ROD AND WIRE MILL INTERIM MEASURES SUPPLEMENTAL INVESTIGATION REPORT

TRADEPOINT ATLANTIC
SPARROWS POINT, MARYLAND

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1.0 INTRODUCTION

1.1 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 Rod and Wire Mill Area (RWM). In particular, this report expands on the previous Pre-Design Investigation Rod and Wire Mill Characterization Report (ARM, 2016), and the Rod and Wire Mill Interim Measures Progress Report – December 2018 (RM, 2019).

In an email received on November 28, 2018, the United States Environmental Protection Agency (USEPA) provided comments on the "Rod and Wire Mill Interim Measures Progress Report – August 2018". The comments identified elevated zinc levels, as a potential concern with respect to discharges to surface water. The most recent progress report, "Rod and Wire Mill Interim Measures Progress Report—December 2018" was submitted to the EPA and the Maryland Department of the Environment (MDE) on February 15, 2019. In an email received on February 28, 2019, the MDE provided comments that recommended the installation of additional wells to address data gaps in the RWM's monitoring network.

This report presents the results of additional data collection activities recently completed within the RWM in accordance with the RWM Interim Measure Supplemental Investigation Work Plan, Revision 1 dated March 7, 2019, and the Offshore Investigation Work Plan, Revision 1 approved March 5, 2019. The objectives of the supplemental investigation were to improve the understanding of groundwater conditions in the RWM, to address the concerns raised by MDE and EPA outlined in the comments mentioned above, and to provide additional investigation data to support the evaluation of the most relevant and effective additional corrective actions for the groundwater conditions at the RWM. The objective of the offshore investigation was to assess whether current groundwater discharges from the RWM could be adversely impacting the offshore environment.

1.1 Tradepoint Atlantic – Site Background

The Tradepoint Atlantic property is located in Baltimore County, Maryland within the southeastern corner of the Baltimore metropolitan area, and approximately nine miles from downtown. The property encompasses approximately 3,100 acres of land located on a peninsula situated on the Patapsco River near its confluence with the Chesapeake Bay, and physically positioned in the mouth of the heavily industrialized and urbanized Baltimore Harbor / Patapsco River region. **Figure 1** shows the location and boundaries of the Tradepoint Atlantic property.

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 Former Rod and Wire Mill

The RWM (the Site) is located in the northwestern portion of the Tradepoint Atlantic property, and is the location of the former mills that produced rods and wire products from the 1940's to the early 1980's. **Figure 2** shows the location and boundaries of the RWM.

All manufacturing activities at the RWM ceased operation in the early 1980's, with the subsequent demolition of all structures between 1994 and 2000. Current ground cover includes slag aggregate that was placed in conjunction with the demolition program.

Manufacturing activities at the RWM included leaching of zinc ore and a subsequent treatment process to remove cadmium impurities. These activities resulted in zinc and cadmium contaminated soil and groundwater. The leaching process was implemented in large tanks located inside the north end of the former RWM building. In the 1950's through the early 1970's, the acidic leach residue was stored in the Northwest Pond until about 1959 when filters were installed to dewater the residues. Dewatered sludge generated from this process was temporarily stored on the ground outside the north end of the mill in the Former Sludge Bin Storage Area, the location of which is shown on **Figure 2**. Filtrate from the dewatering process was recycled to the wire plating process. Excess filtrate was discharged to the East Pond until 1971, after which it was sent to the Humphrey Creek Wastewater Treatment Plant (HCWWTP) for treatment. These operations ended in the early 1980's when the RWM was shut down.

Historically, as part of a series of site investigations conducted by the then owner, Bethlehem Steel Corporation, there were various Solid Waste Management Units (SWMUs) identified in the vicinity of the Rod and Wire Mill area during the mid-1980s and on through the early 1990s. Specifically, there were 8 SWMUs identified in the Description of Current Conditions Report – Bethlehem Steel Corporation – Sparrows Point report (DCC report), Section 3.3.4, prepared by Rust Environment & Infrastructure:

SWMU 27: Rod Mill Remediation Area
SWMU 28: Northwest Pond
SWMU 29: East Pond
SWMU 30: Rod Mill Equalization Tanks (2)
SWMU 38: Cadmium Treatment Trenches
SWMU 39: Rod Mill Scale Pits (2)
SWMU 44: Rod Mill Cooling Tower

SWMU 45: Rod Mill Trenches/Sumps

As part of the Phase I Environmental Site Assessment conducted by Weaver Boos Consultants, LLC, in May 2014, the SWMUs were updated from the DCC report; there were six Recognized Environmental Conditions (RECs) identified in the RWM as still requiring further investigation for a permanent remediation measure. The locations of the RECs are shown on **Figure 2** and further described as follows:

New REC	Former SMWU/AOC	Area Name	Explanation
6A	27	Rod Mill Remediation Area	Continuing interim measures (IM) are in place for cadmium/zinc impacted groundwater as per the Consent Decree. During the site visit the existing IM remediation system was observed. Based on this information, the potential for a material release which may impact the environment is present.
6B	28	[Filled] Northwest Pond	Continuing interim measures are in place for cadmium/zinc impacted groundwater as per the Consent Decree. During the site visit the existing IM remediation system was observed. Based on our review of historical source information and experience, the Northwest Pond may have potentially contained hazardous substances and/or petroleum products which may have resulted in a release to the environment.
6C	29	[Filled] East Pond	Continuing interim measures are in place for cadmium/zinc impacted groundwater as per the Consent Decree. During the site visit the existing IM remediation system was observed. Based on this information, the potential for a material release which may impact the environment is present.
6D	45	Rod Mill Trenches/Sumps	The DCC Report recommended further action was needed for this item which were identified as piping designed to transport process wastewater. Based on our review of historical source information and experience, the trenches/sumps may have potentially contained hazardous substances and/or petroleum products which may have resulted in a release to the environment.
6E	X	Unknown Aboveground Tank	The DCC Report recommended further action was needed for this item. Based on our review of historical source information and experience, the tank may have contained hazardous substances and/or petroleum products which may have resulted in a release to the environment.

General layout of the industrial buildings formerly located at the Site are shown on **Figure 3.**

1.3 RWM Interim Measures

In 1986, a soil and groundwater remediation program was initiated to address groundwater that exhibited elevated concentrations of cadmium and residual soil contamination within the Sludge Bin Storage Area. Remediation initially consisted of a soil flushing program with associated pumping and treatment of groundwater from shallow and intermediate wells.

This pump and treat system was reconfigured in 2001 to provide groundwater recovery from two intermediate zone recovery wells (RW10-PZM020 and RW15-PZM020) that operated at a rate of between 5 and 12 gallons per minute (gpm). Recovered groundwater was transported via a pipeline

to the HCWWTP for subsequent treatment and discharge in accordance with the National Pollutant Discharge Elimination System (NPDES) permit requirements for the Facility. The pump and treat system remained active until September 2016.

The current remedial approach utilizes in-situ treatment trenches designed to reduce dissolved metal concentrations in the intermediate zone within the identified source areas. Specifically, alkaline reagents (TerrabondMG – 40% by weight in conjunction with limestone aggregate – 60% by weight) were added into the intermediate groundwater zone as permeable reactive barrier trenches designed to intercept groundwater flowing to the west from select high concentration areas. The trenches were backfilled with reagent mix from a depth of 35 feet below ground surface (bgs) up to a depth approximately 12 feet bgs. The design and oversight of this remedial technique was completed by Advanced GeoServices (AGS) and is discussed in greater detail in the AGS Work Plan, Interim Measure Work Plan In-Situ Groundwater Treatment dated August 22, 2016. The construction of the trenches was completed in January 2017.

The soils and groundwater beneath the Former Sludge Bin Storage area contained the highest concentrations of cadmium in the RWM. A 130-foot by 130-foot section of this area was designated as the cadmium hot spot. To reduce the source of continuing cadmium contamination to groundwater in this area, approximately 1,252 cubic yards of soils were excavated from the top 2 feet of the cadmium hot spot and disposed of off-site. TerrabondMG powder was then mixed into the hot spot soils from a depth of 2 feet to 7 feet bgs. After the soils were mixed with the TerrabondMG, the cadmium hot spot was capped with a 12-inch layer of the smaller gradation of steel mill slag.

Since the completion of the soil stabilization and trench installation, groundwater monitoring (monthly through 2017 and quarterly in 2018) has been performed at upgradient, performance and perimeter wells to assess their performance. Interim Measures Progress Reports have been submitted to the EPA and MDE on a semi-annual basis. These progress reports summarize the results of the quarterly monitoring events.

The interim groundwater treatment goals are to increase the pH in order to precipitate the dissolved metals and achieve a reduction in dissolved concentrations of cadmium and zinc within the source areas when compared to pretreatment conditions. Ultimately the treatment goal will be to demonstrate that the concentration of the primary contaminants (cadmium and zinc) in groundwater discharging at the shoreline/property boundary are acceptable.

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 RWM Interim Measure 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 Groundwater Investigation

2.1.1 Well Installation

During this supplemental investigation, a total of 20 shallow and 22 intermediate zone temporary groundwater sample collection points (piezometers) were installed in accordance with the procedures referenced in the QAPP Worksheet 21 – Field SOPs, SOP No. 13 – Drilling and SOP No. 28 – Direct Push Installation and Construction of Temporary Groundwater Sample Collection Points (Rev. 01). The new temporary piezometers were constructed with either stick-up steel protective casing or flush mount surface protection.

The 42 piezometers were installed at the locations shown on **Figure 4**, and the rationale for each specific location is summarized below.

- Improve coverage of sentinel wells along the western property boundary.
- Fill spatial gaps in current coverage.
- Fulfill specific MDE request.
- Investigate conditions in the former northwest pond area.
- Investigate potential flow toward the northeast.
- Investigate upgradient (eastern) conditions.
- Investigate conditions within and immediately downgradient of a remedial trench.
- Install replacements for RW05-MW(I) and RW22-MW(I).

Intermediate monitoring wells RW05-MW(I) and RW22-MW(I) were inspected and developed in December 2018. Observations made during redevelopment of these wells indicated that the bottom five feet of RW05-MW(I) may have collapsed, while RW22-MW(I) had very poor recharge. The conditions in these wells may have caused groundwater samples that are not representative of the groundwater conditions in their respective vicinities. Replacements were proposed for these wells because the structural condition of both wells was in poor condition.

Additionally, three pairs of monitoring wells were installed to replace historical monitoring wells that were previously abandoned in support of development activities. The locations of these wells are shown on **Figure 4**. All new 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 in Unconsolidated Formations (Rev. 02).

The temporary piezometers and monitoring wells were installed using a Geoprobe® direct-push drill rig. Final depths and screen intervals correspond to the current on-site shallow and intermediate zone wells. 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 Unified Soil Classification System (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 proposed well/piezometer locations due to equipment refusal and/or utility conflicts. If the Geoprobe tooling encountered refusal, the rig would be shifted a few feet laterally and another attempt would be made to begin drilling. Several attempts were made at the locations of proposed piezometers RWC-MWS, RWC-MWI, and RWP-MWS. Given the multiple refusals that were encountered at depths below 5 feet bgs for RWC-MWS and RWC-MWI, and below 7 feet bgs for RWP-MWS, piezometers were ultimately not installed at any of these three locations.

2.1.2 Well Development

The newly installed temporary piezometers and 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 historical wells and newly installed monitoring wells have been included in **Appendix B**.

2.1.3 Water Level Measurements

The piezometers and monitoring wells used in 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 on May 2, 2019 from each piezometer and monitoring well 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. The hydrogeologic zones of each listed well are also indicated.

2.1.4 Groundwater Sampling

Groundwater samples were collected from the new temporary piezometers, new monitoring wells, and the existing 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. A total of 74 samples were collected for the RWM Interim Measure Supplemental Investigation. Of the 74 total sample collection points that were sampled as part of the study area, 36 were screened in the shallow hydrogeologic zone, 37 were screened in the intermediate hydrogeologic zone, and 1 was screened in the deep hydrogeologic zone. A groundwater sample was also collected from RW21-MW(S), a non-aqueous phase liquid (NAPL) monitoring well installed in the shallow zone. Although this well was originally installed to monitor NAPL thickness, it has had little or no measured NAPL over several of the most recent measurements.

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, and a turbidity meter. 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 total and dissolved metals (zinc and cadmium only) via method 6010C, alkalinity via method SM2320, and acidity via method SM2310. Groundwater samples submitted for analysis of dissolved metals were filtered in the field with an in-line 0.45-micron filter. Samples were 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.

Sampling of RWA-MWS, RWA-MWI, RWB-MWS, RWB-MWI, RW22R-MWS, and RW22R-MWI for total and dissolved zinc and cadmium was repeated to provide confirmation data for groundwater concentrations identified during the initial sampling event.

2.2 Trench Investigation

Soil borings were completed at the locations shown on **Figure 4** in order to assess conditions of the alkaline charge material in the remediation trenches. The soil borings were installed in accordance with the procedures referenced in the QAPP Worksheet 21 – Field SOPs, SOP No. 09 – subsurface Soil Sampling. Field shifts were made to the proposed location for RWT-SB to avoid several stormwater drainage pipes in the subsurface. Based on visual observations of the recovered soil, none of the attempts at the shifted locations were successfully drilled into the trench material, and therefore no samples were collected.

Composite soil samples of trench material below the water table were collected from boring locations RWJ and RWU, and submitted to the laboratory for analysis for total metals (zinc and cadmium only) via method 6010C, net neutralization potential via method Modified Sobek 3.2, and cation

exchange capacity via EPA SW846 method 9081. All down-hole soil sampling equipment was decontaminated after soil sampling had been concluded at a location in accordance with the procedures and methods referenced in the QAPP Worksheet 21 – Field SOPs, SOP No. 016 – Equipment Decontamination.

Composite soil samples of trench material were collected and submitted to JLT Laboratories, Inc. for sieve analysis, hydrometer analysis, and Atterburg Limits with laboratory soil classifications.

Additionally, grab groundwater samples were collected from locations RWJ-SB and RWU-SB utilizing a peristaltic pump and polyethylene tubing. The grab groundwater samples were analyzed for pH, dissolved metals (zinc and cadmium only) via method 6010C, alkalinity via method SM2320, and acidity via method SM2310.

2.3 Pore Water Investigation

Pore water sample locations were arranged in eight transects at offshore locations in Bear Creek adjacent to the RWM Area as depicted on **Figure 5**. Six transects south of Interstate 695 have sampling locations at distances approximately 10 feet, 75 feet, and 150 feet from the shoreline. Two transects located north of Interstate 695 had sampling locations at distances approximately 10 feet, 50 feet, and 75 feet from the shoreline, as it was anticipated that sandy substrate did not extend as far from the shoreline in this area as it extended in the area south of the Interstate 695 bridge. Additional pore water samples were collected at locations PW-D02 and PW-DE01 which had previously been sampled in the off-shore study conducted for the USEPA (EA, 2016). These samples were collected to determine if pore water concentrations have changed since the previous investigation.

Sampling was attempted at each of the planned pore water sampling locations shown on **Figure 5.** 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 5** notes the planned locations and relative depths where sampling was unsuccessful, as well as the reason that the pore water sample could not be collected from the 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 depths 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 in accordance with the procedures referenced in SOP No. 29 – Pore Water Sampling, 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 simultaneously to verify the push-point sampler was sealed and isolated from the surface water. The pore water samples were field filtered, 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 dissolved zinc and cadmium, hardness, and pH. 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.

2.4 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 RWM.

Seven surface water samples were collected offshore of the RWM 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. In some sampling locations, the total depth below the water surface was three feet. At these locations, surface water samples were collected at a depth of 1.5 feet below the water surface to prevent sediment disturbance. All surface water samples were collected in accordance with the procedures referenced in SOP No. 4 – Surface Water Sampling. Samples were analyzed for dissolved zinc and total hardness.

2.5 Laboratory Analysis

Samples were sent by courier to Pace Analytical Services, Inc. (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 cadmium and zinc analyses are provided in QAPP Worksheet 15 – Project Action Limits and Laboratory-Specific Detection/Quantitation Limits. All PACE laboratory reports are included as an electronic attachment**.** Laboratory reports from JLT Laboratories, Inc. containing the geotechnical results for trench soil samples are also included as an electronic attachment.

2.6 Quality Assurance and Quality Control Samples

Quality control (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:

- 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 Shallow Groundwater

Figure 6 maps the distribution of zinc concentrations in the shallow zone of the RWM. The highest measured concentration was at RWN-MWS (978,000 micrograms per liter, or µg/L). This well is located upgradient of the western-most remediation trench in the historical sludge bin storage source area. Zinc was also measured in relatively high concentrations north of the remediation trenches as shown in well RW21-MWS (282,000 µg/L).

Cadmium concentrations in the shallow zone are shown on **Figure 7**. RWN-MWS had the highest detected concentration of cadmium at 13,000 µg/L. No elevated cadmium concentrations were identified downgradient of the western-most remediation trench in the shallow zone. North of the trenches, cadmium was elevated (>100 ug/L) in RW21-MWS and RWI-MWS in the former Northwest Pond source area, and in RW22R-MWS.

Shallow zone acidity and alkalinity values, plotted spatially on **Figure 8**, show some variability. Acidity values were below the detection limit for over half of the sampled wells. The highest acidity measurement occurred at RWN-MWS (1,480 milligrams per liter, or mg/L). The highest acidity measurement downgradient of the permeable reactive barrier trenches is RW22R-MWS, at 366 mg/L. Alkalinity values do not appear to have a spatial trend, but 12 of the well samples had values that exceeded 100 mg/L.

Measurements of pH in the shallow groundwater zone, shown on **Figure 9**, ranged from 5.03 to 12.03. Values of pH were generally higher in wells near the shoreline and closest to the remediation trenches. The two highest pH values, RWJ-MWS and RW24-MWS (12.03 and 11.96 respectively), were the two locations closest to a remediation trench. Additionally, RW18-MW(S) had a relatively high pH and is located downgradient of a trench. The lowest measured pH value (5.03) was at RWR-MWS, located upgradient of the trenches.

Eh is a hydrologic parameter that reflects the oxidation-reduction potential (ORP) of a water sample. In conjunction with pH, temperature, pressure, and parameter concentration, Eh determines the thermodynamic stability of a particular chemical species within an aqueous solution. Positive values indicate more oxidizing conditions and negative values indicate more reducing conditions. Eh was calculated based on field-measured ORP and water temperature values. Values for Eh in the shallow zone ranged between -106 and 377 millivolts (mV). **Figure 10** shows that, while there is some spatial variability, most shallow groundwater wells produced oxidizing water samples. Some exceptions to this trend are observed at wells RWA-MWS and RWG-MWS, located at the furthest northwest and southwest extent of the survey area, respectively, in addition to wells RWH-MWS and RW16-MW(S), located to the north of the remediation trenches. These samples are only slightly reducing. The most negative calculated Eh value was that from well RWJ-MWS, which is located closest to the western-most remediation trench. However, as distance from the remediation trench

increases, so does shallow zone Eh. All groundwater data for shallow zone wells are summarized in **Table 3.**

3.2 Intermediate Groundwater

Intermediate groundwater zinc concentrations, mapped spatially on **Figure 11**, generally decrease from east to west across the RWM. Zinc concentration was highest in and around the former East Pond source area, with RW19-MW(I) measuring 7,280,000 µg/L. Zinc concentrations are above 600,000 µg/L in RW21-MWI and RWI-MWI, which indicates that the contaminant plume in the intermediate zone extends beyond the northern limits of the treatment trenches, and that the former northwest pond source area may have acted as a source of contaminant mass to the intermediate zone groundwater. Based on the low concentration in RW22R-MWI, the relatively high zinc concentration in RWA-MWI appears to be an isolated plume separated from the high concentrations noted around the former northwest pond source area. At RWJ-MWI, zinc concentrations are relatively low (1,580 µg/L) in the groundwater that has passed through the final remediation trench. Concentrations of zinc above 100,000 µg/L extend westward along an axis from RWL-MWI, downgradient of the westernmost treatment trench, to RWE-MWI. The elevated zinc levels in the perimeter wells along the shoreline, are bounded to the south by a low concentration observed in RWG-MWI.

Intermediate zone cadmium concentrations, shown on **Figure 12**, vary significantly across the RWM. The highest cadmium concentration was recorded in RWI-MWI, located to the north of the western-most remediation trench, within the former northwest pond source. There are also relatively high concentrations southwest of the western-most trench at RW23-MWI (2,270 µg/L) and RW05-MWI (2,570 µg/L), with the elevated cadmium occurring generally south of the area. The extent of the elevated cadmium is limited to the south by relatively low concentrations observed in wells RW01-MW(I) and RWG-MWI. As with zinc, the high detection at the northwestern-most corner of the Site at RWA-MWI (6,830 µg/L) appears to be isolated from the known source areas.

Figure 13 maps acidity and alkalinity trends within the intermediate zone. Acidity values are significantly higher compared with the shallow zone. In general, the acidity greatly exceeds the alkalinity in all of the wells outside the remediation trench area. The highest acidity values are in the wells in and around the former east pond source area, located upgradient of most of the remediation trenches. RW21-MWI and RW09-MWI, located in and around the former northwest pond source area, also have relatively high acidity values (1,980 and 900 mg/L respectively). Notably, the acidity within the former sludge bin storage source area is low. Some wells located near the shoreline, such as RWA-MWI and RWE-MWI have relatively high acidity values (832 and 528 mg/L respectively). Alkalinity values are significantly lower in the intermediate zone than in the shallow zone. The highest measured alkalinity value is at RWI-MWI (184 mg/L), a well that is located to the north of the remediation trenches. In wells RWJ-MWI, RWK-MWI and RWL-MWI, which are closely spaced and located progressively further from the western-most trench, alkalinity values remain consistently low while acidity values increase from 10 to 452 mg/L.

Measurements of pH within the intermediate zone, as shown on **Figure 14**, are generally less variable in comparison to the shallow zone but exhibit a similar spatial distribution. The two highest pH values (10.47 and 10.12) are located at RW15-MW(I) and RW13-MW(I). Both wells are located directly downgradient of remediation trenches. The lowest pH value (5.28) was measured at RW19-MW(I), located directly upgradient of the eastern-most remediation trench, in the former East Pond source area.

Calculated Eh values from intermediate zone well water samples, as shown in **Figure 15**, are spatially variable. Overall, these intermediate-zone Eh values are significantly higher than their shallow zone counterparts, ranging from -76 to 337 mV. Positive Eh values were calculated for RWA-MWI and RWG-MWI despite the relatively low values observed in the shallow wells. Some of the highest Eh values are located in between the remediation trenches. The only negative Eh value, indicative of reducing conditions, is located at RWJ-MWI. This well follows a similar trend to the shallow zone, with Eh values that increase rapidly with distance from the permeable reactive barrier trench. All groundwater data for intermediate zone wells are summarized in **Table 4.**

3.3 Pore Water

Figure 16 shows the locations and results for the 16 locations where pore water samples were successfully collected. The results are summarized in **Table 5.**

Cadmium results were all low, with the maximum concentration (10.9 µg/L in RW-006-PW-2) only slightly exceeding the National Recommended Water Quality Criteria (NRWQC) of 7.9 µg/L for saltwater chronic aquatic life protection. For zinc, no exceedances of the NRWQC of 81 µg/L for saltwater chronic aquatic life protection were identified in the five transects along the northern portion of the shoreline. Elevated levels of zinc were identified in three locations (RW-006-PW, RW-007-PW, and RW-008-PW) located in the southern portion of the shoreline, in the vicinity of the well RW05 well pair and the newly installed RWE and RWF locations on-shore.

Two pore water samples were collected from locations that had been previously sampled by EA in 2015. EA had previously reported zinc at 22 µg/L in PW-D02. The re-sample (PW-D02-1) confirmed low levels of zinc (2.7 J µg/L) at this location. Cadmium was not detected at this location in either sample. At location PW-DE01, EA had reported a cadmium concentration of <10 µg/L and a zinc concentration of 160 µg/L. The re-sample of this location (sample PW-DE01-1) was non-detect for both metals. However, both zinc and cadmium were reported at the 2-foot depth in sample RW-006-PW-2, nearby. A comparison of the results from the 2015 results to the current results does not indicate any significant change in the pore water levels at these locations.

3.4 Surface Water

Figure 17 shows the locations and results for the seven locations where surface water samples were collected. The results are summarized in **Table 6.** Total hardness was observed between 572,000 µg/L (RW-004-SW-2) and 623,000 µg/L (RW-006-SW-1.5 and RW-022-SW-1.5). Dissolved zinc was observed at concentrations between 7.4 µg/L (RW-006-SW-1.5) and 13.7 µg/L (RW-008-SW-1.5), indicating that dissolved zinc is present at concentrations below the surface water criteria offshore of the RWM.

3.5 Trench Material

The remediation trenches were filled with an alkaline charge reagent blend. The reagent blend consisted of ASHTO #57 crushed limestone aggregate (60% by weight) and TerrabondMG powder (40% by weight). Approximately 5,500 cubic yards (CY) of limestone and approximately 3,150 CY of TerrabondMG were used in the construction of the remediation trenches. An additional 625 CY (estimated) was used for restoration of hot spot excavations.

Bulk samples of the trench fill material were collected for geotechnical analysis to assess whether the material had degraded since installation and if it is still permeable. Samples were sent to JLT Laboratories, Inc. for grain size analysis to assess permeability. The results indicate that the material consists of over 60% gravel, with the majority of it being fine gravel. Sand and fines represent the remainder of the aggregate, with silt and clay representing 16-17% of the aggregate material in the trench fill. Thus, the material is expected to be more permeable than the surrounding soils in the intermediate zone.

Three samples of the trench material, composited from multiple depths in the trenches, were collected for analysis for zinc and cadmium to determine if the alkaline charge material appeared to be enriched by metal precipitates. The results from these analyses are presented below:

Boring Location	Sample Interval (feet bgs)	Zinc (mg/kg)	Cadmium (mg/kg)	Neutralization Potential (Ton/1000)	Cation Exchange Capacity (meq/100g)
RWJ-SB	12.5-25.5	184	0.92 J	485	8.4
RWJ-MWI	12.5-35	270	12.8	93.2	1.8 J
RWU-SB	12.8-23	161	0.73 J	744	9.2

The neutralization potential measures the tons of CaCO3 equivalent per 1000 tons of reagent material. This ranged from a low of 93.2 to a high of 744, with a mean of approximately 440 tons CaCO3 per 1000 tons of reagent. RWJ-MWI did not appear to be fully in the trench, so this value is likely not representative of the reagent material. Thus, it appears that there is an abundance of neutralization capacity remaining in the reagent material after 2 years in place.

The zinc and cadmium were not highly elevated in the samples of the trench material, indicating that the material does not appear to be fouled with metal precipitate.

Wells RWJ-MWI, RWK-MWI and RWL-MWI were placed in close proximity and located progressively further from the western-most trench to assess the near-field effect of the remediation trenches. **Figure 18** shows the locations and spacing of these wells relative to the trench, along with the zinc and cadmium concentrations in the wells. As indicated in the figure, intermediate groundwater upgradient of the trench contains over 100,000 µg/L dissolved zinc. The zinc concentration in the well immediately downgradient of the trench (RWJ-MWI) dropped to 1,580 µg/L. However, as the distance downgradient from the trench increased, the zinc concentration was observed to increase such that the zinc concentration was back over 100,000 µg/L only 26 feet from the trench at RWL-MWI. It appears that the permeable reactive barrier treatment technology and the reagent is effective, but that the effect is confined to a very limited area downgradient. This is likely associated with the reagent not being distributed very far due to the very slow rate of groundwater movement through the remediation trench and intermediate groundwater zone, along with the limited amount of alkalinity that can be dissolved into the groundwater to overcome the residual acidity in the downgradient plume.

4.0 DATA USABILITY ASSESSMENT

All data validation procedures were 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 cadmium (total and dissolved) and zinc (total and dissolved). QA/QC samples associated with the pore water sampling investigation were also analyzed for hardness. 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 006, 007, 009, 010, 011, 012, 013, 014, 016, 017, 018, 019, 020, 024, 027, and 029. 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

The results from this supplemental investigation were evaluated to update the Conceptual Site Model (CSM) for the Rod and Wire Mill Area.

5.1 Site Geology

In general, the subsurface geology at the RWM includes slag fill overlying natural soils, which include fine-grained sediments (clays and silts) and coarse-grained sediments (sands). At most of the Site, the slag fill is directly underlain by a layer of silts/clays, and below this is a layer of coarse-grained sand. Subsequent layers moving downward generally consist of alternating silt/clay layers and sand layers.

Cross-sections were developed from the site boring logs to illustrate the site-specific lithologies. **Figure 19** shows the locations of the cross-sections. Cross-section A-A' (**Figure 20)** depicts the subsurface along the western boundary of the Site from north to south. Cross sections B-B' (**Figure 21**) and C-C' (**Figure 22**) depict the subsurface in the northern and central portions of the Site, respectively, both from west to east. Cross-section C-C' also shows the locations and construction of two of the existing treatment trenches.

5.2 Site Hydrogeology

Groundwater occurrence at the Site has been segregated into three zones identified as the shallow, intermediate and deep hydrogeologic zones. The Site-Wide Investigation Groundwater Study Report (SWI) completed by CH2M-Hill in 2001 incorporated a detailed, three-dimensional, hydrogeologic model that enumerated the alternating subsurface sediment layers at the Site as Clay 1, Sand 1, Clay 2, Sand 2, and so on. This naming system is particularly convenient for discussing the hydrogeology at the Site. At most of the Site, the shallow zone is considered to be the groundwater found in the surficial slag unit and/or the uppermost sand unit (Sand 1). In some areas of the Site, a silt/clay layer (Clay 1) lies directly underneath the surficial slag unit. In other areas of the Site, the Clay 1 unit is not found directly beneath the slag fill, and the slag fill is directly underlain by and connected to the Sand 1 unit. In these areas, the slag fill and Sand 1 form a single groundwater flow system. The screens of shallow zone wells are installed within the surficial slag layer or Sand 1. Examples of the uppermost three lithologic units at the Site (Slag, Clay 1, Sand 1) can be seen on all three cross sections (**Figures 20-22**).

Beneath Sand 1 lies another silt/clay layer (Clay 2), followed by another sand layer (Sand 2). Sand 2 can be seen on all three cross sections. The intermediate zone is considered to be the groundwater found in Sand 2, with screens of most intermediate zone wells being installed within this sand unit.

Beneath Sand 2 lies yet another silt/clay layer (Clay 3), followed by another sand layer (Sand 3). The lower (or deep) hydrogeologic zone is considered to be the groundwater found in Sand 3. The deep zone was not a focus in this groundwater investigation.

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. The water levels indicate a downward vertical gradient over most of the site, although the gradient reverses to a slight upward gradient near the shoreline in cross section C-C' in the vicinity of RW05R-MWI, and on the southern end of cross section A-A'.

5.3 Groundwater Flow

A synoptic round of groundwater level measurements was collected on May 2, 2019. Based on the field measurements, groundwater potentiometric surface maps were constructed for the shallow and intermediate hydrogeologic zones. Potentiometric maps for the shallow and intermediate zones have been included on **Figure 23** and **Figure 24**, respectively.

In the shallow zone, the predominant flow directions are to the west, northwest and southwest. In the northern portion of the Site, groundwater flow is to the north near the former northwest pond. Groundwater also flows north near RWM-MWS. Groundwater flows to the south near RWR-MWS and near RW11-MWS. Groundwater flows radially from a small mound centered on RW23-MWS. In the intermediate zone, the potentiometric surface is nearly flat, with extremely little variation (less than a half foot of difference) amongst most calculated groundwater elevations across the Site.

The hydraulic gradient for each groundwater zone was estimated using the water level data for the upgradient well pairs (RWQ & RWS) and the downgradient shoreline well pairs (RWA, RWB, RWD, & RWE). The distance between the upgradient and shoreline wells is approximately 1,100 ft. For the shallow zone, upgradient wells (RWQ & RWS) had an average water level of 6.06 feet (ft) above mean sea level (amsl). Shoreline wells (RWA, RWB, RWD, & RWE) had an average water level of 1.46 ft amsl. The hydraulic gradient in the shallow zone is a difference of 4.60 ft over the 1,100 ft distance, or a gradient of 0.004 ft/ft. For the intermediate zone, upgradient wells (RWQ & RWS) had an average water level of 1.26 ft amsl. Shoreline wells (RWA, RWB, RWD, & RWE) had an average water level of 0.94 amsl. The hydraulic gradient in the intermediate zone is a difference of 0.32 ft over the 1,100 ft distance, or a gradient of 0.0003 ft/ft.

Hydraulic conductivity values determined in previous modeling studies (CH2M Hill, 2001) were used to estimate the groundwater velocities. The equation for groundwater velocity is:

$$V = \frac{Ki}{n}$$

where V=groundwater velocity, K=hydraulic conductivity, i=hydraulic gradient, and n=porosity. A porosity of 0.36 can be used for both hydrogeologic units based on the findings in the "Pre-Design Investigation Rod and Wire Mill Area Characterization Report (ARM, 2016). Slug tests documented in the PDI produced an average value for K in the shallow zone of 8.33 feet per day, and an average value for K in the intermediate zone of 16.24 feet per day. These values yield:

$$V_{shallow} = \frac{Ki}{n} = \frac{8.33*0.004}{0.36} = 0.093 \text{ ft/day} \text{ or } \mathbf{33.8\ ft/year}$$

$$V_{intermediate} = \frac{Ki}{n} = \frac{16.24*0.0003}{0.36} = 0.0135 \frac{\text{ft}}{\text{day}} \text{or } \mathbf{4.94\ ft/year}$$

5.4 Contaminant Sources

Previous studies identified elevated concentrations of zinc and cadmium in the soil in the former East Pond and Sludge Bin Storage areas as the source of the contaminants of concern, zinc and cadmium, in the groundwater, and previous interim measures were designed to address these source areas.

Appendix H provides figures extracted from the Report of 1997 Remediation and Monitoring Activities (Bethlehem Steel, 1998). These figures show the reported cadmium concentrations identified in the initial investigations in 1987. As indicated in the figures from that previous report, cadmium concentrations in the intermediate zone in excess of 10 milligrams per liter (mg/L) (or 10,000 micrograms per liter, µg/L) were shown to extend west almost to Riverside Drive in 1987. Zinc concentrations were not available for 1987 but are provided in a table for 1997, and the 1997 values have been indicated in red (in µg/L) on the well location map from the 1997 report. At that time, the concentration of zinc in the wells closest to Riverside Drive ranged from 5.2 mg/L (5,200 µg/L) to 360 mg/L (360,000 µg/L). The 1997 concentrations of zinc in the northernmost wells ranged from 320,000 µg/L to 2,300,000 µg/L.

The supplemental investigation results confirm the former East Pond to be the primary source of zinc in the intermediate groundwater zone. The highest zinc concentration in the shallow zone was located in the former Sludge Bin Storage area. Elevated concentrations of zinc were also identified in the vicinity of the former Northwest Pond. However, the concentrations in this area were an order of magnitude lower than observed in the intermediate zone in the former East Pond area. The maximum cadmium concentration on the Site was observed in the shallow zone in the former Sludge Bin Storage area, with no significant detections occurring in the shallow zone outside the former Sludge Bin Storage area. Elevated cadmium concentrations were notably absent in the intermediate zone in the Sludge Bin Storage area, within the area of the treatment trenches, but were detected in several areas of the Site. Based on the historical cadmium plume shown in Appendix H, and the remaining high concentration of cadmium in the shallow zone in RWN-MWS, it is likely that the Sludge Bin Storage area was the primary original source of cadmium in the intermediate zone and the widespread elevated levels of cadmium are residual levels associated with historic releases from the Sludge Bin Storage area.

5.5 Migration Pathways and Extent

The Interim Measure Work Plan – In-Situ Groundwater Treatment (Advanced GeoServices Corp., August 2016) presented a CSM that focused on a source of acidity to the local groundwater that lowered pH and increased the solubility of cadmium and zinc and mobilized these metals creating the groundwater plume containing these metals. The acidity is neutralized by alkaline slag in the shallow groundwater zone; however, slag is not present and neutralization does not occur in the intermediate zone aquifer where the elevated zinc and cadmium is observed in the groundwater plume.

Figure 25 through 28 present extended zinc and cadmium distributions for the shallow and intermediate zones, utilizing additional concentrations observed in surrounding wells from previous investigations. **Figure 25** shows that, while zinc is detected in several of the shallow wells outside the interim measure area, the elevated zinc plume is delineated to the northern portion of the former rod and wire mill footprint. Similarly, **Figure 26** shows that there were no elevated levels of cadmium detected in the shallow zone outside the interim measure area. **Figure 27** shows the interpolated extent of the zinc plume in the intermediate zone. The interpolation likely overstates the lateral extent due to the well spacing, since there were no significant detections of zinc in the intermediate zone outside of the interim measure area. RWG-MWI shows the likely southern limit of the zinc plume. Similarly, **Figure 28** shows the interpolated limits of the cadmium plume in the intermediate zone, but likely overstates the lateral extent.

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. Since the constituents of concern are zinc and cadmium, volatilization from the groundwater is not a concern.

The groundwater ultimately discharges to Bear Creek. 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.

Figure 29 is a conceptual cross-section showing the potential migration pathways, sample locations, and the relationship between the shallow and intermediate groundwater zones and the off-shore environment.

There were no exceedances of the chronic NRWQC for zinc in the surface water samples collected off-shore. Therefore, surface water is not considered a medium of concern.

Pore water samples show no exceedances of the chronic aquatic life NRWQC for cadmium in the upper 1 ft samples, and only one slight exceedance (10.9 µg/L) was identified in any of the pore

water samples. Therefore, cadmium is not a constituent of concern in the off-shore environment and the discharge to Bear Creek of cadmium in groundwater is not a pathway of concern. There were no exceedances of the chronic aquatic life NRWQC for zinc in pore water in the northern portion of the site. Therefore, the discharge to Bear Creek of zinc in groundwater is not a concern in the northern portion of the Site.

Exceedances for zinc in pore water were limited to three sample locations in the southern portion of the shoreline. The observed pore water zinc concentrations are similar to or higher than the perimeter well groundwater concentrations. As such, lines of evidence are present that continued groundwater discharges will not exacerbate the identified pore water impacts. The highest concentration of zinc in the pore water samples (122,000 µg/L in RW-007-PW-3) is slightly higher than the zinc concentration in RWE-MWI (112,000 µg/L) and is approximately twice the concentrations present in RW05R-MWI or RWF-MWI. Levels of zinc were higher in the shallow zone in this area relative to most of the site, however the highest level (39,100 µg/L in RWF-MWS) was just a third of the maximum pore water concentration. Increases in groundwater concentrations in perimeter wells in this area have been noted since the pump and treat system was suspended in 2017. However, based on the groundwater velocity estimates of 5 ft/year or less for the intermediate zone, it is not feasible that pore water impacts observed at a distance of up to 300 ft off-shore could have migrated from areas of on-shore groundwater impact over a two-year period. In addition, since the zinc concentrations in the perimeter wells are no higher than the existing concentrations in the pore water, continued migration is not expected to result in increases in the current off-shore pore water concentrations. It is much more likely that these pore water concentrations represent historical off-shore impacts.

Previous off-shore studies conducted in the surface water bodies surrounding the Sparrows Point peninsula collected zinc concentrations from surficial sediment samples. The Phase I Offshore Investigation Report (EA Engineering, Science and Technology, Inc., 2016) presents zinc concentrations from a number of sediment samples collected in Bear Creek. The Final Trip Report – Sparrows Point Southeast Area Sediment Assessment Second Round of Sample Collection (Weston Solutions, Inc., 2018) presents zinc concentrations from a number of sediment samples collected in Jones Creek, Old Road Bay, and the Patapsco River. Select figures from these two reports showing zinc concentrations in sediment samples have been included as **Appendix I.** The results from both of these reports show that zinc is detected at a majority of locations at concentrations greater than 1,000 milligrams per kilogram (mg/kg). Measurements near the center of Bear Creek range from 2,000-4,200 mg/kg. The levels found in samples collected directly off-shore of the RWM represent some of the lowest concentrations of zinc (290-670 mg/kg) observed around the peninsula. This strongly indicates that the presence of zinc in pore water off-shore of the RWM is from historical sources that affected the broader area surrounding the whole Sparrows Point peninsula as opposed to current groundwater discharges from the RWM.

6.0 FINDINGS

This supplemental investigation has adequately defined the nature and extent of groundwater and conditions within potential offshore discharge areas associated with the RWM to facilitate a Corrective Measures Study (CMS). The purpose of the CMS will be to develop and evaluate the corrective action alternative(s) and to recommend additional corrective measures as necessary to supplement the currently implemented remedies in order to meet groundwater remedial objectives.

The groundwater impacts within the RWM interim measure area were found to be more widespread than indicated by previous investigations, and to extend outside the suspected source areas that were targeted by the permeable reactive treatment trench interim measure that was implemented in 2017.

The trench investigation indicates that the permeable reactive wall treatment technology and the reagent is effective, but that the effect is confined to a very limited area downgradient, likely associated with the reagent not being distributed very far due to the very slow rate of groundwater movement through the treatment trench, along with the limited amount of alkalinity that can be dissolved into the groundwater to overcome the residual acidity in the downgradient plume. The current interim measure is likely to be effective in containing the migration of contaminants from the specific source areas that were the focus of the pre-design investigation (the former sludge bin storage area and former east pond).

Groundwater concentrations in the newly installed shoreline groundwater sampling points confirmed the presence of elevated levels of dissolved zinc and, to a lesser extent, cadmium. The existing interim measure is unlikely to reduce concentrations in the plume area downgradient of the trenches within the foreseeable future.

In surface water samples collected for this investigation, concentrations of zinc were 13.7 µg/L or less, well below the chronic NRWQC (81 µg/L). Therefore, surface water is not considered a medium of concern. Pore water sample results show that the groundwater has not adversely impacted pore water over most of the shoreline. Exceedances of the NRWQC for zinc in pore water were limited to three sample locations in the southern portion of the shoreline. The observed pore water concentrations are similar to or higher than the perimeter well groundwater concentrations, such that continued groundwater discharges would not exacerbate the identified current pore water levels. Furthermore, results from sediment samples in previous studies indicate that zinc found off-shore of the RWM is much more likely from historical sources that affected the broader area surrounding the whole Sparrows Point peninsula as opposed to current groundwater discharges from the RWM.

7.0 REFERENCES

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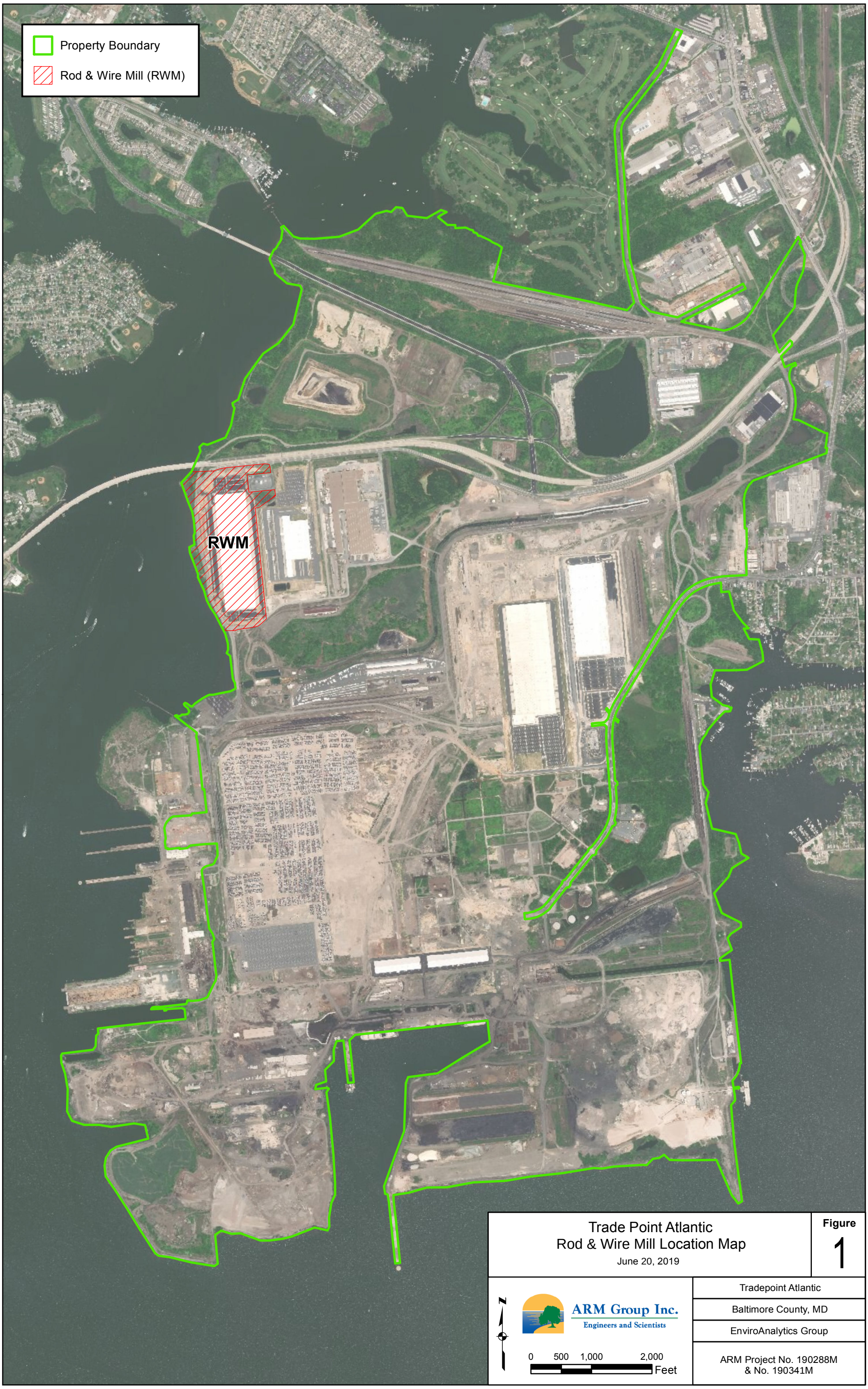
FIGURES



Trade Point Atlantic
Rod & Wire Mill Location Map
June 20, 2019

Figure
1

ARM Group Inc.
Engineers and Scientists

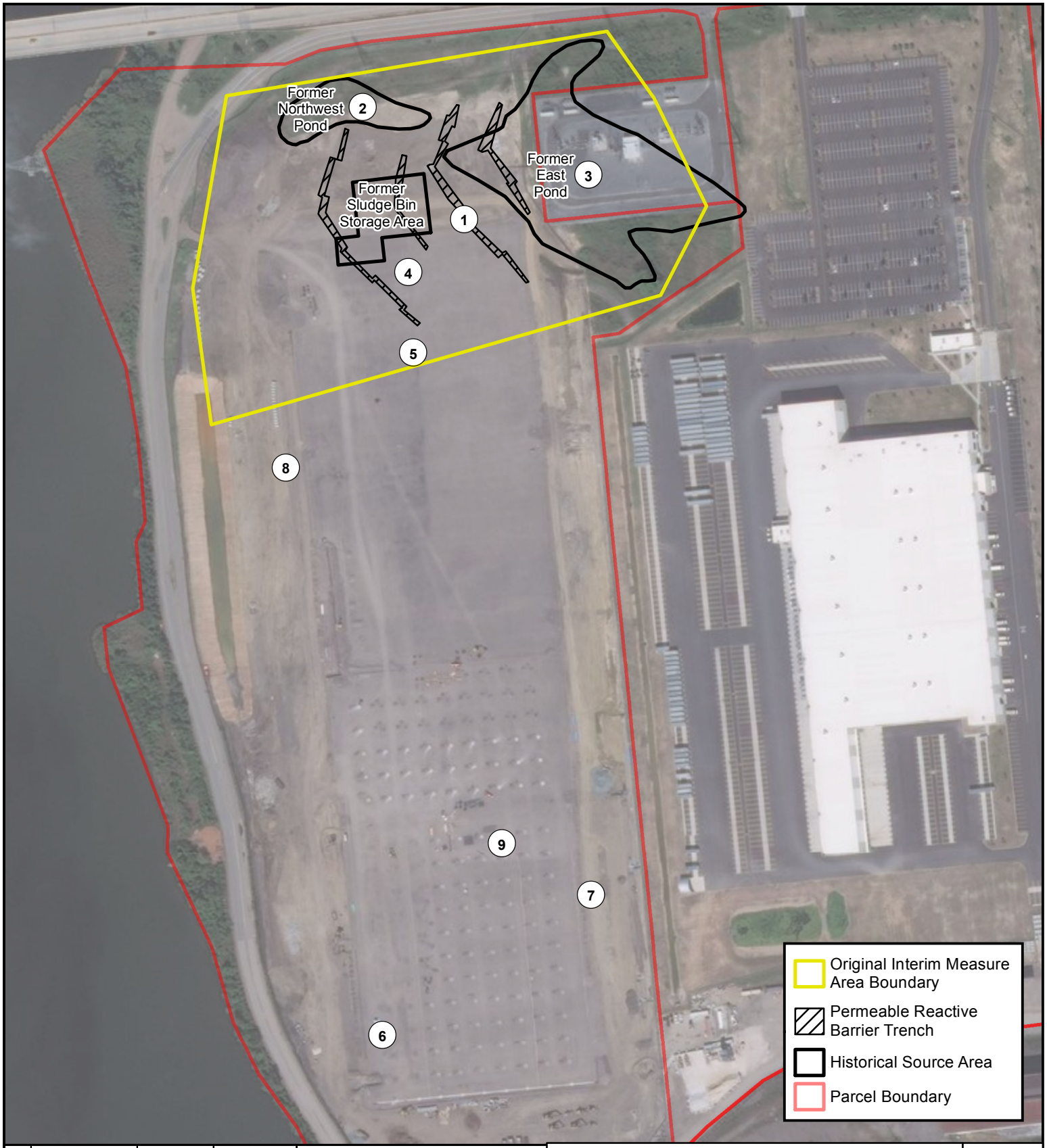
0 500 1,000 2,000
Feet

Tradepoint Atlantic

Baltimore County, MD

EnviroAnalytics Group

ARM Project No. 190288M
& No. 190341M



ID	SWMU/AOC	Finding	REC	Description
1	27	131	REC-6A	Remediation Area
2	28	132	REC-6B	Northwest Pond
3	29	133	REC-6C	East Pond
4	30	134	Non-REC	Equalization Tanks
5	38	142	Non-REC	Cadmium Treatment Trenches
6	39	143	Non-REC	Scale Pit
7	39/44	143/148	Non-REC	Scale Pit/Cooling Tower
8	45	149	REC-6D	Site-Wide Trenches/Sumps
9	X	160	REC-6E	Unknown Aboveground Tank

Rod & Wire Mill
Interim Measures Location with RECs & SWMUs

Figure 2

ARM Group Inc.
Engineers and Scientists

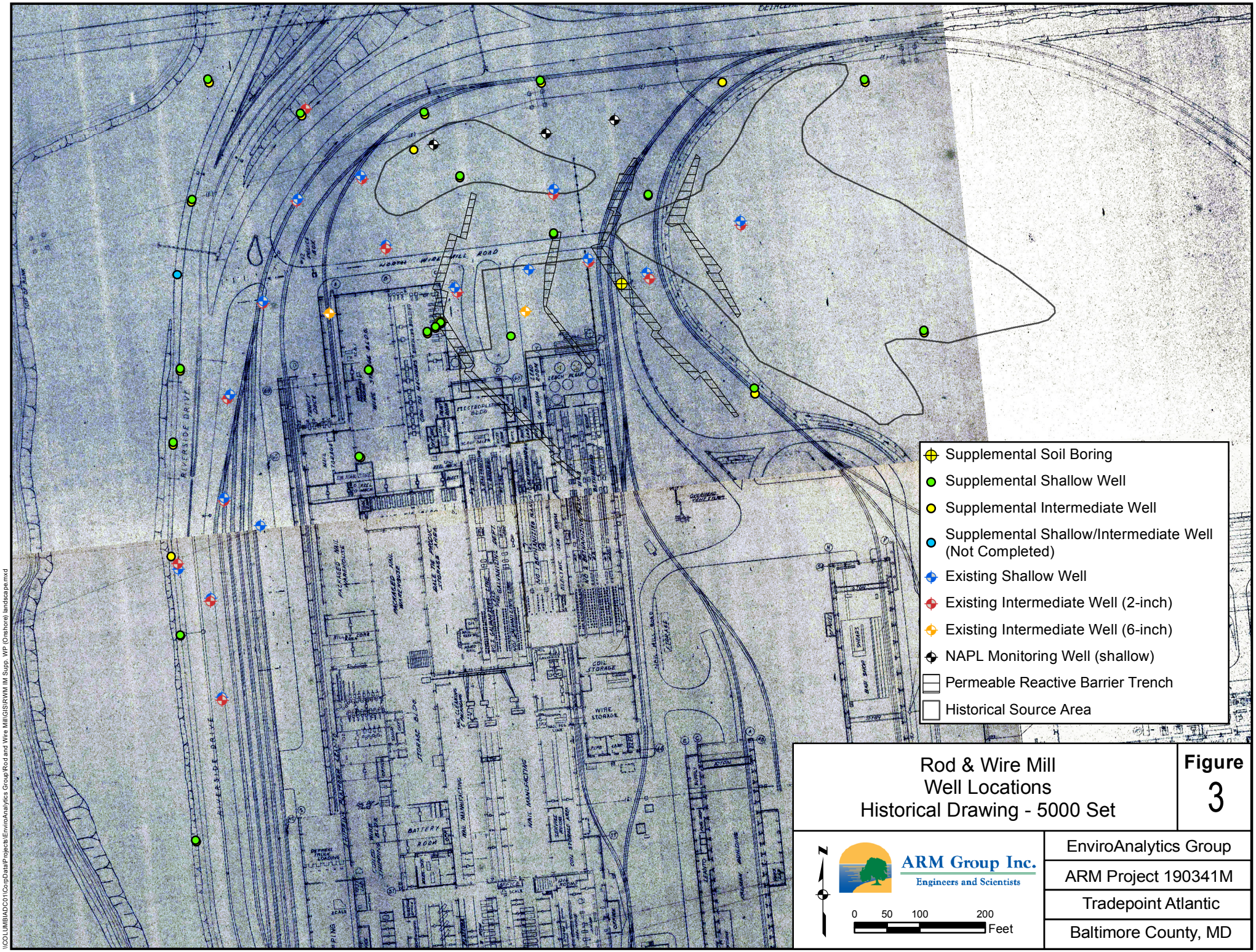
0 100 200 400 Feet

EnviroAnalytics Group

ARM Project 180450M

Tradepoint Atlantic

Baltimore County, MD



Rod & Wire Mill
Well Locations
Historical Drawing - 5000 Set

Figure 3

ARM Group Inc.
Engineers and Scientists

EnviroAnalytics Group

ARM Project 190341M

Tradepoint Atlantic

Baltimore County, MD

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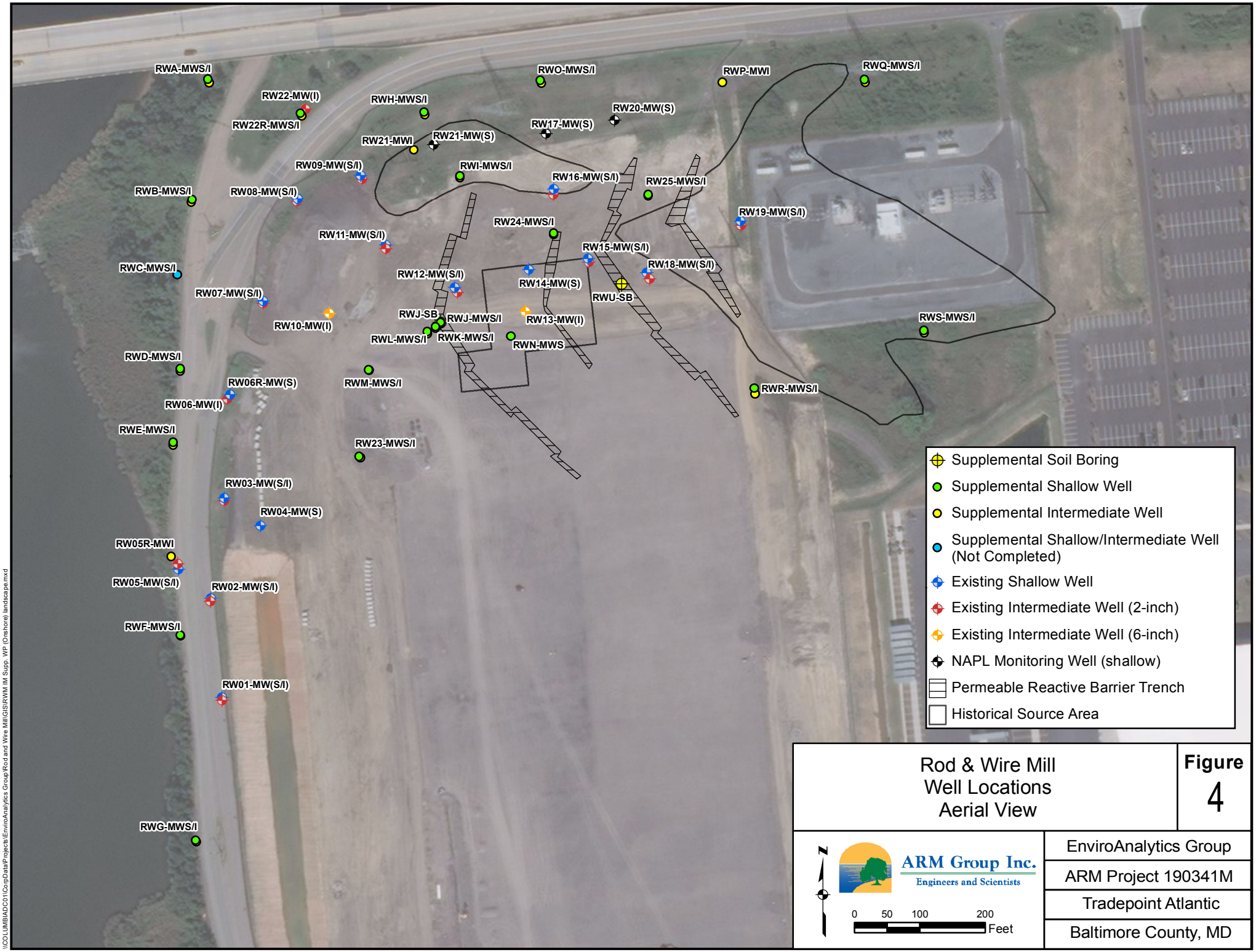


Rod & Wire Mill
Well Locations
Aerial View

Figure 4

ARM Group Inc.
Engineers and Scientists

0 50 100 200 Feet

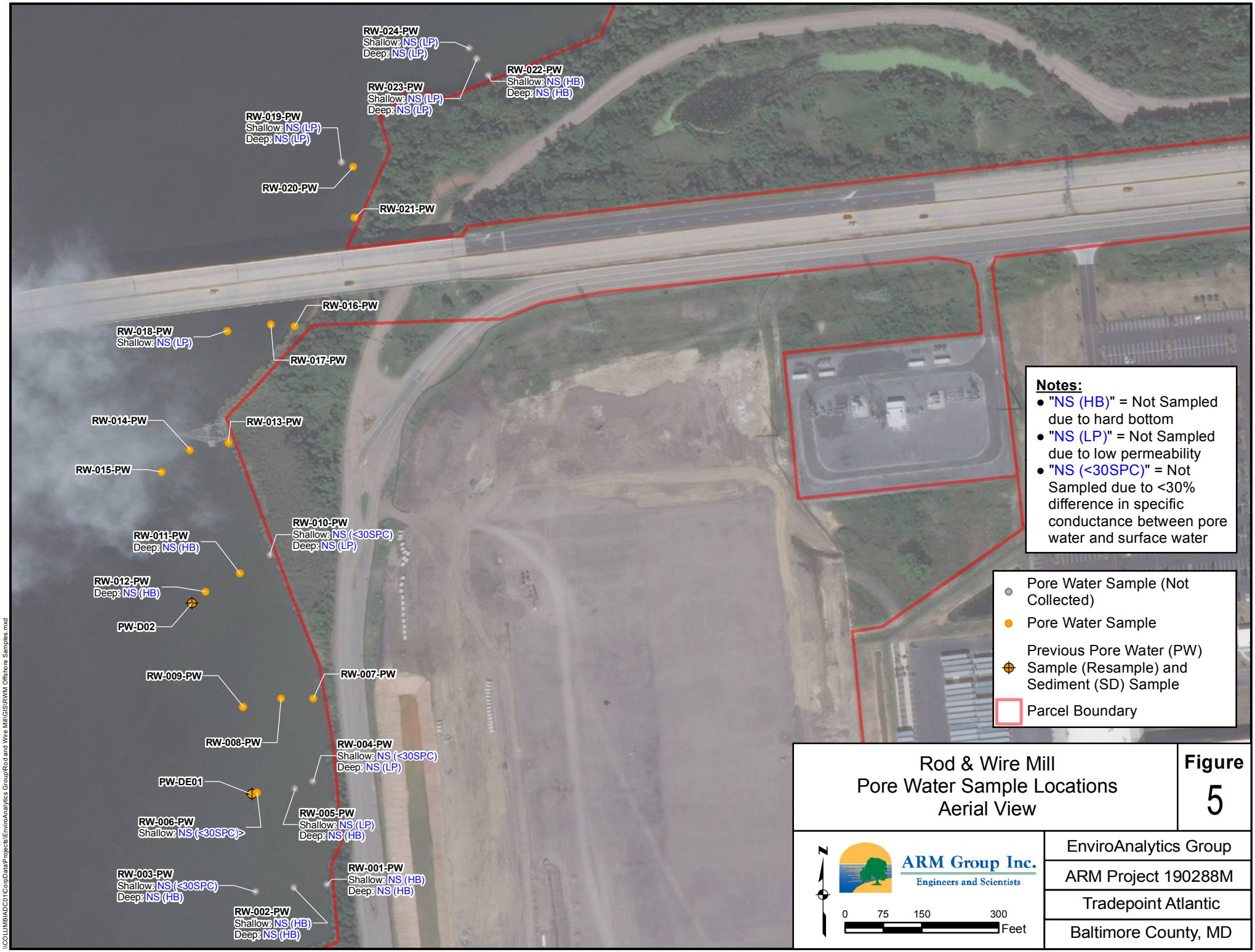
EnviroAnalytics Group

ARM Project 190341M

Tradepoint Atlantic

Baltimore County, MD

\\COLUMBIADC01\CorpData\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Supp. WP (Onshore) landscape.mxd



\\COLUMBIADC01\Corp\Data\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM Offshore Samples.mxd

Rod & Wire Mill
Pore Water Sample Locations
Aerial View

Figure 5

ARM Group Inc.
Engineers and Scientists

EnviroAnalytics Group
ARM Project 190288M
Tradepoint Atlantic
Baltimore County, MD

RWA-MWS
516

RWO-MWS
2,660

RWQ-MWS
146

RWH-MWS
367

RW20-MW(S)
NS

RW17-MW(S)
NS

RW22R-MWS
58,100

RW09-MW(S)
14,100

RW21-MW(S)
282,000

RW16-MW(S)
106

RW25-MWS
70,500

RWI-MWS
25,800

RWB-MWS
7.4 J

RW19-MW(S)
3,180

RW08-MW(S)
11,300

RW11-MW(S)
38,900

RW24-MWS
5 J

RW15-MW(S)
684

RW07-MW(S)
137

RW12-MW(S)
1,550

RW18-MW(S)
16.9

RW14-MW(S)
69,600

RWS-MWS
10,100

RWK-MWS
6,710

RWJ-MWS
ND

RWN-MWS
978,000

RWD-MWS
4.7 J

RWL-MWS
8,480

RWR-MWS
213,000

RW06R-MW(S)
20.7

RWM-MWS
6 J

RWE-MWS
468

RW03-MW(S)
18,700

RW23-MWS
22.4

RW04-MW(S)
ND

RW05-MW(S)
ND

RW02-MW(S)
21,900

RWF-MWS
39,100

RW01-MW(S)
16,300

RWG-MWS
ND

Notes:
- ND = Non-Detect
- NS = Not Sampled
- AWQS = Ambient Water Quality Standard

Dissolved Groundwater Result (in µg/L)

Supplemental Well

Existing Monitoring Well

Existing Shallow Well

Existing NAPL Monitoring Well (shallow)

Permeable Reactive Barrier Trench

Historical Source Area

Zinc Distribution (µg/L)

ND - 81 (AWQS)

