED AND SECURED WITH GALVANIZED STEEL SCREWS.
PHOTO 2 Photo of sample interval portion from screened section of PMW-19 (screen set from 80-90-ft. bgs).		**SEE PHOTO LOG IN REPORT FOR ADDITIONAL CONSTRUCTION PHOTOS
PHOTO 3 Photo of sample interval portion from screened section of PMW-19 (screen set from 80-90-ft. bgs).		

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-23 SHEET 1 of 2

GA INSP. VF DRILLING METHOD 3¼"I.D. H.S.A's & 5⅞"MUD ROTARY GROUND ELEV. ~164 FT. WATER DEPTH FT.BTOR

WEATHER P.CLOUDY DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. FT. DATE/TIME

TEMP. 56-65° F DRILL RIG CME-75 DRILLER J. SCRIBELLITO STARTED 0800 06/05/13 (TIME / DATE) COMPLETED 1320 06/05/13 (TIME / DATE)

LOCATION / COORDINATES N, E (SOUTHEAST OF CELL 7)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 208 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

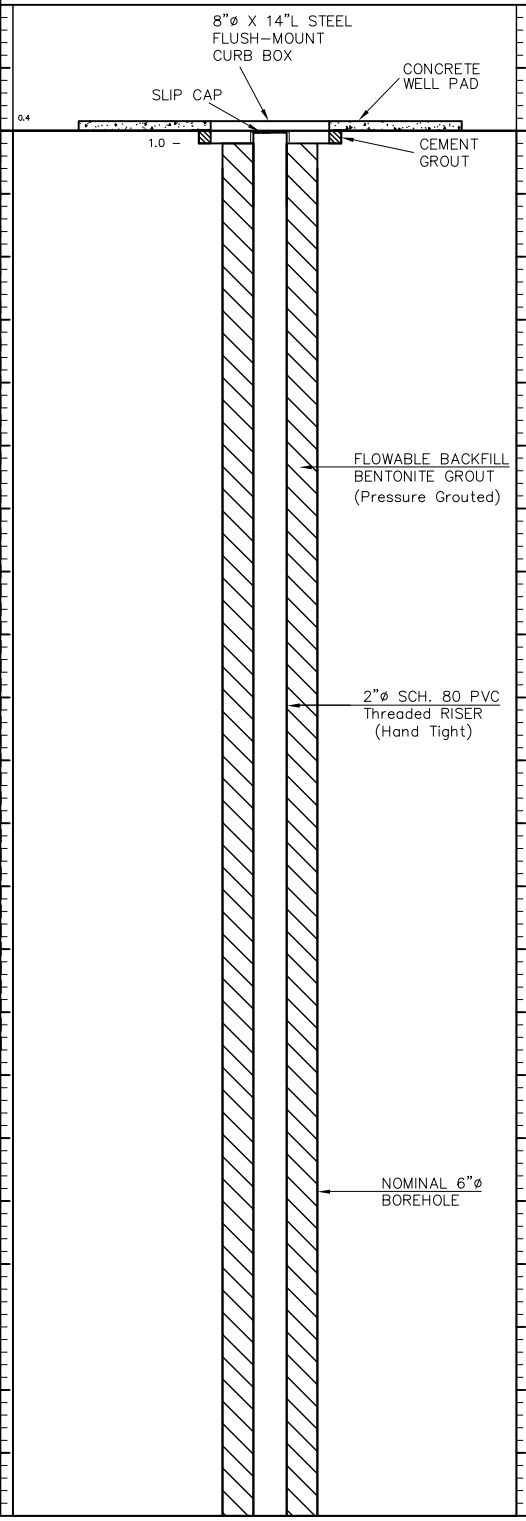
CASING TYPE SCHEDULE 80 PVC SCREEN TYPE SCHEDULE 80 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 10 BAGS

GROUT QUANTITY ~280-300 GALLONS CENTRALIZERS 1-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD TREMIE-WASHED

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
~164.0	EXISTING GROUND SURFACE*
	INTERPRETED SUB-SURFACE*
10.0	
	SILTY SAND
20.0	(SM) Silty f-m SAND, tan br. to pale br., non-plastic, non-cohesive to cohesive, loose, trace plastic fines, occasional white-gray silty CLAY seams, moist to wet,
30.0	
40.0	
50.0	
60.0	
70.0	
94.0	
73.0	
80.0	CLAY TO SILTY CLAY
	(CH-CL) CLAY to SILTY CLAY, light grey & maroon-dk. maroon to red-purple, pale purple-white mottled to dark grey, low to high plasticity, trace gravel, trace to some fine sand & silt lenses, trace silty sand lenses, occasionally fissured and blocky, cohesive, w<PL to w>PL, stiff to hard.
90.0	
100.0	
110.0	



INSTALLATION NOTES

AUGERED WITH 3¼"I.D. HOLLOW STEM AUGERS (HSAs) TO 10.0 FT. BELOW GROUND SURFACE (bgs) WITH STANDARD SAMPLING 3-5 FT AND 8-10 FT. AUGERS REMOVED. TEMPORARY 6" STEEL SURFACE CASING HYDRAULICALLY PUSHED TO 9 FT. bgs. RESUMED STANDARD SAMPLING USING 5⅞"DRAG BIT FROM 13.0-240.0 FT. bgs. DRILLED BOREHOLE ON 06/4/13 TO 229 FT bgs. TO SET WELL. BOREHOLE FLUSHED WITH CLEAN WATER PRIOR TO REMOVING DRILL RODS & DRILL BIT. 1" DIAMETER SCH 40 PVC TREMIE PIPE INSERTED TO DEPTH THROUGH TEMPORARY 6" SURFACE CASING. WELL MATERIALS PLACED IN BOREHOLE USING 10.0 FT. SOLID RISER SUMP, FLAT-END THREADED END CAP, 20.0 FT. WELL SCREEN, 208.0 FT. OF RISER AND J-PLUG CAP FOR OVERALL LENGTH OF 228.55 FT. WELL MATERIALS PLACED TO 240.55 FT. bgs. AND SECURED AT DRILLING DECK WITH CHAIN BRACE WITH TEMPORARY 3.0 FT. STICKUP. M#2 SANDPACK TREMIE-WASHED 229.0-203.0 FT. bgs. 1/2" COATED BENTONITE TABLET SEAL PLACED BY HAND 203.0-195.0 FT. bgs. TABLETS ALLOWED TO HYDRATE 30 MINUTES. BENTONITE SLURRY TREMIED 195.0 FT. bgs. TO GROUND SURFACE WHILE...

SEE SHEET 2 FOR ADDITIONAL NOTES

*MEASUREMENTS REFERENCED FROM FIELD-MODIFIED GROUND SURFACE AS OF INSTALLATION DATE (05/15/13).

WELL DEVELOPMENT NOTES

DATE DEVELOPED:

DEVELOPMENT METHOD: AIR LIFT/

VOLUME PURGED: GALS.

FOR FURTHER DETAILS SEE ACCOMPANYING WELL DEVELOPMENT FIELD RECORD.

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-23 SHEET 2 of 2

GA INSP. VF DRILLING METHOD 3 1/4" I.D. H.S.A's & 5 7/8" MUD ROTARY GROUND ELEV. ~164 FT. WATER DEPTH FT.BTOR

WEATHER P.CLOUDY DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. FT. DATE/TIME

56-65° F DRILL RIG CME-75 DRILLER J. SCRIBELLITO STARTED 0800 06/05/13 (TIME / DATE) COMPLETED 1320 06/05/13 (TIME / DATE)

LOCATION / COORDINATES N, E (SOUTHEAST OF CELL 7)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 208 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

CASING TYPE SCHEDULE 80 PVC SCREEN TYPE SCHEDULE 80 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 10 BAGS

GROUT QUANTITY ~280-300 GALLONS CENTRALIZERS 1-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD TREMIE-WASHED

110.0
CLAY TO SILTY CLAY

See Sheet 1 for Details

120.0

130.0

140.0

150.0

160.0

170.0

-32.0
178.0

180.0
SILTY CLAY to CLAYEY SILT

190.0

200.0

-57.0
208.0

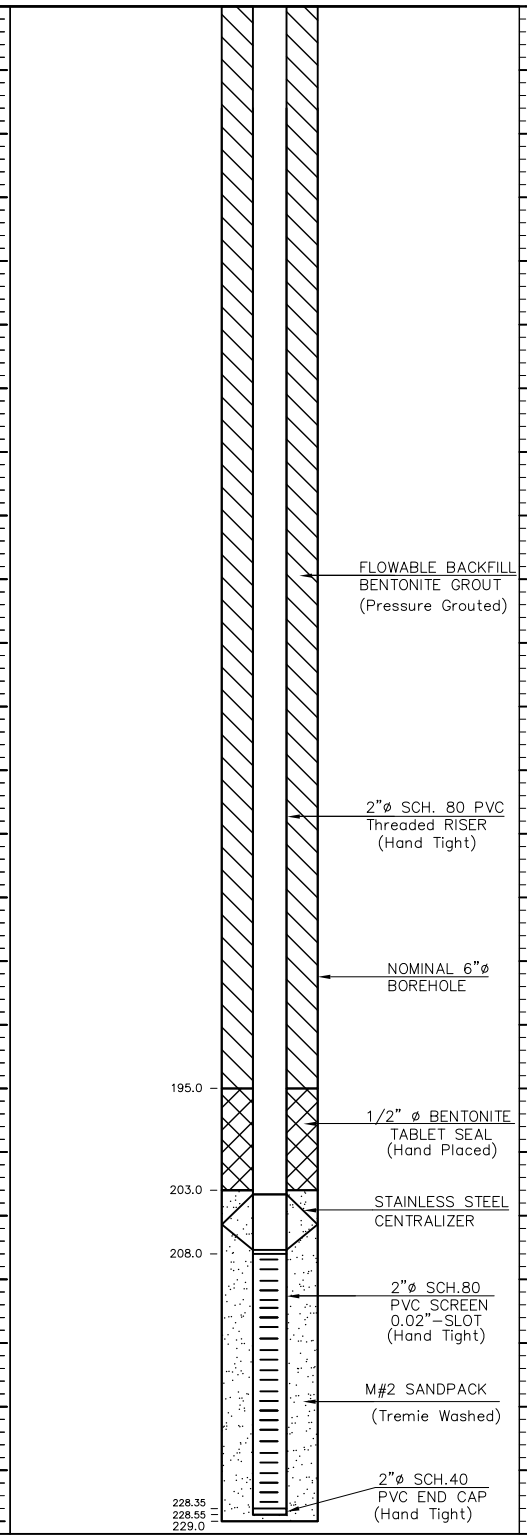
210.0
SILTY SAND to SAND

(SM-SP) Silty f-m SAND, pale grey & white, non-plastic, non-cohesive, trace low plasticity fines and occasional thin clay lenses, wet, dense.

220.0

229.0 -75.0

EOB @ 229.0 FT. bgs.



INSTALLATION NOTES

REMOVING TEMPORARY 6" STEEL SURFACE CASING. GROUT LEVEL WAS MEASURED AT APPROX. 3.0 FT. bgs. ON 06/06/13 AFTER SETTLING, AND ADDITIONAL GROUT PLACED TO WITHIN 1-FT. OF GROUND SURFACE. TEMPORARY RISER STICKUP REMOVED TO APPROX. 0.5 FT bgs. CEMENT GROUT ADDED APPROX. 1.0 FT TO 0.5 FT bgs. WHILE PUSHING 8" DIAMETER, 14" LONG STEEL FLUSH-MOUNTED SURFACE CASING SET TO 4" ABOVE GROUND SURFACE (ags). 2 FT. X 2 FT. CONCRETE WELL PAD POURED AT GROUND SURFACE TO 4" ags.

Golder Associates

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-28 SHEET 1 of 2

GA INSP. RJM DRILLING METHOD 3 1/4" I.D. H.S.A's & 5 7/8" MUD ROTARY GROUND ELEV. ~142 FT. WATER DEPTH 65.55 FT.BTOR

WEATHER SUNNY DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. ~141.5 FT. DATE/TIME 05/22/13 1015

TEMP. 54-78° F DRILL RIG CME-55 ATV DRILLER J. SCRIBELLITO STARTED 0950 05/17/13 (TIME / DATE) COMPLETED 1215 05/17/13 (TIME / DATE)

LOCATION / COORDINATES N, E (SW OF CELL 11 AREA)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 57 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

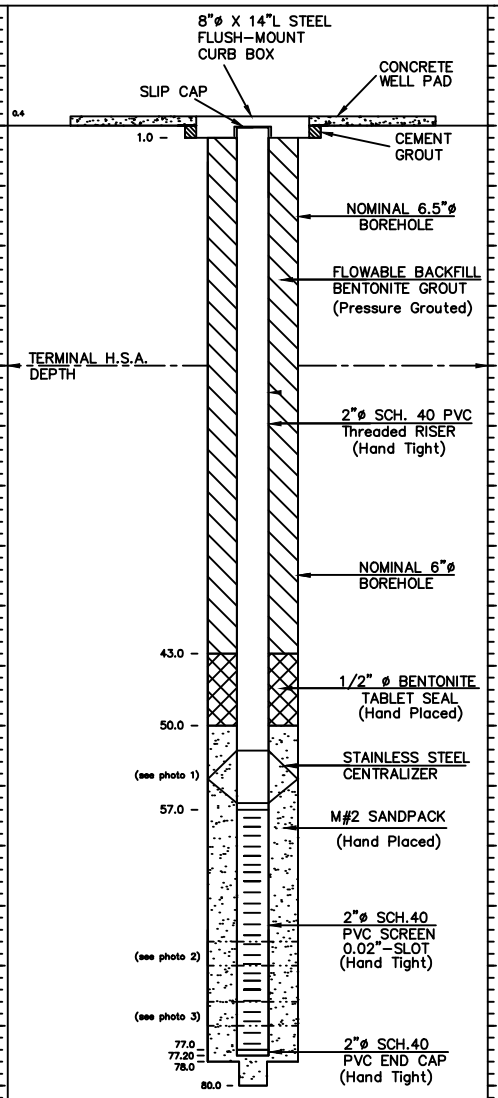
CASING TYPE SCHEDULE 40 PVC SCREEN TYPE SCHEDULE 40 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 11 BAGS

GROUT QUANTITY ~100-120 GALLONS CENTRALIZERS 1-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD GRAVITY THROUGH CASING

ELEV./DEPTH	SOIL/ROCK DESCRIPTION
~142.0	EXISTING GROUND SURFACE*
0.0	INTERPRETED SUB-SURFACE*
	Clayey SILT to Silty Gravelly SAND to Silty SAND & SAND
10.0	(MH) CLAYEY SILT, some f-sand, brown to ol.br., cohesive, sl. plasticity, cohesive, w~PL, firm, then (GM) SILTY f-c subr. qtz. GRAVEL with m-c SAND, tr. f-sand, moist, loose to CP., then layered (ML-SM) CLAYEY SILT to SILTY f-SAND, occasional soft-firm pale grey clay seams,cohesive to non-coh., br., loose to CP, m-wet, grading to (SP) f-SAND,uniformly graded, tr.fines, slightly stratified br. to tan-br., loose, moist to wet (possibly perched water at ~19.0 FT. bgs).
20.0	
117.6	
24.4	
30.0	
40.0	
50.0	SAND
	(SP) Fine to coarse SAND, poorly graded, subrounded, some fine to coarse gravel, occasional seams and pockets of soft, light grey f-sandy clay decreasing with depth, some to trace fines, light brown to tan-br., non-cohesive, moist to wet, compact to dense.
60.0	
70.0	
62.0	
80.0	EOB @ 80.0 FT. bgs.



INSTALLATION NOTES

AUGERED WITH 3¼"I.D. HOLLOW STEM AUGERS (HSAs) TO 20.0 FT. BELOW GROUND SURFACE (bgs) WITH STANDARD SAMPLING 3-20 FT. bgs. ON 05/16/13. AUGERS REMOVED. TEMPORARY 6" STEEL SURFACE CASING HYDRAULICALLY PUSHED/HAMMERED TO 18.5 FT. bgs. RESUMED STANDARD SAMPLING USING 5⅞" DRAG BIT FROM 23.0-55.0 FT. bgs. RESUMED STANDARD SAMPLING ON 05/17/13 FROM 55-80 FT. bgs. DRILLED BOREHOLE TO 78 FT. bgs. TO SET WELL. BOREHOLE FLUSHED WITH CLEAN WATER PRIOR TO REMOVING DRILL RODS & DRILL BIT. 1" DIAMETER SCH 40 PVC TREMIE PIPE INSERTED TO DEPTH THROUGH TEMPORARY 6" SURFACE CASING. WELL MATERIALS PLACED IN BOREHOLE USING 20.0 FT. WELL SCREEN, FLAT-END THREADED END CAP, 57.0 FT. OF RISER AND J-PLUG CAP FOR OVERALL LENGTH OF 77.20 FT. WELL MATERIALS PLACED TO 77.0 FT. bgs. AND SECURED AT DRILLING DECK WITH CHAIN BRACE WITH TEMPORARY 3.0 FT. STICKUP. M#2 SANDPACK GRAVITY FED 80.0-50.0 FT. bgs. 1/2" COATED BENTONITE TABLET SEAL PLACED BY HAND 50.0-43.0 FT. bgs. TABLETS ALLOWED TO HYDRATE 30 MINUTES. BENTONITE SLURRY TREMIED 43.0 FT.

SEE SHEET 2 FOR ADDITIONAL NOTES

*MEASUREMENTS REFERENCED FROM FIELD-MODIFIED GROUND SURFACE AS OF INSTALLATION DATE (05/17/13).

WELL DEVELOPMENT NOTES

DATE DEVELOPED:

DEVELOPMENT METHOD: SUBMERSIBLE PUMP

VOLUME PURGED:

FOR FURTHER DETAILS SEE ACCOMPANYING WELL DEVELOPMENT FIELD RECORD.

Golder Associates

G:\Projects\2018\20183854 - Chesapeake Terrace LF\Work Documents\Info from Golder\CAD\~Misc\Well Logs\CAD Files for Well Logs\Shallow Wells\PMW-28 well log.dwg

MONITORING WELL INSTALLATION LOG

JOB NO. 063-1431-003 PROJECT NWM/CHESAPEAKE TERRACE SFI/MD WELL NO. PMW-28 SHEET 2 of 2

GA INSP. RJM DRILLING METHOD 3 1/4" I.D. H.S.A's & 5 7/8" MUD ROTARY GROUND ELEV. ~142 FT. WATER DEPTH 65.55 FT.BTOR

WEATHER SUNNY DRILLING COMPANY FREE STATE DRILLING COLLAR ELEV. ~141.5 FT. DATE/TIME 05/22/13 1015

TEMP. 54-78° F DRILL RIG CME-55 ATV DRILLER J. SCRIBELLITO STARTED 0950 05/17/13 (TIME / DATE) COMPLETED 1215 05/17/13 (TIME / DATE)

LOCATION / COORDINATES N, E (SW OF CELL 11 AREA)

MATERIALS INVENTORY

WELL CASING 2.0 in. dia. 57 l.f. WELL SCREEN 2.0 in. dia. 20.0 l.f. BENTONITE SEAL 1/2" BENTONITE TABLETS

CASING TYPE SCHEDULE 40 PVC SCREEN TYPE SCHEDULE 40 PVC INSTALLATION METHOD GRAVITY THROUGH CASING

JOINT TYPE FLUSH THREADED SLOT SIZE 0.02"-SLOT FILTER PACK QTY. 11 BAGS

GROUT QUANTITY ~100 GALLONS CENTRALIZERS 1-STAINLESS STEEL USED FILTER PACK TYPE M#2-SIZE SAND

GROUT TYPE BENTONITE CLAY SLURRY DRILLING MUD TYPE WYO-BEN HIGH YIELD INSTALLATION METHOD GRAVITY THROUGH CASING

	INSTALLATION PHOTOS**	INSTALLATION NOTES
PHOTO 1 Well assembly materials including stainless steel centralizer at (shallow) permanent replacement monitoring well PMW-28.		bgs. TO GROUND SURFACE WHILE REMOVING TEMPORARY 6" STEEL SURFACE CASING. GROUT LEVEL WAS MEASURED AT APPROX. 6.0 FT. bgs. ON 05/21/13 AFTER SETTLING, AND BENTONITE CHIPS PLACED TO WITHIN 1-FT. OF GROUND SURFACE. TEMPORARY RISER STICKUP REMOVED TO APPROX. 0.5 FT bgs. CEMENT GROUT ADDED APPROX. 1.0 FT TO 0.5 FT bgs. WHILE PUSHING 8" DIAMETER, 14" LONG STEEL FLUSH-MOUNTED SURFACE CASING SET TO 4" ABOVE GROUND SURFACE (ags). 2 FT. X 2 FT. CONCRETE WELL PAD POURED AT GROUND SURFACE TO 4" ags. **SEE PHOTO LOG IN REPORT FOR ADDITIONAL CONSTRUCTION PHOTOS
PHOTO 2 Photo of sample interval portion from screened section of PMW-28 (screen set from 57-77-ft. bgs).		
PHOTO 3 Photo of sample interval portion from screened section of PMW-28 (screen set from 57-77-ft. bgs).		

APPENDIX G

Geotechnical Laboratory Analysis

HARDIN-KIGHT ASSOCIATES, INC.
CONSULTING ENGINEERS

November 9, 2002

MARK SCHULTZ ASSOCIATES
1202 West Street
Annapolis, Maryland 21401

Reference: Geotechnical Evaluation and Testing
Chesapeake Rubble Fill

Dear Mark,

In accordance with your request on October 31, 2002, I have reviewed MDE's August 5, 2002 letter and, in particular the Comments, 4a, 4b, and 4c.

Based on my experience as a geotechnical engineer, I can offer the following opinions.

1. With respect to the sentence in Comment 4a: ***"...there may also be the need for specific information on 'distinct strata' that underlie the site, in order to verify that the design of the landfill is and will remain stable after construction."***, I have reviewed the result of 33 Standard Penetration Test Borings and laboratory tests on samples of the clay which has "N" values in the range of 40 blow/foot. The test borings indicate that the clays below the cells have "N" values in excess of 100 blows/foot. It is my opinion that the geotechnical date collected to date are adequate to verify the design of the rubble fill and to verify that the rubble fill will remain stable after construction.

2. With respect to the sentence in Comment 4b: ***"Clays often exhibit greater porosity and plasticity than coarser sediments, and may subsequently be compressed to a greater extent than silts or sand when subjected to dewatering, vibration caused by traffic, and/or long term increase loading such would be expected under the proposed landfill area."*** This statement may apply to some clays, but none of these concerns are valid for clays with "N" values greater than 100 blows/foot. It is my opinion that the character of the clay as indicated by the existing Standard Penetration Test Borings is more than adequate to ***"insure that the liner and leachate collection system will not be subject to undue deflective stress, suffer damage, or exhibit a decrease in performance due to change in grade."*** To confirm that long term consolidation of the clays below the liner and the leachate collection system will be insignificant to the performance of the liner and the leachate collection system, you can obtain relatively undisturbed samples for one-dimensional consolidation testing. Some disturbance of the samples of the very hard clays below the liner and leachate collection system will be unavoidable, but the disturbance will

result in an estimated settlement greater than the actual settlement which will occur under the net long term load imposed by the landfill. Our evaluation of the existing subsurface data is that clay becomes stronger with depth below the existing surface and we anticipate that undisturbed sample will be obtained within 10 feet below the proposed bottom of the cells.

3. With respect to Comment 4c: *"The subsurface evaluation should provide sufficient information for a stability analysis to be performed on the proposed design, if one has not already been performed."* We recommend that the existing subsurface data be plotted to show the relationship between the subsurface data and the cells during construction and at completion. Based on these data stability analyses can be performed using conservative estimates of the soil characteristic based on the available data. Based on this initial evaluation, additional samples can be obtained, if necessary, to the confirm that the actual strength and compressibility characteristics of the undisturbed soils exceed the values used in the initial evaluation.

We have assumed that the civil engineering consultant can provide the sections which show the relationship between proposed Rubble Fill and the existing subsurface data. We propose to review the sections to determine where additional samples are required to allow us to predict the long term settlement of the clay below the liner and the leachate collection system and determine the most critical section for consideration of long term slope stability.

We have assumed that the contract for the collection of additional samples, if necessary, will be with the owner. We estimate that the cost of obtaining additional samples will be about $5000.00.

We estimate that the cost of additional laboratory testing, if necessary, will be about $5000.00.

We estimate that the cost of the geotechnical evaluation will be about $10,000.00.

We recommend that you budget $20,000 for the additional geotechnical evaluation which has been suggested by MDE's August 5, 2002 letter.

If you have any questions or if we can provide further assistance at this time, please call us.

Very truly yours,

HARDIN-KIGHT ASSOCIATES, INC.

Jack Hardin

Jack Hardin, PE

HARDIN-KIGHT ASSOCIATES, INC.
CONSULTING ENGINEERS

May 27, 2003 Our No.: 02231

Mark Schultz Associates, Inc.
1202 West Street
Annapolis, MD 21401

Reference: Geotechnical Testing and Evaluation
Chesapeake Rubble Landfill

Dear Mr. Schultz:

We have conducted laboratory tests on clay specimens for the Chesapeake Rubble Landfill as requested. Submitted herein are the results of the tests and our evaluation. This study was undertaken to predict the behavior of the clay at the bottom of the cell. The tests were conducted on hand carved soil samples obtained in the area of MW 28 at a depth of two feet. The test boring data reveals that the clays have a standard penetration test resistance (N) value of 30 to 40 blows per foot indicating a hard condition. This N value is less than the value for clays expected to be present at the proposed bottom of the cell according to the previous standard penetration test borings.

We conducted one dimensional consolidation test in accordance with ASTM D 2435 and unconfined compressive strength in accordance with ASTM D 2166. In addition, we conducted grain size distribution and index tests in accordance with the ASTM methods as indicated on the attached test results. In summary, the test results indicate that the soils encountered in the test pit are classified as CH in accordance with the Unified Soil Classification System (ASTM D 2487). The one dimensional consolidation test results indicate that the clays have an indicated pre-consolidation pressure of 5.4 tons per square foot. The initial void ratio and porosity are 0.499 and 0.333 respectively. The unconfined compressive strength was determined to be 10,594 pounds per square foot or 5.3 tons per square foot.

The sample tested in this study is a very hard clay. These soils will exhibit insignificant settlement when loaded to less than the 5.4 ton pre-consolidation pressure. The unconfined compressive strength indicates that the soils will support the anticipated loads with a factor of safety of at least two against bearing failure. For a 100 foot thickness of rubble, we estimate the loads to be roughly 4 tons per square foot.

According to the previous test boring data, most of the clays present on the site are harder than the clay represented by these tests. These test results indicate that the soils will be stable and are ideal for the proposed use. We expect the exposed materials at the bottom of the cell excavation to be superior based on the test boring data.

Attached are laboratory test results for your reference. If you have any questions concerning this matter, please call our office.

Very truly yours,

HARDIN KIGHT ASSOCIATES, INC.

Stephen E. Kight, P.E.

Jack Hardin, P.E.

SEK/JH/dlr

attachments

UNCONFINED COMPRESSION OF COHESIVE SOIL

Project: Chesapeake Rubble Fill
Job #: 02231
Lab #: 030081
Sample Location: On Site
Sample Description: Maroon & Gray Clay
Method: ASTM D2166

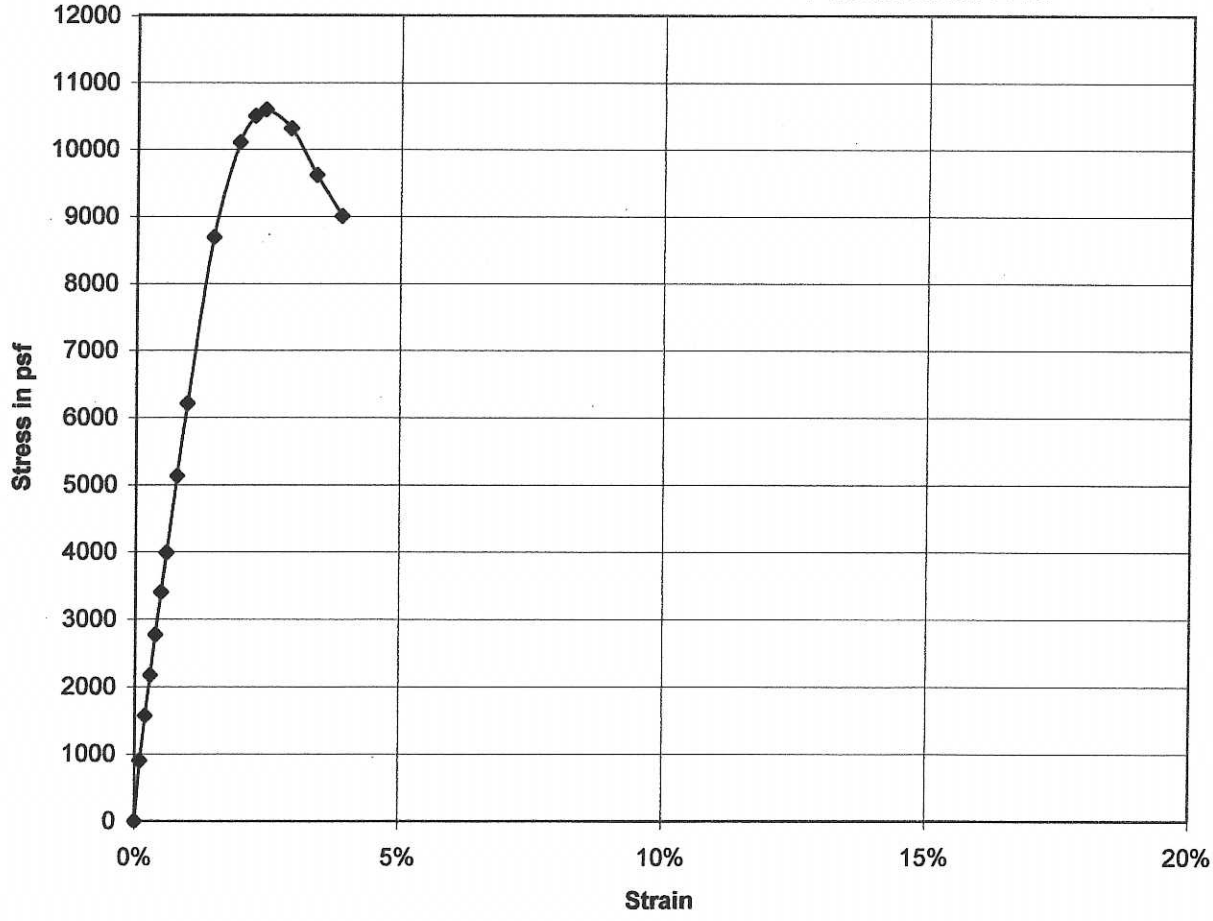
Date: 4/17/2003

Length:	5.140"	Initial Wet Wt.:	1138.47g	Initial Wet Unit Wt.:	132.4pcf
Diameter:	2.848"	Final Wet Wt.:	1136.48g	Final Wet Unit Wt.:	132.2pcf
Area:	6.371in^2	Dry Wt:	1083.46g	Dry Unit Wt.:	115.1pcf
Volume:	32.750in^3	Initial Moisture:	15.0%	L/D:	1.8

Load Rate: .045"/min

Stress-Strain Curve

Maximun Stress: 10594psf
Percent Strain: 2.4%



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CONSOLIDATION

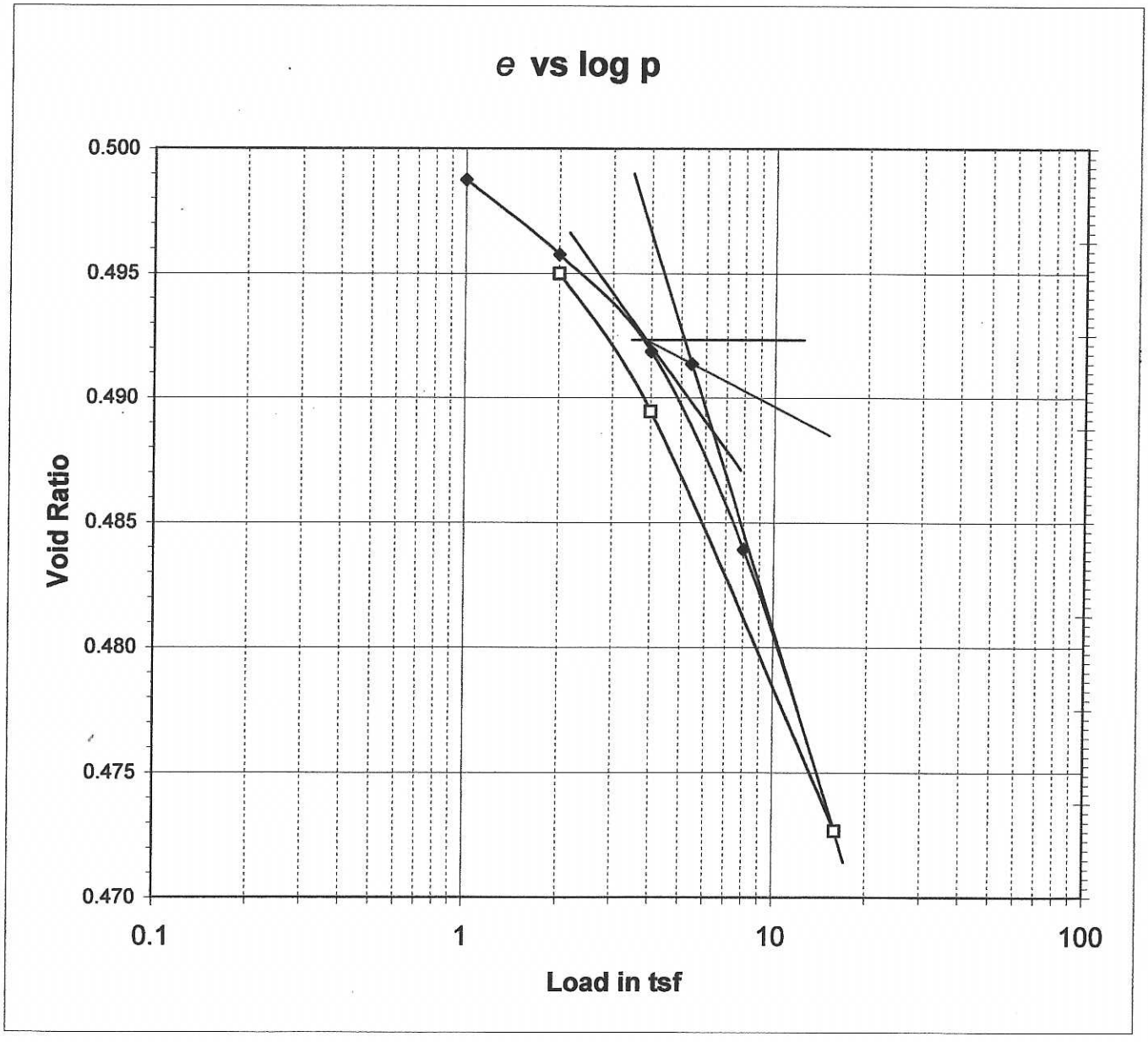
Project: Chesapeake Rubble Landfill
Job #: 02231
Lab #: 030081
Sample Location: On Site
Sample Description: Maroon & Gray Clay

Date: Apr-03

Specific Gravity: 2.8
Moisture Content: 17.3%
Sample Dia: 2.500"
Initial Sample Len: 1.000"

Unit Wt. Wet: 136.8 pcf
Unit Wt. Dry: 116.6 pcf
Initial Void Ratio: 0.499

Preconsolidation Pressure: 5.4 tsf



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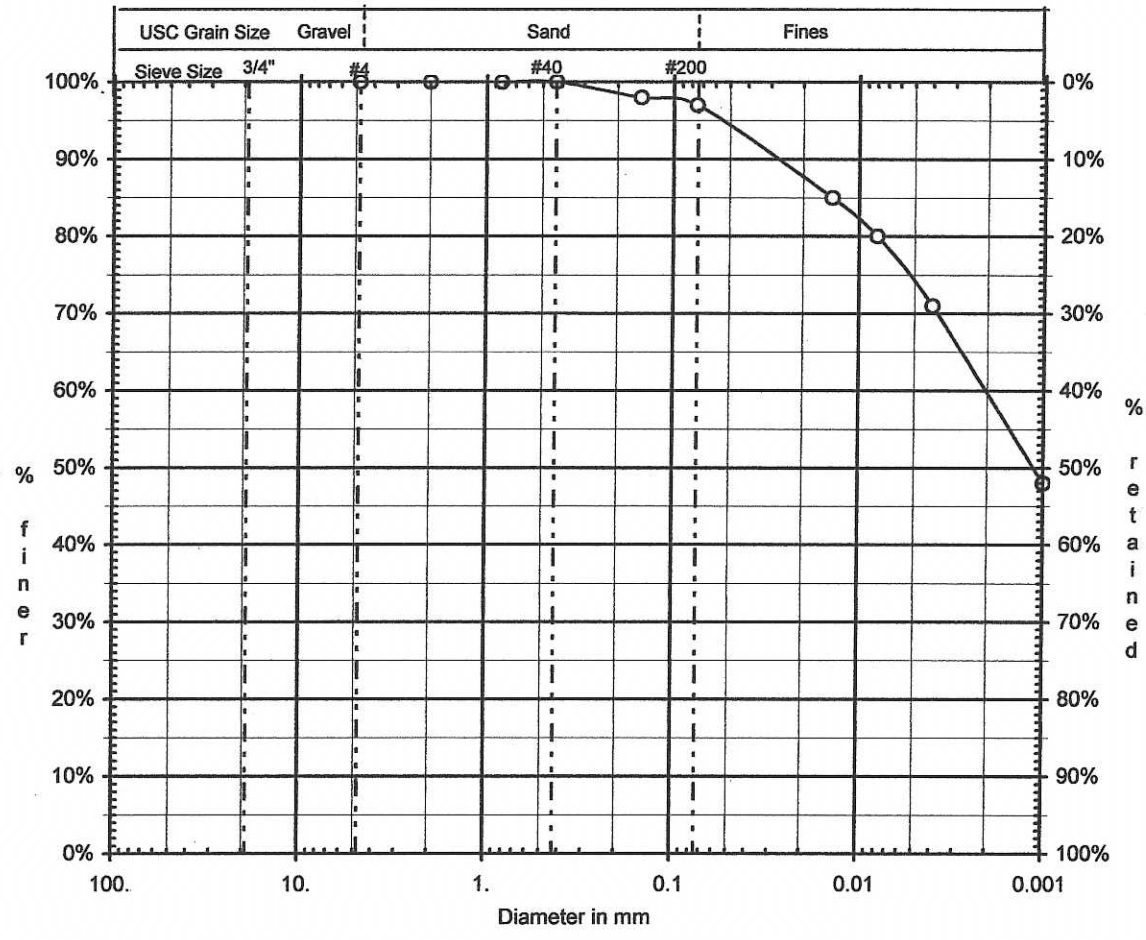
Grain Size Analysis

Project: Chesapeake Rubble Landfill
Job #: 02231

Date: 4/17/2003
Lab #: 030081

Identification: On Site

Description: Maroon & Gray Clay



Test Methods	Soil Properties		Classification
Moisture Content: ASTM D2216	Moisture Content	18.4%	USC: CH
Grain Size Analysis: ASTM D422	Liquid Limit:	66	
Liquid & Plastic Limits: ASTM D4318	Plastic Limit:	28	
	Plastic Index:	38	
	A Line:	34	

C:\~jobs\02\02231\[030081MAL.xls]

Checked By:	Tested By:

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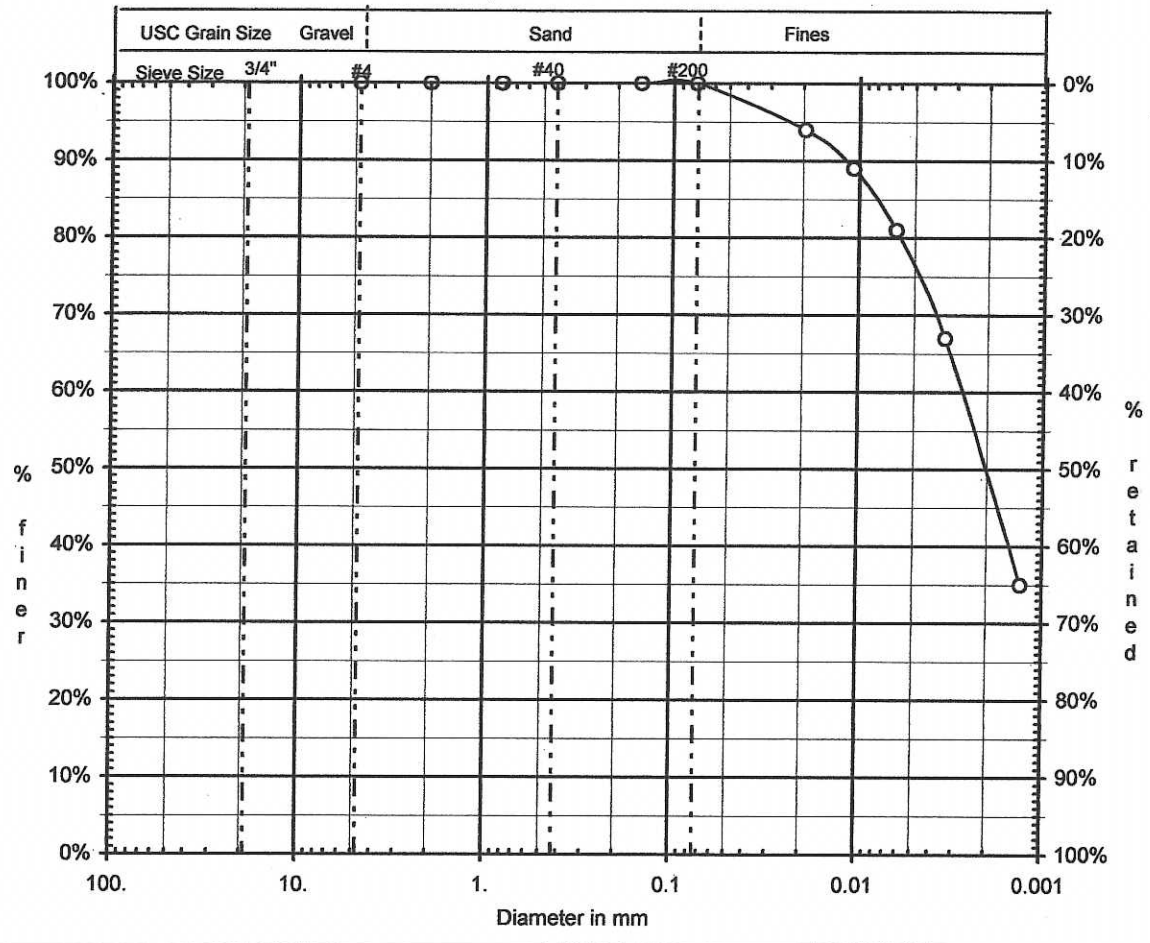
Grain Size Analysis

Project: Chesapeake Rubble Landfill
Job #: 02231

Date: 4/23/2003
Lab #: 030091

Identification: MW-23, S-13 & S-14

Description: Red brown & gray Clay



Test Methods	Soil Properties		Classification
Moisture Content: ASTM D2216	Moisture Content	24.2%	USC: CL
Grain Size Analysis: ASTM D422	Liquid Limit:	49	
Liquid & Plastic Limits: ASTM D4318	Plastic Limit:	27	
	Plastic Index:	22	
	A Line:	21	
	Checked By:		Tested By:

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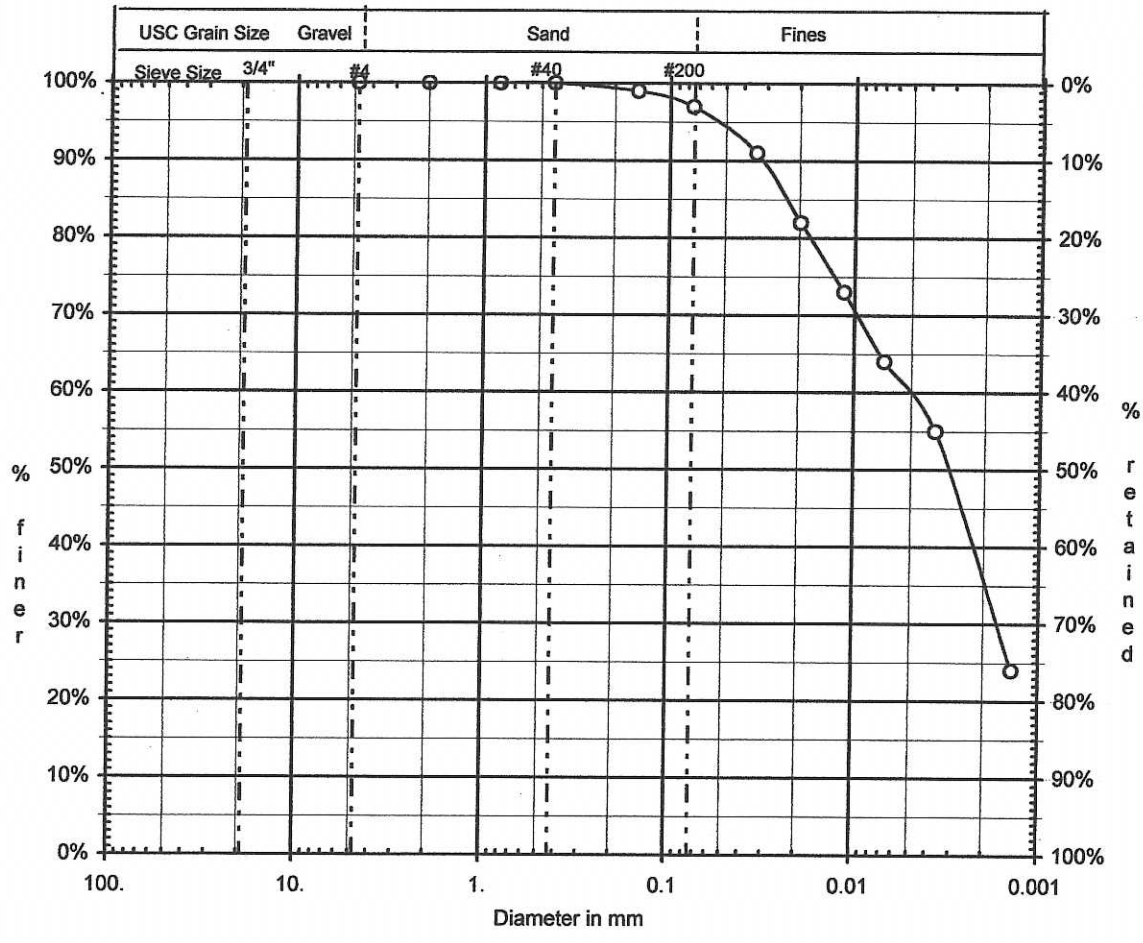
Grain Size Analysis

Project: Chesapeake Rubble Landfill
Job #: 02231

Date: 5/2/2003
Lab #: 030097

Identification: MW-23, S-8 & S-9

Description: Red & brown Clay



Test Methods	Soil Properties		Classification
Moisture Content: ASTM D2216	Moisture Content	20.0%	USC: CL
Grain Size Analysis: ASTM D422	Liquid Limit:	34	
Liquid & Plastic Limits: ASTM D4318	Plastic Limit:	23	
	Plastic Index:	11	
	A Line:	10	
	Checked By:		Tested By:

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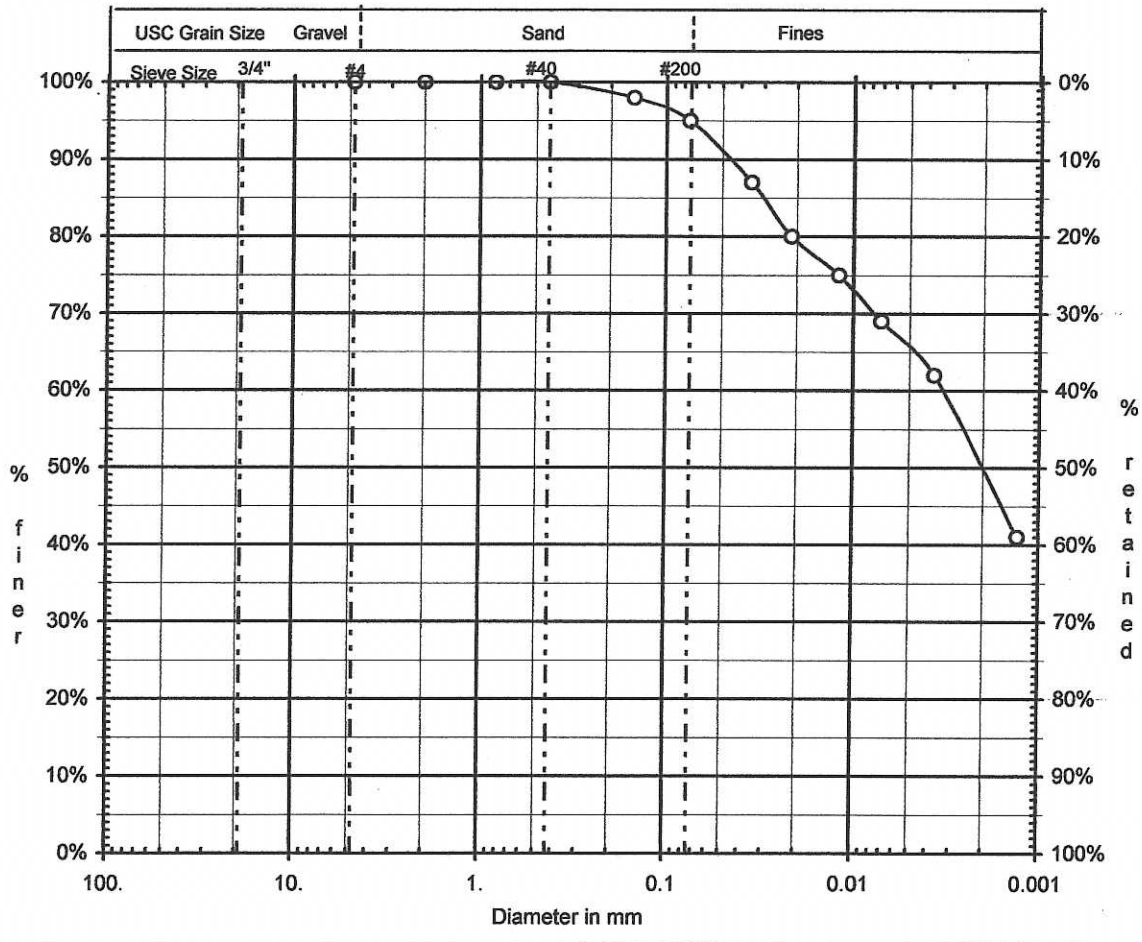
Grain Size Analysis

Project: Chesapeake Rubble Landfill
Job #: 02231

Date: 5/2/2003
Lab #: 030098

Identification: MW-23, 43-50'

Description: Red gray Clay



Test Methods	Soil Properties		Classification
Moisture Content: ASTM D2216	Moisture Content	20.0%	USC: CL
Grain Size Analysis: ASTM D422	Liquid Limit:	43	
Liquid & Plastic Limits: ASTM D4318	Plastic Limit:	20	
	Plastic Index:	23	
	A Line:	17	
	Checked By:		Tested By:

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Phone: 410 553-0802
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Project: Chesapeake Rubble Landfill
Job #: 02231
Lab #: 030081
Location: On-Site
Description: Maroon & White Clay
Sample Type: Block Trimmed

Device Constants

	Burret		Pipet		Panel:	2	
Vol:	50.0	cc	0.086	cc/Burret Unit	h_{wat}:	1.066	cm/cc
Len:	53.3	cm	1.07	cm/Burret Unit	in-out	0	Burret Units
Area:	0.94	cm^2	0.0807	cm^2	Offset	0.00	cm

Date: 4/21/2003

Sample Dimensions			Moisture Contents		
	Initial	Final		On site	Final
Length:	3.621 in				
Diameter:	2.845 in		Tare #:		
Wet Wt.:	808.61 g		Wet Wt.:	98.03 g	
Wet Unit Wt.:	133.8 pcf		Dry Wt.:	89.49 g	
Dry Unit Wt.:	108.9 pcf		Tare Wt.:	52.24 g	
Compaction:	#DIV/0!		Moisture:	22.9 %	

Date/Time	Pressure Cell	Pressure Head	Pressure tail	Head vol	Head b/p	Tail vol	Tail b/p	Temp	Volume In run	Volume In total	Volume Out Run	Volume Out Total	In/Out Ratio	Run Time sec	Head/Tail Differential psi	Head/Tail Differential cm	h	Hydraulic Gradiant	Temperature Ave.	Temperature Corr.	Hydraulic Conductivity (k_{20}) cm/sec	Steady State Average cm/sec
8:14	92.7	65.0	60.0	4.1	p	46.6	p	22.7									397.5					
10:08	92.7	65.0	60.0	4.5	p	46.1	p	22.8	0.0	0.0	0.0	0.0	0.80	6840	5.0	352.2	396.5	43	22.8	0.937	3.0E-09	
10:08	92.7	65.0	60.0	4.5	p	46.1	p	22.8									396.5					
11:47	92.7	65.0	60.0	4.8	p	45.6	p	22.9	0.0	0.1	0.0	0.1	0.60	5940	5.0	352.2	395.6	43	22.9	0.935	3.1E-09	
11:47	92.7	65.0	60.0	4.8	p	45.6	p	22.9									395.6					
15:50	92.7	65.0	60.0	5.6	p	44.2	p	23.2	0.1	0.1	0.1	0.2	0.57	14580	5.0	352.2	393.3	43	23.1	0.930	3.4E-09	
4/21/2003 15:50	92.7	65.0	60.0	5.6	p	44.2	p	23.2									393.3					
4/22/2003 8:07	92.7	65.0	60.0	9.3	p	39.8	p	23.0	0.3	0.4	0.4	0.6	0.84	58620	5.0	352.2	384.7	42	23.1	0.929	3.2E-09	
8:07	92.7	65.0	60.0	9.3	p	39.8	p	23.0									384.7					
14:15	92.7	65.0	60.0	10.4	p	38.1	p	23.3	0.1	0.5	0.1	0.7	0.65	22080	5.0	352.2	381.7	42	23.2	0.927	3.0E-09	
4/22/2003 14:15	92.7	65.0	60.0	10.4	p	38.1	p	23.3									381.7					
4/23/2003 8:03	92.7	65.0	60.0	14.0	p	33.5	p	23.2	0.3	0.9	0.4	1.1	0.78	64080	5.0	352.2	372.9	41	23.3	0.925	3.0E-09	
8:03	92.7	65.0	60.0	14.0	p	33.5	p	23.2									372.9					
15:30	92.7	65.0	60.0	16.2	p	31.4	p	23.1	0.2	1.0	0.2	1.3	1.05	26820	5.0	352.2	368.4	40	23.2	0.927	3.9E-09	
4/23/2003 15:30	92.7	65.0	60.0	16.2	p	31.4	p	23.1									368.4					
4/24/2003 7:56	92.7	65.0	60.0	21.3	p	25.5	p	23.0	0.4	1.5	0.5	1.8	0.86	59160	5.0	352.2	356.6	39	23.1	0.930	4.6E-09	
7:56	92.7	65.0	60.0	21.3	p	25.5	p	23.0									356.6					
16:47	92.7	65.0	60.0	23.8	p	22.5	p	23.0	0.2	1.7	0.3	2.1	0.83	31860	5.0	352.2	350.8	38	23.0	0.931	4.4E-09	4.0E-09
4/24/2003 16:47	92.7	65.0	60.0	23.8	p	22.5	p	23.0									350.8					
4/25/2003 7:53	92.7	65.0	60.0	28.0	p	17.6	p	23.0	0.4	2.1	0.4	2.5	0.86	54360	5.0	352.2	341.1	38	23.0	0.931	4.3E-09	4.3E-09
7:53	92.7	65.0	60.0	28.0	p	17.6	p	23.0									341.1					
15:31	92.7	65.0	60.0	30.1	p	15.1	p	23.0	0.2	2.2	0.2	2.7	0.84	27480	5.0	352.2	336.2	37	23.0	0.931	4.4E-09	4.4E-09
4/25/2003 15:31	92.7	65.0	62.0	1.8	b	45.6	b	23.0									258.0					
4/28/2003 8:18	92.7	65.0	62.0	2.8	b	44.5	b	22.7	1.0	3.2	1.1	3.8	0.91	233220	3.0	211.3	255.7	28	22.9	0.935	3.7E-09	4.2E-09

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Summary of Soil Samples for Laboratory Testing *Chesapeake Terrace Supplemental Field Investigation*	
Sample	***Description***
PMW-28-A	Composite bagged material from S6 (28.0-30.0 ft), S8 (38.0-40.0 ft), and S14 (68-70.0 ft).
PMW-13-A	Bagged material from S4 (18.0-20.0 ft).
PMW-13-B	Bagged material from S14 (68.0-70.0 ft).
PMW-13-C	Composite bagged material from S16 (78.0-80.0 ft), and S18 (88.0-90.0 ft).
PMW-13-D	Composite bagged material from S20 (98.0-100.0 ft), and S21 (103.0-105.0 ft).
PMW-19-A	Composite bagged material from S21 (72.0-74.0 ft), S22 (74.0-76.0 ft), and S23 (76.0-78.0 ft).
PMW-19-B	Composite bagged material from S24 (83.0-85.0 ft), and S25 (88.0-90.0 ft).
B-105-A	Composite bagged material from S6(28.0-30.0 ft), and S7 (33.0-35.0 ft).
B-105-B	Composite bagged material from S11 (53.0-55.0 ft), and S12 (58.0-60.0 ft).
B-102-A	Bagged material from S14 (88.0-90.0 ft).
PMW-12-A	Bagged material from S10 (48.0-50.0 ft), and S11 (53.0-55.0 ft).
PMW-12-B	Composite bagged material from S28 (148.0-150.0 ft), S29 (158.0-160.0 ft), S30 (1653.0-165.0 ft), and S31 (168.0-170.0 ft).
PMW-12-C	Composite Bagged material from S41 (218.0-220.0), and S44 (233.0-235.0 ft).
PMW-23	Thin-walled tube sample (128.0-130.0 ft)

NWM/CHESAPEAKE TERRACE SFI/MD
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classi-fication	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
PMW-12A	Bag	-	CL	17.1	25	17	8	-0.04	100.0	78.5	33.5	-	-	-	-	-	-	-
PMW-12B	Bag	-	CL	19.0	43	21	22	-0.11	100.0	95.1	72.0	-	-	-	-	-	-	-
PMW-12C	Bag	-	CL-ML	18.6	22	16	6	0.49	100.0	57.3	26.0	-	-	-	-	-	-	-
PMW-13A	Bag	-	(SM)	13.7	-	-	-	-	99.2	15.0	-	-	-	-	-	-	-	-
PMW-13B	Bag	-	(SP-SM)	19.1	-	-	-	-	100.0	9.9	-	-	-	-	-	-	-	-
PMW-13C	Bag	-	CL	15.7	37	18	19	-0.14	100.0	96.7	62.0	-	-	-	-	-	-	-
PMW-13D	Bag	-	CL	20.4	42	22	20	-0.06	100.0	97.0	58.5	-	-	-	-	-	-	-
PMW-19A	Bag	-	CL	16.0	27	16	11	-0.03	100.0	73.6	39.0	-	-	-	-	-	-	-
PMW-19B	Bag	-	(SC)	22.0	-	-	-	-	100.0	45.4	-	-	-	-	-	-	-	-
PMW-28A	Bag	-	(SM)	15.5	-	-	-	-	100.0	15.3	-	-	-	-	-	-	-	-
PMW-102A	Bag	-	CL	14.3	30	19	11	-0.46	100.0	79.4	39.0	-	-	-	-	-	-	-
PMW-105A	Bag	-	CH	24.7	61	25	36	-0.02	100.0	96.0	88.5	-	-	-	-	-	-	-
PMW-105B	Bag	-	CL	21.2	46	25	21	-0.16	100.0	98.1	60.5	-	-	-	-	-	-	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

DECEMBER 2013

063-1431-003

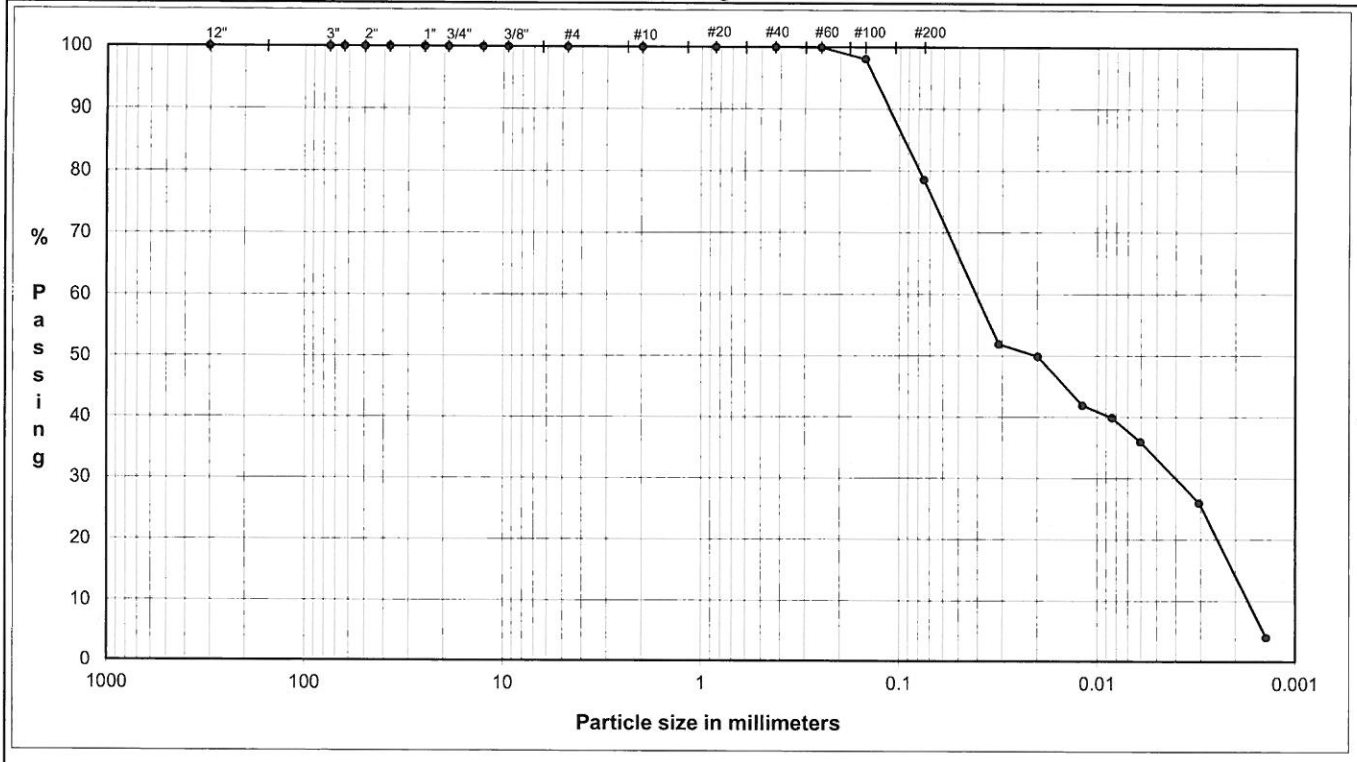
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**

SAMPLE ID: **PMW-12A** Depth: -

TYPE: **Bag**



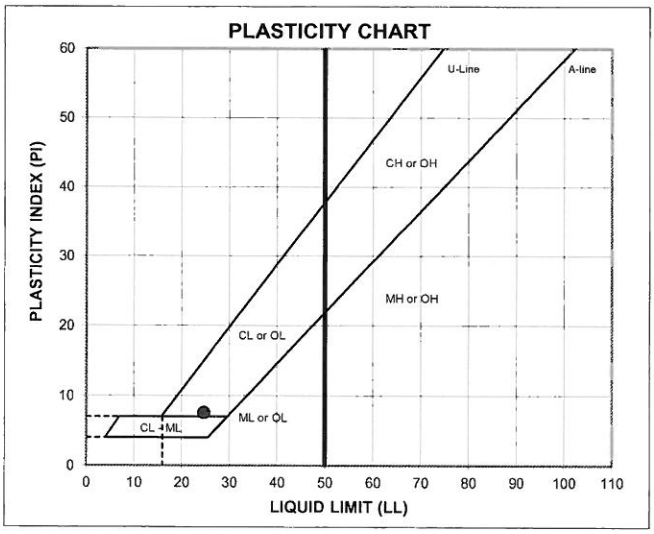
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**100.0**	Medium Sand	**0.0**
#60	0.25	**99.9**		
#100	0.15	**98.1**		
#200	0.075	**78.5**	Fine Sand	**21.5**

Hydrometer Analysis

(mm)	%Finer		
0.031	**51.9**		
0.020	**49.9**		
0.012	**41.9**	Fines	
0.0084	**39.9**	Silt or Clay	**78.5**
0.0060	**35.9**		
0.0031	**26.0**		
0.0014	**4.0**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
17.1	**25**	**17**	**8**	**-0.04**

LL (oven-dried) / <0.75 - ORGANIC (OL,OH)

DESCRIPTION: sandy SILTY CLAY, fine sand; light gray.

USCS: CL

TECH	AM/TJ
DATE	12/18/13
CHECK	aem
REVIEW	DA
APPROVE	

Golder Associates Inc.

DECEMBER 2013

063-1431-003

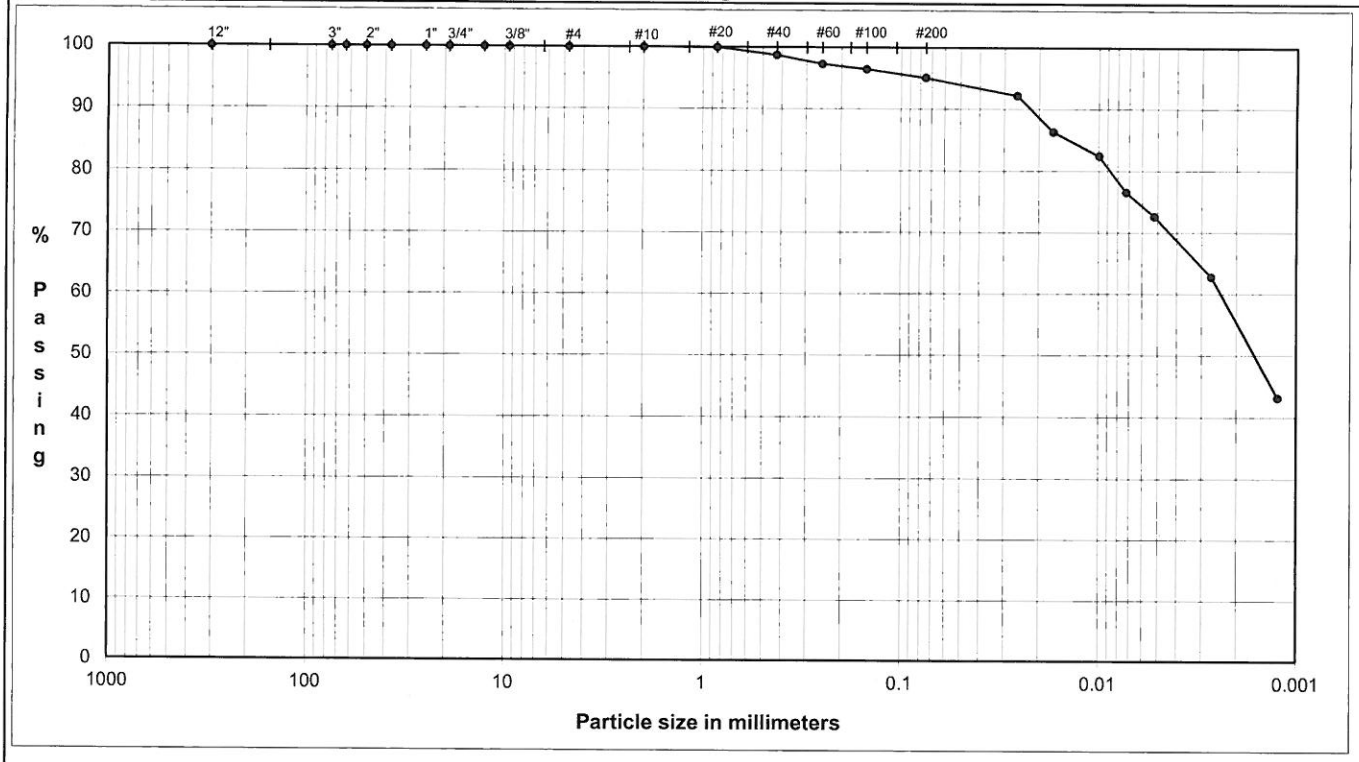
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**

SAMPLE ID: **PMW-12B** Depth: -

TYPE: **Bag**



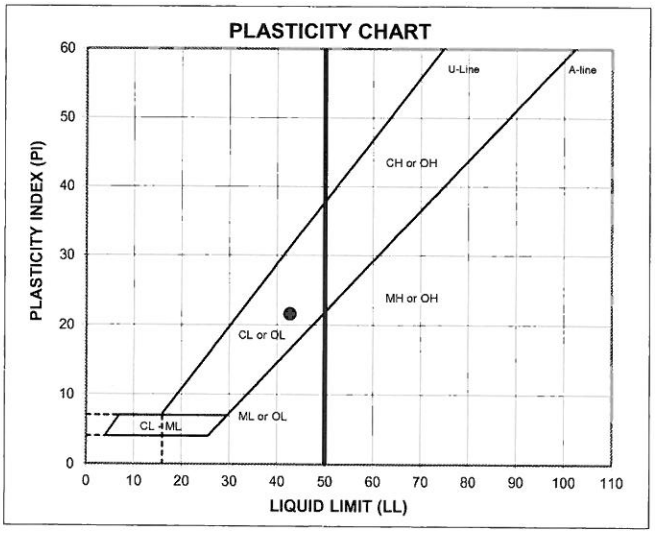
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**98.7**	Medium Sand	**1.3**
#60	0.25	**97.3**		
#100	0.15	**96.5**		
#200	0.075	**95.1**	Fine Sand	**3.6**

Hydrometer Analysis

(mm)	%Finer		
0.026	**92.2**		
0.017	**86.3**		
0.010	**82.4**	Fines	
0.0072	**76.5**	Silt or Clay	**95.1**
0.0052	**72.6**		
0.0027	**62.8**		
0.0012	**43.2**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
19.0	**43**	**21**	**22**	**-0.11**

LL (oven-dried) / <0.75 = ORGANIC (OL/OH)

DESCRIPTION: SILTY CLAY, trace fine to medium sand; reddish yellow, reddish brown, and greenish gray.

