

ROD AND WIRE MILL INTERIM MEASURE 2019 PROGRESS REPORT

TRADEPOINT ATLANTIC
SPARROWS POINT, MARYLAND

Prepared for:



ENVIROANALYTICS GROUP

1650 Des Peres Road, Suite 230
Saint Louis, Missouri 63131

Prepared by:



ARM GROUP LLC

9175 Guilford Road
Suite 310
Columbia, Maryland 21046

ARM Project No. 20010103

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Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Stewart Kabis".

Stewart Kabis, P.G.
Project Geologist

A handwritten signature in black ink, appearing to read "Neil Peters".

T. Neil Peters, P.E.
Vice President

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1.0 INTRODUCTION

This Progress Report for the Rod and Wire Mill Interim Measure at the Tradepoint Atlantic property has been prepared by ARM Group (ARM) on behalf of EnviroAnalytics Group (EAG). This report presents a brief history of the Rod and Wire Mill Area (RWM), a description of historical interim measures (IMs) that operated at the RWM, a description of additional remedial efforts that were completed in 2016 and 2017 to facilitate soil and groundwater treatment in the RWM area, the resulting changes observed in groundwater flow patterns and contaminant distribution, and an evaluation of the effectiveness of the interim measure.

1.1. TRADEPOINT ATLANTIC SITE BACKGROUND

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

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

The original topography of the peninsula was flat with elevations not exceeding 15 feet based on the North American Vertical Datum 1988 (NAVD88). The peninsula has been drastically altered since the inception of the steel manufacturing activities. Creeks have been filled in and new land has been added to various areas of the Site by building up near-shore areas of the river.

1.2. SITE OWNERSHIP HISTORY

Bethlehem Steel Corporation operated an integrated steelmaking facility at the site from approximately 1916 through 2003. As a result of multiple market factors, Bethlehem Steel declared bankruptcy in 2001 and the facility was subsequently operated by a succession of owners, the last of which (RG Steel Sparrows Point, LLC) filed for bankruptcy in 2012. The site was subsequently purchased by Sparrows Point, LLC (SPLLC) at a bankruptcy sale on August 7, 2012. Sparrows Point Terminal, LLC (SPT) purchased the real property on September 18, 2014 subject to the provisions of a Purchase and Sale Agreement wherein SPLLC and SPT have allocated

various environmental responsibilities, liabilities, and obligations among themselves. SPT has subsequently undergone a name change and is now doing business as Tradepoint Atlantic.

1.3. REGULATORY PROCESS

Environmental responses for the RWM and for the site in general are being implemented pursuant to the following:

- Multi-Media Consent Decree (Decree) between Bethlehem Steel Corporation, the United States Environmental Protection Agency (EPA), and the Maryland Department of the Environment (MDE) (effective October 8, 1997); this Decree has been modified in accordance with a stipulated order entered into by Sparrows Point LLC and the respective agencies effective July 28, 2014;
- Administrative Consent Order (ACO) between Sparrows Point Terminal, LLC and the Maryland Department of the Environment (effective September 12, 2014); and,
- Settlement Agreement and Covenant Not to Sue (SA) between Sparrows Point Terminal, LLC and the United States Environmental Protection Agency (effective November 25, 2014).

The original Consent Decree for the Sparrows Point facility dealt with many issues associated with ongoing iron-making, steel-making, coking, byproduct, plating, and finishing operations. To the extent that these operations are no longer conducted, and the associated facilities no longer exist, many specific requirements of the Decree are no longer applicable and have been removed in accordance with the stipulated order implementing modifications to the Decree. The RWM is part of the acreage that remains subject to the requirements of the Decree as documented in correspondence received from EPA on September 12, 2014.

2.0 ROD AND WIRE MILL

2.1. SITE DESCRIPTION

2.1.1. Historical RWM Industrial Activities

The RWM (the Site) is located in the northwestern portion of the Tradepoint Atlantic property. This area has also been given the designation of Parcel A3, as the Tradepoint Atlantic property as a whole has been divided into several separate parcels. These parcels, including Parcel A3 (the RWM), are shown on **Figure 1**.

The RWM is the location of the former mill that produced rods and wire products from the 1940s to the early 1980s. All manufacturing activities at the RWM ceased operation in the early 1980s with subsequent demolition of all structures between 1994 and 2000, based on historical aerial photos.

Manufacturing activities at the RWM included leaching of zinc ore and a subsequent treatment process to remove cadmium impurities. The leaching process was implemented in large tanks located inside the north end of the former RWM building. From the 1950s through the early 1970s, the acidic leach residue was stored in the Northwest Pond until about 1959 when filters were utilized 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. 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 1980s when the Rod and Wire Mill was shut down. The former locations of the Northwest Pond, the Sludge Bin Storage Area, and the East Pond are shown on **Figure 2**.

2.1.2. Site Geology/Hydrogeology

In general, the subsurface geology at the RWM includes slag fill materials overlying natural soils, which include fine-grained sediments (clays and silts) and coarse-grained sediments (sands). Groundwater occurrence at the Site has been segregated into three horizons identified as shallow, intermediate and deep hydrogeologic zones.

The shallow hydrogeologic zone includes recent sedimentary deposits or slag fill material and the unconfined water table at the Site. Monitoring wells and piezometers designated as shallow are screened within this uppermost, unconfined water bearing unit. The “shallow” bottom-of-screen elevations generally range from +5 to -20 feet above mean sea level (amsl). In some areas of the Site, the slag fill is directly underlain by and hydrologically connected to, the coarser-grained beds or lenses within the Talbot Formation that comprise the Upper Talbot Channel Unit. In these areas, the slag fill and Upper Talbot Channel Units form a single groundwater flow system. In much of

the investigation area, the slag fill material is underlain by finer-grained silts and clays that comprise the Talbot Clay Aquitard. In these areas, shallow groundwater flow may be separated from groundwater in any underlying coarse-grained beds or lenses.

The intermediate hydrogeologic zone was the focus of the pump and treat interim measure formerly used at the Site and is therefore also referred to as the intermediate pumping zone. The intermediate zone includes the unconfined to partially confined groundwater in the Pleistocene-aged Upper Talbot unit. The “intermediate” bottom-of-screen elevations range from approximately -20 to -50 feet amsl. The presence of clay and silt layers within the intermediate hydrogeologic zone likely retard the vertical recharge of groundwater from the upper fill material.

The lower hydrogeologic zone includes the confined groundwater in the Lower Talbot or Upper Patapsco Sand unit. The “lower” bottom-of-screen elevations range from approximately -50 to -141 feet amsl. The lower hydrogeologic zone was not a primary focus of this groundwater investigation. Hydrogeologic zones at greater depth are known to exist based on a review of the regional geology; however, these deeper units are isolated from the upper three units and impacts associated with the former iron and steel operations have not been identified.

2.2. HISTORICAL INTERIM MEASURE FOR GROUNDWATER CONDITIONS

The historical operations within the RWM resulted in releases of cadmium and zinc to soil and groundwater. In 1986, a soil and groundwater remediation program was initiated to address groundwater exhibiting elevated levels of cadmium and zinc, as well as residual soil contamination in the Sludge Bin Storage Area. Remediation initially consisted of a soil flushing program and associated pumping and treatment of groundwater from shallow and intermediate wells. The groundwater pumping was discontinued, and the treatment plant was dismantled in 1999 to support the demolition of the Rod and Wire Mill, allowing for reassessment of the interim measure. A Work Plan to re-establish interim measures was submitted to the reviewing agencies (MDE and EPA) in July 2000, and the Work Plan was approved in November 2000. Re-establishment of the interim measures included the following:

- Institutional controls for soils were established to provide a “Restricted Work Area” to control the exposure of onsite workers to soils in the Former Sludge Bin Storage Area.
- A groundwater monitoring network consisting of 31 wells was installed to monitor the performance of the groundwater pump and treat system. This monitoring network was used to collect water level and groundwater quality data.
- A groundwater pump and treat system was operated and maintained, which consisted of two intermediate zone recovery wells (RW10-PZM020 and RW15-PZM020) that removed water at a rate of between 5 and 12 gallons per minute (gpm). The expected normal operating rate for the treatment system was set at a combined rate of 8 to 12 gpm, with a maximum design flow of 25 gpm.

- Recovered groundwater was transported via a pipeline to the HCWWTP for subsequent treatment and discharge in accordance with the NPDES permit requirements for the facility.

The pumping and treatment of groundwater resumed in September 2001. This IM was subsequently discontinued in 2017 so that additional remedial work could be performed at the RWM.

3.0 NEW INTERIM MEASURE AND GROUNDWATER CONDITIONS

3.1. INTERIM MEASURE REMEDIAL APPROACH

EAG contracted Advanced GeoServices (AGS) to design and install remediation trenches to serve as the new interim measure for remediating groundwater at the RWM. The full details of the remediation design are presented in the AGS Work Plan, *Interim Measure Work Plan In-Situ Groundwater Treatment* (AGS, 2016). The primary purpose of this new interim measure, which focused on groundwater in the intermediate zone, was to reduce concentrations of dissolved metals and to minimize contaminant discharges from this zone to surface water. Groundwater in the shallow zone was noted to have a higher pH due to the presence of slag fill, and as a result, the distribution of metals in the shallow zone groundwater indicates very limited mobility (i.e., lack of migration). Therefore, the intermediate zone was the primary focus of the new interim measure.

Groundwater extraction from the pumping wells ceased in September 2016 to support the construction of the remediation trenches. The approach for addressing the elevated dissolved cadmium and zinc in the intermediate groundwater zone was to precipitate the dissolved metals in-situ by raising the groundwater pH from approximately 4 to approximately 9.5 to 10 through the addition of alkaline reagents into the intermediate groundwater zone at select high concentration areas. To accomplish this, excavated soils were replaced with alkaline charges that react with acidic groundwater to create alkaline conditions within the aquifer and remove the dissolved cadmium and zinc from solution. The alkaline charges utilized a combination of fast acting TerrabondMG (40% by weight) in conjunction with limestone aggregate (60% by weight). The reagents were placed in trenches in a staggered/offset alignment perpendicular to the anticipated groundwater flow. A typical cross-section of a remediation trench is provided as **Figure 3** and the approximate locations of the trenches are shown on **Figures 4-11** and **Figures 24-31**.

Approximately 2,392 cubic yards of contaminated soil were removed from the RWM during construction of the trenches and disposed of at an offsite facility. Construction of the trenches was completed in January 2017.

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 is to demonstrate that the concentration of the primary contaminants (cadmium and zinc) in groundwater discharging at the shoreline/property boundary are acceptable.

Several new groundwater wells were installed at the RWM in April 2019 as described in the *Rod and Wire Mill Interim Measure Supplemental Investigation Report – Revision 0 (July 26, 2019)*.

The purpose of these wells was to improve the delineation of cadmium and zinc concentrations in the shallow and intermediate zones. Samples were collected from these wells during the May, September, and December 2019 sampling events to support the supplemental investigation; however, these wells are not part of the IM monitoring network and are not proposed for continued sampling during the quarterly 2020 events.

3.2. GROUNDWATER CONDITIONS AFTER TRENCH INSTALLATION

Groundwater samples were collected from wells on a monthly basis starting in February 2017 up to January 2018. Following the January 2018 sampling event, groundwater samples were collected on a quarterly basis. This report summarizes groundwater conditions following trench installation, with particular focus on the results of the four quarterly sampling events carried out in 2019.

3.2.1. Shallow Groundwater Zone

A synoptic round of groundwater level measurements was collected for each of the quarterly sampling events conducted in March, May, September and December 2019. Based on the field measurements, groundwater potentiometric surface maps were constructed for the shallow zone for the May and December events and are included as **Figure 4** and **Figure 5**, respectively. In the shallow zone, the predominant flow directions are to the west, northwest and southwest off of a mound-like feature extending from east to west. In the northern portion of the Site near the former Northwest Pond groundwater flow is to the north. Groundwater flows south near RWR-MWS. Groundwater flows radially from a ridge-like feature that extends from the east through RW23-MWS.

Figure 6 displays the distribution of zinc concentrations in the shallow zone during the May event. The highest measured concentration was at RWN-MWS (978,000 µg/L). This well is located upgradient of the western-most remediation trench in the former Sludge Bin Storage Area. Zinc was also measured in relatively high concentrations north of the remediation trenches as shown in well RW21-MWS (282,000 µg/L).

Figure 7 displays the distribution of zinc concentrations in the shallow zone during the December event. The zinc distribution is similar to that of the May event. The highest measured concentration was also at RWN-MWS (943,000 µg/L), with additional elevated concentrations north of the remediation trenches in well RW21-MWS (368,000 µg/L).

Figure 8 displays the distribution of cadmium concentrations in the shallow zone during the May event. 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 µg/L) in RW21-MWS and RWI-MWS in the former Northwest Pond source area, and in RW22R-MWS.

Figure 9 displays the distribution of cadmium concentrations in the shallow zone during the December event. Like the May event, RWN-MWS had the highest detected concentration of cadmium (11,200 µg/L) but no elevated cadmium concentrations were identified downgradient of the western-most remediation trench. North of the trenches, cadmium was still elevated in RW21-MWS and RWI-MWS in the former Northwest Pond source area, and in RW22R-MWS.

Measurements of pH in the shallow groundwater zone from the May event, shown on **Figure 10**, ranged from 4.85 to 12.16. 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 (12.09 and 12.16 respectively), were observed at the two locations closest to a remediation trench. Additionally, RW16-MWS and RW18-MWS have relatively high pH values and are located downgradient of trenches. The lowest measured pH value (4.85) was at RWR-MWS, located upgradient of the trenches. Low pH was also measured in RWN-MWS and RW14-MWS, both located within the former Sludge Bin Storage Area.

Measurements of pH in the shallow zone from the December event, shown on **Figure 11**, ranged from 4.95 to 11.49. Like the May event, values of pH were generally higher in wells near the shoreline and closest to the remediation trenches. The two highest pH values were measured in RWJ-MWS and RW24-MWS. Wells RW16-MWS and RW18-MWS also had relatively high pH values. During the December event, the two lowest pH values were measured in RWN-MWS (4.95) and RW14-MWS (4.99), both located within the former Sludge Bin Storage Area.

For the purposes of evaluating trends in groundwater, shallow zone wells have been categorized into four groups. The “perimeter” wells are generally located farthest to west (downgradient). The “interior” shallow wells are located in the central portion of the site. The “delineation” wells are located along the northern boundary of the site. The “upgradient” wells are located farthest upgradient, generally farthest to the east. Well categories are shown in the table below.

Shallow Zone Well Categories			
Perimeter	Interior	Delineation	Upgradient
RW01-MWS	RW09-MWS	RW21-MWS	RW19-MWS
RW02-MWS	RW11-MWS	RWH-MWS	RWR-MWS
RW03-MWS	RW12-MWS	RWI-MWS	RWS-MWS
RW04-MWS	RW14-MWS	RWO-MWS	
RW05-MWS	RW15-MWS	RWQ-MWS	
RW06R-MWS	RW16-MWS		
RW07-MWS	RW18-MWS		
RW08-MWS	RW23-MWS		
RW22R-MWS	RW24-MWS		
RWA-MWS	RW25-MWS		
RWB-MWS	RWJ-MWS		
RWD-MWS	RWK-MWS		
RWE-MWS	RWL-MWS		
RWF-MWS	RWM-MWS		
RWG-MWS	RWN-MWS		

Results for perimeter shallow zone wells show that zinc decreased from December 2018 levels or stayed relatively the same over the course of 2019. The only exception was the concentration in RW22R-MWS. The zinc in this well increased from the May event to the September event. Although it subsequently exhibited a decrease during the December event, it remained at a relatively elevated level. During the December 2019 sampling event, concentrations of zinc in perimeter shallow wells were below the relevant surface water criterion of 81 µg/L in wells RWA-MWS (49.7 µg/L), RWB-MWS (38.7 µg/L), RWD-MWS (5.4 µg/L), RW06R-MWS (4.3 µg/L) and RW05-MWS (41.6 µg/L). Time-series graphs of zinc concentrations in shallow perimeter wells are included as **Figure 12** (original wells) and **Figure 13** (supplemental wells).

Results for interior shallow zone wells show that, while wells RWN-MWS and RW14-MWS had the highest levels of zinc in the shallow zone, these levels remained relatively stable over 2019. Zinc concentrations in most other shallow interior wells remained relatively stable over the year, except for wells RW09-MWS, RW11-MWS, and RWK-MWS, which exhibited increases over the year. The concentration of zinc in well RW25-MWS exhibited drastic fluctuations including a notable decrease during the December event. The lowest zinc concentration amongst the shallow interior wells during the December 2019 sampling event was detected in RW24-MWS at a concentration of 6.7 µg/L. Time-series graphs of zinc concentrations in shallow interior wells are included as **Figure 14** (original wells) and **Figure 15** (supplemental wells).

Zinc concentrations in delineation wells generally remained stable from the May 2019 event through the December 2019 event (all wells in this category were installed in April 2019). The only exception is RW21-MWS, the former NAPL monitoring well. This well was originally installed to monitoring NAPL but was sampled in the last three 2019 events to provide additional delineation in the former Northwest Pond former source area. RW21-MWS exhibited higher zinc concentrations during the September 2019 and December 2019 events. A time-series graph displaying zinc concentrations for the delineation wells is included as **Figure 16**.

While the zinc concentrations in upgradient shallow zone wells RW19-MWS and RWS-MWS generally decreased over 2019, new supplemental upgradient well RWR-MWS exhibited elevated levels and increases during the September and December events. A time-series graph of the zinc concentrations over time in the shallow upgradient wells is included as **Figure 17**. Results for zinc concentrations in shallow wells are shown in **Table 1**. Laboratory reports for samples collected during 2019 are included as **Appendix A**.

Results for perimeter shallow zone wells show that total cadmium decreased or stayed relatively stable during the 2019 events. During the December 2019 sampling event, concentrations of cadmium in perimeter shallow wells were below the relevant surface water criterion of 7.9 µg/L, except for RW03-MWS (18.8 µg/L) and RW22R-MWS (70.4 µg/L). Cadmium was not detected in several of the shallow perimeter wells during the 2019 events. Since February 2017, cadmium concentrations in perimeter wells generally seem to be remaining stable or decreasing over time.

Time-series graphs of cadmium concentrations in shallow perimeter wells are included as **Figure 18** (original wells) and **Figure 19** (supplemental wells).

Sampling results for interior shallow zone wells show that total cadmium was generally below 20 µg/L during 2019, except for in RW14-MWS and RWN-MWS. Both of these wells are located within the former Sludge Bin Storage Area. Well RW14-MWS continues to have the highest levels of cadmium in the shallow zone, with a concentration that was three orders of magnitude greater than concentrations in the majority of shallow zone wells. The second highest concentration (lower but elevated compared to other shallow zone wells) was nearby at RWN-MWS (11,200 µg/L during the December 2019 sampling event). Time-series graphs of cadmium concentrations in shallow interior wells are included as **Figure 20** (original wells) and **Figure 21** (supplemental wells).

Cadmium concentrations in delineation wells generally remained stable from the May 2019 event through the December 2019 event (all wells in this category were installed in April 2019). The only exception is RWI-MWS, which exhibited increases during the September and December events. A time-series graph displaying cadmium concentrations for the delineation wells is included as **Figure 22**.

Cadmium was generally not detected in upgradient shallow zone wells RW19-MWS and RWS-MWS during 2019 but was detected in new supplemental well RWR-MWS. However, this well did exhibit an overall decrease from the May 2019 event to the December 2019 event. A time-series graph of cadmium concentrations in shallow upgradient wells is included as **Figure 23**. Cadmium concentrations in shallow wells are shown in **Table 2**. Laboratory reports for samples collected during 2019 are included as **Appendix A**.

Individual time-series graphs for each shallow zone monitoring well are presented in **Appendix B**. The time-series graphs illustrate the dramatic fluctuations in groundwater concentrations from quarter to quarter within some wells.

3.2.2. Intermediate Groundwater Zone

A synoptic round of groundwater level measurements was collected for each of the quarterly sampling events conducted in March, May, September, and December 2019. Based on these field measurements, groundwater potentiometric surface maps were constructed for the intermediate zone for the May and December events (included as **Figure 24** and **Figure 25**, respectively). The potentiometric surface in the intermediate zone is nearly flat, with hardly any variation (less than a half foot of difference) amongst most calculated groundwater elevations across the Site. Wells RW18-MWI and RW19-MWI had notably higher groundwater elevations in the December event than in the May event. Groundwater elevations in the intermediate zone are generally lower than in the shallow zone, indicating a downward vertical gradient, except to the southwest near the

shore at well pairs RWF and RWG. In these well pairs, the water levels are higher in the intermediate wells than in the shallow wells, indicating an upward gradient in this area.

Intermediate groundwater zinc concentrations during the May 2019 event, mapped spatially on **Figure 26**, generally decrease from east to west across the Site. Zinc concentration was highest in and around the former East Pond source area, with RW19-MWI measuring 7,280,000 $\mu\text{g/L}$. Zinc concentrations are above 600,000 $\mu\text{g/L}$ 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. An elevated concentration was also observed in RWA-MWI. 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 $\mu\text{g/L}$) in the groundwater in the final remediation trench. However, concentrations of zinc above 100,000 $\mu\text{g/L}$ extend westward along an axis from RWL-MWI, downgradient of the westernmost treatment trench, to RWE-MWI. 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 groundwater zinc concentrations during the December 2019 event, shown on **Figure 27**, reveal nearly the same distribution of zinc as the May 2019 event. Zinc concentration was still the highest in the former East Pond source area at RW19-MWI, but RWR-MWI (to the south) exhibited a level closer to that of RW19-MWI during this event. Concentrations in the former Northwest Pond source area (RW21-MWI and RWI-MWI) were slightly lower but still above 500,000 $\mu\text{g/L}$. The zinc concentration in RW13-MWI, within the former Sludge Bin Storage Area, was more than three orders of magnitude higher in December than during the May event. The isolated plume in the northwest corner near RWA-MWI persists, as well as the axis of concentrations above 100,000 $\mu\text{g/L}$ extending from RWL-MWI eastward to RWE-MWI. The elevated zinc levels in the perimeter wells along the shoreline are still bounded to the south by a low concentration observed in RWG-MWI during the December 2019 event.

Intermediate zone cadmium concentrations during the May event, shown on **Figure 28**, vary significantly across the Site. The highest cadmium concentration was measured in RWI-MWI, located to the north of the western-most remediation trench, within the former Northwest Pond source area. There are also relatively high concentrations southwest of the western-most trench at RW23-MWI (2,270 $\mu\text{g/L}$) and RW05R-MWI (2,570 $\mu\text{g/L}$). The extent of the elevated cadmium is limited to the south by relatively low concentrations observed in wells RW01-MWI and RWG-MWI. As with zinc, the high cadmium detection at the northwestern-most corner of the Site at RWA-MWI (6,830 $\mu\text{g/L}$) appears to be isolated from the known source areas.

Intermediate zone cadmium concentrations during the December event, shown on **Figure 29**, are similar to those observed during the May event. Like the zinc concentration, the cadmium concentration in RW13-MWI was almost three orders of magnitude higher in the December event. The concentration in RWH-MWI, north of the former Northwest Pond, was more than an order of magnitude higher, while the concentration in RWP-MWI, north of the East Pond, also increased significantly. Relatively high concentrations southwest of the western-most trench at RW23-MWI and RW05R-MWI persisted to the December event, as well as the isolated plume in the northwest corner at RWA-MWI.

Measurements of pH within the intermediate zone during the May event, as shown on **Figure 30**, are generally less variable in comparison to the shallow zone but exhibit a similar spatial distribution. The two highest pH values (10.25 and 9.88) are located at RW13-MWI and RW16-MWI. Both wells are located directly downgradient of remediation trenches. The three lowest pH values (5.19, 5.23, and 5.24) were measured at RWP-MWI, RW19-MWI and RWR-MWI, located in or near the former East Pond source area.

Measurements of pH within the intermediate zone during the December event, as shown on **Figure 31**, were generally similar to those measured during the May event, with a few exceptions. The two locations that had the highest pH values in the May event, RW13-MWI and RW16-MWI, had notably lower pH values during the December event. Well RWJ-MWI (installed within a remediation trench) exhibited the highest pH value during this event, at 8.15. The lowest pH value during this event, 4.96, was measured at RWP-MWI. Toward the west, wells RW07-MWI and RWD-MWI exhibited higher pH relative to the May event.

For the purposes of evaluating trends in groundwater, intermediate zone wells have been categorized into four groups based on their location. The “perimeter” wells are generally located farthest to west. The “performance” wells are located in the central portion of the site. The “delineation” wells are located along the northern boundary of the site, north of the remediation trenches. The “upgradient” wells are located farthest upgradient, generally farthest to the east. Well categories are shown in the table below.

Intermediate Zone Well Categories			
Perimeter	Performance	Delineation	Upgradient
RW01-MWI	RW09-MWI	RW21-MWI	RW19-MWI
RW02-MWI	RW10-MWI	RWH-MWI	RWR-MWI
RW03-MWI	RW11-MWI	RWI-MWI	RWS-MWI
RW05R-MWI	RW12-MWI	RWO-MWI	
RW06-MWI	RW13-MWI	RWP-MWI	
RW07-MWI	RW15-MWI	RWQ-MWI	
RW08-MWI	RW16-MWI		
RW22R-MWI	RW18-MWI		
RWA-MWI	RW23-MWI		
RWB-MWI	RW24-MWI		

Intermediate Zone Well Categories			
Perimeter	Performance	Delineation	Upgradient
RWD-MWI	RW25-MWI		
RWE-MWI	RWJ-MWI		
RWF-MWI	RWK-MWI		
RWG-MWI	RWL-MWI		
	RWM-MWI		

While concentrations of zinc in some perimeter wells remained stable over 2019, concentrations in the majority of perimeter wells exhibited overall increases over the course of 2019. Furthermore, concentrations in RW02-MWI, RW03-MWI, RW06-MWI, and RW07-MWI exhibited notable increases compared to concentrations measured in 2017. Zinc in RW01-MWI was measured at lower levels in 2019 than in 2017 and zinc in RW08-MWI has exhibited significant decreases from levels measured in 2018. During the December 2019 sampling event, zinc concentrations in the perimeter intermediate wells were below the relevant surface water criterion of 81 µg/L in RWB-MWI (47.8 µg/L) and RW08-MWI (48.9 µg/L) and above the criterion in the all other perimeter wells. The highest zinc concentration amongst perimeter wells in 2019 was consistently measured in well RWA-MWI. Time-series graphs of zinc concentrations in intermediate perimeter wells are included as **Figure 32** (original wells) and **Figure 33** (supplemental wells).

Results for performance intermediate zone wells showed that zinc concentrations fluctuated in 2019 in wells RW13-MWI and RW25-MWI. Besides RW25-MWI, new supplemental wells have generally been relatively stable or decreased over 2019. RW15-MWI exhibited an overall increase over the course of 2019, with concentrations notably higher than in 2017. Concentrations of zinc in RW09-MWI and RW18-MWI in 2019 are slightly higher than average concentrations from 2017. In wells RW10-MWI, RW11-MWI, RW12-MWI, and RW16-MWI, concentrations in 2019 were notably lower than they were in 2017. Time-series graphs of zinc concentrations in intermediate performance wells are included as **Figure 34** (original wells) and **Figure 35** (supplemental wells).

Zinc concentrations in delineation wells mostly exhibited overall decreases from the May 2019 event to the December 2019 event, except for RWH-MWI and RWP-MWI which exhibited increases. The levels observed in RWP-MWI are particularly elevated and are continuing to increase. A time-series graph of zinc concentrations in intermediate delineation wells is included as **Figure 36**.

The zinc concentration in upgradient intermediate zone well RW19-MWI fluctuated over 2019 but has generally remained relatively the same concentration since February 2017. New supplemental upgradient well RWR-MWI exhibited increases during the September 2019 and December 2019 events, while RWS-MWI remained relatively stable. RW19-MWI well typically

had the highest zinc concentration of all upgradient intermediate wells. A time-series graph of the zinc concentration over time in the intermediate upgradient well is included as **Figure 37**. All intermediate well zinc results are included in **Table 3**. Laboratory reports for samples collected during 2019 are included as **Appendix A**.

Concentrations of cadmium in perimeter wells generally remained relatively stable or increased over the course of 2019. Concentrations of cadmium in perimeter intermediate wells were below the relevant surface water criterion of 7.9 µg/L in wells RWB-MWI, RW22R-MWI (not detected in either well), and RW08-MWI. The highest cadmium concentration in perimeter wells in 2019 was consistently measured in well RWA-MWI. Wells RW02-MWI, RW03-MWI, RW06-MWI, and RW07-MWI exhibited notable increases in cadmium in 2019 compared to 2017 levels. However, 2019 cadmium concentrations for RW01-MWI exhibited notable decreases compared to its 2017 levels and RW08-MWI exhibited notable decreases compared to its 2018 levels. Time-series graphs of cadmium concentrations in intermediate perimeter wells are included as **Figure 38** (original wells) and **Figure 39** (supplemental wells).

While concentrations of cadmium in a few intermediate performance wells remained relatively stable, the majority of concentrations in performance wells exhibited increases during 2019. Well RW13-MWI had the highest level of cadmium in the intermediate performance wells in the March and December events, but had much lower concentrations during the May and September events, comparable or lower than those of other intermediate performance wells. Cadmium concentrations were 13.9 µg/L or below in RW09-MWI, RW10-MWI, and RW16-MWI during 2019. The cadmium concentrations in RW15-MWI were notably higher in 2019 than levels observed in 2017, while concentrations in RW18-MWI were consistent with levels observed in 2017. However, in wells RW09-MWI, RW10-MWI, RW11-MWI, RW12-MWI, and RW16-MWI, 2019 cadmium concentrations were notably lower than those observed in 2017. Time-series graphs of cadmium concentrations in intermediate performance wells are included as **Figure 40** (original wells) and **Figure 41** (supplemental wells).

Cadmium concentrations in intermediate delineation wells either remained relatively stable or increased from the May 2019 event to the December 2019 event. Wells RWH-MWI and RWP-MWI exhibited increases during both the September and December events. A time-series graph of cadmium concentrations in intermediate delineation wells is included as **Figure 42**.

Cadmium concentrations in upgradient intermediate zone well RW19-MWI remained relatively stable over the course of 2019 but have exhibited an overall decrease from the beginning of post-trench monitoring in February 2017. Concentrations in new supplemental upgradient well RWR-MWI increased during the September 2019 and December 2019 events, but remained below those of RW19-MWI. Cadmium was typically not detected in well RWS-MWI in 2019. A time-series graph of the cadmium concentration in the intermediate upgradient well is included as

Figure 43. Cadmium results for all samples from the intermediate zone are included in **Table 4**.

Individual time-series graphs for each intermediate zone monitoring well are presented in **Appendix C**. The time-series graphs illustrate the dramatic fluctuations in groundwater concentrations from quarter to quarter within some wells.

3.3. STATISTICAL TREND EVALUATION

Data for cadmium, zinc, and pH from intermediate zone wells were analyzed using the Mann-Kendall trend analysis. Statistically significant upward trends were identified for the following:

- pH: RW08-MWI and RW12-MWI
- cadmium: RW02-MWI, RW03-MWI, RW06-MWI, RW07-MWI, RW08-MWI, and RW15-MWI
- zinc: RW02-MWI, RW03-MWI, RW06-MWI, RW07-MWI, and RW15-MWI

Statistically significant downward trends were identified for the following:

- pH: RW01-MWI, RW02-MWI, RW10-MWI, and RW15-MWI
- cadmium: RW11-MWI, RW12-MWI, RW18-MWI, and RW19-MWI
- zinc: RW11-MWI, RW12-MWI, and RW16-MWI

Most of the wells with statistically significant upward trends in cadmium/zinc are perimeter wells. Most of the wells with statistically significant downward trends in cadmium/zinc are performance wells. The results of all trend tests are included in **Appendix D**.

3.4. CONTAMINANT REDUCTION

The interim groundwater treatment goals are to increase the pH in the intermediate groundwater zone in order to precipitate the dissolved metals and achieve a reduction in dissolved concentrations of cadmium and zinc within the source areas.

The time-series graphs show that the cadmium and zinc concentrations have, in some cases, fluctuated by orders of magnitude from quarter to quarter. As a result, the comparison of individual quarterly values for some wells can indicate an increase or decrease depending which specific quarterly values are compared. For ease in visualizing overall trends and magnitude of reductions, annual average concentrations of cadmium and zinc were calculated for each well for which multiple years of data are available. Values for total and dissolved metals were used interchangeably in the calculations under the assumption that nearly all of the total metals concentrations are accounted for by the dissolved fraction.

Table 5 summarizes average annual groundwater cadmium and zinc concentrations at each shallow zone well installed before 2019. With the exception of RW14-MWS, the average cadmium concentrations in the shallow zone wells in 2019 are close to the ambient water quality criterion of 7.9 ug/L, and most have shown decreases over the observed time period. Well RW14-MWS, located within the former Sludge Bin Storage source area, is the only shallow well with cadmium values significantly higher than the ambient water quality criterion. The levels in this well have increased since 2017. Cadmium values at perimeter well RW03-MWS have increased since 2017 but are not significantly above the ambient water quality criterion.

Zinc concentrations in the easternmost interior shallow zone wells RW15-MWS and RW18-MWS) showed reductions of approximately 90% or greater since 2015. However, zinc concentrations increased from 2015 to 2019 at the more western interior wells RW09-MWS, RW11-MWS, RW12-MWS, and RW14-MWS. The largest percent increase (376%) was observed at perimeter well RW02-MWS, where the zinc concentration increased from an average of 3,308 µg/L in 2017 to an average of 15,749 µg/L in 2019. Zinc concentrations in other perimeter wells RW04-MWS, RW05-MWS, RW06R-MWS and RW07-MWS were all less than three times the ambient water quality criterion of 81 ug/L in 2019. When compared to 2017 concentrations, zinc concentrations have not been reduced at perimeter wells RW01-MWS, RW03-MWS, and RW04-MWS, and showed an increase in RW02-MWS and RW08-MWS.

Table 6 summarizes average annual groundwater cadmium and zinc concentrations at each intermediate zone well installed before 2019. Nearly all intermediate zone performance wells for which historical cadmium concentration data are available showed average decreases from the earliest yearly average to the 2019 yearly average, except for RW15-MWI. The most significant cadmium concentration decreases were observed at RW10-MWI, RW11-MWI, and RW12-MWI, with values decreasing by close to 90%. Intermediate zone cadmium concentrations have generally increased within the perimeter well group. Except for well RW01-MWI, all cadmium concentration measurements increased over this time period. The most notable increase is at well RW06-MWI, where average cadmium concentration increased from 34.8 µg/L in 2015 to 807 µg/L in 2019.

Within the intermediate zone, most performance group wells showed significant decreases in zinc concentrations from the earliest yearly average to the 2019 yearly average. Performance wells RW09-MWI and RW18-MWI remained relatively unchanged, while well RW15-MWI showed an anomalous increase in zinc concentration in 2019 (compared to other performance wells). All but two of the intermediate zone perimeter wells (RW01-MWI and RW08-MWI) showed historical average zinc concentration increases.

4.0 SUMMARY AND CONCLUSIONS

The current approach for addressing the elevated dissolved cadmium and zinc in the intermediate groundwater zone is to precipitate the dissolved metals in-situ by raising the groundwater pH above 7. This approach relies on groundwater movement to distribute the reagent to increase pH and to intercept the migration of metals contaminants in the intermediate zone. Therefore, the effectiveness of the new interim measure is expected to be observed first in the intermediate zone wells closest to the trenches and, due to the relatively slow groundwater velocity, may not be apparent in downgradient wells for some time.

Groundwater in the shallow zone is monitored, although it is not the focus of the interim measure. As noted, with the exception of well RW14-MWS, concentrations of cadmium in the interior wells are near the ambient water quality criterion, and zinc concentrations have decreased significantly in the easternmost interior wells. Cadmium and zinc have increased notably above 2017 levels in well RW14-MWS, which is located within the boundary of the former Sludge Bin Storage source area. Zinc concentrations have also increased, to a lesser extent, in the western interior wells. The interior wells are all located within or very close to the area that has been paved as part of the new building construction. Stormwater from the paved area is now directed to the lined stormwater pond. As a result, fresh recharge to the shallow zone from direct precipitation has been cut off within this area and groundwater elevations in the shallow zone within the interior area have dropped several feet from the pre-trench conditions. This has caused flattening of hydraulic gradients and a corresponding reduction in groundwater velocities in the shallow groundwater zone. This slower groundwater velocity is likely to have contributed to a rebound effect in dissolved metal concentrations due to greater contact time and equilibration between the shallow groundwater with residual contamination in the shallow aquifer matrix.

In the perimeter shallow zone wells, cadmium concentrations in all wells are below the ambient water quality criterion. Zinc concentrations are below the ambient water quality criterion in the northern wells but still exceed the criterion in the southwestern wells. Zinc concentrations in southwestern perimeter wells RW01-MWS and RW03-MWS are slightly higher than the levels observed in these wells in 2017, and RW02-MWS has increased to levels comparable to these wells. Therefore, the levels in the perimeter wells overall are relatively unchanged from 2017. This is consistent with the IM design basis that noted limited migration due to the presence of the alkaline slag in the shallow zone.

In the intermediate zone, the cadmium and zinc concentrations in the performance wells have generally exhibited decreases, with the notable exceptions of RW15-MWI and RW18-MWI. IN RW18-MWI, concentrations had been decreasing but returned to the 2017 level in 2019. So, in general, the wells for which there are several years of data indicate that progress is being made in the intermediate zone. However, the newly installed wells have identified elevated concentrations at additional locations outside the area of influence of the current IM.

In the intermediate zone perimeter wells, both the zinc and cadmium concentrations generally continued to show increases in 2019. In addition, the newly installed perimeter monitoring wells have identified elevated concentrations at additional locations. In the IM design, the groundwater velocities were expected to be slow, in the range of 5 to 10 feet per year. Paving in the area has reduced aquifer recharge from precipitation, causing the hydraulic gradient in the intermediate zone and therefore the groundwater velocity to decrease over time. Therefore, the increases observed in the perimeter wells and the elevated levels identified in some of the new perimeter wells would not be expected to be the result of increased migration from the upgradient source areas. Rather, the reduction in aquifer recharge allows for greater equilibration between the groundwater and residual contamination already present in the aquifer matrix downgradient of the IM area due to reduced groundwater velocity and greater contact time.

It is recommended that sampling of the original monitoring well network for dissolved cadmium and zinc should continue at the Site to assess the overall performance and effectiveness of the remediation trenches.

The RWM IM Supplemental Investigation Report (ARM 2019) identified some areas that may be outside the intended effective zone of the remediation trenches. The long-term effectiveness of the interim measure and the need for additional or alternative remedial measures will be evaluated further as described in the Rod and Wire Mill Groundwater Corrective Measures Study Work Plan (Revision 0, dated October 18, 2019).

Direct injections of alkaline reagents were identified in the IM design report as a potential contingency measure. Based on the concentrations observed in 2019, it is recommended that this contingency be executed with a treatability study including a field pilot test to support the evaluation of this alternative in the Corrective Measures Study.

5.0 REFERENCES

Advanced GeoServices Corp. (2016). *Interim Measure Work Plan In-Situ Groundwater Treatment*. Revised August 22, 2016.

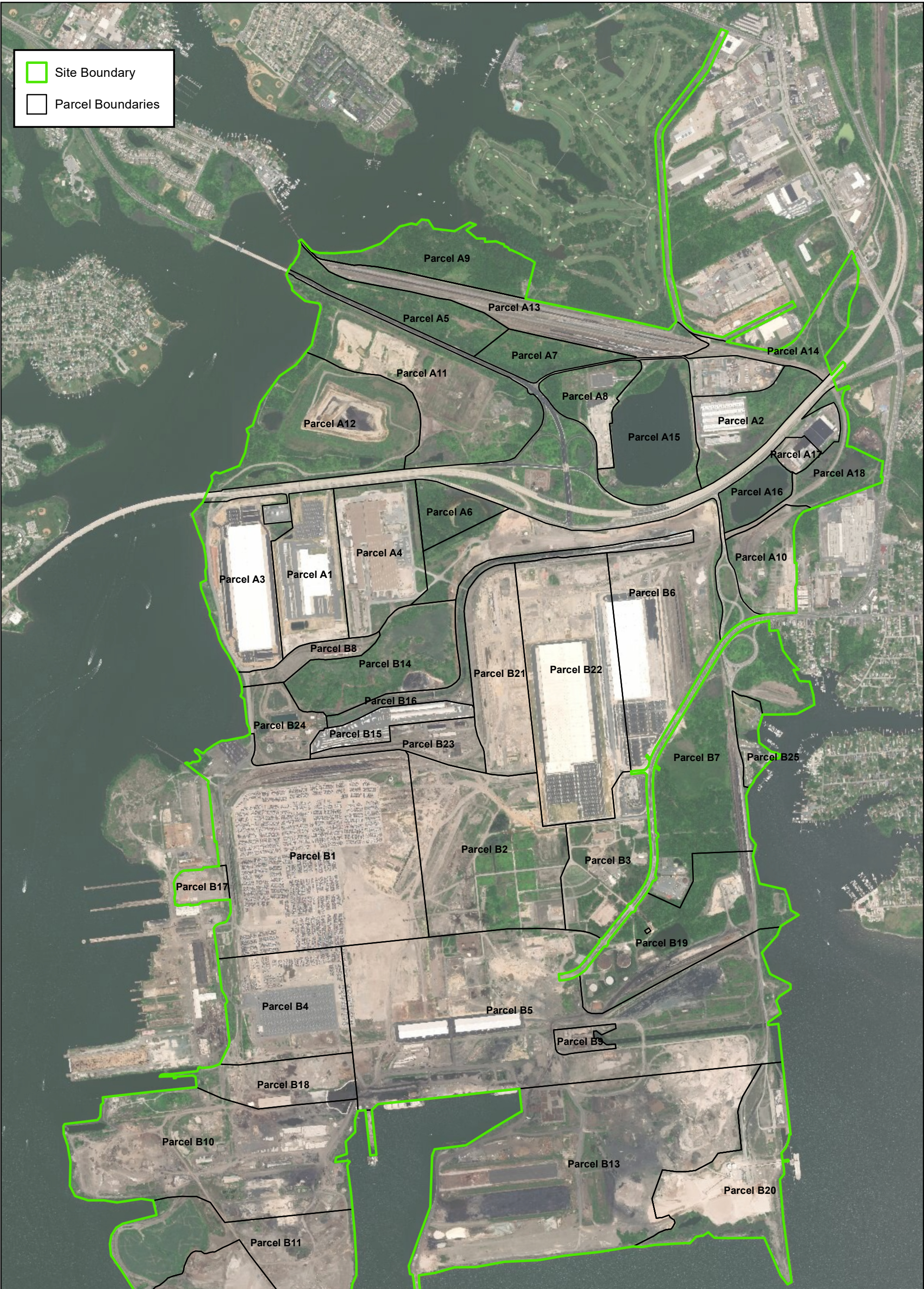
ARM Group, Inc. (2016). *Phase II Investigation Work Plan Area A: Parcel A3*. Revision 0 - June 10, 2016.

ARM Group, Inc. (2016). *Pre-Design Investigation Rod and Wire Mill Area Characterization Report Area A: Parcel A3*. Revision 0 – June 10, 2016.

ARM Group, Inc. (2018). *RWM Interim Measure Supplemental Investigation Work Plan*. Revision 0—December 21, 2018.

FIGURES

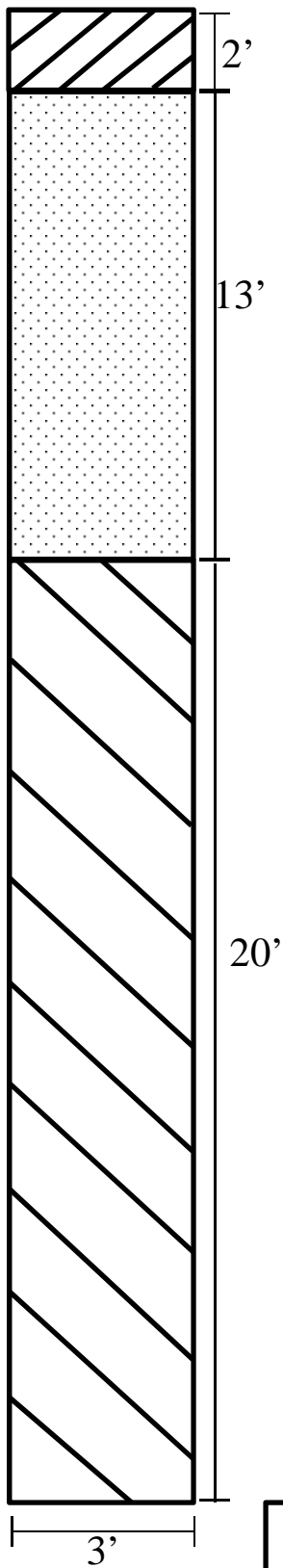
Site Boundary
 Parcel Boundaries




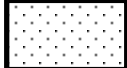

Tradepoint Atlantic Site Map and Parcel Boundaries January 24, 2020		Figure 1
 ARM Group LLC Engineers and Scientists	Tradepoint Atlantic Baltimore County, MD	
	EnviroAnalytics Group ARM Project 20010103-8	



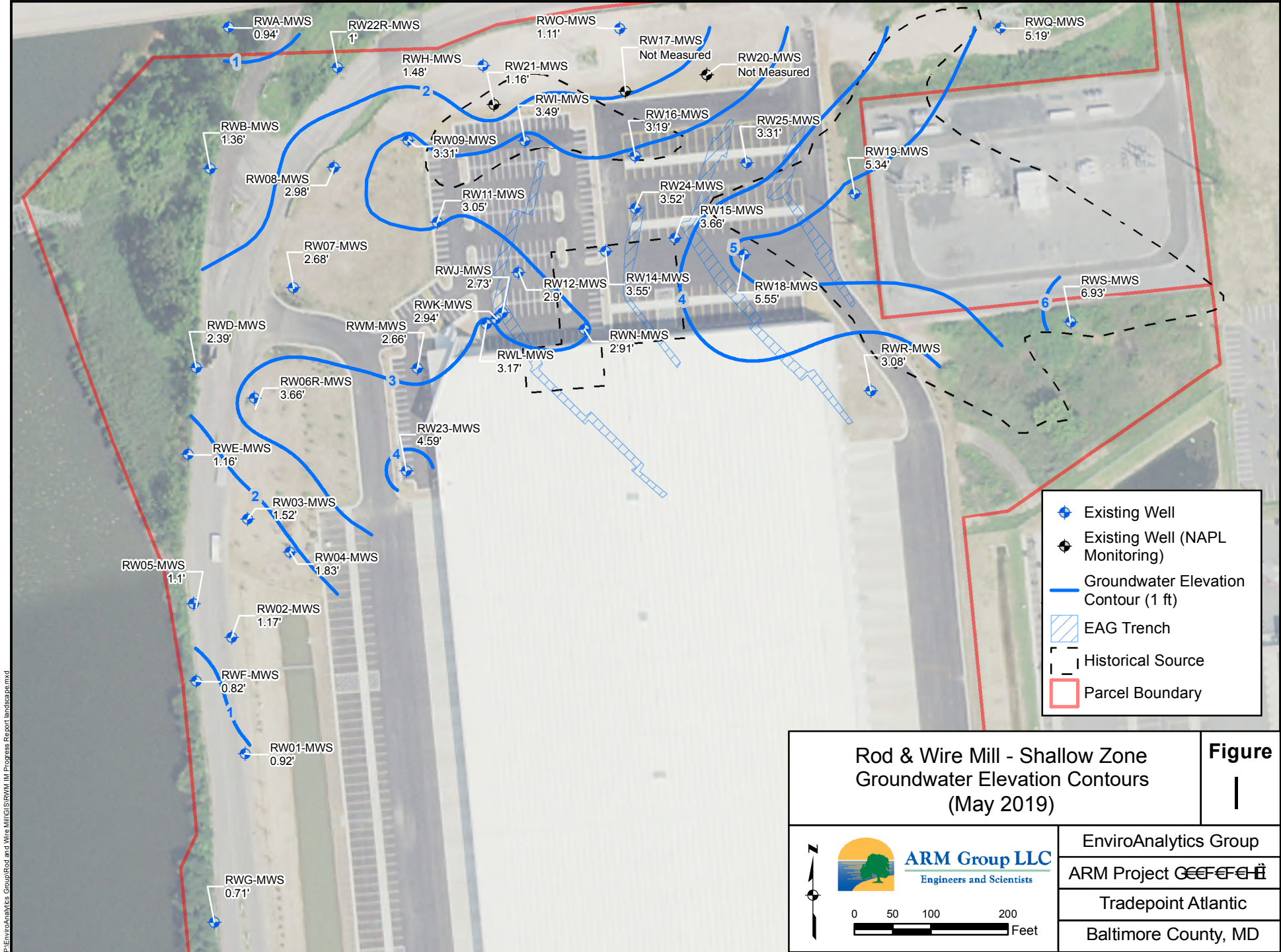
Parcel A3 (Rod & Wire Mill) Location of Historical Activities January 13, 2020		Figure 2
EnviroAnalytics Group	Tradepoint Atlantic	
ARM Project 20010103-8	Baltimore County, MD	
ARM Group LLC Engineers and Scientists	<ul style="list-style-type: none"> Former Northwest Pond Former East Pond Former Sludge Bin Storage Area Approximate Boundary of Remedial Design Area Parcel A3 (RWM) boundary 	



Legend



-  On-Site Clean Fill
-  Backfill Spoils
-  Alkaline Charge

Former Rod and Wire Mill Area Sparrows Point Terminal Sparrows Point, Maryland		
Treatment Trench Cross-Section		
 <small>Engineering for the Environment. Planning for People.™</small> 1055 Andrew Drive, Suite A West Chester, PA 19380-4293 tel 610.840.9100 fax 610.840.9190 www.advancedgeoservices.com	Project No.: 2016-3421	FIGURE 3



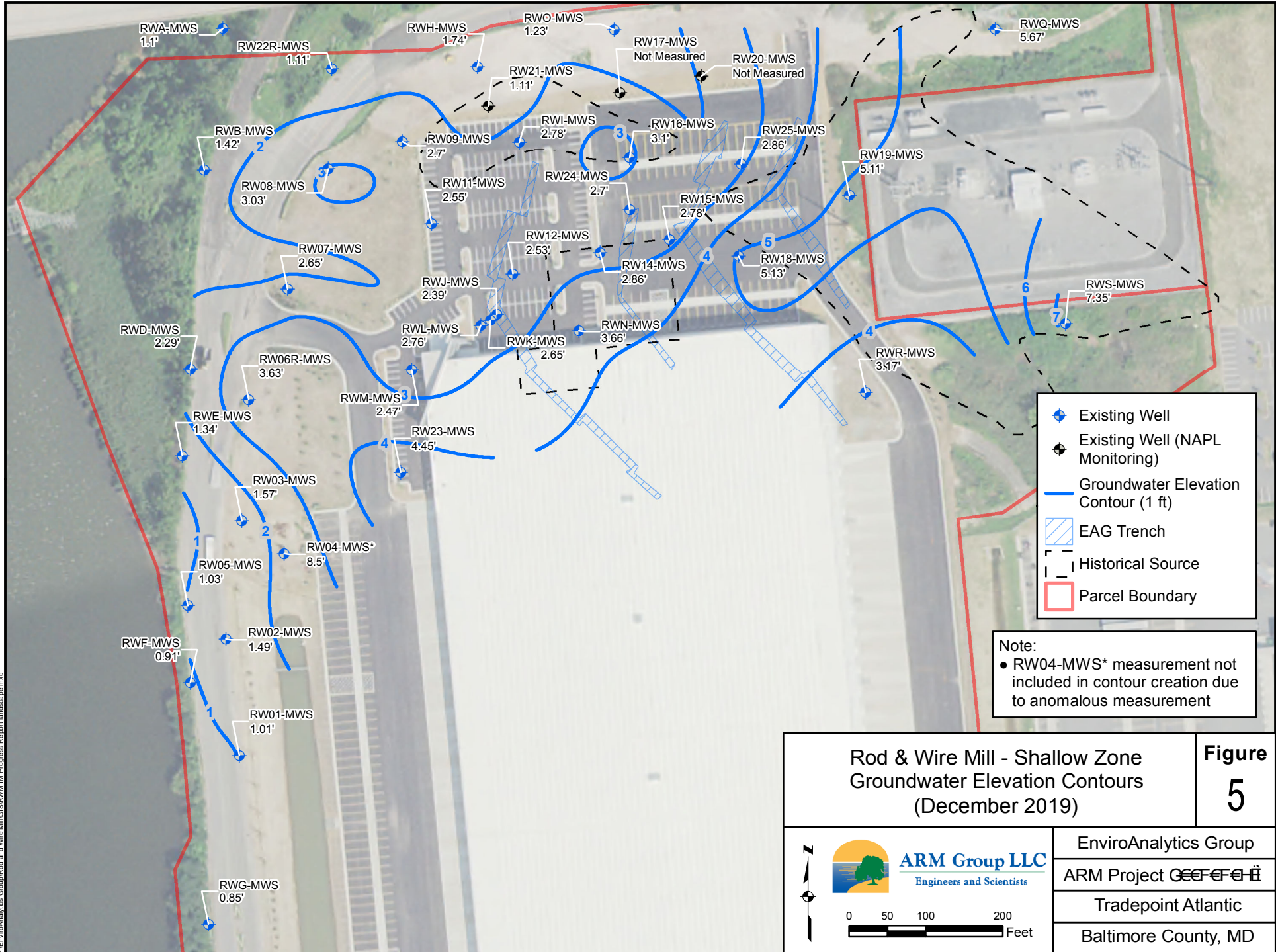
Rod & Wire Mill - Shallow Zone
Groundwater Elevation Contours
(May 2019)

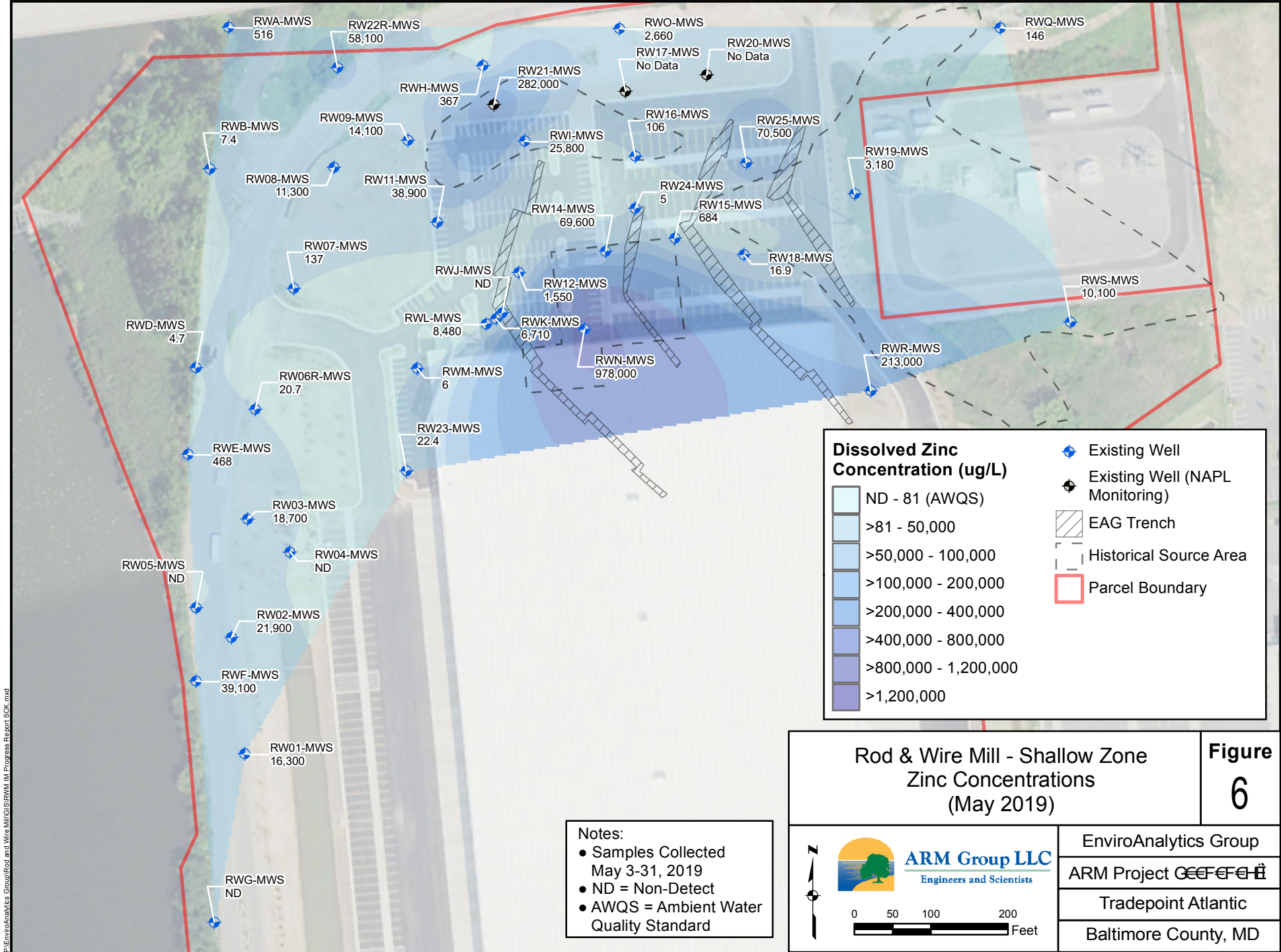
Figure
I



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 Engineers and Scientists

0 50 100 200
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 Tradepoint Atlantic
 Baltimore County, MD



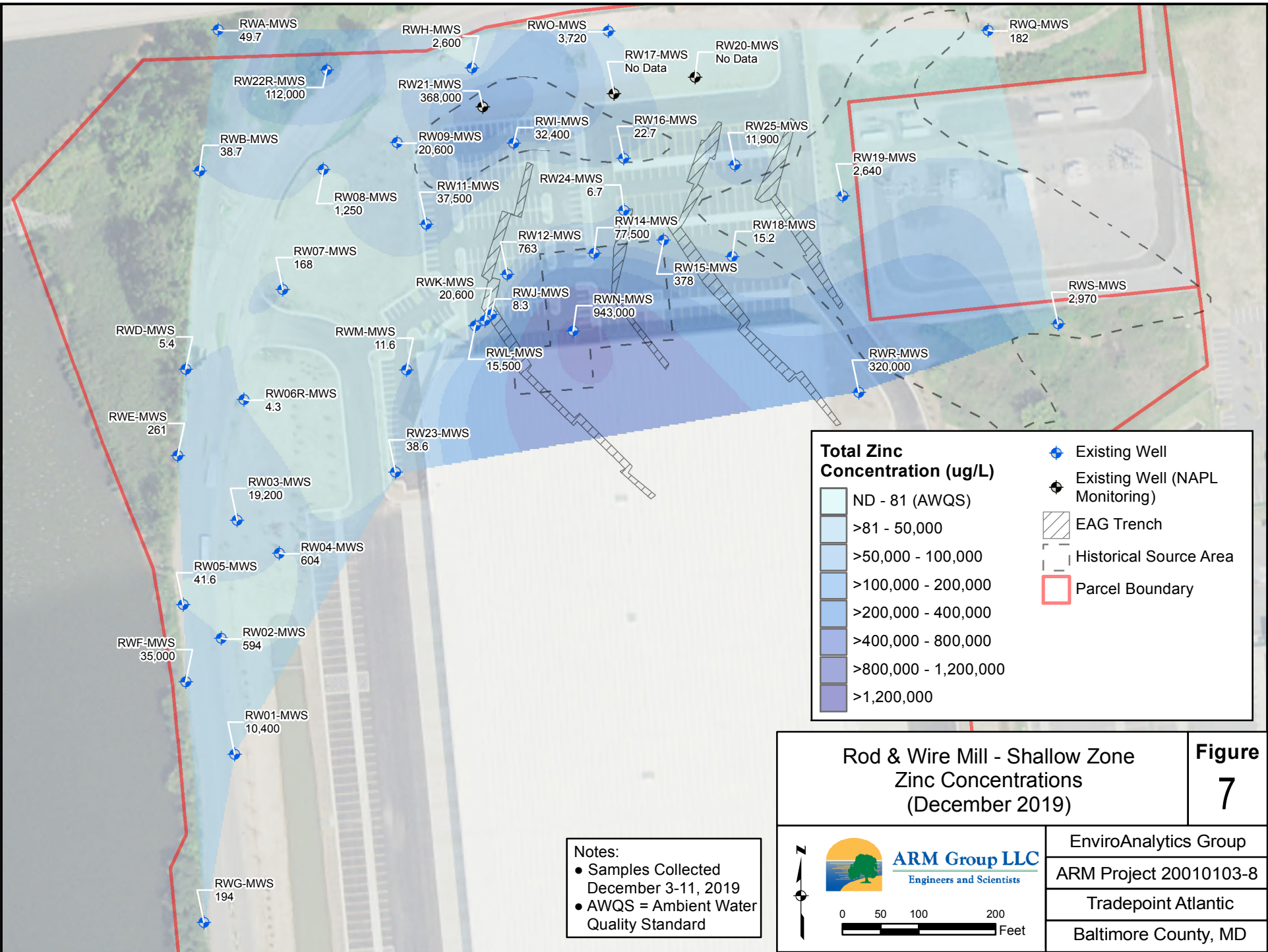


Rod & Wire Mill - Shallow Zone
Zinc Concentrations
(May 2019)