>81 - 50,000

>50,000 - 100,000

>100,000 - 200,000

>200,000 - 400,000

>400,000 - 600,000

>600,000 - 1,000,000

>1,000,000

Rod & Wire Mill
Onshore Sample Locations - Shallow Groundwater Zinc Distribution

Figure 6

N

0 75 150 300 Feet

ARM Group Inc.
Engineers and Scientists

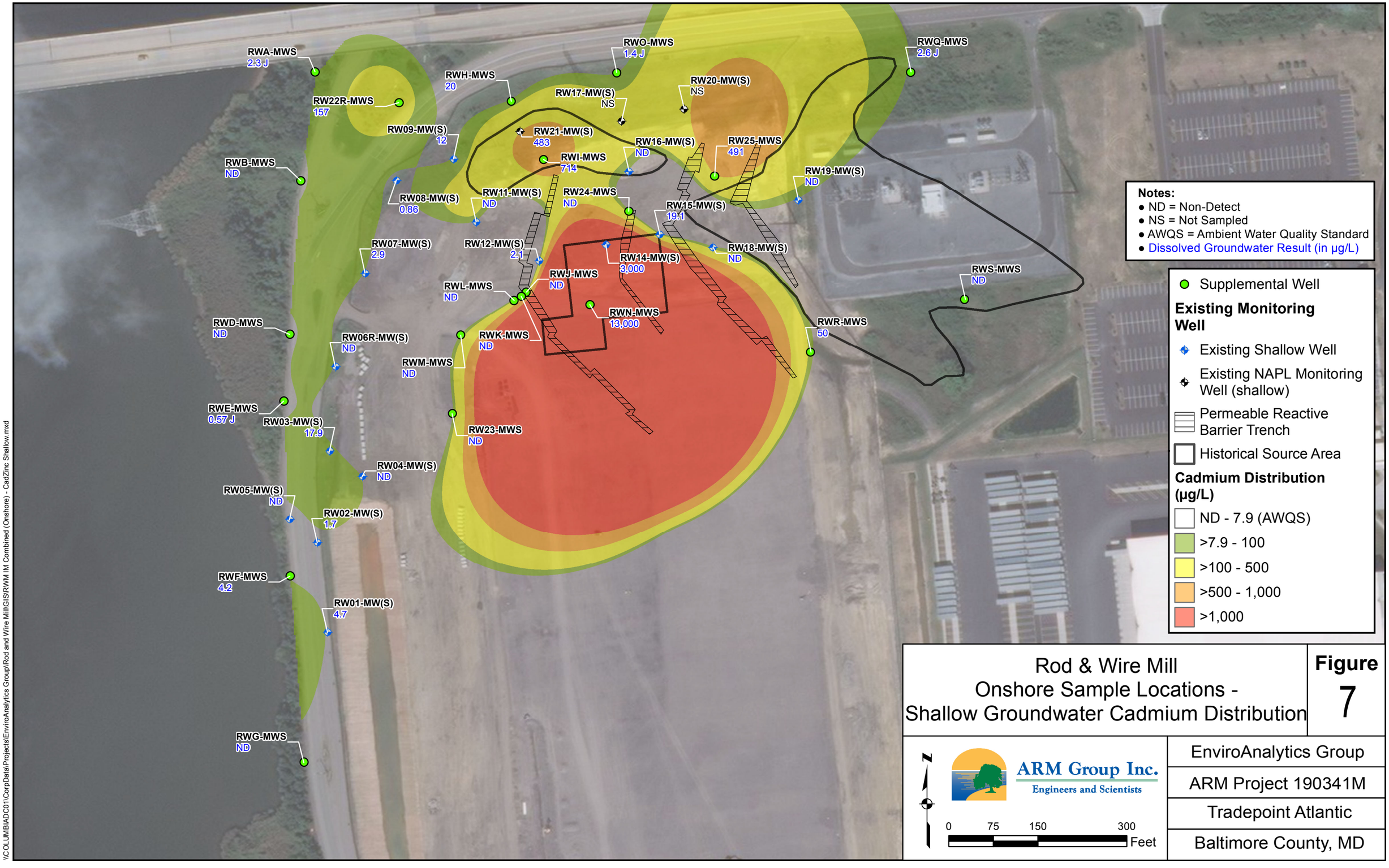
EnviroAnalytics Group

ARM Project 190341M

Tradepoint Atlantic

Baltimore County, MD

\\COLUMBIADC01\CorpData\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Shallow.mxd



Notes:
- ND = Non-Detect
- NS = Not Sampled
- AWQS = Ambient Water Quality Standard
- Dissolved Groundwater Result (in µg/L)

Supplemental Well

Existing Monitoring Well

Existing Shallow Well

Existing NAPL Monitoring Well (shallow)

Permeable Reactive Barrier Trench

Historical Source Area

Cadmium Distribution (µg/L)

ND - 7.9 (AWQS)

>7.9 - 100

>100 - 500

>500 - 1,000

>1,000

Rod & Wire Mill
Onshore Sample Locations - Shallow Groundwater Cadmium Distribution

Figure 7

ARM Group Inc.
Engineers and Scientists

0 75 150 300 Feet

EnviroAnalytics Group

ARM Project 190341M

Tradepoint Atlantic

Baltimore County, MD

\\COLUMBIADC01\Corp\Data\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Shallow.mxd

RWA-MWS
Acidity: ND
Alkalinity: 42

RWO-MWS
Acidity: ND
Alkalinity: 320

RWQ-MWS
Acidity: ND
Alkalinity: 150

RWH-MWS
Acidity: ND
Alkalinity: 258

RW22R-MWS
Acidity: 326
Alkalinity: 48

RW21-MW(S)
Acidity: 478
Alkalinity: 70

RW20-MW(S)
NS

RW17-MW(S)
NS

RW09-MW(S)
Acidity: ND
Alkalinity: 60

RWB-MWS
Acidity: ND
Alkalinity: 120

RW25-MWS
Acidity: 110
Alkalinity: 50

RW16-MW(S)
Acidity: ND
Alkalinity: 142

RW19-MW(S)
Acidity: 110
Alkalinity: 40

RWI-MWS
Acidity: ND
Alkalinity: 88

RW24-MWS
Acidity: ND
Alkalinity: 268

RW08-MW(S)
Acidity: 20
Alkalinity: 32

RW11-MW(S)
Acidity: 220
Alkalinity: 14

RW15-MW(S)
Acidity: ND
Alkalinity: 20

RW12-MW(S)
Acidity: ND
Alkalinity: 62

RW07-MW(S)
Acidity: ND
Alkalinity: 72

RWJ-MWS
Acidity: ND
Alkalinity: 232

RW14-MW(S)
Acidity: 116
Alkalinity: 2 J

RW18-MW(S)
Acidity: ND
Alkalinity: 130

RWS-MWS
Acidity: ND
Alkalinity: 336

RWD-MWS
Acidity: ND
Alkalinity: 104

RWL-MWS
Acidity: 66
Alkalinity: 20

RWR-MWS
Acidity: 428
Alkalinity: 28

RW06R-MW(S)
Acidity: ND
Alkalinity: 96

RWK-MWS
Acidity: 42
Alkalinity: 26

RWN-MWS
Acidity: 1,480
Alkalinity: 12

RWM-MWS
Acidity: ND
Alkalinity: 44

RWE-MWS
Acidity: ND
Alkalinity: 248

RW23-MWS
Acidity: 20
Alkalinity: 50

RW03-MW(S)
Acidity: 30
Alkalinity: 5 J

RW04-MW(S)
Acidity: ND
Alkalinity: 210

RW05-MW(S)
Acidity: ND
Alkalinity: 46

RW02-MW(S)
Acidity: 70
Alkalinity: 20

RWF-MWS
Acidity: 204
Alkalinity: 6 J

RW01-MW(S)
Acidity: 80
Alkalinity: 5 J

RWG-MWS
Acidity: ND
Alkalinity: 120

Notes:
- ND = Non-Detect
- NS = Not Sampled
- All Results in mg/l

- Supplemental Well

Existing Monitoring Well

- Existing Shallow Well
- Existing NAPL Monitoring Well (shallow)
- Permeable Reactive Barrier Trench
- Historical Source Area

Rod & Wire Mill
Onshore Sample Locations - Shallow
GW Acidity and Alkalinity Distribution

Figure
8

ARM Group Inc.
Engineers and Scientists

0 75 150 300 Feet

EnviroAnalytics Group

ARM Project 190341M

Tradepoint Atlantic

Baltimore County, MD

\\COLUMBIADC01\CorpData\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Shallow.mxd

RWA-MWS 7.63
RWO-MWS 6.71
RWQ-MWS 6.44
RW22R-MWS 6.64
RWH-MWS 7.92
RW20-MW(S) NS
RW17-MW(S) NS
RW21-MW(S) 5.95
RW09-MW(S) 6.23
RWI-MWS 7.13
RW16-MW(S) 6.1
RW25-MWS 6.14
RWB-MWS 10.77
RW19-MW(S) 7.13
RW08-MW(S) 5.74
RW11-MW(S) 5.72
RW24-MWS 11.96
RW15-MW(S) 8.72
RW07-MW(S) 6.94
RW14-MW(S) 5.53
RWJ-MWS 12.03
RW12-MW(S) 6.7
RW18-MW(S) 10.41
RWS-MWS 6.43
RWD-MWS 6.71
RWL-MWS 6.4
RWK-MWS 10.48
RWN-MWS 5.17
RWR-MWS 5.03
RW06R-MW(S) 8.56
RWM-MWS 6.85
RW23-MWS 6.46
RWE-MWS 7.13
RW03-MW(S) 5.48
RW04-MW(S) 6.9
RW05-MW(S) 9.12
RW02-MW(S) 6.49
RWF-MWS 5.58
RW01-MW(S) 5.88
RWG-MWS 9.74

Notes:
- NS = Not Sampled

Supplemental Well

Existing Monitoring Well

Existing Shallow Well

Existing NAPL Monitoring Well (shallow)

Permeable Reactive Barrier Trench

Historical Source Area

pH

<2
>2 - 4
>4 - 6
>6 - 8
>8 - 10
>10

Rod & Wire Mill
Onshore Sample Locations - Shallow Groundwater pH Distribution

Figure 9

ARM Group Inc.
Engineers and Scientists

0 75 150 300 Feet

EnviroAnalytics Group

ARM Project 190341M

Tradepoint Atlantic

Baltimore County, MD

\\COLUMBIADC01\Corp\Data\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Shallow.mxd

RWA-MWS
-18

RW22R-MWS
239

RWH-MWS
-86

RWO-MWS
132

RW17-MW(S)
NS

RW20-MW(S)
NS

RWQ-MWS
231

RW21-MW(S)
179

RW09-MW(S)
221

RWI-MWS
127

RW16-MW(S)
-49

RW25-MWS
145

RWB-MWS
110

RW19-MW(S)
95

RW08-MW(S)
250

RW11-MW(S)
231

RW24-MWS
-12

RW15-MW(S)
66

RW07-MW(S)
331

RWJ-MWS
-106

RW12-MW(S)
235

RW14-MW(S)
377

RW18-MW(S)
101

RWS-MWS
171

RWD-MWS
177

RWL-MWS
149

RWK-MWS
88

RWN-MWS
191

RWR-MWS
233

RW06R-MW(S)
264

RWM-MWS
206

RW23-MWS
239

RWE-MWS
65

RW03-MW(S)
323

RW04-MW(S)
203

RW05-MW(S)
189

RW02-MW(S)
182

RWF-MWS
260

RW01-MW(S)
292

RWG-MWS
-96

Notes:
- NS = Not Sampled
- All Results in mV

Supplemental Well

Existing Monitoring Well

Existing Shallow Well

Existing NAPL Monitoring Well (shallow)

Permeable Reactive Barrier Trench

Historical Source Area

Eh

<0

>0 - 50

>50 - 100

>100 - 150

>150 - 200

>200 - 250

>250 - 300

>300

Rod & Wire Mill
Onshore Sample Locations - Shallow Groundwater Eh Distribution

Figure 10

N

ARM Group Inc.
Engineers and Scientists

0 75 150 300 Feet

EnviroAnalytics Group

ARM Project 190341M

Tradepoint Atlantic

Baltimore County, MD

\\COLUMBIADC01\CorpData\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Shallow.mxd

RWA-MWI
375,000

RW22R-MWI
1,030

RW21-MWI
624,000

RWH-MWI
226,000

RWO-MWI
249,000

RWP-MWI
3,210,000

RWQ-MWI
357,000

RW09-MW(I)
64,200

RW25-MWI
413,000

RW16-MW(I)
4.9

RWI-MWI
632,000

RW19-MW(I)
7,280,000

RW08-MW(I)
ND

RWB-MWI
18.4

RW11-MW(I)
122,000

RW24-MWI
650,000

RW15-MW(I)
16,400

RW12-MW(I)
111,000

RW18-MW(I)
279,000

RW07-MW(I)
136,000

RW10-MW(I)
5,560

RW13-MW(I)
97.7

RWL-MWI
169,000

RWJ-MWI
1,580

RWS-MWI
797,000

RW06-MW(I)
108,000

RWD-MWI
36,200

RWM-MWI
162,000

RWK-MWI
21,100

RWR-MWI
2,560,000

RWE-MWI
112,000

RW03-MW(I)
13,300

RW23-MWI
109,000

RW05R-MWI
66,800

RW02-MW(I)
56,600

RWF-MWI
41,900

RW01-MW(I)
5,670

RWG-MWI
332

Notes:
- ND = Non-Detect
- AWQS = Ambient Water Quality Standard
- Dissolved Groundwater Results (in µg/L)

- Supplemental Well
- 2-inch Existing Intermediate Well
- 6-inch Existing Intermediate Well
- Permeable Reactive Barrier Trench
- Historical Source Area

Zinc Distribution (µg/L)

- ND - 81 (AWQS)
- >81 - 50,000
- >50,000 - 100,000
- >100,000 - 200,000
- >200,000 - 400,000
- >400,000 - 600,000
- >600,000 - 1,000,000
- >1,000,000

Rod & Wire Mill
Onshore Sample Locations - Intermediate Groundwater Zinc Distribution

Figure 11

N

ARM Group Inc.
Engineers and Scientists

0 75 150 300 Feet

EnviroAnalytics Group

ARM Project 190341M

Tradepoint Atlantic

Baltimore County, MD

\\COLUMBIADC01\Corp\Data\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Interm..mxd

RWA-MWI 6,830
RW22R-MWI ND
RW21-MWI 50.2
RWH-MWI 92.4
RWO-MWI 68.2
RWP-MWI 2,810
RWQ-MWI 26.2
RW09-MW(I) 3.8
RW25-MWI 507
RW16-MW(I) ND
RWI-MWI 8,050
RWB-MWI ND
RW08-MW(I) ND
RW19-MW(I) 2,420
RW11-MW(I) 586
RW24-MWI 1,580
RW15-MW(I) 64.2
RW12-MW(I) 1,520
RW07-MW(I) 453
RW18-MW(I) 38
RW10-MW(I) 0.86
RW13-MW(I) 51.1
RWL-MWI 1,230
RWS-MWI ND
RWJ-MWI 61.2
RW06-MW(I) 885
RWK-MWI 33.5
RWD-MWI 395
RWM-MWI 1,080
RWR-MWI 440
RWE-MWI 700
RW03-MW(I) 449
RW23-MWI 2,270
RW05R-MWI 2,570
RW02-MW(I) 785
RWF-MWI 859
RW01-MW(I) 19.4
RWG-MWI 22.9

Notes:
- ND = Non-Detect
- AWQS = Ambient Water Quality Standard
- Dissolved Groundwater Results (in µg/L)

- Supplemental Well
- 2-inch Existing Intermediate Well
- 6-inch Existing Intermediate Well
- Permeable Reactive Barrier Trench
- Historical Source Area

Cadmium Distribution (µg/L)
- ND - 7.9 (AWQS)
- >7.9 - 100
- >100 - 500
- >500 - 1,000
- >1,000

Rod & Wire Mill
Onshore Sample Locations - Intermediate Groundwater Cadmium Distribution

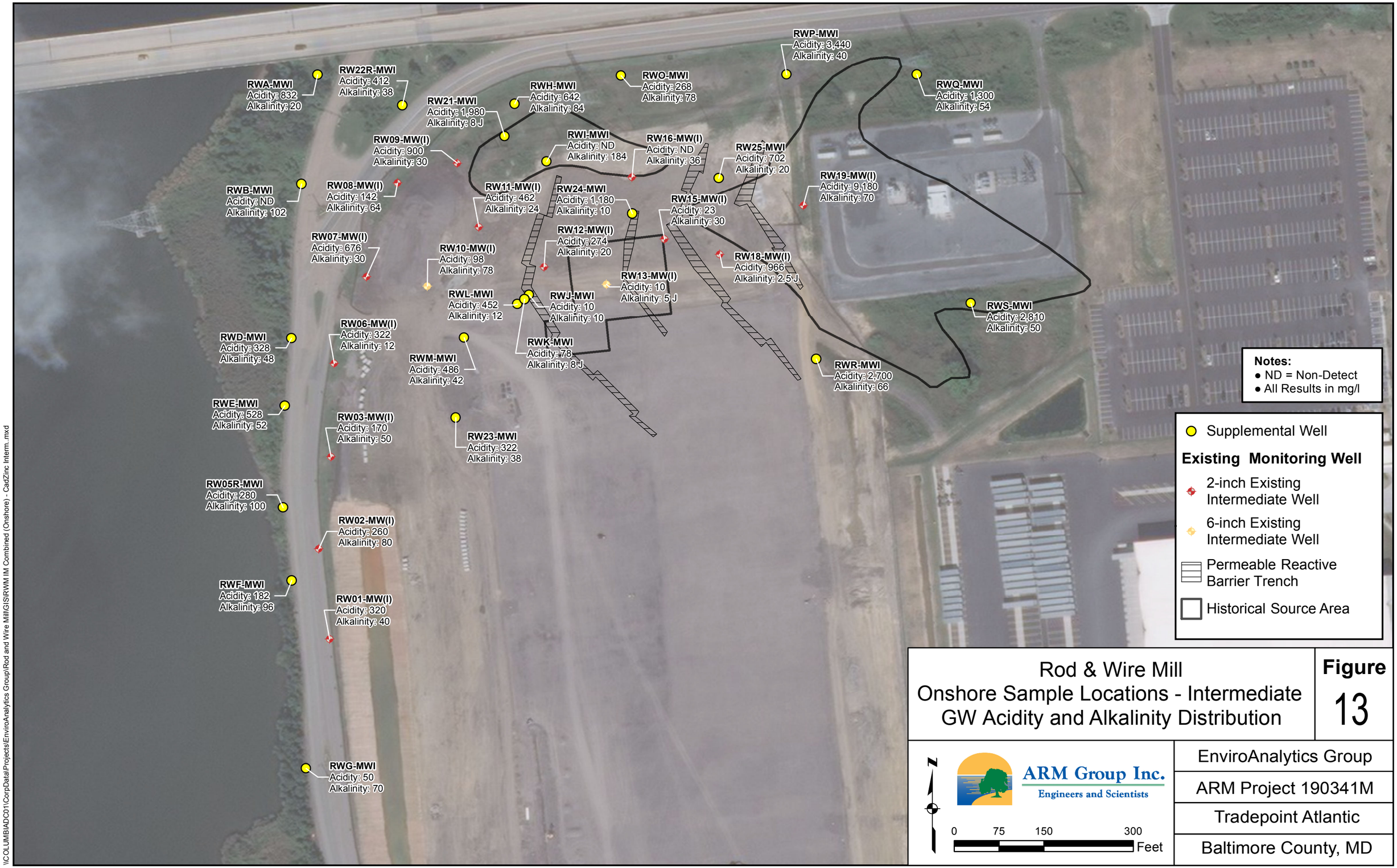
Figure 12

ARM Group Inc.
Engineers and Scientists

0 75 150 300 Feet

EnviroAnalytics Group
ARM Project 190341M
Tradepoint Atlantic
Baltimore County, MD

\\COLUMBIADC01\Corp\Data\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Interm..mxd



Rod & Wire Mill
Onshore Sample Locations - Intermediate
GW Acidity and Alkalinity Distribution

Figure 13

ARM Group Inc.
Engineers and Scientists

EnviroAnalytics Group
ARM Project 190341M
Tradepoint Atlantic
Baltimore County, MD

\\COLUMBIADC01\Corp\Data\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Interm..mxd

RWA-MWI 5.49
RW22R-MWI 6.26
RWH-MWI 6.24
RWO-MWI 5.69
RWP-MWI 5.55
RWQ-MWI 5.9
RW09-MW(I) 6.15
RW21-MWI 5.6
RW16-MW(I) 8.47
RW25-MWI 6.99
RWB-MWI 6.58
RWI-MWI 6.14
RW19-MW(I) 5.28
RW08-MW(I) 6.31
RW11-MW(I) 6.3
RW24-MWI 5.37
RW15-MW(I) 10.47
RW12-MW(I) 7.03
RW07-MW(I) 6.1
RW13-MW(I) 10.12
RW18-MW(I) 5.49
RWL-MWI 6.19
RWS-MWI 5.57
RWJ-MWI 8.32
RW10-MW(I) 6.63
RWD-MWI 6.52
RWK-MWI 7.4
RWR-MWI 5.5
RWM-MWI 6.08
RW06-MW(I) 7.74
RWE-MWI 6.29
RW23-MWI 5.42
RW03-MW(I) 6.38
RW05R-MWI 6.57
RW02-MW(I) 6.74
RWF-MWI 6.73
RW01-MW(I) 6.23
RWG-MWI 6.73

Supplemental Well
Existing Monitoring Well
2-inch Existing Intermediate Well
6-inch Existing Intermediate Well
Permeable Reactive Barrier Trench
Historical Source Area

pH
<2
>2 - 4
>4 - 6
>6 - 8
>8 - 10
>10

Rod & Wire Mill
Onshore Sample Locations - Intermediate Groundwater pH Distribution

Figure 14

ARM Group Inc.
Engineers and Scientists

0 75 150 300 Feet

EnviroAnalytics Group
ARM Project 190341M
Tradepoint Atlantic
Baltimore County, MD

\\COLUMBIADC01\CorpData\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Interm. mxd

RWA-MWI 272
RW22R-MWI 190
RWH-MWI 142
RWO-MWI 187
RWP-MWI 253
RWQ-MWI 199
RW09-MW(I) 182
RW21-MWI 183
RW16-MW(I) 221
RW25-MWI 119
RWB-MWI 251
RWI-MWI 153
RW19-MW(I) 267
RW08-MW(I) 122
RW11-MW(I) 176
RW24-MWI 228
RW15-MW(I) 153
RW12-MW(I) 277
RW07-MW(I) 178
RW18-MW(I) 249
RW10-MW(I) 105
RW13-MW(I) 337
RWS-MWI 199
RWL-MWI 197
RWJ-MWI -76
RWD-MWI 221
RWK-MWI 57
RW06-MW(I) 241
RWM-MWI 127
RWR-MWI 134
RWE-MWI 120
RW23-MWI 233
RW03-MW(I) 180
RW05R-MWI 113
RW02-MW(I) 126
RWF-MWI 127
RW01-MW(I) 129
RWG-MWI 142

Notes:
- All Results in mV

Supplemental Well

Existing Monitoring Well

2-inch Existing Intermediate Well

6-inch Existing Intermediate Well

Permeable Reactive Barrier Trench

Historical Source Area

Eh

<0
>0 - 50
>50 - 100
>100 - 150
>150 - 200
>200 - 250
>250 - 300
>300

Rod & Wire Mill
Onshore Sample Locations - Intermeidate Groundwater Eh Distribution

Figure 15

N

ARM Group Inc.
Engineers and Scientists

0 75 150 300 Feet

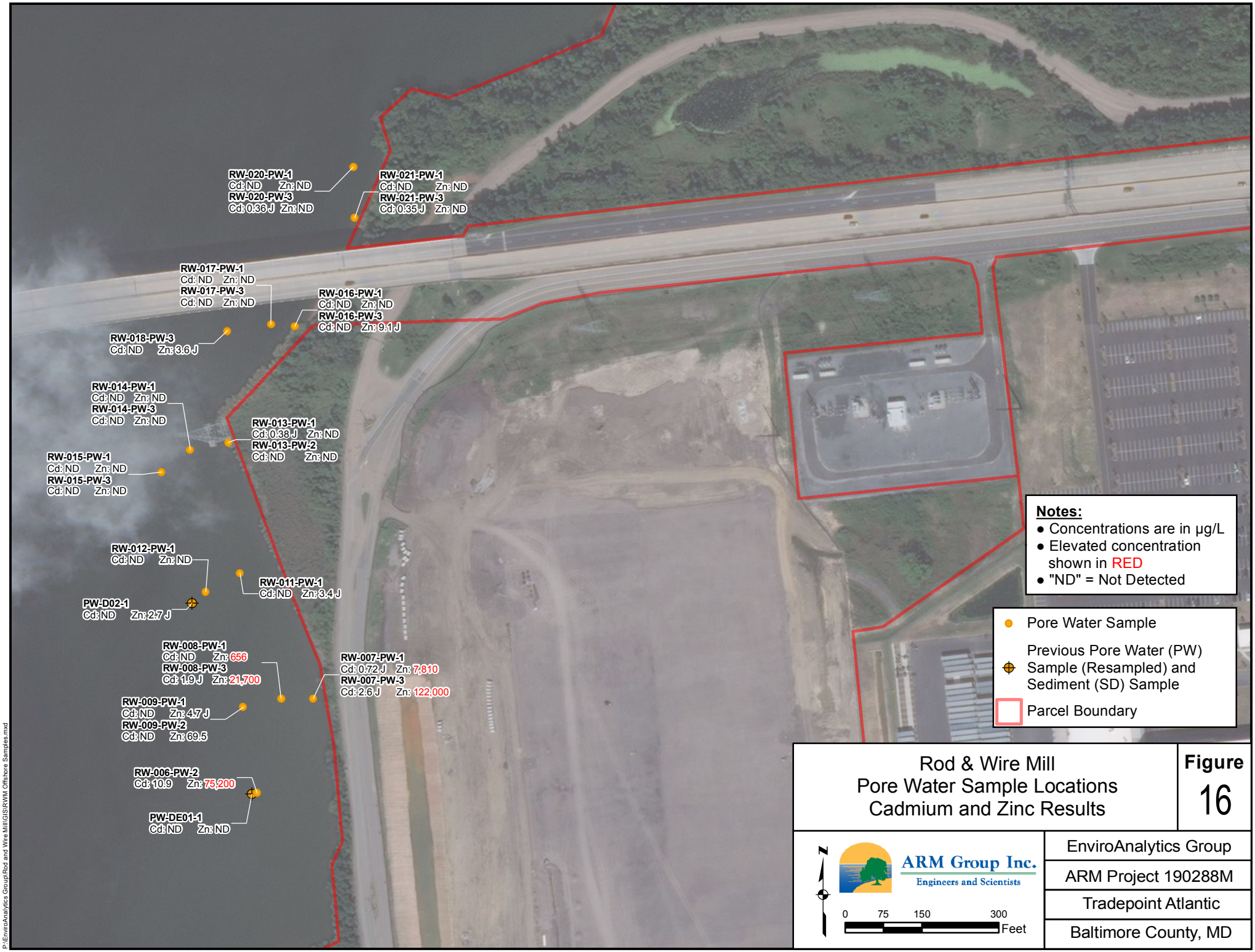
EnviroAnalytics Group

ARM Project 190341M

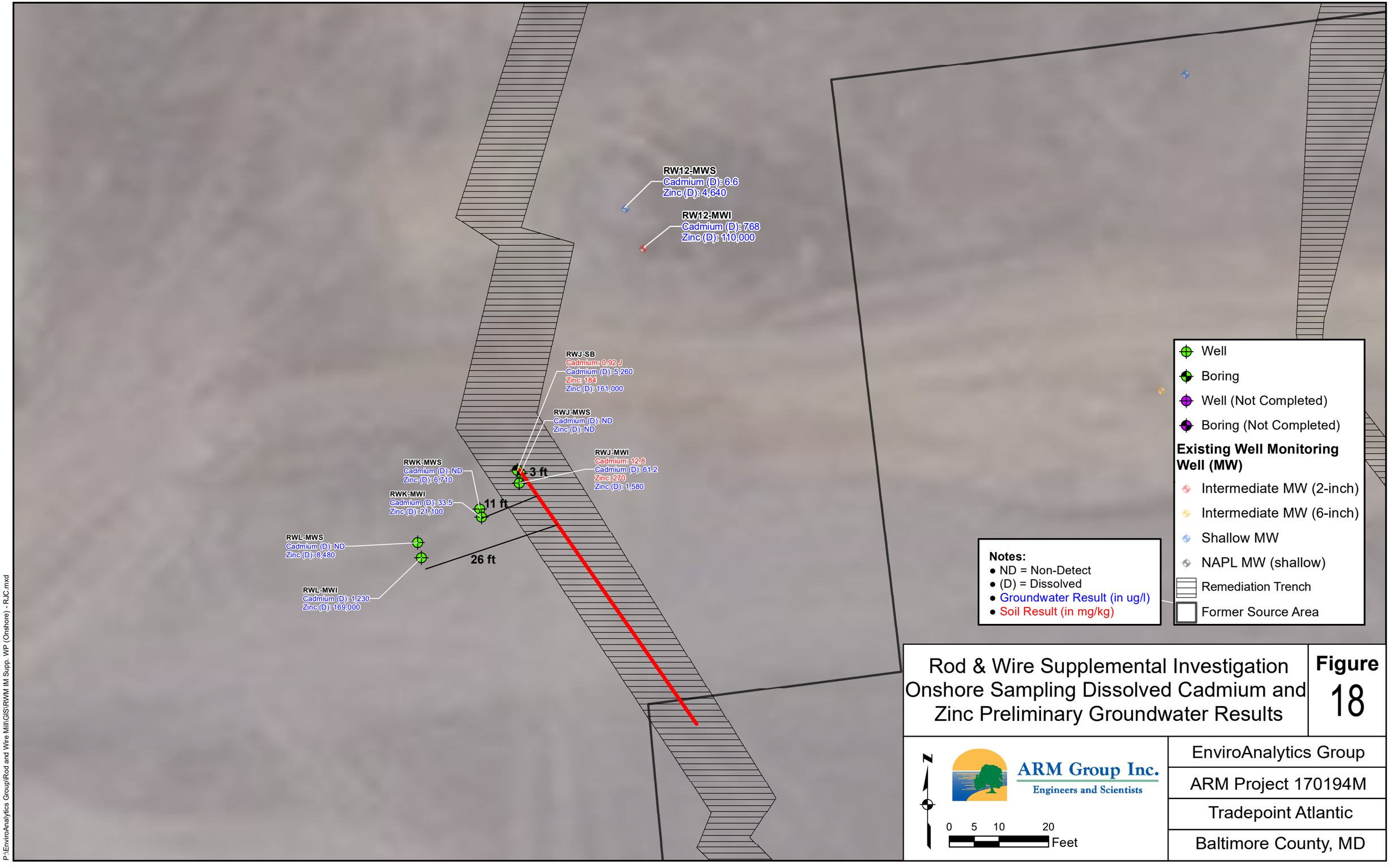
Tradepoint Atlantic

Baltimore County, MD

\\COLUMBIADC01\CorpData\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Interm..mxd


RW-020-PW-1
Cd: ND Zn: ND
RW-020-PW-3
Cd: 0.36 J Zn: ND
RW-021-PW-1
Cd: ND Zn: ND
RW-021-PW-3
Cd: 0.35 J Zn: ND
RW-017-PW-1
Cd: ND Zn: ND
RW-017-PW-3
Cd: ND Zn: ND
RW-016-PW-1
Cd: ND Zn: ND
RW-016-PW-3
Cd: ND Zn: 9.1 J
RW-018-PW-3
Cd: ND Zn: 3.6 J
RW-014-PW-1
Cd: ND Zn: ND
RW-014-PW-3
Cd: ND Zn: ND
RW-013-PW-1
Cd: 0.38 J Zn: ND
RW-013-PW-2
Cd: ND Zn: ND
RW-015-PW-1
Cd: ND Zn: ND
RW-015-PW-3
Cd: ND Zn: ND
RW-012-PW-1
Cd: ND Zn: ND
RW-011-PW-1
Cd: ND Zn: 3.4 J
PW-D02-1
Cd: ND Zn: 2.7 J
RW-008-PW-1
Cd: ND Zn: 656
RW-008-PW-3
Cd: 1.9 J Zn: 21,700
RW-007-PW-1
Cd: 0.72 J Zn: 7,810
RW-007-PW-3
Cd: 2.6 J Zn: 122,000
RW-009-PW-1
Cd: ND Zn: 4.7 J
RW-009-PW-2
Cd: ND Zn: 69.5
RW-006-PW-2
Cd: 10.9 Zn: 75,200
PW-DE01-1
Cd: ND Zn: ND
Notes:
• Concentrations are in µg/L
• Elevated concentration shown in RED
• "ND" = Not Detected
Pore Water Sample
Previous Pore Water (PW) Sample (Resampled) and Sediment (SD) Sample
Parcel Boundary
Rod & Wire Mill
Pore Water Sample Locations
Cadmium and Zinc Results
Figure
16
ARM Group Inc.
Engineers and Scientists
0 75 150 300
Feet
EnviroAnalytics Group
ARM Project 190288M
Tradepoint Atlantic
Baltimore County, MD
P:\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM Offshore Samples.mxd


RW-022-SW-1.5
ND
RW-010-SW-1.5
ND
RW-008-SW-1.5
13.7
RW-007-SW-1.5
11.5
RW-006-SW-1.5
ND
RW-004-SW-2
12.2
RW-001-SW-2
ND
Notes:
● Concentrations are in µg/L
● "ND" = Not Detected
Surface Water Sample
Parcel Boundary
Rod & Wire Mill
Surface Water Sample Locations
Zinc Results
Figure
17
ARM Group Inc.
Engineers and Scientists
0 75 150 300
Feet
EnviroAnalytics Group
ARM Project 190288M
Tradepoint Atlantic
Baltimore County, MD
\\COLUMBIADC01\CorpData\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM Offshore Samples.mxd



Rod & Wire Supplemental Investigation Onshore Sampling Dissolved Cadmium and Zinc Preliminary Groundwater Results

Figure 18

ARM Group Inc.
Engineers and Scientists

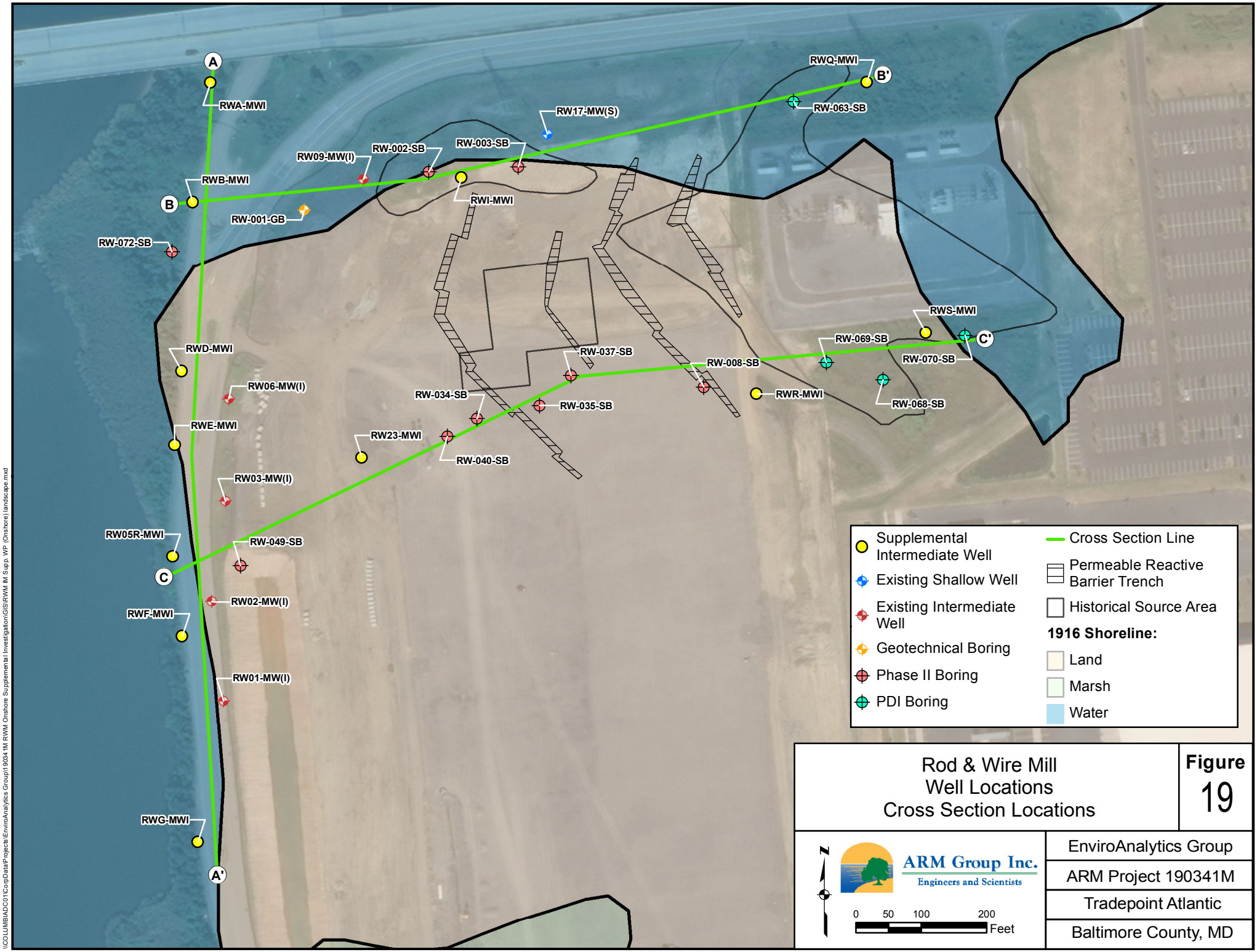
EnviroAnalytics Group

ARM Project 170194M

Tradepoint Atlantic

Baltimore County, MD

P:\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Supp. WP (Onshore) - RJC.mxd



Rod & Wire Mill
Well Locations
Cross Section Locations

Figure 19

ARM Group Inc.
Engineers and Scientists

EnviroAnalytics Group
ARM Project 190341M
Tradepoint Atlantic
Baltimore County, MD

\\COLUMBIADC01\Corp\Data\Projects\EnviroAnalytics Group\190341M RWM Onshore Supplemental Investigation\GIS\RWM IM Supp. WP (Onshore) landscape.mxd

A (north)

A' (south)

RWA-MWS/I RWB-MWS/I RWD-MWS/I RWE-MWS/I RW05R-MWS/I RW02-MWS/I RWF-MWS/I RW01-MWS/I RWG-MWS/I

ELEVATION (feet)

20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250

DISTANCE (feet)

No Geologic Data Below Bottom of Boreholes

LEGEND

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

Tradepoint Atlantic
Sparrows Point, MD
ARM Project 190341M

Figure 20

ARM Group Inc.
Engineers and Scientists

Geologic Cross Section
Section A-A'

07-12-2019 P:\EnviroAnalytics Group\190341M RWM Onshore Supplemental Investigation\Documents\Cross Sections\QuickCross\A-A` SCK.cro

B (west)

B' (east)

RWB-MWS/I

RW-001-GB

RW-002-SB

RWI-MWS/I

RW-003-SB

RW17-MW(S)

RW-063-SB

RWQ-MWS/I

ELEVATION (feet)

20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35 -40

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200

DISTANCE (feet)

No Geologic Data Below Bottom of Boreholes

LEGEND

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

Tradepoint Atlantic
Sparrows Point, MD
ARM Project 190341M

ARM Group Inc.
Engineers and Scientists

Figure 21

Geologic Cross Section

Section B-B'

07-12-2019 \\armgroup.lcl\CorpData\Projects\EnviroAnalytics Group\190341M RWM Onshore Supplemental Investigation\Documents\Cross Sections\QuickCross\B-B' SCK.cro

C (west)

C' (east)

RW05R-MWS/I | RW23-MWS/I | RW-040-SB | RW-034-SB | Trench | RW-035-SB | RW-037-SB | Trench | RWR-MWS/I | RW-069-SB | RWS-MWS/I | RW-070-SB

Elevation (feet)

20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35

No Geologic Data Below Bottom of Boreholes

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350

DISTANCE (feet)

LEGEND

- Slag
- Sand
- Silt/Clay
- Trench Alkaline Charge Material
- Shallow Well Groundwater Elevation
- Intermediate Well Groundwater Elevation

Tradepoint Atlantic
Sparrows Point, MD
ARM Project 190341M

Figure 22

ARM Group Inc.
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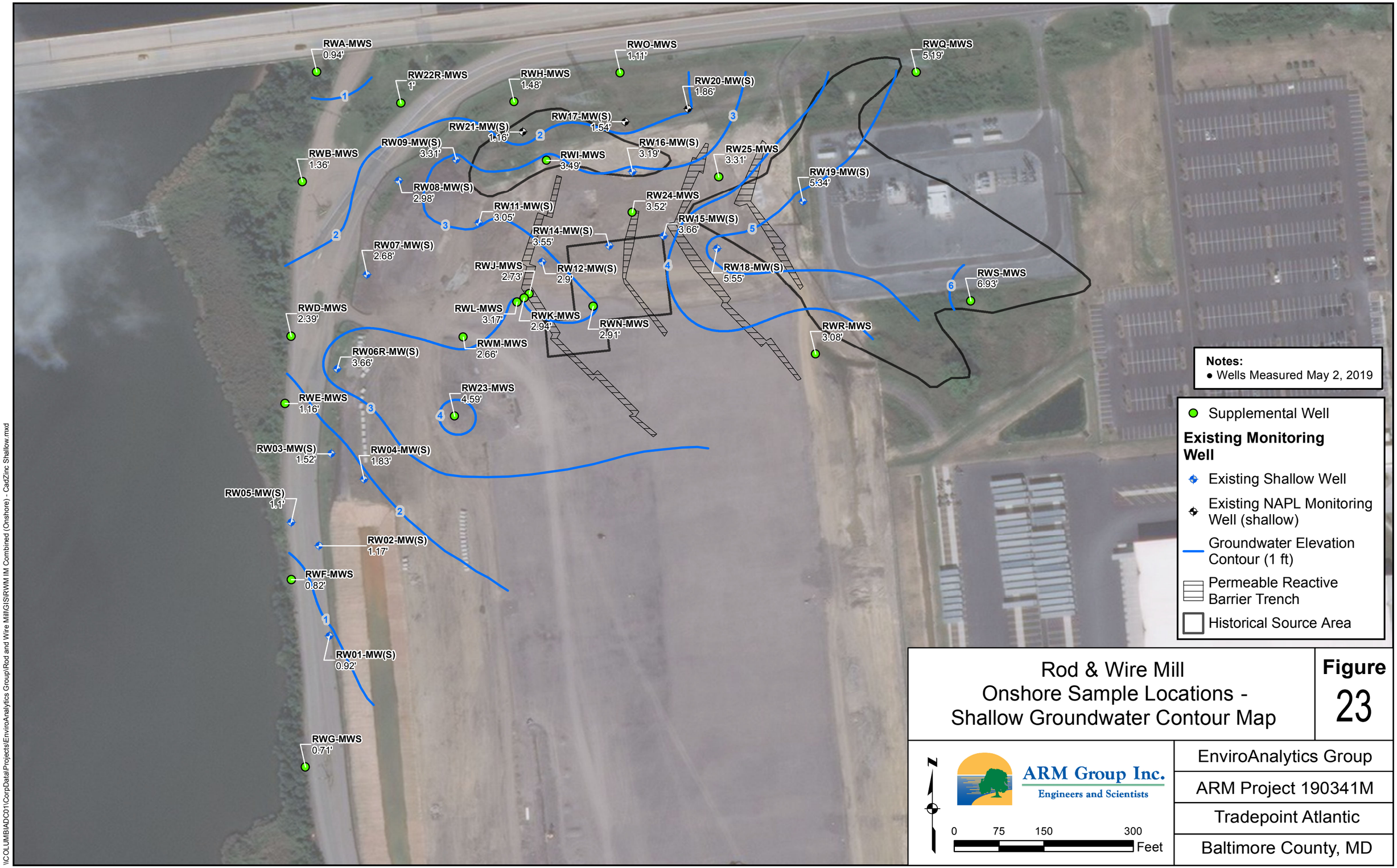
Geologic Cross Section

Section C-C'

07-10-2019 P:\EnviroAnalytics Group\190341M RWM Onshore Supplemental Investigation\Documents\Cross Sections\QuickCross\C-C' SCK.cro



Rod & Wire Mill
Onshore Sample Locations - Shallow Groundwater Contour Map

Figure 23

ARM Group Inc.
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0 75 150 300 Feet

EnviroAnalytics Group

ARM Project 190341M

Tradepoint Atlantic

Baltimore County, MD

\\COLUMBIADC01\CorpData\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Shallow.mxd

Rod & Wire Mill
Onshore Sample Locations - Intermediate Groundwater Contour Map

Figure 24

ARM Group Inc.
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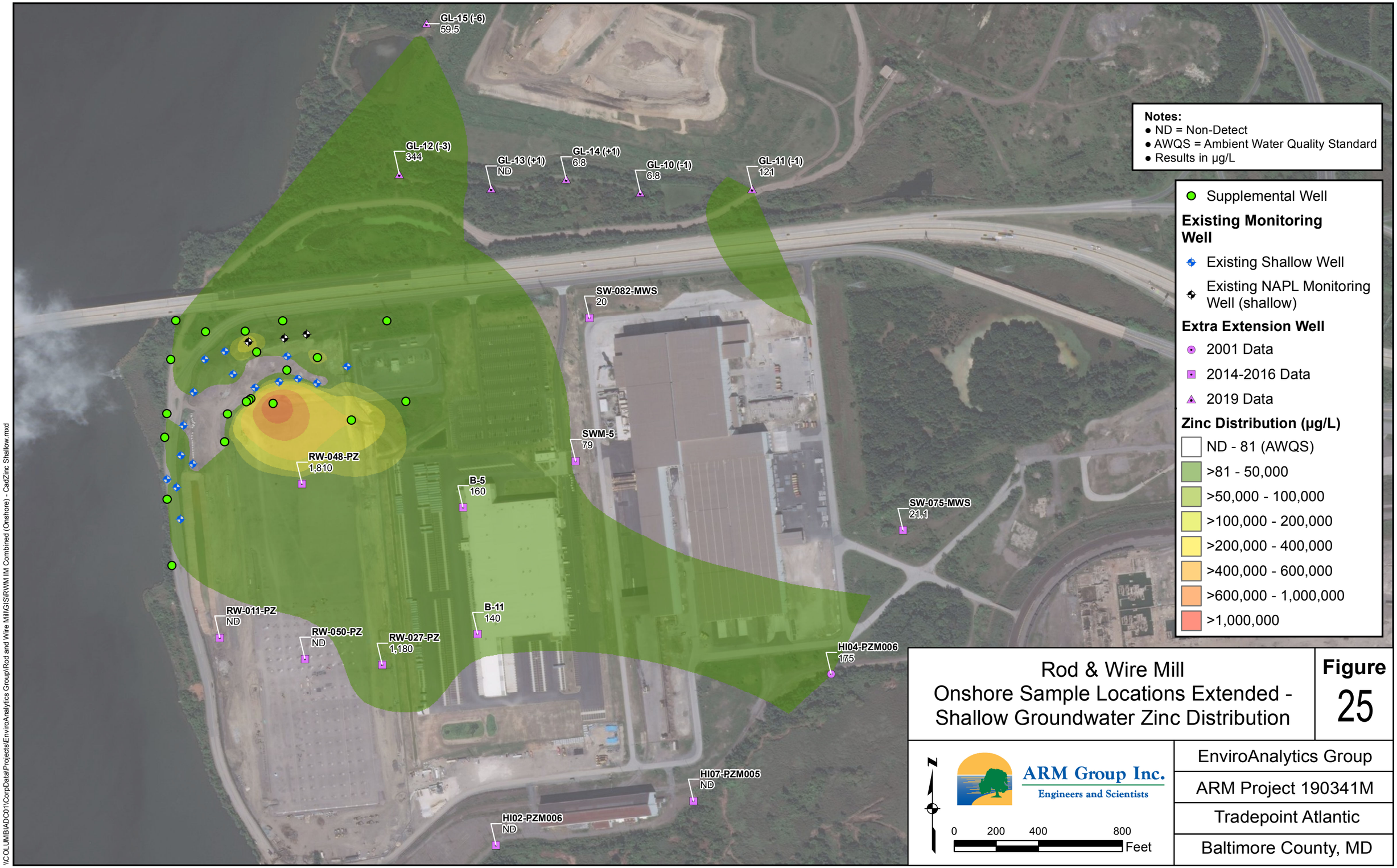
EnviroAnalytics Group

ARM Project 190341M

Tradepoint Atlantic

Baltimore County, MD

\\COLUMBIADC01\CorpData\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Interm..mxd



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Rod & Wire Mill
Onshore Sample Locations Extended - Shallow Groundwater Zinc Distribution

Figure 25

ARM Group Inc.
Engineers and Scientists

EnviroAnalytics Group

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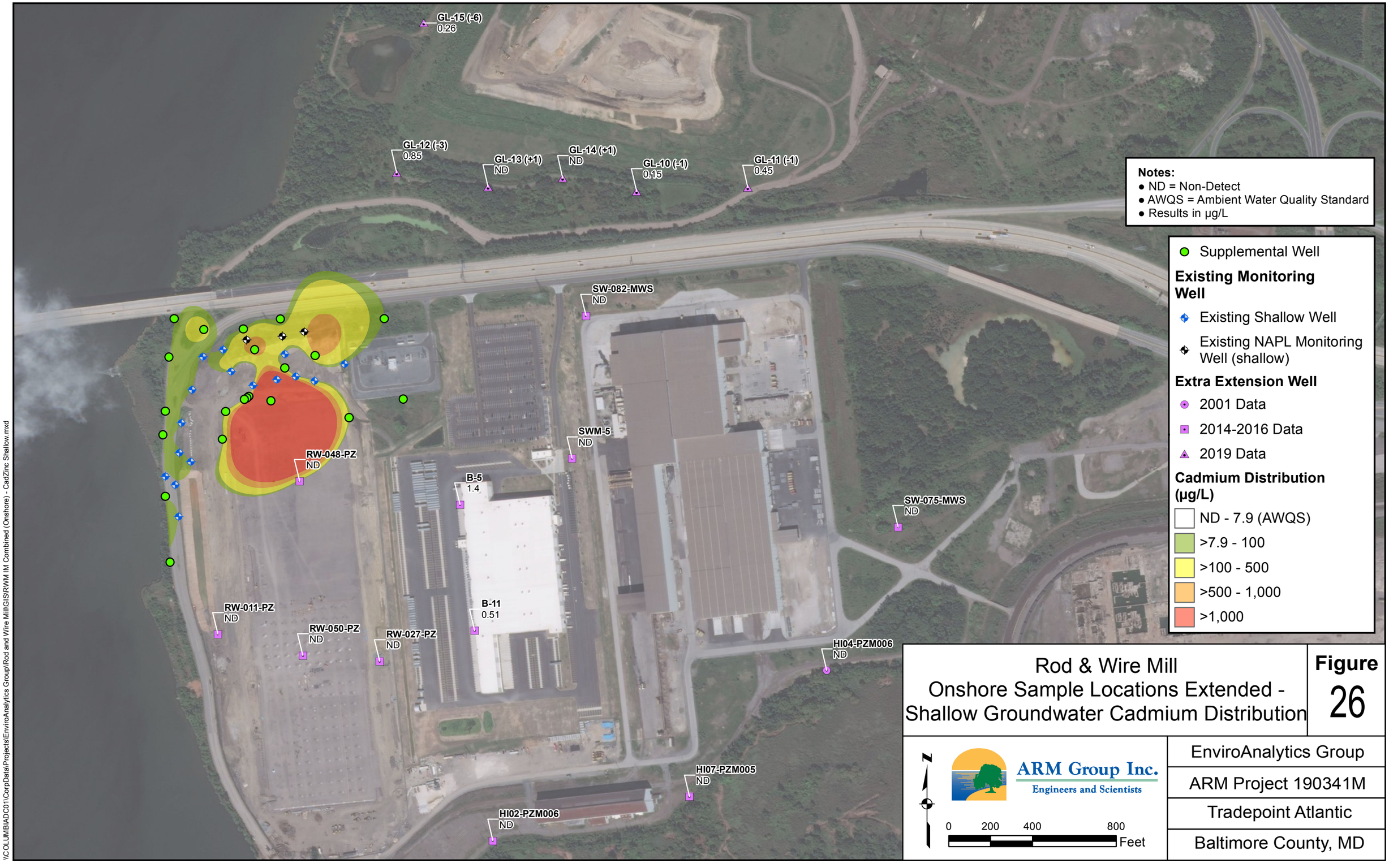
Tradepoint Atlantic

Baltimore County, MD



Rod & Wire Mill
Onshore Sample Locations Extended - Shallow Groundwater Cadmium Distribution

Figure 26

ARM Group Inc.
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Tradepoint Atlantic

Baltimore County, MD

\\COLUMBIADC01\CorpData\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Shallow.mxd

GL-15 (-36)
8.5

GL-12 (-17)
ND

GL-13 (-26)
ND

GL-14 (-33)
ND

GL-10 (-31)
ND

GL-11 (-33)
ND

SW-082-MWI
52

RW-070-PZ
65,400

BW-4
380,000

BW-15
9,500

SW-075-MWI
ND

HI04-PZM034
11.4

HI07-PZM032
ND

HI02-PZM032
ND

Notes:
- ND = Non-Detect
- AWQS = Ambient Water Quality Standard
- Results in µg/L

Supplemental Well
2-inch Existing Intermediate Well
6-inch Existing Intermediate Well

Extra Extension Well

1997-2001 Data
2015-2016 Data
2019 Data

Zinc Distribution (µg/L)

ND - 81 (AWQS)
>81 - 50,000
>50,000 - 100,000
>100,000 - 200,000
>200,000 - 400,000
>400,000 - 600,000
>600,000 - 1,000,000
>1,000,000

Rod & Wire Mill
Onshore Sample Locations Extended - Intermediate Groundwater Zinc Distribution

Figure 27

N

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0 200 400 800 Feet

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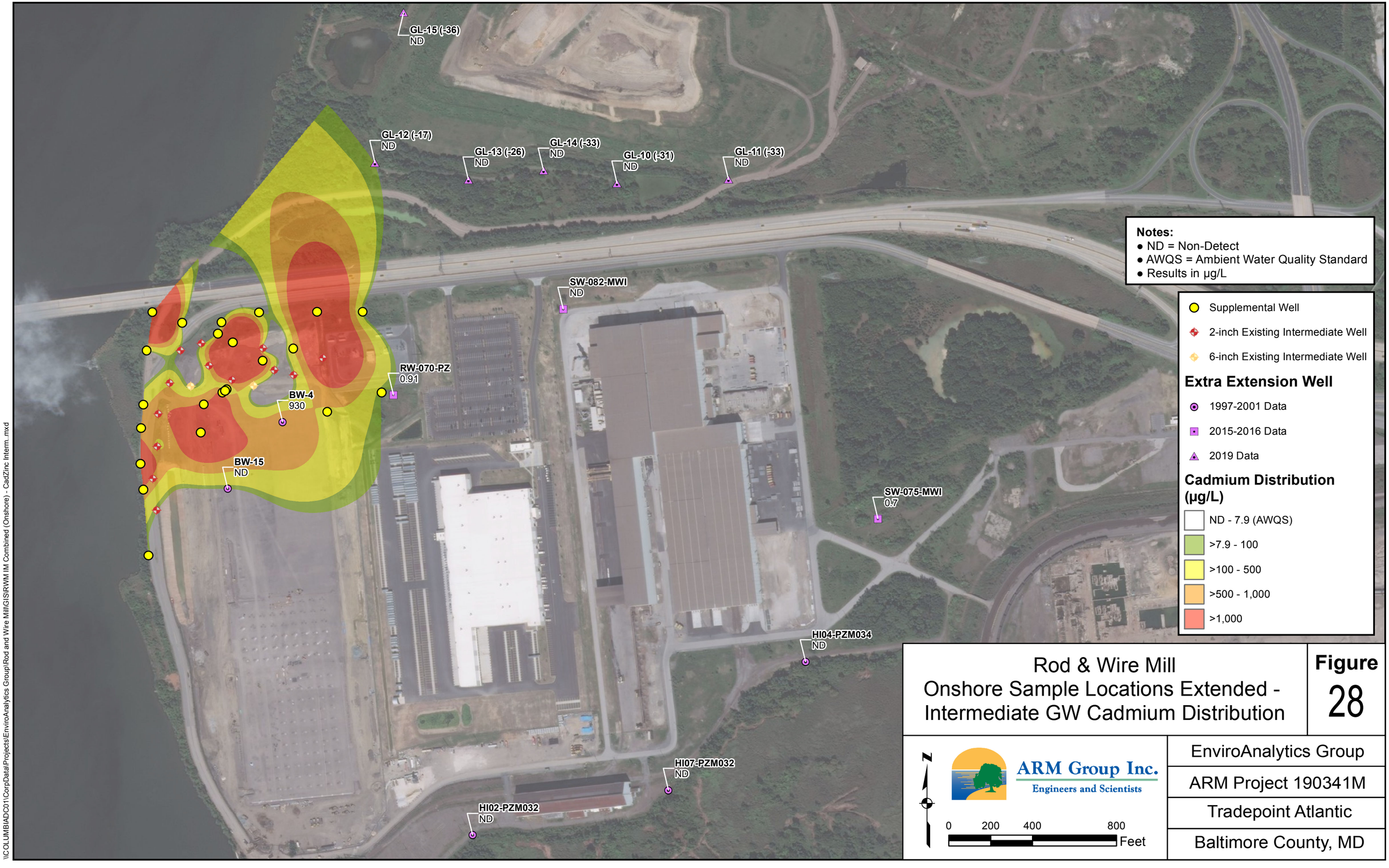
Tradepoint Atlantic
Baltimore County, MD

\\COLUMBIADC01\Corp\Data\Projects\EnviroAnalytics Group\Rod and Wire Mill\GIS\RWM IM Combined (Onshore) - CadZinc Interm..mxd



Rod & Wire Mill
Onshore Sample Locations Extended - Intermediate GW Cadmium Distribution

Figure 28

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Tradepoint Atlantic

Baltimore County, MD

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West

East

Shallow and Intermediate Monitoring Well Pair

Trench

Surface water sample

Bear Creek

9-inch deep pore water sample

2-foot deep pore water sample

3-foot deep pore water sample

Elevation (feet)

20 15 10 5 0 -5 -10 -15 -20 -25 -30 -35 -40 -45 -50 -55 -60 -65 -70

0 50 100 150 200 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000 1050 1100 1150 1200 1250 1300 1350 1400 1450 1500 1550 1600

DISTANCE (feet)

LEGEND

- Slag
- Sand
- Silt/Clay
- Trench Alkaline Charge Material

Tradepoint Atlantic
Sparrows Point, MD
ARM Project 190341M

Figure 29

ARM Group Inc.
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Conceptual Site Model
Cross Section

07-22-2019 P:\EnviroAnalytics Group\190341M RWM Onshore Supplemental Investigation\Documents\Cross Sections\QuickCross\D-D' Conceptual Site Model.cro

TABLES

Table 1
Groundwater Well Elevations and Measurements
Rod and Wire Mill Area
Sparrows Point, Maryland

Shallow Wells				Intermediate Wells			
Well Name	**Depth to Water (ft)**	**TOC Elev**	**GW Elev**	**Well Name**	**Depth to Water (ft)**	**TOC Elev**	**GW Elev**
RW01-MWS	8.79	9.71	0.92	RW01-MWI	8.76	9.78	1.02
RW02-MWS	8.84	10.01	1.17	RW02-MWI	8.79	9.86	1.07
RW03-MWS	9.16	10.68	1.52	RW03-MWI	9.77	10.81	1.04
RW04-MWS	7.35	9.18	1.83				
RW05-MWS	8.63	9.73	1.10	RW05R-MWI	11.98	12.95	0.97
RW06-MWS	7.66	11.32	3.66	RW06-MWI	10.22	11.44	1.22
RW07-MWS	10.29	12.97	2.68	RW07-MW(I)	11.63	12.81	1.18
RW08-MWS	9.4	12.38	2.98	RW08-MW(I)	11.38	12.27	0.89
RW09-MWS	9.59	12.90	3.31	RW09-MWI	11.62	12.68	1.06
				RW10-MWI	12.39	13.46	1.07
RW11-MWS	9.28	12.33	3.05	RW11-MWI	11.36	12.44	1.08
RW12-MWS	10.23	13.13	2.90	RW12-MWI	12.16	13.35	1.19
				RW13-MWI	12.3	13.67	1.37
RW14-MWS	9.1	12.65	3.55				
RW15-MWS	9.56	13.22	3.66	RW15-MWI	11.9	13.33	1.43
RW16-MWS	8.85	12.04	3.19	RW16-MWI	10.52	12.08	1.56
RW18-MWS	8.13	13.68	5.55	RW18-MWI	12.54	13.95	1.41
RW19-MWS	9.08	14.41938	5.34	RW19-MWI	13.22	14.1385	0.92
RW21-MWS	12.35	13.51	1.16	RW21-MWI	13.35	14.46	1.11
RW22R-MWS	15.56	16.56	1.00	RW22R-MWI	15.77	16.63	0.86
RW23-MWS	9.65	14.24	4.59	RW23-MWI	13.36	14.36	1.00
RW24-MWS	9.03	12.55	3.52	RW24-MWI	10.96	12.57	1.61
RW25-MWS	8.63	11.94	3.31	RW25-MWI	10.5	12.08	1.58
RWA-MWS	9.65	10.59	0.94	RWA-MWI	9.62	10.20	0.58
RWB-MWS	18.81	20.17	1.36	RWB-MWI	18.66	19.73	1.07
RWD-MWS	12.54	14.93	2.39	RWD-MWI	13.79	14.87	1.08
RWE-MWS	12.8	13.96	1.16	RWE-MWI	12.91	13.92	1.01
RWF-MWS	11.92	12.74	0.82	RWF-MWI	11.32	12.31	0.99
RWG-MWS	11.79	12.50	0.71	RWG-MWI	11.55	12.48	0.93
RWH-MWS	10.35	11.83	1.48	RWH-MWI	10.79	12.03	1.24
RWI-MWS	9.4	12.89	3.49	RWI-MWI	11.65	12.95	1.30
RWJ-MWS	11.08	13.81	2.73	RWJ-MWI	11.88	14.10	2.22
RWK-MWS	11.3	14.24	2.94	RWK-MWI	13.01	14.22	1.21
RWL-MWS	11.09	14.26	3.17	RWL-MWI	13.19	14.36	1.17
RWM-MWS	12.31	14.97	2.66	RWM-MWI	13.86	14.92	1.06
RWN-MWS	11.95	14.86	2.91				
RWO-MWS	10.48	11.59	1.11	RWO-MWI	10.24	11.67	1.43
				RWP-MWI	11.49	12.55	1.06
RWQ-MWS	10.74	15.93	5.19	RWQ-MWI	14.34	15.63	1.29
RWR-MWS	10.6	13.68	3.08	RWR-MWI	12.21	13.61	1.40
RWS-MWS	7.72	14.65	6.93	RWS-MWI	13.07	14.30	1.23
RW17-MWS	11.86	13.40	1.54				
RW20-MWS	10.47	12.33	1.86				

Date of Water Level Measurement: May 2, 2019

Table 2
Sampling Locations, Descriptions, and Notes
Rod and Wire Mill Area
Sparrows Point, Maryland

Sample	Depth	Sampling Coordinates		Description/Notes	Picture
		Northing	Easting		
RW-001-PW	-	571330.6616	1455859.621	Could not sample this location due to hard bottom	
RW-002-PW	-	571324.1256	1455794.95	Could not sample this location due to hard bottom	
RW-003-PW	-	571316.5841	1455720.33	9 inch sample could not be collected because pore water and surface water specific conductance did not have a 30% difference; 3 foot sample could not be collected due to hard bottom	
RW-004-PW	-	571532.2652	1455832.48	9 inch sample could not be collected because pore water and surface water specific conductance did not have a 30% difference; 3 foot sample could not be collected due to low permeability of the substrate	
RW-005-PW	-	571517.3412	1455797.562	9 inch sample could not be collected due to low permeability of the substrate; 3 foot sample could not be collected due to hard bottom	
RW-006-PW-2	2 feet	571510.1736	1455722.905	9 inch sample could not be collected because pore water and surface water specific conductance did not have a 30% difference	
RW-007-PW-1		571694.0374	1455832.798		
RW-007-PW-3		571694.0374	1455832.798		
RW-008-PW-1		571693.7085	1455770.451		
RW-008-PW-3		571693.7085	1455770.451		
RW-009-PW-1		571677.7749	1455696.229		
RW-009-PW-2		571677.7749	1455696.229		
RW-010-PW	-	571974.8221	1455749.06	9 inch sample could not be collected because pore water and surface water specific conductance did not have a 30% difference; 3 foot sample could not be collected due to low permeability of the substrate	
RW-011-PW-1	9 inches	571938.6987	1455689.47	3 foot sample could not be collected due to hard bottom	
RW-012-PW-1	9 inches	571902.6699	1455623.146	3 foot sample could not be collected due to hard bottom	

Table 2
Sampling Locations, Descriptions, and Notes
Rod and Wire Mill Area
Sparrows Point, Maryland

Sample	Depth	Sampling Coordinates		Description/Notes	Picture
		Northing	Easting		
RW-013-PW-1	9 inches	572194.3323	1455667.323	Screen filter is covered in black mud	Photo: 1
RW-013-PW-2	2 feet	572194.3323	1455667.323		
RW-014-PW-1	9 inches	572179.5537	1455592.378		
RW-014-PW-3	3 feet	572179.5537	1455592.378		
RW-015-PW-1	9 inches	572136.2905	1455536.502		
RW-015-PW-3	3 feet	572136.2905	1455536.502		
RW-016-PW-1	9 inches	572421.0041	1455796.468		
RW-016-PW-3	3 feet	572421.0041	1455796.468		
RW-017-PW-1	9 inches	572425.1565	1455750.869		
RW-017-PW-3	3 feet	572425.1565	1455750.869		
RW-018-PW-3	3 feet	572412.3149	1455665.391		
RW-019-PW	-	572742.5539	1455888.172	Could not sample this location due to low permeability of the substrate; screen filter is covered in black mud	
RW-020-PW-1		572732.8471	1455911.211		
RW-020-PW-3		572732.8471	1455911.211		
RW-021-PW-1		572633.5729	1455913.452		
RW-021-PW-3		572633.5729	1455913.452		
RW-022-PW	-	572912.0162	1456175.458	Could not sample this location due to hard bottom	
RW-023-PW	-	572944.7172	1456152.422	Could not sample this location due to low permeability of the substrate; screen filter is covered in black mud	Photo: 2
RW-024-PW	-	572965.1554	1456138.025	Could not sample this location due to low permeability of the substrate; screen filter is covered in black mud	
PW-D02-1	9 inches	571880.6144	1455595.503	3 foot sample could not be collected due to hard bottom	
PW-DE01-1	9 inches	571507.18	1455712.52	3 foot sample could not be collected due to hard bottom	