USCS: CL

TECH	AM/TJ
DATE	12/18/13
CHECK	alm
REVIEW	JA
APPROVE	

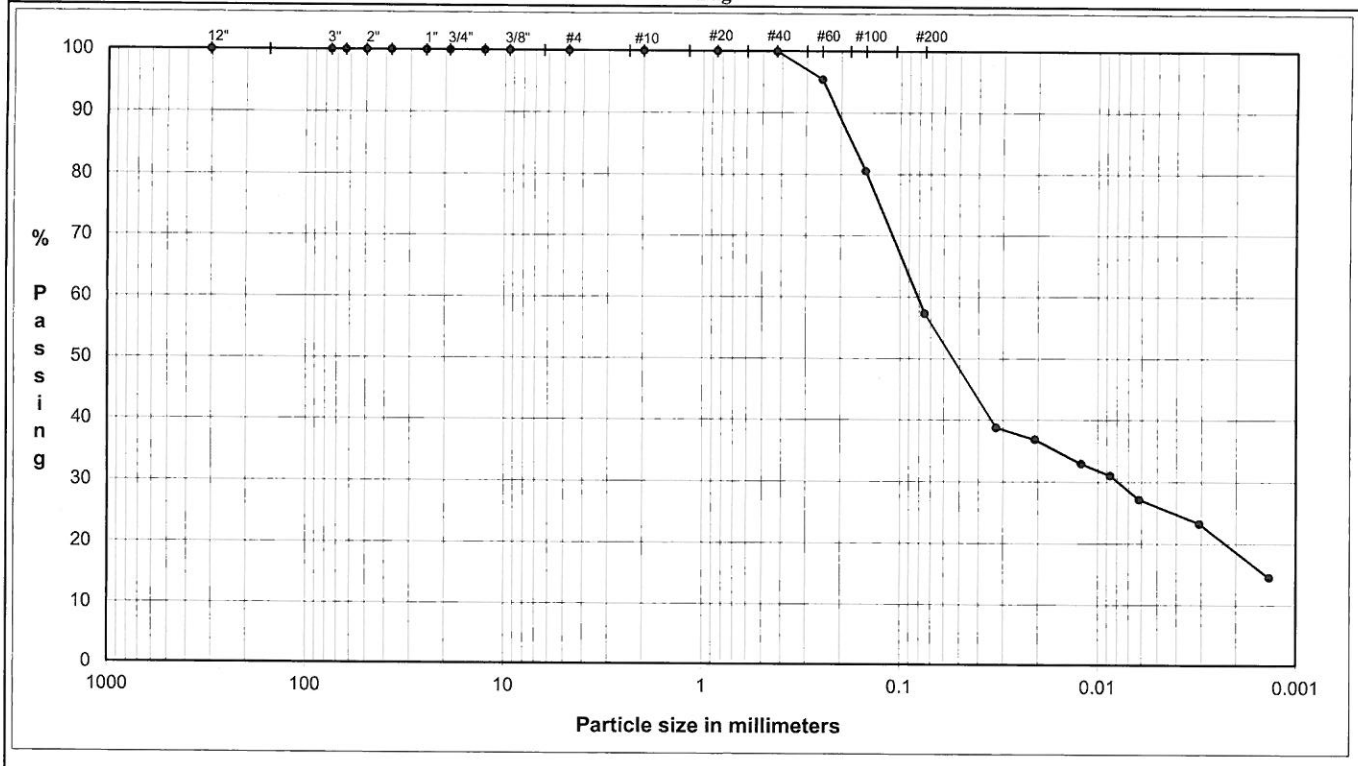
DECEMBER 2013

063-1431-003

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-12C** Depth: -
TYPE: **Bag**



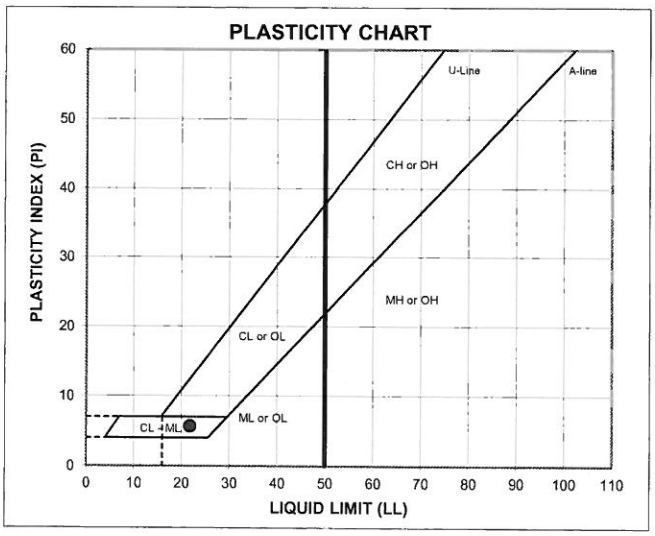
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**100.0**	Medium Sand	**0.0**
#60	0.25	**95.4**		
#100	0.15	**80.6**		
#200	0.075	**57.3**	Fine Sand	**42.6**

Hydrometer Analysis

(mm)	%Finer		
0.033	**38.8**		
0.021	**36.8**		
0.012	**33.0**	Fines	
0.0087	**31.0**	Silt or Clay	**57.3**
0.0062	**27.1**		
0.0031	**23.3**		
0.0014	**14.5**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
18.6	**22**	**16**	**6**	**0.49**

LL (oven-dried) / LL (not dried) < 0.75 = ORGANIC (OL,OH)

DESCRIPTION: SILTY CLAY to CLAYEY SILT and SAND, fine to medium; grayish brown.

USCS: CL-ML

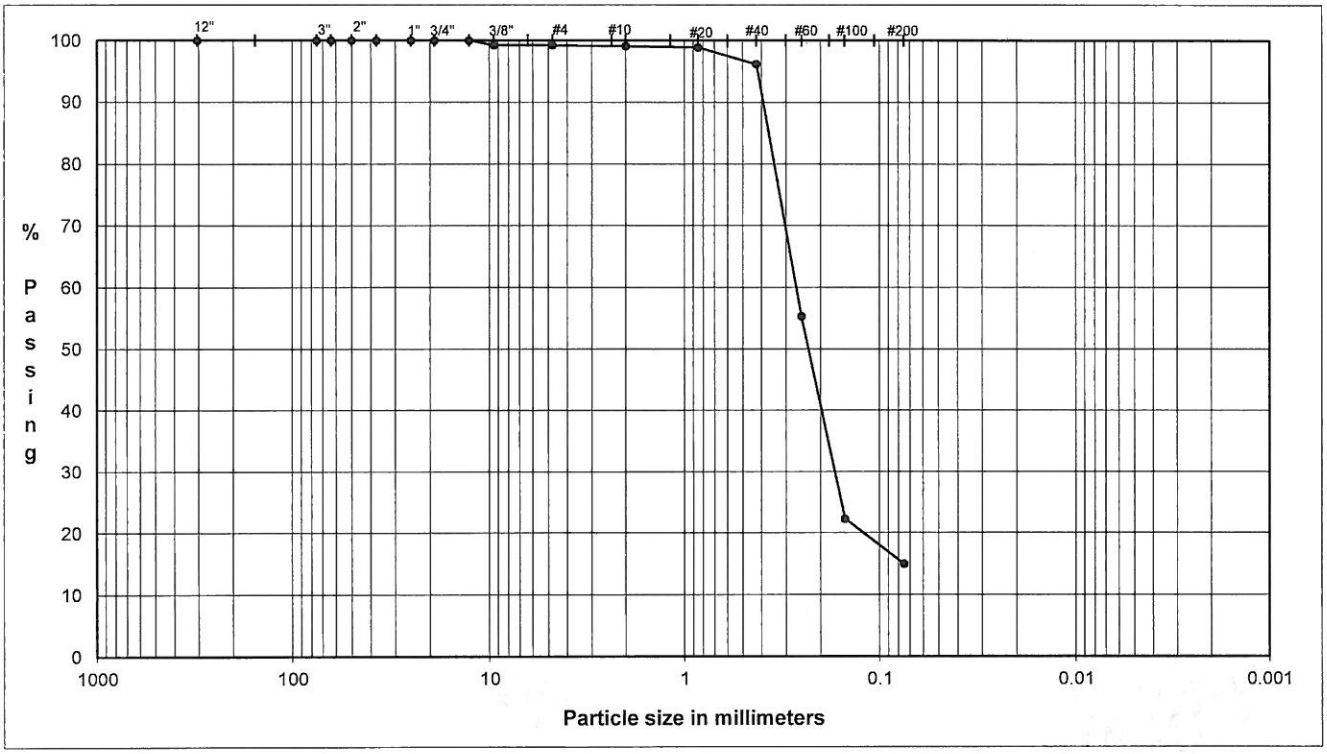
TECH	TJ
DATE	12/20/13
CHECK	alm
REVIEW	JA
APPROVE	

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D6913, D4318

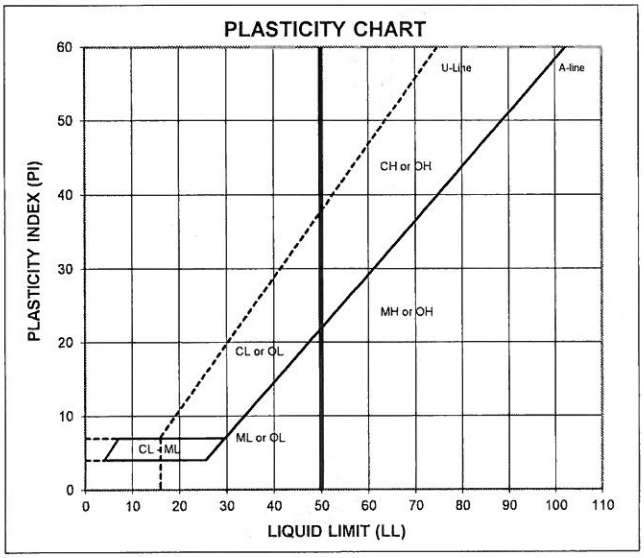
PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-13A** Depth: -
TYPE: **Bag**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**99.2**		
#4	4.8	**99.2**	Fine Gravel	**0.8**
#10	2.00	**99.1**	Coarse Sand	**0.2**
#20	0.85	**98.9**		
#40	0.43	**96.2**	Medium Sand	**2.9**
#60	0.25	**55.3**		
#100	0.15	**22.3**		
#200	0.075	**15.0**	Fine Sand	**81.2**
			Fines	**15.0**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
13.7				

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: SILTY SAND, fine to coarse, trace fine gravel; yellowish brown.

USCS: (SM)

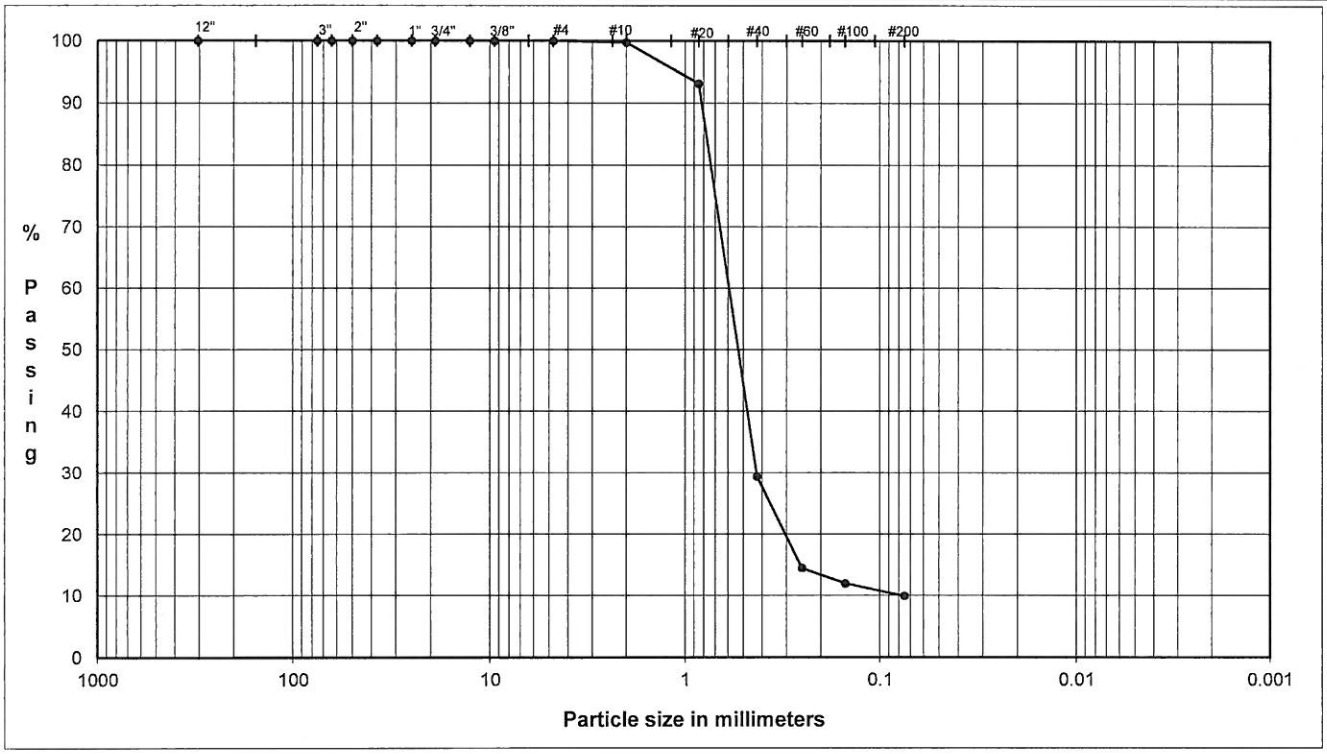
TECH	TJ/AM
DATE	12/12/13
CHECK	gem
REVIEW	
APPROVE	

DECEMBER 2013 063-1431-003

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D6913, D4318

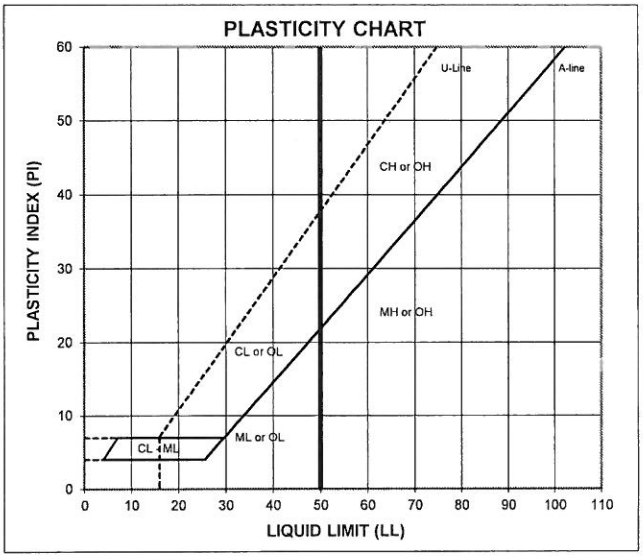
PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-13B** Depth: -
TYPE: **Bag**



COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.7**	Coarse Sand	**0.3**
#20	0.85	**93.2**		
#40	0.43	**29.4**	Medium Sand	**70.4**
#60	0.25	**14.5**		
#100	0.15	**12.0**		
#200	0.075	**9.9**	Fine Sand	**19.5**
			Fines	**9.9**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
19.1				

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: SAND, fine to coarse, some fines; yellowish brown.

USCS: (SP-SM)

TECH	TJ/AM
DATE	12/12/13
CHECK	
REVIEW	
APPROVE	

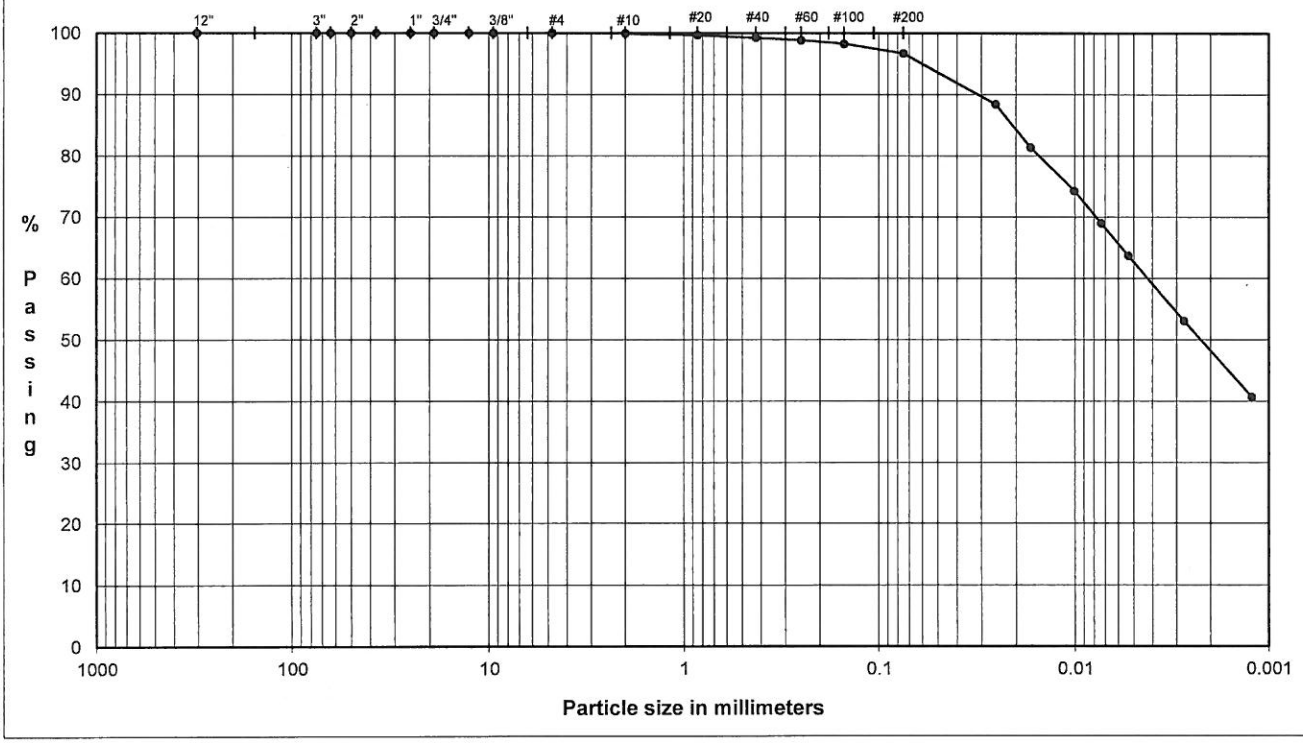
Golder Associates Inc.

DECEMBER 2013 063-1431-003

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-13C** Depth: -
TYPE: **Bag**



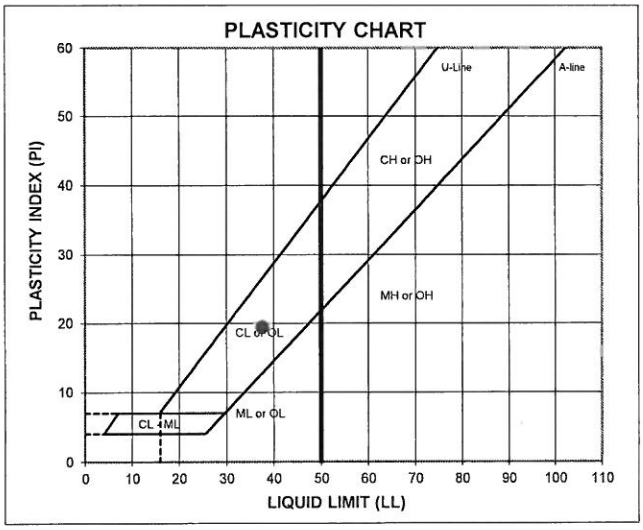
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	99.9	Coarse Sand	0.1
#20	0.85	99.7		
#40	0.43	99.3	Medium Sand	0.7
#60	0.25	98.9		
#100	0.15	98.3		
#200	0.075	96.7	Fine Sand	2.5

Hydrometer Analysis

(mm)	%Finer		
0.025	88.4		
0.017	81.4		
0.010	74.3	Fines	
0.0074	69.0	Silt or Clay	96.7
0.0053	63.7		
0.0028	53.1		
0.0012	40.7		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
15.7	37	18	19	-0.14

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: SILTY CLAY, trace fine to coarse sand; reddish gray.

USCS: CL

TECH	TJ/AM/TW
DATE	12/12/13
CHECK	aem
REVIEW	[illegible]
APPROVE	

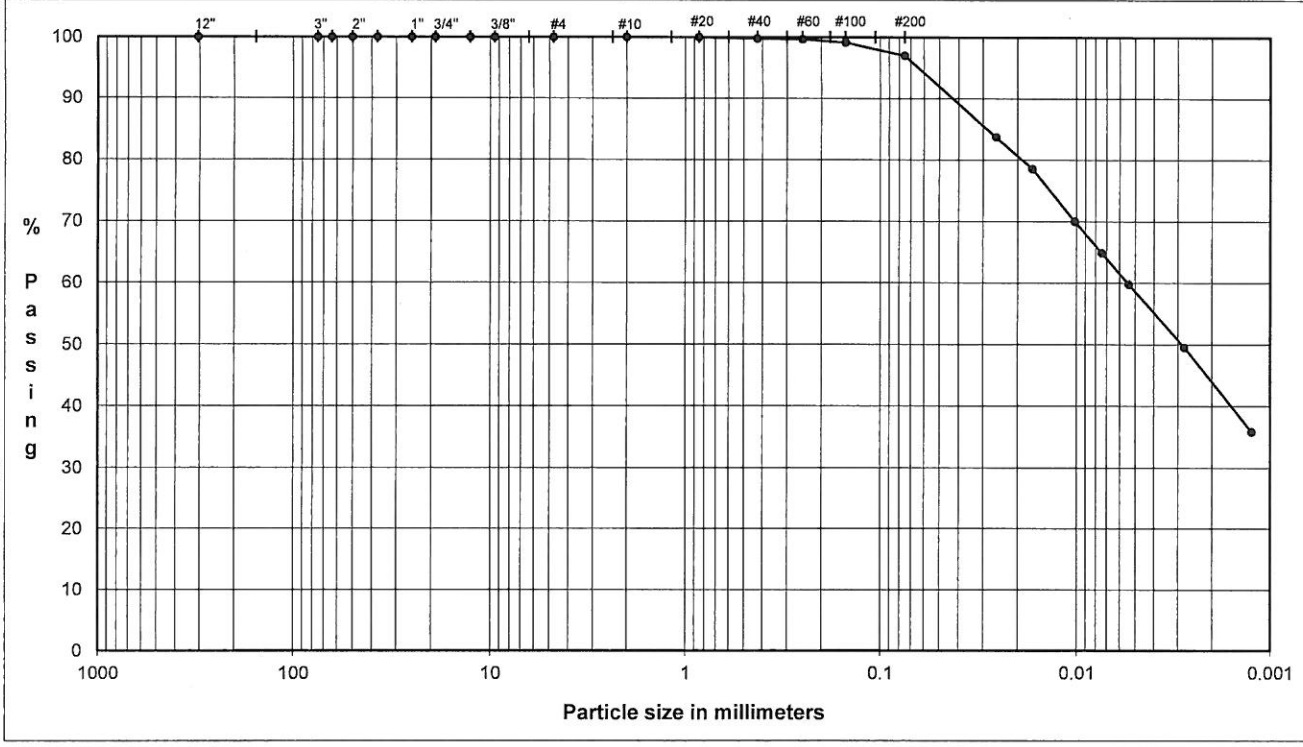
Golder Associates Inc.

DECEMBER 2013 063-1431-003

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-13D** Depth: -
TYPE: **Bag**



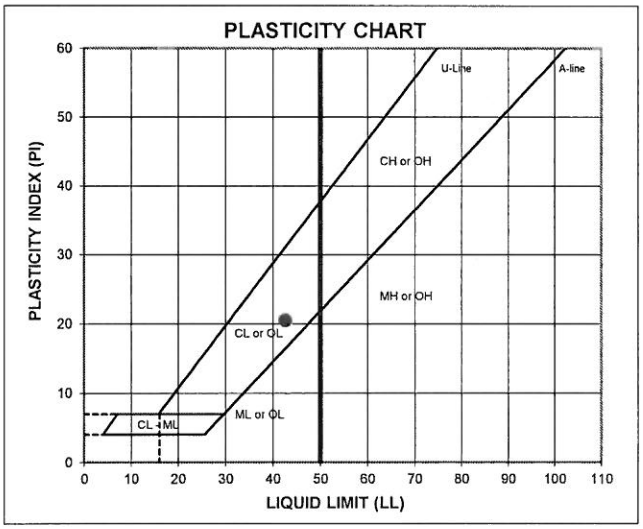
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	100.0	Coarse Sand	0.0
#20	0.85	100.0		
#40	0.43	99.8	Medium Sand	0.2
#60	0.25	99.7		
#100	0.15	99.1		
#200	0.075	97.0	Fine Sand	2.7

Hydrometer Analysis

(mm)	%Finer		
0.026	83.7		
0.017	78.6		
0.010	70.0	Fines	
0.0074	64.9	Silt or Clay	97.0
0.0054	59.8		
0.0028	49.5		
0.0012	35.9		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
20.4	42	22	20	-0.06

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: SILTY CLAY, trace fine to medium sand; reddish brown and yellow.

USCS: CL

TECH	TJ/AM/TW
DATE	12/12/13
CHECK	aem
REVIEW	PLM
APPROVE	

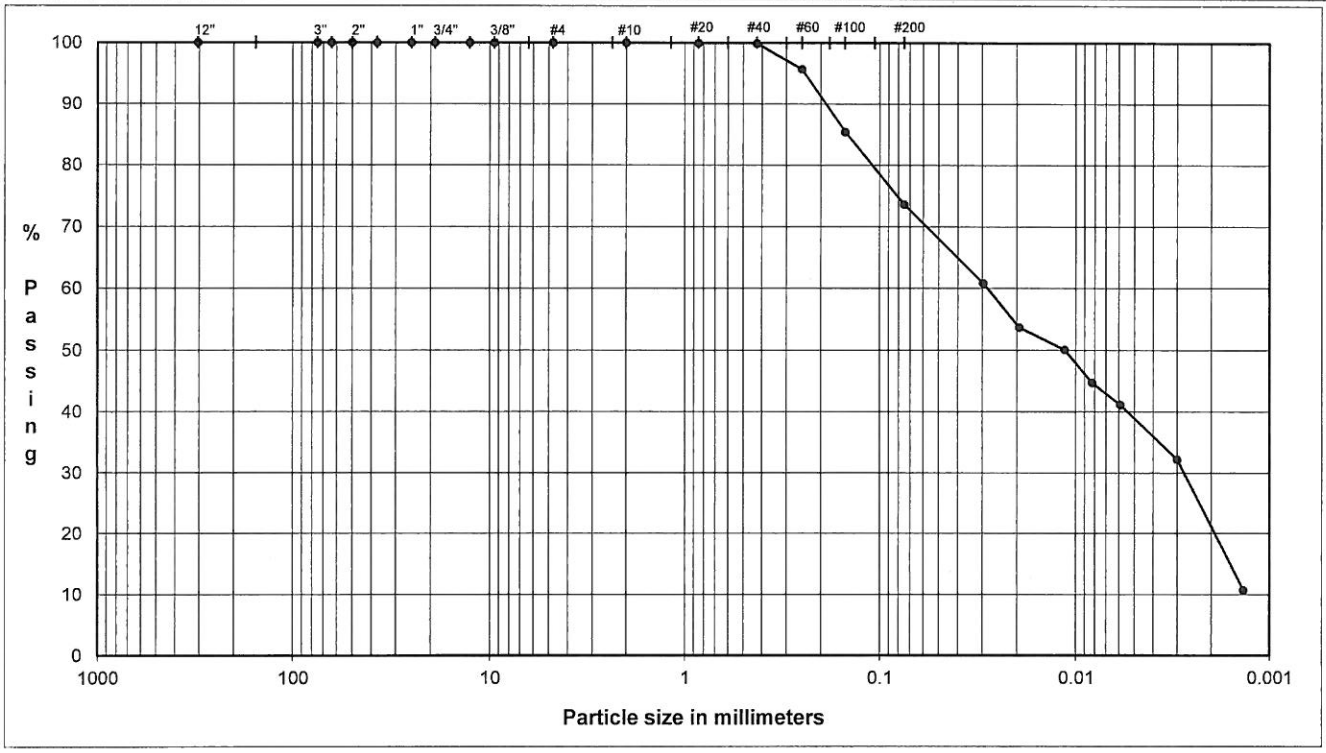
Golder Associates Inc.

DECEMBER 2013 063-1431-003

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-19A** Depth: -
TYPE: **Bag**



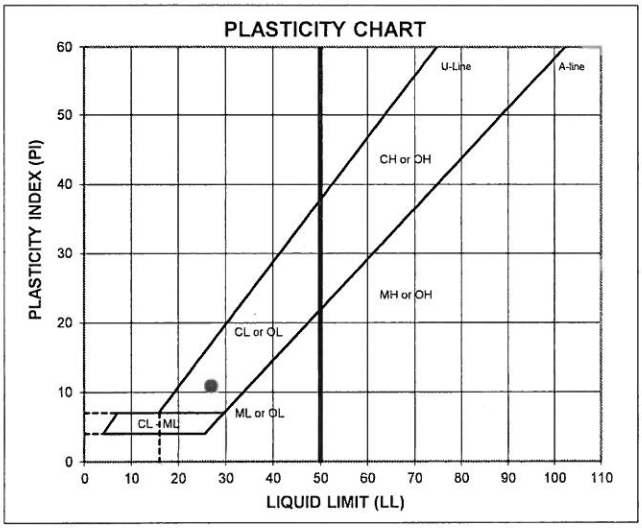
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**99.9**	Medium Sand	**0.1**
#60	0.25	**95.7**		
#100	0.15	**85.5**		
#200	0.075	**73.6**	Fine Sand	**26.3**

Hydrometer Analysis

(mm)	%Finer		
0.030	**60.8**		
0.019	**53.7**		
0.011	**50.1**	Fines	
0.0082	**44.7**	Silt or Clay	**73.6**
0.0059	**41.2**		
0.0030	**32.2**		
0.0014	**10.7**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
16.0	**27**	**16**	**11**	**-0.03**

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: sandy SILTY CLAY, fine to medium; reddish brown.

USCS: CL

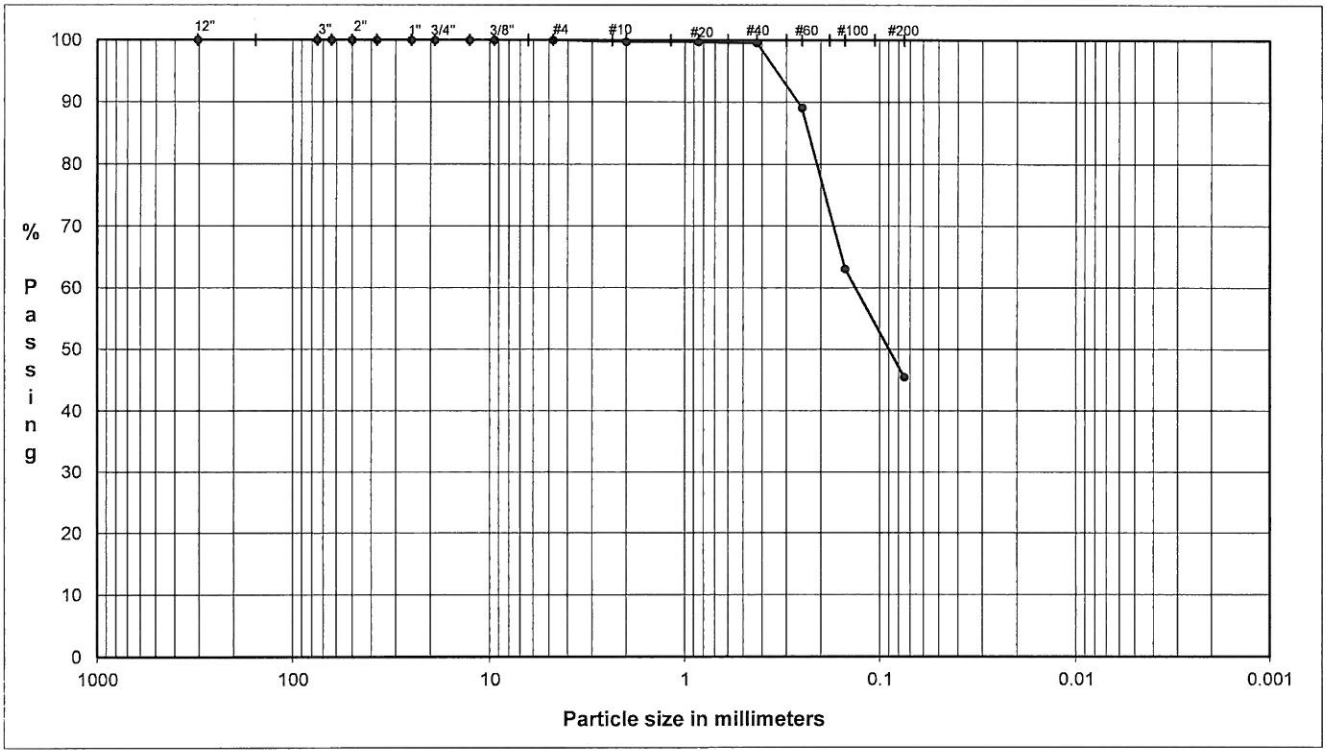
TECH	TW/TJ/AM
DATE	12/12/13
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D6913, D4318

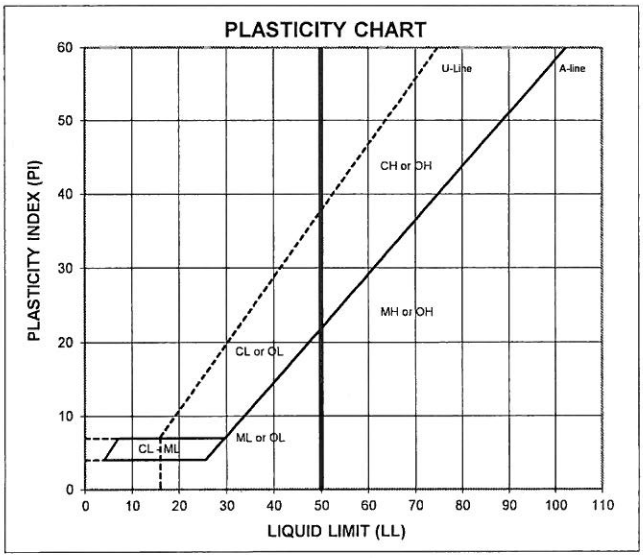
PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-19B** Depth: -
TYPE: **Bag**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.7**	Coarse Sand	**0.3**
#20	0.85	**99.7**		
#40	0.43	**99.6**	Medium Sand	**0.2**
#60	0.25	**89.1**		
#100	0.15	**63.0**		
#200	0.075	**45.4**	Fine Sand	**54.1**
			Fines	**45.4**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
22.0				

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: fine to coarse SAND and SILTY CLAY; light brown and red.

USCS: (SC)

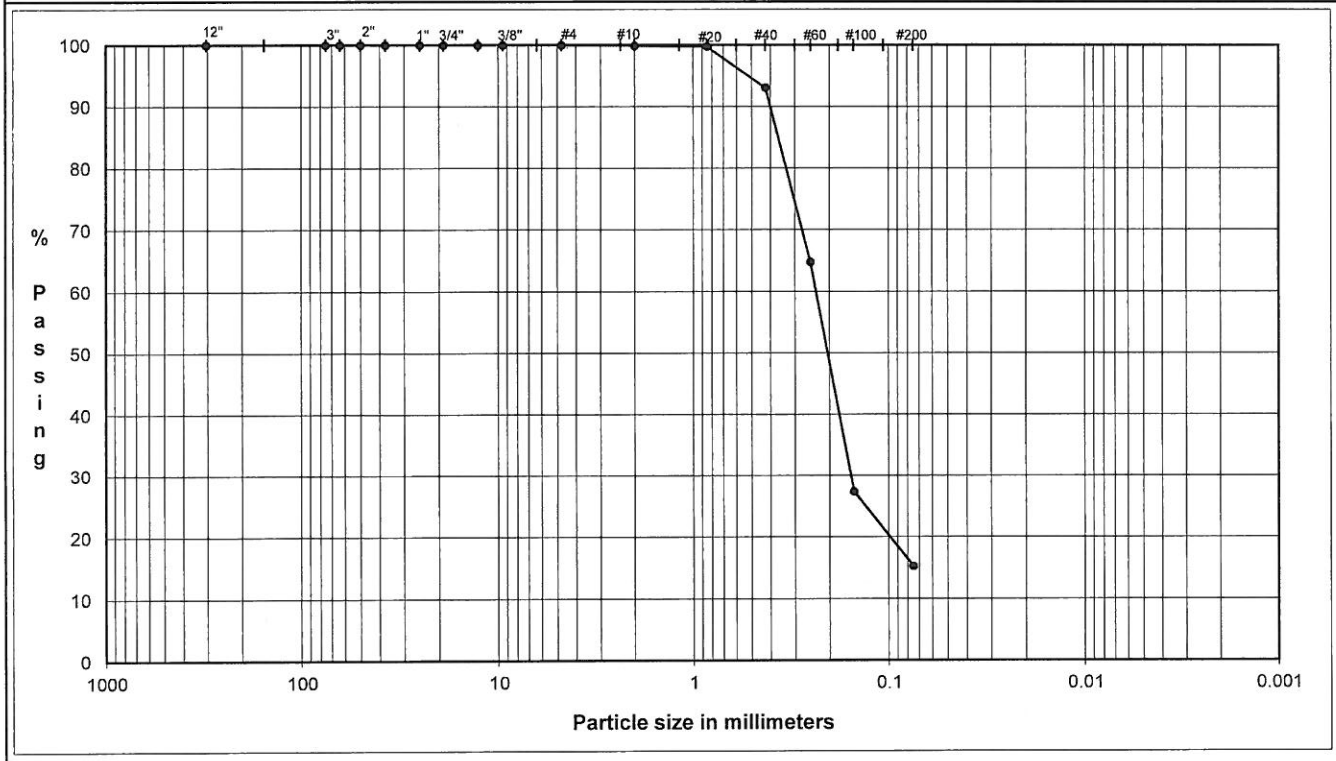
TECH	TJ/AM
DATE	12/12/13
CHECK	qem
REVIEW	mwh
APPROVE	

DECEMBER 2013 063-1431-003

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D6913, D4318

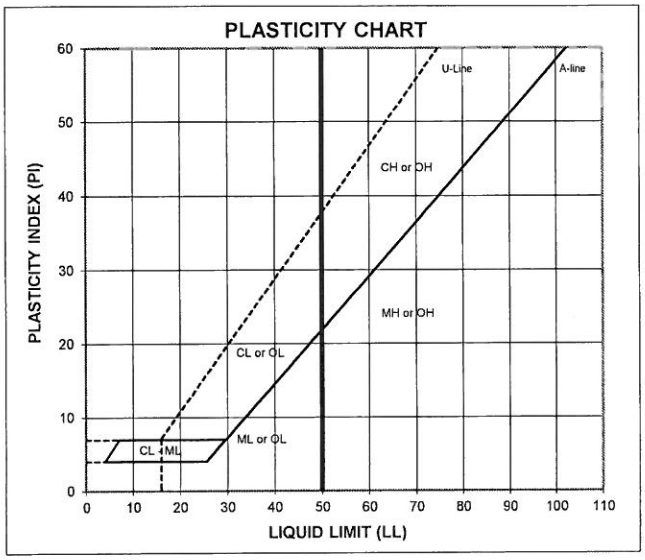
PROJECT NAME: NWM/CHESAPEAKE TERRACE SFI/MD
SAMPLE ID: PMW-28A Depth: -
TYPE: Bag



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	99.9	Coarse Sand	0.1
#20	0.85	99.8		
#40	0.43	93.1	Medium Sand	6.8
#60	0.25	64.8		
#100	0.15	27.4		
#200	0.075	15.3	Fine Sand	77.8
			Fines	15.3



DESCRIPTION: SILTY SAND, fine to coarse; yellowish brown.

USCS: (SM)

ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
15.5				

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

TECH	TJ/AM
DATE	12/12/13
CHECK	aem
REVIEW	[illegible]
APPROVE	

Golder Associates Inc.

DECEMBER 2013

063-1431-003

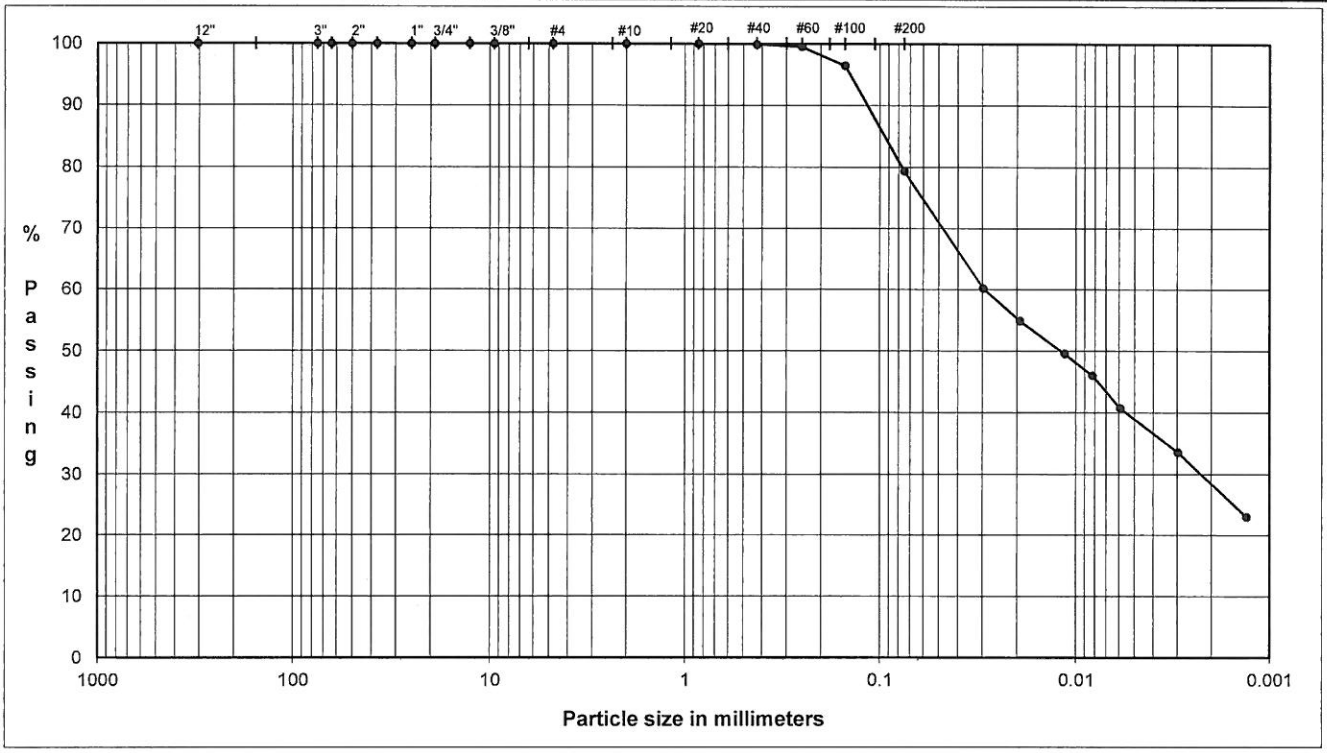
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**

SAMPLE ID: **PMW-102A** Depth: -

TYPE: **Bag**



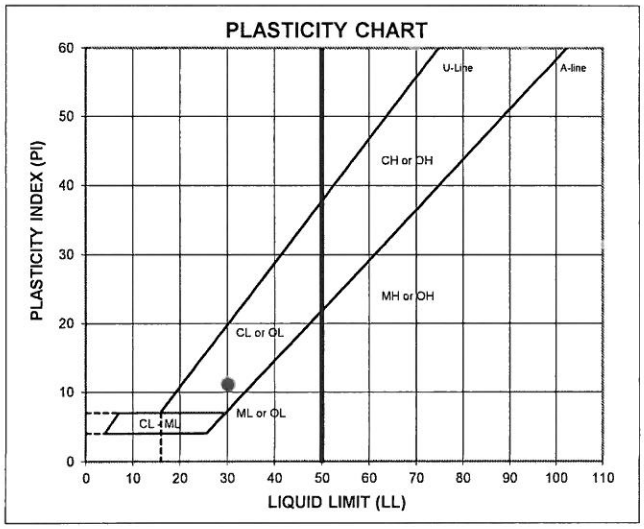
COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**99.9**	Medium Sand	**0.1**
#60	0.25	**99.5**		
#100	0.15	**96.5**		
#200	0.075	**79.4**	Fine Sand	**20.5**

Hydrometer Analysis

(mm)	%Finer		
0.030	**60.2**		
0.019	**54.9**		
0.011	**49.6**	Fines Silt or Clay	**79.4**
0.0082	**46.0**		
0.0059	**40.7**		
0.0030	**33.6**		
0.0013	**23.0**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
14.3	**30**	**19**	**11**	**-0.46**

LL (oven-dried) / LL < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: sandy SILTY CLAY, fine to medium; gray.

USCS: CL

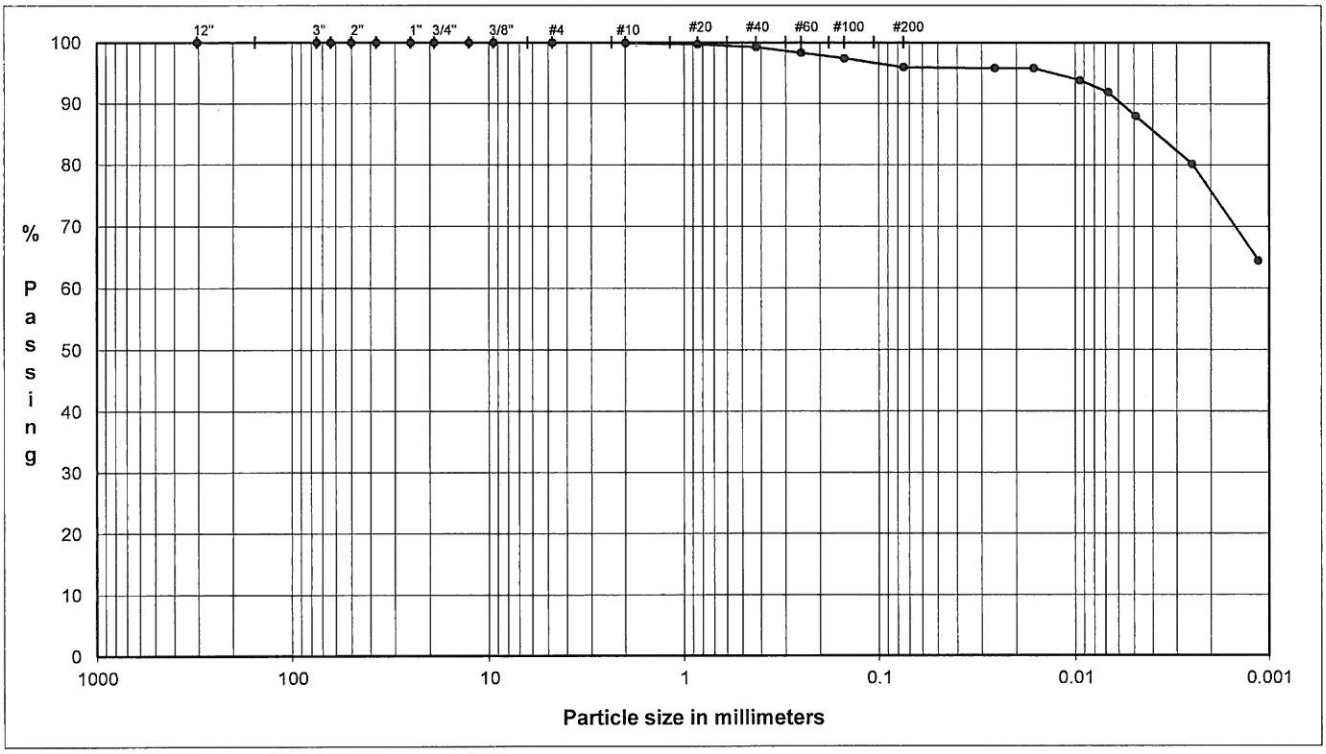
TECH	TJ/AM/TW
DATE	12/12/13
CHECK	aem
REVIEW	
APPROVE	

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-105A** Depth: -
TYPE: **Bag**



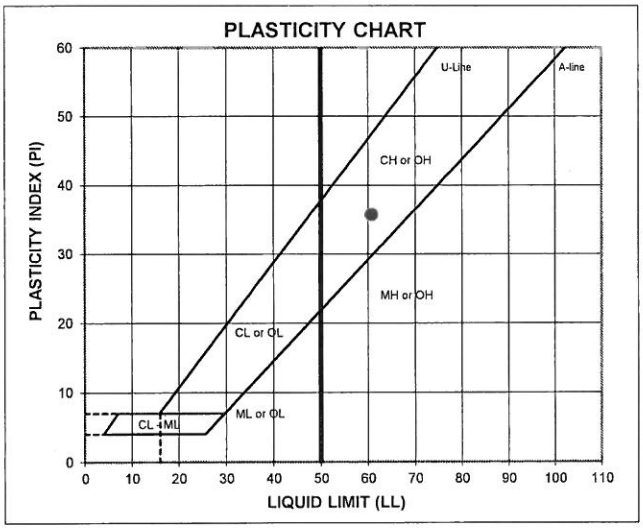
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.9**	Coarse Sand	**0.1**
#20	0.85	**99.7**		
#40	0.43	**99.3**	Medium Sand	**0.7**
#60	0.25	**98.3**		
#100	0.15	**97.4**		
#200	0.075	**96.0**	Fine Sand	**3.3**

Hydrometer Analysis

(mm)	%Finer		
0.026	**95.8**		
0.016	**95.8**		
0.009	**93.9**	Fines	
0.0068	**91.9**	Silt or Clay	**96.0**
0.0049	**88.0**		
0.0025	**80.2**		
0.0011	**64.5**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
24.7	**61**	**25**	**36**	**-0.02**

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: CLAY, trace fine to coarse sand; reddish brown.

USCS: CH

TECH	TJ/AM?TW
DATE	12/12/13
CHECK	aem
REVIEW	[illegible]
APPROVE	

DECEMBER 2013

063-1431-003

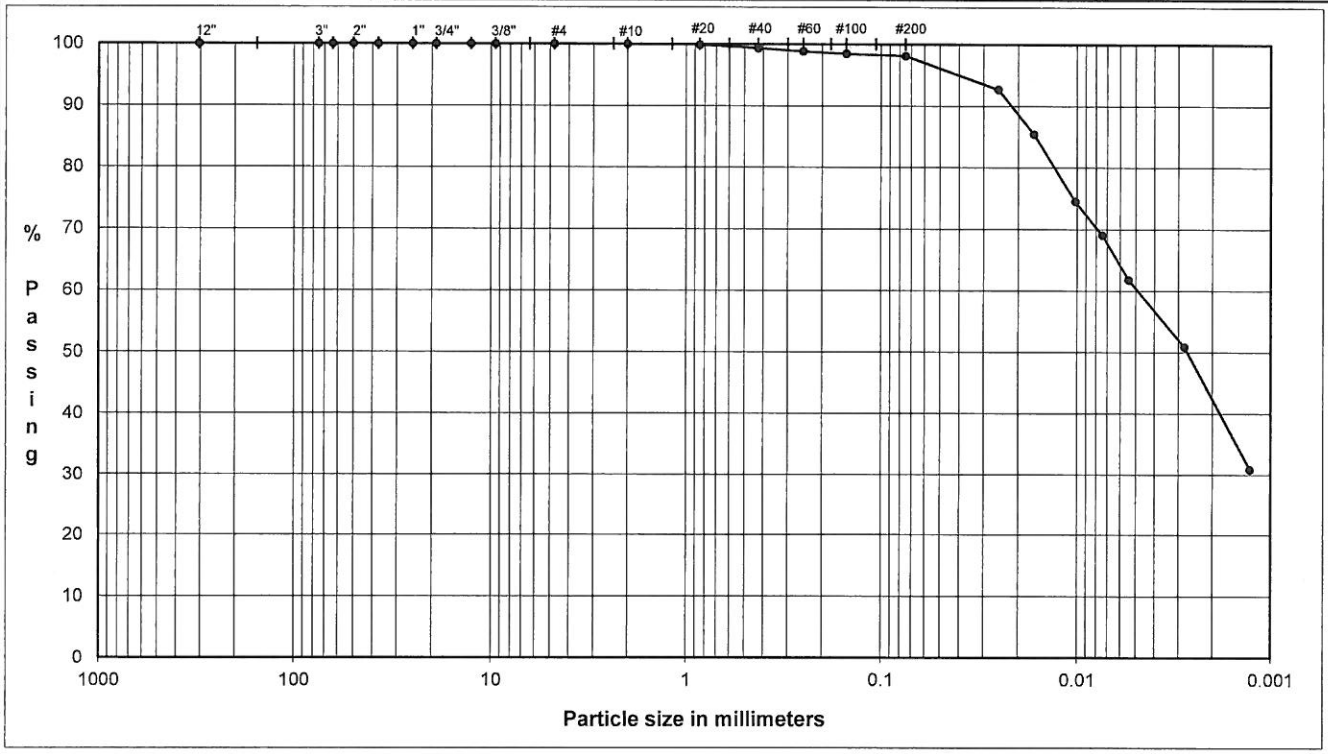
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**

SAMPLE ID: **PMW-105B** Depth: -

TYPE: **Bag**



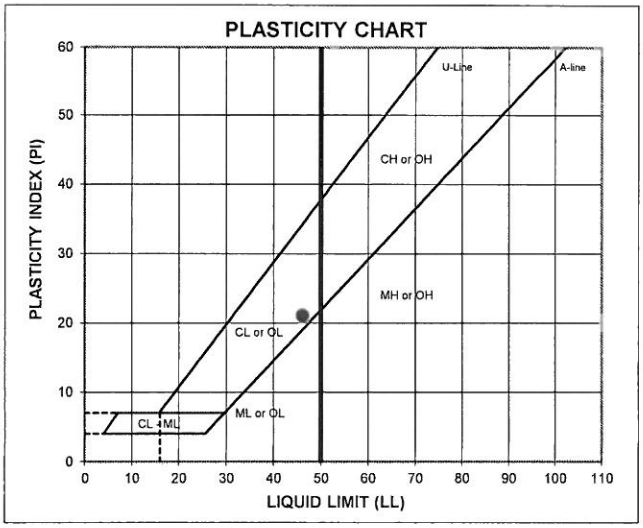
COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**99.9**		
#40	0.43	**99.3**	Medium Sand	**0.7**
#60	0.25	**98.9**		
#100	0.15	**98.5**		
#200	0.075	**98.1**	Fine Sand	**1.2**

Hydrometer Analysis

(mm)	%Finer		
0.025	**92.7**		
0.017	**85.4**		
0.010	**74.5**	Fines	
0.0074	**69.1**	Silt or Clay	**98.1**
0.0054	**61.8**		
0.0028	**50.9**		
0.0013	**30.9**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_r	LL	PL	PI	LI
21.2	**46**	**25**	**21**	**-0.16**

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: SILTY CLAY, trace fine to medium; yellowish red.

USCS: CL

TECH	TJ/AM/TW
DATE	12/12/13
CHECK	qem
REVIEW	PWM
APPROVE	

NWM/CHESAPEAKE TERRACE SFI/MD
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classification	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
PMW-13	UD	105-107'	(CH)	28.9	-	-	-	-	-	-	-	-	-	2.80	28.9	96.4	-	C
PMW-23	UD	128-130'	(CH)	21.0	-	-	-	-	-	-	-	-	-	2.80	21.0	111.1	-	C

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

ONE-DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B

PROJECT NAME	NWM/CHESAPEAKE TERRACE SFI/MD
PROJECT NUMBER	063-1431-003
SAMPLE ID	PMW -13
SAMPLE DEPTH	105.0 - 107.0'
SAMPLE TYPE	UD

DESCRIPTION: CLAY; reddish brown and gray; soft (thumb will penetrate); moist.

CLASSIFICATION: (CH)

CONSOLIDOMETER #: 2

ASTM D 2435 Method: B

	LL	PL	PI	Gs
	-	-	-	2.796

Sample Data	Trimmings	Before Test	After Test
Tare plus wet soil, g	137.62	195.63	191.23
Tare plus dry soil, g	118.99	168.68	168.68
Tare, g	52.22	74.73	74.73
Water, g	18.63	26.95	22.55
Dry soil, g	66.77	93.95	93.95
Water Content	27.9%	28.7%	24.0%

Diameter (in)	2.500
Height of sample (in)	0.750
Area of sample (in^2)	4.909
Volume of sample (in^3)	3.682
Water Content	28.7%
Sample Wt (wet, g)	120.9
Sample Wt (dry, g)	93.95
Water Wt (g)	26.95

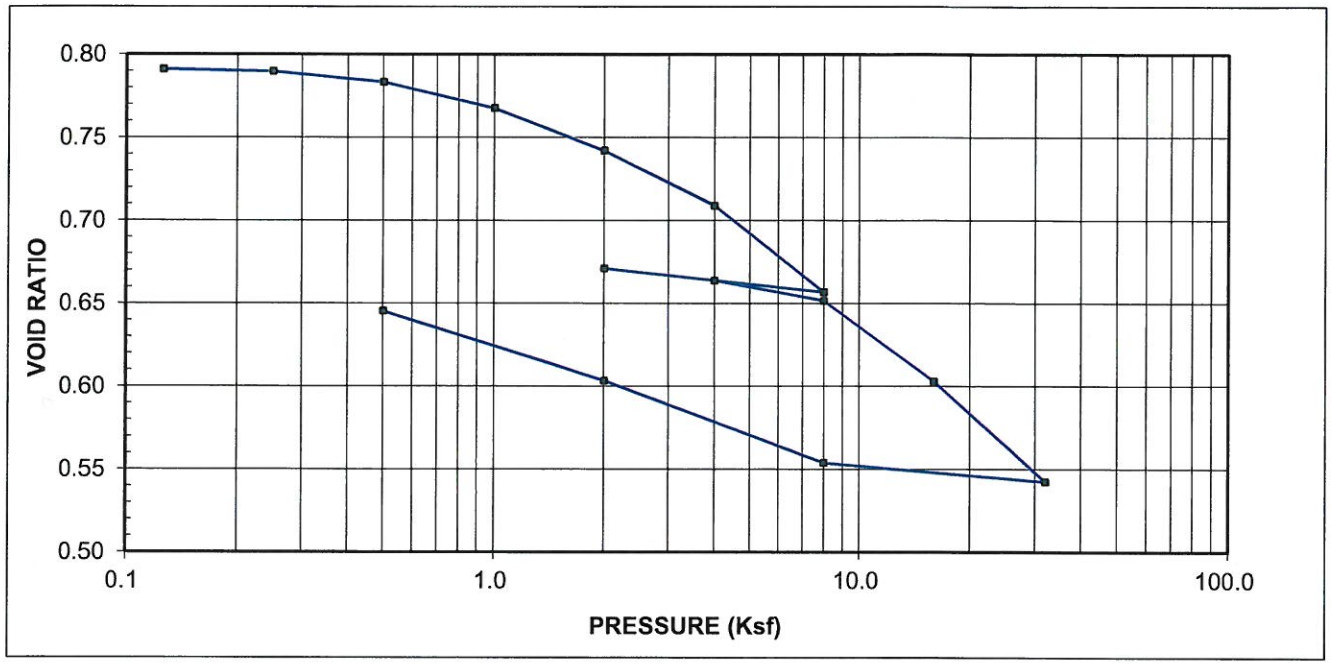
Sample Data	Initial	Final
Total Height (in)	0.750	0.688
Height of solids (in)	0.418	0.418
Height of voids (in)	0.332	0.270
Height of water (in)	0.335	0.280
Void ratio	0.795	0.645
Degree of saturation	100%	100%
Dry unit wt (pcf)	97.2	106.0
Wet unit wt (pcf)	125.1	131.5

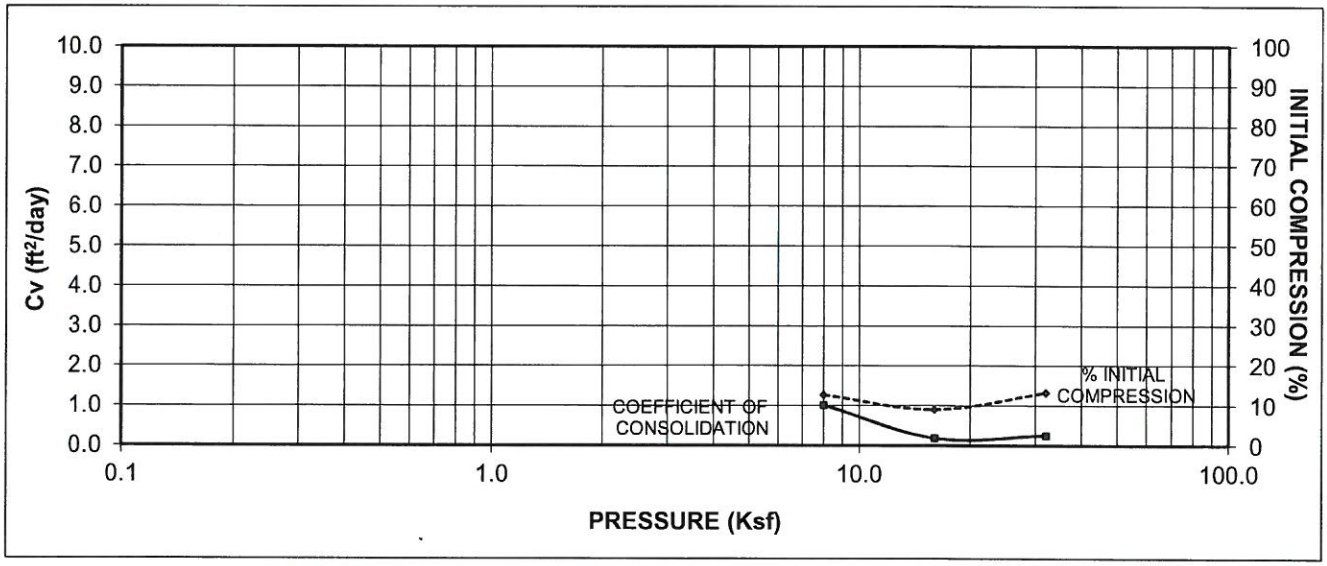
PRESSURE (ksf)	H100 DIAL READING	MACHINE / STONE CORR.	DIAL CHANGE (in)	FITTING TIME (sec) t90	SAMPLE HEIGHT (in)	HEIGHT OF VOIDS Hv	VOID RATIO e	CHANGE IN HEIGHT (accum)	STRAIN %	LENGTH OF DRAINAGE PATH (DOUBLE DRAINAGE) H (in)	LENGTH OF DRAINAGE PATH (DOUBLE DRAINAGE) H^2 (cm^2)	PERCENT INITIAL COMPRESSION	COEFFICIENT OF CONSOLIDATION (ft^2/day)
0.125	0.0000	0.0000	0.0000	0	0.750	0.3321	0.7947	0.0000	0.0	0.375	0.907		
0.126	0.0015	0.0000	0.0015	522	0.749	0.3306	0.7912	0.0015	0.2	0.375	0.906		
0.250	0.0020	0.0000	0.0020	614	0.748	0.3301	0.7898	0.0020	0.3	0.374	0.903		
0.500	0.0047	0.0000	0.0047	290	0.745	0.3274	0.7834	0.0047	0.6	0.373	0.899		
1.000	0.0113	0.0000	0.0113	614	0.739	0.3208	0.7677	0.0113	1.5	0.371	0.888		
2.000	0.0219	0.0000	0.0219	653	0.728	0.3102	0.7422	0.0219	2.9	0.367	0.868		
4.000	0.0358	0.0000	0.0358	406	0.714	0.2963	0.7090	0.0358	4.8	0.361	0.839	7.9	0.163
8.000	0.0576	0.0000	0.0576	540	0.692	0.2745	0.6568	0.0576	7.7	0.352	0.798	10.1	0.116
2.000	0.0517	0.0000	0.0517		0.698	0.2804	0.6711	0.0517	6.9	0.348	0.780		
4.000	0.0547	0.0000	0.0547	109	0.695	0.2774	0.6638	0.0547	7.3	0.348	0.783	17.4	0.565
8.000	0.0598	0.0000	0.0598	60	0.690	0.2723	0.6516	0.0598	8.0	0.346	0.774	12.7	1.017
16.000	0.0802	0.0000	0.0802	317	0.670	0.2519	0.6029	0.0802	10.7	0.340	0.746	9.0	0.185
32.000	0.1054	0.0000	0.1054	217	0.645	0.2267	0.5426	0.1054	14.0	0.329	0.697	13.2	0.254
8.000	0.1006	0.0000	0.1006		0.649	0.2315	0.5539	0.1006	13.4				
2.000	0.0800	0.0000	0.0800		0.670	0.2521	0.6034	0.0800	10.7				
0.500	0.0624	0.0000	0.0624		0.688	0.2697	0.6455	0.0624	8.3				

NOTES:
Loading sequence provided by client.
Sample was run inundated.
Sample was trimmed into consolidation ring
Time Deformation Method - Square root of time.

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

ONE - DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B





SAMPLE ID	PMW -13
SAMPLE TYPE	UD
SAMPLE DEPTH	105.0 - 107.0'

LL	-
PL	-
PI	-
Gs	2.80

	Initial	Final
Dry Unit Weight (pcf)	97.2	106.0
Wet Unit Weight (pcf)	125.1	131.5
Moisture Content	28.7%	24.0%
Void Ratio	0.795	0.645
Degree of Saturation	100%	100%

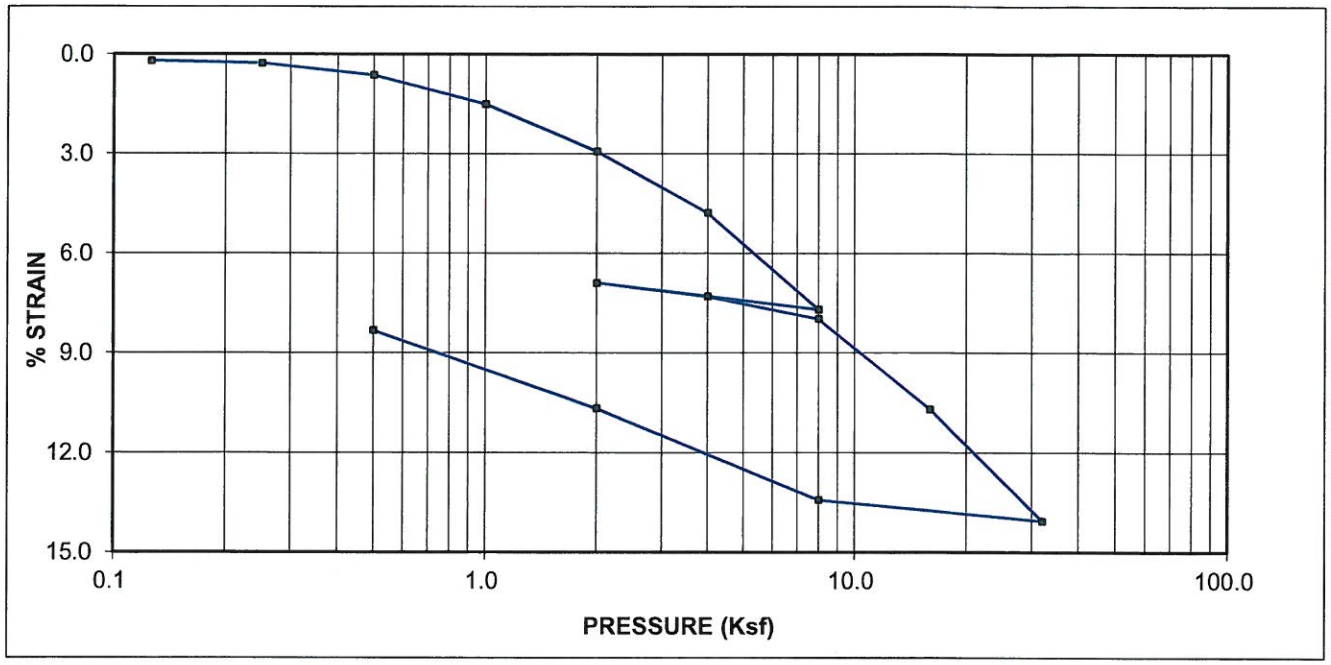
DESCRIPTION: CLAY; reddish brown and gray; soft (thumb will penetrate); moist.

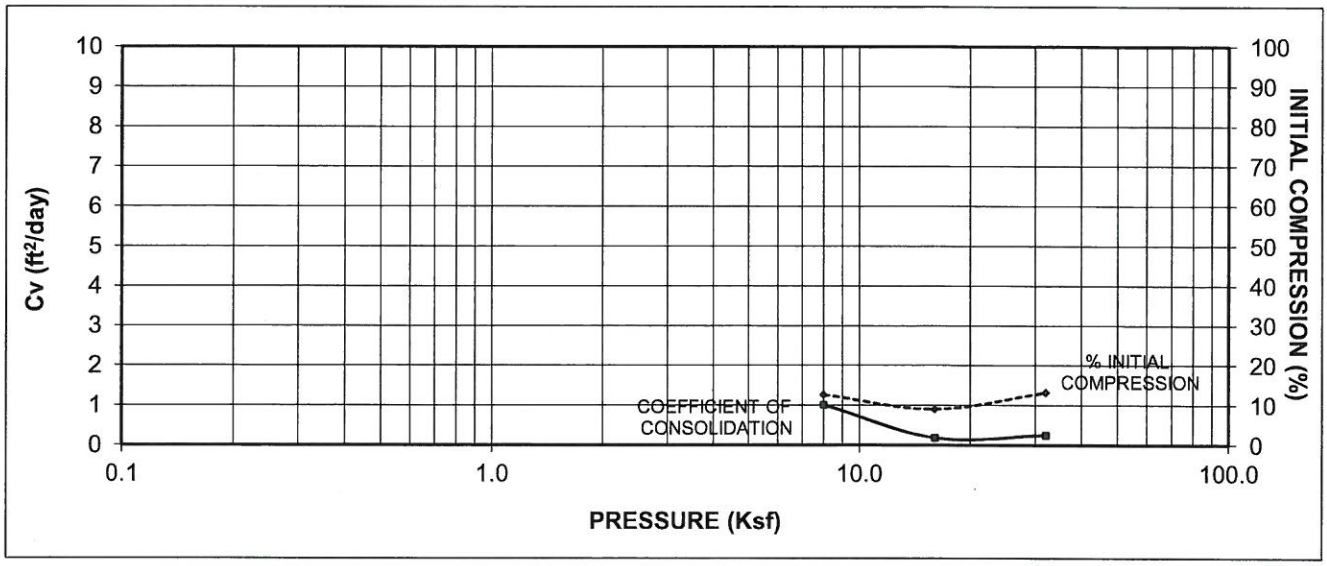
USCS: (CH)

NWM/CHESAPEAKE TERRACE SFI/MD
063-1431-003

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

ONE - DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B





SAMPLE ID	PMW -13
SAMPLE TYPE	UD
SAMPLE DEPTH	105.0 - 107.0'

LL	-
PL	-
PI	-
Gs	2.80

	Initial	Final
Dry Unit Weight (pcf)	97.2	106.0
Wet Unit Weight (pcf)	125.1	131.5
Moisture Content	28.7%	24.0%
Void Ratio	0.795	0.645
Degree of Saturation	100%	100%

DESCRIPTION: CLAY; reddish brown and gray; soft (thumb will penetrate); moist.

USCS: (CH)

NWM/CHESAPEAKE TERRACE SFI/MD
063-1431-003

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

ONE-DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B

PROJECT NAME	NWM/CHESAPEAKE TERRACE SFI/MD
PROJECT NUMBER	063-1431-003
SAMPLE ID	PMW - 23
SAMPLE DEPTH	128.0 - 130.0'
SAMPLE TYPE	UD

DESCRIPTION: CLAY; dark reddish brown and gray; Hard (can indent with thumb nail); dry to moist.