Figure
6

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Baltimore County, MD



Total Zinc Concentration (ug/L)

ND - 81 (AWQS)
>81 - 50,000
>50,000 - 100,000
>100,000 - 200,000
>200,000 - 400,000
>400,000 - 800,000
>800,000 - 1,200,000
>1,200,000

Legend:

- Existing Well
- Existing Well (NAPL Monitoring)
- EAG Trench
- Historical Source Area
- Parcel Boundary

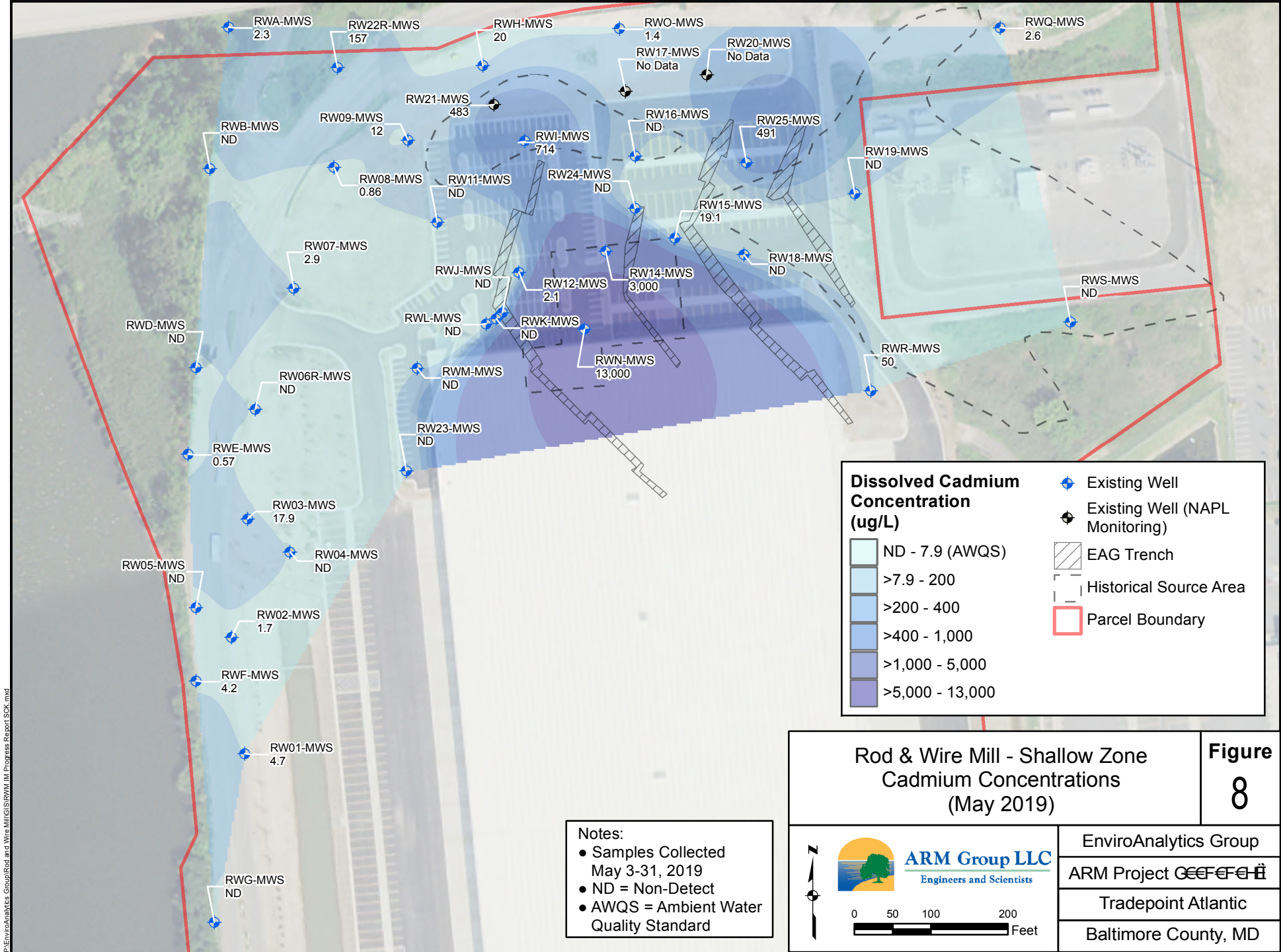
Rod & Wire Mill - Shallow Zone Zinc Concentrations (December 2019)

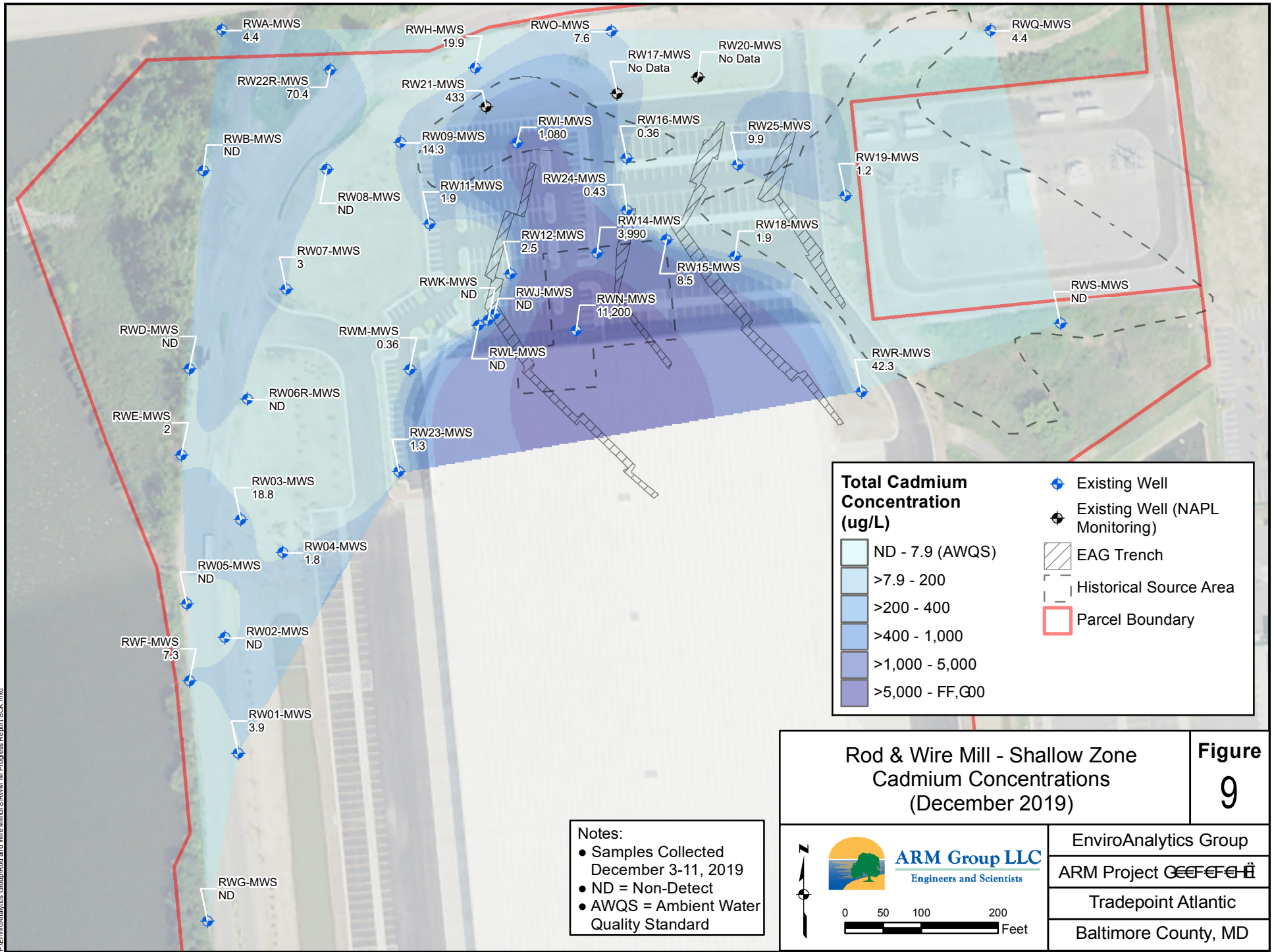
Figure 7

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 ARM Project 20010103-8
 Tradepoint Atlantic
 Baltimore County, MD

Notes:

- Samples Collected December 3-11, 2019
- AWQS = Ambient Water Quality Standard





Total Cadmium Concentration (ug/L)

- ND - 7.9 (AWQS)
- >7.9 - 200
- >200 - 400
- >400 - 1,000
- >1,000 - 5,000
- >5,000 - FF,000

- Existing Well
- Existing Well (NAPL Monitoring)
- EAG Trench
- Historical Source Area
- Parcel Boundary

Rod & Wire Mill - Shallow Zone Cadmium Concentrations (December 2019)

Figure 9

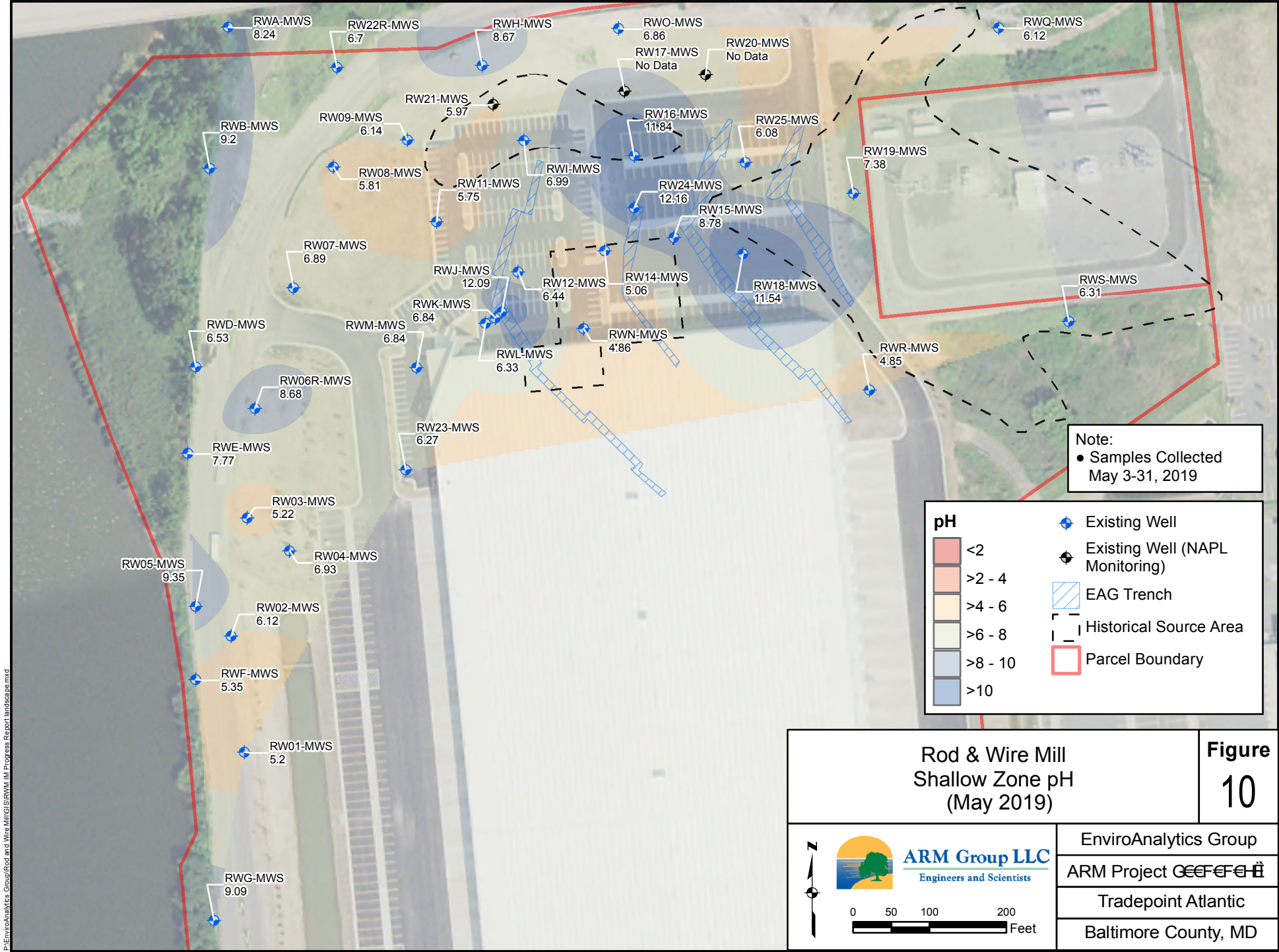
Notes:

- Samples Collected December 3-11, 2019
- ND = Non-Detect
- AWQS = Ambient Water Quality Standard

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ARM Project ~~000000~~
Tradepoint Atlantic
Baltimore County, MD



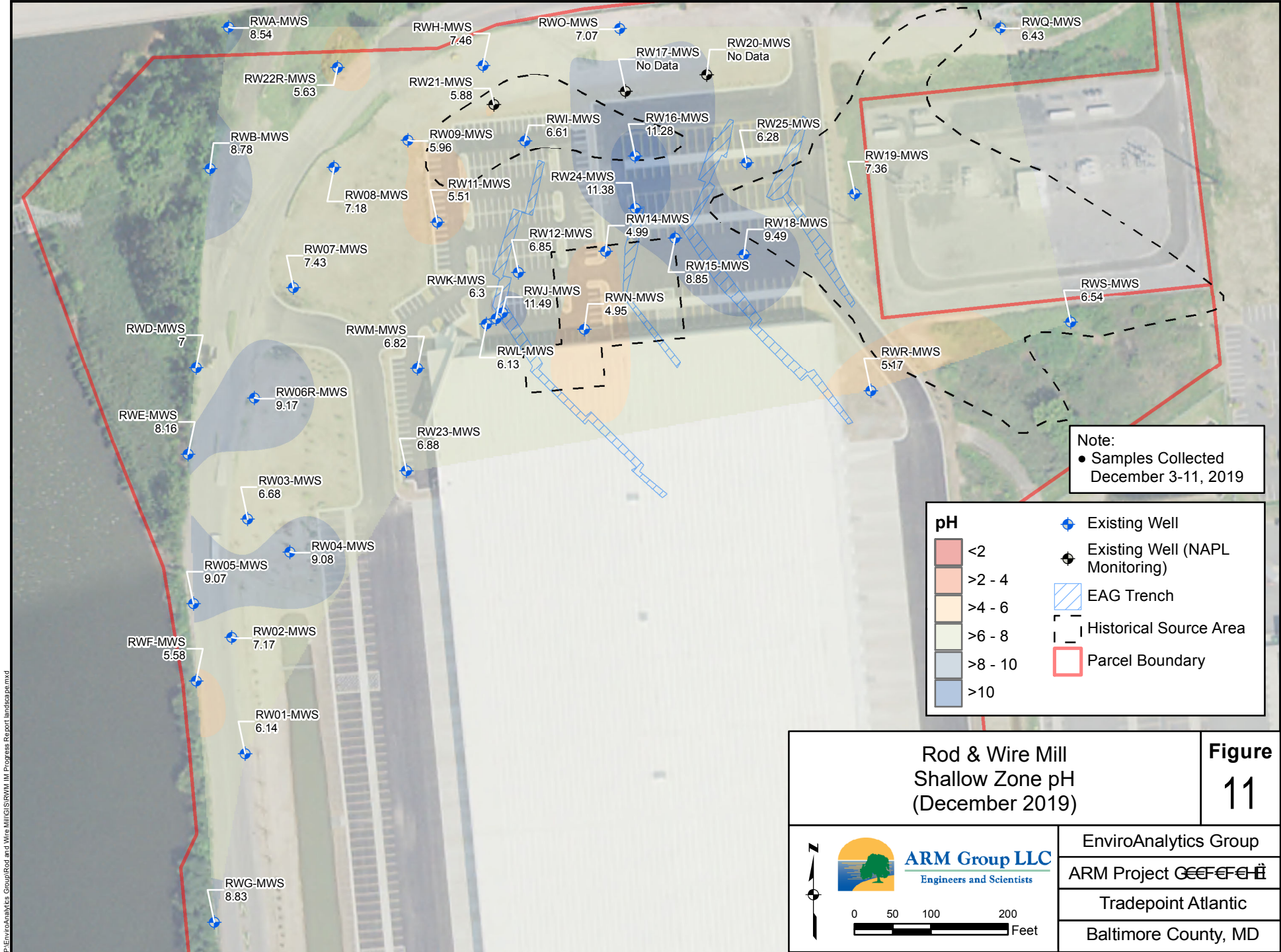
**Rod & Wire Mill
 Shallow Zone pH
 (May 2019)**

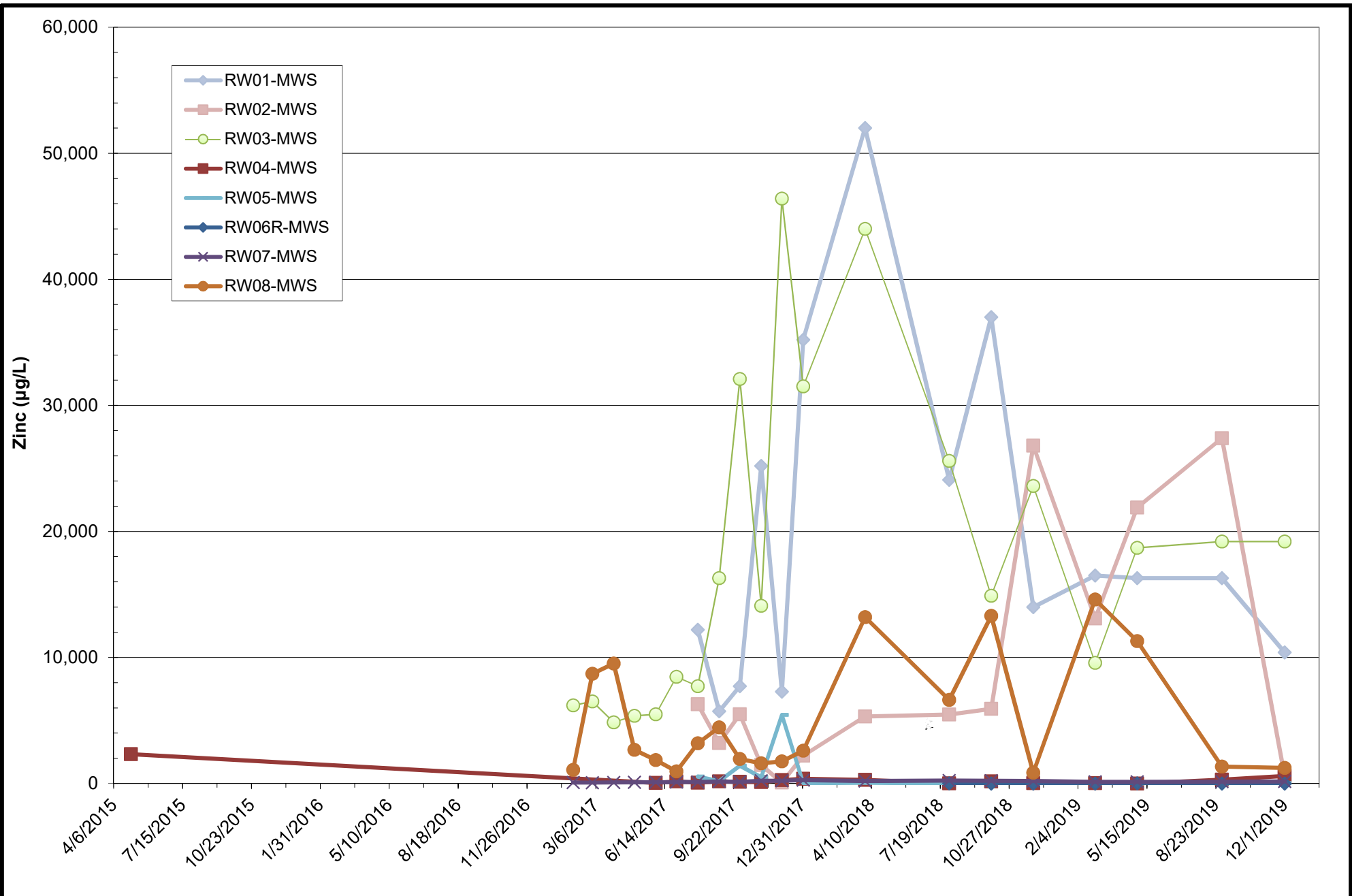
**Figure
 10**



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 Baltimore County, MD





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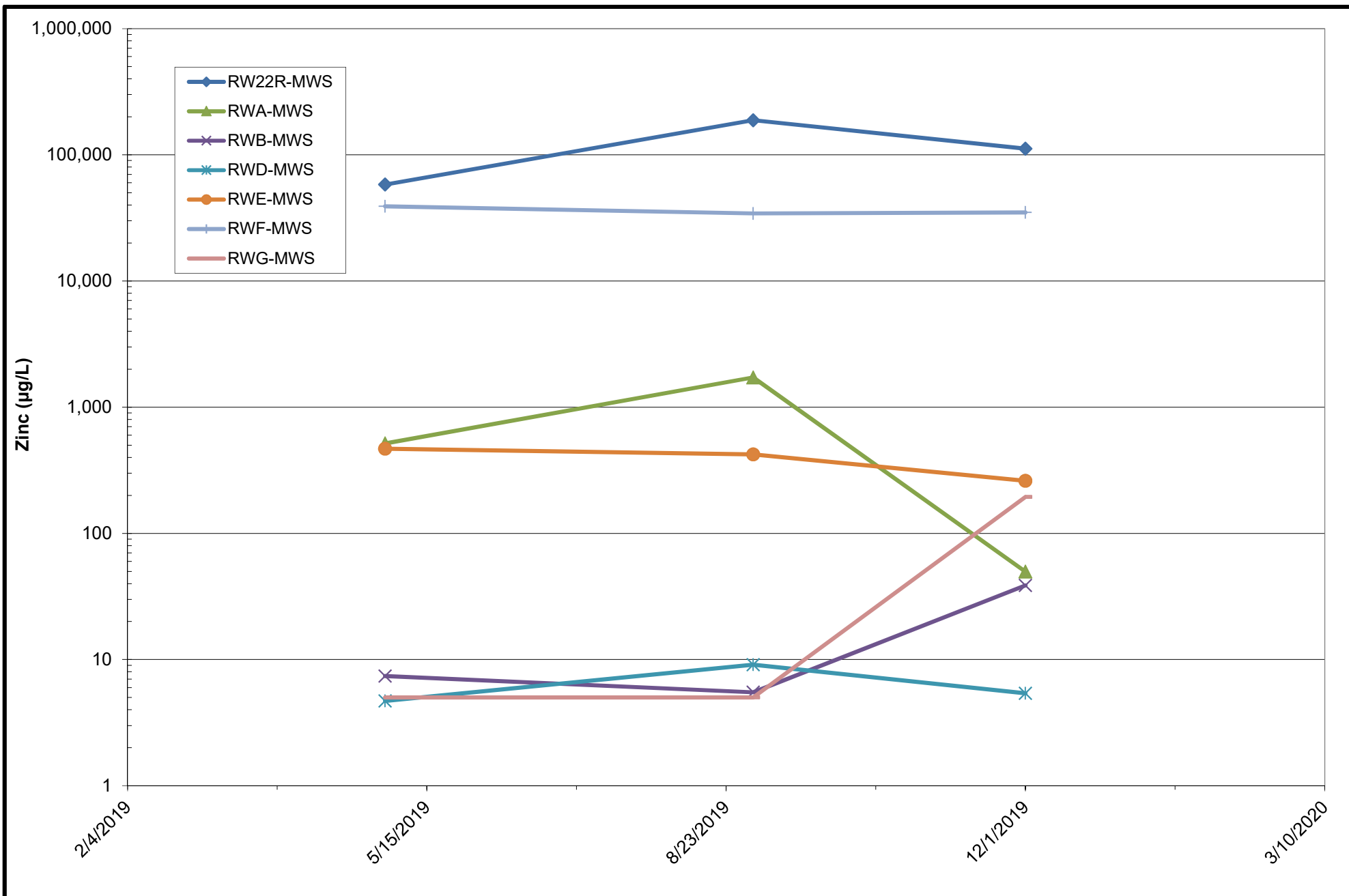
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

Shallow Perimeter Zinc Concentrations (Original Wells)

January 24, 2020

Figure 12



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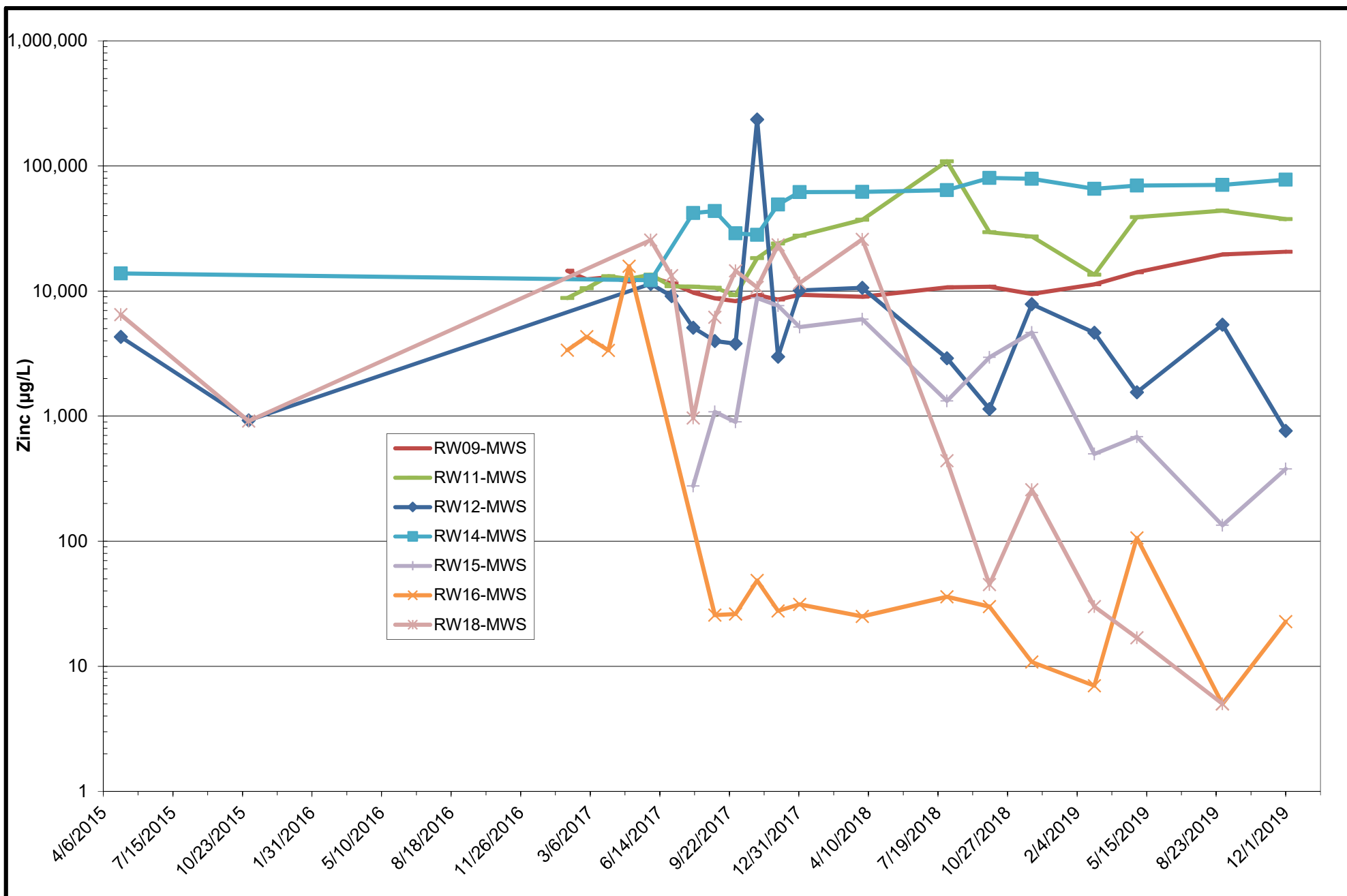
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Tradeport Atlantic

Sparrows Point, Maryland

Shallow Perimeter Zinc Concentrations (Supplemental Wells)

January 24, 2020

**Figure
1'**



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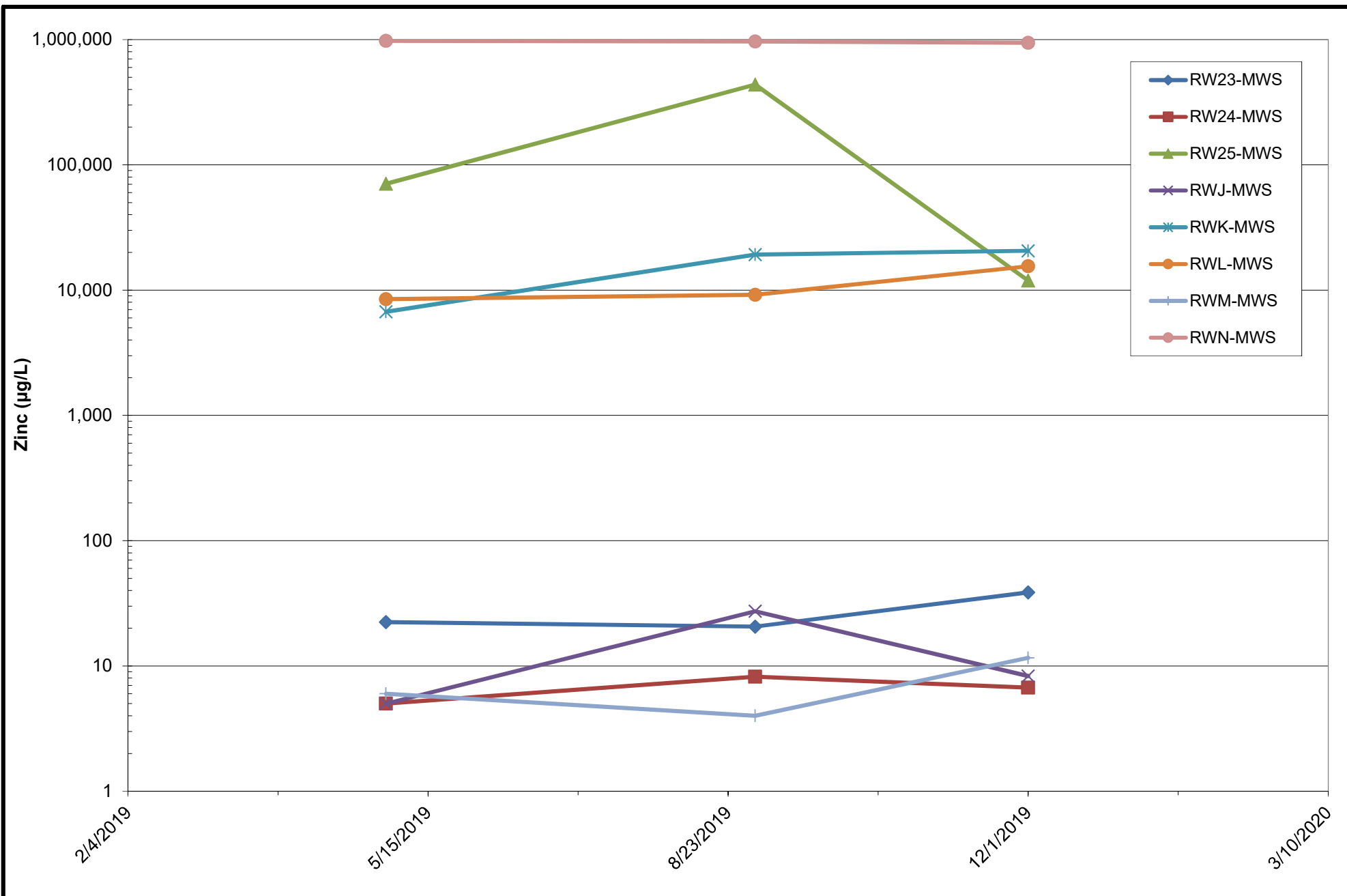
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Sparrows Point, Maryland

Shallow Interior Zinc Concentrations (Original Wells)

January 24, 2020

**Figure
14**



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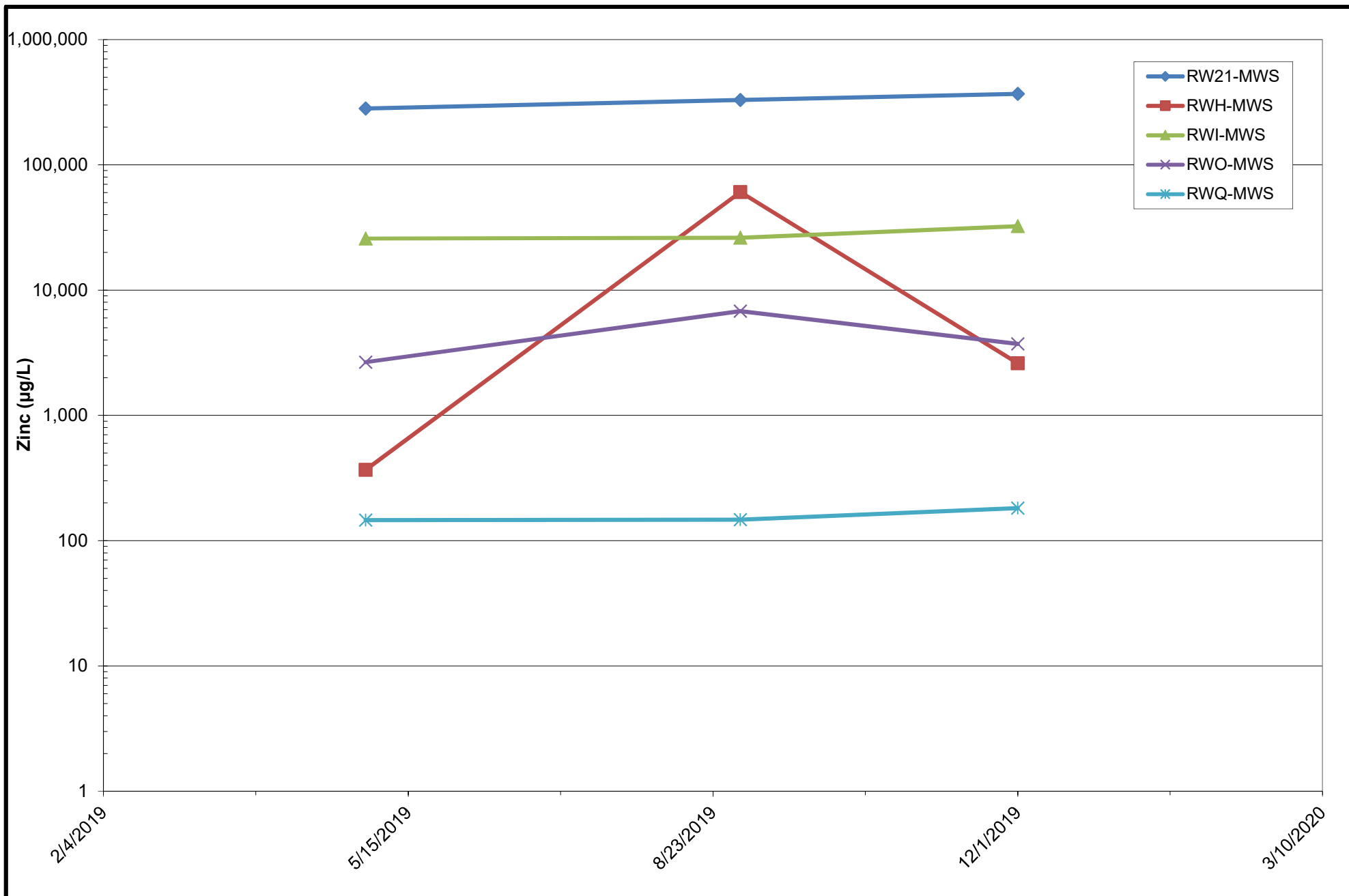
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Sparrows Point, Maryland

Shallow Interior Zinc Concentrations (Supplemental Wells)

January 24, 2020

**Figure
15**



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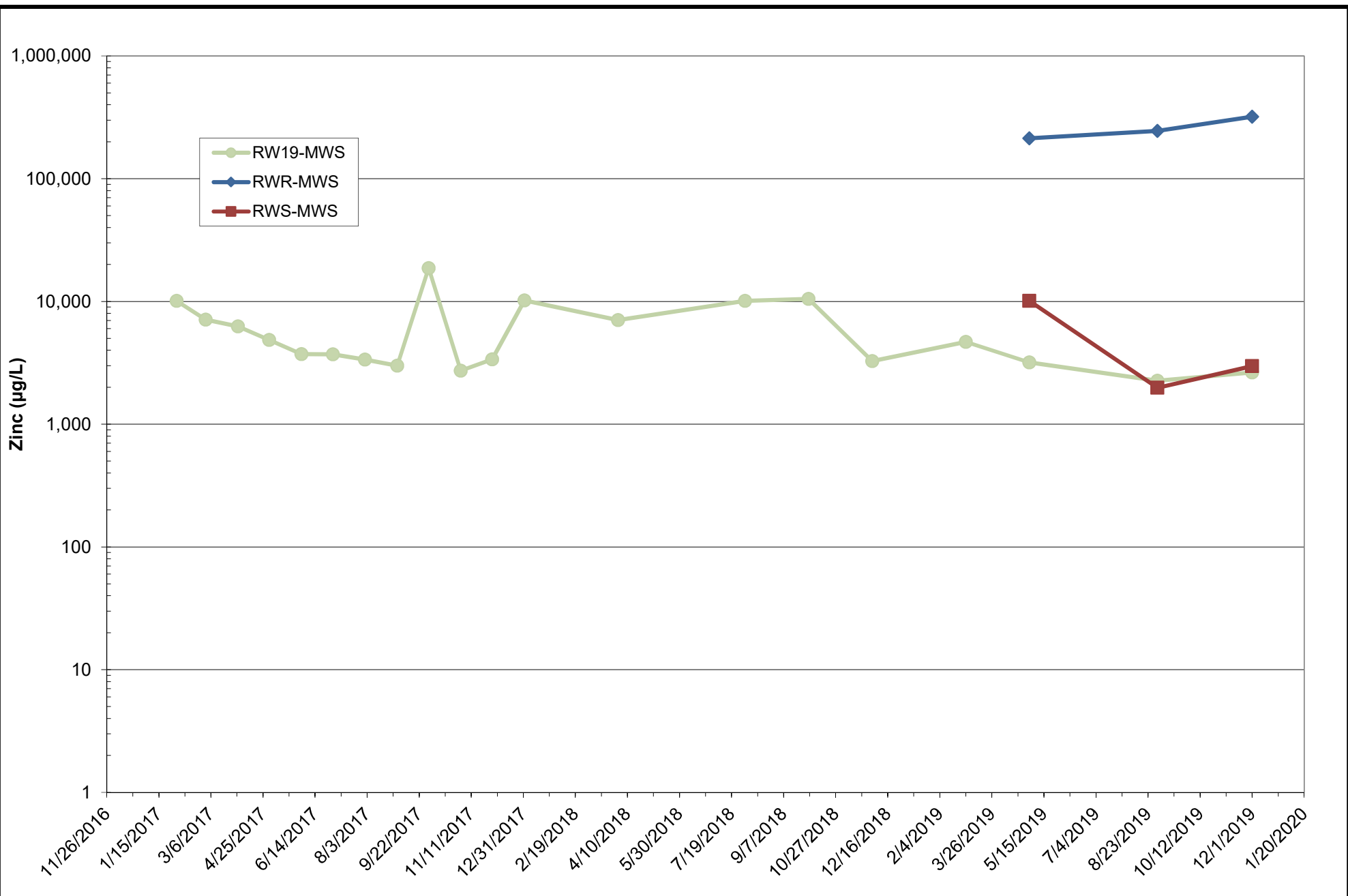
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Shallow Delineation Wells Zinc Concentrations

January 24, 2020

**Figure
16**



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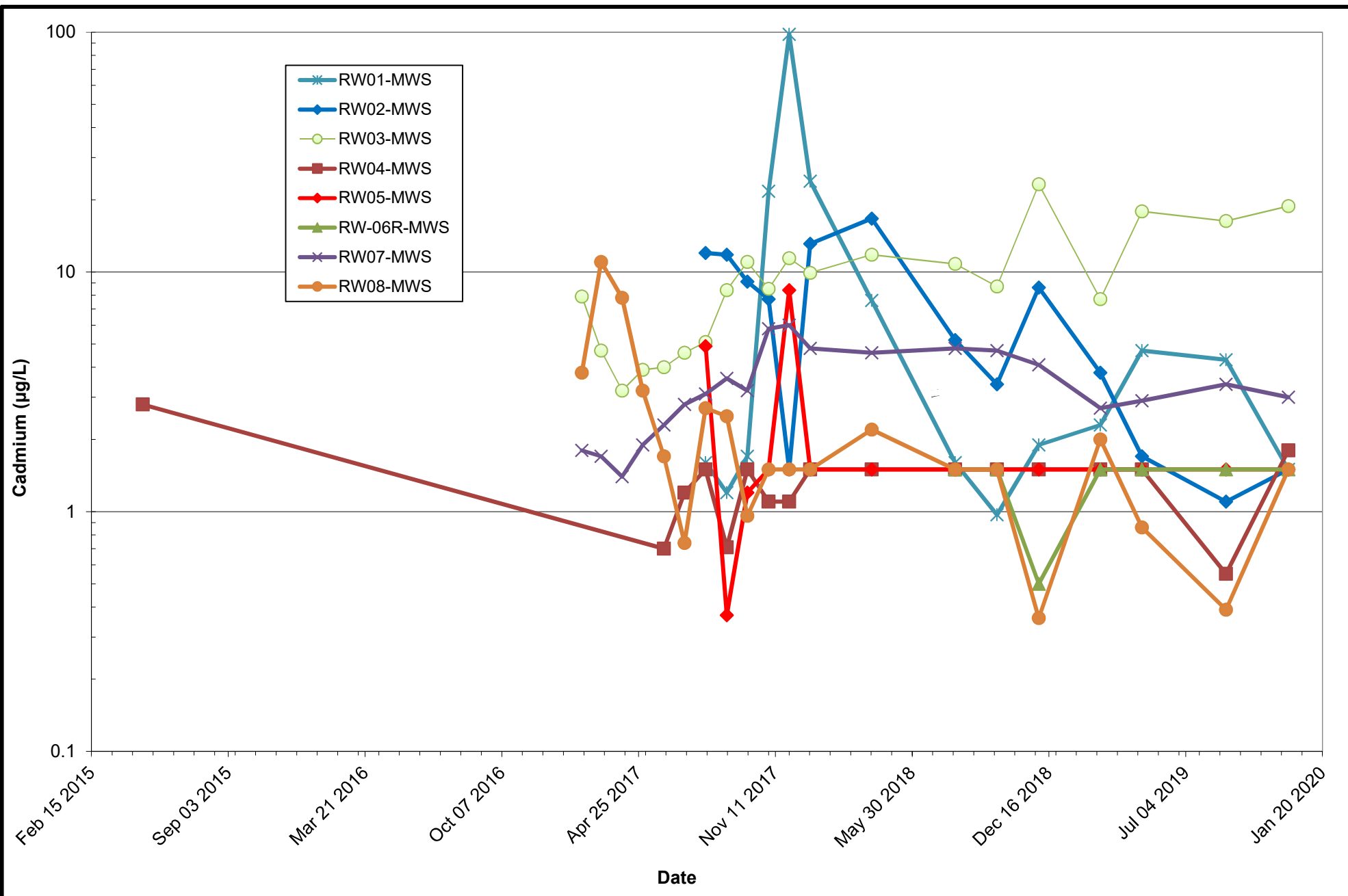
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Shallow Upgradient Zinc Concentrations

January 24, 2020

**Figure
17**



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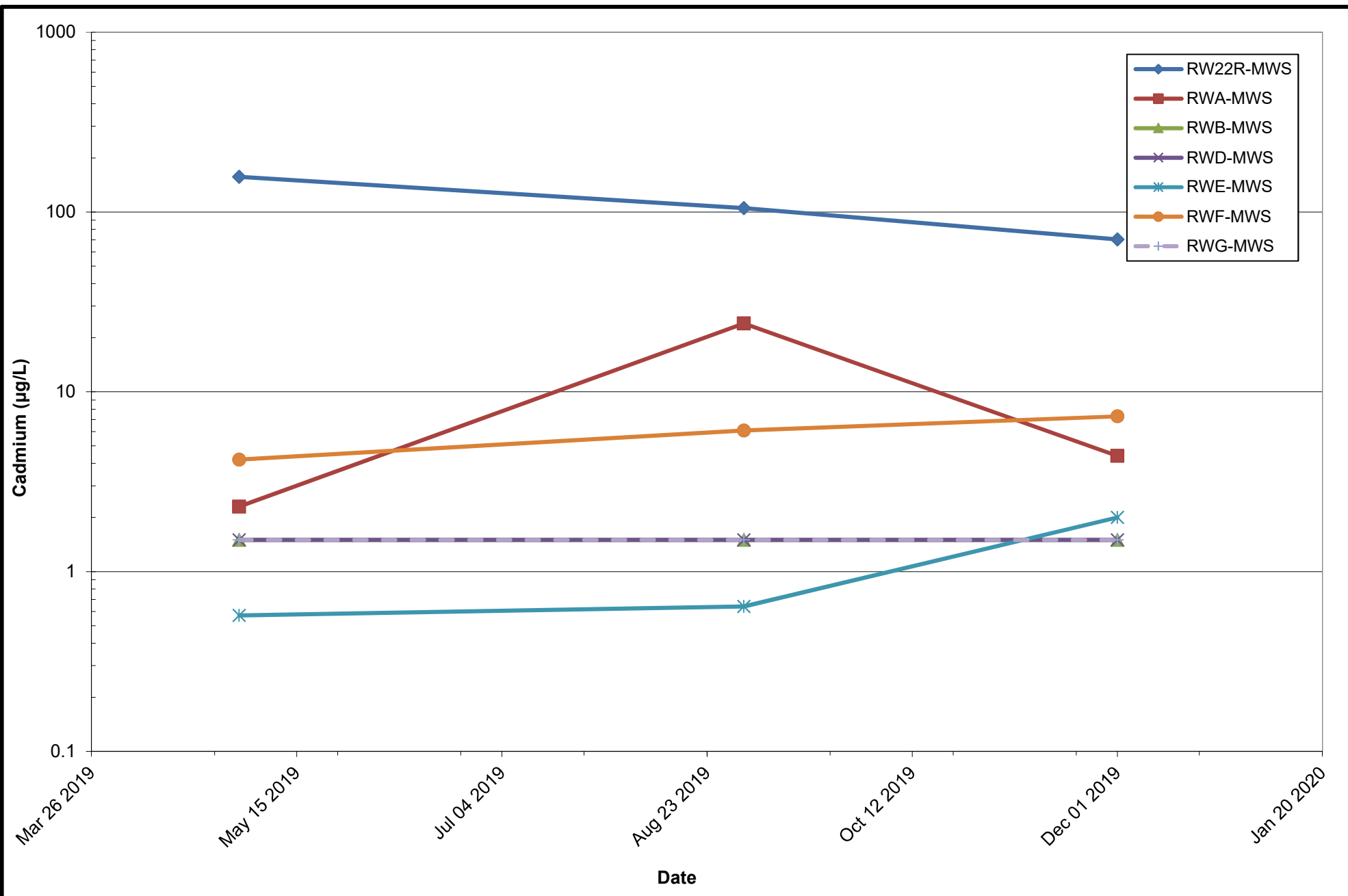
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Sparrows Point, Maryland

Shallow Perimeter Cadmium Concentrations (Original Wells)

January 24, 2020

**Figure
18**



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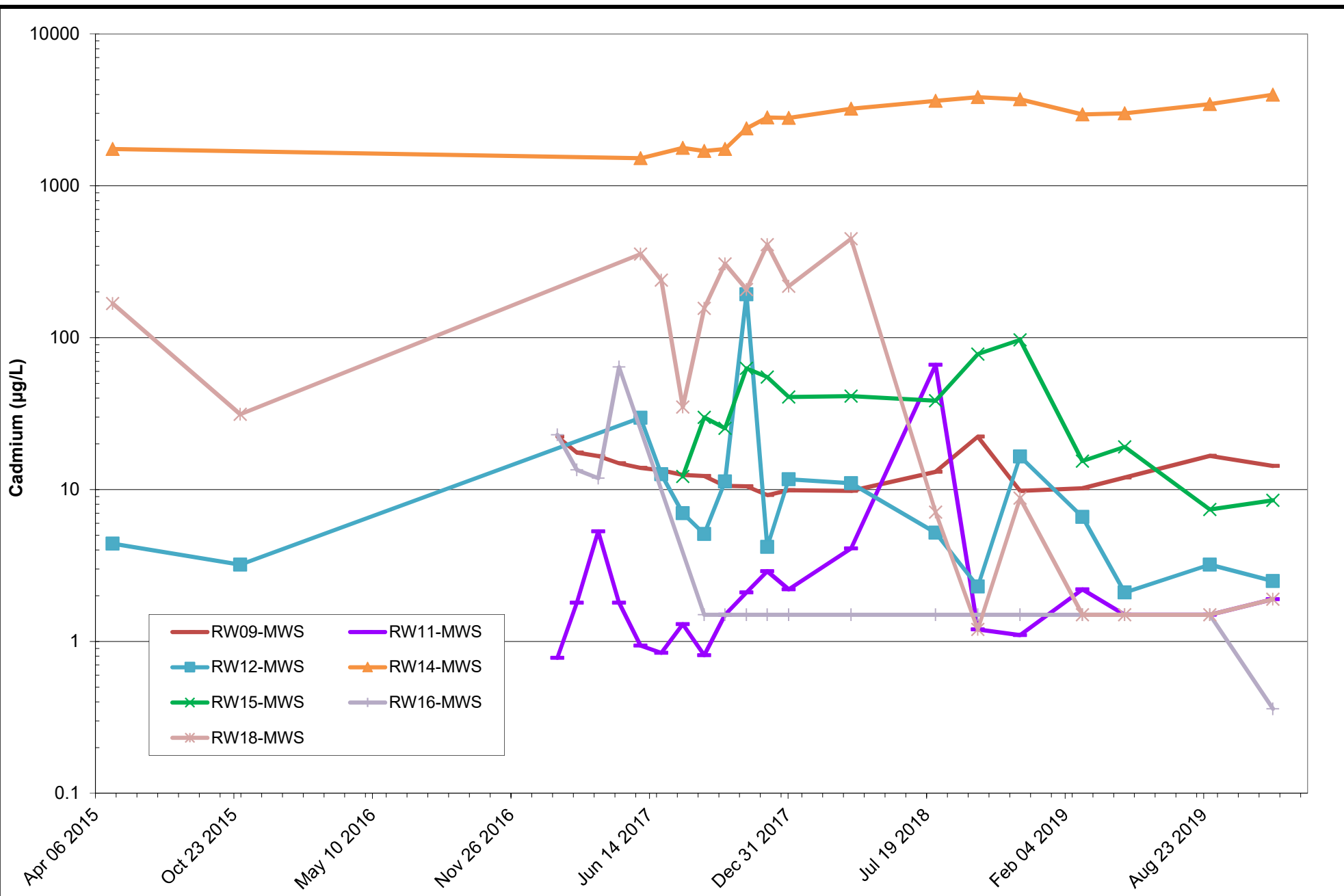
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Sparrows Point, Maryland

Shallow Perimeter Cadmium Concentrations (Supplemental Wells)

January 24, 2020

**Figure
19**



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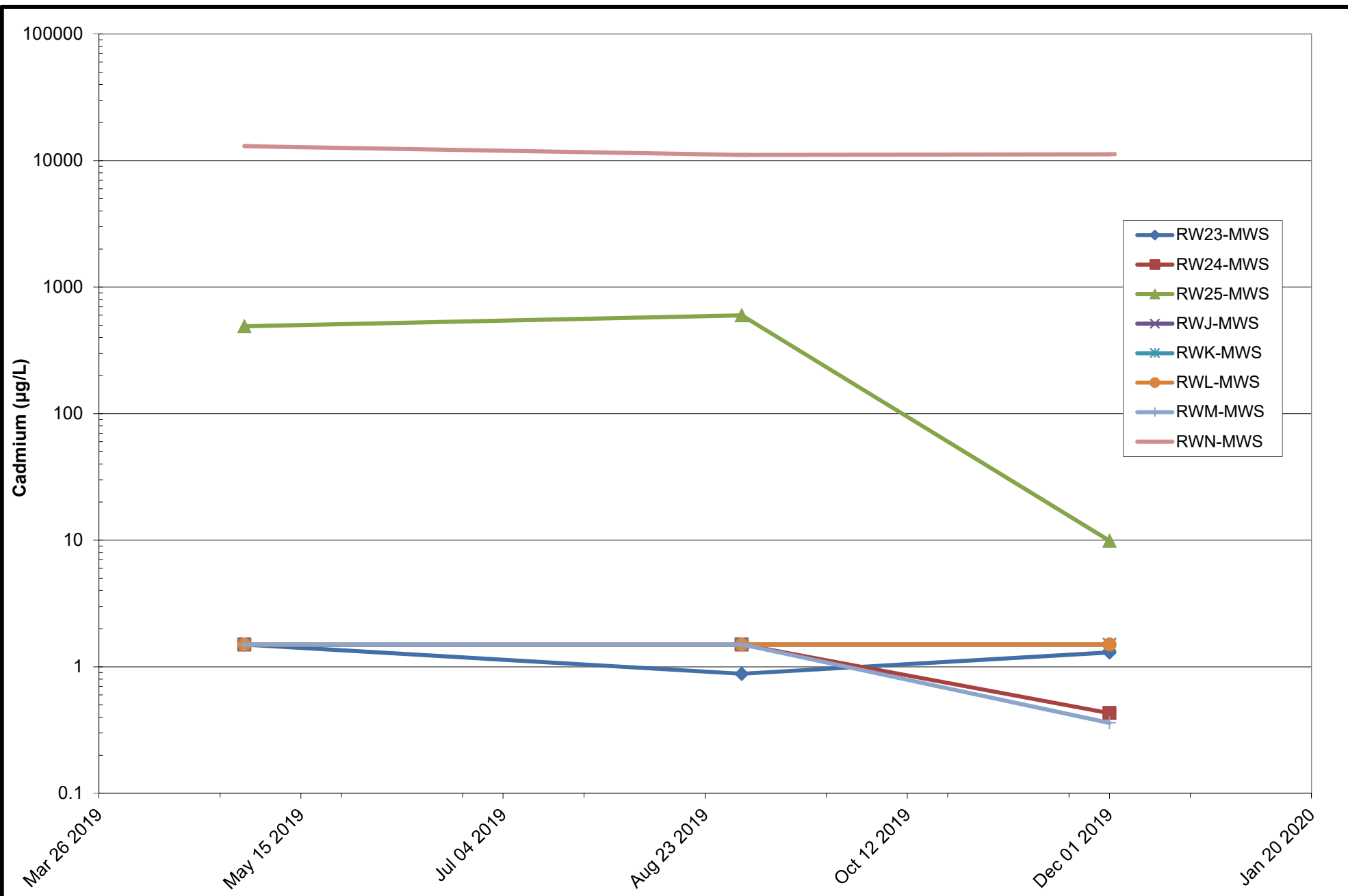
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Tradeport Atlantic

Sparrows Point, Maryland

Shallow Interior Cadmium Concentrations (Original Wells)

January 24, 2020

**Figure
20**



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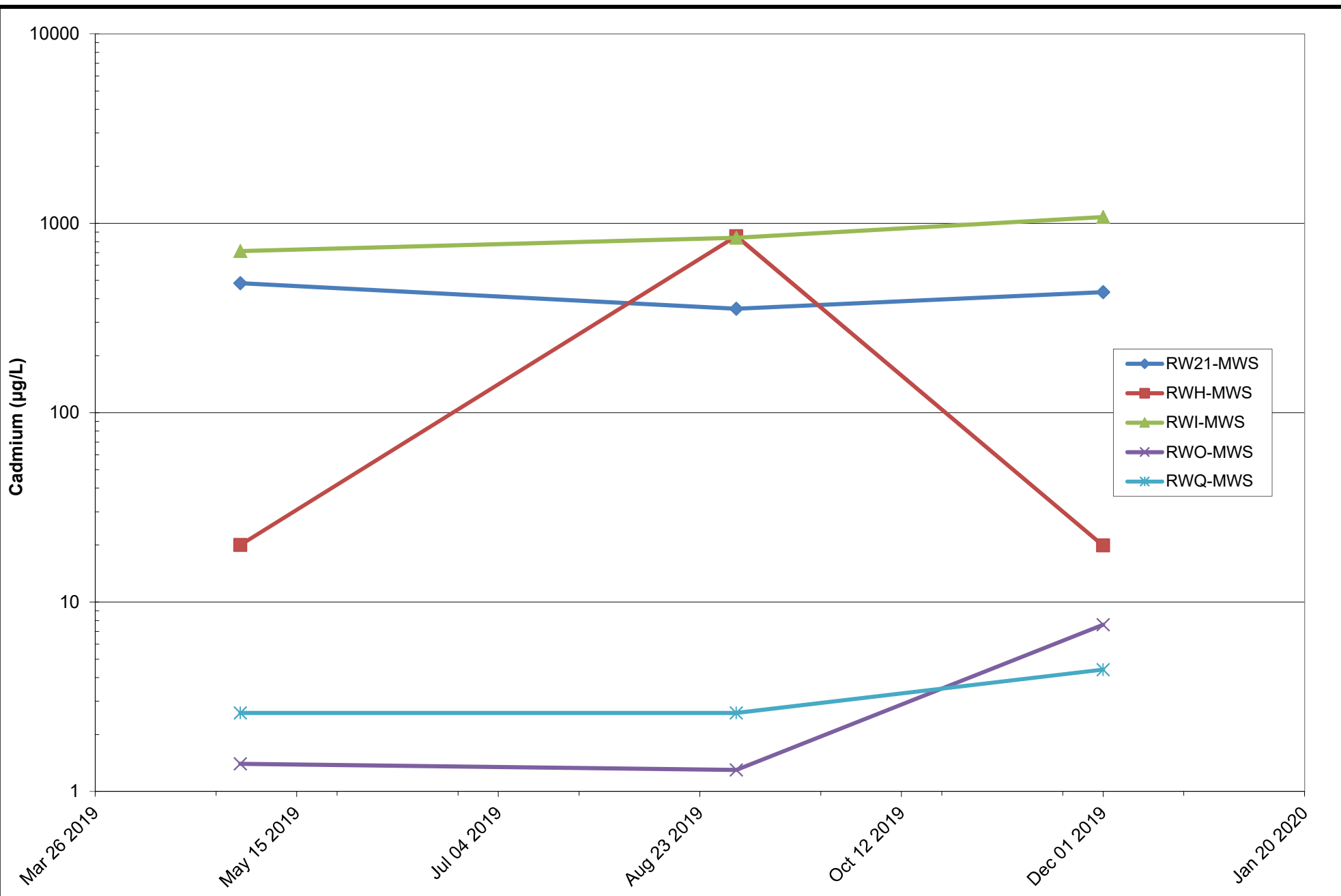
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Sparrows Point, Maryland

Shallow Interior Cadmium Concentrations (Supplemental Wells)

