

FORMER COKE OVEN AREA (COA) INTERIM MEASURES SUPPLEMENTAL INVESTIGATION REPORT

TRADEPOINT ATLANTIC
SPARROWS POINT, MARYLAND

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1.0 INTRODUCTION

ARM Group Inc. (ARM), on behalf of EnviroAnalytics Group (EAG), has prepared this Interim Measures (IM) Supplemental Investigation Report for a portion of the Tradepoint Atlantic Property that has been designated as the Former Coke Oven Area (COA). This report summarizes the findings of investigation activities at the COA conducted in accordance with the Former COA Interim Measures (IM) Supplemental Investigation Work Plan, Revision 1 (dated March 7, 2019) and the Offshore Investigation Work Plan, Revision 1 (dated February 27, 2019).

The activities summarized in this report were proposed based on the findings and recommendations from the Coke Oven Interim Measures 2018 Progress Report, Revision 0, dated February 2019, and the United States Environmental Protection Agency (USEPA) letter, dated December 3, 2018, submitted in response to the report Assessment of Current Groundwater to Surface Water Discharges from the Coke Point Area (ARM, 2018).

1.1 Tradepoint Atlantic – Site Background

The Tradepoint Atlantic property is located in Baltimore County, Maryland at the southeastern corner of the Baltimore metropolitan area, approximately nine miles from the downtown area. The property encompasses approximately 3,100 acres located on a peninsula situated on the Patapsco River near its confluence with the Chesapeake Bay, physically positioned in the mouth of the heavily industrialized and urbanized Baltimore Harbor / Patapsco River region. A land connection to the northeast links the peninsula with the adjacent community of Edgemere.

From the late 1800s until 2012, the property was used for the production and manufacturing of steel. Iron and steel production operations and processes at the Site included raw material handling, coke production, sinter production, iron production, steel production, and semi-finished and finished product preparation. In 1970, Sparrows Point was the largest steel facility in the United States, producing hot and cold rolled sheets, coated materials, pipes, plates, and rod and wire. The steelmaking operations at the facility ceased in fall 2012, and current plans for the Site include demolition and redevelopment over the next several years. Some portions of the site have already undergone remediation and/or redevelopment.

1.2 Coke Oven Area – General Information

The COA is located on a peninsula in the southwestern portion of the Tradepoint Atlantic Property, shown on **Figure 1**. It is bordered by the Patapsco River to the west and south, and the Turning Basin to the east. This peninsula comprises approximately 308 acres of the approximately 3,100-acre former plant property, includes the former COA and the Coke Point Landfill.

Within the COA, this Supplemental Investigation focused on three distinct smaller areas designated as Cell 2, Cell 3, and Cell 5. **Figure 2** shows the location and boundaries of the COA and the Cells.

Below is a list of the cells, the name of the area they cover, and their current IM system(s):

- Cell 2 (former Coal Basin Area): Air-sparging/soil-vapor extraction (AS/SVE) system in the shallow groundwater zone and groundwater pump and treat (GWPT) system in the intermediate groundwater zone;
- Cell 3 (Cove Area): AS/SVE system in the shallow zone; and
- Cell 5 (Turning Basin side of COA): Dual Phase Extraction (DPE) system and Dense Non-Aqueous Phase Liquid (DNAPL) recovery system for the shallow zone.

A brief overview, including system performance and recommendations from the CO IM 2018 Progress Report of these three IM systems are discussed below. Relevant findings of the Pre-Design Investigation (PDI) Summary Report (Key Environmental, 2015) are also discussed.

1.3 Cell 2 Description and Background

Cell 2 is located in the former Benzol Processing area. **Figure 3** shows the historic plant drawings indicating the past operations in this area and the locations of all wells within the area. Cell 2 includes an AS/SVE system for the shallow groundwater zone and a GWPT system for the intermediate groundwater zone in the former Coal Basin Area of the site. The primary focus of the IMs for this area is the presence of elevated concentrations of benzene, toluene, ethylbenzene, and xylenes (BTEX) and naphthalene in the intermediate groundwater zone. The AS/SVE system was turned off indefinitely in April 2018 due to yielding extremely low concentrations in recovered vapors.

The PDI Summary Report (Key, 2015) focused on potential light non-aqueous phase liquid (LNAPL) communication between Cell 2 and Cell 6 in the area southeast of Cell 2. Minimal impacts were observed east and southeast of Cell 2.

The findings in the CO IM 2018 Progress Report (ARM, 2019) indicated the existing GWPT system appeared to be effectively removing hydrocarbons from the subsurface and should continue to be operated and monitored in accordance with current practices. The AS/SVE system was not providing effective removal (i.e., less than 0.1 pounds of hydrocarbons removed in 2018) and was shut down in April 2018 as a result.

1.4 Cell 3 Description and Background

Cell 3 is located south of the former Benzol Processing area and north of a cove on the western shore of the COA. **Figure 4** shows Cell 3 features overlain on historic plant drawings indicating the past operations in this area and the locations of all wells within the area. No specific plant operations are identified in this area. The Cell 3 IM consists of an AS/SVE system for the shallow groundwater zone. The primary focus of the IM for this area is the presence of elevated concentrations of BTEX and naphthalene in the shallow groundwater zone (between approximately 20 and 27 feet below grade, near the base of the fill materials located above the native underlying clay and silt layers).

The findings of the PDI Summary Report (Key, 2015) revealed minimal impacts at monitoring wells CO32-PZM004 and TS06-PPM008 located east of the cove that lies to the south of Cell 3. Therefore, groundwater discharge from east of the cove is not believed to be a source of the surface water impacts observed in the cove during the investigation outlined in the Assessment of Current Groundwater to Surface Water Discharges from the Coke Point Area. (ARM, 2018). In addition, minimal impacts were observed in iso-flow groundwater samples collected at location CO130-SB036, located northeast of the Cell 3, and at location CO126-SB036, along the western portion of the remedial trench. These borings suggested that the eastern and western horizontal extents of impacted groundwater in this area were delineated.

The findings in the CO IM 2018 Progress Report (ARM, 2019) indicated that the existing AS/SVE system was not effectively removing significant hydrocarbon mass. It was recommended that consideration be given to modifying the system or utilizing alternate approaches.

1.5 Cell 5 Description and Background

Cell 5 is located in the former Coal Tar Storage area, just west of the Turning Basin. **Figure 5** shows the historic plant drawings indicating the past operations in this area and the locations of all wells within the area. Cell 5 includes a DPE system and a DNAPL recovery system for the shallow groundwater zone on the Turning Basin side of the former COA. The primary focus of the IMs for this area is naphthalene in the shallow groundwater zone.

The PDI activities completed in 2015 focused on the horizontal and vertical delineation of DNAPL in an area located west of Cell 5, but no additional soil borings and/or monitoring wells were installed within the vicinity of Cell 5 to better delineate naphthalene impacts in the shallow groundwater zone.

The findings in the CO IM 2018 Progress Report (ARM, 2019) indicated that the DPE system was not effectively removing hydrocarbons. It was recommended that consideration be given to modifying the current system. The DNAPL system seemed to be operating effectively and should continue to be operated and monitored in accordance with current practices.

2.0 SITE INVESTIGATION ACTIVITIES

Information regarding the project organization, field activities (including installation, development and sampling), field equipment, sample handling and management procedures, the selected laboratory and analytical methods, quality control and quality assurance procedures, investigation-derived waste (IDW) management methods, and reporting requirements are described in detail in the approved Former COA Interim Measures (IM) Supplemental Investigation Work Plan, Revision 1 (dated March 7, 2019). All methods and protocols for this investigation followed the procedures included in the Quality Assurance Project Plan (QAPP) dated April 5, 2016, which was approved by the agencies to support the investigation and remediation of the Tradepoint Atlantic property.

2.1 Cell 2

2.1.1 Groundwater Investigation

Shallow monitoring wells were installed in Cell 2 to investigate the extent of shallow impacts near the western shoreline. Shallow wells were also installed between the sparge wells and the northern shoreline to determine whether the treatment system has reduced concentrations within the expected zone of influence. In addition, shallow wells were installed in spatial gaps between existing monitoring wells in Cell 2 and Cell 1. Although some of the new wells were installed within or very close to Cell 1, they are referred to as Cell 2 wells for the sake of this investigation. Intermediate monitoring wells were installed to improve horizontal delineation of contamination to the south and west of the Cell 2 AS/SVE system.

A total of 12 shallow and nine intermediate groundwater monitoring wells were installed in accordance with the procedures referenced in the QAPP Worksheet 21 – Field Standard Operating Procedures (SOPs), SOP No. 13 – Drilling and SOP No. 14 – Monitoring Well Construction. The new monitoring wells were constructed with a stick-up steel protective casing. Locations of the new monitoring wells in Cell 2 are shown on **Figure 6**.

The new monitoring wells were installed using an 8140LS Geoprobe[®] Sonic drill rig. During installation, each soil core was visually inspected and screened with a hand-held photoionization detector (PID) prior to logging soil types, which were recorded by a geologist in accordance with QAPP Worksheet 21 – Field SOPs, SOP No. 12 – Geologic Logging. Unless otherwise indicated, all USCS group symbols provided on the attached boring logs are from visual observations. Well construction and boring logs are provided in **Appendix A**.

During the completion of field work, it was necessary to shift some groundwater points from the proposed locations shown in the Work Plan, primarily due to utility and accessibility conflicts. Field shifts were completed during the installation of proposed monitoring wells COK-MWS, COK-MWI,

CON-MWS, CON-MWI, COO-MWS, COO-MWI, and COU-MWS. The necessary field location shifts were completed due to the following:

- COK-MWS and COK-MWI due to the location of a berm surrounding the perimeter of Cell 2
- CON-MWS, CON-MWI, COO-MWS, and COO-MWI due to dredge material located along the western edge of Cell 2 located inside of the berm area
- COU-MWS due to utilities

During monitoring well installation activities, several screen intervals were adjusted due to site conditions. The adjustments listed below were made to the proposed monitoring well construction specifications.

- COR-MWI: screen interval was shifted to 22-37 feet bgs to capture product (NAPL) observed in the soil core 26-30 feet bgs.
- COS-MWS and COT-MWS: screen intervals were shifted to 5-20 feet bgs to match the bottom screen level depths of other shallow monitoring wells in Cell 1 at similar grade.
- COU-MWS, COW-MWS, and COY-MWS: screen intervals were shifted to 5-20 feet bgs to bridge the water level observed in the soil cores.
- COX-MWS and COZ-MWS: screen intervals were shifted to 10-20 to more closely match the screen intervals of existing nearby shallow monitoring wells.

The newly installed monitoring wells were developed in accordance with QAPP Worksheet 21 – Field SOPs, SOP No. 15 – Well Development. After development, the depth to bottom in each well was recorded to compare to the original drilled depth. Well Development Forms for the newly installed monitoring wells have been included in **Appendix B**.

The new monitoring wells installed during this investigation were surveyed by a Maryland-licensed surveyor to obtain top of casing (TOC) elevation data. Supporting documentation from the surveys is included as **Appendix C**. A synoptic round of groundwater measurements was collected from the monitoring wells included in the monitoring network. Surveyed top of casing (TOC) for all applicable locations can be found in **Table 1**, along with the depth to water (DTW) measurements from this date, and the calculated groundwater elevation.

Groundwater samples were collected from the new monitoring wells in accordance with the procedures referenced in Worksheet 21 – Field SOPs, SOP No. 007 – Low Flow Groundwater Sampling provided in Appendix A of the QAPP. Groundwater samples were collected using laboratory supplied sample containers and preservatives, a peristaltic pump, dedicated polyethylene tubing, a YSI water quality meter with a flow-through cell. The purge logs have been included in **Appendix D**. Calibration of the YSI meter was performed before the start of each day of the sampling event. Appropriate documentation of the YSI meter calibration has also been included in

Appendix D.

All groundwater samples were analyzed for BTEX, naphthalene, total petroleum hydrocarbons diesel range organics (TPH-DRO), and TPH gasoline range organics (GRO).

2.1.2 Pore Water Investigation

Pore water sampling was conducted in the offshore areas of Cell 2 to investigate possible effects of groundwater discharge to surface water. Sampling was attempted at each of the proposed pore water sampling locations shown on **Figure 7**. At each location, attempts were made to drive separate push-point samplers to depths of 9-inches and 3 feet below the sediment-water interface. Pore water sampling was not successful at many of the proposed locations because of refusal of the sampler on hard (rocky) substrate, or the presence of low permeability fine-grain sediments at the proposed sample interval which clogged the screen of the sampler. In some cases, the sample was collected from a depth of 2 feet below the sediment-water interface when a sample could not be collected from a depth of 3 feet. **Figure 7** notes the proposed locations and relative depths where sampling was unsuccessful, as well as the reason that the pore water sample could not be collected from the proposed sample interval. **Table 2** provides a summary of pore water sampling locations. **Appendix E** provides a photographic summary of common sampling issues that prevented pore water sample collection at various locations.

Where successful, separate push-point samplers were advanced to a depth of 9-inches and 3 feet below the sediment-water interface. Each push-point sampler was equipped with a spiked sampling flange to secure the instrument to the sediment floor, gauge the proper depth of the sampler below the sediment surface, and to serve as a surface seal to prevent intrusion of surface water into the sampler. All pore water samples were collected using disposable tubing.

Pore water samples were collected at a total of 20 locations. Pore water samples were collected in accordance with the procedures referenced in SOP No. 29 – Pore Water Sampling, which is a new SOP proposed for addition to the QAPP, and SOP No. 006 – Groundwater Sampling in the approved QAPP (Revision 3). Prior to filling sampling containers with pore water from the push-point sampler, water quality parameters (temperature, pH, dissolved oxygen, conductivity, oxidation-reduction potential) of surface water and of pore water were monitored to assess to verify the push-point sampler was sealed and isolated from the surface water. The pore water samples placed directly into laboratory-supplied preserved sample bottles and placed on ice in coolers to be transported to the laboratory under a completed Chain of Custody.

All pore water samples were analyzed for BTEX, naphthalene, TPH-DRO and TPH-GRO. Analytical methods, sample containers, preservatives, and holding times for the sample analyses are listed in the QAPP Worksheet 19 & 30 – Sample Containers, Preservation, and Holding Times.

2.1.3 Surface Water Investigation

Following receipt of the analytical laboratory data for the pore water samples, the preliminary results were shared with the MDE and the USEPA at a meeting on June 6th, 2019. The agencies subsequently requested the collection of supplemental surface water samples from the offshore areas of the COA. A supplemental work plan for the collection of surface water samples was approved in an email dated July 9, 2019.

Six surface water samples were collected offshore of Cell 2 at locations that corresponded with pore water sampling locations with elevated analytical data. Surface water samples were collected at a depth of two feet below the water surface. At three of the sampling locations, the depth of the water was greater than six feet. At these locations a second surface water sample was collected at a depth that was two feet above the sediment-water interface. All surface water samples were collected in accordance with the procedures referenced in SOP No. 4 – Surface Water Sampling. Samples were analyzed for benzene and naphthalene.

2.2 Cell 3

2.2.1 Groundwater Investigation

In Cell 3, monitoring wells were installed to investigate groundwater from deeper zones than covered by the majority of the existing monitoring wells. In particular, it was observed that monitoring wells CO101-PZM, CO102-PZM, CO103-PZM, and CO104-PZM were installed to an approximate depth of 20 feet bgs, while the most contaminated monitoring well at Cell 3, CO30-PZM015, was installed to a depth of 27.5 feet bgs.

In Cell 3, Vertical Aquifer Profiling (VAP) was performed in order to identify the subsurface depth interval which contained the greatest amount of contamination in the groundwater. VAP was completed during drilling of the borehole for monitoring well COD-MWS, located in the central portion of Cell 3. Groundwater samples were collected from seven different five-foot intervals. The VAP samples were collected and analyzed for BTEX. The VAP was performed in accordance with the QAPP, Worksheet 21 – Field SOPs, SOP No. 30 Vertical Aquifer Profiling – Sonic Drilling. The results of the VAP (discussed in Section 3.0) determined the screen intervals of the new monitoring wells installed at Cell 3.

A total of 10 shallow zone monitoring wells were installed in accordance with the procedures referenced in the QAPP Worksheet 21 – Field SOPs, SOP No. 13 – Drilling and SOP No. 14 – Monitoring Well Construction. The new monitoring wells were constructed with a stick-up steel protective casing. Locations of the new monitoring wells in Cell 3 are shown on **Figure 8**.

The new monitoring wells were installed using an 8140LS Geoprobe[®] Sonic drill rig. During installation, each soil core was visually inspected and screened with a hand-held photoionization

detector (PID) prior to logging soil types, which were recorded by a geologist in accordance with QAPP Worksheet 21 – Field SOPs, SOP No. 12 – Geologic Logging. Unless otherwise indicated, all USCS group symbols provided on the attached boring logs are from visual observations. Well construction and boring logs are provided in **Appendix A**.

During the completion of field work, it was necessary to shift some groundwater points from the proposed locations shown in the Work Plan, primarily due to accessibility conflicts. Field shifts were completed during the installation of proposed monitoring wells COA-MWS and COB-MWS. The necessary field location shifts were completed due to the following:

- COA-MWS due to a large stockpile
- COB-MWS due to a trench

After the completion of the VAP, it was determined that the screen intervals for the new monitoring wells at Cell 3 should be 20-35 feet bgs. During monitoring well installation, several screen intervals were adjusted due to site conditions. The following adjustments were made to the proposed monitoring well construction specifications:

- COB-MWS, COE-MWS, and COJ-MWS screen intervals were shifted to 10-25 feet bgs due to the presence of clay from 25 to 35 bgs.
- COD-MWS screen interval was shifted to 12-28 feet bgs to bridge the water level observed in the soil core.

The new monitoring wells installed during this investigation were surveyed by a Maryland-licensed surveyor to obtain TOC elevation data. Supporting documentation from the surveys is included as **Appendix C**. A synoptic round of groundwater measurements was collected from the monitoring wells included in the monitoring network. Surveyed TOC for all applicable locations can be found in **Table 3**, along with the DTW measurements from this date, and the calculated groundwater elevation.

All groundwater samples were analyzed for BTEX and the remaining (non-VAP groundwater samples) were additionally analyzed for naphthalene.

2.2.2 Pore Water Investigation

Pore water sampling was conducted in the offshore areas of Cell 3 to investigate possible effects of groundwater discharge to surface water. Sampling was attempted at each of the proposed pore water sampling locations shown on **Figure 9**. At each location, attempts were made to drive separate push-point samplers to depths of 9-inches and 3 feet below the sediment-water interface. Pore water sampling was not successful at many of the proposed locations because of refusal of the sampler on hard (rocky) substrate, or the presence of low permeability fine-grain sediments at the proposed sample interval which clogged the screen of the sampler. In some cases, the sample was collected

from a depth of 2 feet below the sediment-water interface when a sample could not be collected from a depth of 3 feet. **Figure 9** notes the proposed locations and relative depths where sampling was unsuccessful, as well as the reason that the pore water sample could not be collected from the proposed sample interval. **Table 4** provides a summary of pore water sampling locations.

Where successful, separate push-point samplers were advanced to a depth of 9-inches and 3 feet below the sediment-water interface. Each push-point sampler was equipped with a spiked sampling flange to secure the instrument to the sediment floor, gauge the proper depth of the sampler below the sediment surface, and to serve as a surface seal to prevent intrusion of surface water into the sampler. All pore water samples were collected using disposable tubing.

All pore water samples were analyzed for BTEX and naphthalene. Analytical methods, sample containers, preservatives, and holding times for the sample analyses are listed in the QAPP Worksheet 19 & 30 – Sample Containers, Preservation, and Holding Times.

2.2.3 Surface Water Investigation

Surface water samples were collected offshore of Cell 3 at 20 locations. Surface water samples were collected directly offshore at distances of 30 feet, 60 feet, 90 feet, 120 feet, and 150 feet from the shoreline. Surface water samples were collected at a depth of two feet below the water surface. At some of the sampling locations, the depth of the water was greater than six feet. At these locations a second surface water sample was collected at a depth that was two feet above the sediment-water interface. All surface water samples were collected in accordance with the procedures referenced in SOP No. 4 – Surface Water Sampling. Samples were analyzed for BTEX and naphthalene.

2.2.4 Offshore Bathymetry Mapping

In order to investigate the bathymetry of the cove south of Cell 3, a boat and a Furuno Fcv 667 Depth Sounder Fish Finder were used to measure the depth to the bottom substrate at 65 locations in cove. A Trimble Geo7X handheld GPS was used to obtain location coordinates for all of these locations, 26 of which were former surface and/or pore water sampling locations. The additional 39 locations were added to acquire more robust coverage of the Cell 3 cove. The bathymetric map developed from the data is discussed in Section 5 of this report.

2.3 Cell 5

2.3.1 Groundwater Investigation

During this supplemental investigation, a total of six shallow zone groundwater monitoring wells were installed in accordance with the procedures referenced in the QAPP Worksheet 21 – Field SOPs, SOP No. 13 – Drilling and SOP No. 14 –Monitoring Well Construction. The new monitoring wells were constructed with a stick-up or a flush mount steel protective casing. Locations of new

monitoring wells in Cell 5 are shown on **Figure 10**.

During the completion of field work, it was necessary to shift some groundwater points from the proposed locations shown in the Work Plan, primarily due to utility and accessibility conflicts. Field shifts were not completed during the installation of proposed monitoring well COEE-MWS due to a large stockpile. As a result, a monitoring well was not installed at this location.

All new monitoring wells in Cell 5 were installed with well screen intervals of 5-25 feet bgs due to the groundwater table observed in the soil cores.

The new monitoring wells installed during this investigation were surveyed by a Maryland-licensed surveyor to obtain TOC elevation data. Supporting documentation from the surveys is included as **Appendix C**. A synoptic round of groundwater measurements was collected from the monitoring wells included in the monitoring network. Surveyed TOC for all applicable locations can be found in **Table 5**, along with the DTW measurements from this date, and the calculated groundwater elevation.

All groundwater samples were analyzed for naphthalene.

2.3.2 Pore Water Investigation

Pore water sampling was conducted in the offshore areas of Cell 5 to investigate possible effects of groundwater discharge to surface water. Sampling was attempted at each of the proposed pore water sampling locations shown on **Figure 11**. At each location, attempts were made to drive separate push-point samplers to depths of 9-inches and 3 feet below the sediment-water interface. Pore water sampling was not successful at many of the proposed locations because of refusal of the sampler on hard (rocky) substrate, or the presence of low permeability fine-grain sediments at the proposed sample interval which clogged the screen of the sampler. In some cases, the sample was collected from a depth of 2 feet below the sediment-water interface when a sample could not be collected from a depth of 3 feet. **Figure 11** notes the proposed locations and relative depths where sampling was unsuccessful, as well as the reason that the pore water sample could not be collected from the proposed sample interval. **Table 6** provides a summary of pore water sampling locations. **Appendix E** provides a photographic summary of common sampling issues that prevented pore water sample collection at various locations.

Where successful, separate push-point samplers were advanced to a depth of 9-inches and 3 feet below the sediment-water interface. Each push-point sampler was equipped with a spiked sampling flange to secure the instrument to the sediment floor, gauge the proper depth of the sampler below the sediment surface, and to serve as a surface seal to prevent intrusion of surface water into the sampler. All pore water samples were collected using disposable tubing.

All pore water samples were analyzed for naphthalene. Analytical methods, sample containers,

preservatives, and holding times for the sample analyses are listed in the QAPP Worksheet 19 & 30 – Sample Containers, Preservation, and Holding Times.

2.3.3 Surface Water Investigation

Surface water samples were collected offshore of Cell 5 at 11 locations that corresponded with pore water sampling locations with elevated analytical data. Surface water samples were collected at a depth of two feet below the water surface. At some of the sampling locations, the depth of the water was greater than six feet. At these locations a second surface water sample was collected at a depth that was two feet above the sediment-water interface. All surface water samples were collected in accordance with the procedures referenced in SOP No. 4 – Surface Water Sampling. Samples were analyzed for naphthalene.

2.4 Laboratory Analysis

Samples were sent by courier to PACE. of Greensburg, Pennsylvania to perform the laboratory analysis. Analytical methods, sample containers, preservatives, and holding times for the sample analyses are listed in the QAPP Worksheet 19 & 30 – Sample Containers, Preservation, and Holding Times. Quantitation limits and project action limits for all analytes are provided in QAPP Worksheet 15 – Project Action Limits and Laboratory-Specific Detection/Quantitation Limits. All laboratory reports are included as an electronic attachment.

2.5 Quality Assurance (QA) and Quality Control (QC) Samples

QC samples for the entire field effort are collected during field studies for various purposes, among which are to isolate site effects (control samples), to define background conditions (background sample), and to evaluate field/laboratory variability (spikes and blanks, duplicates, etc.).

The following QC samples were submitted for analysis to support the data validation:

- Trip Blank
- Blind Field Duplicate – at a rate of one duplicate per twenty samples
- Matrix Spike/Matrix Spike Duplicate – at a rate of one per twenty samples
- Field Blank – at a rate of one per twenty samples

The QC samples were collected and analyzed in accordance with the QAPP Worksheet 12 – Measurement Performance Criteria, QAPP Worksheet 20 – Field Quality Control and QAPP Worksheet 28 – Analytical Quality Control and Corrective Action. A summary of QA/QC samples collected is included in **Appendix F**.

3.0 ANALYTICAL RESULTS

3.1 Cell 2

3.1.1 Shallow Groundwater

Groundwater data for shallow zone wells are summarized in **Table 7**. Benzene was detected in every shallow well sampled during this investigation, with values ranging from a minimum of 1.1 µg/L in CO42-PZM004 to maximum of 514,000 µg/L in COU-MWS. **Figure 12** shows the distribution of benzene concentrations in the shallow zone in the vicinity of Cell 2. As indicated, the highest concentration in the immediate vicinity of the Cell 2 shallow AS/SVE system is 16,100 µg/L in COL-MWS. Concentrations to the west of Cell 2 toward the Patapsco River were approximately twice the highest level in Cell 2. The shallow zone benzene concentrations decrease to the east and southeast from Cell 2, with low concentrations that seem to separate Cell 2 from the Cell 1 area to the southeast. The highest concentrations of benzene were found further to the southeast in the Cell 1 area and in the area west of Cell 1. Concentrations in this area were above 100,000 µg/L.

Ethylbenzene was detected in 16 shallow zone groundwater wells in Cell 2. The highest detection of ethylbenzene was measured at 1,020 µg/L at COT-MWS. Three historical groundwater wells (CO40-PZM008, CO41-PZM001, and CO42-PZM004) had undetectable levels of ethylbenzene in the groundwater. Toluene was detected in all shallow zone groundwater wells in Cell 2. The maximum concentration was detected at COT-MWS at a concentration of 122,000 µg/L, while the lowest concentration was detected at CO41-PZM001 at a concentration of 0.6 µg/L. Xylenes were detected in all shallow zone groundwater wells in Cell 2, excluding historical well CO41-PZM001. For xylenes, the highest detection of 24,400 µg/L was measured in COT-MWS.

Naphthalene was detected in every shallow zone groundwater well in Cell 2, excluding two historical groundwater wells (CO41-PZM001 and CO42-PZM004). The distribution of naphthalene (**Figure 13**) is very different from benzene. Naphthalene concentrations were much lower than benzene concentrations, and the maximum concentrations were found along the shoreline within Cell 2 and to the west of Cell 2. Concentrations further inland and to the east and southeast are generally less than 1,000 µg/L.

DRO and GRO were both detected in all newly-installed shallow zone groundwater wells. Historical groundwater wells throughout Cell 2 were not sampled for DRO and GRO. The highest concentration of DRO was measured at 10,300 µg/L at COM-MWS, whereas the lowest concentration of DRO was measured at 1,010 µg/L at COK-MWS. GRO was measured between 16,500 µg/L at COK-MWS and 871,000 µg/L (at COW-MWS).

3.1.2 Intermediate Groundwater

All groundwater data for intermediate zone wells are summarized in **Table 8**. Benzene was detected in every intermediate zone groundwater well in Cell 2. Detections ranged from 0.4 J $\mu\text{g/L}$ in well CO38-PZM043 to 361,000 $\mu\text{g/L}$ in COV-MWI. **Figure 14** shows the distribution of benzene in the intermediate zone. The maximum benzene concentration at COV-MWI is south of Cell 2. From there, the benzene plume extends to the west toward the Patapsco River and in a narrow swath to the north to well CO27-PZM046 near the pump and treat system. Directly to the north, the concentration of benzene in COL-MWI is an order of magnitude lower than that of CO27-PZM046.

Ethylbenzene was detected in all intermediate groundwater wells, excluding CO38-PZM043. The highest concentration of ethylbenzene was measured at 918 $\mu\text{g/L}$ at COV-MWI. Toluene was detected in all intermediate groundwater wells, excluding CO38-PZM043. The highest detection of toluene was 71,800 $\mu\text{g/L}$ at CO41-PZM036. Similar to ethylbenzene and toluene, xylenes were detected in all intermediate groundwater wells, excluding CO38-PZM043. The highest concentration of xylenes was measured at 58,500 $\mu\text{g/L}$ at COV-MWI.

Naphthalene was detected in all intermediate zone groundwater locations, excluding CO38-PZM043. The highest detection was measured at 43,500 $\mu\text{g/L}$ at COR-MWI. **Figure 15** shows the highest naphthalene concentrations are to the west and southwest of Cell 2 toward the Patapsco River. In addition, naphthalene is slightly elevated along the northern shore near the pump and treat system in well CO27-PZM046. However, similar to concentrations of benzene, the concentration of naphthalene in COL-MWI (directly to the north) is an order of magnitude lower than that of CO27-PZM046.

DRO and GRO were both detected in all newly-installed intermediate zone groundwater wells. Historical groundwater wells throughout Cell 2 were not sampled for DRO and GRO. The highest measured concentration of DRO was measured at 24,200 $\mu\text{g/L}$ at COR-MWI, whereas the lowest concentration of DRO was measured at 348 $\mu\text{g/L}$ at COK-MWI. GRO was measured between 6,620 $\mu\text{g/L}$ at COK-MWI and 600,000 $\mu\text{g/L}$ at COR-MWI.

3.1.3 Pore Water

Table 9 presents the results of the pore water investigation at Cell 2. As indicated, samples were not obtained at several of the proposed locations due to the presence of either a hard bottom or low permeability sediments. The table also indicates whether sample concentrations exceeded potentially relevant water quality criteria.

Figure 16 shows the locations of pore water sample results for benzene. Benzene was not detected at significant concentrations in the pore water north of Cell 2 in the coal basin. Benzene was only detected in four samples in this area, with the highest concentration detected being 3.4 $\mu\text{g/L}$. Benzene was detected in 6 of the 8 pore water samples collected off the western shore near Cell 2.

Concentrations in this area ranged up to 19,100 µg/L. Concentrations of benzene in 5 of the 8 pore water samples collected off the western shore exceeded the human health ambient water quality criteria (AWQC) for consumption of organism only (noncarcinogenic) of 90 µg/L.

Ethylbenzene was detected in five samples, all near the western shore, with a maximum concentration of 127 µg/L in CO-070-PW-1. None of the concentrations of ethylbenzene exceeded the applicable AWQC. Toluene was detected in five samples, all also near the western shore, with a maximum concentration of 1,910 µg/L in sample CO-070-PW-1. Two concentrations of toluene exceeded the applicable AWQC. Xylenes were detected in the same five western shore samples, with a maximum concentration of 511 µg/L in CO-070-PW-1. There is no applicable AWQC for xylenes.

Figure 17 presents the results for naphthalene in the pore water samples. Naphthalene was detected in 16 samples in the coal basin area. The highest concentration detected was relatively low at 63.9 µg/L. Naphthalene was detected in all of the samples from the western shore, with the maximum concentration being 72,000 µg/L. The results varied substantially with both location and depth. The naphthalene concentrations exceeded the narcosis secondary chronic value (SCV) in 5 of the 32 samples.

DRO was detected in all pore water samples offshore of Cell 2, while GRO was detected in only 6 of the 25 samples. The maximum concentrations for both DRO and GRO were measured in sample CO-049-PW-3 (off the western shore) at concentrations of 26,400 µg/L and 47,400 µg/L, respectively.

3.1.4 Surface Water

The results for the surface water samples at Cell 2 are presented in **Table 10**. The table also indicates whether sample concentrations exceeded potentially relevant water quality criteria. Benzene was detected in 5 of 10 samples, with a maximum concentration of 2.8 ug/L. There were also trace detections of toluene and naphthalene. Ethylbenzene and xylenes were not detected.

Figure 18 shows the locations of the surface water results. While there were trace detections of benzene and naphthalene in the surface water west of Cell 2, there were no exceedances of surface water quality criteria.

3.2 Cell 3

3.2.1 VAP Results

VAP analyses indicate that BTEX concentrations were highest in the 20-25-foot depth sample, while the naphthalene was highest in the 25-30-foot depth sample. Based on these observations, all remaining proposed wells in Cell 3 of the COA were installed with a screen interval of 20-35 feet

bgs to capture the majority of the impacted groundwater. The table below presents the results of the vertical profile samples.

COD-MWS VAP Sample Results						
<u>Depth (bgs)</u>	Benzene	Toluene	Ethylbenzene	Xylenes	Naphthalene	Total
<u>15-20</u>	9,660	742	20.6	236	553	11,211.60
<u>20-25</u>	14,600	1150	31.8	346	4,860	20,987.80
<u>25-30</u>	6,250	554	13.4	128	67,300	74,245.40
<u>30-35</u>	1,460	22.5	21.4	53.1	20,700	22,257
<u>35-40</u>	25	2.3	0.5	2.5	1,340	1,370.30
<u>40-45</u>	12.6	1.3	0.3	1.1	438	453.3
<u>45-50</u>	2.6	0.4	0.3	0.8	89.3	93.4

3.2.2 Shallow Groundwater

All groundwater data for shallow zone wells in Cell 3 are summarized in **Table 11**.

Benzene was detected in every shallow zone groundwater well in Cell 3. The maximum concentration of benzene (51,000 µg/L) was detected at well CO30-PZM015. **Figure 19** maps the distribution of benzene concentrations in the shallow zone of Cell 3. The maximum benzene concentrations are located within a narrow north-south swath in the center of the Cell 3 area.

Ethylbenzene was detected in all shallow groundwater samples, excluding CO101-PZM and CO104-PZM. The highest concentration of ethylbenzene was measured at 90.9 µg/L at COG-MWI. Toluene was detected in all shallow groundwater samples, excluding CO101-PZM and CO104-PZM. The highest detection of toluene was 4,140 µg/L at COC-MWS. Xylenes were detected in all shallow groundwater samples, excluding CO101-PZM and CO104-PZM. The highest concentration of xylenes was measured at 1,440 µg/L at COG-MWS.

Naphthalene was detected in all shallow zone groundwater locations, excluding CO101-PZM. The highest concentration was measured at 10,600 µg/L at COG-MWS. **Figure 20** shows the naphthalene distribution in the shallow zone in Cell 3. The naphthalene plume generally coincides with the benzene plume.

3.2.3 Pore Water

Figure 21 shows the results for the five pore water samples that were successfully collected. The results are also summarized in **Table 12**. The table also indicates whether sample concentrations exceeded potentially relevant water quality criteria.

Although a sample was collected from location CO-016-PW-1, furthest to the east, no analytes were detected. Benzene was detected in each of the other four cove samples (CO-020-PW-1, CO-040-

PW-1, CO040-PW-3, and CO-025-PW-1). The maximum detection of benzene was 1,900 µg/L in sample CO-020-PW-1. Concentrations of benzene in CO-020-PW-1 and CO-040-PW-3 exceeded the applicable AWQC.

Ethylbenzene was detected in all samples (except CO-016-PW-1) with a maximum concentration of 14.4 µg/L in sample CO-040-PW-3. Toluene was detected in the four western samples, with a maximum concentration of 141 µg/L in sample CO-020-PW-1. There were no exceedances of AWQC for ethylbenzene or toluene. Xylenes were also detected in the four western samples with the maximum concentration of 332 µg/L in sample CO-040-PW-3.

Naphthalene was detected in the four western samples. The maximum detection of naphthalene was 18,700 µg/L in sample CO-025-PW-1. In addition to CO-025-PW-1, concentrations of naphthalene in CO-040-PW-1 and CO-040-PW-3 exceeded the narcosis SCV.

3.2.4 Surface Water

Figure 22 shows the locations and results for all 31 surface water samples that were collected. The results are also summarized in **Table 13**. The table also indicates whether sample concentrations exceeded potentially relevant water quality criteria.

Benzene was detected in every sample except SW-23-8.5 and exceeded the AWQC in seven samples (SW-14-2, SW-15-2, SW-16-2, SW-18-2, SW-26-1, SW-27-1, and SW-29-2). The maximum detection of benzene was 736 µg/L in sample SW-29-2.

Ethylbenzene was detected in two samples (SW-26-1 and SW-27-1), with a maximum concentration of 1.5 µg/L at location SW-21-1. Toluene was detected in 25 of the 31 samples, with a maximum concentration of 67.2 µg/L in sample SW-27-1. There were no exceedances of AWQC for ethylbenzene or toluene. Xylenes were detected in 13 of the 31 samples, with a maximum concentration of 21.4 µg/L in sample SW-27-1.

Naphthalene was detected in 30 of the 31 samples, with a maximum concentration of 18.5 µg/L at location SW-27-1. None of the concentrations of naphthalene exceeded the narcosis SCV.

3.3 Cell 5

3.3.1 Shallow Groundwater

Figure 23 maps the distribution of naphthalene concentrations in the shallow zone of Cell 5. All groundwater data for shallow zone wells are summarized in **Table 14**.

Naphthalene was detected in all shallow zone groundwater locations, excluding CO57-PZP002 and CO59-PZP002. The maximum concentration was detected in well CODD-MWS at 14,800 µg/L.

3.3.2 Pore Water

Figure 24 shows the locations and results for the 9 pore water samples that were successfully collected. The results are summarized in **Table 15**. The table also indicates whether sample concentrations exceeded potentially relevant water quality criteria.

Naphthalene was detected in all pore water samples. The minimum concentration was 0.33 J µg/L detected in sample CO-086-PW-1, while the maximum concentration was 9,230 µg/L detected in sample CO-074-PW-1. Concentrations in five samples exceeded the narcosis SCV.

3.3.3 Surface Water

Figure 22 shows the locations and results for the 16 surface water samples that were collected. The results are summarized in **Table 16**. The table also indicates whether sample concentrations exceeded potentially relevant water quality criteria.

Naphthalene was detected in all samples except CO-079-SW-2 and CO-098-SW-2. The maximum concentration was 1.1 µg/L in sample CO-073-SW-5. None of the concentrations exceeded the narcosis SCV.

4.0 DATA USABILITY ASSESSMENT

All data validation procedures will be carried out in accordance with the QAPP Worksheet 34 – Data Verification and Validation Inputs, QAPP Worksheet 35 – Data Verification Procedures and QAPP Worksheet 36 – Data Validation Procedures.

Quality assurance and quality control (QA/QC) samples were collected during field studies to evaluate field/laboratory variability. A summary of QA/QC samples associated with this investigation has been included as **Appendix F**. The following QC samples were submitted for analysis to support the data validation:

- Blind Field Duplicate – at a rate of one duplicate per twenty samples
- Matrix Spike/Matrix Spike Duplicate – at a rate of one per twenty samples
- Field Blank – at a rate of one per twenty samples

Each of these QA/QC samples was analyzed for the appropriate analytes corresponding to the analyses run for samples from each Cell. The QC samples were collected and analyzed in accordance with the QAPP Worksheet 12 – Measurement Performance Criteria, QAPP Worksheet 20 – Field Quality Control and QAPP Worksheet 28 – Analytical Quality Control and Corrective Action.

4.1 Data Verification

A verification review was performed on documentation generated during sample collection and analysis. The verification included a review of field log books, field data sheets, and chain-of-custody (COC) forms to ensure that all planned samples were collected, and to ensure consistency with the field methods and decontamination procedures specified in the QAPP Worksheet 21 – Field SOPs and Appendix A of the QAPP. In addition, calibration logs were reviewed to ensure that field equipment was calibrated and/or checked once per day. The logs have been provided in Appendix D.

The laboratory deliverables were reviewed to ensure that all records specified in the QAPP as well as necessary signatures and dates are present. Sample receipt records were reviewed to ensure that the sample condition upon receipt was noted, and any missing/broken sample containers (if any) were noted and reported according to plan. The data packages were compared to the COCs to verify that results were provided for all collected samples. The data package case narratives were reviewed to ensure that all exceptions (if any) are described.

4.2 Data Validation

The complete analytical dataset underwent USEPA Stage 2B data validation for the environmental sample analyses performed by PACE and supporting Level IV Data Package information by Environmental Data Quality Inc. (EDQI). The full Data Validation Reports (DVRs) provided by

EDQI have been included as an electronic attachment.

Sample analyses have undergone an analytical quality assurance review to ensure adherence to the required protocols. The Stage 2B review was performed as outlined in “Guide for Labeling Externally Validated Laboratory Analytical Data for Superfund Use”, EPA-540-R-08-005. Results were validated or qualified according to general guidance provided in “USEPA National Functional Guidelines for Inorganic Superfund Data Review (ISM02.1)”, USEPA October 2013. Region III references this guidance for validation requirements. This document specifies procedures for validating data generated for Contract Laboratory Program (CLP) analyses. The approved QAPP dated April 5, 2016 and the quality control requirements specified in the methods and associated acceptance criteria were also used to evaluate the non-CLP data.

4.3 Data Usability

The data were evaluated with respect to the quality control elements of precision, bias, representativeness, comparability, completeness and sensitivity relative to data quality indicators and performance measurement criteria outlined in QAPP Worksheet 12 – Measurement Performance Criteria. The following discussion details deviation from the performance measurement criteria, and the impact on data quality and usability.

The measurement performance criteria of precision and bias were evaluated in the data validation process as described in the DVRs. Where appropriate, potential limitations in the results have been indicated through final data flags. These flags indicate whether particular data points were quantitative estimates, biased high/low, associated with blank contamination, etc. Individual data flags are provided with the results in the detection summary tables and on exceedance figures. A qualifier code glossary is included with each data validation report provided by EDQI. Particular results may have been marked with the “R” flag if the result was deemed to be unreliable and was not included in any further data evaluation. None of the results were flagged with an “R” qualifier during data validation. A discussion of data completeness (the proportion of valid data) is included below.

Representativeness is a measure of how accurately and precisely the data describe the Site conditions. Representativeness of the samples submitted for analysis was ensured by adherence to standard sampling techniques and protocols, as well as appropriate sample preservation prior to analysis. Sampling was conducted in accordance with the QAPP Worksheet 21 – Field SOPs and Appendix A of the QAPP. Specific Field SOPs applicable to the assessment of representativeness include Field SOP Numbers 004, 006, 007, 009, 010, 011, 012, 013, 014, 016, 017, 018, 019, 020, 024, 027, 029, and 030. Review of the field notes and laboratory sample receipt records indicated that collection of groundwater, pore water, and surface water at the Site was representative, with no significant deviations from the SOPs.

Comparability describes the degree of confidence in comparing two sets of data. Comparability is maintained across multiple datasets by the use of consistent sampling and analytical methods across multiple project phases. Comparability of sample results was ensured through the use of approved standard sampling and analysis methods outlined in the QAPP. QA/QC protocols help to maintain the comparability of datasets, and in this case were assessed via blind duplicates, blank samples, and spiked samples, where applicable. No deviations from the QAPP were noted in the data set.

Sensitivity is a determination of whether the analytical methods and quantitation limits will satisfy the requirements of the project. The laboratory reports were reviewed to verify that reporting limits met the quantitation limits for specific analytes provided in QAPP Worksheet #15 – Project Action Limits and Laboratory-Specific Detection/Quantitation Limits. In general, the laboratory reporting limits met the detection and quantitation limits specified in the QAPP.

Completeness is expressed as a ratio of the number of valid data points to the total number of analytical data results. Non-usable (“R” flagged) data results were determined through the data validation process. The approved QAPP specifies that the completeness of data is assessed by professional judgement but should be greater than or equal to 90%. Data completeness for each compound is summarized in **Appendix G**. All analytes evaluated had a computed completeness ratio of 100%. Based on the completeness evaluation, there were no significant data gaps.

5.0 CONCEPTUAL SITE MODEL

5.1 COA Geology

The Description of Current Conditions (DCC) report (Rust Environment & Infrastructure, 1998) describes how historical slag fill placement along shorelines expanded the Sparrows Point peninsula in size. In 1916, the Coke Point peninsula did not exist. It was created over the years as slag was placed along the shoreline and land was developed in the southwestern area of the Site outward. **Figure 24** shows the outward progression of the Coke Point peninsula shoreline over time as compiled from various historical aerial photographs. As a result, the entire present-day Coke Point peninsula is covered with a surficial layer of slag. The surficial slag unit is 20 or more feet thick across most of the Site.

Beneath the surficial slag fill layer lie alternating layers of native fine-grained sediments (clays and silts) and coarse-grained sediments (sands).

Cross-sections were developed from the site boring logs to illustrate the site-specific lithologies. **Figure 26** shows the locations of the cross sections. Cross sections A-A' (**Figure 27**) and B-B' (**Figure 28**) depict the subsurface through Cell 2 from west to east and north to south, respectively. Cross section C-C' (**Figure 29**) depicts the subsurface from the western side of Cell 2 in the north to Cell 3 in the south. Cross section D-D' (**Figure 30**) shows the subsurface of Cell 3 from west to east. Cross sections E-E' (**Figure 31**) and F-F' (**Figure 32**) depict the subsurface through Cell 5 from north to south and west to east, respectively.

5.2 COA Hydrogeology

Groundwater occurrence in the COA has been segregated into the shallow zone and the intermediate zone. The shallow zone is considered to be the groundwater found in the surficial slag unit. Wells in this zone typically have screened intervals between 5 and 25 feet bgs.

In most areas of the COA, a native sand layer lies directly underneath the surficial slag unit, separated from the slag layer in some places by a silt/clay layer. The intermediate zone is considered to be the groundwater found in the native sand layer. Wells in the intermediate zone screened in this sand layer. Wells in this zone typically have screened intervals between 30 and 50 feet bgs.

The cross sections indicate the screened intervals of the wells or well pairs in the shallow and intermediate flow zones. The water levels in the shallow and intermediate zones are also indicated on the cross sections.

5.3 Cell 2

5.3.1 Groundwater Flow

Figure 33 shows the groundwater elevations in the shallow zone. Shallow groundwater through the Cell 2 area generally flows from east to west toward the Patapsco River. The presence of the seawall along the northern shore appears to restrict flow to the north and direct it to the west. To the south the gradient appears flat. Some of the water level measurements to the south of Cell 2 would indicate some southerly flow, but these measurements seem to be erratic.

The intermediate groundwater contour map (**Figure 34**) shows a fairly consistent gradient to the north toward the pumping wells. The effect of the pumping is evident in the negative elevations and the depression around the pumping wells. To the south, the water level in well CO02-PZM041 would indicate a possible southerly flow, but the groundwater elevation reported for that well appears anomalous.

5.3.2 Contaminant Sources

Shallow groundwater benzene concentrations within more central locations of the COA were found to be significantly higher than shallow and intermediate zone concentrations in Cell 2. These concentrations in the shallow zone may represent a possible source for benzene observed in the intermediate zone at COV-MWI and CO41-PZM036.

Naphthalene concentrations in groundwater along the shoreline within Cell 2 and to the west of Cell 2 may be associated with contamination deposited in historical river bottom sediments later buried by slag fill.

5.3.3 Migration Pathways and Extent

Figure 35 shows the benzene distribution in the shallow groundwater zone in the western COA. As indicated, the benzene impacts are centered on Cell 6 and Cell 1 to the southeast of Cell 2. The concentrations in the shallow groundwater in Cell 2 are low relative to the concentrations within and to the west of Cell 1. **Figure 36** shows the naphthalene distribution in the shallow groundwater zone in the western COA. The naphthalene concentrations in the shallow zone in and around Cell 2 are highest along the northern and western shorelines, with relatively low levels inland.

Expanded views of naphthalene and benzene concentrations in the intermediate groundwater zone in the western COA are shown on **Figure 37** and **Figure 38**, respectively. The new intermediate well COR-MWI placed between existing wells CO41-PZM036 and CO28-PZM048 confirms an apparent plume in the intermediate zone to the west toward the Patapsco River. Well COV-MWI indicates that the known north-south plume originates further south than CO41-PZM036.

The intermediate wells placed between the recovery wells and the seawall (COK-MWI, COL-MWI and COM-MWI) show that the concentration of benzene downgradient from the recovery wells is lower than the concentrations upgradient. The benzene concentration drops from 264,000 ug/L in COP-MWI upgradient of the recovery wells to 148,000 ug/L in CO46-PZM047 in the immediate vicinity of the recovery wells to 18,800 ug/L in COL-MWI further north and downgradient of the recovery wells. These results indicate that the pump and treat system is effectively controlling the migration of contaminants in the intermediate zone to the north from Cell 2.

The discharge of groundwater from the Cell 2 area is not causing significant impacts to the coal basin to the north of Cell 2. No unacceptable concentrations were identified offshore to the north of Cell 2. The pore water and surface water data show only trace impacts offshore in this inlet. The concentrations in the shallow groundwater along this northern shore are relatively low and discharge from the shallow zone to the pore water and surface water seems to be cut off by the seawall along the northern shoreline, as shown on **Figure 28** (Cross Section B-B').

Pore water samples from the Patapsco River bottom sediments to the west of the Cell 2 area show benzene and naphthalene impacts. This finding of sediment impacts off the western shore is consistent with the findings of previous sediment investigations (EA, 2009) that reported positive field evidence of NAPL in the sediment off the western shore. Positive dye tests, PID readings, and petroleum odor were reported at their Location 2 off the western shore (see Figure 4-4 and Table 4-9 in **Appendix H**). Therefore, these offshore impacts can be attributed to historical releases of NAPL directly to the Patapsco.

Based on the groundwater and pore water results, there is no indication of a direct connection between the observed pore water impacts and current discharges of groundwater. The concentrations of naphthalene in the offshore pore water samples CO-067-PW-1 and CO-049-PW3 are 63,200 ug/L and 72,000 ug/L, respectively. Both the shallow and intermediate wells along the shoreline had lower total naphthalene concentrations (maximum of 8,570 ug/L in COO-MWI) than observed in the pore water samples. In addition, the pore water impacts are predominantly naphthalene, with naphthalene concentrations being roughly 3 to 5 times the concentration of benzene. The shallow and intermediate groundwater in the shoreline wells consistently has higher benzene than naphthalene concentrations, with benzene being 8 to 33 times higher than naphthalene in the shallow groundwater and 8 to 47 times higher in the intermediate zone groundwater.

5.4 Cell 3

5.4.1 Groundwater Flow

The groundwater elevation map for Cell 3 (**Figure 39**) shows less than two tenths of a foot of difference between all the wells and no consistent gradient. The water table is essentially flat within this area. Overall groundwater flow direction is toward the cove south of Cell 3, but the flow

direction is likely to reverse during tidal fluctuations

5.4.2 Contaminant Sources

The benzene and naphthalene plumes in the shallow groundwater originate north of new well COA-MWS, north of the large slag pile at Cell 3. The benzene isoconcentration map for the western COA (**Figure 35**) indicates that the benzene plume may connect to the plume to the west of Cell 1 and may have originated from the Cell 1 area. However, the current benzene concentration in well COA-MWS is slightly lower than the levels currently observed in well CO30-PZM015 and in COG-MWS, indicating that the maximum concentrations in the source of the plume may have attenuated. **Figure 36** shows a similar possible connection for the naphthalene plume, although the naphthalene concentrations are highest close to the shoreline at Cell 3, indicating that they could potential be associated with sediments impacted by historical direct discharges later buried by slag fill. The pore water samples showed naphthalene impacts in the benthic sediments in the cove. These results are consistent with the previous offshore investigation (EA, 2009) which reported an odor and sheen in the sediment boring at their Location 5 in the cove (see Figure 4-4 and Table 4-9 in **Appendix H**). Therefore, the pore water impacts can be attributed to historical direct NAPL discharges to the cove or to the offshore sediments prior to the shoreline being extended.

5.4.3 Migration Pathways and Extent

The new wells installed during this supplemental investigation further refined the identified plume of benzene and naphthalene within the shallow groundwater at Cell 3. The plume continues to be centered within the existing Cell 3 system, and the new well COA-MWS confirms that the plume originates farther north than the limits of the existing wells. The benzene and naphthalene plumes in shallow groundwater terminate to the south at the local discharge within the cove area. The extents of the benzene and naphthalene plumes have been defined to the east and west.

The vertical profiling at the location of well COD-MWS indicated that the benzene plume is located primarily in the interval from 15 ft to 25 ft bgs, which extends below the depth of the air sparge wells in the existing Cell 3 system. In addition, a naphthalene plume was identified primarily in the interval from 25 to 35 ft bgs.

Groundwater discharges to a shallow cove (approximately 700 feet long by 300 feet wide) constructed of slag fill, as indicated in the historical aerial photographs. As shown on **Figure 40**, the bottom of the cove was found to be approximately 8 to 10 feet deep at center. The VAP sampling indicated the highest concentration of benzene was found approximately -8.37 to -13.37 feet above mean sea level (amsl) (20-25 feet bgs).

The results of this investigation indicate that the existing Cell 3 system extends far enough to the east and west, but that the existing sparge wells are not deep enough to fully intercept the plume. The groundwater elevation map shows an essentially flat gradient, likely fluctuating with tidal influence.

This flat gradient and the resulting low groundwater velocity further slows the effectiveness of the Cell 3 system, which is designed to treat groundwater as it migrates through the system.

The current IMs could be modified to address the identified benzene plume to prevent the discharge of benzene in shallow groundwater to the cove. However, it should be noted that the observed surface water benzene impacts could be resulting from direct groundwater discharge or from upwelling from the historical sediment impacts, or both. Therefore, eliminating the discharge of contaminants in groundwater may not reduce the surface water concentrations to the AWQC level.

5.5 Cell 5

5.5.1 Groundwater Flow

The groundwater elevation map for Cell 5 (**Figure 41**) shows very little gradient over this relatively large area. The apparent general groundwater flow direction is from west to east, but the flat gradient and the potential effect of tidal fluctuations make it impossible to further define the flow direction more accurately.

5.5.2 Contaminant Sources

An area of NAPL has been identified in previous investigations as the apparent source of the dissolved naphthalene plume at Cell 5. This supplemental investigation indicated the highest naphthalene concentration in the new wells to be just east of the NAPL area, supporting the previous conclusions of the NAPL area as the source of the dissolved plume.

5.5.3 Migration Pathways and Extent

Figure 23 shows the lateral extent of the dissolved naphthalene plume in Cell 5. The supplemental wells COAA-MWS, COBB-MWS, and COCC-MWS identified higher concentrations of naphthalene than previously documented. As a result, and as shown on **Figure 23**, the naphthalene plume extends north of the existing Cell 5 IM system but is bounded to the north by existing wells CO20-PZM004 and CO10-PZM006. The plume is bounded to the east by the shoreline of the Turning Basin, a surface water feature constructed from slag fill.

The surface water sampling indicated no unacceptable surface water concentrations. The pore water investigation showed no significant impacts in the southern shoreline downgradient of the existing Cell 5 system, much lower than concentrations in shoreline wells COFF-MWS and COGG-MWS. However, the pore water sampling identified relatively high pore water naphthalene concentrations at the three northernmost sample locations (CO-073-PW, CO-074-PW and CO-079-PW). These results are consistent with the findings of the previous offshore investigation (EA, 2009) which indicated a sheen and odor in sediment at their Locations 13A and 13C (see Figure 4-4 and Table 4-

9 in **Appendix H**), such that these impacts can be attributed to direct historical discharges rather than current groundwater discharges.