CLASSIFICATION: (CH)

CONSOLIDOMETER #: 1

ASTM D 2435 Method: B

	LL	PL	PI	Gs
	-	-	-	2.803

Sample Data	Trimmings	Before Test	After Test
Tare plus wet soil, g	371.40	205.48	209.50
Tare plus dry soil, g	319.01	182.91	182.91
Tare, g	51.12	75.54	75.54
Water, g	52.39	22.57	26.59
Dry soil, g	267.89	107.37	107.37
Water Content	19.6%	21.0%	24.8%

Diameter (in)	2.500
Height of sample (in)	0.750
Area of sample (in^2)	4.909
Volume of sample (in^3)	3.682
Water Content	21.0%
Sample Wt (wet, g)	129.94
Sample Wt (dry, g)	107.37
Water Wt (g)	22.57

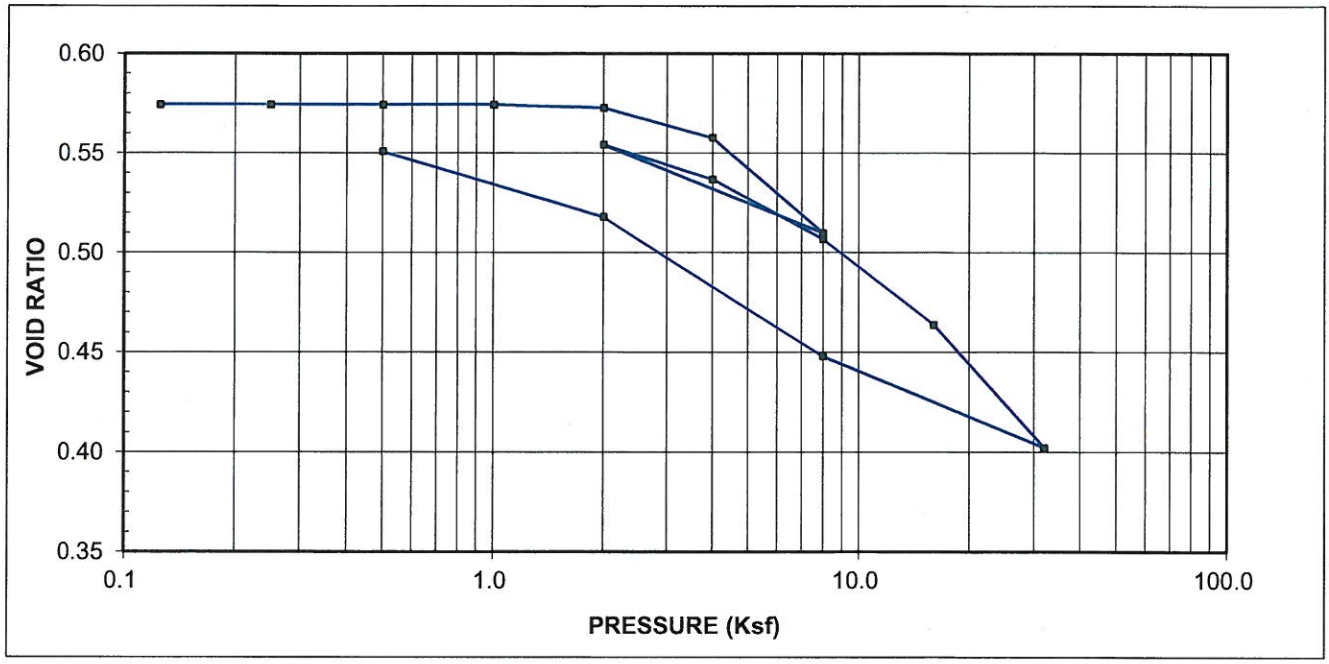
Sample Data	Initial	Final
Total Height (in)	0.750	0.750
Height of solids (in)	0.476	0.476
Height of voids (in)	0.274	0.274
Height of water (in)	0.281	0.331
Void ratio	0.574	0.574
Degree of saturation	100%	100%
Dry unit wt (pcf)	111.1	111.1
Wet unit wt (pcf)	134.5	138.6

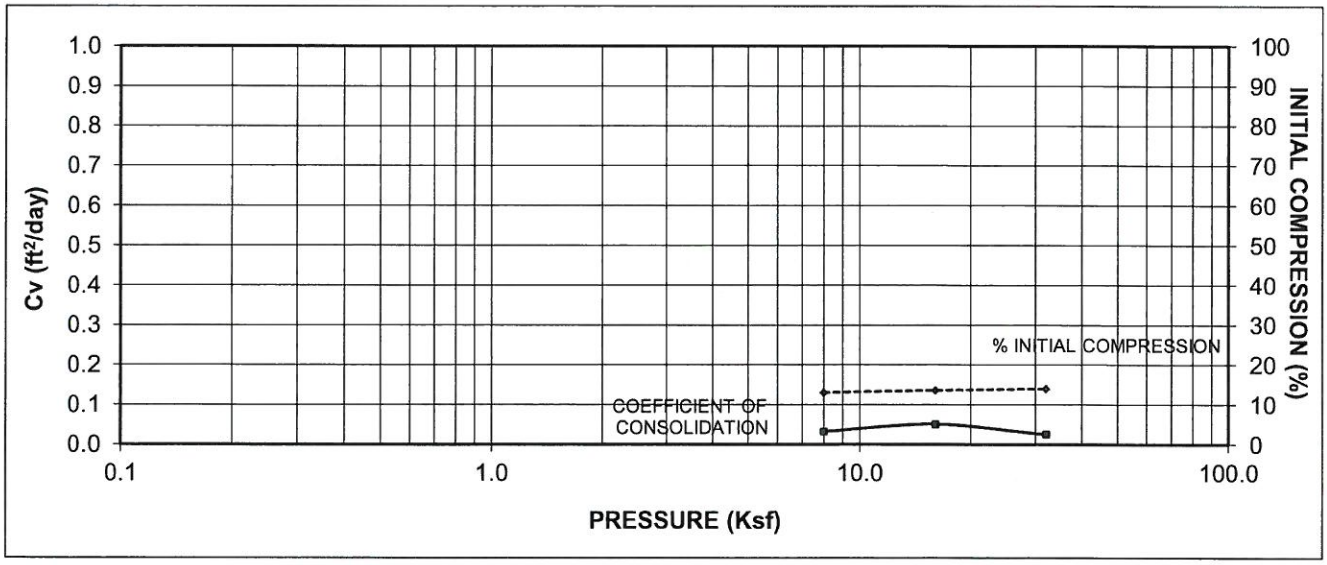
PRESSURE (ksf)	H100 DIAL READING	MACHINE / STONE CORR.	DIAL CHANGE (in)	FITTING TIME (sec) t90	SAMPLE HEIGHT (in)	HEIGHT OF VOIDS Hv	VOID RATIO e	CHANGE IN HEIGHT (accum)	STRAIN %	LENGTH OF DRAINAGE PATH (DOUBLE DRAINAGE) H (in)	LENGTH OF DRAINAGE PATH (DOUBLE DRAINAGE) H^2 (cm^2)	PERCENT INITIAL COMPRESSION	COEFFICIENT OF CONSOLIDATION (ft^2/day)
0.125	0.0000	0.0000	0.0000	0	0.750	0.2736	0.5743	0.0000	0.0	0.375	0.907		
0.125	0.0000	0.0000	0.0000	60	0.750	0.2736	0.5743	0.0000	0.0	0.375	0.907		
0.250	0.0000	0.0000	0.0000	60	0.750	0.2736	0.5743	0.0000	0.0	0.375	0.907		
0.500	0.0000	0.0000	0.0000	0	0.750	0.2736	0.5743	0.0000	0.0	0.375	0.907		
1.000	0.0000	0.0000	0.0000	0	0.750	0.2736	0.5743	0.0000	0.0	0.375	0.907		
2.000	0.0007	0.0000	0.0007	29	0.749	0.2729	0.5727	0.0007	0.1	0.375	0.906		
4.000	0.0079	0.0000	0.0079	194	0.742	0.2657	0.5577	0.0079	1.1	0.373	0.897	38.0	0.364
8.000	0.0307	0.0000	0.0307	1561	0.719	0.2429	0.5099	0.0307	4.1	0.365	0.861	23.1	0.044
2.000	0.0096	0.0000	0.0096		0.740	0.2640	0.5543	0.0096	1.3	0.365	0.859		
4.000	0.0178	0.0000	0.0178	2774	0.732	0.2558	0.5369	0.0178	2.4	0.368	0.874	11.6	0.025
8.000	0.0322	0.0000	0.0322	2053	0.718	0.2414	0.5068	0.0322	4.3	0.363	0.848	13.1	0.033
16.000	0.0527	0.0000	0.0527	1242	0.697	0.2209	0.4638	0.0527	7.0	0.354	0.808	13.6	0.051
32.000	0.0820	0.0000	0.0820	2306	0.668	0.1916	0.4022	0.0820	10.9	0.341	0.752	14.0	0.026
8.000	0.0602	0.0000	0.0602		0.690	0.2134	0.4480	0.0602	8.0				
2.000	0.0268	0.0000	0.0268		0.723	0.2468	0.5180	0.0268	3.6				
0.500	0.0112	0.0000	0.0112		0.739	0.2624	0.5509	0.0112	1.5				

NOTES:
Loading sequence provided by client.
Sample required 4 ksf of pressure ot hold sample down.
Sample was run inundated.
Sample was trimmed into consolidation ring
Time Deformation Method - Square root of time.

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

ONE - DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B





SAMPLE ID	PMW - 23
SAMPLE TYPE	UD
SAMPLE DEPTH	128.0 - 130.0'

LL	-
PL	-
PI	-
Gs	2.80

	Initial	Final
Dry Unit Weight (pcf)	111.1	111.1
Wet Unit Weight (pcf)	134.5	138.6
Moisture Content	21.0%	24.8%
Void Ratio	0.574	0.574
Degree of Saturation	100%	100%

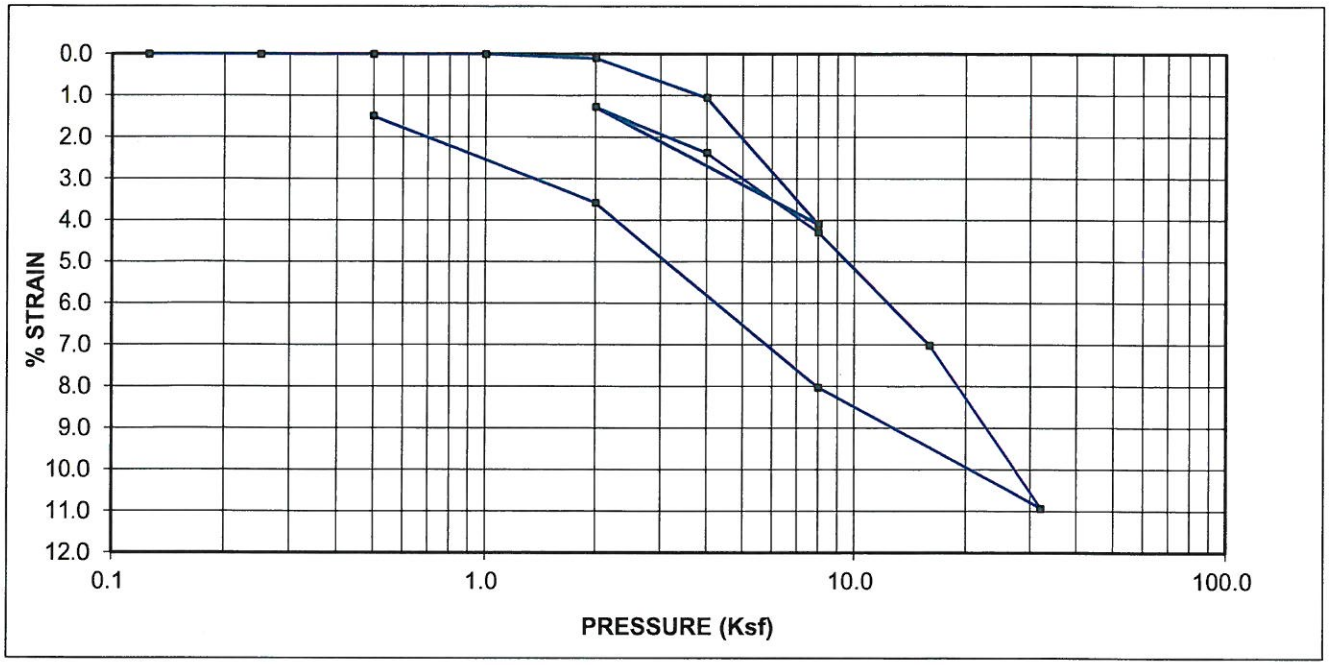
DESCRIPTION: CLAY; dark reddish brown and gray; Hard (can indent with thumb nail); dry to moist.

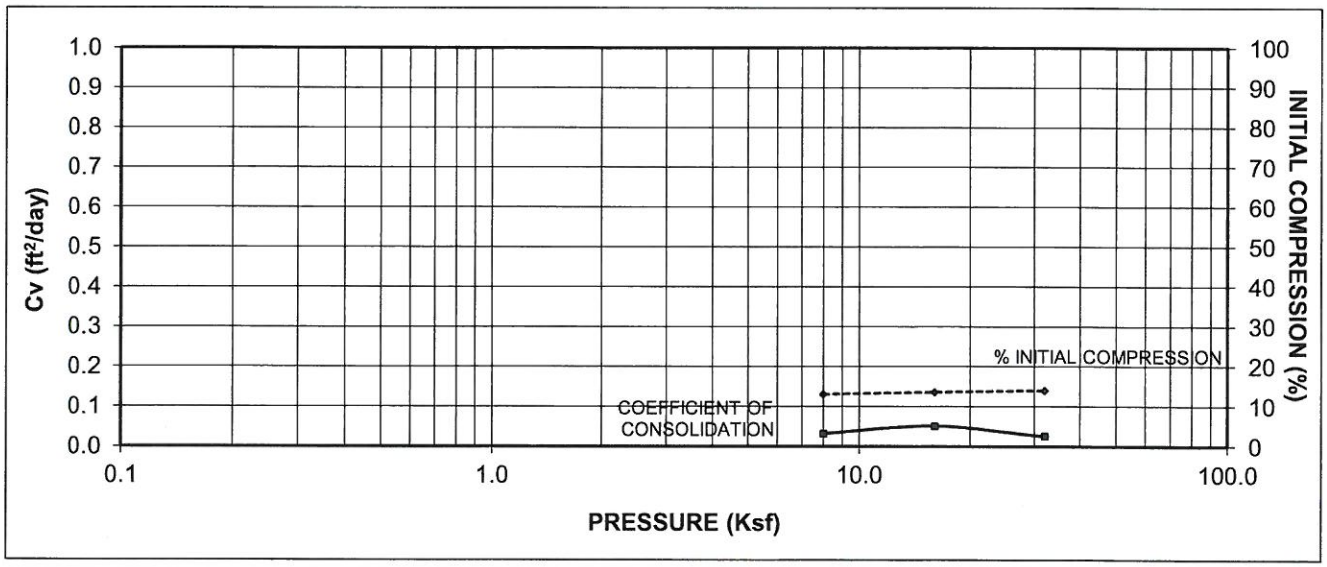
USCS: (CH)

NWM/CHESAPEAKE TERRACE SFI/MD
063-1431-003

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

ONE - DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B





SAMPLE ID	PMW - 23
SAMPLE TYPE	UD
SAMPLE DEPTH	128.0 - 130.0'

LL	-
PL	-
PI	-
Gs	2.80

	Initial	Final
Dry Unit Weight (pcf)	111.1	111.1
Wet Unit Weight (pcf)	134.5	138.6
Moisture Content	21.0%	24.8%
Void Ratio	0.574	0.574
Degree of Saturation	100%	100%

DESCRIPTION: CLAY; dark reddish brown and gray; Hard (can indent with thumb nail); dry to moist.

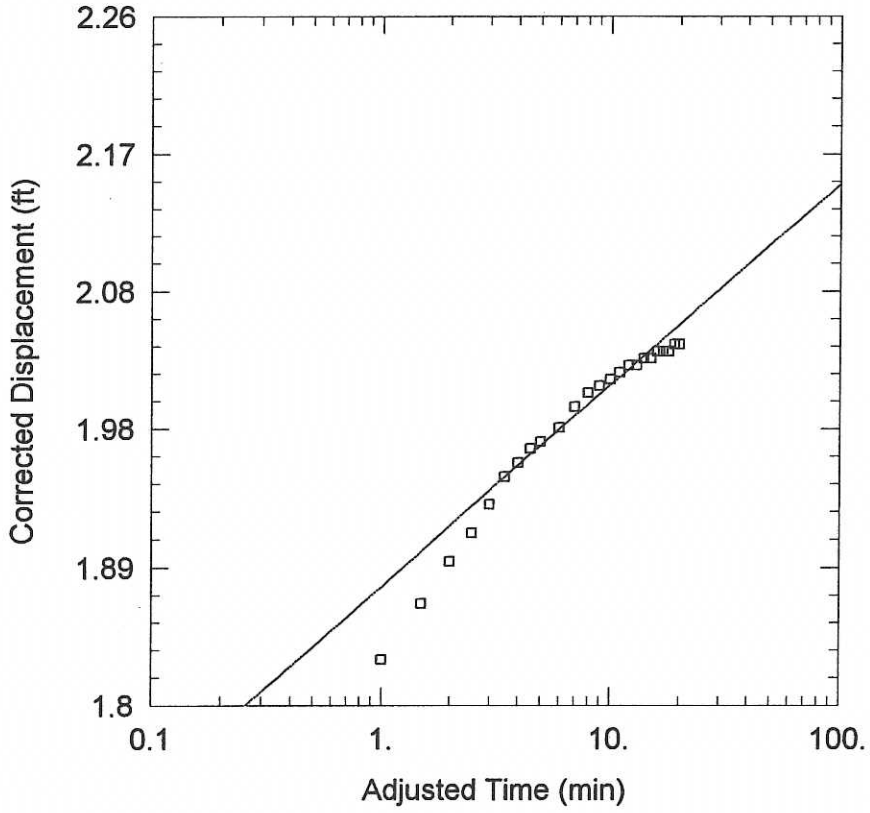
USCS: (CH)

NWM/CHESAPEAKE TERRACE SFI/MD
063-1431-003

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

APPENDIX H

Pumping Test Data (2003)



REC IN MW-3 AFTER PUMPING AT 5.4 GPM FOR 30 MINUTES

Data Set: C:\...\MW-3 rec.aqt
Date: 11/28/03 Time: 14:28:51

PROJECT INFORMATION

Company: Mark Schultz Associates
Client: Natl Waste Managers
Location: Chesapeake Terrace
Test Well: MW-3
Obs. Well: MW-3
Test Date: 4-28-03

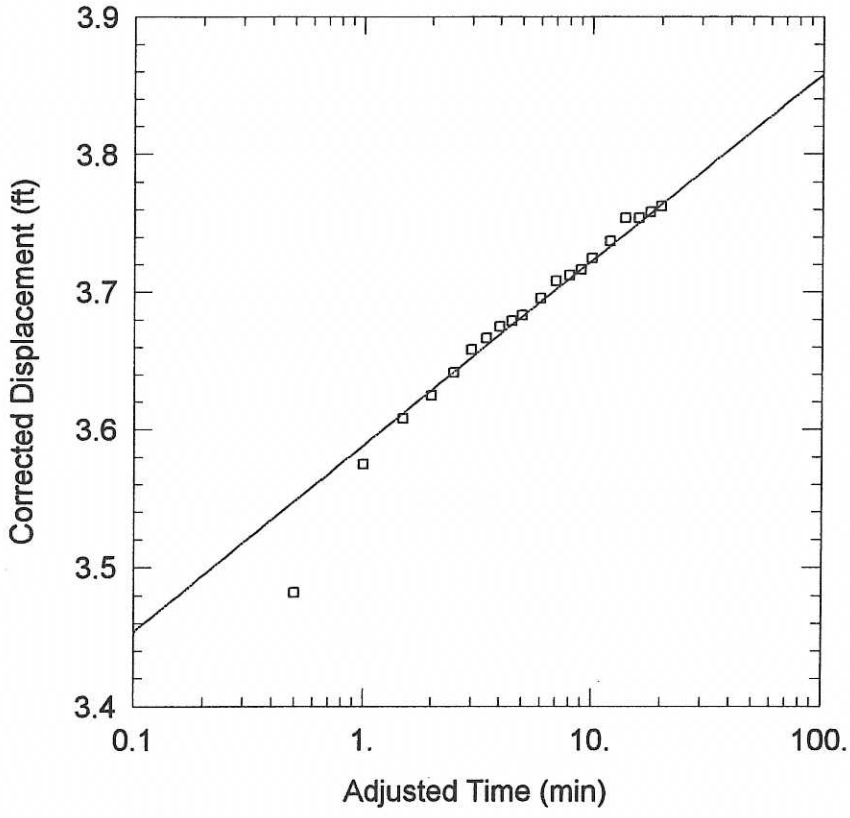
AQUIFER DATA

Saturated Thickness: 30. ft Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob
T = 0.9862 ft^2/min = 1,420 ft^2/day S = 3.394E-12

K = 47 ft^2/day



REC IN MW-4 AFTER PUMPING AT 5.4 GPM FOR 30 MINUTES

Data Set: C:\...\MW-4 rec.aqt
Date: 11/28/03 Time: 14:31:06

PROJECT INFORMATION

Company: Mark Schultz Associates
Client: Natl Waste Managers
Location: Chesapeake Terrace
Test Well: MW-4
Obs. Well: MW-4
Test Date: 4-28-03

AQUIFER DATA

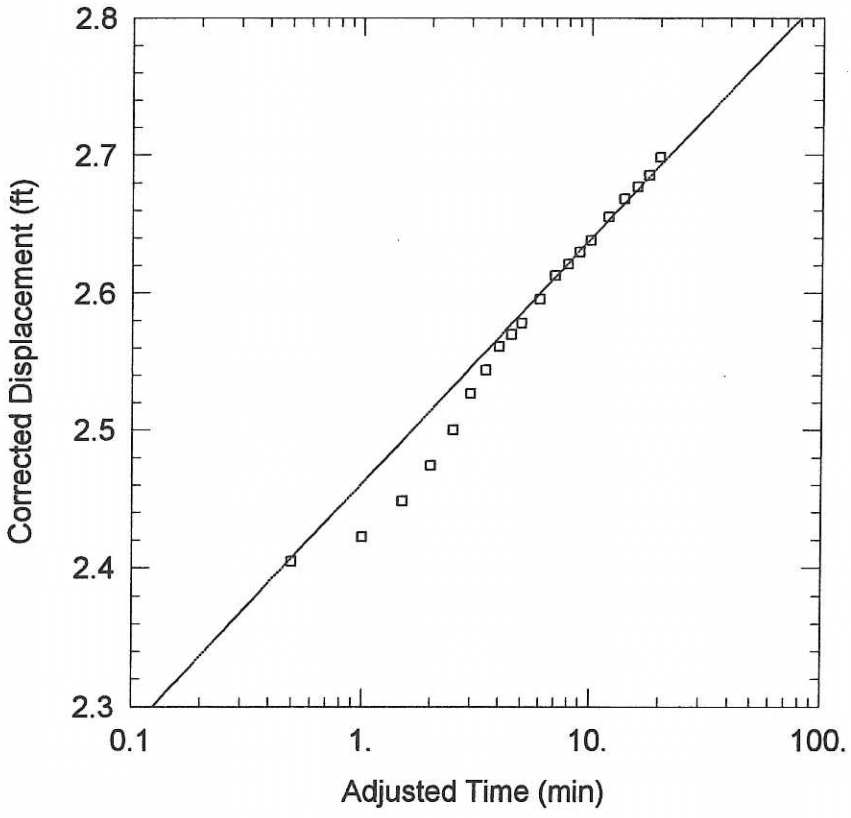
Saturated Thickness: 24. ft Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 0.9829 ft^2/min = 1,415 ft^2/day S = 7.539E-25

K = 60 ft/day



REC IN MW-5 AFTER PUMPING AT 5.6 GPM FOR 30 MINUTES

Data Set: C:\...\MW-5 rec.aqt
Date: 11/28/03 Time: 14:33:36

PROJECT INFORMATION

Company: Mark Schultz Associates
Client: Natl Waste Managers
Location: Chesapeake Terrace
Test Well: MW-5
Obs. Well: MW-5
Test Date: 4-28-03

AQUIFER DATA

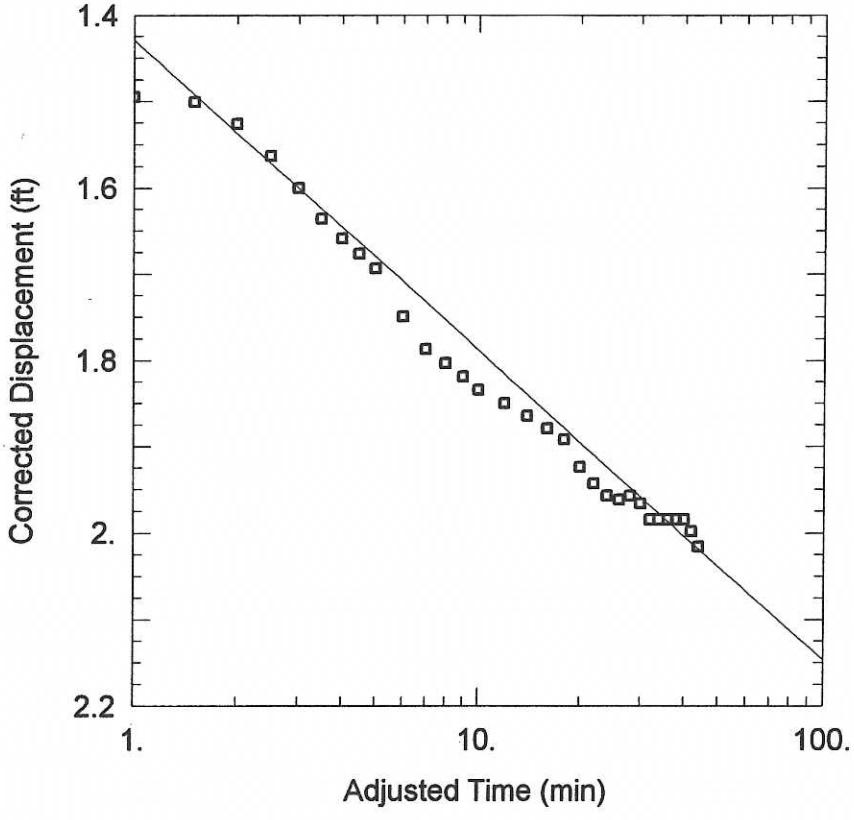
Saturated Thickness: 20. ft Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 0.771 ft^2/min = 1,110 ft^2/day S = 4.032E-12

K = 55 ft/day



DD IN MW-17 WHILE PUMPING AT 0.5 GPM FOR 44 MINUTES

Data Set: C:\...\MW-17 dd.aqt
Date: 12/07/03 Time: 09:40:45

PROJECT INFORMATION

Company: Mark Schultz Associates
Client: National Waste Managers
Location: Chesapeake Terrace
Test Well: MW-17
Test Date: 4/17/03

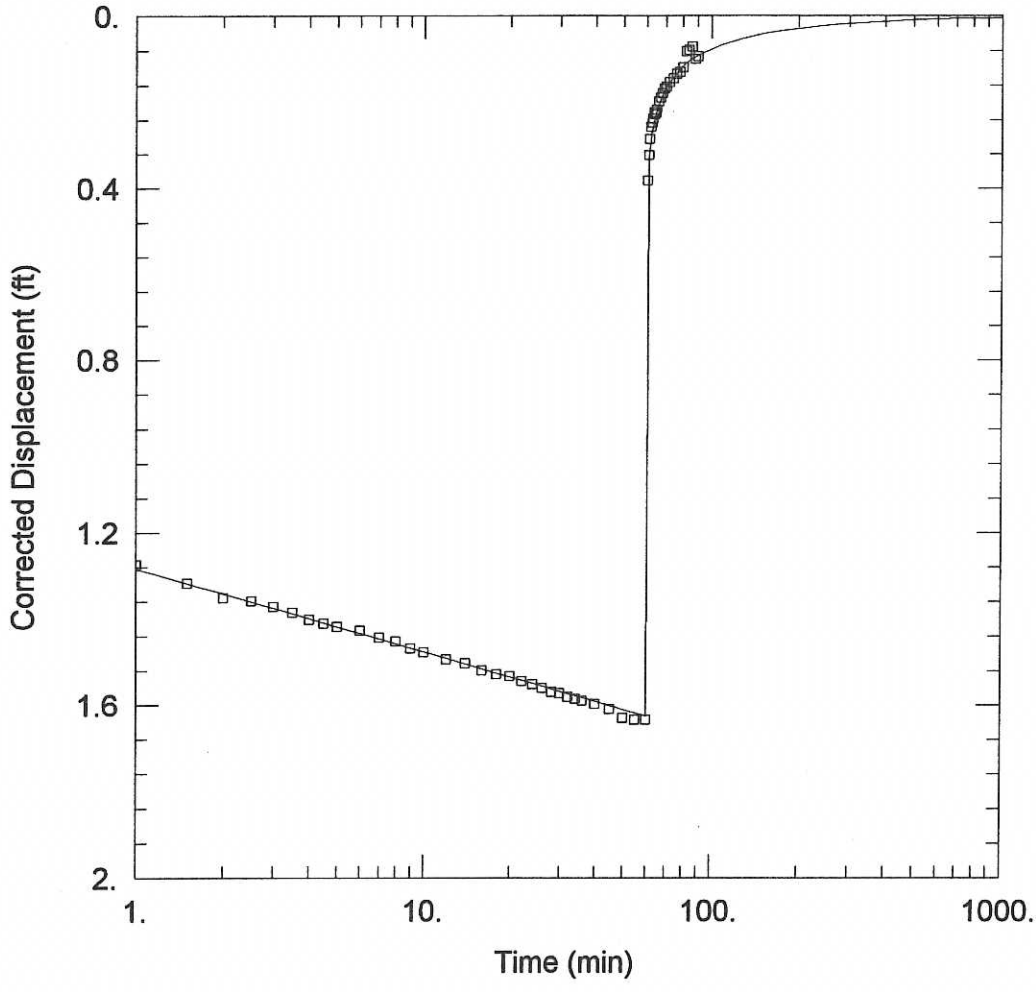
AQUIFER DATA

Saturated Thickness: 5. ft Anisotropy Ratio (Kz/Kr): 390.6

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob
T = 0.03417 ft^2/min $K = 49\ ft^2/day$ S = 0.001235

$K = 10\ ft/day$



DD AND REC IN MW-18 WHILE PUMPING AT 5 GPM FOR 60 MINUTES

Data Set: C:\...\MW-18.aqt
Date: 06/04/03 Time: 18:25:46

PROJECT INFORMATION

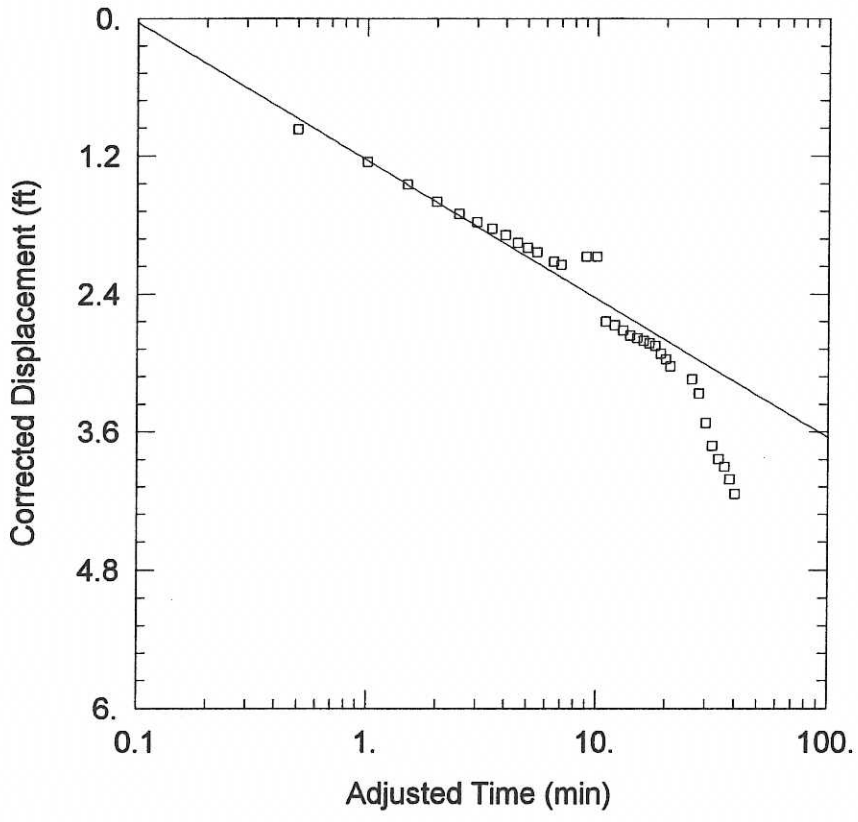
Company: Mark Schultz Associates
Client: Natl Waste Managers
Test Location: Chesapeake Terrace
Test Well: MW-18
Obs. Well: MW-18
Test Date: 4-17-03

SOLUTION

Aquifer Model: Unconfined Solution Method: Theis

T = 0.6382 ft^2/min = 920 ft^2/day S = 4.551E-05
Kz/Kr = 1. b = 9.8 ft

K = 95 ft/day



DD (EARLY) IN MW-19 WHILE PUMPING AT 3 GPM FOR 36 MINUTES

Data Set: C:\...\MW-19 early.aqt
Date: 12/07/03 Time: 09:42:16

PROJECT INFORMATION

Company: Mark Schultz Associates
Client: National Waste Managers
Location: Chesapeake Terrace
Test Well: MW-19
Obs. Well: MW-19
Test Date: 4-15-03

AQUIFER DATA

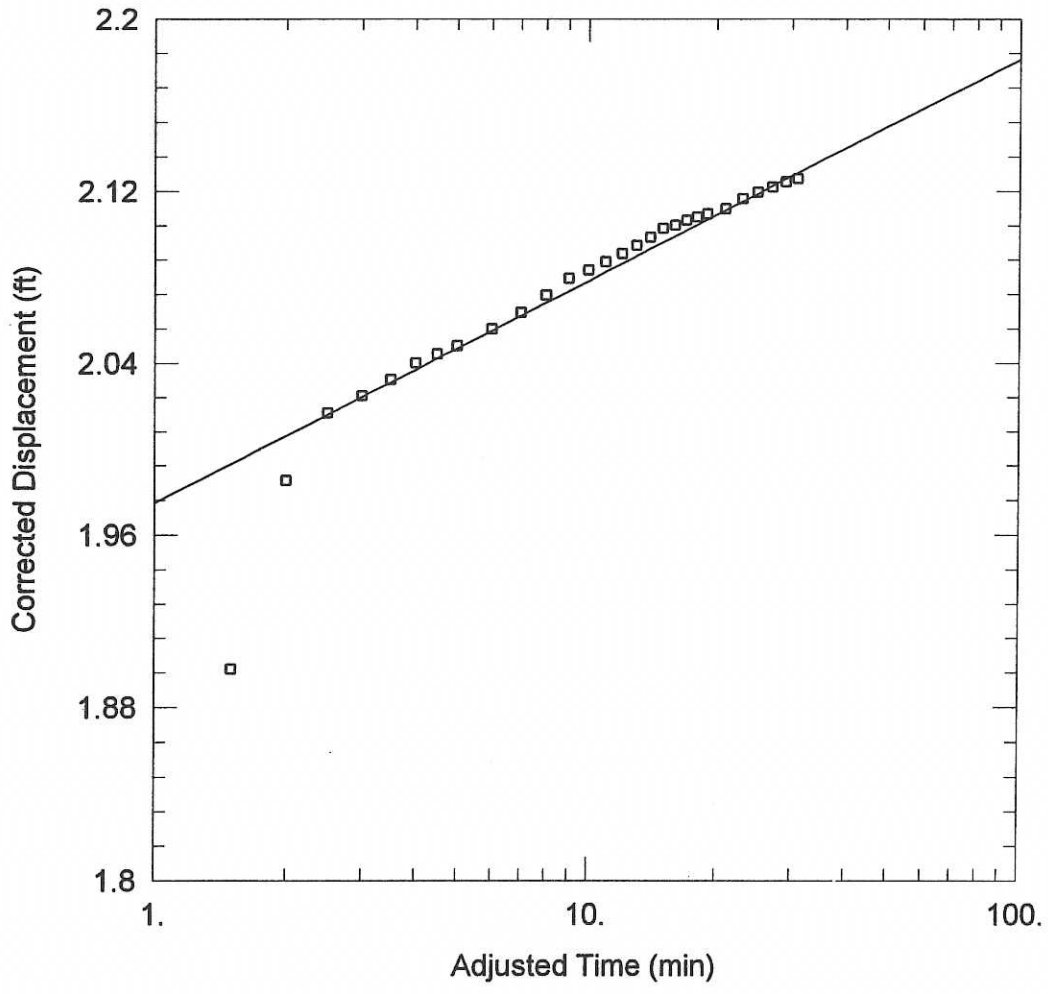
Saturated Thickness: 10. ft Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 0.06093 ft^2/min = 88 ft^2/day S = 1.995

K = 8.8 ft/day



REC IN MW-20 AFTER PUMPING AT 2.3 GPM FOR 60 MINUTES

Data Set: C:\...\MW-20 rec.aqt
Date: 06/05/03 Time: 15:21:52

PROJECT INFORMATION

Company: Mark Schultz Associates
Client: Natl Waste Managers
Test Location: Chesapeake Terrace
Test Well: MW-20
Obs. Well: MW-20
Test Date: 4-15-03

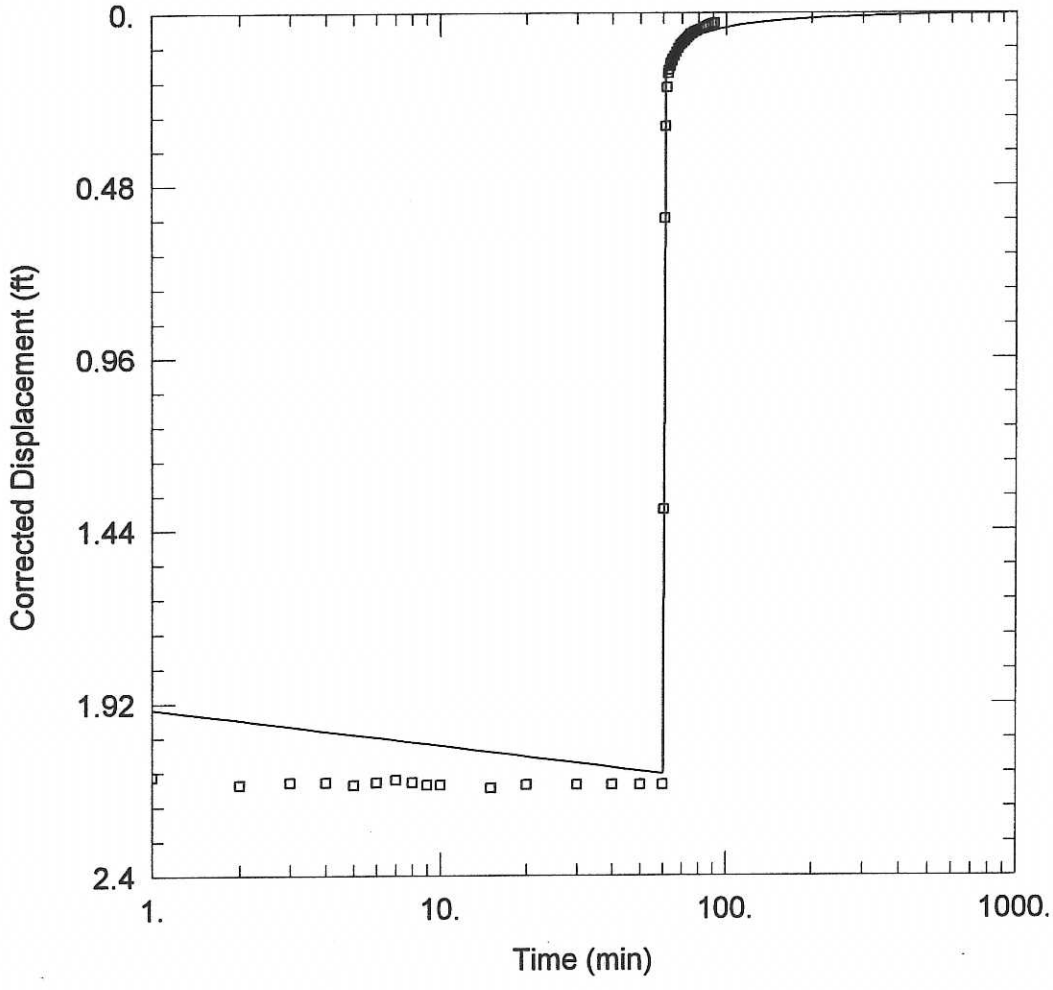
AQUIFER DATA

Saturated Thickness: 10.5 ft Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob
T = 0.5513 ft^2/min = 794 ft^2/day S = 1.319E-17

K = 75 ft/day



DD AND REC IN MW-20 WHEN PUMPING AT 2.3 GPM FOR 60 MINUTES

Data Set: C:\...\MW-20 dd-rec.aqt
Date: 06/05/03 Time: 15:24:37

PROJECT INFORMATION

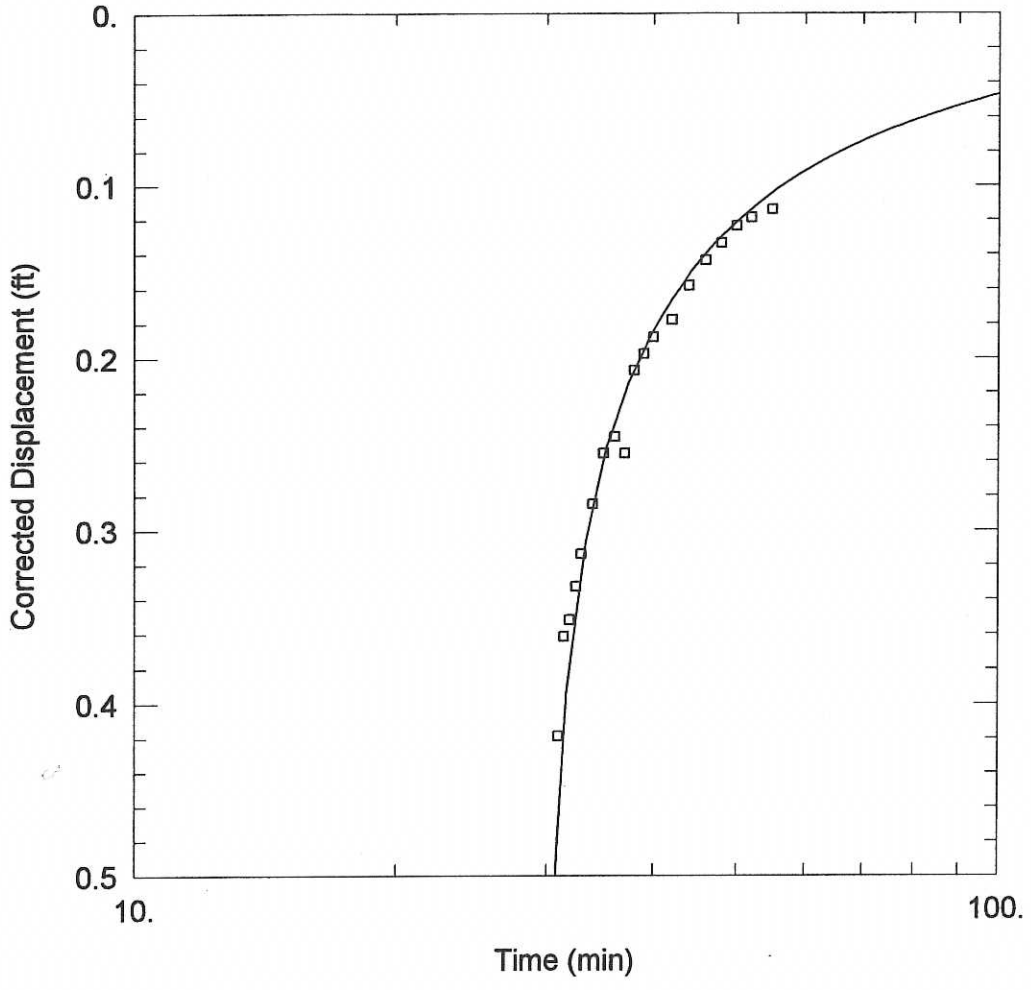
Company: Mark Schultz Associates
Client: Natl Waste Managers
Test Location: Chesapeake Terrace
Test Well: MW-20
Obs. Well: MW-20
Test Date: 4-15-03

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 0.5572 ft^2/min = 802 ft^2/day
S = 1.948E-17
Kz/Kr = 1.
b = 10.5 ft

K = 76 ft/day



DD AND REC IN MW-22 WHEN PUMPING AT 5 GPM FOR 30 MINUTES

Data Set: C:\...\MW-22 dd-rec.aqt
Date: 06/05/03 Time: 17:49:11

PROJECT INFORMATION

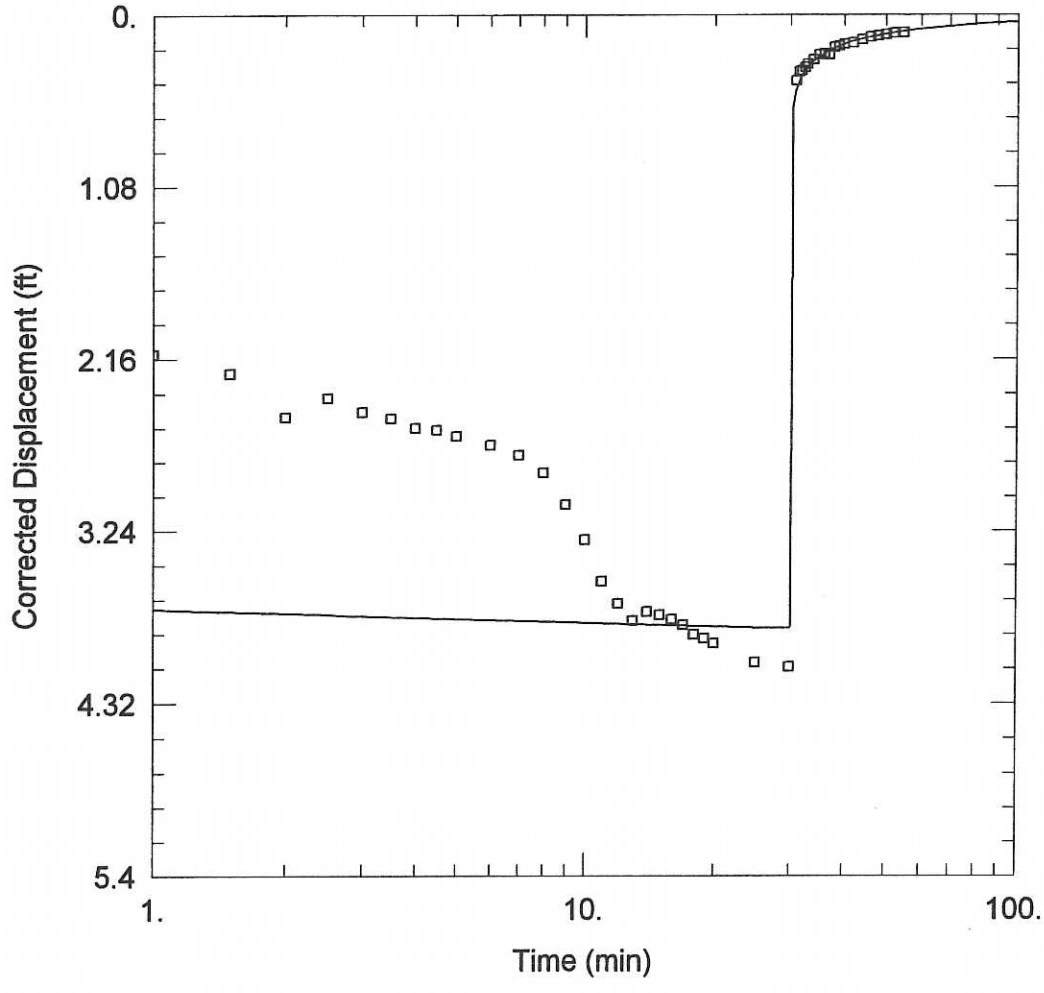
Company: Mark Schultz Associates
Client: Natl Waste Managers
Test Location: Chesapeake Terrace
Test Well: MW-22
Obs. Well: MW-22
Test Date: 4-21-03

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 0.4047 ft^2/min = 580 ft^2/day
S = 1.451E-17
Kz/Kr = 1.
b = 8.2 ft

K = 71 ft/day



DD AND REC IN MW-22 WHEN PUMPING AT 5 GPM FOR 30 MINUTES

Data Set: C:\...\MW-22 dd-rec.aqt
Date: 06/05/03 Time: 17:52:18

PROJECT INFORMATION

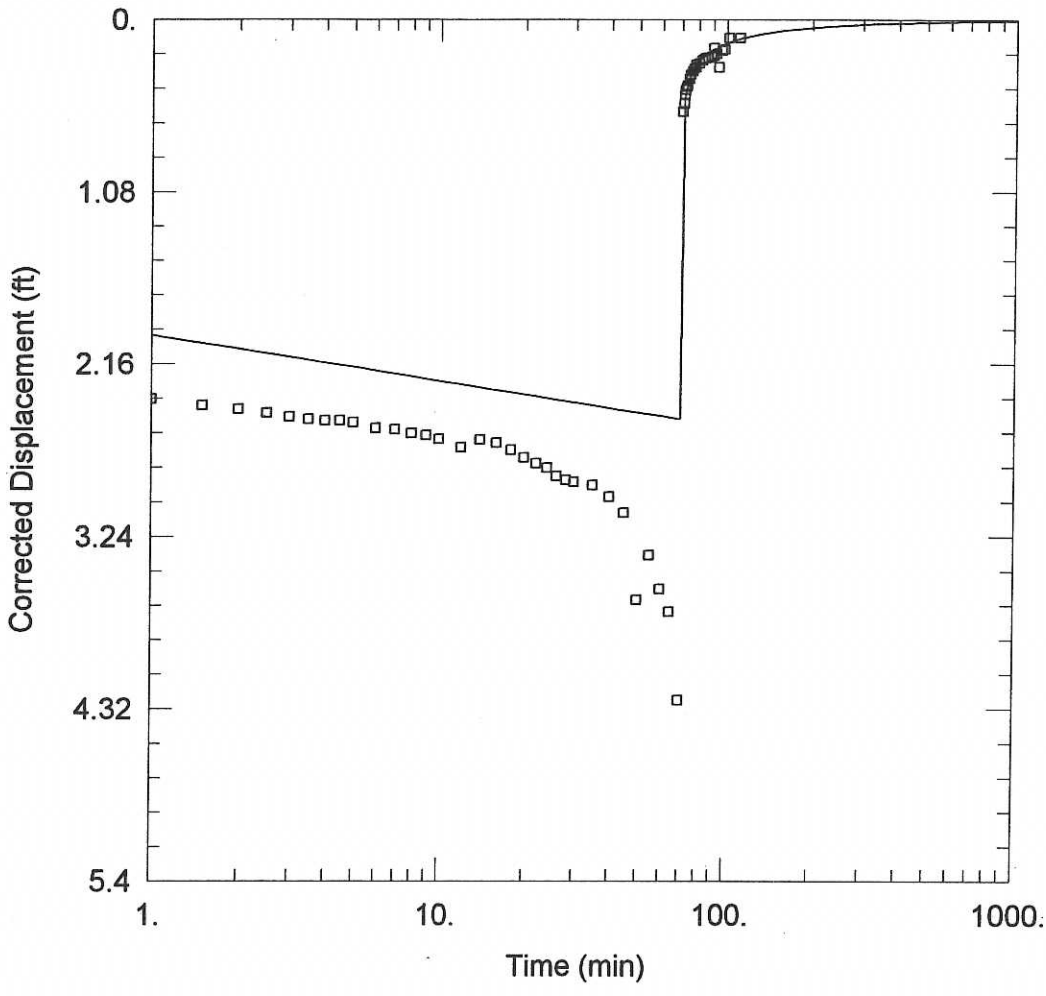
Company: Mark Schultz Associates
Client: Natl Waste Managers
Test Location: Chesapeake Terrace
Test Well: MW-22
Obs. Well: MW-22
Test Date: 4-21-03

SOLUTION

Aquifer Model: Unconfined Solution Method: Theis

T = 0.4047 ft^2/min = 580 ft^2/day S = 1.451E-17
Kz/Kr = 1. b = 8.2 ft

K = 71 ft/day



DD AND REC IN MW-24 WHEN PUMPING AT 4.2 GPM FOR 70 MINUTES

Data Set: C:\...\MW-24 dd-rec.aqt
Date: 06/06/03 Time: 09:39:09

PROJECT INFORMATION

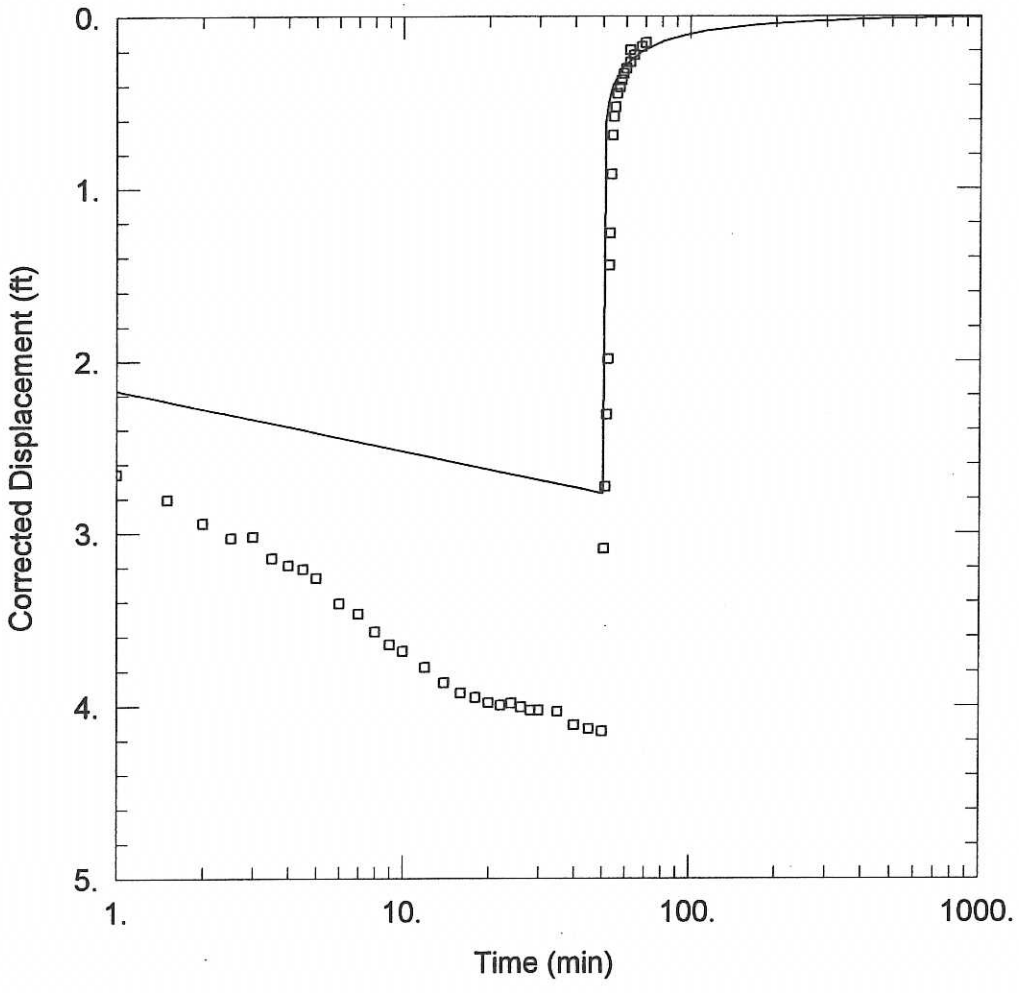
Company: Mark Schultz Associates
Client: Natl Waste Managers
Test Location: Chesapeake Terrace
Test Well: MW-24
Obs. Well: MW-24
Test Date: 4-21-03

SOLUTION

Aquifer Model: Unconfined Solution Method: Theis

T = 0.3607 ft^2/min = 520 ft^2/day S = 1.42E-05
Kz/Kr = 1. b = 14. ft

K = 37 ft/day



DD AND REC IN MW-25 WHEN PUMPING AT 1.5 GPM FOR 50 MINUTES

Data Set: C:\...\MW-25 rec.aqt
Date: 06/08/03 Time: 09:40:25

PROJECT INFORMATION

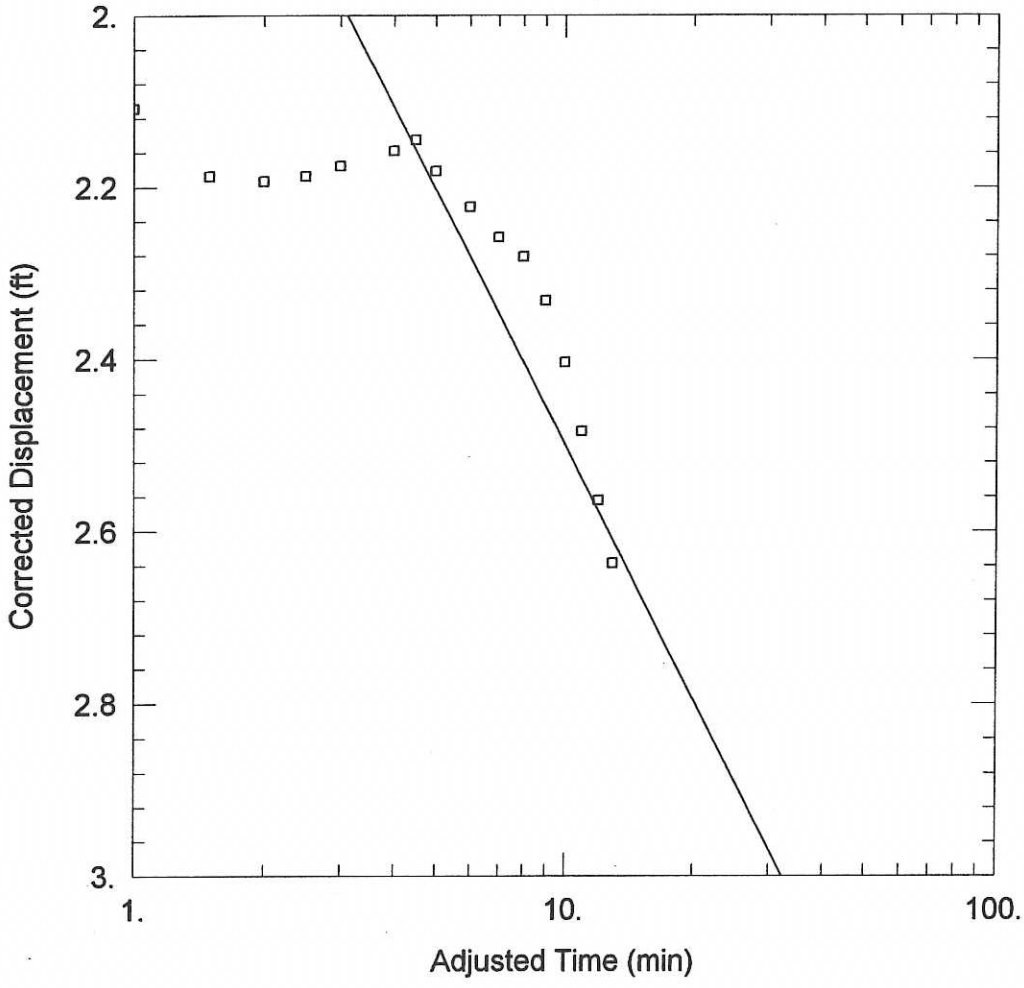
Company: Mark Schultz Associates
Client: Natl Waste Managers
Test Location: Chesapeake Terrace
Test Well: MW-25
Obs. Well: MW-25
Test Date: 4-25-03

SOLUTION

Aquifer Model: Unconfined Solution Method: Theis

T = 0.1037 ft^2/min = 149 ft^2/day S = 2.557E-05
Kz/Kr = 1. b = 12. ft

K = 12.5 ft/day



DD MW-27 WHEN PUMPING AT 0.25 GPM FOR 13 MINUTES

Data Set: C:\...\MW-27.aqt
Date: 06/08/03 Time: 11:14:18

PROJECT INFORMATION

Company: Mark Schultz Associates
Client: Natl Waste Managers
Test Location: Chesapeake Terrace
Test Well: MW-27
Obs. Well: MW-27
Test Date: 4-28-03

AQUIFER DATA

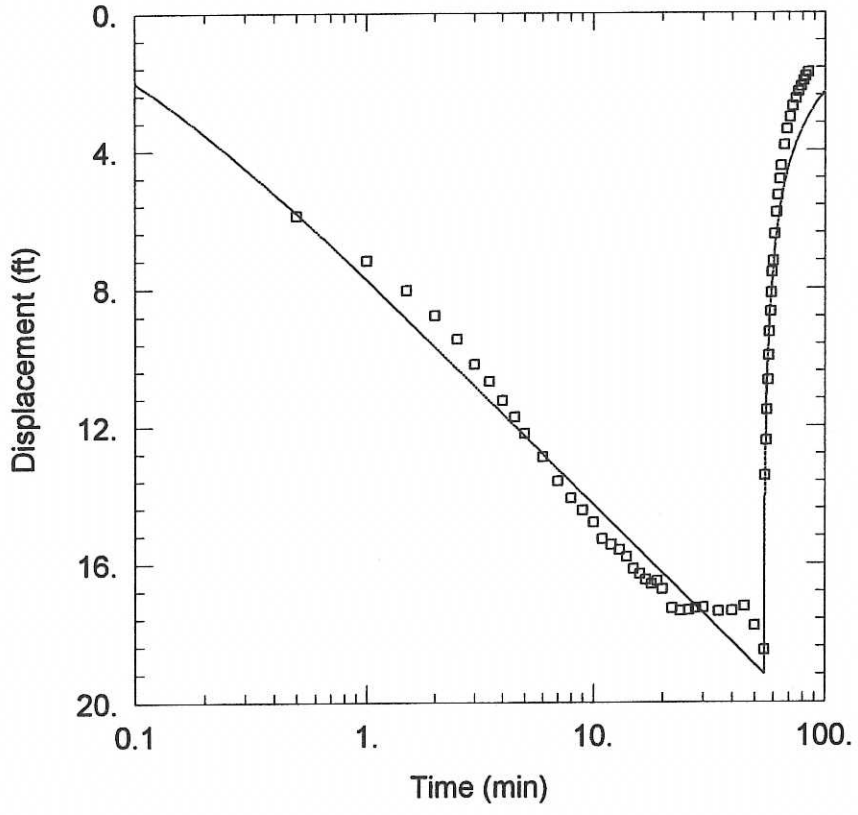
Saturated Thickness: 6.8 ft Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 0.006149 ft^2/min = 8.85 ft^2/day S = 0.06204

K = 1.3 ft/day



DD AND REC IN MW-28 WHEN PUMPING AT 0.5 GPM FOR 55 MINUTES

Data Set: C:\...\MW-28 dd-rec.aqt
Date: 12/01/03 Time: 09:18:26

PROJECT INFORMATION

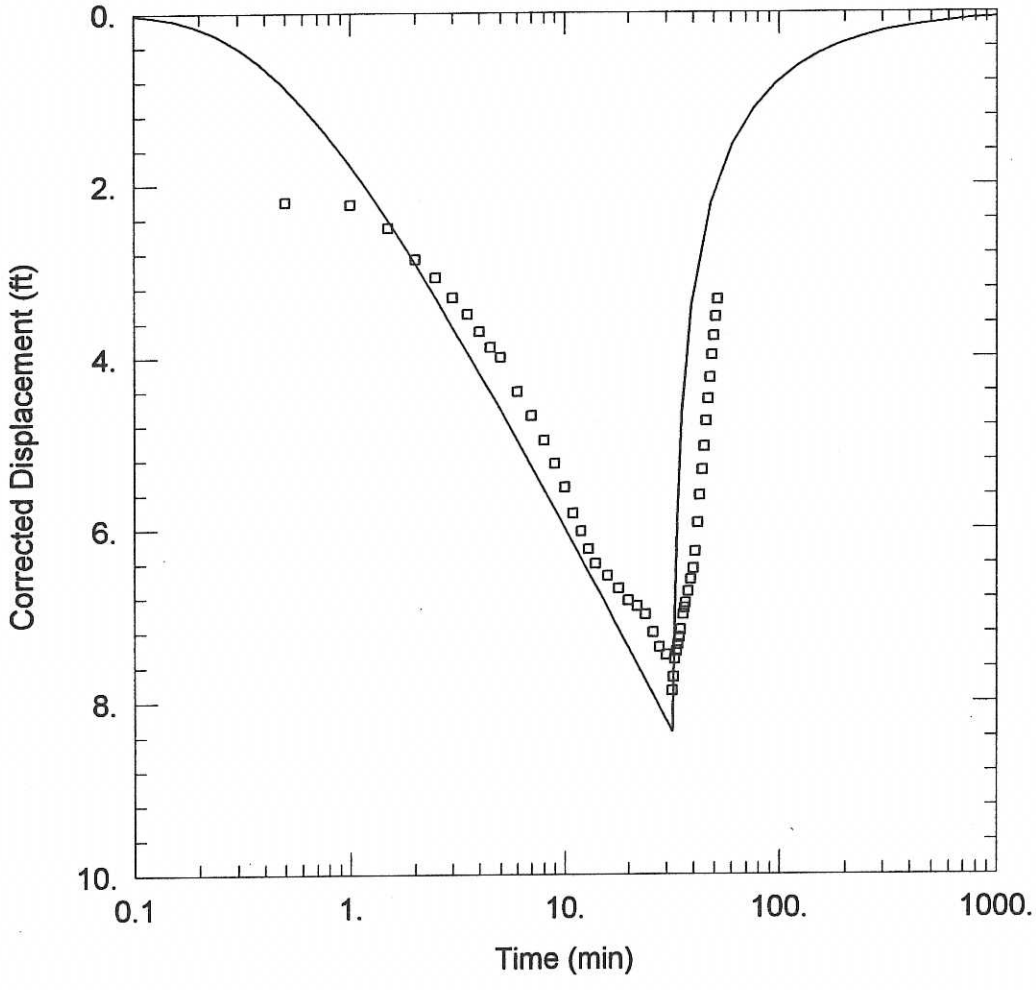
Company: Mark Schultz Associates
Client: Natl Waste Managers
Location: Chesapeake Terrace
Test Well: MW-28
Obs. Well: MW-28
Test Date: 4-25-03

SOLUTION

Aquifer Model: Confined Solution Method: Theis

T = 0.001845 ft^2/min = 2.7 ft^2/day S = 0.04638
Kz/Kr = 1. b = 10. ft

K = 0.27 ft/day



DD AND REC IN MW-29 WHEN PUMPING AT 0.25 GPM FOR 32 MINUTES

Date: 06/08/03 Time: 11:35:45

PROJECT INFORMATION

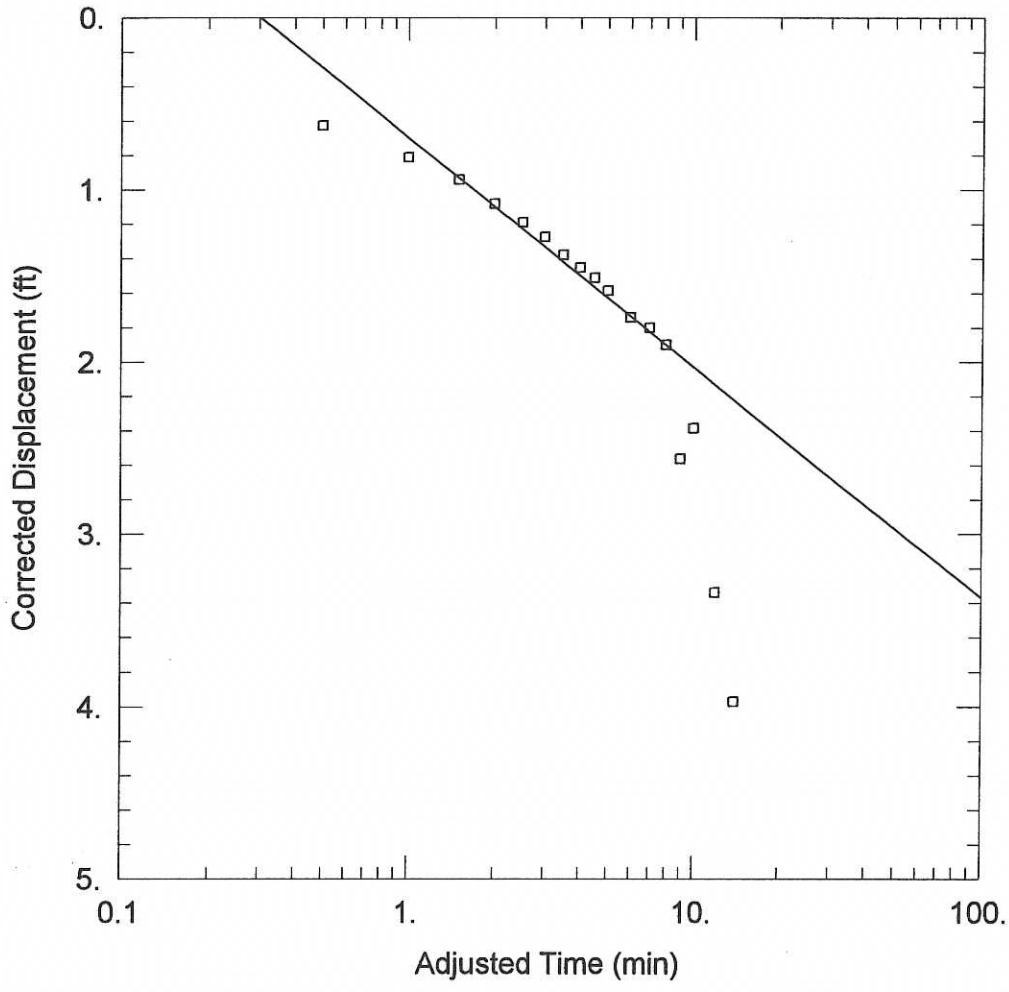
Company: Mark Schultz Associates
Client: Natl Waste Managers
Test Location: Chesapeake Terrace
Test Well: MW-29
Obs. Well: MW-25
Test Date: 4-28-03

SOLUTION

Aquifer Model: Unconfined Solution Method: Theis

T = 0.001289 ft^2/min = 1.8 ft^2/day S = 0.2557
Kz/Kr = 1. b = 19. ft

K = 0.1 ft/day



DD IN MW-30 WHEN PUMPING AT 0.6 GPM FOR 14 MINUTES

Date: 06/09/03 Time: 08:11:29

PROJECT INFORMATION

Company: Mark Schultz Associates
Client: Natl Waste Managers
Test Location: Chesapeake Terrace
Test Well: MW-30
Obs. Well: MW-30
Test Date: 4-28-03

AQUIFER DATA

Saturated Thickness: 10. ft Anisotropy Ratio (Kz/Kr): 1.

SOLUTION

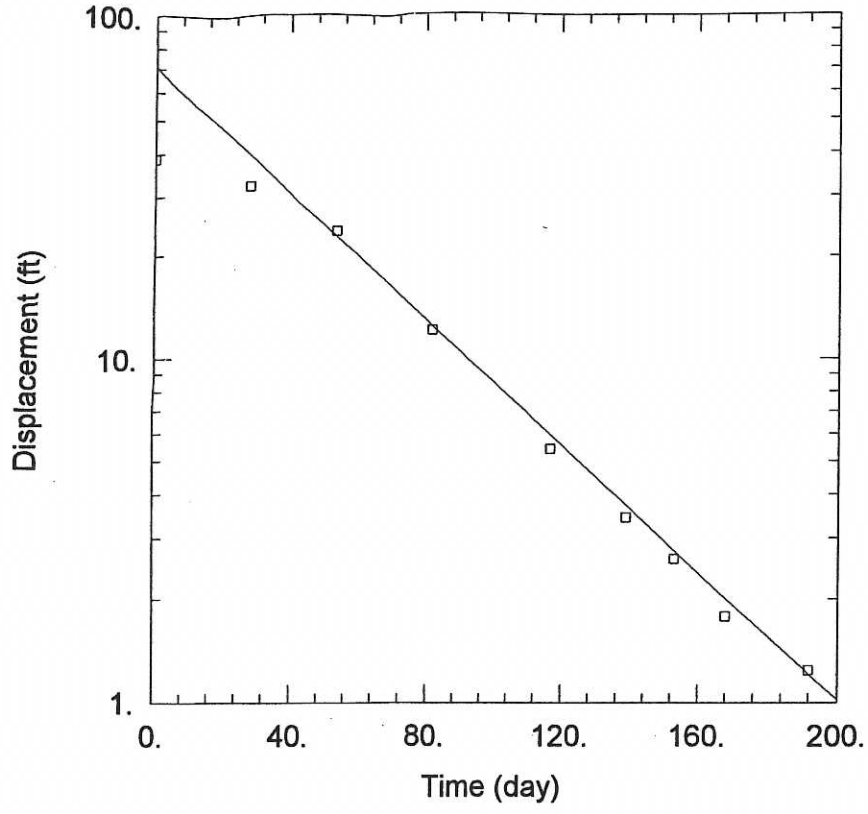
Aquifer Model: Unconfined Solution Method: Cooper-Jacob

T = 0.01206 ft^2/min = 17.4 ft^2/day S = 1.275

K = 1.7 ft/day

APPENDIX I

Slug Test Data (2003)



SLUG TEST CONDUCTED ON MW-31 BEGINNING 4/30/03

Data Set: C:\...\MW-31.aqt
Date: 11/30/03 Time: 12:05:15

PROJECT INFORMATION

Company: Mark Schultz Associates
Client: National Waste Managers
Location: Chesapeake Rubble Fill
Test Well: MW-31
Test Date: 5/03

AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 1.