Table 3
RWM Supplemental Investigation
Summary of Shallow Groundwater Results

Parameter	Units	AWQS	PAL	RW22R-MWS	RW23-MWS	RW24-MWS	RW25-MWS	RWA-MWS	RWB-MWS	RWD-MWS	RWE-MWS	RWF-MWS
Total Metals												
Cadmium	ug/l	7.9	5	**168**	3 U	**0.91 J**	**495**	**6.2**	**0.60 J**	3 U	**0.59 J**	**5.7**
Zinc	ug/l	81	6,000	**65,300**	**12.7**	**94**	**70,800**	**750**	**64.9**	**4.8 J**	**489**	**38,600**
Dissolved Metals												
Cadmium Dissolved	ug/l	7.9	5	**157**	3 U	3 U	**491**	**2.3 J**	3 U	3 U	**0.57 J**	**4.2**
Zinc Dissolved	ug/l	81	6,000	**58,100**	**22.4**	**5 J**	**70,500**	**516**	**7.4 J**	**4.7 J**	**468**	**39,100**
Other												
Acidity (CaCO3 pH8.3)	mg/l			**326**	**20**	10 U	**110**	10 U	10 U	10 U	10 U	**204**
Alkalinity (CaCO3 pH4.5)	mg/l			**48**	**50**	**268**	**50**	**42**	**120**	**104 J-**	**248 J-**	**6 J-**
Dissolved Oxygen	mg/l			**2.5**	**2.97**	**2.34**	**2.29**	**2.39**	**4.1**	**2.39**	**2.73**	**2.6**
Eh	mV			**239**	**239**	**-12**	**145**	**-18**	**110**	**177**	**65**	**260**
ORP	mV			**26.9**	**25.1**	**-225.3**	**-68.3**	**-229.4**	**-100.9**	**-36.7**	**-148.6**	**46.9**
pH	su			**6.64**	**6.46**	**11.96**	**6.14**	**7.63**	**10.77**	**6.71**	**7.13**	**5.58**
Specific Conductance	mS/cm			**2.391**	**0.631**	**2.137**	**1.333**	**2.537**	**1.455**	**0.734**	**2.117**	**2.173**
Turbidity	NTU			**6.97**	**426.9**	**12.7**	**28.1**	**3.78**	**17.6**	**15.6**	**8.14**	**12.2**
Water Temperature	°C			**17.6**	**15.3**	**16.3**	**16.1**	**18.2**	**19.1**	**15**	**15.1**	**15.4**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)
Values in orange indicate an exceedance of the Project Action Limit (PAL)
Values in blue indicate an exceedance of the Ambient Water Quality Standard (AWQS)
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.
J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.
Eh = ORP + C_T
C_T = -0.7357(T) + 224.82

Table 3
RWM Supplemental Investigation
Summary of Shallow Groundwater Results

Parameter	Units	AWQS	PAL	RWG-MWS	RWH-MWS	RWI-MWS	RWJ-MWS	RWK-MWS	RWL-MWS	RWM-MWS	RWN-MWS
Total Metals											
Cadmium	ug/l	7.9	5	3 U	**30.6**	**743**	3 U	3 U	3 U	3 U	**13,000**
Zinc	ug/l	81	6,000	**4.7 J**	**3,880**	**27,500**	**42.7**	**9,130**	**6,280**	**10.5**	**1,020,000**
Dissolved Metals											
Cadmium Dissolved	ug/l	7.9	5	3 U	**20**	**714**	3 U	3 U	3 U	3 U	**13,000**
Zinc Dissolved	ug/l	81	6,000	10 U	**367**	**25,800**	10 U	**6,710**	**8,480**	**6 J**	**978,000**
Other											
Acidity (CaCO3 pH8.3)	mg/l			10 U	10 U	10 U	10 U	**42**	**66**	10 U	**1,480**
Alkalinity (CaCO3 pH4.5)	mg/l			**120 J-**	**258**	**88**	**232**	**26**	**20**	**44**	**12**
Dissolved Oxygen	mg/l			**1.94**	**2.71**	**2.56**	**1.66**	**2.02**	**2.38**	**2.36**	**2.71**
Eh	mV			**-96**	**-86**	**127**	**-106**	**88**	**149**	**206**	**191**
ORP	mV			**-310.4**	**-300.1**	**-86.4**	**-318.7**	**-124.8**	**-61.5**	**-7.1**	**-21.9**
pH	su			**9.74**	**7.92**	**7.13**	**12.03**	**10.48**	**6.40**	**6.85**	**5.17**
Specific Conductance	mS/cm			**1.037**	**0.986**	**2.258**	**1.927**	**0.777**	**0.768**	**0.275**	**2.756**
Turbidity	NTU			**4.99**	**13.8**	**2.87**	**18.6**	**11.2**	**20.8**	**53**	**165.9**
Water Temperature	°C			**13.8**	**15.2**	**16.1**	**16.5**	**16.9**	**19.3**	**15.7**	**15.8**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)
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J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.
$Eh = ORP + C^T$
$C^T = -0.7357(T) + 224.82$

Table 3
RWM Supplemental Investigation
Summary of Shallow Groundwater Results

Parameter	Units	AWQS	PAL	RWO-MWS	RWQ-MWS	RWR-MWS	RWS-MWS	RW01-MW(S)	RW02-MW(S)	RW03-MW(S)	RW04-MW(S)
Total Metals											
Cadmium	ug/l	7.9	5	**10**	**2.9 J**	**51.8**	3 U	**4.8**	**2 J**	**18.9**	3 U
Zinc	ug/l	81	6,000	**3,200**	**148**	**214,000**	**9,740**	**16,100**	**22,400**	**20,100**	**132**
Dissolved Metals											
Cadmium Dissolved	ug/l	7.9	5	**1.4 J**	**2.6 J**	**50**	3 U	**4.7**	**1.7 J**	**17.9**	3 U
Zinc Dissolved	ug/l	81	6,000	**2,660**	**146**	**213,000**	**10,100**	**16,300**	**21,900**	**18,700**	10 U
Other											
Acidity (CaCO3 pH8.3)	mg/l			10 U	10 U	**428**	10 U	**80**	**70**	**30**	10 U
Alkalinity (CaCO3 pH4.5)	mg/l			**320**	**150**	**28**	**336**	**5 J**	**20**	**5 J**	**210**
Dissolved Oxygen	mg/l			**1.72**	**2.69**	**1.98**	**2.9**	**2.32**	**2.16**	**2.05**	**4**
Eh	mV			**132**	**231**	**233**	**171**	**292**	**182**	**323**	**203**
ORP	mV			**-80.8**	**17.5**	**20.1**	**-43.8**	**80.3**	**-25.5**	**109.9**	**-9.3**
pH	su			**6.71**	**6.44**	**5.03**	**6.43**	**5.88**	**6.49**	**5.48**	**6.90**
Specific Conductance	mS/cm			**1.478**	**0.638**	**2.077**	**1.234**	**1.266**	**0.956**	**0.824**	**0.743**
Turbidity	NTU			**4.17**	**5.97**	**58.5**	**13.7**	**6.99**	**9.44**	**3.81**	**6.75**
Water Temperature	°C			**15.9**	**15**	**15.6**	**14.1**	**18.3**	**23.8**	**16.2**	**17.6**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)
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J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.
$Eh = ORP + C^T$
$C^T = -0.7357(T) + 224.82$

Table 3
RWM Supplemental Investigation
Summary of Shallow Groundwater Results

Parameter	Units	AWQS	PAL	RW05-MW(S)	RW06R-MW(S)	RW07-MW(S)	RW08-MW(S)	RW09-MW(S)	RW21-MW(S)	RW11-MW(S)	RW12-MW(S)
Total Metals											
Cadmium	ug/l	7.9	5	3 U	3 U	3 B	1.2 B	**13.2**	**486**	**1 J**	**4.4**
Zinc	ug/l	81	6,000	**10 J**	**33**	**151**	**12,500**	**15,300**	**279,000**	**38,600**	**5,870**
Dissolved Metals											
Cadmium Dissolved	ug/l	7.9	5	3 U	3 U	**2.9 J**	**0.86 J**	**12**	**483**	1.1 B	**2.1 J**
Zinc Dissolved	ug/l	81	6,000	10 U	**20.7**	**137**	**11,300**	**14,100**	**282,000**	**38,900**	**1,550**
Other											
Acidity (CaCO3 pH8.3)	mg/l			10 U	10 U	10 U	**20**	10 U	**478**	**220**	10 U
Alkalinity (CaCO3 pH4.5)	mg/l			**46**	**96**	**72**	**32**	**60**	**70**	**14**	**62**
Dissolved Oxygen	mg/l			**2.55**	**6.26**	**4.1**	**2.01**	**2.52**	**2**	**2.06**	**2.23**
Eh	mV			**189**	**264**	**331**	**250**	**221**	**179**	**231**	**235**
ORP	mV			**-20.9**	**50.8**	**117.6**	**37.9**	**9.5**	**-33.6**	**19**	**24**
pH	su			**9.12**	**8.56**	**6.94**	**5.74**	**6.23**	**5.95**	**5.72**	**6.70**
Specific Conductance	mS/cm			**1.508**	**0.543**	**1.024**	**0.926**	**1.299**	**3.202**	**1.774**	**0.901**
Turbidity	NTU			**4.61**	**12.8**	**9.81**	**3.64**	**16.2**	**15.3**	**2.33**	**4.27**
Water Temperature	°C			**20.2**	**16.4**	**15.9**	**17.1**	**17.9**	**16.9**	**17.3**	**18.3**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)
Values in orange indicate an exceedance of the Project Action Limit (PAL)
Values in blue indicate an exceedance of the Ambient Water Quality Standard (AWQS)
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.
J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.
Eh = ORP + C^T
C^T = -0.7357(T) + 224.82

Table 3
RWM Supplemental Investigation
Summary of Shallow Groundwater Results

Parameter	Units	AWQS	PAL	RW14-MW(S)	RW15-MW(S)	RW16-MW(S)	RW18-MW(S)	RW19-MW(S)
Total Metals								
Cadmium	ug/l	7.9	5	**3,000**	**20.6**	3 U	3 U	**0.69 J**
Zinc	ug/l	81	6,000	**73,600**	**766**	**5.5 J**	**25.6**	**3,150**
Dissolved Metals								
Cadmium Dissolved	ug/l	7.9	5	**3,000**	**19.1**	3 U	3 U	3 U
Zinc Dissolved	ug/l	81	6,000	**69,600**	**684**	**106**	**16.9**	**3,180**
Other								
Acidity (CaCO3 pH8.3)	mg/l			**116**	10 U	10 U	10 U	**110**
Alkalinity (CaCO3 pH4.5)	mg/l			**2 J**	**20**	**142**	**130**	**40**
Dissolved Oxygen	mg/l			**2.55**	**1.78**	**1.52**	**1.63**	**1.86**
Eh	mV			**377**	**66**	**-49**	**101**	**95**
ORP	mV			**165.4**	**-146.7**	**-260.3**	**-110.1**	**-114.7**
pH	su			**5.53**	**8.72**	**6.10**	**10.41**	**7.13**
Specific Conductance	mS/cm			**1.78**	**0.746**	**1.92**	**0.231**	**2.897**
Turbidity	NTU			**1.85**	**0.87**	**2.47**	**1.93**	**5.01**
Water Temperature	°C			**17.7**	**16.9**	**17.8**	**19**	**20.4**

Detections in bold

Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)

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Values in blue indicate an exceedance of the Ambient Water Quality Standard (AWQS)

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J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.

$Eh = ORP + C_T$

$C_T = -0.7357(T) + 224.82$

Table 4
RWM Supplemental Investigation
Summary of Intermediate and Deep Groundwater Results

Parameter	Units	AWQS	PAL	RW05R-MWI	RW21-MWI	RW22R-MWI	RW23-MWI	RW24-MWI	RW25-MWI	RWA-MWI
Total Metals										
Cadmium	µg/L	7.9	5	**2,590**	**53.9**	3 U	**2,340**	**1,610**	**500**	**6,970**
Zinc	µg/L	81	6,000	**68,400**	**630,000**	**1,750**	**112,000**	**695,000**	**421,000**	**391,000**
Dissolved Metals										
Cadmium Dissolved	µg/L	7.9	5	**2,570**	**50.2**	3 U	**2,270**	**1,580**	**507**	**6,830**
Zinc Dissolved	µg/L	81	6,000	**66,800**	**624,000**	**1,030**	**109,000**	**650,000**	**413,000**	**375,000**
Other										
Acidity (CaCO3 pH8.3)	mg/l			**280**	**1,980**	**412**	**322**	**1,180**	**702**	**832**
Alkalinity (CaCO3 pH4.5)	mg/l			**100 J-**	**8 J**	**38 J-**	**38**	**10**	**20**	**20**
Dissolved Oxygen	mg/l			**2.39**	**2.53**	**1.64**	**3.01**	**2.44**	**3.03**	**2.59**
Eh	mV			**113**	**183**	**190**	**233**	**228**	**119**	**272**
ORP	mV			**-99.8**	**-29**	**-19.8**	**20.8**	**15.9**	**-94**	**61.1**
pH	su			**6.57**	**5.60**	**6.26**	**5.42**	**5.37**	**6.99**	**5.49**
Specific Conductance	mS/cm			**7.627**	**3.508**	**2.882**	**2.129**	**3.232**	**2.053**	**2.968**
Turbidity	NTU			**8.77**	**38.89**	**16.6**	**196.5**	**31.1**	**16.7**	**75.7**
Water Temperature	°C			**16.2**	**17.5**	**20.5**	**16.7**	**17.2**	**16.4**	**18.3**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)
Values in blue indicate an exceedance of the Ambient Water Quality Standard (AWQS)
U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.
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J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.
NS: Not sampled
Eh = ORP + C_T
C_T = -0.7357(T) + 224.82

Table 4
RWM Supplemental Investigation
Summary of Intermediate and Deep Groundwater Results

Parameter	Units	AWQS	PAL	RWB-MWI	RWD-MWI	RWE-MWI	RWF-MWI	RWG-MWI	RWH-MWI	RWI-MWI
Total Metals										
Cadmium	µg/L	7.9	5	3 U	**402**	**722**	**906**	**23.9**	**103**	**8,950**
Zinc	µg/L	81	6,000	**17.6**	**37,700**	**121,000**	**40,700**	**357**	**234,000**	**652,000**
Dissolved Metals										
Cadmium Dissolved	µg/L	7.9	5	3 U	**395**	**700**	**859**	**22.9**	**92.4**	**8,050**
Zinc Dissolved	µg/L	81	6,000	**18.4**	**36,200**	**112,000**	**41,900**	**332**	**226,000**	**632,000**
Other										
Acidity (CaCO3 pH8.3)	mg/l			10 U	**328**	**528**	**182**	**50**	**642**	10 U
Alkalinity (CaCO3 pH4.5)	mg/l			**102**	**48 J-**	**52 J-**	**96 J-**	**70 J-**	**84**	**184**
Dissolved Oxygen	mg/l			**2.68**	**2.71**	**2.68**	**2.99**	**3.05**	**3.05**	**2.96**
Eh	mV			**251**	**221**	**120**	**127**	**142**	**142**	**153**
ORP	mV			**38.9**	**8.1**	**-93.1**	**-85.5**	**-70.5**	**-70.5**	**-59.4**
pH	su			**6.58**	**6.52**	**6.29**	**6.73**	**6.73**	**6.24**	**6.14**
Specific Conductance	mS/cm			**1.719**	**3.332**	**4.837**	**11.36**	**10.287**	**2.787**	**4.35**
Turbidity	NTU			**34.6**	**32.1**	**17.8**	**11.2**	**16.7**	**16.7**	**10.57**
Water Temperature	°C			**16.9**	**15.8**	**16.2**	**16.6**	**16.1**	**16.1**	**16.8**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)
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J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.
NS: Not sampled
$Eh = ORP + C_T$
$C_T = -0.7357(T) + 224.82$

Table 4
RWM Supplemental Investigation
Summary of Intermediate and Deep Groundwater Results

Parameter	Units	AWQS	PAL	RWJ-MWI	RWJ-SB	RWK-MWI	RWL-MWI	RWM-MWI	RWO-MWI
Total Metals									
Cadmium	µg/L	7.9	5	**61.4**	NS	**46.7**	**1,260**	**1,130**	**70.3**
Zinc	µg/L	81	6,000	**3,080**	NS	**21,300**	**163,000**	**165,000**	**243,000**
Dissolved Metals									
Cadmium Dissolved	µg/L	7.9	5	**61.2**	**5,260**	**33.5**	**1,230**	**1,080**	**68.2**
Zinc Dissolved	µg/L	81	6,000	**1,580**	**161,000**	**21,100**	**169,000**	**162,000**	**249,000**
Other									
Acidity (CaCO3 pH8.3)	mg/l			**10**	**230**	**78**	**452**	**486**	**268**
Alkalinity (CaCO3 pH4.5)	mg/l			**10**	**46**	**8 J**	**12**	**42**	**78**
Dissolved Oxygen	mg/l			**1.63**	NS	**1.63**	**2.64**	**2.55**	**2.01**
Eh	mV			**-76**	NS	**57**	**197**	**127**	**187**
ORP	mV			**-288**	NS	**-154.7**	**-15.3**	**-85.6**	**-25.5**
pH	su			**8.32**	NS	**7.40**	**6.19**	**6.08**	**5.69**
Specific Conductance	mS/cm			**2.686**	NS	**2.27**	**2.319**	**2.095**	**2.503**
Turbidity	NTU			**15.7**	NS	**13.8**	**28.1**	**275.3**	**10.6**
Water Temperature	°C			**17.4**	NS	**18.5**	**17.5**	**16.6**	**17.2**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)
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NS: Not sampled
$Eh = ORP + C_T$
$C_T = -0.7357(T) + 224.82$

Table 4
RWM Supplemental Investigation
Summary of Intermediate and Deep Groundwater Results

Parameter	Units	AWQS	PAL	RWP-MWI	RWQ-MWI	RWR-MWI	RWS-MWI	RWU-SB	RW01-MW(I)
Total Metals									
Cadmium	µg/L	7.9	5	**2,790**	**28.3**	**457**	3 U	NS	**24.4**
Zinc	µg/L	81	6,000	**2,970,000**	**339,000**	**2,660,000**	**843,000**	NS	**5,980**
Dissolved Metals									
Cadmium Dissolved	µg/L	7.9	5	**2,810**	**26.2**	**440**	3 U	3 U	**19.4**
Zinc Dissolved	µg/L	81	6,000	**3,210,000**	**357,000**	**2,560,000**	**797,000**	**63.8**	**5,670**
Other									
Acidity (CaCO3 pH8.3)	mg/l			**3,440**	**1,300**	**2,700**	**2,810**	10 U	**320**
Alkalinity (CaCO3 pH4.5)	mg/l			**40**	**54 J-**	**66**	**50**	**138**	**40**
Dissolved Oxygen	mg/l			**2.43**	**2.37**	**2.24**	**3.23**	NS	**2.26**
Eh	mV			**253**	**199**	**134**	**199**	NS	**129**
ORP	mV			**41.2**	**-13.7**	**-79.5**	**-15**	NS	**-82.8**
pH	su			**5.55**	**5.90**	**5.50**	**5.57**	NS	**6.23**
Specific Conductance	mS/cm			**5.9**	**3.125**	**6.076**	**6.05**	NS	**5.02**
Turbidity	NTU			**28.8**	**8.25**	**22.8**	**19.3**	NS	**7.91**
Water Temperature	°C			**17.5**	**16.1**	**15.3**	**15**	NS	**18.3**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)
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$Eh = ORP + C_T$
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Table 4
RWM Supplemental Investigation
Summary of Intermediate and Deep Groundwater Results

Parameter	Units	AWQS	PAL	RW02-MW(I)	RW03-MW(I)	RW06-MW(I)	RW07-MW(I)	RW08-MW(I)	RW09-MW(I)
Total Metals									
Cadmium	µg/L	7.9	5	**803**	**536**	**903**	**445**	3 U	**4.7**
Zinc	µg/L	81	6,000	**58,700**	**14,200**	**109,000**	**132,000**	**44**	**68,400**
Dissolved Metals									
Cadmium Dissolved	µg/L	7.9	5	**785**	**449**	**885**	**453**	3 U	**3.8**
Zinc Dissolved	µg/L	81	6,000	**56,600**	**13,300**	**108,000**	**136,000**	10 U	**64,200**
Other									
Acidity (CaCO3 pH8.3)	mg/l			**260**	**170**	**322**	**676**	**142**	**900**
Alkalinity (CaCO3 pH4.5)	mg/l			**80**	**50**	**12**	**30**	**64**	**30**
Dissolved Oxygen	mg/l			**2.42**	**2.54**	**5.56**	**2.4**	**2.19**	**2.25**
Eh	mV			**126**	**180**	**241**	**178**	**122**	**182**
ORP	mV			**-86.1**	**-32.9**	**29.2**	**-34.4**	**-89.6**	**-29.8**
pH	su			**6.74**	**6.38**	**7.74**	**6.10**	**6.31**	**6.15**
Specific Conductance	mS/cm			**5.31**	**8.89**	**0.23**	**2.66**	**1.295**	**2.049**
Turbidity	NTU			**13.6**	**12.1**	**19.8**	**17.9**	**10.68**	**10.44**
Water Temperature	°C			**17.6**	**16.8**	**17.6**	**17.4**	**17.5**	**17.8**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)
Values in blue indicate an exceedance of the Ambient Water Quality Standard (AWQS)
U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.
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NS: Not sampled
$Eh = ORP + C_T$
$C_T = -0.7357(T) + 224.82$

Table 4
RWM Supplemental Investigation
Summary of Intermediate and Deep Groundwater Results

Parameter	Units	AWQS	PAL	RW10-MW(I)	RW11-MW(I)	RW12-MW(I)	RW13-MW(I)	RW15-MW(I)	RW16-MW(I)
Total Metals									
Cadmium	µg/L	7.9	5	3 B	**598**	**1,500**	**94.7**	**64.9**	3 U
Zinc	µg/L	81	6,000	**6,150**	**122,000**	**120,000**	**580**	**16,500**	**135**
Dissolved Metals									
Cadmium Dissolved	µg/L	7.9	5	**0.86 J**	**586**	**1,520**	**51.1**	**64.2**	3 U
Zinc Dissolved	µg/L	81	6,000	**5,560**	**121,000**	**111,000**	**97.7**	**16,400**	**4.9 J**
Other									
Acidity (CaCO3 pH8.3)	mg/l			**98**	**462**	**274**	**10**	**23**	10 U
Alkalinity (CaCO3 pH4.5)	mg/l			**78**	**24**	**20**	**5 J**	**30**	**36**
Dissolved Oxygen	mg/l			**1.86**	**2.59**	**2.84**	**6.57**	**1.98**	**2.52**
Eh	mV			**105**	**176**	**277**	**377**	**153**	**221**
ORP	mV			**-107.1**	**-36.6**	**66.2**	**124.3**	**-58.6**	**9.4**
pH	su			**6.63**	**6.30**	**7.03**	**10.12**	**10.47**	**8.47**
Specific Conductance	mS/cm			**1.46**	**2.699**	**0.177**	**1.497**	**0.145**	**0.17**
Turbidity	NTU			**45.3**	**6.05**	**0.91**	**0.98**	**4.19**	**6.58**
Water Temperature	°C			**17.4**	**17.2**	**18.5**	**16.9**	**17.3**	**17.9**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)
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U: The analyte was not detected in the sample. The numeric value represents the sample quantitative/detection limit.
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NS: Not sampled
$Eh = ORP + C_T$
$C_T = -0.7357(T) + 224.82$

Table 4
RWM Supplemental Investigation
Summary of Intermediate and Deep Groundwater Results

Parameter	Units	AWQS	PAL	RW18-MW(I)	RW19-MW(I)	RW06R-MW(D)
Total Metals						
Cadmium	µg/L	7.9	5	**38**	**2,440**	3 U
Zinc	µg/L	81	6,000	**276,000**	**7,270,000**	**45**
Dissolved Metals						
Cadmium Dissolved	µg/L	7.9	5	**38**	**2,420**	3 U
Zinc Dissolved	µg/L	81	6,000	**279,000**	**7,280,000**	**24.3**
Other						
Acidity (CaCO3 pH8.3)	mg/l			**966**	**9,180**	**102**
Alkalinity (CaCO3 pH4.5)	mg/l			**2.5 J**	**70**	**54**
Dissolved Oxygen	mg/l			**1.91**	**2.15**	**2.58**
Eh	mV			**249**	**267**	**212**
ORP	mV			**37.1**	**58.1**	**-107.1**
pH	su			**5.49**	**5.28**	**6.59**
Specific Conductance	mS/cm			**4.79**	**6.15**	**1.40**
Turbidity	NTU			**1.9**	**7.91**	**45.3**
Water Temperature	°C			**17.6**	**21.4**	**17.4**

Detections in bold
Values in red indicate an exceedance of the Project Action Limit (PAL) and Ambient Water Quality Standard (AWQS)
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J-: The positive result reported for this analyte is a quantitative estimate but may be biased low.
NS: Not sampled
$Eh = ORP + C_T$
$C_T = -0.7357(T) + 224.82$

Table 5
Rod and Wire Mill - Offshore Investigation
Summary of Pore Water Results

Parameter	Units	Surface Water Criteria	RW-001-PW	RW-002-PW	RW-003-PW	RW-004-PW	RW-005-PW	RW-006-PW-2	RW-007-PW-1
Dissolved Metals									
Cadmium	µg/L	7.9	NS (HB)	NS (HB)	NS (30)	NS (30)	NS (LP)	**10.9**	**0.72 J**
Zinc	µg/L	81	NS (HB)	NS (HB)	NS (30)	NS (30)	NS (LP)	**75,200**	**7,810**
Hardness	µg/L		NS (HB)	NS (HB)	NS (30)	NS (30)	NS (LP)	**1,600,000**	**1,110,000**

Parameter	Units	Surface Water Criteria	RW-007-PW-3	RW-008-PW-1	RW-008-PW-3	RW-009-PW-1	RW-009-PW-2	RW-010-PW	RW-011-PW-1
Dissolved Metals									
Cadmium	µg/L	7.9	**2.6 J**	3 U	**1.9 J**	3 U	3 U	NS (30)	3 U
Zinc	µg/L	81	**122,000**	**656**	**21,700**	**4.7 J**	**69.5**	NS (30)	**3.4 J**
Hardness	µg/L		**1,220,000**	**1,390,000**	**1,940,000**	**985,000**	**2,100,000**	NS (30)	**898,000**

Parameter	Units	Surface Water Criteria	RW-012-PW-1	RW-013-PW-1	RW-013-PW-2	RW-014-PW-1	RW-014-PW-3	RW-015-PW-1	RW-015-PW-3
Dissolved Metals									
Cadmium	µg/L	7.9	3 U	**0.38 J**	3 U	3 U	3 U	3 U	3 U
Zinc	µg/L	81	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Hardness	µg/L		**864,000**	**1,100,000**	**1,290,000**	**1,110,000**	**1,980,000**	**878,000**	**1,650,000**

Detections in bold
Values in red indicate an exceedance of the Surface Water 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 (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

Table 5
Rod and Wire Mill - Offshore Investigation
Summary of Pore Water Results

Parameter	Units	Surface Water Criteria	RW-016-PW-1	RW-016-PW-3	RW-017-PW-1	RW-017-PW-3	RW-018-PW-3	RW-019-PW	RW-020-PW-1
Dissolved Metals									
Cadmium	µg/L	7.9	3 U	3 U	3 U	3 U	3 U	NS (LP)	3 U
Zinc	µg/L	81	10 U	**9.1 J**	10 U	10 U	**3.6 J**	NS (LP)	10 U
Hardness	µg/L		**662,000**	**489,000**	**1,740,000**	**1,150,000**	**1,800,000**	NS (LP)	**1,120,000**

Parameter	Units	Surface Water Criteria	RW-020-PW-3	RW-021-PW-1	RW-021-PW-3	RW-022-PW	RW-023-PW	RW-024-PW	PW-D02-1
Dissolved Metals									
Cadmium	µg/L	7.9	**0.36 J**	3 U	**0.35 J**	NS (HB)	NS (LP)	NS (LP)	3 U
Zinc	µg/L	81	10 U	10 U	10 U	NS (HB)	NS (LP)	NS (LP)	**2.7 J**
Hardness	µg/L		**2,110,000**	**745,000**	**289,000**	NS (HB)	NS (LP)	NS (LP)	**892,000**

Parameter	Units	Surface Water Criteria	PW-DE01-1
Dissolved Metals			
Cadmium	µg/L	7.9	3 U
Zinc	µg/L	81	10 U
Hardness	µg/L		**920,000**

Detections in bold
Values in red indicate an exceedance of the Surface Water 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 (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

Table 6
Rod and Wire Mill - Offshore Investigation
Summary of Surface Water Results

Parameter	Units	Surface Water Criteria	RW-001-SW-2	RW-004-SW-2	RW-006-SW-1.5	RW-007-SW-1.5	RW-008-SW-1.5	RW-10-SW-1.5	RW-022-SW-1.5
Metals									
Zinc (Dissolved)	µg/L	81	**9.5 J**	**12.2**	**7.4 J**	**11.5**	**13.7**	**7.5 J**	**7.9 J**
Hardness (Total)	mg/L	---	**582**	**572**	**623**	**605**	**60**	**603**	**623**

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

APPENDIX A

Boring and Well Construction Logs

ARM Group Inc.
Engineers and Scientists

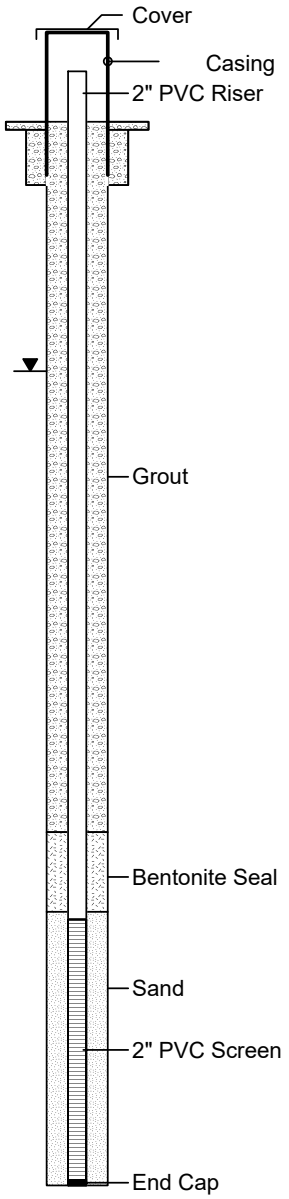
Well ID: RW05R-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Ali Berenbrok-Niblett
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 571732.44
Easting (ft)	: 1455877.00
Date/Time Started	: 4/23/19 1118
Date/Time Completed	: 4/23/19 1427
Surf. Elev. (ft AMSL)	: 10.56'
TOC Elev. (ft AMSL)	: 12.95'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 11.64' TOC
Depth to Water (ft)	: Static: 12.21' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	54	- - 0.2 0.9 0.8	(0-7.5') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense to dense, brown to dark brown, dry to very moist, non-plastic, non-cohesive	SW/GW
5	78	- 1.5 0.4 0.6 0.3	(7.5-9.4') GRAVELLY SILT with SAND, very firm, black, moist, non-plastic, non-cohesive	ML
10	94	0.0 0.0 0.1 0.0	(9.4-10.3') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense to dense, brown to dark brown, dry to very moist, non-plastic, non-cohesive	SW/GW SC
15	100	0.1 0.0 0.0 0.1 0.1 0.2	(10.3-13.5') CLAYEY SAND, medium dense, pale brown, wet, non-plastic, non-cohesive (13.5-13.9') SANDY CLAY, very firm, reddish yellow, moist, low plasticity, cohesive (13.9-15') SAND with CLAY, medium dense, reddish yellow and pale brown, wet, non-plastic, non-cohesive	CL SW/CL SW
20	80	- 0.3 0.1 0.1 0.1	(15-20') SAND, very fine to medium, medium dense, reddish yellow then brownish gray at 17.5' bgs, wet, non-plastic, non-cohesive (20-21.4') SANDY CLAY, soft, gray, very moist, low plasticity, cohesive	CL CL
25	62	- - 0.1 0.1 0.1	(21.4-27.4') CLAY, firm to very firm, brown, moist, medium plasticity, cohesive (27.4-33.3') SAND, medium to coarse, and GRAVEL, fine, loose to medium dense, very pale brown, wet, non-plastic, non-cohesive	SW/GP
30	84	- 0.1 0.2 0.1 0.4	(33.3-35') CLAY, hard, gray, dry to moist, low plasticity, cohesive	CL
35	100	0.1 0.2 0.2 0.3 0.4	(35-36.3') CLAYEY SAND, dense, gray, wet, non-plastic, non-cohesive (36.3-40') SAND with CLAY, medium dense, gray, wet, non-plastic, non-cohesive	SC SW-SC
40			End of boring	
45				



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.15'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.83'
Riser Amount: 26.71'

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 26.71' bgs

Wet at 10.3' bgs

Bentonite Seal: 1-3' sleeve
Top: 26.71' bgs
Bottom: 29.71' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 29.71' bgs
Bottom: 39.71' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 29.71' bgs
Bottom: 39.71' bgs
Total Screen: 10'

Collapsed Material
Top: 39.71' bgs
Bottom: 40.00' bgs

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: 05/01/2019
Purged Amount: 6.50 gallons
Well Volumes Removed: 5.37

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ARM Group Inc.
Engineers and Scientists

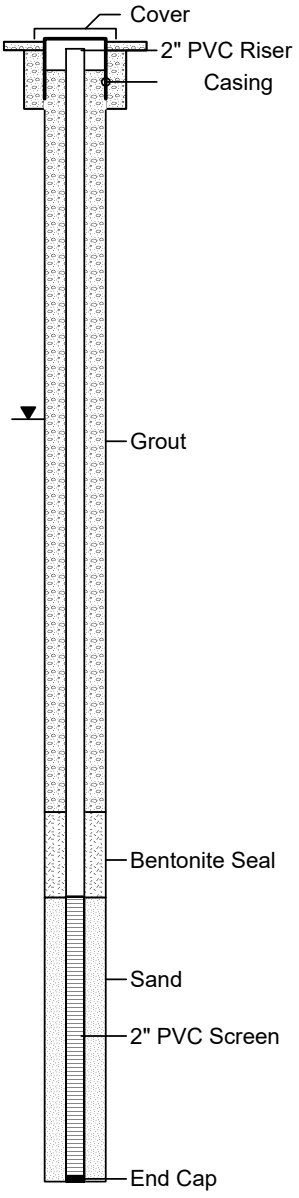
Well ID: RW21-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572350.773
Easting (ft)	: 1456246.875
Date/Time Started	: 4/09/19 1255
Date/Time Completed	: 4/09/19 1535
Surf. Elev. (ft AMSL)	: 14.63'
TOC Elev. (ft AMSL)	: 14.46'
Total Well Depth (ft)	: 40.04' bgs
Depth to Water (ft)	: 0 Hr: 12.83' TOC
Depth to Water (ft)	: Static: 13.00' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	68	-	(0-2.5') SANDY CLAY with GRAVEL, hard, reddish brown, dry, low plasticity, cohesive	CL
		-		
		1.1	(2.5-9.9') Non-native SAND with some SLAG, SAND and GRAVEL-sized, dark brown with gray, dry, non-plastic, non-cohesive	SW/GW
		23.6		
5		16.6		
	80	-		
		20.0		
		3.6		
		6.9		
		2.8		
10	58	-	(9.9-13') SILT with SAND, very soft, yellowish red, wet, non-plastic, non-cohesive	ML
		-		
		0.0		
		0.0	(13-16.2') CLAYEY SAND, firm to very firm, yellowish red and light brown, wet, non-plastic, non-cohesive	SC
		0.0		
15		0.2		
	100	0.0	(16.2-19.5') SANDY CLAY, very firm, yellowish red and light gray, very moist, low plasticity, cohesive	CL
		0.0		
		0.0		
		0.0		
20		0.0	(19.5-20') CLAY with SAND, hard, grayish brown, very moist, low plasticity, cohesive	CL
	100	0.0		
		0.1	(20-28') CLAY, very firm, grayish brown, moist, medium plasticity, cohesive	CL
		0.0		
		0.0		
25		0.6		
	100	4.2		
		0.0		
		0.6	(28-29') SAND, fine to medium, light brown and pale brown, wet, non-plastic, non-cohesive	SW
		0.5		CL
30		-		
	74	0.0	(29-30.5') SANDY CLAY, very firm, very moist, light brown and light gray, low plasticity, cohesive	SW
		0.0		
		0.0		
		0.0	(30.5-34.5') SAND, fine to medium, medium dense, light gray grading to grayish brown, wet, non-plastic, non-cohesive	CL
35		0.0		
		0.0		
	100	0.0		
		0.2	(34.5-35') SANDY CLAY, very firm, very moist, light gray, low plasticity, cohesive	CL
		0.0		
		0.0	(35-40') CLAY with SAND grading to CLAY, very firm, light gray grading to brown, very moist to moist, low plasticity, cohesive	
40			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0.45'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.25'
Riser Amount: 26.79'

Wet at 9.9' bgs

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 27.04' bgs

Bentonite Seal: 1-3' sleeve
Top: 27.04' bgs
Bottom: 30.04' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 30.04' bgs
Bottom: 40.04' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 30' bgs
Bottom: 40' 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: 04/30/2019
Purged Amount: 4.50 gallons
Well Volumes Removed: 4.13

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ARM Group Inc.
Engineers and Scientists

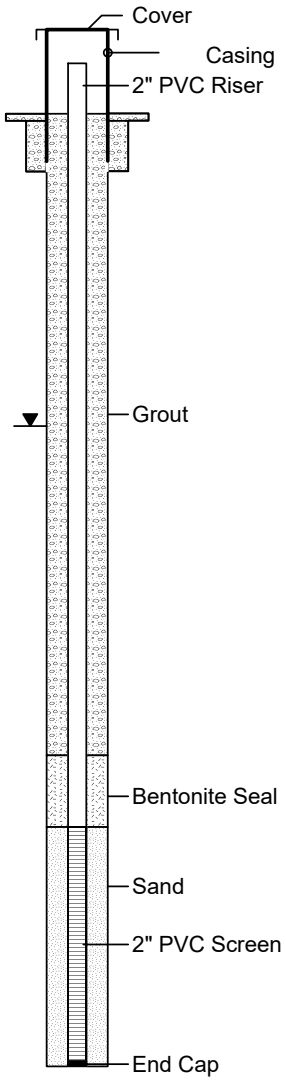
Well ID: RW22R-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572405.72
Easting (ft)	: 1456075.11
Date/Time Started	: 4/11/19 0840
Date/Time Completed	: 4/11/19 1127
Surf. Elev. (ft AMSL)	: 14.02'
TOC Elev. (ft AMSL)	: 16.63'
Total Well Depth (ft)	: 39.8' bgs
Depth to Water (ft)	: 0 Hr: 14.20' TOC
Depth to Water (ft)	: Static: 15.97' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	76	- 0.7 1.8 0.1 0.4	(0-1.5') SANDY SILT, very firm, brown to dark brown, dry, non-plastic, non-cohesive, light amount of ORGANICS	ML
5	40	- - - 0.9 0.7	(1.5-12') Non-native SAND with SLAG, SAND and GRAVEL-sized, medium dense, dark brown with gray, dry, non-plastic, non-cohesive	SW/GW
10	26	- - - 0.1 0.1	(12-15') SAND, fine to medium with trace coarse, yellowish red, wet, non-plastic, non-cohesive	SW
15	100	0.1 0.1 0.1 0.0	(15-17.5') CLAYEY SAND, medium dense, light brown, wet, non-plastic, non-cohesive	SC
20	100	0.0 0.0 0.0 0.1	(17.5-22.5') SANDY CLAY grading to CLAY, very firm to hard, light gray and pale brown to grayish brown, moist, low plasticity, cohesive	CL
25	100	0.1 0.1 0.1 0.1 0.0	(22.5-25') CLAYEY SAND, loose to medium dense, light gray grading to light brown, wet, non-plastic, non-cohesive	SC
30	100	0.0 0.0 0.0 0.0 0.1	(25-26.1') CLAY, very firm, brown and grayish brown, dry, low plasticity, cohesive	CL
35	100	0.1 0.1 0.0 0.0 0.0	(26.1-27') SAND, fine to medium, pale brown and brown, wet, non-plastic, non-cohesive	SW
40	100	0.0 0.0 0.1 0.0	(27-30') SANDY CLAY grading to CLAY with trace SAND, firm to very firm, light gray, very moist to moist, low plasticity, cohesive	SC
45			(30-30.5') SAND, fine to medium, medium dense, light gray, wet, non-plastic, non-cohesive	CL
50			(30.5-32') CLAYEY SAND, medium dense, light gray, wet, non-plastic, non-cohesive	SC
			(32-35') SANDY CLAY, firm. light gray, very moist, low plasticity, cohesive	CL
			(35-36.5') CLAYEY SAND, medium dense, light gray, moist to wet, non-plastic, non-cohesive	
			(36.5-40') CLAY, hard, brown to dark brown, dry, low plasticity, cohesive	
			End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.15'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.92'
Riser Amount: 26.8'

Wet at 13.7' bgs

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 26.8' bgs

Bentonite Seal: 1-3' sleeve
Top: 26.8' bgs
Bottom: 29.8' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 29.8' bgs
Bottom: 39.8' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 30' bgs
Bottom: 40' 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: 04/18/2019
Purged Amount: 3.50 gallons
Well Volumes Removed: 3.37

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ARM Group Inc.
Engineers and Scientists

Well ID: RW22R-MWS

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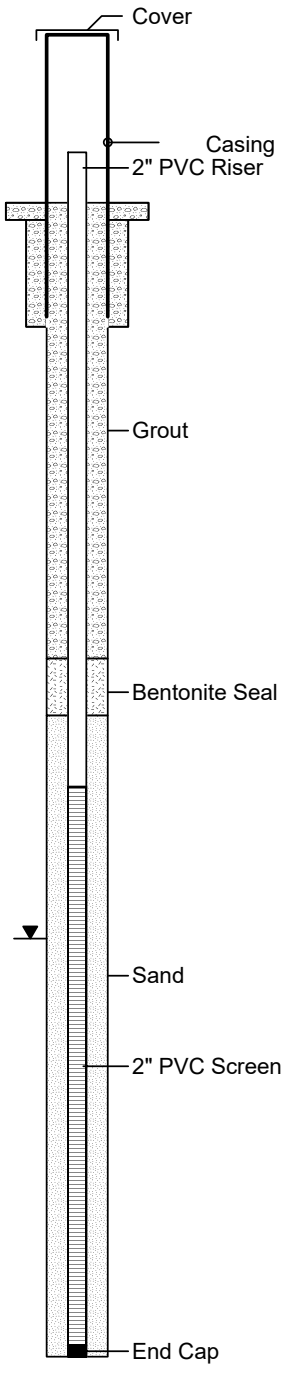
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572408.26
Easting (ft)	: 1456073.27
Date/Time Started	: 4/10/19 1421
Date/Time Completed	: 4/10/19 1515
Surf. Elev. (ft AMSL)	: 14.02'
TOC Elev. (ft AMSL)	: 16.56'
Total Well Depth (ft)	: 20.25' bgs
Depth to Water (ft)	: 0 Hr: 15.58' TOC
Depth to Water (ft)	: Static: 15.61' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	74	-	(0-1.5') SANDY SILT with GRAVEL, hard, reddish brown, dry, non-plastic, non-cohesive	ML
		0.4		
		0.0	(1.5-4') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense, gray and dark brown, dry, non-plastic, non-cohesive	SW/GW
		0.0		
		0.0	(4-13.6') Non-native SAND with BRICK and SLAG, SAND and GRAVEL-sized, loose to medium dense, dark brown, gray, and yellow, moist to dry, non-plastic, non-cohesive	SW/GW
5	50	-		
		-		
		0.0		
		0.0		
		0.0		
10	56	-		
		-		
		0.0		
		0.0		
		0.0	(13.6-15') SAND, very fine to medium, medium dense, yellowish red, wet, non-plastic, non-cohesive	SW
15	84	-	(15-17.2') CLAYEY SAND grading to SAND, medium dense, reddish yellow, light brown, and pale brown, wet, non-plastic, non-cohesive	SC/SW
		0.0		
		0.0	(17.2-19.6') CLAY with SAND to SANDY CLAY, soft to firm, light gray and reddish yellow, very moist to moist, low plasticity, cohesive	CL
		0.0		
		0.0		
20			(19.6-20') CLAY, hard, brown, dry, low plasticity, cohesive	CL
			End of boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 2.98'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.70'
Riser Amount: 10.25'

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 13.6' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 10.25' bgs

2-5' prepack with #2 Sand:
Top: 10.25' bgs
Bottom: 20.25' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 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: 04/17/2019
Purged Amount: 2.75 gallons
Well Volumes Removed: 9.48

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ARM Group Inc.
Engineers and Scientists

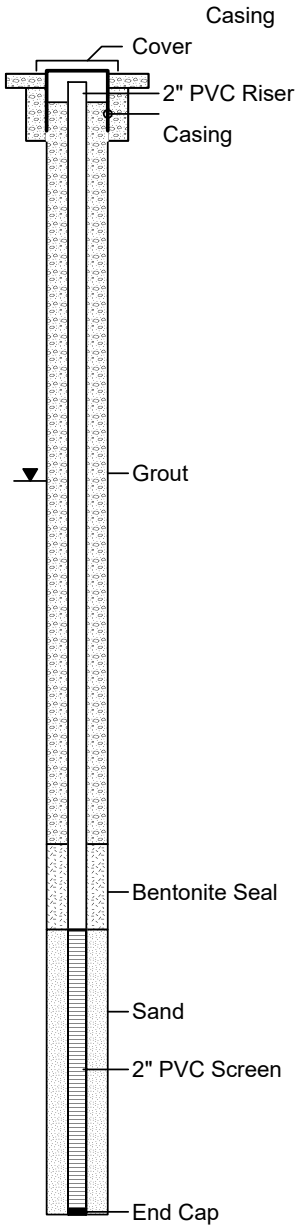
Well ID: RW23-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogel, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 571880.80
Easting (ft)	: 1456165.13
Date/Time Started	: 4/3/19 1215
Date/Time Completed	: 4/3/19 1500
Surf. Elev. (ft AMSL)	: 14.60'
TOC Elev. (ft AMSL)	: 14.36'
Total Well Depth (ft)	: 40.04' bgs
Depth to Water (ft)	: 0 Hr: 13.14' TOC
Depth to Water (ft)	: Static: 14.00' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	78	- 1.7 0.4 0.3 0.2	(0-9.5') Non-native SAND with SLAG, SAND and GRAVEL-sized, dense, dark brown, dry, non-plastic, non-cohesive	SW/GW
5	24	- - - - 0.0		
10	72	- 0.0 0.0 0.0 0.0 0.0	(9.5-16') CLAYEY SAND, medium dense, reddish yellow and light brown then gray from 14.5-16' bgs, very moist then wet at 14' bgs, non-plastic, non-cohesive	SC
15	92	0.0 0.0 0.0 0.0 0.0	(16-19.5') CLAY with SAND to CLAY, soft, dark gray, moist, low plasticity, cohesive	CL
20	100	0.0 0.0 0.0 0.0 0.0	(19.5-22.8') SAND, fine to medium, with SILT, medium dense, gray, wet, non-plastic, non-cohesive	SW-SM
		0.0 0.0	(22.8-24') SANDY CLAY, firm, gray, very moist, low plasticity, cohesive	CL
25	100	0.0 0.4 0.3 0.0	(24-25') CLAY, very firm, grayish brown, moist, low plasticity, cohesive (25-29.1') CLAY, soft to firm, grayish brown, very moist, low plasticity, cohesive	CL
30	52	3.5 - - 0.0 0.0 0.0	(29.1-34.7') SAND, fine to very coarse with GRAVEL, fine, medium dense, brownish yellow, wet, non-plastic, non-cohesive	SW/GP
				GP
35	100	0.0 0.0 0.0 0.0 0.1	(34.7-35') GRAVEL, fine, with trace SAND, medium dense to loose, brownish yellow, wet, non-plastic, non-cohesive (35-40') CLAY with trace SAND, very firm, light brown to grayish brown, moist, low plasticity, cohesive	CL
40			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.3'
Riser Amount: 26.74'

Wet at 14' bgs

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 27.04' bgs

Bentonite Seal: 1-3' sleeve
Top: 27.04' bgs
Bottom: 30.04' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 30.04' bgs
Bottom: 40.04' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 30' bgs
Bottom: 40' 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: 04/16/2019
Purged Amount: 9.25 gallons
Well Volumes Removed: 8.89

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ARM Group Inc.
Engineers and Scientists

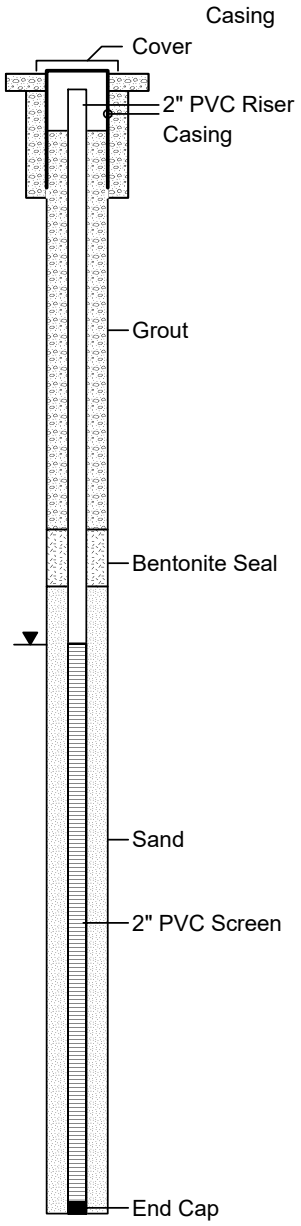
Well ID: RW23-MWS

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 571883.60
Easting (ft)	: 1456164.80
Date/Time Started	: 4/4/19 0815
Date/Time Completed	: 4/4/19 0915
Surf. Elev. (ft AMSL)	: 14.50'
TOC Elev. (ft AMSL)	: 14.24'
Total Well Depth (ft)	: 20' bgs
Depth to Water (ft)	: 0 Hr: 13.00' TOC
Depth to Water (ft)	: Static: 9.74' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-		
	80	0.0	(0-7.7') Non-native SAND with SLAG, SAND and GRAVEL-sized, dense, brown to dark brown, dry, non-plastic, non-cohesive	SW/GW
		0.0		
		0.0		
5		-		
		-		
	56	0.0		
		0.0	(7.7-8) CLAYEY SAND, dense, reddish yellow, moist, non-plastic, non-cohesive	SC
		0.0	(8-10.2') SAND, fine to coarse, reddish yellow, very moist, non-plastic, non-cohesive	SW
10		0.0	(10.2-11.5') SANDY CLAY, firm, reddish yellow with gray, moist, low plasticity, cohesive	CL
		0.0		
	100	0.0	(11.5-14') SAND with CLAY, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SW-SC
		0.0		
		0.0	(14-15.2') CLAYEY SAND, medium dense, gray, wet, non-plastic, non-cohesive	SC
15		0.0	(15.2-20') CLAY, soft, gray, very moist, low plasticity, cohesive	
		0.0		
	100	0.0		CL
		0.0		
		0.0		
20			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.3'
Riser Amount: 9.70'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 11.5' bgs

Filter Pack: #2 sand
Top: 9' bgs
Bottom: 10' bgs

2-5' prepack sand with #2 Sand:
Top: 10' bgs
Bottom: 20' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 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: 04/16/2019
Purged Amount: 3.00 gallons
Well Volumes Removed: 7.32

ARM Group Inc.
Engineers and Scientists

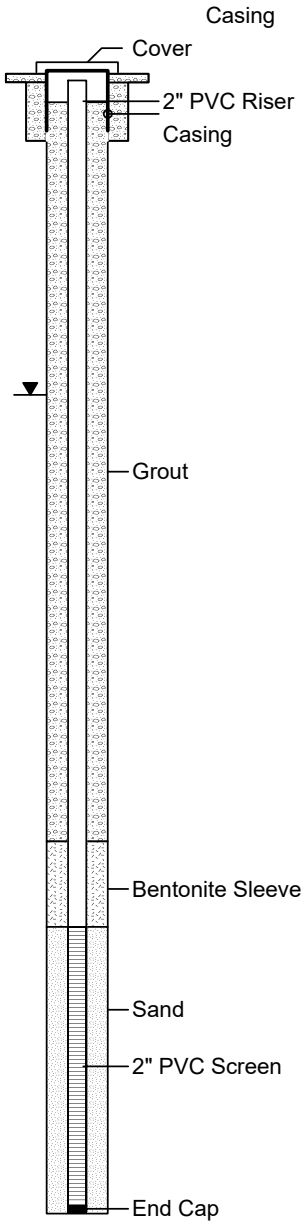
Well ID: RW24-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572223.81
Easting (ft)	: 1456460.41
Date/Time Started	: 4/12/19 0850
Date/Time Completed	: 4/12/19 1045
Surf. Elev. (ft AMSL)	: 12.74'
TOC Elev. (ft AMSL)	: 12.57'
Total Well Depth (ft)	: 39.94' bgs
Depth to Water (ft)	: 0 Hr: 10.84' TOC
Depth to Water (ft)	: Static: 11.04' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	78	- 0.2 0.2 0.5 2.5	(0-11') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense to dense, dark brown and gray, dry then wet at 9.5.bgs, non-plastic, non-cohesive, few cobbles	SW/GW
5	54	- - 0.1 0.7 0.3		
10	50	- - 0.0 0.0 0.0	(11-14.5') SAND with CLAY, medium dense, reddish yellow to pale brown, wet, non-plastic, non-cohesive	SW-SC
15	100	0.0 0.0 0.3 0.0	(14.5-18') CLAYEY SAND, very fine to medium, yellowish red, wet, non-plastic, non-cohesive	SC
20	100	0.0 0.0 0.1 0.0 0.1	(18-23.3') CLAY, hard, reddish brown, moist, low plasticity, cohesive	CL
25	76	0.0 0.0 - 0.3 0.0 0.0	(23.3-29') SAND, very fine to coarse grading to fine GRAVEL with SAND, medium dense, reddish yellow grading to pale brown, wet, non-plastic, non-cohesive	SW/GP
30	80	0.1 - 0.0 0.0 0.1	(29-30') SANDY CLAY, very firm, reddish yellow, very moist, low plasticity, cohesive	CL
			(30-33') SAND, fine to medium with some coarse, medium dense, yellowish red, wet, non-plastic, cohesive	SW
35	100	0.0 0.0 0.0 0.0 0.0	(33-40') CLAY, very firm to hard, grayish brown, dry to moist, low plasticity, cohesive	CL
40			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.23'
Riser Amount: 26.71'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 26.94' bgs

Wet at 9.5' bgs

Bentonite Seal: 1-3' sleeve
Top: 26.94' bgs
Bottom: 29.94' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 29.94' bgs
Bottom: 39.94' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 29.94' bgs
Bottom: 39.94' 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: 04/18/2019
Purged Amount: 5.00 gallons
Well Volumes Removed: 4.35

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ARM Group Inc.
Engineers and Scientists

Well ID: RW24-MWS

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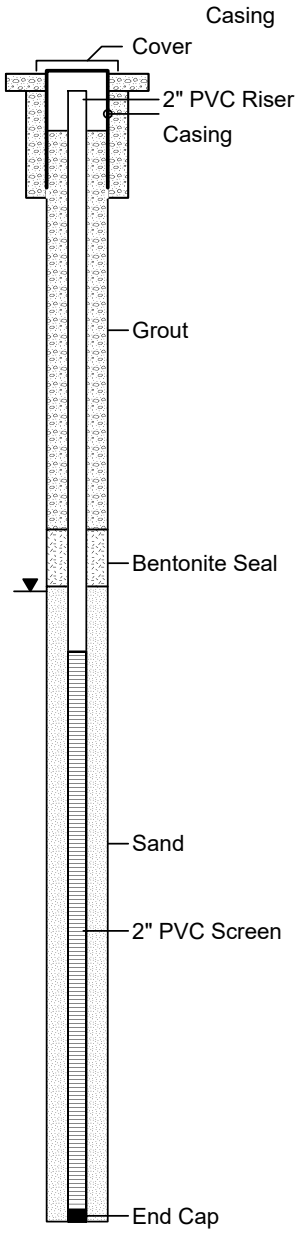
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572226.49
Easting (ft)	: 1456460.20
Date/Time Started	: 4/12/19 1055
Date/Time Completed	: 4/12/19 1146
Surf. Elev. (ft AMSL)	: 12.78'
TOC Elev. (ft AMSL)	: 12.55'
Total Well Depth (ft)	: 20.14' bgs
Depth to Water (ft)	: 0 Hr: 8.50' TOC
Depth to Water (ft)	: Static: 8.78' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-0.5') ASPHALT	NA
	82	5.1	(0.5-10') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense to dense, dark brown with gray, dry then wet at 9.5' bgs, non-plastic, non-cohesive	SW/GW
		0.4		
		0.1		
		0.4		
5		-		
	60	-		
		0.1		
		0.2		
		0.1		
10		0.0	(10-13.5') SAND with CLAY, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SW-SC
	84	0.0		
		0.0		
		0.0	(13.5-18') CLAYEY SAND, medium dense to dense, reddish yellow, wet, non-plastic, non-cohesive	SC
15		0.0		
		-		
	84	0.0		
		0.0		
		0.0	(18-20') CLAY, hard, reddish yellow, moist, low plasticity, cohesive	CL
20		0.0	End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with
Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.21'
Riser Amount: 9.93'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 9.5' bgs

Filter Pack: #2 sand
Top: 9' bgs
Bottom: 10.14' bgs

2-5' prepack with #2 Sand:
Top: 10.14' bgs
Bottom: 20.14' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.14' bgs
Bottom: 20.14' 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: 04/18/2019
Purged Amount: 3.00 gallons
Well Volumes Removed: 6.67

ARM Group Inc.
Engineers and Scientists

Well ID: RW25-MWI

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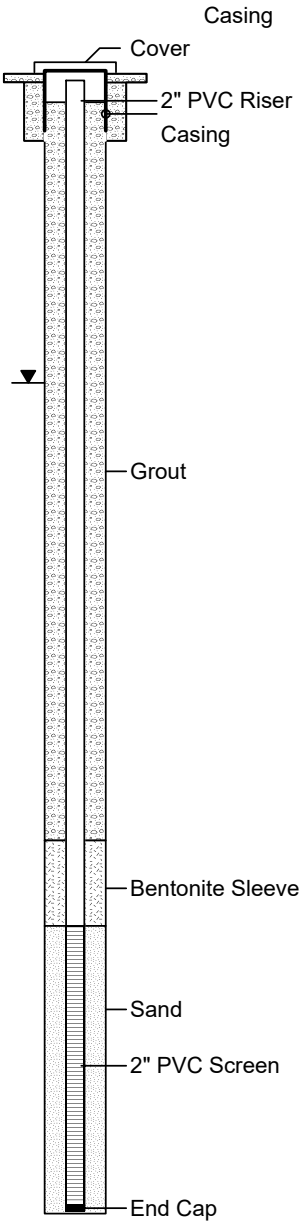
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572283.56
Easting (ft)	: 1456605.08
Date/Time Started	: 4/15/19 0845
Date/Time Completed	: 4/15/19 1030
Surf. Elev. (ft AMSL)	: 12.28'
TOC Elev. (ft AMSL)	: 12.08'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 10.28' TOC
Depth to Water (ft)	: Static: 10.62' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-0.5') ASPHALT	NA
	92	0.1 0.1 0.2 2.7	(0.5-7') Non-native SAND with SLAG, SAND and GRAVEL-sized, dense, dark brown and gray, dry, non-plastic, non-cohesive	SW/GW
5		-		
	40	-	(7-7.5') CLAY, soft, light brown, very moist, low plasticity, cohesive	CL
		0.0		SW/GW
		0.0	(7.5-9.5') Non-native SAND with SLAG, SAND and GRAVEL-sized, dense, dark brown and gray, moist, non-plastic, non-cohesive	CL
10		-		
	54	-		SW
		0.0		
		0.0	(9.5-10.5') CLAY, soft to firm, brown, moist, low plasticity, cohesive	
		0.0		
15		0.0	(10.5-14.5') SAND, fine to medium, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SC
	100	0.0		
		0.0	(14.5-17') CLAYEY SAND, medium dense to dense, reddish yellow and gray, wet, non-plastic, non-cohesive	CL
		0.0		
20		0.0		
		0.0	(17-20.5') CLAY, very firm, gray, moist, low plasticity, cohesive	SC
	100	0.0		
		0.0	(20.5-21') CLAYEY SAND, loose to medium dense, gray, wet, non-plastic, non-cohesive	CL
		0.0		
25		0.0	(21-27') CLAY with SAND, very firm, gray, moist, low plasticity, cohesive	
		-		
	72	-		
		0.0	(27-29') CLAYEY SAND, medium dense, gray, wet, non-plastic, cohesive	SC
		0.0		
		0.0	(29-33.5') SAND, fine to coarse, reddish yellow, wet, non-plastic, non-cohesive	SW
30		-		
	80	0.0		
		0.0		
		0.0		
		0.0	(33.5-40') CLAY, very firm, grayish brown, moist, low plasticity, cohesive	CL
35		-		
	100	0.0		
		0.0		
		0.0		
40		0.0		

End of boring



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.20'
Riser Amount: 26.71'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 26.94' bgs

Wet at 12.3' bgs

Bentonite Seal: 1-3' sleeve
Top: 26.91' bgs
Bottom: 29.91' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 29.91' bgs
Bottom: 39.91' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 29.91' bgs
Bottom: 39.91' 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: 04/18/2019
Purged Amount: 7.50 gallons
Well Volumes Removed: 6.41

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ARM Group Inc.
Engineers and Scientists

Well ID: RW25-MWS

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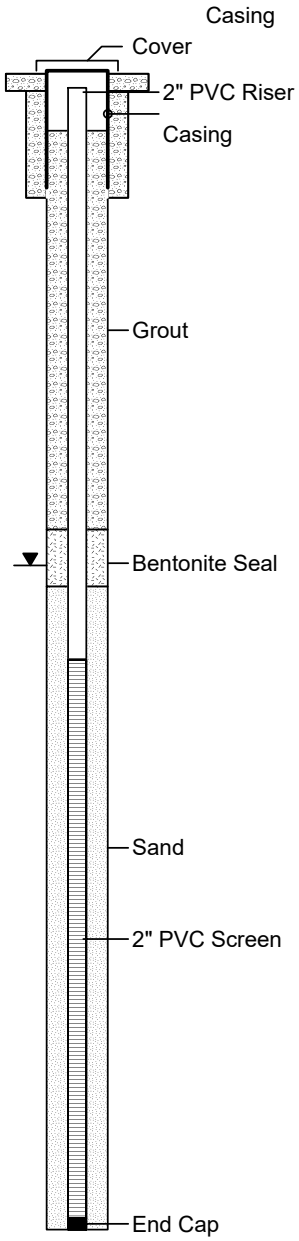
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572286.204
Easting (ft)	: 1456604.855
Date/Time Started	: 4/12/19 1304
Date/Time Completed	: 4/12/19 1407
Surf. Elev. (ft AMSL)	: 12.16'
TOC Elev. (ft AMSL)	: 11.94'
Total Well Depth (ft)	: 20.28' bgs
Depth to Water (ft)	: 0 Hr: 8.37' TOC
Depth to Water (ft)	: Static: 8.38' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-0.5') ASPHALT	NA
		0.0	(0.5-7.4') Non-native SAND with SILT and SLAG, SAND and GRAVEL-sized, dense, dark brown with gray, dry, non-plastic, non-cohesive	
	72	0.0		
		3.6		SW/GW
		7.3		
5		-		
		1.7		
	78	39.1	(7.4-11.2') CLAYEY SAND, medium dense, reddish yellow to yellowish red, wet, non-plastic, non-cohesive	
		0.0		SC
		0.0		
10		-		
		0.0	(11.2-15') SAND with CLAY, medium dense, yellowish red, wet, non-plastic, non-cohesive	
	80	0.0		SW-SC
		0.0		
		0.0		
15		-	(15-18') SANDY CLAY, firm to very firm, reddish yellow, moist to very moist, low plasticity, cohesive	
		0.0		CL
	84	0.0		
		0.0	(18-20') CLAY with trace SAND, gray, moist, medium plasticity, cohesive	
		0.0		CL
20			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with
Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.25'
Riser Amount: 10.03'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 8' bgs

Wet at 7.4' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 10.28' bgs

2-5' prepack with #2 Sand:
Top: 10.28' bgs
Bottom: 20.28' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.28' bgs
Bottom: 20.28' 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: 04/18/2019
Purged Amount: 6.00 gallons
Well Volumes Removed: 13.64

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ARM Group Inc.
Engineers and Scientists