Well CODD-MWS indicates that the highest concentration portion of the naphthalene plume is located within the area upgradient of the existing Cell 5 DPE treatment system. However, the additional shallow wells COAA-MWS, COBB-MWS and COCC-MWS indicate a naphthalene plume extending to the shoreline north of the existing Cell 5 system. These wells are located adjacent to the three pore water sample locations that exhibit elevated naphthalene concentrations. However, as noted above, previous investigations have indicated that these impacts may have resulted from historical direct discharges due the indication of NAPL impacts in the sediment. The naphthalene concentrations in the wells are of the same magnitude as the concentrations already present in the pore water. Therefore, the current discharge of groundwater would not exacerbate the impacts already observed in the sediment.

5.6 Potential Exposure Pathways

The Site is currently developed for industrial use. The area is provided with municipal potable water and a groundwater use restriction will be imposed. Therefore, an industrial worker exposure would not be exposed to groundwater. Exposure through volatilization into indoor air would be a potential future exposure pathway if buildings were to be constructed within impacted areas. The shallow and intermediate groundwater concentrations exceed vapor intrusion screening levels across much of the COA.

The groundwater ultimately discharges to industrial waterways including the coal basin at Cell 2, manmade cove at Cell 3, and the Turning Basin at Cell 5, but also directly to the Patapsco River west of Cell 2. Therefore, the exposures of concern are potential recreational exposure and aquatic life exposure to surface water and sediment. This supplemental investigation included the collection of surface water and sediment pore water samples to assess these potential exposures.

Surface water concentrations were found to be negligible except immediately offshore within the manmade cove south of Cell 3, where benzene concentration at one location exceeds that Maryland surface water quality standard and at a few locations exceeds the ambient water quality criterion (AWQC) for human consumption of organisms. However, benzene concentrations are below these potentially applicable surface water quality criteria in all samples in the western transect before the cove discharges to the Patapsco River. Thus, the surface water meets in-stream water quality criteria within a reasonable mixing zone and does not impact the Patapsco River.

Exceedances of the AWQC indicate pore water is a medium of potential concern. Lines of evidence are present that continued groundwater discharges will not exacerbate the identified pore water impacts. Pore water sampling was unsuccessful at most locations around the COA due a hard slag bottom encountered that prevented sampler penetration into the top foot. The previous EA report

noted the presence of NAPL in cores of the bottom sediments within each of the area where significant pore water concentrations were observed. Therefore, the bottom sediment along the immediate shoreline of the COA is not a desirable habitat for benthic organisms.

6.0 FINDINGS

The results of this supplemental investigation were reviewed and evaluated to fulfill the objectives listed below.

1. Evaluate the groundwater and offshore data to assess whether current conditions could be adversely impacting the offshore environment;
2. Delineate the areas of the COA where elevated concentrations of constituents of concern in groundwater could be causing surface water or pore water impacts;
3. Further delineate the extent of constituents of concern in groundwater in selected locations to further define potential source areas;
4. Assess whether the currently implemented remedies require modifications in order to address potential impact from constituents of concern to sediment pore water or surface water;
5. Assess improvements and/or alternatives to the currently implemented remedies in order to meet groundwater remedial objectives.

The findings of the investigation of each IM area are discussed in the sections below.

6.1 Cell 2

The nature and extent of groundwater impacts in and around Cell 2 have been adequately defined in both the shallow and intermediate zones to support a Corrective Measures Study (CMS) to determine a final remedy. The shallow and intermediate groundwater in the Cell 2 area exceeds potential sitewide cleanup levels for vapor intrusion or potable groundwater use. Surface water is not impacted in the Cell 2 area. Pore water concentrations at some locations west of Cell 2 exceed criteria for human consumption of organisms and protection of benthic aquatic life. However, the current discharges of groundwater are not exacerbating the previously identified offshore impacts from historical direct releases.

6.2 Cell 3

The nature and extent of groundwater impacts in and around Cell 3 have been adequately defined to support a CMS to determine a final remedy. The shallow groundwater in the Cell 3 area exceeds potential sitewide cleanup levels for vapor intrusion or potable groundwater use. Surface water exceeds water quality criteria for human consumption of organisms close to shore in the manmade cove area. However, the impact is highly localized and in-stream water quality criteria are met within a reasonable mixing zone distance. Pore water concentrations at some locations west of Cell 3 exceed criteria for human consumption of organisms and protection of benthic aquatic life. The current discharges of groundwater are likely causing localized surface water quality exceedances, but not exacerbating the previously identified pore water impacts from historical direct releases.

6.3 Cell 5

The nature and extent of groundwater impacts in and around Cell 5 have been adequately defined to support a CMS to determine a final remedy. The shallow groundwater in the Cell 5 area exceeds potential sitewide cleanup levels for vapor intrusion or potable groundwater use. Surface water is not impacted in the Cell 5 area. Pore water concentrations at some locations west of Cell 5 exceed criteria for protection of benthic aquatic life. However, the current discharges of groundwater are not exacerbating the previously identified offshore impacts from historical direct releases.

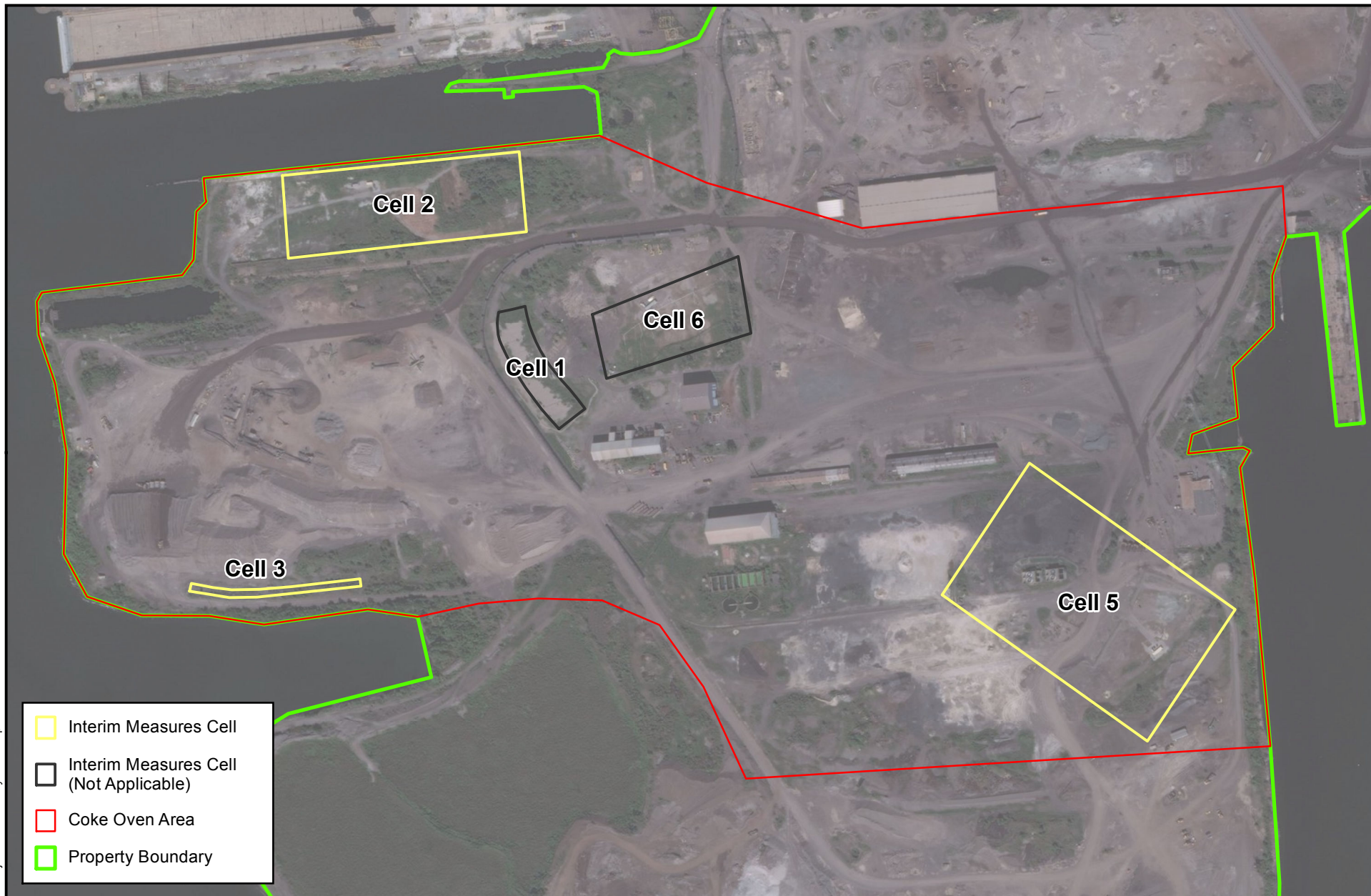
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FIGURES



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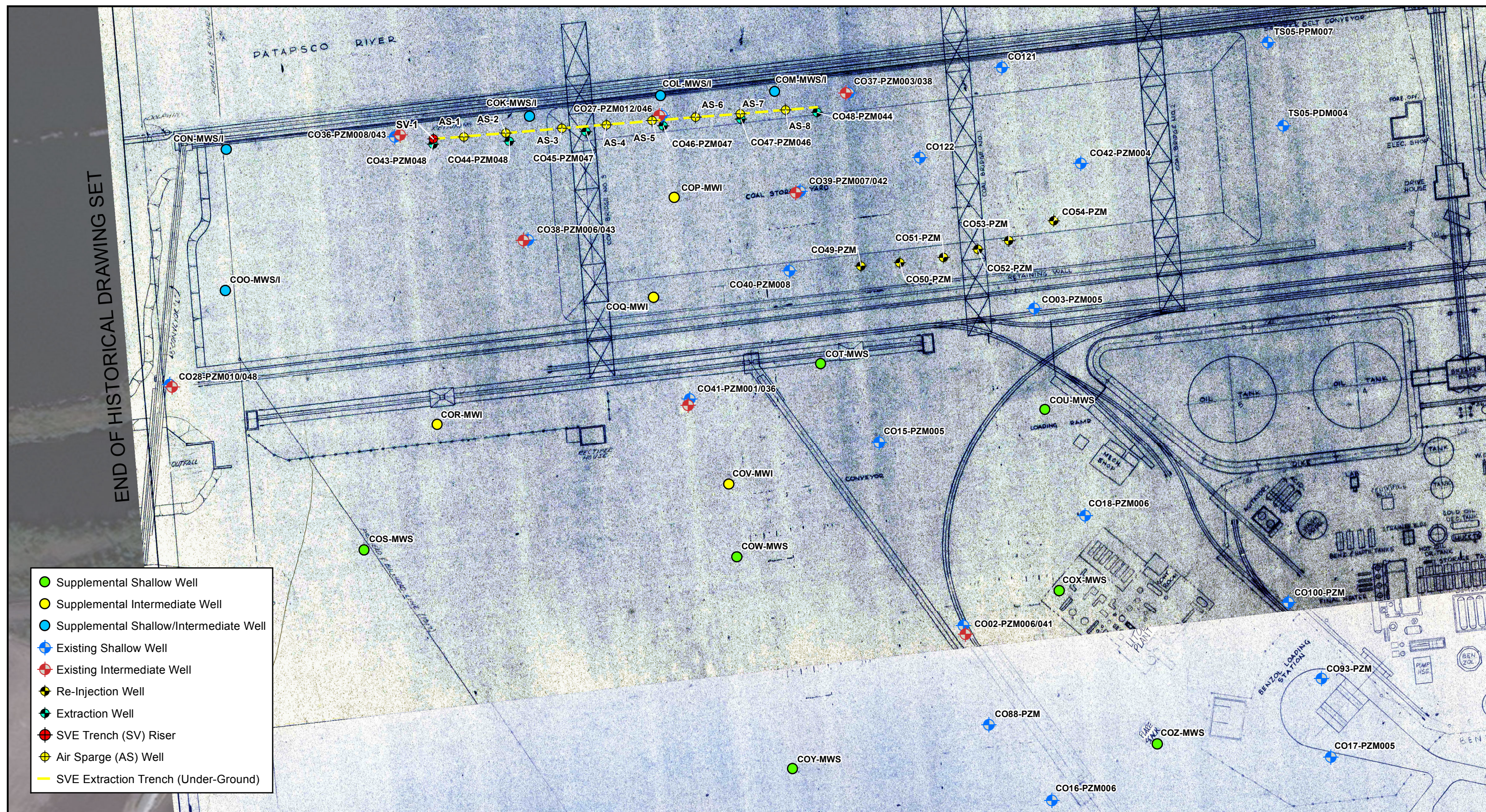
ARM Group Inc.
Engineers and Scientists

1 inch = 500 feet

0 250 500
Feet

Former Coke Oven Area
Interim Measures Cell Locations

**Figure
2**



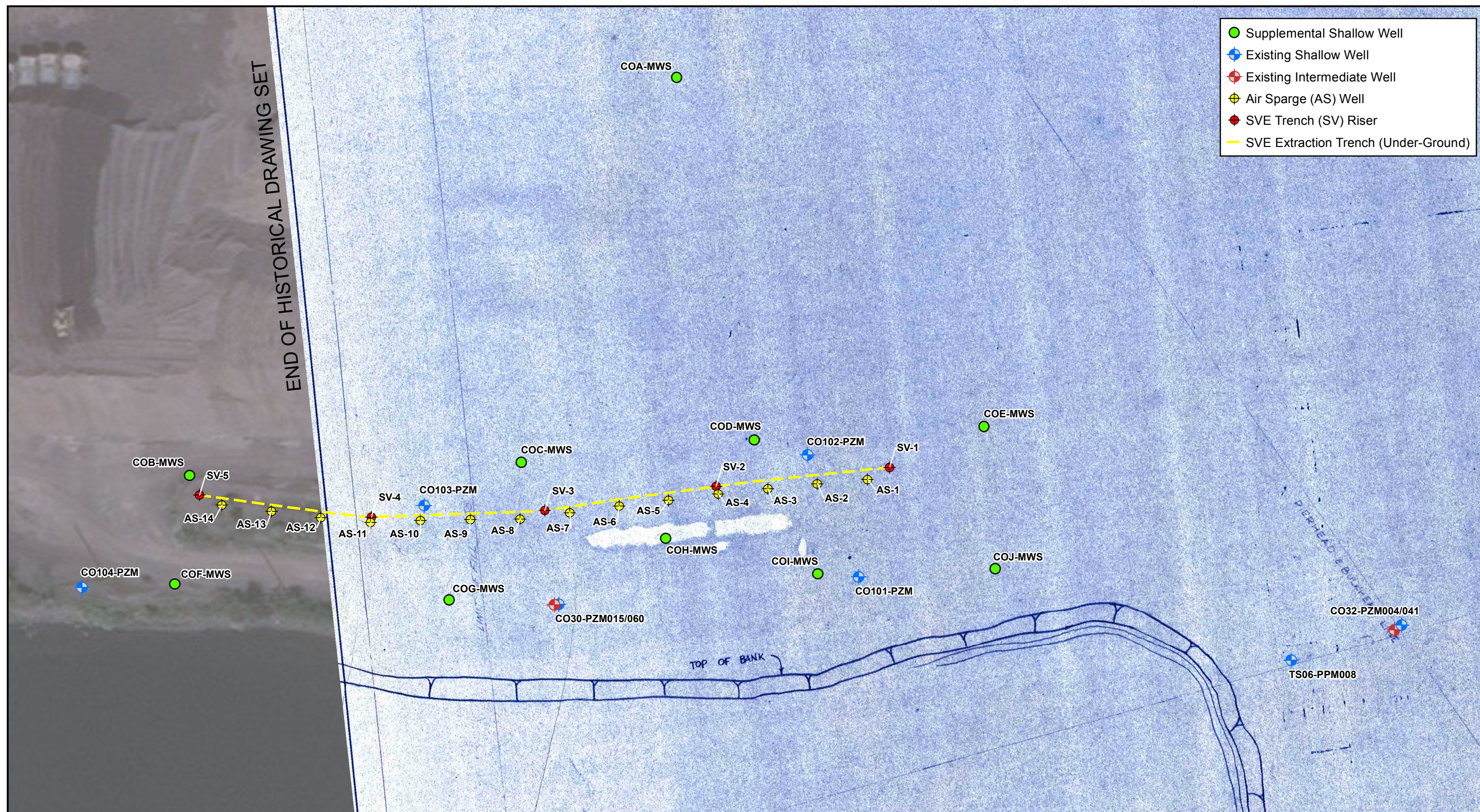
ARM Group Inc.
Engineers and Scientists

1 inch = 120 feet

0 60 120
Feet

Former Coke Oven Area - Cell 2
Well Locations
Historical Drawing - 5000 Set

Figure
3



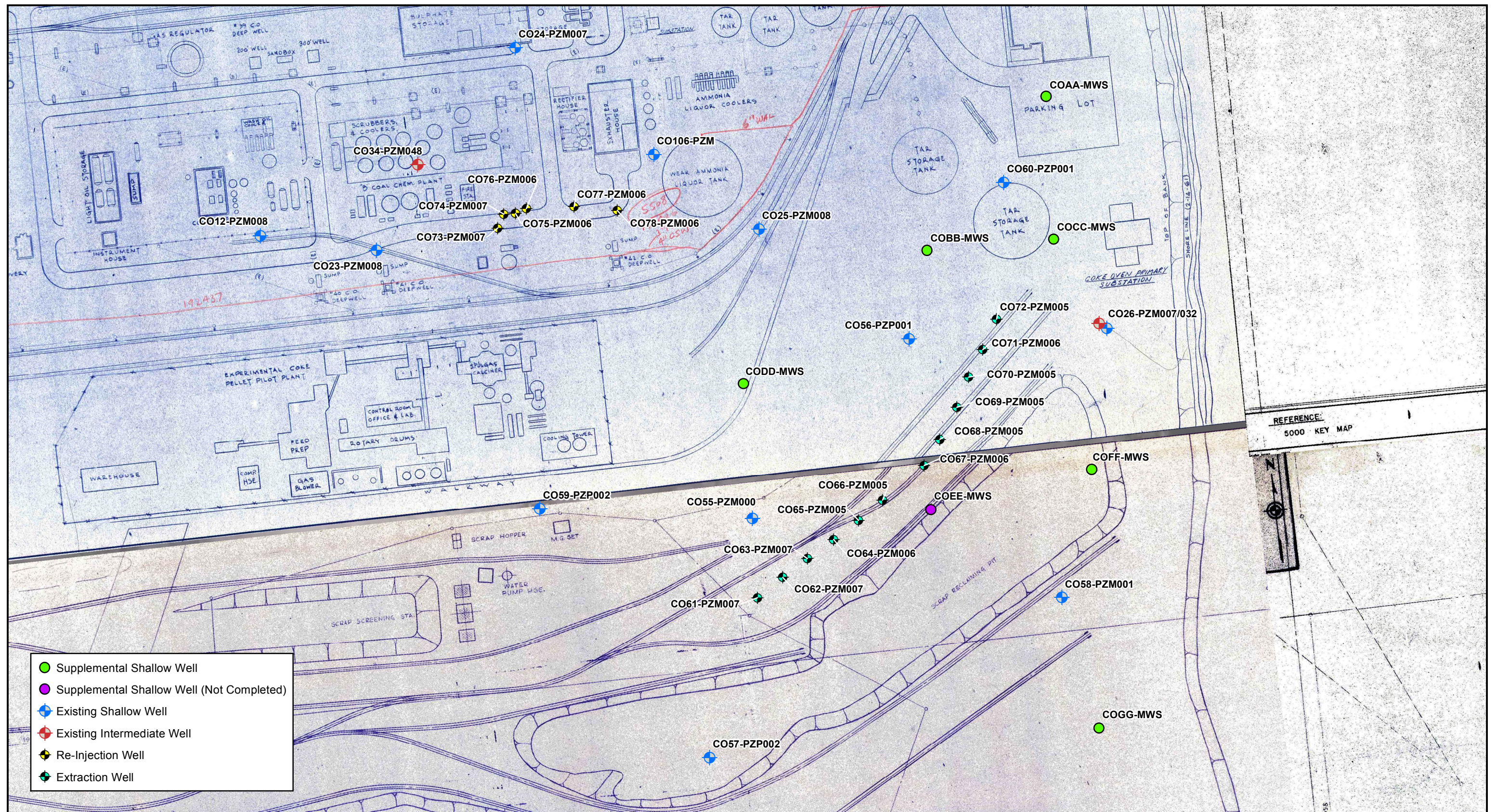
ARM Group Inc.
Engineers and Scientists

1 inch = 80 feet

0 40 80
Feet

Former Coke Oven Area - Cell 3
Well Locations
Historical Drawing - 5000 Set

Figure
4



ARM Group Inc.
Engineers and Scientists

1 inch = 120 feet

0 60 120
Feet

Former Coke Oven Area - Cell 5
Well Locations
Historical Drawing - 5000 Set

Figure
5





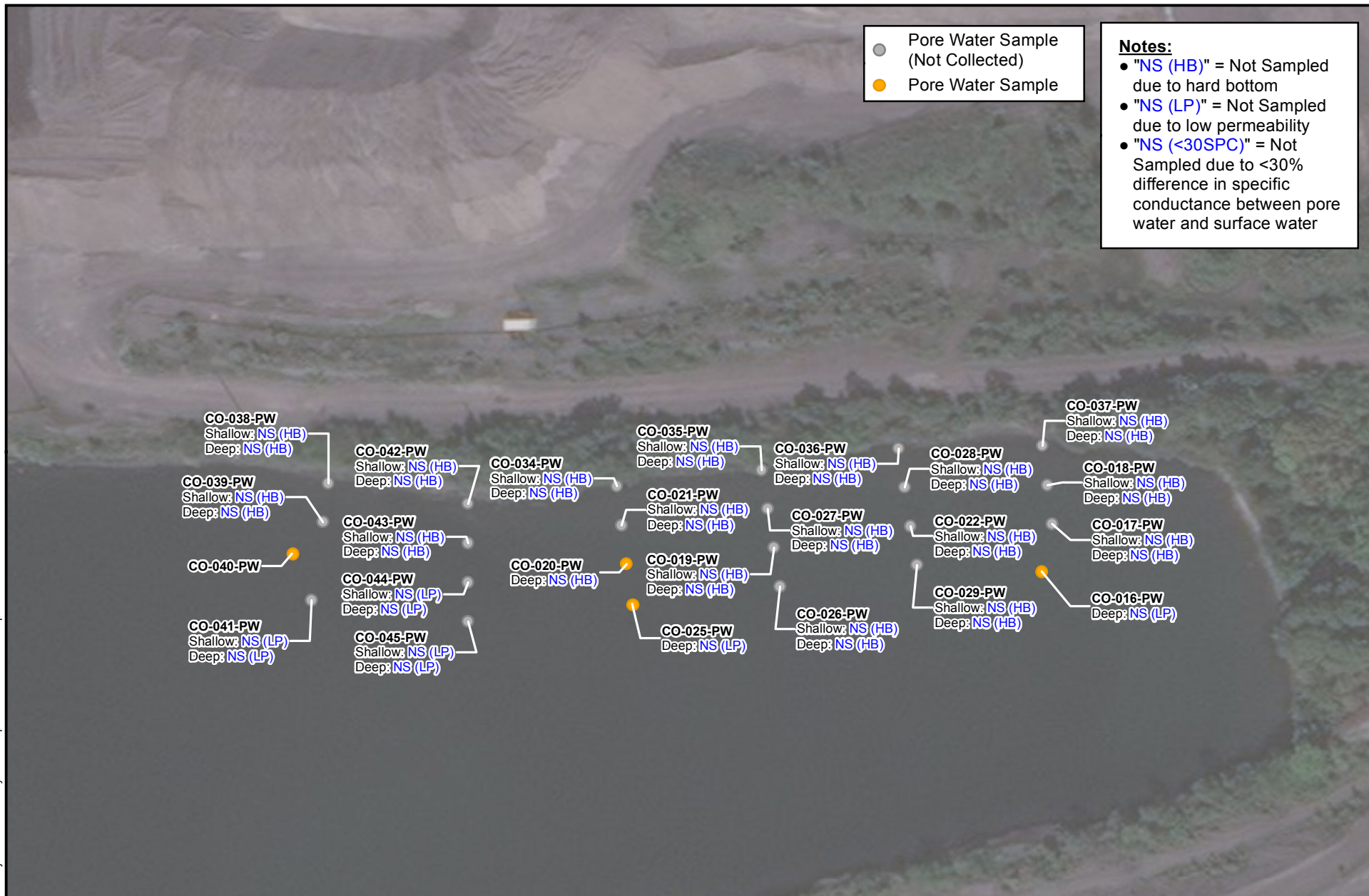
ARM Group Inc.
Engineers and Scientists

1 inch = 80 feet

0 40 80
Feet

Former Coke Oven Area - Cell 3
Well Locations
Aerial View

Figure
8



ARM Group Inc.
Engineers and Scientists

1 inch = 100 feet

0 50 100
Feet

Former Coke Oven Area - Cell 3
Pore Water Sample Locations
Aerial View

**Figure
9**



- Supplemental Shallow Well
- Supplemental Shallow Well (Not Completed)
- ⊕ Existing Shallow Well
- ⊕ Existing Intermediate Well
- ⊕ Re-Injection Well
- ⊕ Extraction Well



ARM Group Inc.
Engineers and Scientists

1 inch = 120 feet

0 60 120
Feet

Former Coke Oven Area - Cell 5
Well Locations
Aerial View

Figure
10



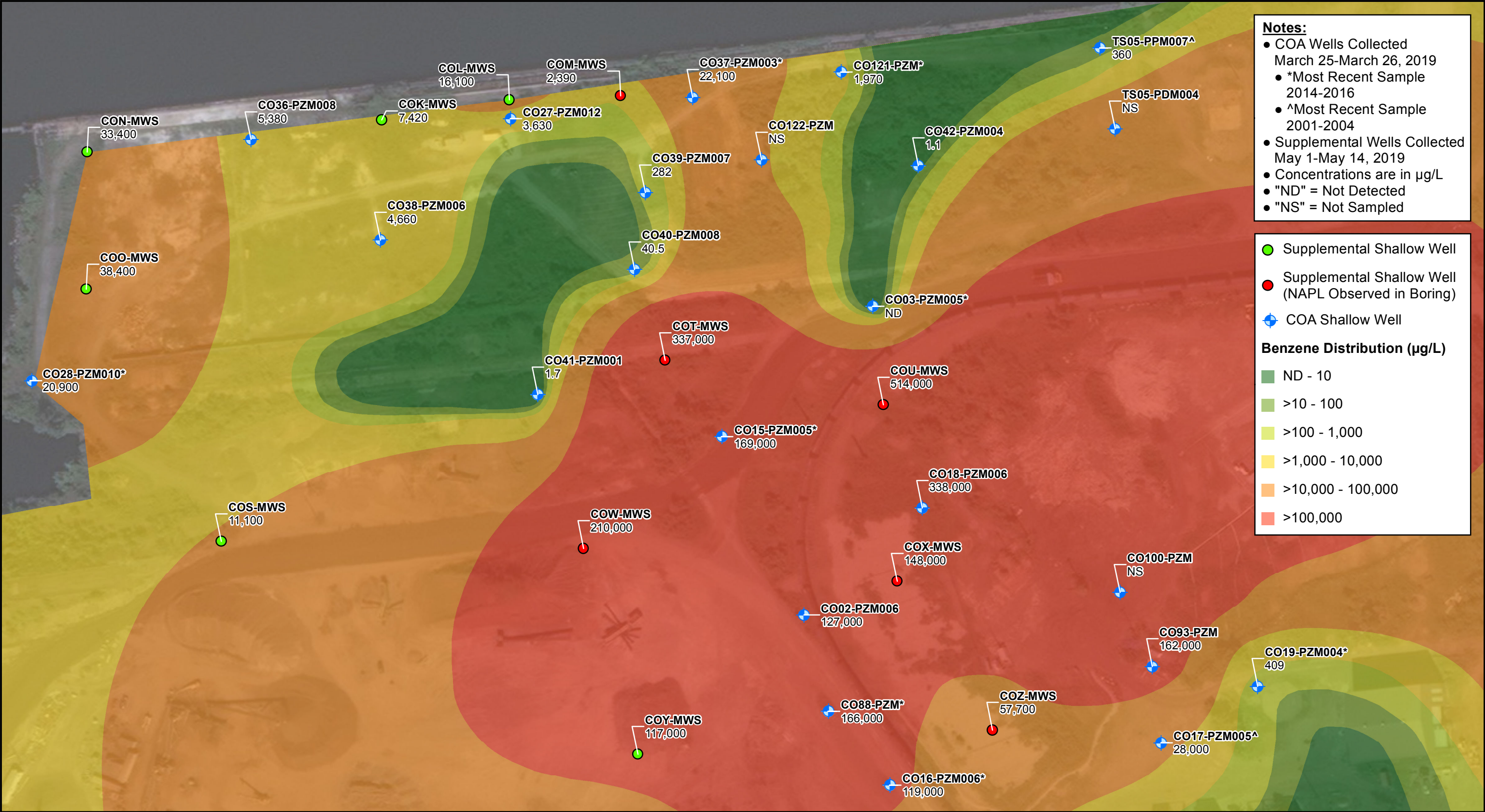
ARM Group Inc.
Engineers and Scientists

1 inch = 170 feet

0 85 170
Feet

Former Coke Oven Area - Cell 3
Pore Water Sample Locations
Aerial View

Figure
11



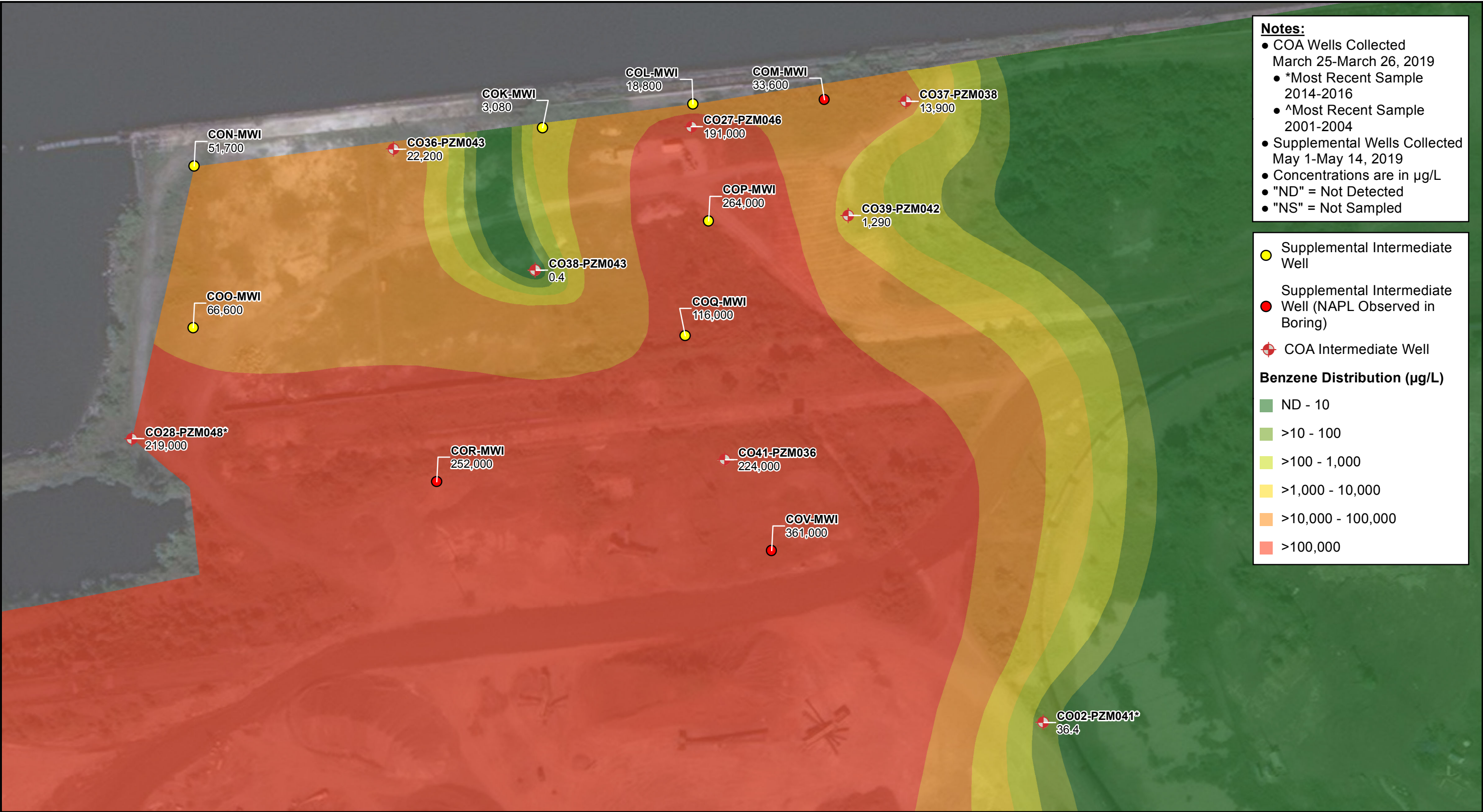
ARM Group Inc.
Engineers and Scientists

1 inch = 120 feet

0 60 120
Feet

Former Coke Oven Area - Cells 2
Onshore Shallow Sample Locations
Benzene Distribution

Figure
12



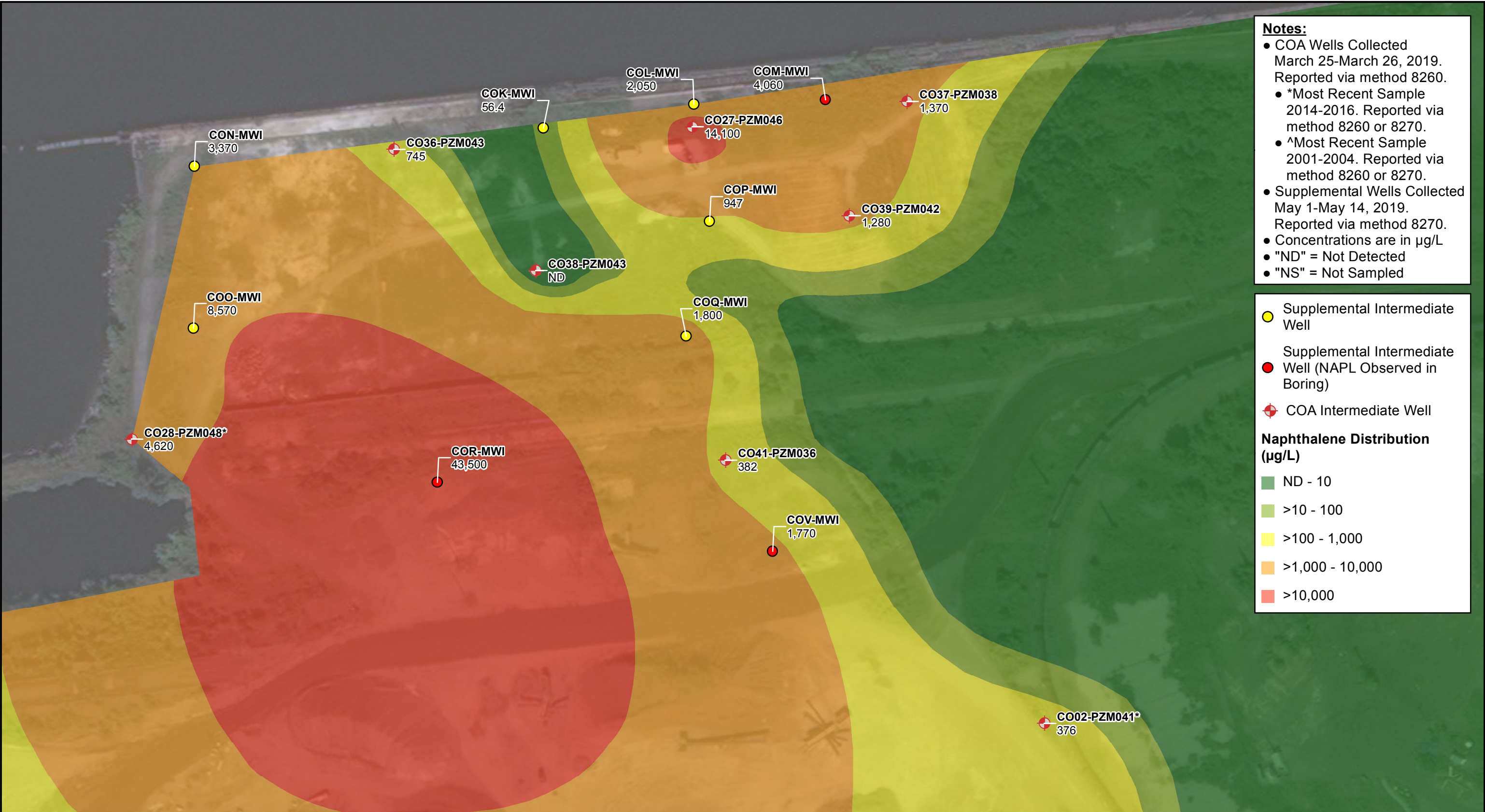
ARM Group Inc.
Engineers and Scientists

1 inch = 100 feet

0 50 100
Feet

Former Coke Oven Area - Cells 2
Onshore Intermediate Sample Locations
Benzene Distribution

Figure
14



ARM Group Inc.
Engineers and Scientists

1 inch = 100 feet

0 50 100
Feet

Former Coke Oven Area - Cells 2
Onshore Intermediate Sample Locations
Naphthalene Distribution

Figure
15







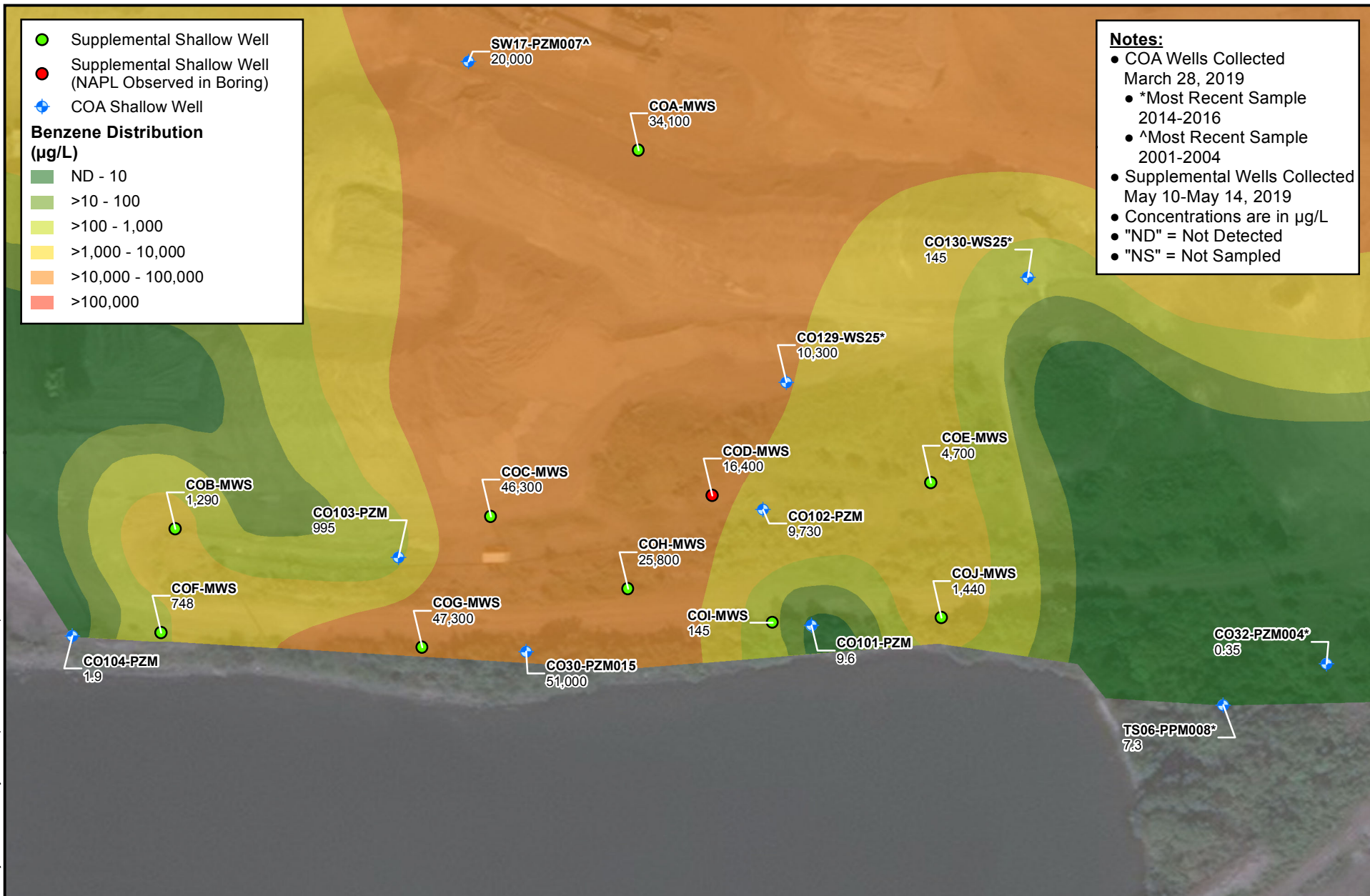
ARM Group Inc.
Engineers and Scientists

1 inch = 80 feet

0 40 80
Feet

Former Coke Oven Area - Cell 2
Surface Water Sample Locations
Benzene and Naphthalene Results

Figure
18



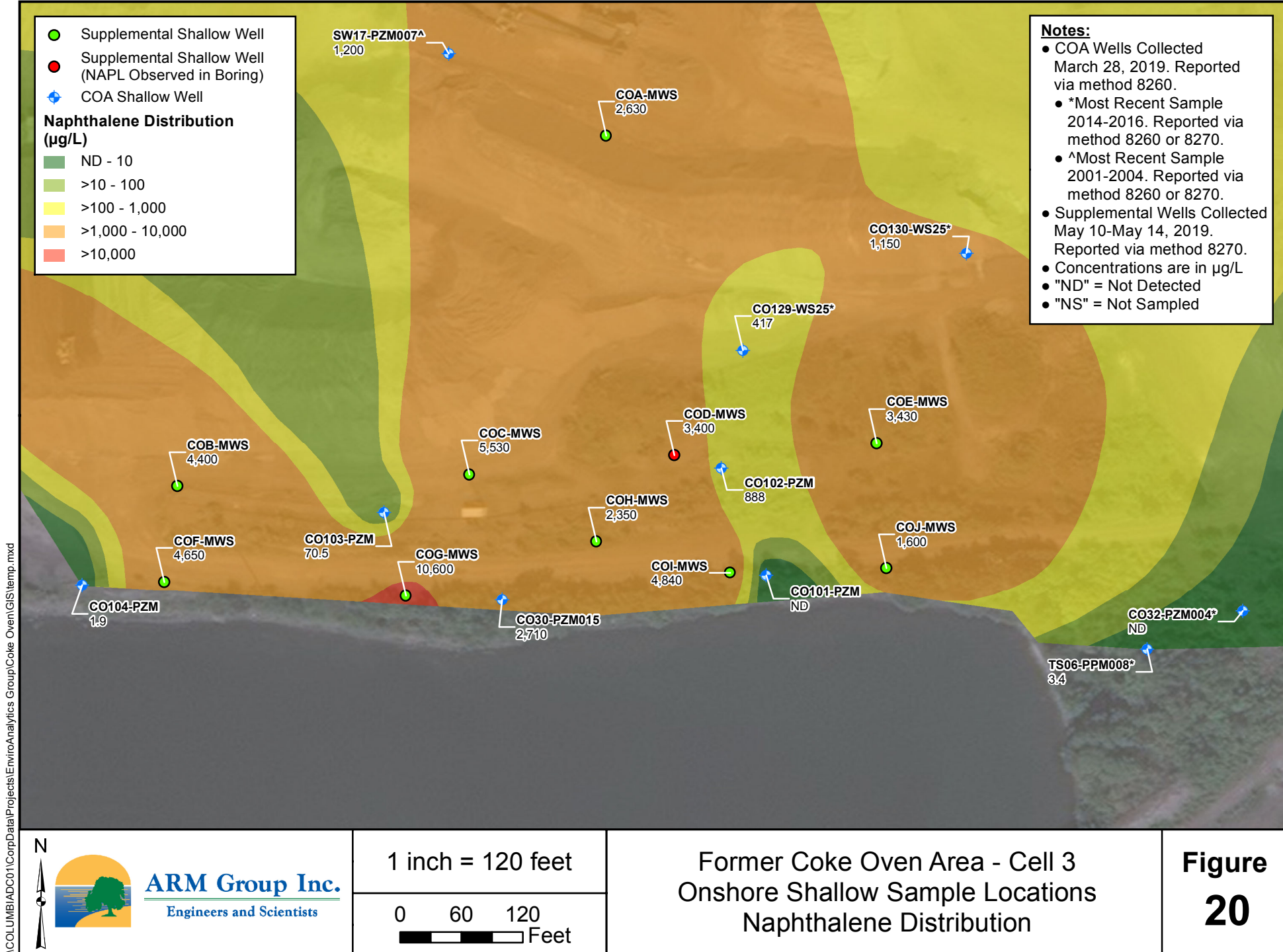
ARM Group Inc.
Engineers and Scientists

1 inch = 120 feet

0 60 120
Feet

Former Coke Oven Area - Cell 3
Onshore Shallow Sample Locations
Benzene Distribution

**Figure
19**





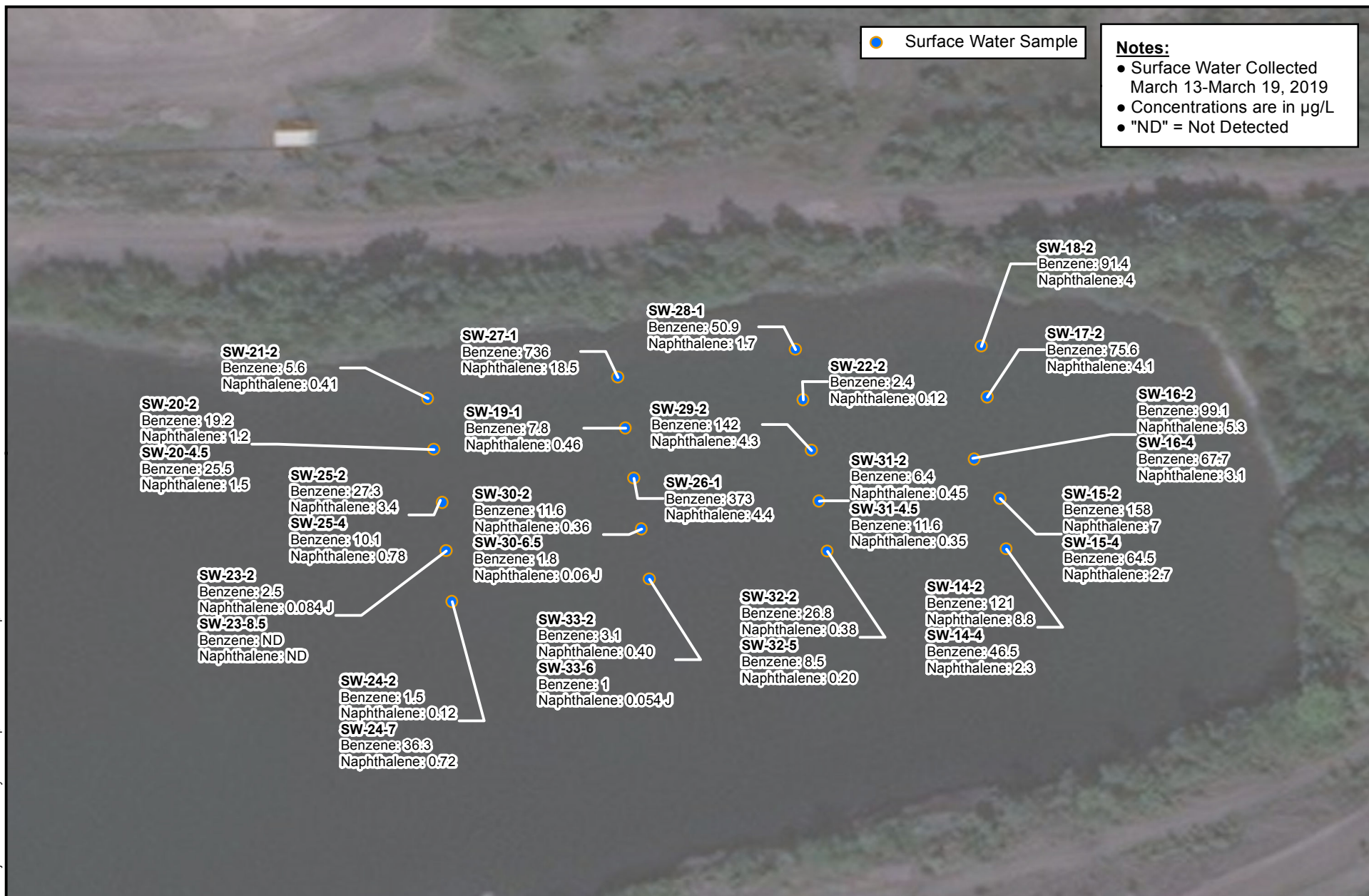
ARM Group Inc.
Engineers and Scientists

1 inch = 100 feet

0 50 100
Feet

Former Coke Oven Area - Cell 3
Pore Water Sample Locations
Benzene and Naphthalene Results

**Figure
21**



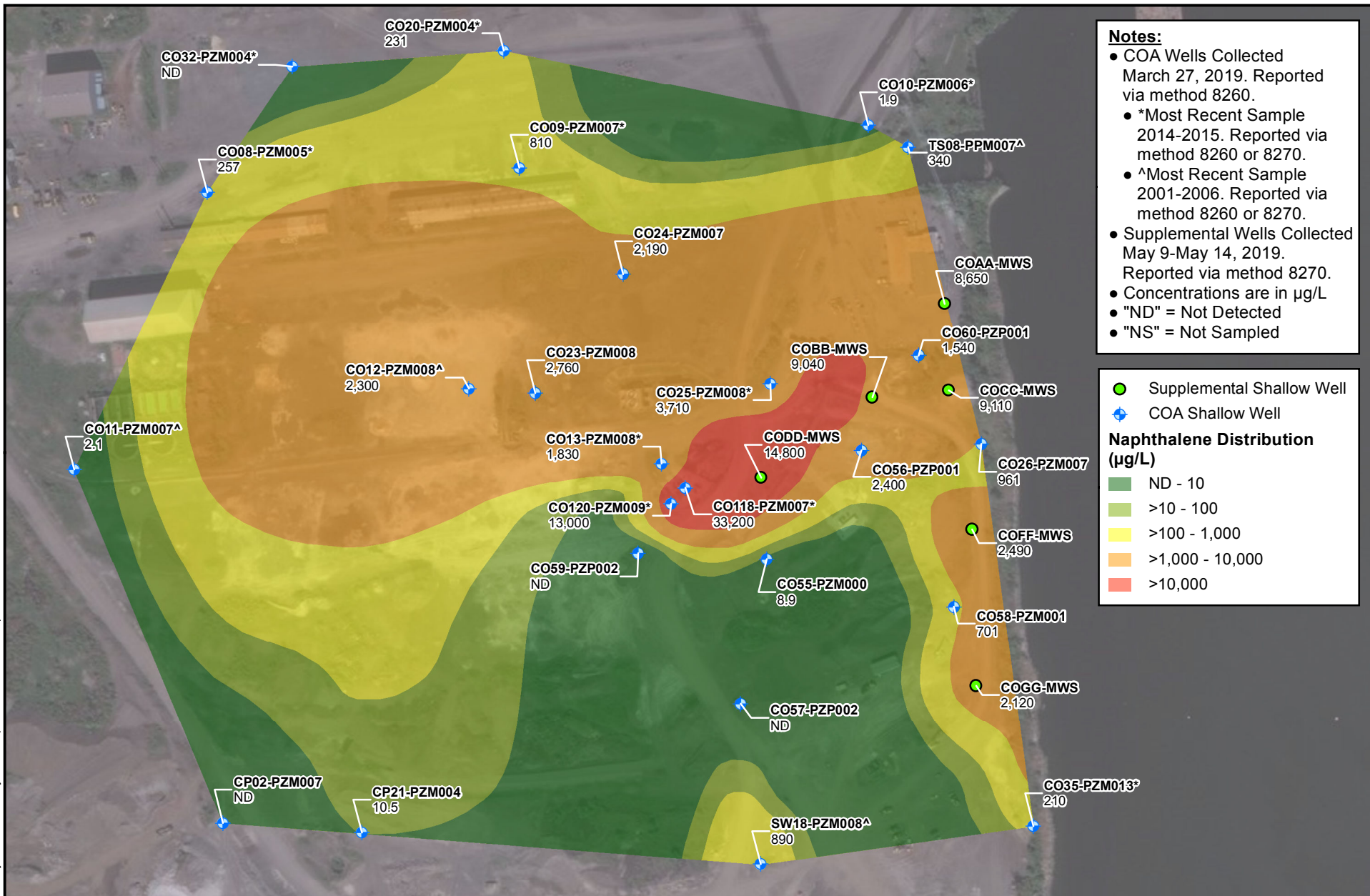
ARM Group Inc.
Engineers and Scientists

1 inch = 80 feet

0 40 80
Feet

Former Coke Oven Area - Cell 3
Surface Water Sample Locations
Benzene and Naphthalene Results

**Figure
22**



ARM Group Inc.
Engineers and Scientists

1 inch = 300 feet

0 150 300
Feet

Former Coke Oven Area - Cell 5
Onshore Shallow Sample Locations
Naphthalene Distribution