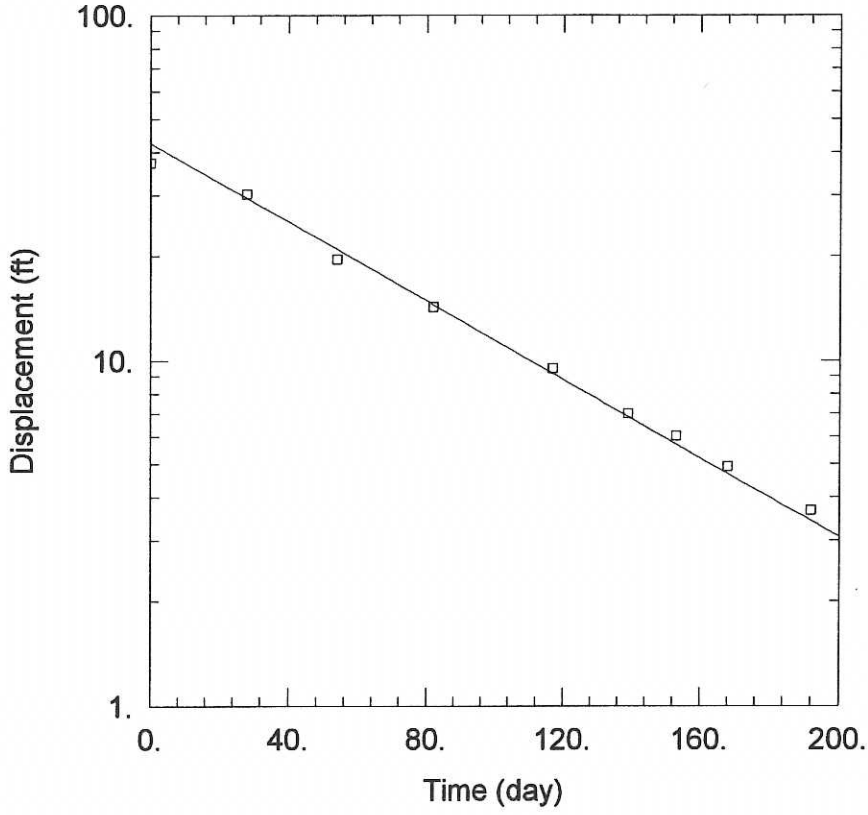
WELL DATA (MW-31)

Initial Displacement: 38.8 ft
Total Well Penetration Depth: 12. ft
Casing Radius: 0.08 ft
Static Water Column Height: 40. ft
Screen Length: 12. ft
Wellbore Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 2.581E-5 ft/day = 9.12 E-9 cm/sec y0 = 70.93 ft



SLUG TEST CONDUCTED ON WELL MW-26 BEGINNING 4/30/03

Data Set: C:\...\MW-26.aqt
Date: 11/30/03 Time: 12:00:14

PROJECT INFORMATION

Company: Mark Schultz Associates
Client: National Waste Managers
Location: Chesapeake Rubble Fill
Test Well: MW-26
Test Date: 5/03

AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 1.

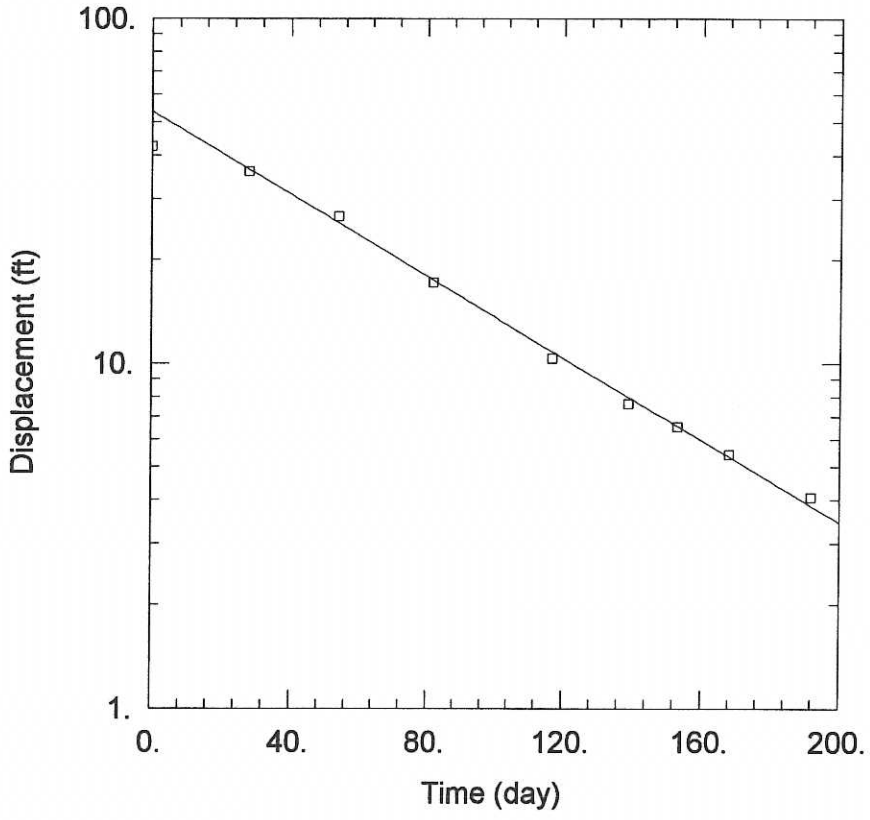
WELL DATA (MW-26)

Initial Displacement: 37.26 ft
Total Well Penetration Depth: 12. ft
Casing Radius: 0.08 ft
Static Water Column Height: 12. ft
Screen Length: 12. ft
Wellbore Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 1.598E-5 ft/day = 5.64×10^{-9} cm/sec y0 = 42.5 ft



SLUG TEST CONDUCTED ON WELL MW-23 BEGINNING 4/30/03

Data Set: C:\...\MW-23 R1 conf.aqt
Date: 11/30/03 Time: 11:48:47

PROJECT INFORMATION

Company: Mark Schultz Associates
Client: National Waste Managers
Location: Chesapeake Rubble Fill
Test Well: MW-23
Test Date: 5/03

AQUIFER DATA

Saturated Thickness: 12. ft Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-23)

Initial Displacement: 42.45 ft
Total Well Penetration Depth: 12. ft
Casing Radius: 0.08 ft
Static Water Column Height: 45. ft
Screen Length: 12. ft
Wellbore Radius: 0.25 ft

SOLUTION

Aquifer Model: Confined Solution Method: Hvorslev

K = 1.672E-5 ft/day = 5.90×10^{-9} cm/sec y0 = 53.69 ft

Summary of Soil Samples for Laboratory Testing *Chesapeake Terrace Supplemental Field Investigation*	
Sample	***Description***
PMW-28-A	Composite bagged material from S6 (28.0-30.0 ft), S8 (38.0-40.0 ft), and S14 (68-70.0 ft).
PMW-13-A	Bagged material from S4 (18.0-20.0 ft).
PMW-13-B	Bagged material from S14 (68.0-70.0 ft).
PMW-13-C	Composite bagged material from S16 (78.0-80.0 ft), and S18 (88.0-90.0 ft).
PMW-13-D	Composite bagged material from S20 (98.0-100.0 ft), and S21 (103.0-105.0 ft).
PMW-19-A	Composite bagged material from S21 (72.0-74.0 ft), S22 (74.0-76.0 ft), and S23 (76.0-78.0 ft).
PMW-19-B	Composite bagged material from S24 (83.0-85.0 ft), and S25 (88.0-90.0 ft).
B-105-A	Composite bagged material from S6(28.0-30.0 ft), and S7 (33.0-35.0 ft).
B-105-B	Composite bagged material from S11 (53.0-55.0 ft), and S12 (58.0-60.0 ft).
B-102-A	Bagged material from S14 (88.0-90.0 ft).
PMW-12-A	Bagged material from S10 (48.0-50.0 ft), and S11 (53.0-55.0 ft).
PMW-12-B	Composite bagged material from S28 (148.0-150.0 ft), S29 (158.0-160.0 ft), S30 (1653.0-165.0 ft), and S31 (168.0-170.0 ft).
PMW-12-C	Composite Bagged material from S41 (218.0-220.0), and S44 (233.0-235.0 ft).
PMW-23	Thin-walled tube sample (128.0-130.0 ft)

NWM/CHESAPEAKE TERRACE SFI/MD
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classi-fication	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
PMW-12A	Bag	-	CL	17.1	25	17	8	-0.04	100.0	78.5	33.5	-	-	-	-	-	-	-
PMW-12B	Bag	-	CL	19.0	43	21	22	-0.11	100.0	95.1	72.0	-	-	-	-	-	-	-
PMW-12C	Bag	-	CL-ML	18.6	22	16	6	0.49	100.0	57.3	26.0	-	-	-	-	-	-	-
PMW-13A	Bag	-	(SM)	13.7	-	-	-	-	99.2	15.0	-	-	-	-	-	-	-	-
PMW-13B	Bag	-	(SP-SM)	19.1	-	-	-	-	100.0	9.9	-	-	-	-	-	-	-	-
PMW-13C	Bag	-	CL	15.7	37	18	19	-0.14	100.0	96.7	62.0	-	-	-	-	-	-	-
PMW-13D	Bag	-	CL	20.4	42	22	20	-0.06	100.0	97.0	58.5	-	-	-	-	-	-	-
PMW-19A	Bag	-	CL	16.0	27	16	11	-0.03	100.0	73.6	39.0	-	-	-	-	-	-	-
PMW-19B	Bag	-	(SC)	22.0	-	-	-	-	100.0	45.4	-	-	-	-	-	-	-	-
PMW-28A	Bag	-	(SM)	15.5	-	-	-	-	100.0	15.3	-	-	-	-	-	-	-	-
PMW-102A	Bag	-	CL	14.3	30	19	11	-0.46	100.0	79.4	39.0	-	-	-	-	-	-	-
PMW-105A	Bag	-	CH	24.7	61	25	36	-0.02	100.0	96.0	88.5	-	-	-	-	-	-	-
PMW-105B	Bag	-	CL	21.2	46	25	21	-0.16	100.0	98.1	60.5	-	-	-	-	-	-	-

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

DECEMBER 2013

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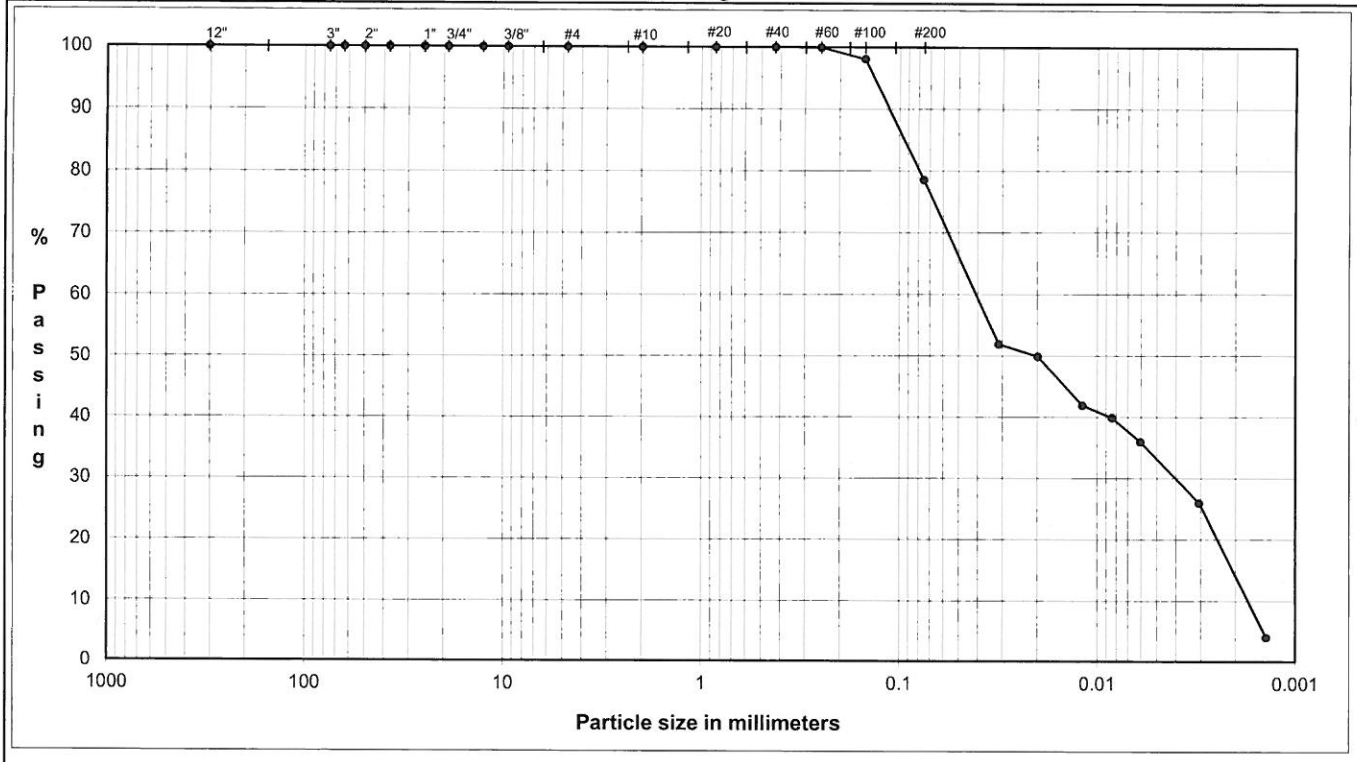
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**

SAMPLE ID: **PMW-12A** Depth: -

TYPE: **Bag**



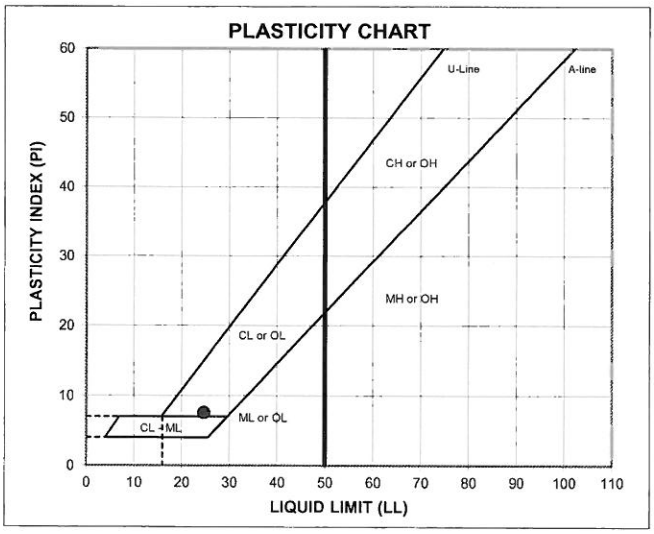
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**100.0**	Medium Sand	**0.0**
#60	0.25	**99.9**		
#100	0.15	**98.1**		
#200	0.075	**78.5**	Fine Sand	**21.5**

Hydrometer Analysis

(mm)	%Finer		
0.031	**51.9**		
0.020	**49.9**		
0.012	**41.9**	Fines	
0.0084	**39.9**	Silt or Clay	**78.5**
0.0060	**35.9**		
0.0031	**26.0**		
0.0014	**4.0**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
17.1	**25**	**17**	**8**	**-0.04**

LL (oven-dried) / <0.75 - ORGANIC (OL,OH)

DESCRIPTION: sandy SILTY CLAY, fine sand; light gray.

USCS: CL

TECH	AM/TJ
DATE	12/18/13
CHECK	aem
REVIEW	DA
APPROVE	

Golder Associates Inc.

DECEMBER 2013

063-1431-003

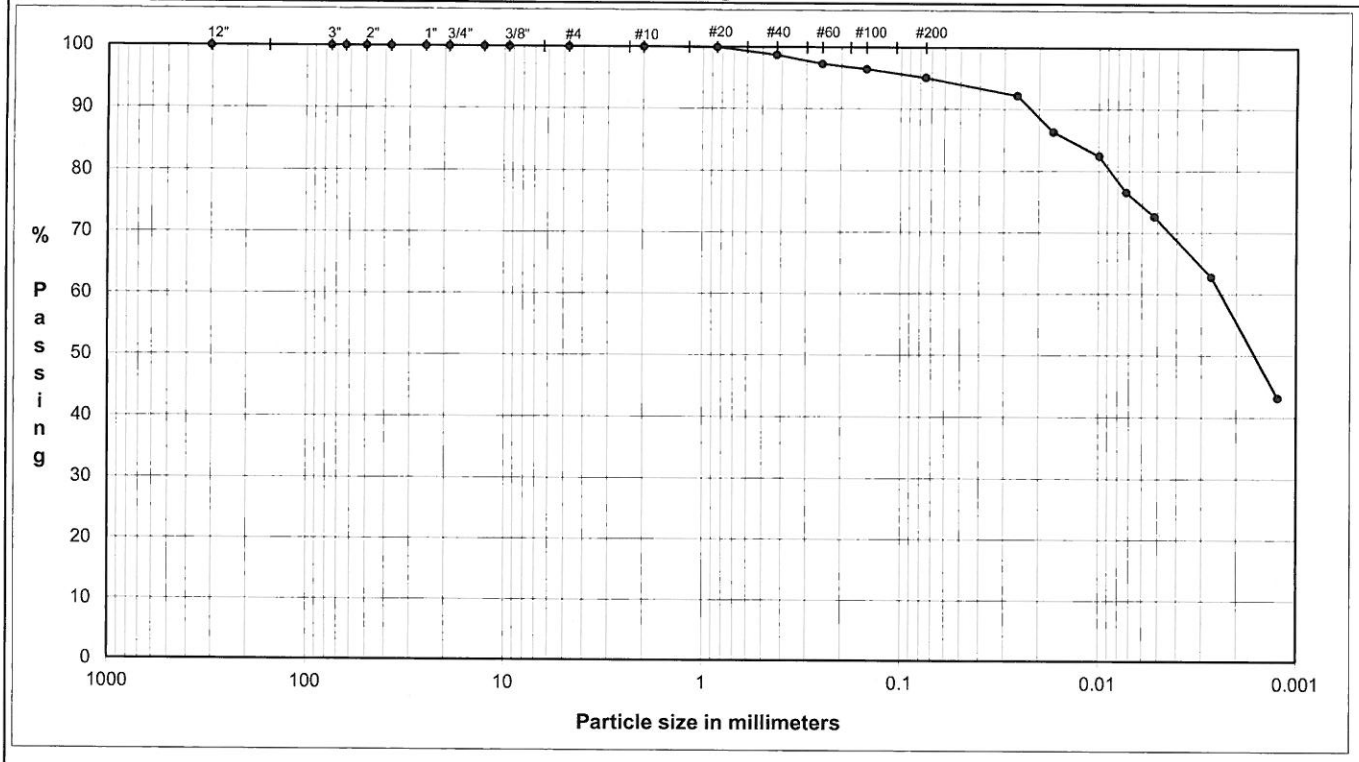
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**

SAMPLE ID: **PMW-12B** Depth: -

TYPE: **Bag**



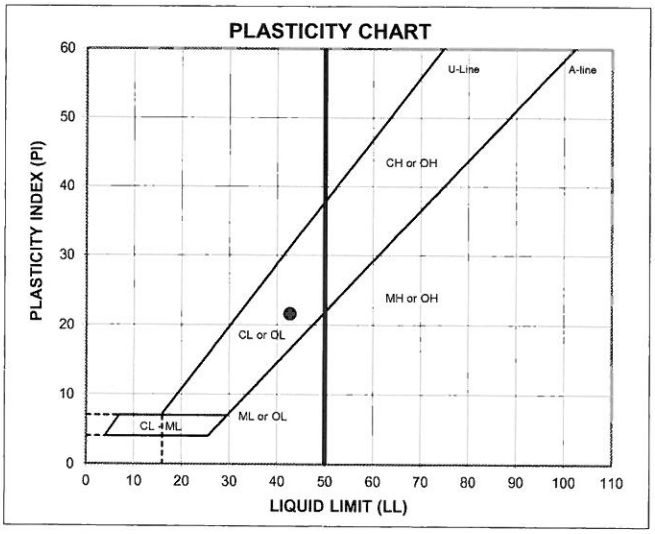
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**98.7**	Medium Sand	**1.3**
#60	0.25	**97.3**		
#100	0.15	**96.5**		
#200	0.075	**95.1**	Fine Sand	**3.6**

Hydrometer Analysis

(mm)	%Finer		
0.026	**92.2**		
0.017	**86.3**		
0.010	**82.4**	Fines	
0.0072	**76.5**	Silt or Clay	**95.1**
0.0052	**72.6**		
0.0027	**62.8**		
0.0012	**43.2**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
19.0	**43**	**21**	**22**	**-0.11**

LL (oven-dried) / <0.75 = ORGANIC (OL/OH)

DESCRIPTION: SILTY CLAY, trace fine to medium sand; reddish yellow, reddish brown, and greenish gray.

USCS: CL

TECH	AM/TJ
DATE	12/18/13
CHECK	alm
REVIEW	JA
APPROVE	

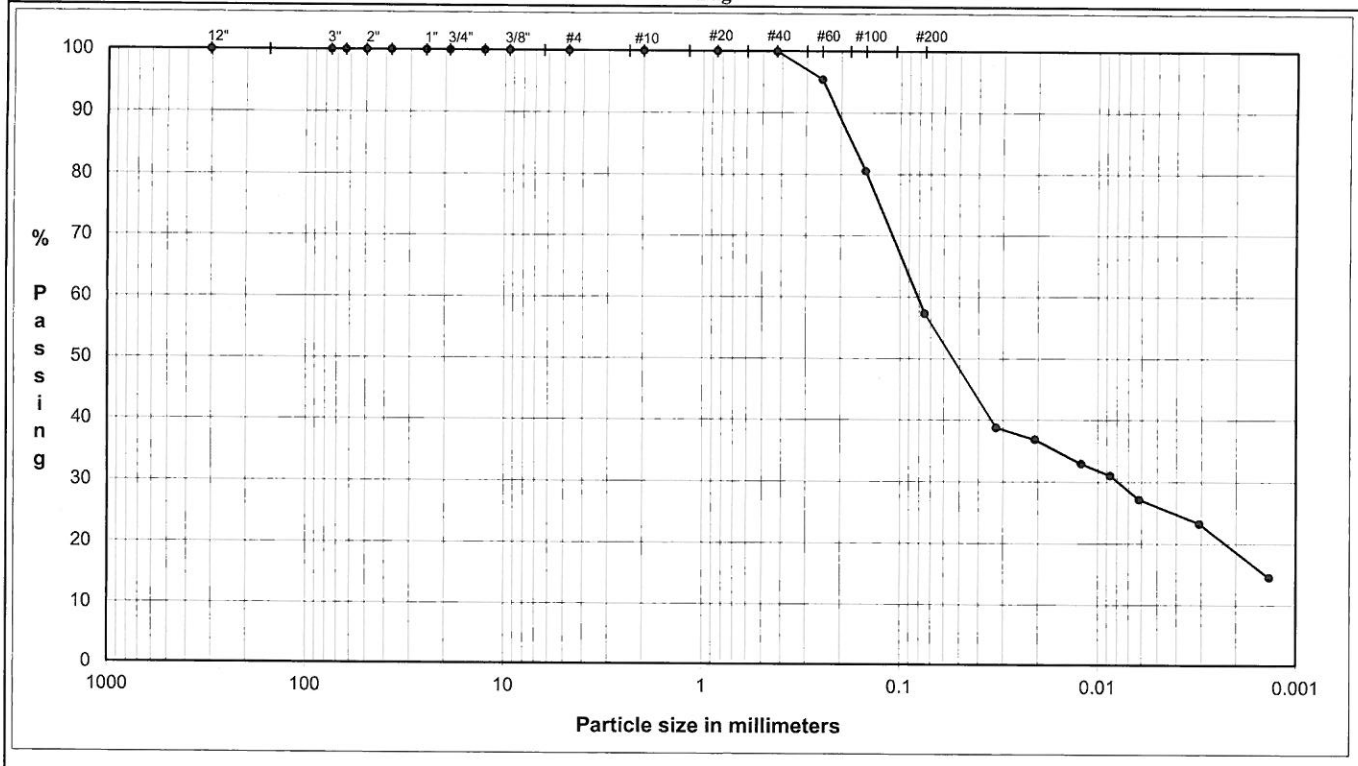
DECEMBER 2013

063-1431-003

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-12C** Depth: -
TYPE: **Bag**



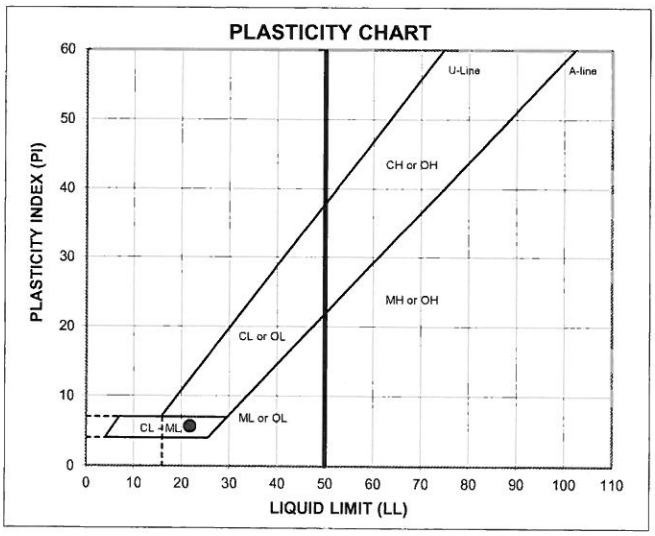
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**100.0**	Medium Sand	**0.0**
#60	0.25	**95.4**		
#100	0.15	**80.6**		
#200	0.075	**57.3**	Fine Sand	**42.6**

Hydrometer Analysis

(mm)	%Finer		
0.033	**38.8**		
0.021	**36.8**		
0.012	**33.0**	Fines	
0.0087	**31.0**	Silt or Clay	**57.3**
0.0062	**27.1**		
0.0031	**23.3**		
0.0014	**14.5**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
18.6	**22**	**16**	**6**	**0.49**

LL (oven-dried) / LL (not dried) < 0.75 = ORGANIC (OL,OH)

DESCRIPTION: SILTY CLAY to CLAYEY SILT and SAND, fine to medium; grayish brown.

USCS: CL-ML

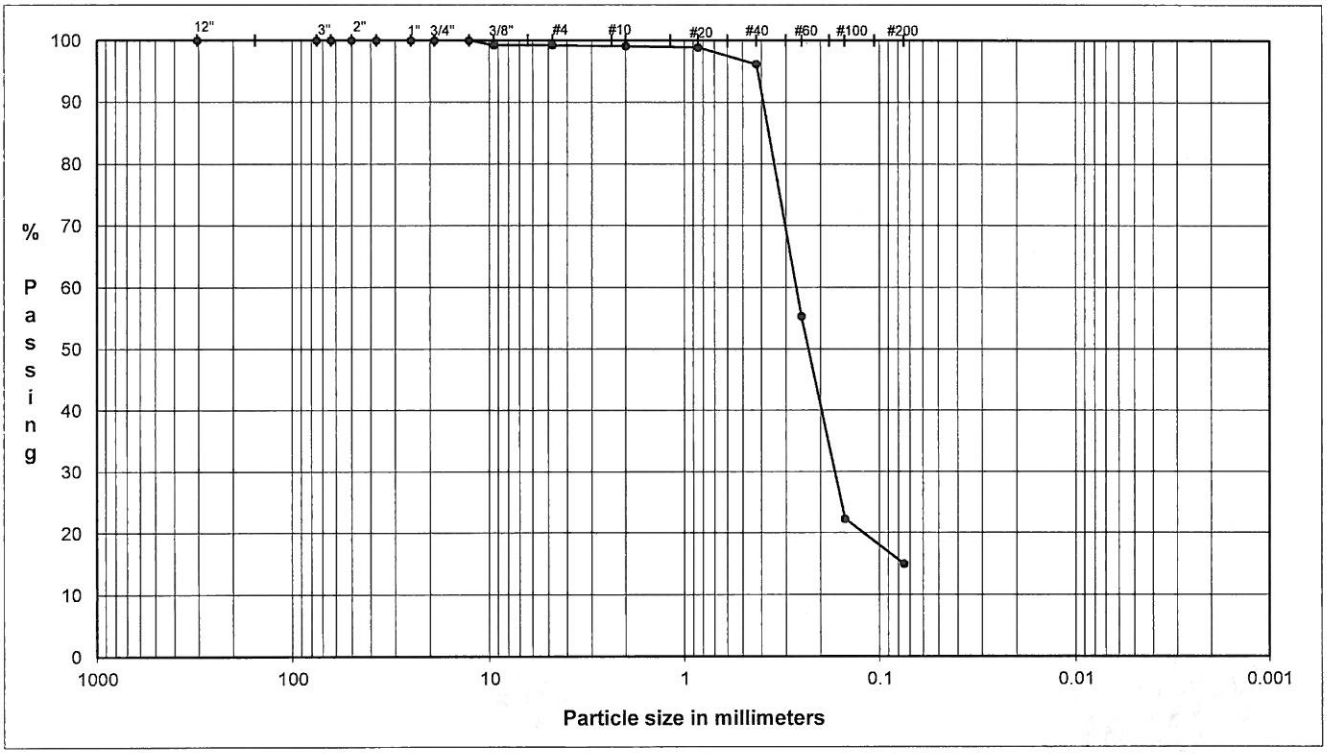
TECH	TJ
DATE	12/20/13
CHECK	alm
REVIEW	JA
APPROVE	

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PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D6913, D4318

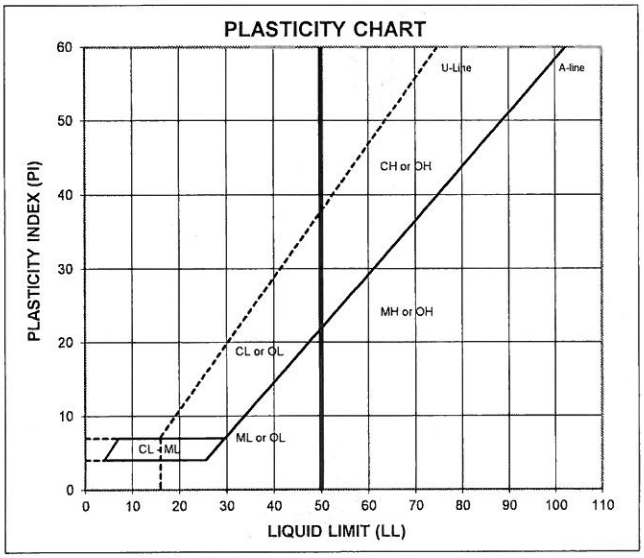
PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-13A** Depth: -
TYPE: **Bag**



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**99.2**		
#4	4.8	**99.2**	Fine Gravel	**0.8**
#10	2.00	**99.1**	Coarse Sand	**0.2**
#20	0.85	**98.9**		
#40	0.43	**96.2**	Medium Sand	**2.9**
#60	0.25	**55.3**		
#100	0.15	**22.3**		
#200	0.075	**15.0**	Fine Sand	**81.2**
			Fines	**15.0**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
13.7				

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: SILTY SAND, fine to coarse, trace fine gravel; yellowish brown.

USCS: (SM)

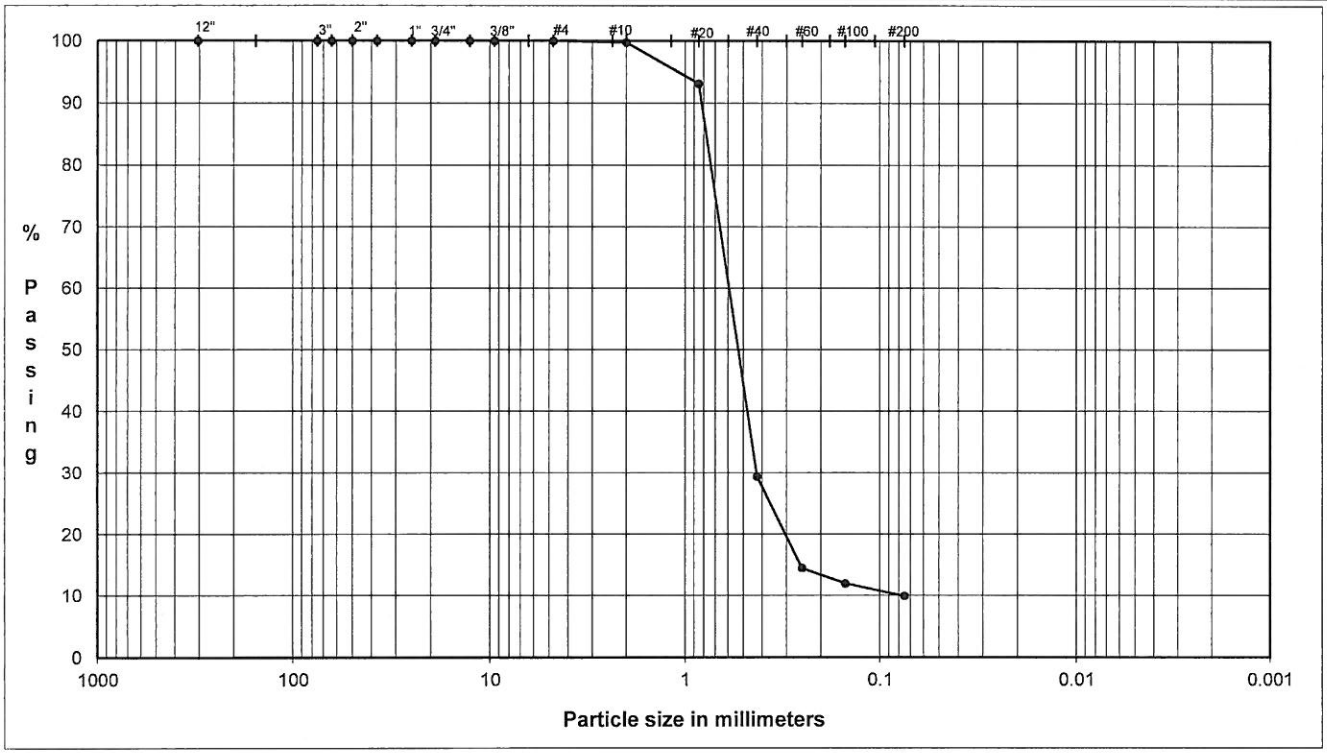
TECH	TJ/AM
DATE	12/12/13
CHECK	gem
REVIEW	
APPROVE	

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PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D6913, D4318

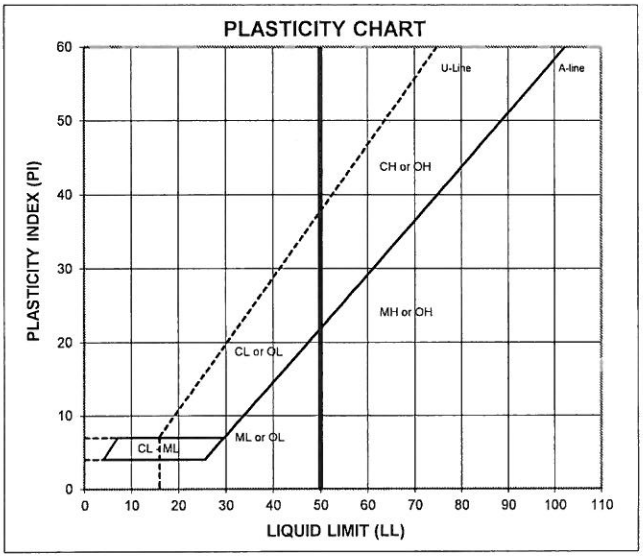
PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-13B** Depth: -
TYPE: **Bag**



COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.7**	Coarse Sand	**0.3**
#20	0.85	**93.2**		
#40	0.43	**29.4**	Medium Sand	**70.4**
#60	0.25	**14.5**		
#100	0.15	**12.0**		
#200	0.075	**9.9**	Fine Sand	**19.5**
			Fines	**9.9**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
19.1				

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: SAND, fine to coarse, some fines; yellowish brown.

USCS: (SP-SM)

TECH	TJ/AM
DATE	12/12/13
CHECK	
REVIEW	
APPROVE	

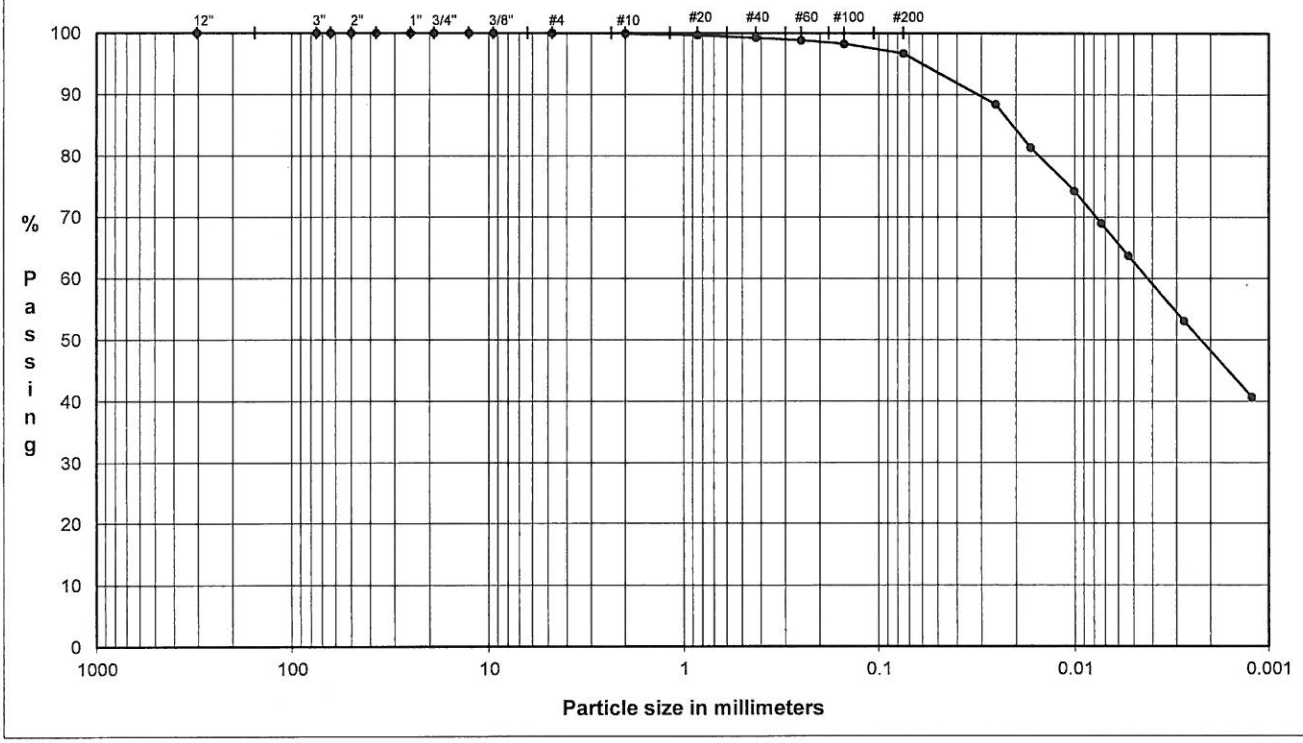
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DECEMBER 2013 063-1431-003

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-13C** Depth: -
TYPE: **Bag**



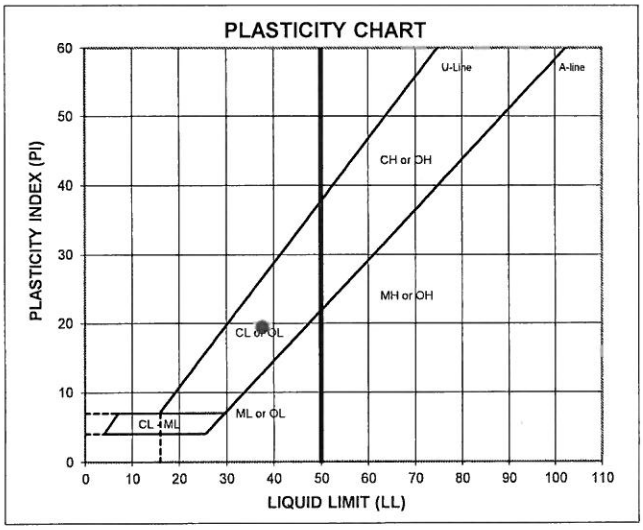
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	99.9	Coarse Sand	0.1
#20	0.85	99.7		
#40	0.43	99.3	Medium Sand	0.7
#60	0.25	98.9		
#100	0.15	98.3		
#200	0.075	96.7	Fine Sand	2.5

Hydrometer Analysis

(mm)	%Finer		
0.025	88.4		
0.017	81.4		
0.010	74.3	Fines	
0.0074	69.0	Silt or Clay	96.7
0.0053	63.7		
0.0028	53.1		
0.0012	40.7		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
15.7	37	18	19	-0.14

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: SILTY CLAY, trace fine to coarse sand; reddish gray.

USCS: CL

TECH	TJ/AM/TW
DATE	12/12/13
CHECK	aem
REVIEW	[illegible]
APPROVE	

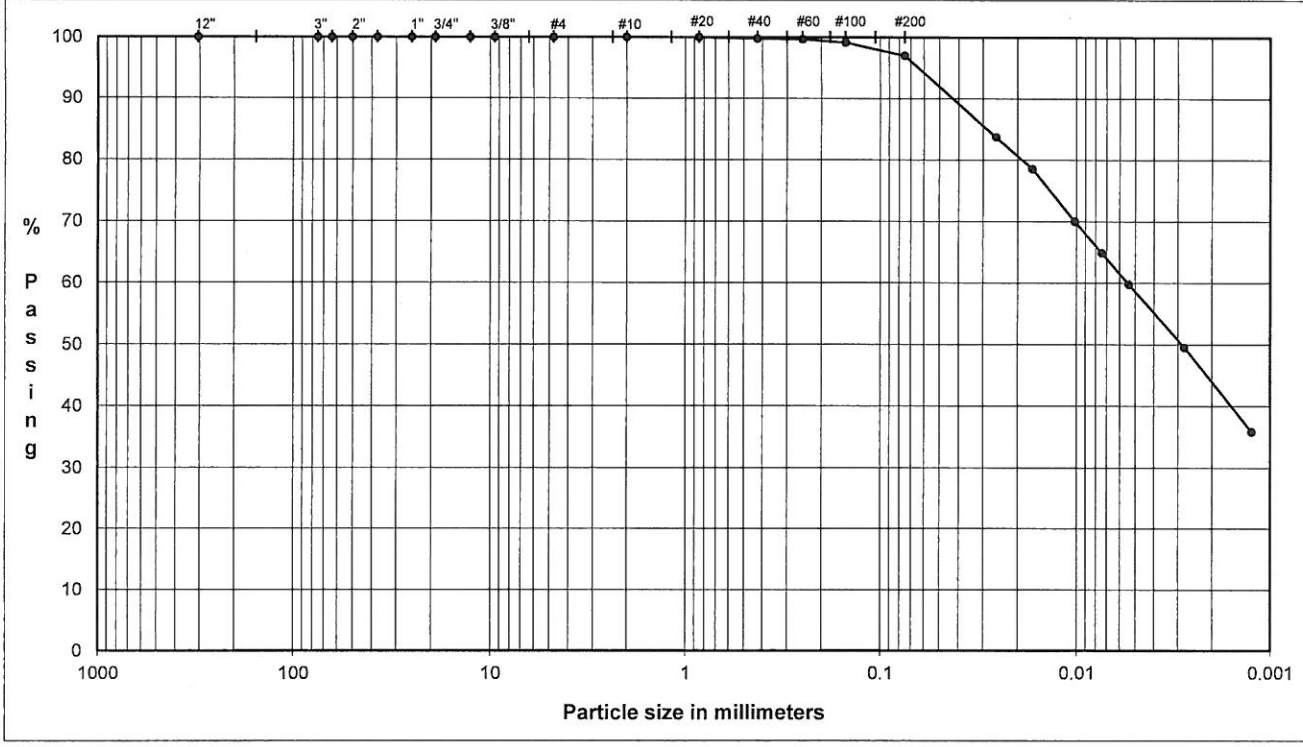
Golder Associates Inc.

DECEMBER 2013 063-1431-003

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-13D** Depth: -
TYPE: **Bag**



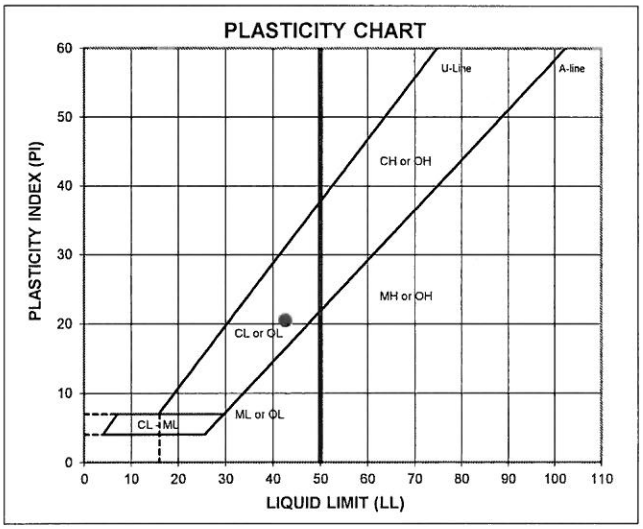
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	100.0	Coarse Sand	0.0
#20	0.85	100.0		
#40	0.43	99.8	Medium Sand	0.2
#60	0.25	99.7		
#100	0.15	99.1		
#200	0.075	97.0	Fine Sand	2.7

Hydrometer Analysis

(mm)	%Finer		
0.026	83.7		
0.017	78.6		
0.010	70.0	Fines	
0.0074	64.9	Silt or Clay	97.0
0.0054	59.8		
0.0028	49.5		
0.0012	35.9		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
20.4	42	22	20	-0.06

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: SILTY CLAY, trace fine to medium sand; reddish brown and yellow.

USCS: CL

TECH	TJ/AM/TW
DATE	12/12/13
CHECK	aem
REVIEW	PLM
APPROVE	

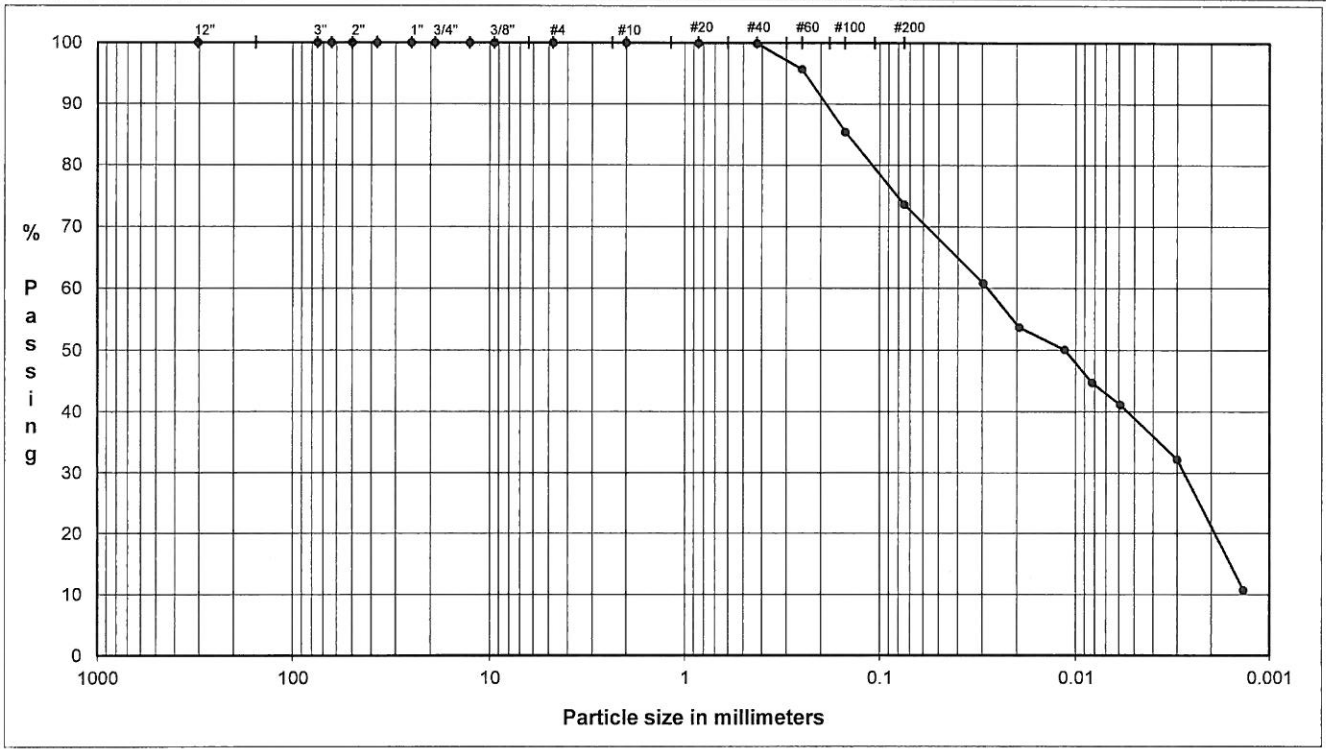
Golder Associates Inc.

DECEMBER 2013 063-1431-003

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-19A** Depth: -
TYPE: **Bag**



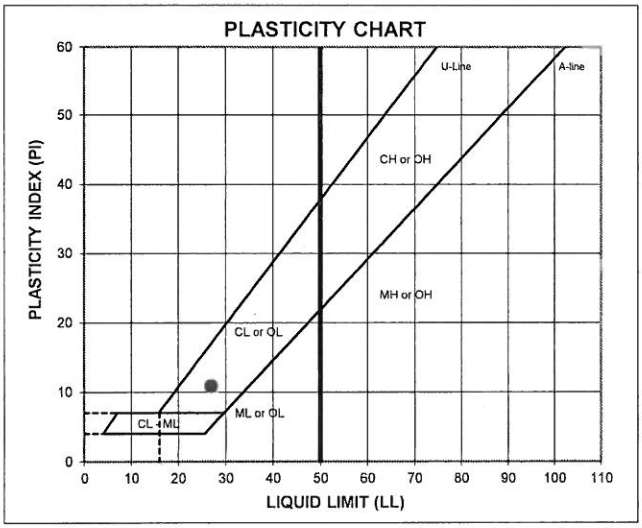
COBBLES	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**99.9**	Medium Sand	**0.1**
#60	0.25	**95.7**		
#100	0.15	**85.5**		
#200	0.075	**73.6**	Fine Sand	**26.3**

Hydrometer Analysis

(mm)	%Finer		
0.030	**60.8**		
0.019	**53.7**		
0.011	**50.1**	Fines	
0.0082	**44.7**	Silt or Clay	**73.6**
0.0059	**41.2**		
0.0030	**32.2**		
0.0014	**10.7**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
16.0	**27**	**16**	**11**	**-0.03**

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: sandy SILTY CLAY, fine to medium; reddish brown.

USCS: CL

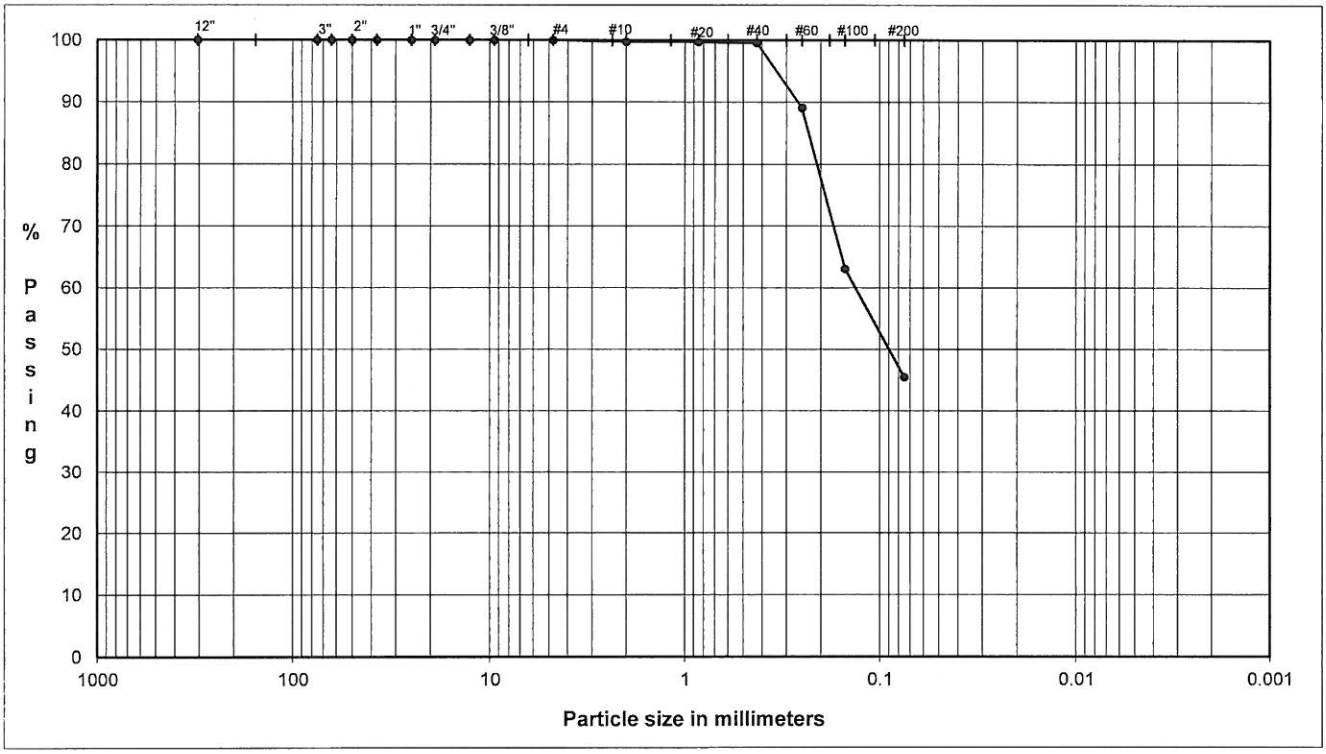
TECH	TW/TJ/AM
DATE	12/12/13
CHECK	
REVIEW	
APPROVE	

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D6913, D4318

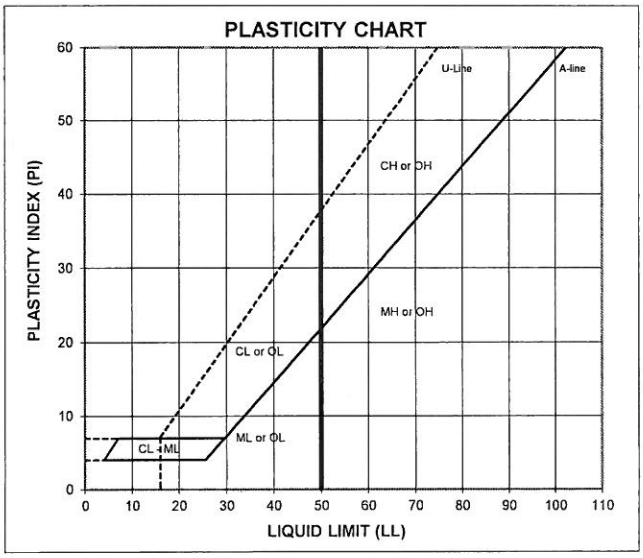
PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-19B** Depth: -
TYPE: **Bag**



COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.7**	Coarse Sand	**0.3**
#20	0.85	**99.7**		
#40	0.43	**99.6**	Medium Sand	**0.2**
#60	0.25	**89.1**		
#100	0.15	**63.0**		
#200	0.075	**45.4**	Fine Sand	**54.1**
			Fines	**45.4**



ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
22.0				

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: fine to coarse SAND and SILTY CLAY; light brown and red.

USCS: (SC)

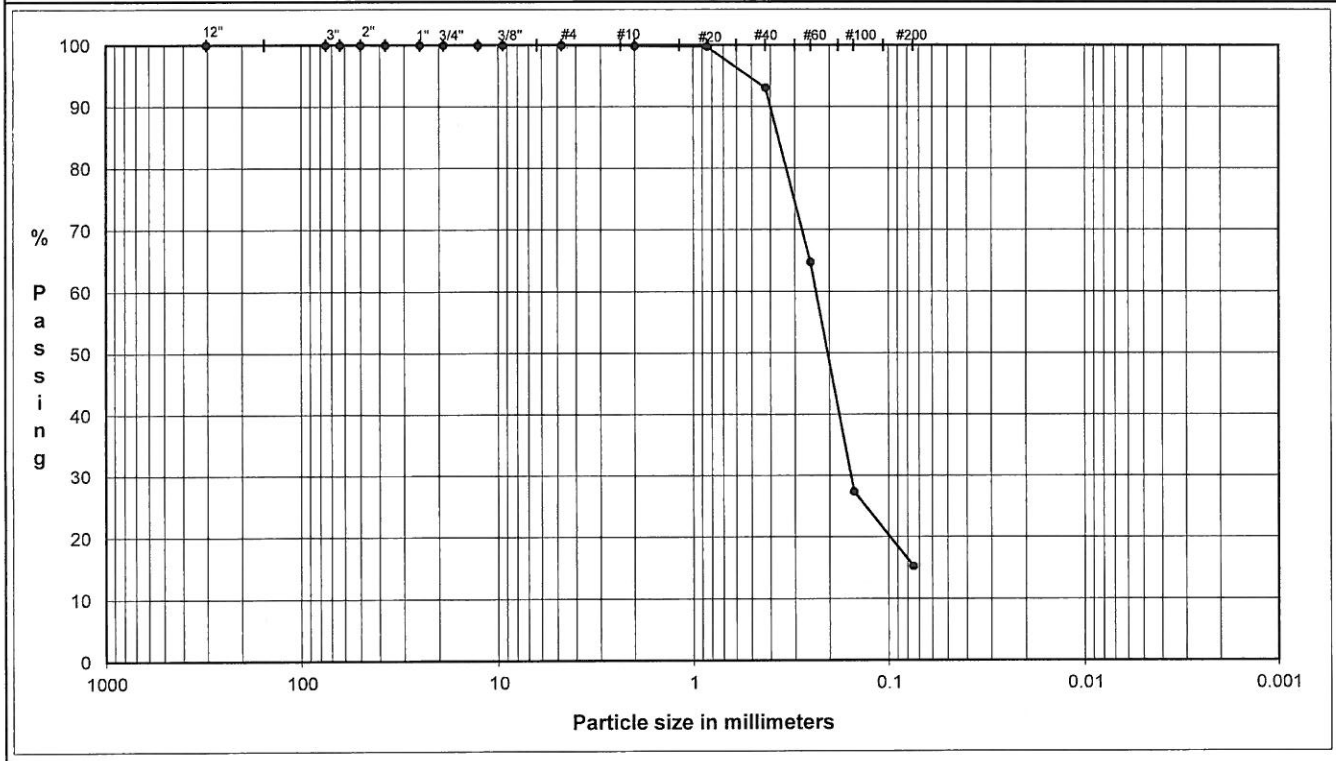
TECH	TJ/AM
DATE	12/12/13
CHECK	qem
REVIEW	mwh
APPROVE	

DECEMBER 2013 063-1431-003

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D6913, D4318

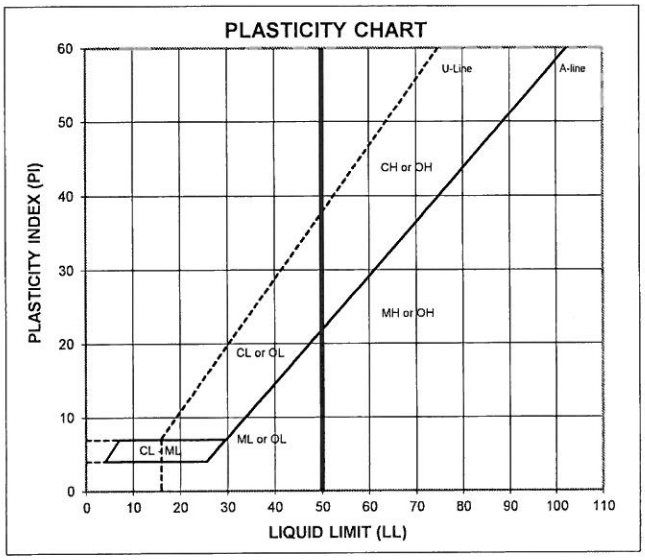
PROJECT NAME: NWM/CHESAPEAKE TERRACE SFI/MD
SAMPLE ID: PMW-28A Depth: -
TYPE: Bag



	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay
COBBLES	GRAVEL		SAND			FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	100.0		
3.0"	75.0	100.0	Cobbles	0.0
2.5"	63.5	100.0		
2.0"	50.0	100.0		
1.5"	37.5	100.0		
1.0"	25.0	100.0		
0.75"	19.0	100.0	Coarse Gravel	0.0
0.50"	12.7	100.0		
0.375"	9.5	100.0		
#4	4.8	100.0	Fine Gravel	0.0
#10	2.00	99.9	Coarse Sand	0.1
#20	0.85	99.8		
#40	0.43	93.1	Medium Sand	6.8
#60	0.25	64.8		
#100	0.15	27.4		
#200	0.075	15.3	Fine Sand	77.8
			Fines	15.3



DESCRIPTION: SILTY SAND, fine to coarse; yellowish brown.

USCS: (SM)

ATTERBERG LIMITS
Method -B (Dry preparation)

M_c	LL	PL	PI	LI
15.5				

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

TECH	TJ/AM
DATE	12/12/13
CHECK	aem
REVIEW	[illegible]
APPROVE	

Golder Associates Inc.

DECEMBER 2013

063-1431-003

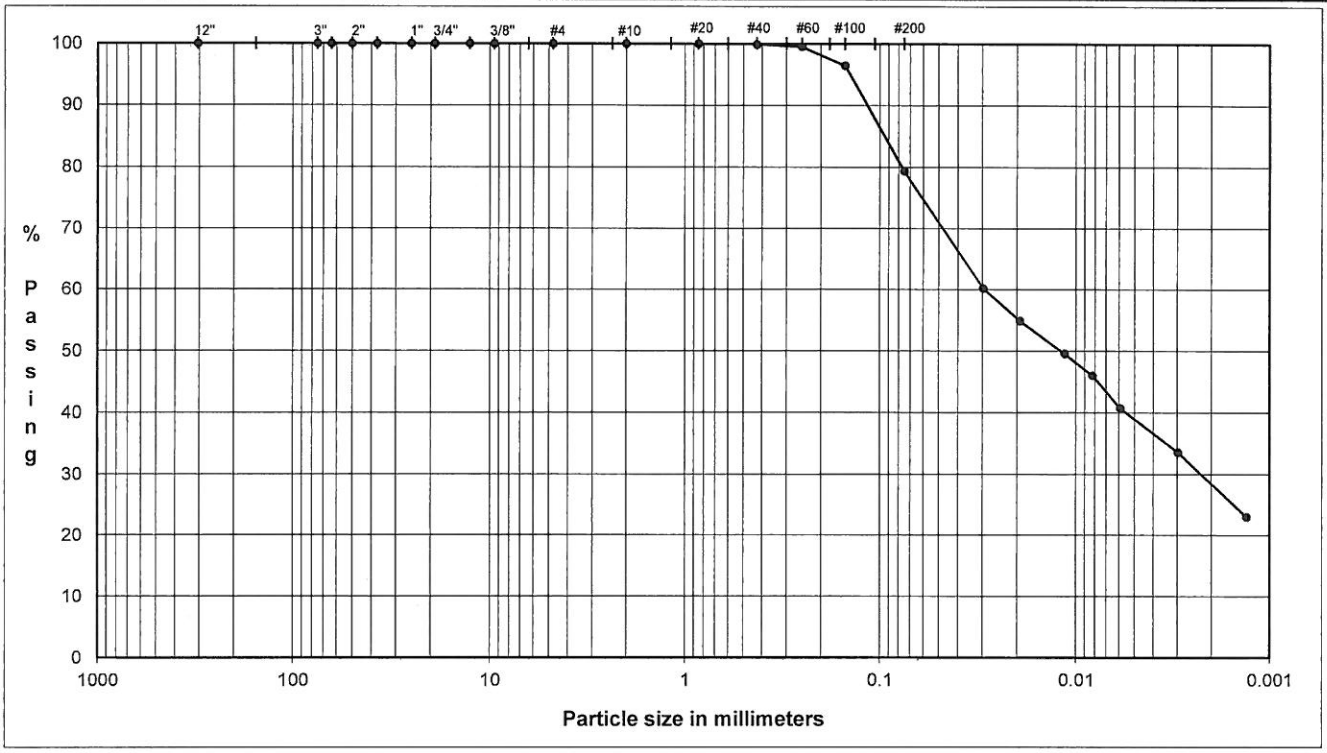
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**

SAMPLE ID: **PMW-102A** Depth: -

TYPE: **Bag**



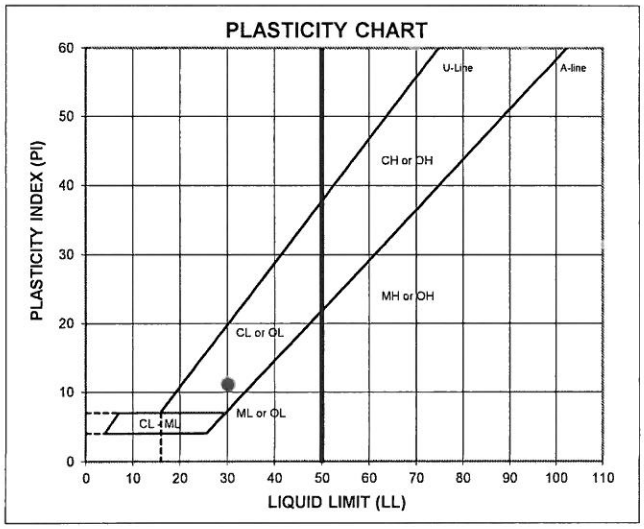
COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**100.0**		
#40	0.43	**99.9**	Medium Sand	**0.1**
#60	0.25	**99.5**		
#100	0.15	**96.5**		
#200	0.075	**79.4**	Fine Sand	**20.5**

Hydrometer Analysis

(mm)	%Finer		
0.030	**60.2**		
0.019	**54.9**		
0.011	**49.6**	Fines Silt or Clay	**79.4**
0.0082	**46.0**		
0.0059	**40.7**		
0.0030	**33.6**		
0.0013	**23.0**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
14.3	**30**	**19**	**11**	**-0.46**

LL (oven-dried) / LL < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: sandy SILTY CLAY, fine to medium; gray.

USCS: CL

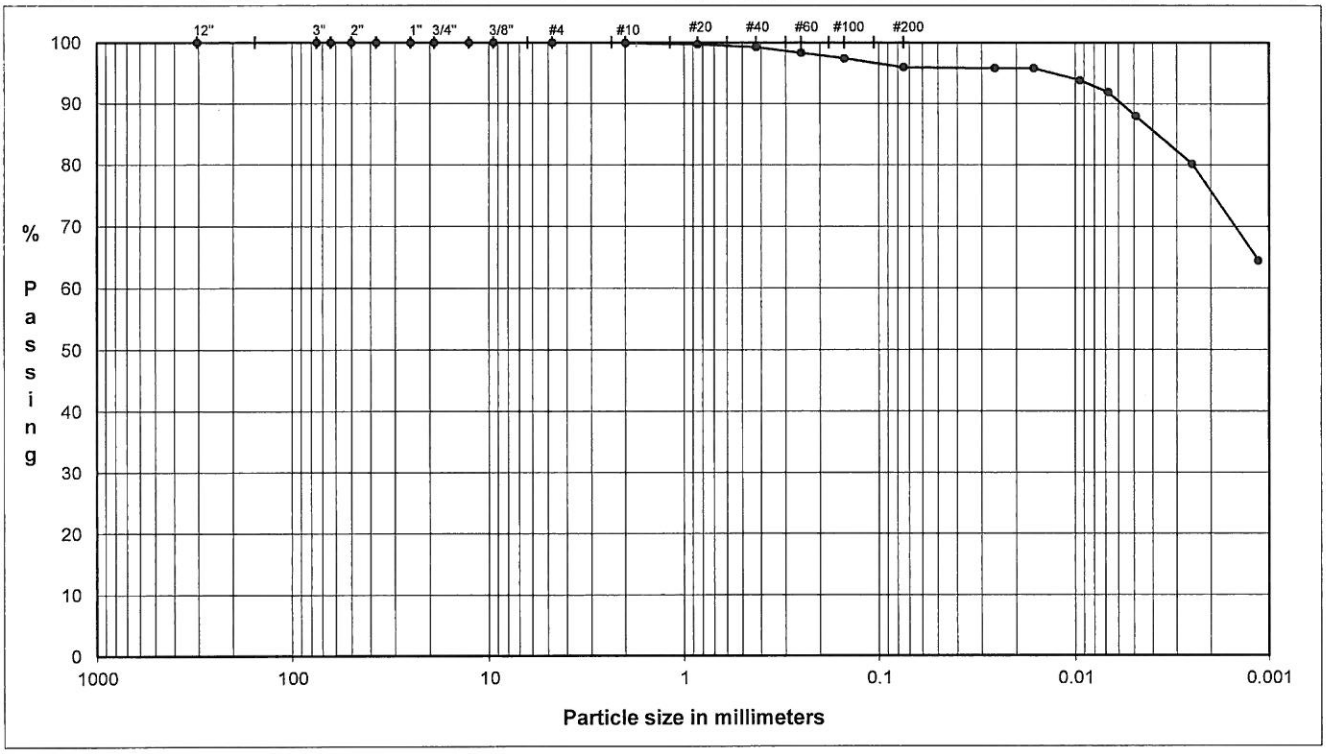
TECH	TJ/AM/TW
DATE	12/12/13
CHECK	aem
REVIEW	
APPROVE	

Golder Associates Inc.

PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**
SAMPLE ID: **PMW-105A** Depth: -
TYPE: **Bag**



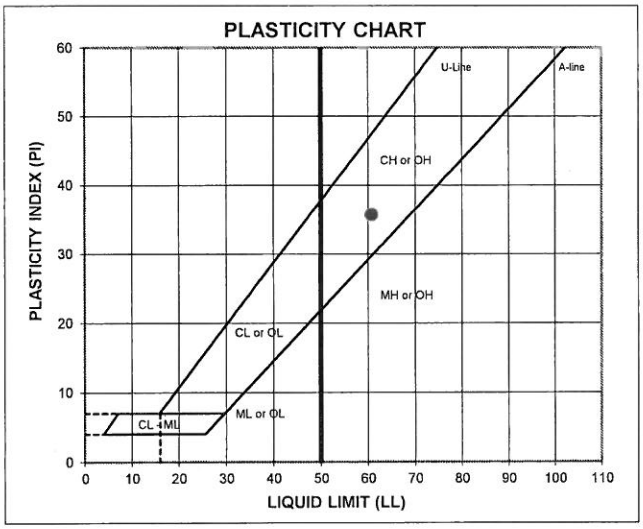
COBBLES	GRAVEL		SAND			FINES
	Coarse	Fine	Coarse	Medium	Fine	Silt or Clay

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**99.9**	Coarse Sand	**0.1**
#20	0.85	**99.7**		
#40	0.43	**99.3**	Medium Sand	**0.7**
#60	0.25	**98.3**		
#100	0.15	**97.4**		
#200	0.075	**96.0**	Fine Sand	**3.3**

Hydrometer Analysis

(mm)	%Finer		
0.026	**95.8**		
0.016	**95.8**		
0.009	**93.9**	Fines	
0.0068	**91.9**	Silt or Clay	**96.0**
0.0049	**88.0**		
0.0025	**80.2**		
0.0011	**64.5**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_c	LL	PL	PI	LI
24.7	**61**	**25**	**36**	**-0.02**

LL (oven-dried) / < 0.75 = ORGANIC (OL/OH)

DESCRIPTION: CLAY, trace fine to coarse sand; reddish brown.