Well ID: RWA-MWI

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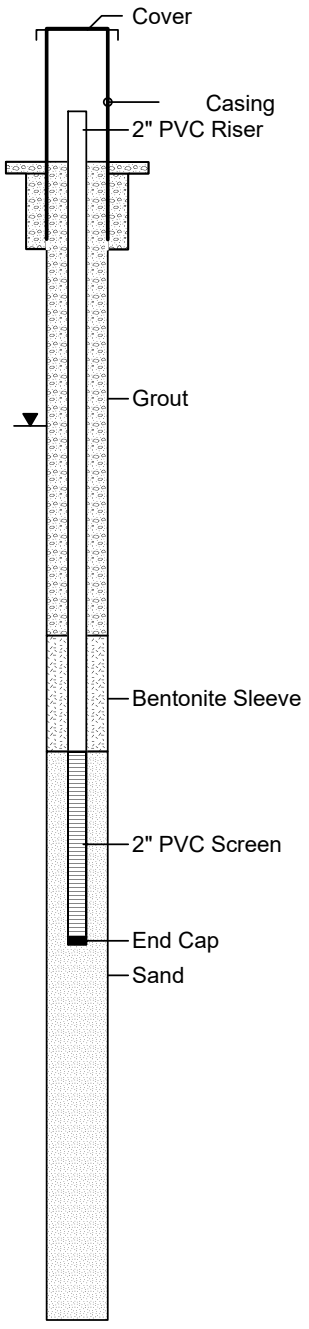
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572453.19
Easting (ft)	: 1455934.71
Date/Time Started	: 4/10/19 0945
Date/Time Completed	: 4/10/19 1215
Surf. Elev. (ft AMSL)	: 7.52'
TOC Elev. (ft AMSL)	: 10.20'
Total Well Depth (ft)	: 30' bgs
Depth to Water (ft)	: 0 Hr: 10.53' TOC
Depth to Water (ft)	: Static: 9.93' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-1') SANDY SILT, very firm, light brown, dry, non-plastic, non-cohesive	ML
	30	-	(1-10') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense, dark brown wtih gray, dry then wet at 9' bgs, non-plastic, non-cohesive, trace BRICK	
		-		
		-		
		0.4		
5		-		SW/GW
	26	-		
		-		
		2.4		
10		-	(10-13') CLAY with SAND, firm to hard, light gray and black, moist to dry, low plasticity, cohesive, trace small sand layers	CL
	80	0.0		
		0.0		
		0.0	(13-18') SAND grading to CLAYEY SAND, very fine to medium, medium dense, pale brown to light brown, wet, non-plastic, non-cohesive	SW/SC
15		0.0		
		0.0		
	92	0.0		
		0.0		
		0.0	(18-30') CLAY, soft to firm grading to hard, light gray to light reddish brown, then dark gray 27-30' bgs, very moist to dry, low plasticity, cohesive	
20		0.0		
		0.0		
	100	0.0		
		0.0		CL
		0.0		
25		0.0		
		0.0		
	100	0.0		
		0.0		
		0.0		
30			End of boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.09'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.86'
Riser Amount: 13.28'

Wet at 9' bgs

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 13.28' bgs

Bentonite Seal: 1-3' Sleeve
Top: 13.28' bgs
Bottom: 15.28' bgs

Filter Pack: 1-5' prepack with #2 Sand
Top: 15.28' bgs
Bottom: 28.28' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 15.28' bgs
Bottom: 20.28' bgs
Total Screen: 5'

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: 04/17/2019
Purged Amount: 2.00 gallons
Well Volumes Removed: 3.92

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ARM Group Inc.
Engineers and Scientists

Well ID: RWA-MWS

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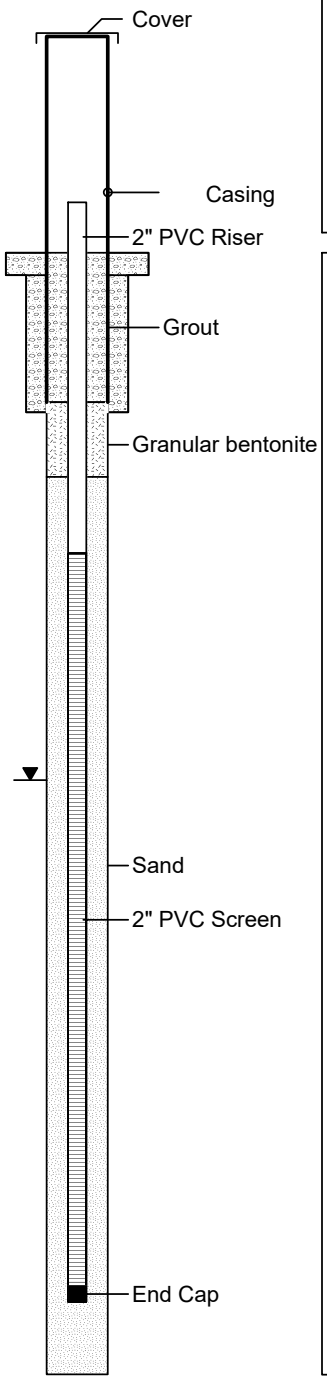
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572455.75
Easting (ft)	: 1455935.89
Date/Time Started	: 4/10/19 1305
Date/Time Completed	: 4/10/19 1415
Surf. Elev. (ft AMSL)	: 7.74'
TOC Elev. (ft AMSL)	: 10.59'
Total Well Depth (ft)	: 20' bgs
Depth to Water (ft)	: 0 Hr: 9.64' TOC
Depth to Water (ft)	: Static: 9.75' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-2') SANDY SILT, very firm, light brown, moist to dry, non-plastic, non-cohesive	ML
		0.4		
	66	0.0	(2-2.5) SANDY CLAY, very firm, reddish yellow, moist, low plasticity, cohesive	CL
		0.0	(2.5-8.3') SAND, fine to medium, yellowish red and brown, moist, non-plastic, non-cohesive	SW
		0.8		
5		-		
		-		
	40	-		
		1.4	(8.3-10.5') Non-native SAND with SLAG, SAND and GRAVEL-sized, medium dense, dark brown, very moist then wet at 9' bgs, non-plastic, non-cohesive	SW/GW
		2.3		
10		-	(10.5-12') CLAY with trace SAND, soft, greenish gray and black, very moist, low plasticity, cohesive	CL
		1.7		
	70	0.0	(12-12.5') SAND, fine to medium, medium dense, light gray, wet, non-plastic, non-cohesive	SW
		0.0	(12.5-13.8') CLAY with SAND, firm to soft, light gray and gray, moist to very moist, low plasticity, cohesive	CL
		0.0	(13.8-15') CLAYEY SAND, dense, reddish yellow with gray, wet, non-plastic, non-cohesive	SC
15			End of boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.18'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.88'
Riser Amount: 4.02'

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 2' bgs

Bentonite Seal: Granular
Top: 2' bgs
Bottom: 3' bgs
Wet at 9' bgs

Filter Pack: #2 Sand
Top: 14.02' bgs and 3' bgs
Bottom: 15 'bgs and 4.02' bgs

2-5' prepack with #2 Sand:
Top: 4.02' bgs
Bottom: 14.02' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 4.02' bgs
Bottom: 14.02' 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: 04/17/2019
Purged Amount: 2.25 gallons
Well Volumes Removed: 7.76

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ARM Group Inc.
Engineers and Scientists

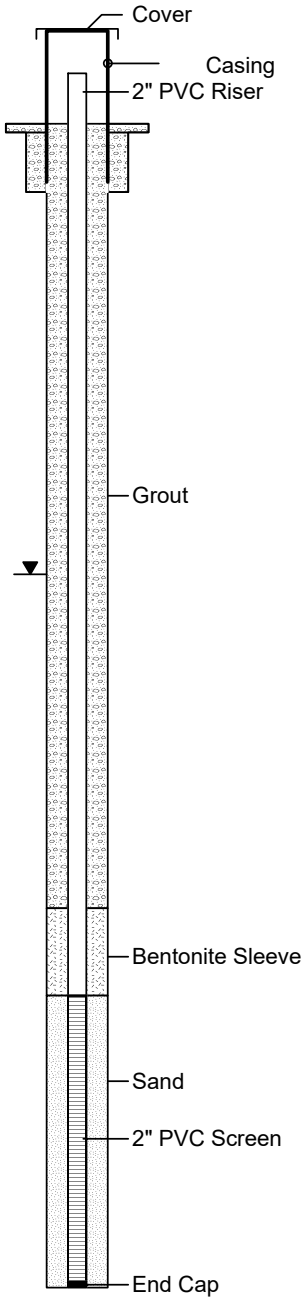
Well ID: RWB-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572273.71
Easting (ft)	: 1455907.08
Date/Time Started	: 4/15/19 1112
Date/Time Completed	: 4/15/19 1441
Surf. Elev. (ft AMSL)	: 17.57'
TOC Elev. (ft AMSL)	: 19.73'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 18.02' TOC
Depth to Water (ft)	: Static: 18.14' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	72	- 0.2 1.2 1.5 0.1	(0-14') Non-native SAND with SILT and SLAG/BRICK, SAND and GRAVEL-sized, dense, dark brown with some red, gray, and yellow, dry to moist then wet at 13' bgs, non-plastic, non-cohesive	SW/GW
5	90	0.3 0.1 1.0 0.1 0.1 2.8 0.1		
10	96	- 0.6 1.4		
15	84	0.5 1.8 0.1 0.0 0.0 0.1 0.1	(14-14.6') CLAYEY SAND, medium dense, brown grading to grayish brown, wet, non-plastic, non-cohesive (14.6-15.4') SAND with CLAY, very fine to medium, medium dense, reddish yellow, wet, non-plastic, non-cohesive (15.4-17') CLAYEY SAND, medum dense, reddish yellow, wet, non-plastic, non-cohesive	SC SW-SC SC CL SC
20	90	0.1 0.1 0.1	(17-19.5') SANDY CLAY grading to CLAY, firm to hard, reddish yellow and light gray, moist to dry, low plasticity, cohesive	CL
25	96	0.0 0.1 0.0 0.0 0.0	(19.5-22') CLAYEY SAND, medium dense, reddish yellow, wet, non-plastic, non-cohesive (22-30') CLAY, hard, reddish yellow and light gray, moist, low plasticity, cohesive	
30	94	0.1 0.0 0.1 0.1 0.0	(30-32.3') CLAYEY SAND, very fine to fine, dense, reddish yellow and light brown, wet, non-plastic, non-cohesive (32.3-34.1') SANDY SILT, very firm, grayish brown, moist to very moist, non-plastic, non-cohesive	SC ML SW
35	100	0.0 0.0 0.0 0.0 0.0 0.0	(34.1-34.5') SAND, fine to medium, medium dense, light brown, wet, non-plastic, non-cohesive (34.5-40') CLAY, firm to hard, grayish brown, moist, low plasticity, cohesive	CL
40			End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 2.95'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.48'
Riser Amount: 26.87'

Wet at 13' bgs

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 26.87' bgs

Bentonite Seal: 1-3' Sleeve
Top: 26.87' bgs
Bottom: 29.87' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 29.87' bgs
Bottom: 39.87' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 29.87' bgs
Bottom: 39.87' 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: 04/19/2019
Purged Amount: 4.00 gallons
Well Volumes Removed: 4.12

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ARM Group Inc.
Engineers and Scientists

Well ID: RWB-MWS

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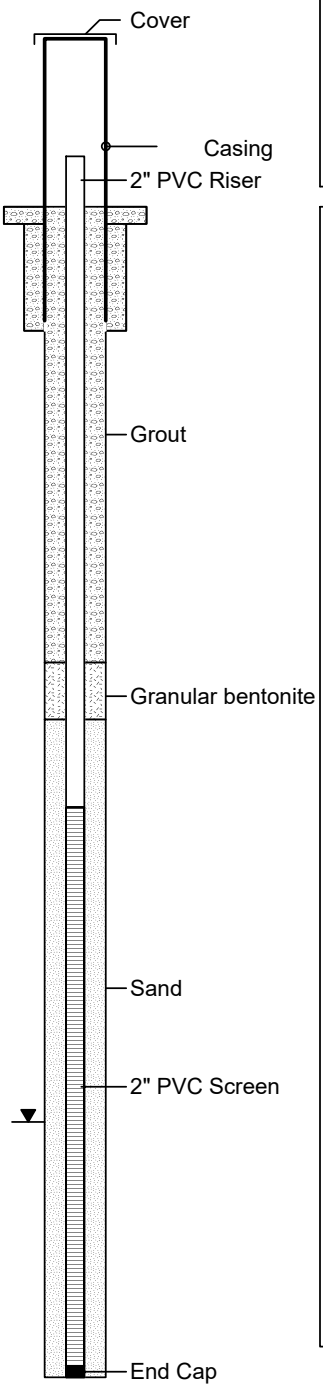
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572277.12
Easting (ft)	: 1455907.95
Date/Time Started	: 4/15/19 1445
Date/Time Completed	: 4/16/19 0937
Surf. Elev. (ft AMSL)	: 17.66'
TOC Elev. (ft AMSL)	: 20.17'
Total Well Depth (ft)	: 20.54' bgs
Depth to Water (ft)	: 0 Hr: 22.90' TOC
Depth to Water (ft)	: Static: 18.76' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-17.5') Non-native SAND, BRICK and SLAG, SAND and GRAVEL-sized, dense, dark brown with red and yellow, dry to moist then wet at 14.5' bgs, non-plastic, non-cohesive	SW/GW
	44	-		
		1.9		
		3.1		
		0.5		
5		0.6		
		0.8		
	82	-		
		2.6		
		2.1		
10		-		
		-		
	46	-		
		84.3		
		0.1		
15		-		
		79.5		
	74	0.5	(17.5-20') CLAYEY SAND, medium dense, light grayish brown, wet, non-plastic, non-cohesive	SC
		0.1		
		0.2		
20			End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 2.9'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.76'
Riser Amount: 10.54'

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 8' bgs

Wet at 14.5' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Filter Pack: #2 Sand
Top: 9' bgs and 20.54' bgs
Bottom: 10.54' bgs and 23.30' bgs

2-5' prepack with #2 Sand:
Top: 10.54' bgs
Bottom: 20.54' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.54' bgs
Bottom: 20.54' 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: 04/19/2019
Purged Amount: 1.25 gallons
Well Volumes Removed: 6.94

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ARM Group Inc.
Engineers and Scientists

Well ID: RWD-MWI

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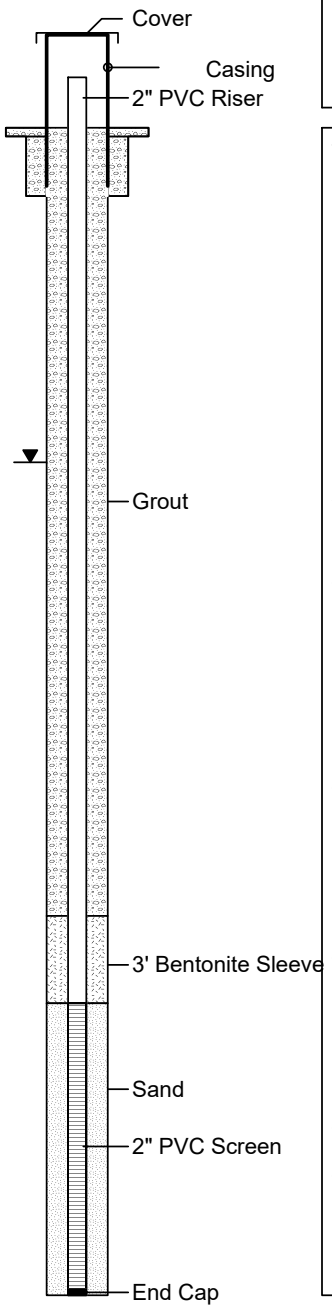
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572013.83
Easting (ft)	: 1455886.20
Date/Time Started	: 4/22/19 0930
Date/Time Completed	: 4/22/19 1100
Surf. Elev. (ft AMSL)	: 12.72'
TOC Elev. (ft AMSL)	: 14.87'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 13.57' TOC
Depth to Water (ft)	: Static: 14.16' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	78	- 536.2 129.3 1.2 0.5	(0-5.5') SILT with SAND to SANDY SILT, soft to very firm, dark grayish brown to dark brown, dry to moist, non-plastic to low plasticity, non-cohesive to cohesive, light amount of coal tar-like substance with strong odor from 1.1-2.2' bgs	ML
5	66	- - 25.7 3.3 5.5	(5.5-12') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense, dark brown, dry, non-plastic, non-cohesive	SW/GW
10	30	- - - 3.1 2.0	(12-17.2') CLAY grading to SANDY CLAY, soft to firm, light brown grading to dark brown then light brownish gray, moist, low plasticity, cohesive	CL
15	80	- 0.5 0.1 0.4 0.1	(17.2-21.5') SAND with CLAY, medium dense, light brownish gray grading to reddish yellow, wet, non-plastic, non-cohesive	SW-SC
20	100	0.0 0.1 0.2 0.1 0.1	(21.5-29') SANDY CLAY grading to CLAY, soft to firm, grayish brown grading to reddish brown, moist, low plasticity,	CL
25	86	- 5.5 0.4 0.1 0.0	(29-31.8') SAND, very fine to coarse, with GRAVEL, fine, and CLAY, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SW/GP
30	100	0.0 0.0 0.0 0.0 0.0	(31.8-37.3') CLAYEY SAND, dense, light gray, very moist, non-plastic, non-cohesive	SC
35	100	0.1 1.0 0.1 0.1 0.1	(37.3-40') SAND with CLAY, pale brown to reddish yellow, medium dense, wet, non-plastic, non-cohesive	SW-SC
40		0.2	End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 2.98'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.55'
Riser Amount: 27'

Wet at 17.2' bgs

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 27' bgs

Bentonite Seal: 1-3' sleeve
Top: 27' bgs
Bottom: 30' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 30' bgs
Bottom: 40' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 30' bgs
Bottom: 40' 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: 05/01/2019
Purged Amount: 9.00 gallons
Well Volumes Removed: 7.89

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ARM Group Inc.
Engineers and Scientists

Well ID: RWD-MWS

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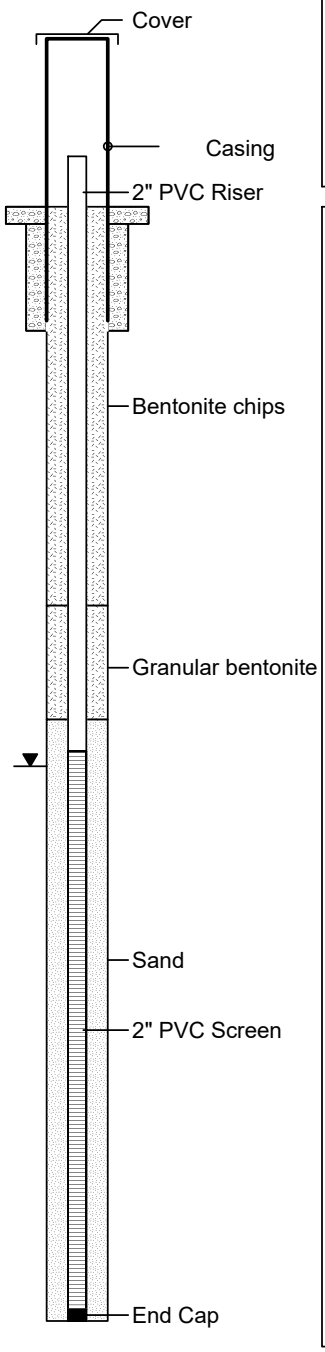
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572013.83
Easting (ft)	: 1455886.20
Date/Time Started	: 4/22/19 1101
Date/Time Completed	: 4/22/19 1240
Surf. Elev. (ft AMSL)	: 12.72'
TOC Elev. (ft AMSL)	: 14.87'
Total Well Depth (ft)	: 19.55' bgs
Depth to Water (ft)	: 0 Hr: 12.34' TOC
Depth to Water (ft)	: Static: 12.52' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0				
	54	-	(0-9') SLAG, SAND and GRAVEL-sized, and non-native SAND, loose to medium dense, dark brown, dry then wet at 8.7' bgs, non-plastic, non-cohesive	
		-		
		8.3		
		1.9		
		2.4		SW/GW
5				
		-		
		-		
	26	-		
		-		
		2.2	(9-10') SAND with CLAY, loose, wet, reddish yellow, non-plastic, non-cohesive	SW-SC
10			(10-18.9') NO RECOVERY	
		-		
		-		
	0	-		
		-		
		-		NA
15				
		-		
		-		
	22	-		
		-		
		7.1	(18.9-20') SANDY CLAY, soft, light brown, very moist to wet, low plasticity, cohesive	CL
20			End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.08'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.6'
Riser Amount: 9.55'

Bentonite: 3/8" chips
Top: 0' bgs
Bottom: 7' bgs

Wet at 8.7' bgs

Bentonite Seal: Granular
Top: 7' bgs
Bottom: 9' bgs

Filter Pack: #2 sand
Top: 9' bgs
Bottom: 9.55' bgs

2-5' prepack with #2 Sand:
Top: 9.55' bgs
Bottom: 19.55' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 9.55' bgs
Bottom: 19.55' 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: 05/01/2019
Purged Amount: 2.00 gallons
Well Volumes Removed: 5.13

ARM Group Inc.
Engineers and Scientists

Well ID: RWE-MWI

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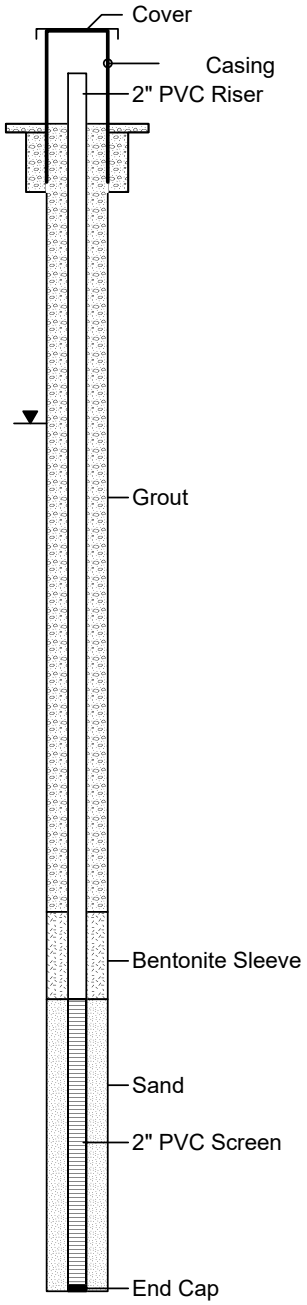
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 571901.50
Easting (ft)	: 1455879.82
Date/Time Started	: 4/22/19 1435
Date/Time Completed	: 4/23/19 1106
Surf. Elev. (ft AMSL)	: 11.43'
TOC Elev. (ft AMSL)	: 13.92'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 12.35' TOC
Depth to Water (ft)	: Static: 12.97' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	60	-	(0-7.5') SLAG, SAND and GRAVEL-sized, with non-native SAND, dense, brown to dark brown with some gray, dry to moist, non-plastic, non-cohesive	SW/GW
		-		
		10.5		
		397.5		
		47.1		
5		-		
	76	0.5		
		0.4		
		2.2	(7.5-8.7') SILT with GRAVEL and SAND, soft, black, very moist, low plasticity, cohesive	ML
		14.3		SW/GW
10		-	(8.7-9.3') SLAG, SAND and GRAVEL-sized, with non-native SAND, dense, brown to dark brown with some gray, dry to moist, non-plastic, non-cohesive	ML
		58.7		
	70	0.5		
		0.1	(9.3-10.5') SILT with GRAVEL and SAND, soft, black, very moist, low plasticity, cohesive, strong sweet odor from 7.5-8.7' bgs and 9.3-10' bgs	CL
15		0.0		
		-		
		0.2		
	76	0.0	(10.5-16.5') CLAY, very firm to hard, reddish yellow and light grayish brown, dry to moist, low plasticity, cohesive	
		0.0		
		0.0		SW
20		0.0	(16.5-21.7') SAND, very fine to medium, medium dense to dense, reddish yellow then grayish brown at 19' bgs, wet, non-plastic, non-cohesive	
		0.0		
	100	0.0		
		0.0		
		0.0	(21.7-28') CLAY, very firm to hard, dark brown, dry to moist, low plasticity, cohesive	CL
25		-		
		0.0		
	90	0.1		
		0.0	(28-30.9') SAND, medium to very coarse, with GRAVEL, fine, loose to medium dense, reddish yellow to pale brown, wet, non-plastic, non-cohesive	SW/GP
		0.0		
30		0.3		
		0.2		GP
	100	0.8	(30.9-32.1') GRAVEL, fine, loose to medium dense, very pale brown, wet, non-plastic, non-cohesive	ML
		1.0		SW
		0.6		
35		-	(32.1-32.6') SILT, very firm, light gray, dry, low plasticity, cohesive	
		-		
	0	-	(32.6-35') SAND, fine to medium, light gray, wet, non-plastic, non-cohesive	-
		-		
		-	(35-40') NO RECOVERY; heaving sands encountered in boring	
40			End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 2.98'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.56'
Riser Amount: 27'

Wet at 16.5' bgs

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 27' bgs

Bentonite Seal: 1-3' sleeve
Top: 27' bgs
Bottom: 30' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 30' bgs
Bottom: 40' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 30' bgs
Bottom: 40' 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: 05/01/2019
Purged Amount: 6.00 gallons
Well Volumes Removed: 5.08

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ARM Group Inc.
Engineers and Scientists

Well ID: RWE-MWS

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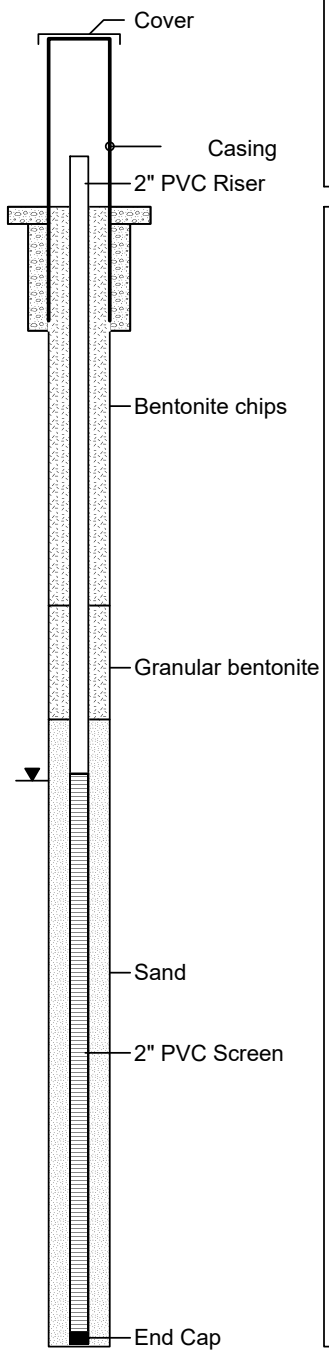
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 571905.45
Easting (ft)	: 1455879.94
Date/Time Started	: 4/22/19 1322
Date/Time Completed	: 4/22/19 1430
Surf. Elev. (ft AMSL)	: 11.57'
TOC Elev. (ft AMSL)	: 13.96'
Total Well Depth (ft)	: 20' bgs
Depth to Water (ft)	: 0 Hr: 12.73' TOC
Depth to Water (ft)	: Static: 12.77' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0				
	56	-	(0-7.5') SLAG, SAND and GRAVEL-sized, and non-native SAND, medium dense to dense, dark brown, dry then very moist 7.2-7.5' bgs, non-plastic, non-cohesive	SW/GW
		2.4		
		5.4		
		2.7		
5		-		
	56	-		
		1.0	(7.5-9.5') CLAY with SAND and GRAVEL, firm, brown to black, moist, low plasticity, cohesive	CL
		1.7		
		3.1	(9.5-11.1') SLAG, SAND and GRAVEL-sized, and non-native SAND, medium dense to dense, dark brown, dry, non-plastic, non-cohesive	SW/GW
10		-		
	88	6.8	(11.1-16') CLAY with trace SAND grading to CLAY, very firm to hard, dry to moist, gray then light brownish gray and reddish yellow from 11.9-16' bgs, low plasticity, cohesive	CL
		0.3		
		0.0		
		0.0		
15		-		
	86	0.0	(16-20') SAND, very fine to medium, medium dense, very pale brown then reddish yellow at 17.2' bgs, then dark brown 17.8-20' bgs, wet, non-plastic, non-cohesive	SW
		0.1		
		0.2		
		0.4		
20			End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.07'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.54'
Riser Amount: 9.95'

Bentonite: 3/8" chips
Top: 0' bgs
Bottom: 7' bgs

Wet at 16' bgs

Bentonite Seal: Granular
Top: 7' bgs
Bottom: 9' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 9.95' bgs

2-5' prepack with #2 Sand:
Top: 9.95' bgs
Bottom: 19.95' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 9.95' bgs
Bottom: 19.95' 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: 04/30/2019
Purged Amount: 4.25 gallons
Well Volumes Removed: 10.90

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ARM Group Inc.
Engineers and Scientists

Well ID: RWF-MWI

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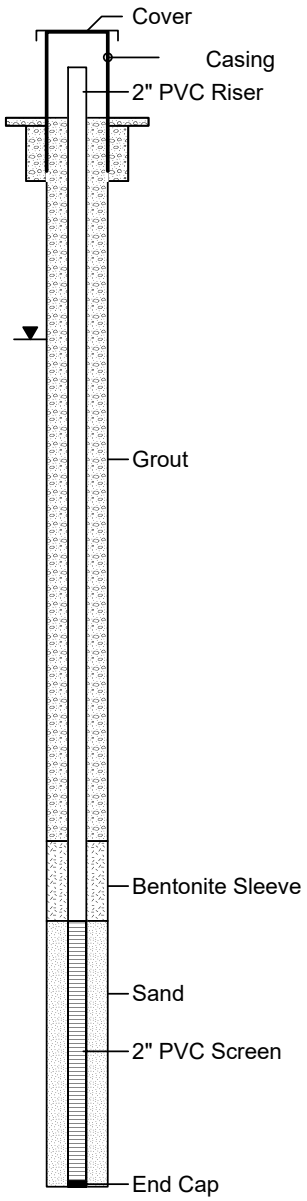
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Don Marchese
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 571606.11
Easting (ft)	: 1455890.87
Date/Time Started	: 4/24/19 0810
Date/Time Completed	: 4/24/19 1500
Surf. Elev. (ft AMSL)	: 10.30'
TOC Elev. (ft AMSL)	: 12.31'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 11.06' TOC
Depth to Water (ft)	: Static: 11.03' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	60	- - 1.6 3.1 5.8	(0-5') Non-native SAND with SLAG and BRICK, SAND and GRAVEL-sized, medium dense, brown with trace yellow, dry, non-plastic, non-cohesive	SW/GW
5	100	0.3 0.4 0.1 0.1 0.2	(5-9.3') SILT with GRAVEL, fine, and SAND, very firm grading to soft, dark brown and gray, moist to very moist, non-plastic, non-cohesive	ML
10	100	0.1 1.3 0.4 1.1 1.3	(9.3-15') CLAY, hard, light brownish gray and reddish yellow, dry, low plasticity, cohesive	CL
15	100	0.0 0.0 0.0 0.7 1.7	(15-18.2') SAND with CLAY, medium dense, reddish yellow then grayish brown at 16.5' bgs, wet, non-plastic, non-cohesive	SW-SC
			(18.2-19') SANDY CLAY, very firm, gray, moist, low plasticity, cohesive	CL
20	100	0.2 0.0 0.0 0.0 0.0	(19-25') CLAY, very firm, gray, moist, low plasticity, cohesive, small SAND layer at depth	CL
25	100	0.0 0.0 0.0 0.1 0.1	(25-26') GRAVEL, fine, with some SAND, medium to very coarse, medium dense, very pale brown, wet, non-plastic, non-cohesive	GP
				SW
			(26-28.7') SAND, fine to very coarse, with some GRAVEL, fine, very pale brown, wet, non-plastic, non-cohesive	GP
30	78	- 0.0 0.0 0.0 0.0	(28.7-30') GRAVEL, fine, with some SAND, medium to very coarse, medium dense, very pale brown, wet, non-plastic, non-cohesive	SW
35	100	0.1 0.1 0.1 0.1 0.0	(30-33.8') SAND, fine to very coarse, with some GRAVEL, fine, very pale brown, wet, non-plastic, non-cohesive	CL
			(33.8-38') CLAY, dark brown, moist, low plasticity, cohesive	SW-SC
40			(38-40') SAND with CLAY, dark gray, wet, non-plastic, non-cohesive	
			End of Boring	
45				



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.13'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.35'
Riser Amount: 27.2'

Wet at 15' bgs

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 27.2' bgs

Bentonite Seal: 1-3' sleeve
Top: 27.2' bgs
Bottom: 30.2' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 30.2' bgs
Bottom: 40.2' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 30.2' bgs
Bottom: 40.2' 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: 04/26/2019
Purged Amount: 5.25 gallons
Well Volumes Removed: 4.17

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ARM Group Inc.
Engineers and Scientists

Well ID: RWF-MWS

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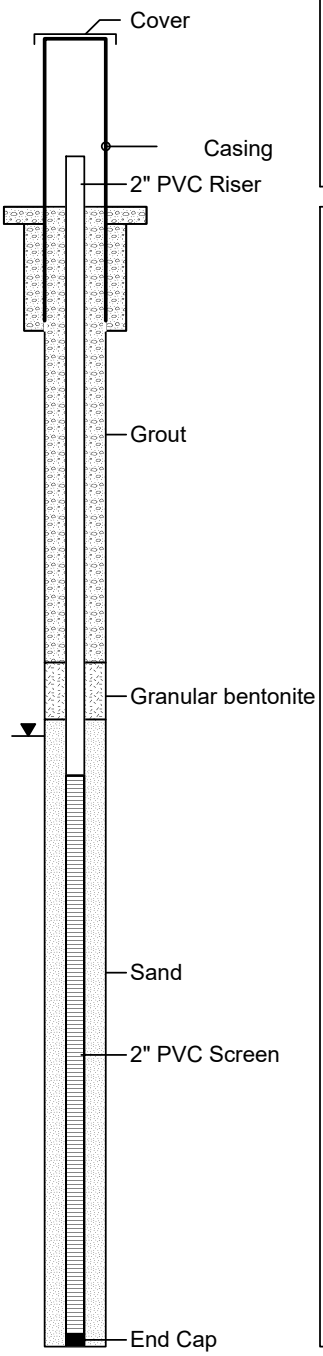
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Ali Berenbrok-Niblett
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 571610.23
Easting (ft)	: 1455890.58
Date/Time Started	: 4/23/19 1435
Date/Time Completed	: 4/24/19 1515
Surf. Elev. (ft AMSL)	: 10.24'
TOC Elev. (ft AMSL)	: 12.74'
Total Well Depth (ft)	: 20' bgs
Depth to Water (ft)	: 0 Hr: 11.78' TOC
Depth to Water (ft)	: Static: 11.99' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-5.5') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense to loose, brown to dark brown, dry, non-plastic, non-cohesive	SW/GW
	60	-		
		0.4		
		0.2		
		0.2		
5		-	(5.5-7.4') SILT with SAND and GRAVEL, hard, dark gray and brown, dry, non-plastic, non-cohesive	ML
		5.7		
	84	0.1	(7.4-8.5') CLAYEY SAND, medium dense, black, wet, non-plastic, non-cohesive	SC
		0.1	(8.5-9.3') SANDY CLAY, soft, black and gray, very moist, low plasticity, cohesive	CL
		0.1	(9.3-15') CLAY, hard, brownish gray and gray, dry, low plasticity, cohesive	CL
10		0.0		
		0.0		
	100	0.1		
		0.2		
		0.2		
15		0.6	(15-18') SAND, very fine to medium, medium dense, pale brown then dark brownish gray at 16.4' bgs, wet, non-plastic, non-cohesive	SW
		0.8		
	100	0.2		
		0.2	(18-19.2') CLAYEY SAND, dense, gray, wet, non-plastic, non-cohesive	SC
		0.2	(19.2-20') CLAY with some SAND, very firm, gray, moist, low plasticity, cohesive	CL
20			End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.15'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.77'
Riser Amount: 9.98'

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 8' bgs

Wet at 7.4' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 9.98' bgs

2-5' prepack with #2 Sand:
Top: 9.98' bgs
Bottom: 19.98' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 9.98' bgs
Bottom: 19.98' 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: 04/26/2019
Purged Amount: 3.75 gallons
Well Volumes Removed: 8.72

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ARM Group Inc.
Engineers and Scientists

Well ID: RWG-MWI

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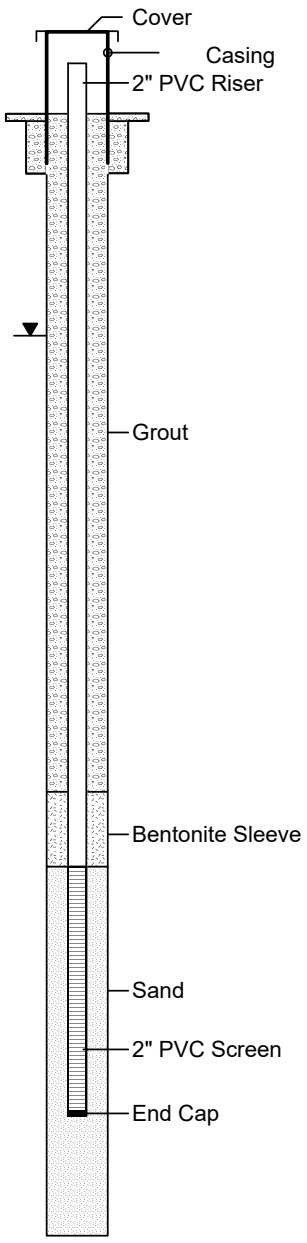
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 571293.18
Easting (ft)	: 1455914.97
Date/Time Started	: 4/25/19 0820
Date/Time Completed	: 4/25/19 1100
Surf. Elev. (ft AMSL)	: 9.96
TOC Elev. (ft AMSL)	: 12.48
Total Well Depth (ft)	: 45' bgs
Depth to Water (ft)	: 0 Hr: 11.42' TOC
Depth to Water (ft)	: Static: 11.60' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	50	- - 1.8 0.7 4.1	(0-7') Non-native SAND with SLAG, SAND and GRAVEL-sized, loose, brown with gray, dry, non-plastic, non-cohesive, trace BRICK and ORGANICS	SW/GW
5	16	- - - 0.2	(7-8') SAND, fine to medium, medium dense, light brown, wet, non-plastic, non-cohesive	SW
10	36	- - - 0.0 0.0 0.0 0.0	(8-11') Non-native SAND with SLAG, SAND and GRAVEL-sized, loose, brown with gray, wet, non-plastic, non-cohesive	SW/GW
15	88	0.0 0.0 0.0 0.0 0.0	(11-17') SAND, very fine to medium with trace GRAVEL, fine, at 16.5' bgs, reddish yellow to pale brown then yellowish red from 16.5-17' bgs, wet, non-plastic, non-cohesive	SW
20	90	0.0 0.0 0.0 0.0 0.0 0.0 0.0	(17-20') SANDY CLAY grading to CLAY, firm to soft, brown, moist, medium plasticity, cohesive	CL
25	100	0.0 0.0 0.0 0.0 0.0 0.0 0.0	(20-22.4') SAND, very fine to medium, fine, reddish yellow to pale brown, wet, non-plastic, non-cohesive	SW
30	82	- 0.0 0.0 0.5	(22.4-25') CLAY, very firm, gray, moist, low plasticity, cohesive	CL
35	100	0.0 0.0 0.0 0.0 0.0 0.0 0.0	(25-26') SAND, very fine to medium, light brown, wet, non-plastic, non-cohesive	SW
40	100	- - - - -	(26-28.5') CLAY, firm to soft, brown, moist, medium plasticity, cohesive	CL
45			(28.5-30') SAND with some GRAVEL, fine, medium dense, very pale brown, wet, non-plastic, non-cohesive	SW
			(30-45') CLAY, very firm to hard, grayish brown (30-35' bgs), brownish gray (35-40' bgs), brown (40-45' bgs), moist to dry, low plasticity, cohesive	CL
			End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.10'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.79'
Riser Amount: 21.75'

Wet at 9.2' bgs

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 21.75' bgs

Bentonite Seal: 1-3' sleeve
Top: 21.75' bgs
Bottom: 24.75' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 24.75' bgs
Bottom: 34.75' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 24.75' bgs
Bottom: 34.75' bgs
Total Screen: 10'

Filter Pack: #2 Sand
Top: 34.75' bgs
Bottom: 45' bgs

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: 04/30/2019
Purged Amount: 6.50 gallons
Well Volumes Removed: 6.25

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ARM Group Inc.
Engineers and Scientists

Well ID: RWG-MWS

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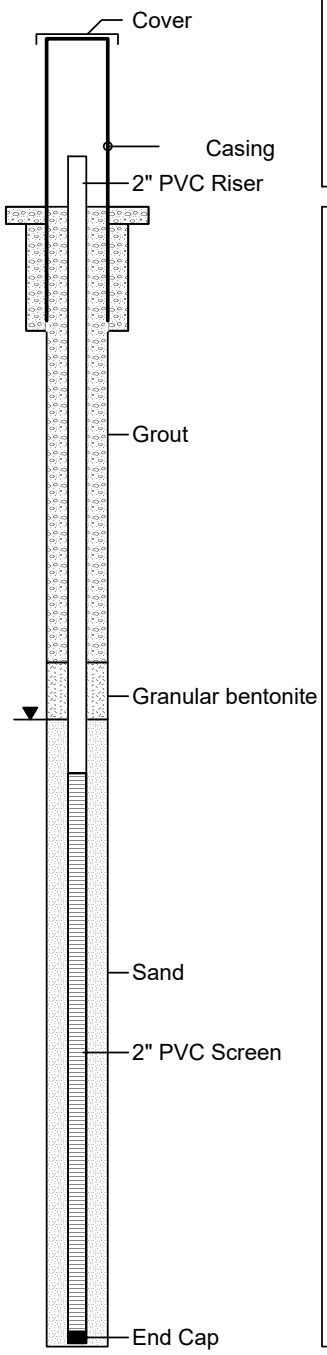
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Don Marchese
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 571296.07
Easting (ft)	: 1455914.82
Date/Time Started	: 4/24/19 1306
Date/Time Completed	: 4/24/19 1400
Surf. Elev. (ft AMSL)	: 10.07'
TOC Elev. (ft AMSL)	: 12.50'
Total Well Depth (ft)	: 20' bgs
Depth to Water (ft)	: 0 Hr: 12.49' TOC
Depth to Water (ft)	: Static: 11.70' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-6.5') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense, brown with gray, dry, non-plastic, non-cohesive	SW/GW
	50	-		
		1.8		
		1.7		
		2.6		
5		-		
		-	(6.5-9') SILT with GRAVEL and SAND, firm, brown with gray, moist, non-plastic, non-cohesive	ML
	34	-		
		0.1		
		0.7	(9-10.5') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense, brown with gray, wet, non-plastic, non-cohesive	SW/GW
10		-	(10.5-13') SANDY CLAY grading to CLAY, soft to very firm, gray, very moist to moist, low plasticity, cohesive	CL
		0.0		
	78	0.0		
		0.0	(13-17.1') SAND with CLAY, medium dense, reddish yellow to pale brown, wet, non-plastic, non-cohesive	SW-SC
		0.0		
15		-		
		0.1		
	86	0.3	(17.1-20') CLAY, soft grading to very firm, grayish brown grading to brown, moist, low plasticity, cohesive	CL
		0.3		
		0.2		
20			End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.78'
Riser Amount: 9.94'

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 8' bgs

Wet at 9.3' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 9.94' bgs

2-5' prepack with #2 Sand:
Top: 9.94' bgs
Bottom: 19.94' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 9.94' bgs
Bottom: 19.94' 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: 04/30/2019
Purged Amount: 4.50 gallons
Well Volumes Removed: 10.23

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ARM Group Inc.
Engineers and Scientists

Well ID: RWH-MWI

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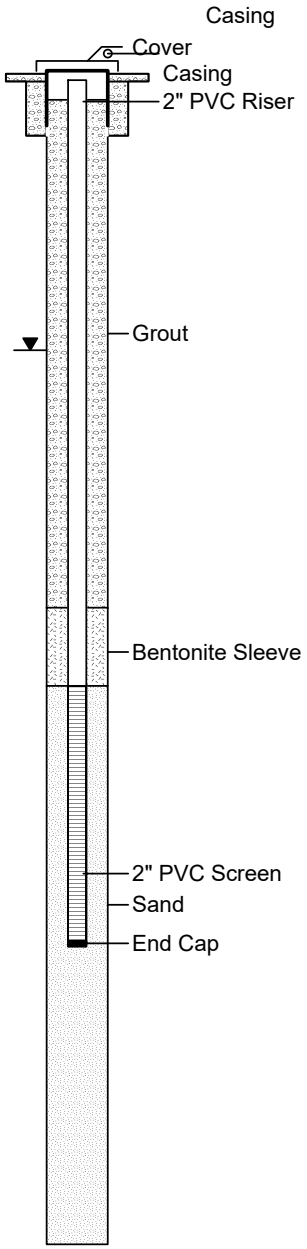
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572408.04
Easting (ft)	: 1456263.43
Date/Time Started	: 4/9/19 0815
Date/Time Completed	: 4/9/19 1155
Surf. Elev. (ft AMSL)	: 12.40'
TOC Elev. (ft AMSL)	: 12.03'
Total Well Depth (ft)	: 45' bgs
Depth to Water (ft)	: 0 Hr: 10.19' TOC
Depth to Water (ft)	: Static: 10.38' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	90	1.1, 2.4, 1.6, 0.4	(0-1.7') GRAVELLY CLAY with SAND, hard, reddish yellow and reddish brown, dry, low plasticity, cohesive, glass present	CL
		0.1	(1.7-4') Non-native SAND with GRAVEL, very dark brown, dry, non-plastic, non-cohesive	SW/GW
5	74	-	(4-5.5') SAND, fine to medium with trace coarse and trace GRAVEL, fine, medium dense, reddish yellow, dry, non-plastic, non-cohesive	SW
		3.2, 3.6, 1.6, 4.3	(5.5-12.5') Non-native SAND with some GRAVEL, medium dense, dark brown, dry, non-plastic, non-cohesive	SW/GW
10	56	-		
		-		
		0.0, 0.0, 0.0, 0.0	(12.5-13.9') GRAVEL with SAND, medium dense, dark brown, wet, non-plastic, non-cohesive	GW/SW
15	92	0.1, 0.1, 0.2, 0.8	(13.9-17') CLAY with SAND, firm, dark brown grading to pale brown, moist, low plasticity, cohesive	CL
		-		SC
20	80	0.2, 0.2, 0.1, 0.0	(17-18') CLAYEY SAND, dense, reddish yellow with gray, wet, non-plastic, non-cohesive	SW
		0.0	(18-22') SAND, fine to medium, medium dense, pale brown and reddish yellow, wet, non-plastic, non-cohesive	CL
25	100	0.0, 0.1, 0.2, 5.2	(22-26') CLAY, very firm, grayish brown, moist, medium plasticity, cohesive	SW
		2.4	(26-28.5') SAND, fine to medium, medium dense, pale brown and reddish yellow, wet, non-plastic, non-cohesive	CL
30	100	3.7, 0.1, 0.1, 0.0	(28.5-30.5') SANDY CLAY, firm to very firm, brown, dry to moist, low plasticity, cohesive	SW
		0.0	(30.5-33') SAND, fine to medium, medium dense, gray, wet, non-plastic, non-cohesive	CL
35	100	-	(33-45') CLAY with trace SAND at top, very firm, gray grading to grayish brown, moist, low plasticity to medium plasticity, cohesive	
		-		
		10.7, 0.3, 0.0, 0.1		
40	100	0.1, 0.0, 0.1		
45			End of Boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0.45'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.38'
Riser Amount: 20.53'

Wet at 12.5' bgs

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 20.53' bgs

Bentonite Seal: 1-3' sleeve
Top: 20.53' bgs
Bottom: 23.53' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 23.53' bgs
Bottom: 33.53' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 23.53' bgs
Bottom: 33.53' bgs
Total Screen: 10'

Filter Pack: #2 Sand
Top: 33.53' bgs
Bottom: 45' bgs

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: 04/26/2019
Purged Amount: 8.00 gallons
Well Volumes Removed: 8.60

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ARM Group Inc.
Engineers and Scientists

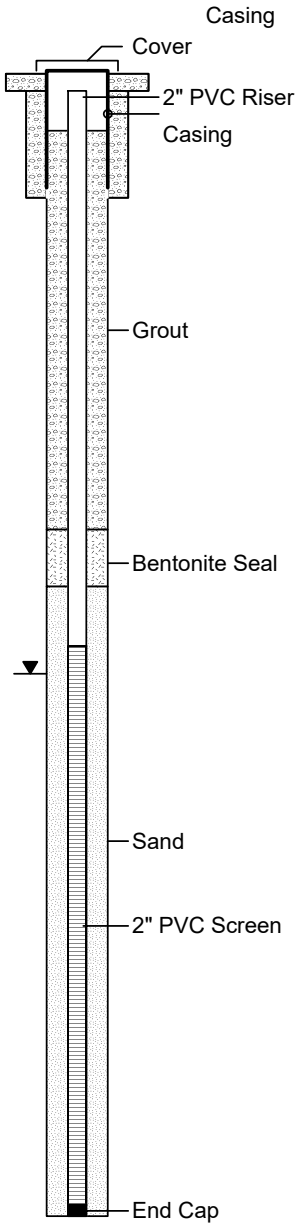
Well ID: RWH-MWS

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: M. Replogle, EIT
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572410.75
Easting (ft)	: 1456262.36
Date/Time Started	: 4/8/19 1350
Date/Time Completed	: 4/8/19 1600
Surf. Elev. (ft AMSL)	: 12.29'
TOC Elev. (ft AMSL)	: 11.83'
Total Well Depth (ft)	: 20.05' bgs
Depth to Water (ft)	: 0 Hr: 9.69' TOC
Depth to Water (ft)	: Static: 10.23' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-8.5') Non-native SAND and SLAG, SAND and GRAVEL-sized, dense, brown, gray, and dark brown, then dark brown 7.5-8.5' bgs, dry then moist 7.5-8.5' bgs, non-plastic, non-cohesive	SW/GW
	74	11.3		
		42.4		
		1.8		
		465.3		
5		-		
		-		
	50	-		
		9.4	(8.5-9.2') GRAVELLY CLAY, stiff, light brown, moist, low plasticity, cohesive	CL
		7.7	(9.2-14.1') SLAG, SAND and GRAVEL-sized, dark brown and reddish yellow, moist, non-plastic, non-cohesive	SW/GW
10		-		
		-		
	56	1.2		
		1.5		
		9.5	(14.1-14.8') CLAY with WOOD CHIPS, soft, greenish gray, moist, low plasticity, cohesive	CL
15				CL
		6.4	(14.8-15') SANDY CLAY, firm, gray, moist, low plasticity, cohesive	CL
		9.9	(15-17') CLAY, firm, gray with some reddish yellow mottling, moist, low plasticity, cohesive	SC
	94	1.4	(17-17.5') CLAYEY SAND, very dense, reddish yellow to light gray, moist, non-plastic, non-cohesive	SP
		1.2		
		2.3	(17.5-20') SAND, medium dense, reddish yellow 17.5-18.8' bgs, light gray 18.8-20' bgs, wet, non-plastic, non-cohesive	
20			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with
Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0.45'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.46'
Riser Amount: 10.05'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 17.5' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 10.05' bgs

2-5' prepack with #2 Sand:
Top: 10.05' bgs
Bottom: 20.05' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.05' bgs
Bottom: 20.05' 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: 04/26/2019
Purged Amount: 3.25 gallons
Well Volumes Removed: 8.33

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ARM Group Inc.
Engineers and Scientists

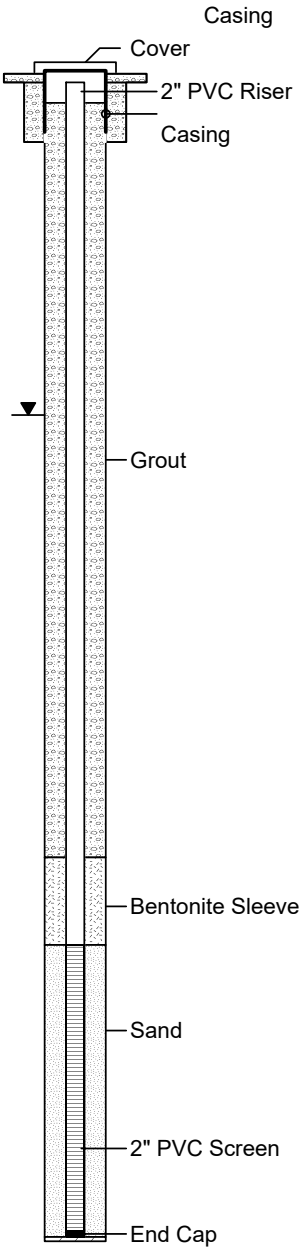
Well ID: RWI-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: M. Replogle, EIT
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572313.76
Easting (ft)	: 1456316.67
Date/Time Started	: 4/8/19 0930
Date/Time Completed	: 4/8/19 1140
Surf. Elev. (ft AMSL)	: 13.23'
TOC Elev. (ft AMSL)	: 12.95'
Total Well Depth (ft)	: 39.85' bgs
Depth to Water (ft)	: 0 Hr: 11.27' TOC
Depth to Water (ft)	: Static: 11.39' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	80	- 0.7 1.4 4.0 1.2	(0-9.5') Non-native SAND with SLAG, SAND and GRAVEL-sized, dense, dark brown, dry, non-plastic, non-cohesive, trace red BRICK 8-9' bgs	SW/GW
5	84	- 10.8 21.0 11.9 1.0		
10	100	0.0 0.1 0.1 0.0 0.2	(9.5-11.2') CLAY, very soft, brown, wet, medium plasticity, cohesive	CL
			(11.2-16') SAND, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SP
15	74	- - 0.0 0.2 0.2	(16-20') CLAY, soft to stiff, gray, moist, medium plasticity, cohesive	CL
20	100	0.4 - - - 0.0	(20-25') SAND, loose, gray, wet, non-plastic, non-cohesive, trace gray clay pockets	SW
25	100	0.0 0.0 0.0	(25-28') CLAY, very stiff, very moist, light brown, medium plasticity, cohesive	CL
		0.0 0.5	(28-30.2') SAND, fine to coarse, gray, reddish yellow, and pale brown, wet, non-plastic, non-cohesive	SW
30	100	0.0 0.0 0.0 0.0 0.0	(30.2-33') SILT, very stiff, gray, dry, non-plastic, non-cohesive, possible mica present	ML
			(33-36.4') CLAY with some SAND, very stiff, gray, dry, low plasticity, cohesive	CL
35	100	0.0 0.0 0.0 0.0 0.0	(36.4-38') CLAYEY SAND, medium dense to loose, wet, non-plastic, non-cohesive	SC
		0.0 0.1	(38-40') CLAY, stiff, dark brown, low plasticity, cohesive, possible mica present	CL
40			End of Boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.36'
Riser Amount: 26.49'

Wet at 9.5' bgs

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 26.85' bgs

Bentonite Seal: 1-3' sleeve
Top: 26.85' bgs
Bottom: 29.85' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 29.85' bgs
Bottom: 39.85' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 29.85' bgs
Bottom: 39.85' 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: 04/17/2019
Purged Amount: 7.50 gallons
Well Volumes Removed: 6.70

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ARM Group Inc.
Engineers and Scientists

Well ID: RWI-MWS

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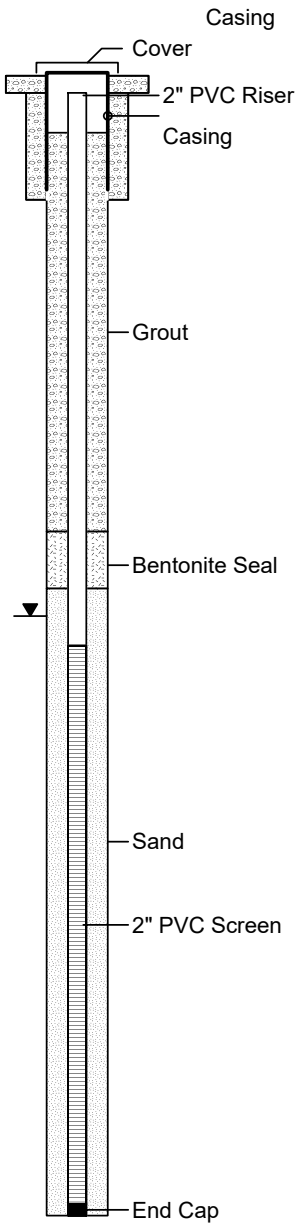
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: M. Replogle, EIT
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572311.02
Easting (ft)	: 1456316.94
Date/Time Started	: 4/8/19 1145
Date/Time Completed	: 4/8/19 1340
Surf. Elev. (ft AMSL)	: 13.23'
TOC Elev. (ft AMSL)	: 12.89'
Total Well Depth (ft)	: 20' bgs
Depth to Water (ft)	: 0 Hr: 8.71' TOC
Depth to Water (ft)	: Static: 9.18' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-10') Non-native SAND and SLAG, SAND and GRAVEL-sized, very dense, dark brown, dry then wet at 9.8' bgs, non-plastic, non-cohesive, trace brick 9-10' bgs, trace moisture 8-10' bgs	
		4.8		
	80	3.4		
		1.5		
		6.4		
5		-		SW/GW
		-		
	52	0.7		
		2.7		
		2.0		
10		-	(10-20') NO RECOVERY	
	0	-		
		-		
		-		
		-		
15		-		NA
	0	-		
		-		
		-		
20		-	End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with
Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.29'
Riser Amount: 9.71'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 9.8' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 10' bgs

2-5' prepack with #2 Sand
Top: 10' bgs
Bottom: 20' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 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: 04/17/2019
Purged Amount: 5.50 gallons
Well Volumes Removed: 13.10

ARM Group Inc.
Engineers and Scientists

Well ID: RWJ-MWI

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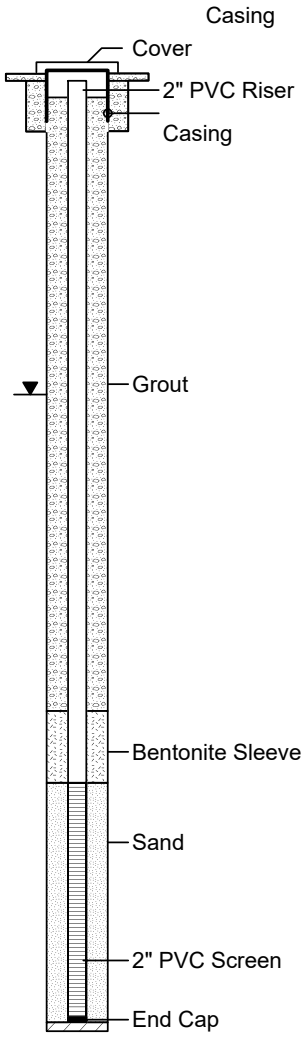
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572086.74
Easting (ft)	: 1456289.53
Date/Time Started	: 4/29/19 1240
Date/Time Completed	: 4/29/19 1440
Surf. Elev. (ft AMSL)	: 14.40'
TOC Elev. (ft AMSL)	: 14.10'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 12.58' TOC
Depth to Water (ft)	: Static: 13.11' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	90	1.8, 5.5, 3.9, 6.4, 21.1 - 93.9	(0-7.5') Non-native SAND and SLAG, SAND and GRAVEL-sized, dense, dark brown with gray, dry to moist, non-plastic, non-cohesive	SW/GW
5	76	1.1, 4.7, 8.4	(7.5-8') LIMESTONE, SAND and GRAVEL-size, dense, white and very light gray, dry, non-plastic, non-cohesive	SW/GW
10	60	- - 2.8, 0.3, 0.8	(8-12.5') Non-native SAND and SLAG, SAND and GRAVEL-sized, dense, dark brown with gray, dry, non-plastic, non-cohesive	SW
15	70	- 2.8, 0.7, 0.9, 0.6	(12.5-17') SAND with trace LIMESTONE GRAVEL, very fine to medium, medium dense, reddish yellow to yellowish red, wet, non-plastic, non-cohesive	CL
20	68	- - 0.7, 0.4, 0.8, 1.5	(17-19.3') CLAY with some SAND, very firm, light grayish brown and reddish yellow, moist, low plasticity, cohesive	SW/GP CL
25	100	1.8, 2.4, 3.8, 2.4	(19.3-19.7') SAND with LIMESTONE GRAVEL, coarse, medium dense, light reddish brown, wet, non-plastic, non-cohesive	SW
30	74	- - 1.0, 1.0, 3.7, 0.6	(19.7-20.4') CLAY with some SAND, very firm, grayish brown, moist, low plasticity, cohesive	CL
35	100	0.8, 0.9, 1.2, 1.4	(20.4-24.6') SAND with trace LIMESTONE GRAVEL, very fine to medium, reddish yellow grading to brownish gray, wet, non-plastic, non-cohesive	SW/GP
40			(24.6-29.5') SANDY CLAY grading to CLAY, firm grading to very firm then hard, brownish gray to brown, moist grading to dry, low plasticity, cohesive	CL
45			(29.5-35') SAND, fine to medium with very coarse at depth, with some GRAVEL, fine, from medium dense to loose, grayish brown grading to reddish yellow, wet, non-plastic, non-cohesive	
50			(35-40') CLAY, very firm, grayish brown, moist, low plasticity, cohesive	
			End of Boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.3'
Riser Amount: 26.33'

Wet at 12.5' bgs

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 26.63' bgs

Bentonite Seal: 1-3' sleeve
Top: 26.63' bgs
Bottom: 29.63' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 29.63' bgs
Bottom: 39.63' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 29.63' bgs
Bottom: 39.63' bgs
Total Screen: 10

Collapsed Material:
Top: 39.63' bgs
Bottom: 40' bgs

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: 05/01/2019
Purged Amount: 8.50 gallons
Well Volumes Removed: 8.02

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ARM Group Inc.
Engineers and Scientists

Well ID: RWJ-MWS

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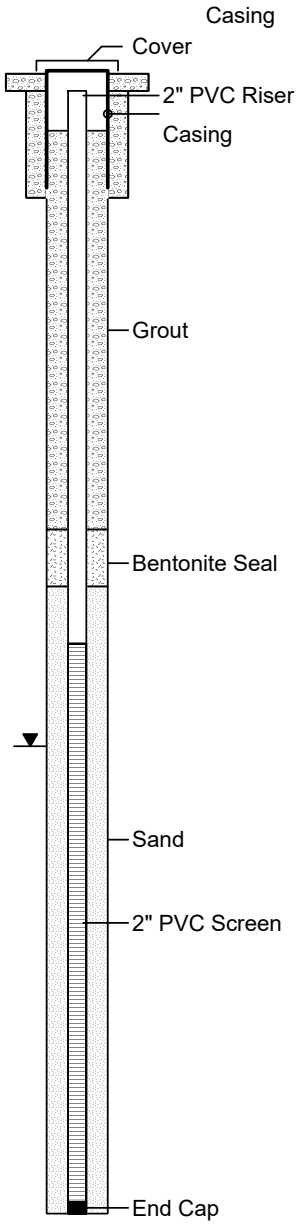
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572088.71
Easting (ft)	: 1456289.31
Date/Time Started	: 4/29/19 1042
Date/Time Completed	: 4/29/19 1158
Surf. Elev. (ft AMSL)	: 14.31'
TOC Elev. (ft AMSL)	: 13.81'
Total Well Depth (ft)	: 20.6' bgs
Depth to Water (ft)	: 0 Hr: 11.07' TOC
Depth to Water (ft)	: Static: 11.50' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-12') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense to dense, brown to dark brown, dry, non-plastic, non-cohesive, some limestone gravel 8-9' bgs	SW/GW
	70	1.3		
		1.4		
		2.0		
		27.4		
5		0.7		
	100	9.2		
		2.6		
		4.6		
		12.9		
10		-		
	10	-	(12-15.5') GRAVEL, coarse, medium dense, gray, moist, non-plastic, non-cohesive	GP
		-		
		1.9		
15		-	(15.5-17.5') SAND, fine to medium, and LIMESTONE GRAVEL, coarse, medium dense to loose, reddish yellow and white, wet ,non-plastic, non-cohesive	SW/GP
		0.8		
	80	1.2	(17.5-19.1') CLAY with SAND, very firm, grayish brown, wet, non-plastic, non-cohesive	CL
		0.8		
		1.1	(19.1-20') SANDY SILT, soft, grayish brown, wet, non-plastic, non-cohesive	ML
20			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with
Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.49'
Riser Amount: 10.11'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 16' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 10.6' bgs

2-5' prepack with #2 Sand:
Top: 10.6' bgs
Bottom: 20.6' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.6' bgs
Bottom: 20.6' 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: 05/01/2019
Purged Amount: 2.00 gallons
Well Volumes Removed: 5.88

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ARM Group Inc.
Engineers and Scientists

Boring ID: RWJ-SB

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Client	: EnviroAnalytics Group
ARM Project No.	: 190341M-2
Project Description	: RWM Onshore Supp. Inv.
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle E.I.T.
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Date	: 05/01/2019
Weather	: 60s, Cloudy
Northing (US ft)	: 572093.78
Easting (US ft)	: 1456289.53

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample ID/Interval	DESCRIPTION	USCS	REMARKS
0						
	76	-	Composite	(0-0.5') ASPHALT	NA	Wet at 12.5' bgs
		0.7		(0.5-10.4') Non-native SAND and SLAG, SAND and GRAVEL-sized, dense, dark brown with gray, dry, non-plastic, non-cohesive	SW/GW	
		0.1				
		1.5				
5		0.2				
	100	1.5				
		2.6				
		1.1				
		2.5				
10		0.4				
	84	-		(10.4-11.8') SLAG, coarse GRAVEL-sized, with some fine GRAVEL-sized and SAND-sized, loose, gray, dry, non-plastic, non-cohesive	GP	
		0.7		(11.8-24.5') LIMESTONE GRAVEL, coarse, with SANDY SILT, medium dense to dense, white and light reddish brown, dry then wet at 12.5' bgs, non-plastic, non-cohesive	GP/ML	
		0.0				
		0.0				
15		0.1				
	100	0.0				
		0.0				
		0.0				
		0.0				
		0.1				
20		-				
	36	-				
		-				
		0.0				
		0.0				
25		0.0		(24.5-25.7') SAND, fine to medium, with trace LIMESTONE GRAVEL, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SW	
		0.0		(25.7-29.5') CLAY, very firm to hard, brown, moist, low plasticity, cohesive	CL	
	92	0.0				
		0.0				
		0.0				
30				(29.5-30') SAND, fine to medium, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SW	
				End of Boring		

Total Borehole Depth: 30' bgs.
Boring terminated at 30' bgs due to water and work plan.