January 24, 2020

**Figure
21**



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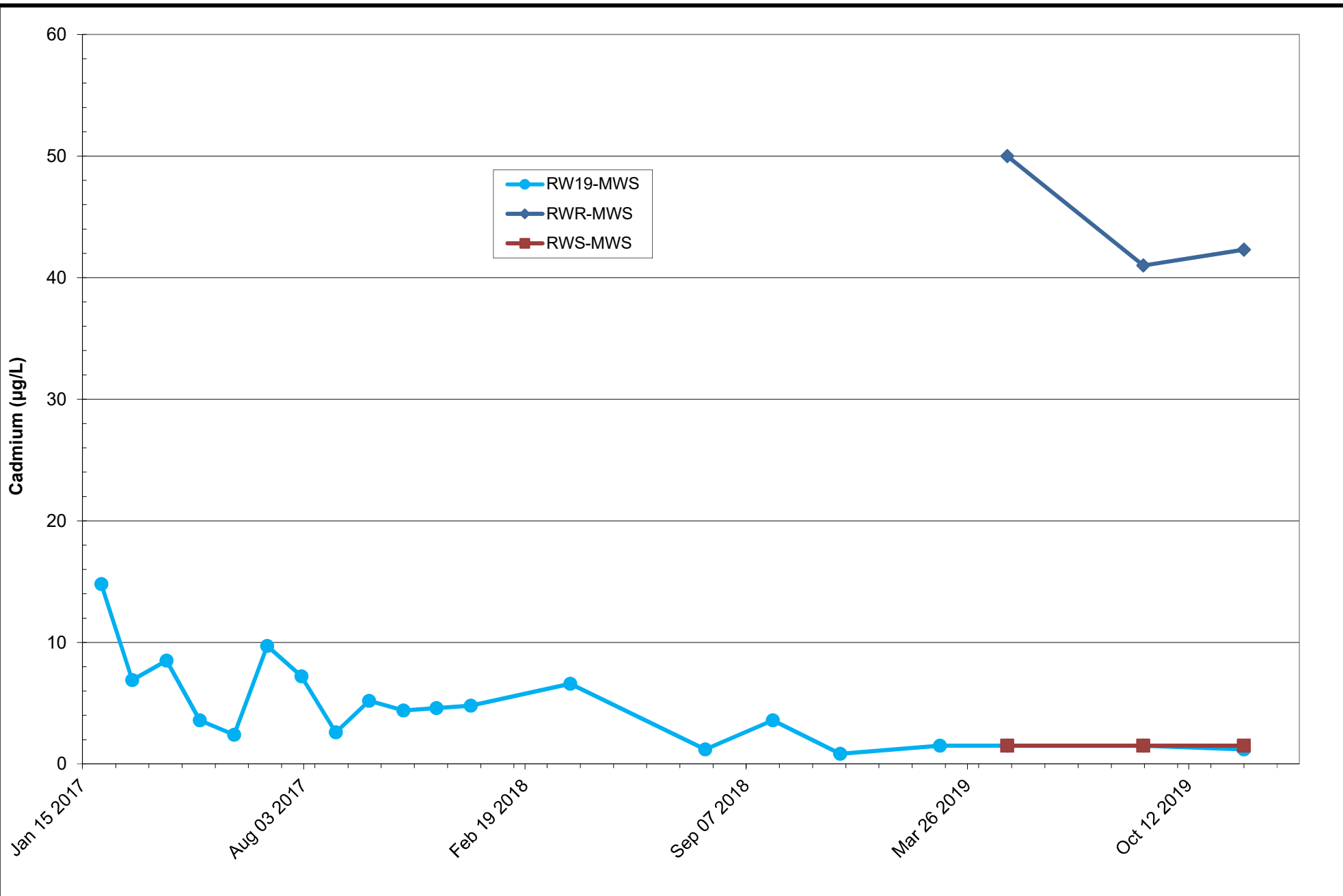
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Sparrows Point, Maryland

Shallow Delineation Cadmium Concentrations

January 24, 2020

**Figure
22**



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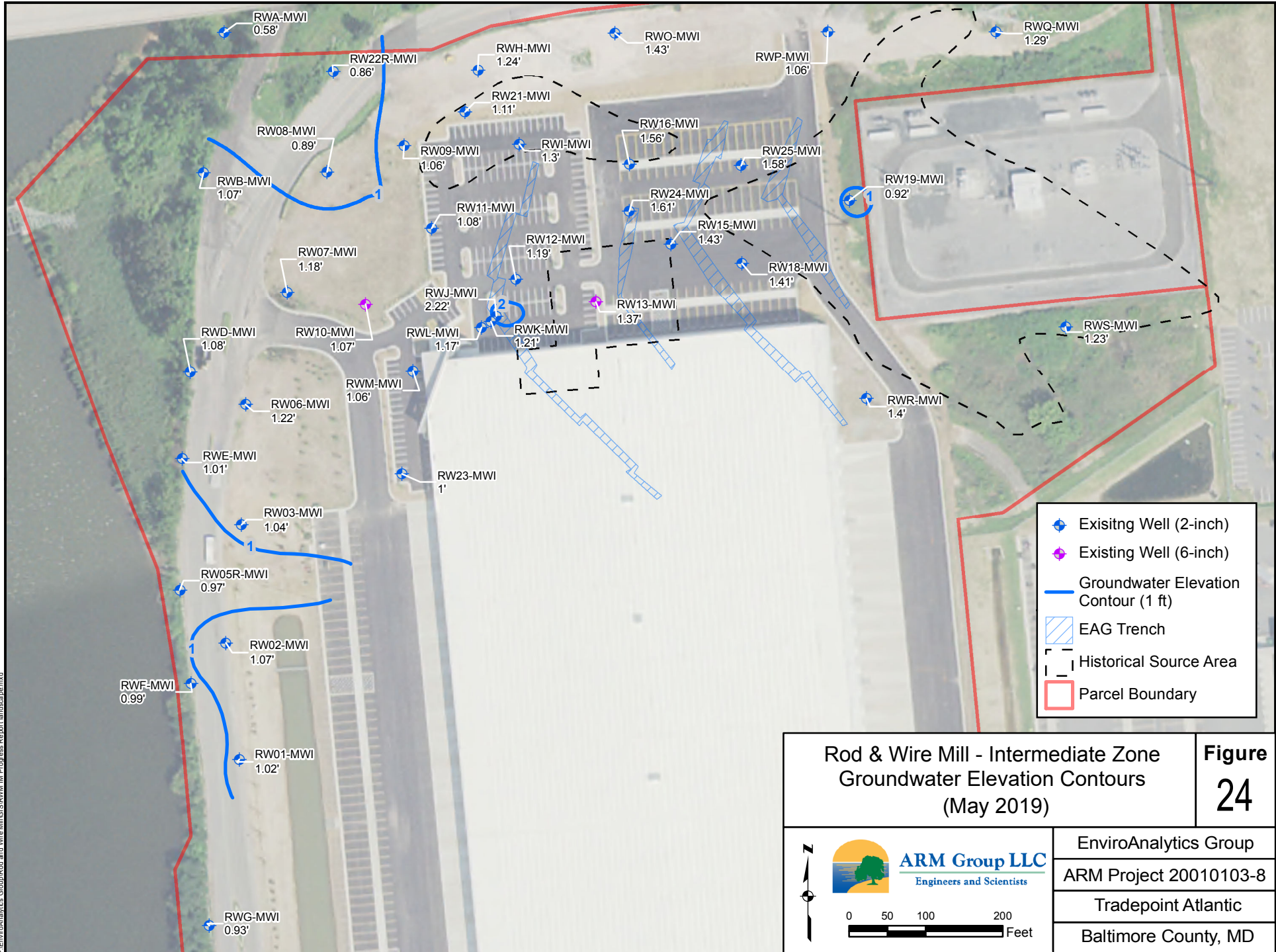
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

Shallow Upgradient Cadmium Concentration



January 24, 2020

**Figure
23**



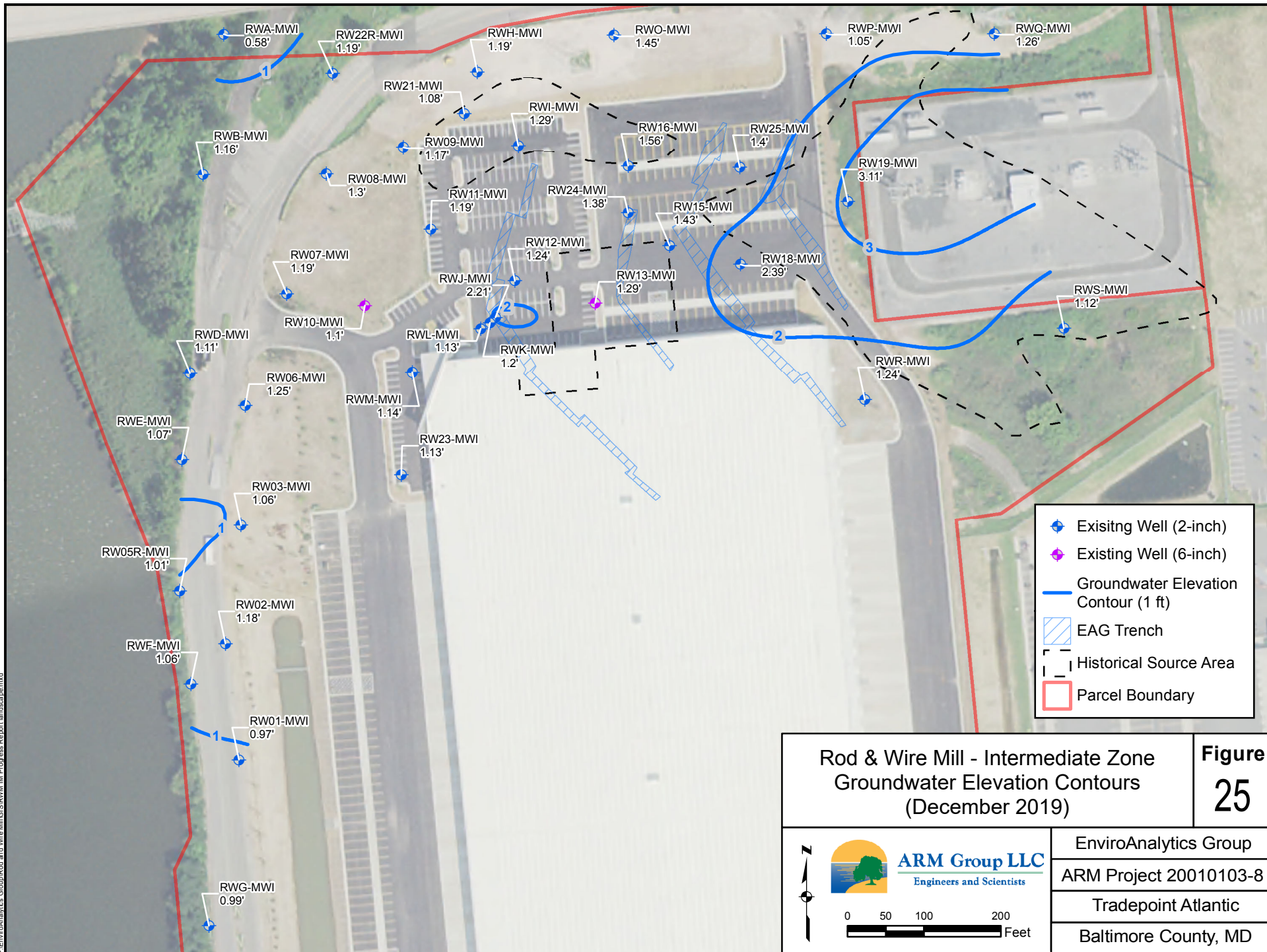
Rod & Wire Mill - Intermediate Zone
Groundwater Elevation Contours
(May 2019)



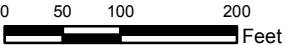
Figure
24

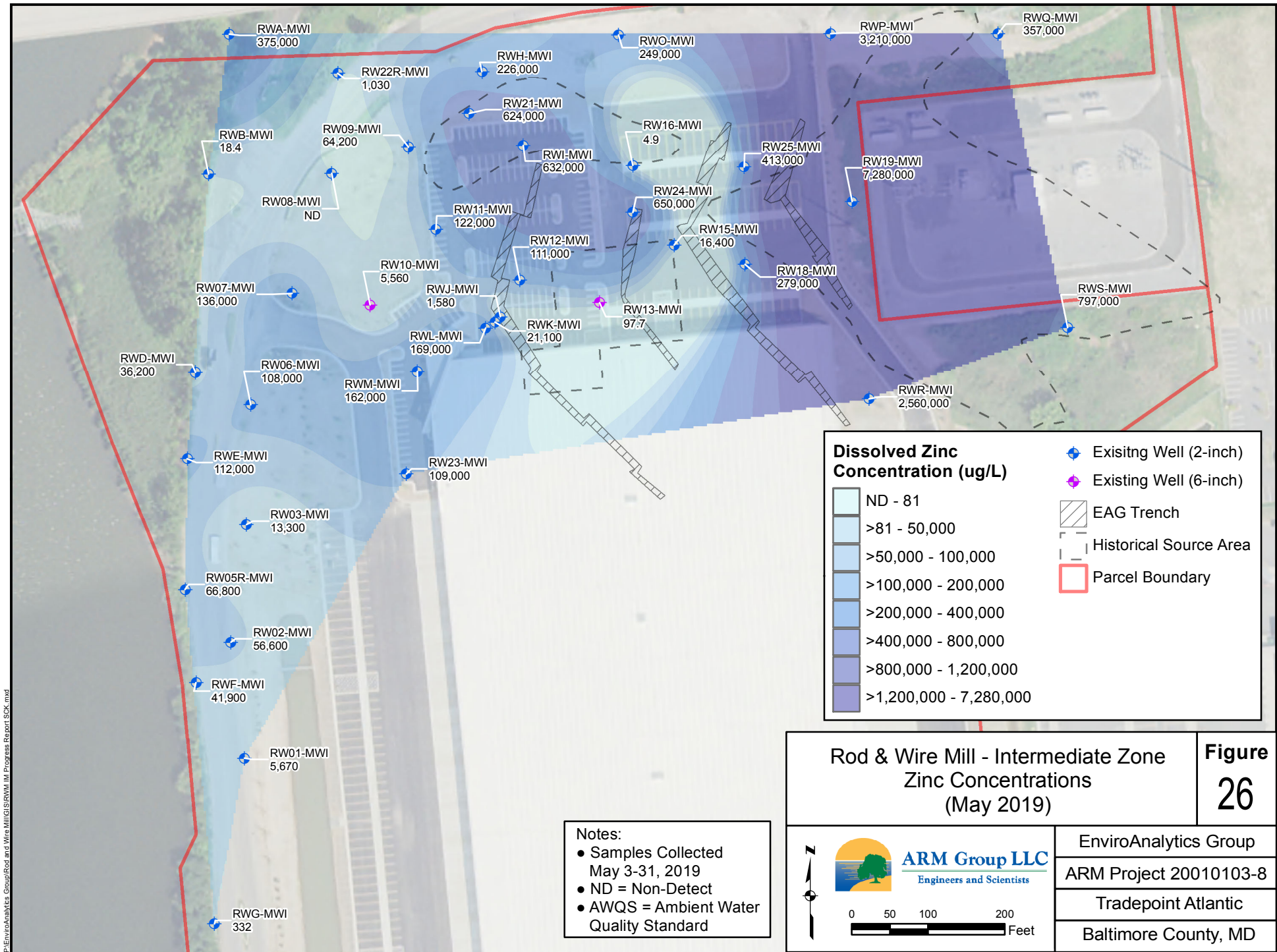


ARM Group LLC
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0 50 100 200
 Feet

EnviroAnalytics Group
 ARM Project 20010103-8
 Tradepoint Atlantic
 Baltimore County, MD



Rod & Wire Mill - Intermediate Zone Groundwater Elevation Contours (December 2019)		Figure 25
 ARM Group LLC Engineers and Scientists		EnviroAnalytics Group ARM Project 20010103-8 Tradepoint Atlantic Baltimore County, MD
 		



Dissolved Zinc Concentration (ug/L)

- ND - 81
- >81 - 50,000
- >50,000 - 100,000
- >100,000 - 200,000
- >200,000 - 400,000
- >400,000 - 800,000
- >800,000 - 1,200,000
- >1,200,000 - 7,280,000

- Existing Well (2-inch)
- Existing Well (6-inch)
- EAG Trench
- Historical Source Area
- Parcel Boundary

**Rod & Wire Mill - Intermediate Zone
Zinc Concentrations
(May 2019)**

Figure 26

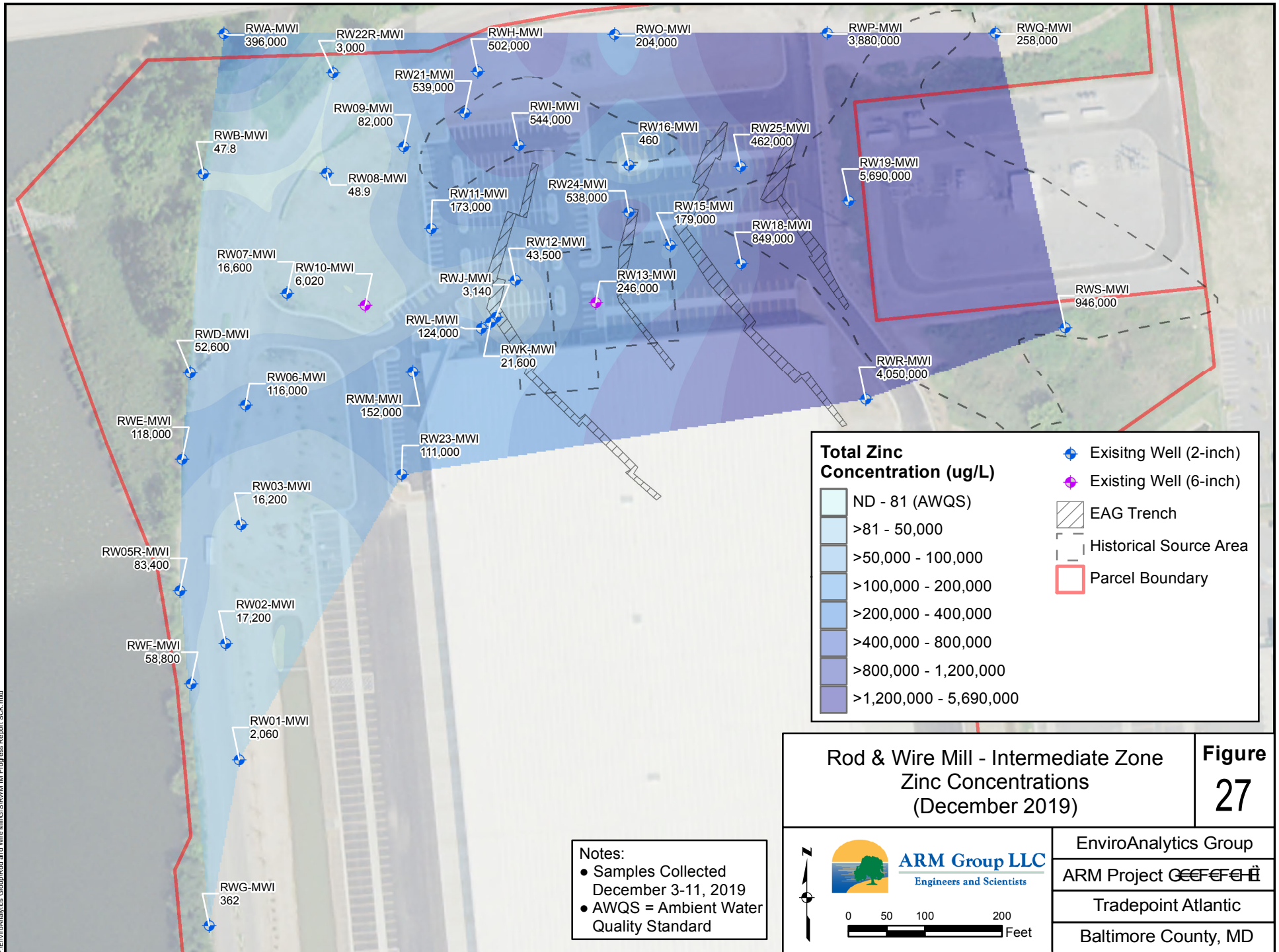
Notes:

- Samples Collected May 3-31, 2019
- ND = Non-Detect
- AWQS = Ambient Water Quality Standard

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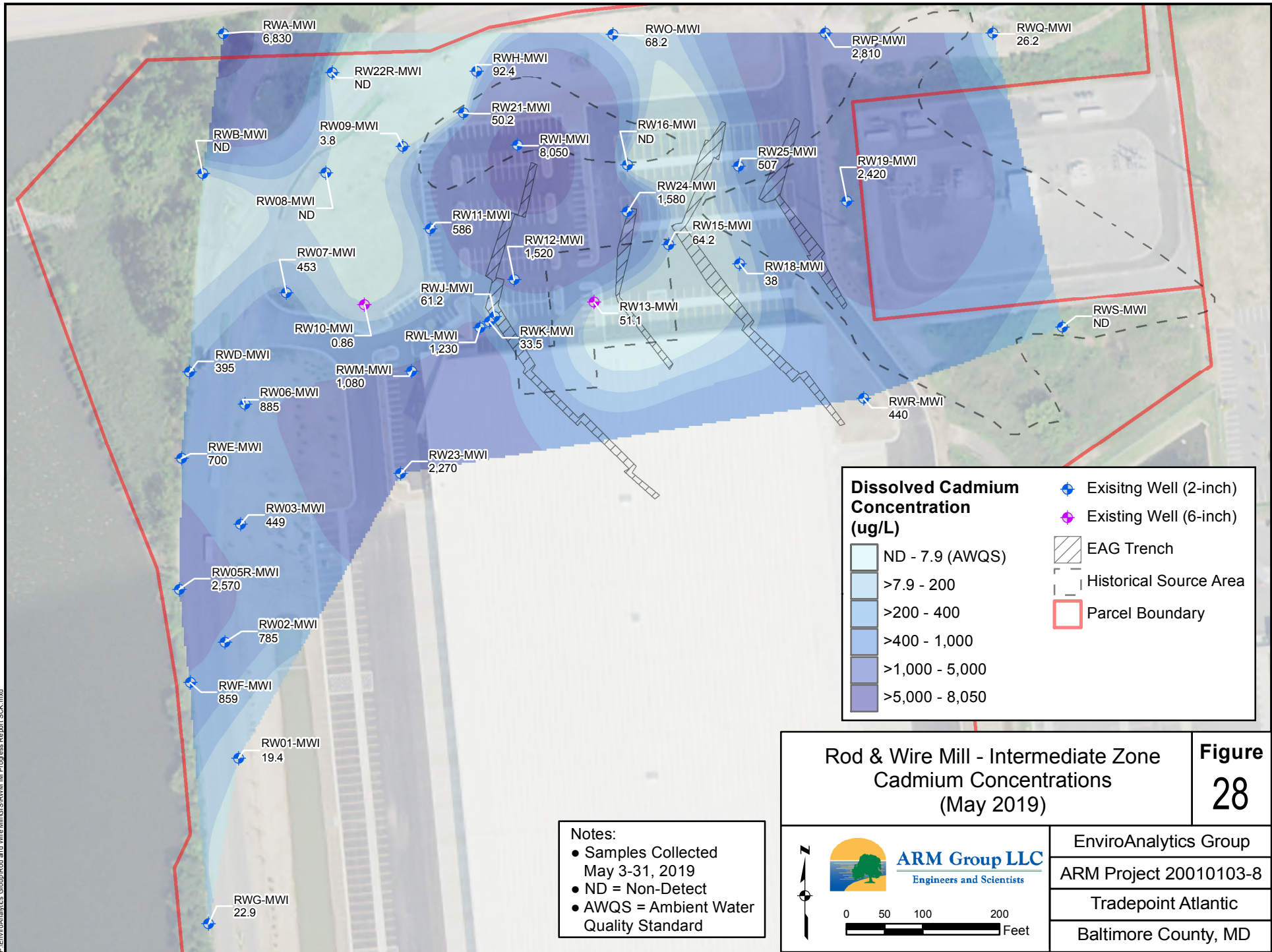
0 50 100 200 Feet

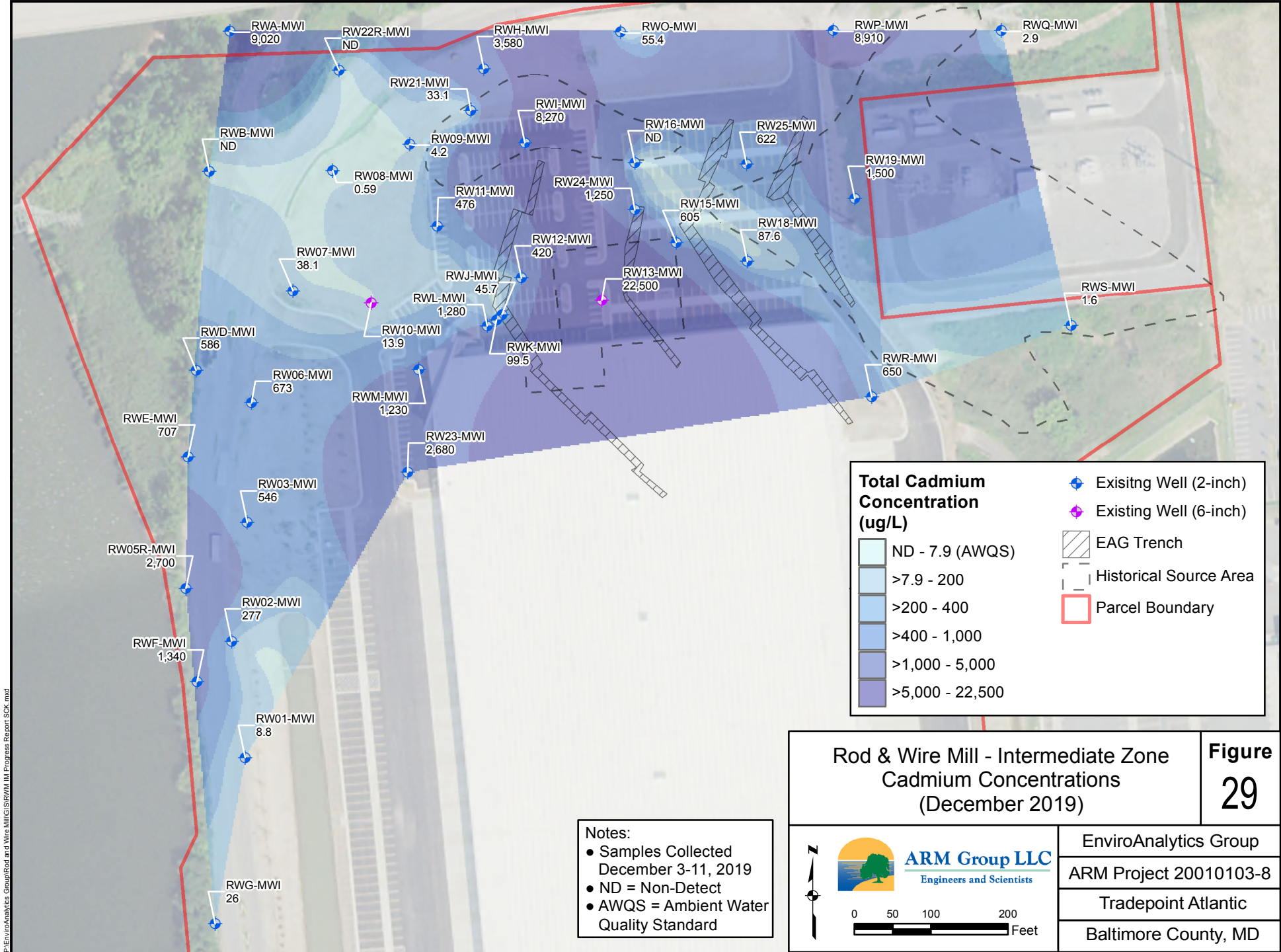
EnviroAnalytics Group
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Tradepoint Atlantic
Baltimore County, MD



**Rod & Wire Mill - Intermediate Zone
Zinc Concentrations
(December 2019)**

**Figure
27**





Total Cadmium Concentration (ug/L)

- ND - 7.9 (AWQS)
- >7.9 - 200
- >200 - 400
- >400 - 1,000
- >1,000 - 5,000
- >5,000 - 22,500

- Existing Well (2-inch)
- Existing Well (6-inch)
- EAG Trench
- Historical Source Area
- Parcel Boundary

Rod & Wire Mill - Intermediate Zone Cadmium Concentrations (December 2019)

Figure 29

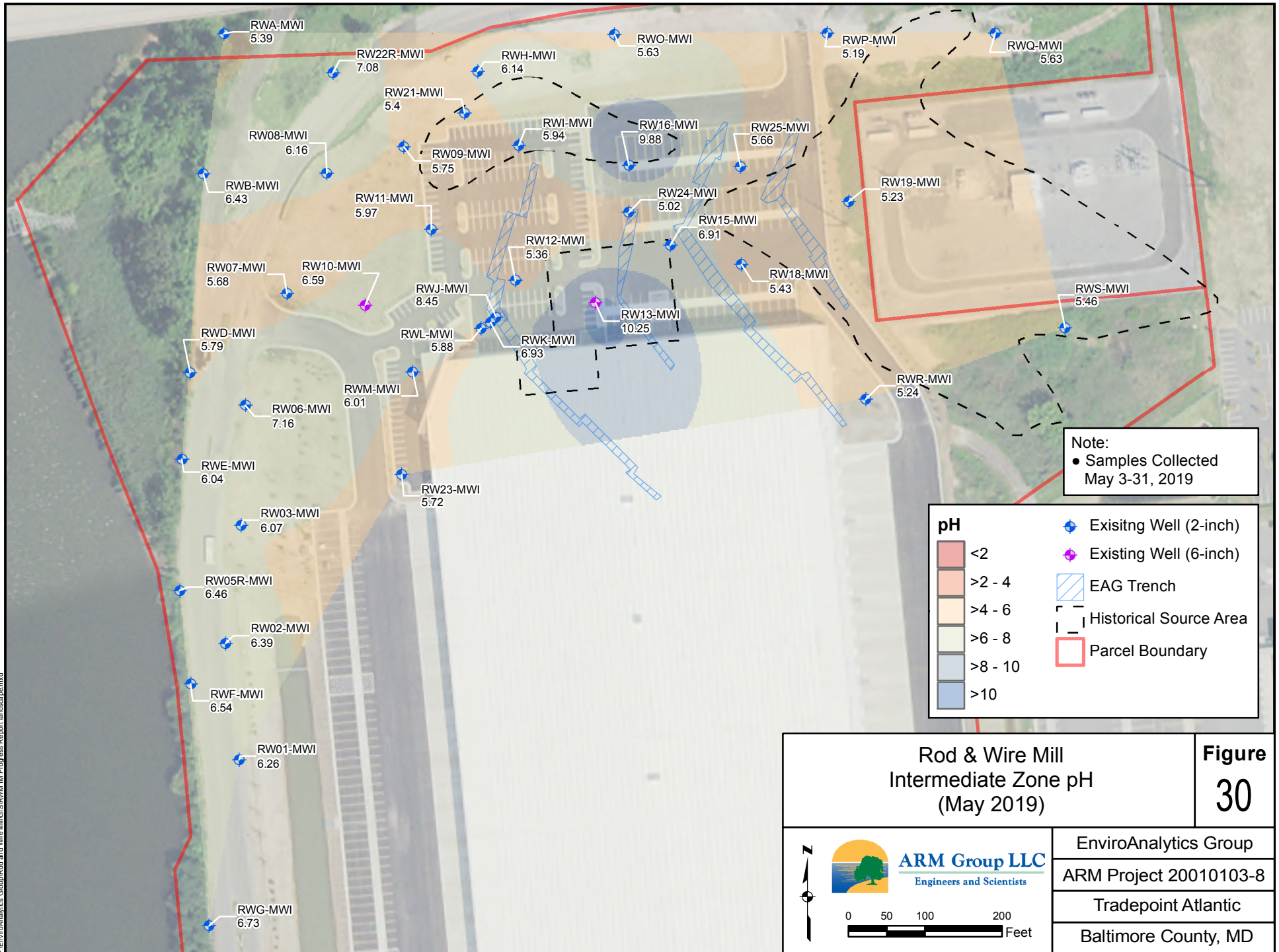
EnviroAnalytics Group
ARM Project 20010103-8
Tradepoint Atlantic
Baltimore County, MD

ARM Group LLC
Engineers and Scientists

0 50 100 200 Feet



Notes:

- Samples Collected December 3-11, 2019
- ND = Non-Detect
- AWQS = Ambient Water Quality Standard



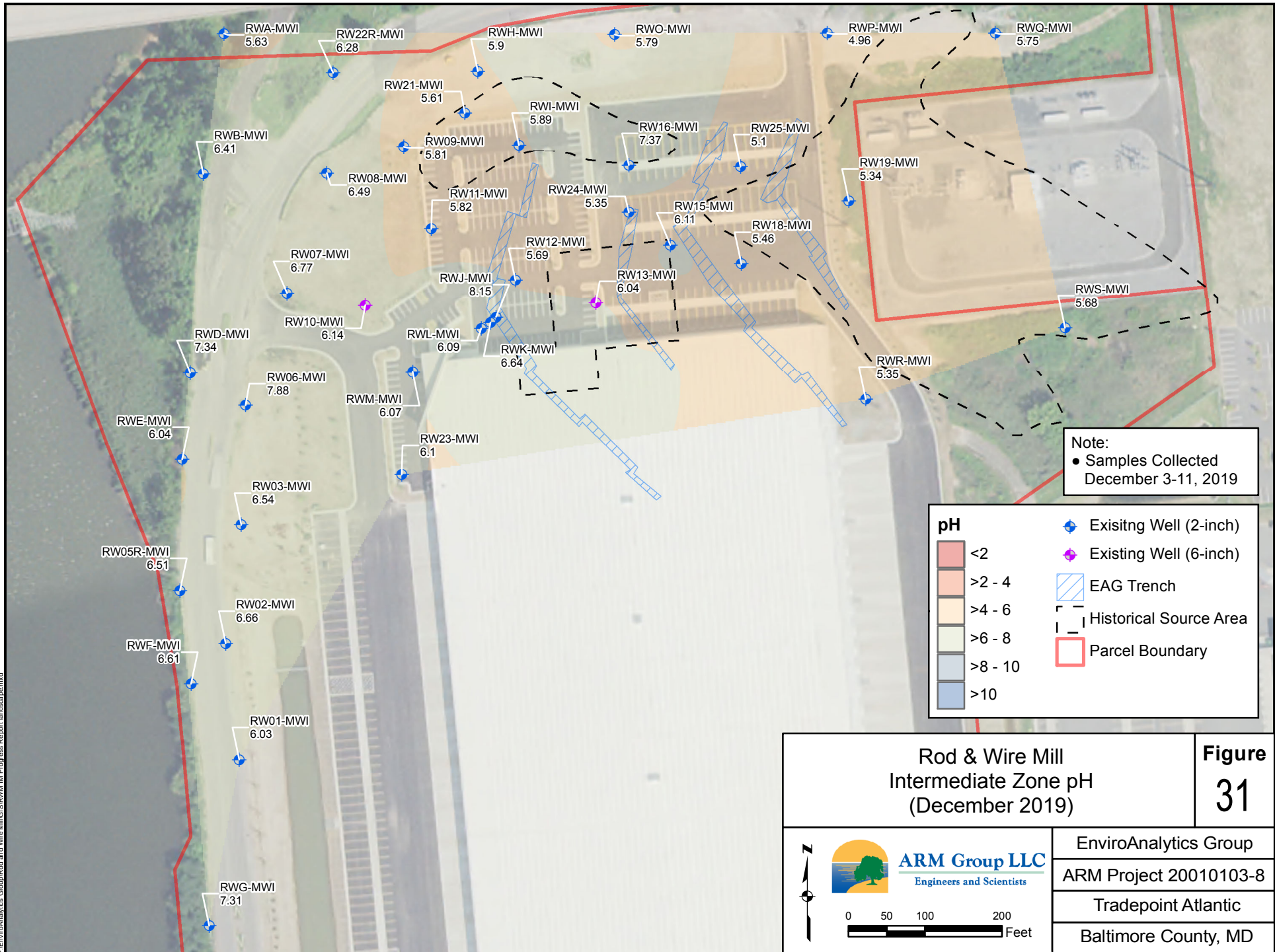
Rod & Wire Mill
 Intermediate Zone pH
 (May 2019)

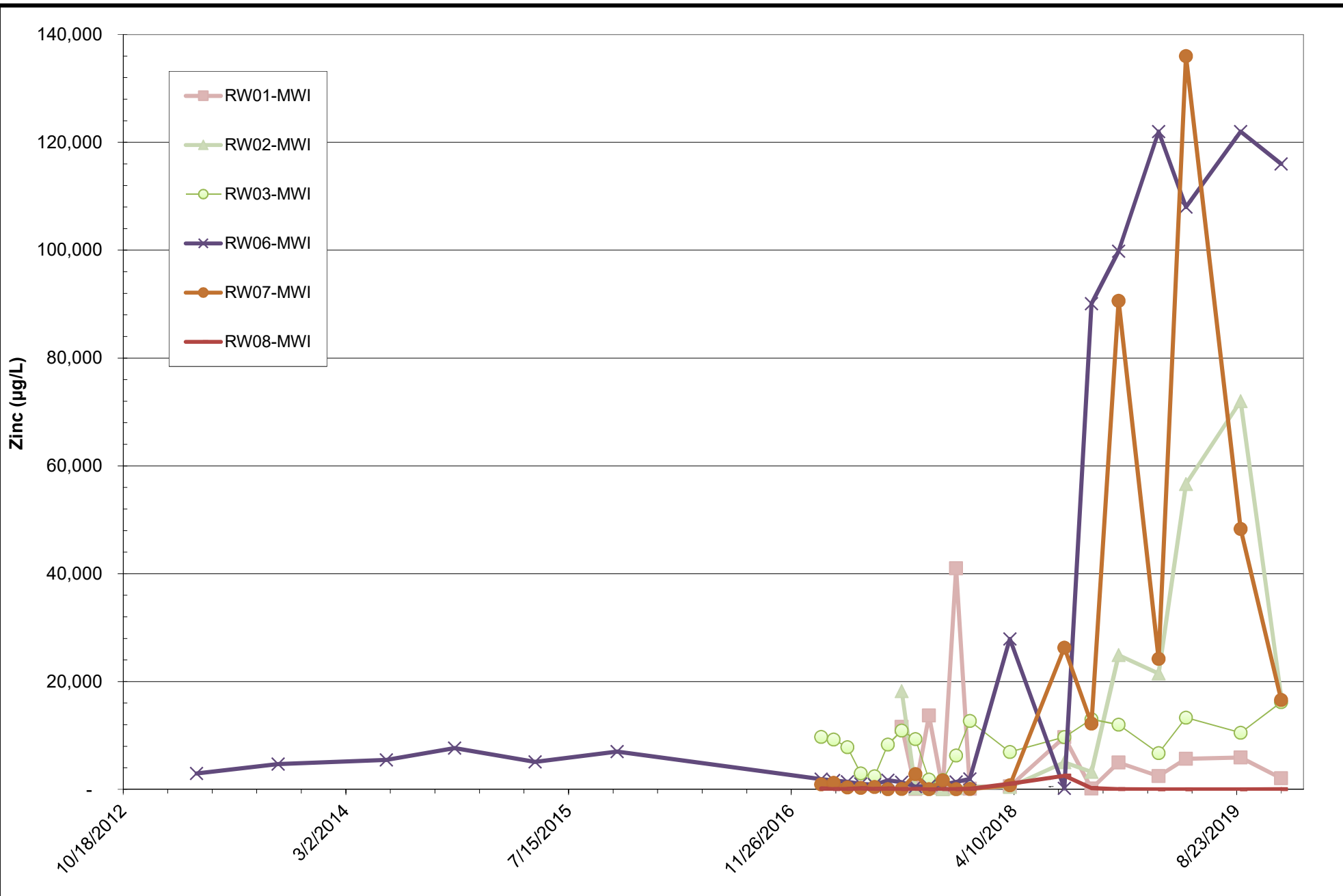
Figure
30



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0 50 100 200
 Feet

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 ARM Project 20010103-8
 Tradepoint Atlantic
 Baltimore County, MD





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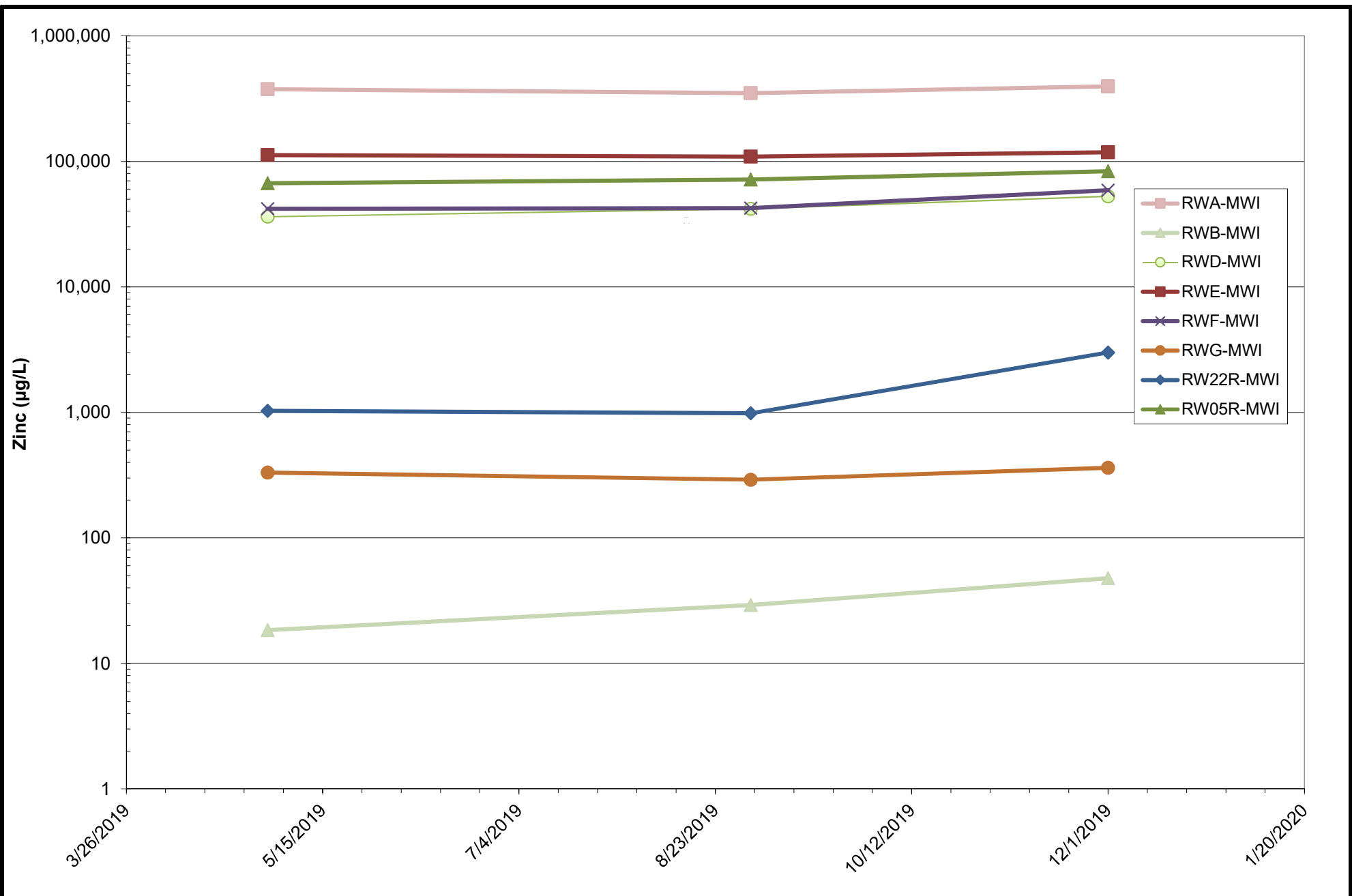
Rod and Wire Mill
Tradeport Atlantic

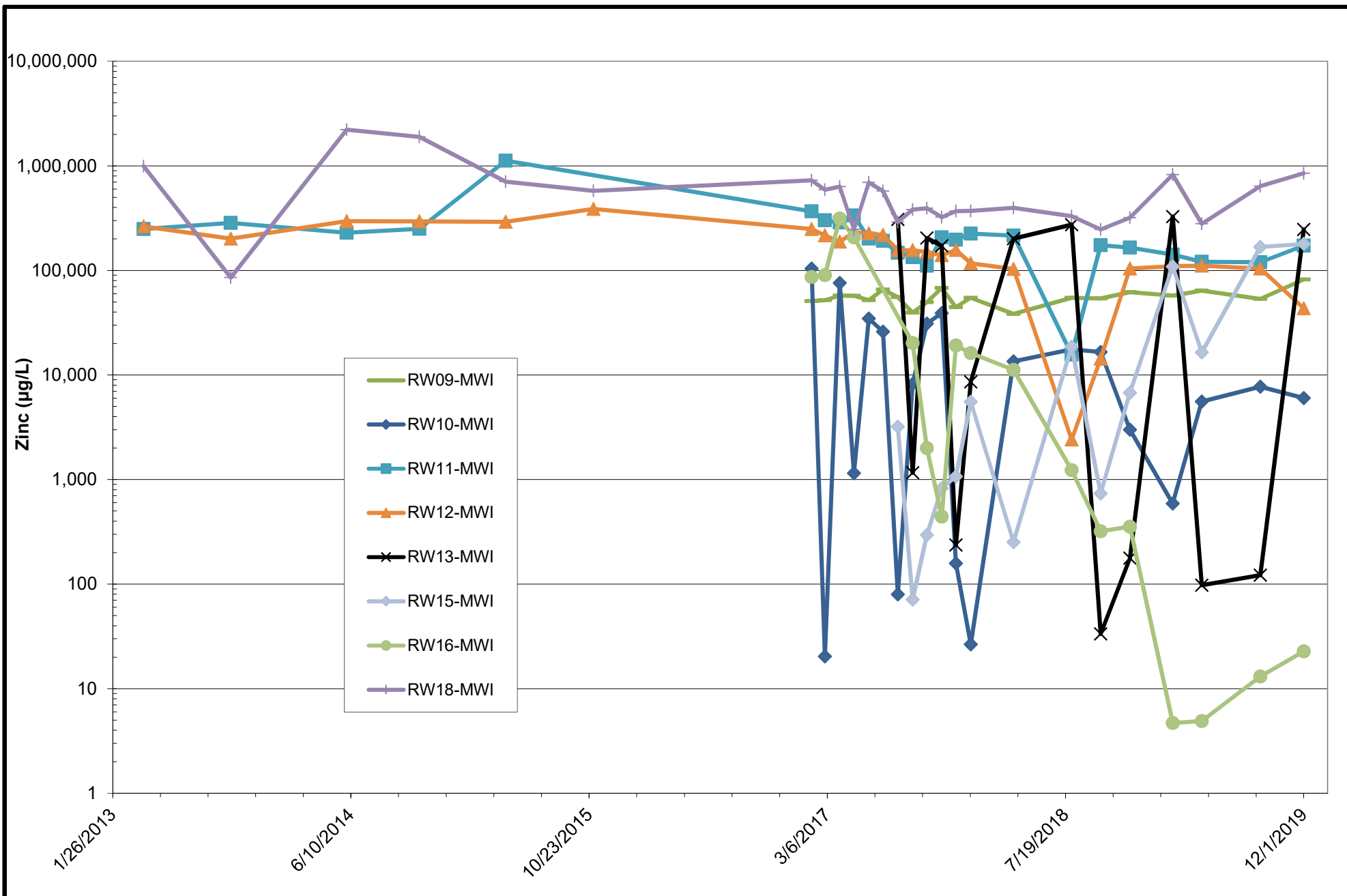
Sparrows Point, Maryland

Intermediate Perimeter Zinc Concentrations (Original Wells)

January 24, 2020

**Figure
32**





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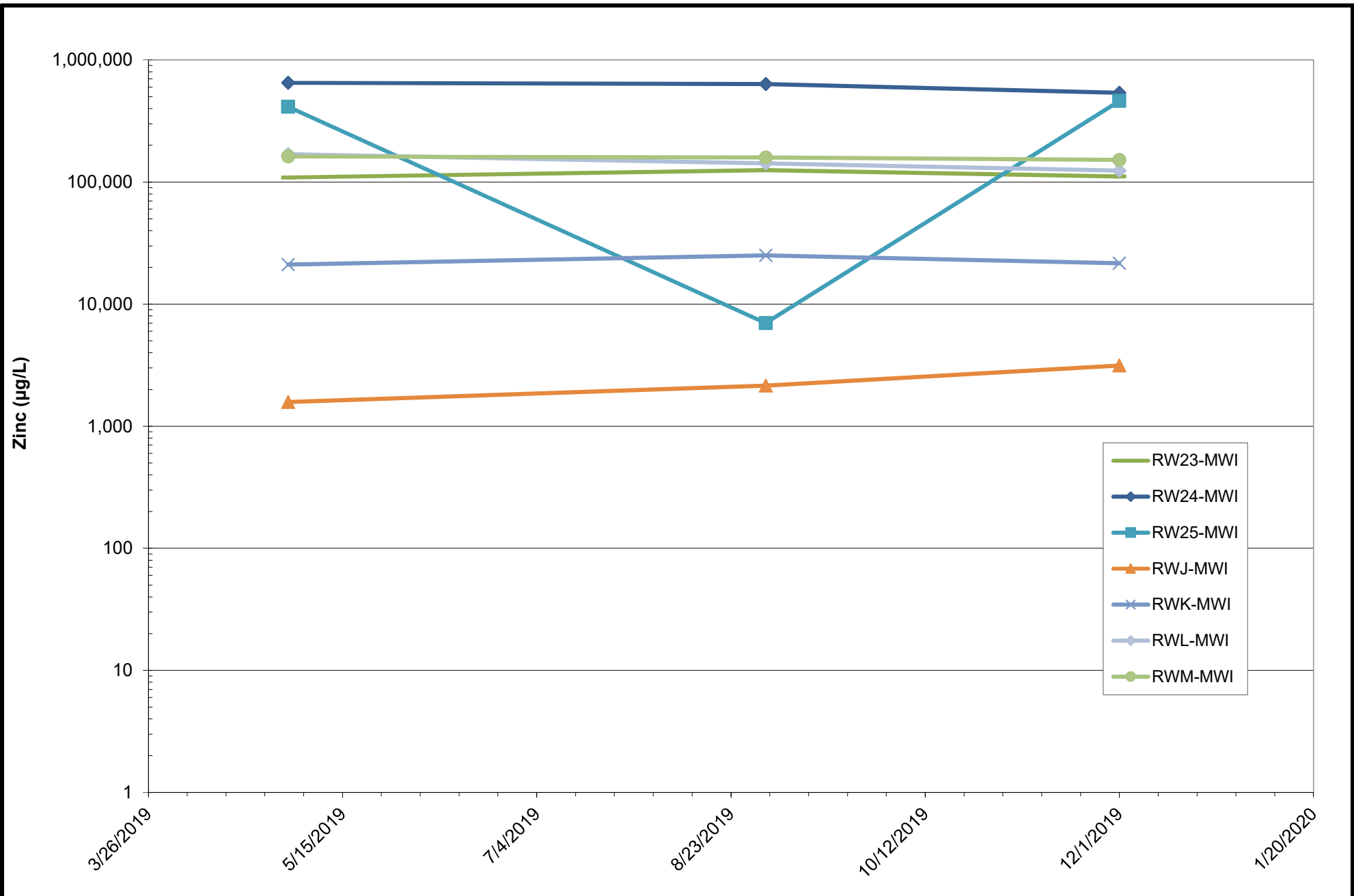
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

Intermediate Performance Zinc Concentrations (Original Wells)

January 24, 2020

Figure 34



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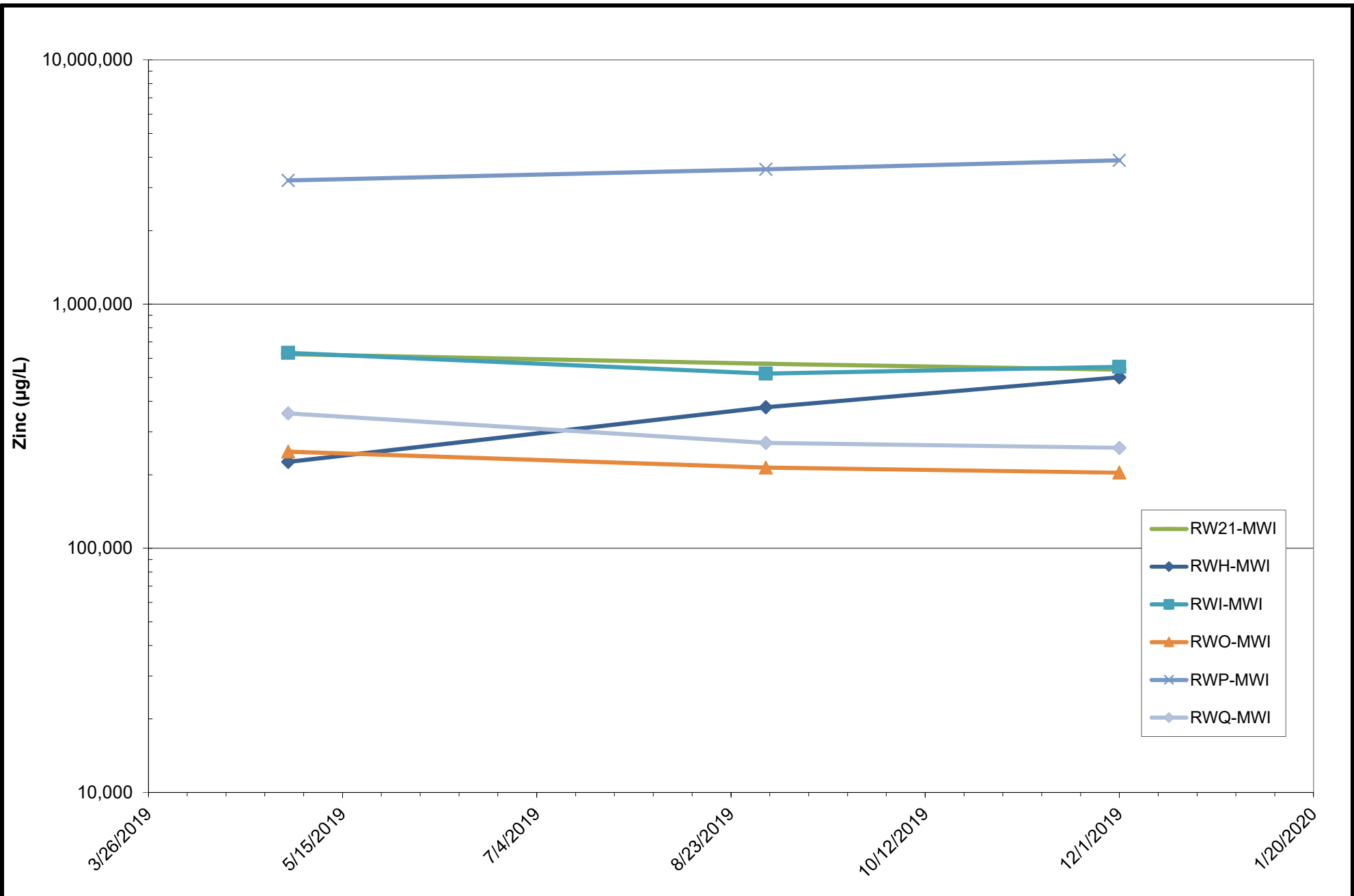
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**Intermediate Performance Zinc
Concentrations (Supplemental Wells)**

January 24, 2020

**Figure
35**



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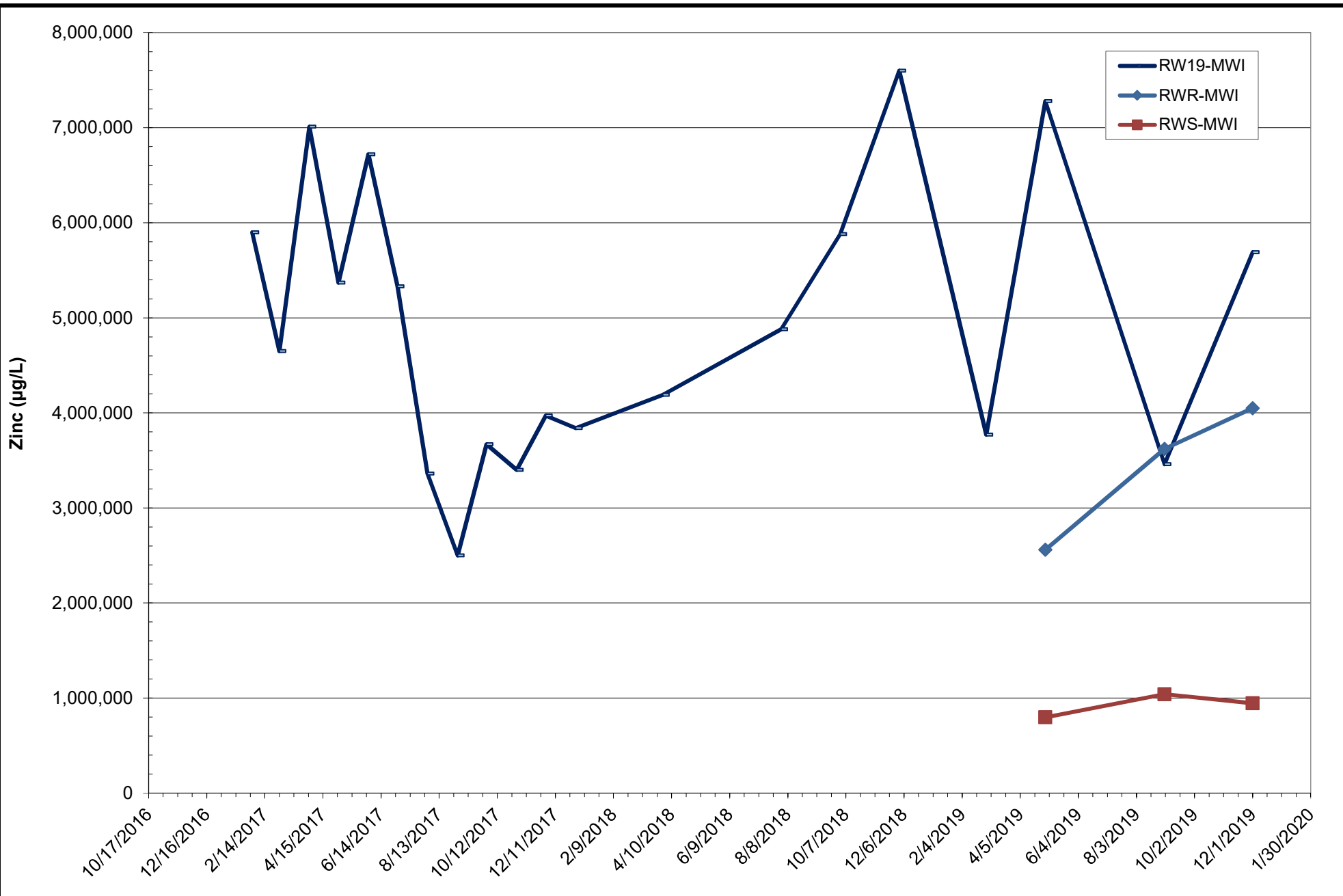
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**Intermediate Delineation Wells
Zinc Concentrations**

January 24, 2020

**Figure
36**



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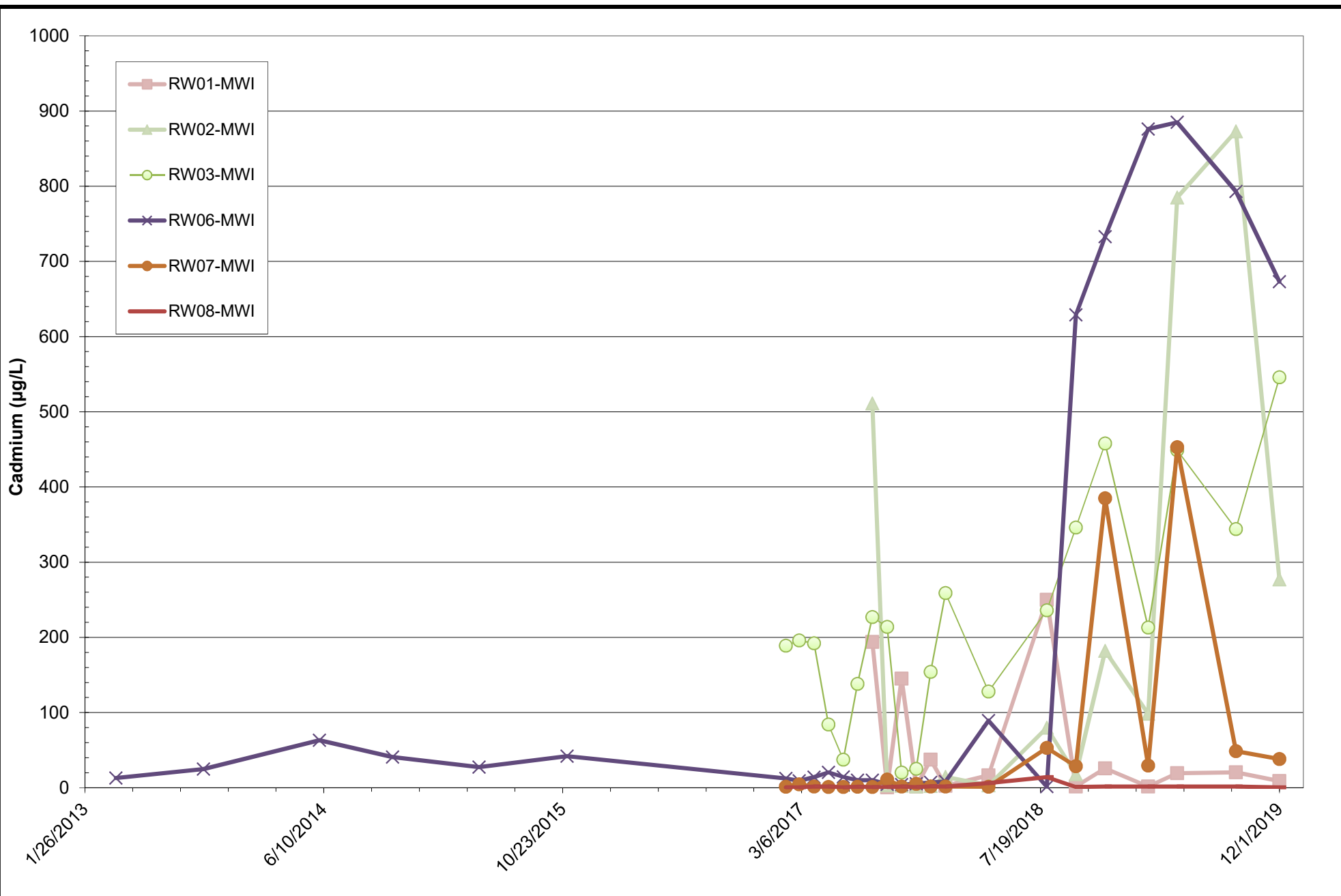
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**Intermediate Upgradient
Zinc Concentrations**