USCS: CH

TECH	TJ/AM?TW
DATE	12/12/13
CHECK	aem
REVIEW	[illegible]
APPROVE	

DECEMBER 2013

063-1431-003

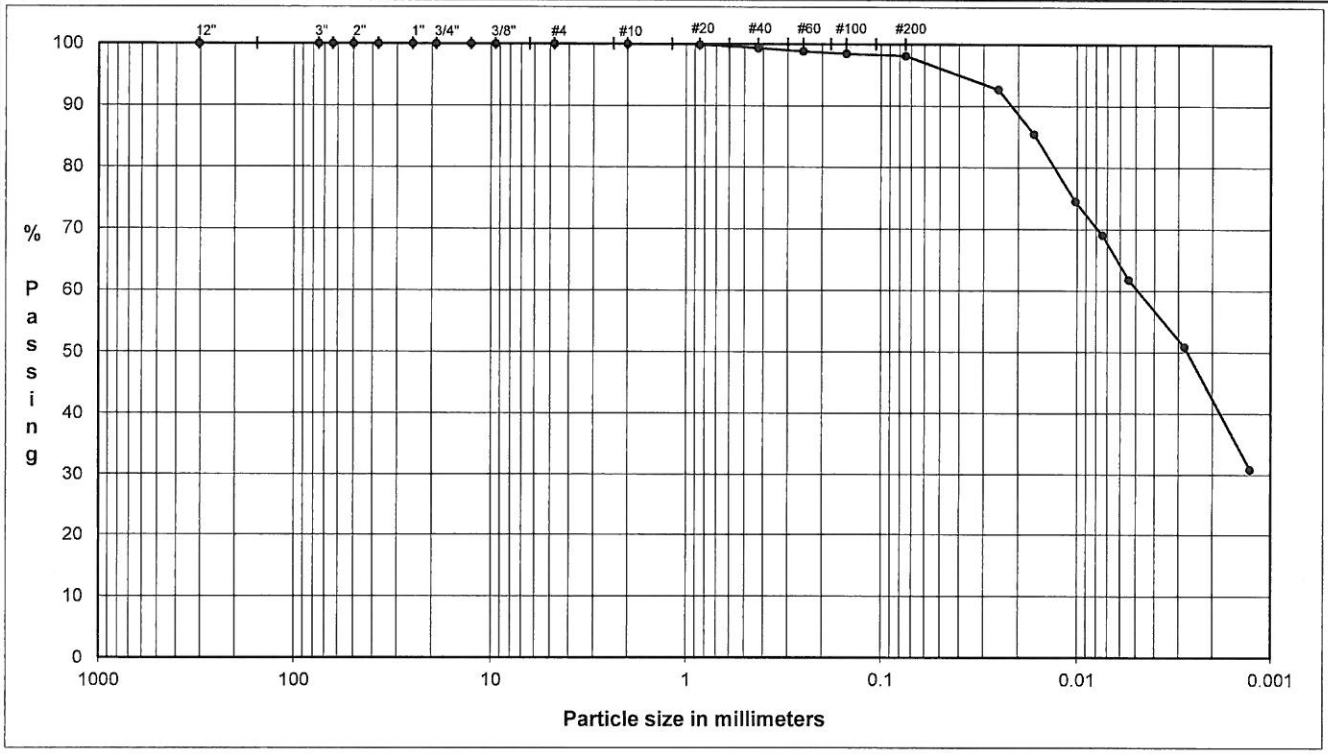
PARTICLE SIZE DISTRIBUTION & ATTERBERG LIMITS

ASTM D421, D422, D4318

PROJECT NAME: **NWM/CHESAPEAKE TERRACE SFI/MD**

SAMPLE ID: **PMW-105B** Depth: -

TYPE: **Bag**



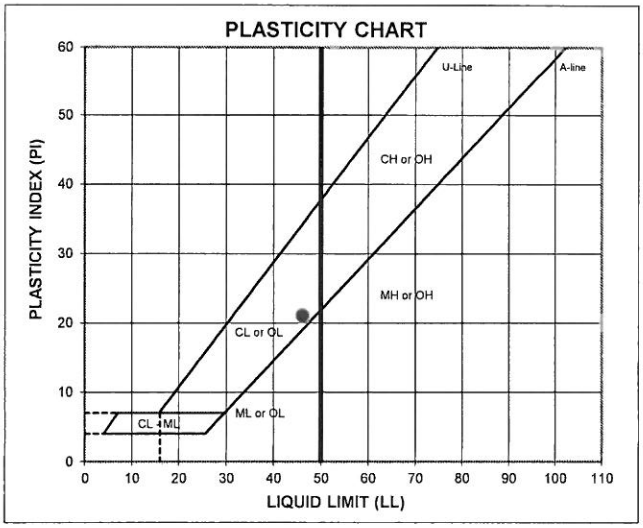
COBBLES	Coarse GRAVEL	Fine GRAVEL	Coarse SAND	Medium SAND	Fine SAND	Silt or Clay FINES

U.S. Standard Sieves Sizes and Numbers

	Particle Size (mm)	% Passing	Particle Size Classification	Percentage
12.0"	304.8	**100.0**		
3.0"	75.0	**100.0**	Cobbles	**0.0**
2.5"	63.5	**100.0**		
2.0"	50.0	**100.0**		
1.5"	37.5	**100.0**		
1.0"	25.0	**100.0**		
0.75"	19.0	**100.0**	Coarse Gravel	**0.0**
0.50"	12.7	**100.0**		
0.375"	9.5	**100.0**		
#4	4.8	**100.0**	Fine Gravel	**0.0**
#10	2.00	**100.0**	Coarse Sand	**0.0**
#20	0.85	**99.9**		
#40	0.43	**99.3**	Medium Sand	**0.7**
#60	0.25	**98.9**		
#100	0.15	**98.5**		
#200	0.075	**98.1**	Fine Sand	**1.2**

Hydrometer Analysis

(mm)	%Finer		
0.025	**92.7**		
0.017	**85.4**		
0.010	**74.5**	Fines	
0.0074	**69.1**	Silt or Clay	**98.1**
0.0054	**61.8**		
0.0028	**50.9**		
0.0013	**30.9**		



ATTERBERG LIMITS

Method -B (Dry preparation)

M_r	LL	PL	PI	LI
21.2	**46**	**25**	**21**	**-0.16**

LL (oven-dried) / 0.75 = ORGANIC (OL/OH)

DESCRIPTION: SILTY CLAY, trace fine to medium; yellowish red.

USCS: CL

TECH	TJ/AM/TW
DATE	12/12/13
CHECK	qem
REVIEW	PWM
APPROVE	

NWM/CHESAPEAKE TERRACE SFI/MD
SUMMARY OF SOIL DATA

Sample Identification	Sample Type	Sample Depth	Soil Classification	Natural Moisture %	Atterberg Limits				Grain Size Distribution			Compaction		Gs	Unit Weight		Permeability (cm/sec)	Additional Tests Conducted (See Notes)
					L.L.	P.L.	P.I.	L.I.	% Finer No. 4 Sieve	% Finer No. 200 Sieve	% Finer .005 mm	Maximum Dry Density (lb/cuft)	Optimum Moisture %		Moisture %	Dry (lb/cuft)		
PMW-13	UD	105-107'	(CH)	28.9	-	-	-	-	-	-	-	-	-	2.80	28.9	96.4	-	C
PMW-23	UD	128-130'	(CH)	21.0	-	-	-	-	-	-	-	-	-	2.80	21.0	111.1	-	C

ABBREVIATIONS: LIQUID LIMIT (LL)
PLASTIC LIMIT (PL)
PLASTICITY INDEX (PI)
LIQUIDITY INDEX (LI)
SPECIFIC GRAVITY (Gs)
MOISTURE (Mc)

NOTES: T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
O = ORGANIC CONTENT
P = pH

ONE-DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B

PROJECT NAME	NWM/CHESAPEAKE TERRACE SFI/MD
PROJECT NUMBER	063-1431-003
SAMPLE ID	PMW -13
SAMPLE DEPTH	105.0 - 107.0'
SAMPLE TYPE	UD

DESCRIPTION: CLAY; reddish brown and gray; soft (thumb will penetrate); moist.

CLASSIFICATION: (CH)

CONSOLIDOMETER #: 2

ASTM D 2435 Method: B

	LL	PL	PI	Gs
	-	-	-	2.796

Sample Data	Trimmings	Before Test	After Test
Tare plus wet soil, g	137.62	195.63	191.23
Tare plus dry soil, g	118.99	168.68	168.68
Tare, g	52.22	74.73	74.73
Water, g	18.63	26.95	22.55
Dry soil, g	66.77	93.95	93.95
Water Content	27.9%	28.7%	24.0%

Diameter (in)	2.500
Height of sample (in)	0.750
Area of sample (in^2)	4.909
Volume of sample (in^3)	3.682
Water Content	28.7%
Sample Wt (wet, g)	120.9
Sample Wt (dry, g)	93.95
Water Wt (g)	26.95

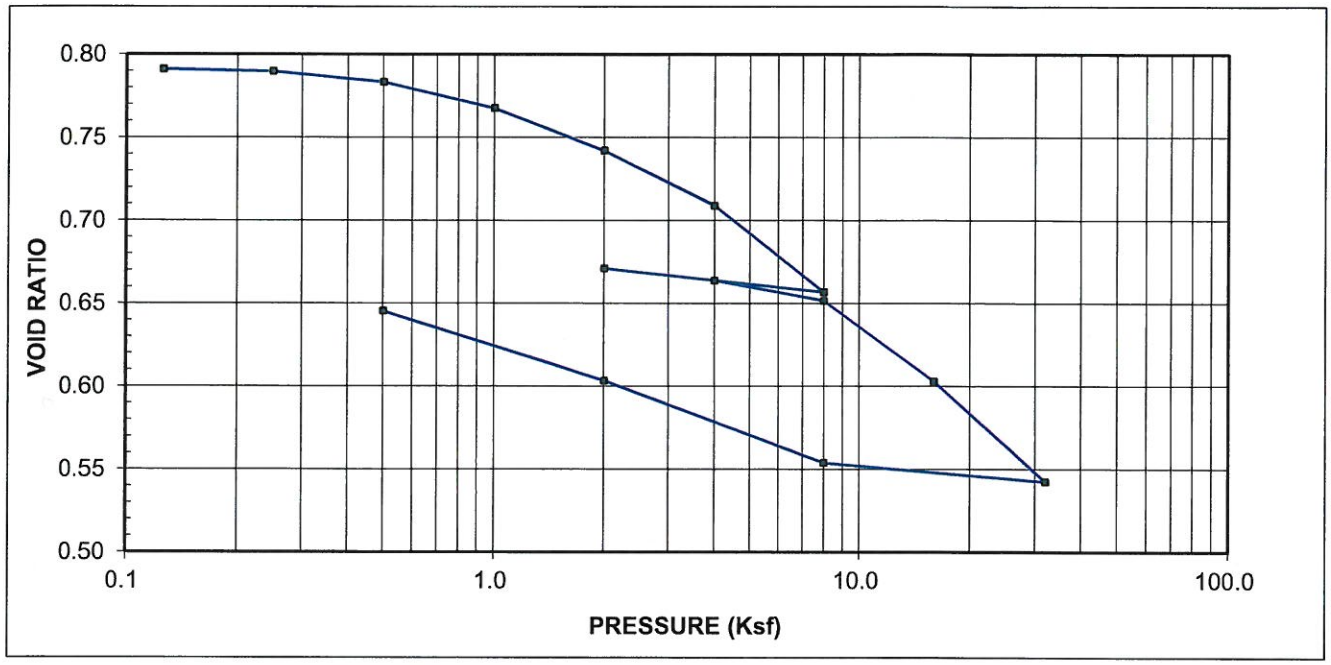
Sample Data	Initial	Final
Total Height (in)	0.750	0.688
Height of solids (in)	0.418	0.418
Height of voids (in)	0.332	0.270
Height of water (in)	0.335	0.280
Void ratio	0.795	0.645
Degree of saturation	100%	100%
Dry unit wt (pcf)	97.2	106.0
Wet unit wt (pcf)	125.1	131.5

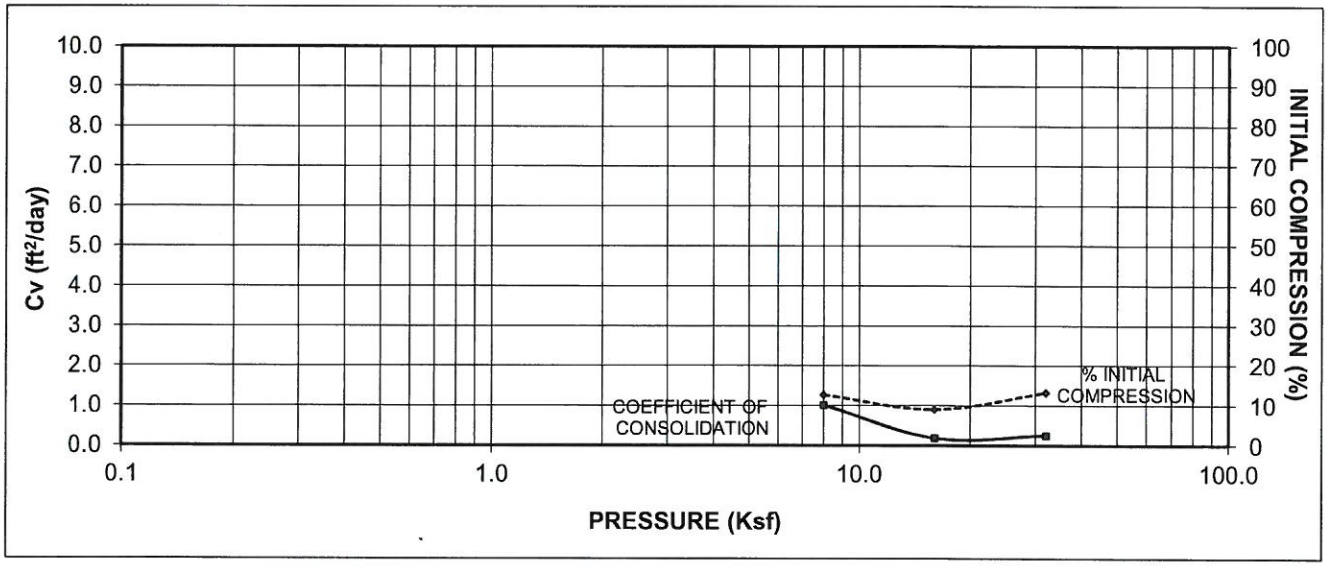
PRESSURE (ksf)	H100 DIAL READING	MACHINE / STONE CORR.	DIAL CHANGE (in)	FITTING TIME (sec) t90	SAMPLE HEIGHT (in)	HEIGHT OF VOIDS Hv	VOID RATIO e	CHANGE IN HEIGHT (accum)	STRAIN %	LENGTH OF DRAINAGE PATH (DOUBLE DRAINAGE) H (in)	LENGTH OF DRAINAGE PATH (DOUBLE DRAINAGE) H^2 (cm^2)	PERCENT INITIAL COMPRESSION	COEFFICIENT OF CONSOLIDATION (ft^2/day)
0.125	0.0000	0.0000	0.0000	0	0.750	0.3321	0.7947	0.0000	0.0	0.375	0.907		
0.126	0.0015	0.0000	0.0015	522	0.749	0.3306	0.7912	0.0015	0.2	0.375	0.906		
0.250	0.0020	0.0000	0.0020	614	0.748	0.3301	0.7898	0.0020	0.3	0.374	0.903		
0.500	0.0047	0.0000	0.0047	290	0.745	0.3274	0.7834	0.0047	0.6	0.373	0.899		
1.000	0.0113	0.0000	0.0113	614	0.739	0.3208	0.7677	0.0113	1.5	0.371	0.888		
2.000	0.0219	0.0000	0.0219	653	0.728	0.3102	0.7422	0.0219	2.9	0.367	0.868		
4.000	0.0358	0.0000	0.0358	406	0.714	0.2963	0.7090	0.0358	4.8	0.361	0.839	7.9	0.163
8.000	0.0576	0.0000	0.0576	540	0.692	0.2745	0.6568	0.0576	7.7	0.352	0.798	10.1	0.116
2.000	0.0517	0.0000	0.0517		0.698	0.2804	0.6711	0.0517	6.9	0.348	0.780		
4.000	0.0547	0.0000	0.0547	109	0.695	0.2774	0.6638	0.0547	7.3	0.348	0.783	17.4	0.565
8.000	0.0598	0.0000	0.0598	60	0.690	0.2723	0.6516	0.0598	8.0	0.346	0.774	12.7	1.017
16.000	0.0802	0.0000	0.0802	317	0.670	0.2519	0.6029	0.0802	10.7	0.340	0.746	9.0	0.185
32.000	0.1054	0.0000	0.1054	217	0.645	0.2267	0.5426	0.1054	14.0	0.329	0.697	13.2	0.254
8.000	0.1006	0.0000	0.1006		0.649	0.2315	0.5539	0.1006	13.4				
2.000	0.0800	0.0000	0.0800		0.670	0.2521	0.6034	0.0800	10.7				
0.500	0.0624	0.0000	0.0624		0.688	0.2697	0.6455	0.0624	8.3				

NOTES:
Loading sequence provided by client.
Sample was run inundated.
Sample was trimmed into consolidation ring
Time Deformation Method - Square root of time.

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

ONE - DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B





SAMPLE ID	PMW -13
SAMPLE TYPE	UD
SAMPLE DEPTH	105.0 - 107.0'

LL	-
PL	-
PI	-
Gs	2.80

	Initial	Final
Dry Unit Weight (pcf)	97.2	106.0
Wet Unit Weight (pcf)	125.1	131.5
Moisture Content	28.7%	24.0%
Void Ratio	0.795	0.645
Degree of Saturation	100%	100%

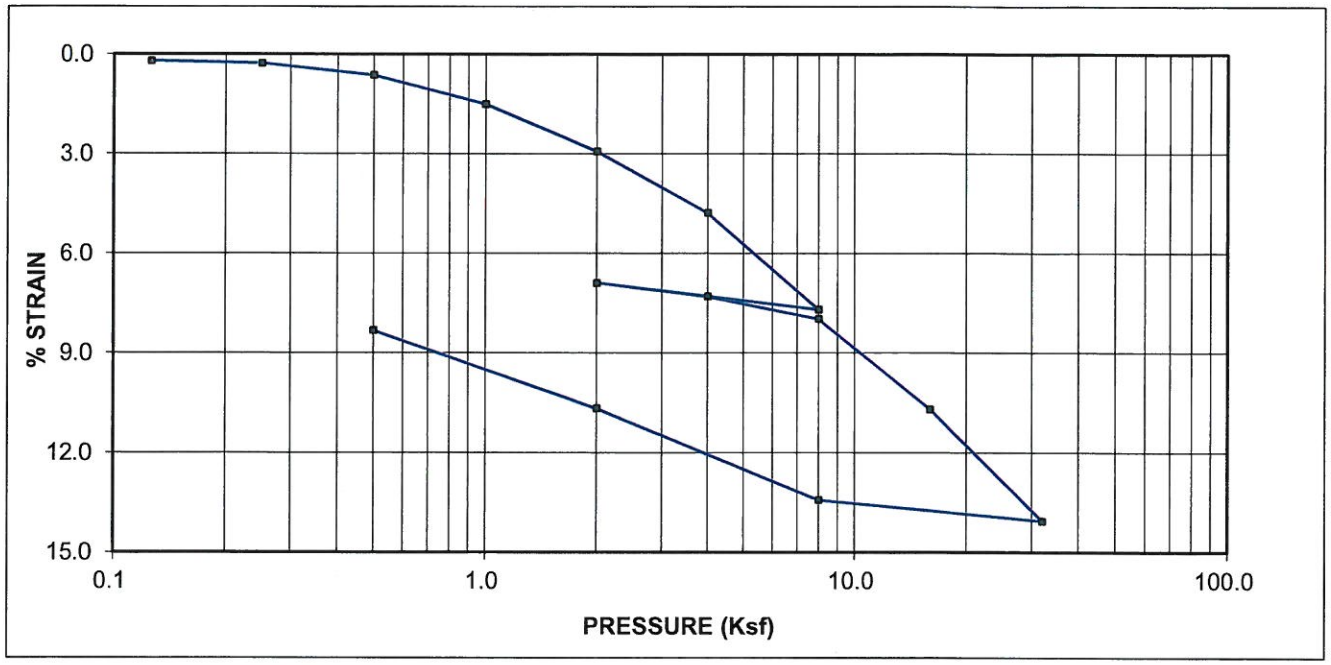
DESCRIPTION: CLAY; reddish brown and gray; soft (thumb will penetrate); moist.

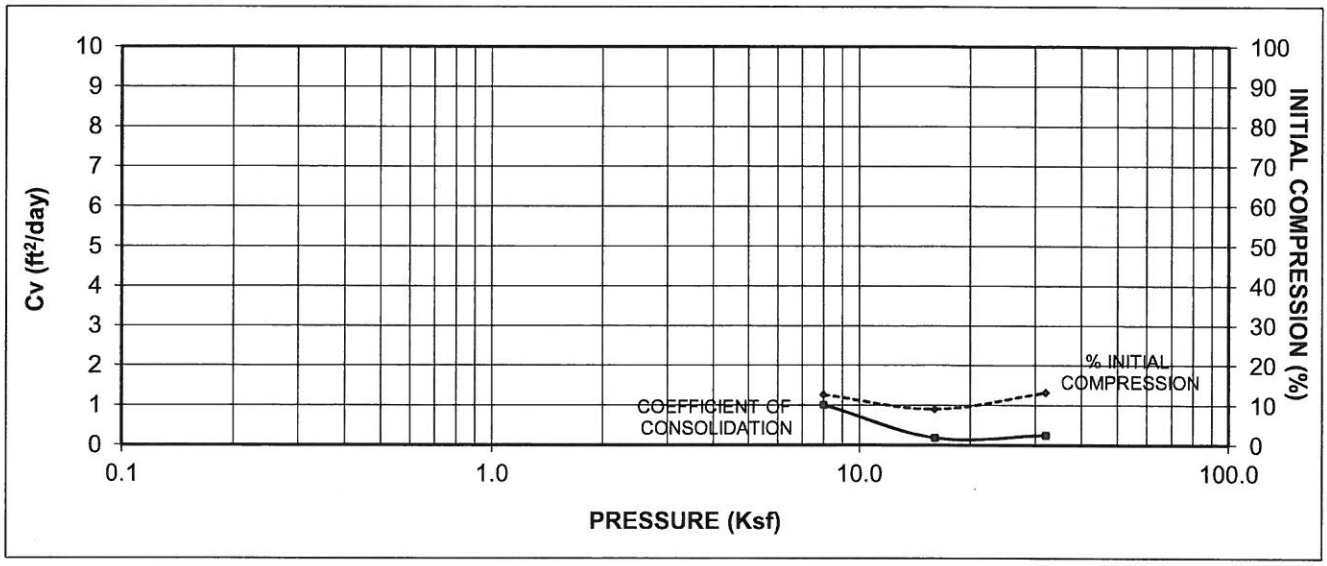
USCS: (CH)

NWM/CHESAPEAKE TERRACE SFI/MD
063-1431-003

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

ONE - DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B





SAMPLE ID	PMW -13
SAMPLE TYPE	UD
SAMPLE DEPTH	105.0 - 107.0'

LL	-
PL	-
PI	-
Gs	2.80

	Initial	Final
Dry Unit Weight (pcf)	97.2	106.0
Wet Unit Weight (pcf)	125.1	131.5
Moisture Content	28.7%	24.0%
Void Ratio	0.795	0.645
Degree of Saturation	100%	100%

DESCRIPTION: CLAY; reddish brown and gray; soft (thumb will penetrate); moist.

USCS: (CH)

NWM/CHESAPEAKE TERRACE SFI/MD
063-1431-003

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

ONE-DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B

PROJECT NAME	NWM/CHESAPEAKE TERRACE SFI/MD
PROJECT NUMBER	063-1431-003
SAMPLE ID	PMW - 23
SAMPLE DEPTH	128.0 - 130.0'
SAMPLE TYPE	UD

DESCRIPTION: CLAY; dark reddish brown and gray; Hard (can indent with thumb nail); dry to moist.

CLASSIFICATION: (CH)

CONSOLIDOMETER #: 1

ASTM D 2435 Method: B

	LL	PL	PI	Gs
	-	-	-	2.803

Sample Data	Trimmings	Before Test	After Test
Tare plus wet soil, g	371.40	205.48	209.50
Tare plus dry soil, g	319.01	182.91	182.91
Tare, g	51.12	75.54	75.54
Water, g	52.39	22.57	26.59
Dry soil, g	267.89	107.37	107.37
Water Content	19.6%	21.0%	24.8%

Diameter (in)	2.500
Height of sample (in)	0.750
Area of sample (in^2)	4.909
Volume of sample (in^3)	3.682
Water Content	21.0%
Sample Wt (wet, g)	129.94
Sample Wt (dry, g)	107.37
Water Wt (g)	22.57

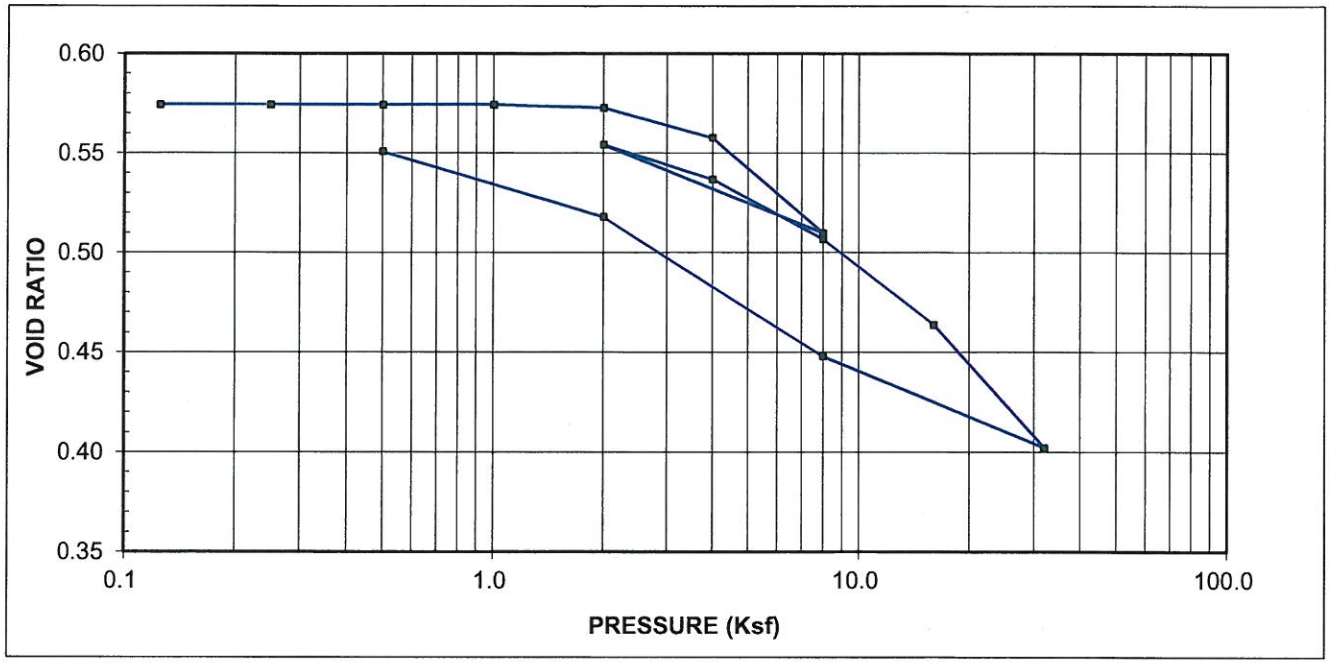
Sample Data	Initial	Final
Total Height (in)	0.750	0.750
Height of solids (in)	0.476	0.476
Height of voids (in)	0.274	0.274
Height of water (in)	0.281	0.331
Void ratio	0.574	0.574
Degree of saturation	100%	100%
Dry unit wt (pcf)	111.1	111.1
Wet unit wt (pcf)	134.5	138.6

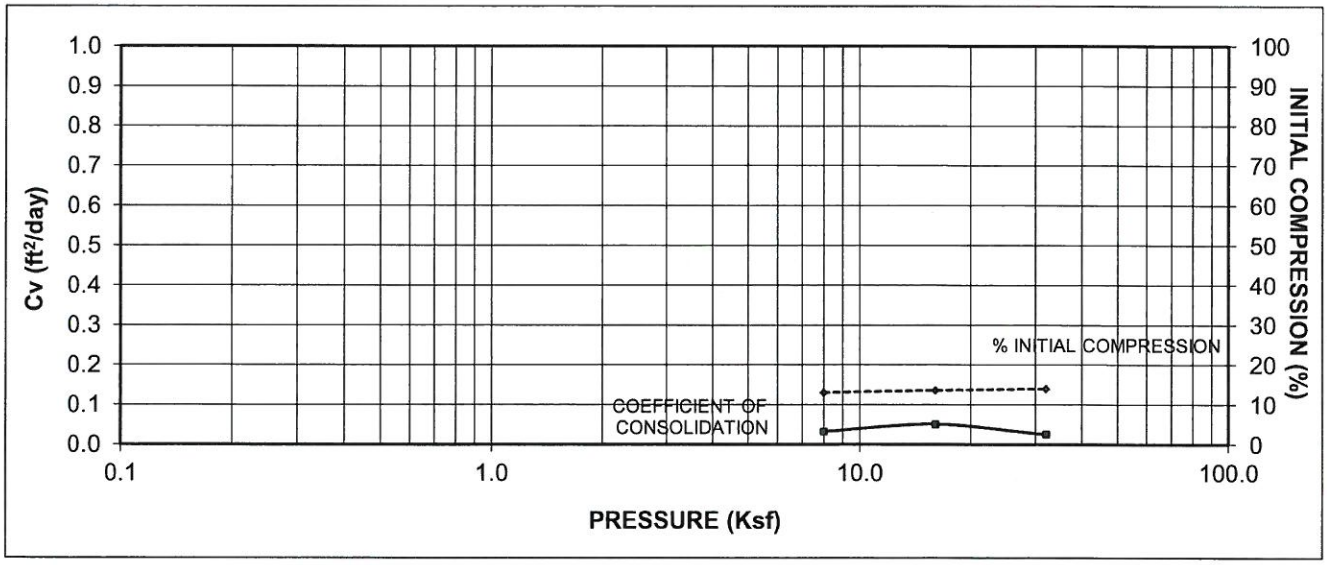
PRESSURE (ksf)	H100 DIAL READING	MACHINE / STONE CORR.	DIAL CHANGE (in)	FITTING TIME (sec) t90	SAMPLE HEIGHT (in)	HEIGHT OF VOIDS Hv	VOID RATIO e	CHANGE IN HEIGHT (accum)	STRAIN %	LENGTH OF DRAINAGE PATH (DOUBLE DRAINAGE) H (in)	LENGTH OF DRAINAGE PATH (DOUBLE DRAINAGE) H^2 (cm^2)	PERCENT INITIAL COMPRESSION	COEFFICIENT OF CONSOLIDATION (ft^2/day)
0.125	0.0000	0.0000	0.0000	0	0.750	0.2736	0.5743	0.0000	0.0	0.375	0.907		
0.125	0.0000	0.0000	0.0000	60	0.750	0.2736	0.5743	0.0000	0.0	0.375	0.907		
0.250	0.0000	0.0000	0.0000	60	0.750	0.2736	0.5743	0.0000	0.0	0.375	0.907		
0.500	0.0000	0.0000	0.0000	0	0.750	0.2736	0.5743	0.0000	0.0	0.375	0.907		
1.000	0.0000	0.0000	0.0000	0	0.750	0.2736	0.5743	0.0000	0.0	0.375	0.907		
2.000	0.0007	0.0000	0.0007	29	0.749	0.2729	0.5727	0.0007	0.1	0.375	0.906		
4.000	0.0079	0.0000	0.0079	194	0.742	0.2657	0.5577	0.0079	1.1	0.373	0.897	38.0	0.364
8.000	0.0307	0.0000	0.0307	1561	0.719	0.2429	0.5099	0.0307	4.1	0.365	0.861	23.1	0.044
2.000	0.0096	0.0000	0.0096		0.740	0.2640	0.5543	0.0096	1.3	0.365	0.859		
4.000	0.0178	0.0000	0.0178	2774	0.732	0.2558	0.5369	0.0178	2.4	0.368	0.874	11.6	0.025
8.000	0.0322	0.0000	0.0322	2053	0.718	0.2414	0.5068	0.0322	4.3	0.363	0.848	13.1	0.033
16.000	0.0527	0.0000	0.0527	1242	0.697	0.2209	0.4638	0.0527	7.0	0.354	0.808	13.6	0.051
32.000	0.0820	0.0000	0.0820	2306	0.668	0.1916	0.4022	0.0820	10.9	0.341	0.752	14.0	0.026
8.000	0.0602	0.0000	0.0602		0.690	0.2134	0.4480	0.0602	8.0				
2.000	0.0268	0.0000	0.0268		0.723	0.2468	0.5180	0.0268	3.6				
0.500	0.0112	0.0000	0.0112		0.739	0.2624	0.5509	0.0112	1.5				

NOTES:
Loading sequence provided by client.
Sample required 4 ksf of pressure ot hold sample down.
Sample was run inundated.
Sample was trimmed into consolidation ring
Time Deformation Method - Square root of time.

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

ONE - DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B





SAMPLE ID	PMW - 23
SAMPLE TYPE	UD
SAMPLE DEPTH	128.0 - 130.0'

LL	-
PL	-
PI	-
Gs	2.80

	Initial	Final
Dry Unit Weight (pcf)	111.1	111.1
Wet Unit Weight (pcf)	134.5	138.6
Moisture Content	21.0%	24.8%
Void Ratio	0.574	0.574
Degree of Saturation	100%	100%

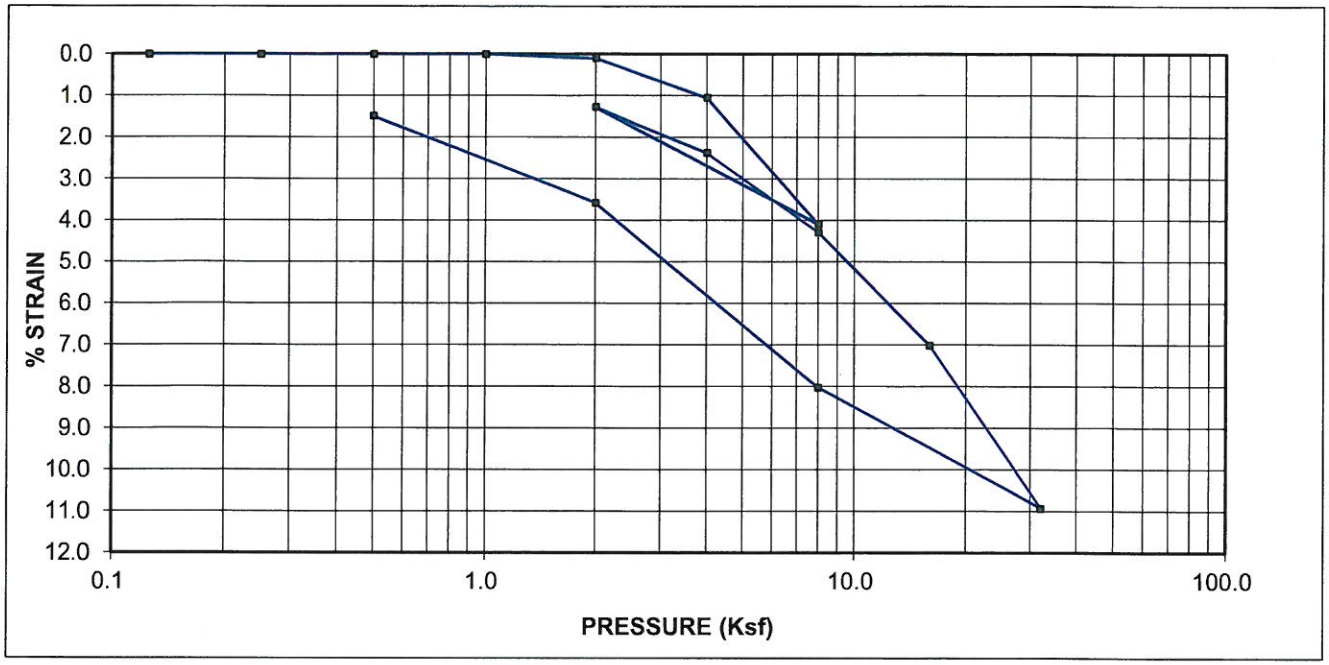
DESCRIPTION: CLAY; dark reddish brown and gray; Hard (can indent with thumb nail); dry to moist.

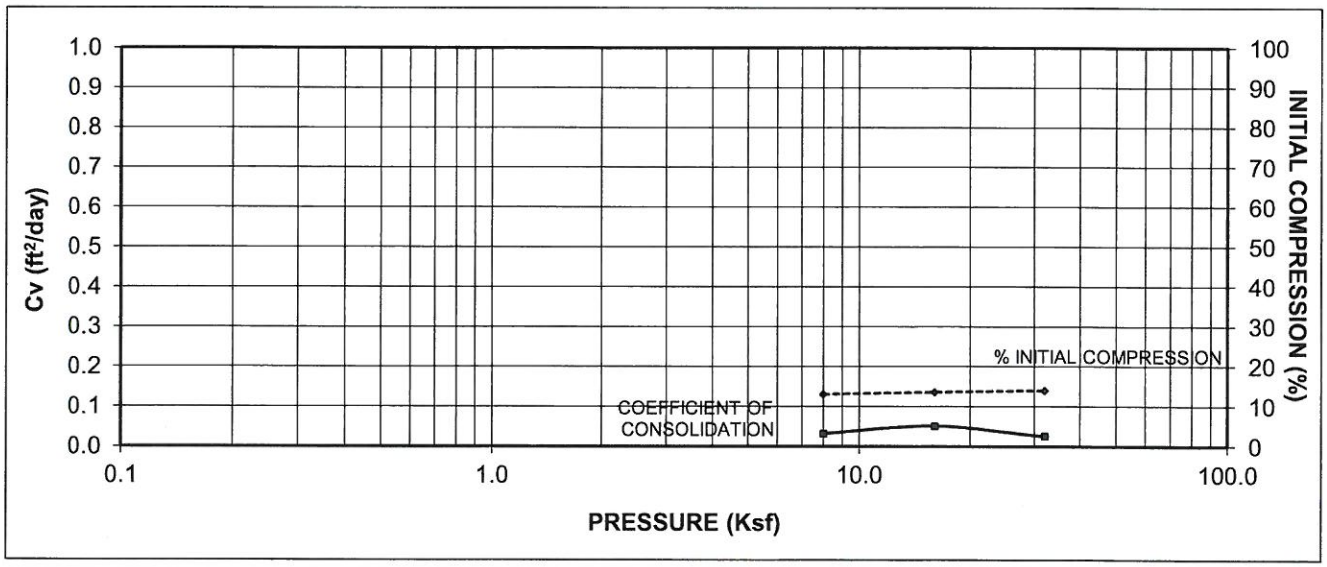
USCS: (CH)

NWM/CHESAPEAKE TERRACE SFI/MD
063-1431-003

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

ONE - DIMENSIONAL CONSOLIDATION
ASTM D 2435 Method B





SAMPLE ID	PMW - 23
SAMPLE TYPE	UD
SAMPLE DEPTH	128.0 - 130.0'

LL	-
PL	-
PI	-
Gs	2.80

	Initial	Final
Dry Unit Weight (pcf)	111.1	111.1
Wet Unit Weight (pcf)	134.5	138.6
Moisture Content	21.0%	24.8%
Void Ratio	0.574	0.574
Degree of Saturation	100%	100%

DESCRIPTION: CLAY; dark reddish brown and gray; Hard (can indent with thumb nail); dry to moist.

USCS: (CH)

NWM/CHESAPEAKE TERRACE SFI/MD
063-1431-003

TECH	PWM
DATE	10/17/13
CHECK	
REVIEW	
APPROVE	

APPENDIX J

Groundwater Model (2003)

Groundwater Model of the Chesapeake Terrace Rubble Fill

submitted to
The Halle Companies
2900 Linden Lane, #300
Silver Spring, MD 20910

submitted by
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December 5, 2003

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Introduction

The Chesapeake Terrace Rubble Landfill is located in Anne Arundel County between the Patuxent and Little Patuxent Rivers. There is a shallow perched water table at the site. This shallow perched water table will be excavated by the footprint of the landfill. The objective of the groundwater model is to predict the impacts of removing this portion of the shallow perched groundwater on adjacent residential water wells and on the hydrologic regime.

Conceptual Groundwater Model

The flow of shallow groundwater at the site is complex. There is a clay layer across the western part of the site. Above this clay is permeable sand. Precipitation infiltrates and percolates vertically until it reaches the clay causing a groundwater mound. Groundwater flows radially away from the top of the mound. Where the clay is not present, the water table aquifer becomes part of a deeper groundwater flow system. Figure 1 shows the conceptual model of groundwater flow.

The landfill will be excavated to a depth of 70 feet above mean sea level. A drain may be used to limit the groundwater from the perched water table from flowing into the excavation.

Model

The shallow perched water table was simulated using MODFLOW. MODFLOW is the USGS modular three dimensional, finite difference groundwater flow model (McDonald and Harbaugh, 1988; Harbaugh and McDonald, 1996). It is the most widely used groundwater flow model in the U.S. The 1996 version of MODFLOW (MODFLOW96) was used.

Model Setup

Grid

The model grid has a spacing of 50 feet in the area of the rubble fill. Grid spacings expand to reach natural boundaries or are far enough away from the rubble fill to not influence the modeling objectives. Figure 2 shows the model grid.

Aquifer Delineation

The perched water table is above a thick layer of clay. The aquifer was modeled as a single layer. The elevation of this clay was mapped based on the available boring data, which are shown in the following table.

Well	x coordinate (ft)	y coordinate (ft)	Elevation of clay (ft above MSL)
MW-15	873883	438342.7	84
MW-16	872788.1	438846.2	91
MW-17	873804.7	440935.3	112
MW-18	873523.8	440301.5	105
MW-19	872914	439834.2	102
MW-20	873186.9	439281.8	94
MW-21	873695.6	438871	91
MW-22	874216.6	439563.6	92
MW-24	873520.1	439711.1	93
MW-25	874771.8	439948.2	66
MW-27	874239.1	440475.8	102
MW-29	874820	440778.9	93
MW-30	874596.1	440085.9	94
B-5	874802	441065	83
B-16	874050	441460	109
B-31/32	874000	440620	110
B-33	874380	440280	99

The clay was assumed to end between monitoring wells MW-25 and MW-12. Several different algorithms were tried in the mapping. The first algorithm tried was triangulation of the available data. This resulted in a good map that rigorously observed the available data points, but did not extend to the extent of the model grid. Then a linear regression through the above data was calculated and the resulting planar surface used to extend the mapping beyond the extent of the triangulation results. This result was not fully satisfactory as the data indicates that the clay dips both to the south and east. Then a kriging algorithm was used with both a linear and quadratic drift term. The kriging algorithm with quadratic drift resulted in a clay surface that matched the geologist's interpretation. This clay surface was used as the bottom of the perched aquifer west of a north-south line between MW-25 and MW-12. To the east of this line, where the clay no longer exists, the aquifer bottom was set at an elevation of 40 feet above mean sea level (MSL) based on review of lithologic cross-sections (Mark Schultz Associates, March 1998). Figure 3 shows the clay surface mapping that was used as the bottom of the perched aquifer.

Boundary Conditions

The perched water table is bounded on the west by the railroad cut. The underlying clay outcrops along this cut. To the south, the perched water table becomes part of deeper groundwater. To the east, the perched water table becomes part of the deeper groundwater. There is a clay outcrop to the north that forms a no flow boundary.

Where the clay outcrops, the model assumed seepage faces (which were evident in the field). These were put into the model as drains. To the north and west of these outcrops, the perched water table does not exist, so this area of the model was noflow grids.

At the southwest corner of the grid, groundwater in the perched aquifer flows towards the Patuxent River. The flow to the river was represented by a general head boundary. The general head boundary allows the use of a boundary condition that is not within the model grid. The boundary is represented by a head elevation and a conductance that represents the resistance to flow between the actual boundary (river) and the edge of the model grid. The general head boundary equation is:

$Q = C (H - H_b)$

where

Q = flow to or from the boundary (cu ft/day)

C = conductance (sq ft/day)

H = head in model (ft)

H_b = boundary head (ft)

The general head boundary conductances were calculated using the following equation.

$C = Khy/x$

where
C = conductance (sq ft/day)
K = hydraulic conductivity (ft)
y = grid width (ft)
h = average thickness of aquifer (ft)
x = distance of boundary from river (ft)

The general head boundary at the southern edge of the grid used a river elevation of 55 feet above MSL, a hydraulic conductivity of 12 ft/day, an aquifer thickness ranging from 20 to 80 feet, a grid width of 50 feet, and a distance from the river of between 1060 and 2300 feet. The general head boundary on the west side, which was added during the calibration used a river elevation of 58 feet above MSL, a hydraulic conductivity of 3 ft/day, an aquifer thickness of 10 feet, a grid width ranging from 50 to 300 feet, and a distance from the river of between 1000 and 1200 feet.

A constant head boundary was used at the northeast and east edges of the model. This boundary represents the Little Patuxent River and associated wetlands. Unlike the southwest boundary, the U.S. Geological Survey topographic map indicates extensive wetlands in the area. Wetlands are typically in connection with the water table, so the elevation of the ground is the elevation of the water table. Constant head elevations ranged from 72 to 62 feet above MSL on the eastern edge of the model and from 76 to 62 feet above MSL on the northern edge of the model.

Figure 4 shows the different boundary conditions used in the model.

Recharge

Recharge was assumed to be uniform over the model area. The initial assumption was 12 inches/year based on the experience of the principal modeler. This value was varied during the calibration.

Hydraulic Conductivity

There were pumping test data available from the new monitoring wells installed at the site.

Well	K (ft/day)	Comment
MW-15	-	believed to have high K based on log
MW-16	-	believed to have high K based on log
MW-17	10.17	
MW-18	94.16	
MW-19	8.80	
MW-20	75.61	
MW-21	-	believed to have high K based on log
MW-22	72.76	
MW-24	37.02	
MW-25	12.73	
MW-27	0.27	
MW-29	2.72	
MW-30	1.74	
arithmetic mean	31.60	
geometric mean	11.08	

The geometric mean is best measure of hydraulic conductivity central tendency because hydraulic conductivity is typically assumed to be lognormally distributed.

Hydraulic conductivities were initially assigned to the model in three zones. The first zone was on the northern side of the rubble fill area around wells MW-27, MW-17 and MW-29. A value of 1 ft/day was initially assigned to this zone. The second zone was on the southern side of the rubble fill area around wells MW-24, MW-22, MW-15, and MW-16. A value of 25 ft/day was initially assigned to this zone. Everywhere else in the model was assigned a hydraulic conductivity value of 12 ft/day.

Hydraulic conductivities were extensively adjusted during the calibration. A fourth zone was added during the calibration. This zone covered the area of the model outside the rubble fill area where water table gradients were very flat. This zone was assigned a hydraulic conductivity of 250 ft/day. This value was confirmed by pumping tests conducted on monitoring wells MW-3, MW-4, and MW-5.

Well	Transmissivity (ft^2/day)	Hydraulic Conductivity (ft/day)
MW-3	1,510	150
MW-4	1,220	122
MW-5	880	88

Note: hydraulic conductivities calculated in above table using a 10 foot screen length

Figure 5 shows the final values of hydraulic conductivity used in the model. Hydraulic conductivity values are in feet per day (ft/day).

Water Levels

Water levels were measured at the site in April, May, and June of 2003. These water levels were averaged and used as the calibration targets for the model. Only wells completed in the perched water table or to the east of the perched water table were used in the calibration.

Well	Water Level (ft above MSL)
MW-1	71.37
MW-3	68.07
MW-4	70.05
MW-5	70.55
MW-6	74.35
MW-15	88.43
MW-16	98.57
MW-17	117.11
MW-18	115.13
MW-19	112.42
MW-20	105.60
MW-21	98.11
MW-22	100.76
MW-24	107.77
MW-25	78.55
MW-27	108.86

Calibration

The model was calibrated by adjusting model parameters and comparing the target water levels to the water levels predicted by the model. Initially, the MODFLOW Strongly Implicit Package was used to solve the model. About half way through the calibration process, the Preconditioned Conjugate Gradient (PCG) package was used instead. The PCG package minimized the number of dry grids. This was particularly important where the perched water table is very thin.

A succession of simulations was performed. Important changes during the calibration were the addition of the general head boundary on the western edge of the model representing flow to a meander of the Patuxent River, addition of a high permeability zone in the areas close to boundaries and where highly transmissive deposits are likely, and the reduction of recharge to 10 inches/year.

Some explanation of the recharge rate is in order. Recharge varies spatially. Some

places have silt and clay at the surface and little recharge, other places have sandy soil at the surface with higher recharge. Recharge rates at the Chesapeake Terrace Rubble Landfill site are also impacted by the mining that has taken place on the property. There are numerous places were water ponds and has the opportunity to infiltrate. The spatial distribution of recharge is complicated and there is no way of accurately measuring it in the field. Consequently, groundwater models frequently make the simplifying assumption that the recharge rate is uniform across the site. This model used the uniform recharge rate assumption.

Recharge rates in Maryland typically range from about 12 inches/year to 20 inches per year. When calibrating a groundwater flow model with only head data, one can adjust either hydraulic conductivity or recharge to calibrate the model to the same head data. Darcy's law states the flow (recharge) is a linear function of hydraulic conductivity and the gradient (heads). The resulting model is nonunique; many different combinations of hydraulic conductivity and recharge may have been used to calibrate the model. The modeler uses the available information on the likelihood of different parameter values to adjust both recharge and hydraulic conductivity to achieve a good model fit. For this model of the Chesapeake Terrace rubble landfill, the hydraulic conductivity close to the river boundaries was adjusted up to 250 ft/day. With this value and recharge of 12 inches/year, the gradient was still too steep near monitoring wells MW-3, MW-4, and MW-5. A hydraulic conductivity larger than 250 ft/day was considered unlikely, therefore recharge was adjusted lower to improve the model calibration.

The following table shows the comparison of model predictions to measured water levels.

Well	Observed (ft above MSL)	Computed (ft above MSL)	Residual (ft)
MW-3	68.07	68.46	-0.39
MW-4	70.05	69.85	0.20
MW-5	70.55	70.67	-0.12
MW-15	88.43	89.65	-1.22
MW-16	98.57	100.72	-2.15
MW-17	117.11	116.58	0.53
MW-18	115.13	112.97	2.16
MW-19	112.42	110.35	2.07
MW-20	105.6	103.41	2.19
MW-21	98.11	97.44	0.67
MW-22	100.76	96.15	4.61
MW-24	107.77	104.95	2.82
MW-25	78.55	80.24	-1.69
MW-27	108.86	111.15	-2.29
Residual Mean			0.53
Res. Std. Dev.			1.97
Sum of Squares			58.13
Abs. Res. Mean			1.65
Min. Residual			-2.29

Max. Residual	4.61
Head Range	49.04
Head Range/Std	0.04

The average difference between model and observed was 0.53 feet. The root-mean-square difference was 1.97 feet. The root-mean-square difference divided by the range of observed heads was 0.040. This number could be roughly interpreted as the model explains ninety-six percent of the head variation across the site.

The statistical comparison shows the model is well-calibrated. Additional adjustment of hydraulic conductivities by creating additional zones would improve the calibration but at the cost of additional complexity. The model is adequate for the intended purpose, which is predicting the impacts of the rubble fill on the groundwater system. Figure 6 shows the model predicted head contours of the water table aquifer.

Predictive Simulations

The calibrated model was used to predict pit inflow and drawdowns in the perched water table aquifer for two scenarios. The first was the excavation of the pit to an elevation of 70 feet above mean sea level (MSL). The excavation on the east side of the property will be above the water table and outside the extent of the perched water table aquifer. The second was the pit plus a drain on the northwest side of the pit.

Two postclosure scenarios were also be simulated. The landfill will be lined with clay. There will be a leachate collection system above the clay liner. After the rubble is placed and the landfill is full, a clay cap will be constructed on the top of the fill. The hydrogeologic impact of the closed landfill is to create a virtually impermeable clay mass in the perched water table aquifer. The model of both postclosure scenarios included a noflow zone surrounding a perimeter drain which represented the leachate collection system. There was a low permeability wall (clay dam) that separated the aquifer from the leachate collection system which represents the clay liner and clay dams on the sides of the landfills. In one of the postclosure scenarios, the drain to the northwest of the landfill is removed, in the other it remained.

All of the predictive simulations were steady state simulations. The resulting predictions of drawdown around the pit are conservative relative to those predicted by a transient simulation, i.e. larger drawdowns than would actually occur. The predicted pit inflows are not conservative. One expects higher inflows as the pit is first excavated. Prediction of pit inflows using a transient groundwater model was not necessary for several reasons. The excavation sequence of the pit has not been determined; it is likely that portions of the excavation will be at the target depth for substantial periods of time allowing the groundwater to approach steady state. Given the shallow saturated thickness of the perched water table, the groundwater should approach steady state relatively rapidly, i.e. months, not years. With the available information, a transient model would overpredict pit inflows at early times because the model assumes the pit is excavated instantaneously. For these reasons, a steady state simulation was adequate.

The excavation was simulated as a series of drains around the perimeter of the pit. These drains were at an elevation of one foot above the clay layer that forms the bottom of the perched water table aquifer. Predicted pit inflow without the drain to the northwest was 27 gallons per minute (gpm). Predicted drawdowns are shown in Figure 7.

The second scenario was simulating a drain on the northwest side of the pit to intercept groundwater before it reaches the excavation. The drain was assumed to be at the same elevation as the clay that forms the bottom of the perched water table aquifer. The conductance of the drain was calculated using the Hooghoudt formula. The Hooghoudt formula is commonly used for calculating the spacing of agricultural drains. It accounts for the convergence of groundwater flow to a small diameter drain. The drain was assumed to have an effective radius of one foot and the ratio of horizontal to vertical hydraulic conductivity was ten. The resulting drain conductance was 127 sq ft/day. Predicted pit inflow was 11 gpm. Predicted drawdowns are shown in Figure 8. Predicted drain inflow (the drain on the northwest side of the pit) was 0.8 gpm.

The first postclosure scenario was a virtually impermeable closed landfill. A clay dam completely around the pit was assumed. The clay dam was assumed to be eight feet wide, extending the complete depth of the perched water table, and have a hydraulic conductivity of 1E-8 cm/sec. The clay dam was simulated as reduced hydraulic conductivity one grid away from the drains that represent the leachate collection system. Assuming a eight foot wide clay dam in a 50 foot wide grid resulted in a hydraulic conductivity of 3.5E-4 ft/day. Predicted drawdowns are shown in Figure 9.

The second postclosure scenario was the drain on the northwest side of the pit and a clay dam around the remaining sides. The clay dam was simulated as previously described. Predicted drawdowns are shown in Figure 10. Predicted drain inflow (the drain on the northwest side of the pit) was 3.5 gpm.

Sensitivity Analysis

Sensitivity analysis is an important part of any modeling study. Sensitivity analysis defines how the uncertainty in model input parameters affects the conclusions of the study. The major uncertainty in the Chesapeake Terrace Rubble Landfill groundwater model was the hydraulic conductivity. The calibrated hydraulic conductivities were different than the aquifer testing results. Hydraulic conductivity was adjusted to calibrate the model. A sensitivity analysis was performed by assuming hydraulic conductivities based on aquifer testing results and then recalibrating the model by adjusting recharge.

Hydraulic conductivities were assigned to the model by nearest neighbor interpolation. Each grid was assigned a hydraulic conductivity based on the aquifer test result it was closest to. The aquifer test results were those tabulated in the hydraulic conductivity section of the model setup chapter of this report. Monitoring wells MW-15, MW-16, and MW-21 were assigned a hydraulic conductivity of 50 ft/day. Figure 11 shows the distribution of hydraulic conductivities in the sensitivity analysis. Hydraulic conductivity units are feet per day (ft/day).

The calibration was performed by adjusting recharge values. The maximum recharge value used was 20 inches/year. The resulting distribution of recharge values is shown in

Figure 12. Recharge units on Figure 12 are feet/day. The following table shows the results of the sensitivity analysis calibration.

Name	Observed (ft above MSL)	Computed (ft above MSL)	Residual (ft)
MW-3	68.07	72.08	-4.01
MW-4	70.05	75.05	-5.00
MW-5	70.55	76.81	-6.26
MW-15	88.43	89.22	-0.79
MW-16	98.57	96.76	1.81
MW-17	117.11	111.48	5.63
MW-18	115.13	107.36	7.77
MW-19	112.42	106.44	5.98
MW-20	105.60	99.68	5.92
MW-21	98.11	94.81	3.30
MW-22	100.76	94.31	6.45
MW-24	107.77	102.71	5.06
MW-25	78.55	86.00	-7.45
MW-27	108.86	115.45	-6.59
Residual Mean			0.84
Res. Std. Dev.			5.44
Sum of Squares			424.07
Abs. Res. Mean			5.14
Min. Residual			-7.45
Max. Residual			7.77
Head Range			49.04
Head Range/Std			0.11

The average difference between computed and observed (residual mean) is not significantly worse than the original calibration. The standard deviation of the residuals, 5.44 ft, is significantly worse than the original calibration (1.97 ft), however. With a maximum recharge of 20 inches/year (4.56E-3 ft/day), it was not possible to match the observed water levels. Figure 13 shows the head distribution predicted by this sensitivity analysis. It displays the same general trend and pattern as the original calibration.

The inflow to the pit was predicted with this alternative calibration. The steady state pit inflow was nine gpm. This was considerably less than predicted with the original calibration. Several areas of the perched water table aquifer went dry during the simulation resulting in less recharge and less pit inflow. This prediction shows the sensitivity of the model to different input parameter assumptions. Figure 14 shows the drawdowns caused by the pit with the sensitivity analysis calibration.

Conclusions

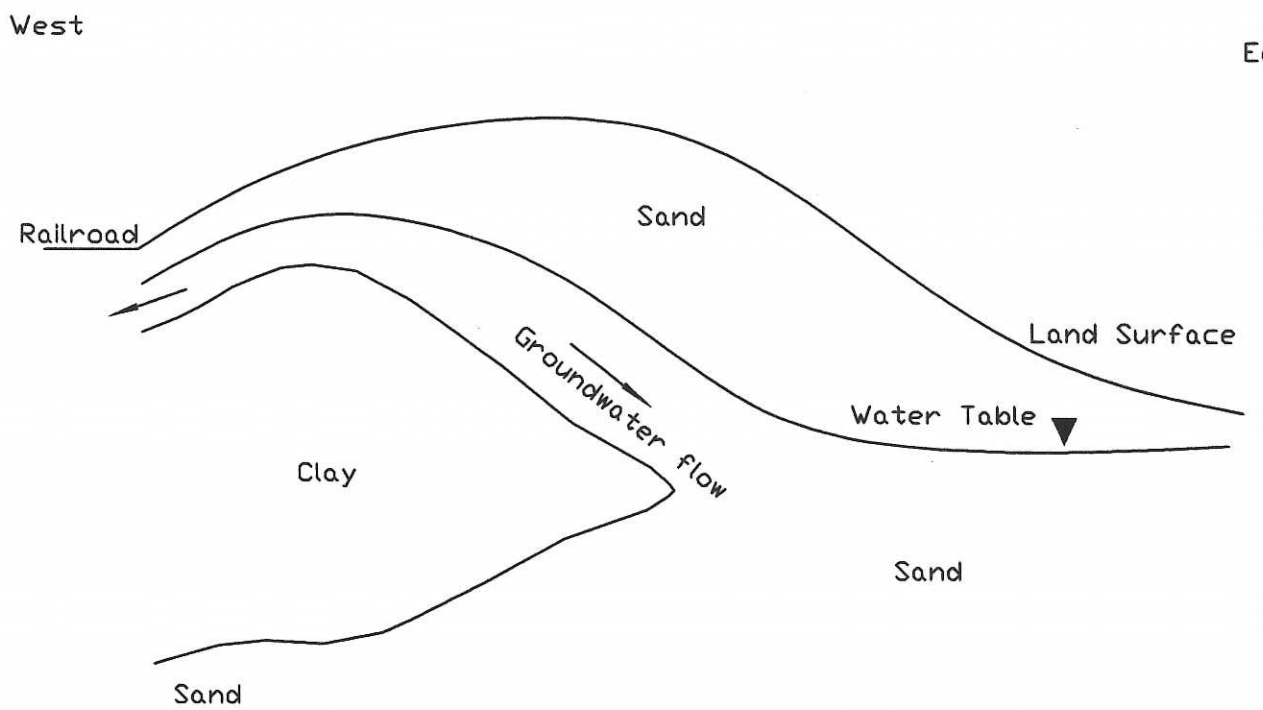
The Chesapeake Rubble Terrace landfill excavation will penetrate through a shallow perched water table aquifer on the western side of the property. A numerical groundwater flow model (MODFLOW) was used to predict the impact of the pit on groundwater flow. Using a drain to limit pit inflow is being considered.

A single layer groundwater model was calibrated at steady state. The model was used to simulate the impact of the excavation on the perched water table aquifer with and without any mitigating measures. The model was also used to simulate the impact of the landfill on the perched water table aquifer after the landfill is closed.

The model results indicate less than six feet of drawdown at the property boundaries and an inflow to the excavation of 27 gpm. A drain on the upgradient side of the landfill excavation will reduce the pit inflow to 11 gpm.

The postclosure scenario simulations show that drawdown at the property boundary remains at less than six feet. The removal of recharge where the clay cap is constructed and the relatively impermeable clay liner result in a drawdown shadow on the downgradient side of the pit.

Sensitivity analysis indicates that model results are very dependent on the hydraulic conductivity and recharge distributions.