**Figure
23**



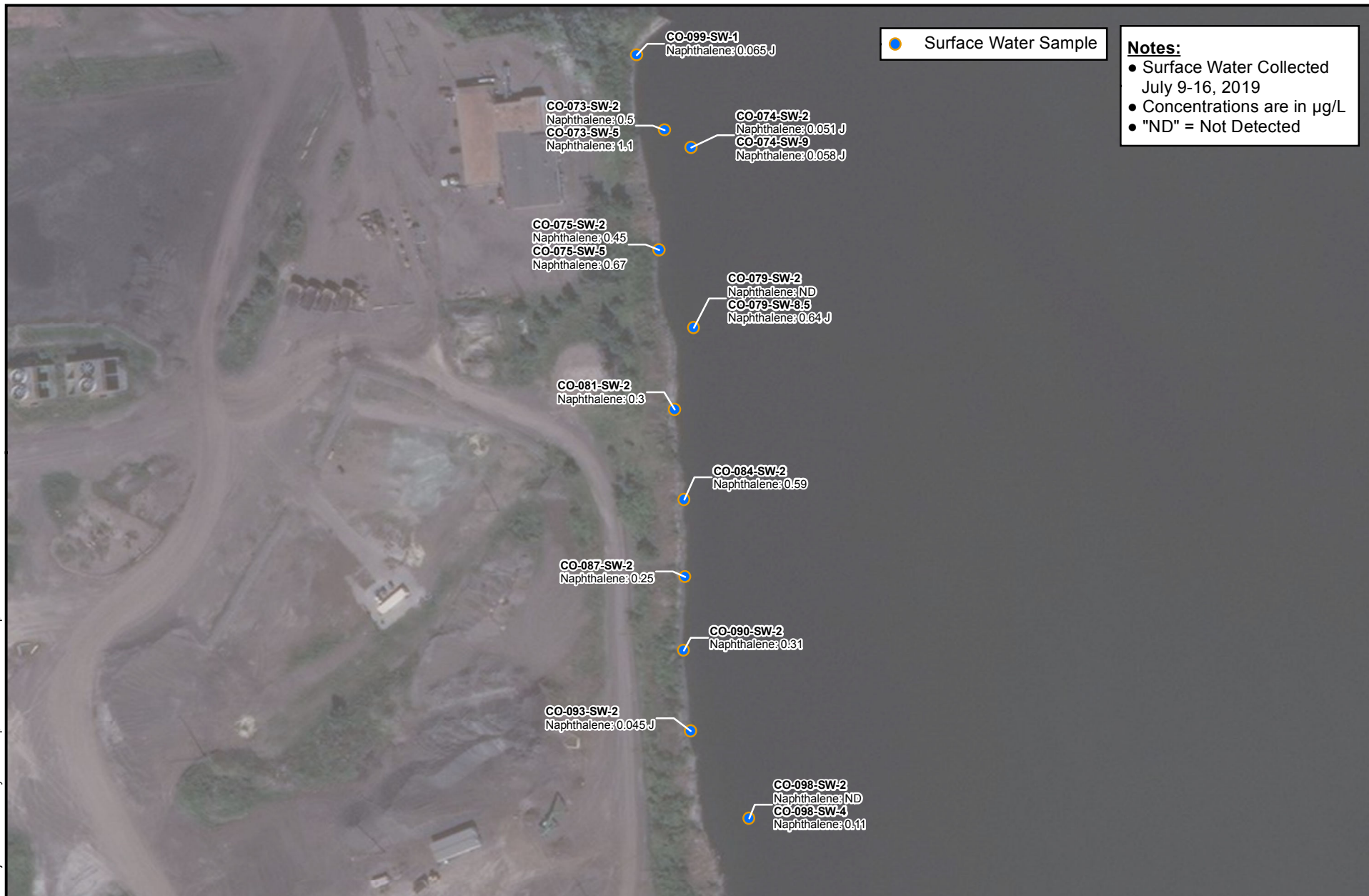
ARM Group Inc.
Engineers and Scientists

1 inch = 170 feet

0 85 170
Feet

Former Coke Oven Area - Cell 3
Pore Water Sample Locations
Naphthalene Results

Figure
24



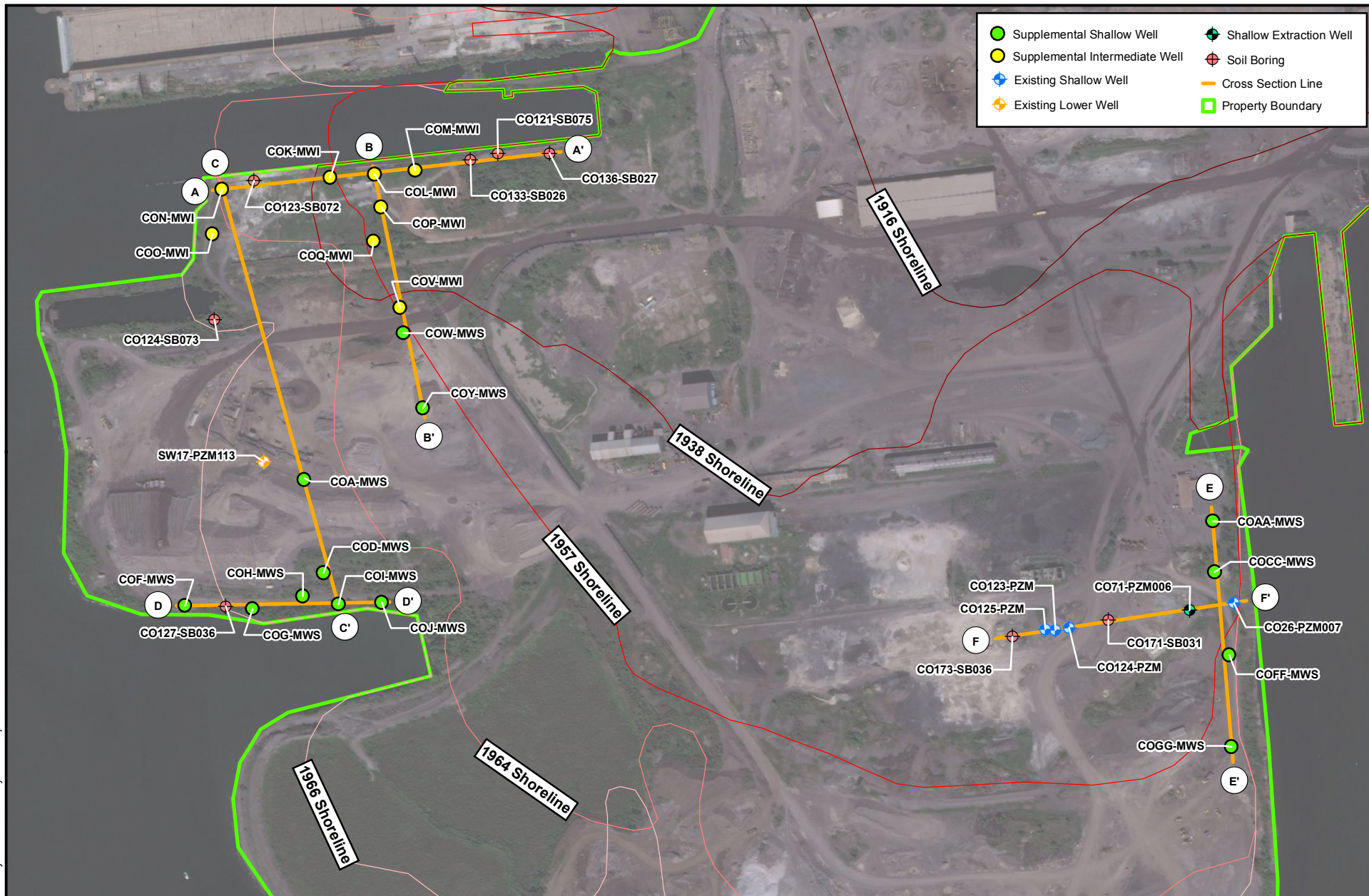
ARM Group Inc.
Engineers and Scientists

1 inch = 170 feet

0 85 170
Feet

Former Coke Oven Area - Cell 5
Surface Water Sample Locations
Naphthalene Results

Figure
25



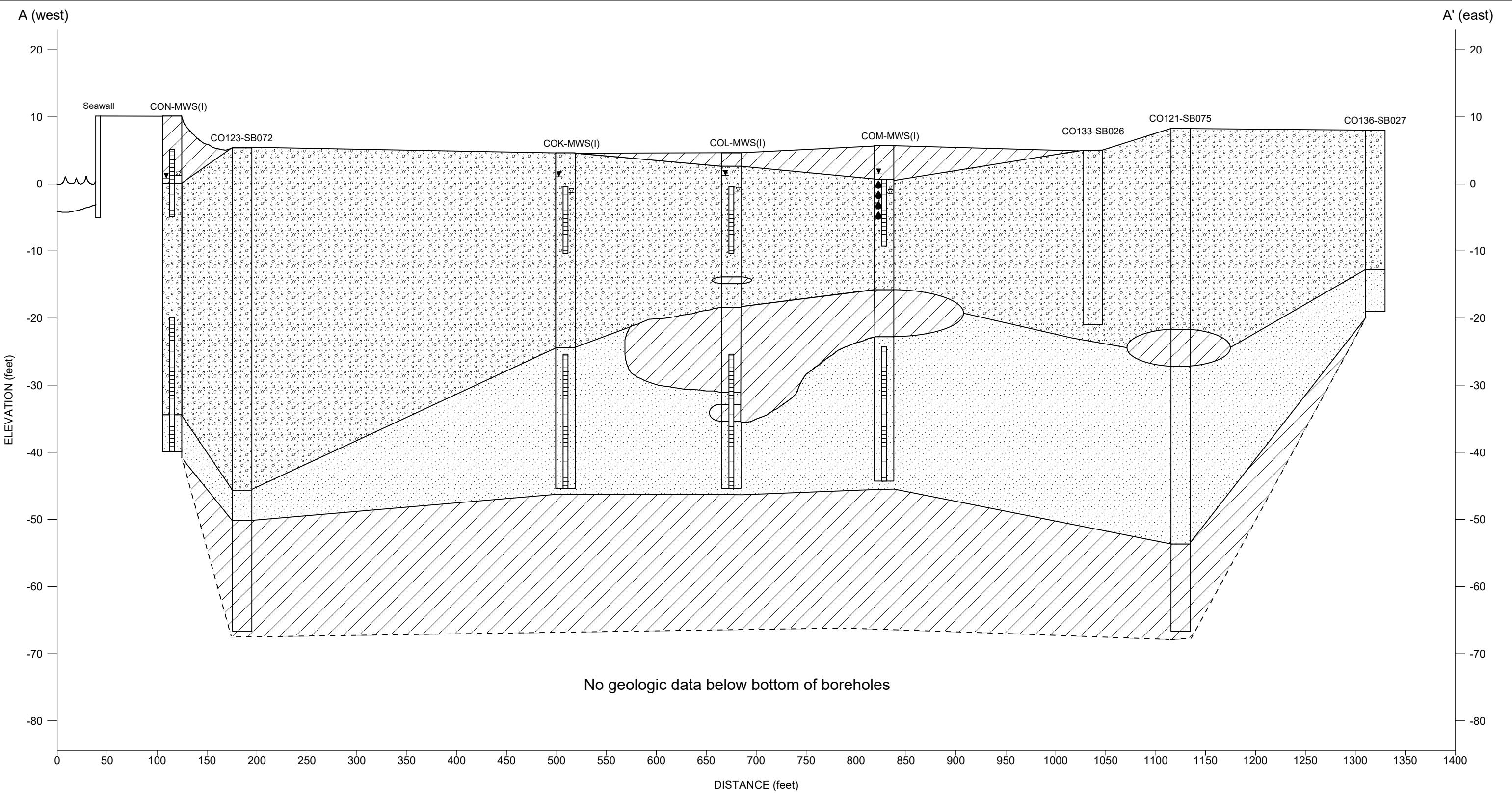
ARM Group Inc.
Engineers and Scientists

1 inch = 500 feet

0 250 500
Feet

Former Coke Oven Area
Cross Section Overview
Approximate Shoreline Progression

**Figure
26**



- Slag Gravel
- Sand
- Silt/Clay

LEGEND

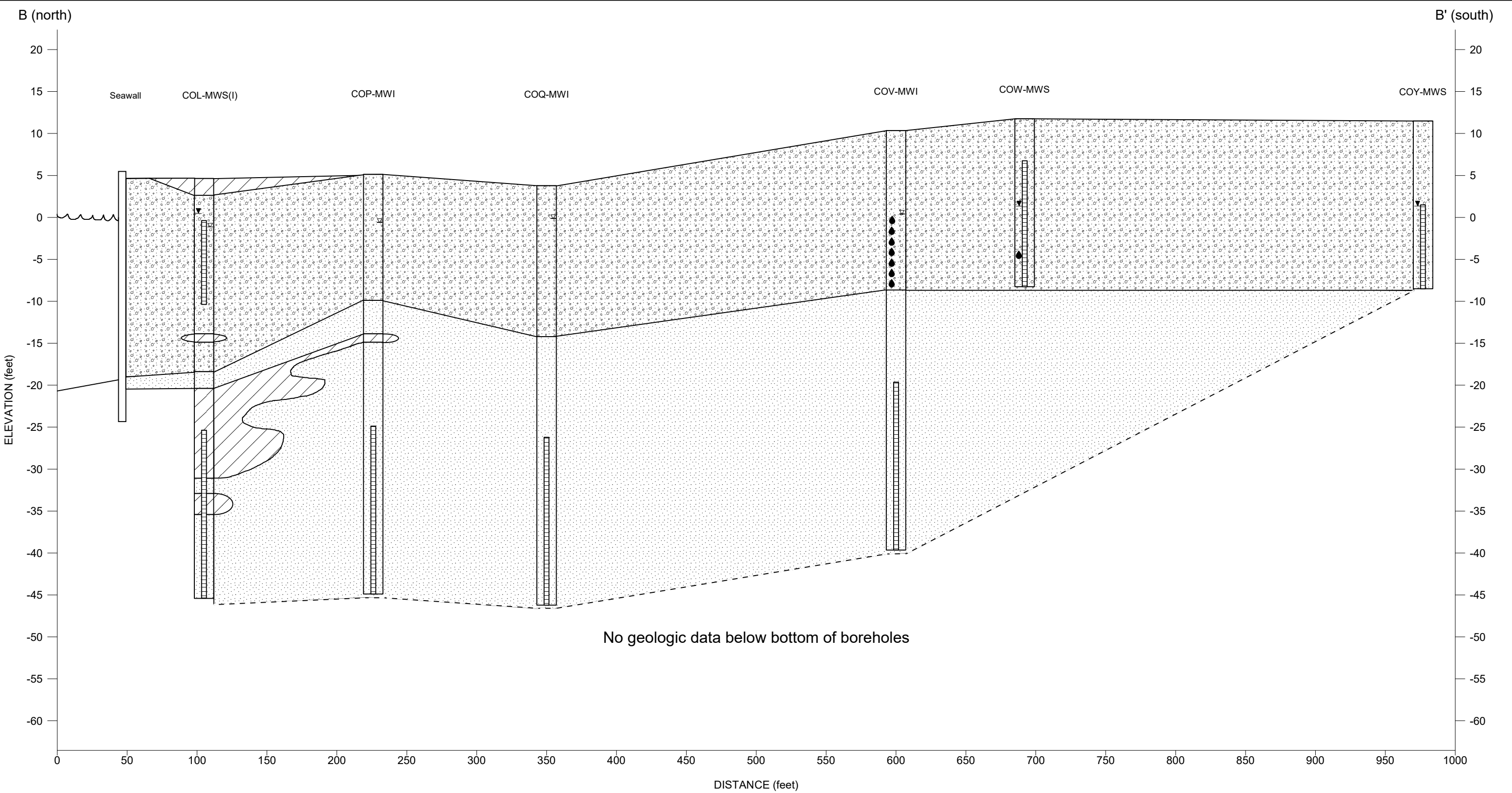
- Shallow Well Groundwater Elevation
- Intermediate Well Groundwater Elevation
- NAPL Present

Tradepoint Atlantic
Sparrows Point, MD
ARM Project 190342M

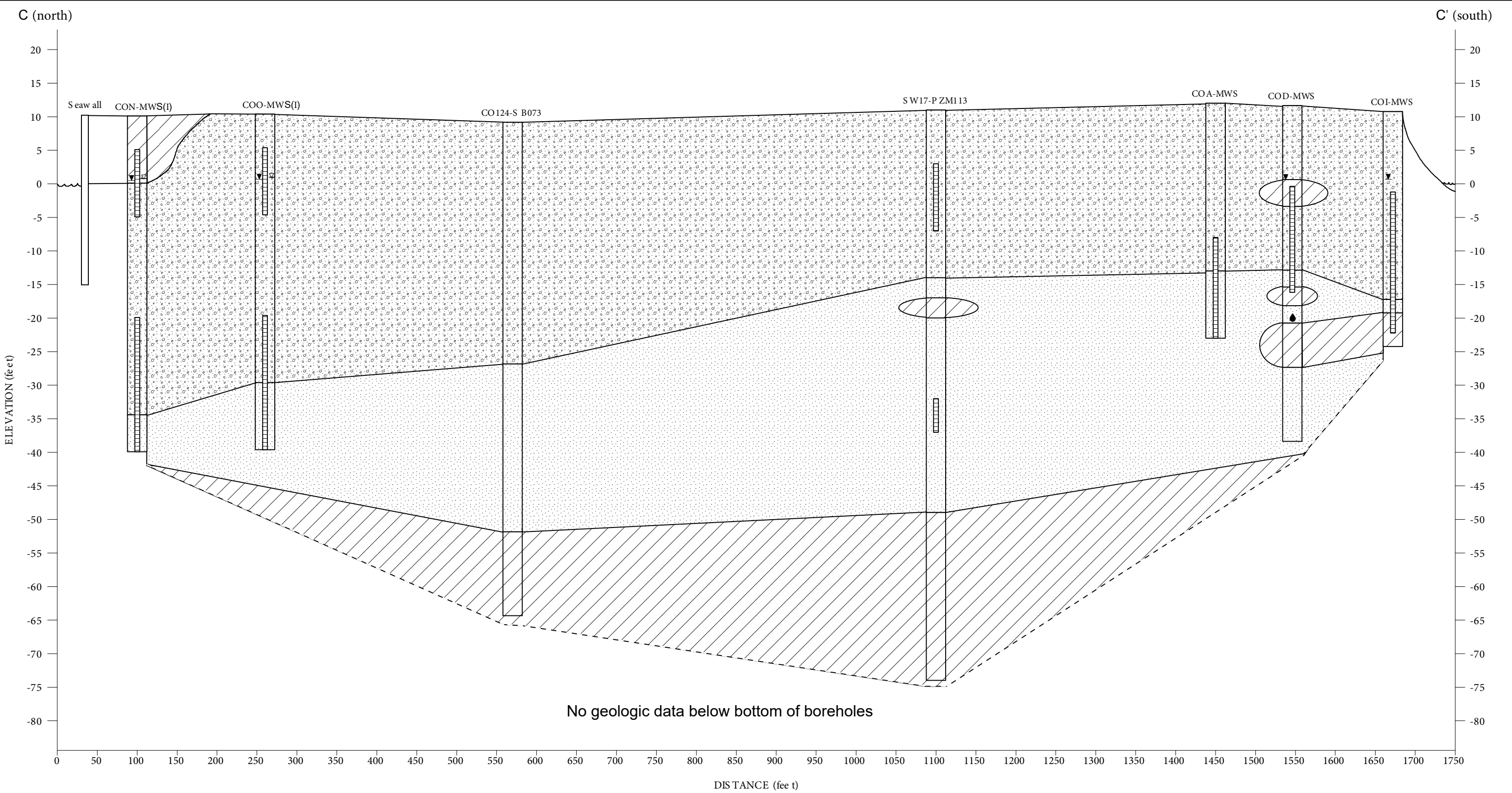


Figure 27

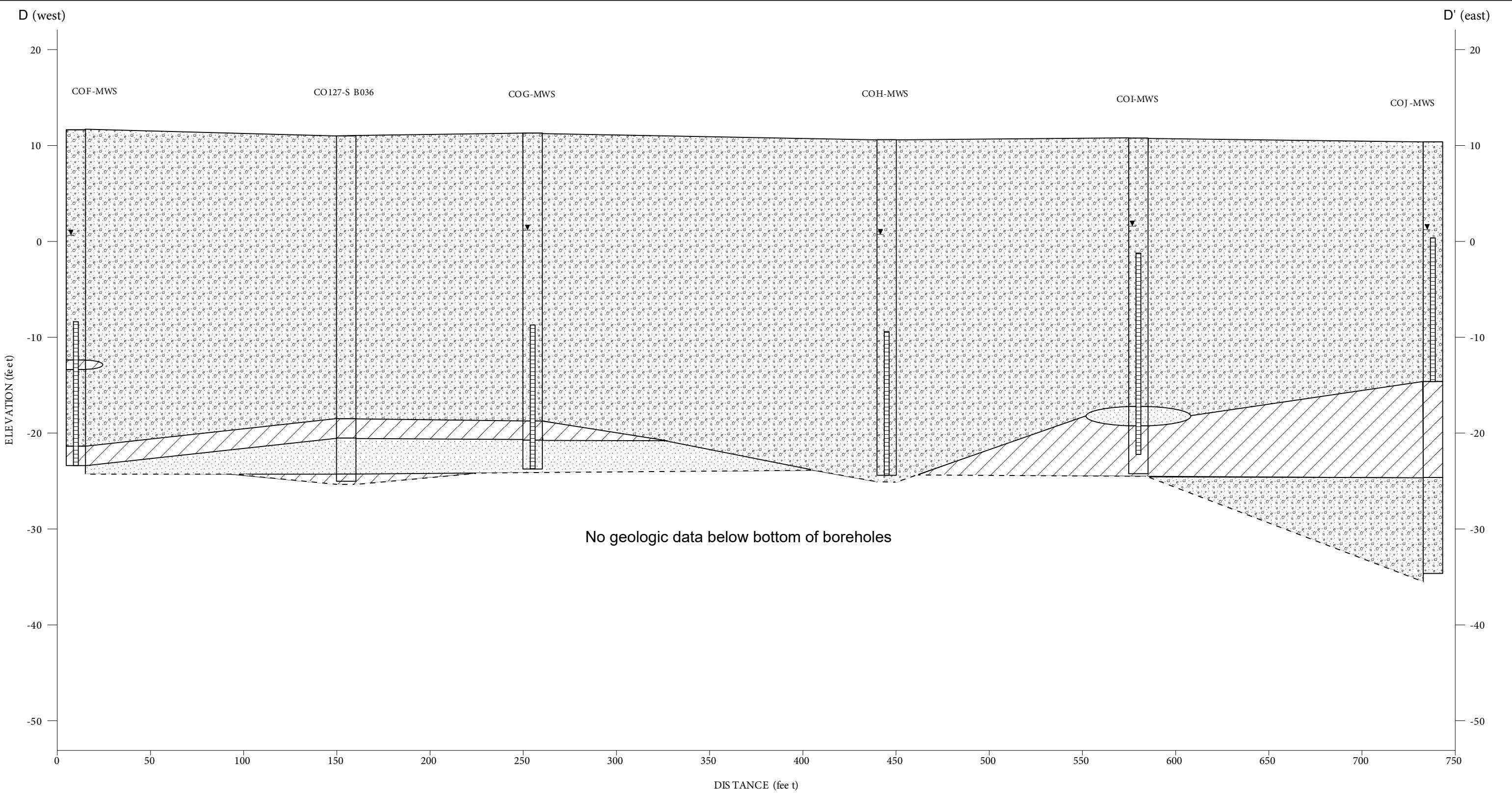
Geologic Cross Section
Section A-A'







<div><div>Slag Gravel</div><div>Sand</div><div>Silt/Clay</div></div>	<div>LEGEND</div> <div><div>Shallow Well Groundwater Elevation</div><div>Intermediate Well Groundwater Elevation</div><div>NAPL Present</div></div>	<div>Tradepoint Atlantic</div> <div>Sparrows Point, MD</div> <div>ARM Project 190342M</div>	<div>Figure 28</div>
		<div><div></div><div>ARM Group Inc.</div><div>Engineers and Scientists</div></div>	<div>Geologic Cross Section</div> <div>Section B-B'</div>



LEGEND		Tradepoint Atlantic Sparrows Point, MD ARM Project 190342M	
Slag	Shallow Well Groundwater Elevation	ARM Group Inc. Engineers and Scientists	
Sand	Intermediate Well Groundwater Elevation		
Silt/Clay	NAPL Present		
		Geologic Cross Section Section C-C'	



LEGEND

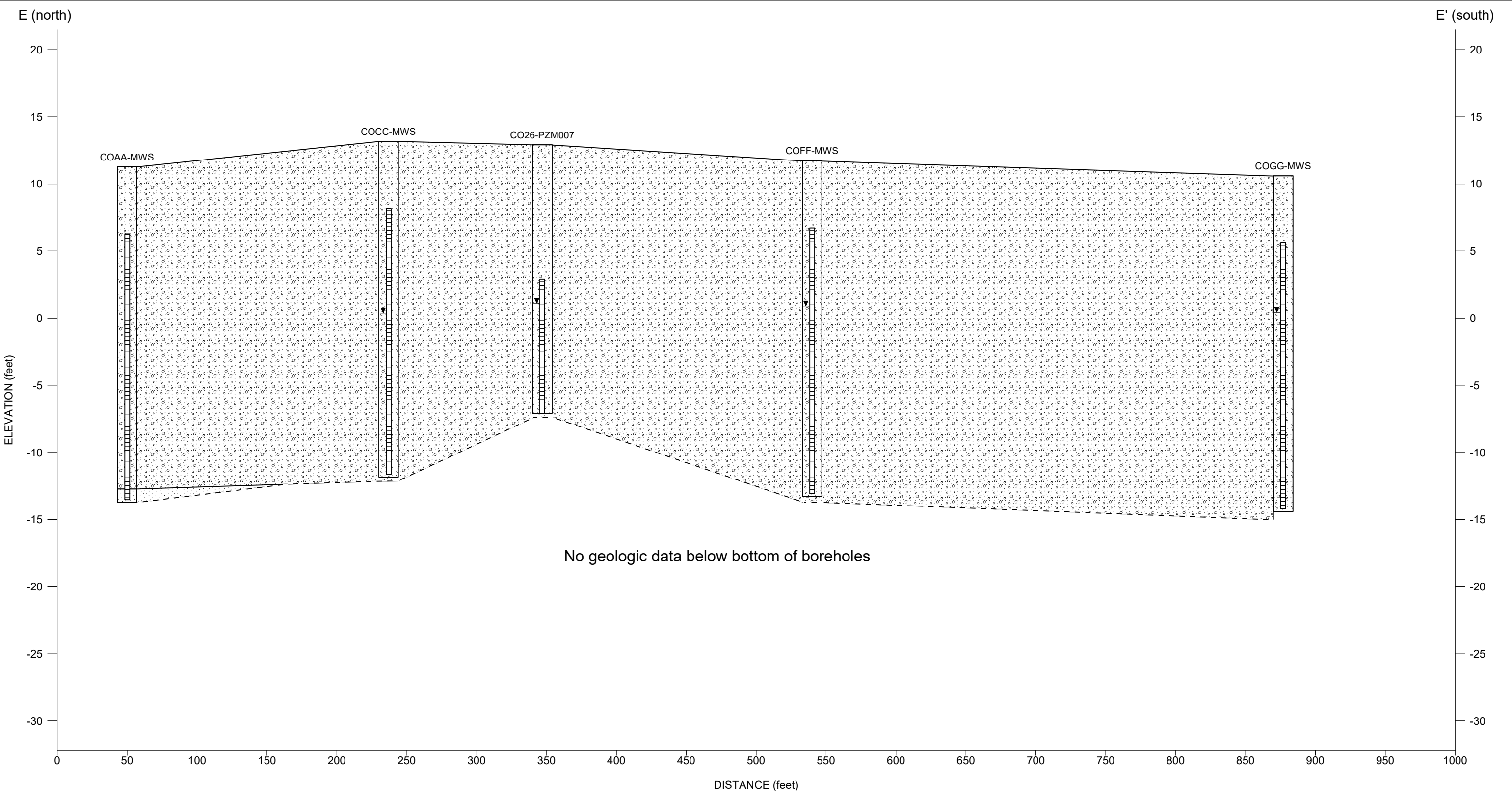
-  S lag
-  S and
-  Silt/Clay
-  Shallow Well Groundwater Elevation


Tradepoint Atlantic
Sparrows Point, MD
ARM Project 190342M

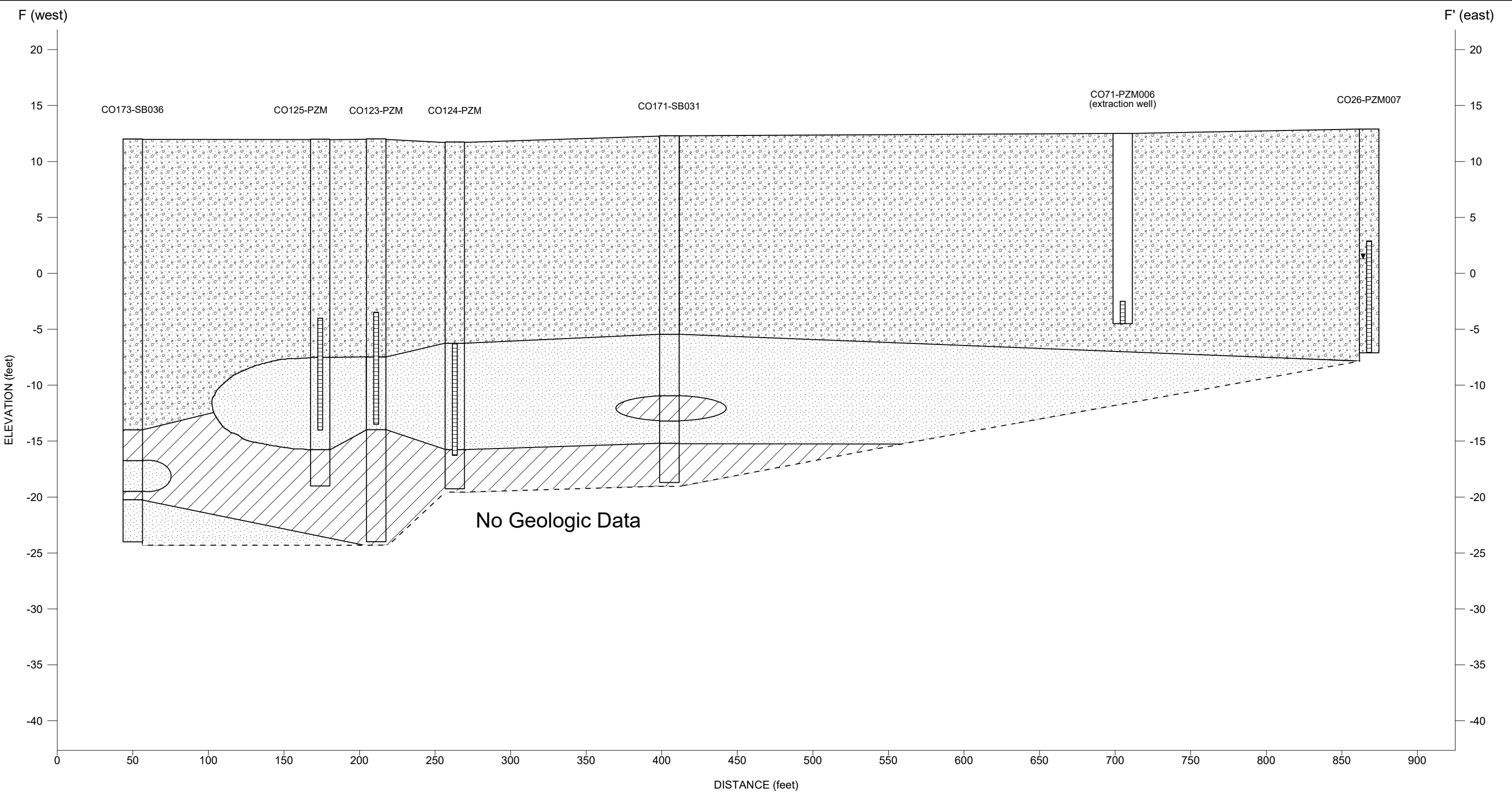


Figure 30

Geologic Cross Section
Section D-D'



LEGEND		<p>Tradepoint Atlantic Sparrows Point, MD ARM Project 190342M</p>  <p>ARM Group Inc. Engineers and Scientists</p>	<p>Figure 31</p> <p>Geologic Cross Section Section E-E'</p>
 Slag	 Sand		



LEGEND

- Slag
- Sand
- Silt/Clay
- Shallow Well Groundwater Elevation

Tradepoint Atlantic
Sparrows Point, MD
ARM Project 190342M



Figure 32

Geologic Cross Section
Section F-F'



ARM Group Inc.
Engineers and Scientists

1 inch = 120 feet

0 60 120
Feet

Former Coke Oven Area - Cell 2
Onshore Shallow Sample Locations
Groundwater Elevation Map

Figure
33



- Supplemental Intermediate Well
- ⊕ Existing Intermediate Well
- Groundwater Elevation Contour (1 ft)

Notes:

- Synoptic Round on July 15-16, 2019
- "NM" = Not Measured

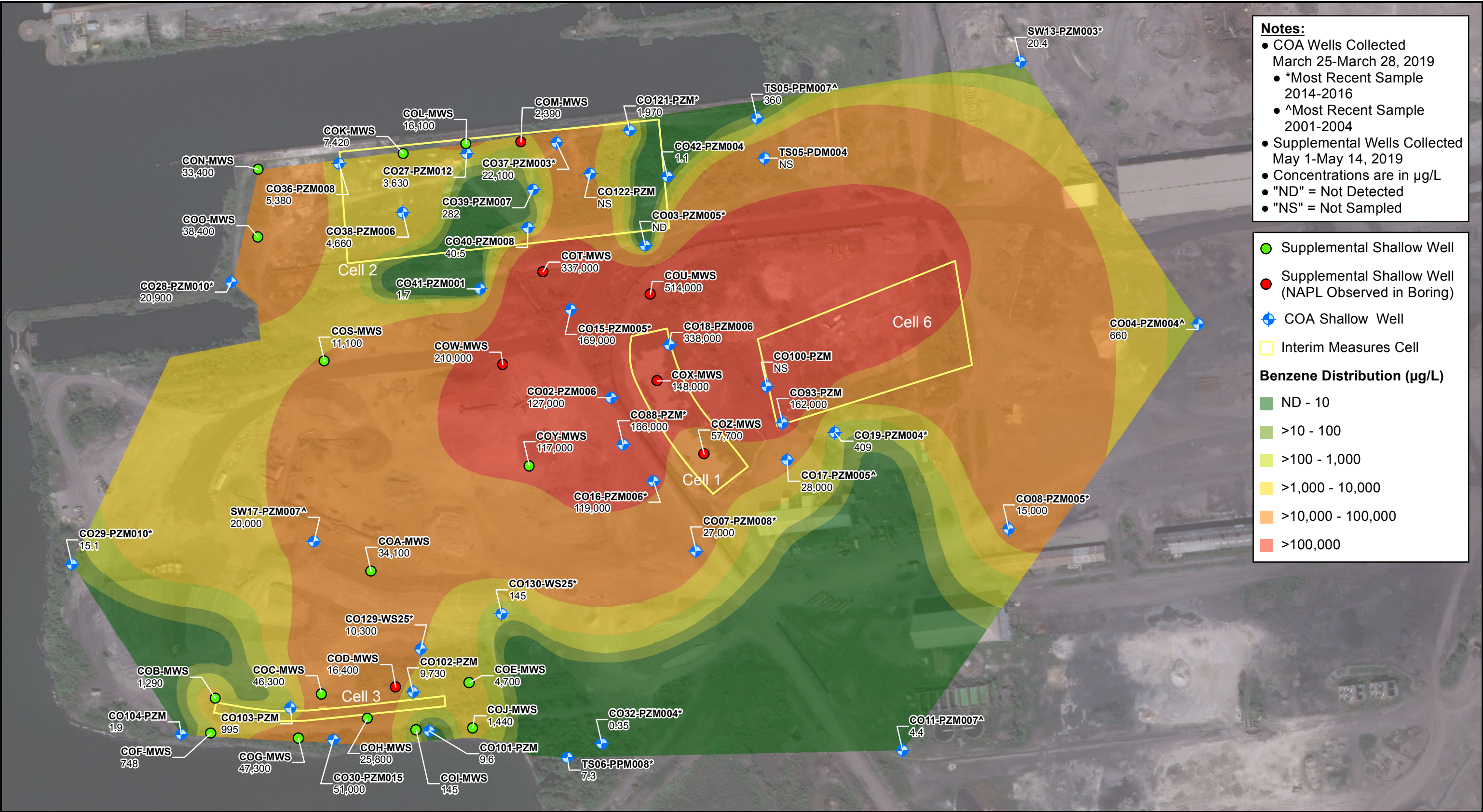


ARM Group Inc.
Engineers and Scientists

1 inch = 100 feet

0 50 100
Feet

Former Coke Oven Area - Cell 2
Onshore Intermediate Sample Locations
Groundwater Elevation Map



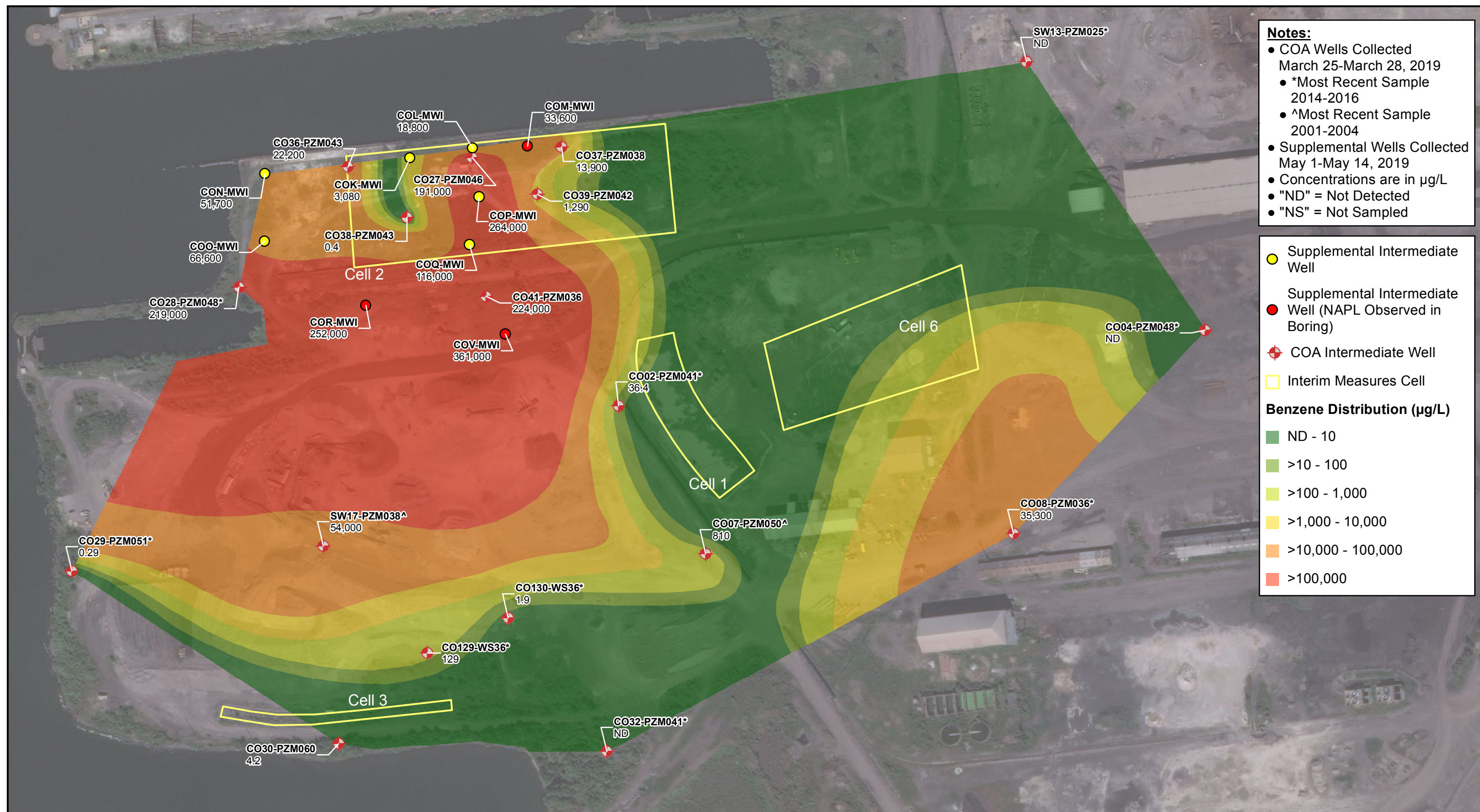
ARM Group Inc.
Engineers and Scientists

1 inch = 250 feet

0 125 250
Feet

Western Former Coke Oven Area
Onshore Shallow Sample Locations
Benzene Distribution

Figure
35



Notes:

- COA Wells Collected March 25-March 28, 2019
- *Most Recent Sample 2014-2016
- ^Most Recent Sample 2001-2004
- Supplemental Wells Collected May 1-May 14, 2019
- Concentrations are in µg/L
- "ND" = Not Detected
- "NS" = Not Sampled

• Supplemental Intermediate Well
 • Supplemental Intermediate Well (NAPL Observed in Boring)
 • COA Intermediate Well
 • Interim Measures Cell

Benzene Distribution (µg/L)

- ND - 10
- >10 - 100
- >100 - 1,000
- >1,000 - 10,000
- >10,000 - 100,000
- >100,000



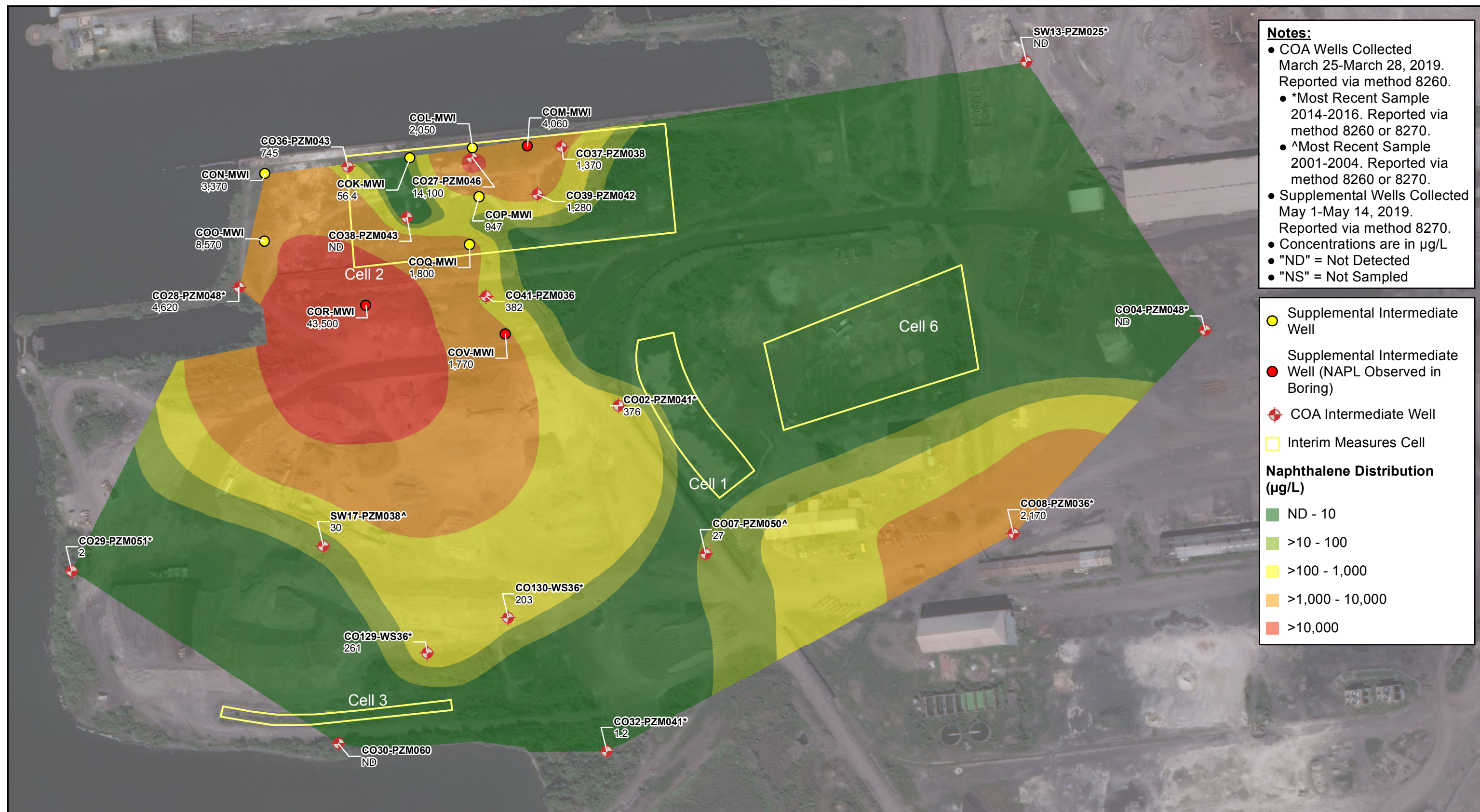
ARM Group Inc.
Engineers and Scientists

1 inch = 250 feet

0 125 250
Feet

Western Former Coke Oven Area
Onshore Intermediate Sample Locations
Benzene Distribution

Figure
37



ARM Group Inc.
Engineers and Scientists

1 inch = 250 feet

0 125 250
Feet

Western Former Coke Oven Area
Onshore Intermediate Sample Locations
Naphthalene Distribution

Figure
38



ARM Group Inc.
Engineers and Scientists

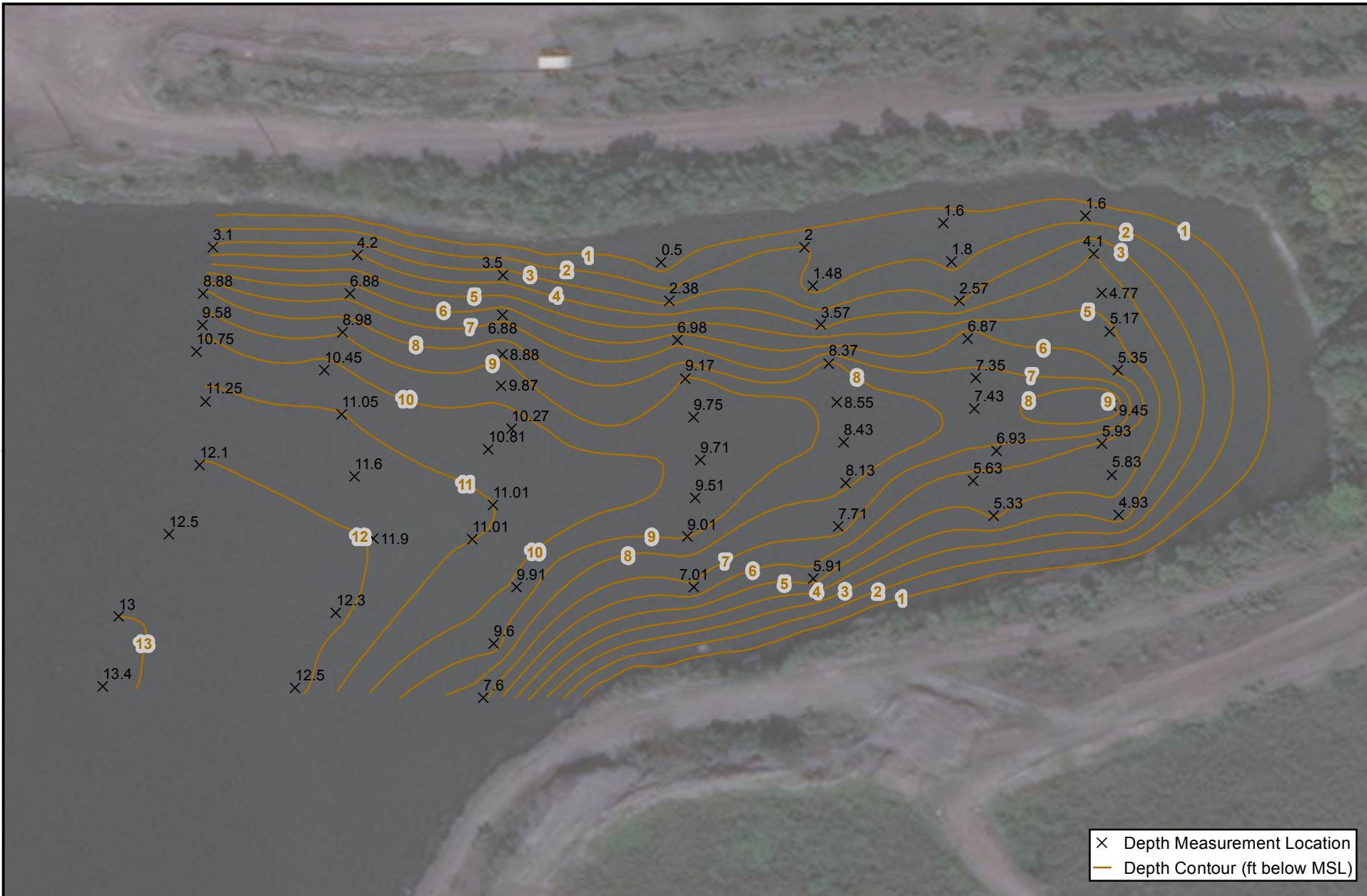
1 inch = 120 feet

0 60 120
Feet

Former Coke Oven Area - Cell 3
Onshore Shallow Sample Locations
Groundwater Elevation Map

Figure

1 -



ARM Group Inc.
Engineers and Scientists

1 inch = 100 feet

0 50 100
Feet

Former Coke Oven Area - Cell 3
Bathymetric Map
Offshore Depth Contours

Figure
40



ARM Group Inc.
Engineers and Scientists

1 inch = 170 feet

0 85 170
Feet

Former Coke Oven Area - Cell 5
Onshore Shallow Sample Locations
Groundwater Elevation Map

Figure
41

TABLES

Table 1
Groundwater Well Elevations and Measurements
Cell 2 - Coke Oven Area
Sparrows Point, Maryland

Well Name	Measurement Date	DTW (ft)	TOC Elev (ft)	GW Elev (ft)	Well Name	Measurement Date	DTW (ft)	TOC Elev (ft)	GW Elev (ft)
CO02-PZM006	7/16/2019	14.41	13.89	-0.52	CO121-PZM	7/16/2019	10.61	11.87	1.26
CO02-PZM041	7/16/2019	15.96	13.88	-2.08	COK-MWS	7/15/2019	6.14	6.62	0.48
CO03-PZM005	7/16/2019	5.68	13.53	7.85	COK-MWI	7/15/2019	8.58	6.83	-1.75
CO16-PZM006	7/16/2019	12.53	12.88	0.35	COL-MWS	7/15/2019	6.87	7.38	0.51
CO18-PZM006	7/16/2019	11.81	13.57	1.76	COL-MWI	7/15/2019	9.03	7.56	-1.47
CO27-PZM012	7/15/2019	4.58	5.12	0.54	COM-MWS	7/15/2019	7.16	8.11	0.95
CO27-PZM046	7/15/2019	6.98	5.17	-1.81	COM-MWI	7/15/2019	9.25	7.43	-1.82
CO28-PZM010	7/16/2019	12.08	12.34	0.26	CON-MWS	7/15/2019	11.70	12.01	0.31
CO28-PZM048	7/16/2019	11.59	12.69	1.10	CON-MWI	7/15/2019	11.54	11.99	0.45
CO36-PZM008	7/15/2019	6.55	6.94	0.39	COO-MWS	7/15/2019	12.31	12.70	0.39
CO36-PZM043	7/15/2019	7.18	6.92	-0.26	COO-MWI	7/15/2019	12.20	12.68	0.48
CO37-PZM038	7/15/2019	12.07	12.12	0.05	COP-MWI	7/15/2019	8.35	7.53	-0.82
CO38-PZM006	7/15/2019	6.09	6.75	0.66	COQ-MWI	7/15/2019	6.55	6.42	-0.13
CO38-PZM043	7/15/2019	6.82	6.65	-0.17	COR-MWI	7/15/2019	11.05	11.65	0.60
CO39-PZM007	7/15/2019	6.69	7.75	1.06	COS-MWS	7/15/2019	13.84	14.43	0.59
CO39-PZM042	7/15/2019	8.01	7.91	-0.10	COT-MWS	7/15/2019	10.68	11.74	1.06
CO40-PZM008	7/15/2019	6.84	7.47	0.63	COU-MWS	7/15/2019	12.97	14.48	1.51
CO41-PZM001	7/15/2019	12.30	13.75	1.45	COV-MWI	7/15/2019	12.02	12.20	0.18
CO41-PZM036	7/15/2019	13.40	13.60	0.20	COW-MWS	7/15/2019	12.79	13.97	1.18
CO42-PZM004	7/15/2019	8.19	10.83	2.64	COX-MWS	7/15/2019	13.99	15.45	1.46
CO88-PZM	7/16/2019	13.15	14.07	0.92	COY-MWS	7/15/2019	12.30	13.48	1.18
CO93-PZM	7/16/2019	12.20	12.12	-0.08	COZ-MWS	7/15/2019	13.20	14.70	1.50
CO100-PZM	7/16/2019	10.42	12.27	1.85					

Table 2
Pore Water Sampling Locations
Descriptions and Notes
Coke Oven Area: Cell 2

Sample	Depth	Sampling Coordinates		Description/Notes	Picture (in Appendix E)
		Northing	Easting		
CO-046-PW	-	563037.4667	1454208.472	Could not sample this location due to hard bottom	
CO-047-PW	-	563035.7934	1454248.437	Could not sample this location due to hard bottom	
CO-048-PW-1	9 inches	563115.2998	1454165.659		
CO-048-PW-3	3 feet	563115.2998	1454165.659		
CO-049-PW-1	9 inches	563133.6603	1454201.504		
CO-049-PW-3	3 feet	563133.6603	1454201.504		
CO-050-PW	-	563133.874	1454253.466	Cannot sample this location due to hard bottom	
CO-051-PW-1	9 inches	563361.1131	1454614.597	3 foot sample was not collected due to low permeability of substrate; screen filter is covered in black mud with no petroleum odor	
CO-052-PW-1	9 inches	563328.1399	1454612.062	Screen filter is covered in black mud with no petroleum odor	
CO-052-PW-2	2 feet	563328.1399	1454612.062	Screen filter is covered in black mud with no petroleum odor	
CO-053-PW-2	2 feet	563287.0226	1454631.006	9 inch sample was not collected due to low permeability of substrate; screen filter is covered in black mud with no petroleum odor	
CO-054-PW-1	9 inches	563380.1098	1454709.354	Screen filter is covered in black mud with no petroleum odor	
CO-054-PW-3	3 feet	563380.1098	1454709.354	Screen filter is covered in black mud with no petroleum odor	
CO-055-PW-1	9 inches	563333.9165	1454724.699	Screen filter is covered in black mud with no petroleum odor	
CO-055-PW-2	2 feet	563333.9165	1454724.699	Screen filter is covered in black mud with no petroleum odor	
CO-056-PW-2	2 feet	563290.0779	1454710.743	9 inch sample was not collected due to low permeability of the substrate; screen filter is covered in black mud with no petroleum odor	Photo: 5

Table 2
Pore Water Sampling Locations
Descriptions and Notes
Coke Oven Area: Cell 2

Sample	Depth	Sampling Coordinates		Description/Notes	Picture (in Appendix E)
		Northing	Easting		
CO-057-PW-1	9 inches	563401.094	1454768.381	3 foot sample was not collected due to low permeability of the substrate; screen filter is covered in black mud with no petroleum odor	
CO-058-PW-1	9 inches	563346.5461	1454802.23	Screen filter is covered in black mud with no petroleum odor	
CO-058-PW-2	2 feet	563346.5461	1454802.23	Screen filter is covered in black mud with no petroleum odor	
CO-059-PW	-	563300.4633	1454811.622	Could not sample this location due to low permeability of the substrate; screen filter is covered in black mud with no petroleum odor	Photo: 6
CO-060-PW	-	563400.204	1454901.352	Could not sample this location due to low permeability of the substrate; screen filter is covered in black mud with no petroleum odor	
CO-061-PW-1	9 inches	563355.5803	1454917.679	3 foot sample was not collected due to low permeability of substrate; screen filter is covered in black mud with no petroleum odor	Photo: 7
CO-062-PW-1	9 inches	563309.9829	1454887.332	3 foot sample was not collected due to low permeability of substrate; screen filter is covered in black mud with no petroleum odor	Photo: 8
CO-063-PW-1	9 inches	563422.9763	1454987.356	Screen filter is covered in black mud with no petroleum odor	
CO-063-PW-2	2 feet	563422.9763	1454987.356	Screen filter is covered in black mud with no petroleum odor	
CO-064-PW-3	3 feet	563367.3641	1455002.893	9 inch sample was not collected due to low permeability of substrate; screen filter is covered in black mud with no petroleum odor	
CO-065-PW-1	9 inches	563321.8146	1455011.101	Screen filter is covered in black mud with no petroleum odor	