January 24, 2020

**Figure
37**



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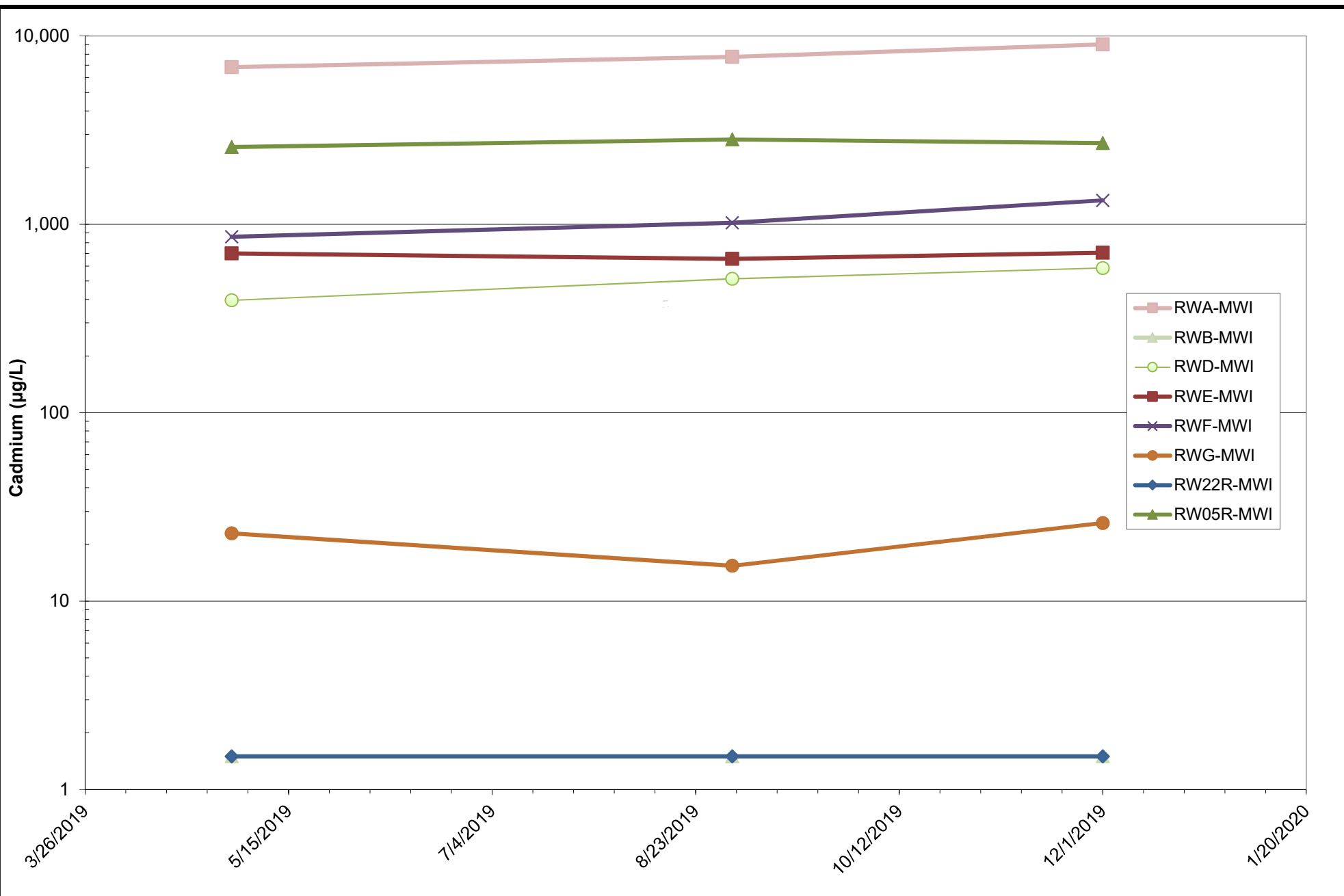
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

Intermediate Perimeter Cadmium Concentrations (Original Wells)

January 24, 2020

**Figure
38**



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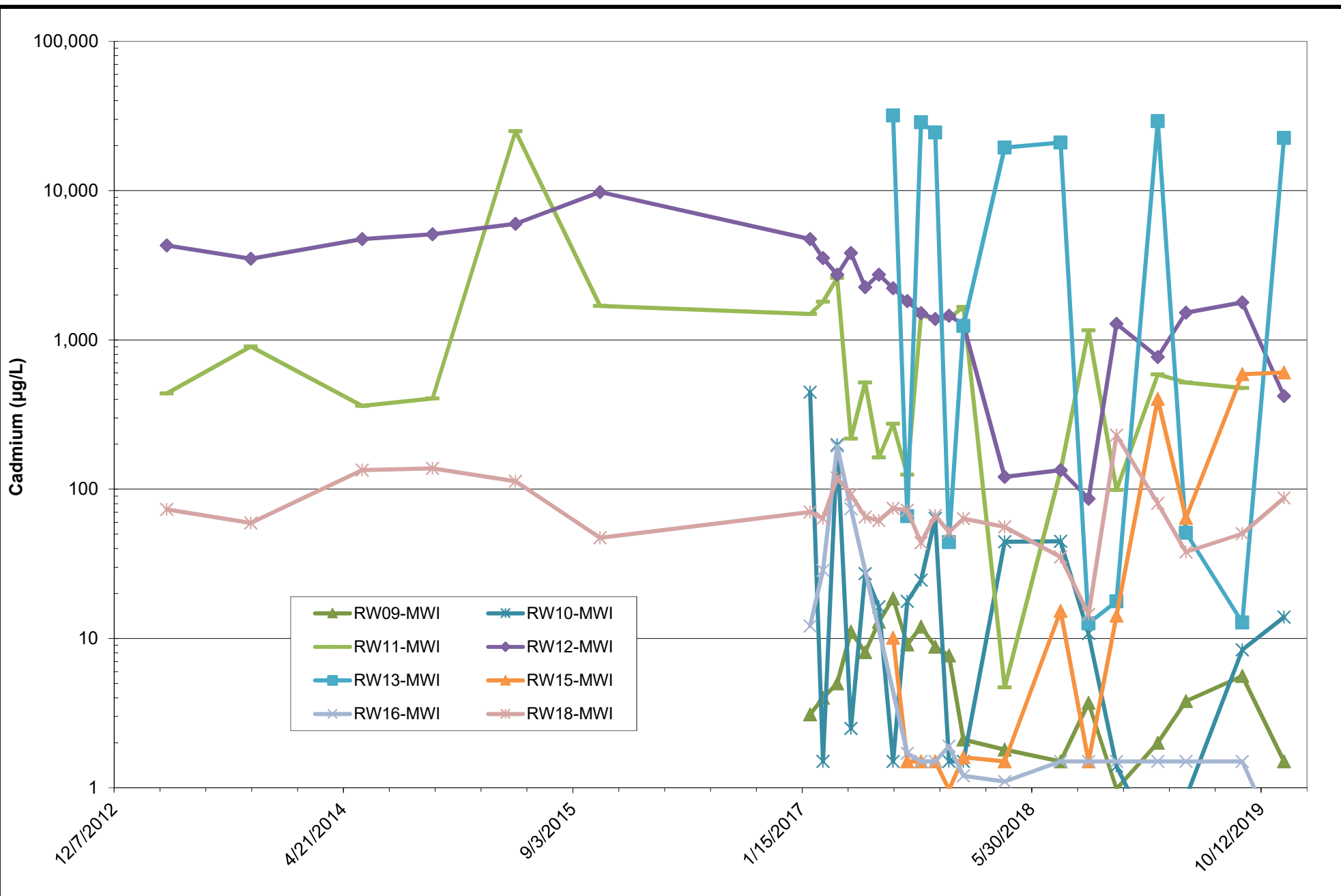
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

Intermediate Perimeter Cadmium Concentrations (Supplemental Wells)

January 24, 2020

**Figure
39**



ARM Group LLC
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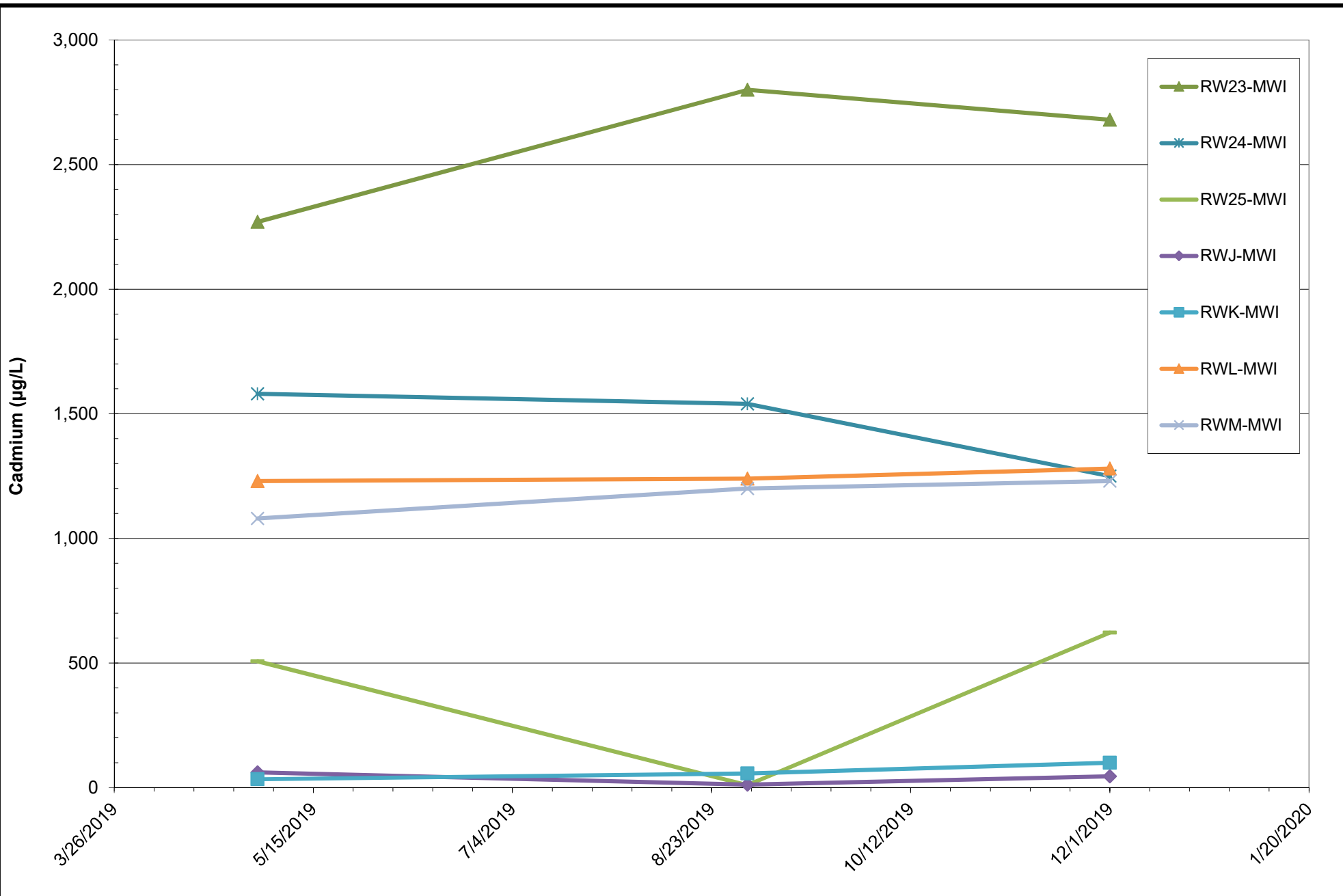
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**Intermediate Performance Cadmium
Concentrations (Original Wells)**

January 24, 2020

**Figure
40**



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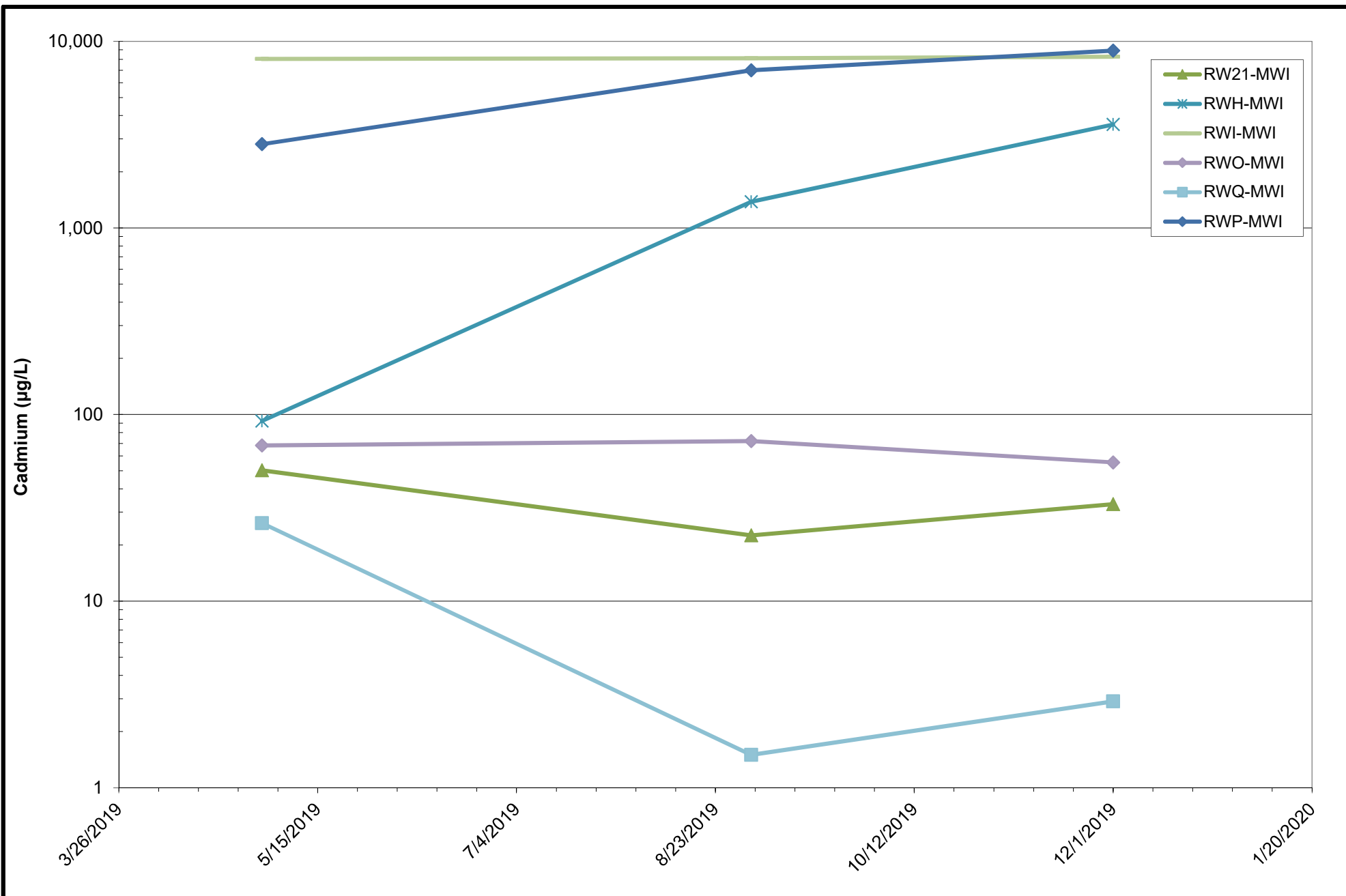
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

Intermediate Performance Cadmium Concentrations (Supplemental Wells)

January 24, 2020

Figure 41



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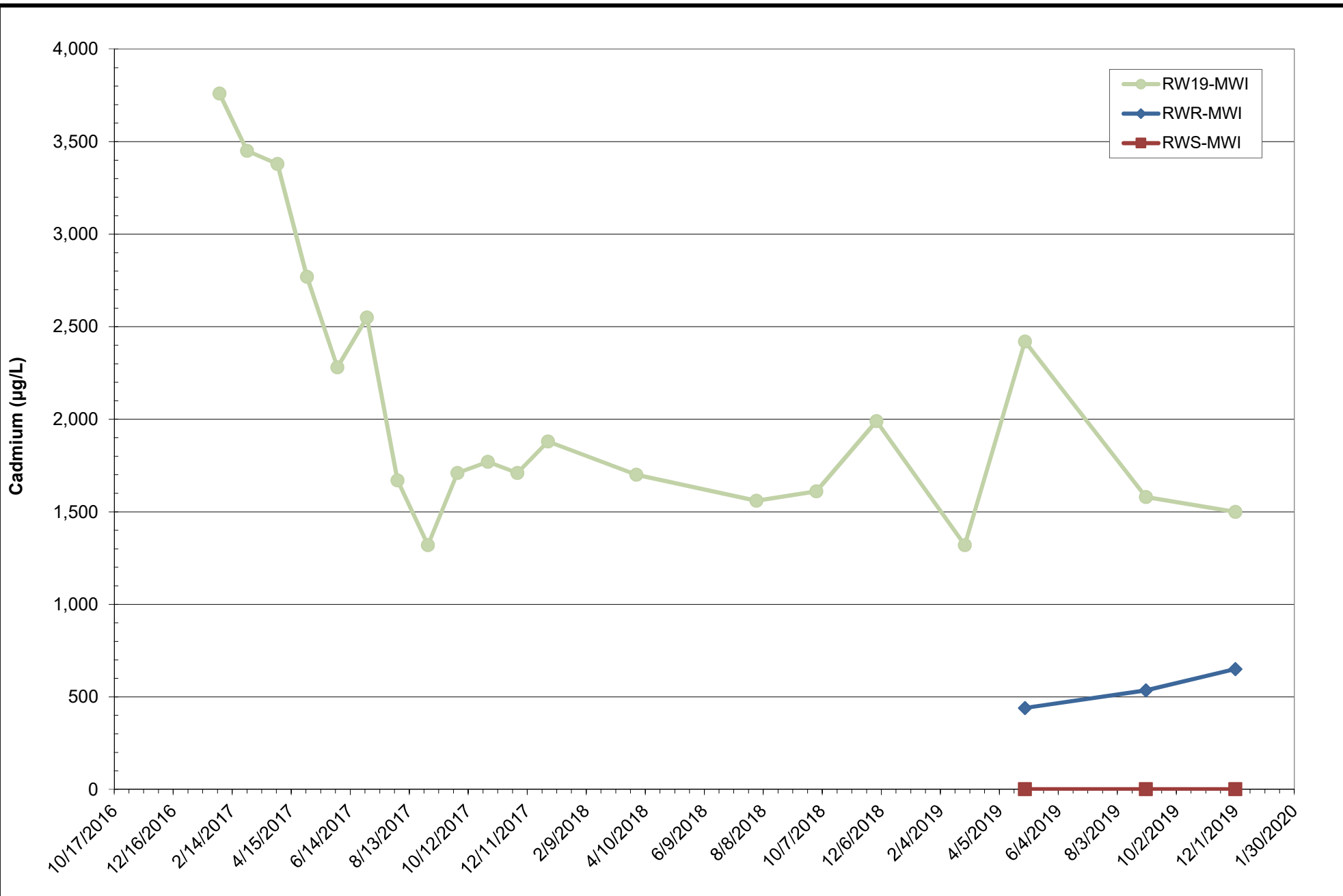
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**Intermediate Delineation Wells
Cadmium Concentrations**

January 24, 2020

**Figure
42**



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Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

Intermediate Upgradient Cadmium Concentrations

January 24, 2020

**Figure
43**

TABLES

TABLE 1
Shallow Zinc Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RW01-MWS	RW02-MWS	RW03-MWS	RW04-MWS	RW05-MWS	RW06R-MWS	RW07-MWS	RW08-MWS	RW09-MWS	RW11-MWS
2/10/2017-2/14/2017	µg/L	NS	NS	6,200	NS	NS	NS	81.6	1,080	14,500	8,790
3/28/2017-3/29/2017	µg/L	NS	NS	6,510	NS	NS	NS	74.8	8,710	12,400	10,500
4/25/2017-4/27/2017	µg/L	NS	NS	4,860	NS	NS	NS	86.4	9,520	12,900	13,100
5/22/2017-5/24/2017	µg/L	NS	NS	5,380	NS	NS	NS	102	2,680	11,900	12,500
6/5/2017-6/8/2017	µg/L	NS	NS	5,500	58.2	NS	NS	107	1,870	13,000	13,500
7/10/2017-7/12/2017	µg/L	NS	NS	8,460	179	NS	NS	114	968	11,500	10,900
8/7/2017-8/10/2017	µg/L	12,200	6,290	7,730	74.7	550	NS	127	3,190	9,700	10,800
9/1/2017-9/8/2017	µg/L	5,730	3,220	16,300	163	184	NS	165	4,460	8,750	10,600
10/2/2017-10/6/2017	µg/L	7,730	5,490	32,100	137	1,410	NS	144	1,950	8,310 ML	9,270
11/3/2017-11/13/2017	µg/L	25,200	1,460	14,100	123	503	NS	227	1,600	9,290	18,300
12/4/2017-12/8/2017	µg/L	7,300	79.3	46,400	279	5,440	NS	216	1,770	8,550	24,000
1/2/2018-1/9/2018	µg/L	35,200	2,210	31,500	384	35.7	NS	276	2,600	9,310	27,700
4/8/2018-4/13/2018	µg/L	52,000	5,320	44,000	300	75.3	NS	204	13,200	8,980	37,100
7/30/2018-8/3/2018	µg/L	24,100	5,470	25,600	7.9 J	32.6	22	248	6,640	10,700	109,000
10/1/2018-10/5/2018	µg/L	37000	5930	14900	168	21.7	3.7 J	223	13300	10800	29500
12/10/2018-12/14/2018*	µg/L	13700	27400	23300	23.5	<i>10 U</i>	<i>10 U</i>	176	931	9200	28900
3/12/2019-3/19/2019*	µg/L	16500	13,100	9,570	33.6	<i>10 U</i>	<i>10 U</i>	142	14600	11300	13500
5/3/2019-6/7/2019*	µg/L	16,300	21,900	18,700	<i>10 U</i>	<i>10 U</i>	20.7	137	11,300	14,100	38,900
9/10/2019-9/23/2019*	µg/L	16,300	27,400	19,200	313	<i>8.3 B</i>	<i>4.1 B</i>	148	1,350	19,600	44,000
12/3/2019-12/11/2019	µg/L	10,400	594	19,200	604	41.6	4.3 J	168	1,250	20,600	37,500

Bold indicates detection above the reporting limit

NS = Not Sampled

DNE = Did Not Exist

*Indicates concentrations are for dissolved metals. All other events show total metals.

TABLE 1
Shallow Zinc Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RW12-MWS	RW14-MWS	RW15-MWS	RW16-MWS	RW18-MWS	RW19-MWS	RW21-MWS	RW22R-MWS	RW23-MWS	RW24-MWS
2/10/2017-2/14/2017	µg/L	NS	NS	NS	NS	NS	10,100	DNE	DNE	DNE	DNE
3/28/2017-3/29/2017	µg/L	NS	NS	NS	NS	NS	7,100	DNE	DNE	DNE	DNE
4/25/2017-4/27/2017	µg/L	NS	NS	NS	NS	NS	6,260	DNE	DNE	DNE	DNE
5/22/2017-5/24/2017	µg/L	NS	NS	NS	NS	NS	4,860	DNE	DNE	DNE	DNE
6/5/2017-6/8/2017	µg/L	11,400	NS	NS	NS	25,500	3,720	DNE	DNE	DNE	DNE
7/10/2017-7/12/2017	µg/L	9,090	NS	NS	NS	13,300	3,700	DNE	DNE	DNE	DNE
8/7/2017-8/10/2017	µg/L	5,090	42,000	276	NS	964	3,360	DNE	DNE	DNE	DNE
9/1/2017-9/8/2017	µg/L	3,980	43,500	1,080	25.6	6,160	2,990	DNE	DNE	DNE	DNE
10/2/2017-10/6/2017	µg/L	3,790	28,900	900	26.2	14,500	18,700	DNE	DNE	DNE	DNE
11/3/2017-11/13/2017	µg/L	235,000	28,100	8,800	48.6	10,700	2,730	DNE	DNE	DNE	DNE
12/4/2017-12/8/2017	µg/L	2,980	49,200	7,630	27.7	23,400	3,380	DNE	DNE	DNE	DNE
1/2/2018-1/9/2018	µg/L	10,100	61,800	5,150	31.2	11,600	10,200	DNE	DNE	DNE	DNE
4/8/2018-4/13/2018	µg/L	10,600	62,100	5,940	25	25,900	7,060	DNE	DNE	DNE	DNE
7/30/2018-8/3/2018	µg/L	2,900	64,100	1,320	35.9	439	10,100	DNE	DNE	DNE	DNE
10/1/2018-10/5/2018	µg/L	1140	80100	2950	30.0	44.9	10500	DNE	DNE	DNE	DNE
12/10/2018-12/14/2018*	µg/L	8570	79200	4380	5.5 J	12.7	3390	DNE	DNE	DNE	DNE
3/12/2019-3/19/2019*	µg/L	4,640	65,700	499	7 J	30	4,680	DNE	DNE	DNE	DNE
5/3/2019-6/7/2019*	µg/L	1,550	69,600	684	106	16.9	3,180	282,000	58,100	22.4	5 J
9/10/2019-9/23/2019*	µg/L	5,390	70,500	134	10.0 U	4.3 B	2,260	330,000	188,000	20.6	8.2 J
12/3/2019-12/11/2019	µg/L	763	77,500	378	22.7	15.2 D6	2,640	368,000	112,000	38.6	6.7 J

Bold indicates detection above the reporting limit

NS = Not Sampled

DNE = Did Not Exist

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TABLE 1
Shallow Zinc Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RW25-MWS	RWA-MWS	RWB-MWS	RWD-MWS	RWE-MWS	RWF-MWS	RWG-MWS	RWH-MWS	RWI-MWS	RWJ-MWS
2/10/2017-2/14/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/28/2017-3/29/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/25/2017-4/27/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/22/2017-5/24/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
6/5/2017-6/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/10/2017-7/12/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
8/7/2017-8/10/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
9/1/2017-9/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/2/2017-10/6/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
11/3/2017-11/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/4/2017-12/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
1/2/2018-1/9/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/8/2018-4/13/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/30/2018-8/3/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/1/2018-10/5/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/10/2018-12/14/2018*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/12/2019-3/19/2019*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/3/2019-6/7/2019*	µg/L	70,500	516	7.4 J	4.7 J	468	39,100	10 U	367	25,800	10 U
9/10/2019-9/23/2019*	µg/L	437,000	1,720	5.5 J	9.1 J	422	34,300	10.0 U	60,600	26,200	27
12/3/2019-12/11/2019	µg/L	11,900	49.7	38.7	5.4 J	261	35,000	194	2,600	32,400	8.3 J

Bold indicates detection above the reporting limit

NS = Not Sampled

DNE = Did Not Exist

*Indicates concentrations are for dissolved metals. All other events show total metals.

TABLE 1
Shallow Zinc Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RWK-MWS	RWL-MWS	RWM-MWS	RWN-MWS	RWO-MWS	RWQ-MWS	RWR-MWS	RWS-MWS
2/10/2017-2/14/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/28/2017-3/29/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/25/2017-4/27/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/22/2017-5/24/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
6/5/2017-6/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/10/2017-7/12/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
8/7/2017-8/10/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
9/1/2017-9/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/2/2017-10/6/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
11/3/2017-11/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/4/2017-12/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
1/2/2018-1/9/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/8/2018-4/13/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/30/2018-8/3/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/1/2018-10/5/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/10/2018-12/14/2018*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/12/2019-3/19/2019*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/3/2019-6/7/2019*	µg/L	6,710	8,480	6 J	978,000	2,660	146	213,000	10,100
9/10/2019-9/23/2019*	µg/L	19,200	9,180	4.0 J	964,000	6,790	147	245,000	1,980
12/3/2019-12/11/2019	µg/L	20,600	15,500	11.6	943,000	3,720	182	320,000	2,970

Bold indicates detection above the reporting limit

NS = Not Sampled

DNE = Did Not Exist

*Indicates concentrations are for dissolved metals. All other events show total metals.

TABLE 2
Shallow Cadmium Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RW01-MWS	RW02-MWS	RW03-MWS	RW04-MWS	RW05-MWS	RW06R-MWS	RW07-MWS	RW08-MWS	RW09-MWS	RW11-MWS
2/10/2017-2/14/2017	µg/L	NS	NS	7.9	NS	NS	NS	1.8 J	3.8	22.3	0.78 J
3/28/2017-3/29/2017	µg/L	NS	NS	4.7	NS	NS	NS	1.7 J	11	17.5	1.8 J
4/25/2017-4/27/2017	µg/L	NS	NS	3.2	NS	NS	NS	1.4 J	7.8	16.6	5.3
5/22/2017-5/24/2017	µg/L	NS	NS	3.9	NS	NS	NS	1.9 J	3.2	14.9	1.8 J
6/5/2017-6/8/2017	µg/L	NS	NS	4	0.7 J	NS	NS	2.3 J	1.7 J	13.9	0.94 J
7/10/2017-7/12/2017	µg/L	NS	NS	4.6	1.2 J	NS	NS	2.8 J	0.74 J	13.4	0.84 J
8/7/2017-8/10/2017	µg/L	1.6 J	12	5.1	3 U	4.9	NS	3.1	2.7 J	12.5	1.3 J
9/1/2017-9/8/2017	µg/L	1.2 J	11.8	8.4	0.71 J	0.37 J	NS	3.6	2.5 J	12.3	0.81 J
10/2/2017-10/6/2017	µg/L	1.7 J	9.1	11	3 U	1.2 J	NS	3.2	0.96 J	10.6	3 U
11/3/2017-11/13/2017	µg/L	21.7	7.7	8.5	1.1 J	3 U	NS	5.8	3 U	10.5	2.1 J
12/4/2017-12/8/2017	µg/L	98	3 U	11.4	1.1 J	8.4	NS	6	3 U	9.2	2.9 J
1/2/2018-1/9/2018	µg/L	23.9	13.1	9.9	3 U	3 U	NS	4.8	3 U	9.9	2.2 J
4/8/2018-4/13/2018	µg/L	7.6	16.7	11.8	3 U	3 U	NS	4.6	2.2 J	9.8	4.1
7/30/2018-8/3/2018	µg/L	1.6 J	5.2	10.8	3 U	3 U	3 U	4.8	3 U	13.1	66.3
10/1/2018-10/5/2018	µg/L	0.97 J	3.4	8.7	3 U	3 U	3 U	4.7	3 U	22.3	1.2 J
12/10/2018-12/14/2018*	µg/L	1.8 J	9	24	3 U	3 U	0.56 J	4.1	3 U	9.3	0.81 J
3/12/2019-3/19/2019*	µg/L	2.3 J	3.8	7.7	3 U	3 U	3 U	2.7 J	2 J	10.2	2.2 J
5/3/2019-6/7/2019*	µg/L	4.7	1.7 J	17.9	3 U	3 U	3 U	2.9 J	0.86 J	12	1.1 B
9/10/2019-9/23/2019*	µg/L	4.3	1.1 J	16.3	0.55 J	3.0 U	3.0 U	3.4	0.39 J	16.7	3.0 U
12/3/2019-12/11/2019	µg/L	3.9 B	0.55 B	18.8	1.8 J	3.0 U	3.0 U	3.0 J	3.0 U	14.3	1.9 J

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TABLE 2
Shallow Cadmium Concentrations
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Sampling Dates	Units	RW12-MWS	RW14-MWS	RW15-MWS	RW16-MWS	RW18-MWS	RW19-MWS	RW21-MWS	RW22R-MWS	RW23-MWS	RW24-MWS
2/10/2017-2/14/2017	µg/L	NS	NS	NS	NS	NS	14.8	DNE	DNE	DNE	DNE
3/28/2017-3/29/2017	µg/L	NS	NS	NS	NS	NS	6.9	DNE	DNE	DNE	DNE
4/25/2017-4/27/2017	µg/L	NS	NS	NS	NS	NS	8.5	DNE	DNE	DNE	DNE
5/22/2017-5/24/2017	µg/L	NS	NS	NS	NS	NS	3.6	DNE	DNE	DNE	DNE
6/5/2017-6/8/2017	µg/L	29.7	NS	NS	NS	356	2.4 J	DNE	DNE	DNE	DNE
7/10/2017-7/12/2017	µg/L	12.6	NS	NS	NS	240	9.7	DNE	DNE	DNE	DNE
8/7/2017-8/10/2017	µg/L	7	1,780	12.2	NS	34.9	7.2	DNE	DNE	DNE	DNE
9/1/2017-9/8/2017	µg/L	5.1	1,700	29.9	3 U	156	2.6 J	DNE	DNE	DNE	DNE
10/2/2017-10/6/2017	µg/L	11.3	1,750	25.3	3 U	306	5.2	DNE	DNE	DNE	DNE
11/3/2017-11/13/2017	µg/L	193	2,390	63	3 U	208	4.4	DNE	DNE	DNE	DNE
12/4/2017-12/8/2017	µg/L	4.2	2,820	55	3 U	410	4.6	DNE	DNE	DNE	DNE
1/2/2018-1/9/2018	µg/L	11.7	2,800	40.7	3 U	218	4.8	DNE	DNE	DNE	DNE
4/8/2018-4/13/2018	µg/L	11	3,220	41.2	3 U	448	6.6	DNE	DNE	DNE	DNE
7/30/2018-8/3/2018	µg/L	5.2	3,630	38.5	3 U	7.1	1.2 J	DNE	DNE	DNE	DNE
10/1/2018-10/5/2018	µg/L	2.3 J	3840	78.1	3 U	1.2 J	3.6	DNE	DNE	DNE	DNE
12/10/2018-12/14/2018*	µg/L	15.3	3730	94.4	3 U	1.5 J	3 U	DNE	DNE	DNE	DNE
3/12/2019-3/19/2019*	µg/L	6.6	2,960	15.4	3 U	3 U	3 U	DNE	DNE	DNE	DNE
5/3/2019-6/7/2019*	µg/L	2.1 J	3,000	19.1	3 U	3 U	3 U	483	157	3 U	3 U
9/10/2019-9/23/2019*	µg/L	3.2	3,450	7.4	3.0 U	3.0 U	3.0 U	354	105	0.88 J	3.0 U
12/3/2019-12/11/2019	µg/L	2.5 J	3,990	8.5	0.36 J	1.9 J	1.2 J	433	70.4	1.3 J	0.43 J

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TABLE 2
Shallow Cadmium Concentrations
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Sampling Dates	Units	RW25-MWS	RWA-MWS	RWB-MWS	RWD-MWS	RWE-MWS	RWF-MWS	RWG-MWS	RWH-MWS	RWI-MWS	RWJ-MWS
2/10/2017-2/14/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/28/2017-3/29/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/25/2017-4/27/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/22/2017-5/24/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
6/5/2017-6/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/10/2017-7/12/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
8/7/2017-8/10/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
9/1/2017-9/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/2/2017-10/6/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
11/3/2017-11/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/4/2017-12/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
1/2/2018-1/9/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/8/2018-4/13/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/30/2018-8/3/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/1/2018-10/5/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/10/2018-12/14/2018*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/12/2019-3/19/2019*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/3/2019-6/7/2019*	µg/L	491	2.3 J	3 U	3 U	0.57 J	4.2	3 U	20	714	3 U
9/10/2019-9/23/2019*	µg/L	599	24	3.0 U	3.0 U	0.64 J	6.1	3.0 U	856	840	3.0 U
12/3/2019-12/11/2019	µg/L	9.9	4.4	3.0 U	3.0 U	2.0 J	7.3	3.0 U	19.9	1080	3.0 U

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TABLE 2
Shallow Cadmium Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RWK-MWS	RWL-MWS	RWM-MWS	RWN-MWS	RWO-MWS	RWQ-MWS	RWR-MWS	RWS-MWS
2/10/2017-2/14/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/28/2017-3/29/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/25/2017-4/27/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/22/2017-5/24/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
6/5/2017-6/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/10/2017-7/12/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
8/7/2017-8/10/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
9/1/2017-9/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/2/2017-10/6/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
11/3/2017-11/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/4/2017-12/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
1/2/2018-1/9/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/8/2018-4/13/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/30/2018-8/3/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/1/2018-10/5/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/10/2018-12/14/2018*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/12/2019-3/19/2019*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/3/2019-6/7/2019*	µg/L	3 U	3 U	3 U	13,000	1.4 J	2.6 J	50	3 U
9/10/2019-9/23/2019*	µg/L	3.0 U1c	3.0 U	3.0 U	11,100	1.3 J	2.6 J	41	3.0 U
12/3/2019-12/11/2019	µg/L	3.0 U	3.0 U	0.36 J	11200	7.6	4.4	42.3	3.0 U

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TABLE 3
Intermediate Zinc Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RW01-MWI	RW02-MWI	RW03-MWI	RW05-MWI	RW05R-MWI	RW06-MWI	RW07-MWI	RW08-MWI	RW09-MWI	RW10-MWI
2/10/2017-2/16/2017	µg/L	NS	NS	9,740	NS	DNE	1,900	944	178	51,000	104,000
3/27/2017-3/30/2017	µg/L	NS	NS	9,240	NS	DNE	1,680	1,210	44.6	51,900	20.4
4/25/2017-4/28/2017	µg/L	NS	NS	7,830	NS	DNE	1,420	364	85	57,500	75,800
5/22/2017-5/24/2017	µg/L	NS	NS	2,960	NS	DNE	999	298	188	57,200	1,150
6/5/2017-6/9/2017	µg/L	NS	NS	2,440	374	DNE	876	432	71.9	51,900	34,600
7/10/2017-7/13/2017	µg/L	NS	NS	8,330	1,730	DNE	1,690	45.7	153	65,600	25,900
8/7/2017-8/10/2017	µg/L	11,600	18,200	10,900	1,730	DNE	1,340	62.7	49.8	55,500	79.7
9/1/2017-9/8/2017	µg/L	90	203	9,340	328	DNE	508	2,840	69.4	39,400	8,220
10/2/2017-10/9/2017	µg/L	13,700	290	1,810	349	DNE	615	23.4	16.9	49,700	31,000
11/3/2017-11/13/2017	µg/L	29	38.6	1,750	502	DNE	909	1,650	21.5	67,900	39,000
12/4/2017-12/8/2017	µg/L	41,000	186	6,270	205	DNE	1,360	39.8	21.4	44,500	158
1/2/2018-1/9/2018	µg/L	104	573	12,700	173	DNE	1,950	70.6	108	54,700	26.5
4/8/2018-4/13/2018	µg/L	576	452	6,920	402	DNE	27,900	756	1,050	38,400	13,500
7/30/2018-8/3/2018	µg/L	9,710	5,030	9,710	282	DNE	191	26,300	2,540	54,700	17,600
10/1/2018-10/5/2018	µg/L	143	3,240	13,000	110	DNE	90,100	12,200	256	53,800	16,600
12/10/2018-12/14/2018*	µg/L	3,880	25,300	14,900	177	DNE	99,600	86,000	11	66,600	2,520
3/12/2019-3/19/2019*	µg/L	2,460	21,500	6720	7.5 J	DNE	122000	24,200	10 U	57500	591
5/3/2019-6/7/2019*	µg/L	5,670	56600	13300	NS	66800	108,000	136,000	10 U	64200	5,560
9/10/2019-9/23/2019*	µg/L	5,940	72,000	10,500	NS	71,700	122,000	48,300	11.2 B	53,300	7,730
12/3/2019-12/11/2019	µg/L	2,060	17,200	16,200	NS	83,400	116,000	16,600	48.9	82,000	6,020

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TABLE 3
Intermediate Zinc Concentrations
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Sampling Dates	Units	RW11-MWI	RW12-MWI	RW13-MWI	RW15-MWI	RW16-MWI	RW18-MWI	RW19-MWI	RW21-MWI	RW22-MWI	RW22R-MWI
2/10/2017-2/16/2017	µg/L	368,000	249,000	NS	NS	NS	728,000	5,900,000	DNE	NS	DNE
3/27/2017-3/30/2017	µg/L	301,000	216,000	NS	NS	NS	592,000	4,650,000	DNE	NS	DNE
4/25/2017-4/28/2017	µg/L	288,000	188,000	NS	NS	NS	633,000	7,010,000	DNE	NS	DNE
5/22/2017-5/24/2017	µg/L	336,000	232,000	NS	NS	NS	246,000	5,370,000	DNE	NS	DNE
6/5/2017-6/9/2017	µg/L	201,000	226,000	NS	NS	NS	694,000	6,720,000	DNE	303	DNE
7/10/2017-7/13/2017	µg/L	192,000	219,000	NS	NS	NS	575,000	5,330,000	DNE	103	DNE
8/7/2017-8/10/2017	µg/L	147,000	156,000	308,000	3,210	NS	290,000	3,360,000	DNE	NS	DNE
9/1/2017-9/8/2017	µg/L	134,000	156,000	1,160	71.1	20,200	382,000	2,500,000	DNE	43,000	DNE
10/2/2017-10/9/2017	µg/L	111,000	150,000	204,000	295	2,000	393,000	3,670,000	DNE	16,100	DNE
11/3/2017-11/13/2017	µg/L	207,000	140,000	172,000	825	441	323,000	3,400,000	DNE	3,700	DNE
12/4/2017-12/8/2017	µg/L	197,000	157,000	237	1,070	19,200	369,000	3,970,000	DNE	19,500	DNE
1/2/2018-1/9/2018	µg/L	225,000	117,000	8,600	5,540	16,200	370,000	3,840,000	DNE	27,200	DNE
4/8/2018-4/13/2018	µg/L	215,000	103,000	201,000	252	11,200	396,000	4,190,000	DNE	44,700	DNE
7/30/2018-8/3/2018	µg/L	15,700	2,410	274,000	18,600	1,230	330,000	4,880,000	DNE	73,300	DNE
10/1/2018-10/5/2018	µg/L	174,000	14,300	33.4	736	320	247,000	5,880,000	DNE	47,100	DNE
12/10/2018-12/14/2018*	µg/L	176,000	109,000	116	6,540	6 J	318,000	7,580,000	DNE	68,100	DNE
3/12/2019-3/19/2019*	µg/L	142000	110,000	328,000	109,000	4.7 J	822,000	3,770,000	DNE	81,100	DNE
5/3/2019-6/7/2019*	µg/L	121000	111,000	97.7	16,400	4.9 J	279,000	7,280,000	624,000	NS	1030
9/10/2019-9/23/2019*	µg/L	120,000	104,000	122	168,000	13.1	640,000	3,460,000	570,000	NS	983
12/3/2019-12/11/2019	µg/L	173,000	43,500	246,000	179,000	22.7	849,000	5,690,000	539,000	NS	3,000

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TABLE 3
Intermediate Zinc Concentrations
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Sampling Dates	Units	RW23-MWI	RW24-MWI	RW25-MWI	RWA-MWI	RWB-MWI	RWD-MWI	RWE-MWI	RWF-MWI	RWG-MWI	RWH-MWI
2/10/2017-2/16/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/27/2017-3/30/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/25/2017-4/28/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/22/2017-5/24/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
6/5/2017-6/9/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/10/2017-7/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
8/7/2017-8/10/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
9/1/2017-9/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/2/2017-10/9/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
11/3/2017-11/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/4/2017-12/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
1/2/2018-1/9/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/8/2018-4/13/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/30/2018-8/3/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/1/2018-10/5/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/10/2018-12/14/2018*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/12/2019-3/19/2019*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/3/2019-6/7/2019*	µg/L	109,000	650,000	413,000	375,000	18	36,200	112,000	41,900	332	226,000
9/10/2019-9/23/2019*	µg/L	125,000	635,000	7,000	349,000	29.2	41,900	109,000	42,300	291	378,000
12/3/2019-12/11/2019	µg/L	111,000	538,000	462,000	396,000	47.8	52,600	118,000	58,800	362	502,000

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TABLE 3
Intermediate Zinc Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RWI-MWI	RWJ-MWI	RWK-MWI	RWL-MWI	RWM-MWI	RWO-MWI	RWP-MWI	RWQ-MWI	RWR-MWI	RWS-MWI
2/10/2017-2/16/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/27/2017-3/30/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/25/2017-4/28/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/22/2017-5/24/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
6/5/2017-6/9/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/10/2017-7/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
8/7/2017-8/10/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
9/1/2017-9/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/2/2017-10/9/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
11/3/2017-11/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/4/2017-12/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
1/2/2018-1/9/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/8/2018-4/13/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/30/2018-8/3/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/1/2018-10/5/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/10/2018-12/14/2018*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/12/2019-3/19/2019*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/3/2019-6/7/2019*	µg/L	632,000	1,580	21,100	169,000	162,000	249,000	3,210,000	357,000	2,560,000	797,000
9/10/2019-9/23/2019*	µg/L	519,000	2,150	25,100	142,000	159,000	214,000	3,570,000	270,000	3,620,000	1,040,000
12/3/2019-12/11/2019	µg/L	554,000	3,140	21,600	124,000	152,000	204,000	3,880,000	258,000	4,050,000	946,000

Bold indicates detection above the reporting limit

NS = Not Sampled

DNE = Did Not Exist

*Indicates concentrations are for dissolved metals. All other events show total metals.

TABLE 4
Intermediate Cadmium Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RW01-MWI	RW02-MWI	RW03-MWI	RW05-MWI	RW05R-MWI	RW06-MWI	RW07-MWI	RW08-MWI	RW09-MWI	RW10-MWI
2/10/2017-2/16/2017	µg/L	NS	NS	189	NS	DNE	12.5	1.2 J	0.49 J	3.1	446
3/27/2017-3/30/2017	µg/L	NS	NS	196	NS	DNE	9.2	4.6	0.39 J	4	3 U
4/25/2017-4/28/2017	µg/L	NS	NS	192	NS	DNE	14	3 U	3 U	5	198
5/22/2017-5/24/2017	µg/L	NS	NS	84	NS	DNE	20.4	1.1 J	1.5 J	11.1	2.5 J
6/5/2017-6/9/2017	µg/L	NS	NS	37.4	1.9 J	DNE	14.3	0.91 J	0.48 J	8.1	27.2
7/10/2017-7/13/2017	µg/L	NS	NS	138	17.5	DNE	10.2	1.2 J	1.3 J	12.9	16.3
8/7/2017-8/10/2017	µg/L	194	511	227	19.3	DNE	10.1	1 J	0.86 J	18.5	3 U
9/1/2017-9/8/2017	µg/L	0.51 J	3 J	214	3.7	DNE	4.5	11	0.77 J	9.1	17.7
10/2/2017-10/9/2017	µg/L	145	2.4 J	20.2	4.2	DNE	4.2	3 U	3 U	12	24.6
11/3/2017-11/13/2017	µg/L	3 U	3 U	25.2	4.9	DNE	5.4	5.1	0.88 J	8.8	63.7
12/4/2017-12/8/2017	µg/L	37.5	2.3 J	154	2.7 J	DNE	7.1	1.7 J	1.8 J	7.7	3 U
1/2/2018-1/9/2018	µg/L	2.4 J	14.5	259	2.2 J	DNE	8.4	3 U	3 U	2.1 J	3 U
4/8/2018-4/13/2018	µg/L	16.5	3	128	2.6 J	DNE	89.2	1.3 J	6.2	1.8 J	44.4
7/30/2018-8/3/2018	µg/L	250	79.9	236	1.3 J	DNE	3 U	52.9	14.1	3 U	44.7
10/1/2018-10/5/2018	µg/L	3 U	18	346	3 U	DNE	629	28.7	0.92 J	3.7	10.8
12/10/2018-12/14/2018*	µg/L	9.3	191	342	0.76 J	DNE	752	344	3 U	0.96 J	3 U
3/12/2019-3/19/2019*	µg/L	3 U	98.3	213	3 U	DNE	876	29.5	3 U	2 J	0.38 J
5/3/2019-6/7/2019*	µg/L	19.4	785	449	NS	2570	885	453	3 U	3.8	0.86 J
9/10/2019-9/23/2019*	µg/L	20.6	873	344	NS	2,820	793	48.7	3.0 U	5.6	8.4
12/3/2019-12/11/2019	µg/L	8.8	277	546	NS	2700	673	38.1	0.59 J	4.2 B	13.9

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DNE = Did Not Exist

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TABLE 4
Intermediate Cadmium Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RW11-MWI	RW12-MWI	RW13-MWI	RW15-MWI	RW16-MWI	RW18-MWI	RW19-MWI	RW21-MWI	RW22-MWI	RW22R-MWI
2/10/2017-2/16/2017	µg/L	1,690	4,740	NS	NS	NS	70.3	3,760	DNE	NS	DNE
3/27/2017-3/30/2017	µg/L	1,490	3,530	NS	NS	NS	63.8	3,450	DNE	NS	DNE
4/25/2017-4/28/2017	µg/L	1,800	2,730	NS	NS	NS	119	3,380	DNE	NS	DNE
5/22/2017-5/24/2017	µg/L	2,600	3,820	NS	NS	NS	92	2,770	DNE	NS	DNE
6/5/2017-6/9/2017	µg/L	218	2,260	NS	NS	NS	65.1	2,280	DNE	0.35 J	DNE
7/10/2017-7/13/2017	µg/L	518	2,730	NS	NS	NS	61.7	2,550	DNE	3 U	DNE
8/7/2017-8/10/2017	µg/L	163	2,220	31,800	10.1	NS	74.4	1,670	DNE	NS	DNE
9/1/2017-9/8/2017	µg/L	274	1,820	66	3 U	1.7 J	72.2	1,320	DNE	2.3 J	DNE
10/2/2017-10/9/2017	µg/L	125	1,510	28,700	3 U	3 U	43.7	1,710	DNE	3 U	DNE
11/3/2017-11/13/2017	µg/L	1,460	1,380	24,500	3 U	3 U	66.6	1,770	DNE	3.8	DNE
12/4/2017-12/8/2017	µg/L	1,380	1,450	44.2	0.97 J	1.9 J	51.5	1,710	DNE	15.2	DNE
1/2/2018-1/9/2018	µg/L	1,400	1,270	1,240	1.6 J	1.2 J	63.5	1,880	DNE	4.1	DNE
4/8/2018-4/13/2018	µg/L	1,660	121	19,400	3 U	1.1 J	55.8	1,700	DNE	3 U	DNE
7/30/2018-8/3/2018	µg/L	4.7	134	21,000	15.3	3 U	35.1	1,560	DNE	3 U	DNE
10/1/2018-10/5/2018	µg/L	133	86.3	12.6	3 U	3 U	14.5	1610	DNE	3 U	DNE
12/10/2018-12/14/2018*	µg/L	1160	1220	3.2	12.9	3 U	44.7	1900	DNE	3 U	DNE
3/12/2019-3/19/2019*	µg/L	98.9	768	29,200	402	3 U	80.3	1,320	DNE	3 U	DNE
5/3/2019-6/7/2019*	µg/L	586	1,520	51.1	64.2	3 U	38.0	2,420	50.2	NS	3 U
9/10/2019-9/23/2019*	µg/L	517	1,780	12.8	589	3.0 U	50.4	1,580	23	NS	3.0 U
12/3/2019-12/11/2019	µg/L	476	420	22,500	605	0.36 J	87.6	1,500	33.1	NS	3.0 U

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TABLE 4
Intermediate Cadmium Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RW23-MWI	RW24-MWI	RW25-MWI	RWA-MWI	RWB-MWI	RWD-MWI	RWE-MWI	RWF-MWI	RWG-MWI	RWH-MWI
2/10/2017-2/16/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/27/2017-3/30/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/25/2017-4/28/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/22/2017-5/24/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
6/5/2017-6/9/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/10/2017-7/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
8/7/2017-8/10/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
9/1/2017-9/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/2/2017-10/9/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
11/3/2017-11/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/4/2017-12/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
1/2/2018-1/9/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/8/2018-4/13/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/30/2018-8/3/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/1/2018-10/5/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/10/2018-12/14/2018*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/12/2019-3/19/2019*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/3/2019-6/7/2019*	µg/L	2,270	1,580	507	6,830	3 U	395	700	859	23	92
9/10/2019-9/23/2019*	µg/L	2,800	1,540	9.9	7,740	3.0 U	514	656	1,020	15.4	1,380
12/3/2019-12/11/2019	µg/L	2,680	1,250	622	9,020	3.0 U	586	707	1,340	26.0	3,580

Bold indicates detection above the reporting limit

NS = Not Sampled

DNE = Did Not Exist

*Indicates concentrations are for dissolved metals. All other events show total metals.

TABLE 4
Intermediate Cadmium Concentrations
Rod Wire Mill Interim Measures Progress Report

Sampling Dates	Units	RWI-MWI	RWJ-MWI	RWK-MWI	RWL-MWI	RWM-MWI	RWO-MWI	RWP-MWI	RWQ-MWI	RWR-MWI	RWS-MWI
2/10/2017-2/16/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/27/2017-3/30/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/25/2017-4/28/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/22/2017-5/24/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
6/5/2017-6/9/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/10/2017-7/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
8/7/2017-8/10/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
9/1/2017-9/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/2/2017-10/9/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
11/3/2017-11/13/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/4/2017-12/8/2017	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
1/2/2018-1/9/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
4/8/2018-4/13/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
7/30/2018-8/3/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
10/1/2018-10/5/2018	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
12/10/2018-12/14/2018*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
3/12/2019-3/19/2019*	µg/L	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE	DNE
5/3/2019-6/7/2019*	µg/L	8,050	61.2	33.5	1,230	1,080	68	2,810	26.2	440	3 U
9/10/2019-9/23/2019*	µg/L	8,120	11.8	56.5	1,240	1,200	72.1	6,990	3.0 U	535	3.0 U
12/3/2019-12/11/2019	µg/L	8,270	45.7	99.5	1,280	1,230	55.4	8,910	2.9 J	650	1.6 J

Bold indicates detection above the reporting limit

NS = Not Sampled

DNE = Did Not Exist

*Indicates concentrations are for dissolved metals. All other events show total metals.

TABLE 5
Average Historical Shallow Zone Groundwater Data
 Rod Wire Mill Interim Measure Progress Report

Shallow Zone Cadmium Concentration (µg/L)						
Well Group	Well	2015	2017	2018	2019	% Change from Earliest Yearly Average
Upgradient	RW19-MWS	NA	6.4	3.4	1.4	-78%
Interior	RW09-MWS	NA	14.0	13.0	13.3	-5%
	RW11-MWS	NA	1.8	15.0	1.8	-3%
	RW12-MWS	3.8	37.6	9.3	3.6	-5%
	RW14-MWS	NA	2,088	3,440	3,350	60%
	RW15-MWS	NA	37.1	59.1	12.6	-66%
	RW16-MWS	NA	1.5	1.5	1.2	-19%
	RW18-MWS	100	244	137	1.6	-98%
Perimeter	RW01-MWS	NA	24.8	7.2	3.2	-87%
	RW02-MWS	NA	8.4	9.4	2.0	-76%
	RW03-MWS	NA	6.6	12.9	15.2	130%
	RW04-MWS	2.8	1.1	1.5	1.3	-52%
	RW05-MWS	NA	3.3	1.5	1.5	-54%
	RW06R-MWS	NA	NA	1.2	1.5	29%
	RW07-MWS	NA	3.1	4.6	3.0	-2%
	RW08-MWS	NA	3.4	1.4	1.2	-65%

Shallow Zone Zinc Concentration (µg/L)						
Well Group	Well	2015	2017	2018	2019	% Change from Earliest Yearly Average
Upgradient	RW19-MWS	NA	6,082	8,226	3,190	-48%
Interior	RW09-MWS	NA	10,982	9,856	16,400	49%
	RW11-MWS	NA	12,933	46,100	33,475	159%
	RW12-MWS	2,608	38,761	6,516	3,086	18%
	RW14-MWS	NA	38,340	69,380	70,825	85%
	RW15-MWS	NA	3,737	4,002	424	-89%
	RW16-MWS	NA	32	26.6	35.2	10%
	RW18-MWS	3,691	13,503	7,648	17.3	-100%
Perimeter	RW01-MWS	NA	11,632	32,460	14,875	28%
	RW02-MWS	NA	3,308	9,146	15,749	376%
	RW03-MWS	NA	13,958	27,920	16,668	19%
	RW04-MWS	2,330	145	180	239	-90%
	RW05-MWS	NA	1,617	34.3	14.2	-99%
	RW06R-MWS	NA	NA	9.9	8.8	-11%
	RW07-MWS	NA	131	230	149	13%
	RW08-MWS	NA	3,436	7,320	7,125	107%

Positive % change
 Negative % change
 NA = Not Applicable

TABLE 6
Average Historical Intermediate Zone Groundwater Data

Rod Wire Mill Interim Measure Progress Report

Average Cadmium Concentration (µg/L)						
Well Group	Well	2015	2017	2018	2019	% Change from Earliest Yearly Average
Upgradient	RW19-MWI	NA	2,397	1,748	1,705	-29%
Performance	RW09-MWI	NA	9.1	2.0	3.2	-65%
	RW10-MWI	NA	72.8	20.6	5.9	-92%
	RW11-MWI	25,000	1,065	872	419	-98%
	RW12-MWI	7,890	2,563	578	1,122	-86%
	RW13-MWI	44,500	17,022	8,334	12,941	-71%
	RW15-MWI	NA	3.1	6.8	415	13229%
	RW16-MWI	NA	1.7	1.4	1.2	-26%
	RW18-MWI	80.1	70.9	79.8	64.1	-20%
Perimeter	RW01-MWI	NA	75.7	59.2	12.6	-83%
	RW02-MWI	NA	104	59.5	508	389%
	RW03-MWI	NA	134	285	388	189%
	RW06-MWI	34.8	10.2	292	807	2222%
	RW07-MWI	NA	2.8	94	142	4981%
	RW08-MWI	NA	1.0	4.8	1.3	22%

Average Zinc Concentration (µg/L)						
Well Group	Well	2015	2017	2018	2019	% Change from Earliest Yearly Average
Upgradient	RW19-MWI	NA	4,716,364	5,278,000	5,050,000	7%
Performance	RW09-MWI	NA	53,827	52,740	64,250	19%
	RW10-MWI	NA	29,084	10,143	4,975	-83%
	RW11-MWI	1,120,000	225,636	158,940	139,000	-88%
	RW12-MWI	339,000	189,909	68,142	92,125	-73%
	RW13-MWI	658,000	137,079	96,762	143,555	-78%
	RW15-MWI	NA	1,094	6,374	118,100	10693%
	RW16-MWI	NA	10,460	5,861	11.4	-100%
	RW18-MWI	642,000	475,000	332,400	647,500	1%
Perimeter	RW01-MWI	NA	13,284	3,107	4,033	-70%
	RW02-MWI	NA	3,784	6,839	41,825	1005%
	RW03-MWI	NA	6,419	10,866	11,680	82%
	RW06-MWI	6,045	1,209	43,988	117,000	1835%
	RW07-MWI	NA	719	25,985	56,275	7726%
	RW08-MWI	NA	81.8	800	16.0	-80%

Positive % change

Negative % change

NA = Not Applicable

The RW13-MWI concentrations for 2015 are actually results for a sample from RW-057-PZ, a PDI piezometer existing in November 2015 at a location within a few feet of the current location of RW13-MWI.

APPENDIX A

2019 Laboratory Reports

March 20, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

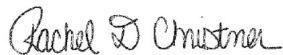
RE: Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30283708

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on March 12, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Rachel Christner for
Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30283708

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30283708

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30283708001	RW11-MWS	Water	03/12/19 10:45	03/12/19 23:15
30283708002	RW11-MWI	Water	03/12/19 11:40	03/12/19 23:15
30283708003	RW05-MWI	Water	03/12/19 15:10	03/12/19 23:15
30283708004	RW05-MWS	Water	03/12/19 16:05	03/12/19 23:15

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30283708

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30283708001	RW11-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30283708002	RW11-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30283708003	RW05-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30283708004	RW05-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30283708

Method: EPA 6010C
Description: 6010C MET ICP
Client: EnviroAnalytics Group, LLC
Date: March 20, 2019

General Information:

4 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 333824

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30283708001,30283980005

ML: Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

- MS (Lab ID: 1624714)
 - Zinc
- MSD (Lab ID: 1624715)
 - Zinc

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Batch Comments:

- The PDS failed for Fe and Ag.
- QC Batch: 333927

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30283708

Method: EPA 6010C
Description: 6010C MET ICP
Client: EnviroAnalytics Group, LLC
Date: March 20, 2019

Analyte Comments:

QC Batch: 333824

1c: The PDS failed for Fe and Ag.