Chesapeake Terrace Rubble Landfill Groundwater Model			
Figure 1 Conceptual Model of Perched Water Table Groundwater Flow			
SCALE : NONE	CONTRACT NO.: N657	DATE : 11/03	SHEET : OF

Figure 2

Model Grid

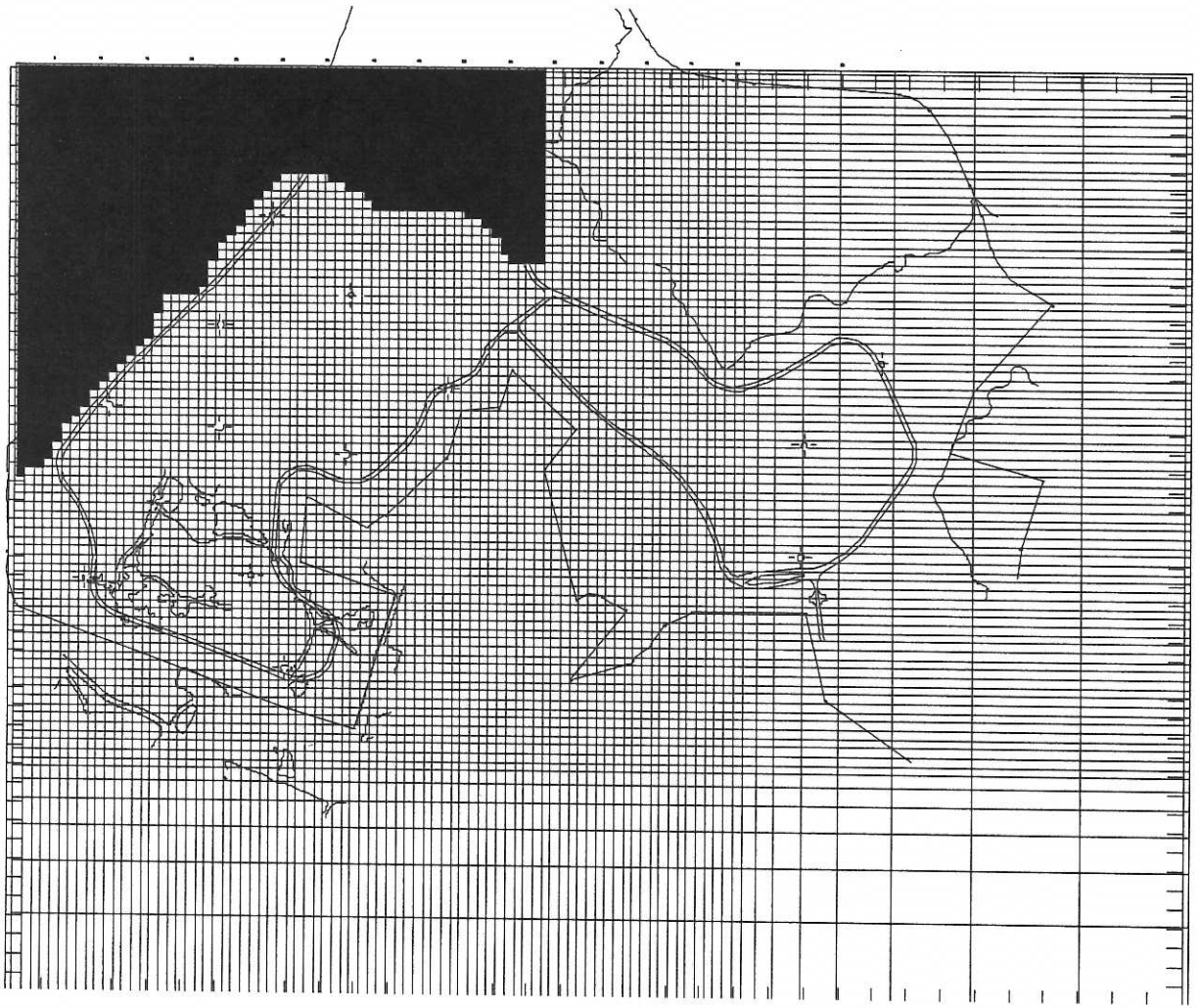


Figure 3

Elevation of Top of Clay Layer

Bottom of Perched Water Table

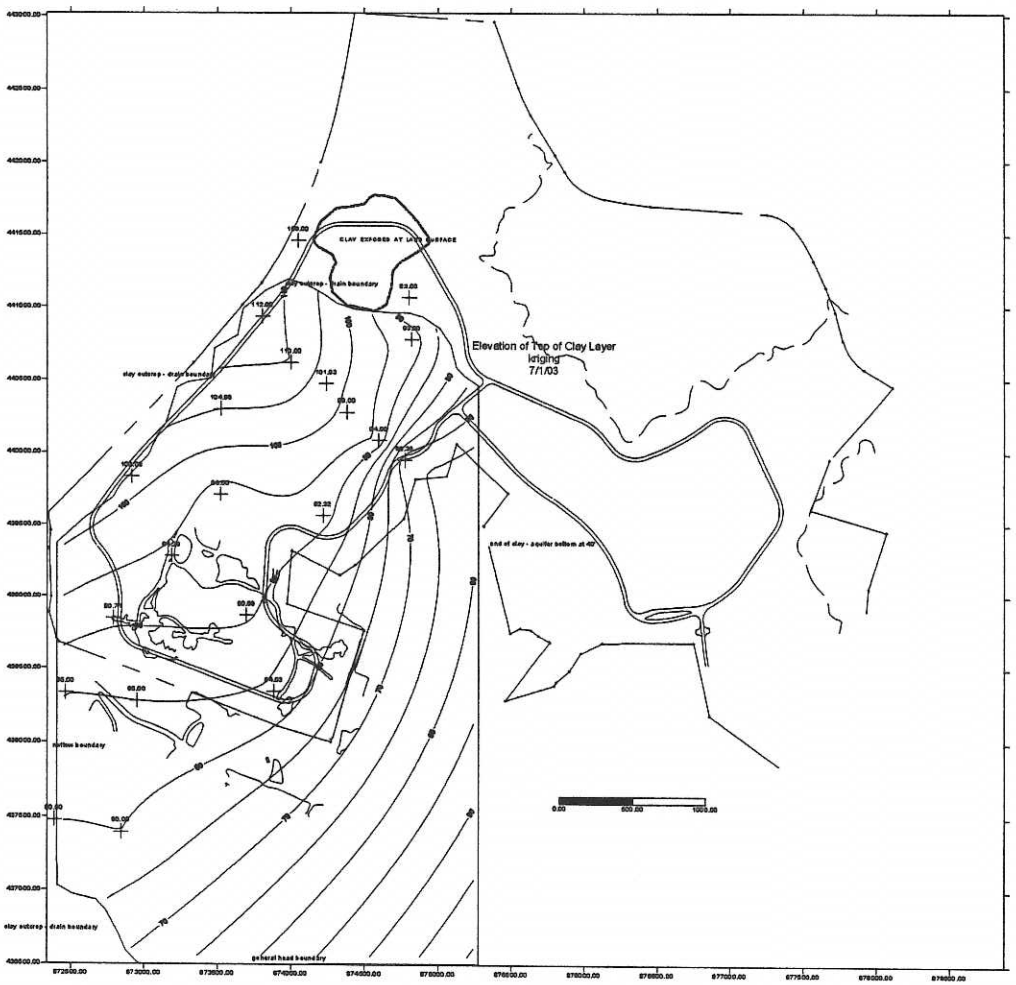


Figure 4
Boundary Conditions

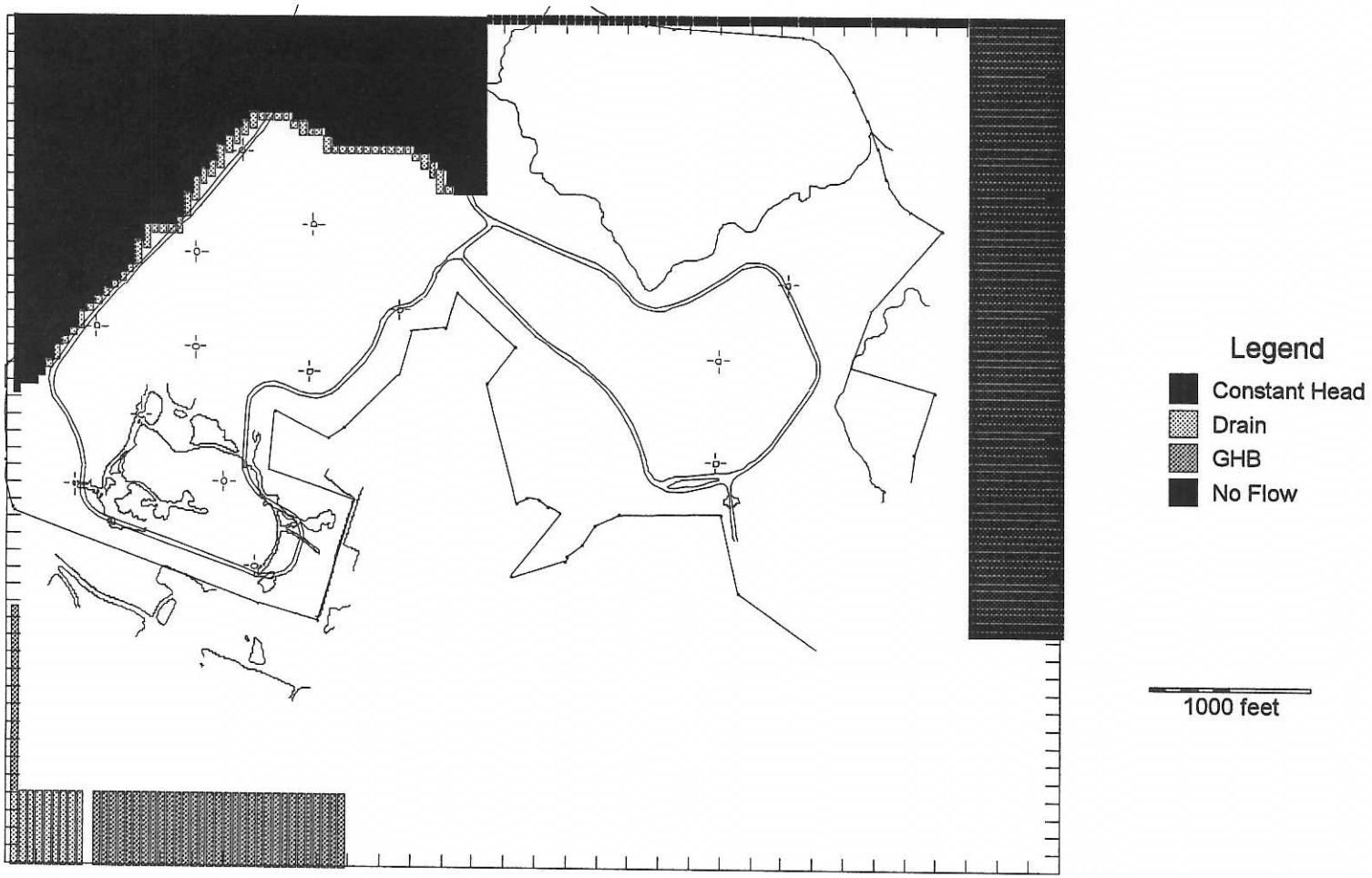
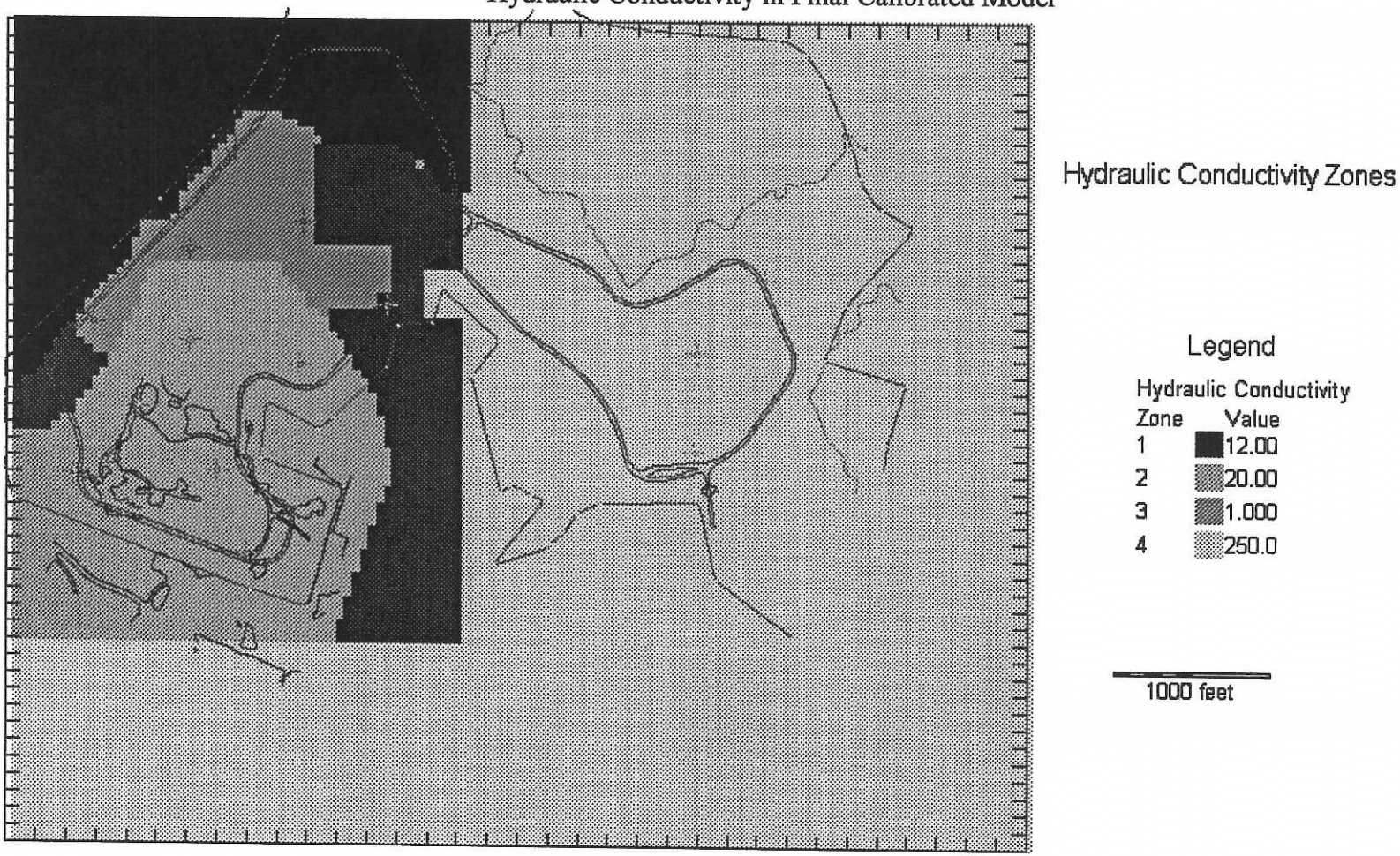
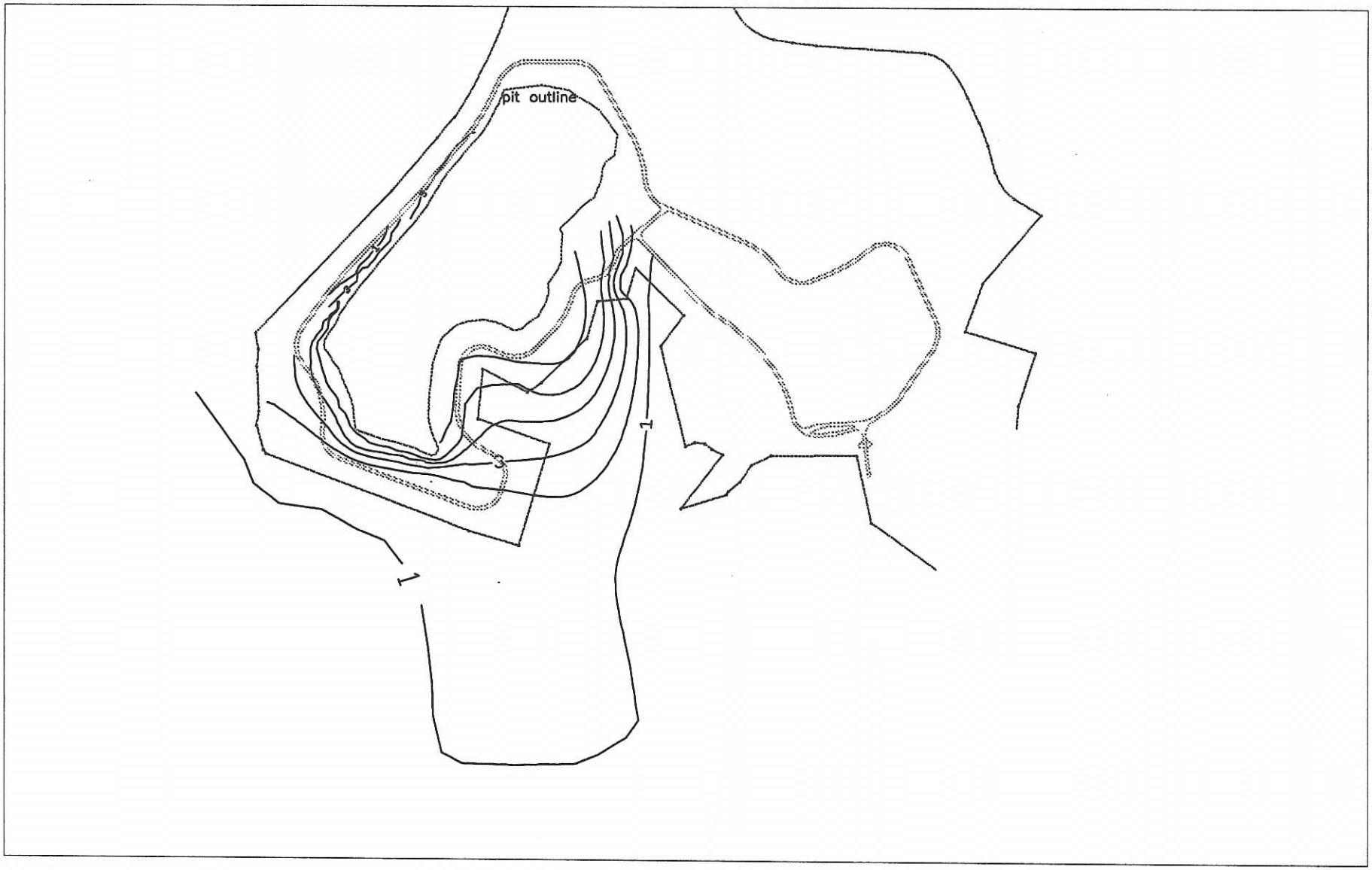


Figure 5
Hydraulic Conductivity in Final Calibrated Model



f

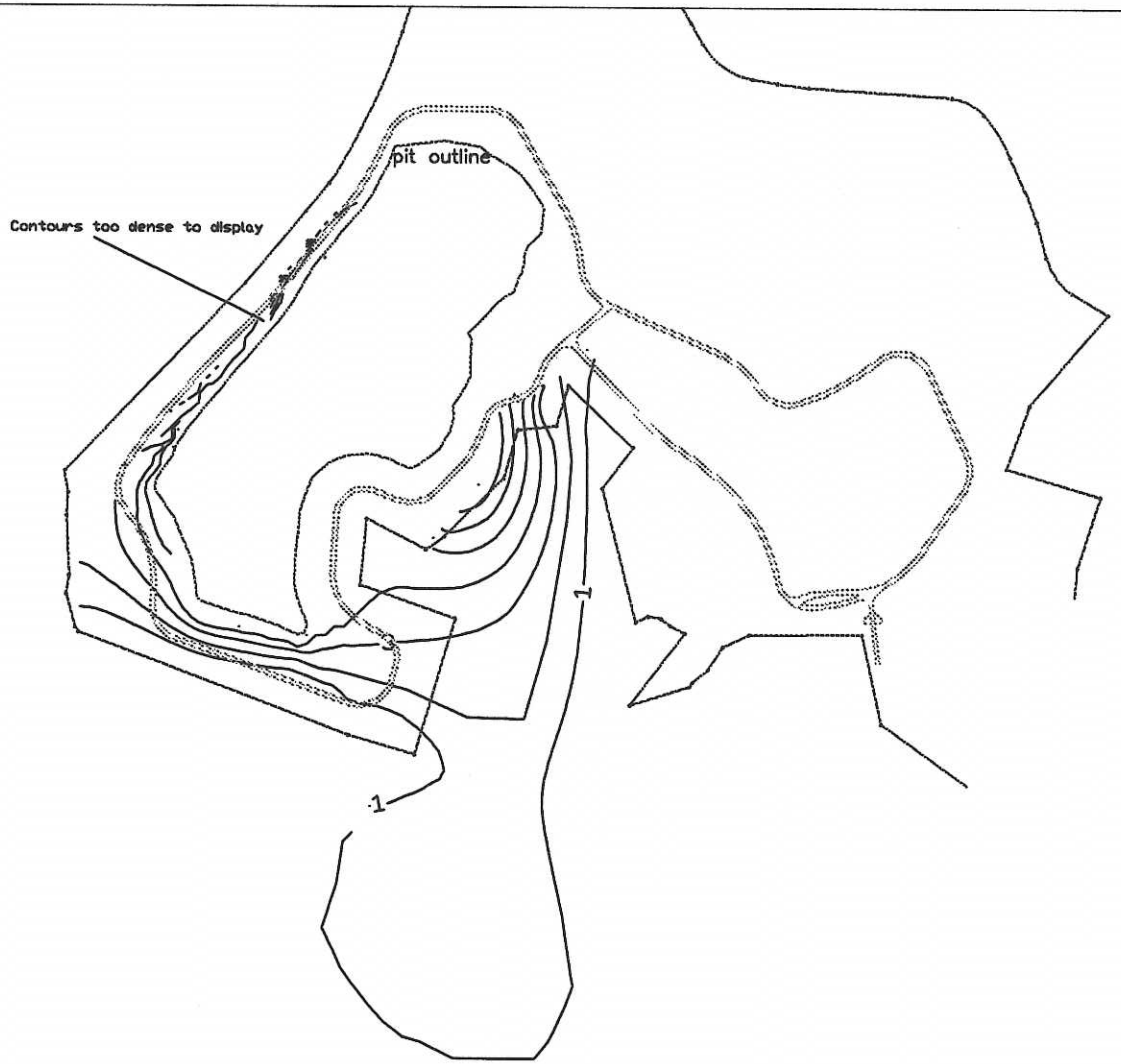


Contours show drawdown in feet

Chesapeake Terrace Rubble
Landfill Groundwater Model

Figure 7
Steady State Drawdown
Around Excavation

SCALE :1"=1000'	CONTRACT NO.: N657	DATE : 11/03	SHEET : OF

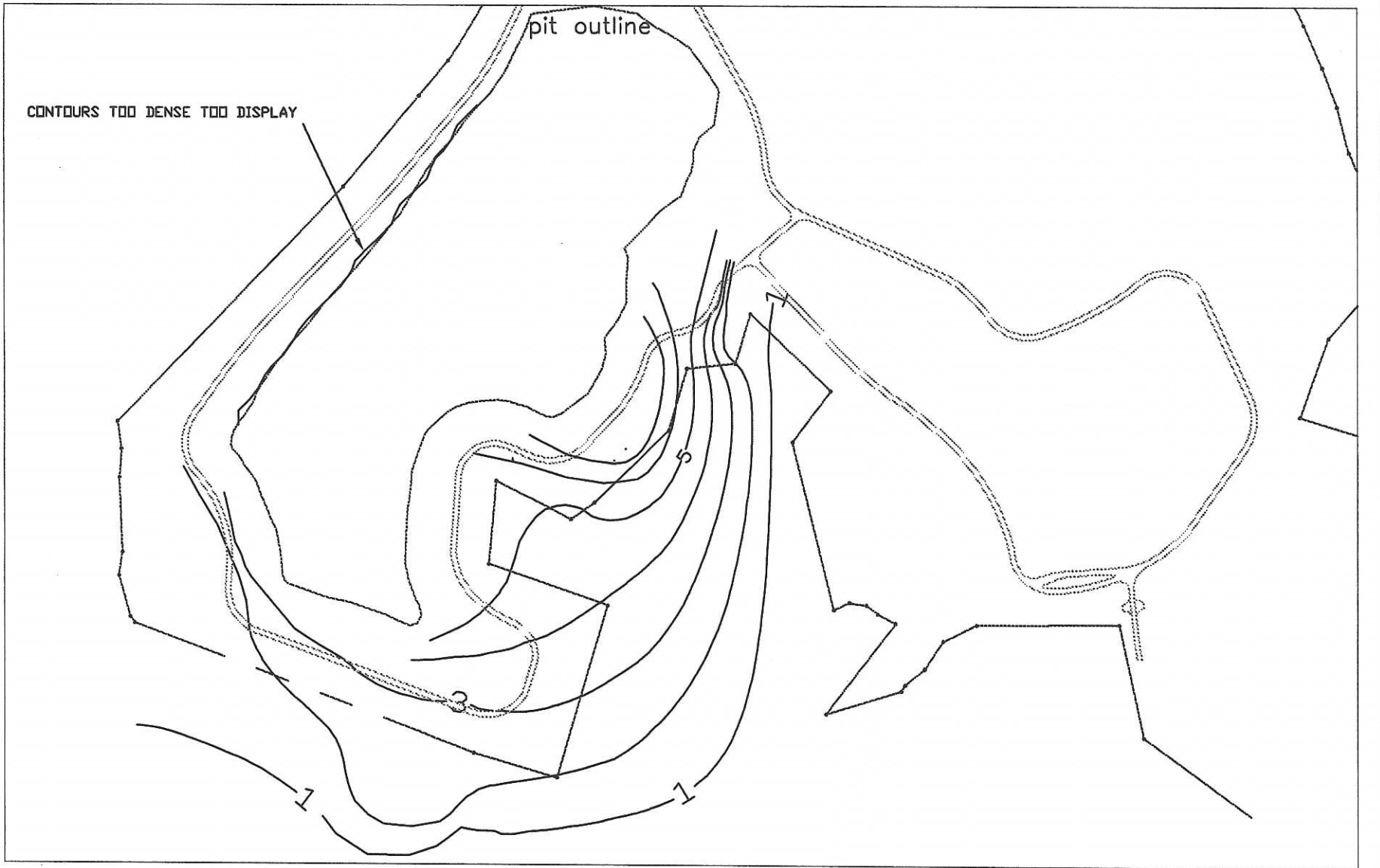


Contours show drawdown in feet

Chesapeake Terrace Rubble
Landfill Groundwater Model

Figure 8
Steady State Drawdown
Around Excavation with Drain

SCALE :	CONTRACT NO.: N657	DATE : 11/03	SHEET : OF

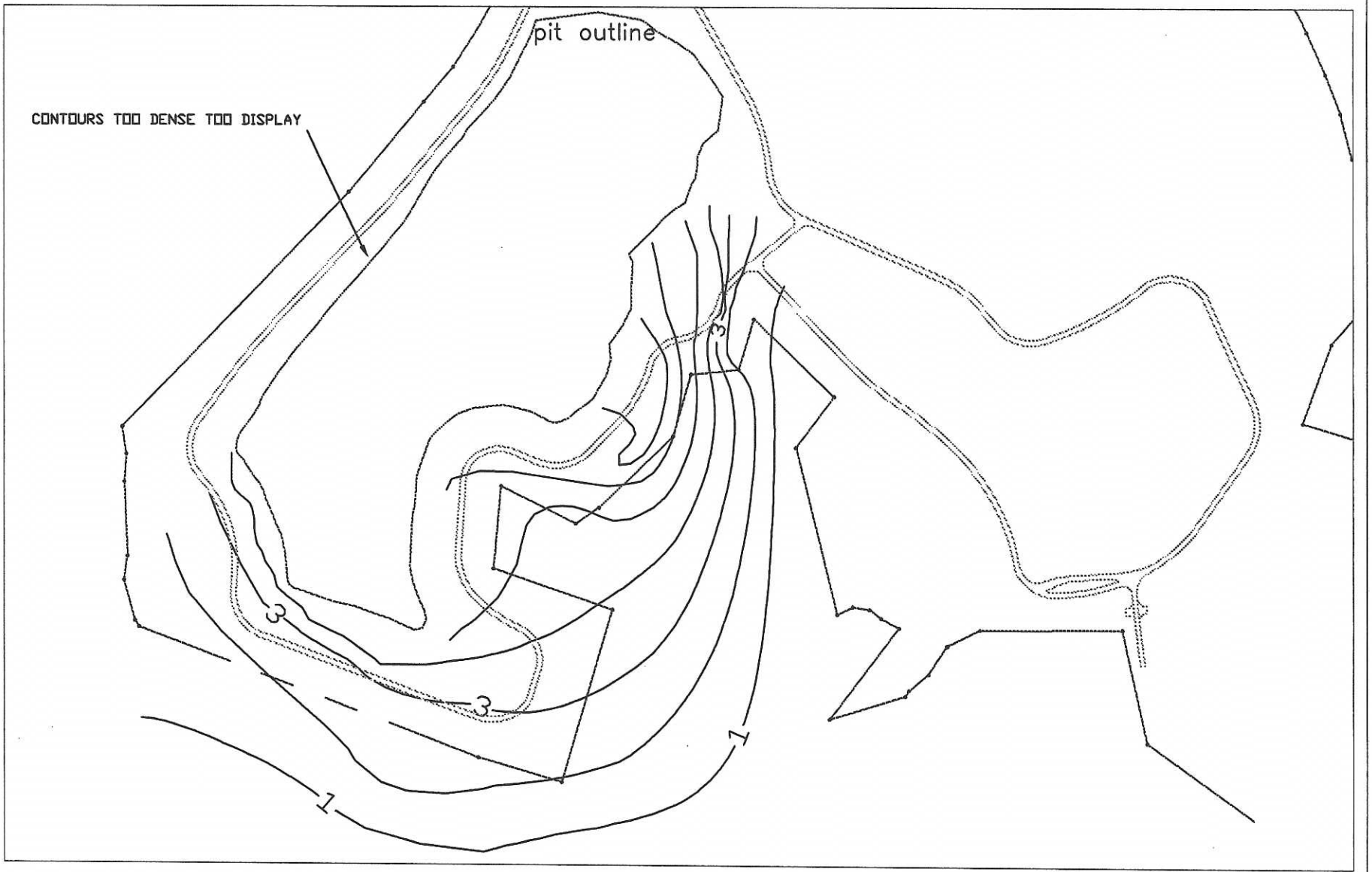


Contours show drawdown in feet

Chesapeake Terrace Rubble
Landfill Groundwater Model

Figure 9
Steady State Drawdown
Around Closed Landfill
without Drain

SCALE :1"=600'	CONTRACT NO.: N657	DATE : 11/03	SHEET : OF



Contours show drawdown in feet

Chesapeake Terrace Rubble
Landfill Groundwater Model

Figure 10
Steady State Drawdown
Around Closed Landfill
with Drain

SCALE : 600'=1"	CONTRACT NO.: N657	DATE : 11/03	SHEET : OF

Figure 11
Hydraulic Conductivity Distribution in Sensitivity Analysis

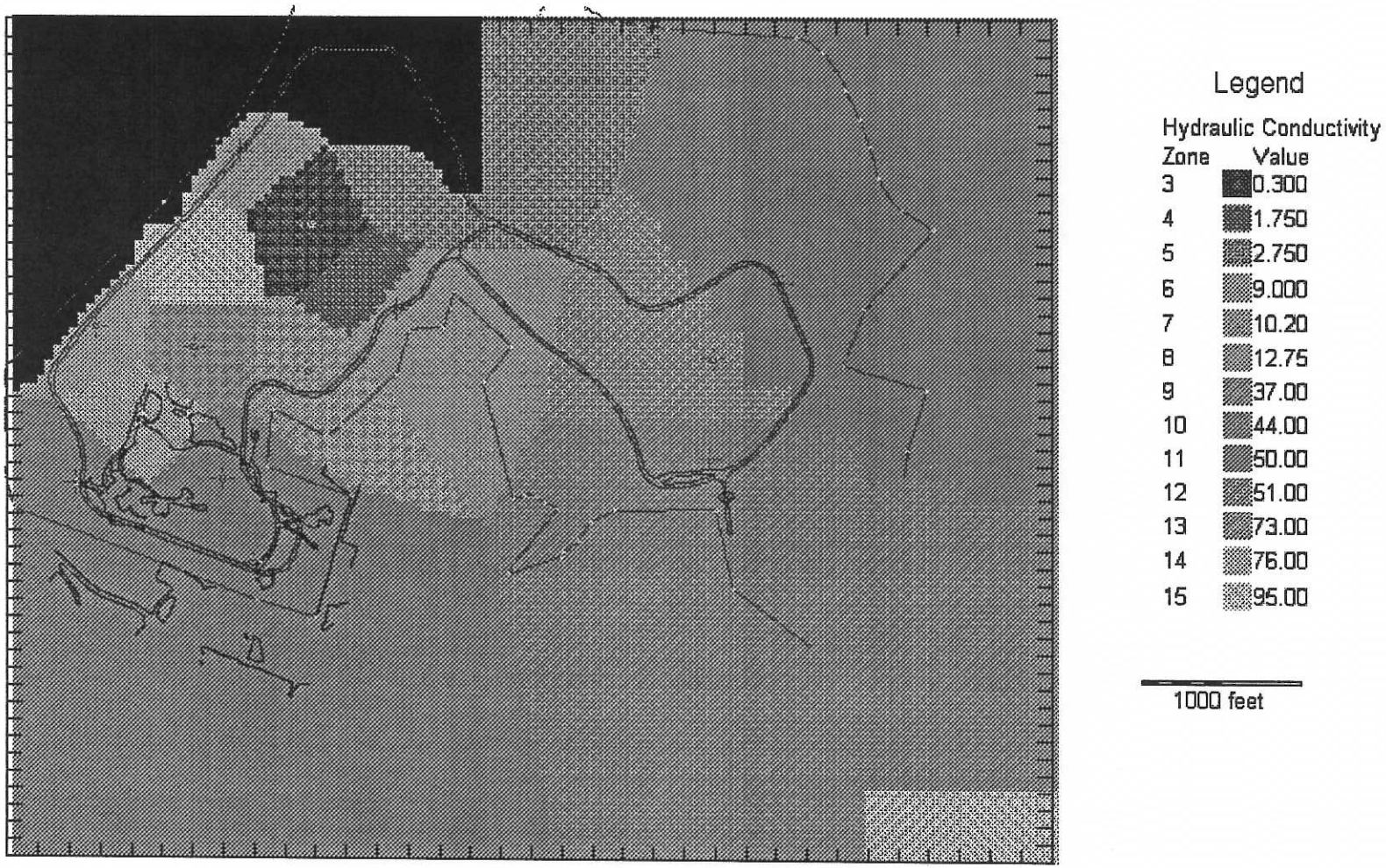
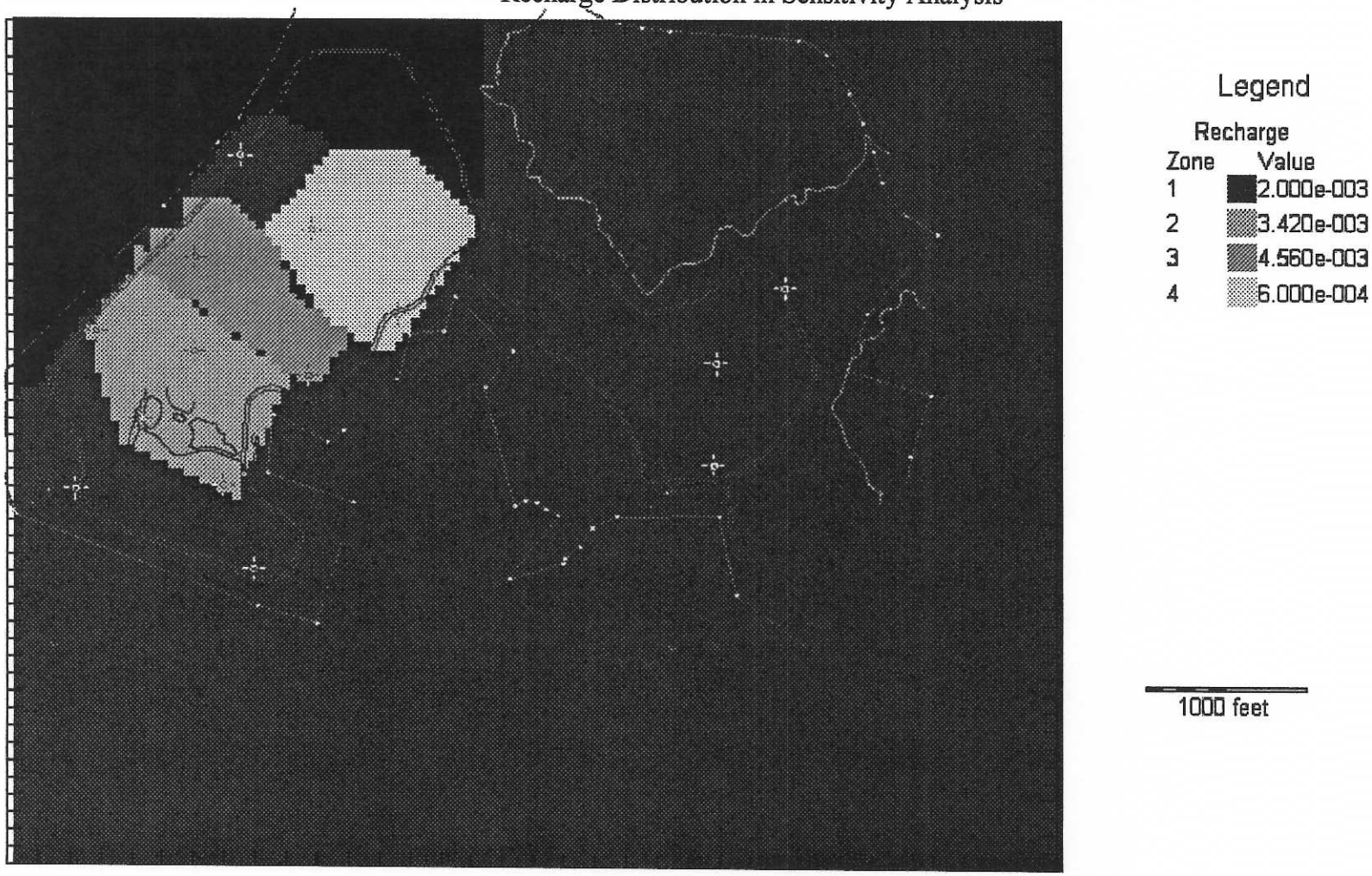
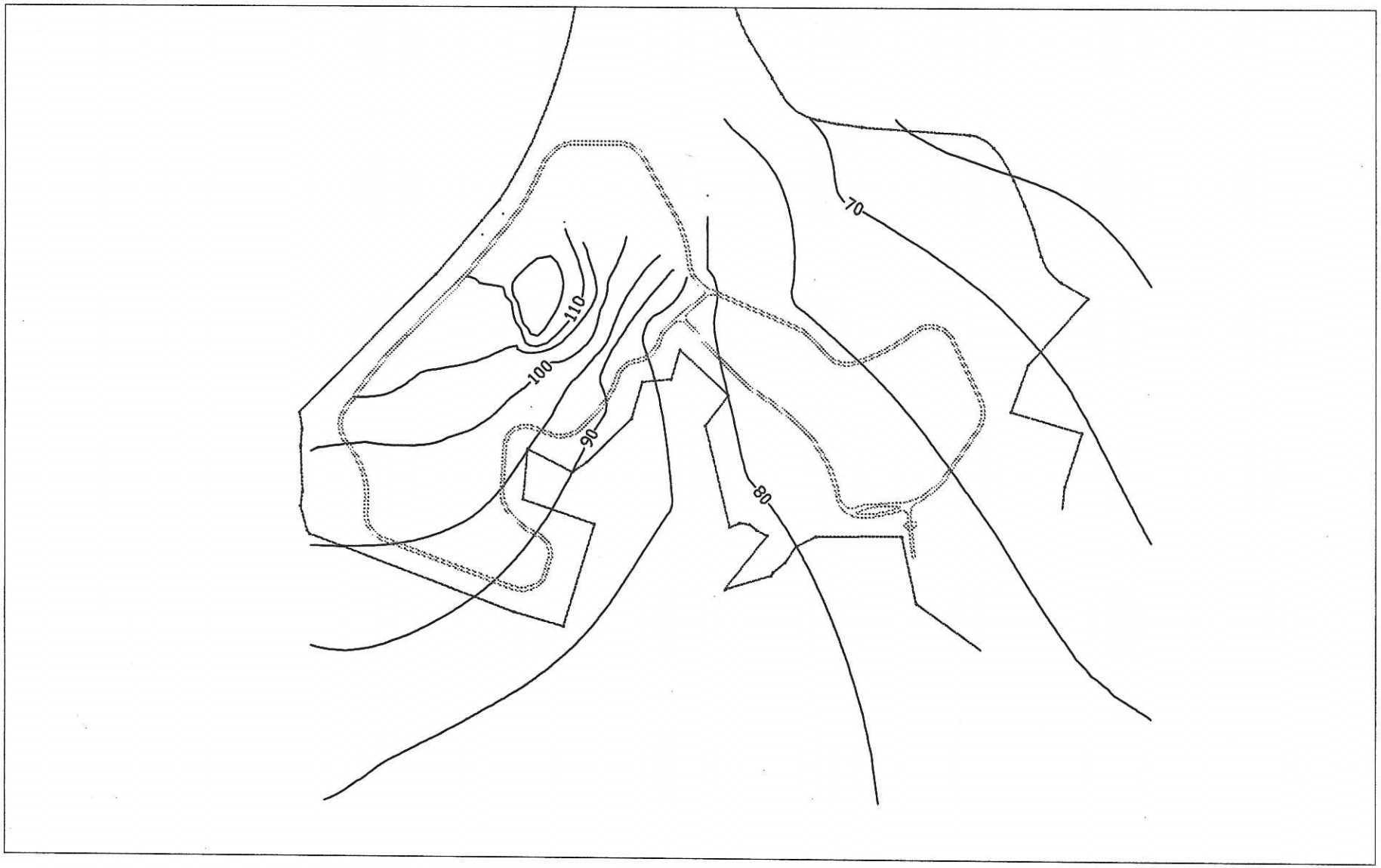


Figure 12
Recharge Distribution in Sensitivity Analysis





Contours show head elevation in feet above MSL

Chesapeake Terrace Rubble Landfill Groundwater Model

Figure 13
Sensitivity Analysis
Water Table Aquifer, Model Predicted Heads

SCALE 1"=1000'	CONTRACT NO.: N857	DATE : 11/03	SHEET : OF



Contours show drawdown in feet

Chesapeake Terrace Rubble Landfill Groundwater Model			
Figure 14 Sensitivity Analysis Steady State Drawdown Around Excavation			
SCALE :1"=1000'	CONTRACT NO.: N657	DATE : 11/03	SHEET : OF

APPENDIX K

NOAA Historical Rainfall Data

Baltimore MD Precipitation
*** PLEASE NOTE ***
Climate data on this page are PRELIMINARY (unofficial).
CERTIFIED (official) climate data are available from the
National Centers for Environmental Information (NCEI) - http://www.ncdc.noaa.gov/
*** PLEASE NOTE ***

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	WINTER	SPRING	SUMMER	AUTUMN	1ST HALF	2ND HALF
1871	1.55	1.38	3.03	1.90	2.03	2.82	6.15	3.41	2.22	3.11	3.24	1.90	32.74	M	6.96	12.38	8.57	12.71	20.03
1872	0.88	1.46	3.06	3.06	1.44	4.16	1.58	4.59	5.06	4.08	3.17	2.22	34.76	4.24	7.56	10.33	12.31	14.06	20.70
1873	4.27	4.74	3.02	2.77	6.31	0.94	2.90	9.49	3.70	6.21	4.05	0.97	49.37	11.23	12.10	13.33	13.96	22.05	27.32
1874	2.22	3.18	1.41	6.65	1.92	1.11	4.30	3.47	4.83	0.16	2.48	1.90	33.63	6.37	9.98	8.88	7.47	16.49	17.14
1875	2.51	2.91	4.72	4.27	1.49	2.85	4.78	8.67	3.62	1.44	4.86	3.14	45.26	7.32	10.48	16.30	9.92	18.75	26.51
1876	1.67	2.96	6.37	1.90	4.94	4.09	5.64	1.76	10.52	2.80	2.74	1.32	46.71	7.77	13.21	11.49	16.06	21.93	24.78
1877	3.80	1.87	3.60	3.30	2.23	3.53	4.25	0.64	5.27	5.22	6.85	2.23	42.79	6.99	9.13	8.42	17.34	18.33	24.46
1878	4.51	3.31	4.74	4.19	5.38	4.09	4.76	4.82	0.82	4.41	3.55	5.61	50.19	10.05	14.31	13.67	8.78	26.22	23.97
1879	2.59	1.55	1.65	3.69	2.74	3.92	3.16	6.71	2.72	0.75	1.30	5.23	36.01	9.75	8.08	13.79	4.77	16.14	19.87
1880	2.26	1.96	4.82	3.07	1.23	5.48	6.47	4.44	1.78	2.64	2.88	4.89	41.92	9.45	9.12	16.39	7.30	18.82	23.10
1881	4.84	5.68	7.59	2.00	2.30	7.81	1.40	2.15	2.98	4.06	2.41	5.90	49.12	15.41	11.89	11.36	9.45	30.22	18.90
1882	5.38	3.73	3.43	2.14	3.42	2.30	4.02	5.10	9.38	0.86	0.65	1.70	42.11	15.01	8.99	11.42	10.89	20.40	21.71
1883	3.16	4.69	3.68	3.20	1.22	8.08	3.10	2.72	3.49	2.83	1.37	2.98	40.52	9.55	8.10	13.90	7.69	24.03	16.49
1884	4.81	6.69	6.37	2.65	3.17	2.51	9.43	1.74	0.09	1.42	3.09	3.91	45.88	14.48	12.19	13.68	4.60	26.20	19.68
1885	3.07	4.40	1.60	1.37	4.50	6.31	2.67	7.78	1.30	6.51	4.04	2.49	46.04	11.38	7.47	16.76	11.85	21.25	24.79
1886	4.48	5.49	4.85	2.06	7.07	5.64	8.08	3.94	1.90	1.39	4.09	3.12	52.11	12.46	13.98	17.66	7.38	29.59	22.52
1887	2.57	4.69	3.49	2.44	2.57	4.44	8.32	4.15	2.80	1.06	2.02	5.04	43.59	10.38	8.50	16.91	5.88	20.20	23.39
1888	3.35	2.83	4.62	2.11	4.22	3.22	2.82	6.17	4.90	2.99	3.04	3.26	43.53	11.22	10.95	12.21	10.93	20.35	23.18
1889	4.22	2.53	5.71	8.70	6.82	6.17	11.03	1.40	4.59	4.12	6.45	0.61	62.35	10.01	21.23	18.60	15.16	34.15	28.20
1890	1.80	4.80	4.07	3.94	5.98	2.42	3.61	6.44	4.76	5.73	0.74	2.67	46.96	7.21	13.99	12.47	11.23	23.01	23.95
1891	4.89	5.52	7.94	2.48	3.11	5.45	7.79	4.24	5.46	2.76	1.33	3.24	54.21	13.08	13.53	17.48	9.55	29.39	24.82
1892	6.42	2.41	7.20	3.15	6.35	4.87	4.07	1.83	2.36	0.26	3.85	2.28	45.05	12.07	16.70	10.77	6.47	30.40	14.65
1893	1.78	4.43	1.38	3.52	3.78	2.26	1.88	1.81	1.80	3.44	3.78	2.29	32.15	8.49	8.68	5.95	9.02	17.15	15.00
1894	1.46	3.53	1.19	3.80	7.26	3.29	1.73	1.41	4.75	3.80	1.98	4.12	38.32	7.28	12.25	6.43	10.53	20.53	17.79
1895	4.67	0.83	2.94	7.42	3.04	2.83	3.40	2.43	6.01	2.20	1.86	2.84	40.47	9.62	13.40	8.66	10.07	21.73	18.74
1896	2.62	7.07	4.70	1.44	1.61	3.94	6.32	1.93	4.14	1.11	3.34	0.37	38.59	12.53	7.75	12.19	8.59	21.38	17.21

Baltimore MD Precipitation

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	WINTER	SPRING	SUMMER	AUTUMN	1ST HALF	2ND HALF	
1897	2.05	5.13	2.40	3.19	6.88	2.57	6.93	4.71	2.17	3.67	4.39	3.40	47.49	7.55	12.47	14.21	10.23	22.22	25.27	
1898	2.99	1.32	2.58	1.84	3.86	1.06	3.51	6.09	1.56	3.97	4.34	3.34	36.46	7.71	8.28	10.66	9.87	13.65	22.81	
1899	3.50	5.47	4.93	1.89	3.29	2.16	1.64	4.86	7.09	2.09	2.27	1.40	40.59	12.31	10.11	8.66	11.45	21.24	19.35	
1900	2.11	4.65	3.17	2.06	1.00	4.34	1.51	2.91	4.26	1.68	1.81	2.07	31.57	8.16	6.23	8.76	7.75	17.33	14.24	
1901	2.45	0.65	3.58	5.53	3.67	0.90	6.18	6.73	2.50	1.52	2.26	7.07	43.04	5.17	12.78	13.81	6.28	16.78	26.26	
1902	3.05	4.68	3.41	2.90	1.62	4.30	2.45	4.31	7.19	6.85	3.71	5.66	50.13	14.80	7.93	11.06	17.75	19.96	30.17	
1903	3.81	5.43	4.40	3.29	3.33	5.01	7.65	5.88	1.00	3.54	0.73	2.19	46.26	14.90	11.02	18.54	5.27	25.27	20.99	
1904	2.86	1.50	2.88	2.37	1.84	3.27	4.58	1.95	5.90	3.73	1.87	3.34	36.09	6.55	7.09	9.80	11.50	14.72	21.37	
1905	4.69	2.40	3.23	3.07	1.82	4.05	10.65	6.85	2.14	2.04	1.35	4.32	46.61	10.43	8.12	21.55	5.53	19.26	27.35	
1906	3.22	2.21	4.63	3.31	2.73	5.10	7.96	5.80	0.32	5.74	1.74	4.06	46.82	9.75	10.67	18.86	7.80	21.20	25.62	
1907	3.14	1.93	2.94	3.13	2.92	5.22	5.76	4.60	8.52	1.61	5.02	4.30	49.09	9.13	8.99	15.58	15.15	19.28	29.81	
1908	3.49	4.71	2.50	1.09	4.04	1.08	4.34	5.17	2.59	2.59	0.77	3.04	35.41	12.50	7.63	10.59	5.95	16.91	18.50	
1909	2.78	3.25	4.58	2.18	4.59	4.38	1.31	0.86	3.97	1.03	1.15	4.62	34.70	9.07	11.35	6.55	6.15	21.76	12.94	
1910	4.68	2.28	0.46	7.76	2.95	5.30	0.95	1.37	2.13	2.71	1.93	2.45	34.97	11.58	11.17	7.62	6.77	23.43	11.54	
1911	3.48	2.31	2.45	2.69	3.45	5.52	3.53	12.28	1.60	3.31	4.28	3.68	48.58	8.24	8.59	21.33	9.19	19.90	28.68	
1912	2.63	2.75	6.64	1.94	3.30	3.09	5.96	3.25	8.75	0.72	1.93	4.17	45.13	9.06	11.88	12.30	11.40	20.35	24.78	
1913	2.45	1.61	3.89	5.15	3.12	1.47	2.63	6.38	1.51	3.50	1.82	2.58	36.11	8.23	12.16	10.48	6.83	17.69	18.42	
1914	5.66	2.89	1.80	4.55	1.17	1.64	2.55	6.74	1.64	1.24	2.18	4.34	36.40	11.13	7.52	10.93	5.06	17.71	18.69	
1915	6.81	4.75	1.06	1.37	3.19	6.23	2.22	9.93	2.30	3.86	1.59	3.08	46.39	15.90	5.62	18.38	7.75	23.41	22.98	
1916	1.51	3.21	3.61	3.68	3.49	5.33	5.04	0.83	1.82	1.61	1.97	3.94	36.04	7.80	10.78	11.20	5.40	20.83	15.21	
1917	3.04	1.75	3.80	2.21	3.24	4.05	7.09	2.39	2.86	5.01	0.52	1.96	37.92	8.73	9.25	13.53	8.39	18.09	19.83	
1918	5.00	1.04	4.17	6.79	3.17	1.75	2.28	3.35	3.01	0.76	1.50	4.72	37.54	8.00	14.13	7.38	5.27	21.92	15.62	
1919	3.51	2.62	4.22	4.05	5.46	2.69	7.21	6.45	2.31	2.50	3.10	3.11	47.23	10.85	13.73	16.35	7.91	22.55	24.68	
1920	1.87	3.41	2.56	4.84	2.30	8.25	4.94	9.47	3.08	0.17	3.96	3.58	48.43	8.39	9.70	22.66	7.21	23.23	25.20	
1921	2.05	2.85	2.60	2.59	5.99	1.97	4.93	3.49	3.19	1.61	4.37	2.08	37.72	8.48	11.18	10.39	9.17	18.05	19.67	
1922	4.88	2.94	4.83	0.88	4.00	4.45	7.28	1.11	2.69	5.58	0.44	3.43	42.51	9.90	9.71	12.84	8.71	21.98	20.53	
1923	4.14	2.51	4.12	3.68	2.59	1.84	2.04	3.14	3.85	2.83	2.04	3.88	36.66	10.08	10.39	7.02	8.72	18.88	17.78	
1924	4.33	4.14	6.66	5.89	5.80	5.54	1.99	5.22	5.75	0.05	1.37	2.30	49.04	12.35	18.35	12.75	7.17	32.36	16.68	
1925	5.35	0.98	2.00	2.66	1.86	1.01	5.57	2.41	0.75	5.43	3.16	1.54	32.72	8.63	6.52	8.99	9.34	13.86	18.86	
1926	3.10	4.27	2.19	1.46	2.60	2.46	5.74	5.58	4.19	4.24	6.46	2.89	45.18	8.91	6.25	13.78	14.89	16.08	29.10	
1927	1.38	3.78	1.47	5.48	2.03	2.96	1.41	3.04	1.95	6.90	2.22	3.61	36.23	8.05	8.98	7.41	11.07	17.10	19.13	
1928	2.76	2.89	3.12	6.26	3.09	4.43	3.54	9.70	4.35	0.26	1.78	1.22	43.40	9.26	12.47	17.67	6.39	22.55	20.85	
1929	2.90	3.45	3.16	6.73	1.78	4.82	1.13	4.04	2.79	6.77	2.44	2.46	42.47	7.57	11.67	9.99	12.00	22.84	19.63	

Last updated 4/2/2019

Baltimore MD Precipitation

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	WINTER	SPRING	SUMMER	AUTUMN	1ST HALF	2ND HALF	
1930	2.66	2.38	2.27	3.12	2.91	2.97	0.64	0.78	0.37	0.37	1.13	1.95	21.55	7.50	8.30	4.39	1.87	16.31	5.24	
1931	1.89	1.41	4.62	2.77	5.80	1.89	6.04	7.98	2.05	1.79	1.13	2.20	39.57	5.25	13.19	15.91	4.97	18.38	21.19	
1932	5.85	2.08	6.48	2.15	5.51	2.91	2.42	3.92	1.47	7.17	6.17	3.45	49.58	10.13	14.14	9.25	14.81	24.98	24.60	
1933	3.37	2.95	4.60	7.58	5.17	3.09	3.90	13.83	3.28	1.76	0.96	2.47	52.96	9.77	17.35	20.82	6.00	26.76	26.20	
1934	2.53	3.29	4.47	2.32	4.04	5.39	2.24	6.63	12.41	0.95	3.51	3.10	50.88	8.29	10.83	14.26	16.87	22.04	28.84	
1935	4.79	2.74	2.82	5.12	4.51	5.01	4.55	3.97	7.59	2.63	5.63	2.16	51.52	10.63	12.45	13.53	15.85	24.99	26.53	
1936	5.94	3.75	6.42	2.56	3.18	1.48	4.89	4.60	2.16	1.73	0.79	7.10	44.60	11.85	12.16	10.97	4.68	23.33	21.27	
1937	6.74	3.52	1.93	7.92	3.27	3.53	3.81	5.06	1.10	7.75	5.21	0.95	50.79	17.36	13.12	12.40	14.06	26.91	23.88	
1938	2.23	3.10	2.44	1.40	4.86	1.49	4.87	2.43	5.05	2.15	2.11	2.66	34.79	6.28	8.70	8.79	9.31	15.52	19.27	
1939	3.77	6.52	3.75	5.92	1.47	3.86	2.41	3.52	3.08	4.01	0.76	1.87	40.94	12.95	11.14	9.79	7.85	25.29	15.65	
1940	1.81	3.97	3.97	6.99	4.41	2.37	2.85	5.60	1.32	2.37	5.99	2.68	44.33	7.65	15.37	10.82	9.68	23.52	20.81	
1941	3.29	1.07	2.20	3.29	3.61	7.77	5.61	1.60	0.50	0.99	1.32	3.48	34.73	7.04	9.10	14.98	2.81	21.23	13.50	
1942	2.04	2.79	6.50	0.88	4.19	2.26	4.46	7.01	1.82	7.75	2.36	3.96	46.02	8.31	11.57	13.73	11.93	18.66	27.36	
1943	3.53	2.08	4.38	2.56	4.76	1.29	4.95	0.86	1.84	6.29	2.77	1.44	36.75	9.57	11.70	7.10	10.90	18.60	18.15	
1944	5.04	2.20	6.04	3.80	1.72	2.55	2.81	4.22	5.39	4.01	3.93	3.83	45.54	8.68	11.56	9.58	13.33	21.35	24.19	
1945	3.75	3.44	1.41	3.55	3.50	2.65	9.68	2.48	5.06	1.18	3.92	5.99	46.61	11.02	8.46	14.81	10.16	18.30	28.31	
1946	1.66	3.33	1.89	1.56	6.39	3.65	5.37	4.02	3.98	2.59	1.24	1.97	37.65	10.98	9.84	13.04	7.81	18.48	19.17	
1947	3.89	1.87	1.54	5.56	3.95	7.48	4.92	3.74	3.54	1.20	6.92	1.63	46.24	7.73	11.05	16.14	11.66	24.29	21.95	
1948	5.83	1.89	3.85	2.92	6.41	9.36	1.94	5.75	2.27	3.62	5.40	5.47	54.71	9.35	13.18	17.05	11.29	30.26	24.45	
1949	6.13	3.41	2.74	2.44	5.90	1.19	3.24	2.82	2.33	4.11	1.13	2.25	37.69	15.01	11.08	7.25	7.57	21.81	15.88	
1950	2.13	4.12	4.30	1.37	5.00	3.81	3.07	2.66	5.93	2.67	2.05	3.74	40.85	8.50	10.67	9.54	10.65	20.73	20.12	
1951	2.88	3.36	3.70	3.69	3.92	8.80	1.84	0.77	4.13	2.02	6.20	4.49	45.80	9.98	11.31	11.41	12.35	26.35	19.45	
1952	4.14	2.59	4.77	8.15	4.97	3.19	6.71	4.71	5.68	0.51	7.68	3.47	56.57	11.22	17.89	14.61	13.87	27.81	28.76	
1953	4.56	2.74	6.80	4.43	6.37	2.90	4.94	4.26	4.05	2.83	1.32	3.05	48.25	10.77	17.60	12.10	8.20	27.80	20.45	
1954	2.02	1.21	3.96	3.07	2.07	0.15	1.77	4.10	1.16	3.24	2.42	2.72	27.89	6.28	9.10	6.02	6.82	12.48	15.41	
1955	0.29	2.68	3.34	2.34	2.34	6.73	0.30	18.35	0.56	5.66	1.35	0.20	44.14	5.69	8.02	25.38	7.57	17.72	26.42	
1956	2.49	3.38	4.11	2.18	2.38	2.11	7.06	1.81	3.42	4.65	2.69	3.22	39.50	6.07	8.67	10.98	10.76	16.65	22.85	
1957	2.28	2.61	2.27	2.46	0.55	4.08	1.25	2.44	5.63	2.21	2.87	5.30	33.95	8.11	5.28	7.77	10.71	14.25	19.70	
1958	3.45	3.51	6.18	4.29	2.75	3.65	7.73	6.26	1.27	2.51	2.15	1.39	45.14	12.26	13.22	17.64	5.93	23.83	21.31	
1959	2.39	1.82	2.72	3.44	2.82	3.68	6.00	4.39	0.82	4.16	2.12	3.57	37.93	5.60	8.98	14.07	7.10	16.87	21.06	
1960	2.31	4.95	2.82	3.40	7.10	1.27	8.18	4.30	6.38	2.12	1.08	2.92	46.83	10.83	13.32	13.75	9.58	21.85	24.98	
1961	2.91	4.63	3.87	4.45	2.72	5.19	4.57	4.31	1.57	3.70	1.98	2.85	42.75	10.46	11.04	14.07	7.25	23.77	18.98	

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YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	WINTER	SPRING	SUMMER	AUTUMN	1ST HALF	2ND HALF	
1962	2.02	4.41	4.85	4.25	2.43	3.16	2.09	2.26	2.39	2.96	6.50	2.92	40.24	9.28	11.53	7.51	11.85	21.12	19.12	
1963	1.84	2.07	4.68	2.15	1.70	9.16	0.69	4.21	4.12	T	6.85	2.08	39.55	6.83	8.53	14.06	10.97	21.60	17.95	
1964	5.27	4.36	2.98	4.37	0.43	2.40	2.66	1.96	2.61	1.19	2.51	3.94	34.68	11.71	7.78	7.02	6.31	19.81	14.87	
1965	3.09	2.89	4.31	1.72	1.79	1.94	2.61	4.72	1.94	1.90	0.68	0.63	28.22	9.92	7.82	9.27	4.52	15.74	12.48	
1966	4.15	4.24	0.93	4.39	4.53	1.18	1.48	1.87	8.50	4.80	2.78	3.53	42.38	9.02	9.85	4.53	16.08	19.42	22.96	
1967	0.99	2.25	4.39	1.73	3.79	1.89	3.56	8.87	0.21	1.34	2.60	5.31	36.93	6.77	9.91	14.32	4.15	15.04	21.89	
1968	3.42	0.72	4.41	1.61	5.41	3.35	2.75	4.16	4.39	3.13	3.85	2.60	39.80	9.45	11.43	10.26	11.37	18.92	20.88	
1969	1.38	1.75	1.63	1.80	1.46	3.65	5.22	3.81	2.60	1.10	1.74	7.44	33.58	5.73	4.89	12.68	5.44	11.67	21.91	
1970	0.94	3.34	3.07	4.53	1.69	4.10	4.32	1.33	0.46	3.04	5.11	3.50	35.43	11.72	9.29	9.75	8.61	17.67	17.76	
1971	2.02	6.21	1.90	1.75	6.12	2.92	4.03	10.91	5.55	6.88	3.75	1.29	53.33	11.73	9.77	17.86	16.18	20.92	32.41	
1972	2.82	6.01	2.38	5.30	4.11	9.95	2.81	2.22	1.15	3.51	7.05	5.02	52.33	10.12	11.79	14.98	11.71	30.57	21.76	
1973	2.81	2.82	3.96	6.41	3.73	3.16	4.22	3.35	4.87	2.86	1.28	6.36	45.83	10.65	14.10	10.73	9.01	22.89	22.94	
1974	2.92	0.94	4.12	2.59	3.58	2.84	0.85	5.85	5.45	1.53	1.39	5.70	37.76	10.22	10.29	9.54	8.37	16.99	20.77	
1975	3.47	2.47	5.17	2.73	4.63	3.82	7.15	4.23	8.62	2.89	2.03	4.61	51.82	11.64	12.53	15.20	13.54	22.29	29.53	
1976	4.10	2.16	2.23	1.27	5.03	2.49	5.56	2.98	6.93	8.09	0.56	2.04	43.44	10.87	8.53	11.03	15.58	17.28	26.16	
1977	1.36	0.63	3.93	3.05	1.49	3.44	2.62	3.31	0.62	5.17	5.01	5.76	36.39	4.03	8.47	9.37	10.80	13.90	22.49	
1978	7.34	0.56	4.74	1.26	5.49	2.81	6.83	3.39	1.03	0.71	2.70	4.63	41.49	13.66	11.49	13.03	4.44	22.20	19.29	
1979	7.84	7.16	2.05	3.37	4.15	5.74	3.71	9.38	6.73	5.53	2.45	0.87	58.98	19.63	9.57	18.83	14.71	30.31	28.67	
1980	2.58	1.06	5.46	4.24	3.58	3.04	3.25	4.00	1.00	3.08	2.72	0.70	34.71	4.51	13.28	10.29	6.80	19.96	14.75	
1981	0.49	2.93	1.14	2.04	3.63	5.40	4.59	1.93	2.89	2.57	0.31	3.30	31.22	4.12	6.81	11.92	5.77	15.63	15.59	
1982	3.37	4.04	3.03	3.61	1.85	5.70	2.16	0.95	3.63	2.31	3.13	2.39	36.17	10.71	8.49	8.81	9.07	21.60	14.57	
1983	2.21	4.81	6.80	6.55	5.47	5.23	1.31	1.57	1.76	3.58	5.02	6.72	51.03	9.41	18.82	8.11	10.36	31.07	19.96	
1984	1.96	3.90	5.79	2.95	4.29	1.65	3.27	4.11	2.38	1.94	3.01	1.71	36.96	12.58	13.03	9.03	7.33	20.54	16.42	
1985	2.03	3.03	2.37	0.39	6.01	2.44	2.53	3.72	6.22	2.48	4.71	0.84	36.77	6.77	8.77	8.69	13.41	16.27	20.50	
1986	2.16	3.78	0.96	2.64	0.37	1.46	4.12	4.26	0.58	1.86	5.96	5.52	33.67	6.78	3.97	9.84	8.40	11.37	22.30	
1987	5.85	2.22	0.99	1.86	4.16	2.63	5.05	1.61	7.34	2.25	5.05	2.07	41.08	13.59	7.01	9.29	14.64	17.71	23.37	
1988	3.24	3.25	2.35	2.44	4.37	0.84	3.78	2.64	2.05	1.59	4.78	0.97	32.30	8.56	9.16	7.26	8.42	16.49	15.81	
1989	3.07	3.36	4.24	3.16	8.71	5.98	7.35	3.38	3.64	4.90	1.97	2.12	51.88	7.40	16.11	16.71	10.51	28.52	23.36	
1990	3.71	1.48	2.54	4.23	4.92	2.55	5.68	6.17	1.07	2.57	2.10	4.86	41.88	7.31	11.69	14.40	5.74	19.43	22.45	
1991	3.54	0.73	5.65	1.68	1.16	1.08	1.76	2.54	3.05	3.20	1.69	4.08	30.16	9.13	8.49	5.38	7.94	13.84	16.32	
1992	1.27	2.49	4.58	1.76	2.92	1.89	5.07	2.19	5.96	2.73	3.44	4.63	38.93	7.84	9.26	9.15	12.13	14.91	24.02	
1993	2.73	2.84	8.12	3.68	3.66	2.56	1.71	2.55	4.09	3.02	3.09	4.45	42.50	10.20	15.46	6.82	10.20	23.59	18.91	
1994	4.59	4.07	8.64	2.53	3.02	2.84	4.54	3.44	3.93	1.82	1.95	1.95	43.32	13.11	14.19	10.82	7.70	25.69	17.63	

Last updated 4/2/2019

Baltimore MD Precipitation

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	WINTER	SPRING	SUMMER	AUTUMN	1ST HALF	2ND HALF	
1995	2.87	1.88	2.12	1.92	3.40	1.80	3.65	2.98	3.29	6.24	4.12	2.66	36.93	6.70	7.44	8.43	13.65	13.99	22.94	
1996	6.80	2.36	3.57	3.76	5.68	4.08	7.38	4.17	5.65	4.32	3.77	6.77	58.31	11.82	13.01	15.63	13.74	26.25	32.06	
1997	2.83	2.23	5.67	2.40	3.03	3.74	1.49	4.21	1.47	3.43	5.79	2.05	38.34	11.83	11.10	9.44	10.69	19.90	18.44	
1998	5.65	6.40	5.56	3.02	3.46	3.22	1.42	0.91	1.27	1.06	1.13	1.27	34.37	14.10	12.04	5.55	3.46	27.31	7.06	
1999	4.70	2.65	3.46	2.27	1.73	2.04	2.06	6.14	11.50	2.48	1.95	2.96	43.94	8.62	7.46	10.24	15.93	16.85	27.09	
2000	3.64	2.01	4.35	5.06	2.82	5.54	5.64	3.18	5.55	0.08	1.73	2.31	41.91	8.61	12.23	14.36	7.36	23.42	18.49	
2001	2.68	2.35	4.76	1.32	5.34	3.58	3.85	5.74	1.43	0.78	1.01	1.73	34.57	7.34	11.42	13.17	3.22	20.03	14.54	
2002	2.19	0.36	3.75	4.08	2.99	2.39	2.26	3.66	3.17	6.01	3.78	4.96	39.60	4.28	10.82	8.31	12.96	15.76	23.84	
2003	2.59	6.70	4.17	2.40	6.81	6.96	5.56	4.61	7.47	5.82	4.86	4.71	62.66	14.25	13.38	17.13	18.15	29.63	33.03	
2004	1.26	2.40	2.73	5.33	5.05	4.17	8.69	2.71	3.94	1.44	5.02	2.93	45.67	8.37	13.11	15.57	10.40	20.94	24.73	
2005	3.75	1.66	5.13	3.81	2.64	3.74	8.77	3.71	0.67	9.23	2.12	3.90	49.13	8.34	11.58	16.22	12.02	20.73	28.40	
2006	3.48	2.64	0.18	3.27	1.60	7.32	1.86	1.45	7.56	5.75	6.25	1.88	43.24	10.02	5.05	10.63	19.56	18.49	24.75	
2007	2.48	2.04	4.17	5.00	0.94	2.20	3.31	3.08	0.35	5.85	1.52	4.03	34.97	6.40	10.11	8.59	7.72	16.83	18.14	
2008	1.47	3.80	2.37	4.62	7.77	3.70	5.47	1.48	7.22	1.27	2.61	3.19	44.97	9.30	14.76	10.65	11.10	23.73	21.24	
2009	2.73	0.26	2.07	5.80	8.42	5.52	3.29	4.76	3.48	6.24	4.94	8.06	55.57	6.18	16.29	13.57	14.66	24.80	30.77	
2010	2.24	4.15	5.53	2.20	3.49	1.55	4.36	4.74	8.26	2.95	2.04	1.96	43.47	14.45	11.22	10.65	13.25	19.16	24.31	
2011	2.66	2.69	4.99	3.52	2.42	3.51	2.77	10.38	13.32	3.31	2.45	4.50	56.52	7.31	10.93	16.66	19.08	19.79	36.73	
2012	2.54	2.42	1.76	1.99	1.99	2.68	3.27	5.82	2.21	8.92	0.71	3.11	37.42	9.46	5.74	11.77	11.84	13.38	24.04	
2013	3.64	1.95	2.64	2.20	3.43	7.81	2.77	1.13	1.65	7.62	2.82	5.27	42.93	8.70	8.27	11.71	12.09	21.67	21.26	
2014	2.71	4.58	4.38	8.60	3.35	3.95	2.80	7.90	3.21	4.16	3.36	3.58	52.58	12.56	16.33	14.65	10.73	27.57	25.01	
2015	3.89	2.24	4.67	4.30	2.10	13.09	3.49	2.46	3.25	3.40	2.42	5.85	51.16	9.71	11.07	19.04	9.07	30.29	20.87	
2016	3.50	5.70	2.10	1.31	5.24	3.20	6.09	3.96	4.36	0.78	1.51	2.77	40.52	15.05	8.65	13.25	6.65	21.05	19.47	
2017	2.69	1.46	3.82	3.52	5.64	1.40	7.11	4.60	1.95	2.99	2.15	0.95	38.28	4.15	12.98	13.11	7.09	18.53	19.75	
2018	1.00	5.30	2.25	3.20	8.17	4.77	16.73	3.84	9.19	2.69	8.14	6.54	71.82	9.07	13.62	25.34	20.02	24.69	47.13	
2019	3.15	3.64	4.14										10.93	7.74	4.14	0.00	0.00	10.93	0.00	
NORM	3.05	2.90	3.90	3.19	3.99	3.46	4.07	3.29	4.03	3.33	3.30	3.37	41.88	9.32	11.08	10.82	10.66	20.49	21.39	1981-2010
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL	WINTER	SPRING	SUMMER	AUTUMN	1ST HALF	2ND HALF	

Last updated 4/2/2019

APPENDIX L

Ecological Correspondence

McCARTHY & ASSOCIATES, INC.

REGULATORY and ENVIRONMENTAL
CONSULTANTS

August 20, 2002

Certified Mail Number: 7002 0860 0006 3071 0721

Ms. Katharine McCarthy
Maryland Department of Natural Resources
Wildlife and Heritage Division
Room E-1
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401

Re: Chesapeake Terrace Rubble Landfill

Dear Ms. McCarthy:

I have received Mr. Ed Dexter's correspondence, dated August 5, 2002, to Mr. Warren Halle concerning the above referenced project. In his letter, he has included correspondence from Department of Natural Resources, Environmental Review Section, dated April 5, 2002, relating to this project. The letter from Environmental Review addresses several items relating to the construction of the proposed facility. These include the following:

1. Threatened and endangered species.
2. Non-Tidal Wetlands of Special State concern adjacent to the rubble landfill.
3. Forest Interior Dwelling Bird Best Management Practices.
4. Anadromous Fish usage of the Little Patuxent River and associated time-of-year restriction.
5. Potential impacts to the state-endangered glassy darter.

I would like an opportunity to present a copy of the proposed rubble landfill plan to your office and to the Environmental Review Unit and discuss this project as it relates to the above referenced five items. Furthermore, at this meeting I will provide you with a copy of the federal and state wetland authorizations that are currently in place for this project.

14458 Old Mill Road #201
Upper Marlboro, Maryland 20772

At your earliest convenience, would you please schedule a meeting at your office with the appropriate representatives from the Environmental Review Unit so we may discuss this project in detail. Please call me to schedule this meeting. Your attention to this matter is sincerely appreciated.

Very truly yours,

Milton L. McCarthy

cc: Mr. Steve Fleischman (Halle Enterprises, Inc.)
Mr. Andy Chisholm (J.A. Chisholm, P.E., LLC)

Robert L. Ehrlich, Jr.
Governor

Michael S. Steele
Lt. Governor

C. Ronald Franke
Secretary

W. P. Jensen
Deputy Secretary

Maryland Department of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401

October 21, 2003

Mr. Milton McCarthy
McCarthy & Associates, Inc.
14458 Old Mill Road #201
Upper Marlboro, MD 20772

RE: Chesapeake Terrace Rubble Landfill

Dear Mr. McCarthy:

In response to your request, I have contacted Mr. Ed Dexter of the Maryland Department of the Environment (MDE) Solid Waste Program regarding the status of this project and the protection of rare species. Mr. Dexter indicated that this project is in Phase 2 of the application process, which involves geologic and hydrologic study. We concluded that protection measures for rare species habitats should be addressed in the next phase, that of engineering design. In preparation for the next phase, the Natural Heritage Program recommends that either habitat assessments or species surveys be conducted for the following rare plant species currently known to occur in the vicinity of the project: State endangered Velvety sedge (*Carex vestita*), State threatened Featherbells (*Stenanthium gramineum*), and the State endangered extirpated Water-plantain spearwort (*Ranunculus ambigens;* though this species has not been seen in the vicinity since 1974, to our knowledge no effort has been made to relocate it due to the potential for unexploded ordinance at the historical site, and it is believed to persist in wetlands along the Patuxent River). Our guidelines for rare plant surveys should be followed and results of the surveys or habitat assessments should be submitted to the Natural Heritage Program and the Solid Waste Program.

In addition to working with the Solid Waste Program to prevent impacts to any rare plant habitat identified on or adjacent to the site, the Natural Heritage Program will coordinate with the Solid Waste Program to protect the state endangered fish, Glassy darter (*Etheostoma vitreum*) which inhabits the Little Patuxent River below the Rte 198 crossing. As noted in previous correspondence, the major concerns regarding protection of this rare fish are avoidance of sedimentation and maintenance of water quality in the Little Patuxent River and its tributaries in this vicinity.

I also contacted Mr. Ed Larrimore of the MDE Mining Program concerning the proposed surface mine adjacent to the Patuxent Community Ponds nontidal wetland of special state concern as part of the Chesapeake Rubble Fill Addition (referred to as the Plummer Property in correspondence we have received). He indicated that this

application was closed. If the applicant reactivates this application, then surveys or habitat assessments for the species noted would also be requested for this project site. The Natural Heritage Program would pursue protection measures for any rare species habitat identified on site and for the adjacent plant community within the nontidal wetland of special state concern through our review of the Mining Program permit application.

If you have any questions concerning these comments, please feel free to call me.

Sincerely,

Katharine McCarthy
Natural Heritage Program

Cc: Ed Dexter
Ed Larrimore

APPENDIX M

Wetlands Permit Extensions

Maryland
Department of
the Environment

Larry Hogan, Governor
Boyd K. Rutherford, Lt. Governor

Ben Grumbles, Secretary
Horacio Tablada, Deputy Secretary

April 26, 2019

Mr. Stephen N. Fleischman
The Halle Companies
2900 Linden Lane
Suite 300
Silver Spring, Maryland 20190

Re: Chesapeake Terrace Rubble Landfill
Water Quality Certification No. 91-WQ-0516
AI No. 63592

Dear Mr. Fleischman:

The purpose of this letter is to confirm that the Water Quality Certification No. 91-WQ-0516, originally issued for the U.S. Army Corps of Engineers' Chesapeake Terrace Rubble Landfill Permit (No. CENAB-OP-RMN 1991-01204-M18), remains in effect until the December 31, 2023 expiration date of the federal permit. Should you have any questions, please feel free to contact me at 410-537-3766 or at amanda.sigillito@maryland.gov .

Sincerely,

Amanda Sigillito, Chief
Nontidal Wetlands Division

C: Richard Kibby (Maryland Section Northern, Regulatory Functions Branch, Baltimore District Army Corps of Engineers, 2 Hopkins Plaza, Baltimore, MD 21201)

Milton L. McCarthy (Bay Environmental, Inc., 2661 Riva Road, Bldg. 800, Suite A, Annapolis, MD 21401)

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
ATTN: REGULATORY BRANCH
2 HOPKINS PLAZA
BALTIMORE, MD 21201

January 3, 2019

Operations Division

National Waste Manager, Inc.
Attn: Mr. Warren E. Halle
2900 Linden Lane, Suite #6
Silver Spring, Maryland 20910

Dear Mr. Halle:

This is in reference to your request for an extension of time to the Department of the Army Permit, **CENAB-OP-RMN (CHESAPEAKE TERRACE RUBBLE LANDFILL) 1991-01204-M18**. The property is located adjacent to the Little Patuxent River on Patuxent Road, Odenton, Anne Arundel County, Maryland.

As there have been no significant changes in the attendant circumstances since authorization was granted, the District has determined that it is not contrary to the public interest to grant an extension of time. Accordingly, the time limit for completing the work authorized ends on December 31, 2023. Please note, no additional extensions for the proposed work will be granted by this office.

All conditions of the original permit remain in effect. You may proceed with the construction indicated therein, provided you have obtained all other required state and/or local authorizations.

If you have any questions concerning this matter, please call Mr. Richard Kibby of this office at (410)962-0694.