Table 2
Pore Water Sampling Locations
Descriptions and Notes
Coke Oven Area: Cell 2

Sample	Depth	Sampling Coordinates		Description/Notes	Picture (in Appendix E)
		Northing	Easting		
CO-065-PW-2	2 feet	563321.8146	1455011.101	Screen filter is covered in black mud with no petroleum odor	
CO-066-PW-1	9 inches	563418.8298	1455102.179	Screen filter is covered in black mud with no petroleum odor	
CO-066-PW-2	2 feet	563418.8298	1455102.179	Screen filter is covered in black mud with no petroleum odor	
CO-067-PW-1	9 inches	563368.6234	1455077.557	Screen filter is covered in black mud with no petroleum odor	
CO-067-PW-2	2 feet	563368.6234	1455077.557	Screen filter is covered in black mud with no petroleum odor	
CO-068-PW-2	2 feet	563332.4074	1455109.412	9 inch sample was not collected due to low permeability of substrate; screen filter is covered in black mud with no petroleum odor	Photo: 9
CO-069-PW-1	9 inches	563049.7789	1454128.916		
CO-069-PW-2	2 feet	563049.7789	1454128.916		
CO-070-PW-1	9 inches	562946.0499	1454147.482		
CO-070-PW-2	2 feet	562946.0499	1454147.482		
CO-071-PW	-	562941.8181	1454194.334	Could not sample this location due to hard bottom	
CO-072-PW	-	562940.4391	1454234.31	Could not sample this location due to hard bottom	

Table 3
Groundwater Well Elevations and Measurements
Cell 3 - Coke Oven Area
Sparrows Point, Maryland

Well Name	Measurement Date	DTW (ft)	TOC Elev (ft)	GW Elev (ft)
CO30-PZM015	7/17/2019	11.63	12.3	0.67
CO30-PZM060	7/17/2019	13.09	13.29	0.20
CO101-PZM	7/17/2019	11.74	12.39	0.65
CO102-PZM	7/17/2019	12.22	12.88	0.66
CO103-PZM	7/17/2019	12.83	13.48	0.65
CO104-PZM	7/17/2019	12.72	13.29	0.57
COB-MWS	7/17/2019	13.70	14.23	0.53
COC-MWS	7/17/2019	13.71	14.32	0.61
COD-MWS	7/17/2019	13.06	13.74	0.68
COE-MWS	7/17/2019	13.32	13.98	0.66
COF-MWS	7/17/2019	13.86	14.51	0.65
COG-MWS	7/17/2019	13.08	13.77	0.69
COH-MWS	7/17/2019	13.12	13.76	0.64
COI-MWS	7/17/2019	12.56	13.30	0.74
COJ-MWS	7/17/2019	13.15	13.86	0.71

Table 4
Pore Water Sampling Locations
Descriptions and Notes
Coke Oven Area: Cell 3

Sample	Depth	Sampling Coordinates		Description/Notes	Picture (in Appendix E)
		Northing	Easting		
CO-016-PW-1	9 inches	561553.5854	1454927.706	Screen filter is covered in black mud with petroleum odor; 3 foot sample was not collected due to low permeability of substrate	Photo: 1
CO-017-PW	-	561589.8535	1454935.465	Could not sample this location due to hard bottom	
CO-018-PW	-	561619.6198	1454931.728	Could not sample this location due to hard bottom	
CO-019-PW	-	561571.7742	1454723.153	Could not sample this location due to hard bottom	
CO-020-PW-1	9 inches	561559.2165	1454610.617	Pore water and surface water specific conductance did not have a 30% difference; 3 foot sample could not be collected due to hard bottom	
CO-021-PW	-	561589.0102	1454607.104	Could not sample this location due to hard bottom	
CO-022-PW	-	561588.1813	1454827.463	Could not sample this location due to hard bottom	
CO-025-PW-1	9 inches	561527.9356	1454615.503	Screen filter is covered in black mud with petroleum odor; 3 foot sample could not be collected due to low permeability of the substrate	Photo: 2
CO-026-PW	-	561542.1386	1454727.814	Could not sample this location due to hard bottom	
CO-027-PW	-	561601.4099	1454718.491	Could not sample this location due to hard bottom	
CO-028-PW	-	561617.8169	1454822.801	Could not sample this location due to hard bottom	
CO-029-PW	-	561558.5456	1454832.124	Could not sample this location due to hard bottom	
CO-034-PW	-	561618.8039	1454603.592	Could not sample this location due to hard bottom	
CO-035-PW	-	561631.0455	1454713.83	Could not sample this location due to hard bottom	
CO-036-PW	-	561647.4526	1454818.14	Could not sample this location due to hard bottom	
CO-037-PW	-	561649.3861	1454927.99	Could not sample this location due to hard bottom	
CO-038-PW	-	561620.9393	1454383.395	Could not sample this location due to hard bottom	
CO-039-PW	-	561591.2518	1454379.076	Could not sample this location due to hard bottom	
CO-040-PW-1	9 inches	561567.131	1454356.522	Screen filter is covered in black mud	Photo: 3

Table 4
Pore Water Sampling Locations
Descriptions and Notes
Coke Oven Area: Cell 3

Sample	Depth	Sampling Coordinates		Description/Notes	Picture (in Appendix E)
		Northing	Easting		
CO-040-PW-3	3 feet	561567.131	1454356.522	Screen filter is covered in black mud	
CO-041-PW	-	561531.8769	1454370.438	Could not sample this location due to low permeability of the substrate; screen filter is covered in black mud with petroleum odor	
CO-042-PW	-	561605.4205	1454490.065	Could not sample this location due to hard bottom	
CO-043-PW	-	561575.4205	1454490.065	Could not sample this location due to hard bottom	
CO-044-PW	-	561545.4205	1454490.065	Could not sample this location due to low permeability of the substrate; screen filter is covered in black mud	
CO-045-PW	-	561515.4205	1454490.065	Could not sample this location due to low permeability of the substrate; screen filter is covered in black mud with petroleum odor	Photo: 4

Table 5
Groundwater Well Elevations and Measurements
Cell 5 - Coke Oven Area
Sparrows Point, Maryland

Well Name	Measurement Date	DTW (ft)	TOC Elev (ft)	GW Elev (ft)
CO23-PZM008	7/17/2019	14.73	15.74	1.01
CO24-PZM007	7/17/2019	14.34	15.95	1.61
CO26-PZM007	7/17/2019	11.70	12.76	1.06
CO55-PZM000	7/17/2019	14.14	15.10	0.96
CO56-PZP001	7/17/2019	14.98	15.92	0.94
CO57-PZP002	7/17/2019	15.48	16.59	1.11
CO58-PZM001	7/17/2019	13.38	14.31	0.93
CO59-PZP002	7/17/2019	15.74	16.75	1.01
CO60-PZP001	7/17/2019	14.89	15.83	0.94
COAA-MWS	7/17/2019	10.66	10.65	-0.01
COBB-MWS	7/17/2019	15.14	16.27	1.13
CODD-MWS	7/17/2019	13.31	14.37	1.06
COFF-MWS	7/17/2019	13.79	14.78	0.99
COGG-MWS	7/17/2019	12.10	12.69	0.59
COCC-MWS	7/17/2019	14.95	15.55	0.60

Table 6
Pore Water Sampling Locations
Descriptions and Notes
Coke Oven Area: Cell 5

Sample	Depth	Sampling Coordinates		Description/Notes	Picture (in Appendix E)
		Northing	Easting		
CO-073-PW-1	9 inches	562099.775	1458102.681	3 foot sample was not collected due to hard bottom	
CO-074-PW-1	9 inches	562077.8959	1458136.024		
CO-074-PW-2	2 feet	562077.8959	1458136.024		
CO-075-PW	-	561949.4456	1458096.093	Could not sample this location due to hard bottom	
CO-076-PW	-	561953.4747	1458125.821	9 inch sample could not be collected due to low permeability of substrate; 3 foot sample could not be collected due to hard bottom	
CO-077-PW	-	561957.5039	1458155.55	Could not sample this location due to hard bottom	
CO-078-PW	-	561850.9765	1458109.439	Could not sample this location due to hard bottom	
CO-079-PW-1	9 inches	561852.7893	1458139.384		
CO-080-PW-1	9 inches	561853.247	1458165.104		
CO-081-PW	-	561750.0392	1458115.549	Could not sample this location due to hard bottom	
CO-082-PW	-	561753.1364	1458145.389	Could not sample this location due to hard bottom	
CO-083-PW	-	561756.2337	1458175.229	Could not sample at this location due to low permeability of substrate; screen filter is covered in black mud with slight petroleum odor	Photo: 10
CO-084-PW	-	561637.447	1458127.236	Could not sample this location due to hard bottom	
CO-085-PW	-	561637.447	1458157.236	Could not sample this location due to hard bottom	
CO-086-PW-1	9 inches	561666.1498	1458183.07	3 foot sample could not be collected due to low permeability of substrate	
CO-087-PW	-	561541.0459	1458128.612	Could not sample this location due to hard bottom	
CO-088-PW	-	561541.0459	1458158.612	Could not sample this location due to hard bottom	
CO-089-PW	-	561541.0459	1458188.612	Could not sample this location due to low permeability of substrate; screen filter is covered in black mud with slight petroleum odor	Photo: 11 Photo: 12
CO-090-PW	-	561448.53	1458126.511	Could not sample this location due to hard bottom	
CO-091-PW	-	561448.53	1458156.511	Could not sample this location due to hard bottom	

Table 6
Pore Water Sampling Locations
Descriptions and Notes
Coke Oven Area: Cell 5

Sample	Depth	Sampling Coordinates		Description/Notes	Picture (in Appendix E)
		Northing	Easting		
CO-092-PW	-	561448.53	1458186.511	Could not sample this location due to low permeability of substrate; screen filter is covered in black mud with slight petroleum odor	
CO-093-PW	-	561348.1177	1458135.579	Could not sample this location due to hard bottom	
CO-094-PW	-	561350.816	1458165.457	Could not sample this location due to hard bottom	
CO-095-PW-1	9 inches	561360.0423	1458199.751	Screen filter is covered in black mud with slight petroleum odor	
CO-095-PW-2	2 feet	561360.0423	1458199.751	Screen filter is covered in black mud with slight petroleum odor	Photo: 13
CO-096-PW	-	561252.7034	1458149.966	Could not sample this location due to hard bottom	
CO-097-PW	-	561257.1765	1458179.631	Could not sample this location due to hard bottom	
CO-098-PW-1	-	561238.9088	1458208.577	Screen filter is covered in black mud with slight petroleum odor; 3 foot sample could not be collected due to low permeability of substrate	
CO-099-PW	-	562193.4503	1458068.083	Could not sample this location due to hard bottom	
CO-100-PW	-	562195.4336	1458098.018	Could not sample this location due to hard bottom	
CO-101-PW	-	562197.417	1458127.952	Could not sample this location due to <30% difference in specific conductance between pore water and surface water	
CO-102-PW	-	562069.9233	1458076.268	Could not sample this location due to hard bottom	

Table 7
Coke Oven Area - Cell 2 Onshore Investigation
Summary of Shallow Groundwater Results

Parameter	Units	COK-MWS	COL-MWS	COM-MWS	CON-MWS	COO-MWS	COS-MWS
Volatile Organic Compounds							
Benzene	µg/L	7,420	16,100	2,390	33,400	38,400	11,100
Ethylbenzene	µg/L	31.5	231	299	147	155	17
Toluene	µg/L	331	8,270	3,260	8,330	9,020	663
Xylene	µg/L	240	1,980	2,970	2,540	2,420	269
Semi-Volatile Organic Compounds							
Naphthalene	µg/L	83	2,520	2,710	2,700	4,810	1,880
TPH/Oil and Grease							
Diesel Range Organics	µg/L	1,010	4,300	10,300	3,100	4,550	2,160
Gasoline Range Organics	µg/L	16,500	48,800	17,300	92,700	89,100	30,000

Parameter	Units	COT-MWS	COU-MWS	COW-MWS	COX-MWS	COY-MWS	COZ-MWS
Volatile Organic Compounds							
Benzene	µg/L	337,000	514,000	210,000	148,000	117,000	57,700
Ethylbenzene	µg/L	1,020	780	316	49.5	269	194
Toluene	µg/L	122,000	23,200	23,100	9,200	11,900	2,850
Xylene	µg/L	24,400	11,100	4,120	437	2,750	548
Semi-Volatile Organic Compounds							
Naphthalene	µg/L	126	600	895	39.8	271	120
TPH/Oil and Grease							
Diesel Range Organics	µg/L	3,780	4,540	4,030	2,450	4,110	3,460
Gasoline Range Organics	µg/L	615,000	726,000	871,000	180,000	146,000	68,000

Detections in bold

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

NS: Not sampled

Table 7
Coke Oven Area - Cell 2 Onshore Investigation
Summary of Shallow Groundwater Results

Parameter	Units	CO27-PZM012	CO36-PZM008	CO38-PZM006	CO39-PZM007	CO40-PZM008
Volatile Organic Compounds						
Benzene	µg/L	3,630	5,380	4,660	282	40.5
Ethylbenzene	µg/L	35.2	15.3	59	0.99 J	1 U
Toluene	µg/L	854	1,160	1,100	9.9	4.7
Xylene	µg/L	308	536	490	4.7	2.8 J
Semi-Volatile Organic Compounds						
Naphthalene	µg/L	316	248	1,520	433	16
TPH/Oil and Grease						
Diesel Range Organics	µg/L	NS	NS	NS	NS	NS
Gasoline Range Organics	µg/L	NS	NS	NS	NS	NS

Parameter	Units	CO41-PZM001	CO42-PZM004
Volatile Organic Compounds			
Benzene	µg/L	1.7	1.1
Ethylbenzene	µg/L	1 U	1 U
Toluene	µg/L	0.60 J	1.4
Xylene	µg/L	3 U	1.4 J
Semi-Volatile Organic Compounds			
Naphthalene	µg/L	2 U	2 U
TPH/Oil and Grease			
Diesel Range Organics	µg/L	NS	NS
Gasoline Range Organics	µg/L	NS	NS

Detections in bold

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

NS: Not sampled

Table 8
Coke Oven Area - Cell 2 Onshore Investigation
Summary of Intermediate Groundwater Results

Parameter	Units	COK-MWI	COL-MWI	COM-MWI	CON-MWI	COO-MWI
Volatile Organic Compounds						
Benzene	µg/L	3,080	18,800	33,600	51,700	66,600
Ethylbenzene	µg/L	9.2	206	379	182	271
Toluene	µg/L	50.8	6,460	9,900	11,700	17,500
Xylene	µg/L	46.7	1,750	2,580	2,870	4,210
Semi-Volatile Organic Compounds						
Naphthalene	µg/L	56.4	2,050	4,060	3,370	8,570
TPH/Oil and Grease						
Diesel Range Organics	µg/L	348	3,910	6,330	2,940	5,320
Gasoline Range Organics	µg/L	6,620	49,500	76,100	123,000	147,000

Parameter	Units	COP-MWI	COQ-MWI	COR-MWI	COV-MWI	CO27-PZM046
Volatile Organic Compounds						
Benzene	µg/L	264,000	116,000	252,000	361,000	191,000
Ethylbenzene	µg/L	917	716	574	918	552
Toluene	µg/L	37,100	42,700	57,000	50,200	35,100
Xylene	µg/L	10,800	13,800	8,940	58,500	7,360
Semi-Volatile Organic Compounds						
Naphthalene	µg/L	947	1,800	43,500	1,770	14,100
TPH/Oil and Grease						
Diesel Range Organics	µg/L	3,510	4,050	24,200	5,110	NS
Gasoline Range Organics	µg/L	419,000	234,000	600,000	472,000	NS

Detections in bold

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

NS: Not sampled

Table 8
Coke Oven Area - Cell 2 Onshore Investigation
Summary of Intermediate Groundwater Results

Parameter	Units	CO36-PZM043	CO37-PZM038	CO38-PZM043	CO39-PZM042	CO41-PZM036
Volatile Organic Compounds						
Benzene	µg/L	22,200	13,900	0.4 J	1,290	224,000
Ethylbenzene	µg/L	76.1	244	1 U	12.3	520
Toluene	µg/L	4,210	8,190	1 U	377	71,800
Xylene	µg/L	1,150	1,930	3 U	117	11,300
Semi-Volatile Organic Compounds						
Naphthalene	µg/L	745	1,370	2 U	1,280	382
TPH/Oil and Grease						
Diesel Range Organics	µg/L	NS	NS	NS	NS	NS
Gasoline Range Organics	µg/L	NS	NS	NS	NS	NS

Detections in bold

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

NS: Not sampled

Table 9
Coke Oven Area - Cell 2 Offshore Investigation
Summary of Pore Water Results

Parameter	Units	Water Quality Criteria	CO-046-PW	CO-047-PW	CO-048-PW-1	CO-048-PW-3	CO-049-PW-1	CO-049-PW-3	CO-050-PW
Volatile Organic Compounds									
Benzene	µg/L	90*	NS (HB)	NS (HB)	1 U	1 U	149	19,100	NS (HB)
Ethylbenzene	µg/L	130‡	NS (HB)	NS (HB)	1 U	1 U	1.6	34.2	NS (HB)
Toluene	µg/L	520‡	NS (HB)	NS (HB)	1 U	1 U	34.9	631	NS (HB)
Xylene	µg/L	---	NS (HB)	NS (HB)	3 U	3 U	25.4	382	NS (HB)
Semi-Volatile Organic Compounds									
Naphthalene	µg/L	193.5~	NS (HB)	NS (HB)	2.9	6,380	500	72,000	NS (HB)
TPH/Oil and Grease									
Diesel Range Organics	µg/L	---	NS (HB)	NS (HB)	343	4,620	1,210	26,400	NS (HB)
Gasoline Range Organics	µg/L	---	NS (HB)	NS (HB)	200 U	200 U	457	47,400	NS (HB)

Parameter	Units	Surface Water Criteria	CO-051-PW-1	CO-052-PW-1	CO-052-PW-2	CO-053-PW-2	CO-054-PW-1	CO-054-PW-3	CO-055-PW-1
Volatile Organic Compounds									
Benzene	µg/L	90*	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	µg/L	130‡	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	µg/L	520‡	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene	µg/L	---	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Semi-Volatile Organic Compounds									
Naphthalene	µg/L	193.5~	1.7	2	0.096 J	11.5	0.45 B	0.42 B	8.4
TPH/Oil and Grease									
Diesel Range Organics	µg/L	---	3,970	2,610	118	69.4 J	262	265	565
Gasoline Range Organics	µg/L	---	185 J	200 U	200 U	200 U	200 U	200 U	200 U

Detections in bold

Values in red indicate an exceedance of the Water Quality Criteria.

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

NS (HB): Not sampled due to hard bottom

NS (LP): Not sampled due to low porosity

*Human health Ambient Water Quality Criteria for consumption of organism only (noncarcinogenic)

‡Human health Ambient Water Quality Criteria for consumption of organism only (carcinogenic)

~Narcosis Secondary Chronic Value

Table 9
Coke Oven Area - Cell 2 Offshore Investigation
Summary of Pore Water Results

Parameter	Units	Water Quality Criteria	CO-055-PW-2	CO-056-PW-2	CO-057-PW-1	CO-058-PW-1	CO-058-PW-2	CO-059-PW	CO-060-PW
Volatile Organic Compounds									
Benzene	µg/L	90*	1 U	1 U	1 U	0.80 J	1 U	NS (LP)	NS (LP)
Ethylbenzene	µg/L	130‡	1 U	1 U	1 U	1 U	1 U	NS (LP)	NS (LP)
Toluene	µg/L	520‡	1 U	1 U	1 U	1 U	1 U	NS (LP)	NS (LP)
Xylene	µg/L	---	3 U	3 U	3 U	3 U	3 U	NS (LP)	NS (LP)
Semi-Volatile Organic Compounds									
Naphthalene	µg/L	193.5~	0.33	0.35	1.5	6.2	0.59	NS (LP)	NS (LP)
TPH/Oil and Grease									
Diesel Range Organics	µg/L	---	113	113	245	158	1,150	NS (LP)	NS (LP)
Gasoline Range Organics	µg/L	---	200 U	200 U	200 U	200 U	200 U	NS (LP)	NS (LP)

Parameter	Units	Surface Water Criteria	CO-061-PW-1	CO-062-PW-1	CO-063-PW-1	CO-063-PW-2	CO-064-PW-3	CO-065-PW-1	CO-065-PW-2
Volatile Organic Compounds									
Benzene	µg/L	90*	1 U	1 U	3.4	1 U	1 U	1 U	1 U
Ethylbenzene	µg/L	130‡	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	µg/L	520‡	1 U	1 U	1	1 U	1 U	1 U	1 U
Xylene	µg/L	---	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Semi-Volatile Organic Compounds									
Naphthalene	µg/L	193.5~	0.14 J	6.4	63.9	1.2 B	0.29	0.10 B	0.15 B
TPH/Oil and Grease									
Diesel Range Organics	µg/L	---	379	1,010	6,280	193	143	114	60.7 J
Gasoline Range Organics	µg/L	---	200 U	200 U	200 U	200 U	200 U	200 U	200 U

Detections in bold

Values in red indicate an exceedance of the Water Quality Criteria.

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

NS (HB): Not sampled due to hard bottom

NS (LP): Not sampled due to low porosity

*Human health Ambient Water Quality Criteria for consumption of organism only (noncarcinogenic)

‡Human health Ambient Water Quality Criteria for consumption of organism only (carcinogenic)

~Narcosis Secondary Chronic Value

Table 9
Coke Oven Area - Cell 2 Offshore Investigation
Summary of Pore Water Results

Parameter	Units	Water Quality Criteria	CO-066-PW-1	CO-066-PW-2	CO-067-PW-1	CO-067-PW-2	CO-068-PW-1	CO-068-PW-2	CO-069-PW-1
Volatile Organic Compounds									
Benzene	µg/L	90*	0.78 J	0.62 J	1 U	1 U	1 U	1 U	0.99 J
Ethylbenzene	µg/L	130‡	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	µg/L	520‡	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene	µg/L	---	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Semi-Volatile Organic Compounds									
Naphthalene	µg/L	193.5~	0.31 B	0.44 B	0.045 J	0.33	NS (LP)	0.099 U	3.6
TPH/Oil and Grease									
Diesel Range Organics	µg/L	---	247	186	82.7 J	273	NS (LP)	217	1,070
Gasoline Range Organics	µg/L	---	200 U	200 U	200 U	200 U	200 U	200 U	200 U

Parameter	Units	Surface Water Criteria	CO-069-PW-2	CO-070-PW-1	CO-070-PW-2	CO-071-PW	CO-072-PW
Volatile Organic Compounds							
Benzene	µg/L	90*	104	17,200	9,470	NS (HB)	NS (HB)
Ethylbenzene	µg/L	130‡	0.53 J	41	127	NS (HB)	NS (HB)
Toluene	µg/L	520‡	1 U	1,910	128	NS (HB)	NS (HB)
Xylene	µg/L	---	2.5 J	511	421	NS (HB)	NS (HB)
Semi-Volatile Organic Compounds							
Naphthalene	µg/L	193.5~	192	52,000	63,200	NS (HB)	NS (HB)
TPH/Oil and Grease							
Diesel Range Organics	µg/L	---	2,220	10,100	18,000	NS (HB)	NS (HB)
Gasoline Range Organics	µg/L	---	202	38,200	22,900	NS (HB)	NS (HB)

Detections in bold

Values in red indicate an exceedance of the Water Quality Criteria.

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

B: This analyte was not detected substantially above the level of the associated method blank/preparation or field blank.

NS (HB): Not sampled due to hard bottom

NS (LP): Not sampled due to low porosity

*Human health Ambient Water Quality Criteria for consumption of organism only (noncarcinogenic)

‡Human health Ambient Water Quality Criteria for consumption of organism only (carcinogenic)

~Narcosis Secondary Chronic Value

Table 10
Coke Oven Area - Cell 2 Offshore Investigation
Summary of Surface Water Results

Parameter	Units	Water Quality Criteria	CO-047-SW-2	CO-048-SW-2	CO-048-SW-8	CO-049-SW-2	CO-049-SW-6
Volatile Organic Compounds							
Benzene	µg/L	90*	1.2	2.8	1	1 U	1.1
Ethylbenzene	µg/L	130‡	1 U	1 U	1 U	1 U	1 U
Toluene	µg/L	520‡	0.41 J	0.86 J	1 U	1 U	1 U
Xylene	µg/L	---	3 U	3 U	3 U	3 U	3 U
Semi-Volatile Organic Compounds							
Naphthalene	µg/L	193.5~	0.19	0.56	1.5	0.18	0.32

Parameter	Units	Surface Water Criteria	CO-069-SW-2	CO-069-SW-6	CO-070-SW-2	CO-070-SW-7.5	CO-072-SW-2
Volatile Organic Compounds							
Benzene	µg/L	90*	1 U	0.34 J	1 U	1 U	1 U
Ethylbenzene	µg/L	130‡	1 U	1 U	1 U	1 U	1 U
Toluene	µg/L	520‡	1 U	1 U	1 U	1 U	1 U
Xylene	µg/L	---	3 U	3 U	3 U	3 U	3 U
Semi-Volatile Organic Compounds							
Naphthalene	µg/L	193.5~	0.34	0.24	0.064 J	0.055 J	0.099 J

Detections in bold

Values in red indicate an exceedance of the Water Quality Criteria

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

*Human health Ambient Water Quality Criteria for consumption of organism only (noncarcinogenic)

‡Human health Ambient Water Quality Criteria for consumption of organism only (carcinogenic)

~Narcosis Secondary Chronic Value

Table 11
Coke Oven Area - Cell 3 Onshore Investigation
Summary of Shallow Groundwater Results

Parameter	Units	COA-MWS	COB-MWS	COC-MWS	COD-MWS	COE-MWS	COF-MWS	COG-MWS	COH-MWS
Volatile Organic Compounds									
Benzene	µg/L	34,100	1,290	46,300	16,400	4,700	748	47,300	25,800
Ethylbenzene	µg/L	53.1	4.8 J	83.5	33.6	12.1	4.6 J	90.9	40.6
Toluene	µg/L	2,770	160	4,140	1,330	389	145	3,560	1,910
Xylene	µg/L	609	75.1	1,120	395	127	71.3	1,440	537
Semi-Volatile Organic Compounds									
Naphthalene	µg/L	2,630	4,400	5,530	3,400	3,430	4,650	10,600	2,350

Parameter	Units	COI-MWS	COJ-MWS	CO30-PZM015	CO101-PZM	CO102-PZM	CO103-PZM	CO104-PZM
Volatile Organic Compounds								
Benzene	µg/L	145	1,440	51,000	10	9,730	995	1.9
Ethylbenzene	µg/L	0.97 J	3.2	87.3	1 U	17.4	2.5 J	1 U
Toluene	µg/L	12.7	120	3,890	1 U	716	53.6	1 U
Xylene	µg/L	9.8	41	1,190	3 U	202	31.1	3 U
Semi-Volatile Organic Compounds								
Naphthalene	µg/L	4,840	1,600	2,710	2 U	888	71	1.9 J

Detections in bold

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

Table 12
Coke Oven Area - Cell 3 Offshore Investigation
Summary of Pore Water Results

Parameter	Units	Water Quality Criteria	CO-016-PW-1	CO-017-PW	CO-018-PW	CO-019-PW	CO-020-PW-1	CO-021-PW	CO-022-PW
Volatile Organic Compounds									
Benzene	µg/L	90*	1 U	NS (HB)	NS (HB)	NS (HB)	1,990	NS (HB)	NS (HB)
Ethylbenzene	µg/L	130‡	1 U	NS (HB)	NS (HB)	NS (HB)	2.9	NS (HB)	NS (HB)
Toluene	µg/L	520‡	1 U	NS (HB)	NS (HB)	NS (HB)	141	NS (HB)	NS (HB)
Xylene	µg/L	---	3 U	NS (HB)	NS (HB)	NS (HB)	45.4	NS (HB)	NS (HB)
Semi-Volatile Organic Compounds									
Naphthalene	µg/L	193.5~	NS (LP)	NS (HB)	NS (HB)	NS (HB)	176	NS (HB)	NS (HB)

Parameter	Units	Surface Water Criteria	CO-025-PW-1	CO-026-PW	CO-027-PW	CO-028-PW	CO-029-PW	CO-034-PW	CO-035-PW
Volatile Organic Compounds									
Benzene	µg/L	90*	19.4	NS (HB)	NS (HB)	NS (HB)	NS (HB)	NS (HB)	NS (HB)
Ethylbenzene	µg/L	130‡	1.4	NS (HB)	NS (HB)	NS (HB)	NS (HB)	NS (HB)	NS (HB)
Toluene	µg/L	520‡	8.6	NS (HB)	NS (HB)	NS (HB)	NS (HB)	NS (HB)	NS (HB)
Xylene	µg/L	---	17.8	NS (HB)	NS (HB)	NS (HB)	NS (HB)	NS (HB)	NS (HB)
Semi-Volatile Organic Compounds									
Naphthalene	µg/L	193.5~	18,700	NS (HB)	NS (HB)	NS (HB)	NS (HB)	NS (HB)	NS (HB)

Detections in bold

Values in red indicate an exceedance of the Water Quality Criteria

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

NS (HB): Not sampled due to hard bottom

NS (LP): Not sampled due to low porosity

*Human health Ambient Water Quality Criteria for consumption of organism only (noncarcinogenic)

‡Human health Ambient Water Quality Criteria for consumption of organism only (carcinogenic)

~Narcosis Secondary Chronic Value

Table 12
Coke Oven Area - Cell 3 Offshore Investigation
Summary of Pore Water Results

Parameter	Units	Water Quality Criteria	CO-036-PW	CO-037-PW	CO-038-PW	CO-039-PW	CO-040-PW-1	CO-040-PW-3	CO-041-PW
Volatile Organic Compounds									
Benzene	µg/L	90*	NS (HB)	NS (HB)	NS (HB)	NS (HB)	9.9	165	NS (LP)
Ethylbenzene	µg/L	130‡	NS (HB)	NS (HB)	NS (HB)	NS (HB)	1.6	14.4	NS (LP)
Toluene	µg/L	520‡	NS (HB)	NS (HB)	NS (HB)	NS (HB)	3.6	110	NS (LP)
Xylene	µg/L	---	NS (HB)	NS (HB)	NS (HB)	NS (HB)	7.5	332	NS (LP)
Semi-Volatile Organic Compounds									
Naphthalene	µg/L	193.5~	NS (HB)	NS (HB)	NS (HB)	NS (HB)	7,160	17,900	NS (LP)

Parameter	Units	Surface Water Criteria	CO-042-PW	CO-043-PW	CO-044-PW	CO-045-PW
Volatile Organic Compounds						
Benzene	µg/L	90*	NS (HB)	NS (HB)	NS (LP)	NS (LP)
Ethylbenzene	µg/L	130‡	NS (HB)	NS (HB)	NS (LP)	NS (LP)
Toluene	µg/L	520‡	NS (HB)	NS (HB)	NS (LP)	NS (LP)
Xylene	µg/L	---	NS (HB)	NS (HB)	NS (LP)	NS (LP)
Semi-Volatile Organic Compounds						
Naphthalene	µg/L	193.5~	NS (HB)	NS (HB)	NS (LP)	NS (LP)

Detections in bold

Values in red indicate an exceedance of the Water Quality Criteria

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

NS (HB): Not sampled due to hard bottom

NS (LP): Not sampled due to low porosity

*Human health Ambient Water Quality Criteria for consumption of organism only (noncarcinogenic)

‡Human health Ambient Water Quality Criteria for consumption of organism only (carcinogenic)

~Narcosis Secondary Chronic Value

Table 13
Coke Oven Area - Cell 3 Offshore Investigation
Summary of Surface Water Results

Parameter	Units	Water Quality Criteria	SW-14-2	SW-14-4	SW-15-2	SW-15-4	SW-16-2	SW-16-4	SW-17-2	SW-18-2	SW-19-1
Volatile Organic Compounds											
Benzene	µg/L	90*	121	46.5	158	64.5	99.1	67.7	75.6	91.4	7.8
Ethylbenzene	µg/L	130‡	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	µg/L	520‡	9.5	3.8	12.3	5.1	7.8	5.4	6	7.2	0.70 J
Xylene	µg/L	---	3.3	0.94 J	4.4	1.8 J	2.6 J	1.9 J	2.1 J	2.4 J	3 U
Semi-Volatile Organic Compounds											
Naphthalene~	µg/L	193.5~	8.8	2.3	7	2.7	5.3	3.1	4.1	4	0.46

Parameter	Units	Surface Water Criteria	SW-20-2	SW-20-4.5	SW-21-2	SW-22-2	SW-23-2	SW-23-8.5	SW-24-2	SW-24-7	SW-25-2
Volatile Organic Compounds											
Benzene	µg/L	90*	19.2	25.5	5.6	2.4	2.5	1 U	1.5	36.3	27.3
Ethylbenzene	µg/L	130‡	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	µg/L	520‡	1.6	2.1	0.57 J	1 U	1 U	1 U	1 U	2.9	2.4
Xylene	µg/L	---	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	0.81 J
Semi-Volatile Organic Compounds											
Naphthalene	µg/L	193.5~	1.2	1.5	0.41	0.12	0.084 J	0.10 U	0.12	0.72	3.4

Detections in bold

Values in red indicate an exceedance of the Water Quality Criteria

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

NS: Not sampled

*Human health Ambient Water Quality Criteria for consumption of organism only (noncarcinogenic)

‡Human health Ambient Water Quality Criteria for consumption of organism only (carcinogenic)

~Narcosis Secondary Chronic Value

Table 13
Coke Oven Area - Cell 3 Offshore Investigation
Summary of Surface Water Results

Parameter	Units	Water Quality Criteria	SW-25-4	SW-26-1	SW-27-1	SW-28-1	SW-29-2	SW-30-2	SW-30-6.5	SW-31-2	SW-31-4.5
Volatile Organic Compounds											
Benzene	µg/L	90*	10.1	373	736	50.9	142	11.6	1.8	6.4	11.6
Ethylbenzene	µg/L	130‡	1 U	0.74 J	1.5	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	µg/L	520‡	0.99 J	27.7	67.2	4.1	10.7	1	1 U	0.64 J	1
Xylene	µg/L	---	3 U	8.6	21.4	1.1 J	3.8	3 U	3 U	3 U	3 U
Semi-Volatile Organic Compounds											
Naphthalene~	µg/L	193.5~	0.78	4.4	18.5	1.7	4.3	0.36	0.060 J	0.45	0.35

Parameter	Units	Surface Water Criteria	SW-32-2	SW-32-5	SW-33-2	SW-33-6	SW-34	SW-35	SW-36	SW-37
Volatile Organic Compounds										
Benzene	µg/L	90*	26.8	8.5	3.1	1	NS	NS	NS	NS
Ethylbenzene	µg/L	130‡	1 U	1 U	1 U	1 U	NS	NS	NS	NS
Toluene	µg/L	520‡	2	0.78 J	0.34 J	1 U	NS	NS	NS	NS
Xylene	µg/L	---	3 U	3 U	3 U	3 U	NS	NS	NS	NS
Semi-Volatile Organic Compounds										
Naphthalene	µg/L	193.5~	0.38	0.2	0.4	0.054 J	NS	NS	NS	NS

Detections in bold

Values in red indicate an exceedance of the Water Quality Criteria

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

NS: Not sampled

*Human health Ambient Water Quality Criteria for consumption of organism only (noncarcinogenic)

‡Human health Ambient Water Quality Criteria for consumption of organism only (carcinogenic)

~Narcosis Secondary Chronic Value

Table 14
Coke Oven Area - Cell 5 Onshore Investigation
Summary of Shallow Groundwater Results

Parameter	Units	COAA-MWS	COBB-MWS	COCC-MWS	CODD-MWS	COEE-MWS	COFF-MWS
Semi-Volatile Organic Compounds							
Naphthalene	µg/L	8,650	9,040	9,110	14,800	NS	2,490

Parameter	Units	COGG-MWS	CO23-PZM008	CO24-PZM007	CO26-PZM007	CO55-PZM000	CO56-PZP001
Semi-Volatile Organic Compounds							
Naphthalene	µg/L	2,120	2,760	2,190	961	8.9	2,400

Parameter	Units	CO57-PZP002	CO58-PZM001	CO59-PZP002	CO60-PZP001
Semi-Volatile Organic Compounds					
Naphthalene	µg/L	2 U	701	2 U	1,540

Detections in bold

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

NS: Not sampled

Table 15
Coke Oven Area - Cell 5 Offshore Investigation
Summary of Pore Water Results

Parameter	Units	Water Quality Criteria	CO-073-PW-1	CO-074-PW-1	CO-074-PW-2	CO-075-PW	CO-076-PW	CO-077-PW	CO-078-PW	CO-079-PW-1
Semi-Volatile Organic Compounds										
Naphthalene	µg/L	193.5~	1,530	9,230	8,880	NS (HB)	NS (HB/LP)	NS (HB)	NS (HB)	3,680

Parameter	Units	Surface Water Criteria	CO-080-PW-1	CO-081-PW	CO-082-PW	CO-083-PW	CO-084-PW	CO-085-PW	CO-086-PW-1	CO-087-PW
Semi-Volatile Organic Compounds										
Naphthalene	µg/L	193.5~	0.41	NS (HB)	NS (HB)	NS (LP)	NS (HB)	NS (HB)	0.33	NS (HB)

Parameter	Units	Surface Water Criteria	CO-088-PW	CO-089-PW	CO-090-PW	CO-091-PW	CO-092-PW	CO-093-PW	CO-094-PW	CO-095-PW-1
Semi-Volatile Organic Compounds										
Naphthalene	µg/L	193.5~	NS (HB)	NS (LP)	NS (HB)	NS (HB)	NS (LP)	NS (HB)	NS (HB)	0.14

Parameter	Units	Surface Water Criteria	CO-095-PW-2	CO-096-PW	CO-097-PW	CO-098-PW-1	CO-099-PW	CO-100-PW	CO-101-PW	CO-102-PW
Semi-Volatile Organic Compounds										
Naphthalene	µg/L	193.5~	30.4	NS (HB)	NS (HB)	352	NS (HB)	NS (HB)	NS (30)	NS (HB)

Detections in bold

Values in red indicate an exceedance of the Water Quality Criteria

NS (HB): Not sampled due to hard bottom

NS (LP): Not sampled due to low porosity

NS (30): Not sampled due to <30% difference in specific conductance between pore water and surface water

*Human health Ambient Water Quality Criteria for consumption of organism only (noncarcinogenic)

‡Human health Ambient Water Quality Criteria for consumption of organism only (carcinogenic)

~Narcosis Secondary Chronic Value

Table 16
Coke Oven Area - Cell 5 Offshore Investigation
Summary of Surface Water Results

Parameter	Units	Water Quality Criteria	CO-073-SW-2	CO-073-SW-5	CO-074-SW-2	CO-074-SW-9	CO-075-SW-2	CO-075-SW-5
Semi-Volatile Organic Compounds								
Naphthalene	µg/L	193.5~	0.5	1.1	0.051 J	0.058 J	0.45	0.67

Parameter	Units	Surface Water Criteria	CO-079-SW-2	CO-079-SW-8.5	CO-081-SW-2	CO-084-SW-2	CO-087-SW-2	CO-090-SW-2
Semi-Volatile Organic Compounds								
Naphthalene	µg/L	193.5~	0.1 U	0.64 J	0.3	0.59	0.25	0.31

Parameter	Units	Surface Water Criteria	CO-093-SW-2	CO-098-SW-2	CO-098-SW-4	CO-099-SW-1
Semi-Volatile Organic Compounds						
Naphthalene	µg/L	193.5~	0.045 J	0.1 U	0.11	0.065 J

Detections in bold

Values in red indicate an exceedance of the Water Quality Criteria

U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.

J: The positive result reported for this analyte is a quantitative estimate.

*Human health Ambient Water Quality Criteria for consumption of organism only (noncarcinogenic)

‡Human health Ambient Water Quality Criteria for consumption of organism only (carcinogenic)

~Narcosis Secondary Chronic Value

APPENDIX A

Boring and Well Construction Logs



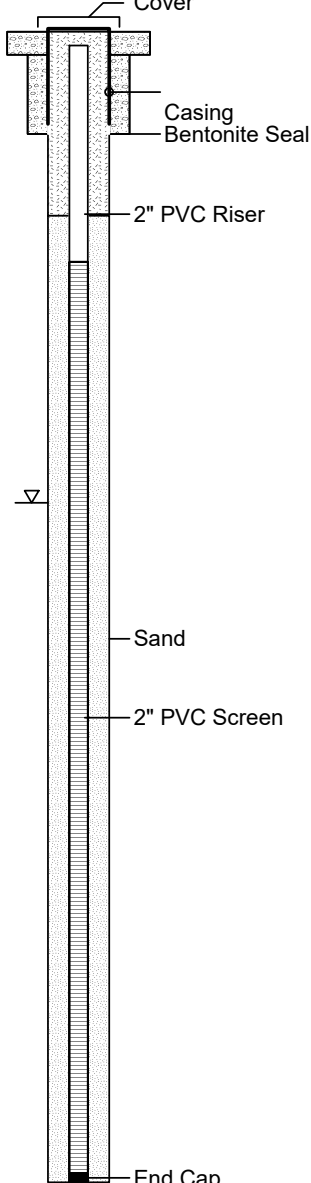
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 5
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561979.89
Easting (ft) : 1457970.98
Date/Time Started : 4/13/19 1450
Date/Time Completed : 4/13/19 1535
Surf. Elev. (ft AMSL) : 11.27
TOC Elev. (ft AMSL) : 10.65
Total Well Depth (ft) : 25' bgs
Depth to Water (ft) : 0 Hr: 10.18' TOC
Depth to Water (ft) : 48 hr: 9.93' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COAA-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		12.9	(0-24') SLAG SAND and GRAVEL-sized, with SILT, loose, brown grading to black at 20' bgs, moist, non-plastic, non-cohesive	GW-GM	 <p>4" Protective Steel Casing with Locking Flush Mount Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 0'</p> <p>Wet at 14' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs</p> <p>Filter Pack: #2 Sand Top: 4' bgs Bottom: 25' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 25' bgs Total Screen: 20'</p>
		5.5			
		11.5			
		6.7			
		21.3			
5	100	-			
		7.6			
		17.1			
		12.2			
		7.7			
10		28.6			
		42.9			
	100	20.7			
		5.5			
		4.7			
15		13.6			
		9.9			
		4.0			
		4.2			
		2.5			
20	100	-			
		10.2			
		7.3			
		1.6			
		3.0			
25			(24-25') SAND, very fine, very dense, greenish brown, wet, non-plastic, non-cohesive	SP	

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/25/2019
Purged Amount: 16 gallons
Well Volumes Removed: 6.56



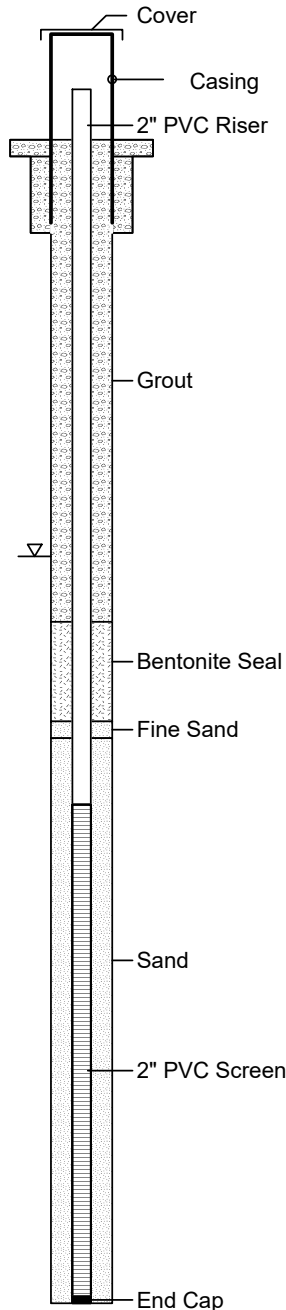
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 3
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) :
Easting (ft) :
Date/Time Started : 4/28/19 0745
Date/Time Completed : 4/28/19 0915
Surf. Elev. (ft AMSL) :
TOC Elev. (ft AMSL) :
Total Well Depth (ft) : 35' bgs
Depth to Water (ft) : 0 Hr: 15.31' TOC
Depth to Water (ft) : 48 hr: 15.28' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COA-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS		COMPLETION DETAILS
0		45.8	(0-10') SLAG, SAND and GRAVEL-sized, with SILT, loose, dark brown, moist, non-plastic, non-cohesive	SW/GW		4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.77' Wet at 15' bgs Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 14.5' bgs Bentonite Seal: 3/8" chips Top: 14.5' bgs Bottom: 17.5' bgs Sand Blotter: #1 Sand Top: 17.5' bgs Bottom: 18' bgs Filter Pack: #2 Sand Top: 18' bgs Bottom: 35' bgs Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 20' bgs Bottom: 35' bgs Total Screen: 15'
		40.2				
		14.0				
		6.4				
		4.6				
5	100	-				
		14.0				
		-				
		23.4				
		37.4				
10		12.2	(10-25') SLAG, SAND and GRAVEL-sized, loose, dark gray with some black, wet, non-plastic, non-cohesive	SW/GW		
		15.0				
	100	14.6				
		12.4				
		9.2				
15		-				
		-				
		-				
		-				
		-				
20	100	-				
		-				
		-				
		-				
		-				
25		-	(25-35') SAND, very fine, medium dense, gray then very light brown, wet, non-plastic, non-cohesive	SP		
		-				
		-				
		-				
30	100	-				
		-				
		-				
		-				
		-				
35		-				
			End of boring			

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/07/2019
Purged Amount: 15 gallons
Well Volumes Removed: 4.04



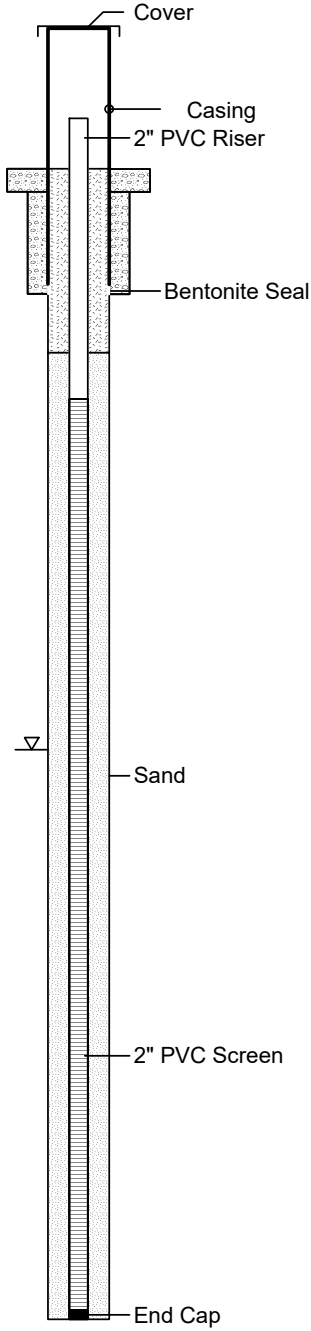
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 5
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561776.15
Easting (ft) : 1457813.75
Date/Time Started : 4/13/19 1400
Date/Time Completed : 4/13/19 1735
Surf. Elev. (ft AMSL) : 13.61
TOC Elev. (ft AMSL) : 16.27
Total Well Depth (ft) : 25' bgs
Depth to Water (ft) : 0 Hr: 14.47' TOC
Depth to Water (ft) : 48 hr: 15.37' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COBB-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		4.0	(0-25') SLAG, SAND and GRAVEL-sized, with SILT, loose, dark brown, moist then wet at 14.5' bgs, non-plastic, non-cohesive	SW/GW	 <p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.69'</p> <p>Wet at 14.5' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs</p> <p>Filter Pack: #2 Sand Top: 4' bgs Bottom: 25' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 25' bgs Total Screen: 20'</p>
2.7		2.1			
2.1		3.7			
3.7		12.6			
5	100	-			
		58.2			
		78.8			
		25.5			
		14.4			
10		2.7			
		1.2			
	100	4.0			
		1.5			
		26.3			
15		-			
		13.6			
		4.9			
		3.1			
20	100	1.7			
		-			
		2.0			
		13.2			
		29.8			
25		29.4			
			End of boring		

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/25/2019
Purged Amount: 16 gallons
Well Volumes Removed: 8.12



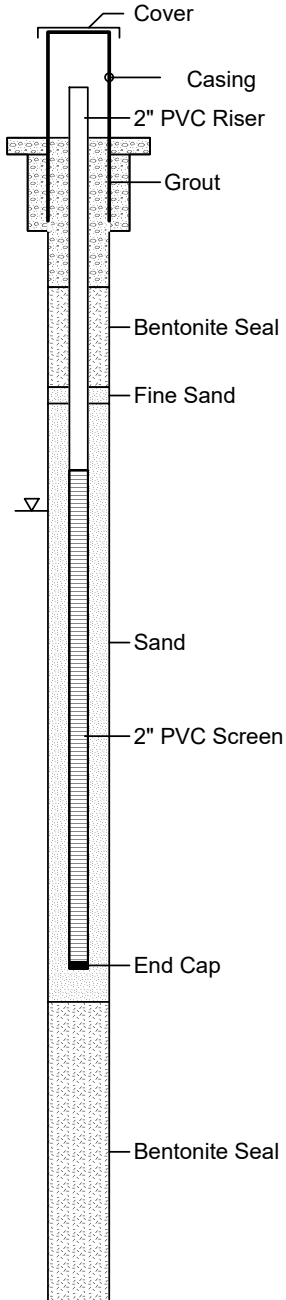
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 3
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561768.07
Easting (ft) : 1454242.77
Date/Time Started : 4/27/19 0945
Date/Time Completed : 4/27/19 1130
Surf. Elev. (ft AMSL) : 11.30
TOC Elev. (ft AMSL) : 14.23
Total Well Depth (ft) : 35' bgs
Depth to Water (ft) : 0 Hr: 13.82' TOC
Depth to Water (ft) : 48 hr: 13.97' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COB-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		-	(0-10') SILT and SLAG, SAND and GRAVEL-sized, loose, dark brown to gray, dry, non-plastic, non-cohesive	ML/GW	 <p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.88'</p> <p>Wet at 15' bgs</p> <p>Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 4.5' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 4.5' bgs and 26' bgs Bottom: 7.5' bgs and 35' bgs</p> <p>Sand Blotter: #1 Sand Top: 7.5' bgs Bottom: 8' bgs</p> <p>Filter Pack: #2 Sand Top: 8' bgs Bottom: 25' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 10' bgs Bottom: 25' bgs Total Screen: 15'</p>
5	100	0.0			
10		0.1	(10-25') SLAG, SAND and GRAVEL-sized, loose, dark brown and gray, moist, wet at 15' bgs, non-plastic, non-cohesive	SW/GW	
15		0.2			
20	100	0.0			
25		0.0	(25-35') CLAY, very firm, gray, moist, low plasticity, cohesive	CL	
30	100	0.0			
35		0.0	End of boring		

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/07/2019
Purged Amount: 10 gallons
Well Volumes Removed: 5.32



ARM Group Inc.
Engineers and Scientists

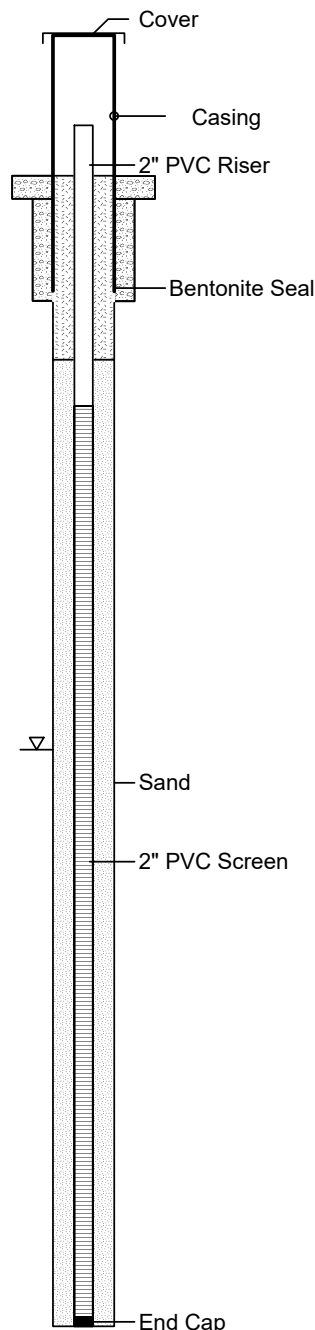
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 5
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561794.48
Easting (ft) : 1457978.39
Date/Time Started : 4/13/19 1345
Date/Time Completed : 4/13/19 1430
Surf. Elev. (ft AMSL) : 13.16
TOC Elev. (ft AMSL) : 15.55
Total Well Depth (ft) : 25' bgs
Depth to Water (ft) : 0 Hr: 15.21' TOC
Depth to Water (ft) : 48 hr: 15.22' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COCC-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		0.0	(0-4.5') SILT with SAND, loose, dark brown, moist, non-plastic, non-cohesive	ML	4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap
100		0.8 2.3			
5		3.5	(4.5-6') CONCRETE	NA	Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.73'
100		4.1			
10		35.5	(6-14') SLAG, SAND and GRAVEL-sized, loose, dark brown, dry, non-plastic, non-cohesive	SW/GW	Wet at 14.5' bgs
100		18.0			
15		12.2			Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs
100		18.3			
20		19.2	(14-16') SILT with SAND, loose, dark brown, moist then wet at 14.5' bgs, non-plastic, non-cohesive	ML	Filter Pack: #2 Sand Top: 4' bgs Bottom: 25' bgs
100		8.5			
25		13.7	(16-25') SLAG, SAND and GRAVEL-sized, loose, dark brown grading to black, wet, non-plastic, non-cohesive	SW/GW	Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 25' bgs Total Screen: 20'
100		38.9			
		19.2			
		9.5			
		4.0			
		15.5			
		16.7			
		7.5			
		21.8			
		11.5			
		37.8			
		10.5			
		21.4			
25			End of boring		



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/25/2019
Purged Amount: 23 gallons
Well Volumes Removed: 10.70