- BLANK (Lab ID: 1624711)
 - Cadmium
 - Zinc
- DUP (Lab ID: 1624713)
 - Cadmium
 - Zinc
- DUP (Lab ID: 1624716)
 - Cadmium
 - Zinc
- LCS (Lab ID: 1624712)
 - Cadmium
 - Zinc
- MS (Lab ID: 1624714)
 - Cadmium
 - Zinc
- MS (Lab ID: 1624717)
 - Cadmium
 - Zinc
- MSD (Lab ID: 1624715)
 - Cadmium
 - Zinc
- RW05-MWI (Lab ID: 30283708003)
 - Cadmium
 - Zinc
- RW05-MWS (Lab ID: 30283708004)
 - Cadmium
 - Zinc
- RW11-MWI (Lab ID: 30283708002)
 - Cadmium
 - Zinc
- RW11-MWS (Lab ID: 30283708001)
 - Cadmium
 - Zinc

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod & Wire Mill GW Sampling

Pace Project No.: 30283708

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: March 20, 2019

General Information:

4 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 333868

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30283708001,30283980007

MH: Matrix spike recovery and/or matrix spike duplicate recovery was above laboratory control limits. Result may be biased high.

- MS (Lab ID: 1624860)
 - Zinc, Dissolved
- MS (Lab ID: 1624863)
 - Zinc, Dissolved

ML: Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

- MSD (Lab ID: 1624861)
 - Zinc, Dissolved

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Batch Comments:

- The PDS failed for Zn
 - QC Batch: 333994

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30283708

Method: EPA 6010C
Description: 6010C MET ICP,Dissolved
Client: EnviroAnalytics Group, LLC
Date: March 20, 2019

Analyte Comments:

QC Batch: 333868

2c: The PDS failed for Zn

- BLANK (Lab ID: 1624857)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- DUP (Lab ID: 1624859)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- DUP (Lab ID: 1624862)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- LCS (Lab ID: 1624858)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- MS (Lab ID: 1624860)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- MS (Lab ID: 1624863)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- MSD (Lab ID: 1624861)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW05-MWI (Lab ID: 30283708003)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW05-MWS (Lab ID: 30283708004)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW11-MWI (Lab ID: 30283708002)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW11-MWS (Lab ID: 30283708001)
 - Cadmium, Dissolved
 - Zinc, Dissolved

3c: The PDS recovery was outside of the laboratory control limits. Result may be biased high

- RW11-MWS (Lab ID: 30283708001)
 - Zinc, Dissolved

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling

Pace Project No.: 30283708

Sample: RW11-MWS		Lab ID: 30283708001		Collected: 03/12/19 10:45		Received: 03/12/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	2.1J	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 16:29	7440-43-9	1c
Zinc	16600	ug/L	100	23.8	10	03/15/19 09:09	03/15/19 17:56	7440-66-6	1c,ML
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	2.2J	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 15:29	7440-43-9	2c
Zinc, Dissolved	13500	ug/L	100	23.8	10	03/15/19 11:58	03/19/19 16:35	7440-66-6	2c,3c, MH,ML

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling

Pace Project No.: 30283708

Sample: RW11-MWI		Lab ID: 30283708002		Collected: 03/12/19 11:40		Received: 03/12/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	885	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 16:53	7440-43-9	1c
Zinc	137000	ug/L	1000	238	100	03/15/19 09:09	03/15/19 18:11	7440-66-6	1c
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	98.9	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 15:43	7440-43-9	2c
Zinc, Dissolved	142000	ug/L	1000	238	100	03/15/19 11:58	03/19/19 16:49	7440-66-6	2c

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling

Pace Project No.: 30283708

Sample: RW05-MWI		Lab ID: 30283708003		Collected: 03/12/19 15:10		Received: 03/12/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1.7J	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 16:55	7440-43-9	1c
Zinc	490	ug/L	10.0	2.4	1	03/15/19 09:09	03/15/19 16:55	7440-66-6	1c
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 15:47	7440-43-9	2c
Zinc, Dissolved	7.5J	ug/L	10.0	2.4	1	03/15/19 11:58	03/19/19 15:47	7440-66-6	2c

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling

Pace Project No.: 30283708

Sample: RW05-MWS		Lab ID: 30283708004		Collected: 03/12/19 16:05		Received: 03/12/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 16:58	7440-43-9	1c
Zinc	48.3	ug/L	10.0	2.4	1	03/15/19 09:09	03/15/19 16:58	7440-66-6	1c
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 15:58	7440-43-9	2c
Zinc, Dissolved	10.0 U	ug/L	10.0	2.4	1	03/15/19 11:58	03/19/19 15:58	7440-66-6	2c

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30283708

QC Batch: 333824 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30283708001, 30283708002, 30283708003, 30283708004

METHOD BLANK: 1624711 Matrix: Water
Associated Lab Samples: 30283708001, 30283708002, 30283708003, 30283708004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	03/15/19 16:19	1c
Zinc	ug/L	10.0 U	10.0	2.4	03/15/19 16:19	1c

LABORATORY CONTROL SAMPLE: 1624712

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	493	99	80-120	1c
Zinc	ug/L	500	497	99	80-120	1c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1624714 1624715

Parameter	Units	30283708001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	2.1J	500	500	511	500	102	100	75-125	2	20	1c
Zinc	ug/L	16600	500	500	16700	16500	32	-14	75-125	1	20	1c,ML

MATRIX SPIKE SAMPLE: 1624717

Parameter	Units	30283980005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	0.34J	500	508	102	75-125	1c
Zinc	ug/L	112	500	598	97	75-125	1c

SAMPLE DUPLICATE: 1624713

Parameter	Units	30283708001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	2.1J	1.9J		20	1c
Zinc	ug/L	16600	16300	1	20	1c

SAMPLE DUPLICATE: 1624716

Parameter	Units	30283980005 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.34J	3.0 U		20	1c
Zinc	ug/L	112	117	4	20	1c

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30283708

QC Batch: 333868 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30283708001, 30283708002, 30283708003, 30283708004

METHOD BLANK: 1624857 Matrix: Water
Associated Lab Samples: 30283708001, 30283708002, 30283708003, 30283708004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	03/19/19 15:24	2c
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	03/19/19 15:24	2c

LABORATORY CONTROL SAMPLE: 1624858

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	464	93	80-120	2c
Zinc, Dissolved	ug/L	500	475	95	80-120	2c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1624860 1624861

Parameter	Units	30283708001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	ug/L	2.2J	500	500	516	508	103	101	75-125	2	20	2c
Zinc, Dissolved	ug/L	13500	500	500	14100	13800	128	72	75-125	2	20	2c, MH, ML

MATRIX SPIKE SAMPLE: 1624863

Parameter	Units	30283980007 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	10.2	500	518	102	75-125	2c
Zinc, Dissolved	ug/L	11300	500	12200	174	75-125	2c, MH

SAMPLE DUPLICATE: 1624859

Parameter	Units	30283708001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	2.2J	2.2J		20	2c
Zinc, Dissolved	ug/L	13500	13400	1	20	2c

SAMPLE DUPLICATE: 1624862

Parameter	Units	30283980007 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	10.2	10.0	2	20	2c
Zinc, Dissolved	ug/L	11300	11600	3	20	2c

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Rod & Wire Mill GW Sampling

Pace Project No.: 30283708

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

BATCH QUALIFIERS

Batch: 333927

[1] The PDS failed for Fe and Ag.

Batch: 333994

[1] The PDS failed for Zn

ANALYTE QUALIFIERS

1c The PDS failed for Fe and Ag.

2c The PDS failed for Zn

3c The PDS recovery was outside of the laboratory control limits. Result may be biased high

MH Matrix spike recovery and/or matrix spike duplicate recovery was above laboratory control limits. Result may be biased high.

ML Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30283708

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30283708001	RW11-MWS	EPA 3005A	333824	EPA 6010C	333927
30283708002	RW11-MWI	EPA 3005A	333824	EPA 6010C	333927
30283708003	RW05-MWI	EPA 3005A	333824	EPA 6010C	333927
30283708004	RW05-MWS	EPA 3005A	333824	EPA 6010C	333927
30283708001	RW11-MWS	EPA 3005A	333868	EPA 6010C	333994
30283708002	RW11-MWI	EPA 3005A	333868	EPA 6010C	333994
30283708003	RW05-MWI	EPA 3005A	333868	EPA 6010C	333994
30283708004	RW05-MWS	EPA 3005A	333868	EPA 6010C	333994

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CHAIN-OF-CUSTODY NO#: 30283708

The Chain-of-Custody is



Page: (of)

Section A Required Client Information:

Company: EnviroAnalytics Group
 Address: 1600 Sparrows Point Blvd, Suite B2
 Sparrows Point, MD 21219
 Email To: jcalenda@enviroanalyticsgroup.com
 Phone: 314-620-3056 Fax:
 Requested Due Date/TAT: 5 Day

Section B Required Project Information:

Report To: James Calenda
 Copy To: Stewart Kabis
 Purchase Order No.: EAG-SPT-6452
 Project Name: Rod and Wire Mill GW Sampling
 Project Number: 180227M-1

Attention: Laura Sargent
 Company Name: EnviroAnalytics Group
 Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131
 Pace Quote Reference:
 Pace Project Manager: Samantha Bayura
 Pace Profile #:

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: MD
 STATE:

ITEM #	Section D Required Client Information	Valid Matrix Codes	MATRIX CODE	MATRIX CODE (see valid codes to left)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	Requested Analysis: Filtered (Y/N)	Pace Project No./ Lab I.D.
					COMPOSITE START	COMPOSITE END/GRAB					
	Required Client Information	MATRIX CODE	DATE	TIME	DATE	TIME					
1	RW11-MWS	DRINKING WATER DW	3/12/19	1045			2	Unpreserved	Analysis Test ↑		001
2	RW11-MWI	WASTE WATER WW		1140			2	H ₂ SO ₄	Total Cadmium 6010		002
3	RW05-MWI	WASTE WATER WW		1510			2	HNO ₃	Total Zinc 6010		003
4	RW05-MWS	WASTE WATER WW		1605			2	HCl	Dissolved cadmium 6010		004
5		WASTE WATER WW						NaOH	Dissolved zinc 6010		
6		WASTE WATER WW						Na ₂ S ₂ O ₃			
7		WASTE WATER WW						Other			
8		WASTE WATER WW									
9		WASTE WATER WW									
10		WASTE WATER WW									
11		WASTE WATER WW									
12		WASTE WATER WW									

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
NO data plss	J. Calenda	3/12/19	1645	J. Calenda	3/12/19	1645	
	J. Calenda	3/13/19	1955	J. Calenda	3-13-19	2000	
	J. Calenda	3-12-19	2315	J. Calenda	3-12-19	2315	

Temp In °C	Received on	Ice (Y/N)	Custody Sealed	Cooler (Y/N)	Samples Intact

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Lisa Perrin
 SIGNATURE of SAMPLER: Lisa Perrin
 DATE Signed (MM/DD/YY): 3-12-19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviro Analytics

Project # 30283708

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label BLM
LIMS Login BLM

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 0.9 °C Correction Factor: 0.1 °C Final Temp: 1.0 °C
Temp should be above freezing to 6°C

pH paper Lot# 10D2981 Date and Initials of person examining contents: BLM 3-13-19

Comments:	Yes	No	N/A	
Chain of Custody Present:	/			1.
Chain of Custody Filled Out:	/			2.
Chain of Custody Relinquished:	/			3.
Sampler Name & Signature on COC:	/			4.
Sample Labels match COC: -Includes date/time/ID Matrix: <u>WT</u>	/			5.
Samples Arrived within Hold Time:	/			6.
Short Hold Time Analysis (<72hr remaining):		/		7.
Rush Turn Around Time Requested:	/			8.
Sufficient Volume:	/			9.
Correct Containers Used: -Pace Containers Used:	/			10.
Containers Intact:	/			11.
Orthophosphate field filtered			/	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			/	13.
Organic Samples checked for dechlorination:			/	14.
Filtered volume received for Dissolved tests	/			15.
All containers have been checked for preservation.	/			16.
All containers needing preservation are found to be in compliance with EPA recommendation.	/			
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed <u>BLM</u> Date/time of preservation
				Lot # of added preservative
Headspace in VOA Vials (>6mm):			/	17.
Trip Blank Present:			/	18.
Trip Blank Custody Seals Present			/	
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed: Date:

Client Notification/ Resolution:
Person Contacted: _____ Date/Time: _____ Contacted By: _____
Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)
*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

March 20, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

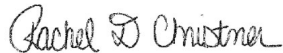
RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on March 13, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Rachel Christner for
Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30283980001	RW04-MWS	Water	03/13/19 09:40	03/13/19 23:30
30283980002	RW06-MWD	Water	03/13/19 10:25	03/13/19 23:30
30283980003	RW06R-MWS	Water	03/13/19 11:10	03/13/19 23:30
30283980004	RW06-MWI	Water	03/13/19 11:50	03/13/19 23:30
30283980005	RW08-MWI	Water	03/13/19 12:55	03/13/19 23:30
30283980006	RW08-MWS	Water	03/13/19 13:55	03/13/19 23:30
30283980007	RW09-MWS	Water	03/13/19 15:00	03/13/19 23:30
30283980008	RW09-MWI	Water	03/13/19 15:55	03/13/19 23:30

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30283980001	RW04-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30283980002	RW06-MWD	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30283980003	RW06R-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30283980004	RW06-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30283980005	RW08-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30283980006	RW08-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30283980007	RW09-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30283980008	RW09-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

Method: EPA 6010C
Description: 6010C MET ICP
Client: EnviroAnalytics Group, LLC
Date: March 20, 2019

General Information:

8 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 333824

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30283708001,30283980005

ML: Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

- MS (Lab ID: 1624714)
 - Zinc
- MSD (Lab ID: 1624715)
 - Zinc

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Batch Comments:

- The PDS failed for Fe and Ag.
- QC Batch: 333927

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: March 20, 2019

Analyte Comments:

QC Batch: 333824

1c: The PDS failed for Fe and Ag.

- BLANK (Lab ID: 1624711)
 - Cadmium
 - Zinc
- DUP (Lab ID: 1624713)
 - Cadmium
 - Zinc
- DUP (Lab ID: 1624716)
 - Cadmium
 - Zinc
- LCS (Lab ID: 1624712)
 - Cadmium
 - Zinc
- MS (Lab ID: 1624714)
 - Cadmium
 - Zinc
- MS (Lab ID: 1624717)
 - Cadmium
 - Zinc
- MSD (Lab ID: 1624715)
 - Cadmium
 - Zinc
- RW04-MWS (Lab ID: 30283980001)
 - Cadmium
 - Zinc
- RW06-MWD (Lab ID: 30283980002)
 - Cadmium
 - Zinc
- RW06-MWI (Lab ID: 30283980004)
 - Cadmium
 - Zinc
- RW06R-MWS (Lab ID: 30283980003)
 - Cadmium
 - Zinc
- RW08-MWI (Lab ID: 30283980005)
 - Cadmium
 - Zinc
- RW08-MWS (Lab ID: 30283980006)
 - Cadmium
 - Zinc
- RW09-MWI (Lab ID: 30283980008)
 - Cadmium
 - Zinc

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: March 20, 2019

Analyte Comments:

QC Batch: 333824

1c: The PDS failed for Fe and Ag.

- RW09-MWS (Lab ID: 30283980007)

- Cadmium

- Zinc

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: March 20, 2019

General Information:

8 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 333868

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30283708001,30283980007

MH: Matrix spike recovery and/or matrix spike duplicate recovery was above laboratory control limits. Result may be biased high.

- MS (Lab ID: 1624860)
 - Zinc, Dissolved
- MS (Lab ID: 1624863)
 - Zinc, Dissolved

ML: Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

- MSD (Lab ID: 1624861)
 - Zinc, Dissolved

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Batch Comments:

- The PDS failed for Zn
 - QC Batch: 333994

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: March 20, 2019

Analyte Comments:

QC Batch: 333868

2c: The PDS failed for Zn

- BLANK (Lab ID: 1624857)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- DUP (Lab ID: 1624859)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- DUP (Lab ID: 1624862)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- LCS (Lab ID: 1624858)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- MS (Lab ID: 1624860)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- MS (Lab ID: 1624863)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- MSD (Lab ID: 1624861)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW04-MWS (Lab ID: 30283980001)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW06-MWD (Lab ID: 30283980002)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW06-MWI (Lab ID: 30283980004)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW06R-MWS (Lab ID: 30283980003)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW08-MWI (Lab ID: 30283980005)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW08-MWS (Lab ID: 30283980006)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW09-MWI (Lab ID: 30283980008)
 - Cadmium, Dissolved
 - Zinc, Dissolved

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: March 20, 2019

Analyte Comments:

QC Batch: 333868

2c: The PDS failed for Zn

- RW09-MWS (Lab ID: 30283980007)
 - Cadmium, Dissolved
 - Zinc, Dissolved

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Sample: RW04-MWS		Lab ID: 30283980001		Collected: 03/13/19 09:40		Received: 03/13/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	0.43J	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 17:00	7440-43-9	1c
Zinc	142	ug/L	10.0	2.4	1	03/15/19 09:09	03/15/19 17:00	7440-66-6	1c
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 16:00	7440-43-9	2c
Zinc, Dissolved	33.6	ug/L	10.0	2.4	1	03/15/19 11:58	03/19/19 16:00	7440-66-6	2c

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

Sample: RW06-MWD Lab ID: 30283980002 Collected: 03/13/19 10:25 Received: 03/13/19 23:30 Matrix: Water									
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 17:02	7440-43-9	1c
Zinc	17.2	ug/L	10.0	2.4	1	03/15/19 09:09	03/15/19 17:02	7440-66-6	1c
6010C MET ICP,Dissolved Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 16:03	7440-43-9	2c
Zinc, Dissolved	10.9	ug/L	10.0	2.4	1	03/15/19 11:58	03/19/19 16:03	7440-66-6	2c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Sample: RW06R-MWS		Lab ID: 30283980003		Collected: 03/13/19 11:10		Received: 03/13/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 17:05	7440-43-9	1c
Zinc	10.0 U	ug/L	10.0	2.4	1	03/15/19 09:09	03/15/19 17:05	7440-66-6	1c
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 16:05	7440-43-9	2c
Zinc, Dissolved	10.0 U	ug/L	10.0	2.4	1	03/15/19 11:58	03/19/19 16:05	7440-66-6	2c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Sample: RW06-MWI		Lab ID: 30283980004		Collected: 03/13/19 11:50		Received: 03/13/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	934	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 17:25	7440-43-9	1c
Zinc	128000	ug/L	1000	238	100	03/15/19 09:09	03/15/19 18:29	7440-66-6	1c
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	876	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 16:07	7440-43-9	2c
Zinc, Dissolved	122000	ug/L	1000	238	100	03/15/19 11:58	03/19/19 16:52	7440-66-6	2c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Sample: RW08-MWI **Lab ID: 30283980005** Collected: 03/13/19 12:55 Received: 03/13/19 23:30 Matrix: Water

Comments: • Collection time on sample containers does not match COC.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	0.34J	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 17:08	7440-43-9	1c
Zinc	112	ug/L	10.0	2.4	1	03/15/19 09:09	03/15/19 17:08	7440-66-6	1c
6010C MET ICP,Dissolved									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 16:12	7440-43-9	2c
Zinc, Dissolved	10.0 U	ug/L	10.0	2.4	1	03/15/19 11:58	03/19/19 16:12	7440-66-6	2c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Sample: RW08-MWS		Lab ID: 30283980006		Collected: 03/13/19 13:55		Received: 03/13/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	2.7J	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 17:27	7440-43-9	1c
Zinc	14300	ug/L	100	23.8	10	03/15/19 09:09	03/15/19 18:31	7440-66-6	1c
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	2.0J	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 16:14	7440-43-9	2c
Zinc, Dissolved	14600	ug/L	100	23.8	10	03/15/19 11:58	03/19/19 16:54	7440-66-6	2c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Sample: RW09-MWS		Lab ID: 30283980007		Collected: 03/13/19 15:00		Received: 03/13/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	11.2	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 17:30	7440-43-9	1c
Zinc	11800	ug/L	100	23.8	10	03/15/19 09:09	03/15/19 18:34	7440-66-6	1c
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	10.2	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 16:17	7440-43-9	2c
Zinc, Dissolved	11300	ug/L	100	23.8	10	03/15/19 11:58	03/19/19 17:04	7440-66-6	2c,MH

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30283980

Sample: RW09-MWI		Lab ID: 30283980008		Collected: 03/13/19 15:55		Received: 03/13/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	5.3	ug/L	3.0	0.34	1	03/15/19 09:09	03/15/19 17:32	7440-43-9	1c
Zinc	59800	ug/L	1000	238	100	03/15/19 09:09	03/15/19 18:36	7440-66-6	1c
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	2.0J	ug/L	3.0	0.34	1	03/15/19 11:58	03/19/19 16:31	7440-43-9	2c
Zinc, Dissolved	57500	ug/L	1000	238	100	03/15/19 11:58	03/19/19 17:12	7440-66-6	2c

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

QC Batch: 333824 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30283980001, 30283980002, 30283980003, 30283980004, 30283980005, 30283980006, 30283980007, 30283980008

METHOD BLANK: 1624711 Matrix: Water
Associated Lab Samples: 30283980001, 30283980002, 30283980003, 30283980004, 30283980005, 30283980006, 30283980007, 30283980008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	03/15/19 16:19	1c
Zinc	ug/L	10.0 U	10.0	2.4	03/15/19 16:19	1c

LABORATORY CONTROL SAMPLE: 1624712

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	493	99	80-120	1c
Zinc	ug/L	500	497	99	80-120	1c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1624714 1624715

Parameter	Units	30283708001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	2.1J	500	500	511	500	102	100	75-125	2	20	1c
Zinc	ug/L	16600	500	500	16700	16500	32	-14	75-125	1	20	1c,ML

MATRIX SPIKE SAMPLE: 1624717

Parameter	Units	30283980005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	0.34J	500	508	102	75-125	1c
Zinc	ug/L	112	500	598	97	75-125	1c

SAMPLE DUPLICATE: 1624713

Parameter	Units	30283708001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	2.1J	1.9J		20	1c
Zinc	ug/L	16600	16300	1	20	1c

SAMPLE DUPLICATE: 1624716

Parameter	Units	30283980005 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.34J	3.0 U		20	1c

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

SAMPLE DUPLICATE: 1624716

Parameter	Units	30283980005 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	112	117	4	20	1c

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

QC Batch: 333868 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30283980001, 30283980002, 30283980003, 30283980004, 30283980005, 30283980006, 30283980007, 30283980008

METHOD BLANK: 1624857 Matrix: Water
Associated Lab Samples: 30283980001, 30283980002, 30283980003, 30283980004, 30283980005, 30283980006, 30283980007, 30283980008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	03/19/19 15:24	2c
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	03/19/19 15:24	2c

LABORATORY CONTROL SAMPLE: 1624858

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	464	93	80-120	2c
Zinc, Dissolved	ug/L	500	475	95	80-120	2c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1624860 1624861

Parameter	Units	30283708001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	ug/L	2.2J	500	500	516	508	103	101	75-125	2	20	2c
Zinc, Dissolved	ug/L	13500	500	500	14100	13800	128	72	75-125	2	20	2c, MH, ML

MATRIX SPIKE SAMPLE: 1624863

Parameter	Units	30283980007 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	10.2	500	518	102	75-125	2c
Zinc, Dissolved	ug/L	11300	500	12200	174	75-125	2c, MH

SAMPLE DUPLICATE: 1624859

Parameter	Units	30283708001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	2.2J	2.2J		20	2c
Zinc, Dissolved	ug/L	13500	13400	1	20	2c

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

SAMPLE DUPLICATE: 1624862

Parameter	Units	30283980007 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	10.2	10.0	2	20	2c
Zinc, Dissolved	ug/L	11300	11600	3	20	2c

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.
ND - Not Detected at or above adjusted reporting limit.
TNTC - Too Numerous To Count
J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
MDL - Adjusted Method Detection Limit.
PQL - Practical Quantitation Limit.
RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.
S - Surrogate
1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.
Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.
LCS(D) - Laboratory Control Sample (Duplicate)
MS(D) - Matrix Spike (Duplicate)
DUP - Sample Duplicate
RPD - Relative Percent Difference
NC - Not Calculable.
SG - Silica Gel - Clean-Up
U - Indicates the compound was analyzed for, but not detected.
N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.
Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.
TNI - The NELAC Institute.

BATCH QUALIFIERS

Batch: 333927
[1] The PDS failed for Fe and Ag.
Batch: 333994
[1] The PDS failed for Zn

ANALYTE QUALIFIERS

1c The PDS failed for Fe and Ag.
2c The PDS failed for Zn
MH Matrix spike recovery and/or matrix spike duplicate recovery was above laboratory control limits. Result may be biased high.
ML Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30283980

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30283980001	RW04-MWS	EPA 3005A	333824	EPA 6010C	333927
30283980002	RW06-MWD	EPA 3005A	333824	EPA 6010C	333927
30283980003	RW06R-MWS	EPA 3005A	333824	EPA 6010C	333927
30283980004	RW06-MWI	EPA 3005A	333824	EPA 6010C	333927
30283980005	RW08-MWI	EPA 3005A	333824	EPA 6010C	333927
30283980006	RW08-MWS	EPA 3005A	333824	EPA 6010C	333927
30283980007	RW09-MWS	EPA 3005A	333824	EPA 6010C	333927
30283980008	RW09-MWI	EPA 3005A	333824	EPA 6010C	333927
30283980001	RW04-MWS	EPA 3005A	333868	EPA 6010C	333994
30283980002	RW06-MWD	EPA 3005A	333868	EPA 6010C	333994
30283980003	RW06R-MWS	EPA 3005A	333868	EPA 6010C	333994
30283980004	RW06-MWI	EPA 3005A	333868	EPA 6010C	333994
30283980005	RW08-MWI	EPA 3005A	333868	EPA 6010C	333994
30283980006	RW08-MWS	EPA 3005A	333868	EPA 6010C	333994
30283980007	RW09-MWS	EPA 3005A	333868	EPA 6010C	333994
30283980008	RW09-MWI	EPA 3005A	333868	EPA 6010C	333994

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CHAIN-OF-C
The Chain-of-Custody is

WO#: 30283980



Page: _____ of _____

Section A
Required Client Information:

Company: **EnviroAnalytics Group**
Address: **1600 Sparrows Point Blvd, Suite B2**
Sparrows Point, MD 21219

Report To: **James Calenda**
Copy To: **Stewart Kabis**

Valid Matrix Codes:
MATRIX: DRINKING WATER (DW), WASTE WATER (WT), PRODUCT (P), SOIL/SOLID (SL), OIL (OL), WIPE (WI), AIR (AR), OTHER (OT), TISSUE (TS)

Project Name: **Rod and Wire Mill GW Sampling**
Project Number: **180227M-1**

Attention: **Laura Sargent**
Company Name: **EnviroAnalytics Group**
Address: **1650 Dps Peres Road, Suite 303 St. Louis, MO 63131**

Site Location: **MD**
STATE: _____

REGULATORY AGENCY:
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Section B
Required Project Information:

Purchase Order No.: **EAG-SRF-6452**
Pace Project Reference: _____
Pace Project Manager: **Samantha Bayura**
Pace Profile #: _____

ITEM #	Section D Required Client Information	Valid Matrix Codes	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	Analysis Test ↑	Requested Analysis Filtered (Y/N)	Temp in °C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Samples Intact (Y/N)	
					COMPOSITE START	COMPOSITE END/GRAB										
1	RW04-MWS	DRINKING WATER	WT G	G	DATE: 3-13-19	TIME: 940		2	H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₈ Methanol Other	Total Zinc 6010 Total Cadmium 6010 Diss Cadmium 6010 Diss Zinc 6010	Y	1.0	Y	Y	001	
2	RW06-MWD	WASTE WATER	WT G	G	DATE: 3-13-19	TIME: 1025		2	Unpreserved		Y					002
3	RW08-MWS	WASTE WATER	WT G	G	DATE: 3-13-19	TIME: 1110		2			Y					003
4	RW06-MWI	WASTE WATER	WT G	G	DATE: 3-13-19	TIME: 1150		2			Y					004
5	RW08-MWI	WASTE WATER	WT G	G	DATE: 3-13-19	TIME: 1255		2			Y					005
6	RW08-MWS	WASTE WATER	WT G	G	DATE: 3-13-19	TIME: 1355		2			Y					006
7	RW09-MWS	WASTE WATER	WT G	G	DATE: 3-13-19	TIME: 1500		2			Y					007
8	RW09-MWI	WASTE WATER	WT G	G	DATE: 3-13-19	TIME: 1555		2			Y					008
9																
10																
11																
12																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
data p155	James Calenda	3-13-19	1635	David J. Holleyman/Pace	3-13-19	1635	
	David J. Holleyman/Pace	3-13-19	1958	RDS WACE	3-13-19	2000	Y
	RDS WACE	3-13-19	2330	Bill T. McCann	3-13-19	2330	Y

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: **Lisa Perra**
SIGNATURE OF SAMPLER: *Lisa Perra*
DATE Signed (MM/DD/YYYY): **3-13-19**

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviro Analytics

Project # 30283980

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 10 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.6 °C Correction Factor: 0 °C Final Temp: 1.6 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>10D2481</u>	<u>BLM 3-14-19</u>
Chain of Custody Present:	/			1.	
Chain of Custody Filled Out:	/			2.	
Chain of Custody Relinquished:	/			3.	
Sampler Name & Signature on COC:	/			4.	
Sample Labels match COC: -Includes date/time/ID Matrix: <u>WT</u>	/			5.	<u>Time on sample RW08-MWF is 1155</u>
Samples Arrived within Hold Time:	/			6.	
Short Hold Time Analysis (<72hr remaining):		/		7.	
Rush Turn Around Time Requested:	/			8.	
Sufficient Volume:	/			9.	
Correct Containers Used: -Pace Containers Used:	/			10.	
Containers Intact:	/			11.	
Orthophosphate field filtered			/	12.	
Hex Cr Aqueous Compliance/NPDES sample field filtered			/	13.	
Organic Samples checked for dechlorination:			/	14.	
Filtered volume received for Dissolved tests	/			15.	
All containers have been checked for preservation.	/			16.	
All containers needing preservation are found to be in compliance with EPA recommendation.	/				
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed	Date/time of preservation
				<u>BLM</u>	
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/	17.	
Trip Blank Present:			/	18.	
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

March 20, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

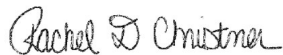
RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284302

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on March 14, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Rachel Christner for
Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284302

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284302

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30284302001	RW07-MWS	Water	03/14/19 09:30	03/14/19 23:45
30284302002	RW07-MWI	Water	03/14/19 10:25	03/14/19 23:45
30284302003	RW10-MWI	Water	03/14/19 11:50	03/14/19 23:45
30284302004	RW18-MWS	Water	03/14/19 13:45	03/14/19 23:45
30284302005	RW18-MWI	Water	03/14/19 14:25	03/14/19 23:45
30284302006	RW14-MWS	Water	03/14/19 15:15	03/14/19 23:45

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284302

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30284302001	RW07-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284302002	RW07-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284302003	RW10-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284302004	RW18-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284302005	RW18-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284302006	RW14-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284302

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: March 20, 2019

General Information:

6 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284302

Method: EPA 6010C
Description: 6010C MET ICP,Dissolved
Client: EnviroAnalytics Group, LLC
Date: March 20, 2019

General Information:

6 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284302

Sample: RW07-MWS		Lab ID: 30284302001		Collected: 03/14/19 09:30	Received: 03/14/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	2.8J	ug/L	3.0	0.34	1	03/18/19 08:50	03/19/19 19:16	7440-43-9		
Zinc	199	ug/L	10.0	2.4	1	03/18/19 08:50	03/19/19 19:16	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	2.7J	ug/L	3.0	0.34	1	03/18/19 08:49	03/19/19 17:37	7440-43-9		
Zinc, Dissolved	142	ug/L	10.0	2.4	1	03/18/19 08:49	03/19/19 17:37	7440-66-6		

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284302

Sample: RW07-MWI		Lab ID: 30284302002		Collected: 03/14/19 10:25	Received: 03/14/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	32.3	ug/L	3.0	0.34	1	03/18/19 08:50	03/19/19 19:30	7440-43-9		
Zinc	24800	ug/L	1000	238	100	03/18/19 08:50	03/19/19 20:05	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	29.5	ug/L	3.0	0.34	1	03/18/19 08:49	03/19/19 17:51	7440-43-9		
Zinc, Dissolved	24200	ug/L	1000	238	100	03/18/19 08:49	03/19/19 18:30	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284302

Sample: RW10-MWI **Lab ID: 30284302003** Collected: 03/14/19 11:50 Received: 03/14/19 23:45 Matrix: Water

Comments: • Collection time on bottle does not match COC.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	1.3J	ug/L	3.0	0.34	1	03/18/19 08:50	03/19/19 19:34	7440-43-9	
Zinc	914	ug/L	10.0	2.4	1	03/18/19 08:50	03/19/19 19:34	7440-66-6	
6010C MET ICP,Dissolved									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	0.38J	ug/L	3.0	0.34	1	03/18/19 08:49	03/19/19 17:55	7440-43-9	
Zinc, Dissolved	591	ug/L	10.0	2.4	1	03/18/19 08:49	03/19/19 17:55	7440-66-6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284302

Sample: RW18-MWS		Lab ID: 30284302004		Collected: 03/14/19 13:45	Received: 03/14/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	0.69J	ug/L	3.0	0.34	1	03/18/19 08:50	03/19/19 19:42	7440-43-9		
Zinc	88.7	ug/L	10.0	2.4	1	03/18/19 08:50	03/19/19 19:42	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/18/19 08:49	03/19/19 18:04	7440-43-9		
Zinc, Dissolved	30.0	ug/L	10.0	2.4	1	03/18/19 08:49	03/19/19 18:04	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284302

Sample: RW18-MWI		Lab ID: 30284302005		Collected: 03/14/19 14:25		Received: 03/14/19 23:45		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	82.9	ug/L	3.0	0.34	1	03/18/19 08:50	03/19/19 19:44	7440-43-9	
Zinc	846000	ug/L	10000	2380	1000	03/18/19 08:50	03/19/19 20:08	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	80.3	ug/L	3.0	0.34	1	03/18/19 08:49	03/19/19 18:07	7440-43-9	
Zinc, Dissolved	822000	ug/L	10000	2380	1000	03/18/19 08:49	03/19/19 18:33	7440-66-6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284302

Sample: RW14-MWS		Lab ID: 30284302006		Collected: 03/14/19 15:15	Received: 03/14/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	2980	ug/L	3.0	0.34	1	03/18/19 08:50	03/19/19 19:47	7440-43-9		
Zinc	65500	ug/L	1000	238	100	03/18/19 08:50	03/19/19 20:10	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	2960	ug/L	3.0	0.34	1	03/18/19 08:49	03/19/19 18:12	7440-43-9		
Zinc, Dissolved	65700	ug/L	1000	238	100	03/18/19 08:49	03/19/19 18:42	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284302

QC Batch: 334037 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30284302001, 30284302002, 30284302003, 30284302004, 30284302005, 30284302006

METHOD BLANK: 1626039 Matrix: Water
Associated Lab Samples: 30284302001, 30284302002, 30284302003, 30284302004, 30284302005, 30284302006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	03/19/19 19:11	
Zinc	ug/L	10.0 U	10.0	2.4	03/19/19 19:11	

LABORATORY CONTROL SAMPLE: 1626040

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	497	99	80-120	
Zinc	ug/L	500	522	104	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1626042 1626043

Parameter	Units	30284302001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	2.8J	500	500	517	497	103	99	75-125	4	20	
Zinc	ug/L	199	500	500	721	703	104	101	75-125	3	20	

SAMPLE DUPLICATE: 1626041

Parameter	Units	30284302001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	2.8J	2.9J		20	
Zinc	ug/L	199	201	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284302

QC Batch: 334036 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30284302001, 30284302002, 30284302003, 30284302004, 30284302005, 30284302006

METHOD BLANK: 1626034 Matrix: Water
Associated Lab Samples: 30284302001, 30284302002, 30284302003, 30284302004, 30284302005, 30284302006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	03/19/19 17:32	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	03/19/19 17:32	

LABORATORY CONTROL SAMPLE: 1626035

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	438	88	80-120	
Zinc, Dissolved	ug/L	500	454	91	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1626037 1626038

Parameter	Units	30284302001 Result	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
			Spike Conc.	MS Result	MSD Result	MSD Result						
Cadmium, Dissolved	ug/L	2.7J	500	500	508	519	101	103	75-125	2	20	
Zinc, Dissolved	ug/L	142	500	500	650	661	102	104	75-125	2	20	

SAMPLE DUPLICATE: 1626036

Parameter	Units	30284302001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	2.7J	2.8J		20	
Zinc, Dissolved	ug/L	142	141	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284302

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284302

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30284302001	RW07-MWS	EPA 3005A	334037	EPA 6010C	334173
30284302002	RW07-MWI	EPA 3005A	334037	EPA 6010C	334173
30284302003	RW10-MWI	EPA 3005A	334037	EPA 6010C	334173
30284302004	RW18-MWS	EPA 3005A	334037	EPA 6010C	334173
30284302005	RW18-MWI	EPA 3005A	334037	EPA 6010C	334173
30284302006	RW14-MWS	EPA 3005A	334037	EPA 6010C	334173
30284302001	RW07-MWS	EPA 3005A	334036	EPA 6010C	334172
30284302002	RW07-MWI	EPA 3005A	334036	EPA 6010C	334172
30284302003	RW10-MWI	EPA 3005A	334036	EPA 6010C	334172
30284302004	RW18-MWS	EPA 3005A	334036	EPA 6010C	334172
30284302005	RW18-MWI	EPA 3005A	334036	EPA 6010C	334172
30284302006	RW14-MWS	EPA 3005A	334036	EPA 6010C	334172

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CHAIN-OF-CUSTODY NO#: 30284302

The Chain-of-Custody is a LEI



Page: 1 of 1

Section A
Required Client Information:
 Company: EnviroAnalytics Group
 Address: 1600 Sparrows Point Blvd, Suite B2
 Sparrows Point, MD 21219
 Email To: icalenda@enviroanalyticsgroup.com
 Phone: 314-620-3056 Fax:
 Requested Due Date/TAT: 5 Day

Section B
Required Project Information:
 Report To: James Calenda
 Copy To: Stewart Kabis
 Purchase Order No.: EAG-SPT-6452
 Project Name: Rod and Wire Mill GW Sampling
 Project Number: 180227M-1

Section C
Invoice Information:
 Invoice #: 30284302
 Attention: Laura Sargent
 Company Name: EnviroAnalytics Group
 Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131
 Pace Quote Reference:
 Pace Project Manager: Samantha Bayura
 Pace Profile #:

REGULATORY AGENCY:
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: MD
 STATE:

ITEM #	Section D Required Client Information	Valid Matrix Codes	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
					DATE	TIME						
1	RW07-MWS	DRINKING WATER	DW	WTG	3-14-19	9:30		2	Unpreserved			001
2	RW07-MWI	WASTE WATER	WW	WTG		10:25		2	H ₂ SO ₄			002
3	RW10-MWI	WASTE WATER PRODUCT	WW	WTG		11:50		2	HCl			003
4	RW18-MWS	SOILSOLID	P	WTG		13:45		2	HNO ₃			604
5	RW18-MWI	OIL	OL	WTG		14:25		2	NaOH			005
6	RW14-MWS	WASTE WATER	WW	WTG		15:15		2	Na ₂ S ₂ O ₃			006
7												
8												
9												
10												
11												
12												
ADDITIONAL COMMENTS: Data PKGS (Y) Shree... David... DS TRACE												
RELINQUISHED BY / AFFILIATION: Shree... David... DS TRACE												
ACCEPTED BY / AFFILIATION: Lisa... Lisa... Lisa...												
DATE: 3-14-19 3-14-19 3-14-19												
TIME: 16:30 20:45 23:45												
SAMPLE CONDITIONS: Received on: Y Ice (Y/N): Y Custody Sealed (Y/N): N Cooler (Y/N): N Samples Intact (Y/N): Y												

SAMPLER NAME AND SIGNATURE:
 PRINT Name of SAMPLER: Lisa Perin
 SIGNATURE of SAMPLER: Lisa Perin
 DATE Signed (MM/DD/YYYY): 3/14/19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviroanalytics

Project # 30284402

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 10 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.0 °C Correction Factor: 0 °C Final Temp: 1.0 °C
Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents:
	Yes	No	N/A	
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. <u>10D3581</u>
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4.
Sample Labels match COC: -Includes date/time/ID Matrix: <u>WT</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5. <u>TIME ON SAMPLE RW10-MWF IS 1210</u>
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6.
Short Hold Time Analysis (<72hr remaining):	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7.
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8.
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9.
Correct Containers Used: -Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10.
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11.
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13.
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14.
Filtered volume received for Dissolved tests	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15.
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16.
All containers needing preservation are found to be in compliance with EPA recommendation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed: <u>BLM</u> Date/time of preservation: _____ Lot # of added preservative: _____
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	17.
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	18.
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed: _____ Date: _____

Client Notification/ Resolution:
 Person Contacted: _____ Date/Time: _____ Contacted By: _____
 Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)
 *PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

March 20, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

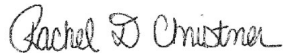
RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284494

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on March 15, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Rachel Christner for
Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284494

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284494

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30284494001	RW12-MWS	Water	03/15/19 12:25	03/15/19 22:30
30284494002	RW12-MWI	Water	03/15/19 13:00	03/15/19 22:30
30284494003	RW13-MWI	Water	03/15/19 14:15	03/15/19 22:30
30284494004	RW22-MWI	Water	03/15/19 15:20	03/15/19 22:30

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284494

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30284494001	RW12-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284494002	RW12-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284494003	RW13-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284494004	RW22-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284494

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: March 20, 2019

General Information:

4 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284494

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: March 20, 2019

General Information:

4 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284494

Sample: RW12-MWS		Lab ID: 30284494001		Collected: 03/15/19 12:25	Received: 03/15/19 22:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	7.3	ug/L	3.0	0.34	1	03/18/19 08:50	03/19/19 19:52	7440-43-9		
Zinc	5360	ug/L	100	23.8	10	03/18/19 08:50	03/19/19 20:19	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	6.6	ug/L	3.0	0.34	1	03/18/19 08:49	03/19/19 18:28	7440-43-9		
Zinc, Dissolved	4640	ug/L	100	23.8	10	03/18/19 08:49	03/19/19 18:45	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284494

Sample: RW12-MWI		Lab ID: 30284494002		Collected: 03/15/19 13:00	Received: 03/15/19 22:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	755	ug/L	3.0	0.34	1	03/18/19 08:50	03/19/19 19:55	7440-43-9		
Zinc	111000	ug/L	1000	238	100	03/18/19 08:50	03/19/19 20:21	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	768	ug/L	3.0	0.34	1	03/18/19 08:49	03/19/19 18:16	7440-43-9		
Zinc, Dissolved	110000	ug/L	1000	238	100	03/18/19 08:49	03/19/19 18:47	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284494

Sample: RW13-MWI		Lab ID: 30284494003		Collected: 03/15/19 14:15		Received: 03/15/19 22:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	26900	ug/L	3000	340	1000	03/18/19 08:50	03/19/19 19:59	7440-43-9	
Zinc	321000	ug/L	10000	2380	1000	03/18/19 08:50	03/19/19 19:59	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	29200	ug/L	3000	340	1000	03/18/19 08:49	03/19/19 18:50	7440-43-9	
Zinc, Dissolved	328000	ug/L	10000	2380	1000	03/18/19 08:49	03/19/19 18:50	7440-66-6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284494

Sample: RW22-MWI		Lab ID: 30284494004		Collected: 03/15/19 15:20		Received: 03/15/19 22:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	03/18/19 08:50	03/19/19 20:01	7440-43-9	
Zinc	93000	ug/L	1000	238	100	03/18/19 08:50	03/19/19 20:24	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/18/19 08:49	03/19/19 18:21	7440-43-9	
Zinc, Dissolved	81100	ug/L	1000	238	100	03/18/19 08:49	03/19/19 18:52	7440-66-6	

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284494

QC Batch: 334037 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30284494001, 30284494002, 30284494003, 30284494004

METHOD BLANK: 1626039 Matrix: Water
Associated Lab Samples: 30284494001, 30284494002, 30284494003, 30284494004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	03/19/19 19:11	
Zinc	ug/L	10.0 U	10.0	2.4	03/19/19 19:11	

LABORATORY CONTROL SAMPLE: 1626040

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	497	99	80-120	
Zinc	ug/L	500	522	104	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1626042 1626043

Parameter	Units	30284302001 Result	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
			Spike Conc.	Spike Conc.	MS Result	MSD Result						
Cadmium	ug/L	2.8J	500	500	517	497	103	99	75-125	4	20	
Zinc	ug/L	199	500	500	721	703	104	101	75-125	3	20	

SAMPLE DUPLICATE: 1626041

Parameter	Units	30284302001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	2.8J	2.9J		20	
Zinc	ug/L	199	201	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284494

QC Batch: 334036 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30284494001, 30284494002, 30284494003, 30284494004

METHOD BLANK: 1626034 Matrix: Water
Associated Lab Samples: 30284494001, 30284494002, 30284494003, 30284494004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	03/19/19 17:32	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	03/19/19 17:32	

LABORATORY CONTROL SAMPLE: 1626035

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	438	88	80-120	
Zinc, Dissolved	ug/L	500	454	91	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1626037 1626038

Parameter	Units	30284302001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	ug/L	2.7J	500	500	508	519	101	103	75-125	2	20	
Zinc, Dissolved	ug/L	142	500	500	650	661	102	104	75-125	2	20	

SAMPLE DUPLICATE: 1626036

Parameter	Units	30284302001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	2.7J	2.8J		20	
Zinc, Dissolved	ug/L	142	141	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284494

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284494

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30284494001	RW12-MWS	EPA 3005A	334037	EPA 6010C	334173
30284494002	RW12-MWI	EPA 3005A	334037	EPA 6010C	334173
30284494003	RW13-MWI	EPA 3005A	334037	EPA 6010C	334173
30284494004	RW22-MWI	EPA 3005A	334037	EPA 6010C	334173
30284494001	RW12-MWS	EPA 3005A	334036	EPA 6010C	334172
30284494002	RW12-MWI	EPA 3005A	334036	EPA 6010C	334172
30284494003	RW13-MWI	EPA 3005A	334036	EPA 6010C	334172
30284494004	RW22-MWI	EPA 3005A	334036	EPA 6010C	334172

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

30284494

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company: EnviroAnalytics Group	Report To: James Calenda	Attention: Laura Sargent	Company Name: EnviroAnalytics Group	Address: 1950 Des Peres Road, Suite 303 St. Louis, MO 63131	REGULATORY AGENCY
Address: 1600 Sparrows Point Blvd, Suite B2	Copy To: Stewart Kabis	Purchase Order No.: EAG-SPT-0452	Address: 1950 Des Peres Road, Suite 303 St. Louis, MO 63131	NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER	<input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER <input type="checkbox"/>
Sparrows Point, MD 21219		Project Name: Rod and Wire Mill GW Sampling	Pace Quote Reference: Samantha Bayura	Site Location: MD	STATE: MD
Email To: jcalenda@enviroanalyticsgroup.com		Project Number: 180227M-1-1	Pace Profile #:		
Phone: 314-620-3056	Fax:				
Requested Due Date/TAT: 5 Day					

Page: _____ of _____

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WATER WATER WW WASTE WATER P PRODUCT SOLID SL OIL WP AIR AR OTHER OT TISSUE TS	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	Preservatives H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ O ₃ Methanol Other	Analytes Test ↑	Requester Analysis Filtered (Y/N)	Pace Project No./ Lab I.D.
		DATE	TIME							
1	RW12 - MWS	3-15-19	1225	WTG	WTG	2			Y	001
2	RW12 - MWI	3-15-19	1300	WTG	WTG	2			Y	002
3	RW13 - MWI	3-15-19	1415	WTG	WTG	2			Y	003
4	RW22 - MWI	3-15-19	1520	WTG	WTG	2			Y	004
5										
6										
7										
8										
9										
10										
11										
12										

NO#: 30284494

30284494

REQUISITIONED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
<i>[Signature]</i>	3-15-19	1630	<i>[Signature]</i>	3-15-19	1649	Y
<i>[Signature]</i>	3-15-19	1745	<i>[Signature]</i>	3-15-19	1935	Y
<i>[Signature]</i>	3-15-19	2330	<i>[Signature]</i>	3-15-19	2330	Y

Temp in °C _____

Received on Ice (Y/N) _____

ustody Sealed (Y/N) _____

Cooler (Y/N) _____

Samples Intact (Y/N) _____

SAMPLER NAME AND SIGNATURE: *[Signature]*

PRINT Name of SAMPLER: Lisa Perrin

DATE SIGNED: 3-15-19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Spannans

Project # **# 30284494**

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label <i>ARM</i>
LIMS Login <i>ARM</i>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 10 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 2.1 °C Correction Factor: 10.0 °C Final Temp: 2.1 °C

Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents: <i>ARM SHH</i>
	Yes	No	N/A	
Chain of Custody Present:	/			1.
Chain of Custody Filled Out:	/			2.
Chain of Custody Relinquished:	/			3.
Sampler Name & Signature on COC:	/			4.
Sample Labels match COC:	/			5.
-Includes date/time/ID Matrix: <u>WT</u>				
Samples Arrived within Hold Time:	/			6.
Short Hold Time Analysis (<72hr remaining):		/		7.
Rush Turn Around Time Requested:	/			8.
Sufficient Volume:	/			9.
Correct Containers Used:	/			10.
-Pace Containers Used:	/			
Containers Intact:	/			11.
Orthophosphate field filtered			/	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			/	13.
Organic Samples checked for dechlorination:			/	14.
Filtered volume received for Dissolved tests	/			15.
All containers have been checked for preservation.	/			16.
All containers needing preservation are found to be in compliance with EPA recommendation.	/			
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed: <i>ARM</i> Date/time of preservation
				Lot # of added preservative
Headspace in VOA Vials (>6mm):			/	17.
Trip Blank Present:			/	18.
Trip Blank Custody Seals Present			/	
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed: Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

March 26, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284670

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on March 18, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284670

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284670

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30284670001	RW15-MWS	Water	03/18/19 09:35	03/18/19 22:30
30284670002	RW15-MWI	Water	03/18/19 10:25	03/18/19 22:30
30284670003	RW16-MWS	Water	03/18/19 11:20	03/18/19 22:30
30284670004	RW16-MWI	Water	03/18/19 12:00	03/18/19 22:30
30284670005	RW19-MWS	Water	03/18/19 13:45	03/18/19 22:30
30284670006	RW19-MWI	Water	03/18/19 15:10	03/18/19 22:30

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284670

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30284670001	RW15-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284670002	RW15-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284670003	RW16-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284670004	RW16-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284670005	RW19-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284670006	RW19-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284670

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: March 26, 2019

General Information:

6 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 334760

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30284670001,30284942005

ML: Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

- MS (Lab ID: 1629156)
- Zinc

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284670

Method: EPA 6010C
Description: 6010C MET ICP,Dissolved
Client: EnviroAnalytics Group, LLC
Date: March 26, 2019

General Information:

6 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 334759

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30284670001,30284942005

MH: Matrix spike recovery and/or matrix spike duplicate recovery was above laboratory control limits. Result may be biased high.

- MS (Lab ID: 1629149)
- Zinc, Dissolved

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284670

Sample: RW15-MWS		Lab ID: 30284670001		Collected: 03/18/19 09:35	Received: 03/18/19 22:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	22.7	ug/L	3.0	0.34	1	03/21/19 09:10	03/25/19 17:08	7440-43-9		
Zinc	1060	ug/L	10.0	2.4	1	03/21/19 09:10	03/25/19 17:08	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	15.4	ug/L	3.0	0.34	1	03/21/19 09:00	03/25/19 15:02	7440-43-9		
Zinc, Dissolved	499	ug/L	10.0	2.4	1	03/21/19 09:00	03/25/19 15:02	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284670

Sample: RW15-MWI		Lab ID: 30284670002		Collected: 03/18/19 10:25		Received: 03/18/19 22:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	396	ug/L	3.0	0.34	1	03/21/19 09:10	03/25/19 17:22	7440-43-9	
Zinc	110000	ug/L	1000	238	100	03/21/19 09:10	03/25/19 18:17	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	402	ug/L	3.0	0.34	1	03/21/19 09:00	03/25/19 15:16	7440-43-9	
Zinc, Dissolved	109000	ug/L	1000	238	100	03/21/19 09:00	03/25/19 16:09	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284670

Sample: RW16-MWS		Lab ID: 30284670003		Collected: 03/18/19 11:20	Received: 03/18/19 22:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	3.0 U	ug/L	3.0	0.34	1	03/21/19 09:10	03/25/19 17:27	7440-43-9		
Zinc	24.0	ug/L	10.0	2.4	1	03/21/19 09:10	03/25/19 17:27	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/21/19 09:00	03/25/19 15:27	7440-43-9		
Zinc, Dissolved	7.0J	ug/L	10.0	2.4	1	03/21/19 09:00	03/25/19 15:27	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284670

Sample: RW16-MWI		Lab ID: 30284670004		Collected: 03/18/19 12:00		Received: 03/18/19 22:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	03/21/19 09:10	03/25/19 17:37	7440-43-9	
Zinc	131	ug/L	10.0	2.4	1	03/21/19 09:10	03/25/19 17:37	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/21/19 09:00	03/25/19 15:30	7440-43-9	
Zinc, Dissolved	4.7J	ug/L	10.0	2.4	1	03/21/19 09:00	03/25/19 15:30	7440-66-6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284670

Sample: RW19-MWS		Lab ID: 30284670005		Collected: 03/18/19 13:45	Received: 03/18/19 22:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	3.7	ug/L	3.0	0.34	1	03/21/19 09:10	03/25/19 17:40	7440-43-9		
Zinc	5210	ug/L	100	23.8	10	03/21/19 09:10	03/25/19 18:20	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/21/19 09:00	03/25/19 15:33	7440-43-9		
Zinc, Dissolved	4680	ug/L	100	23.8	10	03/21/19 09:00	03/25/19 16:11	7440-66-6		

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284670

Sample: RW19-MWI		Lab ID: 30284670006		Collected: 03/18/19 15:10		Received: 03/18/19 22:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1330	ug/L	30.0	3.4	10	03/21/19 09:10	03/25/19 17:42	7440-43-9	
Zinc	3660000	ug/L	10000	2380	1000	03/21/19 09:10	03/25/19 18:22	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	1320	ug/L	30.0	3.4	10	03/21/19 09:00	03/25/19 16:14	7440-43-9	
Zinc, Dissolved	3770000	ug/L	10000	2380	1000	03/21/19 09:00	03/25/19 16:18	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284670

QC Batch: 334760 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30284670001, 30284670002, 30284670003, 30284670004, 30284670005, 30284670006

METHOD BLANK: 1629150 Matrix: Water
Associated Lab Samples: 30284670001, 30284670002, 30284670003, 30284670004, 30284670005, 30284670006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	03/25/19 17:03	
Zinc	ug/L	10.0 U	10.0	2.4	03/25/19 17:03	

LABORATORY CONTROL SAMPLE: 1629151

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	476	95	80-120	
Zinc	ug/L	500	485	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1629153 1629154

Parameter	Units	30284670001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	22.7	500	500	498	519	95	99	75-125	4	20	
Zinc	ug/L	1060	500	500	1490	1530	85	94	75-125	3	20	

MATRIX SPIKE SAMPLE: 1629156

Parameter	Units	30284942005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	2.5J	500	484	96	75-125	
Zinc	ug/L	17200	500	17400	40	75-125 ML	

SAMPLE DUPLICATE: 1629152

Parameter	Units	30284670001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	22.7	22.9	1	20	
Zinc	ug/L	1060	1090	2	20	

SAMPLE DUPLICATE: 1629155

Parameter	Units	30284942005 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	2.5J	2.6J		20	
Zinc	ug/L	17200	16600	4	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284670

QC Batch: 334759 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30284670001, 30284670002, 30284670003, 30284670004, 30284670005, 30284670006

METHOD BLANK: 1629143 Matrix: Water
Associated Lab Samples: 30284670001, 30284670002, 30284670003, 30284670004, 30284670005, 30284670006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	03/25/19 14:57	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	03/25/19 14:57	

LABORATORY CONTROL SAMPLE: 1629144

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	464	93	80-120	
Zinc, Dissolved	ug/L	500	465	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1629146 1629147

Parameter	Units	30284670001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	ug/L	15.4	500	500	514	511	100	99	75-125	1	20	
Zinc, Dissolved	ug/L	499	500	500	972	962	95	93	75-125	1	20	

MATRIX SPIKE SAMPLE: 1629149

Parameter	Units	30284942005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	2.3J	500	499	99	75-125	
Zinc, Dissolved	ug/L	16500	500	17200	134	75-125 MH	

SAMPLE DUPLICATE: 1629145

Parameter	Units	30284670001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	15.4	15.5	1	20	
Zinc, Dissolved	ug/L	499	499	0	20	

SAMPLE DUPLICATE: 1629148

Parameter	Units	30284942005 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	2.3J	2.4J		20	
Zinc, Dissolved	ug/L	16500	16600	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284670

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

MH Matrix spike recovery and/or matrix spike duplicate recovery was above laboratory control limits. Result may be biased high.

ML Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284670

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30284670001	RW15-MWS	EPA 3005A	334760	EPA 6010C	334889
30284670002	RW15-MWI	EPA 3005A	334760	EPA 6010C	334889
30284670003	RW16-MWS	EPA 3005A	334760	EPA 6010C	334889
30284670004	RW16-MWI	EPA 3005A	334760	EPA 6010C	334889
30284670005	RW19-MWS	EPA 3005A	334760	EPA 6010C	334889
30284670006	RW19-MWI	EPA 3005A	334760	EPA 6010C	334889
30284670001	RW15-MWS	EPA 3005A	334759	EPA 6010C	334888
30284670002	RW15-MWI	EPA 3005A	334759	EPA 6010C	334888
30284670003	RW16-MWS	EPA 3005A	334759	EPA 6010C	334888
30284670004	RW16-MWI	EPA 3005A	334759	EPA 6010C	334888
30284670005	RW19-MWS	EPA 3005A	334759	EPA 6010C	334888
30284670006	RW19-MWI	EPA 3005A	334759	EPA 6010C	334888

REPORT OF LABORATORY ANALYSIS

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CHAIN-OF-CUSTODY WO#: 30284670

The Chain-of-Custody is a LEGAL

Page: 1 of 1

Section A
Required Client Information:

Company: **EnviroAnalytics Group**
Address: **1600 Sparrows Point Blvd, Suite B2 Sparrows Point, MD 21219**
Email To: **icalenda@enviroanalyticsgroup.com**
Phone: **314-620-3056** Fax:
Requested Due Date/TAT: **5 Day**

Section B
Required Project Information:

Report To: **James Calenda**
Copy To: **Stewart Kabis**
Purchase Order No.: **2AG-SPT 6452**
Project Name: **Rod and Wire Mill GW Sampling**
Project Number: **180227M-17**

Section **30284670**
Invoice In

Attention: **Laura Sargent**
Company Name: **EnviroAnalytics Group**
Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
Pace Quote Reference: **Samantha Bayura**
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY:

NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: **MD**
STATE:

ITEM #	Section D Required Client Information	Valid Matrix Codes	MATRIX CODE	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	Preservatives	Requester Analysis Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
				COMPOSITE START	COMPOSITE END/GRAB							
1	RW15-MWS	DRINKING WATER	DW	3-18-19	935	WTG	WTG	2	Unpreserved	X		001
2	RW15-MWI	WASTE WATER	WW	1025		WTG	WTG	2	H ₂ SO ₄	X		002
3	RW16-MWS	WASTE WATER	WW	1120		WTG	WTG	2	HCl	X		003
4	RW16-MWI	WASTE WATER	WW	1200		WTG	WTG	2	HNO ₃	X		004
5	RW19-MWS	WASTE WATER	WW	1345		WTG	WTG	2	NaOH	X		005
6	RW19-MWI	WASTE WATER	WW	1510		WTG	WTG	2	Na ₂ S ₂ O ₃	X		006
7									Other			
8									Methanol			
9												
10												
11												
12												

RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
<i>James Calenda</i>	3-18-19	1600	<i>Laura Sargent</i>	3-18-19	1645	
<i>James Calenda</i>	3-18-19	1530	<i>IDS</i>	3-18-19	1930	Y
<i>IDS</i>	3-18-19	2330	<i>IDS</i>	3-18-19	2230	Y

Temp in °C
Received on Ice (Y/N)
Cooled Sealed (Y/N)
Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: *Lisa Pearm*
SIGNATURE: *Lisa Pearm*
DATE Signed: *3-18-19*

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviroanalytics

Project # 30284670

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals Intact: yes no

Thermometer Used 11 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 2.0 °C Correction Factor: 0 °C Final Temp: 2.0 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				10D3581	BLM 3-18-19
Chain of Custody Present:	/	/		1.	
Chain of Custody Filled Out:	/	/		2.	
Chain of Custody Relinquished:	/	/		3.	
Sampler Name & Signature on COC:	/	/		4.	
Sample Labels match COC:	/	/		5.	
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	/	/		6.	
Short Hold Time Analysis (<72hr remaining):	/	/		7.	
Rush Turn Around Time Requested:	/	/		8.	
Sufficient Volume:	/	/		9.	
Correct Containers Used:	/	/		10.	
-Pace Containers Used:	/	/			
Containers Intact:	/	/		11.	
Orthophosphate field filtered			/	12.	
Hex Cr Aqueous Compliance/NPDES sample field filtered			/	13.	
Organic Samples checked for dechlorination:			/	14.	
Filtered volume received for Dissolved tests	/	/		15.	
All containers have been checked for preservation.	/	/		16.	
All containers needing preservation are found to be in compliance with EPA recommendation.	/	/			
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed	Date/time of preservation
				<u>BLM</u>	
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/	17.	
Trip Blank Present:			/	18.	
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

March 26, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284942

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on March 19, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284942

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284942

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30284942001	RW03-MWS	Water	03/19/19 10:25	03/19/19 22:30
30284942002	RW03-MWI	Water	03/19/19 11:05	03/19/19 22:30
30284942003	RW02-MWS	Water	03/19/19 12:50	03/19/19 22:30
30284942004	RW02-MWI	Water	03/19/19 13:40	03/19/19 22:30
30284942005	RW01-MWS	Water	03/19/19 14:40	03/19/19 22:30
30284942006	RW01-MWI	Water	03/19/19 15:15	03/19/19 22:30

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284942

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30284942001	RW03-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284942002	RW03-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284942003	RW02-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284942004	RW02-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284942005	RW01-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
30284942006	RW01-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284942

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: March 26, 2019

General Information:

6 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 334760

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30284670001,30284942005

ML: Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

- MS (Lab ID: 1629156)
- Zinc

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284942

Method: EPA 6010C
Description: 6010C MET ICP,Dissolved
Client: EnviroAnalytics Group, LLC
Date: March 26, 2019

General Information:

6 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 334759

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30284670001,30284942005

MH: Matrix spike recovery and/or matrix spike duplicate recovery was above laboratory control limits. Result may be biased high.