ARM Group Inc.
Engineers and Scientists

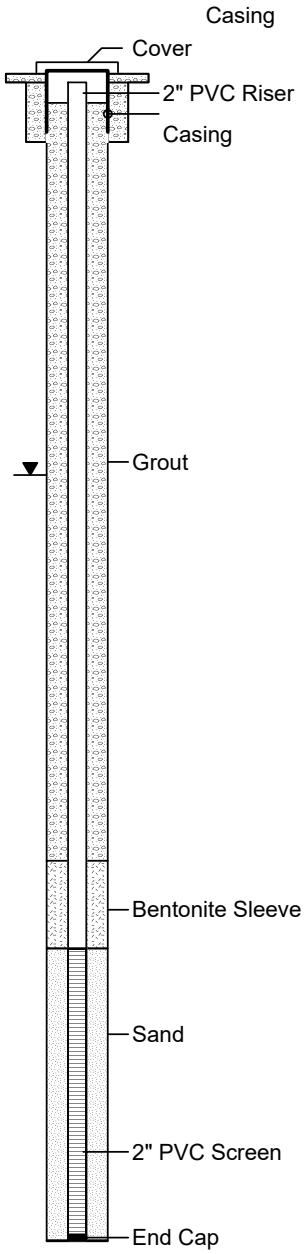
Well ID: RWK-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572080.79
Easting (ft)	: 1456279.77
Date/Time Started	: 4/2/19
Date/Time Completed	: 4/2/19
Surf. Elev. (ft AMSL)	: 14.54'
TOC Elev. (ft AMSL)	: 14.22'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 13.04' TOC
Depth to Water (ft)	: Static: 13.45' bgs
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	80	- 2.2 0.2 0.4 0.0	(0-7.6') SLAG, SAND and GRAVEL-sized, with non-native SAND, dense, brown to dark brown, dry to moist, non-plastic, non-cohesive	SW/GW
5	80	- 1.5 1.0 0.0 0.0	(7.6-10.5') SILTY SAND, dense, brown then reddish yellow with pale brown at 8.5' bgs, very moist, non-plastic, non-cohesive	SM
10	80	- 0.0 0.0 0.2 0.0 0.0	(10.5-16') SAND, fine to medium, dense, reddish yellow, wet, non-plastic, non-cohesive	SW
15	100	0.0 0.0 0.0 0.0	(16-20') SANDY CLAY grading to CLAY, very firm to firm, gray, very moist to moist, low plasticity, cohesive	CL
20	100	0.0 0.0 0.0 0.0 0.0	(20-25') SAND, fine to medium, with trace GRAVEL, fine to coarse, at depth, dense, reddish yellow grading to brownish gray, wet, non-plastic, non-cohesive	SW
25	100	0.0 0.0 0.0 0.0 0.0	(25-31') CLAY, very firm, gray, moist, low plasticity, cohesive	CL
30	60	- - 0.0 0.0	(31-32.5') SAND with trace GRAVEL, fine to coarse, brownish gray, wet, non-plastic, non-cohesive	SW
35	100	0.0 0.0 0.0 0.0 0.0	(32.5-35.2') GRAVEL, fine, with SAND, medium dense, reddish yellow, wet, non-plastic, non-cohesive	GP/SW
40			(35.2-40') CLAY, very firm to firm, gray, moist, low plasticity, cohesive	CL
			End of Boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.3'
Riser Amount: 26.67'

Wet at 11' bgs

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 26.97' bgs

Bentonite Seal: 1-3' sleeve
Top: 26.97' bgs
Bottom: 29.97' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 29.97' bgs
Bottom: 39.97' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 29.97' bgs
Bottom: 39.97' bgs
Total Screen: 10

Collapsed Material:
Top: 39.97' bgs
Bottom: 40' bgs

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: 04/16/2019
Purged Amount: 6.50 gallons
Well Volumes Removed: 6.19

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ARM Group Inc.
Engineers and Scientists

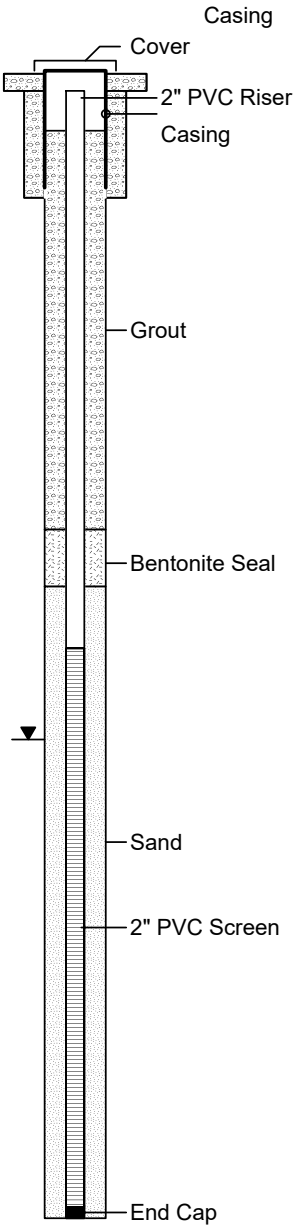
Well ID: RWK-MWS

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572082.89
Easting (ft)	: 1456279.78
Date/Time Started	: 4/01/19
Date/Time Completed	: 4/01/19
Surf. Elev. (ft AMSL)	: 14.50'
TOC Elev. (ft AMSL)	: 14.24'
Total Well Depth (ft)	: 20.08' bgs
Depth to Water (ft)	: 0 Hr: 10.84' TOC
Depth to Water (ft)	: Static: 11.38' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-		
		0.0		
	80	0.1	(0-7.5') Non-native SAND and SLAG GRAVEL, fine to coarse, medium dense to dense, gray and dark brown, dry to moist, then wet at 7.3' bgs, non-plastic, non-cohesive	SW/GW
		2.3		
		0.3		
5		-		
		0.3		
	76	3.2	(7.5-10.4') SILTY SAND, dense, reddish yellow and light brown, wet, non-plastic, non-cohesive	SM
		0.0		
		0.0		
10		-		
		0.0		
	84	0.0	(10.4-16') SAND with trace SILT, medium dense to dense, very pale brown then reddish yellow with light brown, wet, non-plastic, non-cohesive	SW
		0.0		
		0.1		
15		-		
		0.0		
	94	0.0	(16-20') CLAY, very firm, gray, moist, low plasticity, cohesive	CL
		0.0		
		0.0		
20			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with
Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.25'
Riser Amount: 9.83'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 7.5' bgs

Filter Pack: #2 sand
Top: 9' bgs
Bottom: 10.08' bgs

2-5' prepack with #2 Sand:
Top: 10.08' bgs
Bottom: 20.08' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.08' bgs
Bottom: 20.08' 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: 04/17/2019
Purged Amount: 3.00 gallons
Well Volumes Removed: 9.38

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ARM Group Inc.
Engineers and Scientists

Well ID: RWL-MWI

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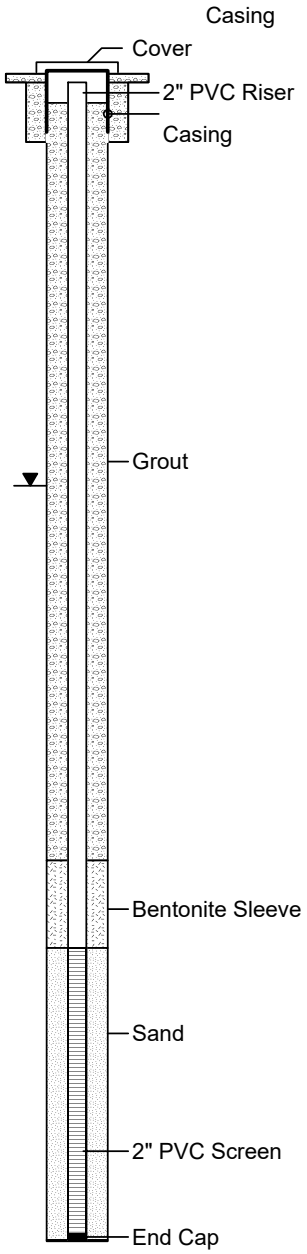
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572073.09
Easting (ft)	: 1456266.84
Date/Time Started	: 4/2/19
Date/Time Completed	: 4/2/19
Surf. Elev. (ft AMSL)	: 14.60'
TOC Elev. (ft AMSL)	: 14.36'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 13.25' TOC
Depth to Water (ft)	: Static: 13.82' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	100	0.0, 0.1, 0.8, 0.2, 0.1	(0-8') SLAG, SAND and GRAVEL-sized, with non-native SAND, dense, dark brown, brown, and gray, dry to moist, non-plastic, non-cohesive	SW/GW
5	72	-, 0.5, 0.0		
		0.0, 0.0	(8-9.5') SILTY SAND, medium dense to dense, dark brown to light brown, very moist, non-plastic, non-cohesive	SM
10	90	0.0, 0.0, 0.0, 0.0, 0.0	(9.5-14.6') SAND, fine to medium with trace coarse, medium dense to dense, reddish yellow to yellowish red, wet, non-plastic, non-cohesive	SW
15	100	0.0, 0.0, 5.2, 0.0, 0.0, 0.0	(14.6-22.2') SANDY CLAY grading to CLAY, very firm to firm then hard, gray wtih reddish yellow to gray, dry to very moist, low plasticity, cohesive	CL
20	86	-, 0.0, 0.0		
		0.0, 0.0	(22.2-23.4') CLAYEY SAND, medium dense, gray, wet, non-plastic, non-cohesive	SC
25	90	0.0, 5.2, 3.4, 2.2, 0.2, 0.0	(23.4-25.7') SAND, fine to medium, yellowish red, wet, non-plastic, non-cohesive	SW
30	80	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	(25.7-32.5') CLAY, firm to hard, gray, dry to very moist, low plasticity, cohesive	CL
35	100	0.0, 0.0, 0.0, 0.0, 0.0, 0.0	(32.5-35') GRAVEL, fine, with SAND, coarse to medium, medium dense, reddish yellow, wet, non-plastic, non-cohesive	GP/SW
		0.0, 0.0	(35-37') SANDY CLAY, very firm, gray, moist, low plasticity, cohesive	CL
40		0.0, 0.0	(37-40') CLAY, very firm, gray, moist, low plasticity, cohesive	CL
			End of Boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.25'
Riser Amount: 26.70'

Wet at 9.5' bgs

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 26.95' bgs

Bentonite Seal: 1-3' sleeve
Top: 26.95' bgs
Bottom: 29.95' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 29.95' bgs
Bottom: 39.95' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 29.95' bgs
Bottom: 39.95' bgs
Total Screen: 10

Collapsed Material:
Top: 39.95' bgs
Bottom: 40' bgs

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: 04/16/2019
Purged Amount: 8.00 gallons
Well Volumes Removed: 7.69

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ARM Group Inc.
Engineers and Scientists

Well ID: RWL-MWS

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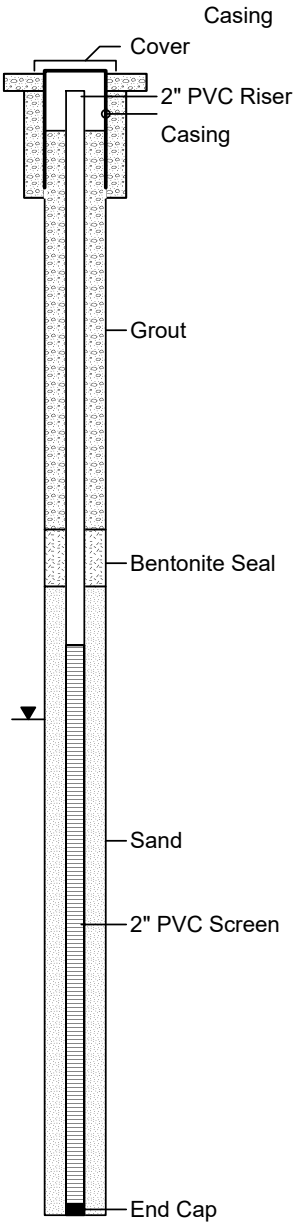
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572075.55
Easting (ft)	: 1456266.81
Date/Time Started	: 4/02/19
Date/Time Completed	: 4/02/19
Surf. Elev. (ft AMSL)	: 14.55'
TOC Elev. (ft AMSL)	: 14.26'
Total Well Depth (ft)	: 20.03' bgs
Depth to Water (ft)	: 0 Hr: 14.75' TOC
Depth to Water (ft)	: Static: 11.03' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		1.0	(0-7.5') SLAG, SAND and GRAVEL-sized with non-native SAND, dense, dark brown and gray, dry to moist, non-plastic, non-cohesive	SW/GW
	90	0.1		
		0.0		
		0.0		
5		-		
		0.0		
	74	0.0		
		0.0	(7.5-9') SILTY SAND, dense, dark brown, very moist, non-plastic, non-cohesive	SM
		0.0	(9-14.5') SAND, fine to medium, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SW
10		-		
		0.0		
	84	0.0		
		0.0		
		0.0		
15		-	(14.5-15') SANDY CLAY, very firm, gray, moist, low plasticity, cohesive	CL
		0.4	(15-20') CLAY, very firm, gray, moist, low plasticity, cohesive	
	92	1.5		CL
		0.0		
		0.0		
20			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with
Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.30'
Riser Amount: 9.73'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 9' bgs

Filter Pack: #2 sand
Top: 9' bgs
Bottom: 10.03' bgs

2-5' prepack with #2 Sand:
Top: 10.03' bgs
Bottom: 20.03' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.03' bgs
Bottom: 20.03' 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: 04/16/2019
Purged Amount: 2.00 gallons
Well Volumes Removed: 5.71

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ARM Group Inc.
Engineers and Scientists

Well ID: RWM-MWI

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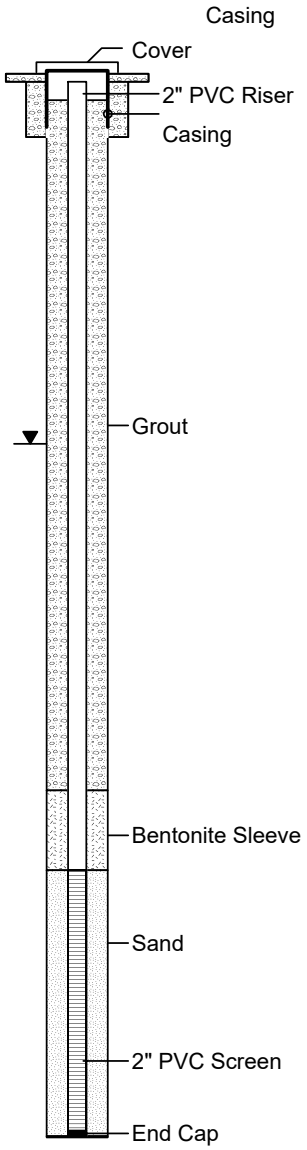
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572014.78
Easting (ft)	: 1456177.44
Date/Time Started	: 4/4/19 0920
Date/Time Completed	: 4/4/19 1205
Surf. Elev. (ft AMSL)	: 15.20'
TOC Elev. (ft AMSL)	: 14.92'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 13.73' TOC
Depth to Water (ft)	: Static: 13.62' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	88	- 0.0 0.1 0.0 0.0	(0-11') Non-native SAND with SLAG, SAND and GRAVEL-sized, dense, dark brown with gray, dry to moist, non-plastic, non-cohesive	SW/GW
5	6	- - - - 0.3		
10	56	- - 0.0 0.0 0.0	(11-15') CLAYEY SAND, medium dense, pale brown to reddish yellow, very moist then wet at 13.5' bgs, non-plastic, non-cohesive, some bits of clay	SC
15	100	0.0 0.0 0.0 0.0 0.0	(15-19.7') SAND, fine to medium, with CLAY, reddish yellow and pale brown, wet, non-plastic, non-cohesive	SW-SC
20	100	0.0 0.0 0.0 0.0 0.0	(19.7-22.2') SAND, fine to medium with trace coarse, medium dense to dense, pale brown and reddish yellow, wet, non-plastic, non-cohesive	SW
				SC
25	100	0.0 0.0 0.0 0.0 0.0	(22.2-23.6') CLAYEY SAND, dense, yellowish red, wet, non-plastic, non-cohesive, bits of clay	CL
			(23.6-29.5') CLAY, very firm, grayish brown, moist, medium plasticity, cohesive	
30	60	0.0 - - 0.0 0.0 0.0	(29.5-30.5') CLAYEY SAND, medium dense, gray, wet, non-plastic, non-cohesive	SC
			(30.5-36.1') GRAVEL, fine, with SAND, medium to coarse, medium dense, very pale brown, wet, non-plastic, non-cohesive	GP/SW
35	80	- 0.0 0.0 0.0 0.0	(36.1-36.7') CLAY, very firm, gray, moist, low plasticity, cohesive	CL
				SC/SW
			(36.7-38') CLAYEY SAND grading to SAND, fine to medium, medium dense, gray, wet, non-plastic, non-cohesive	SW
40			(38-40') SAND, fine to medium, gray, wet, non-plastic, non-cohesive	
			End of Boring	
45				



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.30'
Riser Amount: 26.65'

Wet at 13.5' bgs

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 26.95' bgs

Bentonite Seal: 1-3' sleeve
Top: 26.95' bgs
Bottom: 29.95' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 29.95' bgs
Bottom: 39.95' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 29.95' bgs
Bottom: 39.95' bgs
Total Screen: 10

Collapsed Material:
Top: 39.95' bgs
Bottom: 40' bgs

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: 7.00 gallons
Well Volumes Removed: 6.67

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ARM Group Inc.
Engineers and Scientists

Well ID: RWM-MWS

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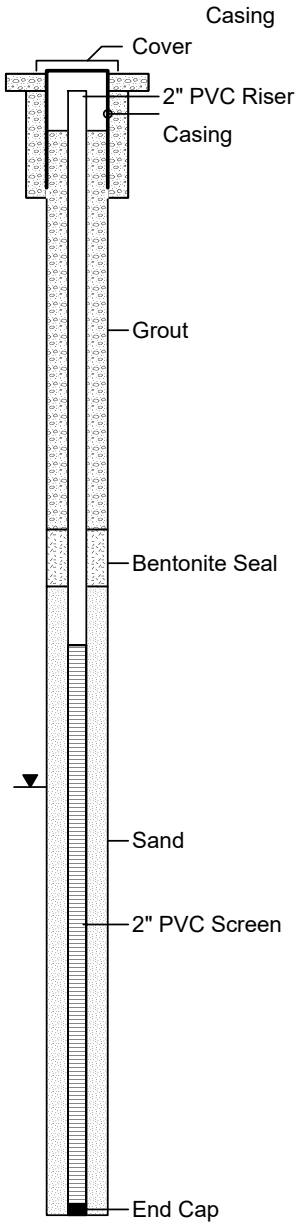
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572017.30
Easting (ft)	: 1456177.36
Date/Time Started	: 4/4/19 1250
Date/Time Completed	: 4/4/19 1405
Surf. Elev. (ft AMSL)	: 15.21'
TOC Elev. (ft AMSL)	: 14.97'
Total Well Depth (ft)	: 20.07' bgs
Depth to Water (ft)	: 0 Hr: 11.71' TOC
Depth to Water (ft)	: Static: 12.22' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	80	- 1.0 0.6 0.1 0.1	(0-7.5') Non-native SAND with SLAG, SAND and GRAVEL-sized, dense, dark brown and dark grayish brown, dry, non-plastic, non-cohesive	SW/GW
5	80	- 3.9 0.0	(7.5-12') SAND, fine to medium, dense, yellowish red, moist, non-plastic, non-cohesive	SW
10	96	0.0 0.0 0.1 0.0 0.0	(12-13.9') CLAY with trace SAND, hard, reddish yellow with light gray, dry to moist, low plasticity, cohesive	CL
		0.0	(13.9-18.5') CLAYEY SAND, dense, reddish yellow and light gray, moist to wet at 15' bgs, non-plastic, non-cohesive	SC
15	100	0.0 0.0 0.0 0.0 0.0	(18.5-20') SAND with CLAY, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SW-SC
20			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.35'
Riser Amount: 9.72'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 15' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 10.07' bgs

2-5' prepack with #2 Sand:
Top: 10.07' bgs
Bottom: 20.07' bgs
Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.07' bgs
Bottom: 20.07' 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: 04/15/2019
Purged Amount: 16.50 gallons
Well Volumes Removed: 55.00

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ARM Group Inc.
Engineers and Scientists

Well ID: RWN-MWS

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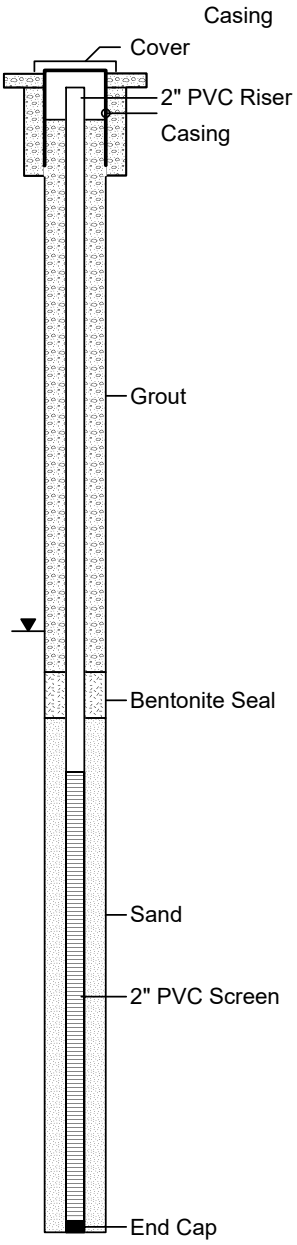
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572065.77
Easting (ft)	: 1456392.44
Date/Time Started	: 4/11/19
Date/Time Completed	: 4/11/19
Surf. Elev. (ft AMSL)	: 15.12'
TOC Elev. (ft AMSL)	: 14.86'
Total Well Depth (ft)	: 25.17' bgs
Depth to Water (ft)	: 0 Hr: 12.76' TOC
Depth to Water (ft)	: Static: 11.81' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-0.5') ASPHALT	NA
	80	3.4	(0.5-7') Non-native SAND with SLAG, SAND and GRAVEL-sized, dense, dark brown with gray, dry then wet at 6.5' bgs, non-plastic, non-cohesive	SW/GW
		0.2		
		0.1		
		0.3		
5		-		
		2.8		
	66	0.1	(7-7.4') BRICK GRAVEL, loose, reddish yellow, very moist to wet, non-plastic, non-cohesive	GW
		0.0	(7.4-10') CLAYEY SAND grading to SAND, very fine to medium, light brown and reddish yellow, wet, non-plastic, non-cohesive	SC/SW
10		0.0		
		5.7	(10-20.5') CLAY, very firm to hard, reddish yellow and light gray, dry, low plasticity, cohesive	CL
	100	3.8		
		0.4		
		0.2		
		0.7		
15		4.6		
		0.0		
	100	0.0		
		0.0		
		0.0		
20		-		
		-	(20.5-25') SAND with CLAY, very fine to medium then very fine to coarse with trace GRAVEL 24-25' bgs, medium dense, pale brown to reddish yellow then brownish gray 24-25' bgs, wet, non-plastic, non-cohesive	SW-SC
	78	-		
		-		
		0.0		
25			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.31'
Riser Amount: 14.86'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 13' bgs

Bentonite Seal: Granular
Top: 13' bgs
Bottom: 14' bgs

Wet at 6.5' bgs

Filter Pack: #2 Sand
Top: 14' bgs
Bottom: 15.17' bgs

2-5' prepack with #2 Sand:
Top: 15.17' bgs
Bottom: 25.17' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 15.17' bgs
Bottom: 25.17' 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: 04/17/2019
Purged Amount: 5.00 gallons
Well Volumes Removed: 9.62

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ARM Group Inc.
Engineers and Scientists

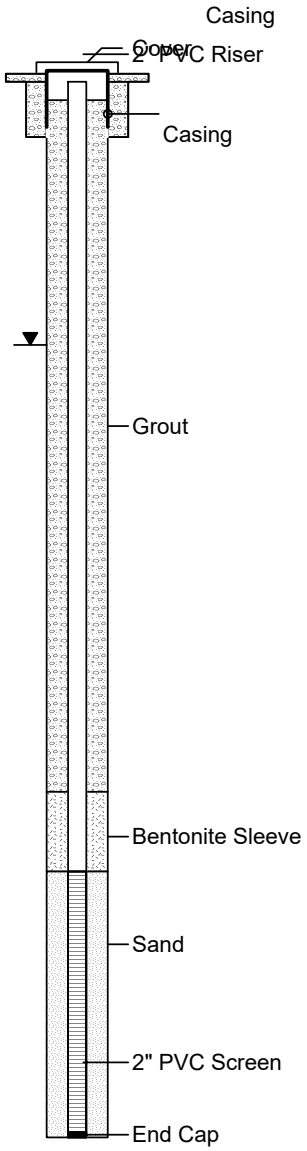
Well ID: RWO-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572456.37
Easting (ft)	: 1456443.37
Date/Time Started	: 4/29/19 0855
Date/Time Completed	: 4/29/19 1030
Surf. Elev. (ft AMSL)	: 11.99'
TOC Elev. (ft AMSL)	: 11.67'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 9.13' TOC
Depth to Water (ft)	: Static: 9.90' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	60	-	(0-2.8') SAND with CLAY, dense, brownish yellow, dry, non-plastic, non-cohesive	SW-SC
		3.7		
		5.3	(2.8-4.8') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense, dark brown and brown, dry, non-plastic, non-cohesive	SW/GW
		31.0		
5	18	-	(4.8-10') SANDY CLAY, with SLAG GRAVEL, firm, light brown, moist, low plasticity, cohesive	CL
		-		
		-		
		8.9		
10	0	-	(10-19.5') NO RECOVERY	
		-		
		-		
		-		
15	10	-		
		-		
		-		
		-		
		43.3		
20	8	-	(19.5-33') SAND, medium dense, grayish brown, wet, non-plastic, non-cohesive	SW
		-		
		-		
		-		
		139.9		
25	4	-		
		-		
		-		
		-		
		18.3		
30	4	-		
		-		
		-		
		-		
		9.1	(33-35') CLAYEY SAND, medium dense, grayish brown, wet, non-plastic, non-cohesive	SC
35	6	-	(35-40') CLAY with SAND, soft to firm, grayish brown, moist, low plasticity, cohesive	CL
		-		
		-		
		-		
		27.0		
40			End of Boring	
45				



COMPLETION DETAILS

6" Protective Steel Casing with
Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0.45'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.35'
Riser Amount: 26.65'

Wet at 19.5' bgs

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 27' bgs

Bentonite Seal: 1-3' sleeve
Top: 27' bgs
Bottom: 30' bgs

Filter Pack: 2-5' prepack with #2 Sand:
Top: 30' bgs
Bottom: 40' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 30' bgs
Bottom: 40' 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: 05/08/2019
Purged Amount: 5.00 gallons
Well Volumes Removed: 4.13

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ARM Group Inc.
Engineers and Scientists

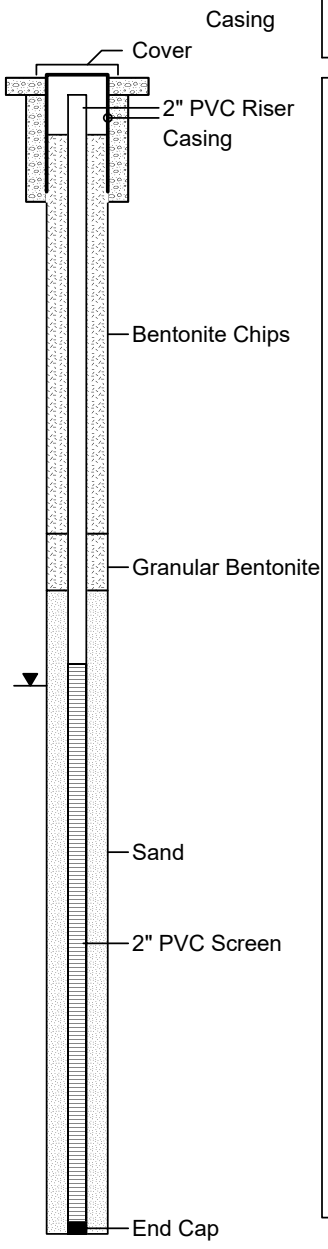
Well ID: RWO-MWS

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572459.66
Easting (ft)	: 1456442.96
Date/Time Started	: 4/29/19 0815
Date/Time Completed	: 4/29/19 0850
Surf. Elev. (ft AMSL)	: 11.93'
TOC Elev. (ft AMSL)	: 11.59'
Total Well Depth (ft)	: 20.29' bgs
Depth to Water (ft)	: 0 Hr: 9.91' TOC
Depth to Water (ft)	: Static: 10.37' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		-	(0-1.5') SAND with CLAY, loose to medium dense, brownish yellow, dry, non-plastic, non-cohesive	SW-SC
		1.1	(1.5-15') Non-native SAND and SLAG, SAND and GRAVEL-sized, medium dense to dense, brown to dark brown, dry then wet at 12' bgs, non-plastic, non-cohesive, strong odor and heavy sheen 14.5-15' bgs	
	78	0.8		
		21.3		
		34.8		
5		-		
		-		
	42	-		SW/GW
		1.1		
		0.8		
10		-		
		-		
	60	28.2		
		5.8		
		255.9		
15		5.8	(15-20') SAND, fine to medium with trace coarse, medium dense, grayish brown, wet, non-plastic, non-cohesive, trace sheen 15-17' bgs	
		6.9		
	100	6.8		SW
		2.3		
		12.9		
20			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0.45'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.40'
Riser Amount: 9.89'

Bentonite Seal: 3'8" chips
Top: 1' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 12' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 10.29' bgs

2-5' prepack with #2 Sand:
Top: 10.29' bgs
Bottom: 20.29' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.29' bgs
Bottom: 20.29' 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: 05/08/2019
Purged Amount: 3.00 gallons
Well Volumes Removed: 7.50

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ARM Group Inc.
Engineers and Scientists

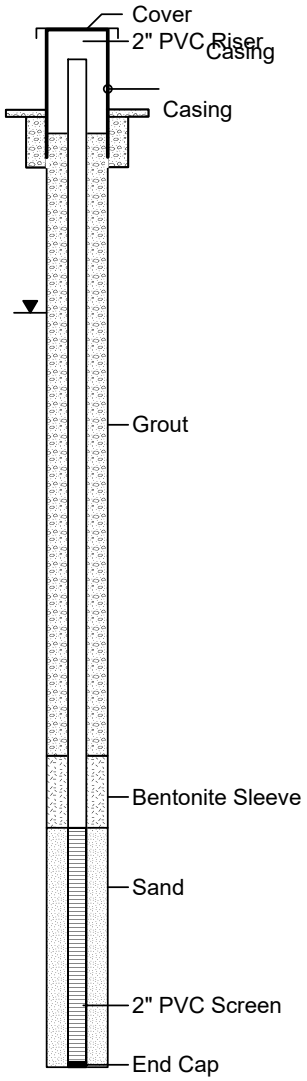
Well ID: RWP-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572456.91
Easting (ft)	: 1456719.41
Date/Time Started	: 4/17/19 0910
Date/Time Completed	: 4/17/19 1115
Surf. Elev. (ft AMSL)	: 10.25'
TOC Elev. (ft AMSL)	: 12.55'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 11.33' TOC
Depth to Water (ft)	: Static: 11.24' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	40	- - - 0.4 0.1	(0-12.5') Non-native SAND and SLAG/BRICK, SAND and GRAVEL-sized, dense, very dark brown, dry then wet at 8.7' bgs, non-plastic, non-cohesive	SW/GW
5	26	- - - 0.5 0.0		
10	64	- - 0.1 0.1 0.1	(12.5-13') SANDY SILT, firm, dark gray, very moist, low plasticity, cohesive	ML
15	64	- 0.0 0.0 0.0 0.0	(13-18.5') SAND, fine to medium, brownish gray, wet, non-plastic, non-cohesive	SW
20	100	0.0 0.0 0.0 0.0 0.0	(18.5-22.6') CLAY, firm, light brown, moist, low plasticity, cohesive	CL
25	94	0.0 0.0 0.1 0.1 0.9 0.5 0.1	(22.6-23.6') SAND, very fine to medium, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SW
				CL
			(23.6-25') CLAY with trace SAND, firm, light gray and reddish yellow, moist, low plasticity, cohesive	SW/GP
				CL
30	100	0.1 0.4 0.1 0.1 0.1	(25-27.5') SAND, very fine to coarse, with GRAVEL, fine, at depth, reddish yellow, wet, non-plastic, non-cohesive	CL
			(27.5-30') CLAY with trace SAND, soft to firm, light gray and reddish yellow, moist, low plasticity, cohesive	
35	100	0.1 0.1 0.1 0.1 0.2	(30-35') SANDY CLAY grading to CLAY with trace SAND at depth, soft to very firm, gray and reddish yellow, very moist to moist, low plasticity, cohesive	CL
				SC
40			(35-36') SANDY CLAY, very firm, yellowish red and grayish brown, moist, low plasticity, cohesive	CL
45			(36-38.8') CLAYEY SAND, medium dense, yellowish red and light grayish brown, wet, non-plastic, non-cohesive	
50			(38.8-40') SANDY CLAY, very firm, yellowish red and grayish brown, moist, low plasticity, cohesive	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.15'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.54'
Riser Amount: 27'

Wet at 8.5' bgs

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 27' bgs

Bentonite Seal: 1-3' sleeve
Top: 27' bgs
Bottom: 30' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 30' bgs
Bottom: 40' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 30' bgs
Bottom: 40' 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: 04/30/2019
Purged Amount: 5.00 gallons
Well Volumes Removed: 4.10

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ARM Group Inc.
Engineers and Scientists

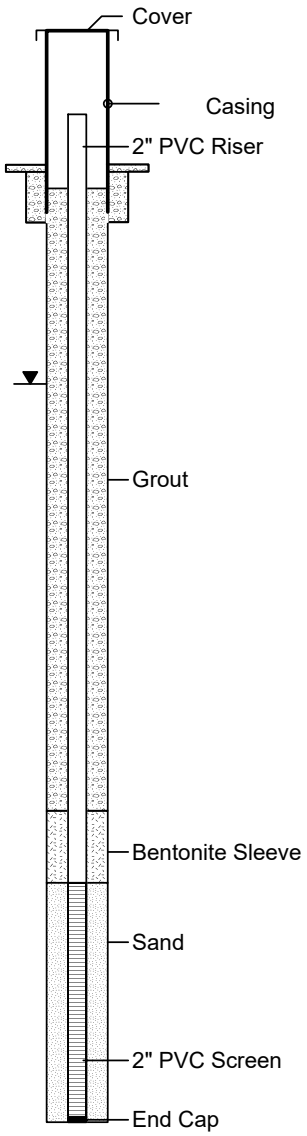
Well ID: RWQ-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572458.02
Easting (ft)	: 1456935.48
Date/Time Started	: 4/18/19 0810
Date/Time Completed	: 4/18/19 1010
Surf. Elev. (ft AMSL)	: 13.42'
TOC Elev. (ft AMSL)	: 15.63'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 14.90' TOC
Depth to Water (ft)	: Static: 14.16' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	92	0.0 0.0 0.0 0.0 0.0	(0-5') CLAY with SAND and trace SLAG GRAVEL, hard, reddish yellow and light brown with some light gray, dry, low plasticity, cohesive	CL
5	74	- 0.0 0.0 0.0 0.0	(5-7.5') Non-native SAND and SLAG, SAND and GRAVEL-sized, loose to medium dense, very dark brown, dry to very moist, non-plastic, non-cohesive	SW/GW
				CL
10	100	0.0 0.0 0.0 0.0 0.0	(7.5-10.5') SANDY CLAY, firm, reddish yellow, very moist, then wet at 8.5' bgs, low plasticity, cohesivesmall wet sand layer at 8.5' bgs	SC
				CL
15	100	0.0 0.0 0.0 0.0 0.0	(10.5-11') CLAYEY SAND, medium dense, reddish yellow, wet, non-plastic, non-cohesive	CL
			(11-15.1') SANDY CLAY, firm, reddish yellow, wet, low plasticity, cohesive	
20	100	0.0 0.0 0.0 0.0 0.0	(15.1-19') CLAY with some SAND at depth, firm to very firm, light gray, moist, low plasticity, cohesive	SW
				CL
25	100	0.0 0.0 0.0 0.1 0.0	(19-21.5') SAND, fine to coarse, yellowish red, wet, non-plastic, non-cohesive	
			(21.5-27.2') CLAY, soft to very firm, brown, moist, low plasticity, cohesive	
30	100	0.0 0.0 0.0 0.0 0.0	(27.2-27.9') SAND, very fine to coarse, grayish brown, wet, non-plastic, non-cohesive	SW
				CL
35	100	0.0 0.0 0.0 0.0 0.0	(27.9-32.2') CLAY, firm to very firm, brownish gray, moist, low plasticity, cohesive	SW
			(32.2-34.2') SAND, very fine to coarse, medium dense, light grayish brown, wet, non-plastic, non-cohesive	CL
				SC
			(34.2-35.6') SANDY CLAY, firm, light brownish gray, moist, low plasticity, cohesive	CL
40			(35.6-37') CLAYEY SAND, loose to medium dense, reddish yellow and yellowish red, wet, non-plastic, non-cohesive	
45			(37-40') CLAY with SAND, soft to firm, light brownish gray with reddish yellow mottling, moist to very moist, low plasticity, cohesive	
50			End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.06'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.53'
Riser Amount: 27'

Wet at 8.5' bgs

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 27' bgs

Bentonite Seal: 1-3' sleeve
Top: 27' bgs
Bottom: 30' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 30' bgs
Bottom: 40' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 30' bgs
Bottom: 40' 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: 04/22/2019
Purged Amount: 4.50 gallons
Well Volumes Removed: 4.05

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ARM Group Inc.
Engineers and Scientists

Well ID: RWQ-MWS

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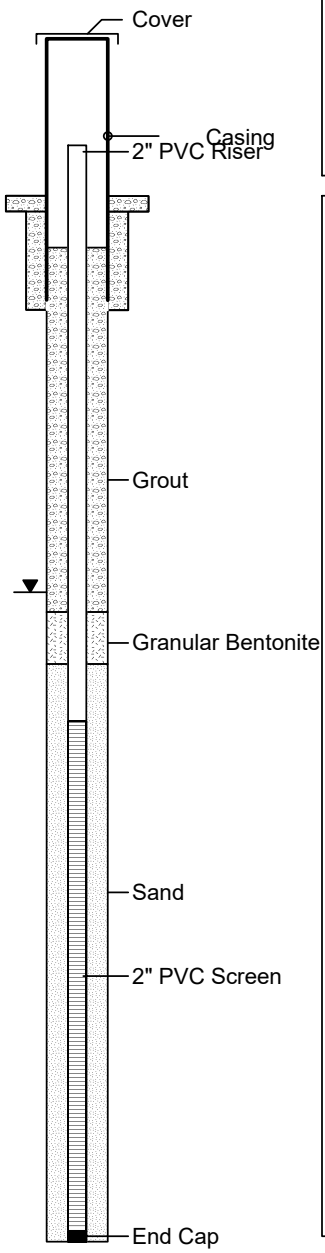
Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572458.02
Easting (ft)	: 1456935.48
Date/Time Started	: 4/17/19 1415
Date/Time Completed	: 4/17/19 1515
Surf. Elev. (ft AMSL)	: 13.42'
TOC Elev. (ft AMSL)	: 15.63'
Total Well Depth (ft)	: 20.10' bgs
Depth to Water (ft)	: 0 Hr: 11.53' TOC
Depth to Water (ft)	: Static: 10.37' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	86	0.1 0.6 0.8 1.2 2.1	(0-4.9') CLAY with SAND and trace ORGANICS, hard, brown grading to light brown, dry, low plasticity, cohesive	CL
5	76	- 1.8 0.2	(4.9-7.7') Non-native SAND and SLAG, SAND and GRAVEL-sized, dense, very dark brown, dry, non-plastic, non-cohesive	SW/GW
		0.1	(7.7-8.8') SAND with CLAY, dense, reddish yellow, wet, non-plastic, non-cohesive	SW-SC
		0.1	(8.8-9.8') CLAYEY SAND, dense, reddish yellow and pale brown, wet, non-plastic, non-cohesive	SC
10	82	- 0.1	(9.8-11.8') SAND, fine to medium, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SW
		0.4	(11.8-12.5') CLAYEY SAND, medium dense, reddish yellow and light gray, wet, non-plastic, non-cohesive	SC
		0.1 0.1 0.2 0.2	(12.5-18.5') CLAY with trace SAND, light gray and reddish yellow, moist, non-plastic, non-cohesive	CL
15	84	0.2		
		0.2	(18.5-19.2') SANDY CLAY, firm, light gray and pale brown, moist, low plasticity, cohesive	CL
		0.3		SW
20			(19.2-20') SAND, fine to coarse, medium dense, yellowish red with black streaks, wet, non-plastic, non-cohesive	
			End of boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.05'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.84'
Riser Amount: 10.10'

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 7.7' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 10.10' bgs

2-5' prepack with #2 Sand:
Top: 10.10' bgs
Bottom: 20.10' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.10' bgs
Bottom: 20.10' 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: 04/22/2019
Purged Amount: 4.50 gallons
Well Volumes Removed: 9.00

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ARM Group Inc.
Engineers and Scientists

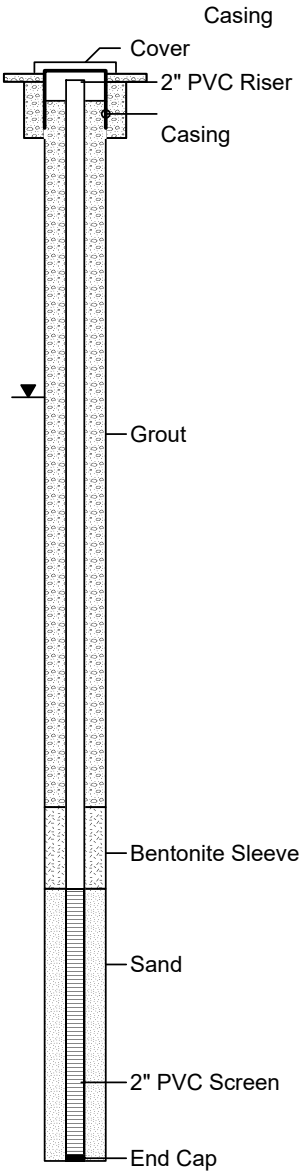
Well ID: RWR-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 571982.52
Easting (ft)	: 1456768.65
Date/Time Started	: 4/25/19 1125
Date/Time Completed	: 4/25/19 1400
Surf. Elev. (ft AMSL)	: 13.99'
TOC Elev. (ft AMSL)	: 13.61'
Total Well Depth (ft)	: 40' bgs
Depth to Water (ft)	: 0 Hr: 11.98' TOC
Depth to Water (ft)	: Static: 11.66' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		0.2	(0-2.3') CLAY with SAND near surface, hard, brown, moist, low plasticity, cohesive, trace ORGANICS	CL
	90	0.6		
		0.2		
		0.2	(2.3-5.8') Non-native SAND with SLAG, SAND and GRAVEL-sized, dense to medium dense, dark brown, brown, and gray, dry, non-plastic, non-cohesive	SW/GW
5		0.2		
		1.2		
		9.3		
	100	6.9	(5.8-16.6') CLAY, hard grading to soft, reddish yellow and light gray then light gray 14-16.6' bgs, dry then moist at 14' bgs, low plasticity, cohesive	CL
		2.3		
		0.4		
10		0.0		
		0.3		
	100	0.6		
		0.3		
		0.1		
15		0.0		
		0.0		
	86	0.0	(16.6-17.5') CLAYEY SAND, medium dense, light gray and reddish yellow, wet, non-plastic, non-cohesive	SC
		0.0		
		0.0	(17.5-22.4') SAND, very fine to medium, medium dense to dense, reddish yellow then dark grayish brown, wet, non-plastic, non-cohesive	SW
20		-		
		0.0		
	78	0.0		
		0.0		
		0.0	(22.4-28') CLAY, very firm, dark brown to brown, moist, medium plasticity, cohesive	CL
25		0.1		
		0.0		
	100	0.0		
		0.0		
		0.0	(28-28.5') SAND, very fine to medium, medium dense, brownish gray, wet, non-plastic, non-cohesive	SW
		0.0		
30		-		CL
		0.6	(28.5-32.4') CLAY, hard grading to soft, dark brown to brown, moist, low plasticity, cohesive	
	100	0.0		
		0.0		
		0.7	(32.4-38.8') SAND, medium to very coarse, with trace GRAVEL, fine, medium dense, very pale brown, wet, non-plastic, non-cohesive	SW
35		0.0		
		0.0		
	100	0.0		
		0.0		
		0.0		
40		0.0	(38.8-40') CLAY with SAND, firm to very firm, brownish gray, moist, low plasticity, cohesive	CL
			End of Boring	



COMPLETION DETAILS

6" Protective Steel Casing with Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.35'
Riser Amount: 26.62'

Wet at 16.6' bgs

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 26.97' bgs

Bentonite Seal: 1-3' sleeve
Top: 26.97' bgs
Bottom: 29.97' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 29.97' bgs
Bottom: 39.97' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 29.97' bgs
Bottom: 39.97' 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: 05/08/2019
Purged Amount: 5.00 gallons
Well Volumes Removed: 4.46

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ARM Group Inc.
Engineers and Scientists

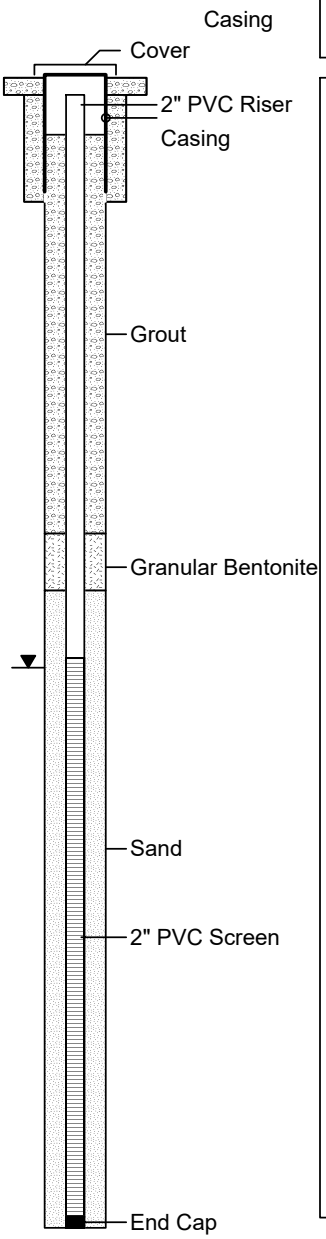
Well ID: RWR-MWS

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Don Marchese
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 571986.20
Easting (ft)	: 1456769.23
Date/Time Started	: 4/25/19 1411
Date/Time Completed	: 4/25/19 1545
Surf. Elev. (ft AMSL)	: 14.07'
TOC Elev. (ft AMSL)	: 13.68'
Total Well Depth (ft)	: 20.18' bgs
Depth to Water (ft)	: 0 Hr: 10.48' TOC
Depth to Water (ft)	: Static: 10.05' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		0.2	(0-0.9') CLAY with SAND, hard, brown and dark brown, dry, low plasticity, cohesive	CL
		0.7	(0.9-7.5') Non-native SAND with SLAG, SAND and GRAVEL-sized, medium dense to dense, dark brown and brown, dry, non-plastic, non-cohesive	SW/GW
	92	0.6		
		0.6		
		0.3		
5		0.0		
		0.0		
	100	0.1		
		2.0	(7.5-17.4') CLAY, hard grading to soft, yellowish red and pale brown then light gray at 15' bgs, dry grading to very moist, low plasticity, cohesive	CL
		1.8		
10		-		
		4.3		
	82	3.3		
		0.0		
		0.0		
15		0.0		
		0.0		
	86	0.0		
		0.0	(17.4-17.8') CLAYEY SAND, medium dense, yellowish red and pale brown, wet, non-plastic, non-cohesive	SC
		0.0	(17.8-20') SAND, medium dense, reddish yellow, wet, non-plastic, non-cohesive	SW
20			End of boring	



COMPLETION DETAILS

6" Protective Steel Casing with
Locking Flush Mount Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 0'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (bgs): 0.32'
Riser Amount: 9.86'

Grout: Portland w/ 5% Bentonite
Top: 1' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 17.4' bgs

Filter Pack: #2 sand
Top: 9' bgs
Bottom: 10.18' bgs

2-5' prepack with #2 Sand:
Top: 10.18' bgs
Bottom: 20.18' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.18' bgs
Bottom: 20.18' 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: 05/08/2019
Purged Amount: 5.00 gallons
Well Volumes Removed: 12.82

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ARM Group Inc.
Engineers and Scientists

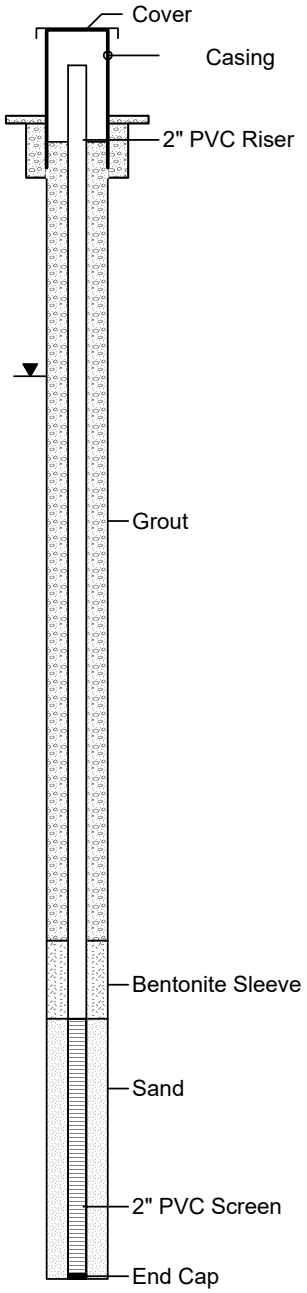
Well ID: RWS-MWI

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572074.85
Easting (ft)	: 1457037.25
Date/Time Started	: 4/18/19 1217
Date/Time Completed	: 4/18/19 1437
Surf. Elev. (ft AMSL)	: 11.89'
TOC Elev. (ft AMSL)	: 14.30'
Total Well Depth (ft)	: 45' bgs
Depth to Water (ft)	: 0 Hr: 13.33' TOC
Depth to Water (ft)	: Static: 12.76' TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0	94	0.2, 0.4, 0.2, 0.0, 0.0	(0-0.5') SILT with ORGANICS, soft, dark brown, dry, non-plastic, non-cohesive	ML
			(0.5-6') Non-native SAND with SLAG, SAND and GRAVEL-sized, dense, dark brown, dry, non-plastic, non-cohesive	SW/GW
5	78	-, 0.0, 0.0, 0.0, 0.0	(6-15') CLAY grading to CLAY with SAND, soft the firm to very firm, light gray then light brownish gray with some reddish yellow mottling, very moist the dry to moist from 7.5-15' bgs, low plasticity, cohesive, WOOD FRAGMENTS from 6.5-7.5' bgs	CL
10	74	-, 0.0, 0.0, 0.0, 0.0		
15	66	-, -, -, 0.0, 0.0	(15-20') SAND, very fine to medium, medium dense, pale brown grading to reddish yellow, wet, non-plastic, cohesive	SW
20	100	0.0, 0.0, 0.0, 0.0, 0.0	(20-28.5') CLAY, soft, reddish brown grading to brown, very moist, low plasticity, cohesive	CL
25	100	0.0, 0.0, 0.0, 0.0, 0.0		
30	100	0.0, 0.0, 0.0, 0.0, 0.0	(28.5-29') SAND, fine to medium, dark gray, wet, non-plastic, non-cohesive	SW
			(29-40') CLAY, soft grading to very firm, brownish gray grading to bluish gray, very moist to moist, low plasticity, cohesive	CL
35	100	0.0, 0.0, 0.0, 0.0, 0.0		
40	62	-, -, 0.0, 0.0, 0.0	(40-45') SAND, fine to medium, medium dense, light gray, wet, non-plastic, non-cohesive	SW
45			End of Boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.10'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.65'
Riser Amount: 31.71'
Wet at 3.7' bgs

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 31.71' bgs

Bentonite Seal: 1-3' sleeve
Top: 31.71' bgs
Bottom: 34.71' bgs

Filter Pack: 2-5' prepack with #2 Sand
Top: 34.71' bgs
Bottom: 44.71' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 34.71' bgs
Bottom: 44.71' 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: 04/22/2019
Purged Amount: 5.25 gallons
Well Volumes Removed: 3.83

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ARM Group Inc.
Engineers and Scientists

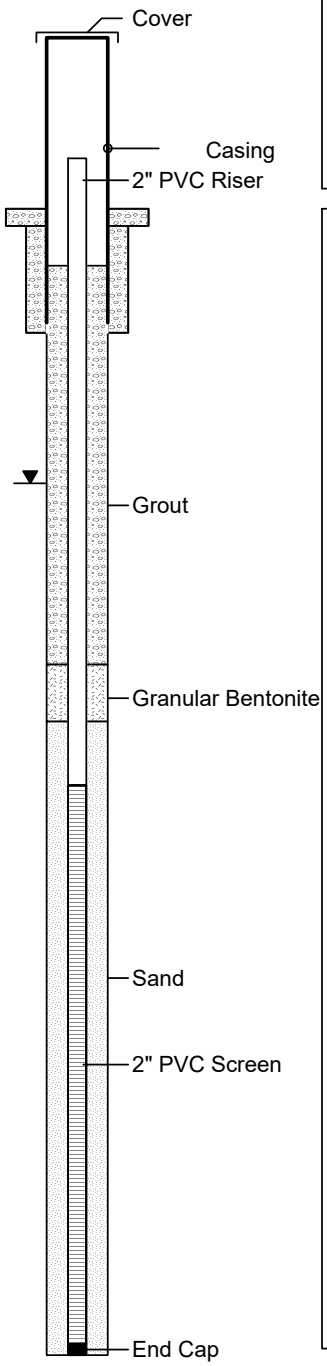
Well ID: RWS-MWS

(page 1 of 1)

Project Name	: RWM Onshore Supp. Inv.
Project Number	: 190341M-2
Client	: EnviroAnalytics Group
Site	: Sparrow's Point
Borehole Location	: Parcel A3
ARM Representative	: L. Perrin
Checked by	: M. Replogle, EIT
Drilling Company	: GSI, Inc.
Driller	: Kevin Pumphrey
Drilling Equipment	: Geoprobe 7822DT

Northing (ft)	: 572077.73
Easting (ft)	: 1457037.46
Date/Time Started	: 4/18/19 1030
Date/Time Completed	: 4/18/19
Surf. Elev. (ft AMSL)	: 12.21'
TOC Elev. (ft AMSL)	: 14.65'
Total Well Depth (ft)	: 20.12' bgs
Depth to Water (ft)	: 0 Hr: 7.47' TOC
Depth to Water (ft)	: Static: 7.57 'TOC
Bit/Auger Size (in.)	: 3.50"

Depth (ft.)	%Recovery	PID (ppm)	DESCRIPTION	USCS
0		0.0	(0-0.8') SANDY SILT with ORGANICS, dark brown, moist, non-plastic, non-cohesive	ML
		0.0	(0.8-6') Non-native SAND and SLAG/BRICK, SAND and GRAVEL-sized, dense, very dark brown and red, dry then wet at 5.5' bgs, non-plastic, non-cohesive	SW/GW
	90	0.0		
		0.0		
		0.0		
5		-		
		0.0	(6-12.5') CLAYEY SAND grading to SAND, very fine to medium, medium dense, pale brown, wet, non-plastic, non-cohesive	SC/SW
	90	0.0		
		0.0		
		0.0		
10		-		
		0.0		
	86	0.0	(12.5-15') CLAY with SAND, firm, light brownish gray, moist, low plasticity, cohesive	CL
		0.0		
		0.0		
15		-	(15-20') SAND with CLAY grading to SAND, medium dense, light brownish gray grading to reddish yellow, wet, non-plastic, non-cohesive	SW-SC
		0.0		
	81	0.0		
		0.0		
		0.0		
20			End of boring	



COMPLETION DETAILS

4" Protective Steel Casing with Locking Lid
1.5x1.5' concrete pad
1" expandable-type cap
Casing Stickup (ags): 3.02'

Riser: Sch 40 PVC
Riser Diameter: 1 in
Riser Stickup (ags): 2.75'
Riser Amount: 10.12'

Grout: Portland w/ 5% Bentonite
Top: 0' bgs
Bottom: 8' bgs

Bentonite Seal: Granular
Top: 8' bgs
Bottom: 9' bgs

Wet at 6' bgs

Filter Pack: #2 Sand
Top: 9' bgs
Bottom: 10.12' bgs

2-5' prepack with #2 Sand:
Top: 10.12' bgs
Bottom: 20.12' bgs

Screen: Sch 40 PVC
Screen Diameter: 1 in
Slot Size: 0.010"
Top: 10.12' bgs
Bottom: 20.12' 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: 04/22/2019
Purged Amount: 5.00 gallons
Well Volumes Removed: 8.20

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ARM Group Inc.
Engineers and Scientists

Boring ID: RWU-SB

(page 1 of 1)

Client	: EnviroAnalytics Group
ARM Project No.	: 190341M-2
Project Description	: RWM Onshore Supp. Inv.
Site Location	: Sparrows Point, MD
ARM Representative	: L. Perrin
Checked by	: M. Replogle E.I.T.
Drilling Company	: GSI, Inc.
Driller	: Don Marchese
Drilling Equipment	: Geoprobe 7822DT

Date	: 04/30/2019
Weather	: 60s, Cloudy
Northing (US ft)	: 572151.09
Easting (US ft)	: 1456563.52

Depth (ft.)	% Recovery	PID Reading (PPM)	Sample ID/Interval	DESCRIPTION	USCS	REMARKS
0						
	100	0.1	Composite	(0-0.5') ASPHALT	NA	Wet at 12.8' bgs
		4.4		(0.5-8') Non-native SAND and SLAG, SAND and GRAVEL-sized, with SILT, dense, dark brown with gray, dry, non-plastic, non-cohesive	SW/GW	
		5.5				
		0.6				
		0.4				
5		-				
		-				
	60	2.3				
		0.6		(8-8.5') LIMESTONE GRAVEL, coarse, medium dense, white, dry, non-plastic, non-cohesive	GP	
		3.9		(8.5-10.3') SLAG GRAVEL, coarse, with some non-native SAND, loose to medium dense, brown and gray, moist, non-plastic, non-cohesive	GP	
10		0.0				
		0.0		(10.3-23') LIMESTONE GRAVEL with non-native SILT, medium dense to dense, white and light reddish brown, with grayish brown 12-12.8' bgs, moist then wet at 12.8' bgs, non-plastic, non-cohesive	GP/ML	
	100	0.0				
		0.0				
		0.0				
15		0.0				
		0.0				
		0.0				
	100	0.0				
		0.0				
		0.0				
20		0.0				
		0.0				
		0.0				
	90	0.0				
		0.0		(23-23.4') CLAYEY SAND, medium dense, brownish gray, wet, non-plastic, non-cohesive	SC	
		0.0		(23.4-25') CLAY, very firm, brownish gray, moist, low plasticity, cohesive	CL	
25				End of Boring		

Total Borehole Depth: 25' bgs.
Boring terminated at 25' bgs due to water and work plan.

APPENDIX B

Well Development Logs

ARM Group Inc.

Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: RWOSR - MW1 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 5-1-19 / 0852	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 5-1-19 / 1003	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 50's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 33 to 43
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+ / -) 2.83	Measured Total Depth of Well When Installed (TOC) (F): ____ ft. (See Original Well Construction Diagram) 42.54

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1.0 0.04 gal/ft	Total Well Depth (TOC): 42.57 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 12.21 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) _____ ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Well Volume: (A x D) _____ gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	39.67 - 43	10	2.5		greyish brown
2	36.33 - 39.67	10	2.0		grey
3	33 - 36.33	10	2.0		grey
	Cumulative Totals: (Minimum of 3 Well Volumes)		6.5		

Final Depth to Water (from TOC): 12.49 Final Total Well Depth (from TOC): 42.57

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: RW21-MW1 **Well Permit No.:** _____ Page 1 of 2

ARM Project No.: 190341M	Date/Time Started: 4-30-19 / 0729	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-30-19 / 0858	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 50's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 30 to 40
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 0.25	Measured Total Depth of Well When Installed (TOC) (F): ____ ft. (See Original Well Construction Diagram) 40.04

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1.0 0.04 gal/Ft	Total Well Depth (TOC): 40.14 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 13.00 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 27.14 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Well Volume: (A x D) 1.09 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	36.67-40	10	1.5		greyish brown
2	33.33-36.67	10	1.5		greyish brown
3	30-33.33	10	1.5		
	Cumulative Totals: (Minimum of 3 Well Volumes)		4.5		

Final Depth to Water (from TOC): 17.42 Final Total Well Depth (from TOC): 40.28

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: RW22R - MWI **Well Permit No.:** _____

ARM Project No.: 19034/M	Date/Time Started: 4-18-19 / 0715	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-18-19 / 0907	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 50°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 32 to 42
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 2.92	Measured Total Depth of Well When Installed (TOC) (F): ____ ft. (See Original Well Construction Diagram) 42.72

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 41.98 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 15.97 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 26.01 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.74 ft.	Wetted Well Volume: (A x D) 1.04 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	38.67 - 42	10	1.5		grey
2	35.33 - 38.67	10	1.0		grey
3	32 - 35.33	10	1.0		grey
	Cumulative Totals: (Minimum of 3 Well Volumes)		3.5		

Final Depth to Water (from TOC): 29.58 Final Total Well Depth (from TOC): 42.77

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: RW 22R - MWS **Well Permit No.:** _____

ARM Project No.: 190341 M	Date/Time Started: 4-17-19 / 1426	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-17-19 / 1510	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 65°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 13 to 23
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 2.7	Measured Total Depth of Well When Installed (TOC) (F): ____ft. (See Original Well Construction Diagram) 22.95

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 22.96 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 15.61 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 7.35 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Well Volume: (A x D) 0.29 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: _____

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	19.67 - 23	10	1.0		brown
2	16.33 - 19.67	10	0.75		brown
3	13 - 16.33	10	1.0		brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		2.75		

Final Depth to Water (from TOC): 15.62 Final Total Well Depth (from TOC): 22.99

Thickness of Any Sediment Remaining in Well: 0.0

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: RW23-MW1 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 4/16/19 / 0953	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4/16/19 / 1126	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 50°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 30 to 40
Well riser/screen material: *PVC*	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) 40.04

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 39.93 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 14.00 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 25.93 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.11 ft.	Wetted Well Volume: (A x D) 1.04 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: _____

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	36.67 - 40	10	3.5		brown
2	33.33 - 36.67	10	2.25		brown
3	30 - 33.33	10	3.5		light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		9.25		

Final Depth to Water (from TOC): 14.20 Final Total Well Depth (from TOC): 39.92

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: RW23-MW5 **Well Permit No.:** _____

ARM Project No.: 190341.01	Date/Time Started: 4/16/19 / 0840	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4/16/19 / 0953	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Partly cloudy 50°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 10 to 20
Well riser/screen material: *PVC*	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) 20.00

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 20.01 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 9.74 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 10.27 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Well Volume: (A x D) 0.41 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	16.67 - 20	10	1.5		brown - light brown
2	13.33 - 16.67	10	0.75		brown - light brown
3	10 - 13.33	10	0.75		brown - light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		3.0		

Final Depth to Water (from TOC): 18.61 Final Total Well Depth (from TOC): 20.01

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: RW24 - MW1 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 4-18-19 / 1099	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-18-19 / 1101	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 60°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 30 to 40
Well riser/screen material: *PVC*	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) 39.94

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 39.89 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 11.04 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 28.85 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.05 ft.	Wetted Well Volume: (A x D) 1.15 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	36.67 - 40	10	1.75		brown
2	33.33 - 36.67	10	1.75		brown
3	30 - 33.33	10	1.50		light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		5.0		

Final Depth to Water (from TOC): 12.62 Final Total Well Depth (from TOC): 39.89

Thickness of Any Sediment Remaining in Well: 0.05

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: RW24-MW5 **Well Permit No.:** _____

ARM Project No.: 190341 M	Date/Time Started: 4-18-19 / 0915	Developed by: JCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-18-19 / 1000	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 60°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 10 to 20
Well riser/screen material: *PVC*	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) 20.14

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 19.91 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 8.78 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 11.13 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.23 ft.	Wetted Well Volume: (A x D) 0.45 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	16.67 - 20	10	1.0		brown
2	13.33 - 16.67	10	1.0		light brown
3	10 - 13.33	10	1.0		light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		3.0		

Final Depth to Water (from TOC): 8.81 Final Total Well Depth (from TOC): 19.91

Thickness of Any Sediment Remaining in Well: 0.23

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: RW25-MW1 **Well Permit No.:** _____

ARM Project No.: 190341 M	Date/Time Started: 4-18-19 / 1212	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-19-19 / 1356	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 70°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 30 to 40
Well riser/screen material: *PVC*	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) 39.91

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 39.84 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 10.62 ft. (C)
Petroleum/Product Present? *Y* or (*N*). Thickness (ft.): _____	Height of Water Column: (B - C) 29.22 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.07 ft.	Wetted Well Volume: (A x D) 1.17 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	36.67-40	10	2.75		light reddish brown
2	33.33-36.67	10	2.25		light reddish brown
3	30-33.33	10	2.5		yellowish brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		7.5		

Final Depth to Water (from TOC): 10.98 Final Total Well Depth (from TOC): 39.88

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

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: RW25 - MWS **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 4-18-19 / 1107	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-18-19 / 1212	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 70°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 10 to 20
Well riser/screen material: *PVC*	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) 20.28

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 19.39 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 8.38 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 11.01 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.89 ft.	Wetted Well Volume: (A x D) 0.44 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	16.67 - 20	10	2.5		light brown
2	13.33 - 16.67	10	2.0		light brown
3	10 - 13.37	10	1.5		yellowish light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		6.0		

Final Depth to Water (from TOC): 9.25 Final Total Well Depth (from TOC): 20.08

Thickness of Any Sediment Remaining in Well: _____

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: RWA-MW1 **Well Permit No.:** _____

ARM Project No.: 190311 M	Date/Time Started: 4-17-19 / 1328	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-17-19 / 1411	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 65°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 18 to 23
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (⊕/-) 3.09'	Measured Total Depth of Well When Installed (TOC) (F): ____ft. (See Original Well Construction Diagram) 23.14

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 22.75 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 9.93 ft. (C)
Petroleum/Product Present? *Y* or (*N*.) Thickness (ft.): _____	Height of Water Column: (B - C) 12.82 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.39 ft.	Wetted Well Volume: (A x D) 0.51 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: _____

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	20.5 - 23	10	1.0		brown
2	16 - 20.5	10	1.0		light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		2.0		

Final Depth to Water (from TOC): 17.09 Final Total Well Depth (from TOC): 23.17

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: RWA - MW5 **Well Permit No.:** _____

ARM Project No.: 19034IM	Date/Time Started: 4-17-19 / 1258	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-17-19 / 1328	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 65°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 11 to 16
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: ((+) / -) 3.18'	Measured Total Depth of Well When Installed (TOC) (F): ____ ft. (See Original Well Construction Diagram) 16.90

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 16.96 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 9.75 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 7.21 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Well Volume: (A x D) 0.29 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	13.5 - 16	10	1.0		greyish brown
2	11 - 13.5	10	1.25		greyish brown
Cumulative Totals: (Minimum of 3 Well Volumes)			2.25		

Final Depth to Water (from TOC): 9.74 Final Total Well Depth (from TOC): 16.96

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: RWB-MW1 **Well Permit No.:** _____

ARM Project No.: ~~150-~~ 19034/M	Date/Time Started: 4-19-19 / 0913	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-19-19 / 1058	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: cloudy 65°	Checked by:

A. Well Construction Details

Well Cover Type: (*Stick-up*) or *Flush-Mount*	PVC Screen Interval: 32 to 42
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: ((+) / -) 2.95	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 42.35

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 42.39 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 18.14 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 24.25 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Bore Volume: (A x D) 0.97 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: _____

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	38.67 - 42	10	1.75		dark grey
2	35.33 - 38.67	10	1.0		grey
3	32 - 35.33	10	1.25		grey
	Cumulative Totals: (Minimum of 3 Well Volumes)		4.0		

Final Depth to Water (from TOC): 27.75 Final well depth: 42.39

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: RwB - MW5 **Well Permit No.:** _____

ARM Project No.: ~~150~~ 190341M	Date/Time Started: 4-19-19 / 0800	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-19-19 / 0913	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 60°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 13 to 23
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+)/(-) 2.76	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 23.30

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 23.35 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 18.76 ft. (C)
Petroleum/Product Present? Y or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 4.59 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Bore Volume: (A x D) 0.18 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	19.67 - 23	10	0.75		dark grey
2	16.33 - 19.67	10	0.25		grey
3	13 - 16.33	10	0.25		light grey
Cumulative Totals: (Minimum of 3 Well Volumes)			1.25		

Final Depth to Water (from TOC): 23.31 Final well depth: 23.35

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: RWD-MW1 **Well Permit No.:** _____

ARM Project No.: 190341	Date/Time Started: 5-1-19 / 1119	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 5-1-19 / 1239	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 60's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 33 to 43
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 2.55	Measured Total Depth of Well When Installed (TOC) (F): ____ ft. (See Original Well Construction Diagram) 42.57

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1.0 0.04 gal/ft	Total Well Depth (TOC): 42.59 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 14.16 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 28.43 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Well Volume: (A x D) 1.14 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	39.67 - 43	10	3.0		greyish brown
2	36.33 - 39.67	10	3.0		greyish light brown
3	33 - 36.33	10	3.0		light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		9.0		

Final Depth to Water (from TOC): 14.35 Final Total Well Depth (from TOC): 42.59

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: RWO-MWS **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 5-1-19 / 1010	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 5-1-19 / 1119	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 60's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 12 to 22
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 2.60	Measured Total Depth of Well When Installed (TOC) (F): ____ ft. (See Original Well Construction Diagram) 22.15

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1.0 0.04 gal/ft	Total Well Depth (TOC): 22.17 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 12.52 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 9.65 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Well Volume: (A x D) 0.39 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	18.67 - 22	10	1.25		light brown
2	15.33 - 18.67	10	0.5		light brown
3	12 - 15.33	10	0.25		light brown
		Cumulative Totals: (Minimum of 3 Well Volumes)	2.0		

Final Depth to Water (from TOC): 21.15 Final Total Well Depth (from TOC): 22.17

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: RWE-MW1 **Well Permit No.:** _____

ARM Project No.: 19034IM	Date/Time Started: 5-1-19 / 0738	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 5-1-19 / 0848	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 50's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 33 to 43
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 2.56	Measured Total Depth of Well When Installed (TOC) (F): ___ ft. (See Original Well Construction Diagram) 42.54

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1.0 0.04 gal/ft	Total Well Depth (TOC): 42.57 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 12.97 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 29.60 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Well Volume: (A x D) 1.18 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	39.67-43	10	2.0		dark brown
2	36.33-39.67	10	2.0		dark brown
3	33-36.33	10	2.0		dark brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		6.0		

Final Depth to Water (from TOC): 13.35 Final Total Well Depth (from TOC): 42.57

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: RwE-MW5 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 4-30-19 / 1437	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-30-19 / 1535	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 70's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 12 to 22
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+ / -) 2.54	Measured Total Depth of Well When Installed (TOC) (F): ____ ft. (See Original Well Construction Diagram) 22.49

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1.0 0.04 gal/ft	Total Well Depth (TOC): 22.51 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 12.77 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 9.74 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Well Volume: (A x D) 0.39 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	19.67-22	10	1.25		grey
2	15.33-19.67	10	1.5		grey
3	12-15.33	10	1.5		grey
	Cumulative Totals: (Minimum of 3 Well Volumes)		4.25		

Final Depth to Water (from TOC): 12.40 Final Total Well Depth (from TOC): 22.61

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: RWF-MW1 **Well Permit No.:** _____

ARM Project No.: ~~150~~ 19034IM	Date/Time Started: 4-26-19 / 0645	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-26-19 / 1009	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 50's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 32 to 42
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+) / -) 3.13	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 42.55

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 42.57 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 11.03 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 31.55 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Bore Volume: (A x D) 1.26 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	36.67 - 42	10	2.0		grey
2	35.33 - 36.67	10	1.75		grey
3	32 - 35.33	10	1.5		grey
	Cumulative Totals: (Minimum of 3 Well Volumes)		5.25		

Final Depth to Water (from TOC): 11.24 Final well depth: 42.69

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: RWF-MW5 **Well Permit No.:** _____

ARM Project No.: 150-190341M	Date/Time Started: 4-26-19 / 0742	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-26-19 / 0842	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 50's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 13 to 23
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 2.77	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 22.75

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 22.75 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 11.99 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 10.76 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Bore Volume: (A x D) 0.43 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	19.67 - 23	10	1.25		brownish grey
2	16.33 - 19.67	10	1.25		light grey
3	13 - 16.33	10	1.25		light brownish grey
	Cumulative Totals: (Minimum of 3 Well Volumes)		3.75		

Final Depth to Water (from TOC): 11.99 Final well depth: 22.77

Thickness of Any Sediment Remaining in Well: 9.90

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: RWG-MW1 **Well Permit No.:** _____ Page 1 of 2

ARM Project No.: 190341M	Date/Time Started: 4-30-19 / 1145	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-30-19 / 1302	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 70's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 28 to 38
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 2.79	Measured Total Depth of Well When Installed (TOC) (F): ___ ft. (See Original Well Construction Diagram) 37.54

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1.0 0.04 gal/ft	Total Well Depth (TOC): 37.54 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 11.60 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 25.94 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Well Volume: (A x D) 1.04 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	34.67 - 38	10	2.0		greyish brown
2	31.33 - 34.67	10	2.0		greyish brown
3	28 - 31.33	10	2.5		greyish brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		6.5		

Final Depth to Water (from TOC): 11.75 Final Total Well Depth (from TOC): 37.56

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: RWG-MW5 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 4-30-19 / 1041	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-30-19 / 1145	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 60's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 13 to 23
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+ / -) 2.79	Measured Total Depth of Well When Installed (TOC) (F): ____ ft. (See Original Well Construction Diagram) 22.72

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1.0 0.04 gal/ft	Total Well Depth (TOC): 22.72 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 11.70 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 11.02 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Well Volume: (A x D) 0.44 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	19.67 - 23	10	1.5		greyish light brown
2	16.33 - 19.67	10	1.5		light brown
3	13 - 16.33	10	1.5		light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		4.5		

Final Depth to Water (from TOC): 12.11 Final Total Well Depth (from TOC): 22.72

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

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: RWH-MW1 **Well Permit No.:** _____

ARM Project No.: 150 19034 1M	Date/Time Started: 4-26-19 / 1250	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-26-19 / 1428	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 70's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 23 to 33
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+ / (-)) 0.38	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 33.53

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 33.61 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 10.38 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 23.23 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Bore Volume: (A x D) 0.93 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	29.67 - 33	10	3.0		grey
2	26.33 - 29.67	10	2.5		grey
3	23 - 26.33	10	2.5		brownish grey
		Cumulative Totals: (Minimum of 3 Well Volumes)	8.0		

Final Depth to Water (from TOC): 10.98 Final well depth: 33.62

Thickness of Any Sediment Remaining in Well: 0.09

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: RWH-MW5 **Well Permit No.:** _____

ARM Project No.: 150-19934/M	Date/Time Started: 4-26-19 / 1040	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-26-19 / 1130	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Drizzle 60's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 10 to 20
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 0.45	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 20.05

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 20.02 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 10.23 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 9.79 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.03 ft.	Wetted Bore Volume: (A x D) 0.39 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	16.67-20	10	1.25		brown
2	13.33-16.67	10	1.0		light brown
3	10-13.33	10	1.0		light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		3.25		

Final Depth to Water (from TOC): 10.39 Final well depth: 20.05

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: RWI-MWI **Well Permit No.:** _____

ARM Project No.: 19034/M	Date/Time Started: 4-12-19 / 1000	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-17-19 / 1123	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 60°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 30 to 40
Well riser/screen material: *PVC*	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) 39.95

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 (0.04 gal/ft)	Total Well Depth (TOC): 39.49 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 11.39 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 28.1 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.36 ft.	Wetted Well Volume: (A x D) 1.12 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	36.67 - 40	10	2.75		brown
2	33.33 - 36.67	10	2.0		brown
3	30 - 33.33	10	2.75		brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		7.5		

Final Depth to Water (from TOC): 12.26 Final Total Well Depth (from TOC): 39.61

Thickness of Any Sediment Remaining in Well: 0.24

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: RWI - MW5 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 4-17-19 / 1123	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-17-19 / 1231	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 60°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 10 to 20
Well riser/screen material: *PVC*	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) 20.00

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 19.68 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 9.18 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 10.50 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.32 ft.	Wetted Well Volume: (A x D) 0.42 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	16.67 -20	10	2.0		dark brown
2	13.33 - 16.67	10	1.5		brown
3	10 - 13.33	10	2.0		brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		5.5		

Final Depth to Water (from TOC): 9.28 Final Total Well Depth (from TOC): 19.85

Thickness of Any Sediment Remaining in Well: 0.15

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: RWJ-MW1 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 5-1-19 / 1305	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 5-1-19 / 1491	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 60's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 30 to 40
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/(-)) 0.3	Measured Total Depth of Well When Installed (TOC) (F): ____ ft. (See Original Well Construction Diagram) 39.93

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1.0 0.04 gal/ft	Total Well Depth (TOC): 39.66 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 13.11 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 26.55 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.27 ft.	Wetted Well Volume: (A x D) 1.06 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	36.67 - 40	10	3.0		brown
2	33.33 - 36.67	10	2.5		yellowish brown
3	30 - 33.33	10	3.0		yellowish brown
		Cumulative Totals: (Minimum of 3 Well Volumes)	8.5		

Final Depth to Water (from TOC): 13.40 Final Total Well Depth (from TOC): 39.67

Thickness of Any Sediment Remaining in Well: 0.26

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: RWJ-MW5 **Well Permit No.:** _____

ARM Project No.: ~~150~~ 19034/M	Date/Time Started: 5-1-19 / 1441	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 5-1-19 / 1527	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 60's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 10 to 20
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 0.49	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 20.60

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 20.16 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 11.50 ft. (C)
Petroleum/Product Present? Y or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 8.66 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.44 ft.	Wetted Bore Volume: (A x D) 0.34 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	16.67-20	10	1.0		light brown
2	13.33-16.67	10	0.5		pale brown/mostly clear
3	10-13.33	10	0.5		pale brown/mostly clear
		Cumulative Totals: (Minimum of 3 Well Volumes)	2.0		

Final Depth to Water (from TOC): 11.56 Final well depth: 20.16

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: RWK-MW1 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 4-16-19 / 1418	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-16-19 / 1548	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 60°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 30 to 40
Well riser/screen material: *PVC*	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) 39.97

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 39.72 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 13.45 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 26.27 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.25 ft.	Wetted Well Volume: (A x D) 1.05 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: _____

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	36.67 - 40	10	2.75		brown
2	33.33 - 36.67	10	1.75		brown
3	30 - 33.33	10	2.0		yellowish brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		6.5		

Final Depth to Water (from TOC): 13.79 Final Total Well Depth (from TOC): 39.77

Thickness of Any Sediment Remaining in Well: 0.20

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: RWK - MW5 **Well Permit No.:** _____

ARM Project No.: 190341 M	Date/Time Started: 4-17-19 / 0721	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-17-19 / 0817	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 55°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 10 to 20
Well riser/screen material: *PVC*	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) 19.84

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 19.41 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 11.38 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 8.03 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.43 ft.	Wetted Well Volume: (A x D) 0.32 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	16.67 - 20	10	1.5		dark yellowish brown
2	13.33 - 16.67	10	0.75		yellowish brown
3	10 - 13.33	10	0.75		yellowish brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		3.0		

Final Depth to Water (from TOC): 13.91 Final Total Well Depth (from TOC): 19.90

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: RWL-MW1 **Well Permit No.:** _____

ARM Project No.: 19034/M	Date/Time Started: 4-16-19 / 1137	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-16-19 / 1319	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Partly cloudy 50°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 30 to 40
Well riser/screen material: *PVC*	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) 39.95

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 39.81 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 13.82 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 25.99 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.14 ft.	Wetted Well Volume: (A x D) 1.04 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: _____

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	36.67 - 40	10	2		brown
2	33.33 - 36.67	10	2.75		yellowish brown
3	30 - 33.33	10	3.25		yellowish brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		8		

Final Depth to Water (from TOC): 14.17 Final Total Well Depth (from TOC): 39.88

Thickness of Any Sediment Remaining in Well: 0.07

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

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Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: RWL-MW5 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 4-16-19 / 1319	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-16-19 / 1418	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 55°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 10 to 20
Well riser/screen material: *PVC*	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) 20.03

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 19.81 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 11.03 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 8.78 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.22 ft.	Wetted Well Volume: (A x D) 0.35 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: _____

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	16.67 - 20	10	1.5		yellowish brown
2	13.33 - 16.67	10	0.5		yellowish brown
3	10 - 13.33	10	0.5		brownish yellow
	Cumulative Totals: (Minimum of 3 Well Volumes)		2.0		

Final Depth to Water (from TOC): 16.32 Final Total Well Depth (from TOC): 19.81

Thickness of Any Sediment Remaining in Well: 0.22

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

0.005543 1 gal / .1343

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1 gal = .134 ft³

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: RWM-MW1 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 4/15/19 / 1145	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4/15/19 / 1212	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Breezy 60°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or (*Flush-Mount*)	PVC Screen Interval: 30 to 40
Well riser/screen material: *PVC*	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) 39.95

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 inch 0.04 gal/ft 1" PVC	Total Well Depth (TOC): 39.79 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 13.62 ft. (C)
Petroleum/Product Present? *Y* or (*N*) Thickness (ft.): _____	Height of Water Column: (B - C) 26.17 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.16 ft.	Wetted Well Volume: (A x D) 1.05 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1 inch 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	36.67-40	10	~2		brownish-yellow
2	33.33-36.67	10	~2		brownish-yellow
3	30-33.33	10	~3.5		brownish-yellow
	Cumulative Totals: (Minimum of 3 Well Volumes)		~7		

Final Depth to Water (from TOC): 13.90 Final Total Well Depth (from TOC): 39.85

Thickness of Any Sediment Remaining in Well: 0.10

1 inch = 0.0833 ft

0.00554² ← Area of circle w/ 1 inch radius

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

SOP No. 018 - Monitoring Well Development Form (Rev 02/01/18)
Sparrows Point

Well ID: _____
Date: _____

ID Numbers of IDW Drums Generated:

1. _____
2. _____
3. _____

D. Checklists

Equipment Check List:

- ☐ Original Well Construction Diagram
- ☐ Well Development Form
- ☐ Clean Weighted Tape for Determining Total Well Depth and Depth to Any Sediment or Possible Blockages Within the Well
- ☐ Water Level Meter and/or Oil-Water Interface Probe
- ☐ Surge Block and appropriate ID PVC Casing Extensions
- ☐ Appropriate Pump
- ☐ Disposable Pump Tubing
- ☐ Clean Paper Towels
- ☐ Alconox Detergent
- ☐ Clean Brushes for Decontamination Work
- ☐ Distilled Water for Rinsing Equipment
- ☐ 2 New, Clean Spray Bottles for Spray Distilled Water
- ☐ 2 to 3 Clean Five-gallon Buckets
- ☐ 55-gallon Drum(s) for Development Water; Drum Non-hazardous Waste Labeling Supplies
- ☐ Personal Protective Equipment Per Health and Safety Plan

Quality Control Procedures Include:

- ☐ Decon All Equipment that Goes Down-hole per Appropriate Standard Operating Procedure (SOP)
- ☐ Staging Down-hole Equipment, Tubing, etc. on Clean Plastic Sheeting
- ☐ _____

E. Notes/Comments

_____

_____

_____

_____

_____

_____

F. Signatures

	Print Name	Signature	Date
Field Representative(s):	Tyler Van Ness		4-15-19

All depths reported are from reference notch in top of TOC.
All measurements made in 10ths of feet

TOC = from Top of PVC Casing
Grd = Ground Surface
TD = Total Depth

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Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: RWM-MW5 **Well Permit No.:** _____

ARM Project No.: 190341 M	Date/Time Started: 4/15/19 / 1430	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4/15/19 / 1550	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 50°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 10.07 to 20.07
Well riser/screen material: *PVC*	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) 20.07

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft.	Total Well Depth (TOC): 19.83 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 12.22 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 7.61 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.24 ft.	Wetted Well Volume: (A x D) 0.30 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	16.67 - 20	10	~ 2		brownish - yellow
2	13.33 - 16.67	10	~ 1		brownish - yellow
3	10 - 13.33	10	~ 2		brownish - yellow
	Cumulative Totals: (Minimum of 3 Well Volumes)		~ 16.5		

Final Depth to Water (from TOC): 13.51' Final Total Well Depth (from TOC): 19.84'

Thickness of Any Sediment Remaining in Well: 0.23'

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

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Earth Resource Engineers and Consultants

Tradepoint Atlantic – Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: RWN-MW5 **Well Permit No.:** _____

ARM Project No.: 190311M	Date/Time Started: 4-17-19 / 0848	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-17-19 / 0953	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 55°	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 15 to 25
Well riser/screen material: *PVC*	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) 25.17

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1 0.04 gal/ft	Total Well Depth (TOC): 24.92 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 11.81 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 13.11 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.25 ft.	Wetted Well Volume: (A x D) 0.52 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	21.67 - 25	10	1.5		brown
2	18.33 - 21.67	10	1.75		brown
3	15 - 18.33	10	1.75		light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		5.0		

Final Depth to Water (from TOC): 12.08 Final Total Well Depth (from TOC): 24.98

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

Sparrows Point

Monitoring Well Development Form – Surge and Pump Method

Well ID: RWO - MW1 **Well Permit No.:** _____

ARM Project No.: 150-19934/M	Date/Time Started: 5-8-19 / 1438	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 5-8-19 / 1536	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 70's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 30 to 40
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 0.35	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 39.99

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 40.09 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 9.90 ft. (C)
Petroleum/Product Present? *Y* or (*N*) Thickness (ft.): _____	Height of Water Column: (B - C) 30.19 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Bore Volume: (A x D) 1.21 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	36.67-40	10	2.0		brown
2	33.33-36.67	10	1.5		brown
3	30-33.33	10	1.5		brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		5.0		

Final Depth to Water (from TOC): 11.03 Final well depth: 40.18

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: RWO - MW5 **Well Permit No.:** _____

ARM Project No.: ~~150~~-190341M	Date/Time Started: 5-8-19 / 1401	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 5-8-19 / 1438	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 70's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 10 to 20
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+ /(-) 0.40	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 20.29

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 20.41 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft.~~ (A) 0.04 gal/ft	Depth to Static Water Level (TOC): 10.37 ft. (C)
Petroleum/Product Present? (Y) or N. Thickness (ft.): Trace	Height of Water Column: (B - C) 10.04 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Bore Volume: (A x D) 0.40 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	16.67 - 20	10	1.0		dark brown
2	13.33 - 16.67	10	1.0		dark brown
3	10 - 13.33	10	1.0		dark brown
Cumulative Totals: (Minimum of 3 Well Volumes)			3.0		

Final Depth to Water (from TOC): 10.37 Final well depth: 20.42

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: RWP-MW1 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 4-30-19 / 0901	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-30-19 / 1035	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 60's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 32 to 42
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (F/-) 2.54	Measured Total Depth of Well When Installed (TOC) (F): ____ ft. (See Original Well Construction Diagram) 42.56

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1.0 0.04 gal/ft	Total Well Depth (TOC): 41.71 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 11.24 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 30.47 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.85 ft.	Wetted Well Volume: (A x D) 1.22 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	38.67-42	10	2.0		light brown
2	35.33-38.67	10	1.5		light brown
3	32-35.33	10	1.5		light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		5.0		

Final Depth to Water (from TOC): 17.51 Final Total Well Depth (from TOC): 42.57

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: RWQ-MW1 **Well Permit No.:** _____

ARM Project No.: 150 190341M	Date/Time Started: 4-22-19 / 0740	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-22-19 / 0848	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 50's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 32 to 42
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 2.53	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 42.53

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 41.79 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 14.16 ft. (C)
Petroleum/Product Present? Y or N. Thickness (ft.): _____	Height of Water Column: (B - C) 27.63 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.74 ft.	Wetted Bore Volume: (A x D) 1.11 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	38.67 - 42	10	1.5		grey
2	35.33 - 38.67	10	1.5		light grey
3	32 - 35.33	10	1.5		light grey
Cumulative Totals: (Minimum of 3 Well Volumes)			4.5		

Final Depth to Water (from TOC): 14.56 Final well depth: 42.54

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: RWQ - MW5 **Well Permit No.:** _____

ARM Project No.: ~~150~~ 190341M	Date/Time Started: 4-22-19 / 0848	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-22-19 / 0936	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 60's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 13 to 23
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+) / -) 2.84	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 22.94

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 22.95 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 10.37 ft. (C)
Petroleum/Product Present? Y or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 12.58 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Bore Volume: (A x D) 0.50 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	19.67 - 23	10	1.25		yellowish brown
2	16.33 - 19.67	10	1.75		yellowish brown
3	13 - 16.33	10	1.5		light yellowish brown
Cumulative Totals: (Minimum of 3 Well Volumes)			4.5		

Final Depth to Water (from TOC): 10.90 Final well depth: 22.95

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: RWR-MW1 **Well Permit No.:** _____

ARM Project No.: 190341M	Date/Time Started: 5-8-19 / 1145	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 5-8-19 / 1257	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 70's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 30 to 40
Well riser/screen material: *PVC*	Sand Pack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 0.35	Measured Total Depth of Well When Installed (TOC) (F): ____ft. (See Original Well Construction Diagram) 39.97

B. Wetted Bore Volume Determination

Well (PVC) Diameter (in.): 1.0 0.04 gal/ft	Total Well Depth (TOC): 39.68 ft. (B)
Well Volume: 0.163 gal./ft. (2" PVC) or 0.652 gal/ft (4" PVC) (A)	Depth to Static Water Level (TOC): 11.66 ft. (C)
Petroleum/Product Present? *Y* or *N*. Thickness (ft.): _____	Height of Water Column: (B - C) 28.02 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.29 ft.	Wetted Well Volume: (A x D) 1.12 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	36.67 - 40	10	1.75		greyish brown
2	33.33 - 36.67	10	1.75		light brown
3	30 - 33.33	10	1.5		light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		5.0		

Final Depth to Water (from TOC): 12.00 Final Total Well Depth (from TOC): 39.68

Thickness of Any Sediment Remaining in Well: 0.29

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: RwR - MW5 **Well Permit No.:** _____

ARM Project No.: ~~150-19034~~ 1M	Date/Time Started: 5-8-19 / 1257	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 5-8-19 / 1356	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: cloudy 70's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 10 to 20
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+ / (-) 0.32	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 20.19

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 19.90 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 10.05 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 9.85 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.29 ft.	Wetted Bore Volume: (A x D) 0.39 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	16.67 - 20	10	2.0		brownish yellow
2	13.33 - 16.67	10	1.5		yellowish brown
3	10 - 13.33	10	1.5		yellowish brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		5.0		

Final Depth to Water (from TOC): 10.20 Final well depth: 19.90

Thickness of Any Sediment Remaining in Well: 0.29

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: RWS-MW1 **Well Permit No.:** _____

ARM Project No.: ~~150-19934M~~	Date/Time Started: 4-22-19 / 1050	Developed by: JCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-22-19 / 1229	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Sunny 60's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 37 to 47
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+/-) 2.65	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 47.36

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 46.98 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 12.76 ft. (C)
Petroleum/Product Present? *Y* or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 34.22 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.38 ft.	Wetted Bore Volume: (A x D) 1.37 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	43.67 - 47	10	2.0		grey
2	40.33 - 43.67	10	1.75		grey
3	37 - 40.33	10	1.5		grey
	Cumulative Totals: (Minimum of 3 Well Volumes)		5.25		

Final Depth to Water (from TOC): 13.35 Final well depth: 47.64

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: RWS-MW5 **Well Permit No.:** _____

ARM Project No.: 150 19934/	Date/Time Started: 4-22-19 / 0945	Developed by: TCV
Client: **EnviroAnalytics Group**	Date/Time Completed: 4-22-19 / 1039	Company:
Well Location: Area A, Parcel 3	Weather/Site Conditions: Cloudy 60's	Checked by:

A. Well Construction Details

Well Cover Type: *Stick-up* or *Flush-Mount*	PVC Screen Interval: 13 to 23
Well riser/screen material: *PVC*	Sandpack Interval: _____ to _____
Difference between Ground Surface and TOC: (+ / -) 3.02	Measured Total Depth of Well When Installed (TOC) (F): (See Original Well Construction Diagram) 22.97

B. Wetted Bore Volume Determination

Well (PVC) Diameter: ~~2.0 in.~~ 1.0 in	Well Total Depth (TOC): 22.90 ft. (B)
Well (PVC) Volume: ~~0.163 gal./ft. (A)~~ 0.04 gal/ft	Depth to Static Water Level (TOC): 7.57 ft. (C)
Petroleum/Product Present? Y or (N) Thickness (ft.): _____	Height of Water Column: (B - C) 15.33 ft. (D)
Initial Thickness of Sediment in Bottom of Well (F - B): 0.00 ft.	Wetted Bore Volume: (A x D) 0.61 gal. (E)

C. Surge and Pump Event Summary Data

Description of Surge Equipment: 1" 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	19.67 - 23	10	2.0		brown
2	16.33 - 19.67	10	1.5		light brown
3	13 - 16.33	10	1.5		light brown
	Cumulative Totals: (Minimum of 3 Well Volumes)		5.0		

Final Depth to Water (from TOC): 8.35 Final well depth: 22.90

Thickness of Any Sediment Remaining in Well: 0.00

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

APPENDIX C

Survey Data

June 11, 2019

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

Mr. Calenda:
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	1457970.981	10.65	11.27	FLUSH MOUNT
COA-MWS	NO WELL FOUND				
COBB-MWS	561776.152	1457813.750	16.27	13.61	
COB-MWS	561768.065	1454242.766	14.23	11.30	
COCC-MWS	561794.484	1457978.386	15.55	13.16	
COC-MWS	561775.581	1454539.223	14.32	11.56	
CODD-MWS	561604.499	1457576.287	14.37	12.30	
COD-MWS	561792.574	1454723.993	13.74	11.63	
COEE-MWS	NO WELL FOUND				
COE-MWS	561802.955	1454925.926	13.98	11.34	
COFF-MWS	561492.274	1458030.691	14.78	11.72	GROUND SHOT TAKEN ON SOUTHERN SIDE
COF-MWS	561671.419	1454219.187	14.51	11.62	
COGG-MWS	561156.320	1458040.330	12.69	10.60	
COG-MWS	561660.615	1454465.549	13.77	11.28	
COH-MWS	561707.142	1454648.497	13.76	10.60	
COI-MWS	561676.613	1454778.725	13.30	10.77	
COJ-MWS	561684.219	1454936.945	13.86	10.38	
COK-MWI	563234.629	1454749.248	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	

ROD & WIRE MILL ONSHORE SUPPLEMENTAL WELL LOCATIONS					
DESCRIPTION	**NORTHING**	**EASTING**	**TOP CASING ELEVATION**	**GROUND AT WELL ELEVATION**	**NOTES**
RW05R-MWI	571732.443	1455877.003	12.95	10.56	WELL SHOT ON LOWER, EASTERN POINT OF CASING
RW21-MWI	572350.773	1456246.875	14.46	14.63	FLUSH MOUNT
RW22R-MWI	572405.722	1456075.106	16.63	14.02	
RW22R-MWS	572408.255	1456073.268	16.56	14.02	
RW23-MWI	571880.798	1456165.126	14.36	14.60	FLUSH MOUNT
RW23-MWS	571883.604	1456164.804	14.24	14.50	FLUSH MOUNT
RW24-MWI	572223.805	1456460.411	12.57	12.74	FLUSH MOUNT
RW24-MWS	572226.487	1456460.200	12.55	12.78	FLUSH MOUNT
RW25-MWI	572283.559	1456605.078	12.08	12.28	FLUSH MOUNT
RW25-MWS	572286.204	1456604.855	11.94	12.16	FLUSH MOUNT
RWA-MWI	572453.190	1455934.708	10.20	7.52	
RWA-MWS	572455.753	1455935.886	10.59	7.74	
RWB-MWI	572273.713	1455907.075	19.73	17.57	
RWB-MWS	572277.119	1455907.945	20.17	17.66	WELL SHOT ON LOWER, WESTERN POINT OF CASING
RWD-MWI	572013.829	1455886.200	14.87	12.72	
RWD-MWS	572016.631	1455886.265	14.93	12.68	
RWE-MWI	571901.499	1455879.816	13.92	11.43	GROUND SHOT FROM 60D NAIL SET
RWE-MWS	571905.453	1455879.938	13.96	11.57	
RWF-MWI	571606.108	1455890.867	12.31	10.30	
RWF-MWS	571610.231	1455890.581	12.74	10.24	
RWG-MWI	571293.176	1455914.969	12.48	9.96	
RWG-MWS	571296.068	1455914.820	12.50	10.07	WELL SHOT ON LOWER, SOUTHERN POINT OF CASING
RWH-MWI	572408.040	1456263.434	12.03	12.40	FLUSH MOUNT
RWH-MWS	572410.751	1456262.361	11.83	12.29	FLUSH MOUNT
RWI-MWI	572313.757	1456316.674	12.95	13.23	FLUSH MOUNT
RWI-MWS	572311.024	1456316.938	12.89	13.23	FLUSH MOUNT
RWJ-MWI	572086.735	1456289.529	14.10	14.40	FLUSH MOUNT
RWJ-MWS	572088.705	1456289.306	13.81	14.31	FLUSH MOUNT
RWK-MWI	572080.786	1456279.773	14.22	14.54	FLUSH MOUNT
RWK-MWS	572082.893	1456279.782	14.24	14.50	FLUSH MOUNT

DESCRIPTION	*NORTHING*	*EASTING*	*TOP CASING ELEVATION*	*GROUND AT WELL ELEVATION*	*NOTES*
RWL-MWI	572073.093	1456266.836	14.36	14.60	FLUSH MOUNT
RWL-MWS	572075.553	1456266.813	14.26	14.55	FLUSH MOUNT
RWM-MWI	572014.780	1456177.443	14.92	15.20	FLUSH MOUNT
RWM-MWS	572017.304	1456177.362	14.97	15.21	FLUSH MOUNT
RWN-MWS	572065.768	1456392.441	14.86	15.12	FLUSH MOUNT
RWO-MWI	572456.369	1456443.368	11.67	11.99	FLUSH MOUNT
RWO-MWS	572459.658	1456442.964	11.59	11.93	FLUSH MOUNT
RWP-MWI	572456.912	1456719.408	12.55	10.25	
RWQ-MWI	572458.019	1456935.483	15.63	13.42	
RWQ-MWS	572461.924	1456935.546	15.93	13.39	
RWR-MWI	571982.522	1456768.645	13.61	13.99	FLUSH MOUNT
RWR-MWS	571986.201	1456769.228	13.68	14.07	FLUSH MOUNT
RWS-MWI	572074.853	1457037.250	14.30	11.89	
RWS-MWS	572077.727	1457037.464	14.65	12.21	

ALL WELL SHOTS LOCATED ON NORTH SIDE OF CASING (UNLESS NOTED)
ALL GROUND SHOTS ON CONCRETE ON NORTH SIDE OF WELL (UNLESS NOTED)

APPENDIX D

Purge and YSI Calibration Logs

Low Flow Sampling
Permanent Wells

ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name:	A3 onshore GW	Project Number:	190341m-2
Well Number:	RWDSR-MW1	Date:	5/13/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.95	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	42.50	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
1414	0.0	10.93	16.1	6.57	7.627	4.40	-97.6	53.1	
1419	0.45	10.93	16.0	6.50	7.609	3.73	-96.7	29.9	
1424	0.90	10.93	16.1	6.49	7.589	3.22	-97.5	14.0	
1429	1.35	10.92	16.3	6.48	7.577	2.83	-98.9	11.9	
1434	1.80	10.92	16.2	6.47	7.568	2.61	-99.1	8.78	
1439	2.25	10.92	16.2	6.46	7.549	2.50	-99.4	9.13	
1444	2.70	10.92	16.2	6.46	7.551	2.39	-99.8	8.77	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWDSR-MW1	1455	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					N
Duplicate					N

Sampled By: LP

Comments: Total + Diss Zn + Cd
Alk + Acid.

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:	A3 onshore GW	Project Number:	190341M-2
Well Number:	RW21-MW1	Date:	5/9/19
Well Diameter (in):	1	One Well Volume (gal):	———
Depth to Product (ft):	NA	QED Controller Settings:	———
Depth to Water (ft):	13.70	Flow Rate (mL/min)	303
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	40.25	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
14.01	0.0	20.82	17.3	5.60	3.508	4.32	-37.2	117	
14.06	0.40	20.55	17.4	5.52	3.443	3.56	-33.8	44.2	
14.11	0.80	20.55	17.6	5.49	3.422	3.31	-32.3	42.6	
14.16	1.20	20.54	17.7	5.46	3.395	3.07	-31.7	40.8	
14.21	1.60	20.54	17.3	5.43	3.348	2.81	-29.9	40.6	
14.26	2.00	20.54	17.3	5.41	3.292	2.63	-28.8	42.9	
14.31	2.40	20.54	17.5	5.40	3.322	2.53	-29.0	38.89	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW21-MW1	1445	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					N
Duplicate					N

Sampled By: LCP

Comments: Total + Diss. Zn + Cd
A/K. + Acid

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 Onshore

ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name:	AB GW ~~Direct Support~~	Project Number:	~~180~~ 190341M-2
Well Number:	RW22R-MWI	Date:	5/30/19
Well Diameter (in):	2 1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	5.30	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	42.75	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
1126	0.0	28.70	19.5	5.92	2.634	2.63	-18.9	37.8	
1131	0.35	29.12	19.9	5.86	2.677	2.30	-19.6	47.2	
1136	0.80	29.51	20.4	5.87	2.687	2.07	-21.8	39.9	
1141	1.25	29.86	20.6	5.86	2.662	1.94	-21.2	27.6	
1146	1.70	29.96	20.7	5.85	2.640	1.84	-21.0	22.5	
1151	2.15	30.05	20.9	5.84	2.634	1.76	-20.9	18.81	
1156	2.65	30.21	20.5	5.84	2.612	1.69	-21.1	17.2	
1201	3.15	30.65	20.5	5.82	2.597	1.64	-19.8	16.6	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Preservative	Collected?
RW22R-MWI	1210	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					N
Duplicate					N

Sampled By: CLP

Comments: total + Diss Zn + Cd Resample

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:	A3 onshore GW	Project Number:	190341M-2
Well Number:	RW22R-MW1	Date:	5/14/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	15.47	Flow Rate (mL/min)	227
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	42.73	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
1434	0.0	28.72	16.0	6.26	2.882	2.69	-53.5	31.3	
1439	0.3	28.93	16.3	6.45	2.857	2.46	-49.5	26.2	
1444	0.6	29.07	16.3	6.13	2.850	2.39	-48.3	19.5	
1449	0.9	29.21	16.3	6.11	2.826	2.28	-46.3	17.9	
1454	1.20	29.50	16.3	6.08	2.805	2.23	-44.7	16.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW22R-MW1	1500	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					N
Duplicate					N

Sampled By: LVP

Comments: Zn + Cd (total + diss) Alk. + Acid,

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 onshore

ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name:	AS GW ~~Direct Support~~	Project Number:	19034/M-2
Well Number:	RW22R-MW5	Date:	5-30-19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	15.22	Flow Rate (mL/min)	
Product Thickness (ft):	NA	Length of time Purged (min)	
Depth to Bottom (ft):	22.95	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
1254	0.0	15.35	18.4	5.87	2.210	3.54	26.7	21.2	
1259	0.55	15.35	18.1	5.80	2.209	3.06	27.4	15.2	
1304	1.10	15.36	18.3	5.81	2.215	2.78	27.2	7.73	
1309	1.65	15.36	17.9	5.82	2.205	2.54	27.2	7.47	
1314	2.20	15.36	17.9	5.83	2.216	2.50	26.9	6.97	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW22R-MW5	1320	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
Resample

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:	A3 onshore GW	Project Number:	190344M-2
Well Number:	RW22R-MWS	Date:	5/15/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	14.70	Flow Rate (mL/min)	379
Product Thickness (ft):	NA	Length of time Purged (min)	20
Depth to Bottom (ft):	22.95	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
1400	0.0	14.75	16.5	6.64	2.391	5.93	-31.9	32.4	
1405	0.5	14.75	16.4	6.58	2.430	5.11	-30.6	21.2	
1410	1.00	14.75	16.4	6.65	2.456	4.69	-35.1	4.80	
1415	1.50	14.75	16.5	6.69	2.480	4.53	-38.1	1.75	
1420	2.00	14.75	16.0	6.70	2.471	4.49	-39.4	1.10	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW22R-MWS	1430	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			N
		Duplicate			N

Sampled By: LLP

Comments: total & Diss Zn + Cd
Alk + Acidity

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:	~~190341m-2~~ A3 onshore	Project Number:	190341m-2
Well Number:	RW23-MW1	Date:	5/3/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	13.17	Flow Rate (mL/min)	227
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	39.78	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
800	0.0	13.17	16.7	5.42	2.129	6.87	83.9	242.3	
805	0.3	13.19	16.6	5.53	2.185	5.47	49.5	160.3	
810	0.6	13.22	16.7	5.62	2.267	~~5.21~~ 4.25	32.9	163.6	
815	0.9	13.25	16.7	5.65	2.268	3.68	29.1	263.3	
820	1.2	13.25	16.7	5.67	2.288	3.30	25.0	186.1	
825	1.5	13.26	16.7	5.69	2.283	3.17	23.2	185.4	
830	1.8	13.26	16.7	5.72	2.283	3.01	20.8	196.5	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Preservative	Collected?
RW23-MW1	835	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: LLP

Comments: Diss. + total Zn + Cd Alk. + Acid. Turb. meter not working

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: A3 onshore sampling	Project Number: 19034M-2
Well Number: RW23-MWS	Date: 5/3/19
Well Diameter (in): 1	One Well Volume (gal): —
Depth to Product (ft): NA	QED Controller Settings:
Depth to Water (ft): 10.74	Flow Rate (mL/min) 284
Product Thickness (ft): NA	Length of time Purged (min) 20
Depth to Bottom (ft): 19.97	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
910	0.0	10.74	15.3	6.46	0.631	4.55	-2.3	267.1	
915	0.3	12.49	15.2	6.48	0.645	3.51	6.8	163.1	
920	0.7	13.76	15.2	6.44	0.621	3.08	16.4	270.5	
925	1.10	15.23	15.2	6.34	0.628	2.95	21.3	324.7	
930	1.50	16.10	15.3	6.27	0.633	2.97	25.1	429.9	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW23-MWS	935	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: LVP

Comments: Total + Diss Zn + Cd Alk. + Acid. Turb not working.

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:	A3 onshore GW	Project Number:	40341M-2
Well Number:	RW 24 - MWF	Date:	5/8/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.82	Flow Rate (mL/min)	288
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	39.70	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
1016	0.0	11.33	17.1	5.37	3.232	5.45	28.5	140	
1021	0.45	12.79	17.1	5.24	3.142	4.07	18.1	92.3	
1026	0.85	12.95	17.1	5.17	3.137	3.40	12.6	61.9	
1031	1.20	13.02	17.1	5.11	3.133	3.06	12.5	30.3	
1036	1.55	13.06	17.2	5.08	3.120	2.79	11.6	31.4	
1041	1.90	13.11	17.2	5.05	3.087	2.59	13.4	32.9	
1046	2.25	13.12	17.2	5.02	3.067	2.44	15.9	31.1	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW24-MWF	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
Alk. + Acid.

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:	P3 onshore GW	Project Number:	190341m-2
Well Number:	RW24-MW5	Date:	5/8/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	9.04	Flow Rate (mL/min)	310
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	19.85	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
1055	0.0	9.10	16.1	11.96	2.137	4.56	-252.2	66.6	
1100	0.45	9.10	16.3	12.10	2.533	3.34	-267.1	38.8	
1105	0.85	9.11	16.2	12.13	2.605	2.86	-258.0	14.2	
1110	1.25	9.11	16.3	12.15	2.636	2.58	-244.7	14.4	
1115	1.65	9.11	16.3	12.15	2.644	2.45	-235.0	13.1	
1120	2.05	9.11	16.3	12.16	2.652	2.34	-225.3	12.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW24-MW5	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					N
Duplicate					N

Sampled By: LCP

Comments: total + Diss zn + cd
Alk. + Acid.

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: A3 onshore GW	Project Number: 190341M-2
Well Number: RW25-MWI	Date: 5/8/19
Well Diameter (in): 1	One Well Volume (gal): —
Depth to Product (ft): NA	QED Controller Settings: —
Depth to Water (ft): 10.09	Flow Rate (mL/min) 416
Product Thickness (ft): NA	Length of time Purged (min) 25
Depth to Bottom (ft): 39.81	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
1307	0.45	10.29	16.5	6.99	2.053	6.84	-141.6	76.2	
1312	0.90	10.31	16.5	6.17	2.033	5.03	-130.2	58.8	
1317	1.35	10.31	16.4	5.93	2.041	3.45	-116.6	23.5	
1322	1.85	10.33	16.4	5.79	2.050	3.59	-105.3	19.1	
1327	2.30	10.35	16.4	5.73	2.029	3.32	-100.5	15.9	
1332	2.75	10.36	16.4	5.66	2.029	3.03	-94.0	16.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Preservative	Collected?
RW25-MWI	1345	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					N
Duplicate					N

Sampled By: LHP

Comments: Total zn + cd, Diss zn + cd
Alk. + Acid.

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:	A3 onshore GW	Project Number:	190341M-2
Well Number:	RW25-MW5	Date:	5/8/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	8.53	Flow Rate (mL/min)	265
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	20.00	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
1426	0.0	10.89	16.4	6.14	1.333	2.93	-64.1	1002 AW	
1431	0.35	9.75	16.3	6.12	1.313	2.73	-68.6	184	
1436	0.70	9.79	16.3	6.10	1.327	2.62	-68.5	84.2	
1441	1.05	9.83	16.2	6.09	1.333	2.56	-68.6	76.9	
1446	1.40	9.88	16.1	6.10	1.328	2.52	-69.2	49.0	
1451	1.75	9.89	16.2	6.10	1.319	2.43	-69.6	28.0	
1456	2.10	9.90	16.2	6.09	1.336	2.36	-68.8	28.7	
1501	2.45	9.90	16.1	6.08	1.339	2.29	-68.3	28.1	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW25-MW5	1570	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					N
Duplicate					N

Sampled By: LCP

Comments: total + Diss analyzed for Alk. + Acid.

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
Onshore

ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name:	A3 GW ~~Direct Support~~	Project Number:	190341M-2
Well Number:	RWA-MWI	Date:	5/30/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	~~N/A~~	QED Controller Settings:	—
Depth to Water (ft):	9.07	Flow Rate (mL/min)	227
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	23.15	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
1111	0.0	14.94	18.2	5.41	3.159	4.46	73.6	38	
1116	0.3	15.08	18.3	5.29	3.074	3.72	72.1	35.8	
1121	0.6	15.25	18.0	5.27	3.000	3.39	71.4	28.6	
1126	0.9	15.41	18.1	5.25	2.946	3.09	71.4	16.6	
1131	1.20	15.60	18.3	5.25	2.859	2.89	71.1	16.2	
1136	1.50	15.84	18.1	5.24	2.796	2.74	71.5	15.7	
1141	1.80	16.02	18.0	5.23	2.730	2.60	72.1	14.3	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWA-MWI	1150	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
Resample

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:	A3 onshore GW	Project Number:	190341M-2
Well Number:	RWA-MW7	Date:	5/15/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	9.34	Flow Rate (mL/min)	265
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	23.14	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
~~1208~~	~~0.0~~	~~14.40~~	~~18.0~~	~~5.36~~	~~3.075~~	~~6.73~~	~~73.3~~	~~85.1~~	
~~1213~~	~~0.35~~		~~19.3~~	~~5.32~~	~~3.170~~	~~6.45~~	~~76.3~~		
1233	0.00	18.64	18.3	5.49	2.968	3.53	60.3	109.0	
1238	0.35	18.63	18.3	5.40	2.945	3.23	61.4	107.3	
1243	0.70	18.82	18.3	5.40	2.927	3.01	61.3	83.4	
1248	1.05	19.12	18.3	5.40	2.915	2.89	61.3	65.1	
1253	1.40	19.24	18.5	5.40	2.907	2.69	60.8	70.9	
1258	1.75	19.32	18.3	5.39	2.888	2.59	61.1	75.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWA-MW7	1300	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					N
Duplicate					N

Sampled By: LP

Comments: total + diss. Zn + Cd
Alk. + Acid.

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:	AT3 GW offshore	Project Number:	190341M-2
Well Number:	RWA-MW5	Date:	5/30/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	9.27	Flow Rate (mL/min)	379
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	16.90	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
1420	0.0	9.27	19.1	8.26	2.452	4.72	-156.5	12.5	
1425	0.5	9.27	18.8	8.51	2.501	3.83	-193.8	10.4	
1430	1.00	9.27	18.3	8.65	2.536	3.17	-213.7	6.93	
1435	1.50	9.27	18.5	8.66	2.574	2.80	-217.5	4.96	
1440	2.00	9.27	18.3	8.74	2.601	2.54	-224.5	4.21	
1445	2.50	9.27	18.2	8.78	2.624	2.39	-229.4	3.78	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWA-MW5	1450	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					N
Duplicate					N

Sampled By: LMP

Comments: total + Diss. 2n + cd
Resample

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:	AB onshore GW	Project Number:	190341m-2
Well Number:	RWA-mw5	Date:	5/15/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	8.84	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	20
Depth to Bottom (ft):	16.90	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
1313	0.0	8.85	17.2	7.63	2.537	3.91	-63.8	16.5	
1318	0.45	8.85	17.1	7.86	2.638	3.31	-95.2	6.88	
1323	0.90	8.85	17.1	8.21	2.703	2.90	-130.3	4.97	
1328	1.35	8.85	17.3	8.31	2.724	2.76	-144.3	2.29	
1333	1.80	8.85	18.4	8.24	2.748	2.57	-142.5	1.16	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWA-mw5	1335	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
Alk. + Acidity

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
Onshore GW

ARM Group Inc.
Earth Resource Engineers and Consultants

Project Name:	A3 ~~direct support~~	Project Number:	~~180227M-1~~ 19034M-2
Well Number:	RWB-MW1	Date:	5/30/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	18.25	Flow Rate (mL/min)	466
Product Thickness (ft):	NA	Length of time Purged (min)	60
Depth to Bottom (ft):	42.35	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
957	0.0	27.69	18.6	6.25	1.486	2.13	-36.8	35	purged prior to startup
956	0.55	27.80	18.8	6.20	1.478	2.05	-34.5	108	
1001	1.10	27.97	18.9	6.19	1.469	1.95	-33.9	63	(very silty)
1006	1.65	28.20	19.1	6.24	1.482	1.90	-38.3	61.3	began @ 8:50
1011	2.20	28.30	19.1	6.22	1.455	1.86	-36.2	56.2	
1016	2.75	28.51	19.1	6.18	1.463	1.83	-33.5	49.8	
1021	3.30	28.51	19.3	6.23	1.458	1.79	-36.5	55.9	
1026	3.85	28.77	19.8	6.22	1.461	1.72	-35.6	48.2	
1031	4.40	28.98	19.7	6.21	1.450	1.70	-35.2	41.6	
1036	4.95	28.82	19.8	6.21	1.473	1.66	-35.9	38.4	
1041	5.50	28.93	19.5	6.20	1.454	1.65	-34.5	24.6	
1046	6.05	28.98	19.3	6.16	1.444	1.63	-31.4	23.3	
1051	6.60	29.08	19.6	6.16	1.449	1.60	-31.3	17.8	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWB-MW1	1055	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
~~ATL + Acid~~ Resample

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:	A3 onshore GW	Project Number:	19034/M-2
Well Number:	RWB-MW1	Date:	5/15/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	18.24	Flow Rate (mL/min)	265
Product Thickness (ft):	NA	Length of time Purged (min)	15
Depth to Bottom (ft):	42.32	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
1003	0.0	26.86	16.8	6.58	1.719	3.02	-46.7	37.5	Very silty during purging prior to using YSI
1008	0.35	26.55	16.8	6.47	1.713	2.78	-42.2	36.8	
1013	0.70	26.38	16.8	6.45	1.706	2.75	-41.0	36.3	
1018	1.05	26.18	16.9	6.43	1.696	2.68	-38.9	34.6	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWB-MW1	1020	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
Alk. + Acid.

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:	A3 GW onshore	Project Number:	190341M-2
Well Number:	RWB-MW5	Date:	5/31/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	18.55	Flow Rate (mL/min)	189
Product Thickness (ft):	NA	Length of time Purged (min)	10
Depth to Bottom (ft):	23.31	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
1225	0.0	19.62	19.7	9.30	1.141	5.60	-116.6	39.0	
1230	0.25	21.16	19.4	9.39	1.132	4.42	-108.8	23.4	
1235	0.50	22.89	19.1	9.44	1.124	4.10	-100.9	17.6	
		Purged dry after sampling							

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWB-MW5	1245	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
Resample

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:	A3 onshore GW	Project Number:	19031/m-2
Well Number:	RWB-MW5	Date:	5/15/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	17.76	Flow Rate (mL/min)	257
Product Thickness (ft):	NA	Length of time Purged (min)	20
Depth to Bottom (ft):	23.31	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
1030	0.0	18.73	16.3	10.77	1.455	4.25	-224.4	47.1	
1035	0.3	22.02	16.3	9.37	1.488	3.54	-174.5	32.3	
1040	0.6	22.65	16.8	8.91	1.509	3.09	-204.3	45.3	
1045	0.9	pumped dry			will return to sample				
1505	1.10	20.35	19.2	9.73	1.328	6.02	-68.7	14.6	
1510	1.35	22.25	20.6	9.20	1.344	4.93	-56.6	12.1	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWB-MW5	1515	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			N
		Duplicate			N

Sampled By: LCP

Comments: total + diss Zn + Cd & need to purge very slow
Alk. + Acid.

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:	A3 Onshore GW	Project Number:	160341M-2
Well Number:	RWD-MW2I	Date:	5/14/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	13.53	Flow Rate (mL/min)	372
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	42.58	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
1115	0.0	13.42	16.2	6.52	3.332	6.74	148.0	84.3	
1120	0.45	13.40	16.2	~~6~~5.93	3.210	4.37	-0.1	74.8	
1125	0.95	13.39	16.2	5.87	3.175	3.74	3.2	63.0	
1130	1.45	13.38	15.8	5.83	3.117	3.26	6.0	41.7	
1135	1.95	13.38	15.8	5.81	3.092	3.06	6.7	35.5	
1140	2.45	13.37	15.9	5.80	3.072	~~3~~2.85	7.5	33.9	
1145	2.95	13.35	15.8	5.79	3.046	2.71	8.1	32.1	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWD-MW2	1150	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					N
Duplicate					N

Sampled By: LVP

Comments: total + Diss Zn + Cd
Alk. + Acid.

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:	A3 onshore GW	Project Number:	190341M-2
Well Number:	RWD-MW5	Date:	5/14/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.76	Flow Rate (mL/min)	227
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	22.15	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
1322	0.0	18.48	14.9	6.71	0.734	3.00	-47.8	43.5	Light odor
1327	0.3	18.47	14.9	6.65	0.741	2.86	-47.7	31.3	very silty during purging
1332	0.6	18.45	14.8	6.57	0.690	2.71	-40.7	17.7	
1337	0.9	18.52	14.8	6.53	0.678	2.58	-37.8	15.2	
1342	1.20	18.64	14.9	6.54	0.669	2.48	-38.3	13.4	
1347	1.50	18.68	15.0	6.53	0.659	2.39	-36.7	15.6	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWD-MW5	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss. Zn + Cl
Alk + Acidity

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: A3 Onshore GW	Project Number: 19034M-2
Well Number: RWE-MW I	Date: 5/14/19
Well Diameter (in): 1	One Well Volume (gal): —
Depth to Product (ft): NA	QED Controller Settings: —
Depth to Water (ft): 12.17	Flow Rate (mL/min) 397
Product Thickness (ft): NA	Length of time Purged (min) 25
Depth to Bottom (ft): 42.52	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
914	0.0	12.22	16.2	6.29	4.837	3.70	-100.2	79.5	Very silty
919	0.45	12.26	16.2	6.17	4.800	3.43	-97.8	32.7	during purging
924	0.99	12.28	16.2	6.13	4.767	3.16	-95.3	25.6	
929	1.54	12.28	16.1	6.11	4.746	2.96	-94.2	19.0	
934	2.08	12.28	16.2	6.10	4.717	2.82	-93.7	18.2	
939	2.62	12.28	16.2	6.09	4.699	2.68	-93.1	17.8	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWE-MW I	945	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
Alk. + Acid

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:	A3 onshore GW	Project Number:	190341M-2
Well Number:	RWE-MW5	Date:	5/14/19
Well Diameter (in):	1	One Well Volume (gal):	
Depth to Product (ft):	NA	QED Controller Settings:	
Depth to Water (ft):	12.21	Flow Rate (mL/min)	397
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	22.47	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
953	0.0	12.26	15.8	7.13	2.117	6.78	-98.2	30.4	
958	0.54	12.31	15.2	7.70	1.616	4.22	-134.2	22.79	
1003	1.08	12.32	15.2	7.73	1.626	3.54	-146.5	10.65	
1008	1.62	12.33	15.1	7.75	1.639	3.16	-144.9	8.34	
1013	2.16	12.33	15.1	7.76	1.648	2.90	-147.3	7.58	
1018	2.70	12.33	15.1	7.77	1.654	2.73	-148.6	8.14	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWE-MW5	1025	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss. Zn + Cd
Alk. + Acidity

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:	A3 onshore 560	Project Number:	190344m-2
Well Number:	RWF-MW1	Date:	5/16/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.55	Flow Rate (mL/min)	416
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	42.56	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
929	0.0	10.73	16.6	6.73	11.360	6.43	-91.0	92.1	
934	0.55	10.75	16.5	6.61	11.213	4.94	-90.5	75.8	
939	1.10	10.75	16.6	6.59	11.090	4.27	-89.1	37.0	
944	1.65	10.76	16.6	6.57	11.010	3.92	-88.0	16.7	
949	2.20	10.76	16.6	6.56	10.913	3.59	-86.9	13.3	
954	2.75	10.76	16.6	6.55	10.830	3.39	-86.3	11.6	
959	3.30	10.74	16.6	6.53	10.763	3.18	-85.6	10.9	
1004	3.85	10.76	16.6	6.54	10.708	2.99	-85.5	11.2	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWF-MW1	1005	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss zn + cd
Alk. + Acidity

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:	A3 Onshore GW	Project Number:	190341M-2
Well Number:	RWF-MW5	Date:	5/16/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.18	Flow Rate (mL/min)	379
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	22.75	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
1024	0.0	12.03	15.3	5.58	2.173	4.35	22.2	74.5	
1029	0.50	12.05	15.4	5.44	2.166	3.67	31.7	58.3	
1034	1.00	12.05	15.4	5.42	2.161	3.36	36.0	30.4	
1039	1.50	12.06	15.4	5.40	2.156	3.08	39.7	21.9	
1044	2.00	12.06	15.4	5.37	2.148	2.86	43.2	14.5	
1049	2.50	12.06	15.4	5.37	2.144	2.69	45.3	13.3	
1054	3.00	12.06	15.4	5.35	2.119	2.60	46.9	12.2	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWF-MW5	1105	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Pb
Alk. + Acidity

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:	A3 Onshore GW	Project Number:	190346M-2
Well Number:	RWG-MWI	Date:	5/13/19
Well Diameter (in):	1	One Well Volume (gal):	
Depth to Product (ft):	NA	QED Controller Settings:	
Depth to Water (ft):	11.10	Flow Rate (mL/min)	329
Product Thickness (ft):	NA	Length of time Purged (min)	45
Depth to Bottom (ft):	37.54	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
1046	0.0	11.09	15.3	6.73	10.287	5.32	-96.5	82	
1051	0.45	11.08	15.2	6.71	10.322	4.42	-107.7	77.8	
1056	0.90	11.07	15.2	6.71	10.337	3.95	-112.9	57.1	
1101	1.35	11.06	15.2	6.71	10.330	3.57	-116.7	32.2	
1106	1.80	11.05	15.3	6.72	10.353	3.19	-121.3	25.4	
1111	2.25	11.04	15.4	6.72	10.373	3.00	-123.1	19.8	
1116	2.70	11.04	15.3	6.72	10.359	2.88	-124.2	15.3	
1121	3.10	11.03	15.4	6.73	10.388	2.72	-127.2	13.2	
1126	3.50	11.03	15.4	6.74	10.400	2.53	-130.3	12.1	
1131	3.90	11.03	15.4	6.73	10.408	2.45	-130.7	11.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWG-MWI	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					N
Duplicate					N

Sampled By: LCP

Comments: total + Diss, Zn + Cd All + Acid

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:	A3 onsite GW	Project Number:	19034/M-2
Well Number:	~~A3 onsite GW~~ RWG-MW5	Date:	5/13/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.26	Flow Rate (mL/min)	291/45
Product Thickness (ft):	NA	Length of time Purged (min)	
Depth to Bottom (ft):	22.71	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
1150	0.0	11.30	14.0	9.74	1.037	5.79	-259.9	51	
1155	0.4	11.34	13.9	9.71	1.539	3.77	-279.9	45.7	
1200	0.8	11.37	14.0	9.71	1.568	3.13	-280.2	39.5	
1205	1.20	11.39	13.9	9.73	1.569	2.74	-280.5	33.8	
1210	1.60	11.46	13.9	9.64	1.974	2.52	-287.7	28.6	
1215	2.00	11.49	13.9	9.52	2.311	2.33	-295.4	19.75	
1220	2.40	11.50	13.9	9.35	2.614	2.18	-307.9	10.39	
1225	2.75	11.42	13.8	9.26	2.830	2.11	-309.9	8.12	
1230	3.10	11.33	13.8	9.18	2.983	2.01	-312.7	5.24	
1235	3.45		13.8	9.09	3.105	1.94	-310.4	4.99	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWG-MW5	1240	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					N
Duplicate					N

Sampled By: LLP

Comments: total + diss. Zn + alk. & Acid & cond not stable

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:	A3 onshore GW	Project Number:	19034/m-2
Well Number:	RWH-MWI	Date:	5/9/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.41	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	33.62	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
1223	0.0	11.01	16.1	6.24	2.787	6.21	-48.8	187.	
1228	0.45	11.05	16.0	6.17	2.772	5.20	-54.2	52.2	
1233	0.90	11.07	16.0	6.15	2.735	4.04	-61.6	38.3	
1238	1.35	11.08	16.1	6.15	2.722	3.68	-64.9	16.4	
1243	1.80	11.08	16.1	6.14	2.705	3.33	-68.0	18.0	
1248	2.25	11.08	16.2	6.14	2.687	3.18	-69.1	17.8	
1253	2.70	11.08	16.1	6.14	2.675	3.05	-70.5	16.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWH-MWI	1300	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					N
Duplicate					N

Sampled By: LLP

Comments: total zn + cd, Diss zn + cd
Alk. + Acid.

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:	A3 onshore GW	Project Number:	19034Wm-2
Well Number:	RWH-MW5	Date:	5/9/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.12	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	20
Depth to Bottom (ft):	20.02	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
1310	0.0	10.20	15.2	7.92	0.986	4.46	-176.2	105.6	
1315	0.45	10.21	15.1	8.30	0.983	3.61	-244.4	21.9	
1320	0.90	10.21	15.1	8.51	0.995	3.16	-274.0	15.4	
1325	1.35	10.21	15.2	8.59	1.000	2.97	-291.5	14.1	
1330	1.80	10.21	15.2	8.67	1.007	2.71	-300.1	13.8	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWH-MW5	1335	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
Alk. + Acid.

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:	AZ Onshore GW	Project Number:	190341m-2
Well Number:	RWI-MW1	Date:	~~5/8/19~~ 5/9/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.45	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	40
Depth to Bottom (ft):	39.45	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
928	0.0	11.72	16.8	6.14	4.345	6.54	-61.6	117	
933	0.45	11.71	16.8	5.95	4.339	5.25	-53.6	114	
938	0.90	11.70	16.7	5.93	4.282	4.33	-52.9	~~107~~ 57.0	
943	1.35	11.70	16.7	5.93	4.217	3.86	-53.8	42.9	
948	1.80	11.70	16.8	5.93	4.189	3.69	-54.1	25.3	
953	2.25	11.70	16.8	5.93	4.145	3.50	-54.9	15.5	
958	2.70	11.70	16.8	5.94	4.056	3.25	-56.4	11.3	
1003	3.15	11.70	16.8	5.94	4.004	3.10	-57.7	10.41	
1008	3.60	11.70	16.8	5.94	3.985	2.96	-59.4	10.57	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWI-MW1	1010	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					N
Duplicate					N

Sampled By: LLP

Comments: total + diss collected Alk + acid.