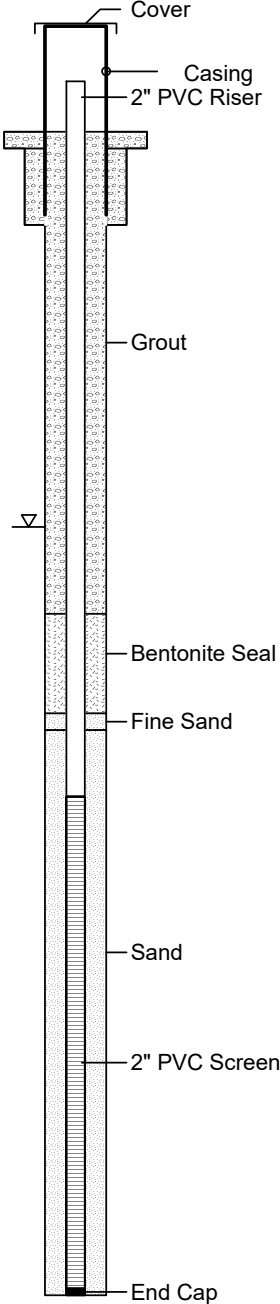
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 3
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561775.58
Easting (ft) : 1454539.22
Date/Time Started : 4/27/19 1215
Date/Time Completed : 4/27/19 1515
Surf. Elev. (ft AMSL) : 11.56
TOC Elev. (ft AMSL) : 14.32
Total Well Depth (ft) : 35' bgs
Depth to Water (ft) : 0 Hr: 13.98' TOC
Depth to Water (ft) : 48 hr: 14.64' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COC-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS		COMPLETION DETAILS			
0		0.0	(0-10') SLAG, SAND and GRAVEL-sized, loose, dark brown and gray, dry, non-plastic, non-cohesive	SW/GW		4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.91' Wet at 13' bgs Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 14.5' bgs Bentonite Seal: 3/8" chips Top: 14.5' bgs Bottom: 17.5' bgs Sand Blotter: #1 Sand Top: 17.5' bgs Bottom: 18' bgs Filter Pack: #2 Sand Top: 18' bgs Bottom: 35' bgs Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 20' bgs Bottom: 35' bgs Total Screen: 15'			
		0.0							
		0.3							
		0.7							
		3.8							
5	100	-					Grout		
		4.6							
		7.6							
		9.1							
10		13.1	(10-15') SLAG, SAND and GRAVEL-sized, with SILT, loose, dark brown and gray, moist, dry then wet at 13' bgs, non-plastic, non-cohesive	GW-GM					
	100	-							
		-							
		-							
		-							
15		20.6	(15-32') SLAG, SAND and GRAVEL-sized, loose, gray, wet, non-plastic, non-cohesive	SW/GW			Bentonite Seal		
		32.1							
		47.4							
		43.9					Fine Sand		
		843.5							
20	100	-							
		75.1							
		32.8							
		48.0							
		8.4							
25		6.9							Sand
		11.2							
		24.1							
		98.7					2" PVC Screen		
30	100	140.7	(32-35') SAND, very fine, medium dense, very light brown, wet, non-plastic, non-cohesive	SP					
		-							
		-							
		-							
		-							
35		-	End of boring		End Cap				

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/07/2019
Purged Amount: 16 gallons
Well Volumes Removed: 3.94



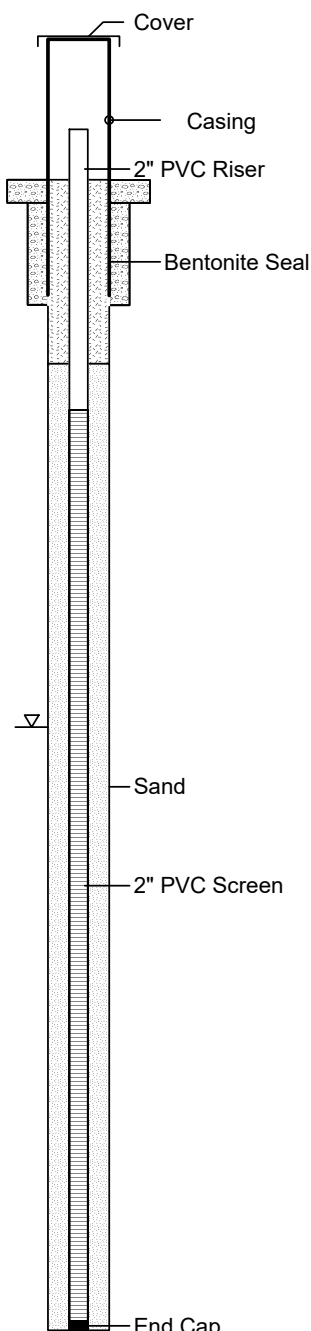
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 5
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561604.50
Easting (ft) : 1457576.29
Date/Time Started : 4/14/19 1100
Date/Time Completed : 4/14/19 1205
Surf. Elev. (ft AMSL) : 12.30
TOC Elev. (ft AMSL) : 14.37
Total Well Depth (ft) : 25' bgs
Depth to Water (ft) : 0 Hr: 15.01' TOC
Depth to Water (ft) : 48 hr: 13.55' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: CODD-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		1.1	(0-23') SLAG, SAND and GRAVEL-sized, with SILT, loose, dark brown, dry then wet at 10.5' bgs, non-plastic, non-cohesive	SW/GW	 <p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 3.81'</p> <p>Wet at 10.5' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs</p> <p>Filter Pack: #2 Sand Top: 4' bgs Bottom: 25' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 25' bgs Total Screen: 20'</p>
		1.8			
		3.3			
		0.6			
		1.7			
5	100	-			
		1.1			
		3.1			
		1.0			
		2.1			
10		10.4			
		3.5			
		3.3			
	100	1.3			
		3.4			
15		3.3			
		7.2			
		2.9			
		11.4			
		4.2			
20	100	-	(23-25') SAND, very fine, dense, black grading to gray, wet, non-plastic, non-cohesive	SP	
		35.0			
		3.4			
		13.3			
25		39.1			
			End of boring		

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/02/2019
Purged Amount: 19 gallons
Well Volumes Removed: 8.41



ARM Group Inc.
Engineers and Scientists

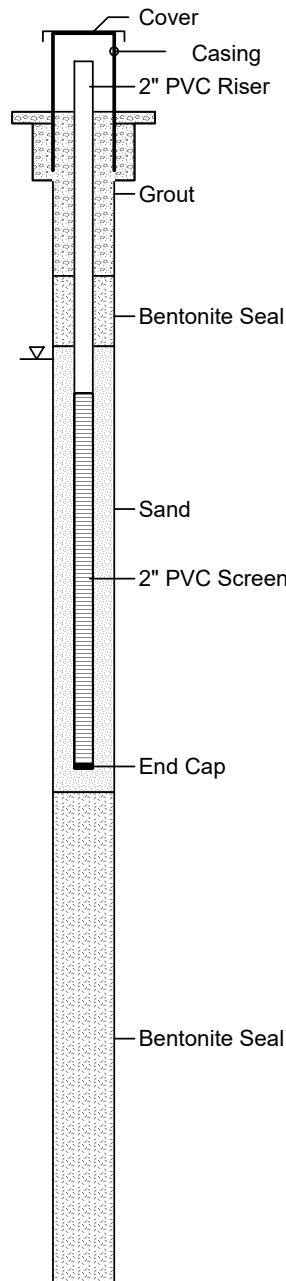
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 3
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561792.57
Easting (ft) : 1454723.99
Date/Time Started : 4/9/19 0930
Date/Time Completed : 4/10/19 1700
Surf. Elev. (ft AMSL) : 11.63
TOC Elev. (ft AMSL) : 13.74
Total Well Depth (ft) : 50' bgs
Depth to Water (ft) : 0 Hr: 16.82' TOC
Depth to Water (ft) : 48 hr: 13.29' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COD-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		653.1 252.3 6618 1702 3841	(0-6.5') SILT with trace SLAG GRAVEL, soft, dark brown, dry, non-plastic, non-cohesive	ML	4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap
5	100	-			
		309.6 180.6 125.8 67.1	(6.5-10') SILTY SAND with SLAG GRAVEL, loose, dark brown, dry, non-plastic, non-cohesive	SM	Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.54'
10		-			
		76.3 49.0 119.8 6386	(10-11') SLAG GRAVEL and SILT, loose, dark brown, dry, non-plastic, non-cohesive	GW/ML	Wet at 15' bgs
15	100	-			
		13.3 3205 15000 3167 2679	(11-15') SILT with trace SLAG GRAVEL, soft, dark brown, dry then very moist at 12.5' bgs, non-plastic, non-cohesive	ML	Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 7' bgs
20		-			
		636.1 264.9 608.2 493.4 877.4	(15-20') SILTY SAND and SLAG GRAVEL, loose, dark brown, wet, non-plastic, non-cohesive	SM	Bentonite Seal: 3/8" chips Top: 7' bgs Bottom: 10' bgs
25	100	-			
		424.5 273.3 320.5 141.7 89.9	(20-24.5') SILTY SAND and SLAG GRAVEL, loose, dark brown, wet, non-plastic, non-cohesive, strong naphthalene-like odor and product at 24.5' bgs	SM/GW	Filter Pack: #2 Sand Top: 10' bgs Bottom: 28' bgs
30		-			
		-	(24.5-27') SILT and SAND, loose, black, wet, non-plastic, non-cohesive	ML/SW	Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 12' bgs Bottom: 28' bgs Total Screen: 16'
35	100	-			
		-	(27-29.8') CLAY, very soft, black, wet, low plasticity, cohesive	CL	End Cap
40		-			
		-	(29.8-30') SAND, fine, very dense, light brown, moist, non-plastic, non-cohesive, oil present at 30' bgs	SP	Bentonite Seal
45	100	-			
		-	(30-32.4') SILTY SAND, very loose, black, wet, non-plastic, non-cohesive	SM	
50		-			
		-	(32.4-34.2') SANDY SILT grading to SILT with CLAY, soft, black, wet, non-plastic, non-cohesive	ML	
		-	(32.7-34.2') CLAYEY SILT, very soft, black, wet, non-plastic, non-cohesive	ML	
		-	(34.2-39') CLAY, very soft, black, wet, low plasticity, cohesive	CL	
		-	(39-50') SAND, fine, very dene, very light brown, wet, non-plastic, non-cohesive	SP	
End of boring					



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/22/2019
Purged Amount: 19 gallons
Well Volumes Removed: 6.93



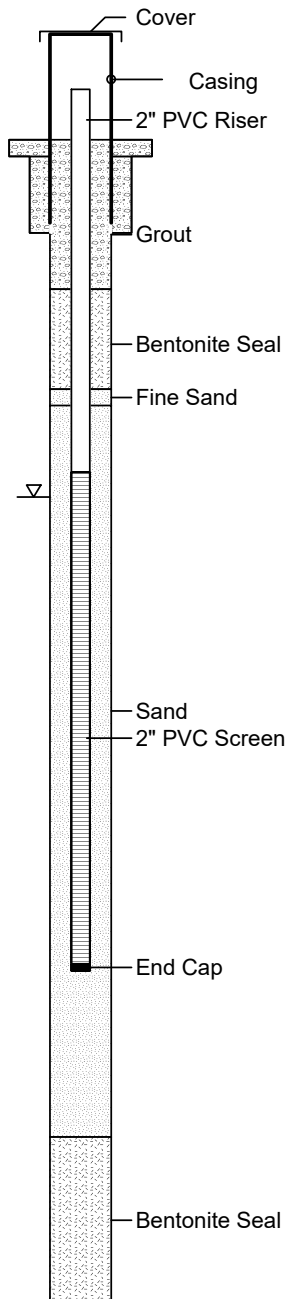
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 3
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561802.96
Easting (ft) : 1454925.93
Date/Time Started : 4/24/19 1320
Date/Time Completed : 4/24/19 1700
Surf. Elev. (ft AMSL) : 11.34
TOC Elev. (ft AMSL) : 13.98
Total Well Depth (ft) : 35' bgs
Depth to Water (ft) : 0 Hr: 13.37' TOC
Depth to Water (ft) : 48 hr: 13.50' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COE-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS		COMPLETION DETAILS
0		3.1	(0-15') SILT with SLAG, SAND and GRAVEL-sized, soft, dark brown, dry, non-plastic, non-cohesive	ML/GW		4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.61' Wet at 15' bgs Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 4.5' bgs Bentonite Seal: 3/8" chips Top: 4.5' bgs and 30' bgs Bottom: 7.5' bgs and 35' bgs Filter Pack: #2 Sand Top: 8' bgs Bottom: 30' bgs Sand: #1 Top: 7.5' bgs Bottom: 8' bgs Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 10' bgs Bottom: 25' bgs Total Screen: 15'
		1.1				
		7.7				
		1.5				
5	100	11.9				
		-				
		18.2				
		13.2				
		48.4				
10		11.5				
		0.6				
	100	0.3				
		3.6				
		14.6				
15		4.6				
		6.2				
		5.9				
		3.5				
		3.6				
20	100	69.8				
		-				
		25.5				
		3.4				
		1.8				
25		12.4				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
30	100	0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
35		0.0				
End of boring						

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/06/2019
Purged Amount: 10 gallons
Well Volumes Removed: 4.29



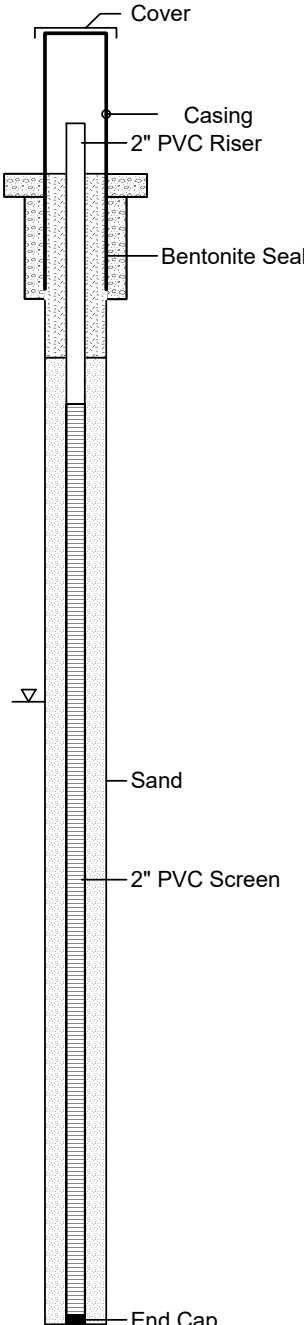
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 5
ARM Representative : L. Glumac
Checked by : M. Replagel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561492.27
Easting (ft) : 1458030.69
Date/Time Started : 4/14/19 0800
Date/Time Completed : 4/14/19 0850
Surf. Elev. (ft AMSL) : 11.72
TOC Elev. (ft AMSL) : 14.78
Total Well Depth (ft) : 25' bgs
Depth to Water (ft) : 0 Hr: 14.04' TOC
Depth to Water (ft) : 48 hr: 14.22' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COFF-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS	
0		0.8	(0-14') SLAG, SAND and GRAVEL-sized, with SILT, loose, dark brown, dry then wet at 11' bgs, non-plastic, non-cohesive	SW/GW	 <p>Cover</p> <p>Casing</p> <p>2" PVC Riser</p> <p>Bentonite Seal</p> <p>Sand</p> <p>2" PVC Screen</p> <p>End Cap</p>	<p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 3.03'</p> <p>Wet at 11' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs</p> <p>Filter Pack: #2 Sand Top: 4' bgs Bottom: 25' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 25' bgs Total Screen: 20'</p>
		0.8				
		0.7				
		10.2				
		29.1				
5	100	-				
		11.1				
		21.4				
		4.1				
		6.6				
10		-				
		12.7				
	100	3.2				
		9.7				
		3.1				
15		6.0				
		0.9				
		5.5				
		6.4				
		3.1				
20	100	-				
		4.8				
		14.7				
		2.2				
		1.1				
25			End of boring			

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/25/2019
Purged Amount: 22 gallons
Well Volumes Removed: 9.40



ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 3
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561671.42
Easting (ft) : 1454219.19
Date/Time Started : 4/26/19 1400
Date/Time Completed : 4/27/19 0930
Surf. Elev. (ft AMSL) : 11.62
TOC Elev. (ft AMSL) : 14.51
Total Well Depth (ft) : 35' bgs
Depth to Water (ft) : 0 Hr: 14.05' TOC
Depth to Water (ft) : 48 hr: 14.51' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COF-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS		COMPLETION DETAILS
0		2.1	(0-7') SLAG, SAND and GRAVEL-sized, loose, dark brown to gray, dry, non-plastic, non-cohesive	SW/GW	<p>Cover Casing 2" PVC Riser Grout Bentonite Seal Fine Sand Sand 2" PVC Screen End Cap</p>	4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap
5	100	0.1				
		0.1				
		1.2				
		2.7				
		-				
		0.0				
		0.0	(7-10') SLAG, SAND and GRAVEL-sized, with SILT, loose, dark brown, dry, non-plastic, non-cohesive	SW/GW		Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.88'
10		0.7				
		1.6				
	100	0.0	(10-24') SLAG, SAND and GRAVEL-sized, loose, dark brown to gray, then gray at 15' bgs, dry then wet at 14.5' bgs, non-plastic, non-cohesive, napthalene-like odor from 23-25' bgs	SW/GW	<p>Grout Bentonite Seal Fine Sand Sand 2" PVC Screen End Cap</p>	Wet at 14.5' bgs Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 14.5' bgs
		0.1				
		0.2				
		0.3				
15		0.5				
		0.2				
		0.3				
		0.0				
		0.4				
	100	6.7				Filter Pack: #2 Sand Top: 18' bgs Bottom: 35' bgs
		-				
		0.8			<p>Sand 2" PVC Screen End Cap</p>	
		2.8				
		60.6				
25		155.8	(24-25') SANDY CLAY, medium dense, gray, wet, low plasticity, cohesive	CL		Sand Blotter: #1 Sand Top: 17.5' bgs Bottom: 18' bgs
		7.5				
		16.6	(25-33') SILTY SLAG, SAND and GRAVEL-sized, medium dense, gray, wet, non-plastic, non-cohesive	GM/SM		Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 20' bgs Bottom: 35' bgs Total Screen: 15'
		6.4				
		2.2				
		0.9				
	100	-				
		3.5				
		12.4				
		1.7	(33-35') SILTY CLAY, medium dense, gray, wet, low plasticity, cohesive	CL		
35		1.6				
			End of boring			

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/07/2019
Purged Amount: 16 gallons
Well Volumes Removed: 4.11



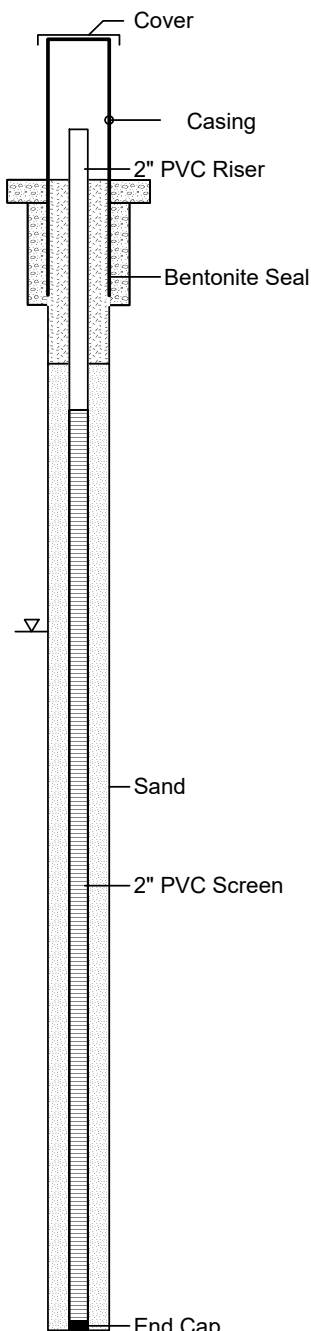
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 5
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561156.32
Easting (ft) : 1458040.33
Date/Time Started : 4/14/19 0915
Date/Time Completed : 4/14/19 1010
Surf. Elev. (ft AMSL) : 10.60
TOC Elev. (ft AMSL) : 12.69
Total Well Depth (ft) : 25' bgs
Depth to Water (ft) : 0 Hr: 12.50' TOC
Depth to Water (ft) : 48 hr: 12.57' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COGG-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		3.3	(0-25') SLAG, SAND and GRAVEL-sized, and SILT, loose, dark brown, dry then wet at 11.5' bgs, non-plastic, non-cohesive	SW/GW	 <p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.31'</p> <p>Wet at 11.5' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs</p> <p>Filter Pack: #2 Sand Top: 4' bgs Bottom: 25' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 25' bgs Total Screen: 20'</p>
0.7		0.7			
1.6		16.4			
4.7		4.7			
5	100	-			
10		10.0			
4.9		4.9			
3.3		3.3			
0.4		0.4			
9.8		9.8			
7.9		7.9			
100		7.3			
12.3		12.3			
0.8		0.8			
15		0.7			
0.4		0.4			
0.7		0.7			
0.3		0.3			
20	100	5.5			
-		-			
4.1		4.1			
2.9		2.9			
4.7		4.7			
6.5		6.5			
25			End of boring		

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/25/2019
Purged Amount: 17.5 gallons
Well Volumes Removed: 7.00



ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 3
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561660.62
Easting (ft) : 1454465.55
Date/Time Started : 4/26/19 1030
Date/Time Completed : 4/26/19 1200
Surf. Elev. (ft AMSL) : 11.28
TOC Elev. (ft AMSL) : 13.77
Total Well Depth (ft) : 35' bgs
Depth to Water (ft) : 0 Hr: 13.64' TOC
Depth to Water (ft) : 48 hr: 13.99' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COG-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS		COMPLETION DETAILS
0		0.0	(0-8') SILTY SLAG GRAVEL, loose, brown, moist, non-plastic, non-cohesive	GM	<p>Cover</p> <p>Casing</p> <p>2" PVC Riser</p> <p>Grout</p> <p>Bentonite Seal</p> <p>Fine Sand</p> <p>Sand</p> <p>2" PVC Screen</p> <p>End Cap</p>	<p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.51'</p> <p>Wet at 15' bgs Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 14.5' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 14.5' bgs Bottom: 17.5' bgs</p> <p>Filter Pack: #2 Sand Top: 18' bgs Bottom: 35' bgs</p> <p>Sand Blotter: #1 Sand Top: 17.5' bgs Bottom: 18' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 20' bgs Bottom: 35' bgs Total Screen: 15'</p>
5	100	-				
10	100	3.1	(8-13.5') SLAG, SAND and GRAVEL-sized, loose, brown and gray, moist, non-plastic, non-cohesive	GW/SW		
15		0.0	(13.5-15') SILT with SLAG, loose, brown, moist, non-plastic, non-cohesive	ML		
20	100	307.5	(15-30') SLAG, SAND and GRAVEL-sized, loose, gray, wet, non-plastic, non-cohesive	SW/GW		
25		569.5				
30	100	91.8				
35		51.6				
		1996				
		-				
		9.1				
		99.4				
		150.6				
		15.5				
		1.2				
		1.3				
		1.8				
		10.2				
		224.6				
		-	(30-32') CLAY, soft, gray, moist, low plasticity, cohesive	CL		
		1.6				
		17.3	(32-35') SAND, fine, dense, gray, wet, non-plastic, non-cohesive	SP		
		1.7				
		1.5				
35			End of boring			

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/07/2019
Purged Amount: 16 gallons
Well Volumes Removed: 3.97



ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 3
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig

Northing (ft) : 561707.14
Easting (ft) : 1454648.50
Date/Time Started : 4/26/19 0750
Date/Time Completed : 4/26/19 1000
Surf. Elev. (ft AMSL) : 10.60
TOC Elev. (ft AMSL) : 13.76
Total Well Depth (ft) : 35' bgs
Depth to Water (ft) : 0 Hr: 12.09' TOC
Depth to Water (ft) : 48 hr: 12.29' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COH-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS		COMPLETION DETAILS
0		-	(0-3') SILT, loose, dark brown, dry, non-plastic, non-cohesive	ML	<p>Cover</p> <p>Casing</p> <p>2" PVC Riser</p> <p>Grout</p> <p>Bentonite Seal</p> <p>Fine Sand</p> <p>Sand</p> <p>2" PVC Screen</p> <p>End Cap</p>	4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap
0.0	100	0.0				Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.11'
0.3		0.7	(3-10') SLAG, SAND and GRAVEL-sized, loose, dark brown, dry, non-plastic, non-cohesive	GW		Wet at 14' bgs Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 14.5' bgs
5		-				
0.5		0.2				
1.2		0.9				
10		0.7	(10-11') SILTY SLAG, loose, dark brown, moist, non-plastic, non-cohesive	GM		Bentonite Seal: 3/8" chips Top: 14.5' bgs Bottom: 17.5' bgs
1.4	100	4.6	(11-21.5') SLAG, SAND and GRAVEL-sized, loose, light brow to very pale brown 11-14' bgs, dark brown 14-15' bgs, gray 15-21.5' bgs, dry, non-plastic, non-cohesive	SW/GW		Filter Pack: #2 Sand Top: 18' bgs Bottom: 35' bgs
15		5.0				
0.2		1.9				
42.0		6.7				
30.3		7.7	(21.5-33') SILTY SLAG, loose, gray, wet, non-plastic, non-cohesive	GM		Sand Blotter: #1 Sand Top: 17.5' bgs Bottom: 18' bgs
20	100	46.0				
6.7		50.7				
25		41.2				
42.4		298.8				
34.8		954.7				
-		-				
30	100	143.9				
309.7		278.0	(33-35') SLAG, SAND and GRAVEL-sized, loose, gray, wet, non-plastic, non-cohesive	SW/GW		Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 20' bgs Bottom: 35' bgs Total Screen: 15'
35		71.5				
			End of boring			

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/06/2019
Purged Amount: 20 gallons
Well Volumes Removed: 4.80



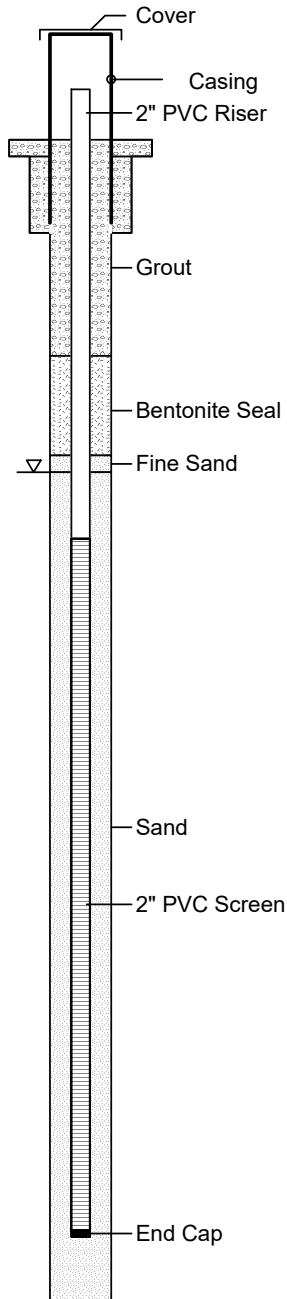
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 3
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561676.61
Easting (ft) : 1454778.73
Date/Time Started : 4/25/19 1230
Date/Time Completed : 4/26/19 1000
Surf. Elev. (ft AMSL) : 10.77
TOC Elev. (ft AMSL) : 13.30
Total Well Depth (ft) : 32' bgs
Depth to Water (ft) : 0 Hr: 12.35' TOC
Depth to Water (ft) : 48 hr: 12.75' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COI-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS	
0		0.1	(0-9.5') SLAG, SAND and GRAVEL-sized, loose, brown to black, moist, non-plastic, non-cohesive	SW/GW		4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.13' Wet at 15' bgs Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 6.5' bgs Bentonite Seal: 3/8" chips Top: 6.5' bgs Bottom: 9.5' bgs Filter Pack: #2 Sand Top: 10' bgs Bottom: 35' bgs Sand Blotter: #1 Sand Top: 9.5' bgs Bottom: 10' bgs Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 12' bgs Bottom: 32' bgs Total Screen: 20'
0.2						
0.2						
0.3						
0.3						
5	100	-				
		0.2				
		0.0				
		0.1				
10		0.0	(9.5-10.5') CLAY with SILT, very firm, very light brown to light brown, dry, low plasticity, cohesive	CL		
		0.0				
	100	0.0	(10.5-28') SLAG, SAND and GRAVEL-sized, with some SILT 10.5-15' bgs, loose, brown to black, moist then wet at 15' bgs, non-plastic, non-cohesive	SW/GW		
		0.0				
15		0.0				
		-				
		-				
		-				
20	100	-				
		-				
		-				
		-				
		-				
25		-				
		98.5				
		78.2				
		127.9				
		0.8	(28-30') SILTY SAND, very fine, dense, gray, wet, non-plastic, non-cohesive	SM		
30	100	17.5				
		-	(30-35') CLAY, very firm, brown, moist, low plasticity, cohesive	CL		
		65.1				
		78.5				
		2.9				
		1.5				
35			End of boring			

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/06/2019
Purged Amount: 14 gallons
Well Volumes Removed: 3.76



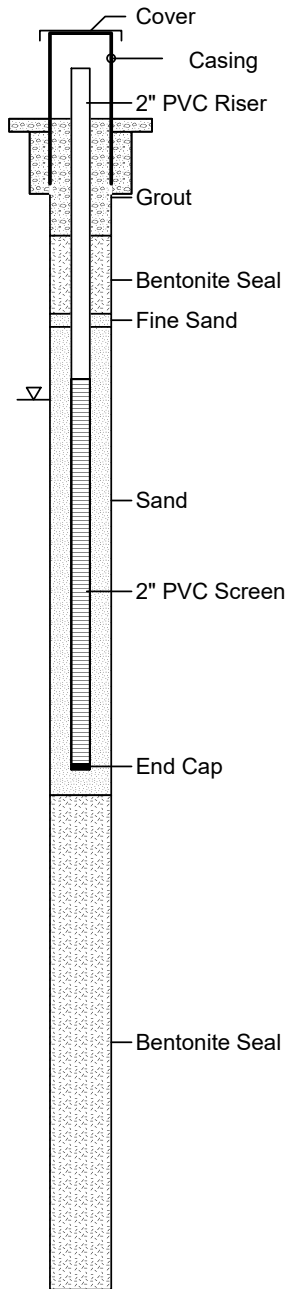
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 3
ARM Representative : L. Glumac
Checked by : M. Replagel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 561684.22
Easting (ft) : 1454936.95
Date/Time Started : 4/25/19 730
Date/Time Completed : 4/25/19 1100
Surf. Elev. (ft AMSL) : 10.38
TOC Elev. (ft AMSL) : 13.86
Total Well Depth (ft) : 25' bgs
Depth to Water (ft) : 0 Hr: 13.14' TOC
Depth to Water (ft) : 48 hr: 13.55' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COJ-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS		COMPLETION DETAILS
0		2.1	(0-25') SLAG, SAND and GRAVEL-sized, loose, brown to dark brown, dry then wet at 15' bgs, non-plastic, non-cohesive	SW/GW		<p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 3.65'</p> <p>Wet at 15' bgs Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 4.5' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 4.5' bgs Bottom: 7.5' bgs</p> <p>Filter Pack: #2 Sand Top: 8' bgs Bottom: 25' bgs</p> <p>Sand Blotter: #1 Sand Top: 7.5' bgs Bottom: 8' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 10' bgs Bottom: 25' bgs Total Screen: 15'</p>
		1.8				
		2.5				
		3.6				
5	100	11.1				
		-				
		2.3				
		4.9				
		1.9				
10		0.5				
		4.6				
	100	5.8				
		3.0				
		23.8				
15		2.4				
		-				
		-				
		-				
		-				
20	100	-				
		-				
		-				
		-				
		-				
25		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
30	100	0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
		0.0				
35		0.0				
		-				
		-				
		-				
		-				
		-				
		-				
		-				
		-				
		-				
40	100	-				
		-				
		-				
		-				
		-				
		-				
		-				
		-				
45		-				
End of boring						

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/06/2019
Purged Amount: 12 gallons
Well Volumes Removed: 5.06



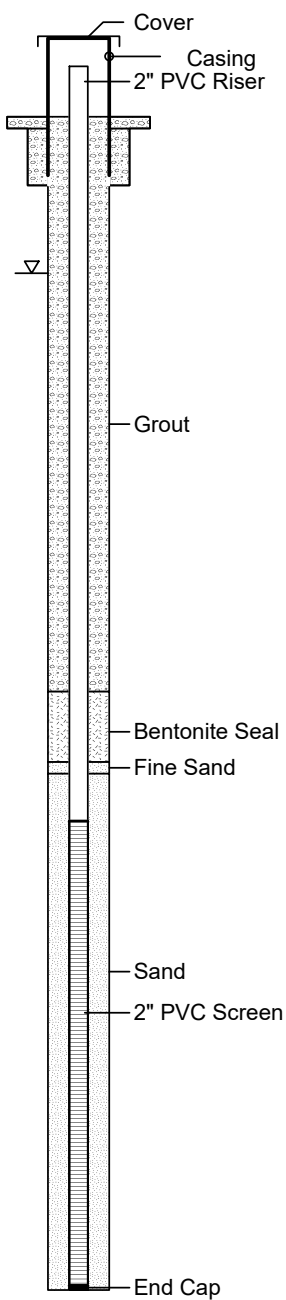
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563234.63
Easting (ft) : 1454749.25
Date/Time Started : 4/12/19 0825
Date/Time Completed : 4/12/19 0920
Surf. Elev. (ft AMSL) : 4.60
TOC Elev. (ft AMSL) : 6.83
Total Well Depth (ft) : 50' bgs
Depth to Water (ft) : 0 Hr: 8.72' TOC
Depth to Water (ft) : 48 hr: 9.42' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COK-MWI

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0	100	15.4 21.8 31.5 39.7 67.4 187.7	(0-4') SANDY SILT, medium dense, brown, dry, non-plastic, non-cohesive	ML	 <p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.39'</p> <p>Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 24.5' bgs</p> <p>Wet at 6' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 24.5' bgs Bottom: 27.5' bgs</p> <p>Sand Blotter: #1 Sand Top: 27.5' bgs Bottom: 28' bgs</p> <p>Filter Pack: #2 Sand Top: 28' bgs Bottom: 50' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 30' bgs Bottom: 50' bgs Total Screen: 20'</p>
5	100	172.7 28.5 66.2 88.9	(4-6') SAND and GRAVEL, loose, dark brown, dry, non-plastic, non-cohesive	SW/GW	
10	100	54.8 73.3 108.6 171.8 91.8	(6-9.9') SAND, very fine, dense, dark brown, wet, non-plastic, non-cohesive	SP	
15	100	4.9 0.8	(9.9-11.5') Fine GRAVEL and SAND, medium, loose, brown, wet, non-plastic, non-cohesive	GW/SW	
20	100	-	(11.5-18') SLAG, SAND and GRAVEL-sized, loose, gray to light gray, wet, non-plastic, non-cohesive	GW/SW	
25	100	-	(18-29') SLAG, SAND and GRAVEL-sized, loose, light gray grading to gray, then grading to dark gray, wet, non-plastic, non-cohesive	SW/GW	
30	100	3.9 17.9	(29-50') SAND, very fine, very dense, light gray then black at 48' bgs, wet, non-plastic, non-cohesive	SP	
35	100	-			
40	100	-			
45	100	4.8 12.6 26.0 14.1 8.1 34.7 6.7			
50			End of boring		

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/24/2019
Purged Amount: 36 gallons
Well Volumes Removed: 5.15



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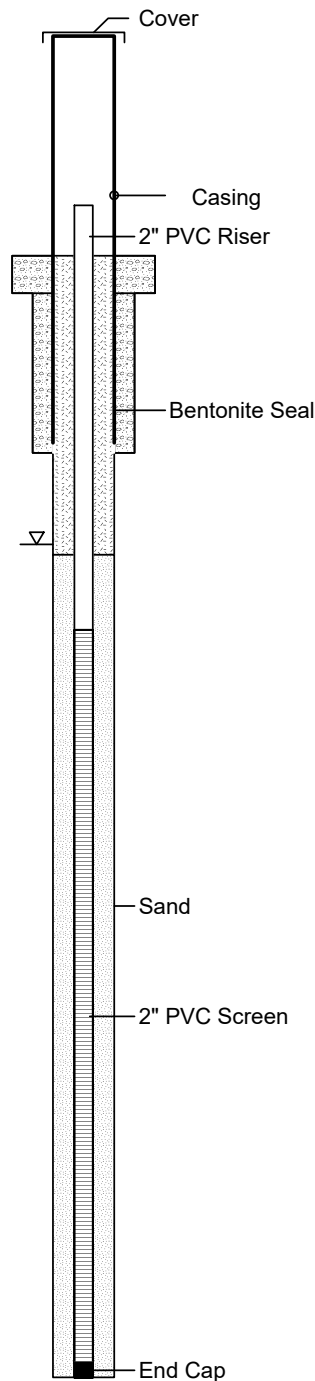
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563234.96
Easting (ft) : 1454751.72
Date/Time Started : 4/12/19 0740
Date/Time Completed : 4/12/19 0815
Surf. Elev. (ft AMSL) : 4.61
TOC Elev. (ft AMSL) : 6.62
Total Well Depth (ft) : 15' bgs
Depth to Water (ft) : 0 Hr: 6.69' TOC
Depth to Water (ft) : 48 hr: 6.61' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COK-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		15.4	(0-4') SANDY SILT, medium dense, brown, dry, non-plastic, non-cohesive	ML	4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.79' Wet at 6' bgs
		21.8			
100		31.5			
		39.7		SW/GW	Bentonite Seal Wet at 6' bgs
5		67.4	(4-6') SAND and GRAVEL, loose, dark brown, dry, non-plastic, non-cohesive		
		187.7			
		172.7	(6-9.9') SAND, very fine, dense, dark brown, wet, non-plastic, non-cohesive	SP	Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs
100		28.5			
		66.2			
		88.9		GW/SW	Filter Pack: #2 Sand Top: 4' bgs Bottom: 15' bgs
10		54.8	(9.9-11.5') Fine GRAVEL and SAND, medium, loose, brown, wet, non-plastic, non-cohesive		
		73.3			
		108.6	(11.5-15') SLAG, SAND and GRAVEL-sized, loose, gray to light gray, wet, non-plastic, non-cohesive	GW/SW	Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 15' bgs Total Screen: 10'
100		171.8			
		91.8			
15			End of boring		



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/24/2019
Purged Amount: 7 gallons
Well Volumes Removed: 3.83



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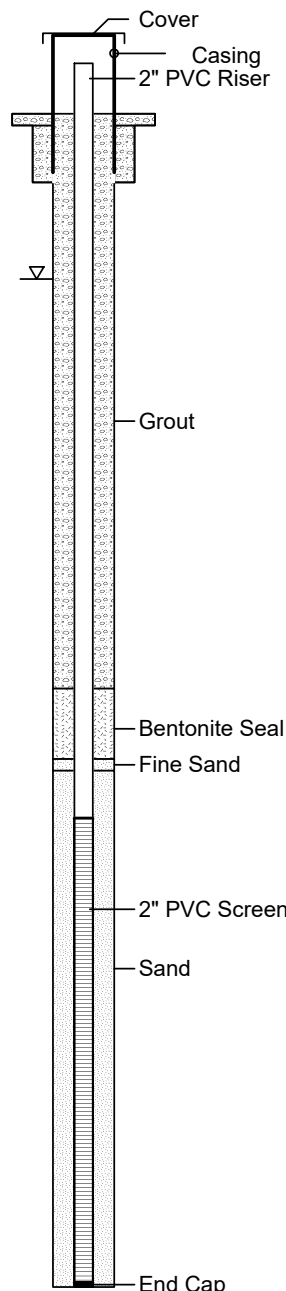
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563246.33
Easting (ft) : 1454911.00
Date/Time Started : 4/11/19 1440
Date/Time Completed : 4/11/19 1600
Surf. Elev. (ft AMSL) : 4.62
TOC Elev. (ft AMSL) : 7.56
Total Well Depth (ft) : 50' bgs
Depth to Water (ft) : 0 Hr: 9.99' TOC
Depth to Water (ft) : 48 hr: 9.80' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COL-MWI

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		4.4	(0-2') CLAY, firm, red to light red, dry, low plasticity, cohesive	CL	4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap
5	100	4.6 27.4 15.2 48.9	(2-5') SILT, SAND and GRAVEL, medium dense, brown, moist, non-plastic, non-cohesive	ML/SW	
10		-	(5-11') SLAG, SAND-sized, very fine, dense, black, wet, non-plastic, non-cohesive	SP	Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.86'
15	100	6.2 28.9 70.7 58.4	(11-13') SLAG, SAND and GRAVEL-sized, medium dense, dark bluish gray, wet, non-plastic, non-cohesive	SW/GW	Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 24.5' bgs
20		297.9	(13-18.5') SAND with some GRAVEL, medium dense, dark gray, wet, non-plastic, non-cohesive	SW	Wet at 5' bgs
25	100	462.9 167.6 2009	(18.5-19.5') CLAY, soft to firm, dark gray, wet, low plasticity, cohesive	CL	Bentonite Seal: 3/8" chips Top: 24.5' bgs Bottom: 27.5' bgs
30		360.6 31.6 93.5 399.6	(19.5-23') GRAVEL and SAND, fine, dense, dark gray, wet, non-plastic, non-cohesive	GW/SW	Product odor 11-50' bgs
35	100	3107 2315 3031	(23-25') SAND, very fine, dense, dark gray, wet, non-plastic, non-cohesive	SP	Sand Blotter: #1 Sand Top: 27.5' bgs Bottom: 28' bgs
40		407.9 1246 1591 87.9	(25-35.7') SANDY CLAY, hard, very pale brown, moist, low plasticity, cohesive, with a sand lens from 28-28.2' bgs	CL	Filter Pack: #2 Sand Top: 28' bgs Bottom: 50' bgs
45	100	30.0 79.1 42.2 58.6	(35.7-37.5') SAND, very fine, very dense, very pale brown, wet, non-plastic, non-cohesive	SP	Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 30' bgs Bottom: 50' bgs Total Screen: 20'
50		15.9 27.6 21.3 72.4	(37.5-40') SANDY CLAY, hard, very pale brown, moist, low plasticity, cohesive	CL	
		36.7 -	(40-50') SAND, very fine, very dense, dark gray, wet, non-plastic, non-cohesive	SP	
		297.5 357.1			
		6447 2008 1879			
		2208 392.4 7047 15000 1482 2143			
End of boring					



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/23/2019
Purged Amount: 33 gallons
Well Volumes Removed: 4.63



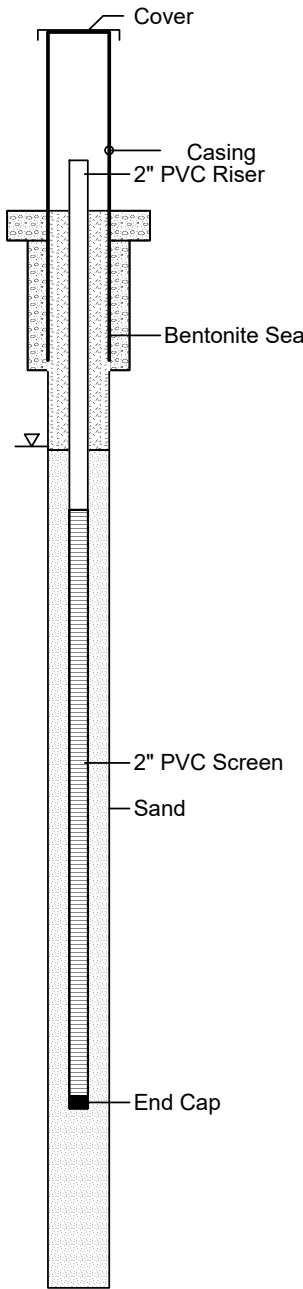
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replagel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563247.85
Easting (ft) : 1454916.39
Date/Time Started : 4/11/19 1340
Date/Time Completed : 4/11/19 1430
Surf. Elev. (ft AMSL) : 4.65
TOC Elev. (ft AMSL) : 7.38
Total Well Depth (ft) : 15' bgs
Depth to Water (ft) : 0 Hr: 6.74' TOC
Depth to Water (ft) : 48 hr: 6.69' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COL-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		4.4	(0-2') CLAY, medium, red to light red, dry, low plasticity, cohesive	CL	 <p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.72'</p> <p>Wet at 5' bgs</p> <p>Product-like odor in core 11-18' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs</p> <p>Filter Pack: #2 Sand Top: 4' bgs Bottom: 15' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 15' bgs Total Screen: 10'</p>
		4.6			
		27.4	(2-5') SILT, SAND and GRAVEL, medium dense, brown, moist, non-plastic, non-cohesive	ML/SW	
		15.2			
		48.9			
5	100	-	(5-11') SLAG, SAND-sized, very fine, dense, black, wet, non-plastic, non-cohesive	SP	
		6.2			
		28.9			
		70.7			
		58.4			
10		297.9			
		462.9	(11-13') SLAG, SAND and GRAVEL-sized, medium dense, dark bluish gray, wet, non-plastic, non-cohesive	SW/GW	
		167.6			
	100	2009	(13-18') SAND with some GRAVEL, medium dense, dark gray, wet, non-plastic, non-cohesive	SW	
		360.6			
15		31.6			
		93.5			
	100	399.6			
			End of boring		
20					

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/23/2019
Purged Amount: 18 gallons
Well Volumes Removed: 10.29



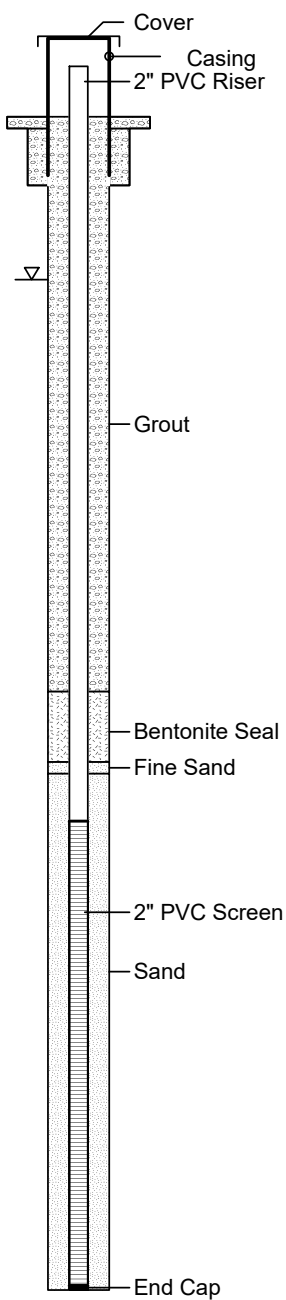
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563260.43
Easting (ft) : 1455059.50
Date/Time Started : 4/11/19 0930
Date/Time Completed : 4/11/19
Surf. Elev. (ft AMSL) : 5.70
TOC Elev. (ft AMSL) : 7.43
Total Well Depth (ft) : 50' bgs
Depth to Water (ft) : 0 Hr: 9.83' TOC
Depth to Water (ft) : 48 hr: 9.70' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COM-MWI

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		2.7	(0-1') CLAY, firm, brown, dry, low plasticity, cohesive	CL	 <p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 1.58'</p> <p>Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 24.5' bgs</p> <p>Wet at 5' bgs</p> <p>Product in core 5-11' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 24.5' bgs Bottom: 27.5' bgs</p> <p>Sand Blotter: #1 Sand Top: 27.5' bgs Bottom: 28' bgs</p> <p>Filter Pack: #2 Sand Top: 28' bgs Bottom: 50' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 30' bgs Bottom: 50' bgs Total Screen: 20'</p>
100		8.1	(1-5') SILT and CLAY with GRAVEL, soft, black, dry, low plasticity, cohesive	ML	
5		29.1	(5-9') SAND, fine, dense, black, wet, non-plastic, non-cohesive	SP	
100		113.7	(9-11') SLAG, SAND and GRAVEL-sized, loose, gray, wet, non-plastic, non-cohesive	SW/GW	
10		188.9	(11-21.5') SLAG, SAND-sized, fine, and some GRAVEL-sized, medium dense, gray to green, wet, non-plastic, non-cohesive	SW/GW	
100		15000	(21.5-28.5') CLAY, soft, gray, wet, low plasticity, cohesive	CL	
15		590.1	(28.5-37') SAND, fine, dense, brown to light brown then gray to dark gray 29-37' bgs, wet, non-plastic, non-cohesive	SP	
100		488.2	(37-39') SAND, very fine, very dense, light gray, moist, non-plastic, non-cohesive	SP	
20		1408	(39-46') SAND, fine, dense, gray to dark gray, wet, non-plastic, non-cohesive	SP	
100		363.2	(46-50') SAND, very fine, very dense, light gray, moist, non-plastic, non-cohesive	SP	
25		380.0	End of boring		

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/23/2019
Purged Amount: 33 gallons
Well Volumes Removed: 4.65



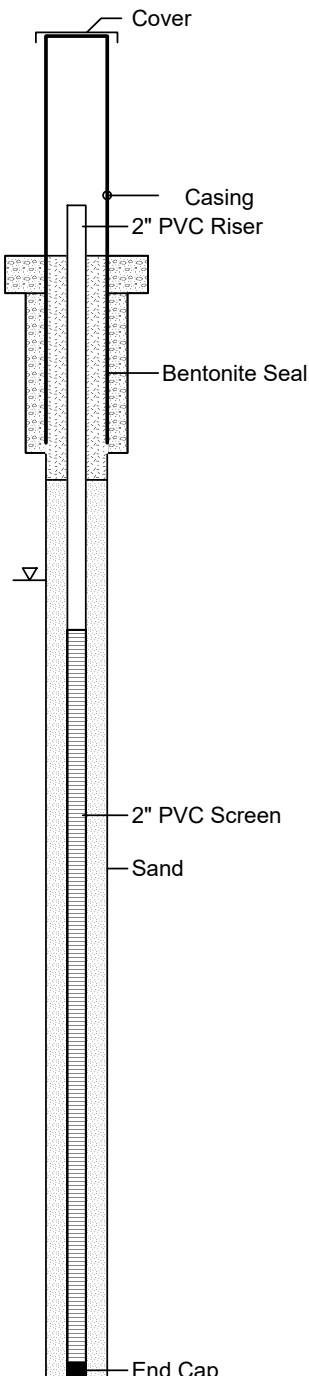
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563262.59
Easting (ft) : 1455064.51
Date/Time Started : 4/11/19 0830
Date/Time Completed : 4/11/19 0915
Surf. Elev. (ft AMSL) : 5.80
TOC Elev. (ft AMSL) : 8.11
Total Well Depth (ft) : 15' bgs
Depth to Water (ft) : 0 Hr: 6.61' TOC
Depth to Water (ft) : 48 hr: 7.09' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COM-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS	
0		2.7	(0-1') CLAY, firm, brown, dry, low plasticity, cohesive	CL	 <p>Cover</p> <p>Casing</p> <p>2" PVC Riser</p> <p>Bentonite Seal</p> <p>2" PVC Screen</p> <p>Sand</p> <p>End Cap</p>	<p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.38'</p> <p>Wet at 5' bgs</p> <p>Product in core 5-11' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 3' bgs</p> <p>Filter Pack: #2 Sand Top: 3' bgs Bottom: 15' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 15' bgs Total Screen: 10'</p>
	8.1		(1-5') SILT and CLAY with GRAVEL, soft, black, dry, low plasticity, cohesive	ML		
100	29.1					
	113.7					
	188.9					
5		15000	(5-9') SAND, fine, dense, black, wet, non-plastic, non-cohesive	SP		
	4238					
100	2693					
	2739					
10		2496	(9-11') SLAG, SAND and GRAVEL-sized, loose, gray, wet, non-plastic, non-cohesive	SW/GW		
	3466			SW/GW		
	6986		(11-15') SLAG, SAND-sized, fine, and some GRAVEL-sized, medium dense, gray to green, wet, non-plastic, non-cohesive			
100	2897					
	15000					
	15000					
15			End of boring			

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/23/2019
Purged Amount: 14 gallons
Well Volumes Removed: 8.28



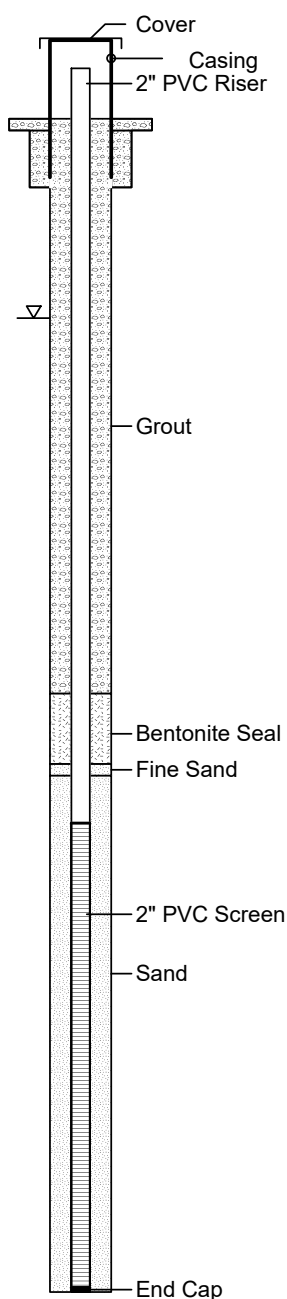
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563192.15
Easting (ft) : 1454354.47
Date/Time Started : 4/12/19 1150
Date/Time Completed : 4/12/19 1510
Surf. Elev. (ft AMSL) : 10.11
TOC Elev. (ft AMSL) : 11.99
Total Well Depth (ft) : 50' bgs
Depth to Water (ft) : 0 Hr: 10.97' TOC
Depth to Water (ft) : 48 hr: 11.25' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: CON-MWI

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS		COMPLETION DETAILS	
0		1.3	(0-10') SANDY SILT, loose, brown then red (2-3.5' bgs), dark brown grading to black (3.5-5' bgs), dry, non-plastic, non-cohesive	ML		<p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.14'</p> <p>Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 24.5' bgs</p> <p>Wet at 9' bgs</p> <p>Odor in core 14-20' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 24.5' bgs Bottom: 27.5' bgs</p> <p>Sand Blotter: #1 Sand Top: 27.5' bgs Bottom: 28' bgs</p> <p>Filter Pack: #2 Sand Top: 28' bgs Bottom: 50' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 30' bgs Bottom: 50' bgs Total Screen: 20'</p>	
100		0.2					
1.5		1.5					
0.1		0.1					
1.3		1.3					
5		9.6					
100		5.8					
6.8		6.8					
1.0		1.0					
4.7		4.7					
10		0.9	(10-44.5') SLAG, SAND and GRAVEL-sized, loose, gray to black, wet, non-plastic, non-cohesive	SW/GW			
100		80.7					
346.2		346.2					
2162		2162					
15		2387					
28.8		28.8					
100		238.5					
60.1		60.1					
330.3		330.3					
5744		5744					
20		-					
		-					
		-					
		-					
25	100	237.4					
		279.9					
		69.0					
		59.2					
30		-					
		-					
		-					
		-					
		-					
35	100	-					
		-					
		-					
		-					
		-					
40		3.1					
		4.8					
		5.7					
		50.6					
45	100	111.9					
		-					
		80.2					
		24.7					
		10.3					
		1.9					
50			(44.5-50') SAND, very fine, very dense, gray grading to light brown, wet, non-plastic, non-cohesive	SP			End of boring

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/24/2019
Purged Amount: 22 gallons
Well Volumes Removed: 3.26