- MS (Lab ID: 1629149)
- Zinc, Dissolved

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284942

Sample: RW03-MWS		Lab ID: 30284942001		Collected: 03/19/19 10:25	Received: 03/19/19 22:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	8.0	ug/L	3.0	0.34	1	03/21/19 09:10	03/25/19 17:48	7440-43-9		
Zinc	10400	ug/L	100	23.8	10	03/21/19 09:10	03/25/19 18:25	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	7.7	ug/L	3.0	0.34	1	03/21/19 09:00	03/25/19 15:40	7440-43-9		
Zinc, Dissolved	9570	ug/L	100	23.8	10	03/21/19 09:00	03/25/19 16:21	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284942

Sample: RW03-MWI		Lab ID: 30284942002		Collected: 03/19/19 11:05	Received: 03/19/19 22:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	278	ug/L	3.0	0.34	1	03/21/19 09:10	03/25/19 17:51	7440-43-9		
Zinc	6420	ug/L	100	23.8	10	03/21/19 09:10	03/25/19 18:28	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	213	ug/L	3.0	0.34	1	03/21/19 09:00	03/25/19 15:43	7440-43-9		
Zinc, Dissolved	6720	ug/L	100	23.8	10	03/21/19 09:00	03/25/19 16:23	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284942

Sample: RW02-MWS		Lab ID: 30284942003		Collected: 03/19/19 12:50	Received: 03/19/19 22:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	4.1	ug/L	3.0	0.34	1	03/21/19 09:10	03/25/19 17:53	7440-43-9		
Zinc	14200	ug/L	100	23.8	10	03/21/19 09:10	03/25/19 18:30	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	3.8	ug/L	3.0	0.34	1	03/21/19 09:00	03/25/19 15:45	7440-43-9		
Zinc, Dissolved	13100	ug/L	100	23.8	10	03/21/19 09:00	03/25/19 16:26	7440-66-6		

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284942

Sample: RW02-MWI		Lab ID: 30284942004		Collected: 03/19/19 13:40	Received: 03/19/19 22:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	92.2	ug/L	3.0	0.34	1	03/21/19 09:10	03/25/19 17:55	7440-43-9		
Zinc	18500	ug/L	100	23.8	10	03/21/19 09:10	03/25/19 18:33	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	98.3	ug/L	3.0	0.34	1	03/21/19 09:00	03/25/19 15:47	7440-43-9		
Zinc, Dissolved	21500	ug/L	100	23.8	10	03/21/19 09:00	03/25/19 16:28	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284942

Sample: RW01-MWS		Lab ID: 30284942005		Collected: 03/19/19 14:40		Received: 03/19/19 22:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	2.5J	ug/L	3.0	0.34	1	03/21/19 09:10	03/25/19 17:58	7440-43-9	
Zinc	17200	ug/L	100	23.8	10	03/21/19 09:10	03/25/19 18:35	7440-66-6	ML
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	2.3J	ug/L	3.0	0.34	1	03/21/19 09:00	03/25/19 15:52	7440-43-9	
Zinc, Dissolved	16500	ug/L	100	23.8	10	03/21/19 09:00	03/25/19 16:38	7440-66-6	MH

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284942

Sample: RW01-MWI		Lab ID: 30284942006		Collected: 03/19/19 15:15	Received: 03/19/19 22:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	5.8	ug/L	3.0	0.34	1	03/21/19 09:10	03/25/19 18:15	7440-43-9		
Zinc	2480	ug/L	10.0	2.4	1	03/21/19 09:10	03/25/19 18:15	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	03/21/19 09:00	03/25/19 16:05	7440-43-9		
Zinc, Dissolved	2460	ug/L	10.0	2.4	1	03/21/19 09:00	03/25/19 16:05	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284942

QC Batch: 334760 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30284942001, 30284942002, 30284942003, 30284942004, 30284942005, 30284942006

METHOD BLANK: 1629150 Matrix: Water
Associated Lab Samples: 30284942001, 30284942002, 30284942003, 30284942004, 30284942005, 30284942006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	03/25/19 17:03	
Zinc	ug/L	10.0 U	10.0	2.4	03/25/19 17:03	

LABORATORY CONTROL SAMPLE: 1629151

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	476	95	80-120	
Zinc	ug/L	500	485	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1629153 1629154

Parameter	Units	30284670001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	22.7	500	500	498	519	95	99	75-125	4	20	
Zinc	ug/L	1060	500	500	1490	1530	85	94	75-125	3	20	

MATRIX SPIKE SAMPLE: 1629156

Parameter	Units	30284942005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	2.5J	500	484	96	75-125	
Zinc	ug/L	17200	500	17400	40	75-125 ML	

SAMPLE DUPLICATE: 1629152

Parameter	Units	30284670001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	22.7	22.9	1	20	
Zinc	ug/L	1060	1090	2	20	

SAMPLE DUPLICATE: 1629155

Parameter	Units	30284942005 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	2.5J	2.6J		20	
Zinc	ug/L	17200	16600	4	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284942

QC Batch: 334759 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30284942001, 30284942002, 30284942003, 30284942004, 30284942005, 30284942006

METHOD BLANK: 1629143 Matrix: Water
Associated Lab Samples: 30284942001, 30284942002, 30284942003, 30284942004, 30284942005, 30284942006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	03/25/19 14:57	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	03/25/19 14:57	

LABORATORY CONTROL SAMPLE: 1629144

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	464	93	80-120	
Zinc, Dissolved	ug/L	500	465	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1629146 1629147

Parameter	Units	30284670001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	ug/L	15.4	500	500	514	511	100	99	75-125	1	20	
Zinc, Dissolved	ug/L	499	500	500	972	962	95	93	75-125	1	20	

MATRIX SPIKE SAMPLE: 1629149

Parameter	Units	30284942005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	2.3J	500	499	99	75-125	
Zinc, Dissolved	ug/L	16500	500	17200	134	75-125 MH	

SAMPLE DUPLICATE: 1629145

Parameter	Units	30284670001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	15.4	15.5	1	20	
Zinc, Dissolved	ug/L	499	499	0	20	

SAMPLE DUPLICATE: 1629148

Parameter	Units	30284942005 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	2.3J	2.4J		20	
Zinc, Dissolved	ug/L	16500	16600	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30284942

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

MH Matrix spike recovery and/or matrix spike duplicate recovery was above laboratory control limits. Result may be biased high.

ML Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30284942

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30284942001	RW03-MWS	EPA 3005A	334760	EPA 6010C	334889
30284942002	RW03-MWI	EPA 3005A	334760	EPA 6010C	334889
30284942003	RW02-MWS	EPA 3005A	334760	EPA 6010C	334889
30284942004	RW02-MWI	EPA 3005A	334760	EPA 6010C	334889
30284942005	RW01-MWS	EPA 3005A	334760	EPA 6010C	334889
30284942006	RW01-MWI	EPA 3005A	334760	EPA 6010C	334889
30284942001	RW03-MWS	EPA 3005A	334759	EPA 6010C	334888
30284942002	RW03-MWI	EPA 3005A	334759	EPA 6010C	334888
30284942003	RW02-MWS	EPA 3005A	334759	EPA 6010C	334888
30284942004	RW02-MWI	EPA 3005A	334759	EPA 6010C	334888
30284942005	RW01-MWS	EPA 3005A	334759	EPA 6010C	334888
30284942006	RW01-MWI	EPA 3005A	334759	EPA 6010C	334888

REPORT OF LABORATORY ANALYSIS

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Section A
Required Client Information:
Company: **EnviroAnalytics Group**
Address: **1600 Sparrows Point Blvd, Suite B2 Sparrows Point, MD 21219**
Email To: **lcalenda@enviroanalyticsgroup.com**
Phone: **314-620-3056** Fax:
Requested Due Date/TAT: **5 Day**

Section B
Required Project Information:
Report To: **James Calenda**
Copy To: **Stewart Kabis**
Purchase Order No.: **5AG-SPT-6452**
Project Name: **Rod and Wire Mill GW Sampling**
Project Number: **180227M-1-1**

Section C
Attention: **Laura Sargent**
Company Name: **EnviroAnalytics Group**
Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
Pace Quote Reference: **Samantha Bayura**
Pace Project Manager: **Samantha Bayura**
Pace Profile #:

REGULATORY AGENCY:
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER
 Site Location: **MD**
 STATE: **MD**

ITEM #	Section D Required Client Information	Valid Matrix Codes	MATRIX CODES	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	# OF CONTAINERS	UNPRESERVED	PRESERVATIVES	ANALYSIS TEST	Requested Analysis: Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.	REQUIREMENT BY / AFFILIATION			ACCEPTED BY / AFFILIATION			SAMPLE CONDITIONS									
				DATE	TIME									DATE	TIME	DATE	TIME	DATE	TIME	Temp In C	Received on	Ice (Y/N)	custody Sealed	Cooler (Y/N)	Samples Intact				
1	RW03-MWS	DRINKING WATER	DW	3/19/19	1025	WT G	2						001				3/19/19	1615											
2	RW03-MWI	WASTE WATER	WW		1105	WT G	2						002																
3	RW02-MWS	PRODUCT	P		1250	WT G	2						003																
4	RW02-MWI	SOIL/SOLID	SL		1340	WT G	2						004																
5	RW01-MWS	OIL	OL		1440	WT G	2						005																
6	RW01-MWI	WIPE	WP		1515	WT G	2						006																
7		AIR	AR																										
8		OTHER	OT																										
9		TISSUE	TS																										
10																													
11																													
12																													
ADDITIONAL COMMENTS: Data Pigs (3) Relinquished by: <i>[Signature]</i> Date: 3/19/19 Time: 1615 Accepted by: <i>[Signature]</i> Date: 3/19/19 Time: 1630 Relinquished by: <i>[Signature]</i> Date: 3/19/19 Time: 2230 Accepted by: <i>[Signature]</i> Date: 3-19-19 Time: 2230														Temp In C	Received on	Ice (Y/N)	custody Sealed	Cooler (Y/N)	Samples Intact										

SAMPLER NAME AND SIGNATURE: *[Signature]*
PRINT Name of SAMPLER: **Lisa Perrin** | **DATE Signed:** **3-19-19**
SIGNATURE OF CHAIN OF CUSTODY: *[Signature]*

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviroanalytics

Project # #-30284942

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label BLM
LIMS Login BLM

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 10 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.3 °C Correction Factor: 0 °C Final Temp: 1.3 °C
Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>10P3581</u>	<u>BLM 3-19-19</u>
Chain of Custody Present:	/			1.	
Chain of Custody Filled Out:	/			2.	
Chain of Custody Relinquished:	/			3.	
Sampler Name & Signature on COC:	/			4.	
Sample Labels match COC:	/			5.	
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	/			6.	
Short Hold Time Analysis (<72hr remaining):	/	/		7.	
Rush Turn Around Time Requested:	/	/		8.	
Sufficient Volume:	/	/		9.	
Correct Containers Used:	/	/		10.	
-Pace Containers Used:	/	/			
Containers Intact:	/			11.	
Orthophosphate field filtered			/	12.	
Hex Cr Aqueous Compliance/NPDES sample field filtered			/	13.	
Organic Samples checked for dechlorination:			/	14.	
Filtered volume received for Dissolved tests	/			15.	
All containers have been checked for preservation.	/			16.	
All containers needing preservation are found to be in compliance with EPA recommendation.	/				
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed <u>BLM</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/	17.	
Trip Blank Present:			/	18.	
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

May 28, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295352

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on May 20, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295352

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295352

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30295352001	RW12-MWI	Water	05/20/19 10:00	05/20/19 23:00
30295352002	RW12-MWS	Water	05/20/19 10:45	05/20/19 23:00
30295352003	RW14-MWS	Water	05/20/19 11:50	05/20/19 23:00

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295352

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30295352001	RW12-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30295352002	RW12-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30295352003	RW14-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295352

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: May 28, 2019

General Information:

3 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295352

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: May 28, 2019

General Information:

3 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295352

Method: SM 2310B-2011

Description: 2310B Acidity, Total

Client: EnviroAnalytics Group, LLC

Date: May 28, 2019

General Information:

3 samples were analyzed for SM 2310B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295352

Method: SM 2320B-2011
Description: 2320B Alkalinity
Client: EnviroAnalytics Group, LLC
Date: May 28, 2019

General Information:

3 samples were analyzed for SM 2320B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295352

Sample: RW12-MWI		Lab ID: 30295352001		Collected: 05/20/19 10:00	Received: 05/20/19 23:00	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1500	ug/L	3.0	0.34	1	05/21/19 16:23	05/22/19 17:48	7440-43-9	
Zinc	120000	ug/L	1000	238	100	05/21/19 16:23	05/22/19 18:13	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	1520	ug/L	3.0	0.34	1	05/23/19 11:33	05/24/19 14:02	7440-43-9	
Zinc, Dissolved	111000	ug/L	1000	238	100	05/23/19 11:33	05/24/19 14:45	7440-66-6	M6
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO3 pH8.3)	274	mg/L	10.0	10.0	1		05/24/19 19:45		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO3 pH4.5)	20.0	mg/L	10.0	1.0	1		05/24/19 19:45		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295352

Sample: RW12-MWS		Lab ID: 30295352002		Collected: 05/20/19 10:45	Received: 05/20/19 23:00	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	4.4	ug/L	3.0	0.34	1	05/21/19 16:23	05/22/19 17:51	7440-43-9		
Zinc	5870	ug/L	1000	238	100	05/21/19 16:23	05/22/19 18:16	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	2.1J	ug/L	3.0	0.34	1	05/23/19 11:33	05/24/19 14:16	7440-43-9		
Zinc, Dissolved	1550	ug/L	10.0	2.4	1	05/23/19 11:33	05/24/19 14:16	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO3 pH8.3)	10.0 U	mg/L	10.0	10.0	1		05/24/19 19:46			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO3 pH4.5)	62.0	mg/L	10.0	1.0	1		05/24/19 19:46			

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295352

Sample: RW14-MWS		Lab ID: 30295352003		Collected: 05/20/19 11:50	Received: 05/20/19 23:00	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3000	ug/L	3.0	0.34	1	05/21/19 16:23	05/22/19 17:53	7440-43-9	
Zinc	73600	ug/L	1000	238	100	05/21/19 16:23	05/22/19 18:18	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	3000	ug/L	3.0	0.34	1	05/23/19 11:33	05/24/19 14:19	7440-43-9	
Zinc, Dissolved	69600	ug/L	1000	238	100	05/23/19 11:33	05/24/19 15:06	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO3 pH8.3)	116	mg/L	10.0	10.0	1		05/24/19 19:49		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO3 pH4.5)	2.0J	mg/L	10.0	1.0	1		05/24/19 19:49		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295352

QC Batch: 343601 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30295352001, 30295352002, 30295352003

METHOD BLANK: 1671939 Matrix: Water
Associated Lab Samples: 30295352001, 30295352002, 30295352003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	05/22/19 17:06	
Zinc	ug/L	10.0 U	10.0	2.4	05/22/19 17:06	

LABORATORY CONTROL SAMPLE: 1671940

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	539	108	80-120	
Zinc	ug/L	500	522	104	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1671944 1671945

Parameter	Units	30295140003		MS		MSD		% Rec Limits	RPD	Max RPD	Qual
		Result	MS Spike Conc.	MSD Spike Conc.	Result	Result	% Rec				
Cadmium	ug/L	2.9J	500	500	522	524	104	104	75-125	0	20
Zinc	ug/L	148	500	500	625	630	96	96	75-125	1	20

SAMPLE DUPLICATE: 1671943

Parameter	Units	30295140003 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	2.9J	3.0J		20	
Zinc	ug/L	148	152	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295352

QC Batch: 343951 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30295352001, 30295352002, 30295352003

METHOD BLANK: 1673672 Matrix: Water
Associated Lab Samples: 30295352001, 30295352002, 30295352003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	05/24/19 13:57	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	05/24/19 13:57	

LABORATORY CONTROL SAMPLE: 1673673

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	487	97	80-120	
Zinc, Dissolved	ug/L	500	484	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1673675 1673676

Parameter	Units	30295352001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	ug/L	1520	500	500	1970	2020	89	99	75-125	2	20	
Zinc, Dissolved	ug/L	111000	500	500	114000	109000	640	-300	75-125	4	20 M6	

SAMPLE DUPLICATE: 1673674

Parameter	Units	30295352001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	1520	1470	4	20	
Zinc, Dissolved	ug/L	111000	106000	4	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295352

QC Batch: 344106 Analysis Method: SM 2310B-2011
QC Batch Method: SM 2310B-2011 Analysis Description: 2310B Acidity, Total
Associated Lab Samples: 30295352001, 30295352002, 30295352003

METHOD BLANK: 1674394 Matrix: Water
Associated Lab Samples: 30295352001, 30295352002, 30295352003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	10.0 U	10.0	10.0	05/24/19 18:58	

LABORATORY CONTROL SAMPLE: 1674396

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	100	92.0	92	85-115	

SAMPLE DUPLICATE: 1674395

Parameter	Units	30294314001 Result	Dup Result	RPD	Max RPD	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	ND	10.0 U		20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295352

QC Batch: 344105 Analysis Method: SM 2320B-2011
QC Batch Method: SM 2320B-2011 Analysis Description: 2320B Alkalinity
Associated Lab Samples: 30295352001, 30295352002, 30295352003

METHOD BLANK: 1674389 Matrix: Water
Associated Lab Samples: 30295352001, 30295352002, 30295352003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	10.0 U	10.0	1.0	05/24/19 19:26	

LABORATORY CONTROL SAMPLE: 1674390

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	20	20.0	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1674391 1674392

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		30295347001 Result	Spike Conc.	Spike Conc.	Conc.								
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	ND	50	50	50.0	50.0	100	100	85-115	0	20		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295352

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295352

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30295352001	RW12-MWI	EPA 3005A	343601	EPA 6010C	343640
30295352002	RW12-MWS	EPA 3005A	343601	EPA 6010C	343640
30295352003	RW14-MWS	EPA 3005A	343601	EPA 6010C	343640
30295352001	RW12-MWI	EPA 3005A	343951	EPA 6010C	344087
30295352002	RW12-MWS	EPA 3005A	343951	EPA 6010C	344087
30295352003	RW14-MWS	EPA 3005A	343951	EPA 6010C	344087
30295352001	RW12-MWI	SM 2310B-2011	344106		
30295352002	RW12-MWS	SM 2310B-2011	344106		
30295352003	RW14-MWS	SM 2310B-2011	344106		
30295352001	RW12-MWI	SM 2320B-2011	344105		
30295352002	RW12-MWS	SM 2320B-2011	344105		
30295352003	RW14-MWS	SM 2320B-2011	344105		

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CHAIN-OF-CUS' MO# : 30295352
The Chain-of-Custody is a LE

Section A
Required Client Information:
Company: EnviroAnalytics Group
Address: 1600 Sparrows Point Blvd, Suite B2
Sparrows Point, MD 21219
Email To: icalenda@enviroanalyticsgroup.com
Phone: 314-620-3056 Fax:
Requested Due Date/TAT: 5 Day

Section B
Required Project Information:
Report To: James Calenda
Copy To: Stewart Kabis
Purchase Order No.:
Project Name: Rod and Wire Mill GW Sampling
Project Number: 180222M-1-1

Section C
Secti Invoice Information:
Attention: Laura Sargent
Company Name: EnviroAnalytics Group
Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131
Face Quote Reference:
Pace Project Manager: Samantha Bayura
Pace Profile #:

REGULATORY AGENCY
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: MD
STATE:

Page: 1 of 1

ITEM #	Section D Required Client Information	Valid Matrix Codes	MATRIX CODE	SAMPLE TYPE (G-GRAB C-COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	Analysis Test	Requested Analysis Filtered (Y/N)	Temp in °C	Received on	Icody Sealed	Cooler (Y/N)	Samples Intact		
					COMPOSITE START	COMPOSITE END/GRAB												
1	RW12-MWI	DRINKING WATER WATER WASTE WATER PRODUCT SOLID OIL WIPE AIR OTHER TISSUE	WT 6	WT 6	DATE	TIME	DATE	TIME	Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₃ Methanol Other	Analysis Test	Y	5/20/19	5/20/19	5/20/19	5/20/19	5/20/19	001	
2	RW12-MWS		WT 6	WT 6	5/20/19	10:45	5/20/19	10:45										002
3	RW14-MWS		WT 6	WT 6	5/20/19	11:50	5/20/19	11:50										003
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		

ADDITIONAL COMMENTS
Data pics (Y)
Shive R - arm
David Hillborn
AD'S FACE
5/20/19 1445
5/20/19 1430
5/20/19 1300
Mannew & Camp

ACCEPTED BY / AFFILIATION
DATE TIME

RELINQUISHED BY / AFFILIATION
DATE TIME

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Lisa Perrin
SIGNATURE OF SAMPLER: Lisa Perrin
DATE Signed: 5/20/19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviro Analytics Group

Project # 30295352

Label BLM
LIMS Login BLM

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals Intact: yes no

Thermometer Used 10 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp .1 °C Correction Factor: 0 °C Final Temp: .1 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>1003581</u>	<u>MLC 5/21/19</u>
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.	
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.	
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.	
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4.	
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5.	
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6.	
Short Hold Time Analysis (<72hr remaining):	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7.	
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8.	
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9.	
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10.	
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11.	
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	12.	
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13.	
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14.	
Filtered volume received for Dissolved tests	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15.	
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16.	
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed <u>MLC</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	17.	
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	18.	
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)
*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

May 29, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295600

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on May 21, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295600

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295600

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30295600001	RW13-MWI	Water	05/21/19 09:30	05/21/19 23:45
30295600002	RW15-MWI	Water	05/21/19 10:45	05/21/19 23:45
30295600003	RW15-MWS	Water	05/21/19 11:25	05/21/19 23:45
30295600004	RW18-MWI	Water	05/21/19 13:35	05/21/19 23:45
30295600005	RW18-MWS	Water	05/21/19 14:40	05/21/19 23:45

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295600

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30295600001	RW13-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30295600002	RW15-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30295600003	RW15-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30295600004	RW18-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30295600005	RW18-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: May 29, 2019

General Information:

5 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: May 29, 2019

General Information:

5 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

Method: SM 2310B-2011

Description: 2310B Acidity, Total

Client: EnviroAnalytics Group, LLC

Date: May 29, 2019

General Information:

5 samples were analyzed for SM 2310B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

Method: SM 2320B-2011

Description: 2320B Alkalinity

Client: EnviroAnalytics Group, LLC

Date: May 29, 2019

General Information:

5 samples were analyzed for SM 2320B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

Sample: RW13-MWI		Lab ID: 30295600001		Collected: 05/21/19 09:30	Received: 05/21/19 23:45	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	94.7	ug/L	3.0	0.34	1	05/23/19 11:32	05/24/19 15:38	7440-43-9	
Zinc	380	ug/L	10.0	2.4	1	05/23/19 11:32	05/24/19 15:38	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	51.1	ug/L	3.0	0.34	1	05/23/19 11:33	05/24/19 14:30	7440-43-9	
Zinc, Dissolved	97.7	ug/L	10.0	2.4	1	05/23/19 11:33	05/24/19 14:30	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO ₃ pH8.3)	10.0	mg/L	10.0	10.0	1		05/28/19 17:48		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO ₃ pH4.5)	5.0J	mg/L	10.0	1.0	1		05/28/19 17:48		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

Sample: RW15-MWI		Lab ID: 30295600002		Collected: 05/21/19 10:45	Received: 05/21/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	64.9	ug/L	3.0	0.34	1	05/23/19 11:32	05/24/19 15:52	7440-43-9		
Zinc	16500	ug/L	1000	238	100	05/23/19 11:32	05/24/19 16:10	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	64.2	ug/L	3.0	0.34	1	05/23/19 11:33	05/24/19 14:33	7440-43-9		
Zinc, Dissolved	16400	ug/L	1000	238	100	05/23/19 11:33	05/24/19 15:08	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO3 pH8.3)	23.0	mg/L	10.0	10.0	1		05/28/19 17:52			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO3 pH4.5)	30.0	mg/L	10.0	1.0	1		05/28/19 17:52			

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

Sample: RW15-MWS		Lab ID: 30295600003		Collected: 05/21/19 11:25		Received: 05/21/19 23:45		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	20.6	ug/L	3.0	0.34	1	05/23/19 11:32	05/24/19 15:55	7440-43-9	
Zinc	766	ug/L	10.0	2.4	1	05/23/19 11:32	05/24/19 15:55	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	19.1	ug/L	3.0	0.34	1	05/23/19 11:33	05/24/19 14:35	7440-43-9	
Zinc, Dissolved	684	ug/L	10.0	2.4	1	05/23/19 11:33	05/24/19 14:35	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO3 pH8.3)	10.0 U	mg/L	10.0	10.0	1		05/28/19 17:53		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO3 pH4.5)	20.0	mg/L	10.0	1.0	1		05/28/19 17:53		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

Sample: RW18-MWI		Lab ID: 30295600004		Collected: 05/21/19 13:35	Received: 05/21/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	38.0	ug/L	3.0	0.34	1	05/23/19 11:32	05/24/19 16:06	7440-43-9		
Zinc	276000	ug/L	1000	238	100	05/23/19 11:32	05/24/19 16:12	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	38.0	ug/L	3.0	0.34	1	05/23/19 11:33	05/24/19 14:38	7440-43-9		
Zinc, Dissolved	279000	ug/L	1000	238	100	05/23/19 11:33	05/24/19 15:11	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO ₃ pH8.3)	966	mg/L	10.0	10.0	1		05/28/19 17:55			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity, Total (CaCO ₃ pH4.5)	2.5J	mg/L	10.0	1.0	1		05/28/19 17:55			

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

Sample: RW18-MWS **Lab ID: 30295600005** Collected: 05/21/19 14:40 Received: 05/21/19 23:45 Matrix: Water

Comments: • Unpreserved volume has basic PH

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	05/23/19 11:32	05/24/19 16:03	7440-43-9	
Zinc	25.6	ug/L	10.0	2.4	1	05/23/19 11:32	05/24/19 16:03	7440-66-6	
6010C MET ICP,Dissolved									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	05/23/19 11:33	05/24/19 14:43	7440-43-9	
Zinc, Dissolved	16.9	ug/L	10.0	2.4	1	05/23/19 11:33	05/24/19 14:43	7440-66-6	
2310B Acidity, Total									
Analytical Method: SM 2310B-2011									
Acidity, Total (CaCO3 pH8.3)	10.0 U	mg/L	10.0	10.0	1		05/28/19 17:56		
2320B Alkalinity									
Analytical Method: SM 2320B-2011									
Alkalinity, Total (CaCO3 pH4.5)	130	mg/L	10.0	1.0	1		05/28/19 17:56		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295600

QC Batch: 343950 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30295600001, 30295600002, 30295600003, 30295600004, 30295600005

METHOD BLANK: 1673664 Matrix: Water
Associated Lab Samples: 30295600001, 30295600002, 30295600003, 30295600004, 30295600005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	05/24/19 15:33	
Zinc	ug/L	10.0 U	10.0	2.4	05/24/19 15:33	

LABORATORY CONTROL SAMPLE: 1673665

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	518	104	80-120	
Zinc	ug/L	500	515	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1673667 1673668

Parameter	Units	30295600001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	94.7	500	500	640	610	109	103	75-125	5	20	
Zinc	ug/L	380	500	500	934	904	111	105	75-125	3	20	

SAMPLE DUPLICATE: 1673666

Parameter	Units	30295600001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	94.7	99.7	5	20	
Zinc	ug/L	380	402	5	20	

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295600

QC Batch: 343951 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30295600001, 30295600002, 30295600003, 30295600004, 30295600005

METHOD BLANK: 1673672 Matrix: Water
Associated Lab Samples: 30295600001, 30295600002, 30295600003, 30295600004, 30295600005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	05/24/19 13:57	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	05/24/19 13:57	

LABORATORY CONTROL SAMPLE: 1673673

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	487	97	80-120	
Zinc, Dissolved	ug/L	500	484	97	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1673675 1673676

Parameter	Units	30295352001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	ug/L	1520	500	500	1970	2020	89	99	75-125	2	20	
Zinc, Dissolved	ug/L	111000	500	500	114000	109000	640	-300	75-125	4	20 M6	

SAMPLE DUPLICATE: 1673674

Parameter	Units	30295352001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	1520	1470	4	20	
Zinc, Dissolved	ug/L	111000	106000	4	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

QC Batch: 344287

Analysis Method: SM 2310B-2011

QC Batch Method: SM 2310B-2011

Analysis Description: 2310B Acidity, Total

Associated Lab Samples: 30295600001, 30295600002, 30295600003, 30295600004, 30295600005

METHOD BLANK: 1675521

Matrix: Water

Associated Lab Samples: 30295600001, 30295600002, 30295600003, 30295600004, 30295600005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	10.0 U	10.0	10.0	05/28/19 17:20	

LABORATORY CONTROL SAMPLE: 1675523

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	100	90.0	90	85-115	

SAMPLE DUPLICATE: 1675522

Parameter	Units	30295600001 Result	Dup Result	RPD	Max RPD	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	10.0	10.0	0	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

QC Batch: 344286 Analysis Method: SM 2320B-2011

QC Batch Method: SM 2320B-2011 Analysis Description: 2320B Alkalinity

Associated Lab Samples: 30295600001, 30295600002, 30295600003, 30295600004, 30295600005

METHOD BLANK: 1675517 Matrix: Water

Associated Lab Samples: 30295600001, 30295600002, 30295600003, 30295600004, 30295600005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	10.0 U	10.0	1.0	05/28/19 17:47	

LABORATORY CONTROL SAMPLE: 1675518

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	20	20.0	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1675519 1675520

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		30295600001 Result	Spike Conc.	Spike Conc.	Conc.								
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	5.0J	50	50	50	60.0	60.0	110	110	85-115	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295600

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295600

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30295600001	RW13-MWI	EPA 3005A	343950	EPA 6010C	344086
30295600002	RW15-MWI	EPA 3005A	343950	EPA 6010C	344086
30295600003	RW15-MWS	EPA 3005A	343950	EPA 6010C	344086
30295600004	RW18-MWI	EPA 3005A	343950	EPA 6010C	344086
30295600005	RW18-MWS	EPA 3005A	343950	EPA 6010C	344086
30295600001	RW13-MWI	EPA 3005A	343951	EPA 6010C	344087
30295600002	RW15-MWI	EPA 3005A	343951	EPA 6010C	344087
30295600003	RW15-MWS	EPA 3005A	343951	EPA 6010C	344087
30295600004	RW18-MWI	EPA 3005A	343951	EPA 6010C	344087
30295600005	RW18-MWS	EPA 3005A	343951	EPA 6010C	344087
30295600001	RW13-MWI	SM 2310B-2011	344287		
30295600002	RW15-MWI	SM 2310B-2011	344287		
30295600003	RW15-MWS	SM 2310B-2011	344287		
30295600004	RW18-MWI	SM 2310B-2011	344287		
30295600005	RW18-MWS	SM 2310B-2011	344287		
30295600001	RW13-MWI	SM 2320B-2011	344286		
30295600002	RW15-MWI	SM 2320B-2011	344286		
30295600003	RW15-MWS	SM 2320B-2011	344286		
30295600004	RW18-MWI	SM 2320B-2011	344286		
30295600005	RW18-MWS	SM 2320B-2011	344286		

REPORT OF LABORATORY ANALYSIS

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The Chain-of-Custody is a LEG



Page: 1 of 1

Section A
Required Client Information:
 Company: **EnviroAnalytics Group**
 Address: **1600 Sparrows Point Blvd, Suite B2 Sparrows Point, MD 21219**
 Email To: **jcalenda@enviroanalyticsgroup.com**
 Phone: **314-620-3056** Fax:
 Requested Due Date/TAT: **5 Day**

Section B
Required Project Information:
 Report To: **James Calenda**
 Copy To: **Stewart Kabis**
 Purchase Order No.:
 Project Name: **Rod and Wire Mill GW Sampling**
 Project Number: **HA 180222M-1**

Section C
Required Agency Information:
 Attention: **Laura Sargent**
 Company Name: **EnviroAnalytics Group**
 Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER
 Site Location: **MD**
 State: **MD**

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WATER WT WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIFE WP AIR AR OTHER OT TISSUE TS	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₃ Methanol Other	Analysis Test W/N	Requester Analytical Parameters (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
				DATE	TIME							
1		WT G		5/21/19	9:30		3		X		001	
2	RW13-MWI	WT G			10:45		3		X		002	
3	RW15-MWI	WT G			11:25		3		X		003	
4	RW18-MWI	WT G			13:35		3		X		004	
5	RW18-MWS	WT G			14:40		3		X		005	
6												
7												
8												
9												
10												
11												
12												

ADDITIONAL COMMENTS:
 Data pgs (2)
 David S. Williams
 RDS TACE
 5/21/19 16:00
 5/21/19 19:50
 5/21/19 21:15

ACCEPTED BY / AFFILIATION:
 David S. Williams / Pace
 RDS TACE
 BSM / MCM

DATE | **TIME** | **DATE** | **TIME**

5/21/19 16:00 | 5/21/19 19:50 | 5/21/19 21:15

RECEIVED BY / AFFILIATION:
 Lisa Park
 DATE Signed: 5-21-19

DATE | **TIME** | **DATE** | **TIME**

5/21/19 16:00 | 5/21/19 19:50 | 5/21/19 21:15

TEMP IN °C | **RECEIVED ON** | **ICE (Y/N)** | **USTODY SEALED** | **COOLER (Y/N)** | **SAMPLES INTACT (Y/N)**

0.3 | Y | Y | N | Y

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviroanalytics

Project # 30295600

Courier: Fed Ex UPS USPS Client Commercial Face, Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals Intact: yes no

Thermometer Used 10 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 0.3 °C Correction Factor: 0 °C Final Temp: 0.3 °C

Temp should be above freezing to 6°C

pH paper Lot#	Date and Initials of person examining contents:
<u>1003581</u>	<u>BLM 5-22-19</u>

Comments:

	Yes	No	N/A	
Chain of Custody Present:	/	/		1.
Chain of Custody Filled Out:	/	/		2.
Chain of Custody Relinquished:	/	/		3.
Sampler Name & Signature on COC:	/	/		4.
Sample Labels match COC:	/	/		5.
-Includes date/time/ID Matrix: <u>WT</u>				
Samples Arrived within Hold Time:	/	/		6.
Short Hold Time Analysis (<72hr remaining):	/	/		7.
Rush Turn Around Time Requested:	/	/		8.
Sufficient Volume:	/	/		9.
Correct Containers Used:	/	/		10.
-Face Containers Used:	/	/		
Containers Intact:	/	/		11.
Orthophosphate field filtered			/	12.
Hex Cr Aqueous sample field filtered			/	13.
Organic Samples checked for dechlorination:			/	14.
Filtered volume received for Dissolved tests	/	/		15.
All containers have been checked for preservation.	/	/		16. unpreserved bottle for sample RW19-MWS has a pH > 10
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix				
All containers meet method preservation requirements.	/	/		Initial when completed <u>BLM</u> Date/time of preservation
				Lot # of added preservative <u>BLM 5-22-19</u>
Headspace in VOA Vials (>6mm):			/	17.
Trip Blank Present:			/	18.
Trip Blank Custody Seals Present			/	
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed: Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

May 31, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295851

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on May 23, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295851

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295851

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30295851001	RW11-MWI	Water	05/22/19 10:20	05/23/19 00:15
30295851002	RW11-MWS	Water	05/22/19 11:00	05/23/19 00:15
30295851003	RW04-MWS	Water	05/22/19 12:05	05/23/19 00:15
30295851004	RW16-MWI	Water	05/22/19 14:00	05/23/19 00:15
30295851005	RW16-MWS	Water	05/22/19 14:45	05/23/19 00:15

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295851

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30295851001	RW11-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30295851002	RW11-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30295851003	RW04-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30295851004	RW16-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30295851005	RW16-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295851

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: May 31, 2019

General Information:

5 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295851

Method: EPA 6010C
Description: 6010C MET ICP,Dissolved
Client: EnviroAnalytics Group, LLC
Date: May 31, 2019

General Information:

5 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

QC Batch: 344339

B: Analyte was detected in the associated method blank.

- BLANK for HBN 344339 [MPRP/258 (Lab ID: 1675847)]
 - Cadmium, Dissolved

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295851

Method: SM 2310B-2011
Description: 2310B Acidity, Total
Client: EnviroAnalytics Group, LLC
Date: May 31, 2019

General Information:

5 samples were analyzed for SM 2310B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295851

Method: SM 2320B-2011

Description: 2320B Alkalinity

Client: EnviroAnalytics Group, LLC

Date: May 31, 2019

General Information:

5 samples were analyzed for SM 2320B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 344292

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30295851001

ML: Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

- MS (Lab ID: 1675536)
 - Alkalinity, Total (CaCO₃ pH4.5)
- MSD (Lab ID: 1675537)
 - Alkalinity, Total (CaCO₃ pH4.5)

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295851

Sample: RW11-MWI Lab ID: 30295851001 Collected: 05/22/19 10:20 Received: 05/23/19 00:15 Matrix: Water									
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	598	ug/L	3.0	0.34	1	05/28/19 08:13	05/30/19 15:11	7440-43-9	
Zinc	122000	ug/L	1000	238	100	05/28/19 08:13	05/30/19 15:58	7440-66-6	M6
6010C MET ICP,Dissolved Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	586	ug/L	3.0	0.34	1	05/28/19 08:16	05/30/19 16:48	7440-43-9	
Zinc, Dissolved	121000	ug/L	1000	238	100	05/28/19 08:16	05/30/19 17:34	7440-66-6	M6
2310B Acidity, Total Analytical Method: SM 2310B-2011									
Acidity, Total (CaCO3 pH8.3)	462	mg/L	10.0	10.0	1		05/30/19 18:34		
2320B Alkalinity Analytical Method: SM 2320B-2011									
Alkalinity,Total (CaCO3 pH4.5)	24.0	mg/L	10.0	1.0	1		05/30/19 18:34		ML

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295851

Sample: RW11-MWS		Lab ID: 30295851002		Collected: 05/22/19 11:00		Received: 05/23/19 00:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1.0J	ug/L	3.0	0.34	1	05/28/19 08:13	05/30/19 15:27	7440-43-9	
Zinc	38600	ug/L	1000	238	100	05/28/19 08:13	05/30/19 16:20	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	1.1J	ug/L	3.0	0.34	1	05/28/19 08:16	05/30/19 17:03	7440-43-9	B
Zinc, Dissolved	38900	ug/L	1000	238	100	05/28/19 08:16	05/30/19 17:56	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO3 pH8.3)	220	mg/L	10.0	10.0	1		05/30/19 18:37		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO3 pH4.5)	14.0	mg/L	10.0	1.0	1		05/30/19 18:37		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295851

Sample: RW04-MWS		Lab ID: 30295851003		Collected: 05/22/19 12:05	Received: 05/23/19 00:15	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:13	05/30/19 15:31	7440-43-9		
Zinc	132	ug/L	10.0	2.4	1	05/28/19 08:13	05/30/19 15:31	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:16	05/30/19 17:07	7440-43-9		
Zinc, Dissolved	10.0 U	ug/L	10.0	2.4	1	05/28/19 08:16	05/30/19 17:07	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO3 pH8.3)	10.0 U	mg/L	10.0	10.0	1		05/30/19 18:39			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO3 pH4.5)	210	mg/L	10.0	1.0	1		05/30/19 18:39			

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295851

Sample: RW16-MWI		Lab ID: 30295851004		Collected: 05/22/19 14:00	Received: 05/23/19 00:15	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:13	05/30/19 15:41	7440-43-9	
Zinc	135	ug/L	10.0	2.4	1	05/28/19 08:13	05/30/19 15:41	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:16	05/30/19 17:17	7440-43-9	
Zinc, Dissolved	4.9J	ug/L	10.0	2.4	1	05/28/19 08:16	05/30/19 17:17	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO3 pH8.3)	10.0 U	mg/L	10.0	10.0	1		05/30/19 18:41		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO3 pH4.5)	36.0	mg/L	10.0	1.0	1		05/30/19 18:41		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295851

Sample: RW16-MWS **Lab ID: 30295851005** Collected: 05/22/19 14:45 Received: 05/23/19 00:15 Matrix: Water

Comments: • Unpreserved sample volume has a basic pH

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:13	05/30/19 15:43	7440-43-9	
Zinc	5.5J	ug/L	10.0	2.4	1	05/28/19 08:13	05/30/19 15:43	7440-66-6	
6010C MET ICP,Dissolved									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:16	05/30/19 17:19	7440-43-9	
Zinc, Dissolved	106	ug/L	10.0	2.4	1	05/28/19 08:16	05/30/19 17:19	7440-66-6	
2310B Acidity, Total									
Analytical Method: SM 2310B-2011									
Acidity, Total (CaCO ₃ pH8.3)	10.0 U	mg/L	10.0	10.0	1		05/30/19 18:43		
2320B Alkalinity									
Analytical Method: SM 2320B-2011									
Alkalinity, Total (CaCO ₃ pH4.5)	142	mg/L	10.0	1.0	1		05/30/19 18:43		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295851

QC Batch: 344338 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30295851001, 30295851002, 30295851003, 30295851004, 30295851005

METHOD BLANK: 1675842 Matrix: Water
Associated Lab Samples: 30295851001, 30295851002, 30295851003, 30295851004, 30295851005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	05/30/19 15:07	
Zinc	ug/L	10.0 U	10.0	2.4	05/30/19 15:07	

LABORATORY CONTROL SAMPLE: 1675843

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	502	100	80-120	
Zinc	ug/L	500	497	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1675845 1675846

Parameter	Units	30295851001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	598	500	500	1080	1110	96	103	75-125	3	20	
Zinc	ug/L	122000	500	500	119000	124000	-680	400	75-125	4	20 M6	

SAMPLE DUPLICATE: 1675844

Parameter	Units	30295851001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	598	614	3	20	
Zinc	ug/L	122000	124000	1	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295851

QC Batch: 344339 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30295851001, 30295851002, 30295851003, 30295851004, 30295851005

METHOD BLANK: 1675847 Matrix: Water
Associated Lab Samples: 30295851001, 30295851002, 30295851003, 30295851004, 30295851005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	0.39J	3.0	0.34	05/30/19 16:44	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	05/30/19 16:44	

LABORATORY CONTROL SAMPLE: 1675848

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	476	95	80-120	
Zinc, Dissolved	ug/L	500	466	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1675850 1675851

Parameter	Units	30295851001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	ug/L	586	500	500	1110	1120	104	106	75-125	1	20	
Zinc, Dissolved	ug/L	121000	500	500	124000	124000	540	660	75-125	0	20 M6	

SAMPLE DUPLICATE: 1675849

Parameter	Units	30295851001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	586	596	2	20	
Zinc, Dissolved	ug/L	121000	123000	1	20	

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295851

QC Batch: 344293

Analysis Method: SM 2310B-2011

QC Batch Method: SM 2310B-2011

Analysis Description: 2310B Acidity, Total

Associated Lab Samples: 30295851001, 30295851002, 30295851003, 30295851004, 30295851005

METHOD BLANK: 1675539

Matrix: Water

Associated Lab Samples: 30295851001, 30295851002, 30295851003, 30295851004, 30295851005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	10.0 U	10.0	10.0	05/30/19 18:31	

LABORATORY CONTROL SAMPLE: 1675541

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	100	92.0	92	85-115	

SAMPLE DUPLICATE: 1675540

Parameter	Units	30295851001 Result	Dup Result	RPD	Max RPD	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	462	462	0	20	

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295851

QC Batch: 344292 Analysis Method: SM 2320B-2011

QC Batch Method: SM 2320B-2011 Analysis Description: 2320B Alkalinity

Associated Lab Samples: 30295851001, 30295851002, 30295851003, 30295851004, 30295851005

METHOD BLANK: 1675534 Matrix: Water

Associated Lab Samples: 30295851001, 30295851002, 30295851003, 30295851004, 30295851005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	10.0 U	10.0	1.0	05/30/19 18:31	

LABORATORY CONTROL SAMPLE: 1675535

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	20	20.0	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1675536 1675537

Parameter	Units	MS		MSD		% Rec		% Rec Limits	RPD	Max RPD	Qual
		30295851001 Result	Spike Conc.	Spike Conc.	Result	Result	% Rec				
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	24.0	50	50	56.0	56.0	64	64	85-115	0	20 ML

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30295851

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

ML Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30295851

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30295851001	RW11-MWI	EPA 3005A	344338	EPA 6010C	344413
30295851002	RW11-MWS	EPA 3005A	344338	EPA 6010C	344413
30295851003	RW04-MWS	EPA 3005A	344338	EPA 6010C	344413
30295851004	RW16-MWI	EPA 3005A	344338	EPA 6010C	344413
30295851005	RW16-MWS	EPA 3005A	344338	EPA 6010C	344413
30295851001	RW11-MWI	EPA 3005A	344339	EPA 6010C	344414
30295851002	RW11-MWS	EPA 3005A	344339	EPA 6010C	344414
30295851003	RW04-MWS	EPA 3005A	344339	EPA 6010C	344414
30295851004	RW16-MWI	EPA 3005A	344339	EPA 6010C	344414
30295851005	RW16-MWS	EPA 3005A	344339	EPA 6010C	344414
30295851001	RW11-MWI	SM 2310B-2011	344293		
30295851002	RW11-MWS	SM 2310B-2011	344293		
30295851003	RW04-MWS	SM 2310B-2011	344293		
30295851004	RW16-MWI	SM 2310B-2011	344293		
30295851005	RW16-MWS	SM 2310B-2011	344293		
30295851001	RW11-MWI	SM 2320B-2011	344292		
30295851002	RW11-MWS	SM 2320B-2011	344292		
30295851003	RW04-MWS	SM 2320B-2011	344292		
30295851004	RW16-MWI	SM 2320B-2011	344292		
30295851005	RW16-MWS	SM 2320B-2011	344292		

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CHAIN-OF-CUS
The Chain-of-Custody is a LE



Page: 7 of 7

Section A
Required Client Information:
Company: EnviroAnalytics Group
Address: 1600 Sparrows Point Blvd, Suite B2
Sparrows Point, MD 21219
Email To: lcalenda@enviroanalyticsgroup.com
Phone: 314-620-3056
Requested Due Date/TAT: 5 Day

Section B
Required Project Information:
Report To: James Calenda
Copy To: Stewart Kabis
Purchase Order No.: 889 SAG-SPT-6452
Project Name: Rod and Wire Mill GW Sampling
Project Number: 180227M-1-1

Attention: Laura Sargent
Company Name: EnviroAnalytics Group
Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131
Pace Quote Reference: Samantha Bayura
Pace Project Manager: Samantha Bayura
Pace Profile #:

REGULATORY AGENCY
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER
 Site Location: MD
 STATE: MD

ITEM #	Section D Required Client Information	Valid Matrix Codes	MATRIX	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	Analysis Test	Requested Analysis: Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
					COMPOSITE START	COMPOSITE END/GRAB							
1	RW11-MWI	DW WT WW P SL OL WP AR OT TS	WTG	G	5/22/19	10:20	1530	3	H ₂ O ₂ HNO ₃ HCl NaOH Na ₂ S ₂ O ₃ Methanol Other	Total Cadmium 6010 Total Zinc 6010 Dis. Zn + Cd Alkalinity (SM 2320) Acidity (SM 2310)	Y	001	
2	RW11-MWS		WTG	G	5/22/19	11:00	1530	3					002
3	RW04-MWS		WTG	G	5/22/19	12:05	1530	3					003
4	RW16-MWI		WTG	G	5/22/19	14:00	1530	3					004
5	RW16-MWS		WTG	G	5/22/19	14:45	1530	3					005

ADDITIONAL COMMENTS:
Data pkg (4)
Sample ID: RW11-MWI
Sample ID: RW11-MWS
Sample ID: RW04-MWS
Sample ID: RW16-MWI
Sample ID: RW16-MWS

RELINQUISHED BY / AFFILIATION: James Calenda
DATE: 5/22/19
TIME: 1530

ACCEPTED BY / AFFILIATION: Dawn F. Henderson
DATE: 5-23-19
TIME: 0040

SAMPLE CONDITIONS:
 Received on Ice (Y/N): Y
 Ustody Sealed (Y/N): Y
 Samples Intact (Y/N): Y

SAMPLER NAME AND SIGNATURE:
 PRINT Name of SAMPLER: Lisa Perrin
 SIGNATURE: Lisa Perrin
 DATE Signed: 5/22/19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviroanalytics

Project # 30295851

Courier: Fed Ex UPS USPS Client Commercial Face, Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals Intact: yes no

Thermometer Used 10 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 0.6 °C Correction Factor: 0 °C Final Temp: 0.6 °C

Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents: <u>BLM S-23-19</u>
	Yes	No	N/A	
Chain of Custody Present:	/			1.
Chain of Custody Filled Out:	/			2.
Chain of Custody Relinquished:	/			3.
Sampler Name & Signature on COC:	/			4.
Sample Labels match COC:	/			5.
-Includes date/time/ID Matrix: <u>WT</u>				
Samples Arrived within Hold Time:	/			6.
Short Hold Time Analysis (<72hr remaining):	/	/		7.
Rush Turn Around Time Requested:	/			8.
Sufficient Volume:	/			9.
Correct Containers Used:	/			10.
-Pace Containers Used:	/			
Containers Intact:	/			11.
Orthophosphate field filtered			/	12.
Hex Cr Aqueous sample field filtered			/	13.
Organic Samples checked for dechlorination:			/	14.
Filtered volume received for Dissolved tests	/			15.
All containers have been checked for preservation.	/			16. <u>unpreserved bottle BMS-23-19</u> <u>sample for sample</u> <u>RW16-MWS has a pH >10</u>
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix				
All containers meet method preservation requirements.	/			Initial when completed: <u>BLM</u> Date/time of preservation: _____
				Lot # of added preservative: _____
Headspace In VOA Vials (>6mm):			/	17.
Trip Blank Present:			/	18.
Trip Blank Custody Seals Present			/	
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed: _____ Date: _____

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (I.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

May 31, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296093

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on May 23, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30296093001	RW06-MWD	Water	05/23/19 11:05	05/23/19 23:45
30296093002	RW06-MWS	Water	05/23/19 11:55	05/23/19 23:45
30296093003	RW06-MWI	Water	05/23/19 12:30	05/23/19 23:45
30296093004	RW05-MWS	Water	05/23/19 14:25	05/23/19 23:45

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30296093001	RW06-MWD	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296093002	RW06-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296093003	RW06-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296093004	RW05-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: May 31, 2019

General Information:

4 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: May 31, 2019

General Information:

4 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

Method: SM 2310B-2011

Description: 2310B Acidity, Total

Client: EnviroAnalytics Group, LLC

Date: May 31, 2019

General Information:

4 samples were analyzed for SM 2310B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

Method: SM 2320B-2011

Description: 2320B Alkalinity

Client: EnviroAnalytics Group, LLC

Date: May 31, 2019

General Information:

4 samples were analyzed for SM 2320B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 344292

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30295851001

ML: Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

- MS (Lab ID: 1675536)
 - Alkalinity, Total (CaCO₃ pH4.5)
- MSD (Lab ID: 1675537)
 - Alkalinity, Total (CaCO₃ pH4.5)

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

Sample: RW06-MWD		Lab ID: 30296093001		Collected: 05/23/19 11:05	Received: 05/23/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:13	05/30/19 15:46	7440-43-9		
Zinc	45.3	ug/L	10.0	2.4	1	05/28/19 08:13	05/30/19 15:46	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:16	05/30/19 17:21	7440-43-9		
Zinc, Dissolved	24.3	ug/L	10.0	2.4	1	05/28/19 08:16	05/30/19 17:21	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO3 pH8.3)	102	mg/L	10.0	10.0	1		05/30/19 19:05			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO3 pH4.5)	54.0	mg/L	10.0	1.0	1		05/30/19 19:05			

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

Sample: RW06-MWS		Lab ID: 30296093002		Collected: 05/23/19 11:55	Received: 05/23/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:13	05/30/19 15:48	7440-43-9		
Zinc	32.7	ug/L	10.0	2.4	1	05/28/19 08:13	05/30/19 15:48	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:16	05/30/19 17:24	7440-43-9		
Zinc, Dissolved	20.7	ug/L	10.0	2.4	1	05/28/19 08:16	05/30/19 17:24	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO3 pH8.3)	10.0 U	mg/L	10.0	10.0	1		05/30/19 19:07			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO3 pH4.5)	96.0	mg/L	10.0	1.0	1		05/30/19 19:07			

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296093

Sample: RW06-MWI		Lab ID: 30296093003		Collected: 05/23/19 12:30	Received: 05/23/19 23:45	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	903	ug/L	3.0	0.34	1	05/28/19 08:13	05/30/19 15:51	7440-43-9	
Zinc	109000	ug/L	1000	238	100	05/28/19 08:13	05/30/19 16:23	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	885	ug/L	3.0	0.34	1	05/28/19 08:16	05/30/19 17:26	7440-43-9	
Zinc, Dissolved	108000	ug/L	1000	238	100	05/28/19 08:16	05/30/19 17:59	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO3 pH8.3)	322	mg/L	10.0	10.0	1		05/30/19 19:08		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO3 pH4.5)	12.0	mg/L	10.0	1.0	1		05/30/19 19:08		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

Sample: RW05-MWS		Lab ID: 30296093004		Collected: 05/23/19 14:25	Received: 05/23/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:13	05/30/19 15:56	7440-43-9		
Zinc	10J	ug/L	10.0	2.4	1	05/28/19 08:13	05/30/19 15:56	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	05/28/19 08:16	05/30/19 17:32	7440-43-9		
Zinc, Dissolved	10.0 U	ug/L	10.0	2.4	1	05/28/19 08:16	05/30/19 17:32	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO3 pH8.3)	10.0 U	mg/L	10.0	10.0	1		05/30/19 19:10			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO3 pH4.5)	46.0	mg/L	10.0	1.0	1		05/30/19 19:10			

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296093

QC Batch: 344338 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30296093001, 30296093002, 30296093003, 30296093004

METHOD BLANK: 1675842 Matrix: Water
Associated Lab Samples: 30296093001, 30296093002, 30296093003, 30296093004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	05/30/19 15:07	
Zinc	ug/L	10.0 U	10.0	2.4	05/30/19 15:07	

LABORATORY CONTROL SAMPLE: 1675843

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	502	100	80-120	
Zinc	ug/L	500	497	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1675845 1675846

Parameter	Units	30295851001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	598	500	500	1080	1110	96	103	75-125	3	20	
Zinc	ug/L	122000	500	500	119000	124000	-680	400	75-125	4	20 M6	

SAMPLE DUPLICATE: 1675844

Parameter	Units	30295851001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	598	614	3	20	
Zinc	ug/L	122000	124000	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296093

QC Batch: 344339 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30296093001, 30296093002, 30296093003, 30296093004

METHOD BLANK: 1675847 Matrix: Water
Associated Lab Samples: 30296093001, 30296093002, 30296093003, 30296093004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	0.39J	3.0	0.34	05/30/19 16:44	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	05/30/19 16:44	

LABORATORY CONTROL SAMPLE: 1675848

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	476	95	80-120	
Zinc, Dissolved	ug/L	500	466	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1675850 1675851

Parameter	Units	30295851001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	ug/L	586	500	500	1110	1120	104	106	75-125	1	20	
Zinc, Dissolved	ug/L	121000	500	500	124000	124000	540	660	75-125	0	20 M6	

SAMPLE DUPLICATE: 1675849

Parameter	Units	30295851001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	586	596	2	20	
Zinc, Dissolved	ug/L	121000	123000	1	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

QC Batch: 344293 Analysis Method: SM 2310B-2011
 QC Batch Method: SM 2310B-2011 Analysis Description: 2310B Acidity, Total
 Associated Lab Samples: 30296093001, 30296093002, 30296093003, 30296093004

METHOD BLANK: 1675539 Matrix: Water
 Associated Lab Samples: 30296093001, 30296093002, 30296093003, 30296093004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	10.0 U	10.0	10.0	05/30/19 18:31	

LABORATORY CONTROL SAMPLE: 1675541

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	100	92.0	92	85-115	

SAMPLE DUPLICATE: 1675540

Parameter	Units	30295851001 Result	Dup Result	RPD	Max RPD	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	462	462	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

QC Batch: 344292 Analysis Method: SM 2320B-2011

QC Batch Method: SM 2320B-2011 Analysis Description: 2320B Alkalinity

Associated Lab Samples: 30296093001, 30296093002, 30296093003, 30296093004

METHOD BLANK: 1675534 Matrix: Water

Associated Lab Samples: 30296093001, 30296093002, 30296093003, 30296093004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	10.0 U	10.0	1.0	05/30/19 18:31	

LABORATORY CONTROL SAMPLE: 1675535

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	20	20.0	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1675536 1675537

Parameter	Units	MS		MSD		MS		MSD		% Rec Limits	RPD	Max RPD	Qual
		30295851001 Result	Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec					
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	24.0	50	50	56.0	56.0	64	64	85-115	0	20	ML	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296093

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

ML Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296093

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30296093001	RW06-MWD	EPA 3005A	344338	EPA 6010C	344413
30296093002	RW06-MWS	EPA 3005A	344338	EPA 6010C	344413
30296093003	RW06-MWI	EPA 3005A	344338	EPA 6010C	344413
30296093004	RW05-MWS	EPA 3005A	344338	EPA 6010C	344413
30296093001	RW06-MWD	EPA 3005A	344339	EPA 6010C	344414
30296093002	RW06-MWS	EPA 3005A	344339	EPA 6010C	344414
30296093003	RW06-MWI	EPA 3005A	344339	EPA 6010C	344414
30296093004	RW05-MWS	EPA 3005A	344339	EPA 6010C	344414
30296093001	RW06-MWD	SM 2310B-2011	344293		
30296093002	RW06-MWS	SM 2310B-2011	344293		
30296093003	RW06-MWI	SM 2310B-2011	344293		
30296093004	RW05-MWS	SM 2310B-2011	344293		
30296093001	RW06-MWD	SM 2320B-2011	344292		
30296093002	RW06-MWS	SM 2320B-2011	344292		
30296093003	RW06-MWI	SM 2320B-2011	344292		
30296093004	RW05-MWS	SM 2320B-2011	344292		

REPORT OF LABORATORY ANALYSIS

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CHAIN-OF-CUSTODY NO#: 30296093

The Chain-of-Custody is:



Section A
 Required Client Information:
 Company: EnviroAnalytics Group
 Address: 1600 Sparrows Point Blvd, Suite B2
 Sparrows Point, MD 21219
 Email To: jcalenda@enviroanalyticsgroup.com
 Phone: 314-620-3056
 Requested Due Date/TAT: 5 Day

Section B
 Required Project Information:
 Report To: James Calenda
 Copy To: Stewart Kabis
 Purchase Order No.: EAG-SPT-6452
 Project Name: Rod and Wire Mill GW Sampling
 Project Number: 180227M-11

Section C
 Attention: Laura Sargent
 Company Name: EnviroAnalytics Group
 Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63181
 Pace Quote Reference: Samantha Bayura
 Pace Project Manager:
 Pace Profile #:

Section D
 Required Client Information:
 Regulatory Agency: NPDES GROUND WATER DRINKING WATER UST RCRA OTHER
 Site Location: MD
 STATE:

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW WATER P PRODUCT SL SOLUBILE OIL WIPE WP AIR AR OTHER OT TISSUE TB	Section D Required Client Information	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW WATER P PRODUCT SL SOLUBILE OIL WIPE WP AIR AR OTHER OT TISSUE TB	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₃ Methanol Other	Requested Analysis Filtered (Y/N)	Y/N	Total Cadmium 6010	Total Zinc 6010	Biss Zn + Cd	Alkalinity (SM20)	Acidity (SM20)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
					COMPOSITE START	COMPOSITE END/GRAB												
1				WT G		5/23/19	1105	3	1			X	X	X	X	X	X	001
2				WT G		5/23/19	1155	3	2			X	X	X	X	X	X	002
3				WT G		5/23/19	1230	3	1			X	X	X	X	X	X	003
4				WT G		5/23/19	1425	3	1			X	X	X	X	X	X	004
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		

ADDITIONAL COMMENTS:
 Data packages
 David H. Williams
 5/23/19 10:25 AM
 RD5 TREE
 5/23/19 15:20
 David H. Williams
 5/23/19 16:25
 RD5 TREE
 5/23/19 23:45
 Marwan J. Chay

RELINQUISHED BY / AFFILIATION:
 James Calenda
 David H. Williams
 RD5 TREE
 5/23/19
 Marwan J. Chay

ACCEPTED BY / AFFILIATION:
 Laura Sargent
 RD5 TREE
 5/23/19
 Marwan J. Chay

RECEIVED ON: 5/23/19
ICE (Y/N): Y
USTDY SEALED (Y/N): Y
SAMPLES INTACT (Y/N): Y

Temp in °C: 12
Y: N
Y: Y

SAMPLER NAME AND SIGNATURE:
 PRINT Name of SAMPLER: Lisa Perum
 SIGNATURE: Lisa Perum
 DATE SIGNED: 5/23/19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics Group

Project # 30296093

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: _____

Label	<u>MLC</u>
LIMS Login	<u>Bum</u>

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 10 Type of Ice: Web Blue None

Cooler Temperature Observed Temp 1.2 °C Correction Factor: 0 °C Final Temp: 1.2 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>10D2981</u>	<u>MLC 5/24/19</u>
Chain of Custody Present:	/			1.	
Chain of Custody Filled Out:	/			2.	
Chain of Custody Relinquished:	/			3.	
Sampler Name & Signature on COC:	/			4.	
Sample Labels match COC:	/			5.	
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	/			6.	
Short Hold Time Analysis (<72hr remaining):		/		7.	
Rush Turn Around Time Requested:	/			8.	
Sufficient Volume:	/			9.	
Correct Containers Used:	/			10.	
-Pace Containers Used:	/				
Containers Intact:	/			11.	
Orthophosphate field filtered			/	12.	
Hex Cr Aqueous sample field filtered			/	13.	
Organic Samples checked for dechlorination:			/	14.	
Filtered volume received for Dissolved tests	/			15.	
All containers have been checked for preservation.	/			16.	
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	/			Initial when completed <u>MLC</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/	17.	
Trip Blank Present:			/	18.	
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

June 03, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296321

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on May 24, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296321

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296321

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30296321001	RW07-MWI	Water	05/24/19 09:45	05/24/19 23:00
30296321002	RW07-MWS	Water	05/24/19 10:25	05/24/19 23:00
30296321003	RW10-MWI	Water	05/24/19 11:20	05/24/19 23:00
30296321004	RW08-MWI	Water	05/24/19 13:20	05/24/19 23:00
30296321005	RW08-MWS	Water	05/24/19 14:40	05/24/19 23:00

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296321

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30296321001	RW07-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296321002	RW07-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296321003	RW10-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296321004	RW08-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296321005	RW08-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296321

Method: EPA 6010C
Description: 6010C MET ICP
Client: EnviroAnalytics Group, LLC
Date: June 03, 2019

General Information:

5 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

QC Batch: 344750

B: Analyte was detected in the associated method blank.