By Authority of the Secretary of the Army:

Issued for and in Behalf of

John T. Litz, PMP
Colonel, U.S. Army
Commander and District Engineer

DAVIA.JOSEPH.P.1229279170
Digitally signed by DAVIA.JOSEPH.P.1229279170
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=DAVIA.JOSEPH.P.1229279170
Date: 2019.01.03 11:23:08 -05'00'

Joseph P. DaVia
Chief, Maryland Section Northern

Enclosure

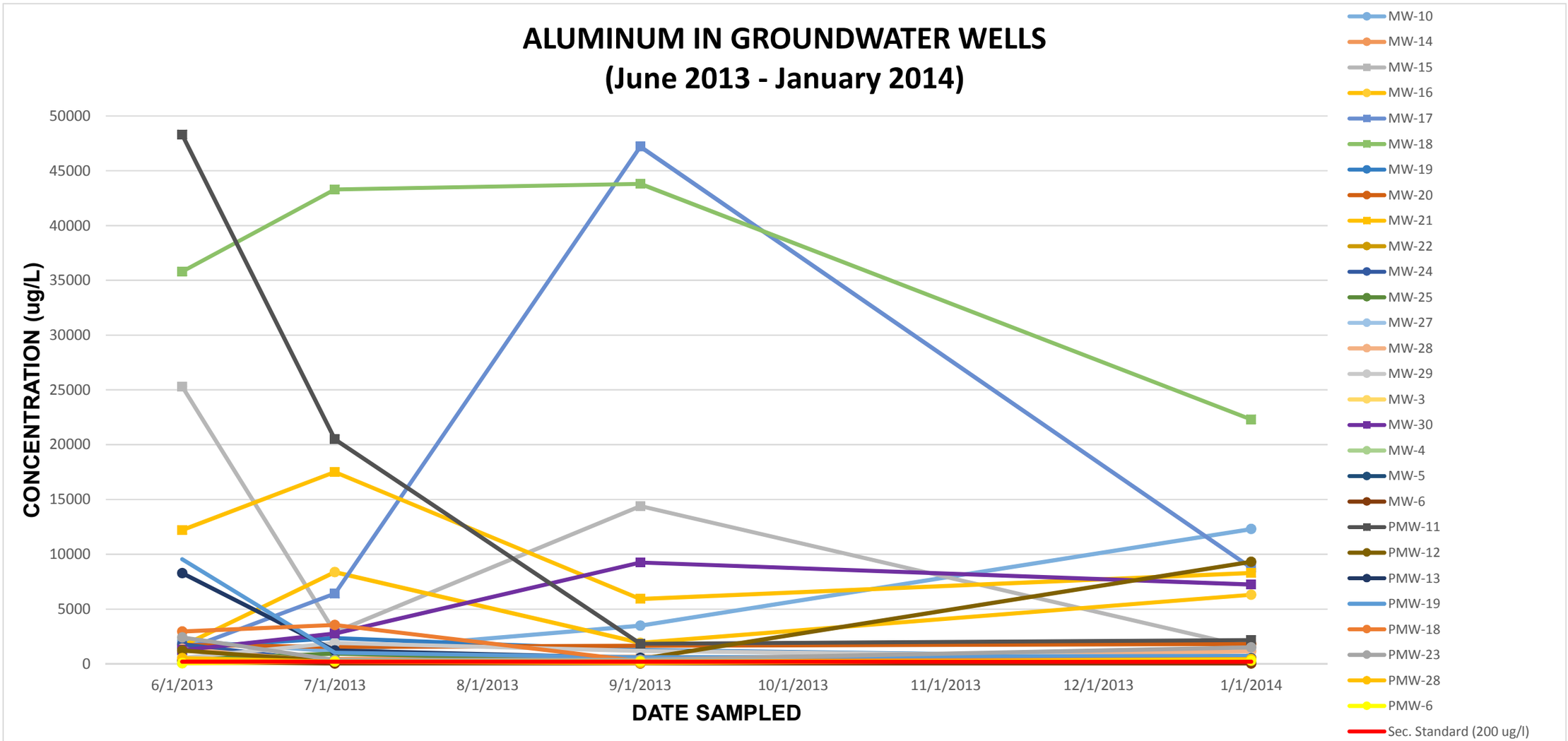
Cc: (via e-mail) Mr. Milt McCarthy, Bay Environmental, Inc. <info@bayenvinc.com>

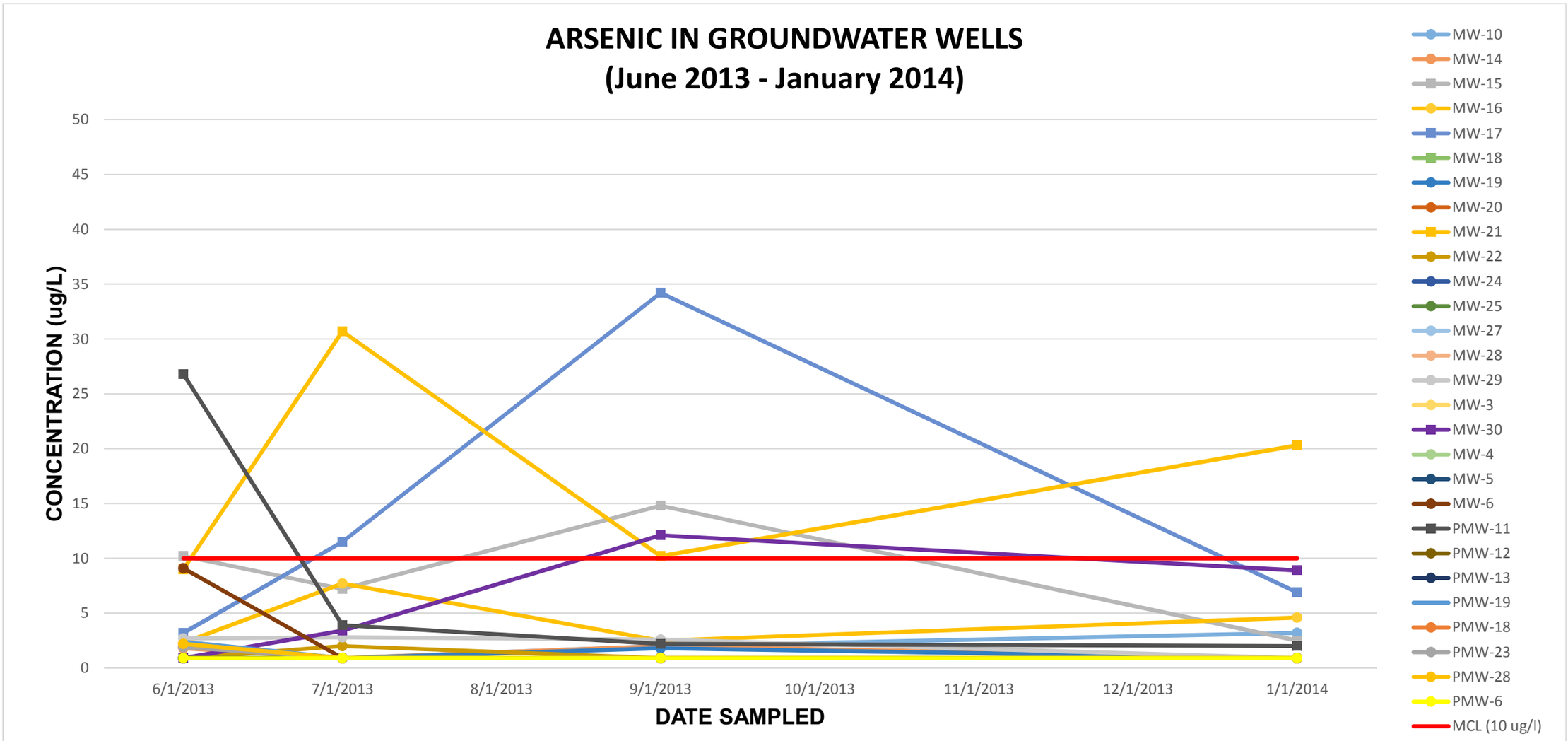
To identify how we can better serve you, we need your help. Please take the time to fill out our new customer service survey at:
http://www.nab.usace.army.mil/Wetlands%20Permits/survey.htm

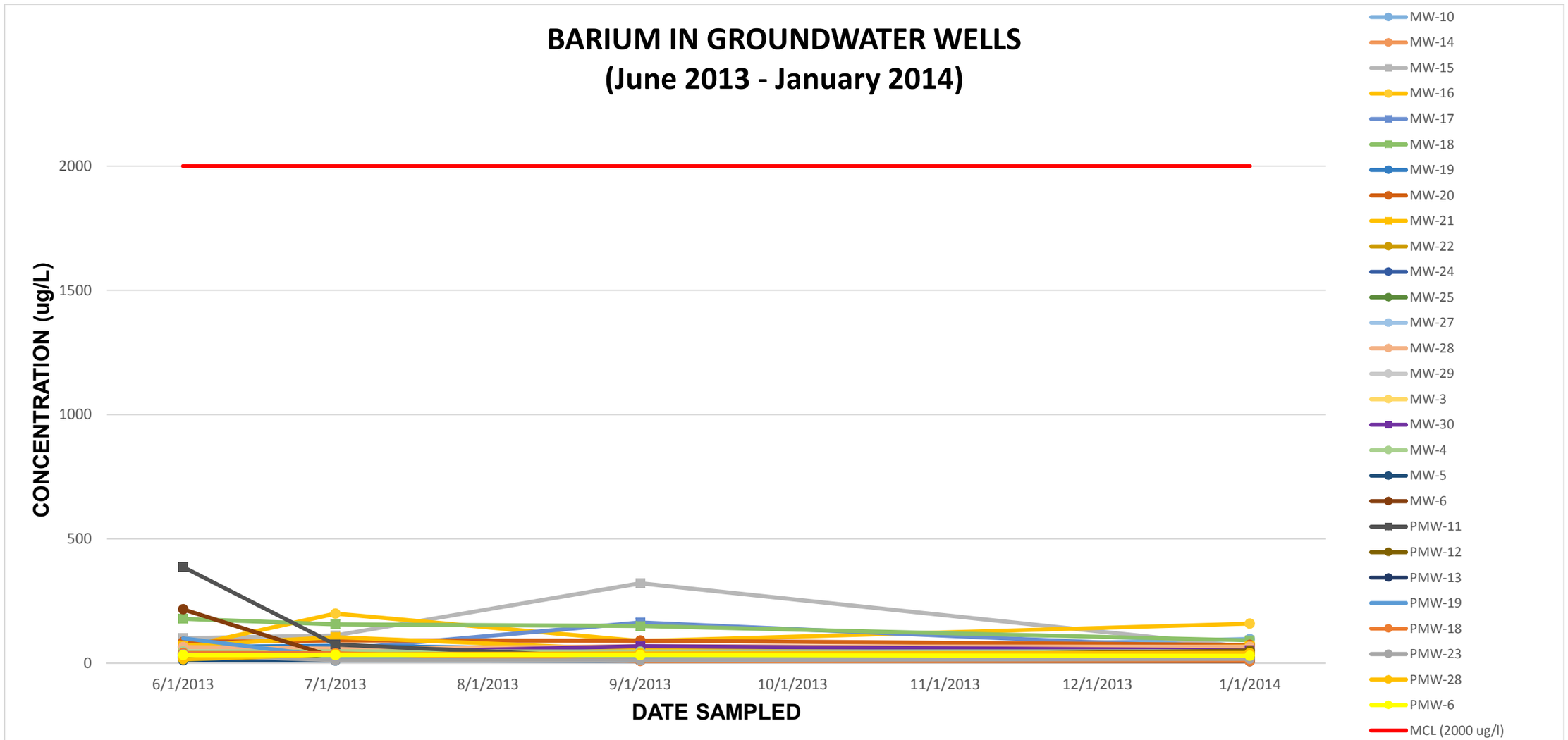
APPENDIX N

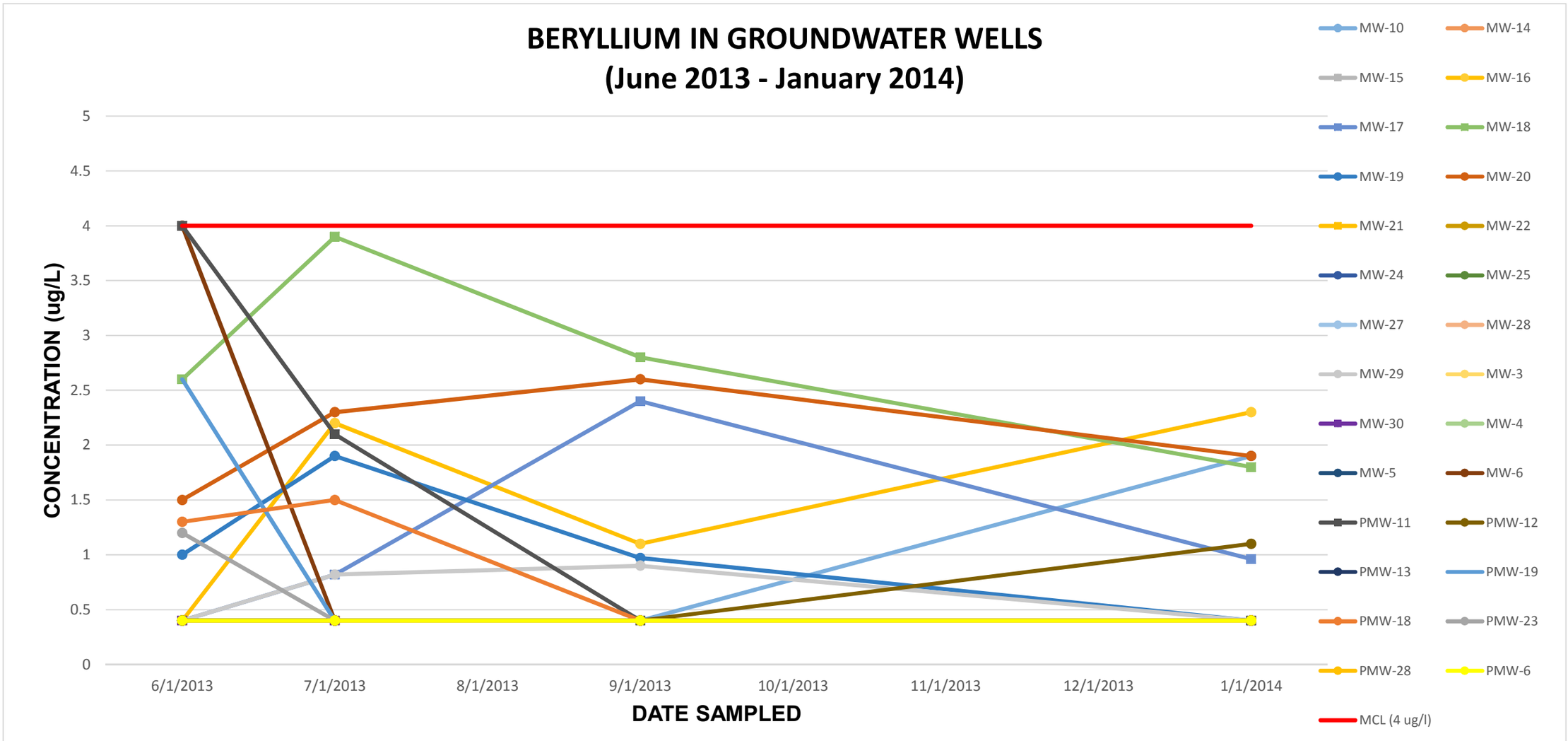
Groundwater Chemistry – Trend Charts

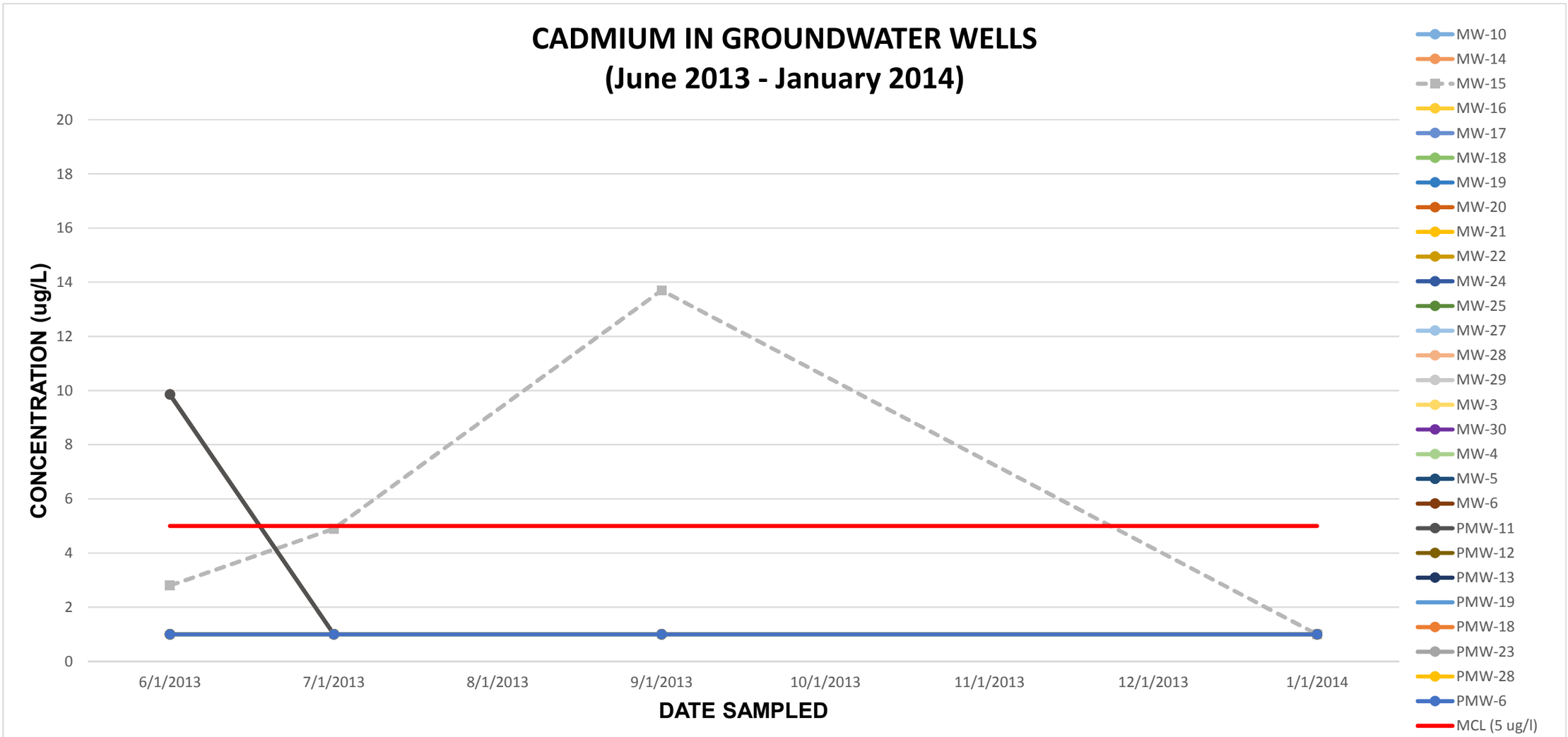
METALS

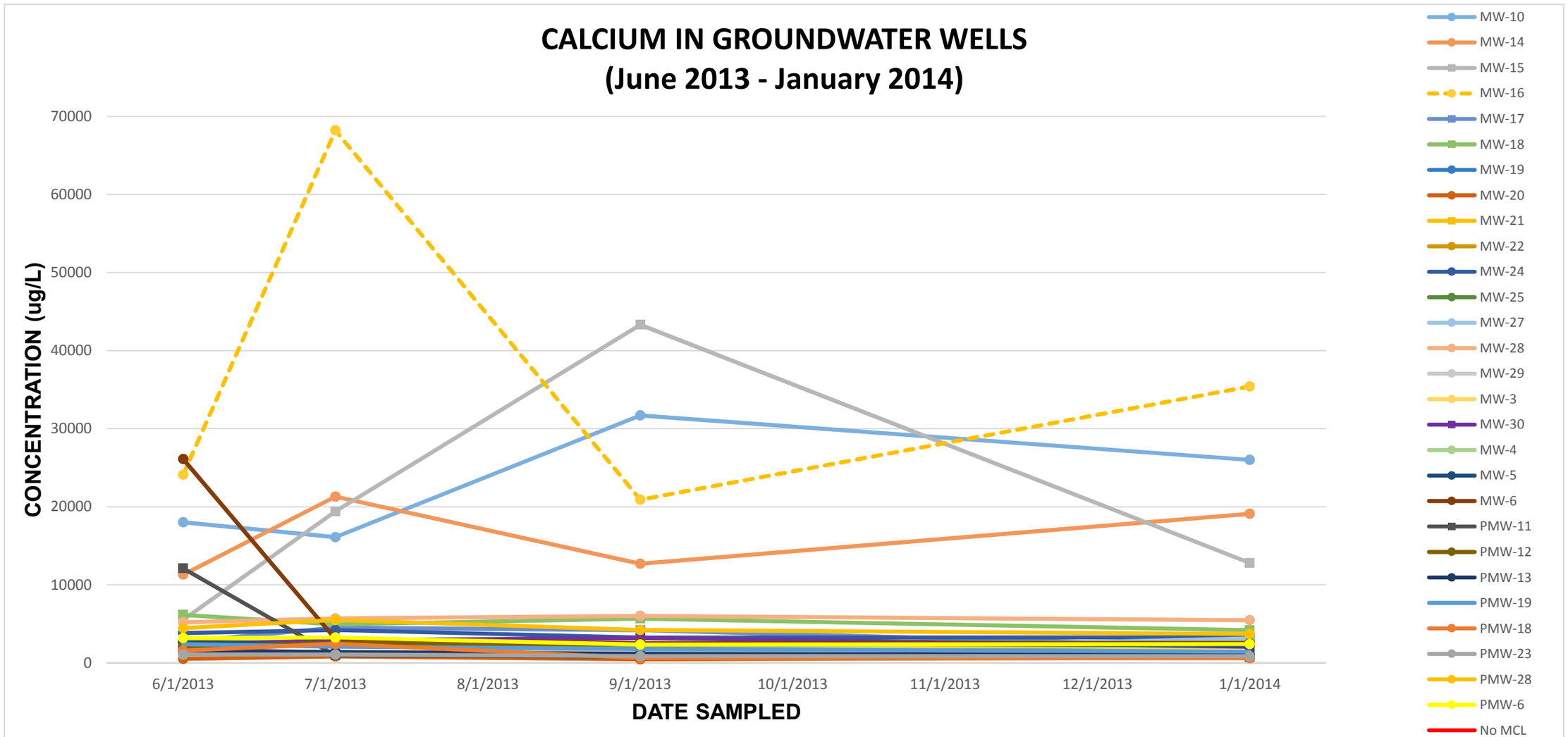

ALUMINUM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
50000
45000
40000
35000
30000
25000
20000
15000
10000
5000
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
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MW-17
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MW-20
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MW-25
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
Sec. Standard (200 ug/l)

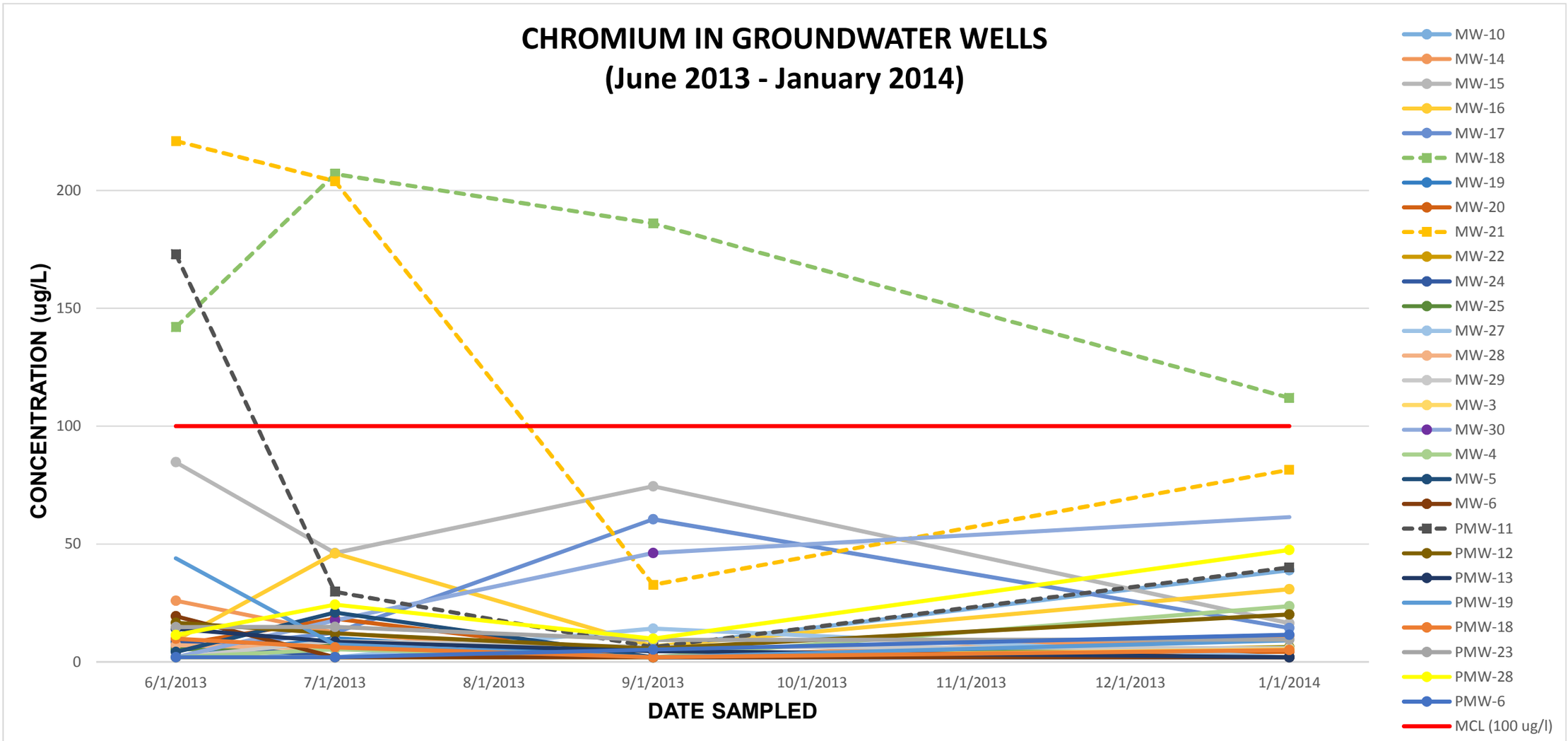

ARSENIC IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
50
45
40
35
30
25
20
15
10
5
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-24
MW-25
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MW-29
MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
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PMW-18
PMW-23
PMW-28
PMW-6
MCL (10 ug/l)

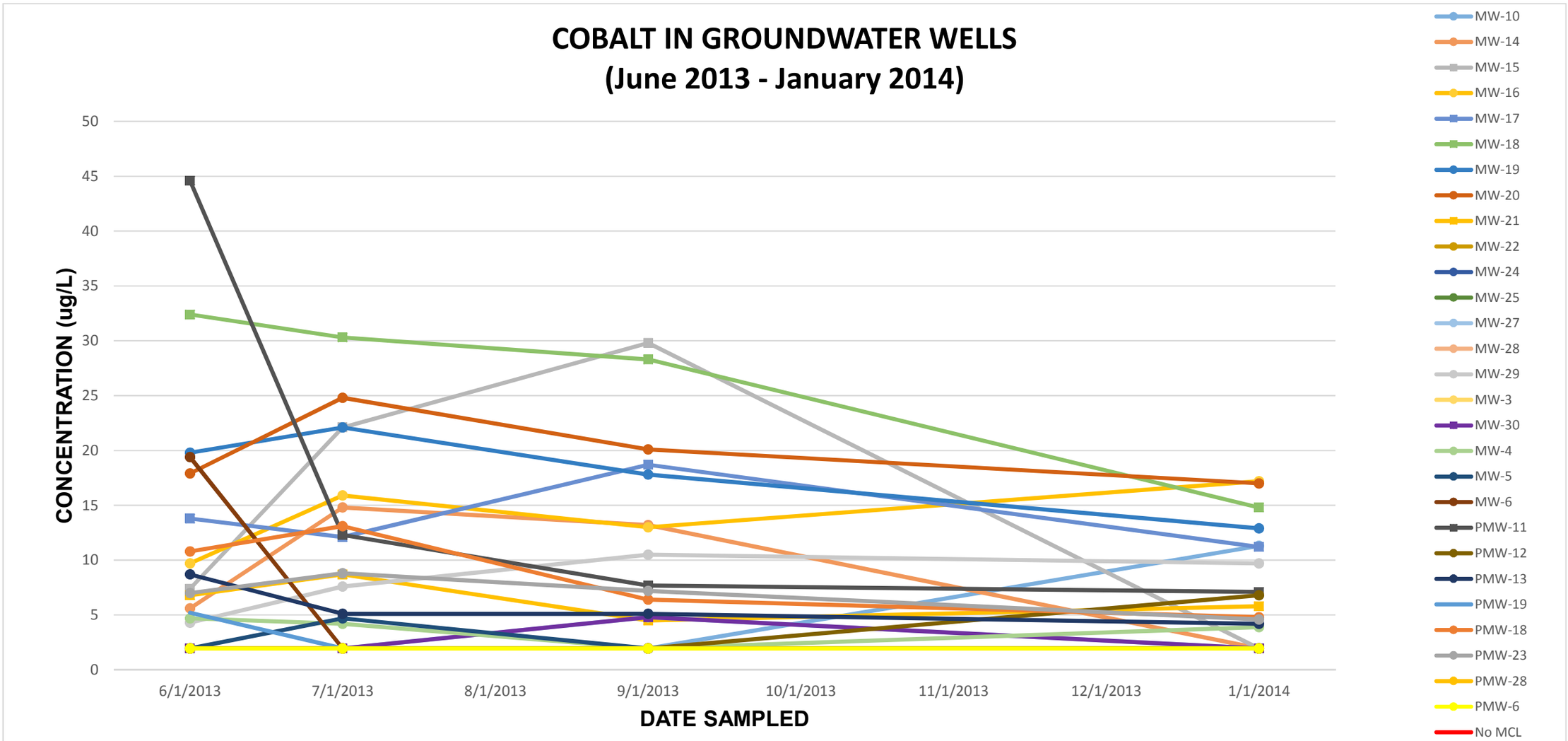

BARIUM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
2000
1500
1000
500
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-25
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MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
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PMW-18
PMW-23
PMW-28
PMW-6
MCL (2000 ug/l)

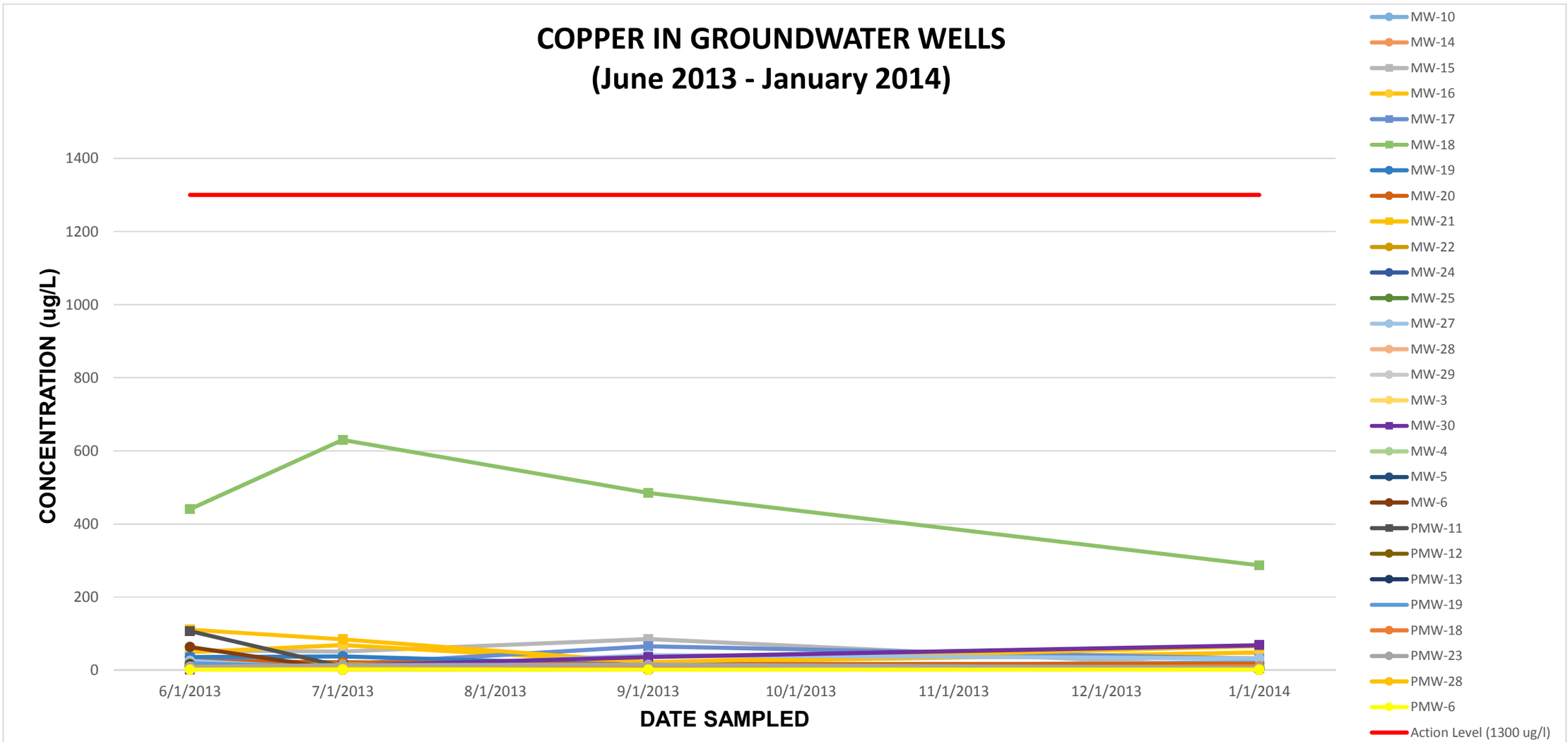

BERYLLIUM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
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PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
MCL (4 ug/l)

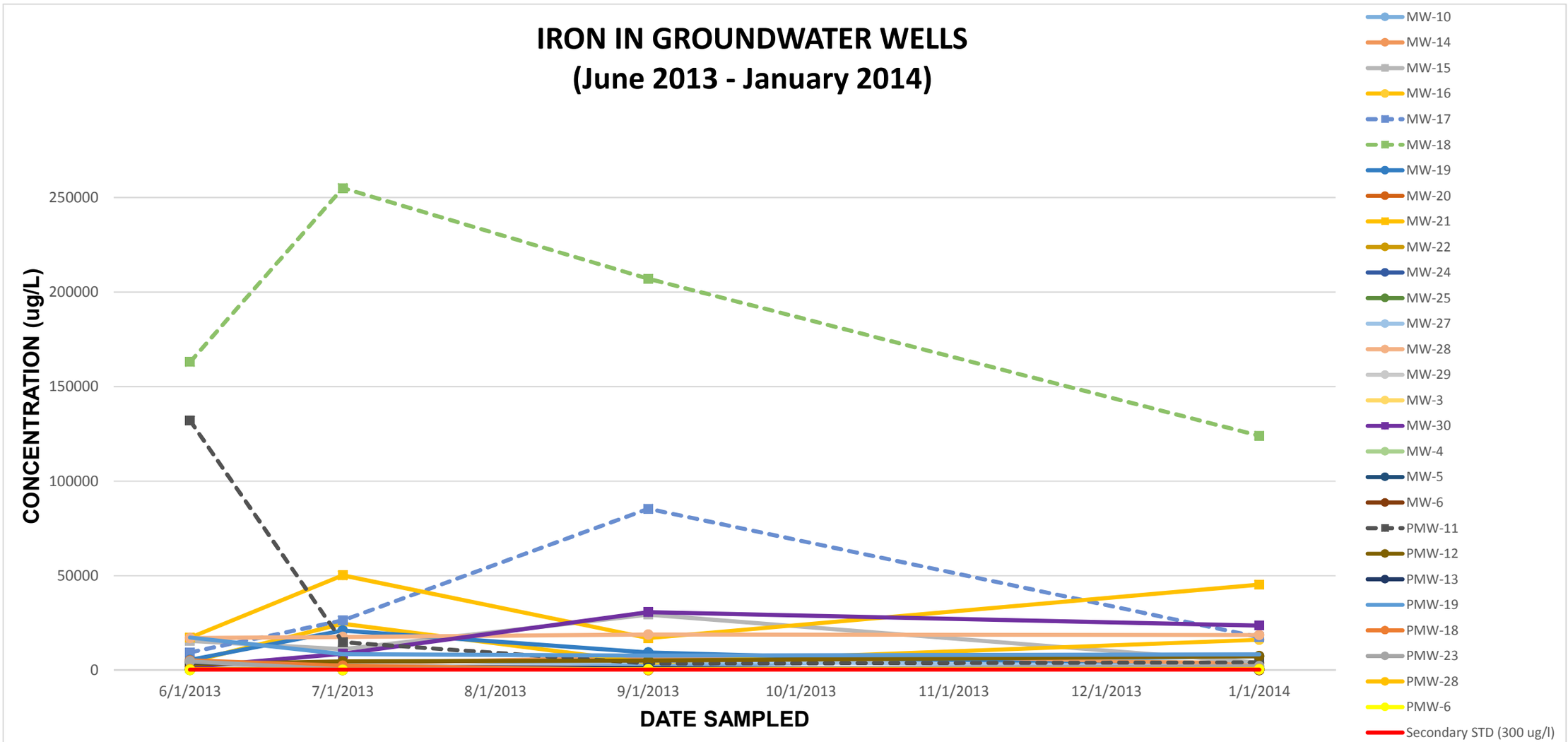

CADMIUM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
20
18
16
14
12
10
8
6
4
2
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-3
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MW-4
MW-5
MW-6
PMW-11
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PMW-18
PMW-23
PMW-28
PMW-6
MCL (5 ug/l)

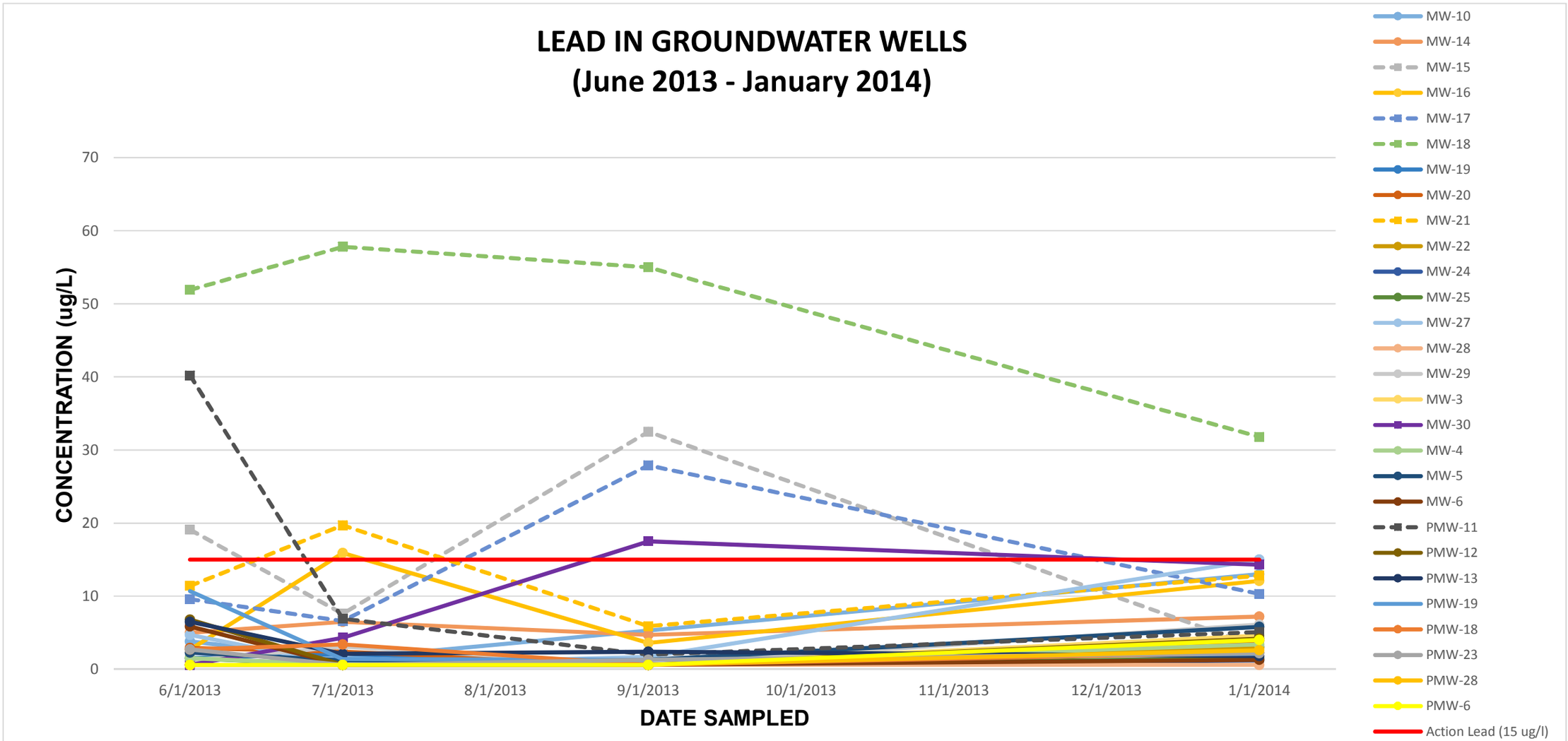

CALCIUM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
70000
60000
50000
40000
30000
20000
10000
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
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MW-6
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PMW-18
PMW-23
PMW-28
PMW-6
No MCL

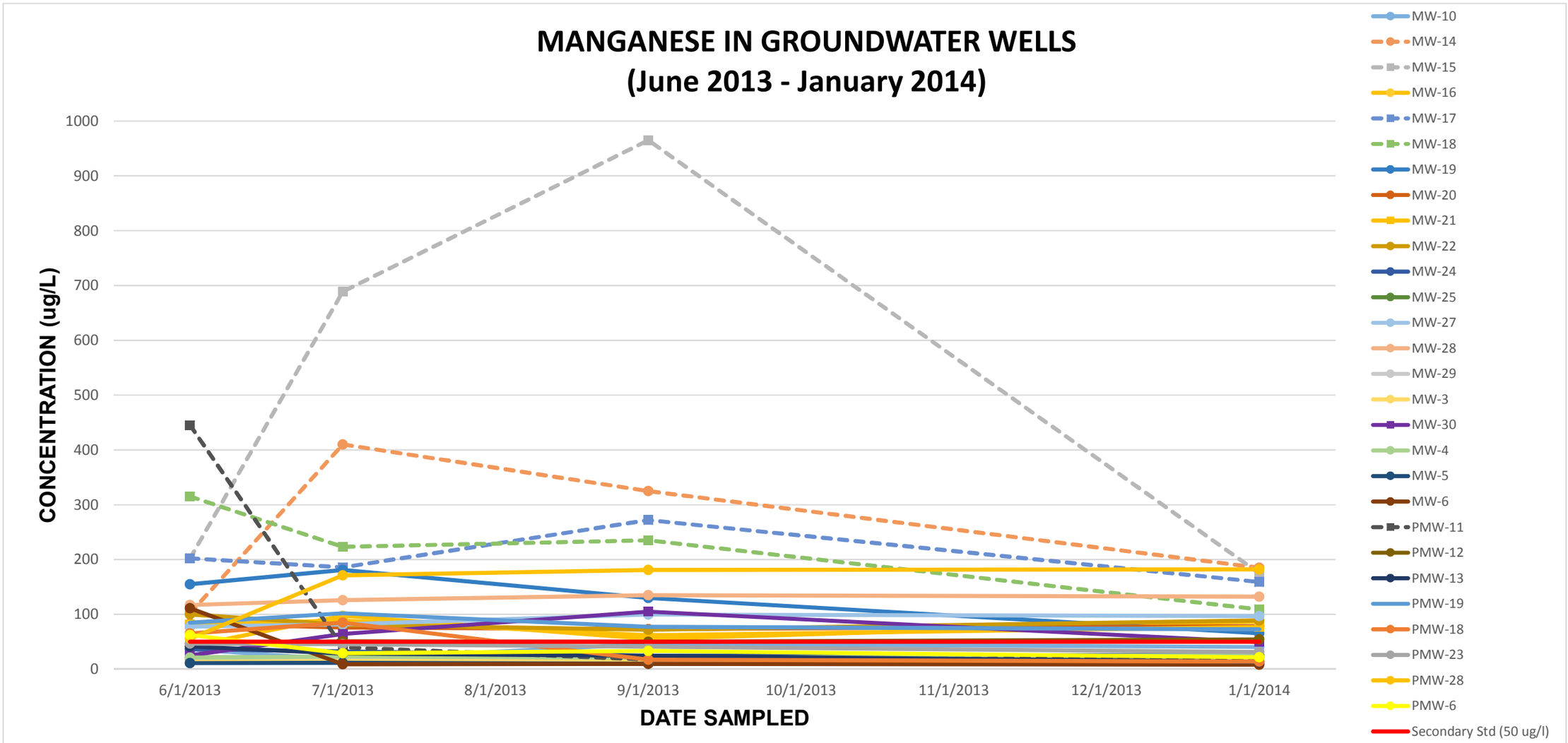

CHROMIUM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
200
150
100
50
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
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MW-5
MW-6
PMW-11
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PMW-18
PMW-23
PMW-28
PMW-6
MCL (100 ug/l)

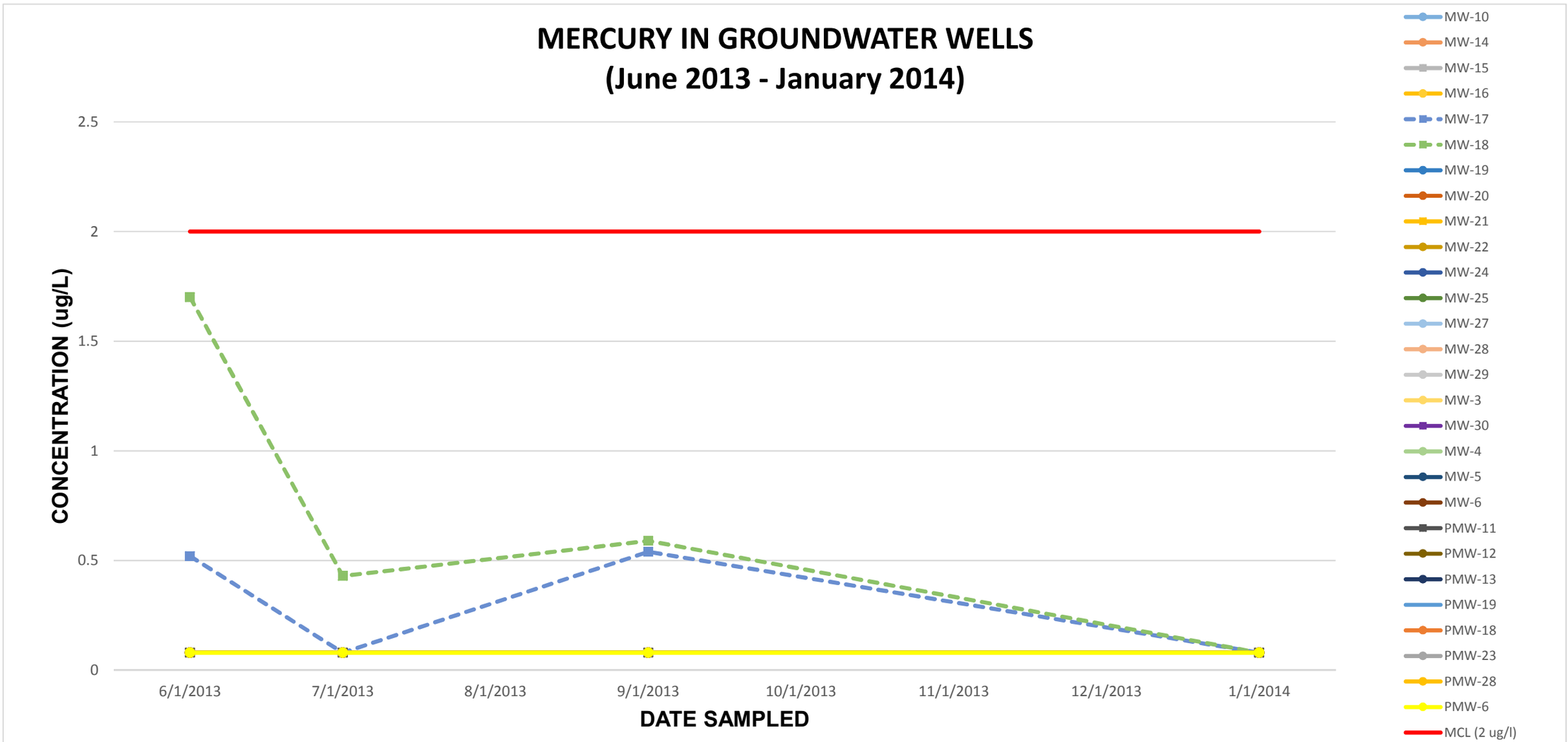

COBALT IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
0
5
10
15
20
25
30
35
40
45
50
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
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MW-5
MW-6
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PMW-6
No MCL

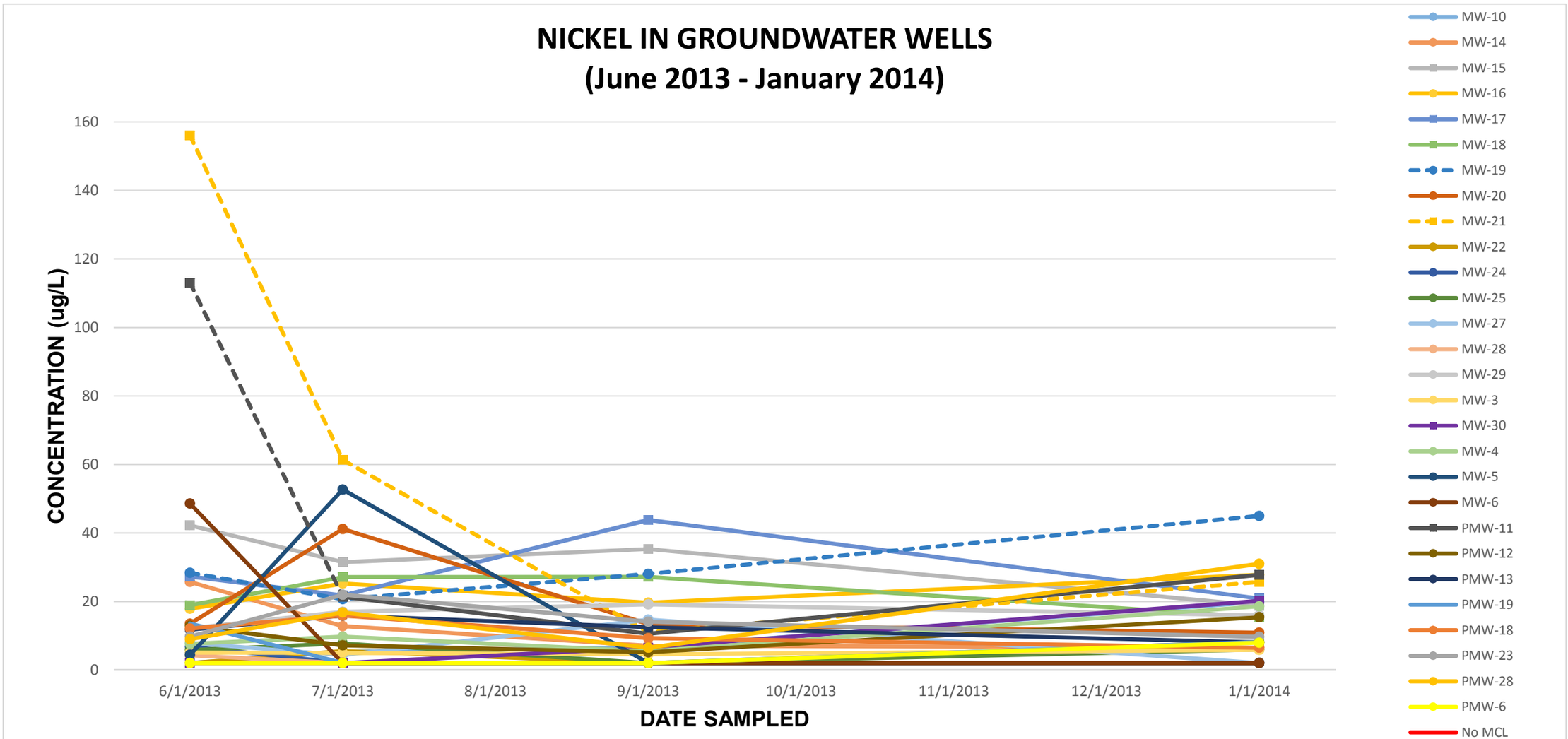

COPPER IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
1400
1200
1000
800
600
400
200
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
Action Level (1300 ug/l)

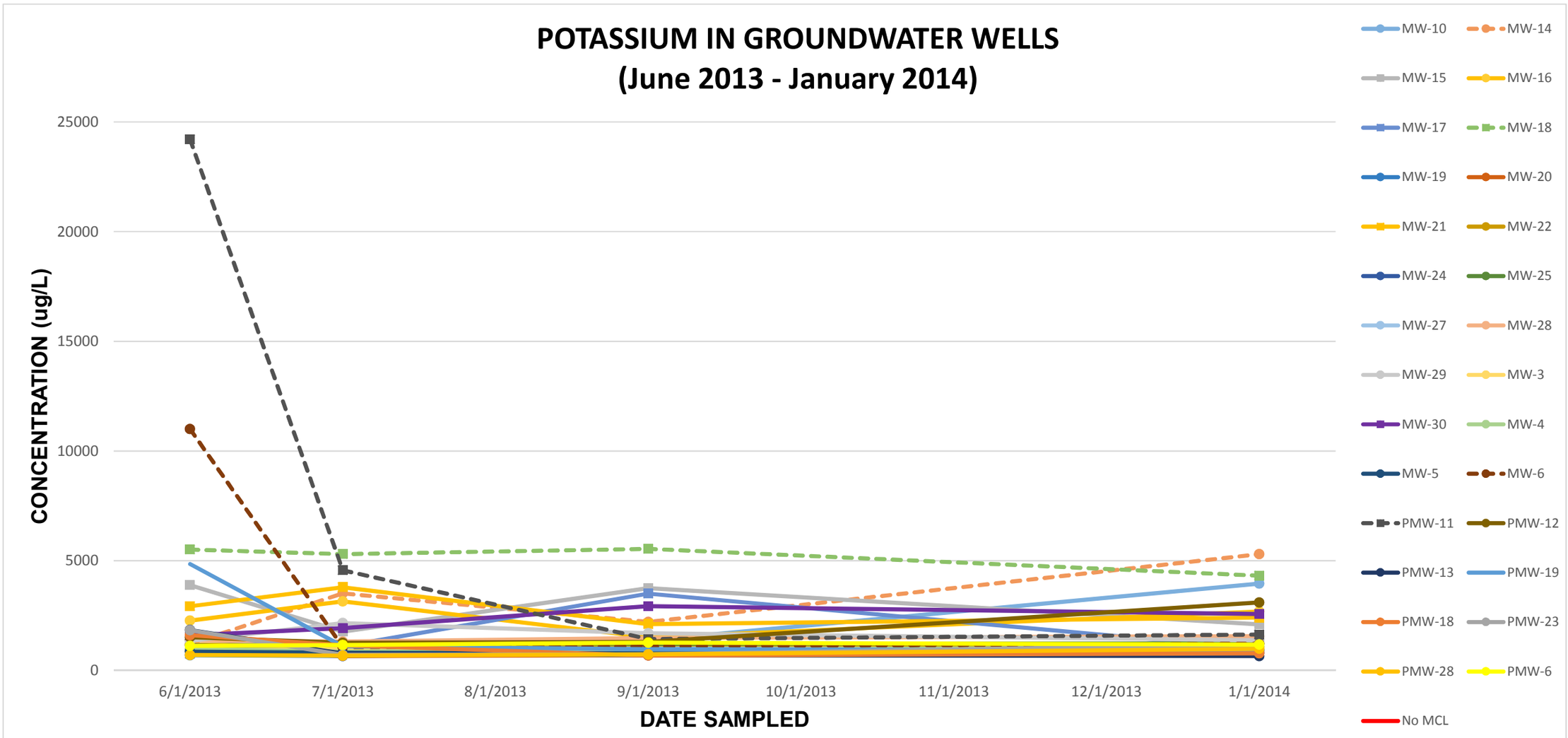

IRON IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
250000
200000
150000
100000
50000
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-24
MW-25
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MW-29
MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
Secondary STD (300 ug/l)

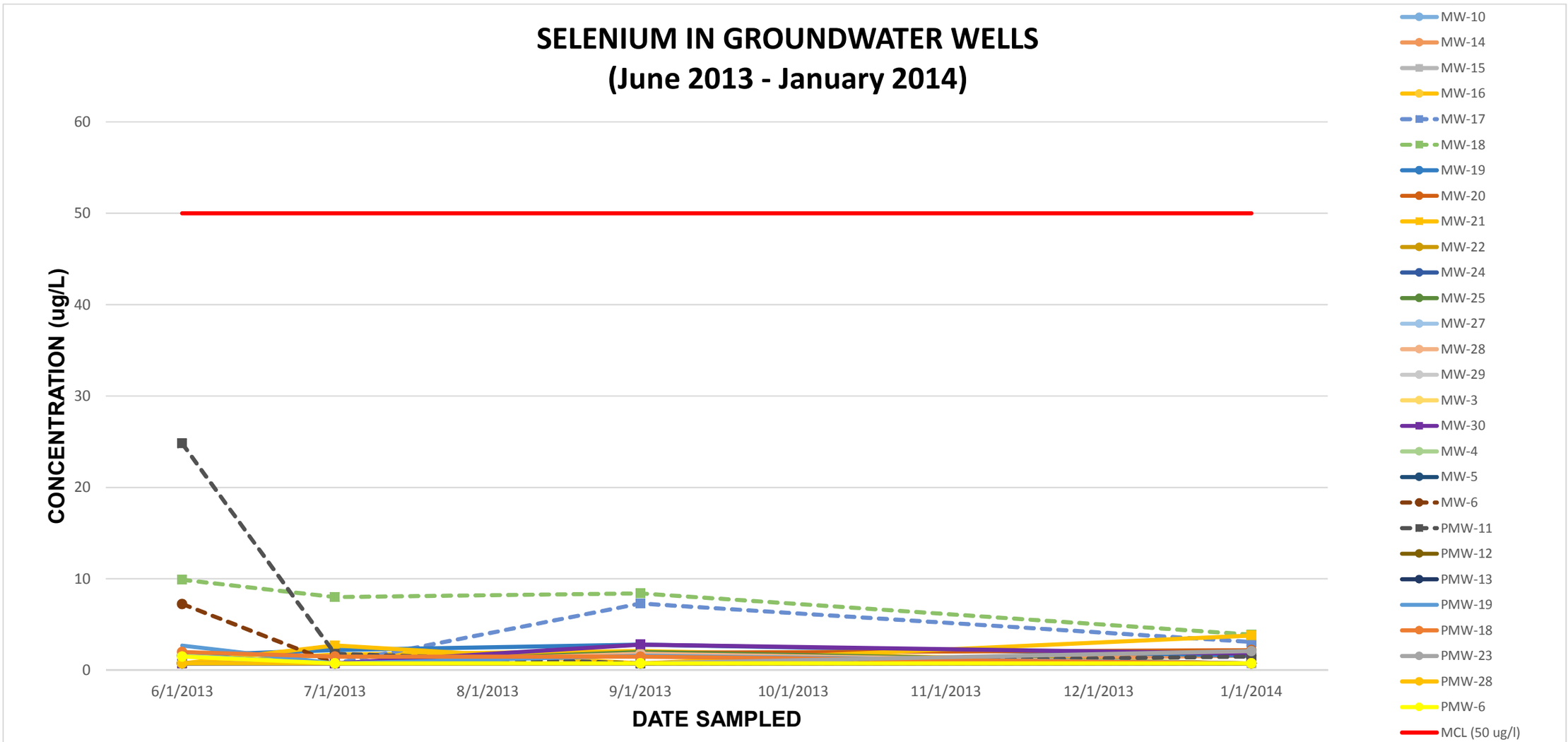

LEAD IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
70
60
50
40
30
20
10
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
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MW-3
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MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
Action Lead (15 ug/l)

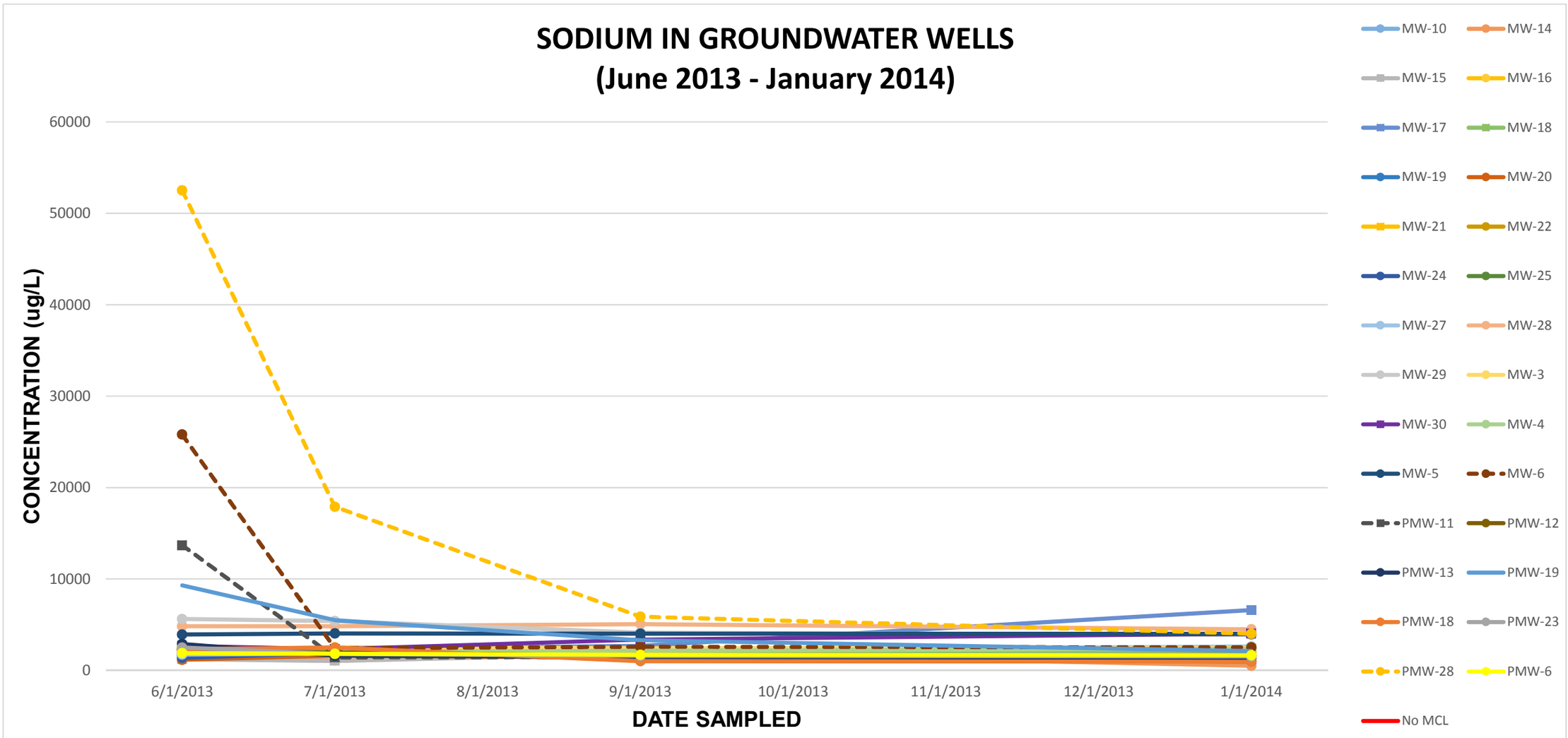

MANGANESE IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
1000
900
800
700
600
500
400
300
200
100
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
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MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
Secondary Std (50 ug/l)

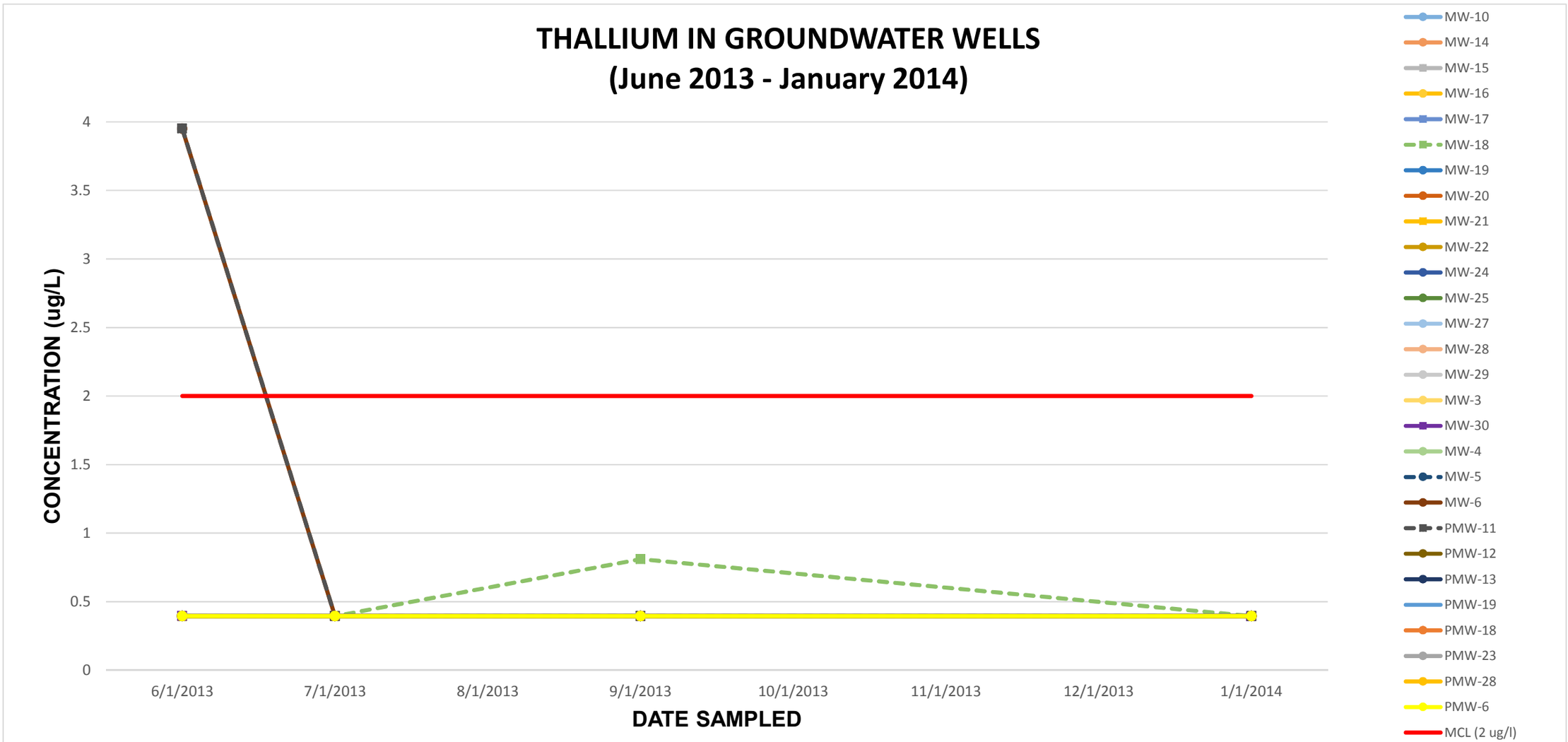

MERCURY IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
2.5
2
1.5
1
0.5
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
MCL (2 ug/l)

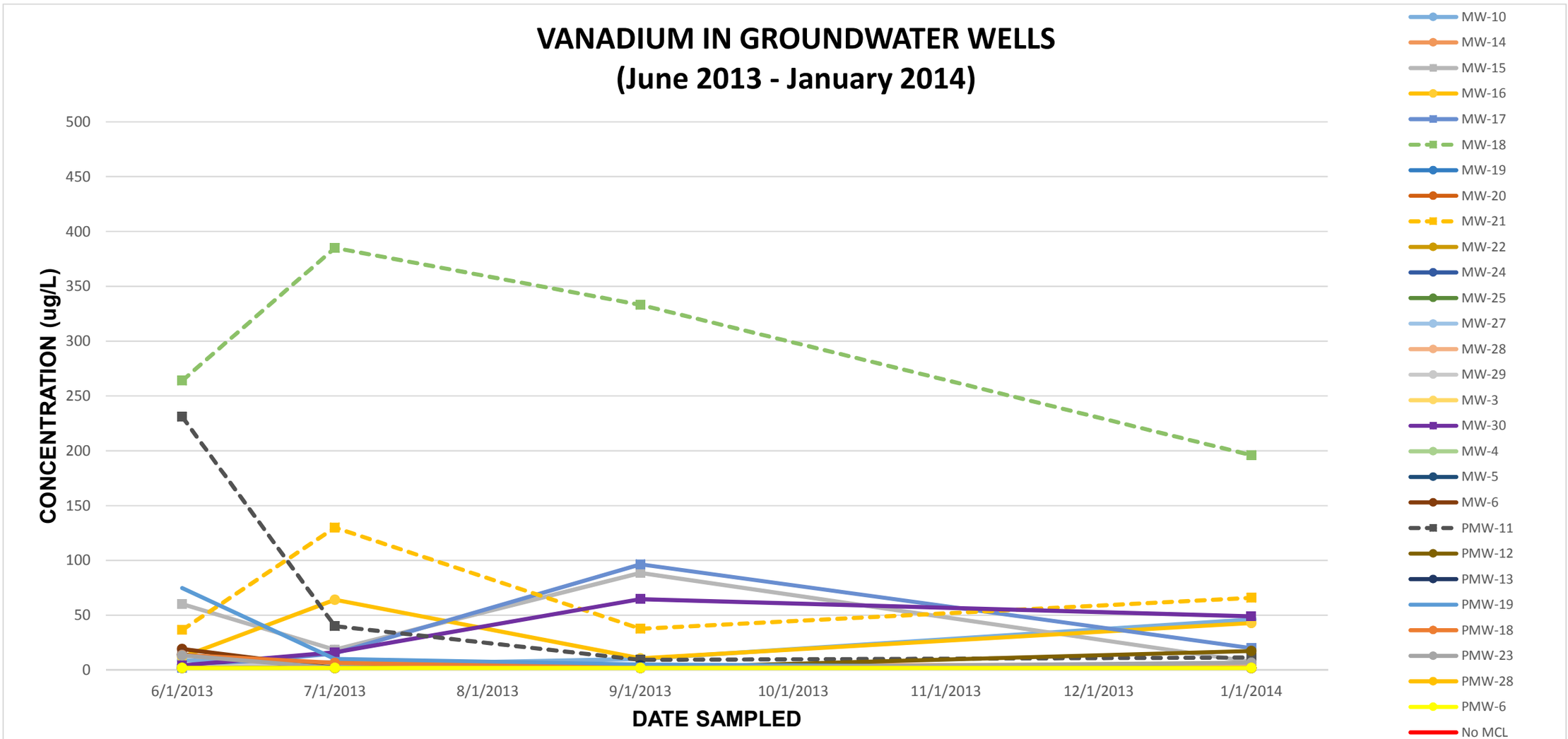

NICKEL IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
160
140
120
100
80
60
40
20
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
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MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
No MCL