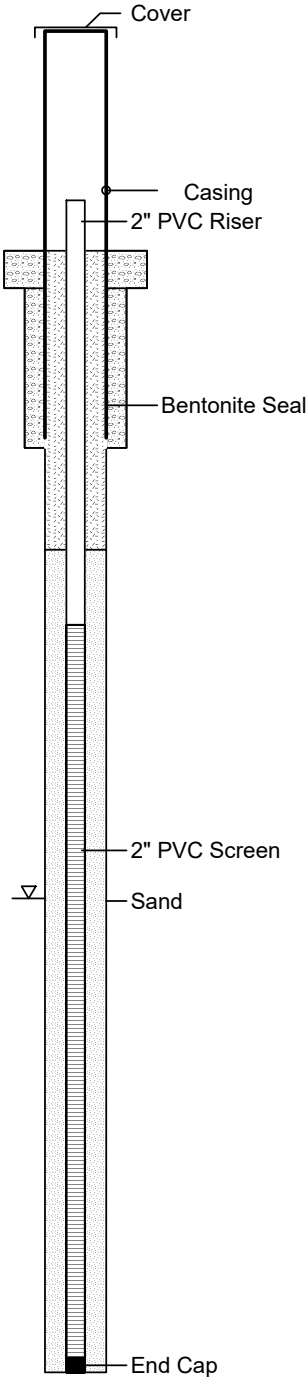
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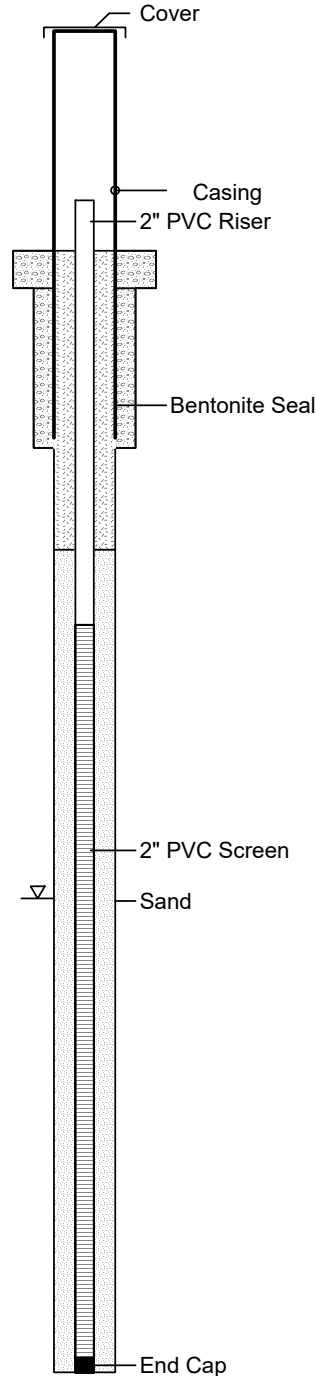
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563190.14
Easting (ft) : 1454350.59
Date/Time Started : 4/12/19 1120
Date/Time Completed : 4/12/19 1150
Surf. Elev. (ft AMSL) : 10.03
TOC Elev. (ft AMSL) : 12.01
Total Well Depth (ft) : 15' bgs
Depth to Water (ft) : 0 Hr: 10.95' TOC
Depth to Water (ft) : 48 hr: 11.41' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: CON-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS	
0			(0-10') SANDY SILT, loose, brown then red (2-3.5' bgs), dark brown grading to black (3.5-5' bgs), dry, non-plastic, non-cohesive	ML		<p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.10'</p> <p>Wet at 9' bgs</p> <p>Odor in core from 14-15' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs</p> <p>Filter Pack: #2 Sand Top: 4' bgs Bottom: 15' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 15' bgs Total Screen: 10'</p>
		1.3				
		0.2				
100		1.5				
		0.1				
5		1.3				
		9.6				
		5.8				
100		6.8				
		1.0				
10		4.7	(10-15') SLAG, SAND and GRAVEL-sized, loose, gray to black, wet, non-plastic, non-cohesive	SW/GW		
		0.9				
		80.7				
100		346.2				
		2162				
		2387				
15			End of boring			



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/24/2019
Purged Amount: 19 gallons
Well Volumes Removed: 18.10



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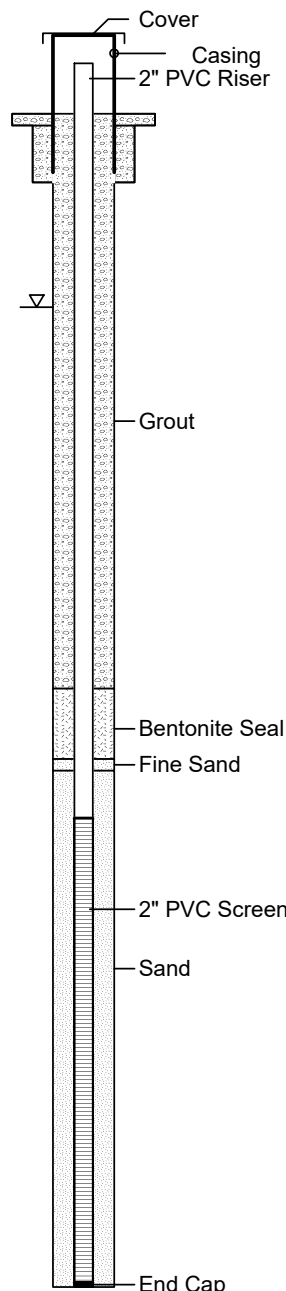
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563028.38
Easting (ft) : 1454319.03
Date/Time Started : 4/13/19 0830
Date/Time Completed : 4/13/19 0945
Surf. Elev. (ft AMSL) : 10.38
TOC Elev. (ft AMSL) : 12.68
Total Well Depth (ft) : 50' bgs
Depth to Water (ft) : 0 Hr: 11.00' TOC
Depth to Water (ft) : 48 hr: 10.99' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COO-MWI

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		4.4	(0-9') SILT with SAND and GRAVEL, loose, dark brown, dry, non-plastic, non-cohesive	ML	4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 1.62' Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 24.5' bgs Wet at 9' bgs Napthalene-like odor in core 17-40' bgs Bentonite Seal: 3/8" chips Top: 24.5' bgs Bottom: 27.5' bgs Sand Blotter: #1 Sand Top: 27.5' bgs Bottom: 28' bgs Filter Pack: #2 Sand Top: 28' bgs Bottom: 50' bgs Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 30' bgs Bottom: 50' bgs Total Screen: 20'
5		6.5 8.9 15.0 22.9 20.9 13.3 21.1 22.8 67.0	(9-40') SLAG, SAND and GRAVEL-sized, loose, dark brown, wet, non-plastic, non-cohesive	SW/GW	
10		1.5 29.6 120.5 235.5 201.5 201.5 89.8 243.7 248.7 264.8 358.6 166.5 9900 44.9 392.2			
15		- 3061 301.4 248.3 210.3 186.1 133.7 366.0 339.9 13959			
20		- 243.4 112.8 147.9 71.8			
25		184.6 173.7	(40-50') SAND, very fine, very dense, light gray to very pale brown, wet, non-plastic, non-cohesive	SP	
30		- - - - - 36.5 42.7			
35					
40					
45					
50			End of boring		



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/25/2019
Purged Amount: 22 gallons
Well Volumes Removed: 3.30



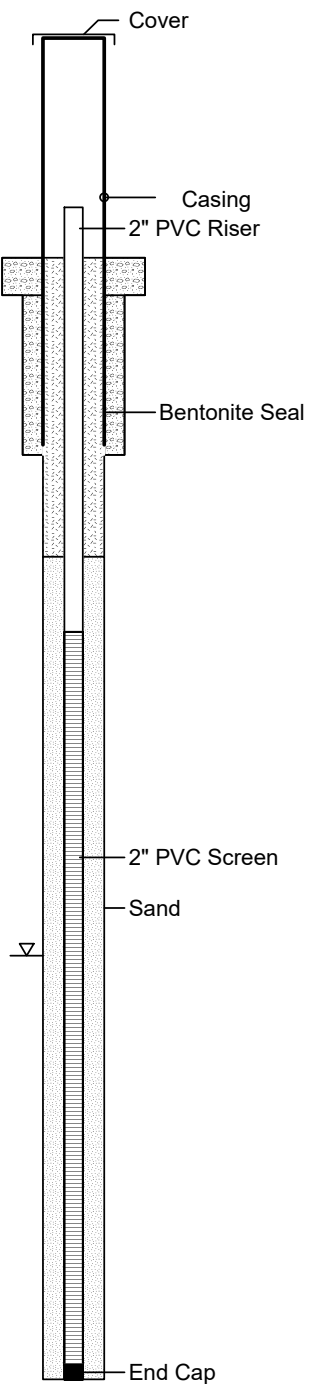
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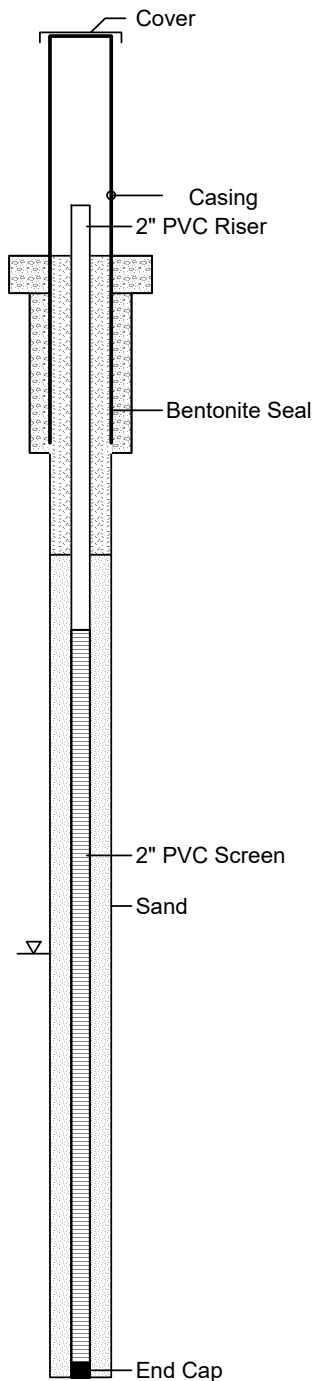
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563024.25
Easting (ft) : 1454318.34
Date/Time Started : 4/13/19 0750
Date/Time Completed : 4/13/19 0820
Surf. Elev. (ft AMSL) : 10.31
TOC Elev. (ft AMSL) : 12.70
Total Well Depth (ft) : 15' bgs
Depth to Water (ft) : 0 Hr: 12.50' TOC
Depth to Water (ft) : 48 hr: 12.08' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COO-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS	
0		4.4	(0-9') SILT with SAND and GRAVEL, loose, dark brown, dry, non-plastic, non-cohesive	ML		<p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.48'</p> <p>Wet at 9' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs</p> <p>Filter Pack: #2 Sand Top: 4' bgs Bottom: 15' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 15' bgs Total Screen: 10'</p>
	6.5					
100	8.9					
	15.0					
	22.9					
5	20.9					
	13.3					
100	21.1					
	22.8					
	67.0					
10	1.5	(9-15') SLAG, SAND and GRAVEL-sized, loose, dark brown, wet, non-plastic, non-cohesive	SW/GW			
	29.6					
100	120.5					
	235.5					
	201.5					
15		End of boring				



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/15/2019
Purged Amount: 17 gallons
Well Volumes Removed: 19.32



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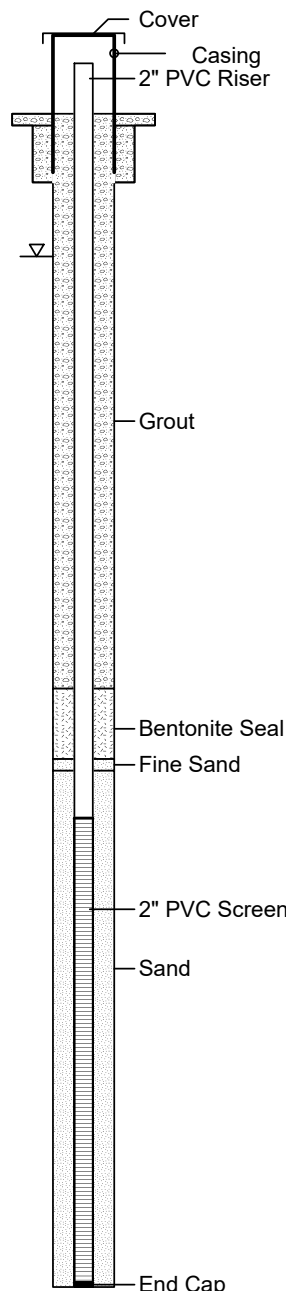
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563127.66
Easting (ft) : 1454935.03
Date/Time Started : 4/24/19 1100
Date/Time Completed : 4/24/19 1330
Surf. Elev. (ft AMSL) : 5.11
TOC Elev. (ft AMSL) : 7.53
Total Well Depth (ft) : 50' bgs
Depth to Water (ft) : 0 Hr: 8.38' TOC
Depth to Water (ft) : 48 hr: 8.84' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COP-MWI

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		0.5	(0-15') SLAG, SAND and GRAVEL-sized, loose, dark black to brown (0-9' bgs), blueish gray (10-15' bgs), dry to wet at 5.5' bgs, non-plastic, non-cohesive	SW/GW	4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap
5	100	0.5 1.0 0.2 0.4			
10		0.2 0.3 0.6 7.1			
15	100	40.2 23.0 14.2 32.9 107.2	(15-19') SAND, fine, medium dense, brown, wet, non-plastic, non-cohesive	SP	Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.52'
20		70.2 7.8	(19-20') CLAY, firm, brown, wet, low plasticity, cohesive	CL	Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 24.5' bgs
25	100	37.5 223.3 229.3 106.8	(20-37') SAND, fine, medium dense, brown, wet, non-plastic, non-cohesive	SP	Wet at 5.5' bgs
30		240.9 939.2 38.4 44.8			Bentonite Seal: 3/8" chips Top: 24.5' bgs Bottom: 27.5' bgs
35	100	232.2 150.1 22.9 48.0 223.2			Sand Blotter: #1 Sand Top: 27.5' bgs Bottom: 28' bgs
40		58.3 20.0 4.5 28.7	(37-41.5') CLAYEY SAND, fine, dense, very pale brown to light brown, then light gray at 41.5' bgs, wet, non-plastic, non-cohesive	SC	Filter Pack: #2 Sand Top: 28' bgs Bottom: 50' bgs
45	100	2.2 0.8 1.9 0.7 2.4			Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 30' bgs Bottom: 50' bgs Total Screen: 20'
50		0.7 1.7 0.7 2.0			
			End of boring		



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/3/2019
Purged Amount: 34 gallons
Well Volumes Removed: 4.72



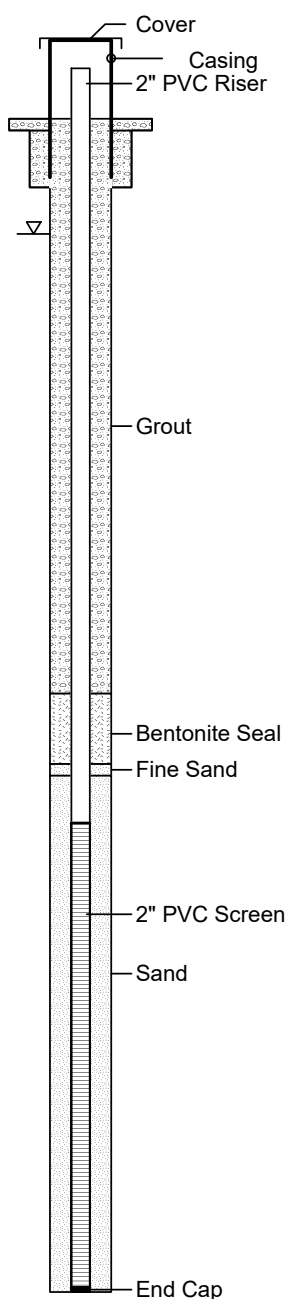
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Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 563001.86
Easting (ft) : 1454907.17
Date/Time Started : 4/24/19 0800
Date/Time Completed : 4/24/19 0940
Surf. Elev. (ft AMSL) : 3.78
TOC Elev. (ft AMSL) : 6.42
Total Well Depth (ft) : 50' bgs
Depth to Water (ft) : 0 Hr: 7.57' TOC
Depth to Water (ft) : 48 hr: 6.67' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COQ-MWI

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS		COMPLETION DETAILS
0		0.2	(0-18') SLAG, SAND and GRAVEL-sized, loose, black to dark gray, moist to wet at 6' bgs, non-plastic, non-cohesive	SW/GW		4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap
		0.2				
		0.4				
		0.3				
		0.3				
5	100	-				
		0.9				
		0.6				
		13.8				
		6.5				
10		14.3				
		2.9				
		21.9				
		12.5				
15	100	27.1				
		-				
		1.1				
		4.7				
		16.4				
20		73.9				
		13.4				
		80.4				
		64.3				
		13.8				
		0.2				
25	100	-				
		1.0				
		57.1				
		189.8				
		24.6				
30		-				
		-				
		-				
		-				
		-				
35	100	-				
		-				
		-				
		-				
		-				
		-				
40		201.6				
		810.2				
		9.0				
		6.7				
		65.9				
45	100	-				
		25.7				
		56.7				
		855.3				
		12.3				
50			End of boring			End Cap

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/3/2019
Purged Amount: 42 gallons
Well Volumes Removed: 5.69



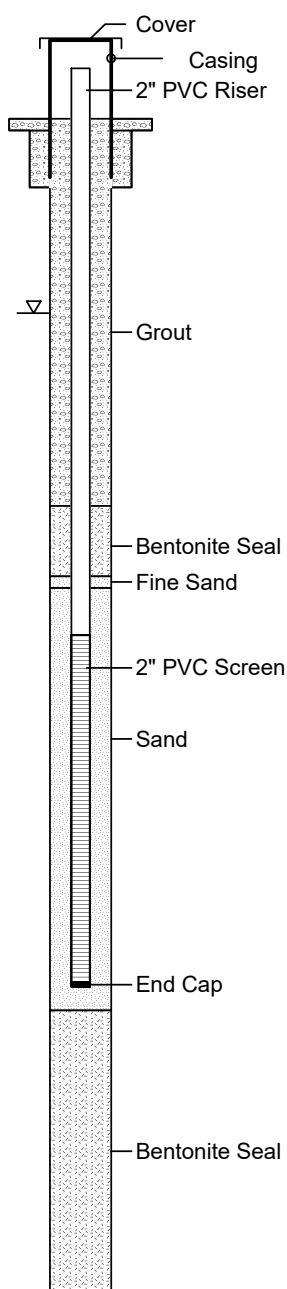
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replagel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 562836.85
Easting (ft) : 1454628.12
Date/Time Started : 4/23/19 0800
Date/Time Completed : 4/23/19 1130
Surf. Elev. (ft AMSL) : 9.59
TOC Elev. (ft AMSL) : 11.65
Total Well Depth (ft) : 37' bgs
Depth to Water (ft) : 0 Hr: 11.24' TOC
Depth to Water (ft) : 48 hr: 11.04' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COR-MWI

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS		COMPLETION DETAILS
0		6.6 3.0 1.0 12.2 13.8	(0-26') SLAG, SAND and GRAVEL-sized, with SILT, loose, dark brown grading to gray/black with light gray from 10-12' bgs, dry then wet at 10' bgs, non-plastic, non-cohesive	SW/GW		4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap
5	100	- 3.7 0.8 0.6 0.3				
10		35.3 35.6				
15	100	2.1 15.3 73.8 6.2				
20		1.1 10.9 77.6 203.6 1466 3303 3783 2402 2985				
25	100	- 1106 3416 3058				
30		317.1 34.3 134.9 2516 2713 708.3				
35	100	- 69.7 89.1 112.0 33.5				
40		19.6 152.7 128.6 95.4				
45	100	10.3 - 218.9 228.3 124.4 25.7				
50			End of boring			
			(26-30') SAND, very fine, dense, black, wet, non-plastic, non-cohesive	SP		Bentonite Seal: 3/8" chips Top: 16.5' bgs Bottom: 19.5' bgs
			(30-50') SAND, very fine, very dense, very pale brown to white grading to light brown at 46' bgs, wet, non-plastic, non-cohesive	SP		Sand Blotter: #1 Sand Top: 19.5' bgs Bottom: 20' bgs
						Filter Pack: #2 Sand Top: 20' bgs Bottom: 37' bgs
						Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 22' bgs Bottom: 37' bgs Total Screen: 15'

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/8/2019
Purged Amount: 20 gallons
Well Volumes Removed: 4.47



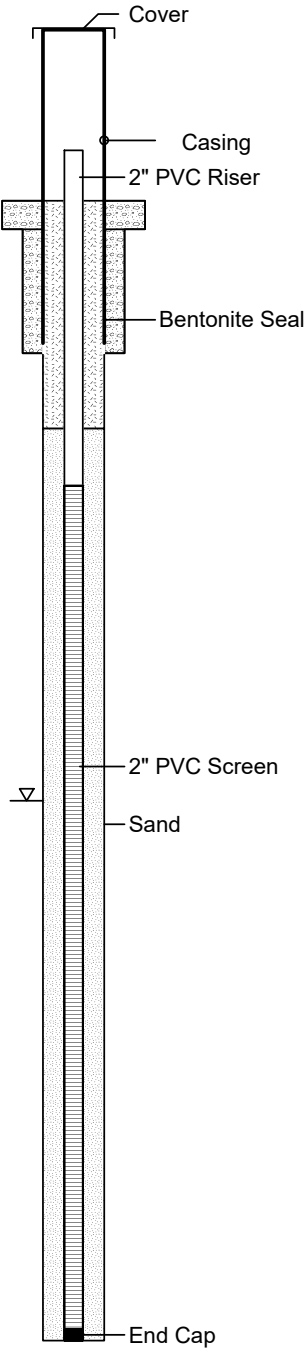
ARM Group Inc.
Engineers and Scientists

Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 562664.68
Easting (ft) : 1454530.10
Date/Time Started : 4/17/19 0730
Date/Time Completed : 4/17/19 0830
Surf. Elev. (ft AMSL) : 11.47
TOC Elev. (ft AMSL) : 14.43
Total Well Depth (ft) : 20' bgs
Depth to Water (ft) : 0 Hr: 13.50' TOC
Depth to Water (ft) : 48 hr: 13.28' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COS-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		0.2	(0-20') SLAG, SAND and GRAVEL-sized, loose, dark brown, moist then wet at 10.5' bgs, non-plastic, non-cohesive	SW/GW	 <p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.29'</p> <p>Wet at 10.5' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs</p> <p>Filter Pack: #2 Sand Top: 4' bgs Bottom: 20' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 20' bgs Total Screen: 15'</p>
		0.0			
		4.3			
		0.9			
		11.4			
5	100	-			
		0.6			
		3.6			
		2.8			
		0.0			
10		0.1			
		3.6			
		1.0			
		4.5			
		33.7			
15	100	-			
		17.8			
		4.8			
		85.3			
20		2532			
			End of boring		

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/2/2019
Purged Amount: 14 gallons
Well Volumes Removed: 8.92



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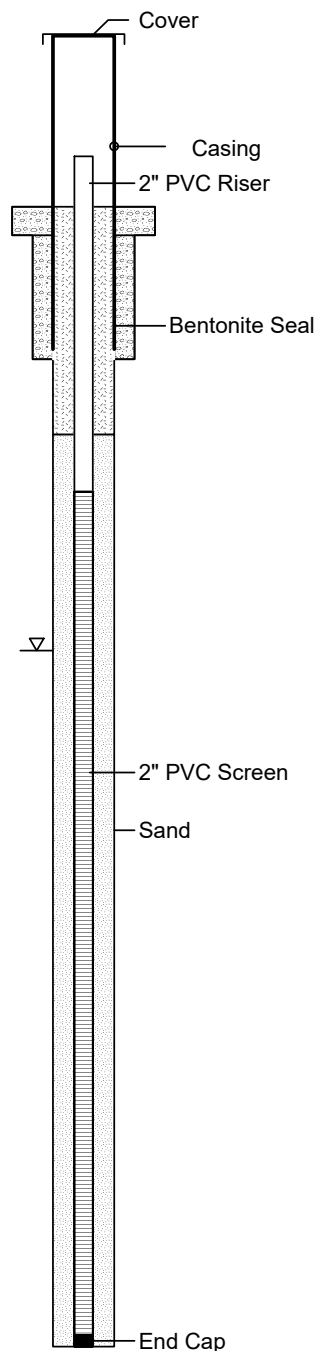
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 562911.80
Easting (ft) : 1455128.85
Date/Time Started : 4/23/19 1250
Date/Time Completed : 4/23/19 1420
Surf. Elev. (ft AMSL) : 9.39
TOC Elev. (ft AMSL) : 11.74
Total Well Depth (ft) : 20' bgs
Depth to Water (ft) : 0 Hr: 10.42' TOC
Depth to Water (ft) : 48 hr: 10.54' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COT-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		29.5	(0-20') SLAG, SAND and GRAVEL-sized, medium dense, dark brown then light gray 18-20' bgs, dry then wet at 11.5' bgs, non-plastic, non-cohesive		4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap
5		25.8			Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.07'
10		35.7		SW/GW	Wet at 11.5' bgs
15		50.2			Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs
20		-	End of boring		Product sheen in core 13-15' bgs
		-			Filter Pack: #2 Sand Top: 4' bgs Bottom: 20' bgs
		-			Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 20' bgs Total Screen: 15'
		-			End Cap



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/3/2019
Purged Amount: 10 gallons
Well Volumes Removed: 4.98



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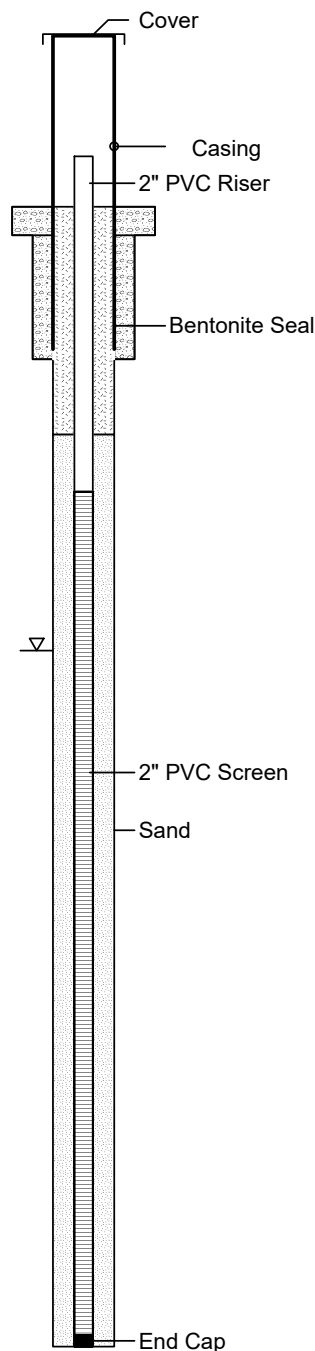
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 562820.60
Easting (ft) : 1455382.44
Date/Time Started : 4/23/19 1430
Date/Time Completed : 4/23/19 1630
Surf. Elev. (ft AMSL) : 11.64
TOC Elev. (ft AMSL) : 14.48
Total Well Depth (ft) : 20' bgs
Depth to Water (ft) : 0 Hr: 13.16' TOC
Depth to Water (ft) : 48 hr: 13.34' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COU-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		24.1	(0-4') SILT with SLAG, loose, dark brown, dry, non-plastic, non-cohesive	ML	4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 3.08' Wet at 10' bgs Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs Product sheen in core 12-20' bgs
100		10.1			
		9.3			
		2669			
5		1524	(4-5') CLAY, hard, gray, dry, low plasticity, cohesive	CL	
		3.8	(5-10') SILT with SLAG, loose, dark brown, moist then wet at 10' bgs, non-plastic, non-cohesive	ML	
		3.7			
		4.1			
		1.3			
10		69.4			
		1192	(10-20') SLAG, SAND and GRAVEL-sized, medium dense, black, wet, non-plastic, non-cohesive	SW/GW	
		1776			
		2092			
		608.7			
15	100	8386			
		-			
		4041			
		3838			
		7897			
		980.2			
20			End of boring		



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/3/2019
Purged Amount: 20 gallons
Well Volumes Removed: 11.63



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Engineers and Scientists

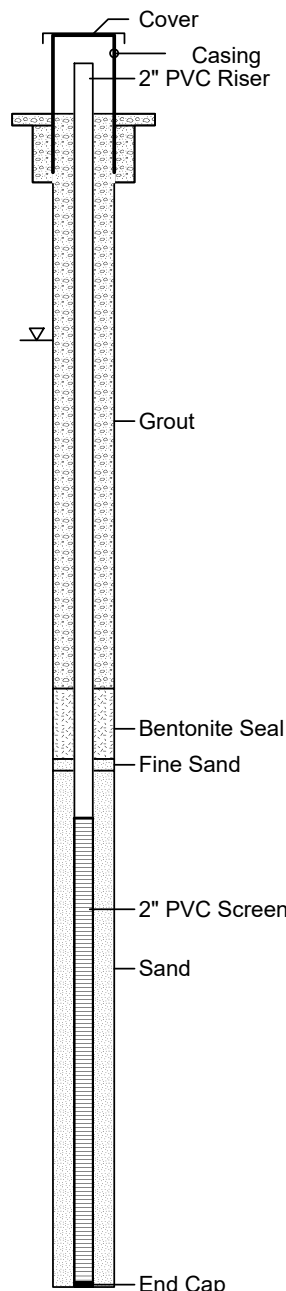
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 562760.83
Easting (ft) : 1455004.68
Date/Time Started : 4/16/19 1300
Date/Time Completed : 4/16/19 1545
Surf. Elev. (ft AMSL) : 10.36
TOC Elev. (ft AMSL) : 12.20
Total Well Depth (ft) : 50' bgs
Depth to Water (ft) : 0 Hr: 16.31' TOC
Depth to Water (ft) : 48 hr: 12.41' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COV-MWI

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		20.5	(0-10.5') SLAG, SAND and GRAVEL-sized, loose, dark brown grading to black, dry then wet at 9.5' bgs, non-plastic, non-cohesive	SW/GW	4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap
5	100	7.7 13.4 7.2 22.2 -			Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.09'
10		32.9 43.0 12.5 24.7	(10.5-19') SAND, very fine, very dense, black, wet, non-plastic, non-cohesive	SP	Grout: Portland w/ 5% Bentonite Top: 0' bgs Bottom: 24.5' bgs
15	100	101.2 148.5 764.5 5900 15000 -			Wet at 9.5' bgs
20		15000 15000 15000	(19-20') CLAY, soft, black, moist, low plasticity, cohesive	CL	Product Sheen in core 10-19' bgs
25	100	80.3 27.4 275.6 2619 -	(20-39') SAND, very fine, very dense, dark gray and yellow (20-27' bgs), red to brownish red (27-31' bgs), brown and yellow (31-38' bgs), very light red (38-38.5' bgs), pale brown to white (38.5-39' bgs), wet, non-plastic, non-cohesive	SW	Bentonite Seal: 3/8" chips Top: 24.5' bgs Bottom: 27.5' bgs
30		61.1 1962 7784 2350			Sand Blotter: #1 Sand Top: 27.5' bgs Bottom: 28' bgs
35	100	- -			2" PVC Screen
40		139.1 387.3 -	(39-50') CLAYEY SAND, very fine, very dense, white to light gray, wet, non-plastic, non-cohesive	SC	Sand Filter Pack: #2 Sand Top: 28' bgs Bottom: 50' bgs
45	100	99.6 1891 1761 2122 -			Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 30' bgs Bottom: 50' bgs Total Screen: 20'
50		2472 174.1 2100 3563			End Cap
			End of boring		



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/2/2019
Purged Amount: 60 gallons
Well Volumes Removed: 9.68



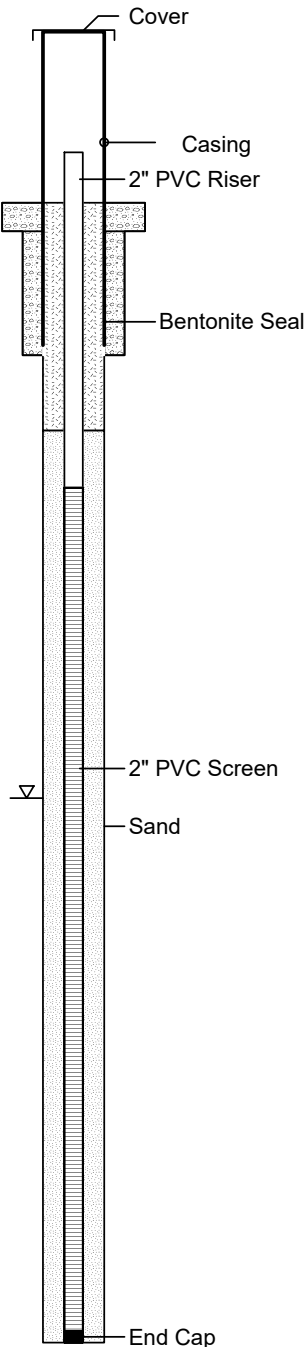
ARM Group Inc.
Engineers and Scientists

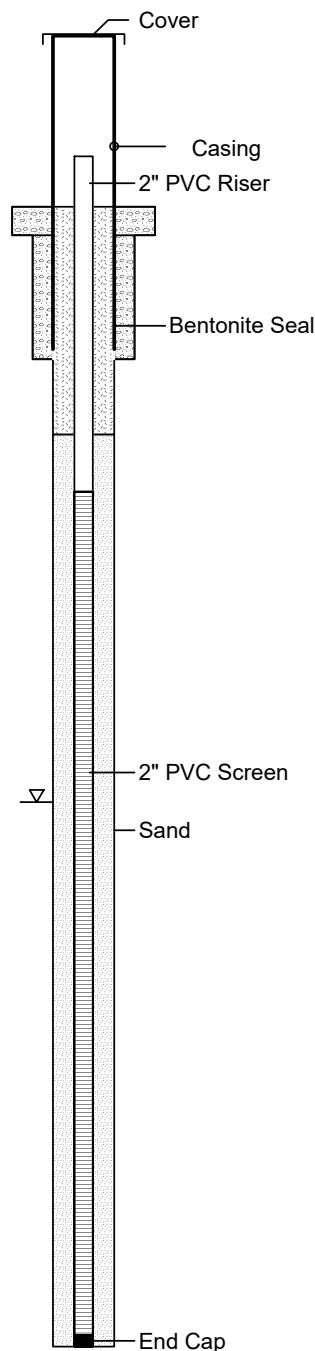
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 562667.55
Easting (ft) : 1455015.35
Date/Time Started : 4/16/19 1120
Date/Time Completed : 4/16/19 1145
Surf. Elev. (ft AMSL) : 11.75
TOC Elev. (ft AMSL) : 13.97
Total Well Depth (ft) : 20' bgs
Depth to Water (ft) : 0 Hr: 13.13' TOC
Depth to Water (ft) : 48 hr: 13.20' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COW-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS	
0		12.2	(0-15.5') SLAG, SAND and GRAVEL-sized, loose, dark brown grading to black, dry then wet at 11' bgs, non-plastic, non-cohesive	SW/GW		4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.32' Wet at 11' bgs Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs Product sheen in core 14.5-15.5' bgs Filter Pack: #2 Sand Top: 4' bgs Bottom: 20' bgs Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 20' bgs Total Screen: 15'
		11.0				
		12.6				
		9.4				
		51.2				
5	100	-				
		7.3				
		17.4				
		7.3				
		32.9				
10		300.1	(15.5-20') SAND, fine, medium dense, black, wet, non-plastic, non-cohesive	SP		
		245.1				
		380.6				
		202.1				
		8389				
15	100	-				
		11954				
		267.3				
		79.9				
		2785				
20			End of boring			



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/2/2019
Purged Amount: 17 gallons
Well Volumes Removed: 10.97



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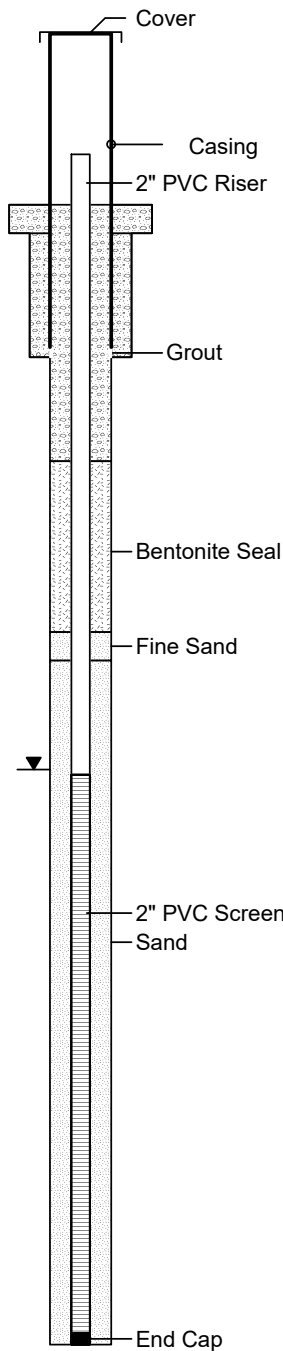
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 562623.23
Easting (ft) : 1455434.17
Date/Time Started : 4/16/19 0830
Date/Time Completed : 4/16/19 0910
Surf. Elev. (ft AMSL) : 12.18
TOC Elev. (ft AMSL) : 15.45
Total Well Depth (ft) : 20' bgs
Depth to Water (ft) : 0 Hr: 12.66' TOC
Depth to Water (ft) : 48 hr: Bubbling over
Bit/Auger Size (in.) : 4.25"

Well ID: COX-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		1.2	(0-14') SLAG, SAND and GRAVEL-sized, loose, dark brown grading to black, dry, moist at 9' bgs, then wet at 10' bgs, non-plastic, non-cohesive		
		0.0			
		2.7			
		0.0			
		0.9			
5	100	-			
		10.4			
		87.1		SW/GW	
		8.9			
		34.2			
10		2.9			
		1.7			
	100	9.4			
		77.3			
		10.4	(14-14.2') WOOD	NA	
15		45.1	(14.2-15') GRAVEL, loose, black, wet, non-plastic, non-cohesive	GW	
		216.7	(15-18.5') SAND, loose, black, wet, non-plastic, non-cohesive	SW	
	100	207.1			
		15000	(18.5-19') SAND, fine, medium dense, black, wet, non-plastic, non-cohesive	SP	
20		15000	(19-20') CLAYEY SAND, medium dense, black, wet, non-plastic, non-cohesive	SC	
			End of boring		



4" Protective Steel Casing with Locking Lid
2x2' concrete pad
2" expandable-type cap

Riser: Sch 40 PVC
Riser Diameter: 2 in
Riser Stickup (ags): 1.96'

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 4.5' bgs

Wet at 10' bgs

Bentonite Seal: 3/8" chips
Top: 4.5' bgs
Bottom: 7.5' bgs

Product odor in core 14-20' bgs with product in core from 14-15' bgs

Sand Blotter: #1 Sand
Top: 7.5' bgs
Bottom: 8' bgs

Filter Pack: #2 Sand
Top: 8' bgs
Bottom: 20' bgs

Screen: Sch 40 PVC
Screen Diameter: 2 in
Slot Size: 0.010"
Top: 10' bgs
Bottom: 20' bgs
Total Screen: 10'

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/2/2019
Purged Amount: 9 gallons
Well Volumes Removed: 5.56



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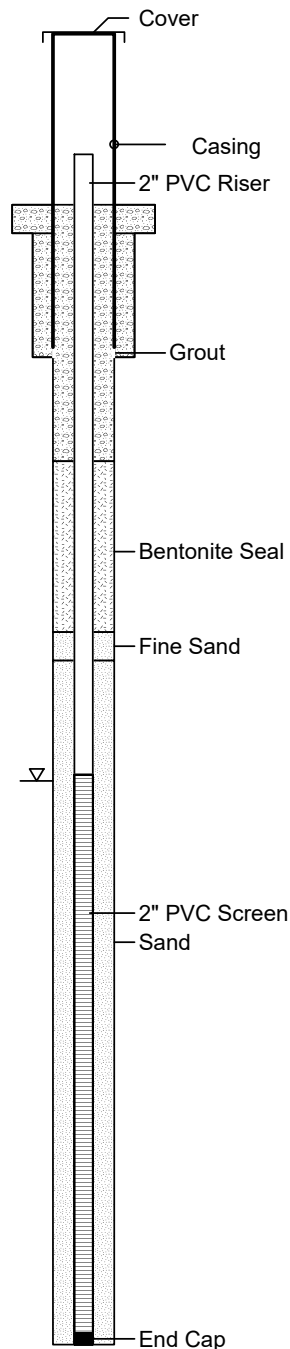
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 562392.83
Easting (ft) : 1455088.30
Date/Time Started : 4/16/19 1015
Date/Time Completed : 4/16/19 1100
Surf. Elev. (ft AMSL) : 11.49
TOC Elev. (ft AMSL) : 13.48
Total Well Depth (ft) : 20' bgs
Depth to Water (ft) : 0 Hr: 11.50' TOC
Depth to Water (ft) : 48 hr: 12.86' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COY-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		11.8	(0-20') SLAG, SAND and GRAVEL-sized, loose, dark brown grading to black, dry then wet at 10' bgs, non-plastic, non-cohesive	SW/GW	<p>4" Protective Steel Casing with Locking Lid 2x2' concrete pad 2" expandable-type cap</p> <p>Riser: Sch 40 PVC Riser Diameter: 2 in Riser Stickup (ags): 2.44'</p> <p>Wet at 10' bgs</p> <p>Bentonite Seal: 3/8" chips Top: 0' bgs Bottom: 4' bgs</p> <p>Filter Pack: #2 Sand Top: 4' bgs Bottom: 20' bgs</p> <p>Screen: Sch 40 PVC Screen Diameter: 2 in Slot Size: 0.010" Top: 5' bgs Bottom: 20' bgs Total Screen: 15'</p>
		4.0			
		92.8			
		16.1			
		130.2			
5	100	-			
		16.7			
		67.1			
		58.9			
		50.0			
10		7.2			
		8.9			
		4980			
		3428			
		6044			
15	100	-			
		123.7			
		223.5			
		375.1			
20		2373			
			End of boring		



TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 05/2/2019
Purged Amount: 23 gallons
Well Volumes Removed: 14.20



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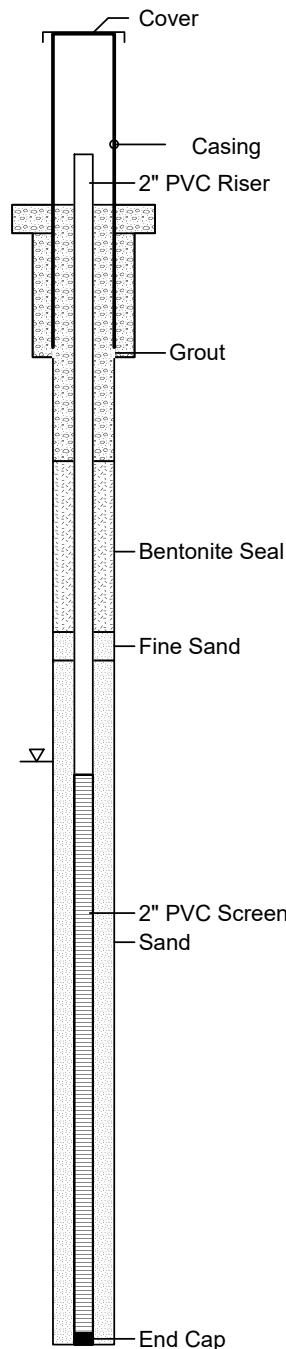
Project Name : COA Onshore Supp. Inv.
Project Number : 190342M-2
Client : EnviroAnalytics Group
Site : Sparrow's Point
Borehole Location : Cell 2
ARM Representative : L. Glumac
Checked by : M. Replogel, EIT
Drilling Company : Geologic Explorations
Driller : Kenny Sargent
Drilling Equipment : Sonic Rig 8140LS

Northing (ft) : 562421.66
Easting (ft) : 1455560.77
Date/Time Started : 4/16/19 0935
Date/Time Completed : 4/16/19 1000
Surf. Elev. (ft AMSL) : 11.88
TOC Elev. (ft AMSL) : 14.70
Total Well Depth (ft) : 20' bgs
Depth to Water (ft) : 0 Hr: 12.53' TOC
Depth to Water (ft) : 48 hr: 12.52' TOC
Bit/Auger Size (in.) : 4.25"

Well ID: COZ-MWS

(page 1 of 1)

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS	COMPLETION DETAILS
0		2.9	(0-15') SLAG, SAND and GRAVEL-sized, loose, dark brown grading to black, moist then wet at 10.5' bgs, non-plastic, non-cohesive		
		0.0			
		0.4			
		0.2			
5	100	1.5			
		-			
		0.2			
		0.3			
		1.1			
10		1.0		SW/GW	
		8.5			
		9.2			
		14.7			
		22.7			
15	100	194.5			
		-	(15-20') SAND, fine, medium dense, black, wet, non-plastic, non-cohesive		
		-			
		-		SP	
		83.8			
20		22.4			
			End of boring		



4" Protective Steel Casing with Locking Lid
2x2' concrete pad
2" expandable-type cap

Riser: Sch 40 PVC
Riser Diameter: 2 in
Riser Stickup (ags): 2.08'

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 4.5' bgs

Wet at 10.5' bgs

Bentonite Seal: 3/8" chips
Top: 4.5' bgs
Bottom: 7.5' bgs

Odor in core 15-20' bgs with product in core from 15-16' bgs

Sand Blotter: #1 Sand
Top: 7.5' bgs
Bottom: 8' bgs

Filter Pack: #2 Sand
Top: 8' bgs
Bottom: 20' bgs

Screen: Sch 40 PVC
Screen Diameter: 2 in
Slot Size: 0.010"
Top: 10' bgs
Bottom: 20' bgs
Total Screen: 10'

TOC - Top of PVC Casing
AMSL - Above Mean Sea Level
ags - above ground surface
bgs - below ground surface
W - weight of hammer

Monitoring Well Development
Date: 04/24/2019
Purged Amount: 18 gallons
Well Volumes Removed: 11.11

APPENDIX B

Well Development Logs



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COAA-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: 150-190342M

Date/Time Started: 4-25-19 / 0917

Developed by: TCV

Client: **EnviroAnalytics Group**

Date/Time Completed: 4-25-19 / 1006

Company: _____

Well Location: Area B, Parcel CO

Weather/Site Conditions: _____

cloudy 60's

Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>5</u> to <u>25</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-)	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>25.01</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>25.02</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>10.02</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>14.99</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.00</u> ft.	Wetted Bore Volume: (A x D) <u>2.44</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
<u>1</u>	<u>20-25</u>	<u>10</u>	<u>4.0</u>		<u>black</u>
<u>2</u>	<u>15-20</u>	<u>10</u>	<u>4.0</u>		<u>black</u>
<u>3</u>	<u>10-15</u>	<u>10</u>	<u>4.0</u>		<u>black</u>
<u>4</u>	<u>5-10</u>	<u>10</u>	<u>4.0</u>		<u>dark grey</u>
Cumulative Totals: (Minimum of 3 Well Volumes)			<u>16.0</u>		

Final Depth to Water (from TOC): 10.02 Final well depth: 25.04

Thickness of Any Sediment Remaining in Well: 0.00

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: LOA-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342-M</u>	Date/Time Started: <u>5-7-19</u> / <u>1207</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-7-19</u> / <u>1300</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stik-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>23</u> to <u>38</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: ($\oplus/-$) <u>2.77</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>38.52</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>37.67</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>14.93</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>22.74</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.45</u> ft.	Wetted Well Volume: (A x D) <u>3.71</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	33-38	10	5		dark grey, VOC odor
2	28-33	10	5		dark grey, VOC odor
3	23-28	10	5		dark grey, VOC odor
Cumulative Totals: (Minimum of 3 Well Volumes)			15		

Final Depth to Water (from TOC): 14.95

Final Total Well Depth (from TOC): 37.81

Thickness of Any Sediment Remaining in Well: 0.71

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COBB-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: 150-190342-M	Date/Time Started: <u>4-25-11</u> / 1020	Developed by: <u>TCV</u>
Client: EnviroAnalytics Group	Date/Time Completed: <u>4-25-11</u> / 1116	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>cloudy 60's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>8</u> to <u>28</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(F -) 2.69</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>28.08</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: 2.0 in.	Well Total Depth (TOC): <u>27.56</u> ft. (B)
Well (PVC) Volume: 0.163 gal./ft. (A)	Depth to Static Water Level (TOC): <u>15.46</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>12.10</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.52</u> ft.	Wetted Bore Volume: (A x D) <u>1.97</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	23-24	10	4.0		black
2	14-23	10	4.0		black
3	13-14	10	4.0		black
4	8-13	10	4.0		black
Cumulative Totals: (Minimum of 3 Well Volumes)			16.0		

Final Depth to Water (from TOC): 15.46 Final well depth: 27.71

Thickness of Any Sediment Remaining in Well: 0.37

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COB-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-7-19</u> / <u>1023</u>	Developed by: <u>TCV</u>
Client: EnviroAnalytics Group	Date/Time Completed: <u>5-7-19</u> / <u>1102</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>10</u> to <u>25</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(F/-) 2.86</u> *	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>25.30</u> *

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>25.00</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>13.49</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>11.51</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.30</u> ft.	Wetted Well Volume: (A x D) <u>1.88</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	20-25	10	4		brownish grey
2	15-20	10	3		grey
3	10-15	10	3		grey
Cumulative Totals: (Minimum of 3 Well Volumes)			10		

Final Depth to Water (from TOC): 13.49

* Final Total Well Depth (from TOC): 25.00

Thickness of Any Sediment Remaining in Well: 0.30

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: C0CC-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>150-190342M</u>	Date/Time Started: <u>4-25-19 / 1127</u>	Developed by: <u>TCV</u>
Client: EnviroAnalytics Group	Date/Time Completed: <u>4-25-19 / 1232</u>	Company: _____
Well Location: <u>Area B, Parcel C0</u>	Weather/Site Conditions: <u>Cloudy 60's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>8</u> to <u>28</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(+/-) 1.98</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>28.96</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>28.47</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>15.27</u> ft. (C)
Petroleum/Product Present? <u>Y or N.</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>13.20</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.49</u> ft.	Wetted Bore Volume: (A x D) <u>2.15</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	23-24	10	6.0		black
2	14-23	10	6.0		black
3	13-14	10	6.0		black
4	6-13	10	5.0		black
Cumulative Totals: (Minimum of 3 Well Volumes)			23.0		

Final Depth to Water (from TOC): 15.27 Final well depth: 28.53

Thickness of Any Sediment Remaining in Well: 0.43

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COC - MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-7-19</u> / <u>1107</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-7-19</u> / <u>1156</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>24</u> to <u>39</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (<u>5</u> / -) <u>2.91</u> *	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>39.09</u> *

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>38.48</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>13.58</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>24.90</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.61</u> ft.	Wetted Well Volume: (A x D) <u>4.06</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	34-39	10	6		dark grey
2	29-34	10	5		dark grey
3	24-29	10	5		dark grey
Cumulative Totals: (Minimum of 3 Well Volumes)			16		

Final Depth to Water (from TOC): 13.62

Final Total Well Depth (from TOC): 38.48

Thickness of Any Sediment Remaining in Well: 0.61

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: 0000-MWS

Well Permit No.: _____

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ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-2-19</u> / <u>1352</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-2-19</u> / <u>1441</u>	Company: _____
Well Location: <u>Area B, Parcel 60</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>9</u> to <u>29</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (<u>6</u> / -) <u>3.81</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>28.92</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>28.53</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal./ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>13.66</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>13.87</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.39</u> ft.	Wetted Well Volume: (A x D) <u>2.26</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	24-29	10	5		dark grey, VOC odor
2	19-24	10	5		dark grey, VOC odor
3	14-19	10	5		dark grey, VOC odor
4	9-14	10	4		grey, VOC odor
Cumulative Totals: (Minimum of 3 Well Volumes)			19		

Final Depth to Water (from TOC): 13.67

Final Total Well Depth (from TOC): 28.40

Thickness of Any Sediment Remaining in Well: 0.12

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COD-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>150-190342M</u>	Date/Time Started: <u>4-22-19 / 1406</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>4-22-19 / 1520</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CD</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>20</u> to <u>30</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(+/-) 2.54</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>30.80</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>30.10</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>13.25</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>16.85</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.70</u> ft.	Wetted Bore Volume: (A x D) <u>2.74</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	25-30	10	8.0		dark grey
2	20-25	10	11.0		dark grey
Cumulative Totals: (Minimum of 3 Well Volumes)			19.0		

Final Depth to Water (from TOC): 13.34 Final well depth: 30.93

Thickness of Any Sediment Remaining in Well: 0.00

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COE-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342 M</u>	Date/Time Started: <u>5-6-19 / 1144</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-6-19 / 1223</u>	Company: _____
Well Location: <u>Area B, Parcel 10</u>	Weather/Site Conditions: <u>Sunny 60's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>13</u> to <u>28</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(+/-) 2.61</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>28.23</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>27.82</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>13.51</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>14.31</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.41</u> ft.	Wetted Well Volume: (A x D) <u>2.33</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	23-28	10	4		grey
2	18-23	10	3		grey
3	13-18	10	3		grey
Cumulative Totals: (Minimum of 3 Well Volumes)			10		

Final Depth to Water (from TOC): 13.51

Final Total Well Depth (from TOC): 27.84

Thickness of Any Sediment Remaining in Well: 0.39

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COFF-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: 150190342M

Date/Time Started: 4-25-19 / 1416

Developed by: TCV

Client: **EnviroAnalytics Group**

Date/Time Completed: 4-25-19 / 1502

Company: _____

Well Location: Area B, Parcel C0

Weather/Site Conditions: _____

cloudy 70's

Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>9</u> to <u>29</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: ($\oplus/-$) <u>3.03</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>29.11</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>29.11</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>14.09</u> ft. (C)
Petroleum/Product Present? <u>Y or N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>14.36</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.66</u> ft.	Wetted Bore Volume: (A x D) <u>2.34</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	<u>24-29</u>	<u>10</u>	<u>6.5</u>		<u>dark grey</u>
2	<u>19-24</u>	<u>10</u>	<u>5.5</u>		<u>dark grey</u>
3	<u>14-19</u>	<u>10</u>	<u>5.0</u>		<u>dark grey</u>
4	<u>9-14</u>	<u>10</u>	<u>5.0</u>		<u>dark grey</u>
Cumulative Totals: (Minimum of 3 Well Volumes)			<u>22.0</u>		

Final Depth to Water (from TOC): 14.09 Final well depth 29.77

Thickness of Any Sediment Remaining in Well: 0.34

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COF - MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: 190342.M

Date/Time Started: 5-7-19 / 0824

Developed by: TCV

Client: EnviroAnalytics Group

Date/Time Completed: 5-7-19 / 0908

Company: _____

Well Location: Area B, Parcel CO

Weather/Site Conditions:

Sunny 70's

Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>23</u> to <u>38</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: $(\oplus/-)$ <u>2.66</u> *	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>39.01</u> *

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>37.47</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal./ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>13.63</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>23.84</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>1.54</u> ft.	Wetted Well Volume: (A x D) <u>3.89</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	33-38	10	6		grey
2	29-33	10	5		grey
3	23-29	10	5		light grey
Cumulative Totals: (Minimum of 3 Well Volumes)			16		

Final Depth to Water (from TOC): 13.62

Final Total Well Depth (from TOC): 38.55

Thickness of Any Sediment Remaining in Well: 0.46

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COGG-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>150 190342M</u>	Date/Time Started: <u>4-25-19</u> / <u>1329</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>4-25-19</u> / <u>1411</u>	Company: _____
Well Location: <u>Area B, Parcel CO</u>	Weather/Site Conditions: <u>Cloudy 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>8</u> to <u>2.9</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(+/-) 2.31</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>28.23</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>27.70</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>12.36</u> ft. (C)
Petroleum/Product Present? <u>Y or N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>15.34</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.53</u> ft.	Wetted Bore Volume: (A x D) <u>2.50</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	23-28	10	4.5		dark grey
2	16-23	10	4.0		dark grey
3	13-16	10	4.0		dark grey
4	8-13	10	5.0		dark grey
Cumulative Totals: (Minimum of 3 Well Volumes)			17.5		