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:	AB onshore GW	Project Number:	19034M-2
Well Number:	RWI-MW5	Date:	~~5/8/19~~ 5/9/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	9.35	Flow Rate (mL/min)	303
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	19.75	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
1034	0.0	9.70	16.2	7.13	2.250	3.38	-89.2	138.0	
1039	0.4	9.73	16.1	7.10	2.239	3.11	-91.2	83.1	
1044	0.8	9.76	16.1	7.04	2.219	2.90	-89.2	34.8	
1049	1.20	9.78	16.1	7.02	2.193	2.71	-87.9	5.11	
1054	1.60	9.79	16.1	7.00	2.175	2.60	-86.9	2.80	
1059	2.00	9.79	16.1	6.99	2.165	2.56	-86.4	2.87	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWI-MW5	1105	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					N
Duplicate					N

Sampled By: LLP

Comments: total + diss zn + cd
Alk. + Acid.

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:	A3 Well Install	Project Number:	190341m-2
Well Number:	RWJ-MW1	Date:	5/7/19
Well Diameter (in):	1	One Well Volume (gal):	
Depth to Product (ft):	NA	QED Controller Settings:	
Depth to Water (ft):	12.41	Flow Rate (mL/min)	265
Product Thickness (ft):	NA	Length of time Purged (min)	40
Depth to Bottom (ft):	39.64	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
840	0.0	12.16	17.6	8.32	2.686	5.68	-85.7	105.9	
845	0.4	12.16	17.4	8.49	2.601	3.19	-230.3	~~77.9~~ 74.4	
850	0.8	12.17	17.4	8.46	2.581	2.65	-238.0	48.6	
855	1.20	12.17	17.4	8.47	2.558	2.32	-246.1	27.9	
900	1.40	12.17	17.4	8.45	2.542	2.06	-256.7	22.3	
906	1.75	12.17	17.5	8.44	2.532	1.91	-263.2	18.7	
910	2.10	12.17	17.5	8.39	2.511	1.81	-271.8	16.5	
915	2.45	12.17	17.4	8.39	2.498	1.72	-281.5	16.0	
920	2.80	12.17	17.4	8.45	2.486	1.63	-288.0	15.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWJ-MW1	925	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: LLP

Comments: total + Diss zn + cd Alk. + Acid.

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:	A3 onshore GW sampling	Project Number:	19034LM-2
Well Number:	RWT-MW5	Date:	5/7/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.96	Flow Rate (mL/min)	303
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	20.10	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
1020	0.0	11.08	16.0	12.03	1.927	3.86	-357.0	69.5	
1025	0.4	11.08	16.3	12.06	1.999	2.89	-358.4	48.4	
1030	0.8	11.07	16.3	12.09	2.046	2.29	-350.9	27.0	
1035	1.20	11.06	16.4	12.09	2.049	1.94	-334.3	12.6	
1040	1.60	11.05	16.4	12.09	2.027	1.86	-326.6	16.7	
1045	2.00	11.03	16.4	12.09	2.003	1.78	-324.1	18.0	
1050	2.40	11.03	16.5	12.09	2.004	1.66	-318.7	18.6	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWT-MW5	10.55	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					Y

Sampled By: LHP

Comments: total + Diss Znt Cd
Alk. + Acid.

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: A3 onshore GW	Project Number: 190341m-2
Well Number: RWK-mw [illegible]	Date: 5/7/19
Well Diameter (in): 1	One Well Volume (gal): ——
Depth to Product (ft): NA	QED Controller Settings: ——
Depth to Water (ft): 12.28	Flow Rate (mL/min) 270
Product Thickness (ft): NA	Length of time Purged (min) 35
Depth to Bottom (ft): 39.65	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
1133	0.0	12.30	18.0	7.40	2.270	3.88	-170.6	1160 AU	
1138	0.4	12.33	18.0	7.11	2.243	2.66	-168.8	139	
1143	0.8	12.37	18.0	7.06	2.250	2.33	-167.0	93.2	
1148	1.20	12.40	18.2	6.99	2.247	2.06	-163.4	40.9	
1153	1.40	12.42	18.2	6.95	2.248	1.87	-159.6	19.5	
1158	1.80	12.45	18.4	6.94	2.244	1.79	-158.0	15.7	
1203	2.10	12.47	18.4	6.93	2.240	1.71	-155.7	14.2	
1208	2.50	12.48	18.5	6.93	2.238	1.63	-154.7	13.8	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWK-MWI	120	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: CLP

Comments: Total + Diss 2nd + Cd
Alk. + Acid.

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:	A3	Project Number:	190341m-2
Well Number:	RWK-MW5	Date:	5/7/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.12	Flow Rate (mL/min)	254
Product Thickness (ft):	NA	Length of time Purged (min)	45
Depth to Bottom (ft):	19.85	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
1330	0.0	11.12	16.6	10.48	0.777	5.13	-36.0	775 AW	
1335	0.35	12.21	16.4	7.81	0.730	3.31	-212.8	221.6	
1340	0.70	13.89	16.3	7.63	0.721	2.86	-196.5	68.0	
1345	1.10	15.01	16.3	7.57	0.735	2.66	-182.7	111.0	
1350	1.50	16.33	16.5	7.50	0.763	2.54	-171.2	83.3	
1355	1.80	15.61	17.0	7.47	0.773	2.49	-167.7	35.5	
1400	2.10	14.34	16.7	7.11	0.746	2.45	-145.4	13.8	
1405	2.40	13.68	16.7	6.85	0.746	2.25	-127.0	12.2	
1410	2.70	13.77	16.8	6.77	0.741	2.11	-118.3	11.8	
1415	3.00	13.84	16.9	6.84	0.749	2.02	-124.8	11.2	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Preservative	Collected?
RWK-MW5	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			Y
		Duplicate			N

Sampled By: LLP

Comments: total + Diss entered Alk. + Acid.

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:	AB onshore GW	Project Number:	190341M-2
Well Number:	RWL-MW1	Date:	5/8/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	12.56	Flow Rate (mL/min)	250
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	39.73	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
910	0.2	12.62	17.3	6.19	2.319	6.91	-50.8	784	
915	0.4	12.61	17.2	5.87	2.266	4.54	-23.7	94.9	
920	0.8	12.59	17.3	5.85	2.247	3.99	-19.3	62.1	
925	1.10	12.58	17.4	5.86	2.210	3.42	-16.5	39.8	
930	1.40	12.55	17.4	5.86	2.197	3.23	-16.0	35.2	
935	1.70	12.54	17.5	5.87	2.154	2.96	-15.7	31.3	
940	2.00	12.53	17.5	5.88	2.122	2.75	-15.4	29.1	
945	2.30	12.53	17.5	5.88	2.103	2.64	-15.3	28.1	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWL-MW1	950	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					N
Duplicate					N

Sampled By: LLP

Comments: total zn + cd + diss zn + cd
Alk + Acidd.

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:	AB onshore GW	Project Number:	190341m-2
Well Number:	RWL-MW5	Date:	5/7/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.67	Flow Rate (mL/min)	227
Product Thickness (ft):	NA	Length of time Purged (min)	15
Depth to Bottom (ft):	19.75	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
1522	0.0	18.43	18.5	6.40	0.768	2.37	-72.4	22.2	
1527	0.30	18.41	18.4	6.37	0.713	2.41	-68.4	21.7	
1532	0.60	18.40	18.9	6.35	0.716	2.40	-65.5	19.6	
1537	0.90	18.42	19.3	6.33	0.709	2.38	-61.5	20.8	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWL-MW5	1540	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss 2ntcd
Alk. + Acid

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:	A3 onshore sampling	Project Number:	190341M-2
Well Number:	RWM-MW1	Date:	5/3/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	13.83	Flow Rate (mL/min)	303
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	39.60	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
1007	0.0	13.91	16.7	6.08	2.095	4.67	-70.2	944.1	
1012	0.4	13.88	16.6	6.06	2.275	3.66	-80.3	481.4	
1017	0.8	13.89	16.6	6.04	2.115	3.10	-80.8	260.3	
1022	1.20	13.89	16.7	6.02	2.131	2.84	-81.1	213.6	
1027	1.60	13.89	16.7	6.02	2.119	2.68	-82.8	237.4	
1032	2.00	13.89	16.6	6.01	2118	2.55	-85.6	275.3	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWM-MW1	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: LLP

Comments: Total + Diss Analyzed for Alk + Acid.

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:	AZ onshore sampling	Project Number:	190341M-2
Well Number:	RWM-MW5	Date:	5/3/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	12.34	Flow Rate (mL/min)	265
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	19.80	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
1058	0.0	13.52	15.7	6.85	0.275	5.16	-22.2	72.5	
1103	0.35	13.43	15.7	6.84	0.269	3.89	-17.3	42.2	
1108	0.70	1335	15.7	6.82	0.271	3.22	-12.8	34.0	
1113	1.05	13.35	15.7	6.83	0.273	2.89	-10.8	47.2	
1118	1.40	13.35	15.7	6.83	0.276	2.67	-9.3	44.4	
1123	1.75	13.35	15.7	6.84	0.279	2.51	-8.4	46.6	
1128	2.10	13.35	15.7	6.84	0.281	2.36	-7.1	53.0	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWM-MW5	1140	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: LLP

Comments: Total znt'd Diss znt'd Alk. + Acid.

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:	A3 onshore sampling	Project Number:	190341m-2
Well Number:	RWN - MW5	Date:	5/3/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.95	Flow Rate (mL/min)	303
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	24.90	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
1324	0.0	12.08	15.6	5.17	2.756	5.55	-8.2	1366.5	
1329	0.4	12.17	15.7	5.02	2.780	4.59	-16.2	1328.1	
1334	0.8	12.29	15.5	4.99	2.817	5.90	-1.2	730.1	
1339	1.20	12.37	15.6	4.90	2.826	4.04	-13.0	624.0	
1344	1.60	12.49	15.7	4.89	2.853	3.37	-17.2	402.7	
1349	2.00	12.53	15.7	4.88	2.875	3.10	-19.2	354.0	
1354	2.40	12.56	15.7	4.88	2.886	2.92	-21.5	262.3	
1359	2.80	12.58	15.8	4.86	2.901	2.71	-21.9	165.9	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWN - MW5	1410	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: LLP

Comments: total + Diss zn + cd Alk + Acid.

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:	A3 Onshore GW	Project Number:	190341m-2
Well Number:	RWO-MW1	Date:	5/10/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	9.81	Flow Rate (mL/min)	288
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	40.12	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
1244	0.0	10.09	16.8	5.69	2.583	3.80	-9.3	68.5	
1249	0.4	11.27	16.9	5.62	2.611	3.19	-9.6	48.1	
1254	0.8	12.53	16.8	5.63	2.641	2.64	-14.4	14.6	
1259	1.20	12.22	17.0	5.63	2.666	2.33	-20.5	12.7	
1304	1.55	11.98	17.2	5.64	2.675	2.17	-24.4	11.4	
1309	1.90	11.91	17.2	5.63	2.689	2.01	-25.5	10.6	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWO-MW1	1315	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					Y
Duplicate					N

Sampled By: LCP

Comments: total + Diss Znt cd Alk. + Acid.

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:	A3 onshore GW	Project Number:	190341.M-2
Well Number:	RWO-MW5	Date:	5/10/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.26	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	45
Depth to Bottom (ft):	20.39	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
1358	0.0	10.27	16.0	6.71	1.478	4.16	-52.1	18.4	Light amount
1403	0.45	10.28	15.9	6.70	1.460	2.99	-62.7	7.01	NAPL during
1408	0.90	10.27	15.7	6.74	1.439	2.56	-67.7	8.08	purging
1413	1.35	10.26	15.7	6.77	1.442	2.29	-71.8	9.15	waited
1418	1.80	10.27	15.8	6.80	1.414	2.10	-74.1	33.1	for sheen to
1423	2.25	10.27	16.0	6.83	1.445	1.99	-76.5	16.2	dissipate before
1428	2.70	10.27	15.9	6.83	1.442	1.91	-77.4	6.69	using flow thru
1433	3.15	10.27	16.3	6.85	1.439	1.82	-79.4	4.49	cell
1438	3.60	10.27	15.9	6.84	1.429	1.78	-79.7	4.36	
1443	4.05	10.27	15.9	6.86	1.426	1.72	-80.8	4.17	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWO-MW5	1445	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					N
Duplicate					N

Sampled By: LCP

Comments: total + Diss. zn + cd
Alk. + Acid

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:	A3 Onshore GW	Project Number:	190341m-2
Well Number:	RWP-MW1	Date:	5/17/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	N/A	QED Controller Settings:	—
Depth to Water (ft):	10.80	Flow Rate (mL/min)	318
Product Thickness (ft):	N/A	Length of time Purged (min)	35
Depth to Bottom (ft):	42.55	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
1353	0-0	19.14	18.1	5.55	5.900	6.72	61.8	73	
1358	0.4	19.22	17.6	5.23	5.208	4.35	56.6	68.1	
1403	0.8	19.44	17.6	5.21	5.265	3.62	51.8	64.9	
1408	1.20	19.60	17.5	5.21	5.287	3.15	48.2	59.3	
1413	1.60	19.91	17.2	5.19	5.205	2.88	46.7	47.9	
1418	2.05	20.84	17.4	5.18	5.284	2.71	46.2	34.9	
1423	2.50	20.98	17.5	5.19	5.299	2.50	42.0	31.7	
1428	2.95	21.10	17.5	5.19	5.331	2.43	41.2	28.8	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWP-MW1	1435	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			N
		Duplicate			Y

Sampled By: LCP

Comments: total (Zn + Cd) + Diss (Zn + Cd)
Alk. + Acidity

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:	AZ onshore GW	Project Number:	190341M-2
Well Number:	~~RWQ~~-RWQ-MW5	Date:	4/5/16/19 5/17/19
Well Diameter (in):		One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	~~9.46~~ 9.50	Flow Rate (mL/min)	416
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	22.92	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
1146	0.0	10.54	14.4	6.34	0.638	5.35	-23.0	35.6	
1151	0.55	10.52	14.5	6.23	0.634	4.27	-1.8	20.1	
1156	1.10	10.52	14.6	6.17	0.630	3.61	7.7	18.5	
1201	1.65	10.52	14.5	6.14	0.626	3.17	14.6	10.23	
1206	2.20	10.52	14.6	6.14	0.625	3.05	16.1	7.19	
1211	2.75	10.52	14.7	6.14	0.623	2.89	18.0	6.42	
1216	3.30	10.52	15.0	6.12	0.623	2.69	17.5	5.97	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWQ MW5	1235	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					~~N~~ Y
Duplicate					

Sampled By: LLP

Comments: total + Diss Zn + CB Alk. + Acid.

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:	AZ onshore GW	Project Number:	190341m-2
Well Number:	RWS-MWS	Date:	5/17/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	6.19	Flow Rate (mL/min)	416
Product Thickness (ft):	NA	Length of time Purged (min) :	30
Depth to Bottom (ft):	22.90	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
1047	0.0	6.45	13.9	6.43	1.234	5.84	-41.1	100.0	
1052	0.55	6.83	14.0	6.38	1.226	4.42	-44.1	71.0	
1057	1.10	7.18	13.9	6.37	1.223	4.02	-44.5	46.3	
1102	1.65	7.69	14.0	6.35	1.219	3.63	-44.6	24.5	
1107	2.20	7.72	14.1	6.33	1.219	3.26	-44.5	16.5	
1112	2.75	7.77	14.0	6.32	1.218	3.00	-44.1	14.9	
1117	3.30	7.83	14.1	6.31	1.216	2.90	-43.8	13.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWS-MWS	1125	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					N
Duplicate					N

Sampled By: LP

Comments: total + DISS. zn-tot Alk. + Acidity

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:	A3 onshore GW	Project Number:	190341m-2
Well Number:	RWS-MW1	Date:	5/17/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	12.43	Flow Rate (mL/min)	416
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	46.40	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
952	0.0	13.30	15.2	5.57	6.047	4.76	-14.3	51.6	
957	0.55	13.45	15.4	5.54	5.897	4.14	-15.1	43.7	
1002	1.10	13.49	15.3	5.52	5.817	3.88	-15.2	30.9	
1007	1.65	13.52	15.2	5.50	5.681	3.58	-15.2	28.0	
1012	2.20	13.57	15.1	5.48	5.551	3.36	-15.0	20.7	
1017	2.75	13.60	15.0	5.46	5.486	3.23	-15.0	19.3	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWS-MW1	1025	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					Y
Duplicate					N

Sampled By: LVP

Comments: total + Diss. Zn + Cd
Alk + Acidity

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:	A3 onshore GW	Project Number:	190341M-2
Well Number:	RWQ-MWI	Date:	5/16/19
Well Diameter (in):	1	One Well Volume (gal):	
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	13.54	Flow Rate (mL/min)	~ 416
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	42.52	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
1236	0.0	13.70	16.3	5.90	3.125	4.85	1.4	60.8	
1241	0.55	13.70	16.0	5.76	3.022	3.81	-3.9	30.1	
1246	1.10	13.74	16.3	5.74	2.992	3.24	-7.7	28.9	
1251	1.65	13.78	15.9	5.72	2.938	2.98	-9.2	19.9	
1256	2.20	13.78	16.3	5.66	2.951	2.78	-9.7	13.2	
1301	2.75	13.78	15.7	5.64	2.885	2.62	-10.7	8.10	
1306	3.30	13.78	15.8	5.63	2.877	2.49	-11.8	8.98	
1311	3.85	13.79	16.1	5.63	2.880	2.37	-13.7	8.25	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWQ-MWI	1320	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					N
Duplicate					N

Sampled By: LP

Comments: total + Diss Zn + Cel Alk + Acid.

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:	A3 onshore GW	Project Number:	190341/M-2
Well Number:	RWF-MWS	Date:	5/16/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.18	Flow Rate (mL/min)	379
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	22.75	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
1024	0.0	12.03	15.3	5.58	2.173	4.35	27.2	74.5	
1029	0.50	12.05	15.4	5.44	2.166	3.67	31.7	58.3	
1034	1.00	12.05	15.4	5.42	2.161	3.36	36.0	30.4	
1039	1.50	12.06	15.4	5.40	2.156	3.08	39.7	21.9	
1044	2.00	12.06	15.4	5.37	2.148	2.86	43.2	14.5	
1049	2.50	12.06	15.4	5.37	2.144	2.69	45.3	13.3	
1054	3.00	12.06	15.4	5.35	2.119	2.60	46.9	12.2	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWF-MWS	1105	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			N
		Duplicate			N

Sampled By: LLP

Comments: total + Diss filtered
A/K. + Acidity

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:	A3 onshore GW	Project Number:	190344m-2
Well Number:	RWF-MW1	Date:	5/16/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.55	Flow Rate (mL/min)	416
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	42.56	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
929	0.0	10.73	16.6	6.73	11.360	6.43	-91.0	92.1	
934	0.55	10.75	16.5	6.61	11.213	4.94	-90.5	75.8	
939	1.10	10.75	16.6	6.59	11.090	4.27	-89.1	37.0	
944	1.65	10.76	16.6	6.57	11.010	3.92	-88.0	16.7	
949	2.20	10.76	16.6	6.56	10.913	3.59	-86.9	13.3	
954	2.75	10.76	16.6	6.55	10.830	3.39	-86.3	11.6	
959	3.30	10.76	16.6	6.53	10.763	3.18	-85.6	10.9	
1004	3.85	10.76	16.6	6.54	10.708	2.99	-85.5	11.2	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWF-MW1	1005	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss zn + cd
Alk. + Acidity

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:	A3 onshore GW	Project Number:	19071M-2
Well Number:	RWB-MW5	Date:	5/15/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	17.76	Flow Rate (mL/min)	257
Product Thickness (ft):	NA	Length of time Purged (min)	20
Depth to Bottom (ft):	23.31	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
1030	0.0	18.73	16.3	10.77	1.455	4.25	-224.4	47.1	
1035	0.3	22.02	16.3	9.37	1.488	3.54	-174.5	32.3	
1040	0.6	22.65	16.8	8.91	1.509	3.09	-204.3	45.3	
1045	0.9	pumped dry			will return to sample				
1505	1.10	20.35	19.2	9.73	1.328	6.02	-68.7	14.6	
1510	1.35	22.25	20.6	9.20	1.344	4.93	-58.6	12.1	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWB-MW5	1515	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			N
		Duplicate			N

Sampled By: LEP

Comments: total + diss Zn + Cd & need to purge very slow
Alk. + Acid.

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:	A3 onshore (GW)	Project Number:	190344.m-2
Well Number:	RW22R-MWS	Date:	5/15/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	14.70	Flow Rate (mL/min)	379
Product Thickness (ft):	NA	Length of time Purged (min)	20
Depth to Bottom (ft):	22.95	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
1400	0.0	14.75	16.5	6.64	2.391	5.93	-31.9	32.4	
1405	0.5	14.75	16.4	6.58	2.430	5.11	-30.6	21.2	
1410	1.00	14.75	16.4	6.65	2.456	4.69	-35.1	4.80	
1415	1.50	14.75	16.5	6.69	2.480	4.53	-38.1	1.75	
1420	2.00	14.75	16.0	6.70	2.471	4.49	-39.4	1.10	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Preservative	Collected?
RW22R-MWS	1430	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					N
Duplicate					N

Sampled By: LLP

Comments: total & Diss Zn + cl
Alk + Acidity

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:	A3 onshore GW	Project Number:	190341m-2
Well Number:	RWA-MW5	Date:	5/15/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	8.84	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	20
Depth to Bottom (ft):	16.90	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
1313	0.0	8.85	17.2	7.63	2.537	3.91	-63.8	16.5	
1318	0.45	8.85	17.1	7.86	2.638	3.31	-95.2	6.88	
1323	0.90	8.85	17.1	8.21	2.703	2.90	-130.3	4.97	
1328	1.35	8.85	17.3	8.31	2.724	2.76	-144.3	2.29	
1333	1.80	8.85	18.4	8.24	2.748	2.57	-142.5	1.16	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWA-MW5	1335	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
B/K. + Acidity

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:	A3 onshore GW	Project Number:	190341m-2
Well Number:	RWA-MW7	Date:	5/15/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	9.34	Flow Rate (mL/min)	265
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	23.14	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
~~1208~~	~~0.0~~	~~14.40~~	~~18.0~~	~~5.36~~	~~3.075~~	~~6.73~~	~~73.3~~	~~85.1~~	
~~1213~~	~~0.35~~		~~19.3~~	~~5.32~~	~~3.170~~	~~6.45~~	~~76.3~~		
1233	0.00	18.64	18.3	5.49	2.968	3.53	60.3	109.0	
1238	0.35	18.63	18.3	5.40	2.945	3.23	61.4	107.3	
1243	0.70	18.82	18.3	5.40	2.927	3.01	61.3	83.4	
1248	1.05	19.12	18.3	5.40	2.915	2.89	61.3	65.1	
1253	1.40	19.24	18.5	5.40	2.907	2.69	60.8	70.9	
1258	1.75	19.32	18.3	5.39	2.888	2.59	61.1	75.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWA-MW7	1300	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					N
Duplicate					N

Sampled By: LVP

Comments: total + Diss. Zn + Cd
Alk. + Acid.

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:	A3 onshore GW	Project Number:	19034/m-2
Well Number:	RWB-MW1	Date:	5/15/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	18.24	Flow Rate (mL/min)	265
Product Thickness (ft):	NA	Length of time Purged (min)	15
Depth to Bottom (ft):	42.32	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
1003	0.0	26.86	16.8	6.58	1.719	3.02	-46.7	37.5	Very silty
1008	0.35	26.55	16.8	6.47	1.713	2.78	-42.2	36.8	during
1013	0.70	26.38	16.8	6.45	1.706	2.75	-41.0	36.3	purging
1018	1.05	26.18	16.9	6.43	1.696	2.68	-38.9	34.6	prior to
									using YSI

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWB-MW1	1020	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
Alk. + Acid.

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:	A3 onshore GW	Project Number:	19034M-2
Well Number:	RW22R-MW1	Date:	5/14/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	15.47	Flow Rate (mL/min)	227
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	42.73	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
1434	0.0	28.72	16.0	6.26	2.882	2.69	-53.5	31.3	
1439	0.3	28.93	16.3	6.15	2.857	2.46	-49.5	26.2	
1444	0.6	29.07	16.3	6.13	2.850	2.39	-48.3	19.5	
1449	0.9	29.21	16.3	6.11	2.826	2.28	-46.3	17.9	
1454	1.20	29.50	16.3	6.08	2.805	2.23	-44.7	16.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW22R-MW1	1500	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					N
Duplicate					N

Sampled By: LVP

Comments: Zn + Cd (total + diss) Alk. + Acid.

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:	AB onshore GW	Project Number:	190341M-2
Well Number:	RWD-MW5	Date:	5/14/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.76	Flow Rate (mL/min)	227
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	32.15	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
1322	0.0	18.48	14.9	6.71	0.734	3.00	-47.8	43.5	Light color
1327	0.3	18.47	14.9	6.65	0.741	2.86	-47.7	31.3	very silty
1332	0.6	18.45	14.8	6.57	0.690	2.71	-40.7	17.7	during purging
1337	0.9	18.52	14.8	6.53	0.678	2.58	-37.8	15.2	
1342	1.20	18.64	14.9	6.54	0.669	2.48	-38.3	13.4	
1347	1.50	18.68	15.0	6.53	0.659	2.39	-36.7	15.6	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWD-MW5	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					N
Duplicate					N

Sampled By: LP

Comments: total + Diss. Zn + Ca
Alk + Acidity

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:	AB onshore GW	Project Number:	160341M-2
Well Number:	RWD-MW#I	Date:	5/14/19
Well Diameter (in):	1	One Well Volume (gal):	———
Depth to Product (ft):	NA	QED Controller Settings:	———
Depth to Water (ft):	13.53	Flow Rate (mL/min)	372
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	42.58	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
1115	0.0	13.42	16.2	6.52	3.332	6.74	148.0	84.3	
1120	0.45	13.40	16.2	5.93	3.210	4.37	-0.1	74.8	
1125	0.95	13.39	16.2	5.87	3.175	3.76	3.2	63.0	
1130	1.45	13.38	15.8	5.83	3.117	3.26	6.0	41.7	
1135	1.95	13.38	15.8	5.81	3.092	3.06	6.7	35.5	
1140	2.45	13.37	15.9	5.80	3.072	2.85	7.5	33.9	
1145	2.95	13.35	15.8	5.79	3.046	2.71	8.1	32.1	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWD-MW#I	1150	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					N
Duplicate					N

Sampled By: LMP

Comments: total + Diss Zn + Cl
Alk. + Acid.

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:	A3 onshore GW	Project Number:	19034/m-2
Well Number:	RWDSR-MW1	Date:	5/13/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.95	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	42.50	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
1414	0.0	10.93	16.1	6.57	7.627	4.40	-97.6	53.11	
1419	0.45	10.93	16.0	6.50	7.609	3.73	-96.7	29.9	
1424	0.90	10.93	16.1	6.49	7.589	3.22	-97.5	14.0	
1429	1.35	10.92	16.3	6.48	7.577	2.83	-98.9	11.9	
1434	1.80	10.92	16.2	6.47	7.568	2.61	-99.1	8.78	
1439	2.25	10.92	16.2	6.46	7.549	2.50	-99.4	9.13	
1444	2.70	10.92	16.2	6.46	7.551	2.39	-99.8	8.77	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWDSR-MW1	1455	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					N
Duplicate					N

Sampled By: CLP

Comments: Total + Diss zinc cd Alk + Acid.

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: A3 onshore GW	Project Number: 19034.1M-2
Well Number: ~~A3 onshore GW~~ (RWG-MWS)	Date: 5/13/19
Well Diameter (in): 1	One Well Volume (gal): —
Depth to Product (ft): NA	QED Controller Settings: —
Depth to Water (ft): 11.26	Flow Rate (mL/min) 291
Product Thickness (ft): NA	Length of time Purged (min) 45
Depth to Bottom (ft): 22.71	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
1150	0.0	11.30	14.0	9.74	1.037	5.79	-259.9	51	
1155	0.4	11.34	13.9	9.71	1.539	3.77	-279.9	45.7	
1200	0.8	11.37	14.0	9.71	1.568	3.13	-280.2	39.5	
1205	1.20	11.39	13.9	9.73	1.569	2.74	-280.5	33.8	
1210	1.60	11.46	13.9	9.64	1.974	2.52	-283.7	28.6	
1215	2.00	11.49	13.9	9.52	2.311	2.33	-295.4	19.75	
1220	2.40	11.50	13.9	9.35	2.614	2.18	-307.9	10.39	
1225	2.75	11.42	13.8	9.26	2.830	2.11	-309.9	8.12	
1230	3.10	11.33	13.8	9.18	2.983	2.01	-312.7	5.24	
1235	3.45		13.8	9.09	3.105	1.94	-310.4	4.99	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWG-MWS	1240	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss. Zn + Cd
Alk. + Acid
cond not stable

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:	A3 Onshore GW	Project Number:	190341M-2
Well Number:	RWG-MW1	Date:	5/13/19
Well Diameter (in):	1	One Well Volume (gal):	
Depth to Product (ft):	NA	QED Controller Settings:	
Depth to Water (ft):	11.10	Flow Rate (mL/min)	329
Product Thickness (ft):	N/A	Length of time Purged (min)	45
Depth to Bottom (ft):	37.54	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
1046	0.0	11.09	15.3	6.73	10.287	5.32	-96.5	82	
1051	0.45	11.08	15.2	6.71	10.322	4.42	-107.7	77.8	
1056	0.90	11.07	15.2	6.71	10.337	3.95	-112.9	57.1	
1101	1.35	11.06	15.2	6.71	10.330	3.57	-116.7	32.2	
1106	1.80	11.05	15.3	6.72	10.353	3.19	-121.3	25.4	
1111	2.25	11.04	15.4	6.72	10.373	3.00	-123.1	19.8	
1116	2.70	11.04	15.3	6.72	10.359	2.88	-124.2	15.3	
1121	3.10	11.03	15.4	6.73	10.388	2.72	-127.2	13.2	
1126	3.50	11.03	15.4	6.74	10.400	2.53	-130.3	12.1	
1131	3.90	11.03	15.4	6.73	10.408	2.45	-130.7	11.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWG-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					N
Duplicate					N

Sampled By: LCP

Comments: total + Diss, zn rcd
All + Acid

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:	A3 onshore GW	Project Number:	190341M-2
Well Number:	RWQ-MW1	Date:	5/16/19
Well Diameter (in):	1	One Well Volume (gal):	
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	13.54	Flow Rate (mL/min)	~ 416
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	42.52	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
1236	0.0	13.70	16.3	5.90	3.125	4.85	1.4	60.8	
1241	0.55	13.70	16.0	5.76	3.022	3.81	-3.9	30.1	
1246	1.10	13.74	16.3	5.74	2.992	3.24	-7.7	28.9	
1251	1.65	13.78	15.9	5.72	2.938	2.98	-9.2	19.9	
1256	2.20	13.78	16.3	5.66	2.951	2.78	-9.7	13.2	
1301	2.75	13.78	15.7	5.64	2.885	2.62	-10.7	8.10	
1306	3.30	13.78	15.8	5.63	2.877	2.49	-11.8	8.98	
1311	3.85	13.79	16.1	5.63	2.880	2.37	-13.7	8.25	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWQ-MW1	1320	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			N
		Duplicate			N

Sampled By: LP

Comments: total + diss Zn + Cd AIK + Acid.

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:	AB onshore GW	Project Number:	190341M-2
Well Number:	~~RWQ~~ RWQ-MW5	Date:	4/5/19 ~~5/16/19~~ 5/17/19
Well Diameter (in):		One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	~~9.40~~ 9.50	Flow Rate (mL/min)	416
Product Thickness (ft):	Nil	Length of time Purged (min)	30
Depth to Bottom (ft):	22.92	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
1146	0.0	10.54	14.4	~~6.4~~ 6.4	0.638	5.35	-23.0	35.6	
1151	0.55	10.52	14.5	6.23	0.634	4.27	-1.8	20.1	
1156	1.10	10.52	14.6	6.17	0.630	3.61	7.7	18.5	
1201	1.65	10.52	14.5	6.14	0.626	3.17	14.6	10.23	
1206	2.20	10.52	14.6	6.14	0.625	3.05	16.1	7.19	
1211	2.75	10.52	14.7	6.14	0.623	2.89	18.0	6.42	
1216	3.30	10.52	15.0	6.12	0.623	2.69	17.5	5.97	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWQ-MW5	1235	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					~~Y~~ N
Duplicate					

Sampled By: LLP

Comments: total + Diss Zn + CN
Alk. + Acid.

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:	A3 onshore GW	Project Number:	190341M-2
Well Number:	RWR-MW1	Date:	5/10/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.90	Flow Rate (mL/min)	326
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	39.64	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
931	0.0	11.98	15.3	5.50	6.076	7.16	-35.6	84	
936	0.45	11.93	15.2	5.31	5.853	3.93	-64.5	71.0	
941	0.90	11.87	15.2	5.29	5.685	3.32	-71.8	54.5	
946	1.35	11.86	15.3	5.27	5.539	2.93	-74.2	52.7	
951	1.80	11.85	15.3	5.26	5.396	2.68	-76.2	50.9	
956	2.20	11.85	15.3	5.25	5.335	2.47	-77.6	26.5	
1001	2.60	11.85	15.4	5.24	5.190	2.35	-79.0	24.0	
1006	3.00	11.85	15.3	5.24	5.052	2.24	-79.5	22.8	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWR-MW1	1010	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					N
Duplicate					N

Sampled By: LEP

Comments: Total + Diss Zn + Cd
Alk + Acid.

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:	A3 onshore GW	Project Number:	190341M-2
Well Number:	RWR-MW5	Date:	5/10/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.03	Flow Rate (mL/min)	288
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	19.83	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
1028	0.0	11.70	14.5	5.03	2.077	3.90	8.8	79.0	
1033	0.4	11.01	14.6	4.88	2.034	3.08	12.6	82.3	
1038	0.8	10.68	14.7	4.88	1.993	2.60	14.6	84.8	
1043	1.20	10.56	14.9	4.87	1.962	2.36	16.8	83.0	
1048	1.60	10.51	15.2	4.86	1.956	2.22	17.1	58.8	
1053	2.00	10.45	15.5	4.86	1.941	2.11	18.9	55.6	
1058	2.30	10.40	15.6	4.85	1.916	1.98	20.1	58.5	
~~1103~~	~~2.60~~								

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWR-MW5	1105	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					N
Duplicate					Y

Sampled By: LLP

Comments: 4 total + Diss mt cd
Alk + Acid

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:	AB onshore GW	Project Number:	190341m-2
Well Number:	RWS-MW1	Date:	5/17/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	12.43	Flow Rate (mL/min)	416
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	46.40	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
952	0.0	13.30	15.2	5.57	6.047	4.76	-14.3	51.6	
957	0.55	13.45	15.4	5.54	5.897	4.14	-15.1	43.7	
1002	1.10	13.49	15.3	5.52	5.817	3.88	-15.2	30.9	
1007	1.65	13.52	15.2	5.50	5.681	3.58	-15.2	28.0	
1012	2.20	13.57	15.1	5.48	5.551	3.36	-15.0	20.7	
1017	2.75	13.60	15.0	5.46	5.486	3.23	-15.0	19.3	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWS-MW1	1025	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					N
Duplicate					N

Sampled By: LVP

Comments: total + Diss. Zn + Cr
Alk + Acidity

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:	AZ onshore GW	Project Number:	190341m-2
Well Number:	RWS-MW5	Date:	5/17/19
Well Diameter (in):	1	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	6.19	Flow Rate (mL/min)	416
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	22.90	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
1047	0.0	6.45	13.9	6.43	1.234	5.84	-41.1	100.0	
1052	0.55	6.83	14.0	6.38	1.226	4.42	-44.1	71.0	
1057	1.10	7.18	13.9	6.37	1.223	4.02	-44.5	46.3	
1102	1.65	7.69	14.0	6.35	1.219	3.63	-44.6	24.5	
1107	2.20	7.72	14.1	6.33	1.219	3.26	-44.5	16.5	
1112	2.75	7.77	14.0	6.32	1.218	3.00	-44.1	14.9	
1117	3.30	7.83	14.1	6.31	1.216	2.90	-43.8	13.7	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RWS-MW5	1125	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			N
		Duplicate			N

Sampled By: LLP

Comments: total + diss. zn too
Alk. + Acidity

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:	A3 GW Direct Support	Project Number:	80227m-L-1
Well Number:	RW01-MWI	Date:	5/29/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	8.42	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	37.62	Condition of Pad/Cover:	Good / Good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (fect)	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
1040	0.0	8.65	18.6	6.23	5.016	5.37	-55.1	38.7	
1045	0.45	8.69	18.6	6.19	5.108	3.84	-64.3	22.0	
1050	0.90	8.67	18.6	6.20	5.330	3.22	-68.0	18.2	
1055	1.35	8.63	18.6	6.25	5.531	2.81	-75.0	14.9	
1100	1.80	8.63	18.7	6.25	5.677	2.57	-85.8	9.02	
1105	2.25	8.65	18.6	6.25	5.764	2.40	-83.5	8.42	
1110	2.70	8.65	18.3	6.26	5.871	2.26	-82.8	7.91	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW01-MWI	1120	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss zn + cd
Alk. + Acid.

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:	A3 EW Direct Support	Project Number:	180227M-1-1
Well Number:	RW01-MW5	Date:	5/29/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	8.62	Flow Rate (mL/min)	416
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	19.20	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
1311	0.0	8.81	19.3	5.88	1.266	5.83	30.0	62.3	very silty during purging
1316	0.55	8.83	18.6	5.49	1.221	4.07	53.7	26.5	
1321	1.10	8.81	18.1	5.40	1.240	3.36	62.7	21.3	
1326	1.65	8.79	18.5	5.34	1.263	2.98	69.3	15.0	
1331	2.20	8.77	18.6	5.30	1.276	2.73	71.8	10.33	
1336	2.75	8.76	18.8	5.24	1.284	2.51	76.8	8.57	
1341	3.30	8.76	18.7	5.21	1.281	2.39	79.5	7.72	
1346	3.85	8.76	18.3	5.20	1.268	2.32	80.3	6.99	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW01-MW5	1350	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					N
Duplicate					N

Sampled By: LCP

Comments: total + Diss Zn + Cd Alk. + Acid.

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:	AB GW Direct Support	Project Number:	180227M-1-1
Well Number:	RW02-MW5	Date:	5/29/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	8.45	Flow Rate (mL/min)	397
Product Thickness (ft):	NA	Length of time Purged (min)	40
Depth to Bottom (ft):	35	Condition of Pad/Cover:	poor / Good cracked/water in hole

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
851	0.0	9.10	17.7	6.74	5.307	5.76	-165.4	89.5	
856	0.5	9.11	17.9	6.55	6.489	4.20	-103.6	55.3	
901	1.00	9.11	17.7	6.49	6.941	3.57	-97.9	47.8	
906	1.50	9.11	17.7	6.46	7.093	3.24	-94.4	39.2	
911	2.00	9.11	17.7	6.43	7.206	2.90	-90.8	24.1	
916	2.55	9.16	17.7	6.41	7.302	2.76	-89.0	20.1	
921	3.10	9.20	17.7	6.40	7.303	2.61	-87.6	15.8	
926	3.65	9.21	17.6	6.39	7.287	2.53	-86.6	13.6	
931	4.20	9.21	17.6	6.39	7.314	2.42	-86.1		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW02-MW5	935	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss zn + cl
Alk + Acid

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:	AS GW direct support	Project Number:	180227MN-1-1
Well Number:	RW02-MW5	Date:	5/29/19
Well Diameter (in):	2	One Well Volume (gal):	
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	8.52	Flow Rate (mL/min)	227
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	18.24	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
943	0.0	10.37	21.3	6.49	0.956	4.43	-48.7	33.8	
948	0.3	10.41	22.3	6.31	0.837	3.42	-37.7	16.9	
953	0.6	10.47	23.5	6.24	0.940	2.73	-34.1	14.8	
958	0.9	10.50	23.9	6.18	0.965	2.45	-30.3	11.6	
1003	1.20	10.53	23.8	6.14	0.977	2.27	-26.9	10.81	
1008	1.50	10.55	23.8	6.12	0.999	2.16	-25.5	9.44	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW02-MW5	1015	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cd
Alk. + Acidity

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:	A3 GW Direct Support	Project Number:	180227M-1-1
Well Number:	RW03-MW1	Date:	5-28-19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	9.42	Flow Rate (mL/min)	379
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	40.69	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
929	0.0	9.48	16.7	6.38	8.892	6.11	-72.0	11.01	
934	0.5	9.48	16.7	6.14	8.525	4.38	-49.8	10.43	
939	1.00	9.49	16.7	6.09	8.360	3.77	-41.6	9.75	
944	1.50	9.49	16.7	6.08	8.117	3.37	-38.7	9.22	
949	2.00	9.49	16.7	6.07	7.897	3.02	-35.9	10.92	
954	2.50	9.49	16.7	6.06	7.732	2.83	-34.6	13.3	
959	3.00	9.49	16.7	6.07	7.554	2.66	-33.7	12.3	
1004	3.50	9.49	16.8	6.07	8.072	2.54	-32.9	12.1	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW03-MW1	1010	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					N
Duplicate					Y

Sampled By: LLP

Comments: total + Diss rntcd AIK. + Acid.

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:	A3 GW Direct Support	Project Number:	180227M-1-1
Well Number:	RW03-MW05	Date:	5-28-19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	8.93	Flow Rate (mL/min)	303
Product Thickness (ft):	NA	Length of time Purged (min)	40
Depth to Bottom (ft):	21.25	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
1024	0.0	9.10	16.0	5.48	0.824	4.39	68.8	81.1	
1029	0.4	9.13	16.2	5.36	0.862	2.93	90.4	21.6	
1034	0.8	9.14	16.3	5.36	0.864	2.79	92.2	19.7	
1039	1.20	9.16	16.1	5.35	0.870	2.65	95.0	12.5	
1044	1.60	9.16	16.2	5.29	0.872	2.45	100.9	9.11	
1049	2.00	9.17	16.2	5.26	0.871	2.32	104.7	~~9.10~~ 6.23	
1054	2.40	9.17	16.2	5.25	0.869	2.22	106.4	4.94	
1059	2.80	9.17	16.1	5.23	0.872	2.13	108.7	4.03	
1105	~~3~~ 3.20	9.17	16.2	5.22	0.875	2.05	109.9	3.81	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW03-MW05	1110	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss. zn + cd
Alk. + Acid.

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:	AB 6W direct support	Project Number:	180227M-1-1
Well Number:	RW04-MWS	Date:	5/22/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	7.30	Flow Rate (mL/min)	220
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	13.24	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
1118	0.0	7.91	14.3	6.90	0.743	6.87	-2.4	13.70	
1123	0.40	9.43	14.9	6.82	0.734	5.96	19.3	17.12	
1128	0.70	10.92	15.1	6.85	0.732	5.49	12.1	18.33	
1133	1.10	12.43	15.0	6.96	0.730	4.35	-16.3	19.87	
1138	1.25	12.61	17.2	6.98	0.747	3.66	-16.5	20.00	
1143	1.50	12.87	17.4	6.94	0.747	3.93	-10.4	7.21	
1148	1.75	13.10	17.6	6.93	0.749	4.00	-9.3	6.75	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Preservative	Collected?
RW04-MWS	1205	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss zn + cd Alk. + Acid.

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: A3 GW direct support	Project Number: 180227m-1-1
Well Number: RW05-MW05	Date: 5/23/19
Well Diameter (in): 2	One Well Volume (gal): —
Depth to Product (ft): NA	QED Controller Settings: —
Depth to Water (ft): 7.99	Flow Rate (mL/min) 227
Product Thickness (ft): NA	Length of time Purged (min) 45
Depth to Bottom (ft): 16.90	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
1336	0.0	8.52	19.1	9.12	1.508	5.09	-27.6	24.4	
1341	0.30	8.73	19.3	9.11	1.516	4.33	-30.9	22.8	
1346	0.60	9.10	19.3	9.15	1.531	3.94	-31.2	21.0	
1351	0.90	9.33	19.7	9.17	1.525	3.49	-29.6	17.9	
1356	1.20	9.57	19.2	9.21	1.507	3.42	-25.9	13.4	
1401	1.50	9.70	19.7	9.29	1.515	3.40	-24.2	10.3	
1406	1.80	9.77	20.2	9.36	1.520	3.23	-24.5	7.55	
1411	2.10	9.85	20.1	9.35	1.510	3.04	-22.8	5.81	
1416	2.40	9.91	19.4	9.35	1.507	2.83	-20.8	4.87	
1421	2.70	10.00	20.2	9.35	1.503	2.55	-20.9	4.61	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW05-MW05	1425	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + Cr6 Alk + Acid.

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:	A3 GW Invest Support	Project Number:	180227m-1-1
Well Number:	RW06 - MWD	Date:	5/23/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.64	Flow Rate (mL/min)	227
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	58	Condition of Pad/Cover:	Good / Good water in hole

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
1036	0.0	15.53	17.3	6.64	2.097	5.11	-72.1	8.97	
1041	0.45	17.12	17.4	6.54	2.080	3.82	-117.3	9.60	
1046	0.75	18.20	17.4	6.50	2.071	3.33	-111.7	10.34	
1051	1.00	19.42	17.8	6.48	2.070	3.01	-108.5	10.36	
1056	1.25	20.86	18.2	6.48	2.071	2.73	-106.3	10.34	
1101	1.50	21.44	18.3	6.47	2.065	2.58	-104.9	9.56	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW06-MWD	1105	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					N
Duplicate					N

Sampled By: LCP

Comments: total + Diss Zn + Cd
Alk. + Acid.

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:	AS GW direct support	Project Number:	180227m-1-1
Well Number:	RW06-MWI	Date:	5-23-19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	9.47	Flow Rate (mL/min)	265
Product Thickness (ft):	NA	Length of time Purged (min)	20
Depth to Bottom (ft):	29.52	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
1200	0.0	9.50	17.4	7.74	0.225	6.61	43.6	22.2	
1205	0.4	9.51	17.3	7.37	0.223	5.97	48.2	22.2	
1210	0.8	9.51	17.4	7.29	0.225	5.78	46.3	22.6	
1215	1.20	9.51	17.6	7.25	0.227	5.66	37.5	22.9	
1220	1.60	9.51	17.6	7.16	0.237	5.56	29.2	19.8	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW06-MWI	1230	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					N
Duplicate					N

Sampled By: LP

Comments: total + diss Zn + Cr6 Alk. + Acid.

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:	AB GW Direct Support	Project Number:	180227M-1-1
Well Number:	RW06 – MWS	Date:	5/23/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	7.12	Flow Rate (mL/min)	242
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	9.84	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
1114	0.0	7.30	17.4	8.56	0.543	6.64	-113.1	90.7	
1119	0.35	7.49	16.8	8.66	0.664	6.57	-83.1	77.6	
1124	0.70	7.61	16.7	8.69	0.734	6.50	-41.1	49.1	
1129	1.05	7.83	16.6	8.67	0.772	6.42	-2.6	35.2	
1134	1.35	7.85	16.5	8.70	0.796	6.33	17.1	22.0	
1139	1.65	7.87	16.2	8.64	0.823	6.63	34.3	14.2	
1144	1.95	7.88	16.4	8.63	0.833	6.41	42.4	13.1	
1149	2.25	7.88	16.4	8.68	0.833	6.26	50.8	12.8	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW06-MWS	1155	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					N
Duplicate					N

Sampled By: LVP

Comments: total + diss Zn + Cd
Alk. + Acid.

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:	AF3 GWI direct support	Project Number:	180227m-1-1
Well Number:	5/24/19 RW07-MW1	Date:	5/24/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.49	Flow Rate (mL/min)	353
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	41.40	Condition of Pad/Cover:	Good / Good

PURGING RECORD

Time	Volume Purged (gallons)	DTW (feet) 11.49	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
915	0.0	~~11.4~~	17.4	6.10	2.658	5.57	-68.2	27.5	
920	0.5	11.72	17.4	5.94	2.653	4.05	-60.8	24.8	
925	1.00	11.70	17.4	5.88	2.677	3.46	-55.5	22.3	
930	1.45	11.70	17.3	5.79	2.827	2.94	-46.4	25.4	
935	1.90	11.70	17.3	5.74	2.888	2.73	-42.2	16.1	
940	2.35	11.70	17.4	5.70	2.917	2.51	-37.1	17.8	
945	2.80	11.70	17.4	5.68	2.919	2.40	-34.4	17.9	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW07-MW1	945	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: LCP

Comments: total + Diss Zn + Cr
Alk. + Acid

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:	AF GLD direct support	Project Number:	180227m-1-4
Well Number:	RW07-MW05	Date:	5/24/19
Well Diameter (in):	2	One Well Volume (gal):	———
Depth to Product (ft):	NA	QED Controller Settings:	———
Depth to Water (ft):	9.95	Flow Rate (mL/min)	265
Product Thickness (ft):	NA	Length of time Purged (min)	20
Depth to Bottom (ft):	22.59	Condition of Pad/Cover:	Good / s/u too high cover doesn't close

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
953	0.0	10.35	15.9	6.94	1.024	4.30	-57.4	23.1	
958	0.35	10.31	15.9	6.88	1.010	4.10	-34.5	14.8	
1003	0.70	10.30	15.9	6.88	1.004	4.09	103.7	11.35	
1008	1.05	10.30	15.8	6.88	0.994	4.11	110.2	10.74	
1013	1.40	10.30	15.9	6.89	0.994	4.10	112.6	9.81	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW07-MW5	1025	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: LMP

Comments: total + Diss Zn + Cd MK. + Acid.

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:	AB GW Direct Support	Project Number:	180229M-11
Well Number:	RW08-MW1	Date:	5/24/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.21	Flow Rate (mL/min)	257
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	38.63	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
1240									
~~1245~~	0.0	11.73	17.4	6.31	1.295	4.58	-72.8	12.3	
1245	0.35	12.95	17.4	6.26	1.278	3.45	-72.7	11.7	
1250	0.70	14.35	17.5	6.25	1.278	3.06	-73.4	~~11.35~~	11.0
1255	1.05	14.73	17.9	6.14	1.478	2.65	-81.6	13.3	
1300	1.35	15.10	17.5	6.13	1.498	2.46	-84.6	10.03	
1305	1.70	15.41	17.5	6.15	1.512	2.30	-88.2	10.37	
1310	2.05	15.68	17.5	6.16	1.499	2.19	-89.6	10.68	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW08-MW1	1320	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss zn + cd
Alk. + Acid.

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:	A3 GW direct support	Project Number:	180229m-17
Well Number:	RW08-MW5	Date:	5-24-19
Well Diameter (in):	2	One Well Volume (gal):	
Depth to Product (ft):	NA	QED Controller Settings:	
Depth to Water (ft):	9.32	Flow Rate (mL/min)	
Product Thickness (ft):	NA	Length of time Purged (min)	40
Depth to Bottom (ft):	17.53	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
1347	0.0	9.87	16.7	5.74	0.926	4.62	50.6	51.0	
1352	0.3	10.10	16.8	5.74	0.928	3.88	35.4	36.4	
1357	0.6	10.15	16.9	5.73	0.930	3.75	29.7	22.1	
1402	0.9	10.18	16.9	5.69	0.939	3.54	32.3	16.6	
1407	1.20	10.19	17.1	5.60	0.946	2.64	43.7	12.61	
1412	1.50	10.20	17.3	5.60	0.942	2.48	45.9	5.12	
1417	1.80	10.21	17.3	5.67	0.942	2.25	44.8	3.98	
1422	2.10	10.21	17.2	5.77	0.936	2.07	40.0	1.83	
1427	2.40	10.22	17.1	5.81	0.928	2.01	37.9	3.64	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW08-MW5	1440	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					N
Duplicate					N

Sampled By: CP

Comments: total + DISS Zn + Cr6 AIK. + Acid.

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:	A3 GW	Project Number:	180227M-1-7
Well Number:	RW09-MWI	Date:	5/28/19
Well Diameter (in):	2	One Well Volume (gal):	
Depth to Product (ft):	NA	QED Controller Settings:	
Depth to Water (ft):	11.03	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	43.05	Condition of Pad/Cover:	poor / good

PURGING RECORD

water in hole

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
1346	0.0	11.46	17.6	6.15	2.049	4.49	-61.6	32.6	
1351	0.45	11.58	17.8	5.84	2.208	3.43	-33.0	25.7	
1356	0.90	11.63	17.9	5.74	2.310	3.03	-27.1	18.2	
1401	1.35	11.65	17.9	5.72	2.346	2.70	-27.1	16.68	
1406	1.80	11.68	17.8	5.72	2.336	2.54	-27.2	10.62	
1411	2.25	11.72	17.6	5.74	2.345	2.39	-28.3	11.26	
1416	2.70	11.73	17.8	5.75	2.367	2.25	-29.8	10.44	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW09-MWI	1428	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					Y
Duplicate					N

Sampled By: LLP

Comments: total + DISS, entered Alk + Acid

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:	A3 GW direct support	Project Number:	180227M-17
Well Number:	RW09-MW5	Date:	5-28-19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	9.28	Flow Rate (mL/min)	303
Product Thickness (ft):	NA	Length of time Purged (min)	15
Depth to Bottom (ft):	23.83	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
1434	0.0	10.03	17.2	6.23	1.299	4.28	0.7	19.8	
1439	0.4		17.6	6.15	1.292	3.03	7.3	17.6	
1444	0.8		17.4	6.14	1.276	2.76	8.7	16.0	
1449	1.20		17.9	6.14	1.276	2.52	9.5	16.2	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW09-MW5	1455	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss. Zn + Cd
ALK + Acid,

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:	AF3 GW direct support	Project Number:	(80227) m-1-1
Well Number:	RW10-MWF	Date:	5/24/19
Well Diameter (in):	~~2~~ 6	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	12.14	Flow Rate (mL/min)	303
Product Thickness (ft):	NA	Length of time Purged (min)	35
Depth to Bottom (ft):	41.70	Condition of Pad/Cover:	Good / Good Vault broken

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	0.0	12.22	17.3	6.63	1.460	5.21	-75.2	43.2	
1035	0.4	12.28	17.2	6.60	1.432	3.42	-93.1	48.7	
1040	0.8	12.28	17.2	6.61	1.424	2.81	-98.6	53.0	
1045	1.20	12.28	17.1	6.60	1.417	2.49	-101.3	54.2	
1050	1.60	12.28	17.6	6.60	1.423	2.21	-104.0	49.7	
1055	2.00	12.28	17.5	6.59	1.410	2.03	-105.1	48.3	
1100	2.40	12.28	17.5	6.60	1.412	1.96	-106.3	47.1	
1105	2.80	12.28	17.4	6.59	1.403	1.86	-107.1	45.3	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW10-MWF	1120	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					N
Duplicate					N

Sampled By: LCP

Comments: total + diss Zn + Cd
Alk. + Acid.

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:	A3 GW direct support	Project Number:	180227MT-1
Well Number:	RW11-MW1	Date:	5/20/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.14	Flow Rate (mL/min)	
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	31.04	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
943	0.0	11.18	17.2	6.30	2.699	6.76	-56.3	27.3	
948	0.45	11.19	17.1	6.02	2.606	4.75	-44.4	17.5	
953	0.90	11.19	17.1	5.99	2.562	3.94	-42.2	11.4	
958	1.35	11.19	17.2	5.98	2.522	3.36	-40.4	9.74	
1003	1.80	11.19	17.2	5.98	2.486	3.02	-39.0	6.98	
1008	2.25	11.19	17.3	5.97	2.470	2.78	-37.6	6.66	
1013	2.70	11.19	17.2	5.97	2.439	2.59	-36.6	6.05	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW11-MW1	1020	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			N
		Duplicate			N

Sampled By: LLP

Comments: total + Diss. Zn + Cd
Alk + Acid

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:	A3 GW direct support	Project Number:	~~EE~~ 150225m-1-1
Well Number:	RW11-MW5	Date:	5/22/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	8.61	Flow Rate (mL/min)	329
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	21.10	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	0.0	9.45	17.0	5.72	1.774	3.29	16.4	21.0	
1030	0.35	9.63	17.1	5.72	1.765	2.81	18.5	14.7	
1035	0.70	9.70	17.1	5.73	1.759	2.50	18.9	8.80	
1040	1.05	9.75	17.2	5.74	1.754	2.27	18.7	4.71	
1045	1.40	9.79	17.1	5.74	1.745	2.16	19.2	3.64	
1050	1.75	9.83	17.3	5.75	1.737	2.06	19.0	2.33	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW11-MW5	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	Y
Matrix Spike					N
Duplicate					N

Sampled By: LLP

Comments: Total + Diss Zn + Cd Alk. + Acid.

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:	RW12-MW1 A3 Direct Support	Project Number:	180227M1-1
Well Number:	RW12-MW1	Date:	5/20/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.14	Flow Rate (mL/min)	303
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	27.93	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
922	0.0	11.20	18.8	7.03	0.177	6.87	155.9	12.9	
927	0.4	11.20	18.6	5.48	0.126	5.01	166.6	8.80	
932	0.8	11.20	18.6	5.35	1.497	4.35	81.2	4.93	
937	1.20	11.21	18.6	5.35	1.583	3.72	68.1	3.57	
942	1.60	11.21	18.5	5.36	1.549	3.35	69.1	1.99	
947	2.00	11.21	18.6	5.37	1.517	3.07	66.5	1.30	
952	2.40	11.21	18.5	5.36	1.495	2.84	66.2	0.91	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW12-MW1	1000	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					N
Duplicate					N

Sampled By: LCP

Comments: total + Diss Zn + Cd
Alk. + Acid.

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:	AS GW Direct Support	Project Number:	180227M-1-1
Well Number:	RW12-MW5	Date:	5/2019
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	9.57	Flow Rate (mL/min)	273
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	16.58	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
1004	0.0	10.15	18.0	6.70	0.901	4.00	22.1	5.95	
1009	0.4	10.64	18.2	6.55	1.026	3.20	27.4	3.28	
1014	0.75	10.79	18.2	6.53	1.070	2.84	27.5	5.49	
1019	1.10	10.92	18.4	6.50	1.126	2.65	27.9	7.59	
1024	1.45	11.03	18.4	6.47	1.251	2.45	21.9	5.22	
1029	1.80	11.05	18.3	6.46	1.275	2.32	21.5	4.93	
1034	2.15	11.08	18.3	6.44	1.264	2.23	24.0	4.27	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW12-MW5	1045	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss zn + cd
Alk. + Acid

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:	A3 GW Direct Support	Project Number:	19034lm-1-1
Well Number:	RW13-MW1	Date:	5/21/19
Well Diameter (in):	10	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.89	Flow Rate (mL/min)	379
Product Thickness (ft):	N/A	Length of time Purged (min)	25
Depth to Bottom (ft):	40.82	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
901	0.0	12.10	16.6	10.12	1.497	8.09	163.3	1.69	
906	0.50	12.18	16.8	10.20	1.501	7.31	143.2	1.12	
911	1.00	12.18	16.6	10.23	1.506	7.13	138.4	0.84	
916	1.50	12.19	16.9	10.23	1.504	6.75	129.6	0.64	
921	2.00	12.18	17.0	10.23	1.504	6.69	127.8	0.72	
926	2.50	12.18	16.9	10.25	1.506	6.57	124.3	0.98	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Preservative	Collected?
RW13-MW1	930	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			N
		Duplicate			N

Sampled By: LLP

Comments: Total + Diss. Zn + Cd
Alk. + Acid.

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:	A3 GW direct support	Project Number:	180227M-1-1
Well Number:	RW14-MW5	Date:	5-20-19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	8.13	Flow Rate (mL/min)	303
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	22.64	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
1110	0.0	8.50	18.6	5.53	1.780	6.56	148.3	16.7	
1115	0.40	8.87	17.6	5.40	1.530	4.07	153.2	11.4	
1120	0.80	8.88	17.7	5.27	1.585	3.60	156.7	7.61	
1125	1.20	8.88	17.5	5.16	1.617	3.24	161.0	4.56	
1130	1.60	8.88	17.5	5.10	1.618	2.87	164.0	3.62	
1135	2.00	8.88	17.6	5.05	1.622	2.71	165.8	2.15	
1140	2.40	8.88	17.7	5.06	1.615	2.55	165.4	1.85	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW14-MW5	1150	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					N
Duplicate					N

Sampled By: LLP

Comments: total + Diss Zn + cd
Alk. + Acid.

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:	A3 GW direct support	Project Number:	150227M-1-1
Well Number:	RW15-MW1	Date:	5-21-19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	11.34	Flow Rate (mL/min)	341
Product Thickness (ft):	NA	Length of time Purged (min)	40
Depth to Bottom (ft):	49.45	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
958	0.0	11.75	17.2	10.47	0.145	6.36	123.2	28.7	
1003	0.45	11.75	17.1	8.30	0.266	3.61	-10.0	36.8	
1008	0.90	11.75	17.2	7.72	0.304	2.91	-125.6	11.6	
1013	1.35	11.75	17.2	7.50	0.317	2.64	-112.6	9.91	
1018	1.80	11.75	17.1	7.31	0.333	2.43	-98.7	7.85	
1023	2.25	11.75	17.1	7.22	0.363	2.29	-87.8	6.32	
1028	2.70	11.75	17.2	7.08	0.425	2.14	-76.0	4.97	
1033	3.15	11.75	17.3	7.01	0.417	2.06	-68.0	4.63	
1038	3.60	11.75	17.3	6.91	0.402	1.98	-58.6	4.19	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW15-MW1	1045	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					N
Duplicate					N

Sampled By: LLP

Comments: total + diss Zn + Cd
Alk. + Acid.

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: A3 GW direct support	Project Number: 180227M-1-1
Well Number: RW15-MW5	Date: 5/21/19
Well Diameter (in): 2	One Well Volume (gal): —
Depth to Product (ft): NA	QED Controller Settings: —
Depth to Water (ft): 9.34	Flow Rate (mL/min) 303
Product Thickness (ft): NA	Length of time Purged (min) 25
Depth to Bottom (ft): 20.86	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
1051	0.0	9.40	16.6	8.72	0.746	3.20	-105.7	7.15	
1056	0.4	9.41	16.6	8.82	0.792	2.45	-133.4	1.29	
1101	0.8	9.41	16.6	8.80	0.806	2.15	-142.2	0.97	
1106	1.20	9.41	16.7	8.79	0.814	1.96	-147.1	0.80	
1111	1.60	9.41	16.8	8.78	0.813	1.84	-147.1	0.82	
1116	2.00	9.41	16.9	8.78	0.815	1.78	-146.7	0.87	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW15-MW5	1125	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					N
Duplicate					N

Sampled By: LLP

Comments: total + diss Zn + Cd Alk. + Acid.

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:	AZ GW direct support	Project Number:	180227M-1-1
Well Number:	RW16-MW1	Date:	5/22/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	10.32	Flow Rate (mL/min)	256
Product Thickness (ft):	NA	Length of time Purged (min)	40
Depth to Bottom (ft):	42.66	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
1314	0.0	11.40	18.3	8.47	0.669	7.85	18.9	11.1	
1319	0.35	13.71	17.8	8.52	0.186	6.79	37.1	6.62	
1324	0.65	13.68	18.3	9.88	0.998	5.44	28.2	8.26	
1329	0.95	13.62	18.3	10.04	1.132	3.78	14.1	10.53	
1334	1.30	13.87	18.4	10.04	1.125	3.41	10.7	9.02	
1339	1.65	14.24	18.0	9.89	0.987	3.20	10.2	7.91	
1344	2.00	14.54	17.9	9.89	0.993	2.97	10.0	6.58	
1349	2.35	14.77	18.2	9.87	0.992	2.75	9.2		
1354	2.70	14.94	17.9	9.88	1019	2.52	9.4		

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW16-MW1	1400	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					N
Duplicate					N

Sampled By: LLP

Comments: Total + Diss. Zn + Cd
All + Acid,

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:	A3 tW direct Support	Project Number:	190229M-171
Well Number:	RW16-MW5	Date:	5/22/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	N/A	QED Controller Settings:	—
Depth to Water (ft):	8.21	Flow Rate (mL/min)	250
Product Thickness (ft):	NA	Length of time Purged (min)	30
Depth to Bottom (ft):	22.25	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
1408	0.0	8.76	18.1	6.60	1.920	6.26	-134.7	8.14	
1413	0.33	9.13	17.9	11.79	2.087	2.48	-216.7	6.53	
1418	0.66	9.15	17.7	11.82	2.117	2.21	-229.5	5.83	
1423	0.99	9.17	17.9	11.84	2.136	1.90	-242.8	4.01	
1428	1.32	9.18	17.8	11.84	2.142	1.67	-253.3	3.49	
1433	1.65	9.19	17.8	11.84	2.143	1.61	-256.0	2.76	
1438	1.98	9.20	17.8	11.84	2.135	1.52	-260.3	2.47	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW16-MW5	1445	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					N
Duplicate					N

Sampled By: LVP

Comments: total + DISS Zn + Cd
Alk. + Acid.

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:	A3 GW Direct Support	Project Number:	180227m-1-1
Well Number:	RW18-mwI	Date:	5/21/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	12.17	Flow Rate (mL/min)	379
Product Thickness (ft):	NA	Length of time Purged (min)	40
Depth to Bottom (ft):	33.18	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
1246	0.0	12.38	17.8	5.49	4.789	5.14	13.0	42.4	
1251	0.5	12.38	18.0	5.33	3.860	3.51	34.1	36.1	
1256	1.00	12.37	17.6	5.37	3.330	3.04	33.1	29.0	
1301	1.50	12.38	17.5	5.40	3.020	2.66	32.8	18.16	
1306	2.00	12.38	17.8	5.41	2.875	2.41	34.4	7.88	
1311	2.50	12.38	18.1	5.42	2.749	2.21	35.5	4.32	
1316	3.00	12.38	17.7	5.42	2.601	2.07	35.7	3.62	
1321	3.50	12.38	17.8	5.43	2.550	2.00	36.2	2.49	
1326	4.00	12.38	17.6	5.43	2.494	1.91	37.1	1.90	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW18-mwI	1335	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					N
Duplicate					N

Sampled By: LLP

Comments: Total + Diss Zn + Cd
Alk. + Acid.