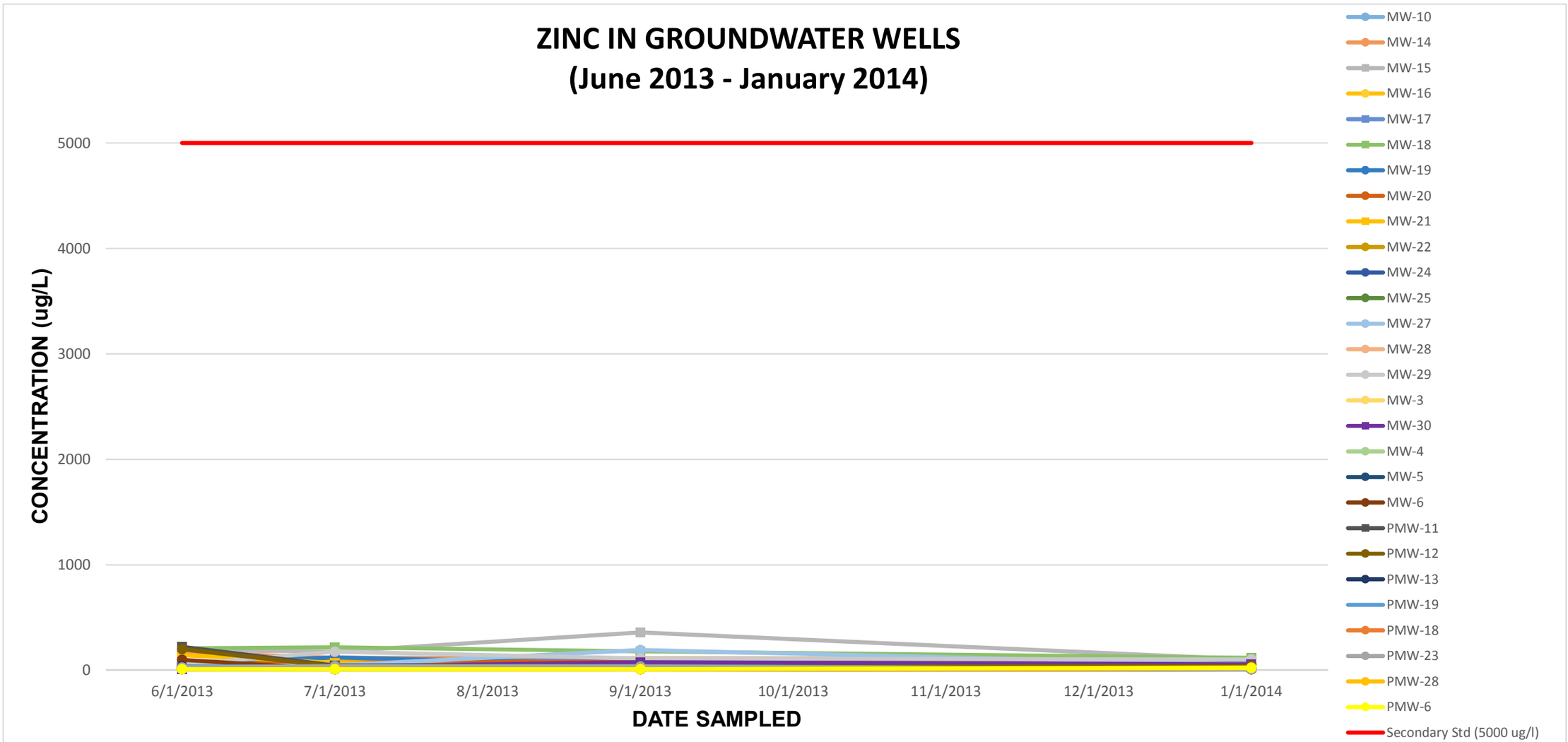

POTASSIUM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
25000
20000
15000
10000
5000
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
MW-16
MW-17
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MW-19
MW-20
MW-21
MW-22
MW-24
MW-25
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
No MCL


SELENIUM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
60
50
40
30
20
10
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-22
MW-24
MW-25
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
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PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
MCL (50 ug/l)

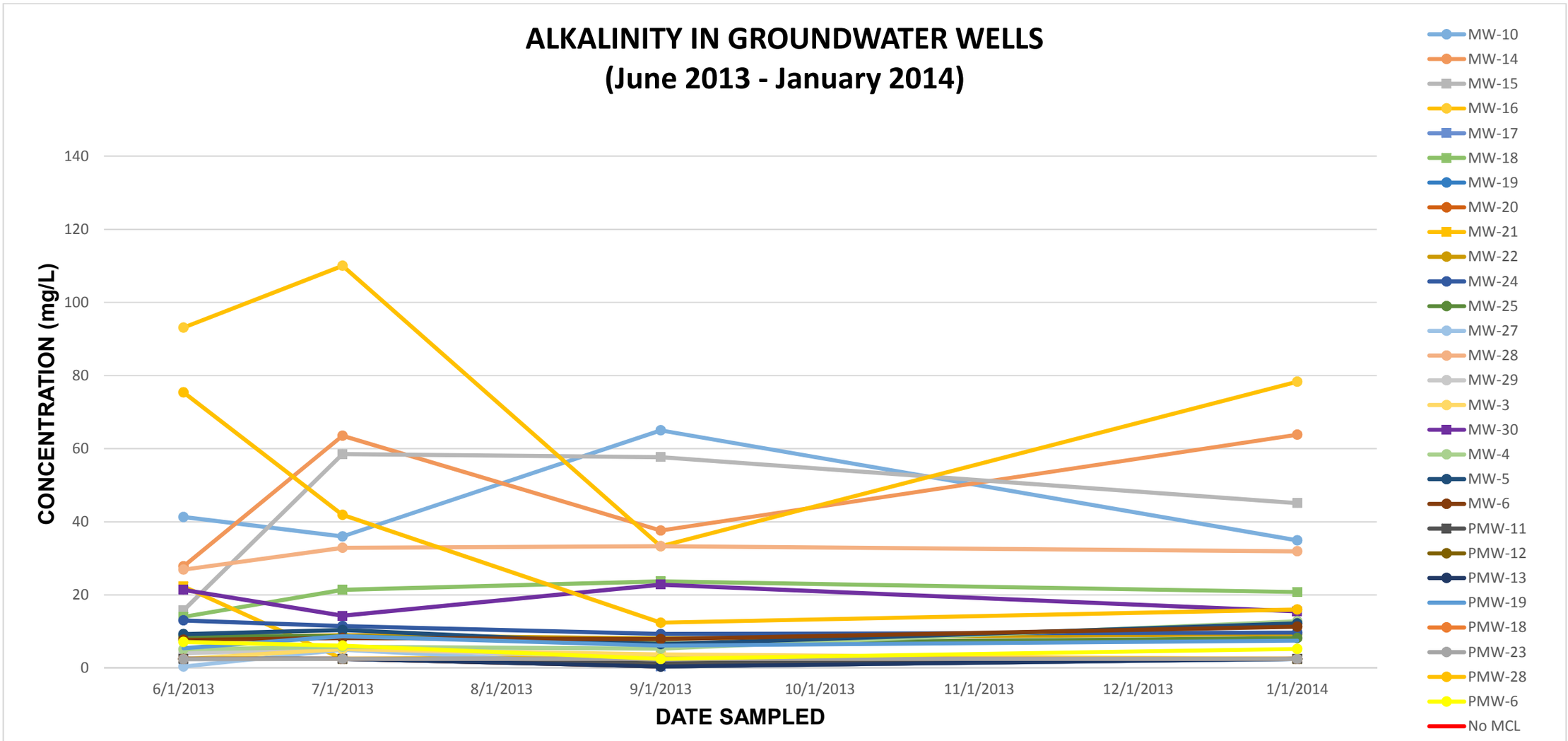

SODIUM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
60000
50000
40000
30000
20000
10000
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
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MW-4
MW-5
MW-6
PMW-11
PMW-12
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PMW-23
PMW-28
PMW-6
No MCL

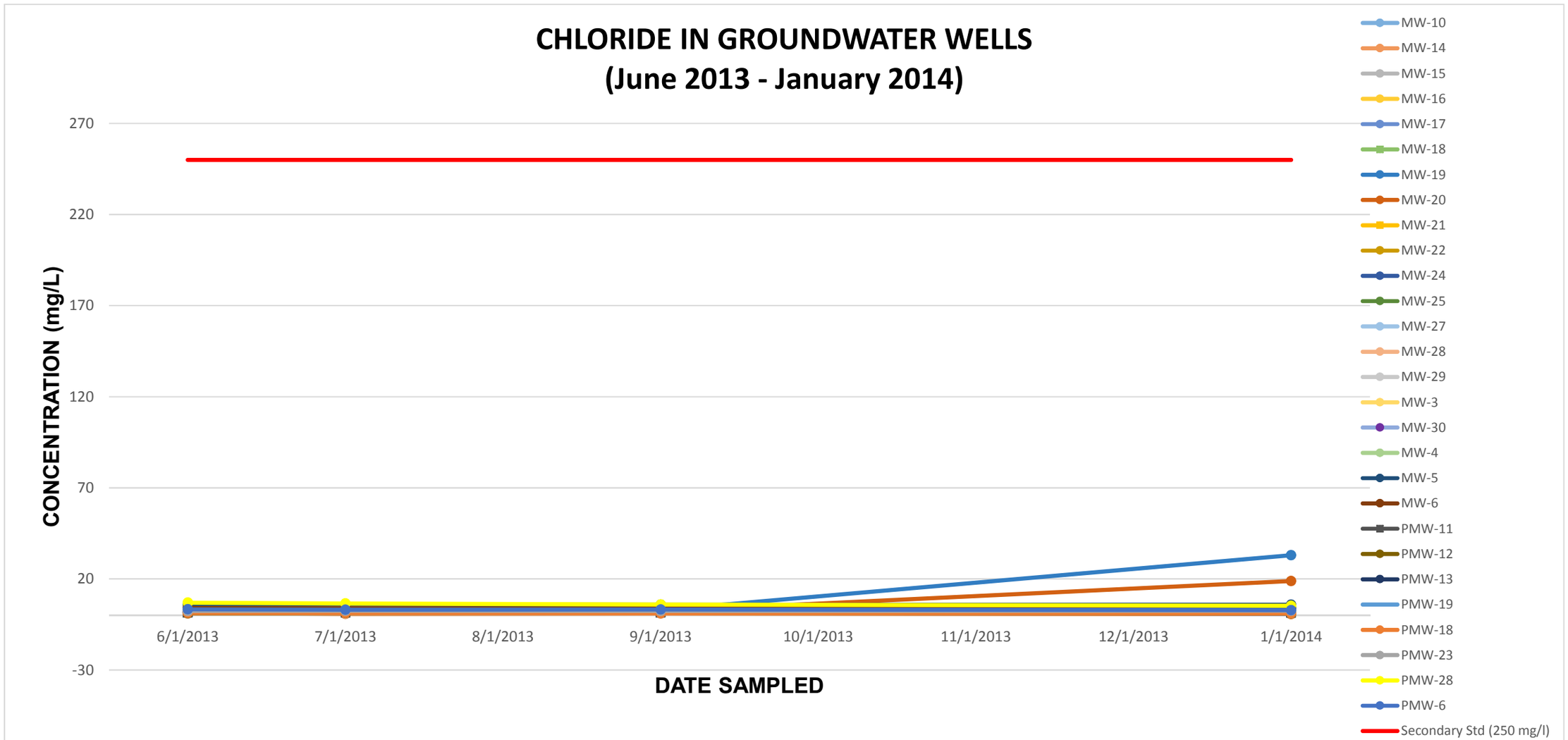

THALLIUM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
4
3.5
3
2.5
2
1.5
1
0.5
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-3
MW-30
MW-4
MW-5
MW-6
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PMW-18
PMW-23
PMW-28
PMW-6
MCL (2 ug/l)

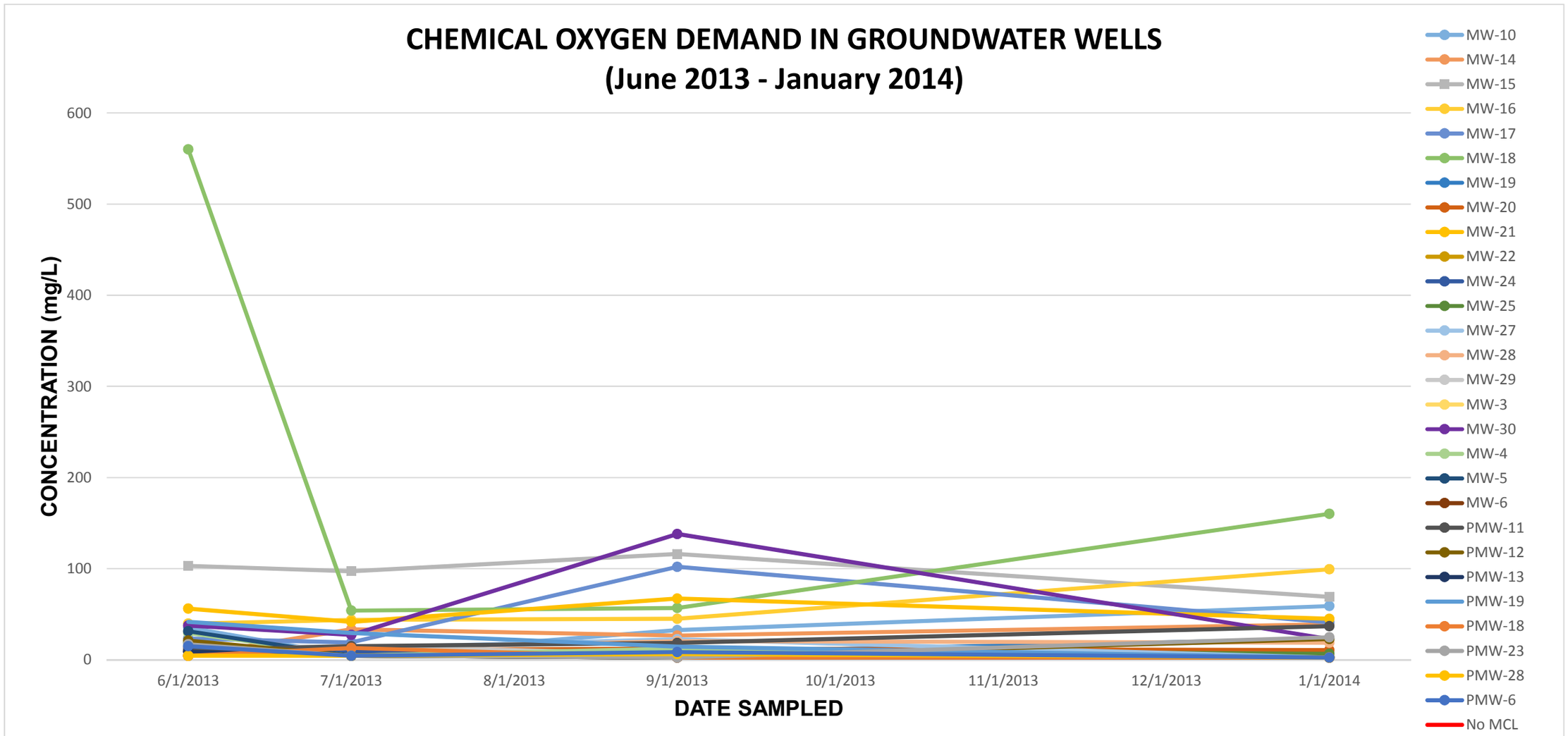

VANADIUM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
500
450
400
350
300
250
200
150
100
50
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-4
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PMW-23
PMW-28
PMW-6
No MCL

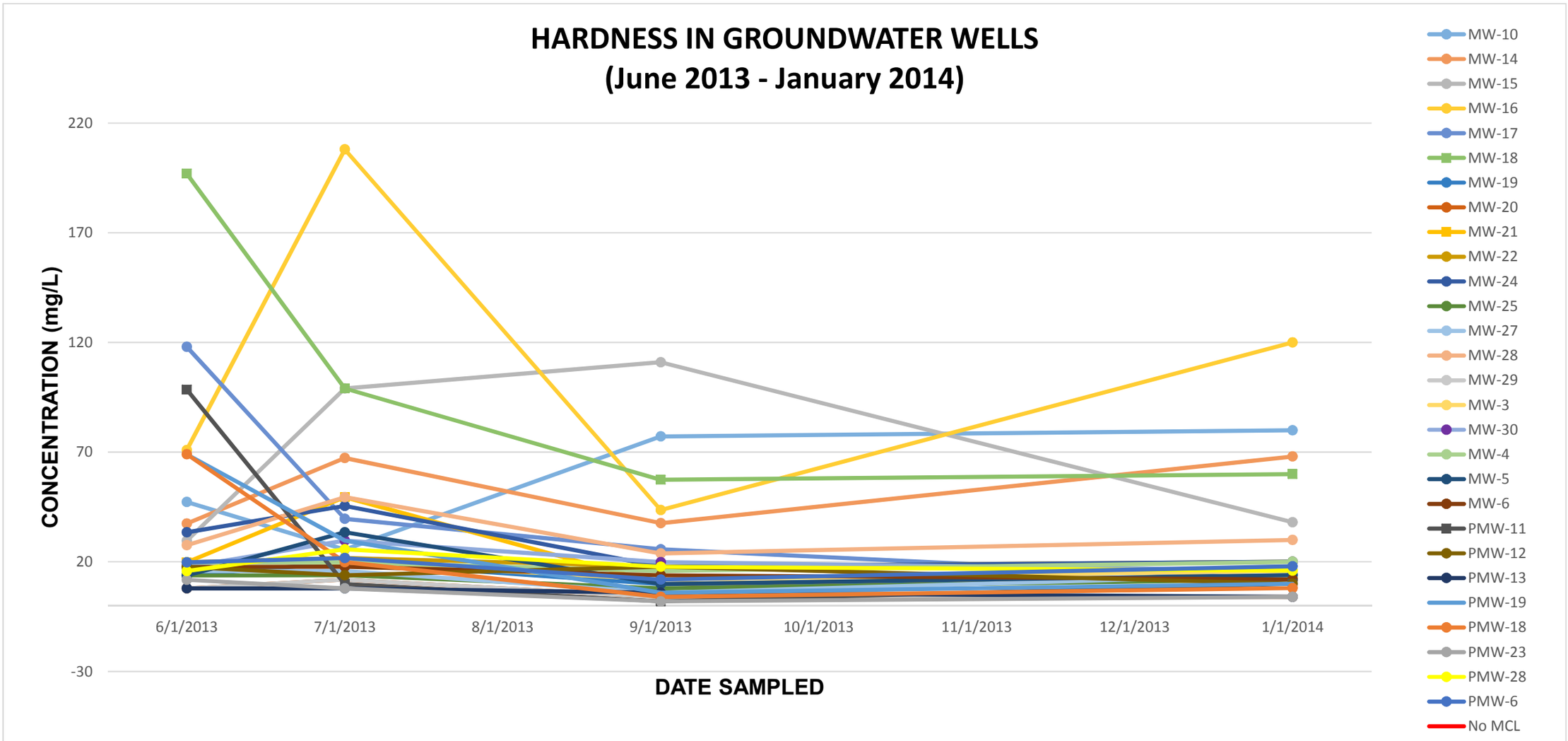

ZINC IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
5000
4000
3000
2000
1000
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
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MW-22
MW-24
MW-25
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
Secondary Std (5000 ug/l)

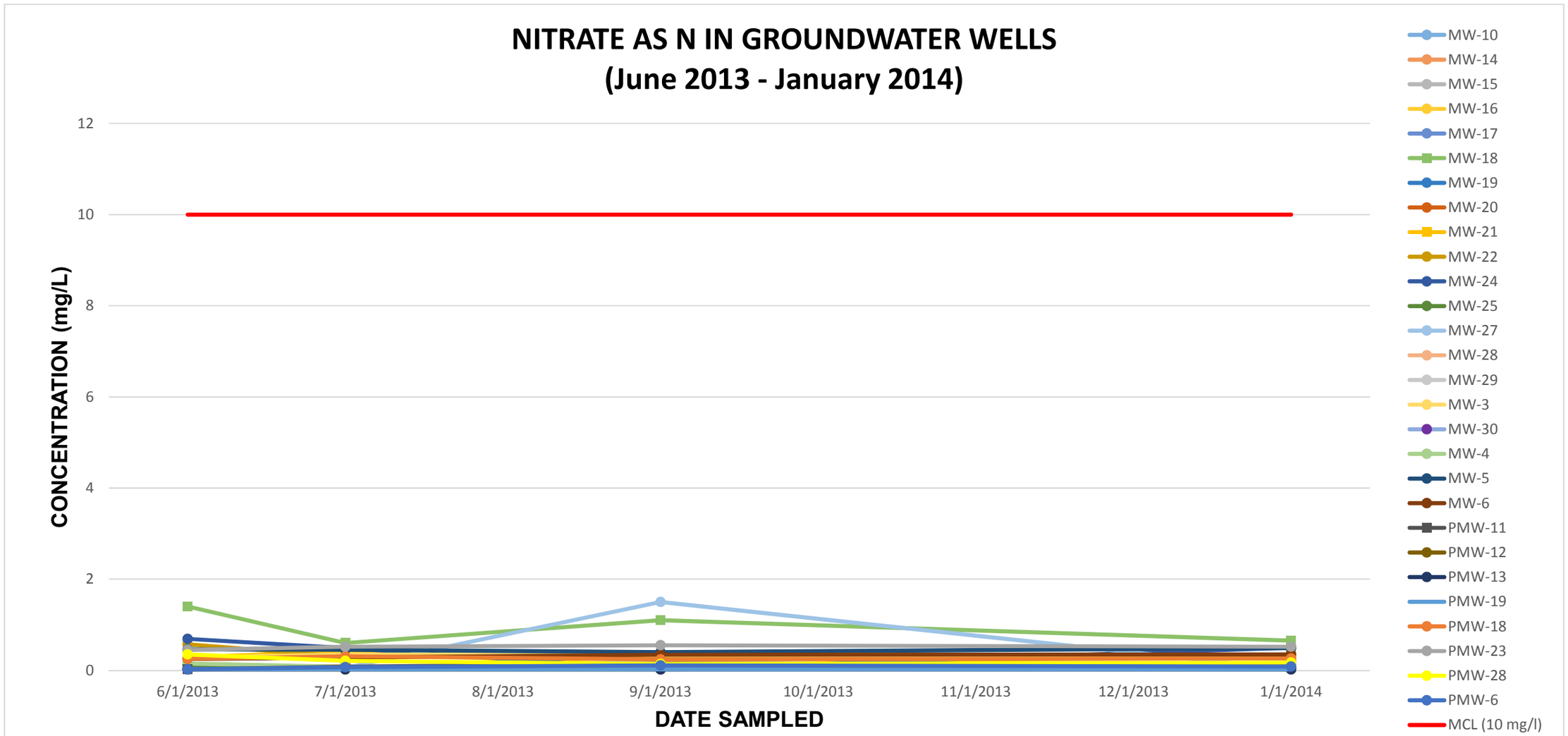
WATER QUALITY PARAMETERS

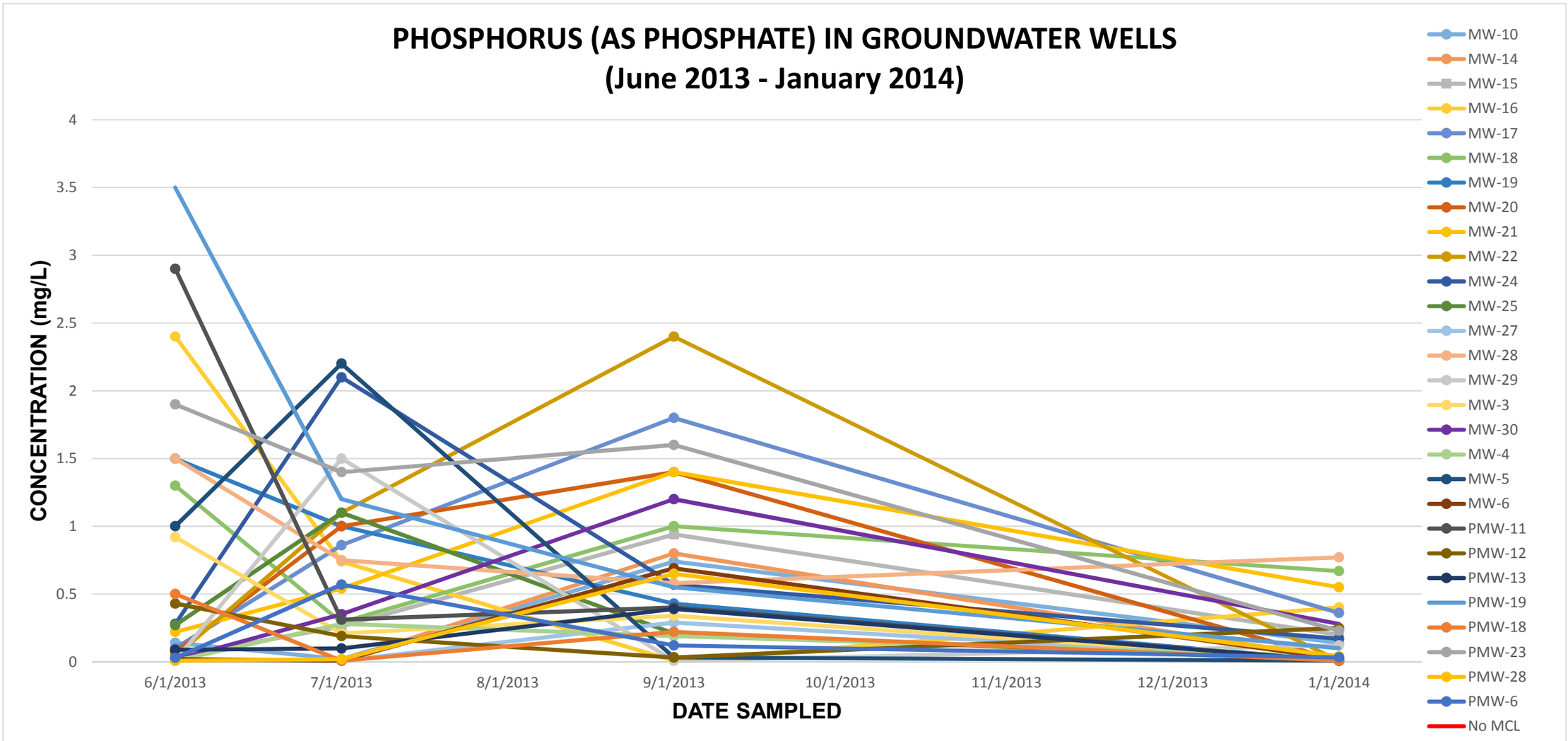

ALKALINITY IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (mg/L)
140
120
100
80
60
40
20
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
No MCL

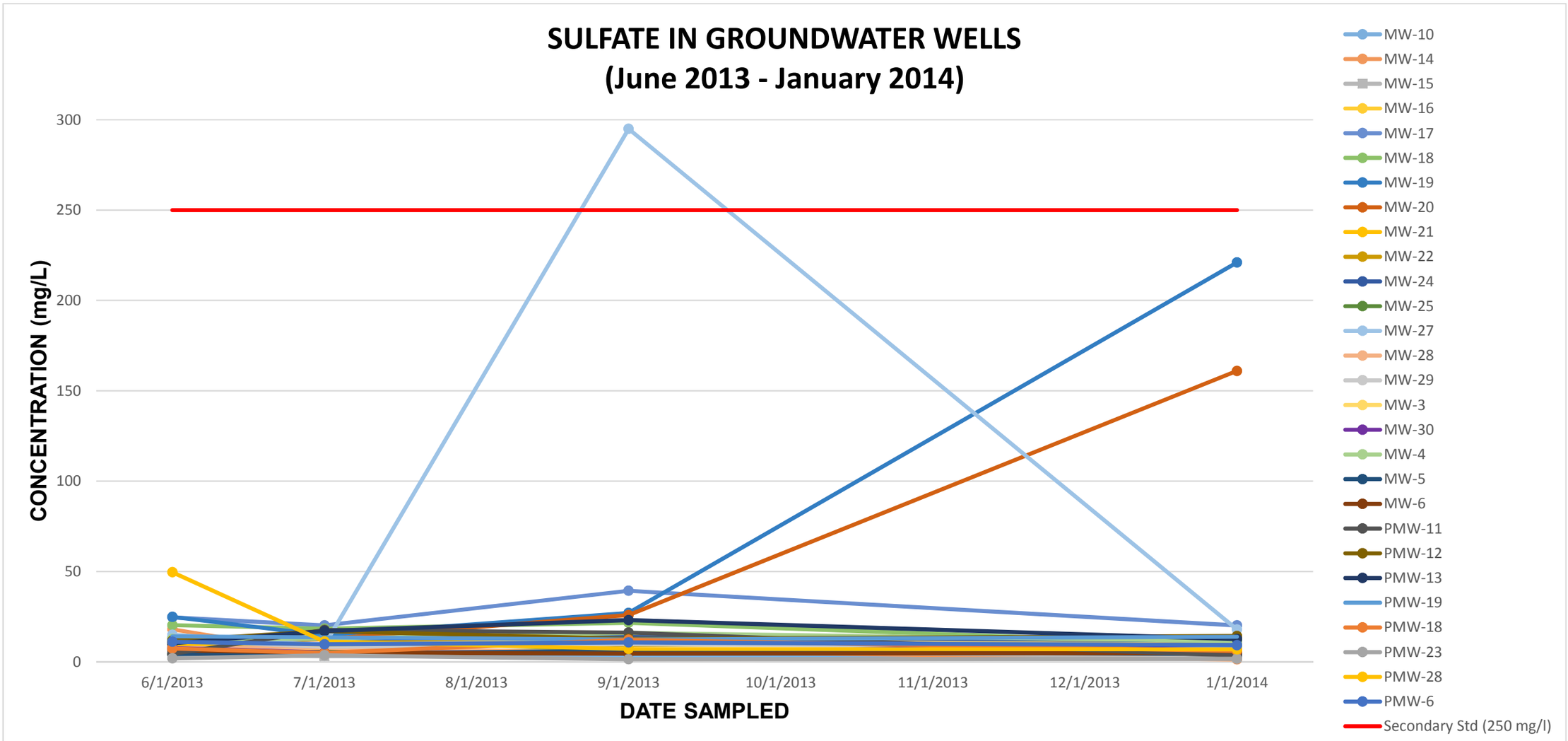

CHLORIDE IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (mg/L)
270
220
170
120
70
20
-30
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
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MW-3
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MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
Secondary Std (250 mg/l)

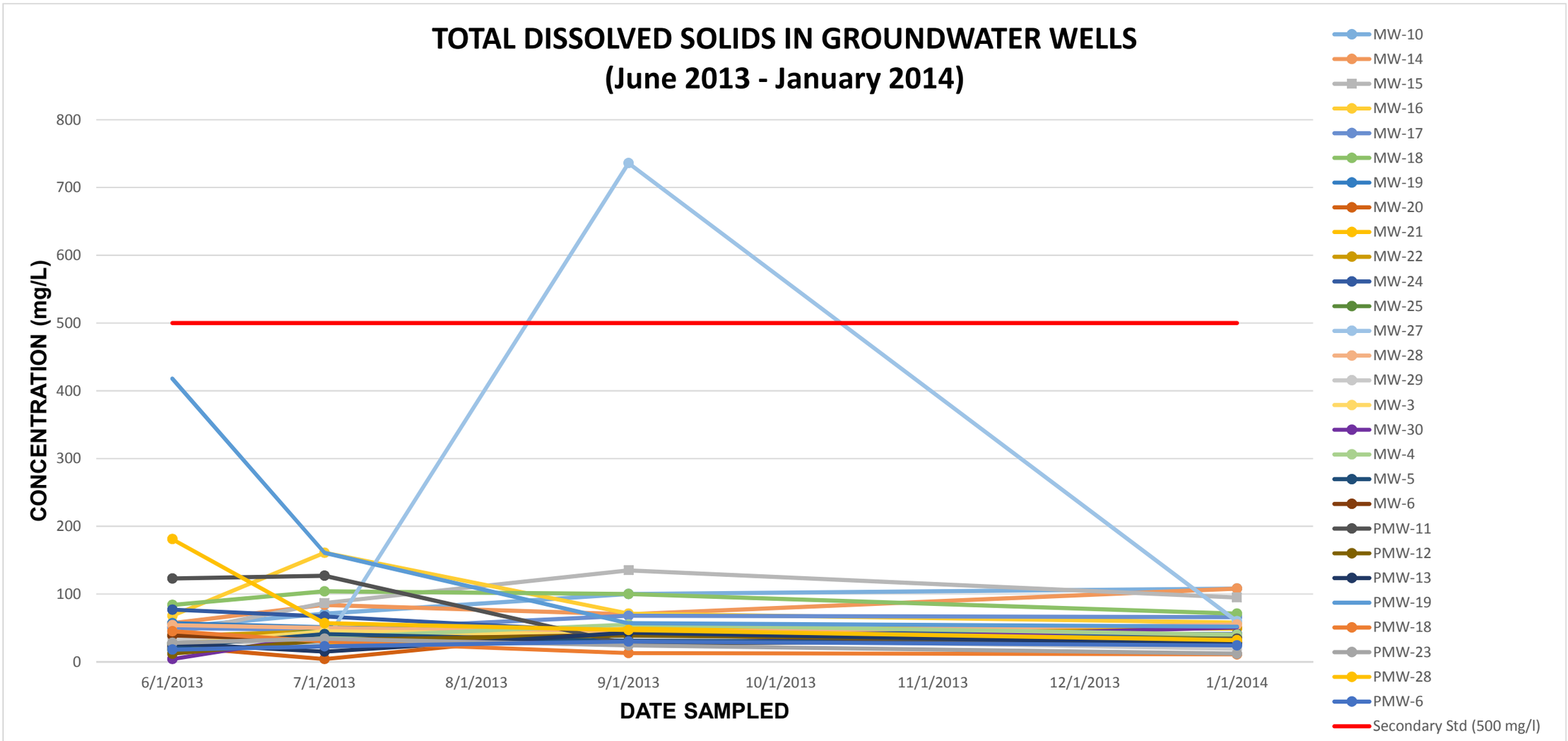

CHEMICAL OXYGEN DEMAND IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (mg/L)
600
500
400
300
200
100
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
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MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
No MCL


HARDNESS IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (mg/L)
220
170
120
70
20
-30
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
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MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-24
MW-25
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MW-28
MW-29
MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
No MCL

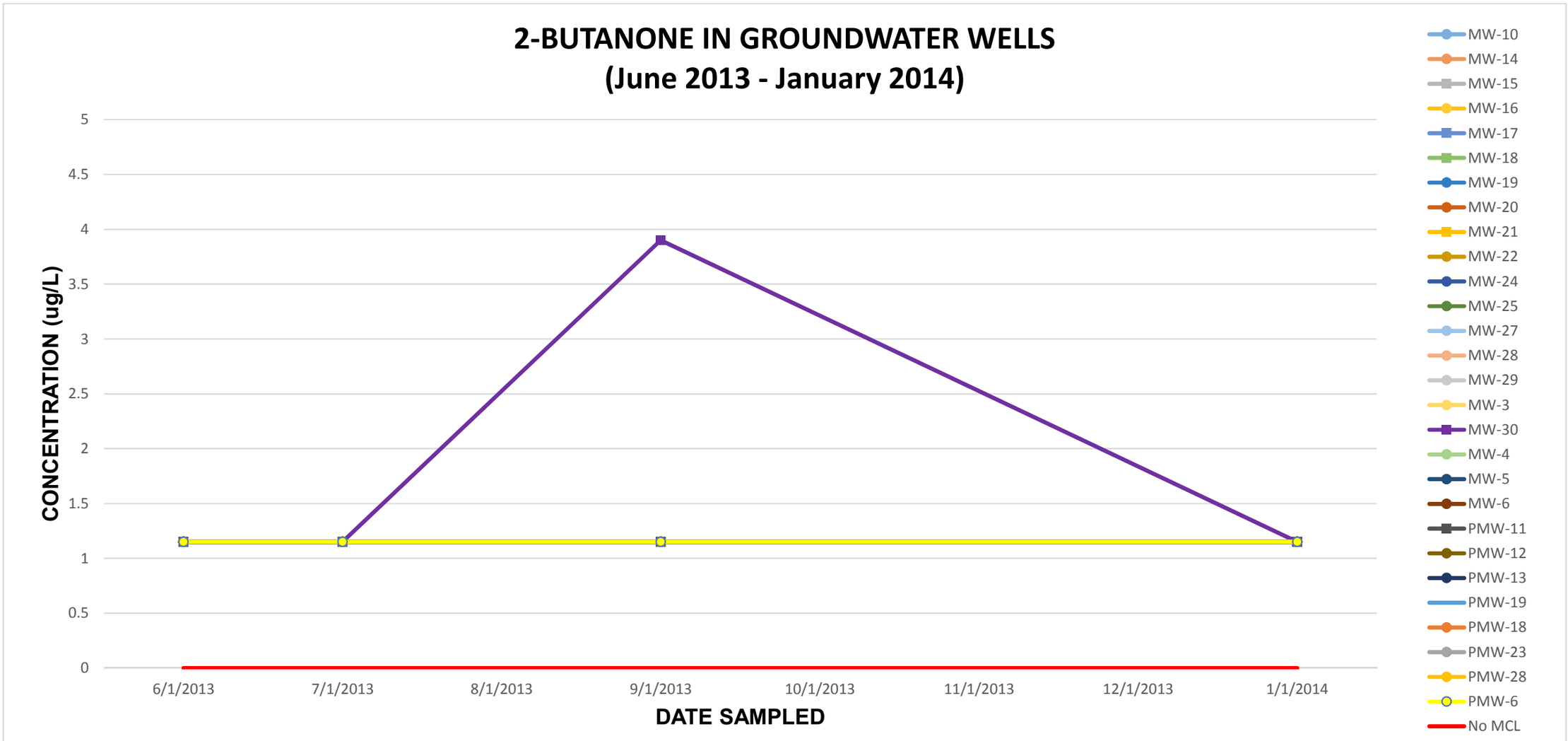

NITRATE AS N IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (mg/L)
12
10
8
6
4
2
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-24
MW-25
MW-27
MW-28
MW-29
MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
MCL (10 mg/l)

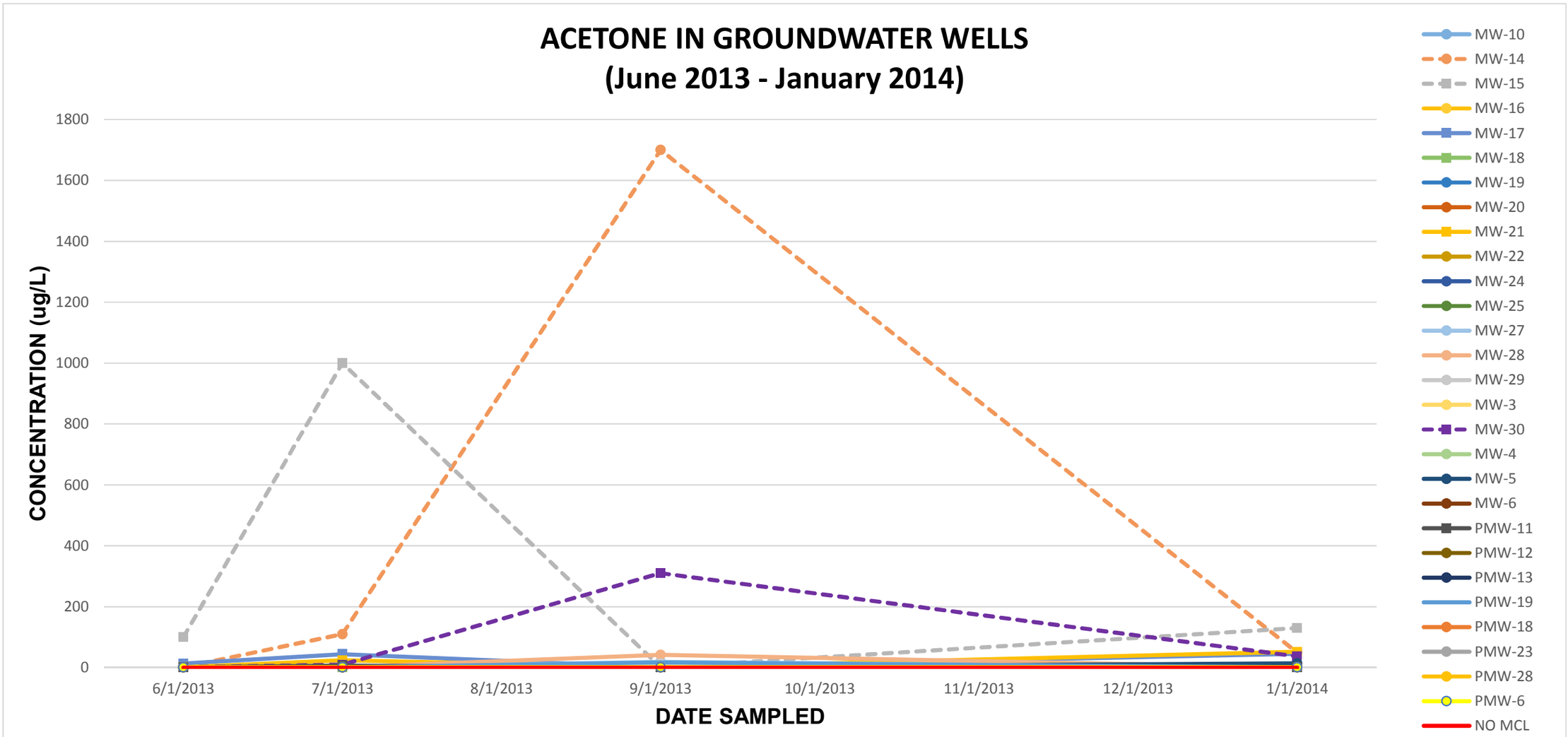

PHOSPHORUS (AS PHOSPHATE) IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (mg/L)
4
3.5
3
2.5
2
1.5
1
0.5
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-24
MW-25
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MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
No MCL

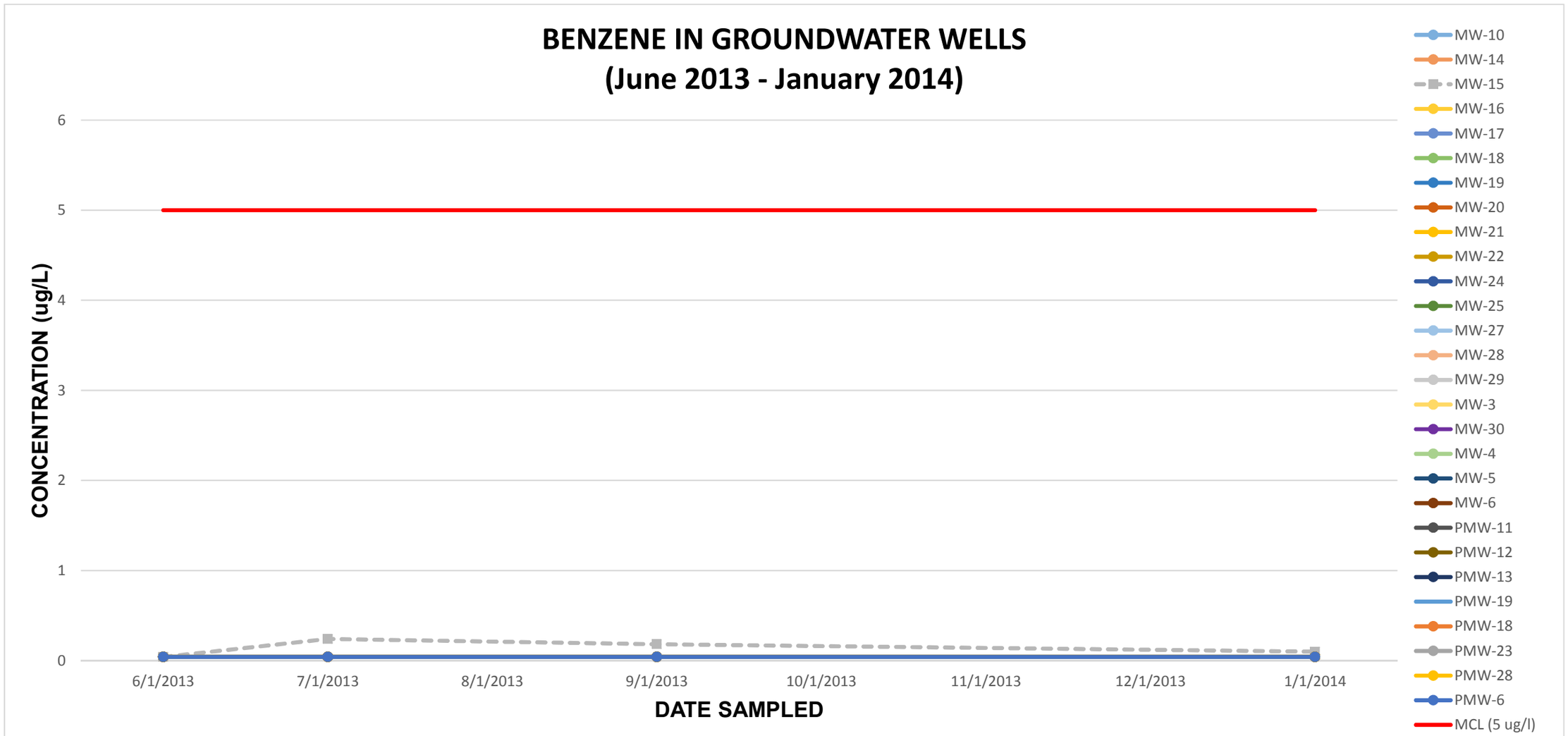

SULFATE IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (mg/L)
300
250
200
150
100
50
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
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MW-19
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MW-22
MW-24
MW-25
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
Secondary Std (250 mg/l)

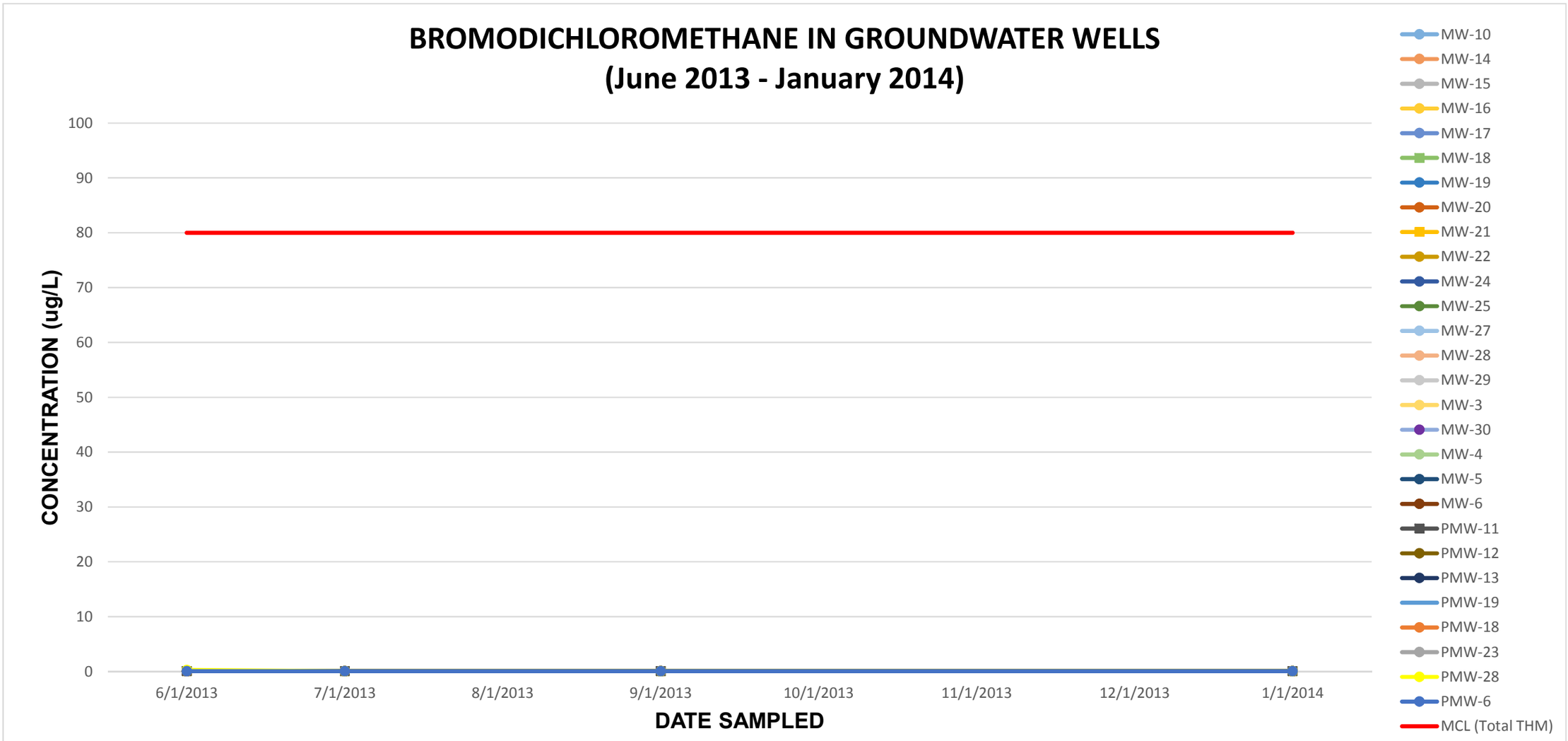

TOTAL DISSOLVED SOLIDS IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (mg/L)
800
700
600
500
400
300
200
100
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
MW-16
MW-17
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MW-22
MW-24
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
Secondary Std (500 mg/l)

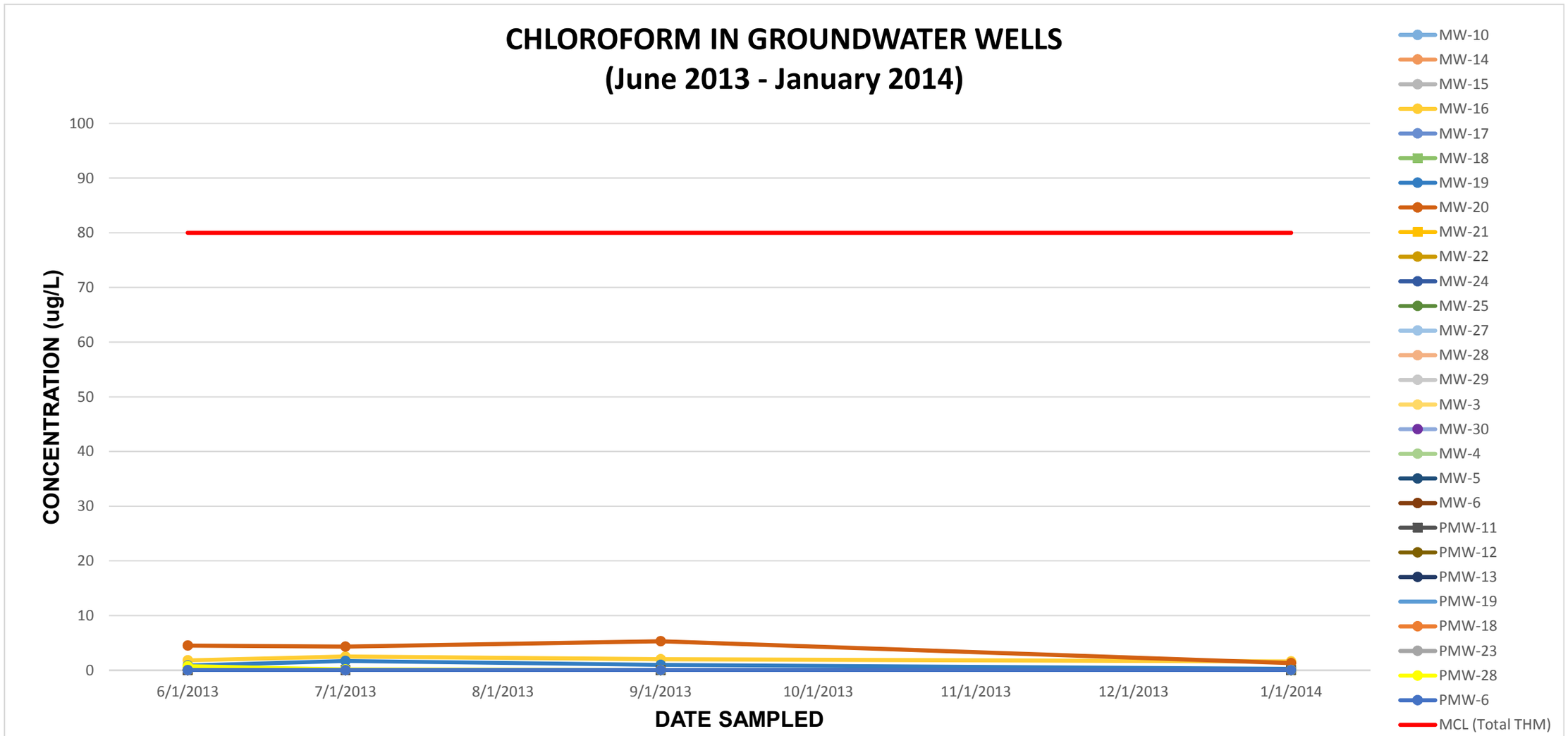
VOLATILE ORGANIC COMPOUNDS

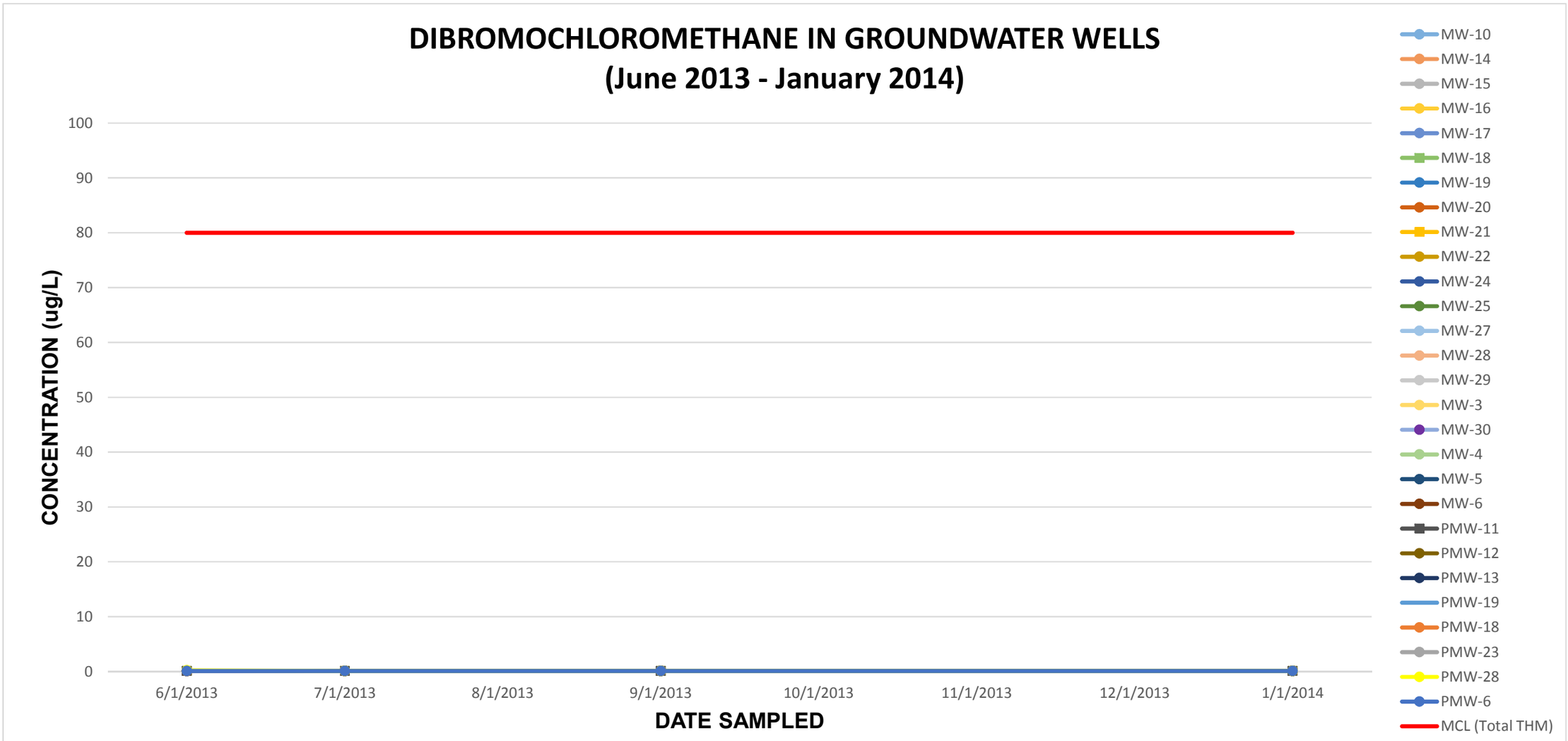

2-BUTANONE IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
No MCL

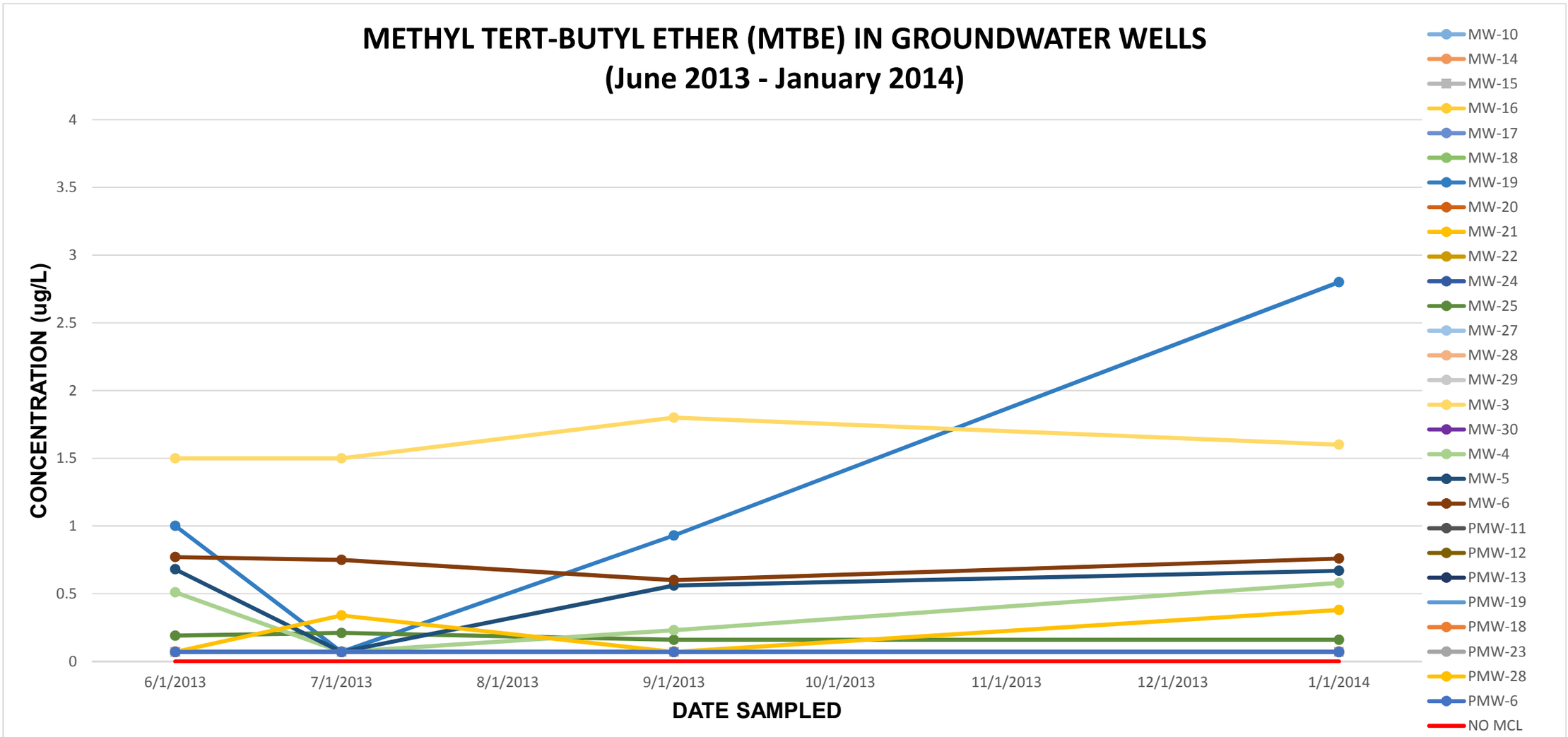

ACETONE IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
1800
1600
1400
1200
1000
800
600
400
200
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-24
MW-25
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
NO MCL

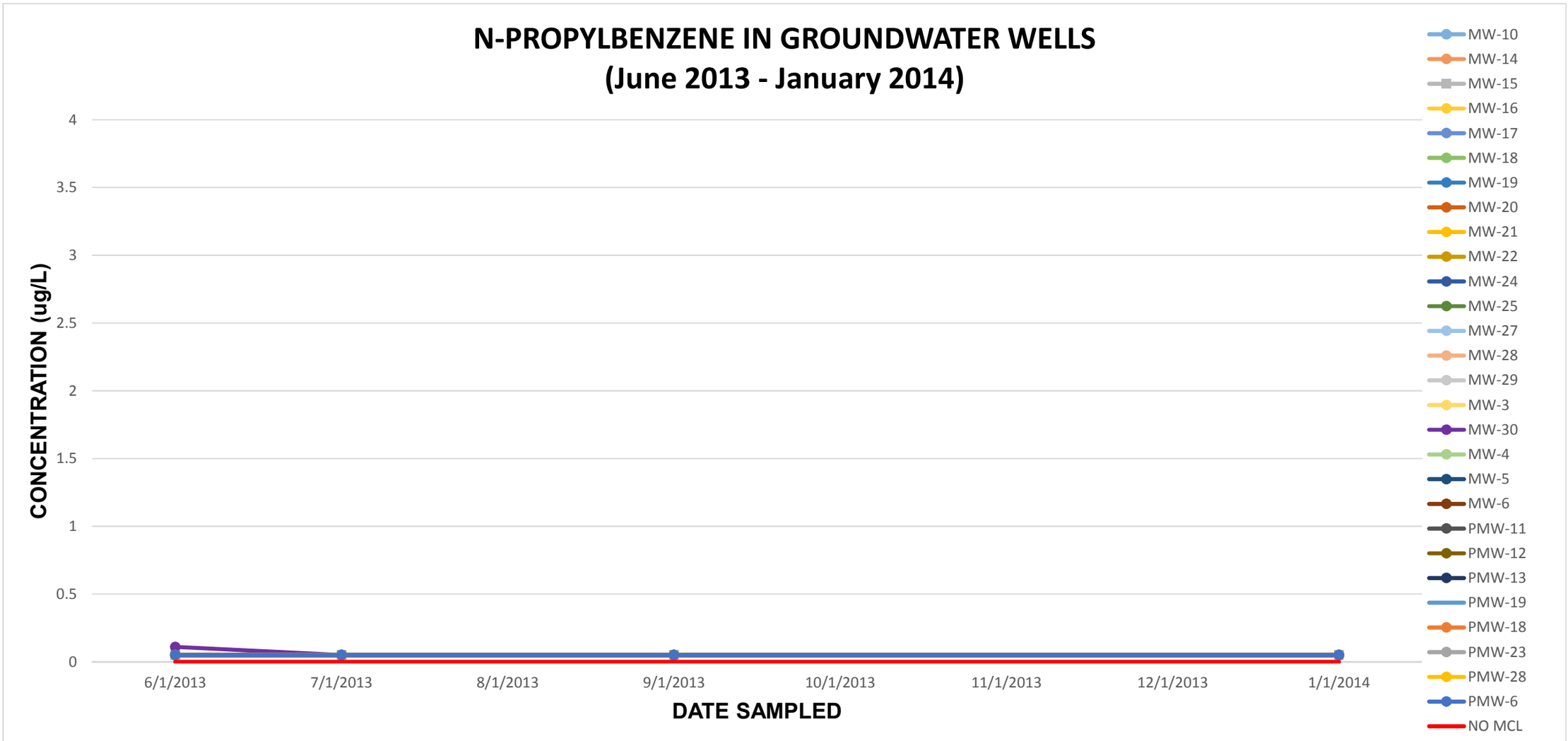

BENZENE IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
0
1
2
3
4
5
6
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
MCL (5 ug/l)

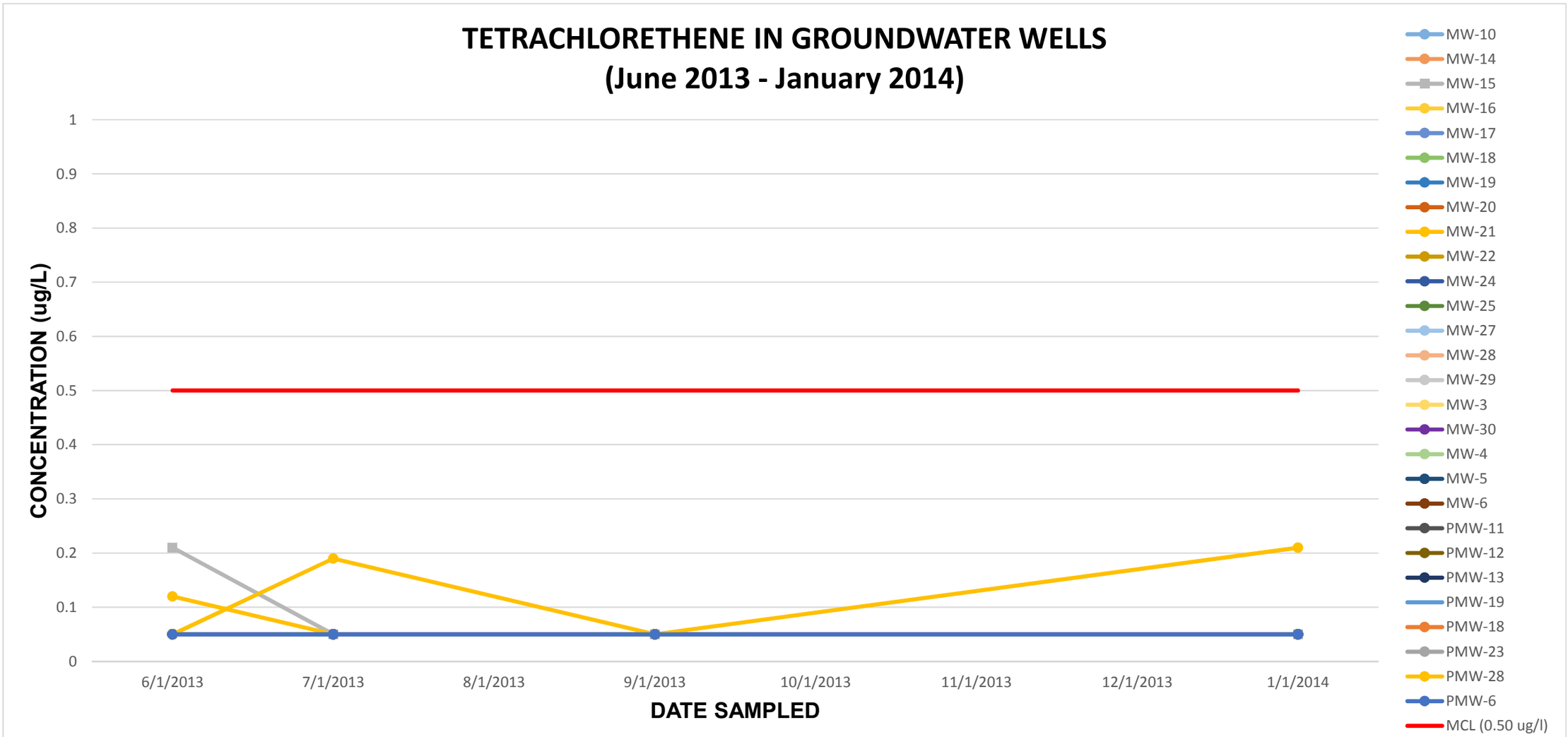

BROMODICHLOROMETHANE IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
100
90
80
70
60
50
40
30
20
10
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-3
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MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
MCL (Total THM)

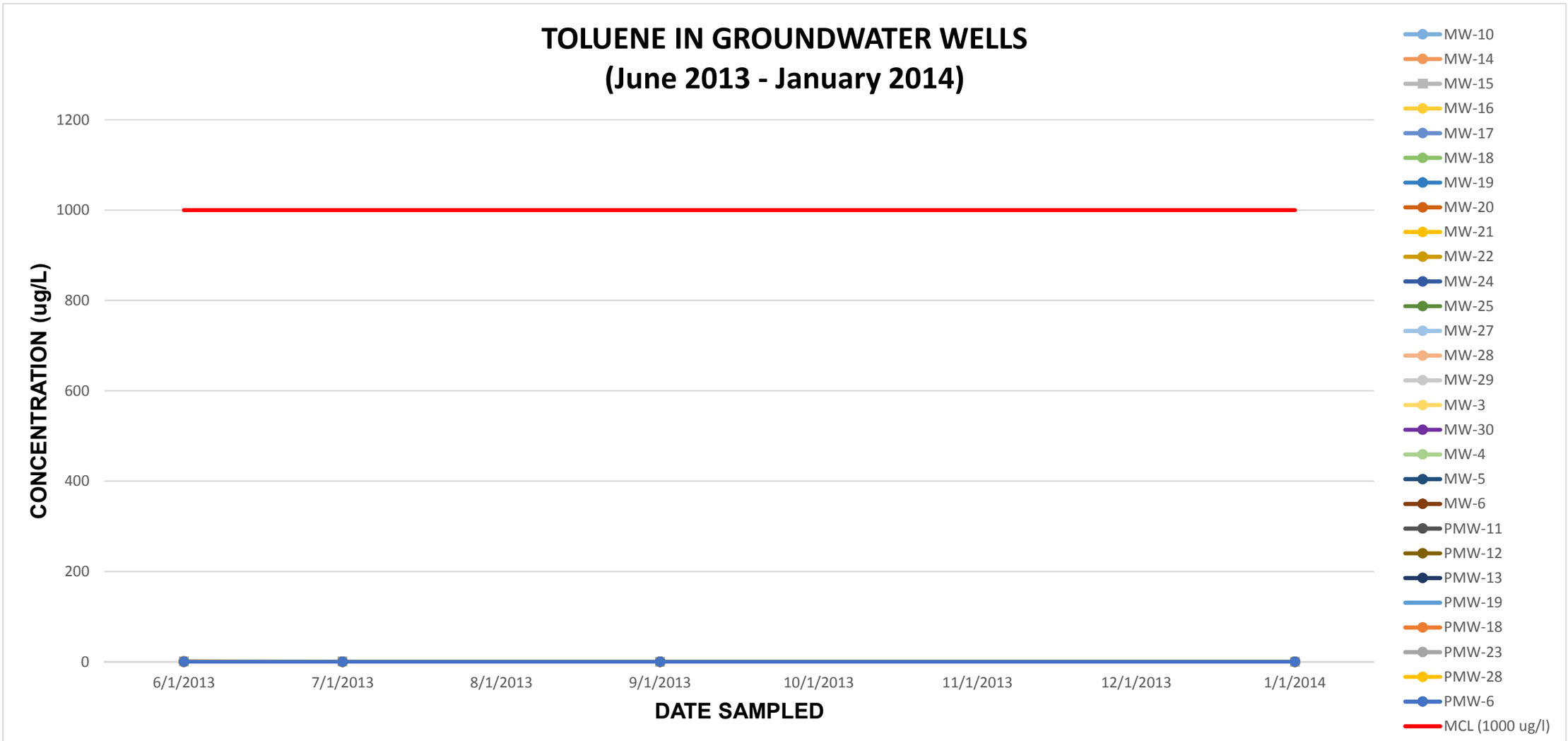

CHLOROFORM IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
100
90
80
70
60
50
40
30
20
10
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
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MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
MCL (Total THM)


DIBROMOCHLOROMETHANE IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
100
90
80
70
60
50
40
30
20
10
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
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MW-22
MW-24
MW-25
MW-27
MW-28
MW-29
MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
MCL (Total THM)


METHYL TERT-BUTYL ETHER (MTBE) IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
4
3.5
3
2.5
2
1.5
1
0.5
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-24
MW-25
MW-27
MW-28
MW-29
MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
NO MCL


N-PROPYLBENZENE IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
4
3.5
3
2.5
2
1.5
1
0.5
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-24
MW-25
MW-27
MW-28
MW-29
MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
NO MCL


TETRACHLORETHENE IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-24
MW-25
MW-27
MW-28
MW-29
MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
MCL (0.50 ug/l)


TOLUENE IN GROUNDWATER WELLS
(June 2013 - January 2014)
CONCENTRATION (ug/L)
1200
1000
800
600
400
200
0
6/1/2013
7/1/2013
8/1/2013
9/1/2013
10/1/2013
11/1/2013
12/1/2013
1/1/2014
DATE SAMPLED
MW-10
MW-14
MW-15
MW-16
MW-17
MW-18
MW-19
MW-20
MW-21
MW-22
MW-24
MW-25
MW-27
MW-28
MW-29
MW-3
MW-30
MW-4
MW-5
MW-6
PMW-11
PMW-12
PMW-13
PMW-19
PMW-18
PMW-23
PMW-28
PMW-6
MCL (1000 ug/l)