Final Depth to Water (from TOC): 12.47 Final well depth: 27.88

Thickness of Any Sediment Remaining in Well: 0.35

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COG-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-7-19</u> / <u>0737</u>	Developed by: <u>TCV</u>
Client: EnviroAnalytics Group	Date/Time Completed: <u>5-7-19</u> / <u>0821</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>Sunny 60's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>23</u> to <u>38</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-)	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>38.16</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>37.74</u> ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal./ft. (4" PVC) (A)	Depth to Static Water Level (TOC): <u>13.03</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>24.71</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.42</u> ft.	Wetted Well Volume: (A x D) <u>4.03</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	33-34	10	6		brownish grey
2	24-33	10	5		brownish grey
3	23-24	10	5		brownish grey
Cumulative Totals: (Minimum of 3 Well Volumes)			16		

Final Depth to Water (from TOC): 13.07

Final Total Well Depth (from TOC): 37.79

Thickness of Any Sediment Remaining in Well: 0.37

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COH-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-6-19</u> / <u>1411</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-6-19</u> / <u>1500</u>	Company: _____
Well Location: <u>Area B, Parcel 10</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>24</u> to <u>39</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (<u>0</u> / -) <u>2.11</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>38.12</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>39.08</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>13.48</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>25.60</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.00</u> ft.	Wetted Well Volume: (A x D) <u>4.17</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	34-39	10	6		greyish brown
2	29-34	10	6		brown
3	24-29	10	6		brown
Cumulative Totals: (Minimum of 3 Well Volumes)			20		

Final Depth to Water (from TOC): 13.53

Final Total Well Depth (from TOC): 39.09

Thickness of Any Sediment Remaining in Well: 0.00

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COI-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-6-19</u> / <u>1314</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-6-19</u> / <u>1358</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>Sunny 70s</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>26</u> to <u>36</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+ / -)	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>35.92</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>35.73</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal./ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>12.94</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>22.81</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.19</u> ft.	Wetted Well Volume: (A x D) <u>3.72</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	31-36	10	7		brownish grey
2	26-31	10	7		
Cumulative Totals: (Minimum of 3 Well Volumes)			14		

Final Depth to Water (from TOC): 12.97

Final Total Well Depth (from TOC): 35.80

Thickness of Any Sediment Remaining in Well: 0.12

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COJ - MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342</u>	Date/Time Started: <u>5-6-19 / 1230</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-6-19 / 1309</u>	Company: _____
Well Location: <u>Area B, Parcel C0</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>13</u> to <u>28</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(6/-) 3.64 *</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>28.4 *</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>27.95</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>13.40</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>(N)</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>14.55</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.45</u> ft.	Wetted Well Volume: (A x D) <u>2.37</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	23-28	10	4		dark grey
2	18-23	10	4		dark grey
3	13-18	10	4		dark grey
Cumulative Totals: (Minimum of 3 Well Volumes)			12		

Final Depth to Water (from TOC): 13.41

Final Total Well Depth (from TOC): 27.95

Thickness of Any Sediment Remaining in Well: 0.45

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COK-MWI

Well Permit No.: _____

Page 1 of 2

ARM Project No.: 150-190342

Date/Time Started: 4-24-19 / 0839

Developed by: TCV

Client: **EnviroAnalytics Group**

Date/Time Completed: 4-24-19 / 1016

Company: _____

Well Location: Area B, Parcel 60

Weather/Site Conditions: _____

Sunny 60's

Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>32</u> to <u>52</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(+/-) 2.39</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>52.15</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>51.19</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>8.28</u> ft. (C)
Petroleum/Product Present? <u>Y or N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>42.91</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.96</u> ft.	Wetted Bore Volume: (A x D) <u>6.99</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	<u>47-52</u>	<u>10</u>	<u>4.0</u>		<u>dark grey</u>
2	<u>42-47</u>	<u>10</u>	<u>11.0</u>		<u>dark grey</u>
3	<u>37-42</u>	<u>10</u>	<u>8.0</u>		<u>dark grey</u>
4	<u>32-37</u>	<u>10</u>	<u>6.0</u>		<u>grey</u>
Cumulative Totals: (Minimum of 3 Well Volumes)			<u>36.0</u>		

Final Depth to Water (from TOC): 8.54 Final well depth: 51.42

Thickness of Any Sediment Remaining in Well: 0.73

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COK-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>150-190342M</u>	Date/Time Started: <u>4-24-19 / 1019</u>	Developed by: <u>TCV</u>
Client: EnviroAnalytics Group	Date/Time Completed: <u>4-24-19 / 1049</u>	Company: _____
Well Location: Area <u>15</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>Sunny 60's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>7</u> to <u>17</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: $(+/-)$ <u>2.79</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>17.57</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>17.14</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>5.90</u> ft. (C)
Petroleum/Product Present? <u>Y or N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>11.24</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.73</u> ft.	Wetted Bore Volume: (A x D) <u>1.83</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	12 - 17	10	3.0		dark grey
2	7 - 12	10	4.0		dark grey
Cumulative Totals: (Minimum of 3 Well Volumes)			7.0		

Final Depth to Water (from TOC): 5.87 Final well depth: 17.25

Thickness of Any Sediment Remaining in Well: 0.64

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COL-MWT

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>150190342/M</u>	Date/Time Started: <u>4-23-19 / 0918</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>4-23-19 / 1055</u>	Company: _____
Well Location: <u>Area B, Parcel CD</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>33</u> to <u>53</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(+/-) 2.86</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>53.23</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>52.71</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>8.96</u> ft. (C)
Petroleum/Product Present? <u>Y or N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>43.75</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.52</u> ft.	Wetted Bore Volume: (A x D) <u>7.13</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	48 - 53	10	7.0		grey
2	43 - 48	10	8.0		grey
3	38 - 43	10	8.0		grey
4	33 - 38	10	10.0		grey
Cumulative Totals: (Minimum of 3 Well Volumes)			33.0		

Final Depth to Water (from TOC): 9.15 Final well depth: 52.80

Thickness of Any Sediment Remaining in Well: 0.43

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COL-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>450-190342</u>	Date/Time Started: <u>4-23-19 / 0748</u>	Developed by: <u>TCV</u>
Client: EnviroAnalytics Group	Date/Time Completed: <u>4-23-19 / 0830</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>Sunny 70</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>8</u> to <u>18</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) <u>2.72</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>17.81</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: 2.0 in.	Well Total Depth (TOC): <u>17.73</u> ft. (B)
Well (PVC) Volume: 0.163 gal./ft. (A)	Depth to Static Water Level (TOC): <u>6.98</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>10.75</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.08</u> ft.	Wetted Bore Volume: (A x D) <u>1.75</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" Surge Block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	13-18	10	8.0		dark grey
2	8-13	10	10.0		dark grey
Cumulative Totals: (Minimum of 3 Well Volumes)			18.0		

Final Depth to Water (from TOC): 7.86 Final well depth: 17.82

Thickness of Any Sediment Remaining in Well: 0.00

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COM-MWI

Well Permit No.: _____

Page 1 of 2

ARM Project No.: 150190342M

Date/Time Started: 4-23-19 / 1257

Developed by: TCV

Client: EnviroAnalytics Group

Date/Time Completed: 4-23-19 / 1422

Company: _____

Well Location: Area B, Parcel 60

Weather/Site Conditions: _____

Checked by: _____

Sunny 70's

A. Well Construction Details

Well Cover Type: <u>Slick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>33</u> to <u>53</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: $(\oplus/-)$ <u>1.58</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>53.39</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: 2.0 in.	Well Total Depth (TOC): <u>52.77</u> ft. (B)
Well (PVC) Volume: 0.163 gal./ft. (A)	Depth to Static Water Level (TOC): <u>9.25</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>(N)</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>43.52</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.62</u> ft.	Wetted Bore Volume: (A x D) <u>7.09</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	<u>48-53</u>	<u>10</u>	<u>6.0</u>		<u>grey</u>
2	<u>43-48</u>	<u>10</u>	<u>7.0</u>		<u>grey</u>
3	<u>38-43</u>	<u>10</u>	<u>8.0</u>		<u>grey</u>
4	<u>33-38</u>	<u>10</u>	<u>10.0</u>		<u>grey</u>
Cumulative Totals: (Minimum of 3 Well Volumes)			<u>33.0</u>		

Final Depth to Water (from TOC): 9.22 Final well depth: 52.90

Thickness of Any Sediment Remaining in Well: 0.49

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COM-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>150-190342M</u>	Date/Time Started: <u>4-23-19 / 1206</u>	Developed by: <u>TCV</u>
Client: EnviroAnalytics Group	Date/Time Completed: <u>4-23-19 / 1244</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>C0</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>8</u> to <u>18</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(+/-) 2.38</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>17.91</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>17.48</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>7.14</u> ft. (C)
Petroleum/Product Present? <u>Y or N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>10.34</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.43</u> ft.	Wetted Bore Volume: (A x D) <u>1.69</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	13-16	10	7.0		dark grey
2	6-13	10	7.0		dark grey
Cumulative Totals: (Minimum of 3 Well Volumes)			14.0		

Final Depth to Water (from TOC): 7.42 Final well depth: 17.40

Thickness of Any Sediment Remaining in Well: 0.11

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: CON-MWI

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>150 190342M</u>	Date/Time Started: <u>4-24-19 / 1109</u>	Developed by: <u>TCV</u>
Client: EnviroAnalytics Group	Date/Time Completed: <u>4-24-19 / 1218</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>Sunny 60's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>33</u> to <u>53</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(F/-) 2.14</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>53.52</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>52.66</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>11.23</u> ft. (C)
Petroleum/Product Present? <u>Y or (N)</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>41.43</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.86</u> ft.	Wetted Bore Volume: (A x D) <u>6.75</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	48-53	10	6.0		dark grey
2	43-48	10	6.0		grey
3	38-43	10	5.0		grey
4	33-38	10	5.0		light grey
Cumulative Totals: (Minimum of 3 Well Volumes)			22.0		

Final Depth to Water (from TOC): 11.20 Final well depth: 52.84

Thickness of Any Sediment Remaining in Well: 0.68

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: CON - MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>150 190342 M</u>	Date/Time Started: <u>4-24-19 / 1228</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>4-24-19 / 1304</u>	Company: _____
Well Location: <u>Area B, Parcel COA</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>8</u> to <u>18</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(8' -) 2.10</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>17.81</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>17.69</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>11.22</u> ft. (C)
Petroleum/Product Present? <u>Y or N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>6.47</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.12</u> ft.	Wetted Bore Volume: (A x D) <u>1.05</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	13 - 14	10	12.0		dark grey
2	8 - 13	10	7.0		dark grey
Cumulative Totals: (Minimum of 3 Well Volumes)			19.0		

Final Depth to Water (from TOC): 11.25 Final well depth: 17.78

Thickness of Any Sediment Remaining in Well: 0.03

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COO-MW-1

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>150190342/M</u>	Date/Time Started: <u>4-25-19 / 0732</u>	Developed by: <u>TCV</u>
Client: EnviroAnalytics Group	Date/Time Completed: <u>4-25-19 / 0852</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>cloudy 50's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>33</u> to <u>53</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(+/-) 1.62</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>53.21</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>53.30</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>12.43</u> ft. (C)
Petroleum/Product Present? <u>Y or N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>40.87</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.00</u> ft.	Wetted Bore Volume: (A x D) <u>6.66</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	48 - 53	10	6.0		grey
2	43 - 48	10	6.0		light grey
3	38 - 43	10	5.0		light grey
4	33 - 38	10	5.0		light grey
Cumulative Totals: (Minimum of 3 Well Volumes)			22.0		

Final Depth to Water (from TOC): 12.42 Final well depth 53.58

Thickness of Any Sediment Remaining in Well: 0.00

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COO-mw5

Well Permit No.: _____

Page 1 of 2

ARM Project No.: 190342.M

Date/Time Started: 4/15/19 / 1300

Developed by: TCV

Client: **EnviroAnalytics Group**

Date/Time Completed: 4/15/19 / 1400

Company: _____

Well Location: Area B, Parcel CO

Weather/Site Conditions:

Cloudy 50°

Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <i>Flush-Mount</i>	PVC Screen Interval: <u>5</u> to <u>15</u>
Well riser/screen material: <i>PVC</i>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-)	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>17.85</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2</u>	Total Well Depth (TOC): <u>17.58</u> ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal./ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>12.16</u> ft. (C)
Petroleum/Product Present? <i>Y</i> or <u>(N)</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>5.42</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.27</u> ft.	Wetted Well Volume: (A x D) <u>0.88</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	<u>14.67 - 18</u>	<u>10</u>	<u>~3</u>		<u>dark brown / VOC odor</u>
2	<u>11.33 - 14.67</u>	<u>10</u>	<u>~4</u>		<u>dark brown / VOC odor</u>
3	<u>8 - 11.33</u>	<u>10</u>	<u>~8</u>		<u>dark brown / VOC odor</u>
Cumulative Totals: (Minimum of 3 Well Volumes)			<u>~17</u>		

Final Depth to Water (from TOC): 12.16'

Final Total Well Depth (from TOC): 17.85'

Thickness of Any Sediment Remaining in Well: 0.00

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COP-MWI

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-3-19</u> / <u>0729</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-3-19</u> / <u>0845</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>C0</u>	Weather/Site Conditions: <u>Drizzle 60's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>34</u> to <u>54</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(6/-)</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>53.98</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>53.54</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>9.34</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>44.2</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.44</u> ft.	Wetted Well Volume: (A x D) <u>7.20</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	49 - 54	10	4		brown, VOC odor
2	44 - 49	10	8		brown, VOC odor
3	39 - 44	10	8		brown, VOC odor
4	34 - 39	10	9		brown, VOC odor
Cumulative Totals: (Minimum of 3 Well Volumes)			34		

Final Depth to Water (from TOC): 9.50

Final Total Well Depth (from TOC): 53.63

Thickness of Any Sediment Remaining in Well: 0.35

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COQ-MWI

Well Permit No.: _____

Page 1 of 2

ARM Project No.: 190342M

Date/Time Started: 5-3-19 / 08:18

Developed by: JCV

Client: EnviroAnalytics Group

Date/Time Completed: 5-3-19 / 1008

Company: _____

Well Location: Area B, Parcel CO

Weather/Site Conditions: _____

Cloudy 60's

Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>33</u> to <u>53</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(+/-) 3.57</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>53.16</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>52.42</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>7.20</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>45.22</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.71</u> ft.	Wetted Well Volume: (A x D) <u>7.38</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	<u>48-53</u>	<u>10</u>	<u>11</u>		<u>grey, VOC odor</u>
2	<u>43-48</u>	<u>10</u>	<u>10</u>		<u>grey, VOC odor</u>
3	<u>38-43</u>	<u>10</u>	<u>10</u>		<u>grey, VOC odor</u>
4	<u>33-38</u>	<u>10</u>	<u>11</u>		<u>grey, VOC odor</u>
Cumulative Totals: (Minimum of 3 Well Volumes)			<u>42</u>		

Final Depth to Water (from TOC): 7.22

Final Total Well Depth (from TOC): 52.64

Thickness of Any Sediment Remaining in Well: 0.51

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COR-MWI

Well Permit No.: _____

Page 1 of 2

ARM Project No.: 190342M
Client: **EnviroAnalytics Group**
Well Location: Area B, Parcel C9

Date/Time Started: 5-8-19 / 0735
Date/Time Completed: 5-8-19 / 0900
Weather/Site Conditions:
cloudy 60's

Developed by: TCV
Company: _____
Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: _____ to _____
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (<u>3</u> / -) <u>2.21</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>39.04</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>38.56</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal./ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>11.15</u> ft. (C)
Petroleum/Product Present? (<u>Y</u>) or <u>N</u> . Thickness (ft.): <u>~1.5</u>	Height of Water Column: (B - C) <u>27.41</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.44</u> ft.	Wetted Well Volume: (A x D) <u>4.47</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1		10	5		grey / DNAPL
2		10	5		brownish grey
3		10	5		brownish grey
4		10	5		
Cumulative Totals: (Minimum of 3 Well Volumes)			20		

Final Depth to Water (from TOC): 11.18

Final Total Well Depth (from TOC): 38.60

Thickness of Any Sediment Remaining in Well: 0.44

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COS-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: 190342M

Date/Time Started: 5-2-19 / 1305

Developed by: TCV

Client: EnviroAnalytics Group

Date/Time Completed: 5-2-19 / 1342

Company: _____

Well Location: Area B, Parcel CO

Weather/Site Conditions:

Sunny 70's

Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>9</u> to <u>24</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+ / -)	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>23.06</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>23.71</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal./ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>14.07</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>9.64</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.00</u> ft.	Wetted Well Volume: (A x D) <u>1.57</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	19-24	10	5		dark grey, VOC odor
2	14-19	10	5		dark grey, VOC odor
3	9-14	10	4		dark grey, VOC odor
Cumulative Totals: (Minimum of 3 Well Volumes)			14		

Final Depth to Water (from TOC): 14.08

Final Total Well Depth (from TOC): 23.72

Thickness of Any Sediment Remaining in Well: 0.00

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COT-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-3-19</u> / <u>1019</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-3-19</u> / <u>1051</u>	Company: _____
Well Location: <u>Area B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>cloudy 60's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>7</u> to <u>22</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+ / -)	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>22.08</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>23.40</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>11.05</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>12.35</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.00</u> ft.	Wetted Well Volume: (A x D) <u>2.01</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	17-22	10	3		light grey
2	12-17	10	4		dark grey
3	7-12	10	3		
Cumulative Totals: (Minimum of 3 Well Volumes)			10		

Final Depth to Water (from TOC): 11.05

Final Total Well Depth (from TOC): 23.40

Thickness of Any Sediment Remaining in Well: 0.00

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COU-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-3-19</u> / <u>1059</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-3-19</u> / <u>1141</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>cloudy 60's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>9</u> to <u>24</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(8' -) 3.08 *</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>23.29 *</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>23.95</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal./ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>13.40</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>(X)</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>10.55</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.00</u> ft.	Wetted Well Volume: (A x D) <u>1.72</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	19-24	10	7		black, VOC odor
2	14-19	10	6		black, VOC odor
3	9-14	10	7		black, VOC odor
Cumulative Totals: (Minimum of 3 Well Volumes)			20		

Final Depth to Water (from TOC): 13.41

Final Total Well Depth (from TOC): 24.12

Thickness of Any Sediment Remaining in Well: 0.00

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COV-MWT

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-2-19</u> / <u>10:41</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-2-19</u> / <u>09:38</u>	Company: _____
Well Location: <u>Area B, Parcel CO</u>	Weather/Site Conditions: <u>cloudy 60's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>31</u> to <u>51</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(6' -) 2.09</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>53.02</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>50.41</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>12.36</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>38.05</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>2.61</u> ft.	Wetted Well Volume: (A x D) <u>6.20</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	46 - 51	10	15		light brown
2	41 - 46	10	16		light brown
3	36 - 41	10	14		light brown
4	31 - 36	10	15		light brown
Cumulative Totals: (Minimum of 3 Well Volumes)			60		

Final Depth to Water (from TOC): 12.44

Final Total Well Depth (from TOC): 52.25

Thickness of Any Sediment Remaining in Well: 0.77

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COW-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-2-19</u> / <u>1140</u>	Developed by: <u>TCV</u>
Client: EnviroAnalytics Group	Date/Time Completed: <u>5-2-19</u> / <u>1224</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>C0</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>8</u> to <u>23</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (\oplus / -) <u>2.32</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>22.46</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>22.79</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>13.14</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>9.51</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.26</u> ft.	Wetted Well Volume: (A x D) <u>1.55</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	18-23	10	6		black, VOC odor
2	13-14	10	5		black, VOC odor
3	8-13	10	6		dark grey, VOC odor
Cumulative Totals: (Minimum of 3 Well Volumes)			17		

Final Depth to Water (from TOC): 13.14

Final Total Well Depth (from TOC): 22.77

Thickness of Any Sediment Remaining in Well: 0.19

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COX-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-2-19</u> / <u>1229</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-2-19</u> / <u>1300</u>	Company: _____
Well Location: <u>Area B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>14</u> to <u>24</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+ / -)	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>22.91</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>24.33</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>14.40</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>N</u> Thickness (ft.): <u>1</u>	Height of Water Column: (B - C) <u>9.93</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.00</u> ft.	Wetted Well Volume: (A x D) <u>1.62</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	14-24	10	5		black, VOC odor
2	14-19	10	4		black, VOC odor
Cumulative Totals: (Minimum of 3 Well Volumes)			9		

Final Depth to Water (from TOC): 14.40

Final Total Well Depth (from TOC): 24.33

Thickness of Any Sediment Remaining in Well: 0.00

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: CDY-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>190342M</u>	Date/Time Started: <u>5-2-19</u> / <u>1034</u>	Developed by: <u>TCV</u>
Client: <u>EnviroAnalytics Group</u>	Date/Time Completed: <u>5-2-19</u> / <u>1127</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>7</u> to <u>22</u>
Well riser/screen material: <u>PVC</u>	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(+/-) 2.44</u>	Measured Total Depth of Well When Installed (TOC) (F): _____ ft. (See Original Well Construction Diagram) <u>22.64</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): <u>2.0</u>	Total Well Depth (TOC): <u>22.31</u> ft. (B)
Well Volume: <u>0.163</u> gal./ft. (2" PVC) or 0.652 gal./ft (4" PVC) (A)	Depth to Static Water Level (TOC): <u>12.40</u> ft. (C)
Petroleum/Product Present? <u>Y</u> or <u>(N)</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>9.91</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.53</u> ft.	Wetted Well Volume: (A x D) <u>1.62</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	17 - 22	10	7		black, VOC odor
2	12 - 17	10	7		dark gray, VOC odor
3	7 - 12	10	9		dark gray, VOC odor
Cumulative Totals: (Minimum of 3 Well Volumes)			23		

Final Depth to Water (from TOC): 12.70

Final Total Well Depth (from TOC): 22.62

Thickness of Any Sediment Remaining in Well: 0.22

All depths reported are from reference notch in top of TOC.



ARM Group Inc.

Earth Resource Engineers and Consultants

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: COZ-MWS

Well Permit No.: _____

Page 1 of 2

ARM Project No.: <u>150190342M</u>	Date/Time Started: <u>4-24-19 / 1455</u>	Developed by: <u>JCV</u>
Client: EnviroAnalytics Group	Date/Time Completed: <u>4-24-19 / 1533</u>	Company: _____
Well Location: Area <u>B</u> , Parcel <u>CO</u>	Weather/Site Conditions: <u>Sunny 70's</u>	Checked by: _____

A. Well Construction Details

Well Cover Type: <u>Stick-up</u> or <u>Flush-Mount</u>	PVC Screen Interval: <u>12</u> to <u>22</u>
Well riser/screen material: <u>PVC</u>	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: <u>(+/-) 2.08</u>	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) <u>22.92</u>

B. Wetted Bore Volume Determination

Well (PVC) Diameter: <u>2.0 in.</u>	Well Total Depth (TOC): <u>22.55</u> ft. (B)
Well (PVC) Volume: <u>0.163 gal./ft. (A)</u>	Depth to Static Water Level (TOC): <u>12.64</u> ft. (C)
Petroleum/Product Present? <u>Y or N</u> Thickness (ft.): _____	Height of Water Column: (B - C) <u>9.91</u> ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): <u>0.37</u> ft.	Wetted Bore Volume: (A x D) <u>1.62</u> gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 2" surge block

Event No.	Screen Interval (ft.)	No. of Surge Strokes	Volume of Water Removed (gal.)	Bore Volumes of Water Removed	Qualitative Description of Color/Turbidity/Odors/Other
1	17-22	10	9.0		black
2	12-17	10	9.0		black
Cumulative Totals: (Minimum of 3 Well Volumes)			18.0		

Final Depth to Water (from TOC): 12.64 Final well depth: 22.71

Thickness of Any Sediment Remaining in Well: _____

All depths reported are from reference notch in top of TOC.

APPENDIX C

Survey Data

Mr. James Calenda
EnviroAnalytis Group, LLC
1650 Des Peres Road, Suite 303
St. Louis, MO 63131

Re: Sparrows Point Well Survey
Sparrows Point, MD
Triad Engineering Job No. 03-15-0343

Below are the specified surveyed wells, date of last field work completed on June 6, 2019. The coordinate values shown were derived from G.P.S. observations based on National Geodetic Surveys stations "GIS 1", PID AC7684 and "GIS 2", PID AC7685 which purport to be on NAD83(2011) Maryland Grid coordinate system with NAVD88 (AMSL) elevations.

FORMER COKE OVEN AREA WELL LOCATIONS					
DESCRIPTION	NORTHING	EASTING	TOP CASING ELEVATION	GROUND AT WELL ELEVATION	NOTES
COAA-MWS	561979.891	1457970.98 1	10.65	11.27	FLUSH MOUNT
COA-MWS	NO WELL FOUND				
COBB-MWS	561776.152	1457813.75 0	16.27	13.61	
COB-MWS	561768.065	1454242.76 6	14.23	11.30	
COCC-MWS	561794.484	1457978.38 6	15.55	13.16	
COC-MWS	561775.581	1454539.22 3	14.32	11.56	
CODD-MWS	561604.499	1457576.28 7	14.37	12.30	
COD-MWS	561792.574	1454723.99 3	13.74	11.63	
COEE-MWS	NO WELL FOUND				
COE-MWS	561802.955	1454925.92 6	13.98	11.34	
COFF-MWS	561492.274	1458030.69 1	14.78	11.72	GROUND SHOT TAKEN ON SOUTHERN SIDE
COF-MWS	561671.419	1454219.18 7	14.51	11.62	

COGG-MWS	561156.320	1458040.33 0	12.69	10.60	
COG-MWS	561660.615	1454465.54 9	13.77	11.28	
COH-MWS	561707.142	1454648.49 7	13.76	10.60	
COI-MWS	561676.613	1454778.72 5	13.30	10.77	
COJ-MWS	561684.219	1454936.94 5	13.86	10.38	
COK-MWI	563234.629	1454749.24 8	6.83	4.60	

DESCRIPTION	NORTHING	EASTING	TOP CASING ELEVATION	GROUND AT WELL ELEVATION	NOTES
COK-MWS	563234.958	1454751.722	6.62	4.61	
COL-MWI	563246.333	1454911.001	7.56	4.62	
COL-MWS	563247.848	1454916.386	7.38	4.65	WELL SHOT ON LOWER, EASTERN POINT OF CASING
COM-MWI	563260.434	1455059.494	7.43	5.70	
COM-MWS	563262.594	1455064.514	8.11	5.80	
CON-MWI	563192.145	1454354.472	11.99	10.11	
CON-MWS	563190.136	1454350.586	12.01	10.03	
COO-MWI	563028.379	1454319.031	12.68	10.38	
COO-MWS	563024.252	1454318.335	12.70	10.31	
COP-MWI	563127.662	1454935.030	7.53	5.11	
COQ-MWI	563001.855	1454907.172	6.42	3.78	
COR-MWI	562836.854	1454628.124	11.65	9.59	
COS-MWS	562664.676	1454530.099	14.43	11.47	
COT-MWS	562911.804	1455128.854	11.74	9.39	
COU-MWS	562820.595	1455382.444	14.48	11.64	
COV-MWI	562760.829	1455004.678	12.20	10.36	
COW-MWS	562667.550	1455015.345	13.97	11.75	
COX-MWS	562623.230	1455434.171	15.45	12.18	GROUND SHOT TAKEN ON WESTERN SIDE
COY-MWS	562392.829	1455088.298	13.48	11.49	
COZ-MWS	562421.661	1455560.773	14.70	11.88	

APPENDIX D

Purge and YSI Calibration Logs

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA Onshore SW
Well Number: COAA-MWS
Well Diameter (in): 2
Depth to Product (ft): none
Depth to Water (ft): 9.50
Product Thickness (ft): none
Depth to Bottom (ft): 25.48

Project Number: 100342m
Date: 5/14/19
One Well Volume (gal):
QED Controller Settings:
Flow Rate (mL/min) 350
Length of time Purged (min)
Condition of Pad/Cover: good 1 good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
0838	.1	9.5	15.22	11.31	3.385	1.3	177.1		turbid
0843	.5	9.5	15.23	11.50	3.364	0.73	103.9		
0848	.9		15.33	11.53	3.344	0.56	89.2		clear
0853	1.3		15.41	11.56	3.383	0.49	74.7		
0858	1.7		15.53	11.59	3.427	0.58	68.4		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COAA-MWS	0903	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	
Matrix Spike Duplicate					

Sampled By: Lmg

Comments:

na ph

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: <u>COA Onshore Site</u>	Project Number: <u>190342m</u>
Well Number: <u>COA - mws</u>	Date: <u>5/13/19</u>
Well Diameter (in): <u>2</u>	One Well Volume (gal):
Depth to Product (ft): <u>none</u>	QED Controller Settings:
Depth to Water (ft): <u>14.81</u>	Flow Rate (mL/min) <u>350</u>
Product Thickness (ft): <u>none</u>	Length of time Purged (min)
Depth to Bottom (ft): <u>38.29</u>	Condition of Pad/Cover: <u>good</u> <u>19000</u>

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1226	0	14.81	15.19	12.28	1.484	4.98	-126.9		
1231	.4	14.81	15.15	12.26	1.465	0.66	-121.6		
1236	.8		15.39	12.26	1.460	0.43	-124.7		
1241	1.2		15.18	12.26	1.455	0.38	-196.7		
1246	1.6		14.27	12.28	1.431	0.35	-201.8		
1251	2		14.01	12.24	1.416	0.31	-199.6		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COA - mws	1256	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

BTEX + napL

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Ordinance Sup
Well Number: COBB-mws
Well Diameter (in): 2
Depth to Product (ft): none
Depth to Water (ft): 15.38
Product Thickness (ft): none
Depth to Bottom (ft): 28.22

Project Number: 190342m
Date: 5/9/19
One Well Volume (gal):
QED Controller Settings:
Flow Rate (mL/min) 350
Length of time Purged (min)
Condition of Pad/Cover: good 1900d

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1138	0	15.38	17.28	10.59	3.336	5.99	-50.2		
1143	0.4	15.38	11.78	11.16	3.378	1.29	-110.8		
1148	0.8	15.38	11.69	11.25	3.411	0.25	-136.9		
1153	1.2		11.67	11.28	3.434	0.76	-141.4		
1158	1.6		11.66	11.32	3.428	0.83	-151.3		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COBB-mws	1203	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike
Duplicate

Sampled By: LNG

Comments:

Naph

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore

Project Number: 90240.W

Well Number: CCB-MWS

Date: 6/13/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 13.56

Flow Rate (mL/min) 350

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 24.88

Condition of Pad/Cover: good / good

PURGING RECORD

[illegible]

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
CUB-MWS	10/3	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

(((Duplicate)))

Sampled By: LMG

Comments:

PTEx

naph

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA Onshore Sup
Well Number: 1000-MWS
Well Diameter (in): 2
Depth to Product (ft): none
Depth to Water (ft): 15.17
Product Thickness (ft): none
Depth to Bottom (ft): 28.99

Project Number: 1903/2m
Date: 5/9/19
One Well Volume (gal):
QED Controller Settings:
Flow Rate (mL/min) 350
Length of time Purged (min)
Condition of Pad/Cover: good 1960d

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1222	0.1	15.17	16.98	11.54	3.195	3.04	-119.3		
1227	0.5	15.17	16.80	11.53	3.212	0.62	-149.4		
1232	0.9	15.12	16.79	11.52	3.174	0.52	-155.7		
1237	1.3		16.80	11.52	3.198	0.35	-157.7		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COCC-MWS	1242	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike
Duplicate

Sampled By: LMG

Comments:

naph

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

ARM Group Inc.
Earth Resource Engineers and Consultants

Condition of Pad/Cover: good / good

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: CGA Onshore Sur
Well Number: CODD-mws
Well Diameter (in): 2
Depth to Product (ft): none
Depth to Water (ft): 13.11
Product Thickness (ft): none
Depth to Bottom (ft): 29.13

Project Number: 190342m
Date: 3/14/19
One Well Volume (gal):
QED Controller Settings:
Flow Rate (mL/min) 350
Length of time Purged (min)
Condition of Pad/Cover: good 1 good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
0937	0	13.11	15.76	10.08	8.885	4.25	29.7		turbid
0942	.4	13.11	16.23	9.90	9.242	0.69	30.6		
0947	.8		16.26	9.88	9.033	0.40	33.3		
0950	1.2		16.45	10.16	5.590	0.31	17.0		
0959	1.6		16.13	10.33	4.557	0.29	11.9		
1002	2		15.63	10.39	4.300	0.28	9.7		
1007	2.4		15.46	10.43	4.225	0.28	7.4		
1012	2.8		15.48	10.45	4.200	0.27	4.9		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
CODD-mws	1019	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

naph

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA onshore Supplemental
Well Number: COB-MWS (15-20)
Well Diameter (in): 2 1/4" = 5' ags
Depth to Product (ft): none
Depth to Water (ft): 16.34
Product Thickness (ft): none
Depth to Bottom (ft): 25

Project Number: 190342m
Date: 4/9/19
One Well Volume (gal): 1.4
QED Controller Settings:
Flow Rate (mL/min) 500
Length of time Purged (min)
Condition of Pad/Cover: no / no

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1100	4		19.26	11.92	2.096	2.74	-28.0		
1105	4.6	15.55	18.68	11.91	2.033	1.32	-117.1		
1110	5.2	15.50	18.52	11.88	2.065	1.16	-145.7		
1115	5.8	15.45	18.50	11.90	2.076	1.10	-155.8		
1120	6.4	15.40	18.44	11.92	2.082	0.99	-163.7		
1125									

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COB-MWS (15-20)	1130	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	
Matrix Spike					
Duplicate					

Sampled By: WMB

Comments:

BTEX + naphthalene

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA Onshore Supplemental
Well Number: COA-MWS(20-25)
Well Diameter (in): 2
Depth to Product (ft): none
Depth to Water (ft): 12.09
Product Thickness (ft): none
Depth to Bottom (ft): 27

Project Number: 190342m
Date: 4/19/19
One Well Volume (gal): 2.9
QED Controller Settings:
Flow Rate (mL/min) 500
Length of time Purged (min)
Condition of Pad/Cover: 1

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1400	7	14.13	19.64	11.87	2.072	0.65	-133.6		
1405	7.6	13.56	19.80	11.82	2.046	0.16	-156.0		
1410	8.2	12.09	19.36	11.81	2.042	0.12	-166.5		
1415	8.8	12.09	19.49	11.80	2.046	0.10	-175.0		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COA-MWS(20-25)	1420	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

BTEX + naphthalene

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
_____ ft x _____ gal/ft = _____ (gal)



Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA Onshore Supplemental
Well Number: COA-MWS(20-35)
Well Diameter (in): 2 s/u: 1.23
Depth to Product (ft): None
Depth to Water (ft): 141.62
Product Thickness (ft): None
Depth to Bottom (ft): 316.23

Project Number: 190342M
Date: 4/10/19
One Well Volume (gal): 0.8
QED Controller Settings:
Flow Rate (mL/min) 500
Length of time Purged (min)
Condition of Pad/Cover: 1

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1003	2.5	15.82	18.16	9.24	1.640	0.07	-39.6		
1008	3.1	15.42	18.18	9.09	1.757	0.06	-71.4		
1013	3.7	15.22	18.18	9.02	1.838	0.06	-116.7		
1018	4.3		18.21	8.99	1.810	0.07	-150.1		
1023	4.9		18.17	8.96	1.882	0.08	-170.8		
1028	5.5		18.22	8.94	1.889	0.07	-183.6		
1033	6.1		18.25	8.92	1.899	0.07	-192.3		
1038	6.7		18.30	8.91	1.909	0.08	-202.5		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COA-MWS(20-35)	1043	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMCg

Comments:

PTFE X 1 naphthalene

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Earth Resource Engineers and Consultants

Project Number: 190342M

Date: 4/10/19

One Well Volume (gal): 1.8

QED Controller Settings:

Flow Rate (mL/min) 500

Length of time Purged (min)

Condition of Pad/Cover:

[illegible]

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COD - MWS(35-40)	/225	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	
Matrix Spike					
Duplicate					

Comments:

BTEX + naphthalen o

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore Supplemental

Project Number: 190342 M

Well Number: COA-MWS(40-45)

Date: 4/10/19

Well Diameter (in): 2 1/4" ID

One Well Volume (gal): 8

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 15.51

Flow Rate (mL/min) 500

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 45.62

Condition of Pad/Cover: +

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1228	2.5	16.42	20.20	8.31	2.123	3.78	-27.1		
1233	3.1	16.12	20.42	8.26	2.112	2.86	-20.6		
1238	3.7	15.62	20.51	7.88	2.719	1.57	-12.10		
1243	4.3		20.68	7.58	3.269	0.93	-34.10		
1248	4.9		20.77	7.02	5.822	0.71	-98.6		
1253	5.5		20.71	6.98	5.851	0.53	-106.2		
1258	6.1		20.58	6.92	5.924	0.3	-113.0		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COA-MWS(40-45)	1403	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	
Matrix Spike					
Duplicate					

Sampled By: LMG

Comments:

BTEX + naph.

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore, Supplemental

Project Number: 190342M

Well Number: COO-mws(45-50)

Date: 4/10/19

Well Diameter (in): 2 $S/U = 2.12$

One Well Volume (gal): 8

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 17.40

Flow Rate (mL/min) 500

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 52.12

Condition of Pad/Cover: 1

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1515	2.5		20.08	6.97	7.742	0.35	-129.3		
1520	3.0		19.90	6.92	7.650	0.26	-135.3		
1525	3.5		19.60	6.91	7.659	0.22	-140.9		
1530	4.0		19.83	6.91	7.689	0.20	-144.9		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COO-mws(45-50)	1535	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

BTEX + naph.

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore Sup

Project Number: 190342m

Well Number: COA - mws

Date: 5/14/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 12.10

Flow Rate (mL/min) 250

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 30.47

Condition of Pad/Cover: good / good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1320	.2	12.61	17.11	12.35	2.440	0.816	-89.2		
1325	.6	12.61	16.94	12.21	2.449	0.67	-135.0		
1330	1		16.94	12.25	2.457	0.38	-156.2		
1335	1.4		16.78	12.29	2.467	0.32	-168.2		
1340	1.8		16.66	12.31	2.455	0.31	-178.5		
1345	2.2		16.65	12.33	2.451	0.30	-173.4		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COA-mws	1355	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

BTEX graph

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore Sup
Well Number: COE-mws
Well Diameter (in): 2
Depth to Product (ft): none
Depth to Water (ft): 12.83
Product Thickness (ft): none
Depth to Bottom (ft): 28.28

Project Number: 190342-m
Date: 5/14/19
One Well Volume (gal):
QED Controller Settings:
Flow Rate (mL/min) 350
Length of time Purged (min)
Condition of Pad/Cover: good / good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1220	0	12.83	16.55	11.67	1.373	2.92	-60.4		turbid
1225	1.1	12.83	16.09	11.60	1.365	0.41	-102.8		
1230	1.8	12.83	16.14	11.67	1.264	0.38	-123.2		
1235	1.2		16.18	11.71	1.362	0.36	-135.1		
1240	1.6		16.10	11.72	1.261	0.34	-143.1		
1245	2		16.07	11.73	1.358	0.34	-148.9		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COE-mws	1250	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	
Matrix Spike					
Duplicate					

Sampled By: LMG

Comments:

BT6X naph

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Earth Resource Engineers and Consultants

Condition of Pad/Cover: good / good

PURGING RECORD

[illegible]

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COFF-mws	13/8	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Comments:

naph

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA Anshel Snp

Project Number: 190342m

Well Number: COF-mws

Date: 5/10/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 13.51

Flow Rate (mL/min) 350

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 39.23

Condition of Pad/Cover: good / good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1143	0.1	13.51	18.19	12.62	7.137	3.11	-153.2		
1148	0.5	13.51	18.28	12.55	7.444	0.67	-202.1		
1153	0.9	13.51	18.46	12.57	7.536	0.46	-220.8		
1158	1.3		18.60	12.52	7.534	0.34	-220.6		
1203	1.7		18.52	12.59	7.528	0.29	-217.6		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COF-mws	1208	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	
Matrix Spike					
Duplicate					

Sampled By: LMG

Comments:

BTEX msp

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Earth Resource Engineers and Consultants

Project Number: 190242m

Date: 5/9/99

One Well Volume (gal):

OED Controller Settings:

Flow Rate (mL/min) 350

Length of time Purged (min)

Condition of Pad/Cover: good / good

MONITORING SAMPLE RECORD

Matrix Spike

Duplicate

Comments:

naph

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: CGA Onshore SMO

Project Number: 190342m

Well Number: 106 - MW 3

Date: 5/10/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

OED Controller Settings:

Depth to Water (ft): 12.78

Flow Rate (mL/min) 350

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 38.51

Condition of Pad/Cover: good / good

PURGING RECORD

[illegible]

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
006-mws	13/3	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	
Matrix Spike					
Duplicate					

Sampled By: LMG

Comments:

PTEX NAPL

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft

ARM Group Inc.
Earth Resource Engineers and Consultants

Earth Resource Engineers and Consultants

Project Name: CDA Chshave

Project Number: 190342m

Well Number: 104-mws

Date: 5/10/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

OED Controller Settings:

Depth to Water (ft): 12.92

Flow Rate (mL/min) 350

Product Thickness (ft): 0.000

Length of time Purged (min)

Depth to Bottom (ft): 39.75

Condition of Pad/Cover: good / good

PURGING RECORD

[illegible]

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COH-mws	1115	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	
Matrix Spike					
Duplicate					

Sampled By: L M G

Comments:

naph BTEX

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft



Earth Resource Engineers and Consultants

Project Name: COA Onshoring Study

Project Number: 190342m

Well Number: C01 - m125

Date: 5/10/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

OED Controller Settings:

Depth to Water (ft): 12.26

Flow Rate (mL/min) 350

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 36.53

Condition of Pad/Cover: good / good

PURGING RECORD

[illegible]

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
C01-MWS	1/14	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	
Matrix Spike					
Duplicate					

Sampled By: LMG

Comments:

BTEX naph

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA Onshore Sup
Well Number: COJ-mws
Well Diameter (in): 2
Depth to Product (ft): none
Depth to Water (ft): 12.94
Product Thickness (ft): none
Depth to Bottom (ft): 28.42

Project Number: 190342m
Date: 5/13/19
One Well Volume (gal):
QED Controller Settings:
Flow Rate (mL/min) 350
Length of time Purged (min)
Condition of Pad/Cover: good 1 good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1327	0	12.94	15.83	12.25	1.784	3.28	-165.0		
1332	.4	12.94	15.16	12.09	1.621	0.53	-172.3		
1337	.8		14.95	12.13	1.613	0.38	-187.9		
1342	1.2		14.98	12.13	1.597	0.32	-199.1		
1347	1.6		14.57	12.15	1.572	0.29	-205.5		
1352	2		14.49	12.15	1.569	0.27	-211.5		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COJ - mws	1357	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	
Matrix Spike					
Duplicate					

Sampled By: LMG

Comments:

BTEX 1ug/L

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore Strip

Project Number: 190342m

Well Number: COK-mw1

Date: 5/6/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 8.98

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 52.58

Condition of Pad/Cover: good / good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1327	0	8.98	16.18	10.62	1.690	2.33	-213.0		
1332	.5	9.01	16.50	9.92	1.732	0.49	-216.6		
1337	1	9.04	16.39	9.73	1.788	0.34	-214.3		
1342	1.5	9.07	16.55	9.58	1.745	0.28	-208.7		
1347	2	9.1	16.49	9.49	1.771	0.28	-255.6		
1352	2.5	9.13	16.54	9.44	1.739	0.25	-262.7		
1357	3	9.16	16.50	9.40	1.739	0.24	-258.4		
1402	3.5	9.19	16.53	9.35	1.737	0.22	-271.5		
1407	4	9.21	16.68	9.33	1.736	0.22	-259.0		
1412	4.5	9.24	16.57	9.31	1.734	0.21	-266.0		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COK-mw1	1417	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: JMG

Comments:

ORP d/n stable

BTEX naph DRO GRO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore Sup

Project Number: 190342m

Well Number: COK-MWS

Date: 5/6/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 6.09

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 17.36

Condition of Pad/Cover: good / good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1237	0	6.09	15.25	11.30	1.561	3.15	-241.2		
1242	0.5	6.09	15.19	11.48	1.553	0.75	-236.0		
1247	1	6.09	15.43	11.53	1.540	0.44	-281.6		
1252	1.5		15.47	11.50	1.510	0.35	-302.9		
1257	2		15.40	11.42	1.489	0.30	-265.5		
1302	2.5		15.45	11.41	1.430	0.27	-257.7		
1307	3		15.44	11.42	1.425	0.26	-264.8		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COK-MWS	1312	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMC

Comments:

BTL x nach DRO GRO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COP on SUP

Project Number: 190312h

Well Number: COL-mw1

Date: 5/1/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 10.35

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 53.32

Condition of Pad/Cover: good / good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1332	0.2	10.15	17.1	11.58	1.830	0.91	-278.0		
1337	0.8		16.9	11.56	1.853	0.22	-294.1		
1342	1.2		16.9	11.56	1.852	0.06	-300.9		
1347	1.7		17.0	11.56	1.851	0.01	-303.5		
1352	2.2		16.9	11.56	1.854	0.00	-306.6		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COL-mw1	1357	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LHX

Comments:

RT-X map, DR & GRO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA On-Sup

Project Number: 190240-m

Well Number: COL-MWS

Date: 5/1/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 7.10

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 17.98

Condition of Pad/Cover: good good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1212	0.1	7.1	15.2	11.94	1.737	0.46	-286.0		
1217	0.6	7.1	15.4	11.98	1.714	0.14	-306.0		
1222	1.1	7.1	15.4	11.98	1.698	0.07	-288.9		
1227	1.6		15.4	11.99	1.699	0.04	-306.9		
1232	2.1		15.5	12.00	1.700	0.02	-306.7		
1237	2.6		15.4	12.01	1.715	0.02	-306.0		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COL-MWS	1242	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

BTEX naph DRO GRO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: <u>COP On-Sup</u>	Project Number: <u>190342M</u>
Well Number: <u>(com-mw)</u>	Date: <u>5/1/19</u>
Well Diameter (in): <u>2</u>	One Well Volume (gal):
Depth to Product (ft): <u>none</u>	QED Controller Settings:
Depth to Water (ft): <u>10.11</u>	Flow Rate (mL/min) <u>400</u>
Product Thickness (ft): <u>none</u>	Length of time Purged (min)
Depth to Bottom (ft): <u>53.59</u>	Condition of Pad/Cover: <u>good</u> / <u>good</u>

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1110	0.2	10.11	16.0	11.52	1.355	0.77	-254.0		
1115	0.7	10.13	15.9	10.84	1.287	0.13	-302.4		
1120	1.2	10.15	16.0	10.67	1.286	0.03	-320.5		
1125	1.7	10.17	16.2	10.61	1.283	0.00	-327.9		
1130	2.2	10.19	16.1	10.52	1.292	-0.01	-328.4		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
com-mw1	1135	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
	PCB	2 - 1 L Amber	None		
Matrix Spike					
Duplicate					

Sampled By: LM

Comments:

BTEX, TPH, DRO - GRO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Earth Resource Engineers and Consultants

Condition of Pad/Cover: good / good

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore Sup

Project Number: 190342m

Well Number: CON-mw1

Date: 5/2/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 10.59

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 54.03

Condition of Pad/Cover: good 1 good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
0923	0.2	10.59	16.82	12.02	1.707	0.67	-178.5		
0928	0.7	10.59	17.06	12.18	2.341	0.52	-205.7		
0923	1.2	10.60	17.20	12.22	2.512	0.42	-219.5		
0938	1.7	10.60	17.22	12.28	2.605	0.38	-222.4		
0943	2.2	10.61	17.43	12.29	2.682	0.33	-227.1		
0948	2.7		17.41	12.29	2.712	0.30	-226.0		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
CON-mw1	0953	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

BTEX naph GRO CRO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA Onshore

Project Number: 190342m

Well Number: CON-MWS

Date: 5/2/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 10.54

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 18.01

Condition of Pad/Cover: good good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
0841	0.1	10.54	15.24	11.79	2.328	3.02	-31.5		
0846	0.6	10.54	15.22	11.87	2.239	1.49	-124.4		
0851	1.1	10.54	15.39	11.98	2.203	1.18	-137.1		
0856	1.6		15.41	12.00	2.200	0.89	-136.1		
0901	2.1		15.39	12.04	2.198	0.77	-141.7		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
CON-MWS	0906	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMC

Comments:

Bitx naph DRO GLO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore

Project Number: 190342m

Well Number: COG-mw1

Date: 5/7/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 11.36

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 54.61

Condition of Pad/Cover: good 1 good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1108	0.2	11.36	19.01	12.06	2.352	3.03	-182.9		
1113	0.7	11.36	19.49	12.11	2.490	0.51	-217.9		
1118	1.2	11.36	19.36	12.14	2.547	0.32	-211.5		
1123	1.7		19.33	12.15	2.547	0.26	-204.3		
1128	2.2		19.24	12.16	2.537	0.22	-199.2		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COG-mw1	1133	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

BTEX naph Deo C & D

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA Onshore Sup
Well Number: 100 - mws
Well Diameter (in): 2
Depth to Product (ft): none
Depth to Water (ft): 11.35
Product Thickness (ft): none
Depth to Bottom (ft): 18.04

Project Number: 190342m
Date: 5/7/19
One Well Volume (gal):
QED Controller Settings:
Flow Rate (mL/min) 400
Length of time Purged (min)
Condition of Pad/Cover: good 1900d

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1030	0.1	11.35	17.80	11.93	2.295	2.25	-148.4		
1035	0.6	11.35	18.04	11.93	2.284	0.63	-173.4		
1040	1.1	11.35	17.97	11.98	2.260	0.44	-173.0		
1045	1.6		17.92	12.01	2.244	0.36	-178.2		
1050									

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COO - mws	1050	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike
Duplicate

Sampled By: LMG

Comments:

BTEX naph DRO GLO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA Onshore SM
Well Number: COP-MW1
Well Diameter (in): 2
Depth to Product (ft): none
Depth to Water (ft): 8.89
Product Thickness (ft): none
Depth to Bottom (ft): 54.47

Project Number: 190342m
Date: 5/9/19
One Well Volume (gal):
QED Controller Settings:
Flow Rate (mL/min): 350
Length of time Purged (min):
Condition of Pad/Cover: good good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1019	0.1	8.89	17.25	9.07	0.704	4.26	-92.9		
1024	0.5	8.89	16.78	8.45	0.167	0.88	-96.6		
1029	0.9	8.90	16.82	8.27	0.663	0.61	-97.4		
1034	1.3	8.90	16.76	8.17	0.663	0.49	-100.7		
1039	1.7	8.91	16.82	8.09	0.678	0.44	-110.4		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COP-MW1	1044	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

BLEX NAPH 200 CBO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA Onshore Sup
Well Number: 10Q - MW1
Well Diameter (in): 2
Depth to Product (ft): none
Depth to Water (ft): 6.78
Product Thickness (ft): 1.0
Depth to Bottom (ft): 53.41

Project Number: 190342
Date: 5/9/19
One Well Volume (gal):
QED Controller Settings:
Flow Rate (mL/min) 400
Length of time Purged (min)
Condition of Pad/Cover: good 1 good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
0903	0	6.78	16.66	6.06	1.521	2.54	-135.8		
0908	0.5	6.78	16.73	8.55	1.521	1.38	-199.3		
0913	1.0	6.78	16.75	9.44	1.543	0.94	-253.1		
0918	1.5		16.83	9.95	1.582	0.71	-282.1		
0923	2.0		16.83	10.20	1.624	0.54	-291.5		
0928	2.5		16.87	10.48	1.704	0.44	-312.1		
0933	3.0		16.94	10.59	1.719	0.38	-305.8		
0938	3.5		16.95	10.65	1.725	0.42	-307.8		
0943	4.0		16.96	10.68	1.721	0.49	-322.9		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COQ-mw1	0948	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: Lmg

Comments:

BTEX nap JKO GRO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

ARM Group Inc.
Earth Resource Engineers and Consultants

Project Number: 190314-m

Date: 5/14/09

One Well Volume (gal):

QED Controller Settings:

Flow Rate (mL/min) 350

Length of time Purged (min)

Condition of Pad/Cover: good / good

PURGING RECORD

[illegible]

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COR-mw 1	11/3	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	
Matrix Spike					
Duplicate					

Comments: purged N15 gal due to screen in water
DRO GRO BTEX Naph

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore

Project Number: 190342m

Well Number: COA-MW5

Date: 5/6/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 14.00

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 24.07

Condition of Pad/Cover: good 1 good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
0856	0.3	14.00	16.09	11.57	1.171	2.84	207.6		
0901	0.8	14.00	16.04	11.64	1.123	1.68	44.7		
0906	1.3	14.00	15.96	11.69	1.128	0.90	17.4		
0911	1.8		15.91	11.75	1.150	0.71	-6.0		
0916	2.3		15.92	11.82	1.167	0.59	-36.2		
0921	2.8		15.94	11.86	1.171	0.52	-61.2		
0926	3.3		15.98	11.93	1.172	0.47	-88.7		
0931	3.8		15.97	11.95	1.166	0.44	-89.2		
0936	4.3		15.99	11.96	1.159	0.41	-99.1		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COA-MW5	0941	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMC

Comments:

BTEX, naph, NPO, GRO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore Sump

Project Number: 190342m

Well Number: COT-mws

Date: 5/8/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 10.82

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 23.71

Condition of Pad/Cover: good / good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
0855	0.1	10.82	16.07	10.47	1.154	2.33	-201.5		
0900	0.6		16.18	11.25	1.211	0.43	-250.3		
0905	1.1		16.17	11.34	1.197	0.40	-248.0		
0910	1.6		16.18	11.37	1.140	0.33	-251.7		
0915	2.1		16.21	11.39	1.104	0.31	-270.3		
0920	2.6		16.13	11.40	1.090	0.29	-264.8		
0925	3.1		16.28	11.42	1.079	0.27	-254.5		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COT-mws	0930	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

BTEX mws DRO GLO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA onshore sup

Project Number: 190342m

Well Number: COU-mws

Date: 5/8/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 13.42

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 24.46

Condition of Pad/Cover: good 1900d

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1358	0.1	13.42	17.12	8.97	2.105	0.164	-53.2		
1403	0.6	13.42	16.75	8.99	1.480	0.26	-90.7		
1408	1.1	13.42	16.37	8.84	1.163	0.20	-118.5		
1413	1.6		16.20	8.77	0.996	0.18	-147.3		
1418	2.1		16.03	8.74	0.931	0.16	-164.4		
1423	2.6		15.94	8.74	0.892	0.15	-186.8		
1428	3.1		15.85	8.74	0.860	0.15	-203.2		
1433	3.6		15.82	8.74	0.842	0.14	-221.1		
1438	4.1		15.80	8.76	0.821	0.14	-240.2		
1443	4.6		15.81	8.77	0.811	0.13	-255.4		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COU-mws	1448	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LFG

Comments:

ORP data stabilized
PTex neg NRO GPO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Earth Resource Engineers and Consultants

Condition of Pad/Cover: good / good[illegible]

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COV- MW1	11/28	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

~~Duplicate~~

Comments:

BTX nach NFO GLO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: CSA Onshore Sup

Project Number: 190242m

Well Number: LOW-mws

Date: 5/16/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 13.19

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 23.04

Condition of Pad/Cover: good / good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1012	0.3	13.19	18.08	11.59	1.065	1.24	-147.9		
1017	0.8	13.21	17.90	11.69	1.067	0.54	-168.4		
1022	1.3	13.24	17.74	11.73	1.059	0.26	-195.4		
1027	1.8	13.27	17.85	11.75	1.064	0.32	-191.6		
1032	2.3	13.29	17.92	11.75	1.063	0.30	-197.8		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
LOW-mws	1037	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2- 1 L Amber	none	
		Oil & Grease	2- 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

STEX naph, DEO, GRs

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: COA Onshore Sup

Project Number: 190340m

Well Number: COX-mws

Date: 5/8/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 14.46

Flow Rate (mL/min)

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 24.97

Condition of Pad/Cover: good 190001

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1256	0.2	14.46	19.14	7.54	3.026	0.62	-184.2		
1301	0.7	14.46	19.01	7.40	2.892	0.31	-183.4		
1306	1.2	14.46	18.67	7.39	1.873	0.28	-202.0		
1311	1.7		18.56	7.42	1.544	0.29	-201.2		
1316	2.2		18.32	7.43	1.500	0.33	200.0		
1321	2.7		18.48	7.43	1.478	0.36	-198.6		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COX-mws	1326	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

BTEX nap VPO C.R.G.