- BLANK for HBN 344750 [MPRP/258 (Lab ID: 1677524)]
 - Cadmium

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296321

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: June 03, 2019

General Information:

5 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296321

Method: SM 2310B-2011

Description: 2310B Acidity, Total

Client: EnviroAnalytics Group, LLC

Date: June 03, 2019

General Information:

5 samples were analyzed for SM 2310B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296321

Method: SM 2320B-2011

Description: 2320B Alkalinity

Client: EnviroAnalytics Group, LLC

Date: June 03, 2019

General Information:

5 samples were analyzed for SM 2320B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296321

Sample: RW07-MWI		Lab ID: 30296321001		Collected: 05/24/19 09:45	Received: 05/24/19 23:00	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	445	ug/L	3.0	0.34	1	05/30/19 06:26	05/30/19 20:45	7440-43-9	
Zinc	132000	ug/L	1000	238	100	05/30/19 06:26	05/30/19 21:32	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	453	ug/L	3.0	0.34	1	05/30/19 06:24	05/30/19 18:58	7440-43-9	
Zinc, Dissolved	136000	ug/L	1000	238	100	05/30/19 06:24	05/30/19 19:46	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO ₃ pH8.3)	676	mg/L	10.0	10.0	1		05/31/19 19:51		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO ₃ pH4.5)	30.0	mg/L	10.0	1.0	1		05/31/19 19:51		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296321

Sample: RW07-MWS		Lab ID: 30296321002		Collected: 05/24/19 10:25	Received: 05/24/19 23:00	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	3.0	ug/L	3.0	0.34	1	05/30/19 06:26	05/30/19 20:51	7440-43-9	B	
Zinc	151	ug/L	10.0	2.4	1	05/30/19 06:26	05/30/19 20:51	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	2.9J	ug/L	3.0	0.34	1	05/30/19 06:24	05/30/19 19:04	7440-43-9		
Zinc, Dissolved	137	ug/L	10.0	2.4	1	05/30/19 06:24	05/30/19 19:04	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO ₃ pH8.3)	10.0 U	mg/L	10.0	10.0	1		05/31/19 19:53			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO ₃ pH4.5)	72.0	mg/L	10.0	1.0	1		05/31/19 19:53			

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296321

Sample: RW10-MWI		Lab ID: 30296321003		Collected: 05/24/19 11:20	Received: 05/24/19 23:00	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0	ug/L	3.0	0.34	1	05/30/19 06:26	05/30/19 20:53	7440-43-9	B
Zinc	6150	ug/L	1000	238	100	05/30/19 06:26	05/30/19 21:35	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	0.86J	ug/L	3.0	0.34	1	05/30/19 06:24	05/30/19 19:06	7440-43-9	
Zinc, Dissolved	5560	ug/L	1000	238	100	05/30/19 06:24	05/30/19 19:48	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO3 pH8.3)	98.0	mg/L	10.0	10.0	1		05/31/19 19:54		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO3 pH4.5)	78.0	mg/L	10.0	1.0	1		05/31/19 19:54		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296321

Sample: RW08-MWI		Lab ID: 30296321004		Collected: 05/24/19 13:20	Received: 05/24/19 23:00	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	05/30/19 06:26	05/30/19 20:56	7440-43-9	
Zinc	43.9	ug/L	10.0	2.4	1	05/30/19 06:26	05/30/19 20:56	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	05/30/19 06:24	05/30/19 19:09	7440-43-9	
Zinc, Dissolved	10.0 U	ug/L	10.0	2.4	1	05/30/19 06:24	05/30/19 19:09	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO3 pH8.3)	142	mg/L	10.0	10.0	1		05/31/19 19:55		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO3 pH4.5)	64.0	mg/L	10.0	1.0	1		05/31/19 19:55		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296321

Sample: RW08-MWS		Lab ID: 30296321005		Collected: 05/24/19 14:40	Received: 05/24/19 23:00	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	1.2J	ug/L	3.0	0.34	1	05/30/19 06:26	05/30/19 20:59	7440-43-9	B	
Zinc	12500	ug/L	1000	238	100	05/30/19 06:26	05/30/19 21:37	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	0.86J	ug/L	3.0	0.34	1	05/30/19 06:24	05/30/19 19:12	7440-43-9		
Zinc, Dissolved	11300	ug/L	1000	238	100	05/30/19 06:24	05/30/19 19:51	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO ₃ pH8.3)	20.0	mg/L	10.0	10.0	1		05/31/19 19:56			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO ₃ pH4.5)	32.0	mg/L	10.0	1.0	1		05/31/19 19:56			

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296321

QC Batch: 344750 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30296321001, 30296321002, 30296321003, 30296321004, 30296321005

METHOD BLANK: 1677524 Matrix: Water
Associated Lab Samples: 30296321001, 30296321002, 30296321003, 30296321004, 30296321005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	0.37J	3.0	0.34	05/30/19 20:11	
Zinc	ug/L	10.0 U	10.0	2.4	05/30/19 20:11	

LABORATORY CONTROL SAMPLE: 1677525

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	512	102	80-120	
Zinc	ug/L	500	501	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1677527 1677528

Parameter	Units	30296552003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	4.7	500	500	536	551	106	109	75-125	3	20	
Zinc	ug/L	68400	500	500	68800	67700	74	-146	75-125	2	20 M6	

SAMPLE DUPLICATE: 1677526

Parameter	Units	30296552003 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	4.7	4.5	5	20	
Zinc	ug/L	68400	66200	3	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296321

QC Batch: 344749 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30296321001, 30296321002, 30296321003, 30296321004, 30296321005

METHOD BLANK: 1677519 Matrix: Water
Associated Lab Samples: 30296321001, 30296321002, 30296321003, 30296321004, 30296321005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	05/30/19 18:18	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	05/30/19 18:18	

LABORATORY CONTROL SAMPLE: 1677520

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	442	88	80-120	
Zinc, Dissolved	ug/L	500	436	87	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1677522 1677523

Parameter	Units	30296552003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	ug/L	3.8	500	500	500	519	99	103	75-125	4	20	
Zinc, Dissolved	ug/L	64200	500	500	63200	64400	-200	52	75-125	2	20 M6	

SAMPLE DUPLICATE: 1677521

Parameter	Units	30296552003 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	3.8	4.0	5	20	
Zinc, Dissolved	ug/L	64200	65700	2	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296321

QC Batch: 344983

Analysis Method: SM 2310B-2011

QC Batch Method: SM 2310B-2011

Analysis Description: 2310B Acidity, Total

Associated Lab Samples: 30296321001, 30296321002, 30296321003, 30296321004, 30296321005

METHOD BLANK: 1678393

Matrix: Water

Associated Lab Samples: 30296321001, 30296321002, 30296321003, 30296321004, 30296321005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	10.0 U	10.0	10.0	05/31/19 19:12	

LABORATORY CONTROL SAMPLE: 1678395

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	100	90.0	90	85-115	

SAMPLE DUPLICATE: 1678394

Parameter	Units	30295461001 Result	Dup Result	RPD	Max RPD	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	100	102	2	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296321

QC Batch: 344982 Analysis Method: SM 2320B-2011
QC Batch Method: SM 2320B-2011 Analysis Description: 2320B Alkalinity
Associated Lab Samples: 30296321001, 30296321002, 30296321003, 30296321004, 30296321005

METHOD BLANK: 1678388 Matrix: Water
Associated Lab Samples: 30296321001, 30296321002, 30296321003, 30296321004, 30296321005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	10.0 U	10.0	1.0	05/31/19 19:37	

LABORATORY CONTROL SAMPLE: 1678389

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	20	20.0	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1679457 1679458

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		30295606004 Result	Spike Conc.	Spike Conc.	Conc.								
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	10.0	50	50	50	60.0	62.0	100	104	85-115	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296321

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296321

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30296321001	RW07-MWI	EPA 3005A	344750	EPA 6010C	344893
30296321002	RW07-MWS	EPA 3005A	344750	EPA 6010C	344893
30296321003	RW10-MWI	EPA 3005A	344750	EPA 6010C	344893
30296321004	RW08-MWI	EPA 3005A	344750	EPA 6010C	344893
30296321005	RW08-MWS	EPA 3005A	344750	EPA 6010C	344893
30296321001	RW07-MWI	EPA 3005A	344749	EPA 6010C	344892
30296321002	RW07-MWS	EPA 3005A	344749	EPA 6010C	344892
30296321003	RW10-MWI	EPA 3005A	344749	EPA 6010C	344892
30296321004	RW08-MWI	EPA 3005A	344749	EPA 6010C	344892
30296321005	RW08-MWS	EPA 3005A	344749	EPA 6010C	344892
30296321001	RW07-MWI	SM 2310B-2011	344983		
30296321002	RW07-MWS	SM 2310B-2011	344983		
30296321003	RW10-MWI	SM 2310B-2011	344983		
30296321004	RW08-MWI	SM 2310B-2011	344983		
30296321005	RW08-MWS	SM 2310B-2011	344983		
30296321001	RW07-MWI	SM 2320B-2011	344982		
30296321002	RW07-MWS	SM 2320B-2011	344982		
30296321003	RW10-MWI	SM 2320B-2011	344982		
30296321004	RW08-MWI	SM 2320B-2011	344982		
30296321005	RW08-MWS	SM 2320B-2011	344982		

REPORT OF LABORATORY ANALYSIS

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company: EnviroAnalytics Group		Report To: James Calenda		Attention: Laura Sargent	
Address: 1600 Sparrows Point Blvd, Suite B2		Copy To: Stewart Kabis		Company Name: EnviroAnalytics Group	
Address: Sparrows Point, MD 21219		Purchase Order No.: EAG-SPT-645A		Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131	
Email To: jcalenda@enviroanalyticsgroup.com		Project Name: Rod and Wire Mill GW Sampling		Pace Quote Reference: Samantha Bayura	
Phone: 314-620-3066		Project Number: 180227M-1-1		Pace Profile #:	
Requested Due Date/FAT: 5 Day		Valid Matrix Codes		REGULATORY AGENCY	
		DW DRINKING WATER WT WASTE WATER WW WASTE WATER P PRODUCT SL SOIL/SOLID OIL WP WIRE AIR OTHER TS TISSUE		<input type="checkbox"/> NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER	
		SAMPLE ID (A-Z, 0-9 / .)		Site Location: MD STATE:	
		Sample IDs MUST BE UNIQUE		Requested Analysis Filtered (Y/N):	

ITEM #	Valid Matrix Codes	COLLECTED		SAMPLE TYPE (G=GRAB C-COMP)	MATRIX CODE (see valid codes to left)	SAMPLE TEMP AT COLLECTION		# OF CONTAINERS	Preservatives	Analysis Test	Total Cadmium 6010	Total Zinc 6010	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
		COMPOSITE START	COMPOSITE END/GRAB			DATE	TIME							
1	RW07-MWI			WTG		5/24/19	945	3	Unpreserved	X	X	X	X	001
2	RW07-MWS			WTG		1025		3	H ₂ SO ₄	X	X	X	X	002
3	RW08-MWI			WTG		1120		3	HNO ₃	X	X	X	X	003
4	RW08-MWS			WTG		1320		3	HCl	X	X	X	X	004
5	RW08-MWS			WTG		1440		3	NaOH	X	X	X	X	005
6									Na ₂ S ₂ O ₃					
7									Other					
8									Methanol					
9														
10														
11														
12														

NO#: 30296321

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
Data page (4)	James Calenda	5/24/19	945	James Calenda	5/24/19	1700	Y
	James Calenda	5/24/19	940	James Calenda	5/24/19	1930	Y
	James Calenda	5/24/19	2300	James Calenda	5/24/19	2300	Y

Temp in °C

Received on Ice (Y/N)

Used/ Sealed Cooler (Y/N)

Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: James Calenda

DATE Signed: 5/24/19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics

Project # 30296321

Courier: Fed Ex UPS USPS Client Commercial Pace, Other _____

Label DK
LIMS Login DK

Tracking #: N/A

Custody Seal on Cooler/Box Present: yes no Seals Intact: yes no

Thermometer Used 10 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.5 °C Correction Factor: 0 °C Final Temp: 1.5 °C
Temp should be above freezing to 6°C

pH paper Lot# 1004281 Date and Initials of person examining contents: DK 05-25-19

Comments:

	Yes	No	N/A	
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4.
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5.
-Includes date/time/ID Matrix: <u>WT</u>				
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6.
Short Hold Time Analysis (<72hr remaining):	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7.
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8.
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9.
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10.
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11.
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	12.
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13.
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14.
Filtered volume received for Dissolved tests	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	15.
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16.
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix				
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed: <u>DK</u> Date/time of preservation: _____
				Lot # of added preservative: _____
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	17.
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	18.
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed: <u>DK</u> Date: _____

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)
*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

June 05, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296552

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on May 28, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296552

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296552

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30296552001	RW03-MWI	Water	05/28/19 10:10	05/28/19 23:30
30296552002	RW03-MWS	Water	05/28/19 11:10	05/28/19 23:30
30296552003	RW09-MWI	Water	05/28/19 14:28	05/28/19 23:30
30296552004	RW09-MWS	Water	05/28/19 14:55	05/28/19 23:30
30296552005	Duplicate	Water	05/28/19 00:01	05/28/19 23:30

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296552

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30296552001	RW03-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296552002	RW03-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296552003	RW09-MWI	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296552004	RW09-MWS	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296552005	Duplicate	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296552

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: June 05, 2019

General Information:

5 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296552

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: June 05, 2019

General Information:

5 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296552

Method: SM 2310B-2011

Description: 2310B Acidity, Total

Client: EnviroAnalytics Group, LLC

Date: June 05, 2019

General Information:

5 samples were analyzed for SM 2310B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296552

Method: SM 2320B-2011

Description: 2320B Alkalinity

Client: EnviroAnalytics Group, LLC

Date: June 05, 2019

General Information:

5 samples were analyzed for SM 2320B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 345377

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30296124001,30296552003

ML: Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

- MS (Lab ID: 1680457)
 - Alkalinity, Total (CaCO₃ pH4.5)
- MSD (Lab ID: 1680458)
 - Alkalinity, Total (CaCO₃ pH4.5)

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296552

Sample: RW03-MWI		Lab ID: 30296552001		Collected: 05/28/19 10:10	Received: 05/28/19 23:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	536	ug/L	3.0	0.34	1	05/30/19 06:26	05/30/19 20:29	7440-43-9		
Zinc	14200	ug/L	1000	238	100	05/30/19 06:26	05/30/19 21:22	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	449	ug/L	3.0	0.34	1	05/30/19 06:24	05/30/19 18:39	7440-43-9		
Zinc, Dissolved	13300	ug/L	1000	238	100	05/30/19 06:24	05/30/19 19:36	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO ₃ pH8.3)	170	mg/L	10.0	10.0	1		06/04/19 18:49			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO ₃ pH4.5)	50.0	mg/L	10.0	1.0	1		06/04/19 18:49			

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296552

Sample: RW03-MWS		Lab ID: 30296552002		Collected: 05/28/19 11:10	Received: 05/28/19 23:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	18.9	ug/L	3.0	0.34	1	05/30/19 06:26	05/30/19 20:32	7440-43-9		
Zinc	20100	ug/L	1000	238	100	05/30/19 06:26	05/30/19 21:25	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	17.9	ug/L	3.0	0.34	1	05/30/19 06:24	05/30/19 18:43	7440-43-9		
Zinc, Dissolved	18700	ug/L	1000	238	100	05/30/19 06:24	05/30/19 19:38	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO ₃ pH8.3)	30.0	mg/L	10.0	10.0	1		06/04/19 18:50			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO ₃ pH4.5)	5.0J	mg/L	10.0	1.0	1		06/04/19 18:50			

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296552

Sample: RW09-MWI		Lab ID: 30296552003		Collected: 05/28/19 14:28	Received: 05/28/19 23:30	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	4.7	ug/L	3.0	0.34	1	05/30/19 06:26	05/30/19 20:15	7440-43-9		
Zinc	68400	ug/L	1000	238	100	05/30/19 06:26	05/30/19 21:01	7440-66-6	M6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	3.8	ug/L	3.0	0.34	1	05/30/19 06:24	05/30/19 18:23	7440-43-9		
Zinc, Dissolved	64200	ug/L	1000	238	100	05/30/19 06:24	05/30/19 19:14	7440-66-6	M6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO ₃ pH8.3)	900	mg/L	10.0	10.0	1		06/04/19 18:51			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO ₃ pH4.5)	30.0	mg/L	10.0	1.0	1		06/04/19 18:51		ML	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296552

Sample: RW09-MWS		Lab ID: 30296552004		Collected: 05/28/19 14:55	Received: 05/28/19 23:30	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	13.2	ug/L	3.0	0.34	1	05/30/19 06:26	05/30/19 20:41	7440-43-9	
Zinc	15300	ug/L	1000	238	100	05/30/19 06:26	05/30/19 21:27	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	12.0	ug/L	3.0	0.34	1	05/30/19 06:24	05/30/19 18:53	7440-43-9	
Zinc, Dissolved	14100	ug/L	1000	238	100	05/30/19 06:24	05/30/19 19:41	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO3 pH8.3)	10.0 U	mg/L	10.0	10.0	1		06/04/19 18:54		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO3 pH4.5)	60.0	mg/L	10.0	1.0	1		06/04/19 18:54		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296552

Sample: Duplicate		Lab ID: 30296552005		Collected: 05/28/19 00:01	Received: 05/28/19 23:30	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	512	ug/L	3.0	0.34	1	05/30/19 06:26	05/30/19 20:43	7440-43-9	
Zinc	13400	ug/L	1000	238	100	05/30/19 06:26	05/30/19 21:30	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	464	ug/L	3.0	0.34	1	05/30/19 06:24	05/30/19 18:56	7440-43-9	
Zinc, Dissolved	13900	ug/L	1000	238	100	05/30/19 06:24	05/30/19 19:43	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO ₃ pH8.3)	150	mg/L	10.0	10.0	1		06/04/19 18:55		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO ₃ pH4.5)	50.0	mg/L	10.0	1.0	1		06/04/19 18:55		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296552

QC Batch: 344750 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30296552001, 30296552002, 30296552003, 30296552004, 30296552005

METHOD BLANK: 1677524 Matrix: Water
Associated Lab Samples: 30296552001, 30296552002, 30296552003, 30296552004, 30296552005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	0.37J	3.0	0.34	05/30/19 20:11	
Zinc	ug/L	10.0 U	10.0	2.4	05/30/19 20:11	

LABORATORY CONTROL SAMPLE: 1677525

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	512	102	80-120	
Zinc	ug/L	500	501	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1677527 1677528

Parameter	Units	30296552003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	4.7	500	500	536	551	106	109	75-125	3	20	
Zinc	ug/L	68400	500	500	68800	67700	74	-146	75-125	2	20 M6	

SAMPLE DUPLICATE: 1677526

Parameter	Units	30296552003 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	4.7	4.5	5	20	
Zinc	ug/L	68400	66200	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296552

QC Batch: 344749 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30296552001, 30296552002, 30296552003, 30296552004, 30296552005

METHOD BLANK: 1677519 Matrix: Water
Associated Lab Samples: 30296552001, 30296552002, 30296552003, 30296552004, 30296552005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	05/30/19 18:18	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	05/30/19 18:18	

LABORATORY CONTROL SAMPLE: 1677520

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	442	88	80-120	
Zinc, Dissolved	ug/L	500	436	87	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1677522 1677523

Parameter	Units	30296552003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium, Dissolved	ug/L	3.8	500	500	500	519	99	103	75-125	4	20	
Zinc, Dissolved	ug/L	64200	500	500	63200	64400	-200	52	75-125	2	20 M6	

SAMPLE DUPLICATE: 1677521

Parameter	Units	30296552003 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	3.8	4.0	5	20	
Zinc, Dissolved	ug/L	64200	65700	2	20	

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REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296552

QC Batch: 345379 Analysis Method: SM 2310B-2011
QC Batch Method: SM 2310B-2011 Analysis Description: 2310B Acidity, Total
Associated Lab Samples: 30296552001, 30296552002, 30296552003, 30296552004, 30296552005

METHOD BLANK: 1680463 Matrix: Water
Associated Lab Samples: 30296552001, 30296552002, 30296552003, 30296552004, 30296552005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	10.0 U	10.0	10.0	06/04/19 18:48	

LABORATORY CONTROL SAMPLE: 1680465

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	100	90.0	90	85-115	

SAMPLE DUPLICATE: 1681217

Parameter	Units	30296552003 Result	Dup Result	RPD	Max RPD	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	900	910	1	20	

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296552

QC Batch: 345377 Analysis Method: SM 2320B-2011
QC Batch Method: SM 2320B-2011 Analysis Description: 2320B Alkalinity
Associated Lab Samples: 30296552001, 30296552002, 30296552003, 30296552004, 30296552005

METHOD BLANK: 1680455 Matrix: Water
Associated Lab Samples: 30296552001, 30296552002, 30296552003, 30296552004, 30296552005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total (CaCO3 pH4.5)	mg/L	10.0 U	10.0	1.0	06/04/19 18:48	

LABORATORY CONTROL SAMPLE: 1680456

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total (CaCO3 pH4.5)	mg/L	20	20.0	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1680457 1680458

Parameter	Units	30296552003		MSD		MS		MSD		% Rec Limits	RPD	Max RPD	Qual
		Result	Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec					
Alkalinity, Total (CaCO3 pH4.5)	mg/L	30.0	50	50	40.0	40.0	20	20	85-115	0	20	ML	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1681213 1681214

Parameter	Units	30296124001		MSD		MS		MSD		% Rec Limits	RPD	Max RPD	Qual
		Result	Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec					
Alkalinity, Total (CaCO3 pH4.5)	mg/L	20.0	50	50	70.0	70.0	100	100	85-115	0	20		

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REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296552

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

ML Matrix spike recovery and/or matrix spike duplicate recovery was below laboratory control limits. Result may be biased low.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296552

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30296552001	RW03-MWI	EPA 3005A	344750	EPA 6010C	344893
30296552002	RW03-MWS	EPA 3005A	344750	EPA 6010C	344893
30296552003	RW09-MWI	EPA 3005A	344750	EPA 6010C	344893
30296552004	RW09-MWS	EPA 3005A	344750	EPA 6010C	344893
30296552005	Duplicate	EPA 3005A	344750	EPA 6010C	344893
30296552001	RW03-MWI	EPA 3005A	344749	EPA 6010C	344892
30296552002	RW03-MWS	EPA 3005A	344749	EPA 6010C	344892
30296552003	RW09-MWI	EPA 3005A	344749	EPA 6010C	344892
30296552004	RW09-MWS	EPA 3005A	344749	EPA 6010C	344892
30296552005	Duplicate	EPA 3005A	344749	EPA 6010C	344892
30296552001	RW03-MWI	SM 2310B-2011	345379		
30296552002	RW03-MWS	SM 2310B-2011	345379		
30296552003	RW09-MWI	SM 2310B-2011	345379		
30296552004	RW09-MWS	SM 2310B-2011	345379		
30296552005	Duplicate	SM 2310B-2011	345379		
30296552001	RW03-MWI	SM 2320B-2011	345377		
30296552002	RW03-MWS	SM 2320B-2011	345377		
30296552003	RW09-MWI	SM 2320B-2011	345377		
30296552004	RW09-MWS	SM 2320B-2011	345377		
30296552005	Duplicate	SM 2320B-2011	345377		

REPORT OF LABORATORY ANALYSIS

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Section A
Required Client Information:

Company: **EnviroAnalytics Group**
 Address: **1600 Sparrows Point Blvd, Suite B2**
 Sparrows Point, MD 21219
 Email To: **lcalenda@enviroanalyticsgroup.com**
 Phone: **314-620-3056** Fax:
 Requested Due Date/TAT: **5 Day**

Section B
Invoice # **30296552**
Required Project Information:

Report To: **James Calenda**
 Copy To: **Stewart Kabis**
 Purchase Order No.: **EAG-SP-6452**
 Project Name: **Rod and Wire Mill GW Sampling**
 Project Number: **180227 M-1-1**

Attention: **Laura Sargent**
 Company Name: **EnviroAnalytics Group**
 Address: **1850 Des Peres Road, Suite 303 St. Louis, MO 63131**
 Regulatory Agency: NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER
 Site Location: **MD**
 State: **MD**

#	ITEM	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WATER WT WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIPE WP AIR AR OTHER OT TISSUE TS	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₈ Methanol Other	Requested Analysis: Filtered: (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
					COMPOSITE START	COMPOSITE END/DUR						
1	RW03 - MWI		WTG	WTG	5/29/19	1010	3			X	X	001
2	RW03 - MWS		WTG	WTG	1110		3			X	X	002
3	RW09 - MWI		WTG	WTG	1428		9			X	X	MS/MSD 003
4	RW09 - MWS		WTG	WTG	1455		3			X	X	004
5	Duplicate		WTG	WTG			3			X	X	005
6												
7												
8												
9												
10												
11												
12												

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
data pgs (4)	James Calenda	5/29/19		Laura Sargent	5/29/19	1717	
	James Calenda	5/28/19	1935	RDS FACE	5/28/19	1945	Y
	RDS FACE	5/28/19	2330	BAR ALUMINUM	5/28/19	2330	Y N
							Y
							N
							Y

Temp in °C	
Received on	
Ice (Y/N)	
Today Sealed	
Cooler (Y/N)	
Samples Intact	

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Lisa Perm DATE Signed: 5/28/19
 SIGNATURE OF SAMPLER: [Signature]

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviroanalytics

Project # 30296552

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals Intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.4 °C Correction Factor: 0.1 °C Final Temp: 1.3 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>10D7281</u>	<u>BLM 5-24-17</u>
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Short Hold Time Analysis (<72hr remaining):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Filtered volume received for Dissolved tests	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed <u>BLM</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

June 06, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296794

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on May 29, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296794

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30296794001	RW02-MWI	Water	05/29/19 09:35	05/29/19 23:45
30296794002	RW02-MWS	Water	05/29/19 10:15	05/29/19 23:45
30296794003	RW01-MWI	Water	05/29/19 11:20	05/29/19 23:45
30296794004	RW01-MWS	Water	05/29/19 13:50	05/29/19 23:45
30296794005	RW19-MWI	Water	05/29/19 14:40	05/29/19 23:45
30296794006	RW19-MWS	Water	05/29/19 15:15	05/29/19 23:45
30296794007	Field Blank	Water	05/29/19 15:30	05/29/19 23:45

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30296794001	RW02-MWI	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296794002	RW02-MWS	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296794003	RW01-MWI	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296794004	RW01-MWS	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296794005	RW19-MWI	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296794006	RW19-MWS	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1
30296794007	Field Blank	EPA 6010C	CTS	2
		SM 2310B-2011	ZMH	1
		SM 2320B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: June 06, 2019

General Information:

7 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 345082

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30296794001,30297089004

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 1678955)
 - Zinc
- MSD (Lab ID: 1678956)
 - Zinc

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: June 06, 2019

General Information:

6 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Method: SM 2310B-2011

Description: 2310B Acidity, Total

Client: EnviroAnalytics Group, LLC

Date: June 06, 2019

General Information:

7 samples were analyzed for SM 2310B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Method: SM 2320B-2011

Description: 2320B Alkalinity

Client: EnviroAnalytics Group, LLC

Date: June 06, 2019

General Information:

7 samples were analyzed for SM 2320B-2011. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Sample: RW02-MWI		Lab ID: 30296794001		Collected: 05/29/19 09:35	Received: 05/29/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	803	ug/L	3.0	0.34	1	05/31/19 15:38	06/03/19 10:00	7440-43-9		
Zinc	58700	ug/L	1000	238	100	05/31/19 15:38	06/03/19 10:59	7440-66-6	M6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	785	ug/L	3.0	0.34	1	05/31/19 14:51	06/03/19 08:22	7440-43-9		
Zinc, Dissolved	56600	ug/L	1000	238	100	05/31/19 14:51	06/03/19 08:52	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO ₃ pH8.3)	260	mg/L	10.0	10.0	1		06/05/19 19:45			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO ₃ pH4.5)	80.0	mg/L	10.0	1.0	1		06/05/19 19:45			

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Sample: RW02-MWS		Lab ID: 30296794002		Collected: 05/29/19 10:15	Received: 05/29/19 23:45	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	2.0J	ug/L	3.0	0.34	1	05/31/19 15:38	06/03/19 10:14	7440-43-9	
Zinc	22400	ug/L	1000	238	100	05/31/19 15:38	06/03/19 11:14	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	1.7J	ug/L	3.0	0.34	1	05/31/19 14:51	06/03/19 08:25	7440-43-9	
Zinc, Dissolved	21900	ug/L	1000	238	100	05/31/19 14:51	06/03/19 08:55	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO ₃ pH8.3)	70.0	mg/L	10.0	10.0	1		06/05/19 19:47		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity,Total (CaCO ₃ pH4.5)	20.0	mg/L	10.0	1.0	1		06/05/19 19:47		

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Sample: RW01-MWI		Lab ID: 30296794003		Collected: 05/29/19 11:20	Received: 05/29/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	24.4	ug/L	3.0	0.34	1	05/31/19 15:38	06/03/19 10:16	7440-43-9		
Zinc	5980	ug/L	1000	238	100	05/31/19 15:38	06/03/19 11:16	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	19.4	ug/L	3.0	0.34	1	05/31/19 14:51	06/03/19 08:27	7440-43-9		
Zinc, Dissolved	5670	ug/L	1000	238	100	05/31/19 14:51	06/03/19 08:57	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO3 pH8.3)	320	mg/L	10.0	10.0	1		06/05/19 19:48			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO3 pH4.5)	40.0	mg/L	10.0	1.0	1		06/05/19 19:48			

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Sample: RW01-MWS		Lab ID: 30296794004		Collected: 05/29/19 13:50	Received: 05/29/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	4.8	ug/L	3.0	0.34	1	05/31/19 15:38	06/03/19 10:24	7440-43-9		
Zinc	16100	ug/L	1000	238	100	05/31/19 15:38	06/03/19 11:19	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	4.7	ug/L	3.0	0.34	1	05/31/19 14:51	06/03/19 08:29	7440-43-9		
Zinc, Dissolved	16300	ug/L	1000	238	100	05/31/19 14:51	06/03/19 09:00	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO ₃ pH8.3)	80.0	mg/L	10.0	10.0	1		06/05/19 19:50			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO ₃ pH4.5)	5.0J	mg/L	10.0	1.0	1		06/05/19 19:50			

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296794

Sample: RW19-MWI		Lab ID: 30296794005		Collected: 05/29/19 14:40	Received: 05/29/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	2440	ug/L	300	34.0	100	05/31/19 15:38	06/03/19 11:29	7440-43-9		
Zinc	7270000	ug/L	100000	23800	10000	05/31/19 15:38	06/03/19 11:32	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	2420	ug/L	300	34.0	100	05/31/19 14:51	06/03/19 09:02	7440-43-9		
Zinc, Dissolved	7280000	ug/L	100000	23800	10000	05/31/19 14:51	06/03/19 09:12	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO3 pH8.3)	9180	mg/L	10.0	10.0	1		06/05/19 19:51			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO3 pH4.5)	70.0	mg/L	10.0	1.0	1		06/05/19 19:51			

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Sample: RW19-MWS		Lab ID: 30296794006		Collected: 05/29/19 15:15	Received: 05/29/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	0.69J	ug/L	3.0	0.34	1	05/31/19 15:38	06/03/19 11:34	7440-43-9		
Zinc	3150	ug/L	10.0	2.4	1	05/31/19 15:38	06/03/19 11:34	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	05/31/19 14:51	06/03/19 09:05	7440-43-9		
Zinc, Dissolved	3180	ug/L	10.0	2.4	1	05/31/19 14:51	06/03/19 09:05	7440-66-6		
2310B Acidity, Total		Analytical Method: SM 2310B-2011								
Acidity, Total (CaCO3 pH8.3)	110	mg/L	10.0	10.0	1		06/05/19 19:53			
2320B Alkalinity		Analytical Method: SM 2320B-2011								
Alkalinity,Total (CaCO3 pH4.5)	40.0	mg/L	10.0	1.0	1		06/05/19 19:53			

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Sample: Field Blank		Lab ID: 30296794007		Collected: 05/29/19 15:30		Received: 05/29/19 23:45		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	05/31/19 15:38	06/03/19 11:37	7440-43-9	
Zinc	8.7J	ug/L	10.0	2.4	1	05/31/19 15:38	06/03/19 11:37	7440-66-6	
2310B Acidity, Total		Analytical Method: SM 2310B-2011							
Acidity, Total (CaCO3 pH8.3)	10.0 U	mg/L	10.0	10.0	1		06/05/19 19:54		
2320B Alkalinity		Analytical Method: SM 2320B-2011							
Alkalinity, Total (CaCO3 pH4.5)	10.0 U	mg/L	10.0	1.0	1		06/05/19 19:54		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296794

QC Batch: 345082 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30296794001, 30296794002, 30296794003, 30296794004, 30296794005, 30296794006, 30296794007

METHOD BLANK: 1678950 Matrix: Water
Associated Lab Samples: 30296794001, 30296794002, 30296794003, 30296794004, 30296794005, 30296794006, 30296794007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	06/03/19 09:55	
Zinc	ug/L	10.0 U	10.0	2.4	06/03/19 09:55	

LABORATORY CONTROL SAMPLE: 1678951

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	498	100	80-120	
Zinc	ug/L	500	493	99	80-120	

MATRIX SPIKE SAMPLE: 1678953

Parameter	Units	30297089004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	1.8J	500	519	103	75-125	
Zinc	ug/L	32.6	500	522	98	75-125	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1678955 1678956

Parameter	Units	30296794001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	803	500	500	1320	1310	104	101	75-125	1	20	
Zinc	ug/L	58700	500	500	58200	59800	-86	220	75-125	3	20 M1	

SAMPLE DUPLICATE: 1678952

Parameter	Units	30297089004 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	1.8J	2.0J		20	
Zinc	ug/L	32.6	37.2	13	20	

SAMPLE DUPLICATE: 1678954

Parameter	Units	30296794001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	803	811	1	20	
Zinc	ug/L	58700	58300	1	20	

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296794

QC Batch: 345080 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30296794001, 30296794002, 30296794003, 30296794004, 30296794005, 30296794006

METHOD BLANK: 1678941 Matrix: Water
Associated Lab Samples: 30296794001, 30296794002, 30296794003, 30296794004, 30296794005, 30296794006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	06/03/19 08:47	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	06/03/19 08:47	

LABORATORY CONTROL SAMPLE: 1678942

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	470	94	80-120	
Zinc, Dissolved	ug/L	500	463	93	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1678944 1678945

Parameter	Units	30297089001		MS		MSD		% Rec Limits	RPD	Max RPD	Qual
		Result	Spike Conc.	Result	Spike Conc.	Result	Result				
Cadmium, Dissolved	ug/L	3.0 U	500	500	502	496	100	99	75-125	1	20
Zinc, Dissolved	ug/L	9.7J	500	500	494	485	97	95	75-125	2	20

SAMPLE DUPLICATE: 1678943

Parameter	Units	30297089001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0 U		20	
Zinc, Dissolved	ug/L	9.7J	9.7J		20	

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

QC Batch: 345595

Analysis Method: SM 2310B-2011

QC Batch Method: SM 2310B-2011

Analysis Description: 2310B Acidity, Total

Associated Lab Samples: 30296794001, 30296794002, 30296794003, 30296794004, 30296794005, 30296794006, 30296794007

METHOD BLANK: 1681229

Matrix: Water

Associated Lab Samples: 30296794001, 30296794002, 30296794003, 30296794004, 30296794005, 30296794006, 30296794007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	10.0 U	10.0	10.0	06/05/19 19:43	

LABORATORY CONTROL SAMPLE: 1681231

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	100	92.0	92	85-115	

SAMPLE DUPLICATE: 1681230

Parameter	Units	30296794001 Result	Dup Result	RPD	Max RPD	Qualifiers
Acidity, Total (CaCO3 pH8.3)	mg/L	260	260	0	20	

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

QC Batch: 345593

Analysis Method: SM 2320B-2011

QC Batch Method: SM 2320B-2011

Analysis Description: 2320B Alkalinity

Associated Lab Samples: 30296794001, 30296794002, 30296794003, 30296794004, 30296794005, 30296794006, 30296794007

METHOD BLANK: 1681219

Matrix: Water

Associated Lab Samples: 30296794001, 30296794002, 30296794003, 30296794004, 30296794005, 30296794006, 30296794007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	10.0 U	10.0	1.0	06/05/19 19:43	

LABORATORY CONTROL SAMPLE: 1681220

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	20	20.0	100	85-115	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1681221 1681222

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		30296794001 Result	Spike Conc.	Spike Conc.	Conc.								
Alkalinity, Total (CaCO ₃ pH4.5)	mg/L	80.0	50	50	130	130	100	100	85-115	0	20		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30296794

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M1 Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30296794

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30296794001	RW02-MWI	EPA 3005A	345082	EPA 6010C	345168
30296794002	RW02-MWS	EPA 3005A	345082	EPA 6010C	345168
30296794003	RW01-MWI	EPA 3005A	345082	EPA 6010C	345168
30296794004	RW01-MWS	EPA 3005A	345082	EPA 6010C	345168
30296794005	RW19-MWI	EPA 3005A	345082	EPA 6010C	345168
30296794006	RW19-MWS	EPA 3005A	345082	EPA 6010C	345168
30296794007	Field Blank	EPA 3005A	345082	EPA 6010C	345168
30296794001	RW02-MWI	EPA 3005A	345080	EPA 6010C	345167
30296794002	RW02-MWS	EPA 3005A	345080	EPA 6010C	345167
30296794003	RW01-MWI	EPA 3005A	345080	EPA 6010C	345167
30296794004	RW01-MWS	EPA 3005A	345080	EPA 6010C	345167
30296794005	RW19-MWI	EPA 3005A	345080	EPA 6010C	345167
30296794006	RW19-MWS	EPA 3005A	345080	EPA 6010C	345167
30296794001	RW02-MWI	SM 2310B-2011	345595		
30296794002	RW02-MWS	SM 2310B-2011	345595		
30296794003	RW01-MWI	SM 2310B-2011	345595		
30296794004	RW01-MWS	SM 2310B-2011	345595		
30296794005	RW19-MWI	SM 2310B-2011	345595		
30296794006	RW19-MWS	SM 2310B-2011	345595		
30296794007	Field Blank	SM 2310B-2011	345595		
30296794001	RW02-MWI	SM 2320B-2011	345593		
30296794002	RW02-MWS	SM 2320B-2011	345593		
30296794003	RW01-MWI	SM 2320B-2011	345593		
30296794004	RW01-MWS	SM 2320B-2011	345593		
30296794005	RW19-MWI	SM 2320B-2011	345593		
30296794006	RW19-MWS	SM 2320B-2011	345593		
30296794007	Field Blank	SM 2320B-2011	345593		

REPORT OF LABORATORY ANALYSIS

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The Chain-of-Custody is a LI



www.pacelabs.com



Section A

Required Client Information:
 Company: **EnviroAnalytics Group**
 Address: **1600 Sparrows Point Blvd, Suite B2**
 Sparrows Point, MD 21219
 Email To: **icalenda@enviroanalyticsgroup.com**
 Phone: **314-620-3056** Fax:
 Requested Due Date/TAT: **5 Day**

Section B

Required Project Information:
 Report To: **James Calenda**
 Copy To: **Stewart Kabis**
 Purchase Order No.: **EAG-SPT-6452**
 Project Name: **Roof and Wire Mill GW Sampling**
 Project Number: **180227M-17**

Attention: **Laura Sargent**
 Company Name: **EnviroAnalytics Group**
 Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
 Pace Quote Reference:
 Pace Project Manager: **Samantha Bayura**
 Pace Profile #:
 Site Location: **MD**
 STATE: **MD**

REGULATORY AGENCY
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER
 Residual Chlorine (Y/N)

Page: of

ITEM #	Section D Required Client Information		Section C Valid Matrix Codes		Section B COLLECTED		Section A SAMPLE TYPE (G=GRAB C=COMP)		Section F PRESERVATIVES			Section E ANALYSIS TESTS			Temp in °C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Samples Intact (Y/N)					
	MATRIX	CODE	DRINKING WATER	WASTE WATER	PRODUCT	SOIL/SOLID	START	END/GRAB	DATE	TIME	DATE	TIME	DATE	TIME					Temp in °C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Samples Intact (Y/N)	
1	RW02-MWI							WTG	5/29/19	9:35												001	
2	RW02-MWS							WTG	5/29/19	10:15													002
3	RW01-MWI							WTG	5/29/19	11:20													003
4	RW01-MWS							WTG	5/29/19	13:50													004
5	RW19-MWI							WTG	5/29/19	14:40													005
6	RW19-MWS							WTG	5/29/19	15:15													006
7	Field Blank							WTG	5/29/19	15:30													007

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Samples Intact (Y/N)
data plus	James Calenda	5/29/19	16:50	David Sargent	5/29/19	15:50				
	David Sargent	5/29/19	19:05	James Calenda	5/29/19	19:30				
	James Calenda	5/29/19	20:15	David Sargent	5/29/19	23:45	1.3	Y	N	Y

Requested Analysis Filtered (Y/N)

Temp in °C

Received on Ice (Y/N)

Custody Sealed (Y/N)

Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: **Lisa Penn**
 SIGNATURE of SAMPLER: *Lisa Penn*
 DATE Signed (MM/DD/YYYY): **5/29/19**

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviroanalytics

Project # 30296794

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label BLM
LIMS Login BLM

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals Intact: yes no

Thermometer Used 11 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.3 °C Correction Factor: 0 °C Final Temp: 1.3 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and initials of person examining contents:
				<u>1004281</u>	<u>BLM 5-30-19</u>
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
-Includes date/time/ID Matrix <u>WT</u>					
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Short Hold Time Analysis (<72hr remaining):	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Filtered volume received for Dissolved tests	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed <u>BLM</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)
*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

September 16, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM Direct Support
Pace Project No.: 30323999

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on September 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM Direct Support

Pace Project No.: 30323999

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM Direct Support

Pace Project No.: 30323999

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30323999001	RW11-MWS	Water	09/10/19 11:22	09/10/19 22:10
30323999002	RW11-MWI	Water	09/10/19 12:40	09/10/19 22:10
30323999003	RW12-MWS	Water	09/10/19 13:36	09/10/19 22:10
30323999004	RW12-MWI	Water	09/10/19 14:25	09/10/19 22:10

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SAMPLE ANALYTE COUNT

Project: RWM Direct Support

Pace Project No.: 30323999

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30323999001	RW11-MWS	EPA 6010C	KAS	2	PASI-PA
30323999002	RW11-MWI	EPA 6010C	KAS	2	PASI-PA
30323999003	RW12-MWS	EPA 6010C	KAS	2	PASI-PA
30323999004	RW12-MWI	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30323999

Sample: RW11-MWS **Lab ID: 30323999001** Collected: 09/10/19 11:22 Received: 09/10/19 22:10 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 10:32	7440-43-9	
Zinc	44000	ug/L	1000	238	100	09/13/19 09:52	09/16/19 12:05	7440-66-6	M6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30323999

Sample: RW11-MWI **Lab ID: 30323999002** Collected: 09/10/19 12:40 Received: 09/10/19 22:10 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	517	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 10:46	7440-43-9	
Zinc	120000	ug/L	1000	238	100	09/13/19 09:52	09/16/19 12:19	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30323999

Sample: RW12-MWS **Lab ID: 30323999003** Collected: 09/10/19 13:36 Received: 09/10/19 22:10 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.2	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 10:50	7440-43-9	
Zinc	5390	ug/L	1000	238	100	09/13/19 09:52	09/16/19 12:22	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30323999

Sample: RW12-MWI		Lab ID: 30323999004		Collected: 09/10/19 14:25		Received: 09/10/19 22:10		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1780	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 10:59	7440-43-9	
Zinc	104000	ug/L	1000	238	100	09/13/19 09:52	09/16/19 12:24	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM Direct Support

Pace Project No.: 30323999

QC Batch: 361229

Analysis Method: EPA 6010C

QC Batch Method: EPA 3005A

Analysis Description: 6010C MET

Associated Lab Samples: 30323999001, 30323999002, 30323999003, 30323999004

METHOD BLANK: 1753082

Matrix: Water

Associated Lab Samples: 30323999001, 30323999002, 30323999003, 30323999004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	09/16/19 10:28	
Zinc	ug/L	10.0 U	10.0	2.4	09/16/19 10:28	

LABORATORY CONTROL SAMPLE: 1753083

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	520	104	80-120	
Zinc	ug/L	500	505	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1753085 1753086

Parameter	Units	30323999001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	3.0 U	500	500	542	547	108	109	75-125	1	20	
Zinc	ug/L	44000	500	500	43200	43600	-160	-80	75-125	1	20 M6	

MATRIX SPIKE SAMPLE: 1753088

Parameter	Units	30324465001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	0.88J	500	527	105	75-125	
Zinc	ug/L	20.6	500	494	95	75-125	

SAMPLE DUPLICATE: 1753084

Parameter	Units	30323999001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	
Zinc	ug/L	44000	43500	1	20	

SAMPLE DUPLICATE: 1753087

Parameter	Units	30324465001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.88J	0.92J		20	
Zinc	ug/L	20.6	22.2	8	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM Direct Support
Pace Project No.: 30323999

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM Direct Support
Pace Project No.: 30323999

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30323999001	RW11-MWS	EPA 3005A	361229	EPA 6010C	361298
30323999002	RW11-MWI	EPA 3005A	361229	EPA 6010C	361298
30323999003	RW12-MWS	EPA 3005A	361229	EPA 6010C	361298
30323999004	RW12-MWI	EPA 3005A	361229	EPA 6010C	361298

REPORT OF LABORATORY ANALYSIS

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Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company: EnviroAnalytics Group		Report To: James Calenda		Attention: Laura Sargent	
Address: 1430 Sparrows Point Blvd		Copy To:		Company Name: EnviroAnalytics Group	
Sparrows Point, MD 21219		PO Number: <u>EAG-SPT-1452</u>		Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131	
Email To: jcalenda@enviroanalyticsgroup.com		Project Name: <u>RWM Direct Support</u>		Price Quote Reference: <u>MD</u>	
Phone: 314-620-3056		Project Number: <u>190215-1-1</u>		Price Project Manager: Samantha Bayura	
Requested Due Date/TAT: <u>5-day</u>				Price Profile #:	

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW PRODUCT P SOIL/SOLID S OIL OI WIFE WIFE AIR AR OTHER OT TISSUE TS	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		# OF CONTAINERS	Preservatives Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ O ₃ Methanol DI Water	Requested Analytical Items (Y/N)	Pace Project No./ Lab I.D.
				COMPOSITE START	COMPOSITE END/GRAB				
1	RW11-MWS	WT G	G	9/10/19 1122	9/10/19 1122	1		X	001
2	RW11-MWT	WT G	G	9/10/19 1240	9/10/19 1240	1		X	002
3	RW12-MWS	WT G	G	9/10/19 1336	9/10/19 1336	1		X	003
4	RW12-MWT	WT G	G	9/10/19 1425	9/10/19 1425	1		X	004
5									
6									
7									
8									
9									
10									
11									
12									

MO#: 30323999



ADDITIONAL COMMENTS	REQUISITION #/AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
Data Package Required? (Y/N):	Joshua Barnum	9/10/19	15:31	Joshua Barnum	9/10/19	15:31	
Data Validation Required? (Y/N):	Joshua Barnum	9/10/19	18:25	RDS Trace	9/10/19	19:10	Y
If data package is required, attach data package checklist.	RDS Trace	9/10/19	22:10	Joshua Barnum	9/10/19	22:10	Y N Y

Temp in °C	Received on	Cooler Sealed	Samples Intact
	09/10/19		

SAMPLER NAME AND SIGNATURE	DATE SIGNED (MM/DD/YY)
Joshua Barnum	09/10/19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics Group

Project # # 30323999

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: N/A

Label	<u>MLC</u>
LIMS Login	<u>MLC</u>

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.1 °C Correction Factor: +0.1 °C Final Temp: 1.2 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>1003581</u>	<u>MLC 9/11/19</u>
Chain of Custody Present:	/				
Chain of Custody Filled Out:	/				
Chain of Custody Relinquished:	/				
Sampler Name & Signature on COC:	/				
Sample Labels match COC:	/				
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	/				
Short Hold Time Analysis (<72hr remaining):		/			
Rush Turn Around Time Requested:	/				
Sufficient Volume:	/				
Correct Containers Used:	/				
-Pace Containers Used:	/				
Containers Intact:	/				
Orthophosphate field filtered			/		
Hex Cr Aqueous sample field filtered			/		
Organic Samples checked for dechlorination:			/		
Filtered volume received for Dissolved tests			/		
All containers have been checked for preservation.	/				
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	/			Initial when completed: <u>MLC</u>	Date/time of preservation:
				Lot # of added preservative:	
Headspace in VOA Vials (>6mm):			/		
Trip Blank Present:			/		
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

September 19, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM Direct Support
Pace Project No.: 30324213

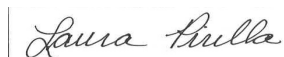
Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on September 11, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Laura M. Pirilla for
Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM Direct Support

Pace Project No.: 30324213

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM Direct Support
Pace Project No.: 30324213

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30324213001	RWM-MWS	Water	09/11/19 09:18	09/11/19 23:15
30324213002	RWM-MWI	Water	09/11/19 09:55	09/11/19 23:15
30324213003	RW23-MWI	Water	09/11/19 11:39	09/11/19 23:15
30324213004	RW14-MWS	Water	09/11/19 12:35	09/11/19 23:15
30324213005	RW24-MWI	Water	09/11/19 14:25	09/11/19 23:15
30324213006	RWN-MWS	Water	09/11/19 15:10	09/11/19 23:15

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM Direct Support

Pace Project No.: 30324213

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30324213001	RWM-MWS	EPA 6010C	KAS	2
30324213002	RWM-MWI	EPA 6010C	KAS	2
30324213003	RW23-MWI	EPA 6010C	KAS	2
30324213004	RW14-MWS	EPA 6010C	KAS	2
30324213005	RW24-MWI	EPA 6010C	KAS	2
30324213006	RWN-MWS	EPA 6010C	KAS	2

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: RWM Direct Support

Pace Project No.: 30324213

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: September 19, 2019

General Information:

6 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30324213

Sample: RWM-MWS		Lab ID: 30324213001		Collected: 09/11/19 09:18		Received: 09/11/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:03	7440-43-9	
Zinc	4.0J	ug/L	10.0	2.4	1	09/13/19 09:52	09/16/19 11:03	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30324213

Sample: RWM-MWI		Lab ID: 30324213002		Collected: 09/11/19 09:55		Received: 09/11/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1200	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:05	7440-43-9	
Zinc	159000	ug/L	1000	238	100	09/13/19 09:52	09/16/19 12:27	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30324213

Sample: RW23-MWI		Lab ID: 30324213003		Collected: 09/11/19 11:39		Received: 09/11/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	2800	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:07	7440-43-9	
Zinc	125000	ug/L	1000	238	100	09/13/19 09:52	09/16/19 13:49	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30324213

Sample: RW14-MWS		Lab ID: 30324213004		Collected: 09/11/19 12:35		Received: 09/11/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3450	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:11	7440-43-9	
Zinc	70500	ug/L	1000	238	100	09/13/19 09:52	09/16/19 13:51	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30324213

Sample: RW24-MWI		Lab ID: 30324213005		Collected: 09/11/19 14:25	Received: 09/11/19 23:15	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1540	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:14	7440-43-9	
Zinc	635000	ug/L	10000	2380	1000	09/13/19 09:52	09/16/19 13:54	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30324213

Sample: RWN-MWS		Lab ID: 30324213006		Collected: 09/11/19 15:10	Received: 09/11/19 23:15	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	11100	ug/L	300	34.0	100	09/13/19 09:52	09/16/19 12:42	7440-43-9		
Zinc	964000	ug/L	10000	2380	1000	09/13/19 09:52	09/16/19 13:56	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM Direct Support
Pace Project No.: 30324213

QC Batch: 361229 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30324213001, 30324213002, 30324213003, 30324213004, 30324213005, 30324213006

METHOD BLANK: 1753082 Matrix: Water
Associated Lab Samples: 30324213001, 30324213002, 30324213003, 30324213004, 30324213005, 30324213006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	09/16/19 10:28	
Zinc	ug/L	10.0 U	10.0	2.4	09/16/19 10:28	

LABORATORY CONTROL SAMPLE: 1753083

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	520	104	80-120	
Zinc	ug/L	500	505	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1753085 1753086

Parameter	Units	30323999001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	3.0 U	500	500	542	547	108	109	75-125	1	20	
Zinc	ug/L	44000	500	500	43200	43600	-160	-80	75-125	1	20 M6	

MATRIX SPIKE SAMPLE: 1753088

Parameter	Units	30324465001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	0.88J	500	527	105	75-125	
Zinc	ug/L	20.6	500	494	95	75-125	

SAMPLE DUPLICATE: 1753084

Parameter	Units	30323999001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	
Zinc	ug/L	44000	43500	1	20	

SAMPLE DUPLICATE: 1753087

Parameter	Units	30324465001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.88J	0.92J		20	
Zinc	ug/L	20.6	22.2	8	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM Direct Support
Pace Project No.: 30324213

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM Direct Support

Pace Project No.: 30324213

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30324213001	RWM-MWS	EPA 3005A	361229	EPA 6010C	361298
30324213002	RWM-MWI	EPA 3005A	361229	EPA 6010C	361298
30324213003	RW23-MWI	EPA 3005A	361229	EPA 6010C	361298
30324213004	RW14-MWS	EPA 3005A	361229	EPA 6010C	361298
30324213005	RW24-MWI	EPA 3005A	361229	EPA 6010C	361298
30324213006	RWN-MWS	EPA 3005A	361229	EPA 6010C	361298

REPORT OF LABORATORY ANALYSIS

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Section A Required Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	EnviroAnalytics Group	Report To:	James Calenda	Attention:	Laura Sargent
Address:	1430 Sparrows Point Blvd Sparrows Point, MD 21219	Copy To:		Company Name:	EnviroAnalytics Group
Email To:	lcalenda@enviroanalyticalgroup.com	PO Number:	EAG-SPT-0452	Address:	1650 Des Peres Road, Suite 303 St. Louis, MO 63131
Phone:	314-620-3056	Project Name:	RWAN Direct Support	Face Quote Reference:	
Requested Due Date/TAT:	5-day	Project Number:	190273-1-1	Face Project Manager:	Samantha Bayura
				Face Profile #:	

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW PRODUCT P SOIL/SOLID SL CIL WIFE AIR AR OTHER OT TISSUE TS	SAMPLE ID (A-Z, 0-9 / -) Sample IDs MUST BE UNIQUE	COLLECTED		# OF CONTAINERS	Preservatives Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₈ Methanol DI Water	Requirements	Pace Project No./ Lab I.D.
			COMPOSITE START	COMPOSITE END/GRAB				
1		RWM-MWS	DATE TIME	TIME				
2		RVM-MWI	9/19/19 09:18					001
3		RW3-MWI	9/19/19 09:58					002
4		RW14-MWS	9/19/19 13:35					003
5		RW24-MWI	9/19/19 14:25					004
6		RWN-MWS	9/19/19 15:10					005
7								006
8								
9								
10								
11								
12								

WO#: 30324213



ADDITIONAL COMMENTS	DATE	TIME	ACCEPTED BY/AFFILIATION	DATE	TIME	TEMP IN C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Samples Intact (Y/N)
Data Package Required? (Y/N):	Jan Bonn	ARM	9/19/19 16:30	Ben Mammali	9/19/19 23:15				
Data Validation Required? (Y/N):	Jan Bonn	ARM	9/19/19 20:00	RDS FACE	9/19/19 23:15		Y		
If data package is required, attach data package checklist.	RDS FACE		9/19/19 23:15	Ben Mammali	9/19/19 23:15	23	Y	N	Y

SAMPLER NAME AND SIGNATURE:
 PRINT Name of SAMPLER: Joshua Bonn
 SIGNATURE of SAMPLER: Jan Bonn
 DATE Signed (MM/DD/YYYY): 09/11/19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics

Project # 30324213

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 2.2 °C Correction Factor: 10.1 °C Final Temp: 213 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>1003581</u>	<u>BLM 9-12-19</u>
Chain of Custody Present:	/				
Chain of Custody Filled Out:	/				
Chain of Custody Relinquished:	/				
Sampler Name & Signature on COC:	/				
Sample Labels match COC:	/				
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	/				
Short Hold Time Analysis (<72hr remaining):	/				
Rush Turn Around Time Requested:	/				
Sufficient Volume:	/				
Correct Containers Used:	/				
-Pace Containers Used:	/				
Containers Intact:	/				
Orthophosphate field filtered			/		
Hex Cr Aqueous sample field filtered			/		
Organic Samples checked for dechlorination:			/		
Filtered volume received for Dissolved tests			/		
All containers have been checked for preservation.	/				
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	/			Initial when completed <u>BLM</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/		
Trip Blank Present:			/		
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person-Contacted: _____ Date/Time: _____ Contacted-By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

September 16, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWN Direct Support
Pace Project No.: 30324465

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on September 12, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWN Direct Support
Pace Project No.: 30324465

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWN Direct Support

Pace Project No.: 30324465

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30324465001	RW23-MWS	Water	09/12/19 08:41	09/12/19 23:25
30324465002	RW24-MWS	Water	09/12/19 09:05	09/12/19 23:25
30324465003	RW16-MWI	Water	09/12/19 14:13	09/12/19 23:25
30324465004	RW16-MWS	Water	09/12/19 13:44	09/12/19 23:25
30324465005	RW15-MWI	Water	09/12/19 13:13	09/12/19 23:25
30324465006	RW15-MWS	Water	09/12/19 12:29	09/12/19 23:25
30324465007	RW25-MWS	Water	09/12/19 14:45	09/12/19 23:25
30324465008	RW25-MWI	Water	09/12/19 15:20	09/12/19 23:25

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWN Direct Support

Pace Project No.: 30324465

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30324465001	RW23-MWS	EPA 6010C	KAS	2	PASI-PA
30324465002	RW24-MWS	EPA 6010C	KAS	2	PASI-PA
30324465003	RW16-MWI	EPA 6010C	KAS	2	PASI-PA
30324465004	RW16-MWS	EPA 6010C	KAS	2	PASI-PA
30324465005	RW15-MWI	EPA 6010C	KAS	2	PASI-PA
30324465006	RW15-MWS	EPA 6010C	KAS	2	PASI-PA
30324465007	RW25-MWS	EPA 6010C	KAS	2	PASI-PA
30324465008	RW25-MWI	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWN Direct Support

Pace Project No.: 30324465

Sample: RW23-MWS **Lab ID: 30324465001** Collected: 09/12/19 08:41 Received: 09/12/19 23:25 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	0.88J	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:20	7440-43-9	
Zinc	20.6	ug/L	10.0	2.4	1	09/13/19 09:52	09/16/19 11:20	7440-66-6	

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ANALYTICAL RESULTS

Project: RWN Direct Support
Pace Project No.: 30324465

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW24-MWS Lab ID: 30324465002 Collected: 09/12/19 09:05 Received: 09/12/19 23:25 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:34	7440-43-9	
Zinc	8.2J	ug/L	10.0	2.4	1	09/13/19 09:52	09/16/19 11:34	7440-66-6	

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ANALYTICAL RESULTS

Project: RWN Direct Support

Pace Project No.: 30324465

Sample: RW16-MWI **Lab ID: 30324465003** Collected: 09/12/19 14:13 Received: 09/12/19 23:25 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:37	7440-43-9	
Zinc	13.1	ug/L	10.0	2.4	1	09/13/19 09:52	09/16/19 11:37	7440-66-6	

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ANALYTICAL RESULTS

Project: RWN Direct Support
Pace Project No.: 30324465

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW16-MWS Lab ID: 30324465004 Collected: 09/12/19 13:44 Received: 09/12/19 23:25 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:39	7440-43-9	
Zinc	10.0 U	ug/L	10.0	2.4	1	09/13/19 09:52	09/16/19 11:39	7440-66-6	

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ANALYTICAL RESULTS

Project: RWN Direct Support

Pace Project No.: 30324465

Sample: RW15-MWI **Lab ID: 30324465005** Collected: 09/12/19 13:13 Received: 09/12/19 23:25 Matrix: Water

Comments: • Sample collection times on containers does not match COC.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	589	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:41	7440-43-9	
Zinc	168000	ug/L	1000	238	100	09/13/19 09:52	09/16/19 13:59	7440-66-6	

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ANALYTICAL RESULTS

Project: RWN Direct Support

Pace Project No.: 30324465

Sample: RW15-MWS **Lab ID: 30324465006** Collected: 09/12/19 12:29 Received: 09/12/19 23:25 Matrix: Water

Comments: • Sample collection times on containers does not match COC.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	7.4	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:55	7440-43-9	
Zinc	134	ug/L	10.0	2.4	1	09/13/19 09:52	09/16/19 11:55	7440-66-6	

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ANALYTICAL RESULTS

Project: RWN Direct Support

Pace Project No.: 30324465

Sample: RW25-MWS **Lab ID: 30324465007** Collected: 09/12/19 14:45 Received: 09/12/19 23:25 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	599	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:46	7440-43-9	
Zinc	437000	ug/L	10000	2380	1000	09/13/19 09:52	09/16/19 14:01	7440-66-6	

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ANALYTICAL RESULTS

Project: RWN Direct Support

Pace Project No.: 30324465

Sample: RW25-MWI **Lab ID: 30324465008** Collected: 09/12/19 15:20 Received: 09/12/19 23:25 Matrix: Water

Comments: • Sample collection times on containers does not match COC.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	9.9	ug/L	3.0	0.34	1	09/13/19 09:52	09/16/19 11:52	7440-43-9	
Zinc	7000	ug/L	1000	238	100	09/13/19 09:52	09/16/19 14:04	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWN Direct Support
Pace Project No.: 30324465

QC Batch: 361229 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30324465001, 30324465002, 30324465003, 30324465004, 30324465005, 30324465006, 30324465007, 30324465008

METHOD BLANK: 1753082 Matrix: Water
Associated Lab Samples: 30324465001, 30324465002, 30324465003, 30324465004, 30324465005, 30324465006, 30324465007, 30324465008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	09/16/19 10:28	
Zinc	ug/L	10.0 U	10.0	2.4	09/16/19 10:28	

LABORATORY CONTROL SAMPLE: 1753083

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	520	104	80-120	
Zinc	ug/L	500	505	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1753085 1753086

Parameter	Units	30323999001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	3.0 U	500	500	542	547	108	109	75-125	1	20	
Zinc	ug/L	44000	500	500	43200	43600	-160	-80	75-125	1	20 M6	

MATRIX SPIKE SAMPLE: 1753088

Parameter	Units	30324465001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L		0.88J	500	527	105	75-125
Zinc	ug/L		20.6	500	494	95	75-125

SAMPLE DUPLICATE: 1753084

Parameter	Units	30323999001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	
Zinc	ug/L	44000	43500	1	20	

SAMPLE DUPLICATE: 1753087

Parameter	Units	30324465001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.88J	0.92J		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: RWN Direct Support
Pace Project No.: 30324465

SAMPLE DUPLICATE: 1753087

Parameter	Units	30324465001 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	20.6	22.2	8	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWN Direct Support
Pace Project No.: 30324465

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWN Direct Support

Pace Project No.: 30324465

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30324465001	RW23-MWS	EPA 3005A	361229	EPA 6010C	361298
30324465002	RW24-MWS	EPA 3005A	361229	EPA 6010C	361298
30324465003	RW16-MWI	EPA 3005A	361229	EPA 6010C	361298
30324465004	RW16-MWS	EPA 3005A	361229	EPA 6010C	361298
30324465005	RW15-MWI	EPA 3005A	361229	EPA 6010C	361298
30324465006	RW15-MWS	EPA 3005A	361229	EPA 6010C	361298
30324465007	RW25-MWS	EPA 3005A	361229	EPA 6010C	361298
30324465008	RW25-MWI	EPA 3005A	361229	EPA 6010C	361298

REPORT OF LABORATORY ANALYSIS

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Section A
Required Client Information:
Company: **EnviroAnalytics Group**
Address: **1430 Sparrows Point Blvd**
Sparrows Point, MD 21219
Email To: **lcalenda@enviroanalyticsgroup.com**
Phone: **314-620-3056** Fax:
Requested Date Data/TAT: **to - day**

Section B
Required Project Information:
Report To: **James Calenda**
Copy To:
Company Name: **EnviroAnalytics Group**
Address: **1050 Das Pass Road, Suite 303 St. Louis, MO 63131**
Face Quota Reference:
Face Project Manager: **Samantha Bayura**
Face Profile #:
MD

Section C
Invoice Information:
Attention: **Laura Sargent**
Company Name: **EnviroAnalytics Group**
Address: **1050 Das Pass Road, Suite 303 St. Louis, MO 63131**
Face Quota Reference:
Face Project Manager: **Samantha Bayura**
Face Profile #:
MD

Page: of

NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

ITEM #	Valid Matrix Codes MATRIX DRINKING WATER DW WASTE WATER WW PRODUCT SOLID OIL WIFE AIR OTHER TISSUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ SO ₃ Methanol DI Water	Preservatives										Pace Project No./ Lab I.D.				
				COMPOSITE START	COMPOSITE END/GRAB				DATE	TIME	METALS/6010C Cl+2M	Mercury/7471A or 7470A	Hexavalent Chromium/7196A	Total Cyanide/9012A	PCB/8082 (soil)	Oil and Grease/1664A (soil)	Oil and Grease/9071B (soil)	Residual Chlorine (Y/N)					
1	RW23 - MWS	WT G	G	9/18/08	0841																	001	
2	RW24 - MWS	WT G	G	9/18/08	0905																		002
3	RW16 - MWS	WT G	G	9/18/08	1413																		003
4	RW1V - MWS	WT G	G	9/18/08	1314																		004
5	RW10 - MWS	WT G	G	9/18/08	1313																		005
6	RW15 - MWS	WT G	G	9/18/08	1329																		006
7	RW25 - MWS	WT G	G	9/18/08	1445																		007
8	RW25 - MWS	WT G	G	9/18/08	1520																		008

ADDITIONAL COMMENTS:

DATE PACKAGE REQUIRED? (Y/N) **Y**

DATA VALIDATION REQUIRED? (Y/N) **Y**

If data package is required, attach data package checklist.