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:	AZ GW Direct Support	Project Number:	180227M-1-1
Well Number:	RW18-MW5	Date:	5/21/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	7.78	Flow Rate (mL/min)	238
Product Thickness (ft):	NA	Length of time Purged (min)	45
Depth to Bottom (ft):	13.55	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
1347	0.0	7.28	17.6	10.41	0.231	5.34	-172.7	31.9	
1352	0.35	8.33	18.2	11.22	0.474	3.07	-188.1	19.79	
1357	0.70	9.54	18.2	11.22	0.515	2.76	-179.8	7.83	
1402	1.05	10.28	18.2	11.23	0.505	2.34	-155.3	4.23	
1407	1.35	10.86	18.0	11.19	0.490	2.13	-141.2	2.50	
1412	1.65	11.07	18.1	11.26	0.536	1.93	-130.4	2.01	
1417	1.95	11.30	18.1	11.30	0.570	1.82	-131.0	1.16	
1422	2.25	11.64	19.1	11.45	0.683	1.71	-126.4	1.23	
1427	2.55	11.87	19.0	11.52	0.670	1.68	-117.9	1.54	
1432	2.85	12.00	19.0	11.54	0.657	1.63	-110.1	1.93	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW18-MW5	1440	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					N
Duplicate					N

Sampled By: LCP

Comments: total + diss. Zn + Cd
Alk. + Acid.

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:	A3 GW Direct Support	Project Number:	180227M-1-1
Well Number:	RW019-MWI	Date:	5/29/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	12.55	Flow Rate (mL/min):	379
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	43.85	Condition of Pad/Cover:	None / ~~Good~~ OK LP

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
1410	0.0	12.88	21.5	5.28	6.150	3.63	54.3	10.48	
1415	0.5	13.00	21.6	5.24	6.578	2.95	55.7	10.69	
1420	1.0	13.02	21.3	5.23	7.133	2.61	56.6	10.16	
1425	1.5	13.02	21.4	5.23	7.312	2.41	57.1	9.37	
1430	2.0	13.02	21.2	5.23	7.086	2.24	57.5	8.62	
1435	2.5	13.02	21.4	5.23	6.893	2.15	58.1	7.91	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW19-MWI	1440	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					N
Duplicate					N

Sampled By: LCP

Comments: total + Diss Zn + Cd Alk + Acid

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:	A3 GW Direct Support	Project Number:	180227M-1-7
Well Number:	RW19-MWS	Date:	5/29/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	8.51	Flow Rate (mL/min)	379
Product Thickness (ft):	NA	Length of time Purged (min)	25
Depth to Bottom (ft):	24.32	Condition of Pad/Cover:	~~Good~~ / Good None

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
1443	0.0	9.40	21.2	7.13	2.897	3.11	-65.9	12.3	
1448	0.5	9.53	20.9	7.34	2.823	2.39	-97.8	9.80	
1453	1.00	9.60	21.0	7.37	2.830	2.17	-106.4	7.03	
1458	1.50	9.62	20.9	7.39	2.806	1.98	-111.1	5.99	
1503	2.00	9.62	20.7	7.39	2.810	1.90	-113.2	5.41	
1508	2.50	9.62	20.4	7.38	2.793	1.86	-114.7	5.01	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW19-MWS	1515	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					N
Duplicate					N

Sampled By: CWP

Comments: total + Diss Zn + Cd
Alk + Acid

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:	A3 GW Direct Support	Project Number:	180227m-1-1
Well Number:	RW21-MWS	Date:	6/7/19
Well Diameter (in):	2	One Well Volume (gal):	—
Depth to Product (ft):	NA	QED Controller Settings:	—
Depth to Water (ft):	12.18	Flow Rate (mL/min)	331
Product Thickness (ft):	NA	Length of time Purged (min)	60
Depth to Bottom (ft):	31.24	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
915	0.0	12.22	16.9	5.95	3.202	4.98	-15.3	50.7	
920	0.35	12.78	16.9	5.92	3.092	4.10	-16.7	57.5	
925	0.70	13.10	16.9	5.93	2.963	3.59	-18.7	54.5	
930	1.15	13.19	16.5	5.95	2.780	3.17	-20.8	47.3	
935	1.60	13.37	16.4	5.17	2.482	2.99	-144.3	24.7	
940	2.10	13.37	16.6	5.97	2.608	2.74	-36.4	76.8	
945	2.60	13.38	16.5	6.17	2.430	2.55	-71.4	110.0	
950	3.00	13.38	16.6	5.98	2.441	2.43	-35.1	51.4	
955	3.45	13.38	16.8	5.97	2.412	2.32	-32.4	52.5	
1000	3.90	13.27	16.8	5.97	2.357	2.18	-32.8	36.6	
1005	4.35	13.27	16.9	5.97	2.333	2.13	-32.4	28.4	
1010	4.80	13.26	16.9	5.97	2.280	2.03	-31.9	19.4	
1015	5.25	13.26	16.9	5.97	2.259	2.00	-33.6	15.3	

MONITORING SAMPLE RECORD

Sample ID	Time Collected	Parameter/Order	Container	Perservative	Collected?
RW21-MWS	1030	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					N
Duplicate					N

Sampled By: CLP

Comments: total + Diss Zn + Cd
HNO3 + Acid

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)

ProDSS Calibration Worksheet

a xylem b

When the Environment C

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 5/3/19 **Technician:** L Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 22.7 *Accurate?* (Y) N

Conductivity

Reading when sensor is dry and in room temp air: 0.001 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 112.3

Reading in calibration solution after calibration is completed: 100.7

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: 765.7

Actual Reading before DO% calibration is accepted: 1.423

Reading in DO% calibration environment after calibration is completed: 1.413

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**

pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.07	-33.7	-50 mV to 50 mV
4	4.00	3.37	-144.5	+165 to +180 from pH 7 buffer mV value
10	10.00	~~10.00~~ 10.10	-198.9	-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.*

ORP

Actual Reading in solution before calibration is accepted: 237.0

Reading in calibration solution after calibration is completed: 240.0

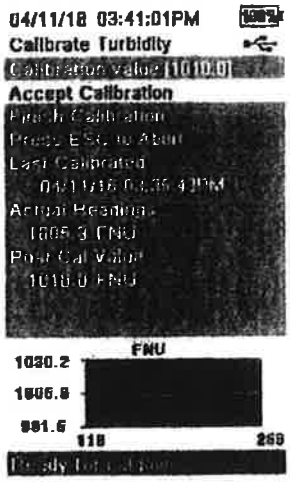
ORP Cal Offset in GLP record after calibration: _____ *Acceptable range is* **-100** *to* **50**

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	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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: mg/L	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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: mg/L	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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.*

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ProDSS Calibration Worksheet

a xylem

When the Environment

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:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 20.2 *Accurate?* (Y) N

Conductivity

Reading when sensor is dry and in room temp air: 0.001 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.489

Reading in calibration solution after calibration is completed: 1.413

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: 766.0

Actual Reading before DO% calibration is accepted: 98.6

Reading in DO% calibration environment after calibration is completed: 100.8

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**

pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.08	-27.3	-50 mV to 50 mV
4	4.00	3.82	147.9	+165 to +180 from pH 7 buffer mV value
10	10.00	9.66	-191.4	-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.*

ORP

Actual Reading in solution before calibration is accepted: 243.8

Reading in calibration solution after calibration is completed: 240.0

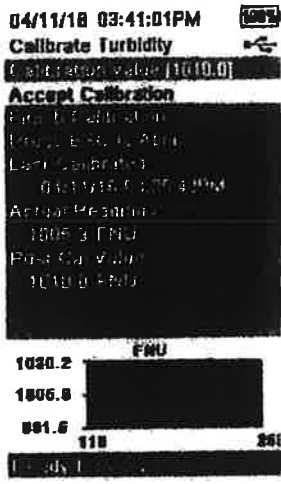
ORP Cal Offset in GLP record after calibration: ✓ *Acceptable range is* **-100** *to* **50**

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	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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: mg/L	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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: mg/L	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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 pulling a third calibration solution is extremely accurate and is th 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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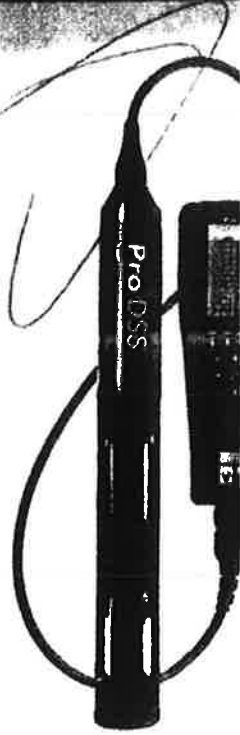
ProDSS Calibration Worksheet

a xylem br

When the Environment



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 5/8/19 **Technician:** L. Ferrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 20.1 *Accurate?* Y N

Conductivity

Reading when sensor is dry and in room temp air: 0.000 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.283

Reading in calibration solution after calibration is completed: 1.413

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: 766.2

Actual Reading before DO% calibration is accepted: 105.3

Reading in DO% calibration environment after calibration is completed: 100.8

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**

pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.15	-29.1	-50 mV to 50 mV
4	4.00	3.99	142.7	+165 to +180 from pH 7 buffer mV value
10	10.00	9.94	-187.3	-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.*

ORP

Actual Reading in solution before calibration is accepted: 238.5

Reading in calibration solution after calibration is completed: 240.0

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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 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

a xylem

When the Environment

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Calibration Date 5/9/19 **Technician:** L-Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 21.3 *Accurate?* (Y) N

Conductivity

Reading when sensor is dry and in room temp air: 0.001 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.388

Reading in calibration solution after calibration is completed: 1.413

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: 766.7

Actual Reading before DO% calibration is accepted: 105.1

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

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.15	-30.3	-50 mV to 50 mV
4	4.00	4.396	140.3	+165 to +180 from pH 7 buffer mV value
10	10.00	9.96	-197.2	-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.*

ORP

Actual Reading in solution before calibration is accepted: 238.1

Reading in calibration solution after calibration is completed: 240.0

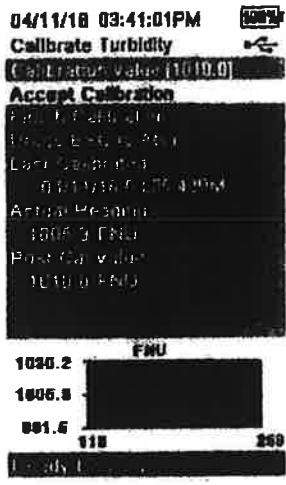
ORP Cal Offset in GLP record after calibration: _____ *Acceptable range is* **-100** *to* **50**

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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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ProDSS Calibration Worksheet

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When the Environment

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Calibration Date 5/10/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 21.1 *Accurate?* (Y) N

Conductivity

Reading when sensor is dry and in room temp air: 0.002 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.414

Reading in calibration solution after calibration is completed: 1413

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: 763.0

Actual Reading before DO% calibration is accepted: 97.2

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

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.12	-29.8	-50 mV to 50 mV
4	4.00	3.93	143.9	+165 to +180 from pH 7 buffer mV value
10	10.00	9.91	-189.7	-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.*

ORP

Actual Reading in solution before calibration is accepted: 238.2

Reading in calibration solution after calibration is completed: 240.0

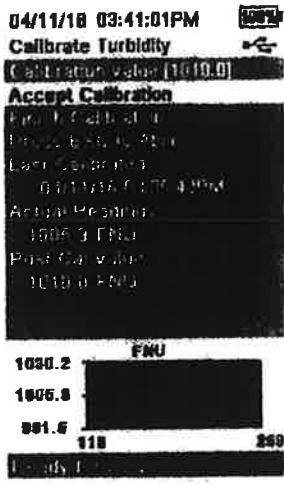
ORP Cal Offset in GLP record after calibration: _____ *Acceptable range is* **-100** *to* **50**

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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 rinsing 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

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When the Environment [illegible]

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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:** L. Ferrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 19.9 *Accurate?* (Y) N

Conductivity

Reading when sensor is dry and in room temp air: 0.003 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.413

Reading in calibration solution after calibration is completed: 1.413

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: 757.9

Actual Reading before DO% calibration is accepted: 98.0

Reading in DO% calibration environment after calibration is completed: 99.7

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**

pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.02	−39.9	-50 mV to 50 mV
4	4.00	3.50	148.7	+165 to +180 from pH 7 buffer mV value
10	10.00	10.10	−198.7	-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.*

ORP

Actual Reading in solution before calibration is accepted: 244.8

Reading in calibration solution after calibration is completed: 240.0

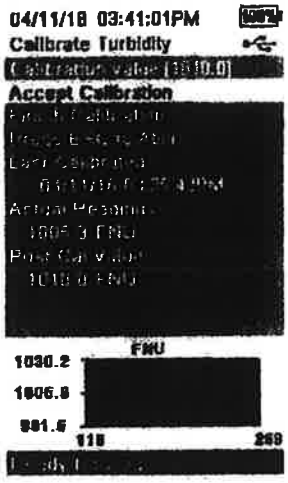
ORP Cal Offset in GLP record after calibration: _____ *Acceptable range is* **-100** *to* **50**

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	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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: mg/L	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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: mg/L	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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 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

a xylem bra

When the Environment

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:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 19.9 *Accurate?* (Y) N

Conductivity

Reading when sensor is dry and in room temp air: 0.002 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: ~~1.413~~ 1.413

Reading in calibration solution after calibration is completed: 1.413

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: 758.5

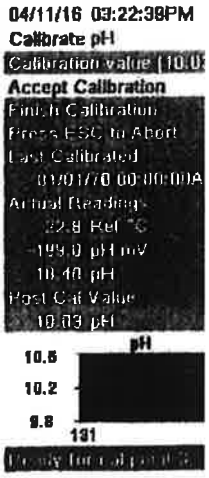
Actual Reading before DO% calibration is accepted: 101.1

Reading in DO% calibration environment after calibration is completed: 99.8

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**

pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.14	-30.6	-50 mV to 50 mV
4	4.00	3.99	142.4	+165 to +180 from pH 7 buffer mV value
10	10.00	10.08	-198.8	-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.*

ProDSS Calibration Worksheet

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When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 237.2

Reading in calibration solution after calibration is completed: 240.0

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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ProDSS Calibration Worksheet

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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 5/15/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 19.2 *Accurate?* ~~Y~~ **N**

Conductivity

Reading when sensor is dry and in room temp air: 0.002 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.396

Reading in calibration solution after calibration is completed: 1.413

Conductivity Cell Constant in GLP record after calibration:* ~~1.0~~

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**

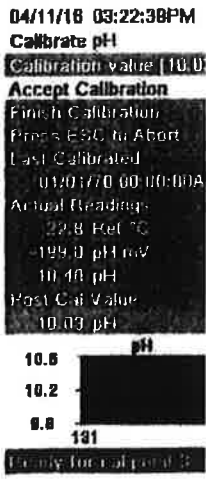
Optical Dissolved Oxygen

Barometric pressure: 761.2

Actual Reading before DO% calibration is accepted: 100.2

Reading in DO% calibration environment after calibration is completed: 100.2

ODO gain in GLP record after calibration: ~~1.00~~ *Acceptable range is* **0.75** *to* **1.50**



pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.30	-30.5	-50 mV to 50 mV
4	4.00	3.79	146.5	+165 to +180 from pH 7 buffer mV value
10	10.00	10.50	-199.8	-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.*

ProDSS Calibration Worksheet

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When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 240 6

Reading in calibration solution after calibration is completed: 240.0

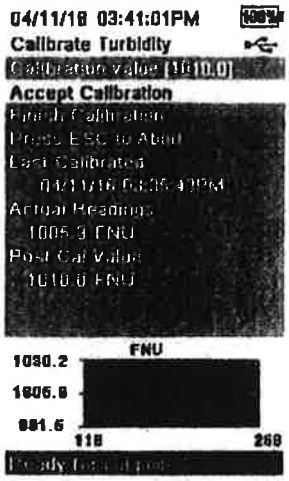
ORP Cal Offset in GLP record after calibration: _____ *Acceptable range is* ***-100*** *to* ***50***

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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ProDSS Calibration Worksheet

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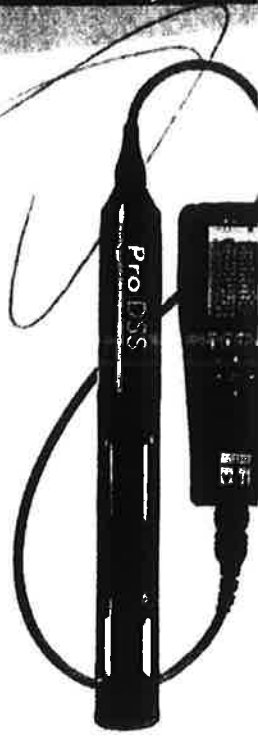
When the Environment Depends on It



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 5/16/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 21.6 *Accurate?* (Y) **N**

Conductivity

Reading when sensor is dry and in room temp air: 0.002 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.459

Reading in calibration solution after calibration is completed: 1.413

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**

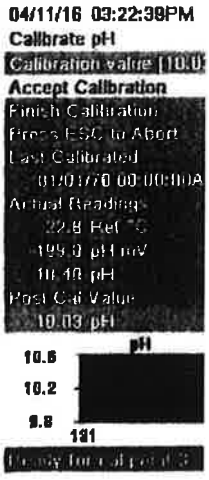
Optical Dissolved Oxygen

Barometric pressure: 760.8

Actual Reading before DO% calibration is accepted: 102.3

Reading in DO% calibration environment after calibration is completed: 100.1

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**



pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.40	-29.3	-50 mV to 50 mV
4	4.00	3.84	146.4	+165 to +180 from pH 7 buffer mV value
10	10.00	10.40	-201.1	-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.*

ProDSS Calibration Worksheet

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When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 236.4

Reading in calibration solution after calibration is completed: 240.0

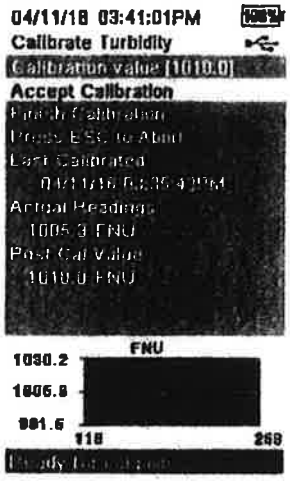
ORP Cal Offset in GLP record after calibration: ✓ *Acceptable range is* **-100** *to* **50**

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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ProDSS Calibration Worksheet

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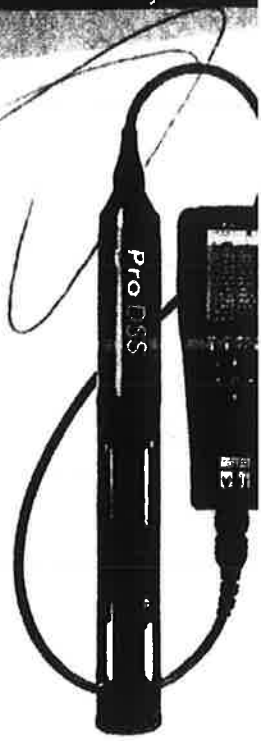
When the Environment Demands It



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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 5/17/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 21.3 *Accurate?* (Y) N

Conductivity

Reading when sensor is dry and in room temp air: 0.003 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: ~~1.397~~ 1.505

Reading in calibration solution after calibration is completed: 1.413

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: 758.0

Actual Reading before DO% calibration is accepted: 99.7

Reading in DO% calibration environment after calibration is completed: 99.7

ODO gain in GLP record after calibration: ~~_____~~ *Acceptable range is* **0.75** *to* **1.50**

pH

Buffer	Calibration Value	Actual Readings during calibration: pH	Actual Readings during calibration: pH mV**	Acceptable pH mV in buffer
7	7.00	7.22	-31.8	-50 mV to 50 mV
4	4.00	4.00	142.8	+165 to +180 from pH 7 buffer mV value
10	10.00	9.98	-191.6	-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.*

ProDSS Calibration Worksheet

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When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 242.0

Reading in calibration solution after calibration is completed: 240.0

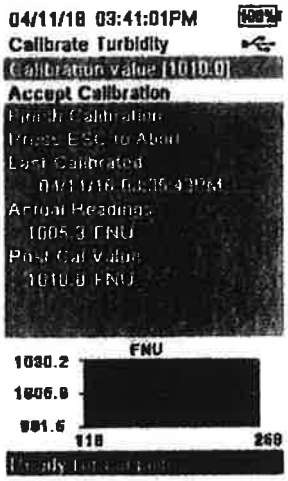
ORP Cal Offset in GLP record after calibration: ✓ *Acceptable range is* **-100** *to* **50**

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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ProDSS Calibration Worksheet

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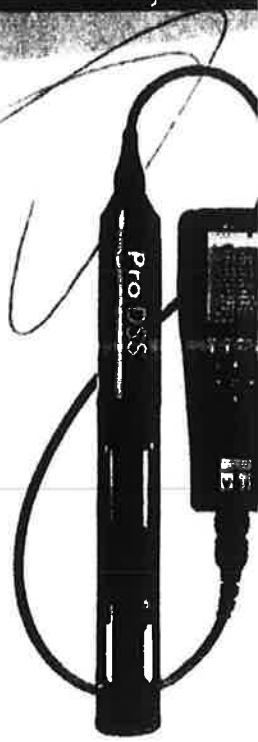
When the Environment Pays Attention



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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 5/20/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 19.6 *Accurate?* (Y) **N**

Conductivity

Reading when sensor is dry and in room temp air: 0.005 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.251

Reading in calibration solution after calibration is completed: 1.413

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**

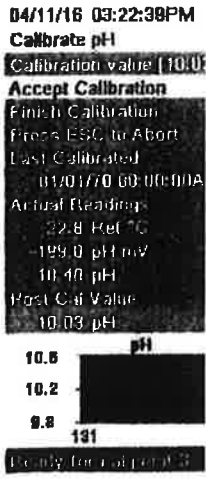
Optical Dissolved Oxygen

Barometric pressure: 759.1

Actual Reading before DO% calibration is accepted: 102.1

Reading in DO% calibration environment after calibration is completed: 99.9

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**



pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.19	-34.0	-50 mV to 50 mV
4	4.00	3.96	140.9	+165 to +180 from pH 7 buffer mV value
10	10.00	9.95	-193.2	-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.*

ORP

Actual Reading in solution before calibration is accepted: 240.3

Reading in calibration solution after calibration is completed: 240.0

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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ProDSS Calibration Worksheet

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When the Environment Matters

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 5/21/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 20.6 *Accurate?* (Y) N

Conductivity

Reading when sensor is dry and in room temp air: 0.000 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.383

Reading in calibration solution after calibration is completed: 1.413

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: 762.2

Actual Reading before DO% calibration is accepted: 101.5

Reading in DO% calibration environment after calibration is completed: 100.3

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**

pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.16	-33.9	-50 mV to 50 mV
4	4.00	3.90	142.3	+165 to +180 from pH 7 buffer mV value
10	10.00	9.93	-201.7	-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.*

ProDSS Calibration Worksheet

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When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 238.4

Reading in calibration solution after calibration is completed: 240.0

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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When the Environment Matters

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Calibration Date 5/22/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 24.1 *Accurate?* (Y) N

Conductivity

Reading when sensor is dry and in room temp air: 0.004 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.577

Reading in calibration solution after calibration is completed: 1.413

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: 768.8

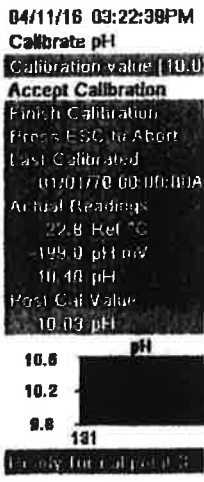
Actual Reading before DO% calibration is accepted: 101.5

Reading in DO% calibration environment after calibration is completed: 101.2

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**

pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.11	−30.4	-50 mV to 50 mV
4	4.00	3.93	142.1	+165 to +180 from pH 7 buffer mV value
10	10.00	9.88	203.2	-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.*

ORP

Actual Reading in solution before calibration is accepted: 241.4

Reading in calibration solution after calibration is completed: 240.0

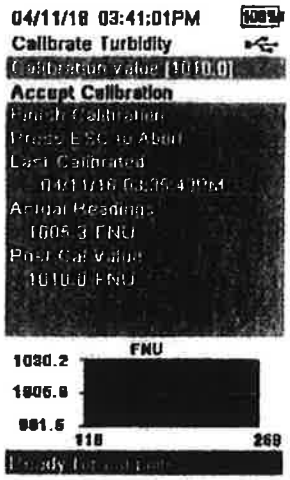
ORP Cal Offset in GLP record after calibration: ____ *Acceptable range is* ***-100*** *to* ***50***

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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ProDSS Calibration Worksheet

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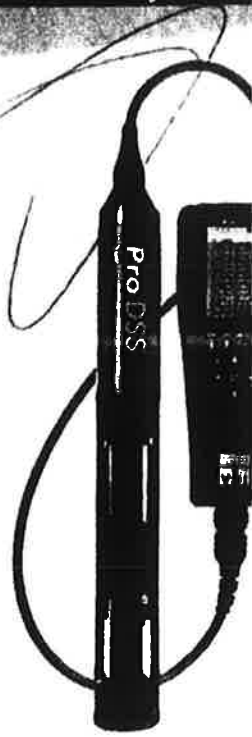
When the Environment



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 5/23/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 0.004 *Accurate?* (Y) N

Conductivity

Reading when sensor is dry and in room temp air: 21.2 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.409

Reading in calibration solution after calibration is completed: 1.413

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**

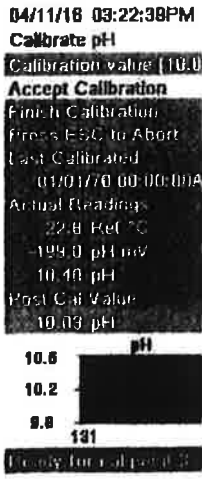
Optical Dissolved Oxygen

Barometric pressure: 766.5

Actual Reading before DO% calibration is accepted: 101.8

Reading in DO% calibration environment after calibration is completed: 100.8

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**



pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.25	-36.5	-50 mV to 50 mV
4	4.00	4.00	138.8	+165 to +180 from pH 7 buffer mV value
10	10.00	9.96	-199.2	-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.*

ProDSS Calibration Worksheet

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When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 235.8

Reading in calibration solution after calibration is completed: 240.0

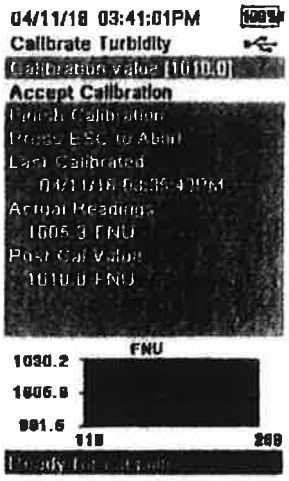
ORP Cal Offset in GLP record after calibration: ____ *Acceptable range is* **-100** *to* **50**

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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ProDSS Calibration Worksheet

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When the Environment

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 5/24/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 21.9 *Accurate?* Y **N**

Conductivity

Reading when sensor is dry and in room temp air: ~~28.9~~ *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.390

Reading in calibration solution after calibration is completed: 1.413

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: 761.9

Actual Reading before DO% calibration is accepted: 98.9

Reading in DO% calibration environment after calibration is completed: 100.3

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**

pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.17	-35.7	-50 mV to 50 mV
4	4.00	3.94	138.1	+165 to +180 from pH 7 buffer mV value
10	10.00	9.94	-200.8	-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.*

ProDSS Calibration Worksheet

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When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 240.2

Reading in calibration solution after calibration is completed: 240.0

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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ProDSS Calibration Worksheet

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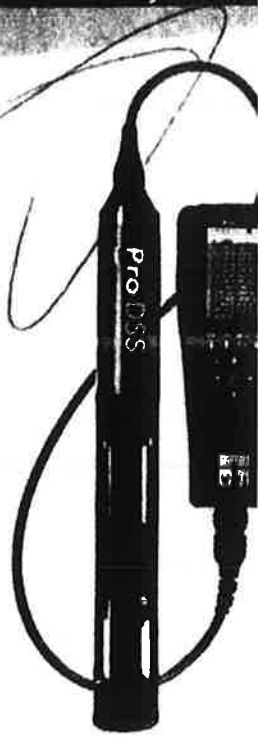
When the Environment Changes, It



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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 5/20/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 21.0 *Accurate?* (Y) **N**

Conductivity

Reading when sensor is dry and in room temp air: 0.001 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 98.9

Reading In calibration solution after calibration is completed: 99.8

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: 758.4

Actual Reading before DO% calibration is accepted: 1.247

Reading in DO% calibration environment after calibration is completed: 1.413

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**

pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.16	−35.5	-50 mV to 50 mV
4	4.00	3.91	139.3	+165 to +180 from pH 7 buffer mV value
10	10.00	9.989 10.01	−200.7	-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.*

ProDSS Calibration Worksheet

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When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 240.1

Reading in calibration solution after calibration is completed: 240.0

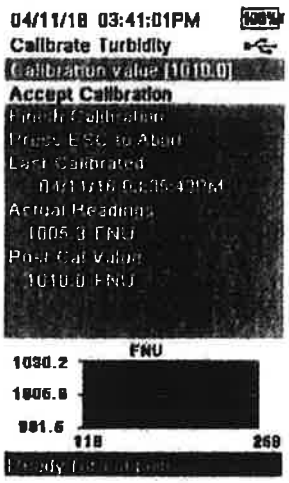
ORP Cal Offset in GLP record after calibration: ✓ *Acceptable range is* ***-100*** *to* ***50***

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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Calibration Date 5/29/19 **Technician:** L. Perrini

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 20.0 *Accurate?* (Y) **N**

Conductivity

Reading when sensor is dry and in room temp air: 0.004 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.596

Reading in calibration solution after calibration is completed: 1.413

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**

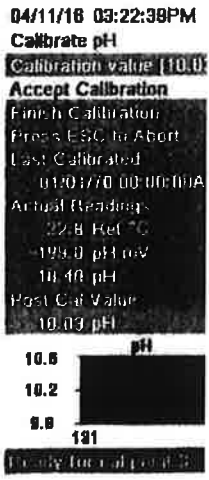
Optical Dissolved Oxygen

Barometric pressure: 756.0

Actual Reading before DO% calibration is accepted: 96.9

Reading in DO% calibration environment after calibration is completed: 99.5

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**



pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.16	−37.1	-50 mV to 50 mV
4	4.00	3.94	139.6	+165 to +180 from pH 7 buffer mV value
10	10.00	9.85	−210.8	-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.*

ORP

Actual Reading in solution before calibration is accepted: 240.5

Reading in calibration solution after calibration is completed: 240.0

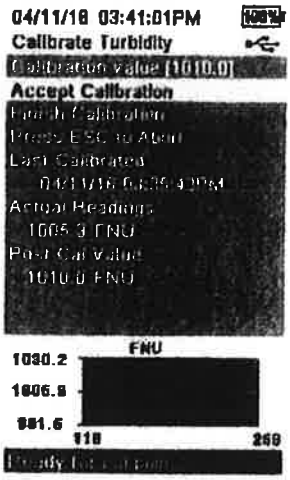
ORP Cal Offset in GLP record after calibration: ✓ *Acceptable range is* ***-100*** *to* ***50***

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	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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: mg/L	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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: mg/L	Actual Readings during calibration: mV***	Acceptable mV when the sensor is new
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.*

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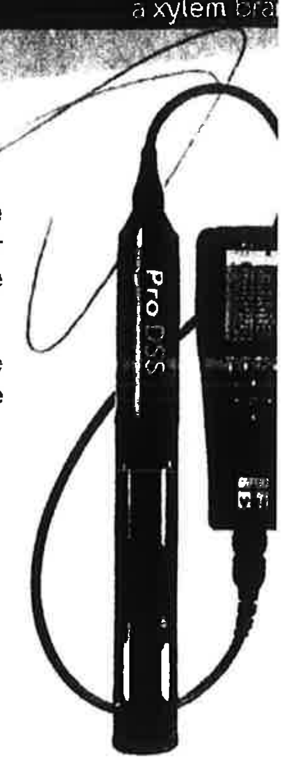
ProDSS Calibration Worksheet

a xylem bra

When the Environment Demands



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 5/30/19 **Technician:** L. Ferrin

Handheld Serial Number: New 17E102514 **Handheld Software Version:** ______

Cable Serial Number: ~~[illegible]~~ 17G101949

Temperature

Reading when sensor is dry and in room temp air: 24.9 *Accurate?* (Y) **N**

Conductivity

Reading when sensor is dry and in room temp air: 0.002 *Acceptable value is less than* ***1 μS/cm***

Actual Reading in solution before calibration is accepted: 1.439

Reading in calibration solution after calibration is completed: 1.413

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: ~~[illegible]~~ 756.8

Actual Reading before DO% calibration is accepted: 99.9

Reading in DO% calibration environment after calibration is completed: 99.6

ODO gain in GLP record after calibration: / *Acceptable range is* ***0.75*** *to* ***1.50***

pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.18	~~[illegible]~~ -36.3	-50 mV to 50 mV
4	4.00	4.00	137.4	+165 to +180 from pH 7 buffer mV value
10	10.00	9.87	-212.4	-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.*

ORP

Actual Reading in solution before calibration is accepted: 231.1

Reading in calibration solution after calibration is completed: 240.0

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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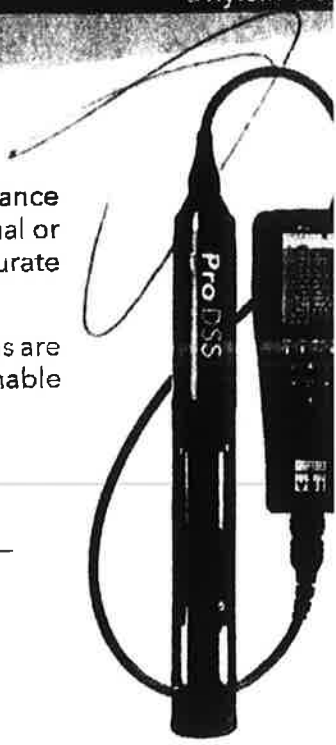
ProDSS Calibration Worksheet

a xylem bra

When the Environment Counts



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 5/31/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 18.5 *Accurate?* (Y) **N**

Conductivity

Reading when sensor is dry and in room temp air: 0.003 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.405

Reading in calibration solution after calibration is completed: 1.413

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**

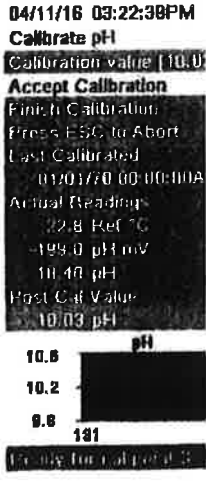
Optical Dissolved Oxygen

Barometric pressure: 757.5

Actual Reading before DO% calibration is accepted: 98.9

Reading in DO% calibration environment after calibration is completed: 99.7

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**



pH

		Actual Readings during calibration		
Buffer	Calibration Value	pH	pH mV**	Acceptable pH mV in buffer
7	7.00	7.19	-36.8	-50 mV to 50 mV
4	4.00	3.90	136.3	+165 to +180 from pH 7 buffer mV value
10	10.00	9.95	-212.1	-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.*

ProDSS Calibration Worksheet

a xylem br

When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 248.4

Reading in calibration solution after calibration is completed: 240.0

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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ProDSS Calibration Worksheet

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When the Environment Depends on 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 6/7/19 **Technician:** L. Perrin

Handheld Serial Number: New **Handheld Software Version:** _____

Cable Serial Number: _____

Temperature

Reading when sensor is dry and in room temp air: 17.9 *Accurate?* (Y) N

Conductivity

Reading when sensor is dry and in room temp air: 0.002 *Acceptable value is less than* **1 µS/cm**

Actual Reading in solution before calibration is accepted: 1.404

Reading in calibration solution after calibration is completed: 1.413

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: 759.5

Actual Reading before DO% calibration is accepted: 102.5

Reading in DO% calibration environment after calibration is completed: 99.9

ODO gain in GLP record after calibration: ✓ *Acceptable range is* **0.75** *to* **1.50**

pH

Buffer	Calibration Value	Actual Readings during calibration: pH	Actual Readings during calibration: pH mV**	Acceptable pH mV in buffer
7	7.00	7.15	-34.3	-50 mV to 50 mV
4	4.00	3.84	140.5	+165 to +180 from pH 7 buffer mV value
10	10.00	10.00	-201.3	-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.*

ProDSS Calibration Worksheet

a xylem br

When the Environment Demands It

ORP

Actual Reading in solution before calibration is accepted: 240.9

Reading in calibration solution after calibration is completed: 240.0

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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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

	Actual Readings during calibration		
Concentration** (i.e. Calibration Value)	mg/L	mV***	Acceptable mV when the sensor is new
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.*

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APPENDIX E

Pore Water Sampling Photograph Log

Pore Water Sampling
Rod and Wire Mill Area
Sparrows Point, Maryland

Photo 1: View of RW-013-PW-1 after attempting a 9 inch sample in the Rod and Wire Mill area. Black mud can be observed on the screen filter.

Photo 2: View of RW-023-PW after attempting both a 9 inch and 3 foot sample in the Rod and Wire Mill area.

APPENDIX F

QA/QC Tracking Log

QA/QC Tracking Log

Trip Blank:	Date:		Sample IDs	
	5/3/2019	1)	RW23-MWI	
		2)	RW23-MWS	
		3)	RWM-MWI	
		4)	RWM-MWS	
		5)	RWN-MWS	
	5/7/2019	6)	RWJ-MWI	
		7)	RWJ-MWS	Duplicate: RWJ-MWS
		8)	RWK-MWI	Date: 5/7/2019
		9)	RWK-MWS	MS/MSD: RWK-MWS
		10)	RWL-MWS	Date: 5/7/2019
	5/8/2019	11)	RWL-MWI	Field Blank:
		12)	RW24-MWI	Date: 5/9/2019
		13)	RW24-MWS	Eq. Blank: -
		14)	RW25-MWI	Date: -
		15)	RW25-MWS	
	5/9/2019	16)	RWI-MWI	
		17)	RWI-MWS	
		18)	RWH-MWI	
		19)	RWH-MWS	
		20)	RW21-MWI	

Trip Blank:	Date:		Sample IDs	
	5/17/2019	1)	RWS-MWI	
		2)	RWS-MWS	
		3)	RWQ-MWS	
		4)	RWQ-MWI	
	5/20/2019	5)	RW12-MWI	
		6)	RW12-MWS	
		7)	RW14-MWS	Duplicate: RWP-MWI
	5/21/2019	8)	RW13-MWI	Date: 5/17/2019
		9)	RW15-MWI	MS/MSD: RWQ-MWS
		10)	RW15-MWS	Date: 5/17/2019
		11)	RW18-MWI	Field Blank:
		12)	RW18-MWS	Date: 5/17/2019
	5/22/2019	13)	RW11-MWI	Eq. Blank: -
		14)	RW11-MWS	Date: -
		15)	RW04-MWS	
		16)	RW16-MWI	
		17)	RW16-MWS	
	5/23/2019	18)	RW06-MWD	
		19)	RW06-MWS	
		20)	RW06-MWI	

	5/10/2019	1)	RWR-MWI	
		2)	RWR-MWS	
		3)	RWO-MWI	
		4)	RWO-MWS	
	5/13/2019	5)	RWG-MWI	
		6)	RWG-MWS	
		7)	RW05R-MWI	Duplicate: RWR-MWS
	5/14/2019	8)	RWE-MWI	Date: 5/10/2019
		9)	RWE-MWS	MS/MSD: RWO-MWI
		10)	RWD-MWI	Date: 5/10/2019
		11)	RWD-MWS	Field Blank:
		12)	RW22R-MWI	Date: 5/14/2019
	5/15/2019	13)	RWB-MWI	Eq. Blank: -
		14)	RWB-MWS	Date: -
		15)	RWA-MWI	
		16)	RWA-MWS	
		17)	RW22R-MWS	
	5/16/2019	18)	RWF-MWI	
		19)	RWF-MWS	
		20)	RWQ-MWI	

		1)	RW05-MWS	
	5/24/2019	2)	RW07-MWI	
		3)	RW07-MWS	
		4)	RW10-MWI	
		5)	RW08-MWI	
		6)	RW08-MWS	
	5/28/2019	7)	RW03-MWI	Duplicate: RW03-MWI
		8)	RW03-MWS	Date: 5/28/2019
		9)	RW09-MWI	MS/MSD: RW09-MWI
		10)	RW09-MWS	Date: 5/28/2019
	5/29/2019	11)	RW02-MWI	Field Blank:
		12)	RW02-MWS	Date: 5/29/2019
		13)	RW01-MWI	Eq. Blank: -
		14)	RW01-MWS	Date: -
		15)	RW19-MWI	
		16)	RW19-MWS	
	6/7/2019	17)	RW21-MWS	
		18)		
		19)		
		20)		

APPENDIX G

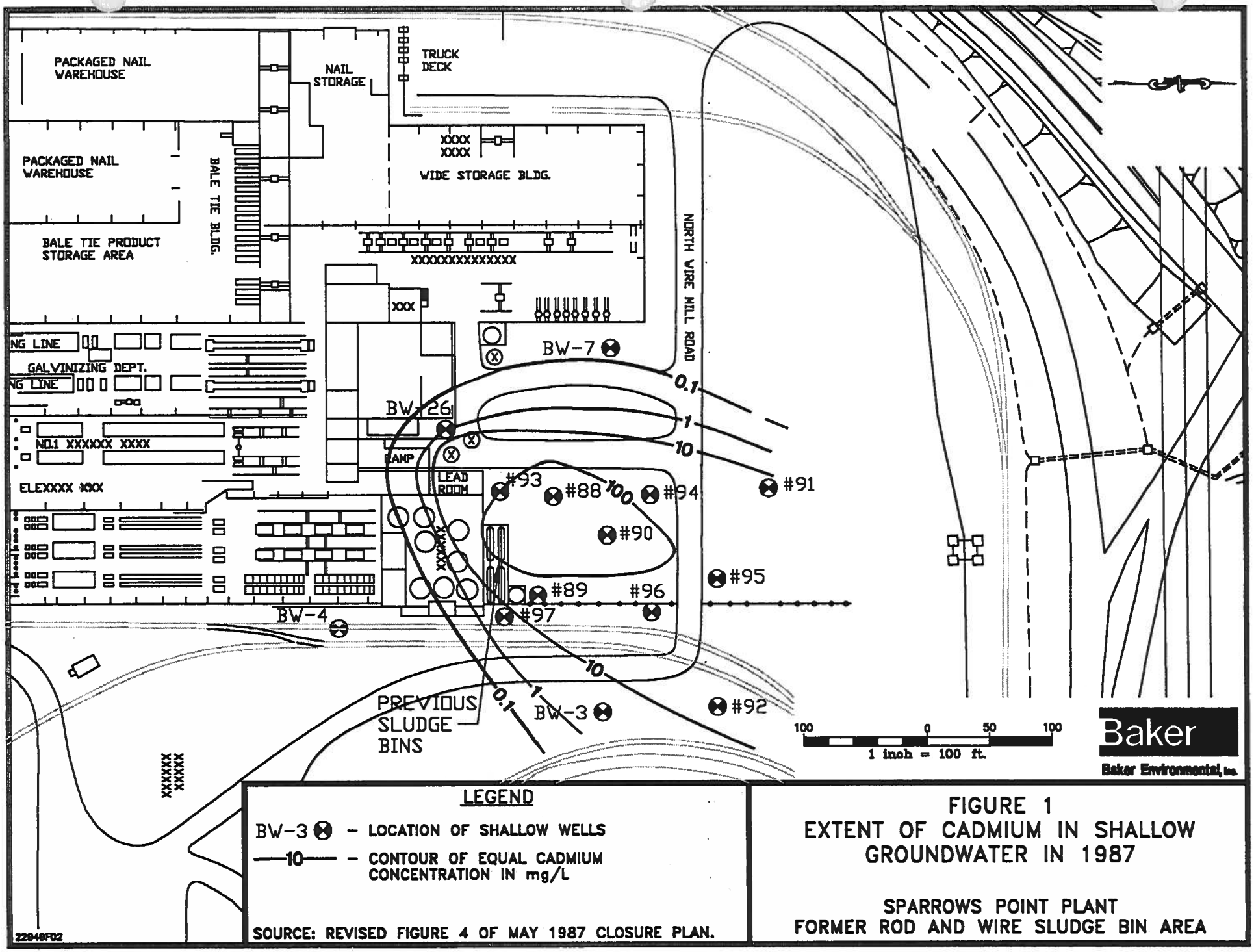
Evaluation of Data Completeness

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
Cadmium	Groundwater	ug/L	76	55	0	76	100%
Zinc	Groundwater	ug/L	76	76	0	76	100%
Cadmium Dissolved	Groundwater	ug/L	76	54	0	76	100%
Zinc Dissolved	Groundwater	ug/L	76	71	0	76	100%
Acidity	Groundwater	mg/L	76	51	0	76	100%
Alkalinity	Groundwater	mg/L	76	76	0	76	100%
Cadmium	Pore Water	ug/L	26	7	0	26	100%
Zinc	Pore Water	ug/L	26	11	0	26	100%
Hardness	Pore Water	ug/L	26	26	0	26	100%
Zinc	Surface Water	ug/L	7	3	0	7	100%
Hardness	Surface Water	ug/L	7	7	0	7	100%

APPENDIX H

1997 Cadmium and Zinc Concentrations



LEGEND

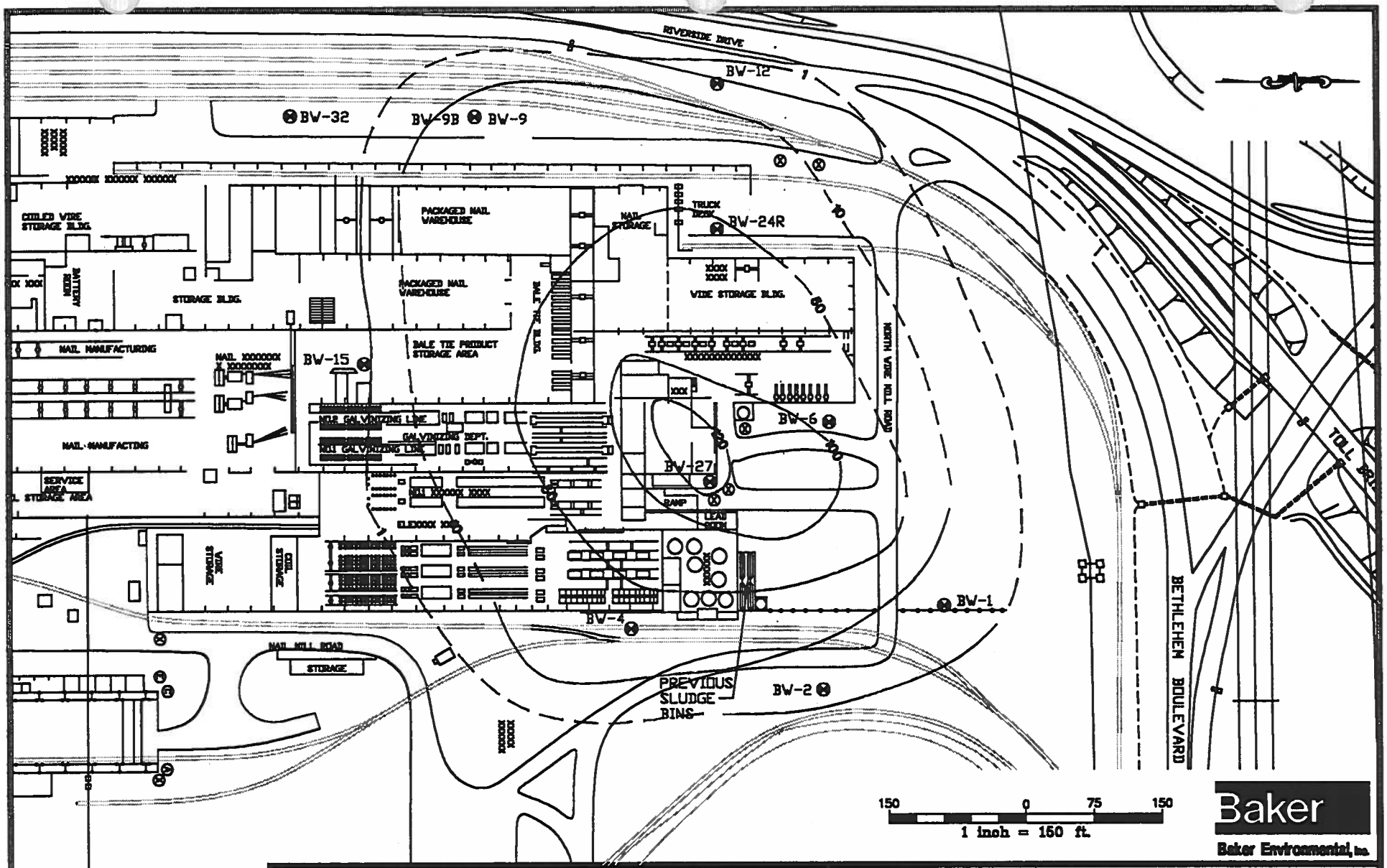
BW-3 ⊗ – LOCATION OF SHALLOW WELLS

—10— – CONTOUR OF EQUAL CADMIUM CONCENTRATION IN mg/L

SOURCE: REVISED FIGURE 4 OF MAY 1987 CLOSURE PLAN.

FIGURE 1
EXTENT OF CADMIUM IN SHALLOW GROUNDWATER IN 1987

SPARROWS POINT PLANT
FORMER ROD AND WIRE SLUDGE BIN AREA



LEGEND

⊗ – INTERMEDIATE WELL

—10— – INTERPRETED CONTOUR OF EQUAL CADMIUM CONCENTRATION IN mg/L

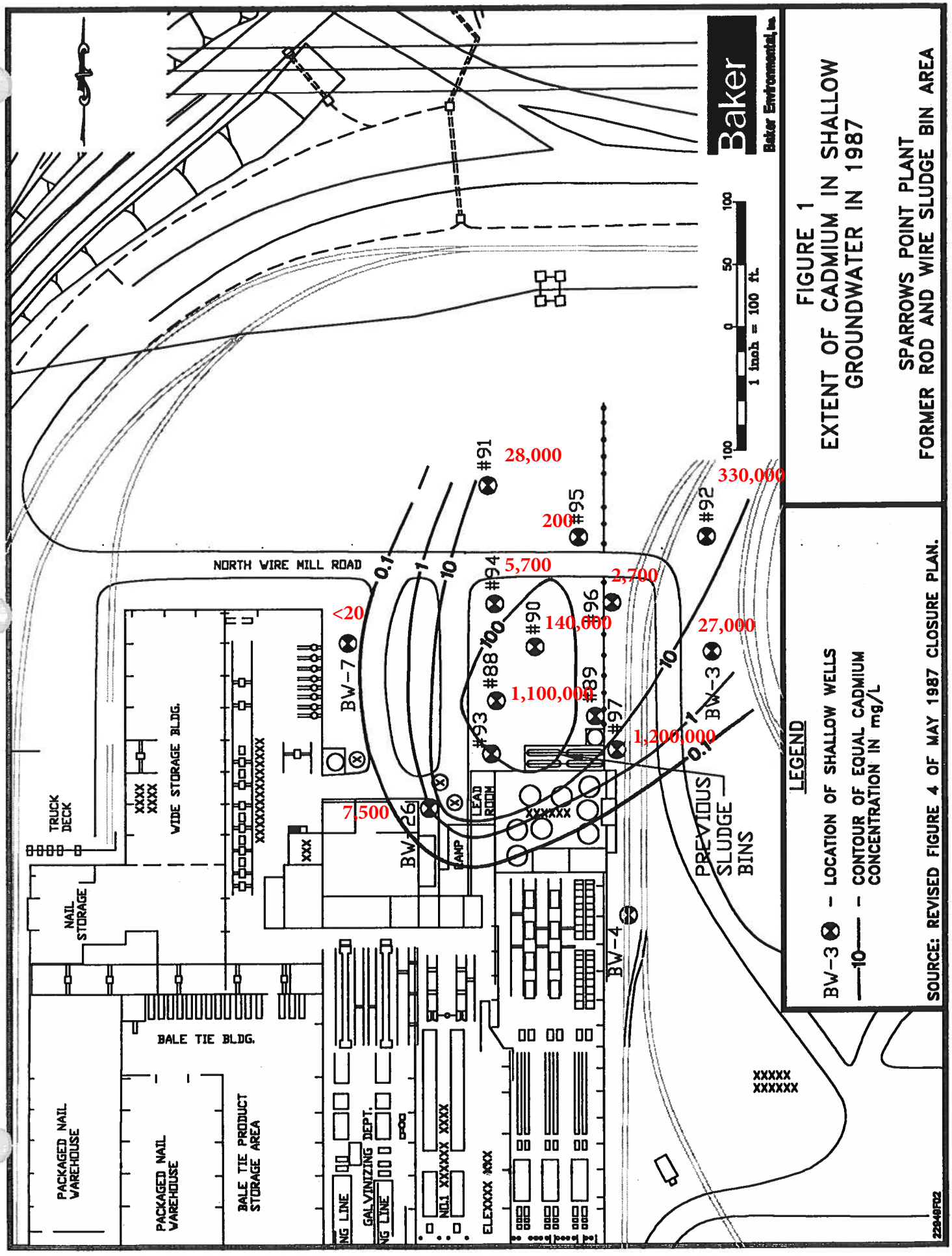
SOURCE: REVISED FIGURE 5 OF MAY 1987 CLOSURE PLAN.

22948F04

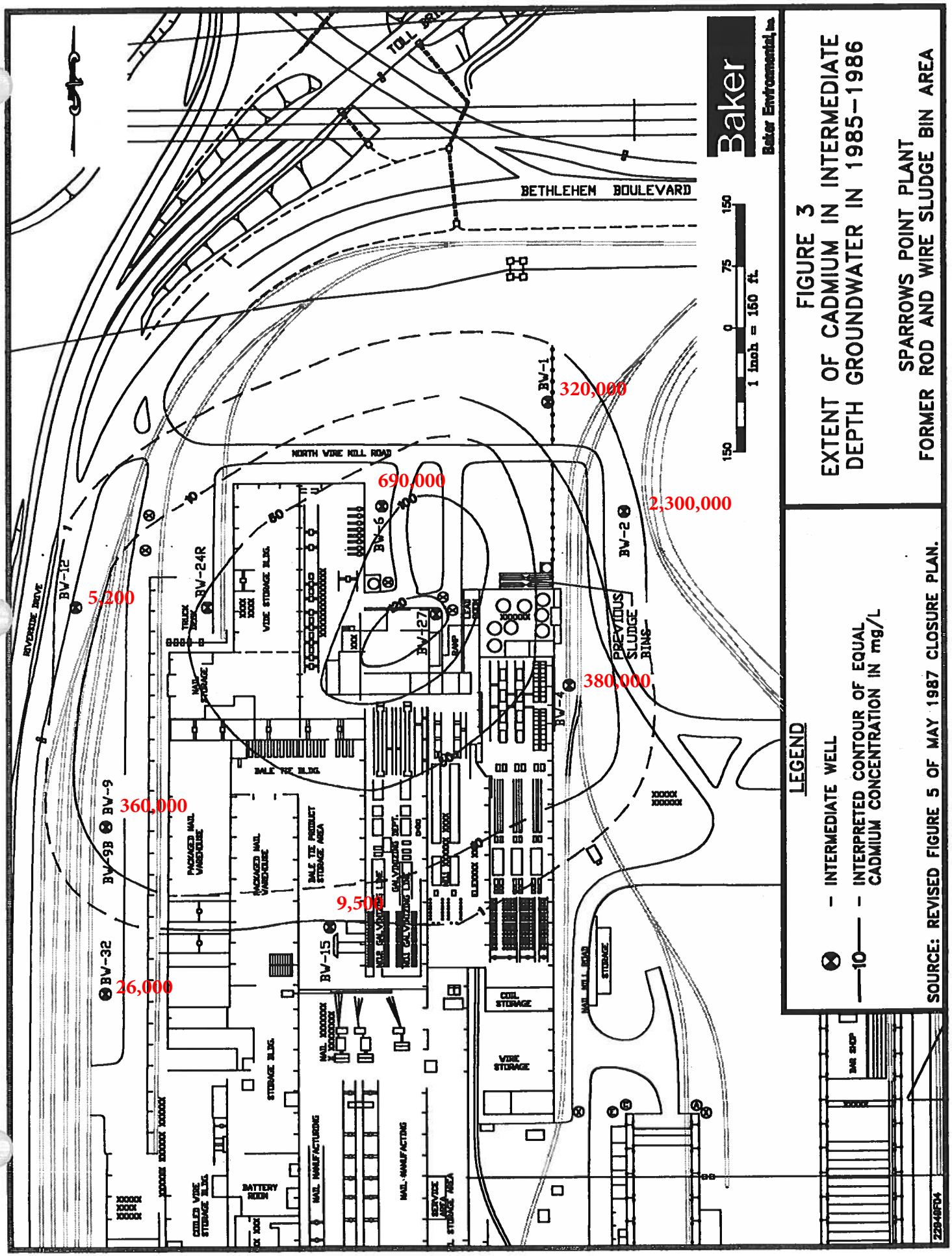
FIGURE 3
EXTENT OF CADMIUM IN INTERMEDIATE DEPTH GROUNDWATER IN 1985–1986

SPARROWS POINT PLANT
FORMER ROD AND WIRE SLUDGE BIN AREA

1997 Zinc Concentrations (ug/L) in Shallow Wells



1997 Zinc Concentrations (ug/L) in Intermediate Wells



RESULTS OF GROUNDWATER SAMPLING
MAY 1997 MONITORING WELLS
BETHLEHEM STEEL - SPARROWS POINT
ROD AND WIRE MILL SLUDGE BIN AREA

Well	Sample Date	Groundwater Elevation	pH (S.U.)	Specific Conductance (umhos/cm @ 25°C)	Cadmium (mg/l)	Zinc (mg/l)
Shallow Wells						
88	5-6-97	8.50	3.90	3548	49	1100
89	5-7-97	8.71	5.86	1125	0.95	44
90	5-6-97	8.57	4.20	1110	8.1	140
91	5-6-97	7.54	6.45	1490	1.2	28
92	5-6-97	8.45	5.45	2320	13	330
93	5-8-97	9.78	4.38	1840	7.9	330
94	5-6-97	8.60	6.50	484	0.53	5.7
95	5-6-97	7.92	6.70	393	0.02	0.20
96	5-6-97	8.14	6.90	1243	0.08/0.08*	2.7/2.6*
97	5-6-97	8.23	4.16	5390	10.0	1200
BW-3	5-6-97	8.10	5.97	1041	0.52	27
BW-7	5-8-97	8.66	10.25	326	<0.005	<0.02
BW-26	5-8-97	9.42	6.85	321	0.02	7.5
Intermediate Depth Wells						
BW-1	5-6-97	-0.61	5.55	2525	0.56	320
BW-2	5-6-97	-0.88	5.32	8380	1.5	2300
BW-4	5-6-97	-1.11	5.42	2790	0.93	380
BW-6	5-8-97	-1.50	4.94	4176	19	690
BW-9	5-8-97	-0.78	6.00	4697	33.0	360
BW-12	5-8-97	-0.78	5.67	1400	0.11	5.2
BW-15	5-8-97	-0.14	3.88	2792	<0.005	9.5
BW-32	5-8-97	-0.56	6.70	5000	2.9	26

* Duplicate sample results

APPENDIX I

Select Figures from Previous Offshore Studies

Legend

- Surface Sample Locations
- Sub Surface Sample Locations
- Approximate Location of Stormwater Outfall

Imagery:
ESRI, Bing Mapping Service

N

Coordinate System:
WGS84 UTM Zone 18N Feet

0 1,000 2,000
Feet

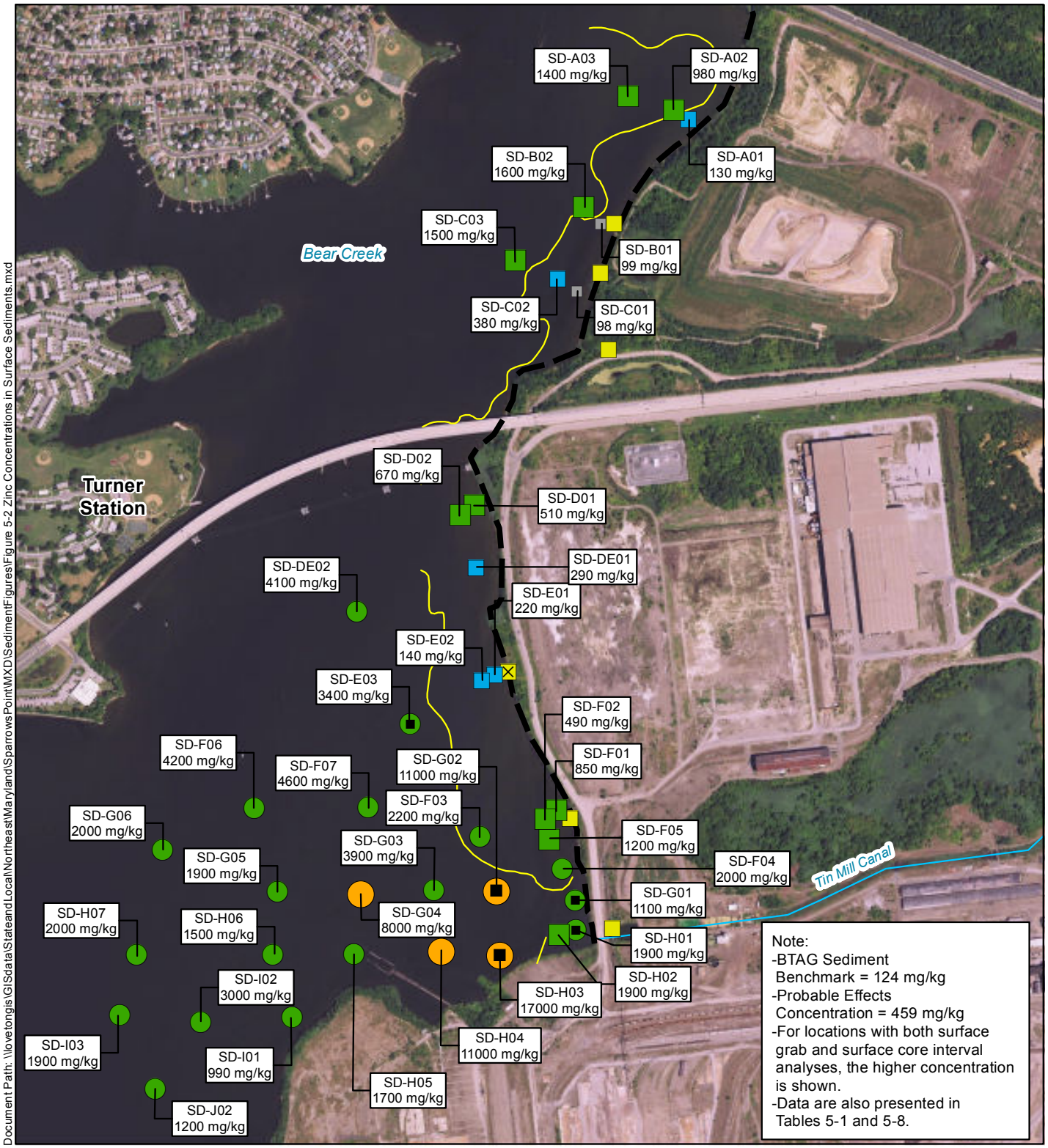
Sparrows Point Southeast Area
Sediment Assessment
Baltimore, Baltimore County, Maryland

Figure 9
Zinc Results

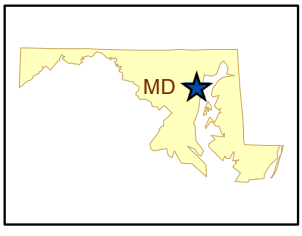
TDD# W501-15-08-003
Contract: EP-S3-15-02
Prepared: 2/15/2018

WESTON SOLUTIONS

File: Y:\EPA_Region_III\Sparrows_Point\MXD\Zinc_Results_Feb2018.mxd, 2/15/2018 12:00:44 PM, ricksc



Document Path: \\lovetongis\GIS\data\StateandLocal\Northeast\Maryland\SparrowsPoint\MXD\SedimentFigures\Figure 5-2 Zinc Concentrations in Surface Sediments.mxd



0 250 500 1,000
Feet

1 inch = 1,000 feet

N

Legend

- Phase 1 Northwest Shoreline
- Perennial Creek/Stream
- Boundary between Sand and Fine Grained Sediment
- Approximate Location of Active Stormwater Outfall
- Approximate Location of Inactive Stormwater Outfall

Zinc in Sediments

- Coring Location 459-5,000 mg/kg
- Coring Location >5,000 mg/kg
- Surface Grab and Coring Location 459-5,000 mg/kg
- Surface Grab and Coring Location >5,000 mg/kg
- Surface Grab < 124 mg/kg
- Surface Grab 124-459 mg/kg
- Surface Grab 459-5,000 mg/kg

Figure 5-2
Zinc Concentrations in Surface Sediment
Phase I Northwest Shoreline
Baltimore, Maryland

Map Date: January 2016
Image Source: ESRI 2011
Projection: NAD 1983 StatePlane Maryland FIPS 1900 (US Feet)