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name: COA Onshore Slip

Project Number: 190342m

Well Number: COY-mws

Date: 5/8/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 12.35

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 22.96

Condition of Pad/Cover: good / good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1025	0.1	12.25	17.51	11.26	0.942	0.95	-235.5		
1030	0.6	12.40	17.39	11.40	0.931	0.39	-263.4		
1035	1.1	12.45	17.52	11.48	0.923	0.31	-252.6		
1040	1.6	12.50	17.49	11.49	0.918	0.33	-227.7		
1045	2.1	12.55	17.51	11.51	0.916	0.32	-210.2		
1050	2.6	12.60	17.57	11.52	0.918	0.28	-212.0		
1055	3.1	12.65	17.57	11.54	0.920	0.25	-213.4		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
COY-mws	1100	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

BTEX naph Deo GLO

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

Low Flow Sampling Permanent Wells



ARM Group Inc.

Earth Resource Engineers and Consultants

Project Name: CO2-mws Sup

Project Number: 190342m

Well Number: CO2-mws

Date: 5/8/19

Well Diameter (in): 2

One Well Volume (gal):

Depth to Product (ft): none

QED Controller Settings:

Depth to Water (ft): 13.60

Flow Rate (mL/min) 400

Product Thickness (ft): none

Length of time Purged (min)

Depth to Bottom (ft): 23.98

Condition of Pad/Cover: good 1000

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet)	Temp (°C)	pH (s.u.) ± 0.1	Specific Conductance (ms/cm) ± 3%	Dissolved Oxygen (mg/L) ± 0.3	ORP (mV) ± 10	Turbidity (NTU) ± 10% or < 5	Comments
1145	0.2	12.10	18.00	8.61	0.788	0.73	-125.7		
1150	0.7	13.6	17.94	8.38	0.767	0.41	-152.5		
1155	1.2	13.6	17.87	8.32	0.673	0.32	-172.1		
1200	1.7		17.66	8.44	0.607	0.28	-182.4		
1205	2.2		17.69	8.50	0.585	0.25	-168.3		
1210	2.7		17.66	8.49	0.587	0.23	-156.3		
1215	3.2		17.71	8.48	0.582	0.22	-146.6		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
CO2-mws	1220	TCL-VOCs	3 - 40 mL VOA	HCl	
		TPH-GRO	3 - 40 mL VOA	HCl	
		TPH-DRO	2 - 1 L Amber	none	
		TCL-SVOCs	2 - 1 L Amber	none	
		Oil & Grease	2 - 1 L Amber	HCl	
		TAL-Metals & Mercury (total)	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (total)	1 - 250 mL Plastic	none	
		Total Cyanide	1 - 250 mL Plastic	NaOH	
		TAL-Metals & Mercury (Dissolved) Field Filtered	1 - 250 mL Plastic	HNO3	
		Hexavalent Chromium (Dissolved) Field Filtered	1 - 250 mL Plastic	none	
		PCB	2 - 1 L Amber	None	

Matrix Spike

Duplicate

Sampled By: LMG

Comments:

Brax nap DRG CLP

Casing Volume: 1" I.D. = 0.041 gal/ft - 2" I.D. = 0.163 gal/ft - 4" I.D. = 0.653 gal/ft - 6" I.D. = 1.47 gal/ft
ft x gal/ft = (gal)

When the Environment Demands It

This calibration worksheet can help document your calibration and track the performance of your sensors. Please follow the detailed calibration procedures in the ProDSS manual or your facility's standard operating procedure (SOP) to ensure all calibrations are as accurate and as consistent as possible.

Refer to the YSI Solution Expiration Dates document to ensure your calibration solutions are fresh. In addition to using fresh standards, never accept an out-of-range or questionable calibration results.

Calibration Date 4/9/19

Technician: LMC

Handheld Serial Number: _____

Handheld Software Version: _____

Cable Serial Number: _____

Pine #15015

Temperature

Reading when sensor is dry and in room temp air: 19.27 Accurate? ☒ Y ☐ N

Conductivity

Reading when sensor is dry and in room temp air: 0.109 ~~12.5 mS/cm~~ Acceptable value is less than 1 μ S/cm

Actual Reading in solution before calibration is accepted: 1.448 mS/cm

Reading in calibration solution after calibration is completed: 1.413 mS/cm

Conductivity Cell Constant in GLP* record after calibration: ✓

Acceptable range for ProDSS conductivity/temperature sensors (626902) is **4.5 to 6.5**

Acceptable range for integral (i.e. built-in) sensors on ODO/CT assemblies is **4.4 to 6.4**

Optical Dissolved Oxygen

Barometric pressure: 29.70 in Hg

Actual Reading before DO% calibration is accepted: 123.37

Reading in DO% calibration environment after calibration is completed: 98.72

ODO gain in GLP record after calibration: ✓ Acceptable range is **0.75 to 1.50**

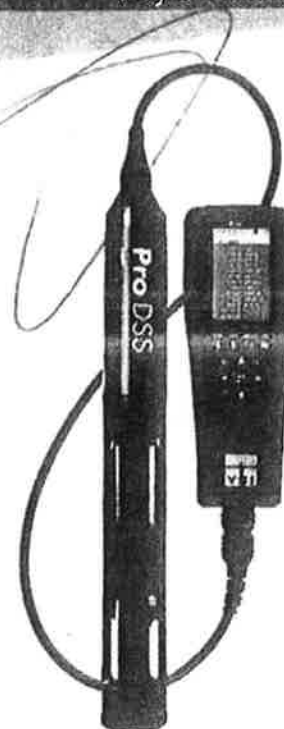
pH

		Actual Readings during calibration		Acceptable pH mV in buffer
Buffer	Calibration Value	pH	pH mV**	
7				-50 mV to 50 mV
4	<u>4</u>	<u>4.55</u>		+165 to +180 from pH 7 buffer mV value
10	<u>10</u>	<u>9.97</u>		-165 to -180 from pH 7 buffer mV value

pH slope in GLP record after calibration: _____ Acceptable range is ~ **55 to 60 pH/mV**
(Ideal is 59.16 mV/pH)

*GLP stands for Good Laboratory Practice file. This calibration record contains important information about the calibration result.

**The pH mV at the time of calibration (Sensor Value) can also be seen in the final pH GLP record.



04/11/16 03:22:38PM

Calibrate pH

Calibration Value (10.09)

Accept Calibration

Finish Calibration

Press ESC to Abort

Last Calibrated

01/01/70 00:00:00AM

Actual Readings

22.8 Ref °C

-199.0 pH mV

10.10 pH

Post Cal Value

10.09 pH

pH

10.6

10.2

9.8

131

Create for cal point 2

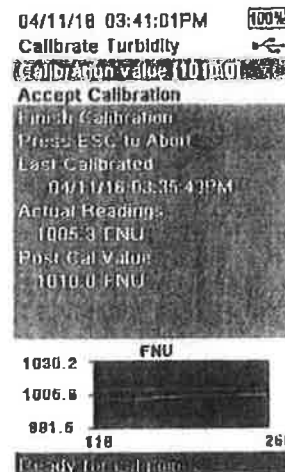
When the Environment Demands It

ORPActual Reading in solution before calibration is accepted: 246.5 mVReading in calibration solution after calibration is completed: 240 mVORP Cal Offset in GLP record after calibration: 6.5 Acceptable range is **-100 to 50****Turbidity**

Calibration value (FNU)*	Actual Reading during calibration
0	
12.4*	
124*	
1010	

Acceptable range for **Actual Reading** during calibration of the first point is **-10 to 10 FNU**

***Note:** The turbidity sensor can be calibrated to 3 points. Either 12.4 or 124 FNU standard can be used for the second point, but not both. Other calibration values can be used when calibrating.

**Depth (Completed in Air)**

Actual Reading before calibration is accepted: _____

Reading in air after calibration is completed: _____

Ammonium

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			-20 mV to 20 mV
2nd point: 100 mg/L			+90 to +130 from mV value in 1 mg/L standard

Nitrate

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			180 mV to 220 mV
2nd point: 100 mg/L			-90 to -130 from mV value in 1 mg/L standard

Chloride

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 10 mg/L			205 mV to 245 mV
2nd point: 1,000 mg/L			-80 to -130 from mV value in 10 mg/L standard

**Other standard concentrations can be used. A 2 point calibration without chilling a third calibration solution is extremely accurate and is the preferred method. However, if there is a large temperature variation during sampling, a chilled third calibration point is recommended.

***The mV at the time of calibration (Sensor Value) for each point can also be seen in the GLP record after a calibration is complete.

When the Environment is Not Ideal

This calibration worksheet can help document your calibration and track the performance of your sensors. Please follow the detailed calibration procedures in the ProDSS manual or your facility's standard operating procedure (SOP) to ensure all calibrations are as accurate and as consistent as possible.

Refer to the YSI Solution Expiration Dates document to ensure your calibration solutions are fresh. In addition to using fresh standards, never accept an out-of-range or questionable calibration results.

Calibration Date: 3/6/19 Technician: LMG

Handheld Serial Number: 15F101565 Handheld Software Version: _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 20.27 Accurate? ☒ Y ☐ N

Conductivity

Reading when sensor is dry and in room temp air: 0.052 Acceptable value is less than 1 $\mu\text{S}/\text{cm}$

Actual Reading in solution before calibration is accepted: 4.507

Reading in calibration solution after calibration is completed: 4.491

Conductivity Cell Constant in GLP* record after calibration:

Acceptable range for ProDSS conductivity/temperature sensors (626902) is 4.5 to 6.5

Acceptable range for integral (i.e. built-in) sensors on ODO/CT assemblies is 4.4 to 6.4

Optical Dissolved Oxygen

Barometric pressure: 759

Actual Reading before DO% calibration is accepted: 122.9%

Reading in DO% calibration environment after calibration is completed: 100%

ODO gain in GLP record after calibration: Acceptable range is 0.75 to 1.50

pH

Buffer	Calibration Value	Actual Readings during calibration		Acceptable pH mV in buffer
		pH	pH mV**	
7	7	7.22		-50 mV to 50 mV
4	4	4.29		+165 to +180 from pH 7 buffer mV value
10	10	10.06		-165 to -180 from pH 7 buffer mV value

pH slope in GLP record after calibration: Acceptable range is ~ 55 to 60 pH/mV
(Ideal is 59.16 mV/pH)

*GLP stands for Good Laboratory Practice file This calibration record contains important information about the calibration result.

**The pH mV at the time of calibration (Sensor Value) can also be seen in the final pH GLP record.

04/11/18 03:22:38
Calibrate pH
Calibration value
Accept Calibration
Finish Calibration
Fresh Buffer to Add
Last Calibrated
03/07/20 00:00
Actual Reading
122.9
125.0 pH mV
10.10 pH
Post Cal Value
10.09 pH
10.8
10.2
9.8
121

When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 257.5

Reading in calibration solution after calibration is completed: 240

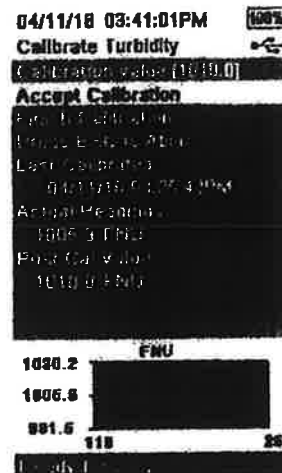
ORP Cal Offset in GLP record after calibration: ✓ Acceptable range is **-100 to 50**

Turbidity

Calibration value (FNU)*	Actual Reading during calibration
0	
12.4*	
124*	
1010	

Acceptable range for **Actual Reading** during calibration of the first point is **-10 to 10 FNU**

***Note:** The turbidity sensor can be calibrated to 3 points. Either 12.4 or 124 FNU standard can be used for the second point, but not both. Other calibration values can be used when calibrating.



Depth (Completed in Air)

Actual Reading before calibration is accepted: _____

Reading in air after calibration is completed: _____

Ammonium

Concentration** (i.e. Calibration Value)	Actual Readings during calibration	
	mg/L	mV***
1st point: 1 mg/L		
2nd point: 100 mg/L		

Acceptable mV when the sensor is new

-20 mV to 20 mV

+90 to +130 from mV value in 1 mg/L standard

Nitrate

Concentration** (i.e. Calibration Value)	Actual Readings during calibration	
	mg/L	mV***
1st point: 1 mg/L		
2nd point: 100 mg/L		

Acceptable mV when the sensor is new

180 mV to 220 mV

-90 to -130 from mV value in 1 mg/L standard

Chloride

Concentration** (i.e. Calibration Value)	Actual Readings during calibration	
	mg/L	mV***
1st point: 10 mg/L		
2nd point: 1,000 mg/L		

Acceptable mV when the sensor is new

205 mV to 245 mV

-80 to -130 from mV value in 10 mg/L standard

**Other standard concentrations can be used. A 2 point calibration without adding a third calibration solution is extremely accurate and is the preferred method. However, if there is a large temperature variation during sampling, a chilled third calibration point is recommended.

***The mV at the time of calibration (Sensor Value) for each point can also be seen in the GLP record after a calibration is complete.

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ProDSS Calibration Worksheet

This calibration worksheet can help document your calibration and track the performance of your sensors. Please follow the detailed calibration procedures in the ProDSS manual or your facility's standard operating procedure (SOP) to ensure all calibrations are as accurate and as consistent as possible.

Refer to the YSI Solution Expiration Dates document to ensure your calibration solutions are fresh. In addition to using fresh standards, never accept an out-of-range or questionable calibration results.

Calibration Date: 5/7/19 Technician: LMA

Handheld Serial Number: 15F101565 Handheld Software Version: _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 19.25 Accurate? ☒ Y ☐ N

Conductivity

Reading when sensor is dry and in room temp air: 0.058 mS Acceptable value is less than 1 $\mu\text{S}/\text{cm}$

Actual Reading in solution before calibration is accepted: 4.573 mS

Reading in calibration solution after calibration is completed: 4.49 mS

Conductivity Cell Constant in GLP* record after calibration: /

Acceptable range for ProDSS conductivity/temperature sensors (626902) is **4.5 to 6.5**

Acceptable range for integral (i.e. built-in) sensors on ODO/CT assemblies is **4.4 to 6.4**

Optical Dissolved Oxygen

Barometric pressure: 760

Actual Reading before DO% calibration is accepted: 108.8 %

Reading in DO% calibration environment after calibration is completed: 100 %

ODO gain in GLP record after calibration: / Acceptable range is **0.75 to 1.50**

pH

Buffer	Calibration Value	Actual Readings during calibration		Acceptable pH mV in buffer
		pH	pH mV**	
7	7	7.06		-50 mV to 50 mV
4	4	3.82		+165 to +180 from pH 7 buffer mV value
10	10	10.08		-165 to -180 from pH 7 buffer mV value

pH slope in GLP record after calibration: _____ Acceptable range is ~ **55 to 60 pH/mV**
(Ideal is 59.16 mV/pH)

*GLP stands for Good Laboratory Practice file. This calibration record contains important information about the calibration result.

**The pH mV at the time of calibration (Sensor Value) can also be seen in the final pH GLP record.

04/11/18 03:22:30

Calibrate pH

Calibration value: 1

Accept Calibration

Final Calibration

Final pH to App

Last Calibrated

04/11/18 03:22:30

Actual Reading

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

10.08 pH

When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 239.6 mV

Reading in calibration solution after calibration is completed: 240 mV

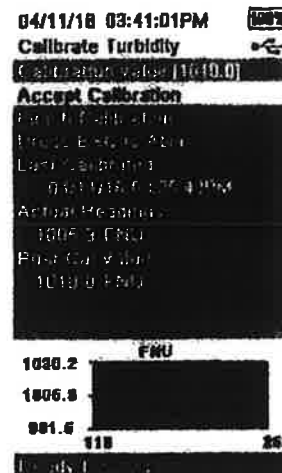
ORP Cal Offset in GLP record after calibration: Acceptable range is **-100 to 50**

Turbidity

Calibration value (FNU)*	Actual Reading during calibration
0	
12.4*	
124*	
1010	

Acceptable range for **Actual Reading** during calibration of the first point is **-10 to 10 FNU**

***Note:** The turbidity sensor can be calibrated to 3 points. Either 12.4 or 124 FNU standard can be used for the second point, but not both. Other calibration values can be used when calibrating.



Depth (Completed in Air)

Actual Reading before calibration is accepted:

Reading in air after calibration is completed:

Ammonium

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			-20 mV to 20 mV
2nd point: 100 mg/L			+90 to +130 from mV value in 1 mg/L standard

Nitrate

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			180 mV to 220 mV
2nd point: 100 mg/L			-90 to -130 from mV value in 1 mg/L standard

Chloride

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 10 mg/L			205 mV to 245 mV
2nd point: 1,000 mg/L			-80 to -130 from mV value in 10 mg/L standard

**Other standard concentrations can be used. A 2 point calibration without adding a third calibration solution is extremely accurate and is the preferred method. However, if there is a large temperature variation during sampling, a chilled third calibration point is recommended.

***The mV at the time of calibration (Sensor Value) for each point can also be seen in the GLP record after a calibration is complete.

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When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 240.9

Reading in calibration solution after calibration is completed: 240

ORP Cal Offset in GLP record after calibration: ✓ Acceptable range is **-100 to 50**

Turbidity

Calibration value (FNU)*	Actual Reading during calibration
0	
12.4*	
124*	
1010	

Acceptable range for **Actual Reading** during calibration of the first point is **-10 to 10 FNU**

***Note:** The turbidity sensor can be calibrated to 3 points. Either 12.4 or 124 FNU standard can be used for the second point, but not both. Other calibration values can be used when calibrating.

04/11/18 03:41:01PM

Calibrate Turbidity

Calibration Value [1010.0]

Accept Calibration

First Calibration

Initial Reading

Last Calibration

0.001 FNU

Actual Reading

1000.0 FNU

First Calibration

1010.0 FNU

1020.2 FNU

1006.8

991.6

110

1000.0 FNU

Depth (Completed in Air)

Actual Reading before calibration is accepted: _____

Reading in air after calibration is completed: _____

Ammonium

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			-20 mV to 20 mV
2nd point: 100 mg/L			+90 to +130 from mV value in 1 mg/L standard

Nitrate

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			180 mV to 220 mV
2nd point: 100 mg/L			-90 to -130 from mV value in 1 mg/L standard

Chloride

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 10 mg/L			205 mV to 245 mV
2nd point: 1,000 mg/L			-80 to -130 from mV value in 10 mg/L standard

**Other standard concentrations can be used. A 2 point calibration without adding a third calibration solution is extremely accurate and is the preferred method. However, if there is a large temperature variation during sampling, a chilled third calibration point is recommended.

***The mV at the time of calibration (Sensor Value) for each point can also be seen in the GLP record after a calibration is complete.

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When the Environment Changes

This calibration worksheet can help document your calibration and track the performance of your sensors. Please follow the detailed calibration procedures in the ProDSS manual or your facility's standard operating procedure (SOP) to ensure all calibrations are as accurate and as consistent as possible.

Refer to the *YSI Solution Expiration Dates* document to ensure your calibration solutions are fresh. In addition to using fresh standards, never accept an out-of-range or questionable calibration results.

Calibration Date 5/9/19 Technician: LMG

Handheld Serial Number: 15F101565 Handheld Software Version: _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 20.34 Accurate? ☒ Y ☐ N

Conductivity

Reading when sensor is dry and in room temp air: 0.026 mS Acceptable value is less than **1 μ S/cm**

Actual Reading in solution before calibration is accepted: 4.49 mS

Reading in calibration solution after calibration is completed: 4.609 mS

Conductivity Cell Constant in GLP* record after calibration: /

Acceptable range for ProDSS conductivity/temperature sensors (626902) is **4.5 to 6.5**

Acceptable range for integral (i.e. built-in) sensors on ODO/CT assemblies is **4.4 to 6.4**

Optical Dissolved Oxygen

Barometric pressure: 767.8

Actual Reading before DO% calibration is accepted: 98.2

Reading in DO% calibration environment after calibration is completed: 101.0

ODO gain in GLP record after calibration: / Acceptable range is **0.75 to 1.50**

pH

Buffer	Calibration Value	Actual Readings during calibration		Acceptable pH mV in buffer
		pH	pH mV**	
7	7	6.96		-50 mV to 50 mV
4	4	3.99		+165 to +180 from pH 7 buffer mV value
10	10	10.01		-165 to -180 from pH 7 buffer mV value

pH slope in GLP record after calibration: _____ Acceptable range is ~ **55 to 60 pH/mV**
(Ideal is 59.16 mV/pH)

*GLP stands for Good Laboratory Practice file. This calibration record contains important information about the calibration result.

**The pH mV at the time of calibration (Sensor Value) can also be seen in the final pH GLP record.



04/11/16 03:22:39PM
Calibrate pH
Calibration Value 100%
Accept Calibration
Finish Calibration
Press ESC to Abort
Last Calibrated
01/01/70 00:00:00AM
Actual Reading:
22.8 Ref °C
199.0 pH mV
10.40 pH
Post Cal Value
10.03 pH

10.6
10.2
9.8
131
Ready for next point

When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 236.8

Reading in calibration solution after calibration is completed: 240

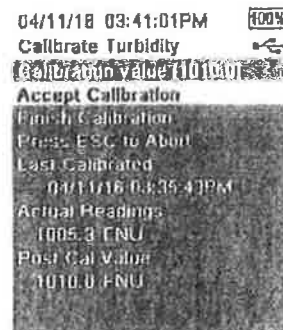
ORP Cal Offset in GLP record after calibration: 3 Acceptable range is **-100 to 50**

Turbidity

Calibration value (FNU)*	Actual Reading during calibration
0	
12.4*	
124*	
1010	

Acceptable range for **Actual Reading** during calibration of the first point is **-10 to 10 FNU**

***Note:** The turbidity sensor can be calibrated to 3 points. Either 12.4 or 124 FNU standard can be used for the second point, but not both. Other calibration values can be used when calibrating.



Depth (Completed in Air)

Actual Reading before calibration is accepted: _____

Reading in air after calibration is completed: _____

Ammonium

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			-20 mV to 20 mV
2nd point: 100 mg/L			+90 to +130 from mV value in 1 mg/L standard

Nitrate

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			180 mV to 220 mV
2nd point: 100 mg/L			-90 to -130 from mV value in 1 mg/L standard

Chloride

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 10 mg/L			205 mV to 245 mV
2nd point: 1,000 mg/L			-80 to -130 from mV value in 10 mg/L standard

**Other standard concentrations can be used. A 2 point calibration without adding a third calibration solution is extremely accurate and is the preferred method. However, if there is a large temperature variation during sampling, a chilled third calibration point is recommended.

***The mV at the time of calibration (Sensor Value) for each point can also be seen in the GLP record after a calibration is complete.

When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 238.5
 Reading in calibration solution after calibration is completed: 240 mV

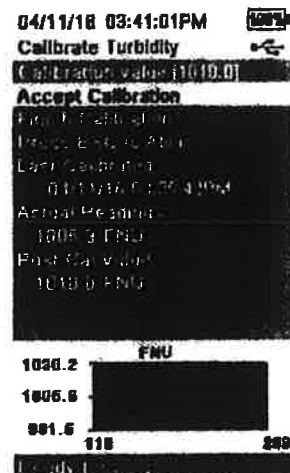
ORP Cal Offset in GLP record after calibration: 1.5 Acceptable range is **-100 to 50**

Turbidity

Calibration value (FNU)*	Actual Reading during calibration
0	
12.4*	
124*	
1010	

Acceptable range for **Actual Reading** during calibration of the first point is **-10 to 10 FNU**

***Note:** The turbidity sensor can be calibrated to 3 points. Either 12.4 or 124 FNU standard can be used for the second point, but not both. Other calibration values can be used when calibrating.



Depth (Completed in Air)

Actual Reading before calibration is accepted: _____

Reading in air after calibration is completed: _____

Ammonium

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			-20 mV to 20 mV
2nd point: 100 mg/L			+90 to +130 from mV value in 1 mg/L standard

Nitrate

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			180 mV to 220 mV
2nd point: 100 mg/L			-90 to -130 from mV value in 1 mg/L standard

Chloride

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 10 mg/L			205 mV to 245 mV
2nd point: 1,000 mg/L			-80 to -130 from mV value in 10 mg/L standard

**Other standard concentrations can be used. A 2 point calibration without adding a third calibration solution is extremely accurate and is the preferred method. However, if there is a large temperature variation during sampling, a chilled third calibration point is recommended.

***The mV at the time of calibration (Sensor Value) for each point can also be seen in the GLP record after a calibration is complete.

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When the Environment Demands It

This calibration worksheet can help document your calibration and track the performance of your sensors. Please follow the detailed calibration procedures in the ProDSS manual or your facility's standard operating procedure (SOP) to ensure all calibrations are as accurate and as consistent as possible.

Refer to the *YSI Solution Expiration Dates* document to ensure your calibration solutions are fresh. In addition to using fresh standards, never accept an out-of-range or questionable calibration results.

Calibration Date 5/13/19 Technician: LMG

Handheld Serial Number: 15F101565 Handheld Software Version: _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 18.43 Accurate? ☒ Y ☐ N

Conductivity

Reading when sensor is dry and in room temp air: 0.029 mS Acceptable value is less than **1 μ S/cm**

Actual Reading in solution before calibration is accepted: 4.333 mS

Reading in calibration solution after calibration is completed: 4.49 mS

Conductivity Cell Constant in GLP* record after calibration:

Acceptable range for ProDSS conductivity/temperature sensors (626902) is **4.5 to 6.5**

Acceptable range for integral (i.e. built-in) sensors on ODO/CT assemblies is **4.4 to 6.4**

Optical Dissolved Oxygen

Barometric pressure: 763

Actual Reading before DO% calibration is accepted: 95.5

Reading in DO% calibration environment after calibration is completed: 100.4

ODO gain in GLP record after calibration: Acceptable range is **0.75 to 1.50**

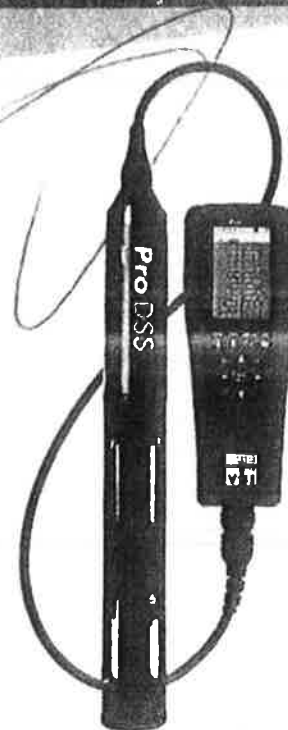
pH

Buffer	Calibration Value	Actual Readings during calibration		Acceptable pH mV in buffer
		pH	pH mV**	
7	<u>7</u>	<u>7.05</u>		-50 mV to 50 mV
4	<u>4</u>	<u>3.98</u>		+165 to +180 from pH 7 buffer mV value
10	<u>10</u>	<u>9.81</u>		-165 to -180 from pH 7 buffer mV value

pH slope in GLP record after calibration: Acceptable range is ~ **55 to 60 pH/mV**
(Ideal is 59.16 mV/pH)

*GLP stands for Good Laboratory Practice file. This calibration record contains important information about the calibration result.

**The pH mV at the time of calibration (Sensor Value) can also be seen in the final pH GLP record.



04/11/16 03:22:38PM

Calibrate pH

Calibration value [10.03]

Accept Calibration

Finish Calibration

Press ESC to Abort

Last Calibrated

01/01/70 00:00:00AM

Actual Readings

22.8 Ref °C

-199.0 pH mV

10.40 pH

Post Cal Value

10.03 pH

pH

10.5

10.2

9.8

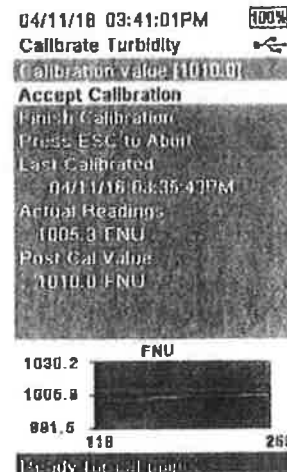
131

Ready for calibration

When the Environment Demands It

ORPActual Reading in solution before calibration is accepted: 244.2Reading in calibration solution after calibration is completed: 240ORP Cal Offset in GLP record after calibration: 4.2 Acceptable range is **-100 to 50****Turbidity**

Calibration value (FNU)*	Actual Reading during calibration
0	
12.4*	
124*	
1010*	

Acceptable range for **Actual Reading** during calibration of the first point is **-10 to 10 FNU*****Note:** The turbidity sensor can be calibrated to 3 points. Either 12.4 or 124 FNU standard can be used for the second point, but not both. Other calibration values can be used when calibrating.**Depth (Completed in Air)**

Actual Reading before calibration is accepted: _____

Reading in air after calibration is completed: _____

Ammonium

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			-20 mV to 20 mV
2nd point: 100 mg/L			+90 to +130 from mV value in 1 mg/L standard

Nitrate

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			180 mV to 220 mV
2nd point: 100 mg/L			-90 to -130 from mV value in 1 mg/L standard

Chloride

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 10 mg/L			205 mV to 245 mV
2nd point: 1,000 mg/L			-80 to -130 from mV value in 10 mg/L standard

**Other standard concentrations can be used. A 2 point calibration without chilling a third calibration solution is extremely accurate and is the preferred method. However, if there is a large temperature variation during sampling, a chilled third calibration point is recommended.

***The mV at the time of calibration (Sensor Value) for each point can also be seen in the GLP record after a calibration is complete.

When the Environment Demands It

This calibration worksheet can help document your calibration and track the performance of your sensors. Please follow the detailed calibration procedures in the ProDSS manual or your facility's standard operating procedure (SOP) to ensure all calibrations are as accurate and as consistent as possible.

Refer to the *YSI Solution Expiration Dates* document to ensure your calibration solutions are fresh. In addition to using fresh standards, never accept an out-of-range or questionable calibration results.

Calibration Date 5/14/19 Technician: Lmg

Handheld Serial Number: 5F101568 Handheld Software Version: _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 20.52 Accurate? ☒ Y ☐ N

Conductivity

Reading when sensor is dry and in room temp air: 0.1037 mS Acceptable value is less than **1 μ S/cm**

Actual Reading in solution before calibration is accepted: 4.1637

Reading in calibration solution after calibration is completed: 4.49 mS

Conductivity Cell Constant in GLP* record after calibration: /

Acceptable range for ProDSS conductivity/temperature sensors (626902) is **4.5 to 6.5**

Acceptable range for integral (i.e. built-in) sensors on ODO/CT assemblies is **4.4 to 6.4**

Optical Dissolved Oxygen

Barometric pressure: 765

Actual Reading before DO% calibration is accepted: 106.2 %

Reading in DO% calibration environment after calibration is completed: 100.4 %

ODO gain in GLP record after calibration: / Acceptable range is **0.75 to 1.50**

pH

Buffer	Calibration Value	Actual Readings during calibration		Acceptable pH mV in buffer
		pH	pH mV**	
7	7	6.96		-50 mV to 50 mV
4	4	4.27		+165 to +180 from pH 7 buffer mV value
10	10	10.19		-165 to -180 from pH 7 buffer mV value

pH slope in GLP record after calibration: _____ Acceptable range is ~ **55 to 60 pH/mV**
(Ideal is 59.16 mV/pH)

*GLP stands for Good Laboratory Practice file This calibration record contains important information about the calibration result.

**The pH mV at the time of calibration (Sensor Value) can also be seen in the final pH GLP record.



04/11/18 03:22:38PM
Calibrate pH
Calibration value 110.0
Accept Calibration
Finish Calibration
Press ESC to Abort
Last Calibrated
01/01/70 00:00:00A
Actual Readings
22.8 Ref °C
195.0 pH mV
10.40 pH
Post Cal Value
10.03 pH
pH
10.8
10.2
9.8
181
Ready for calibration

When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 239.4

Reading in calibration solution after calibration is completed: 240

ORP Cal Offset in GLP record after calibration: Acceptable range is **-100 to 50**

Turbidity

Calibration value (FNU)*	Actual Reading during calibration
0	
12.4*	
124*	
1010	

Acceptable range for **Actual Reading** during calibration of the first point is **-10 to 10 FNU**

***Note:** The turbidity sensor can be calibrated to 3 points. Either 12.4 or 124 FNU standard can be used for the second point, but not both. Other calibration values can be used when calibrating.



Depth (Completed in Air)

Actual Reading before calibration is accepted:

Reading in air after calibration is completed:

Ammonium

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			-20 mV to 20 mV
2nd point: 100 mg/L			+90 to +130 from mV value in 1 mg/L standard

Nitrate

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 1 mg/L			180 mV to 220 mV
2nd point: 100 mg/L			-90 to -130 from mV value in 1 mg/L standard

Chloride

Concentration** (i.e. Calibration Value)	Actual Readings during calibration		Acceptable mV when the sensor is new
	mg/L	mV***	
1st point: 10 mg/L			205 mV to 245 mV
2nd point: 1,000 mg/L			-80 to -130 from mV value in 10 mg/L standard

**Other standard concentrations can be used. A 2 point calibration without chilling a third calibration solution is extremely accurate and is the preferred method. However, if there is a large temperature variation during sampling, a chilled third calibration point is recommended.

***The mV at the time of calibration (Sensor Value) for each point can also be seen in the GLP record after a calibration is complete.

APPENDIX E

Pore Water Sampling Photograph Log

Pore Water Sampling
Coke Oven Area
Sparrows Point, Maryland



Photo 1: View of CO-016-PW-3 after attempting a 3 foot sample in Cell 3 of the Coke Oven Area.



Photo 2: View of CO-025-PW-1 after attempting a 9 inch sample in Cell 3 of the Coke Oven Area.

Pore Water Sampling
Coke Oven Area
Sparrows Point, Maryland



Photo 3: View of CO-040-PW-1 after attempting a 9 inch sample in Cell 3 of the Coke Oven Area.



Photo 4: View of CO-045-PW-3 after attempting a 3 foot sample in Cell 3 of the Coke Oven Area.
Black mud extends nearly up to the flange of the push-point sampler.

Pore Water Sampling
Coke Oven Area
Sparrows Point, Maryland



Photo 5: View of CO-056-PW-1 after attempting a 9 inch sample in Cell 2 of the Coke Oven Area. .



Photo 6: View of CO-059-PW-1 after attempting a 9 inch sample in Cell 2 of the Coke Oven Area. .

Pore Water Sampling
Coke Oven Area
Sparrows Point, Maryland



Photo 7: View of CO-061-PW-2 after attempting a 2 foot sample in Cell 2 of the Coke Oven Area. .



Photo 8: View of CO-062-PW-1 after attempting a 9 inch sample in Cell 2 of the Coke Oven Area. .

Pore Water Sampling
Coke Oven Area
Sparrows Point, Maryland



Photo 9: View of CO-068-PW-1 after attempting a 9 inch sample in Cell 2 of the Coke Oven Area. .



Photo 10: View of CO-083-PW-3 after attempting a 3 foot sample in Cell 5 of the Coke Oven Area. .

Pore Water Sampling
Coke Oven Area
Sparrows Point, Maryland



Photo 11: View of CO-089-PW-1 after attempting a 9 inch sample in Cell 5 of the Coke Oven Area. .



Photo 12: View of CO-089-PW-3 after attempting a 3 foot sample in Cell 5 of the Coke Oven Area.

Pore Water Sampling
Coke Oven Area
Sparrows Point, Maryland



Photo 13: View of CO-095-PW-2 after attempting a 2 foot sample in Cell 5 of the Coke Oven Area. .

APPENDIX F

QA/QC Tracking Log

QA/QC Tracking Log

Trip
Blank:

Date:

Sample IDs

Y	5/1/2019	1) COM-MWS	
Y		2) COM-MWI	
Y		3) COL-MWS	
Y		4) COL-MWI	
Y	5/6/2019	5) COS-MWS	
Y		6) COW-MWS	
Y		7) COV-MWI	<u>Duplicate:</u> COV-MWI
Y		8) COK-MWS	<u>Date:</u> 5/6/2019
Y		9) COK-MWI	<u>MS/MSD:</u> COO-MWI
Y	5/7/2019	10) CON-MWS	<u>Date:</u> 5/7/2019
Y		11) CON-MWI	<u>Field Blank:</u>
Y		12) COO-MWS	<u>Date:</u> 5/7/2019
Y		13) COO-MWI	<u>Eq. Blank:</u> -
Y	5/8/2019	14) COT-MWS	<u>Date:</u> -
Y		15) COY-MWS	
Y		16) COZ-MWS	
Y		17) COX-MWS	
Y		18) COU-MWS	
Y	5/9/2019	19) COQ-MWI	
Y		20) COP-MWI	

Trip
Blank:

Date:

Sample IDs

1)	
2)	
3)	
4)	
5)	
6)	
7)	<u>Duplicate:</u>
8)	<u>Date:</u>
9)	<u>MS/MSD:</u>
10)	<u>Date:</u>
11)	<u>Field Blank:</u>
12)	<u>Date:</u>
13)	<u>Eq. Blank:</u>
14)	<u>Date:</u>
15)	
16)	
17)	
18)	
19)	
20)	

		1) COBB-MWS	
		2) COCC-MWS	
		3) COFF-MWS	
		4) COGG-MWS	
Y	5/10/2019	5) COH-MWS	
Y		6) COF-MWS	
Y		7) COG-MWS	<u>Duplicate:</u> COB-MWS
Y		8) COI-MWS	<u>Date:</u> 5/13/2019
Y	5/13/2019	9) COB-MWS	<u>MS/MSD:</u> COAA-MWS
Y		10) COC-MWS	<u>Date:</u> 5/14/2019
Y		11) COA-MWS	<u>Field Blank:</u>
Y		12) COJ-MWS	<u>Date:</u> 5/13/2019
	5/14/2019	13) COAA-MWS	<u>Eq. Blank:</u> -
		14) CODD-MWS	<u>Date:</u> -
Y		15) COR-MWI	
Y		16) COE-MWS	
Y		17) COD-MWS	
		18)	
		19)	
		20)	

1)	
2)	
3)	
4)	
5)	
6)	
7)	<u>Duplicate:</u>
8)	<u>Date:</u>
9)	<u>MS/MSD:</u>
10)	<u>Date:</u>
11)	<u>Field Blank:</u>
12)	<u>Date:</u>
13)	<u>Eq. Blank:</u>
14)	<u>Date:</u>
15)	
16)	
17)	
18)	
19)	
20)	

APPENDIX G

Evaluation of Data Completeness

EVALUATION OF DATA COMPLETENESS
Percentage of Non-Rejected Results vs. Total Results

Parameter	Matrix	Unit	Number of Validated Results	Detections	Number of Rejected Results	Number of Non-rejected Results	Completeness
Benzene	Groundwater	ug/L	31	31	0	31	100%
Ethylbenzene	Groundwater	ug/L	31	31	0	31	100%
Toluene	Groundwater	ug/L	31	31	0	31	100%
Xylene	Groundwater	ug/L	31	31	0	31	100%
Naphthalene	Groundwater	ug/L	37	37	0	37	100%
Diesel Range Organics	Groundwater	ug/L	21	21	0	21	100%
Gasoline Range Organics	Groundwater	ug/L	21	21	0	21	100%
Benzene	Pore Water	ug/L	38	14	0	38	100%
Ethylbenzene	Pore Water	ug/L	38	9	0	38	100%
Toluene	Pore Water	ug/L	38	9	0	38	100%
Xylene	Pore Water	ug/L	38	9	0	38	100%
Naphthalene	Pore Water	ug/L	45	37	0	45	100%
Diesel Range Organics	Pore Water	ug/L	32	32	0	32	100%
Gasoline Range Organics	Pore Water	ug/L	33	6	0	33	100%
Benzene	Surface Water	ug/L	57	35	0	57	100%
Ethylbenzene	Surface Water	ug/L	57	2	0	57	100%
Toluene	Surface Water	ug/L	57	27	0	57	100%
Xylene	Surface Water	ug/L	57	13	0	57	100%
Naphthalene	Surface Water	ug/L	57	54	0	57	100%

APPENDIX H

Select Figures and Table from Previous Offshore Studies

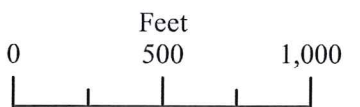
Site Assessment for Proposed Coke Point Dredged Material Containment Facility at Sparrows Point



Legend

- Field Screening Evidence of Hydrocarbon Sheen and Odors Observed in Subsurface Sediment Samples
- Sampling Locations
- Shallow Aquifer Groundwater Flow Direction
- Area of Concern

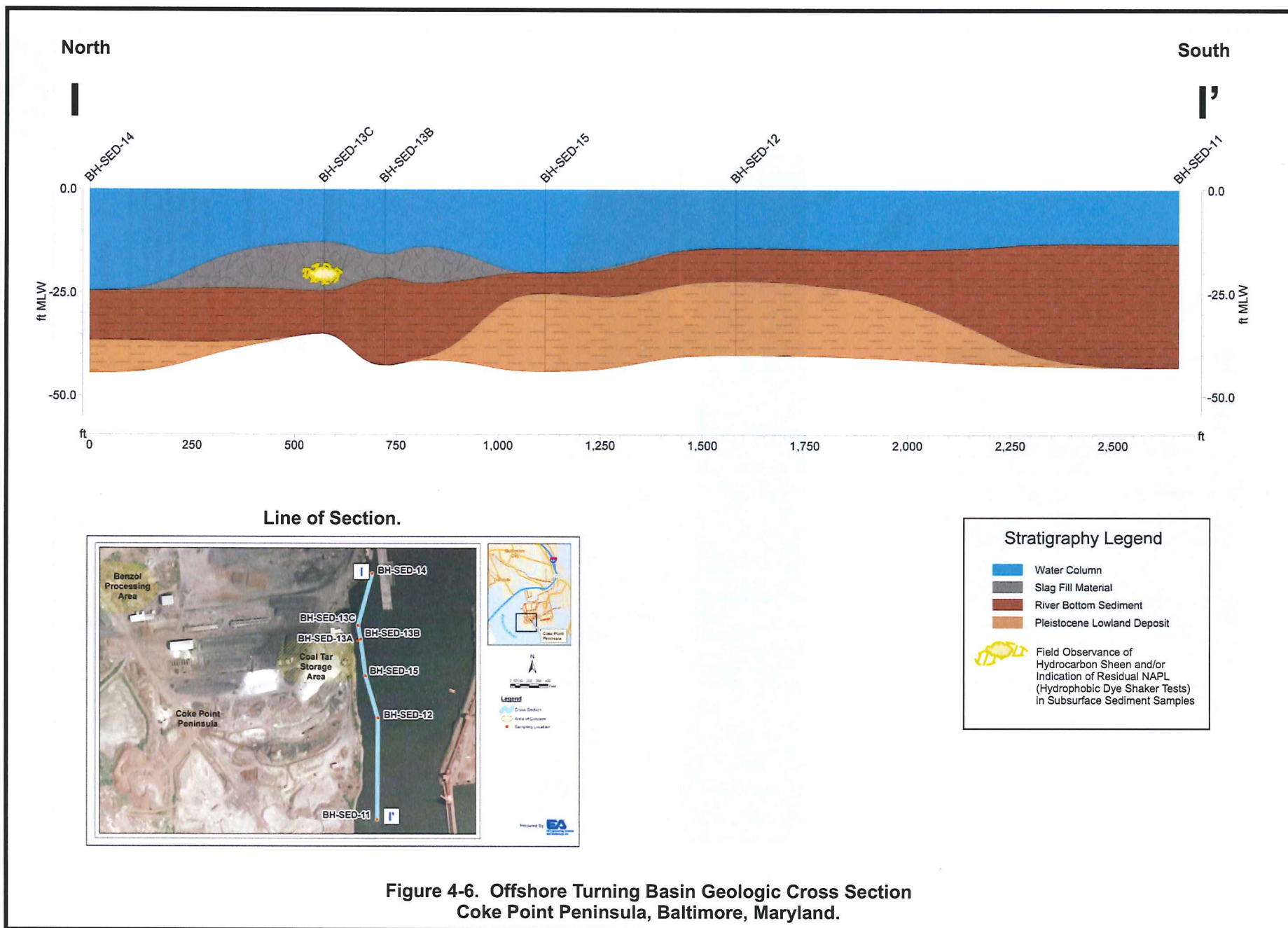
Sources
ESRI, i-cubed, GeoEye, 2009
Tele Atlas North America Inc., ESRI, 2006



EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.



Figure 4-4. Offshore Locations of Field-Observed Impacts, Coke Point Peninsula, Baltimore, Maryland



**Table 4-9. Field Screening Indicators of Non-Aqueous Phase Liquid and/or Highly Impacted Sediment Surrounding the Coke Point Peninsula
Sparrows Point Site Assessment (2009), Baltimore, Maryland**

Depth Interval (ft bgs)	Location 1			Location 2			Location 3A			Location 3B			Location 3C		
	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor
0 - 2	--	0.4	SLIGHT	--	3.6	SLIGHT	SHEEN	--	YES	--	8.6	YES	SHEEN	5.0	YES
2 - 4	--	0.0	SLIGHT	--	--	--	--	0.0	YES	POSITIVE	0.4	YES	SHEEN	0.0	YES
4 - 6	--	0.0	SLIGHT	POSITIVE	8.4	YES	NEGATIVE	0.0	YES	--	11.0	YES	--	0.0	YES
6 - 8	POSITIVE	0.0	VERY SLIGHT	POSITIVE	14.2	SLIGHT	--	0.0	YES	--	1.5	YES	--	0.0	YES
8 - 10	SHEEN	0.0	YES	SHEEN	24.0	YES	--	0.0	YES	--	1.0	YES	--	0.0	SLIGHT
10 - 12	POSITIVE	0.0	YES	SHEEN	21.8	YES	--	0.0	YES	--	0.0	NO	--	0.0	--
12 - 14	--	0.0	SLIGHT	SHEEN	20.0	YES	--	0.0	SLIGHT	--	0.8	NO	--	0.0	--
14 - 16	--	0.0	--	--	2.6	--	--	0.0	NO	--	0.0	--	--	0.0	SLIGHT
16 - 18	--	0.0	--	--	57.0	--	--	0.0	SLIGHT	--	0.0	--	--	0.0	--
18 - 20	--	0.0	--	POSITIVE	112.0	YES	--	0.0	SLIGHT	--	0.0	--	--	0.0	--
20 - 22	--	0.0	--	--	30.2	YES	--	0.0	SLIGHT						
22 - 24	--	0.0	--		13.0	YES									
24 - 26	--	0.0	YES												
26 - 28	--	0.0	YES												
28 - 30	--	--	--												

Notes:

-- = No field screening results noted on borelog.

Bold font and shaded cells indicate definite presence of NAPL.

Bold font cells indicate highly impacted sediment with possible presence of NAPL.

Sheen and odor in the 0 - 2 interval for location 3A were noted during surface sediment sampling

Table 4-9. (continued)

Depth Interval (ft bgs)	Location 3D			Location 3E			Location 4			Location 5			Location 6		
	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor
0 - 2	SHEEN	0.0	YES	--	0.0	NO	--	0.0	SLIGHT	--	--	--	--	7.1	YES
2 - 4	SHEEN	0.0	YES	NEGATIVE	0.0	--	--	--	--	--	0.0	YES	--	9.0	YES
4 - 6	--	0.0	YES	--	0.0	NO	--	0.0	YES	NEGATIVE	0.0	YES	--	14.2	YES
6 - 8	--	0.0	YES	--	0.0	NO	--	0.0	YES	--	0.0	SLIGHT	NEGATIVE	220.0	--
8 - 10	--	0.0	SLIGHT	--	0.0	NO	NEGATIVE	0.0	YES	--	0.0	SLIGHT	--	2.5	--
10 - 12	--	0.0	NO	--	0.0	NO	--	0.0	SLIGHT	--	0.0	SLIGHT	--	0.2	--
12 - 14	--	0.0	NO	--	0.0	NO	--	0.0	--	SHEEN	0.0	YES	--	0.0	--
14 - 16	--	0.0	NO	--	0.0	NO	--	0.0	SLIGHT	SHEEN	0.0	YES	--	1.7	--
16 - 18	--	0.0	NO	--	0.0	NO	--	0.0	NO	--	0.0	YES	--	0.0	--
18 - 20	--	0.0	NO	--	0.0	NO	--	0.0	NO	--	0.0	SLIGHT	--	0.0	--
20 - 22	--	0.0	NO				--	0.0	NO	--	0.0	SLIGHT			
22 - 24							--	0.0	NO	--	0.0	SLIGHT			
24 - 26										--	0.0	SLIGHT			
26 - 28										--	0.0	SLIGHT			
28 - 30															

Notes:

-- = No field screening results noted on borelog.

Bold font and shaded cells indicate definite presence of NAPL.

Bold font cells indicate highly impacted sediment with possible presence of NAPL.

Table 4-9. (continued)

Depth Interval (ft bgs)	Location 7			Location 8			Location 9			Location 10			Location 11		
	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor
0 - 2	--	0.0	NO	--	0.0	NO	--	--	--	--	0.0	SLIGHT	--	0.0	NO
2 - 4	--	0.0	SLIGHT	--	0.0	NO	--	0.0	NO	INCONCLUSIVE	0.0	SLIGHT	NEGATIVE	0.0	YES
4 - 6	--	0.0	SLIGHT	--	0.0	NO	--	--	--	--	0.0	NO	--	0.0	SLIGHT
6 - 8	NEGATIVE	0.0	NO	--	--	--	--	0.0	NO	--	0.0	SLIGHT	--	0.0	SLIGHT
8 - 10	--	0.0	NO	--	0.0	YES	--	0.0	NO	--	0.0	NO	--	0.0	SLIGHT
10 - 12	--	0.0	NO	NEGATIVE	0.0	SLIGHT	--	0.0	NO	--	0.0	NO	--	0.0	NO
12 - 14	--	0.0	NO	--	0.0	SLIGHT	--	0.0	NO	--	0.0	SLIGHT	--	0.0	NO
14 - 16	--	0.0	--	--	0.0	NO	--	0.0	NO	--	0.0	SLIGHT	--	0.0	NO
16 - 18	--	0.0	NO	--	0.0	SLIGHT	--	0.0	NO	--	0.0	SLIGHT	--	0.0	NO
18 - 20	--	0.0	NO	--	0.0	SLIGHT	--	0.0	NO	--	0.0	NO	--	0.0	NO
20 - 22							--	0.0	NO	--	0.0	NO	--	0.0	NO
22 - 24							--	0.0	NO	--	0.0	NO	--	0.0	NO
24 - 26							--	0.0	NO	--	0.0	NO	--	0.0	NO
26 - 28							--	0.0	NO	--	0.0	NO	--	0.0	NO
28 - 30							--	0.0	NO	--	0.0	NO	--	0.0	NO

Notes:

-- = No field screening results noted on borelog.

Bold font and shaded cells indicate definite presence of NAPL.

Bold font cells indicate highly impacted sediment with possible presence of NAPL.

Table 4-9. (continued)

	Location 12			Location 13A			Location 13B			Location 13C			Location 14		
Depth Interval (ft bgs)	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor
0 - 2	--	0.0	--	--	0.0	YES	--	0.0	NO	--	0.0	--	--	--	--
2 - 4	--	0.0	--	--	--	--	--	0.0	NO	--	0.0	YES	--	--	--
4 - 6	--	0.0	--	NEGATIVE	0.0	YES	--	0.0	NO	--	0.0	SLIGHT	--	--	--
6 - 8	--	0.0	--	--	0.0	YES	--	0.0	NO	--	0.0	YES	--	0.0	NO
8 - 10	--	0.0	--	--	0.0	YES	--	0.0	NO	SHEEN	0.0	SLIGHT	--	0.0	YES
10 - 12	--	0.0	--	SHEEN	0.0	YES	--	0.0	NO	--	0.0	SLIGHT	--	0.0	YES
12 - 14	--	0.0	--	--	0.0	SLIGHT	--	0.0	NO	--	0.0	NO	--	0.0	NO
14 - 16	--	0.0	--	--	0.0	SLIGHT	--	0.0	NO	--	0.0	NO	--	0.0	NO
16 - 18	--	0.0	--	--	--	--	--	0.0	NO	--	0.0	NO	--	0.0	NO
18 - 20	--	0.0	--	--	0.0	SLIGHT	--	0.0	NO	--	0.0	NO	--	0.0	NO
20 - 22	--	0.0	--	--	0.0	NO	--	0.0	NO	--	0.0	NO			
22 - 24	--	0.0	--	--	0.0	SLIGHT	--	0.0	NO						
24 - 26	--	0.0	--	--	0.0	--	--	0.0	NO						
26 - 28				--	0.0	NO									
28 - 30				--	0.0	NO									

Notes:

-- = No field screening results noted on borelog.

Bold font and shaded cells indicate definite presence of NAPL.

Bold font cells indicate highly impacted sediment with possible presence of NAPL.

Table 4-9. (continued)

	Location 15			Location 16			Location 17			Location 18		
Depth Interval (ft bgs)	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor	Dye test / Visual	PID (ppm)	Odor
0 - 2	--	0.0	NO	NEGATIVE	0.0	NO	NEGATIVE	0.0	NO	NEGATIVE	0.0	SLIGHT
2 - 4	NEGATIVE	0.0	SLIGHT	--	0.0	NO	--	--	--	--	--	--
4 - 6	--	0.0	SLIGHT	--	0.0	NO	--	0.0	NO	--	0.0	SLIGHT
6 - 8	--	0.0	SLIGHT	--	0.0	NO	--	0.0	NO	--	0.0	SLIGHT
8 - 10	--	0.0	NO	--	0.0	NO	--	0.0	NO	--	0.0	NO
10 - 12	--	0.0	SLIGHT				--	0.0	NO	--	0.0	--
12 - 14	--	0.0	NO				--	0.0	NO	--	0.0	NO
14 - 16	--	0.0	NO				--	0.0	NO	--	0.0	NO
16 - 18	--	0.0	NO				--	0.0	NO	--	0.0	NO
18 - 20	--	0.0	NO				--	0.0	NO	--	0.0	NO
20 - 22	--	0.0	NO				--	0.0	NO	--	0.0	NO
22 - 24	--	0.0	NO				--	0.0	NO	--	0.0	NO
24 - 26							--	0.0	NO	--	0.0	NO
26 - 28							--	0.0	NO	--	0.0	NO
28 - 30										--	0.0	NO

Notes:

-- = No field screening results noted on borelog.

Bold font and shaded cells indicate definite presence of NAPL.

Bold font cells indicate highly impacted sediment with possible presence of NAPL.