TEMP IN °C **0.5**

RECEIVED ON **9/18/08**

CUSTODY SEALED **Y**

SAMPLES INTERACT **Y**

ACCEPTED BY/AFFILIATION: **JMB/AR** **DATE:** **9/18/08** **TIME:** **15:45**

DATE SIGNED (MM/DD/YY): **07/12/10**

SAMPLER NAME AND SIGNATURE: **Josima Barin**

PRINT NAME OF SAMPLER: **Josima Barin**

SIGNATURE OF SAMPLER: **JMB**

WO#: 30324465

30324465

Pittsburgh Lab Sample Condition Upon Receipt

30324465



Client Name: EnviroAnalytics Group Project # _____

Label	<u>MLC</u>
LIMS Login	<u>MLC</u>

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: N/A

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 11 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp .5 °C Correction Factor: 0 °C Final Temp: .5 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>10D3581</u>	<u>MLC 9/13/19</u>
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.	
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.	
Chain of Custody Relinquished: <u>✓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.	
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4.	
Sample Labels match COC: -Includes date/time/ID Matrix: <u>WT</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5.	<u>NO SAMPLES RW15-MWI, RW25-MWS, and RW25-MWI have different times than col</u>
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6.	
Short Hold Time Analysis (<72hr remaining):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.	
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8.	
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9.	
Correct Containers Used: -Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10.	
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11.	
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	12.	
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13.	
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14.	
Filtered volume received for Dissolved tests	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	15.	
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16.	
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed	Date/time of preservation
				<u>MLC</u>	
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	17.	
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	18.	
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)
 *PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

September 19, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: EAG-SPT-6452
Pace Project No.: 30324678

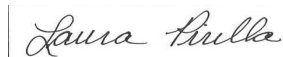
Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on September 13, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Laura M. Pirilla for
Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: EAG-SPT-6452

Pace Project No.: 30324678

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: EAG-SPT-6452
Pace Project No.: 30324678

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30324678001	RW19-MWS	Water	09/13/19 11:11	09/13/19 23:50
30324678002	RWB-MWI	Water	09/13/19 15:23	09/13/19 23:50
30324678003	RW19-MWI	Water	09/13/19 11:52	09/13/19 23:50
30324678004	RWE-MWS	Water	09/13/19 12:45	09/13/19 23:50
30324678005	RWD-MWI	Water	09/13/19 14:34	09/13/19 23:50
30324678006	RWD-MWS	Water	09/13/19 14:07	09/13/19 23:50
30324678007	RWE-MWS RWE-MWI	Water	09/13/19 13:20	09/13/19 23:50

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: EAG-SPT-6452

Pace Project No.: 30324678

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30324678001	RW19-MWS	EPA 6010C	KAS	2
30324678002	RWB-MWI	EPA 6010C	KAS	2
30324678003	RW19-MWI	EPA 6010C	KAS	2
30324678004	RWE-MWS	EPA 6010C	KAS	2
30324678005	RWD-MWI	EPA 6010C	KAS	2
30324678006	RWD-MWS	EPA 6010C	KAS	2
30324678007	RWE-MWS	EPA 6010C	KAS	2

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: EAG-SPT-6452
Pace Project No.: 30324678

Method: EPA 6010C
Description: 6010C MET ICP
Client: EnviroAnalytics Group, LLC
Date: September 19, 2019

General Information:

7 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: EAG-SPT-6452

Pace Project No.: 30324678

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW19-MWS Lab ID: 30324678001 Collected: 09/13/19 11:11 Received: 09/13/19 23:50 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 07:08	7440-43-9	
Zinc	2260	ug/L	10.0	2.4	1	09/17/19 06:26	09/18/19 07:08	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: EAG-SPT-6452

Pace Project No.: 30324678

Sample: RWB-MWI **Lab ID: 30324678002** Collected: 09/13/19 15:23 Received: 09/13/19 23:50 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 07:22	7440-43-9	
Zinc	29.2	ug/L	10.0	2.4	1	09/17/19 06:26	09/18/19 07:22	7440-66-6	

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ANALYTICAL RESULTS

Project: EAG-SPT-6452

Pace Project No.: 30324678

Sample: RW19-MWI		Lab ID: 30324678003		Collected: 09/13/19 11:52		Received: 09/13/19 23:50		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1580	ug/L	300	34.0	100	09/17/19 06:26	09/18/19 07:37	7440-43-9	
Zinc	3460000	ug/L	100000	23800	10000	09/17/19 06:26	09/18/19 07:40	7440-66-6	

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ANALYTICAL RESULTS

Project: EAG-SPT-6452

Pace Project No.: 30324678

Sample: RWE-MWS **Lab ID: 30324678004** Collected: 09/13/19 12:45 Received: 09/13/19 23:50 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	0.64J	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 07:24	7440-43-9	
Zinc	422	ug/L	10.0	2.4	1	09/17/19 06:26	09/18/19 07:24	7440-66-6	

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ANALYTICAL RESULTS

Project: EAG-SPT-6452

Pace Project No.: 30324678

Sample: RWD-MWI		Lab ID: 30324678005		Collected: 09/13/19 14:34		Received: 09/13/19 23:50		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	514	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 07:42	7440-43-9	
Zinc	41900	ug/L	1000	238	100	09/17/19 06:26	09/18/19 08:34	7440-66-6	

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ANALYTICAL RESULTS

Project: EAG-SPT-6452

Pace Project No.: 30324678

Sample: RWD-MWS **Lab ID: 30324678006** Collected: 09/13/19 14:07 Received: 09/13/19 23:50 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 07:45	7440-43-9	
Zinc	9.1J	ug/L	10.0	2.4	1	09/17/19 06:26	09/18/19 07:45	7440-66-6	

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ANALYTICAL RESULTS

Project: EAG-SPT-6452

Pace Project No.: 30324678

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWE-MWS									
Lab ID: 30324678007									
Collected: 09/13/19 13:20 Received: 09/13/19 23:50 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	656	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 07:47	7440-43-9	
Zinc	109000	ug/L	1000	238	100	09/17/19 06:26	09/18/19 08:37	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: EAG-SPT-6452
Pace Project No.: 30324678

QC Batch: 361601 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30324678001, 30324678002, 30324678003, 30324678004, 30324678005, 30324678006, 30324678007

METHOD BLANK: 1754978 Matrix: Water
Associated Lab Samples: 30324678001, 30324678002, 30324678003, 30324678004, 30324678005, 30324678006, 30324678007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	09/18/19 07:03	
Zinc	ug/L	10.0 U	10.0	2.4	09/18/19 07:03	

LABORATORY CONTROL SAMPLE: 1754979

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	548	110	80-120	
Zinc	ug/L	500	524	105	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1754981 1754982

Parameter	Units	30324678001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	3.0 U	500	500	560	578	112	116	75-125	3	20	
Zinc	ug/L	2260	500	500	2810	2790	109	105	75-125	1	20	

MATRIX SPIKE SAMPLE: 1755268

Parameter	Units	30324867004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	1020	500	1600	115	75-125	
Zinc	ug/L	42300	500	42400	20	75-125 M6	

SAMPLE DUPLICATE: 1754980

Parameter	Units	30324678001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	
Zinc	ug/L	2260	2300	2	20	

SAMPLE DUPLICATE: 1755267

Parameter	Units	30324867004 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	1020	1030	1	20	
Zinc	ug/L	42300	42300	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: EAG-SPT-6452
Pace Project No.: 30324678

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: EAG-SPT-6452

Pace Project No.: 30324678

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30324678001	RW19-MWS	EPA 3005A	361601	EPA 6010C	361729
30324678002	RWB-MWI	EPA 3005A	361601	EPA 6010C	361729
30324678003	RW19-MWI	EPA 3005A	361601	EPA 6010C	361729
30324678004	RWE-MWS	EPA 3005A	361601	EPA 6010C	361729
30324678005	RWD-MWI	EPA 3005A	361601	EPA 6010C	361729
30324678006	RWD-MWS	EPA 3005A	361601	EPA 6010C	361729
30324678007	RWE-MWS	EPA 3005A	361601	EPA 6010C	361729

REPORT OF LABORATORY ANALYSIS

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Section A Required Client Information: Company: EnviroAnalytics Group Address: 1430 Sparrows Point Blvd Sparrows Point, MD 21219 Email To: calenda@enviroanalyticsgroup.com Phone: 314-620-3056 Requested Due Date/TAT: 5-day		Section B Required Project Information: Report To: James Calenda Copy To: PO Number: EAG-SPT-642 Project Name: RWM Direct Support Project Number: 190275M-1-1		Section C Invoice Information: Attention: Laura Sargent Company Name: EnviroAnalytics Group Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131 Pace Quote Reference: Pace Project Manager: Samantha Bayura Pace Profile #:		Results To: <input type="checkbox"/> NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER _____ State/Location: MD	
---	--	--	--	---	--	---	--

ITEM #	Section D Required Client Information SAMPLE ID (A-Z, 0-9 / , -) Sample IDs MUST BE UNIQUE	Valid Matrix Codes		COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives								Requester's Analytes				Pace Project No./ Lab I.D.								
		MATRIX	CODE	COMPOSITE START	COMPOSITE END/GRAB			Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	DI Water	VOC/8260B	SVOC 8270D	DRO/8015B	GRO/8015B		METALS/6010C ZATC6	Mercury/7471A or 7470A	Hexavalent Chromium/7196A	Total Cyanide/9012A	PCB/8082 (soil)	Oil and Grease/1664A (soil)	Oil and Grease/9071B (soil)	Residual Chlorine (Y/N)
		MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	DATE	TIME			DATE	TIME																			
1	RW19-MWS	WT	G			09/13/19	1111										X									0221		
2	RWB-MWI	WT	G			09/13/19	1523										X									0222		
3	RW19-MWI	WT	G			9/13/19	1152										X									0223		
4	RWE-MWS	WT	G			9/13/19	1245										X									0224		
5	RWD-MWT	WT	G			9/13/19	1434										X									0225		
6	RWD-MWS	WT	G			9/13/19	1407										X									0226		
7	RWE-MWS	WT	G			9/13/19	1320										X									0227		

WO#: 30324678



ADDITIONAL COMMENTS	BRINGING BY/AFFILIATION	DATE	TIME	ACCEPTED BY/AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
Data Package Required? (Y/N)	DM Bow ARM	9/13/19	1624	David S. H. [Signature]	9/13/19	1624				
Data Validation Required? (Y/N)	David S. H. [Signature]	9/13/19	21:00	RDS [Signature]	9/13/19	2100				✓
If data package is required, attach data package checklist.	RDS [Signature]	9/13/19	2350	PALE [Signature]	9/13/19	2350	23	Y	N	Y

SAMPLER NAME AND SIGNATURE		Temp in °C	Received on ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PRINT Name of SAMPLER:	Joshna Barne				
SIGNATURE of SAMPLER:	DM Bow				
DATE Signed (MM/DD/YY):	09/13/19				

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Environ Analysis Project # 30324678

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: N/A

Label <u>DM</u>
LIMS Login <u>DM</u>

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 2.2 °C Correction Factor: 10.1 °C Final Temp: 2.3 °C
Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>10D3581</u>	<u>09/14/19 DM</u>
Chain of Custody Present:	/				1.
Chain of Custody Filled Out:	/				2.
Chain of Custody Relinquished:	/				3.
Sampler Name & Signature on COC:	/				4.
Sample Labels match COC:	/				5.
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	/				6.
Short Hold Time Analysis (<72hr remaining):		/			7.
Rush Turn Around Time Requested:	/				8.
Sufficient Volume:	/				9.
Correct Containers Used:	/				10.
-Pace Containers Used:	/				
Containers Intact:	/				11.
Orthophosphate field filtered			/		12.
Hex Cr Aqueous sample field filtered			/		13.
Organic Samples checked for dechlorination:			/		14.
Filtered volume received for Dissolved tests			/		15.
All containers have been checked for preservation.	/				16.
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	/			Initial when completed <u>DM</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/		17.
Trip Blank Present:		/			18.
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

September 19, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM Direct Support
Pace Project No.: 30324867

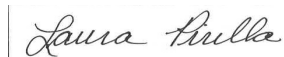
Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on September 16, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Laura M. Pirilla for
Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM Direct Support
Pace Project No.: 30324867

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM Direct Support
Pace Project No.: 30324867

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30324867001	RWG-MWS	Water	09/16/19 09:07	09/16/19 22:05
30324867002	RWG-MWI	Water	09/16/19 09:36	09/16/19 22:05
30324867003	RWF-MWS	Water	09/16/19 10:42	09/16/19 22:05
30324867004	RWF-MWI	Water	09/16/19 11:08	09/16/19 22:05
30324867005	RWB-MWS	Water	09/16/19 11:40	09/16/19 22:05
30324867006	RWA-MWS	Water	09/16/19 12:41	09/16/19 22:05
30324867007	RWA-MWI	Water	09/16/19 13:04	09/16/19 22:05
30324867008	RW22R-MWS	Water	09/16/19 14:16	09/16/19 22:05
30324867009	RW22R-MWI	Water	09/16/19 14:41	09/16/19 22:05

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM Direct Support

Pace Project No.: 30324867

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30324867001	RWG-MWS	EPA 6010C	KAS	2	PASI-PA
30324867002	RWG-MWI	EPA 6010C	KAS	2	PASI-PA
30324867003	RWF-MWS	EPA 6010C	KAS	2	PASI-PA
30324867004	RWF-MWI	EPA 6010C	KAS	2	PASI-PA
30324867005	RWB-MWS	EPA 6010C	KAS	2	PASI-PA
30324867006	RWA-MWS	EPA 6010C	KAS	2	PASI-PA
30324867007	RWA-MWI	EPA 6010C	KAS	2	PASI-PA
30324867008	RW22R-MWS	EPA 6010C	KAS	2	PASI-PA
30324867009	RW22R-MWI	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: RWM Direct Support
Pace Project No.: 30324867

Method: EPA 6010C
Description: 6010C MET ICP
Client: EnviroAnalytics Group, LLC
Date: September 19, 2019

General Information:

9 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30324867

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWG-MWS Lab ID: 30324867001 Collected: 09/16/19 09:07 Received: 09/16/19 22:05 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 07:51	7440-43-9	
Zinc	10.0 U	ug/L	10.0	2.4	1	09/17/19 06:26	09/18/19 07:51	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30324867

Sample: RWG-MWI		Lab ID: 30324867002		Collected: 09/16/19 09:36		Received: 09/16/19 22:05		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	15.4	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 07:54	7440-43-9	
Zinc	291	ug/L	10.0	2.4	1	09/17/19 06:26	09/18/19 07:54	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30324867

Sample: RWF-MWS		Lab ID: 30324867003		Collected: 09/16/19 10:42		Received: 09/16/19 22:05		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	6.1	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 07:56	7440-43-9	
Zinc	34300	ug/L	1000	238	100	09/17/19 06:26	09/18/19 08:39	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30324867

Sample: RWF-MWI **Lab ID: 30324867004** Collected: 09/16/19 11:08 Received: 09/16/19 22:05 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	1020	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 07:59	7440-43-9	
Zinc	42300	ug/L	1000	238	100	09/17/19 06:26	09/18/19 08:42	7440-66-6	M6

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30324867

Sample: RWB-MWS		Lab ID: 30324867005	Collected: 09/16/19 11:40	Received: 09/16/19 22:05	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 08:13	7440-43-9	
Zinc	5.5J	ug/L	10.0	2.4	1	09/17/19 06:26	09/18/19 08:13	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30324867

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWA-MWS									
Lab ID: 30324867006									
Collected: 09/16/19 12:41 Received: 09/16/19 22:05 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	24.0	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 08:16	7440-43-9	
Zinc	1720	ug/L	10.0	2.4	1	09/17/19 06:26	09/18/19 08:16	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30324867

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWA-MWI									
Lab ID: 30324867007									
Collected: 09/16/19 13:04 Received: 09/16/19 22:05 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	7740	ug/L	300	34.0	100	09/17/19 06:26	09/18/19 08:49	7440-43-9	
Zinc	349000	ug/L	10000	2380	1000	09/17/19 06:26	09/18/19 08:51	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30324867

Sample: RW22R-MWS **Lab ID: 30324867008** Collected: 09/16/19 14:16 Received: 09/16/19 22:05 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	105	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 08:21	7440-43-9	
Zinc	188000	ug/L	1000	238	100	09/17/19 06:26	09/18/19 08:54	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30324867

Sample: RW22R-MWI **Lab ID: 30324867009** Collected: 09/16/19 14:41 Received: 09/16/19 22:05 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/17/19 06:26	09/18/19 08:23	7440-43-9	
Zinc	983	ug/L	10.0	2.4	1	09/17/19 06:26	09/18/19 08:23	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM Direct Support
Pace Project No.: 30324867

QC Batch: 361601 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30324867001, 30324867002, 30324867003, 30324867004, 30324867005, 30324867006, 30324867007, 30324867008, 30324867009

METHOD BLANK: 1754978 Matrix: Water
Associated Lab Samples: 30324867001, 30324867002, 30324867003, 30324867004, 30324867005, 30324867006, 30324867007, 30324867008, 30324867009

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	09/18/19 07:03	
Zinc	ug/L	10.0 U	10.0	2.4	09/18/19 07:03	

LABORATORY CONTROL SAMPLE: 1754979

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	548	110	80-120	
Zinc	ug/L	500	524	105	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1754981 1754982

Parameter	Units	30324678001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	3.0 U	500	500	560	578	112	116	75-125	3	20	
Zinc	ug/L	2260	500	500	2810	2790	109	105	75-125	1	20	

MATRIX SPIKE SAMPLE: 1755268

Parameter	Units	30324867004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L		1020	500	1600	115	75-125
Zinc	ug/L		42300	500	42400	20	75-125 M6

SAMPLE DUPLICATE: 1754980

Parameter	Units	30324678001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	
Zinc	ug/L	2260	2300	2	20	

SAMPLE DUPLICATE: 1755267

Parameter	Units	30324867004 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	1020	1030	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM Direct Support
Pace Project No.: 30324867

SAMPLE DUPLICATE: 1755267

Parameter	Units	30324867004 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	42300	42300	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM Direct Support
Pace Project No.: 30324867

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM Direct Support
Pace Project No.: 30324867

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30324867001	RWG-MWS	EPA 3005A	361601	EPA 6010C	361729
30324867002	RWG-MWI	EPA 3005A	361601	EPA 6010C	361729
30324867003	RWF-MWS	EPA 3005A	361601	EPA 6010C	361729
30324867004	RWF-MWI	EPA 3005A	361601	EPA 6010C	361729
30324867005	RWB-MWS	EPA 3005A	361601	EPA 6010C	361729
30324867006	RWA-MWS	EPA 3005A	361601	EPA 6010C	361729
30324867007	RWA-MWI	EPA 3005A	361601	EPA 6010C	361729
30324867008	RW22R-MWS	EPA 3005A	361601	EPA 6010C	361729
30324867009	RW22R-MWI	EPA 3005A	361601	EPA 6010C	361729

REPORT OF LABORATORY ANALYSIS

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The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed at

Section A
Required Client Information:
Company: EnviroAnalytics Group
Address: 1430 Sparrows Point Blvd
Sparrows Point, MD 21219
Email To: jcalenda@enviroanalyticsgroup.com
Phone: 314-620-3056
Requested Due Date/TAT: 5-day

Section B
Required Project Information:
Report To: James Calenda
Copy To:
PO Number: EAG-SPT-6452
Project Name: RWM Direct Support
Project Number: 190275M-1-1

Section C
Invoice Information:
Attention: Laura Sargent
Company Name: EnviroAnalytics Group
Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131
Pace Quide Reference:
Pace Project Manager: Samantha Bayura
Pace Profile #:
State: MD

NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WATER WT WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIPE WIP AIR AR OTHER OT TISSUE TS	SAMPLE ID (A-Z, 0-9 / -) Sample IDs MUST BE UNIQUE	COLLECTED		DATE	TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₃ Methanol DI Water	LABORATORY TEST	VOC/8260B SVOC 8270D DRO/8015B GRO/8015B METALS/6010C CR2M Mercury/7471A or 7470A Hexavalent Chromium/7186A Total Cyanide/9012A PCB/8082 (soil) Oil and Grease/1664A (aq) Oil and Grease/9071B (soil) Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.		
			COMPOSITE START	COMPOSITE END/GRAB										
1		RWG-MWS			9/16	0907								001
2		RWG-MWT			9/16	0936								002
3		RWF-MWS			9/16	1042								003
4		RWF-MWT			9/16	008								004
5		RWB-MWS			9/16	1140								005
6		RWA-MWS			9/16	1241								006
7		RWA-MWT			9/16	1304								007
8		RW2AR-MWS			9/16	1416								008
9		RW2AR-MWT			9/16	1441								009

ADDITIONAL COMMENTS:
 Jim Bonn ARN 9/16/19 16:00 David L. Hilligman Pace
 David L. Hilligman 9/16/19 1905 RDS TRACE
 RDS TRACE Jim Bonn (copy) 9/16/19 2205 11 N Y

ACCEPTED BY/AFFILIATION: DATE: TIME: SAMPLE CONDITIONS

Received on Ice (Y/N) X
 Temp in °C Y
 Custody Sealed (Y/N) Y
 Samples Intact (Y/N) Y

SAMPLER NAME AND SIGNATURE:
 PRINT Name of SAMPLER: Jim Bonn
 SIGNATURE of SAMPLER: Jim Bonn
 DATE Signed (MM/DD/YYYY): 09/16/19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviro Analytics Group

Project # # 30324867

Courier: Fed Ex UPS USPS Client Commercial Pace Other

Tracking #: N/A

Label	<u>MLC</u>
LIMS Login	<u>MLC</u>

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 11 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.1 °C Correction Factor: 0 °C Final Temp: 1.1 °C
 Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents: <u>MLC 9/17/19</u>
	Yes	No	N/A	
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4.
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5.
-Includes date/time/ID Matrix: <u>WT</u>				
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6.
Short Hold Time Analysis (<72hr remaining):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8.
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9.
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10.
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11.
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	12.
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13.
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14.
Filtered volume received for Dissolved tests	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	15.
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16.
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix				
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed: <u>MLC</u> Date/time of preservation:
				Lot # of added preservative:
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	17.
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	18.
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed: Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

September 23, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM Direct Support
Pace Project No.: 30325106

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on September 17, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM Direct Support

Pace Project No.: 30325106

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM Direct Support

Pace Project No.: 30325106

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30325106001	RWR-MWS	Water	09/17/19 08:47	09/17/19 23:10
30325106002	RWR-MWI	Water	09/17/19 09:20	09/17/19 23:10
30325106003	RWS-MWS	Water	09/17/19 10:11	09/17/19 23:10
30325106004	RWS-MWI	Water	09/17/19 10:39	09/17/19 23:10
30325106005	RWQ-MWS	Water	09/17/19 11:51	09/17/19 23:10
30325106006	RWQ-MWI	Water	09/17/19 12:19	09/17/19 23:10
30325106007	RWP-MWI	Water	09/17/19 13:44	09/17/19 23:10
30325106008	RW21-MWI	Water	09/17/19 14:56	09/17/19 23:10

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM Direct Support

Pace Project No.: 30325106

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30325106001	RWR-MWS	EPA 6010C	KAS	2	PASI-PA
30325106002	RWR-MWI	EPA 6010C	KAS	2	PASI-PA
30325106003	RWS-MWS	EPA 6010C	KAS	2	PASI-PA
30325106004	RWS-MWI	EPA 6010C	KAS	2	PASI-PA
30325106005	RWQ-MWS	EPA 6010C	KAS	2	PASI-PA
30325106006	RWQ-MWI	EPA 6010C	KAS	2	PASI-PA
30325106007	RWP-MWI	EPA 6010C	KAS	2	PASI-PA
30325106008	RW21-MWI	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325106

Sample: RWR-MWS		Lab ID: 30325106001		Collected: 09/17/19 08:47	Received: 09/17/19 23:10	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	41.0	ug/L	3.0	0.34	1	09/18/19 14:56	09/20/19 15:20	7440-43-9	1c	
Zinc	245000	ug/L	1000	238	100	09/18/19 14:56	09/20/19 16:13	7440-66-6	1c,2c, M6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325106

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWR-MWI									
Lab ID: 30325106002									
Collected: 09/17/19 09:20 Received: 09/17/19 23:10 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	535	ug/L	3.0	0.34	1	09/18/19 14:56	09/20/19 15:35	7440-43-9	1c
Zinc	3620000	ug/L	10000	2380	1000	09/18/19 14:56	09/20/19 16:37	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325106

Sample: RWS-MWS		Lab ID: 30325106003		Collected: 09/17/19 10:11		Received: 09/17/19 23:10		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/18/19 14:56	09/20/19 15:40	7440-43-9	1c
Zinc	1980	ug/L	10.0	2.4	1	09/18/19 14:56	09/20/19 15:40	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325106

Sample: RWS-MWI		Lab ID: 30325106004		Collected: 09/17/19 10:39		Received: 09/17/19 23:10		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/18/19 14:56	09/20/19 15:55	7440-43-9	1c
Zinc	1040000	ug/L	10000	2380	1000	09/18/19 14:56	09/20/19 16:39	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325106

Sample: RWQ-MWS **Lab ID: 30325106005** Collected: 09/17/19 11:51 Received: 09/17/19 23:10 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	2.6J	ug/L	3.0	0.34	1	09/18/19 14:56	09/20/19 15:53	7440-43-9	1c
Zinc	147	ug/L	10.0	2.4	1	09/18/19 14:56	09/20/19 15:53	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325106

Sample: RWQ-MWI		Lab ID: 30325106006		Collected: 09/17/19 12:19		Received: 09/17/19 23:10		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/18/19 14:56	09/20/19 15:58	7440-43-9	1c
Zinc	270000	ug/L	1000	238	100	09/18/19 14:56	09/20/19 16:41	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325106

Sample: RWP-MWI **Lab ID: 30325106007** Collected: 09/17/19 13:44 Received: 09/17/19 23:10 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	6990	ug/L	300	34.0	100	09/18/19 14:56	09/20/19 16:44	7440-43-9	1c
Zinc	3570000	ug/L	100000	23800	10000	09/18/19 14:56	09/20/19 16:46	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325106

Sample: RW21-MWI		Lab ID: 30325106008		Collected: 09/17/19 14:56		Received: 09/17/19 23:10		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	22.5	ug/L	3.0	0.34	1	09/18/19 14:56	09/20/19 16:00	7440-43-9	1c
Zinc	570000	ug/L	10000	2380	1000	09/18/19 14:56	09/20/19 16:49	7440-66-6	1c

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM Direct Support

Pace Project No.: 30325106

QC Batch: 362022 Analysis Method: EPA 6010C
 QC Batch Method: EPA 3005A Analysis Description: 6010C MET
 Associated Lab Samples: 30325106001, 30325106002, 30325106003, 30325106004, 30325106005, 30325106006, 30325106007, 30325106008

METHOD BLANK: 1756560 Matrix: Water
 Associated Lab Samples: 30325106001, 30325106002, 30325106003, 30325106004, 30325106005, 30325106006, 30325106007, 30325106008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	09/20/19 15:16	1c
Zinc	ug/L	10.0 U	10.0	2.4	09/20/19 15:16	1c

LABORATORY CONTROL SAMPLE: 1756561

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	507	101	80-120	1c
Zinc	ug/L	500	506	101	80-120	1c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1756563 1756564

Parameter	Units	30325106001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	41.0	500	500	558	529	103	98	75-125	5	20	1c
Zinc	ug/L	245000	500	500	238000	235000	-1460	-2140	75-125	1	20	1c, M6

SAMPLE DUPLICATE: 1756562

Parameter	Units	30325106001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	41.0	42.3	3	20	1c
Zinc	ug/L	245000	245000	0	20	1c

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM Direct Support
Pace Project No.: 30325106

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.
ND - Not Detected at or above adjusted reporting limit.
TNTC - Too Numerous To Count
J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
MDL - Adjusted Method Detection Limit.
PQL - Practical Quantitation Limit.
RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.
S - Surrogate
1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.
Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.
LCS(D) - Laboratory Control Sample (Duplicate)
MS(D) - Matrix Spike (Duplicate)
DUP - Sample Duplicate
RPD - Relative Percent Difference
NC - Not Calculable.
SG - Silica Gel - Clean-Up
U - Indicates the compound was analyzed for, but not detected.
N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.
Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.
TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

BATCH QUALIFIERS

Batch: 362105
[1] The PDS failed for Zn.

ANALYTE QUALIFIERS

1c The PDS failed for Zn.
2c The PDS recovery was outside of the laboratory control limits. Result may be biased low
M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM Direct Support
Pace Project No.: 30325106

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30325106001	RWR-MWS	EPA 3005A	362022	EPA 6010C	362105
30325106002	RWR-MWI	EPA 3005A	362022	EPA 6010C	362105
30325106003	RWS-MWS	EPA 3005A	362022	EPA 6010C	362105
30325106004	RWS-MWI	EPA 3005A	362022	EPA 6010C	362105
30325106005	RWQ-MWS	EPA 3005A	362022	EPA 6010C	362105
30325106006	RWQ-MWI	EPA 3005A	362022	EPA 6010C	362105
30325106007	RWP-MWI	EPA 3005A	362022	EPA 6010C	362105
30325106008	RW21-MWI	EPA 3005A	362022	EPA 6010C	362105

REPORT OF LABORATORY ANALYSIS

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Section A

Required Client Information:
 Company: EnviroAnalytics Group
 Address: 1430 Sparrows Point Blvd
 Sparrows Point, MD 21219
 Email To: jcalenda@enviroanalyticsgroup.com
 Phone: 314-620-3056
 Requested Due Date/TAT: 5-day

Section B

Required Project Information:
 Report To: James Calenda
 Copy To:
 PO Number: EAG-SPT-6452
 Project Name: RWM Direct Support
 Project Number: 190275M-1-1

Section C

Invoice Information:
 Attention: Laura Sargent
 Company Name: EnviroAnalytics Group
 Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131
 Pace Quote Reference: Samantha Bayura
 Pace Project Manager: Samantha Bayura
 Pace Profile #: MD

NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

ITEM #	Valid Matrix Codes	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	COLLECTED	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	LABORATORY	VOC/8260B	SVOC 8270D	DRO/8015B	GRO/8015B	METALS/60100 CdPbZn	Mercury/747A or 7470A	Hexavalent Chromium/196A	Total Cyanide/9012A	PCB/8082 (soil)	Oil and Grease/1664A (soil)	Oil and Grease/8071B (soil)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	RWR-MWS	WT G	WT G	WT G	DATE TIME: 9/17 0847	1	Unpreserved	DI Water	LABORATORY												001	
2	RWR-MWI	WT G	WT G	WT G	DATE TIME: 9/17 0930	1	Unpreserved	Methanol	LABORATORY												002	
3	RWS-MWS	WT G	WT G	WT G	DATE TIME: 9/17 1011	1	Unpreserved	Na ₂ S ₂ O ₃	LABORATORY												003	
4	RWS-MWI	WT G	WT G	WT G	DATE TIME: 9/17 1039	1	Unpreserved	NaOH	LABORATORY												004	
5	RWQ-MWS	WT G	WT G	WT G	DATE TIME: 9/17 1151	1	Unpreserved	HCl	LABORATORY												005	
6	RWQ-MWI	WT G	WT G	WT G	DATE TIME: 9/17 1219	1	Unpreserved	HNO ₃	LABORATORY												006	
7	RWP-MWS	WT G	WT G	WT G	DATE TIME: 9/17 1344	1	Unpreserved	H ₂ SO ₄	LABORATORY												007	
8	RWB1-MWI	WT G	WT G	WT G	DATE TIME: 9/17 1459	1	Unpreserved	H ₂ O	LABORATORY												008	

ADDITIONAL COMMENTS	DATE	TIME	ACCEPTED BY/AFFILIATION	DATE	TIME	RECEIVED BY/AFFILIATION	DATE	TIME	Temp In °C	Received on	Cooler (Y/N)	Custom Seal (Y/N)	Samples Intact (Y/N)
Data Package Required? (Y/N):	09/17/19	12:30	Joshua Barna	09/17/19	16:18	David F. Kelly	09/19/2005			X			
Data Validation Required? (Y/N):	09/17/19	16:18	Joshua Barna	09/19/2005		David F. Kelly	09/17/19 23:10		13	Y			Y
If data package is required, attach data package checklist.	09/17/19	23:10	Joshua Barna	09/17/19	23:10	David F. Kelly				Y			

Signature and Name of Sampler: *Joshua Barna* PRINT Name of SAMPLER: Joshua Barna
Signature of Sampler: *Joshua Barna* SIGNATURE OF SAMPLER: Joshua Barna
Date Signed: 09/17/19 DATE SIGNED (MM/DD/YY): 09/17/19

Pittsburgh Lab Sample Condition Upon Receipt

30325106



Client Name: Enviro Analytics Group Project # _____

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>MLC</u>
LIMS Login	<u>MLC</u>

Tracking #: N/A

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 11 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 3 °C Correction Factor: 0 °C Final Temp: 3 °C

Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and initials of person examining contents:
	Yes	No	N/A	
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>1004281</u> <u>MLC 9/18/19</u>
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
-Includes date/time/ID Matrix: <u>WT</u>				
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Short Hold Time Analysis (<72hr remaining):	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Filtered volume received for Dissolved tests	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix				
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed: <u>MLC</u> Date/time of preservation: _____
				Lot # of added preservative: _____
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed: _____ Date: _____

Client Notification/ Resolution:

Person-Contacted: _____ Date/Time: _____ Contacted-By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

September 25, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM Direct Support
Pace Project No.: 30325342

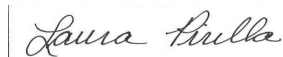
Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on September 19, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Laura M. Pirilla for
Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM Direct Support
Pace Project No.: 30325342

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM Direct Support

Pace Project No.: 30325342

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30325342001	RW09-MWS	Water	09/18/19 08:56	09/19/19 00:45
30325342002	RW09-MWI	Water	09/18/19 09:32	09/19/19 00:45
30325342003	RW21-MWS	Water	09/18/19 10:30	09/19/19 00:45
30325342004	RWH-MWS	Water	09/18/19 11:34	09/19/19 00:45
30325342005	RWH-MWI	Water	09/18/19 12:02	09/19/19 00:45
30325342006	RWI-MWS	Water	09/18/19 13:36	09/19/19 00:45
30325342007	RWI-MWI	Water	09/18/19 13:57	09/19/19 00:45
30325342008	RW10-MWI	Water	09/18/19 14:32	09/19/19 00:45

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM Direct Support
Pace Project No.: 30325342

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30325342001	RW09-MWS	EPA 6010C	KAS	2	PASI-PA
30325342002	RW09-MWI	EPA 6010C	KAS	2	PASI-PA
30325342003	RW21-MWS	EPA 6010C	KAS	2	PASI-PA
30325342004	RWH-MWS	EPA 6010C	KAS	2	PASI-PA
30325342005	RWH-MWI	EPA 6010C	KAS	2	PASI-PA
30325342006	RWI-MWS	EPA 6010C	KAS	2	PASI-PA
30325342007	RWI-MWI	EPA 6010C	KAS	2	PASI-PA
30325342008	RW10-MWI	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: RWM Direct Support
Pace Project No.: 30325342

Method: EPA 6010C
Description: 6010C MET ICP
Client: EnviroAnalytics Group, LLC
Date: September 25, 2019

General Information:

8 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Batch Comments:

- The PDS failed for Mn
- QC Batch: 362634

Analyte Comments:

QC Batch: 362550

- 1c: The PDS failed for Mn
- BLANK (Lab ID: 1759607)
 - Cadmium
 - Zinc
- DUP (Lab ID: 1759609)
 - Cadmium
 - Zinc

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: RWM Direct Support

Pace Project No.: 30325342

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: September 25, 2019

Analyte Comments:

QC Batch: 362550

1c: The PDS failed for Mn

- DUP (Lab ID: 1759612)
 - Cadmium
 - Zinc
- LCS (Lab ID: 1759608)
 - Cadmium
 - Zinc
- MS (Lab ID: 1759610)
 - Cadmium
 - Zinc
- MS (Lab ID: 1759613)
 - Cadmium
 - Zinc
- MSD (Lab ID: 1759611)
 - Cadmium
 - Zinc
- RW09-MWI (Lab ID: 30325342002)
 - Cadmium
 - Zinc
- RW09-MWS (Lab ID: 30325342001)
 - Cadmium
 - Zinc
- RW10-MWI (Lab ID: 30325342008)
 - Cadmium
 - Zinc
- RW21-MWS (Lab ID: 30325342003)
 - Cadmium
 - Zinc
- RWH-MWI (Lab ID: 30325342005)
 - Cadmium
 - Zinc
- RWH-MWS (Lab ID: 30325342004)
 - Cadmium
 - Zinc
- RWI-MWI (Lab ID: 30325342007)
 - Cadmium
 - Zinc
- RWI-MWS (Lab ID: 30325342006)
 - Cadmium
 - Zinc

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325342

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW09-MWS									
Lab ID: 30325342001									
Collected: 09/18/19 08:56 Received: 09/19/19 00:45 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	16.7	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 15:23	7440-43-9	1c
Zinc	19600	ug/L	1000	238	100	09/23/19 06:16	09/23/19 17:15	7440-66-6	1c,M6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325342

Sample: RW09-MWI		Lab ID: 30325342002		Collected: 09/18/19 09:32		Received: 09/19/19 00:45		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	5.6	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 15:46	7440-43-9	1c
Zinc	53300	ug/L	1000	238	100	09/23/19 06:16	09/23/19 17:32	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325342

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW21-MWS Lab ID: 30325342003 Collected: 09/18/19 10:30 Received: 09/19/19 00:45 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	354	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 15:49	7440-43-9	1c
Zinc	330000	ug/L	10000	2380	1000	09/23/19 06:16	09/23/19 17:34	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325342

Sample: RWH-MWS		Lab ID: 30325342004	Collected: 09/18/19 11:34	Received: 09/19/19 00:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	856	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 15:56	7440-43-9	1c
Zinc	60600	ug/L	1000	238	100	09/23/19 06:16	09/23/19 17:37	7440-66-6	1c

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325342

Sample: RWH-MWI		Lab ID: 30325342005		Collected: 09/18/19 12:02		Received: 09/19/19 00:45		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1380	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 16:00	7440-43-9	1c
Zinc	378000	ug/L	10000	2380	1000	09/23/19 06:16	09/23/19 17:39	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325342

Sample: RWI-MWS		Lab ID: 30325342006		Collected: 09/18/19 13:36		Received: 09/19/19 00:45		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	840	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 15:58	7440-43-9	1c
Zinc	26200	ug/L	1000	238	100	09/23/19 06:16	09/23/19 17:49	7440-66-6	1c

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325342

Sample: RWI-MWI		Lab ID: 30325342007		Collected: 09/18/19 13:57		Received: 09/19/19 00:45		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	8120	ug/L	3000	340	1000	09/23/19 06:16	09/23/19 17:51	7440-43-9	1c
Zinc	519000	ug/L	10000	2380	1000	09/23/19 06:16	09/23/19 17:51	7440-66-6	1c

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325342

Sample: RW10-MWI		Lab ID: 30325342008		Collected: 09/18/19 14:32		Received: 09/19/19 00:45		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	8.4	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 16:09	7440-43-9	1c
Zinc	7730	ug/L	1000	238	100	09/23/19 06:16	09/23/19 17:54	7440-66-6	1c

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM Direct Support
Pace Project No.: 30325342

QC Batch: 362550 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30325342001, 30325342002, 30325342003, 30325342004, 30325342005, 30325342006, 30325342007, 30325342008

METHOD BLANK: 1759607 Matrix: Water
Associated Lab Samples: 30325342001, 30325342002, 30325342003, 30325342004, 30325342005, 30325342006, 30325342007, 30325342008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	09/23/19 16:29	1c
Zinc	ug/L	2.5J	10.0	2.4	09/23/19 16:29	1c

LABORATORY CONTROL SAMPLE: 1759608

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	527	105	80-120	1c
Zinc	ug/L	500	527	105	80-120	1c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1759610 1759611

Parameter	Units	30325342001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	16.7	500	500	557	564	108	109	75-125	1	20	1c
Zinc	ug/L	19600	500	500	20100	20400	92	154	75-125	2	20	1c, M6

MATRIX SPIKE SAMPLE: 1759613

Parameter	Units	30325617003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	3.0 U	500	536	107	75-125	1c
Zinc	ug/L	19200	500	19700	104	75-125	1c

SAMPLE DUPLICATE: 1759609

Parameter	Units	30325342001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	16.7	17.0	2	20	1c
Zinc	ug/L	19600	19800	1	20	1c

SAMPLE DUPLICATE: 1759612

Parameter	Units	30325617003 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	1c

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM Direct Support
Pace Project No.: 30325342

SAMPLE DUPLICATE: 1759612

Parameter	Units	30325617003 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	19200	18900	1	20	1c

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM Direct Support

Pace Project No.: 30325342

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

BATCH QUALIFIERS

Batch: 362634

[1] The PDS failed for Mn

ANALYTE QUALIFIERS

1c The PDS failed for Mn

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM Direct Support

Pace Project No.: 30325342

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30325342001	RW09-MWS	EPA 3005A	362550	EPA 6010C	362634
30325342002	RW09-MWI	EPA 3005A	362550	EPA 6010C	362634
30325342003	RW21-MWS	EPA 3005A	362550	EPA 6010C	362634
30325342004	RWH-MWS	EPA 3005A	362550	EPA 6010C	362634
30325342005	RWH-MWI	EPA 3005A	362550	EPA 6010C	362634
30325342006	RWI-MWS	EPA 3005A	362550	EPA 6010C	362634
30325342007	RWI-MWI	EPA 3005A	362550	EPA 6010C	362634
30325342008	RW10-MWI	EPA 3005A	362550	EPA 6010C	362634

REPORT OF LABORATORY ANALYSIS

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Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:	
Company: EnviroAnalytics Group	Report To: James Calenda	Attention: Laura Sargent	Page: () of ()
Address: 1430 Sparrows Point Blvd	Copy To:	Company Name: EnviroAnalytics Group	GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> OTHER <input type="checkbox"/>
Sparrows Point, MD 21219	PO Number: EAG-SPT-6452	Address: 1650 Dee Peres Road, Suite 303 St. Louis, MO 63191	
Email To: calenda@enviroanalyticsgroup.com	Project Name: RWM Direct Support	Face Guide Reference: Samantha Bayura	UST <input type="checkbox"/> RCRA <input type="checkbox"/>
Phone: 314-620-3056	Project Number: 190275M-17	Face Project Manager:	
Requested Due Date/TAT: 15 July		Face Profile #:	MD

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER: DW WASTE WATER: WT WATER PRODUCT: WP SOIL/SOLID: SL OIL: OL WIFE: WF AR: AR OTHER: OT TISSUE: TS	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION		# OF CONTAINERS	Unpreserved	Preservatives										Pace Project No./ Lab I.D.							
				DATE	TIME	DATE	TIME			H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	D ₂ O	METALS/6010C ZM/CA	Mercury/7471A or 7470A	Hexavalent Chromium/7196A		Total Cyanide/9012A	PCB/8082 (soil)	Oil and Grease/1664A (soil)	Oil and Grease/9071B (soil)	Residual Chlorine (Y/N)		
1		WT G	G	9/18	0956			1																			001
2		WT G	G	9/18	0932			1																			002
3		WT G	G	9/18	1030			1																			003
4		WT G	G	9/18	1134			1																			004
5		WT G	G	9/18	1302			1																			005
6		WT G	G	9/18	1336			1																			004
7		WT G	G	9/18	1357			1																			007
8		WT G	G	9/18	1452			1																			008

ADDITIONAL COMMENTS: Data Package Required? (Y/N) Data Validation Required? (Y/N) If data package is required, attach data package checklist.	Date: 9/18/19 Time: 1345 Signature: <i>David Sargent</i>	Date: 9/18/19 Time: 2135 Signature: <i>Ben Bowman</i>	
	Date: 9/19/19 Time: 0045 Signature: <i>Ben Bowman</i>	Date: 9/19/19 Time: 0045 Signature: <i>Ben Bowman</i>	Date: 9/19/19 Time: 0045 Signature: <i>Ben Bowman</i>
	Date: 9/19/19 Time: 0045 Signature: <i>Ben Bowman</i>	Date: 9/19/19 Time: 0045 Signature: <i>Ben Bowman</i>	Date: 9/19/19 Time: 0045 Signature: <i>Ben Bowman</i>

SAMPLER NAME AND SIGNATURE: <i>Joshua Barrer</i>	DATE SIGNED (MM/DD/YYYY): 09/18/19
PRINT Name of SAMPLER: Ben Bowman	DATE SIGNED (MM/DD/YYYY): 09/18/19
SIGNATURE of SAMPLER: <i>Ben Bowman</i>	DATE SIGNED (MM/DD/YYYY): 09/18/19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics Project # 30325342

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label BLM
LIMS Login BLM

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 10 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 0.9 °C Correction Factor: 0 °C Final Temp: 0.9 °C
Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents: <u>BLM 9-11-19</u>
	Yes	No	N/A	
Chain of Custody Present:	/			1.
Chain of Custody Filled Out:	/			2.
Chain of Custody Relinquished:	/			3.
Sampler Name & Signature on COC:	/			4.
Sample Labels match COC: -Includes date/time/ID Matrix: <u>WT</u>	/			5.
Samples Arrived within Hold Time:	/			6.
Short Hold Time Analysis (<72hr remaining):		/		7.
Rush Turn Around Time Requested:	/			8.
Sufficient Volume:	/			9.
Correct Containers Used: -Pace Containers Used:	/			10.
Containers Intact:	/			11.
Orthophosphate field filtered			/	12.
Hex Cr Aqueous sample field filtered			/	13.
Organic Samples checked for dechlorination:			/	14.
Filtered volume received for Dissolved tests			/	15.
All containers have been checked for preservation. exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix	/			16.
All containers meet method preservation requirements.	/			Initial when completed <u>BLM</u> Date/time of preservation
				Lot # of added preservative
Headspace in VOA Vials (>6mm):			/	17.
Trip Blank Present:			/	18.
Trip Blank Custody Seals Present			/	
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed: Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)
*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

September 25, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM Direct Support
Pace Project No.: 30325617

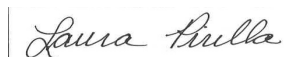
Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on September 19, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Laura M. Pirilla for
Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM Direct Support

Pace Project No.: 30325617

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM Direct Support
Pace Project No.: 30325617

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30325617001	RWO-MWS	Water	09/19/19 09:26	09/19/19 23:45
30325617002	RWO-MWI	Water	09/19/19 10:47	09/19/19 23:45
30325617003	RWK-MWS	Water	09/19/19 11:40	09/19/19 23:45
30325617004	RWK-MWI	Water	09/19/19 12:16	09/19/19 23:45
30325617005	RWL-MWI	Water	09/19/19 12:57	09/19/19 23:45
30325617006	RWJ-MWS	Water	09/19/19 13:23	09/19/19 23:45
30325617007	RWJ-MWI	Water	09/19/19 13:48	09/19/19 23:45
30325617008	RW13-MWI	Water	09/19/19 14:12	09/19/19 23:45

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM Direct Support
Pace Project No.: 30325617

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30325617001	RWO-MWS	EPA 6010C	KAS	2	PASI-PA
30325617002	RWO-MWI	EPA 6010C	KAS	2	PASI-PA
30325617003	RWK-MWS	EPA 6010C	KAS	2	PASI-PA
30325617004	RWK-MWI	EPA 6010C	KAS	2	PASI-PA
30325617005	RWL-MWI	EPA 6010C	KAS	2	PASI-PA
30325617006	RWJ-MWS	EPA 6010C	KAS	2	PASI-PA
30325617007	RWJ-MWI	EPA 6010C	KAS	2	PASI-PA
30325617008	RW13-MWI	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: RWM Direct Support

Pace Project No.: 30325617

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: September 25, 2019

General Information:

8 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Batch Comments:

The PDS failed for Mn

- QC Batch: 362634

Analyte Comments:

QC Batch: 362550

1c: The PDS failed for Mn

- BLANK (Lab ID: 1759607)
 - Cadmium
 - Zinc
- DUP (Lab ID: 1759609)
 - Cadmium
 - Zinc

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: RWM Direct Support

Pace Project No.: 30325617

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: September 25, 2019

Analyte Comments:

QC Batch: 362550

1c: The PDS failed for Mn

- DUP (Lab ID: 1759612)
 - Cadmium
 - Zinc
- LCS (Lab ID: 1759608)
 - Cadmium
 - Zinc
- MS (Lab ID: 1759610)
 - Cadmium
 - Zinc
- MS (Lab ID: 1759613)
 - Cadmium
 - Zinc
- MSD (Lab ID: 1759611)
 - Cadmium
 - Zinc
- RW13-MWI (Lab ID: 30325617008)
 - Cadmium
 - Zinc
- RWJ-MWI (Lab ID: 30325617007)
 - Cadmium
 - Zinc
- RWJ-MWS (Lab ID: 30325617006)
 - Cadmium
 - Zinc
- RWK-MWI (Lab ID: 30325617004)
 - Cadmium
 - Zinc
- RWK-MWS (Lab ID: 30325617003)
 - Cadmium
 - Zinc
- RWL-MWI (Lab ID: 30325617005)
 - Cadmium
 - Zinc
- RWO-MWI (Lab ID: 30325617002)
 - Cadmium
 - Zinc
- RWO-MWS (Lab ID: 30325617001)
 - Cadmium
 - Zinc

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325617

Sample: RWO-MWS		Lab ID: 30325617001		Collected: 09/19/19 09:26		Received: 09/19/19 23:45		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1.3J	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 16:31	7440-43-9	1c
Zinc	6790	ug/L	1000	238	100	09/23/19 06:16	09/23/19 17:56	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325617

Sample: RWO-MWI		Lab ID: 30325617002		Collected: 09/19/19 10:47		Received: 09/19/19 23:45		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	72.1	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 16:34	7440-43-9	1c
Zinc	214000	ug/L	1000	238	100	09/23/19 06:16	09/23/19 17:59	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325617

Sample: RWK-MWS **Lab ID: 30325617003** Collected: 09/19/19 11:40 Received: 09/19/19 23:45 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 16:13	7440-43-9	1c
Zinc	19200	ug/L	1000	238	100	09/23/19 06:16	09/23/19 18:01	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325617

Sample: RWK-MWI		Lab ID: 30325617004		Collected: 09/19/19 12:16	Received: 09/19/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	65.6	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 16:36	7440-43-9	1c	
Zinc	25100	ug/L	1000	238	100	09/23/19 06:16	09/23/19 18:08	7440-66-6	1c	

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325617

Sample: RWL-MWI		Lab ID: 30325617005		Collected: 09/19/19 12:57	Received: 09/19/19 23:45	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	1240	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 16:39	7440-43-9	1c	
Zinc	142000	ug/L	1000	238	100	09/23/19 06:16	09/23/19 18:11	7440-66-6	1c	

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325617

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWJ-MWS Lab ID: 30325617006 Collected: 09/19/19 13:23 Received: 09/19/19 23:45 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 16:49	7440-43-9	1c
Zinc	27.3	ug/L	10.0	2.4	1	09/23/19 06:16	09/23/19 16:49	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325617

Sample: RWJ-MWI **Lab ID: 30325617007** Collected: 09/19/19 13:48 Received: 09/19/19 23:45 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	11.8	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 16:44	7440-43-9	1c
Zinc	2150	ug/L	10.0	2.4	1	09/23/19 06:16	09/23/19 16:44	7440-66-6	1c

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325617

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW13-MWI									
Lab ID: 30325617008									
Collected: 09/19/19 14:12 Received: 09/19/19 23:45 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	12.8	ug/L	3.0	0.34	1	09/23/19 06:16	09/23/19 16:46	7440-43-9	1c
Zinc	122	ug/L	10.0	2.4	1	09/23/19 06:16	09/23/19 16:46	7440-66-6	1c

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM Direct Support
Pace Project No.: 30325617

QC Batch: 362550 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30325617001, 30325617002, 30325617003, 30325617004, 30325617005, 30325617006, 30325617007, 30325617008

METHOD BLANK: 1759607 Matrix: Water
Associated Lab Samples: 30325617001, 30325617002, 30325617003, 30325617004, 30325617005, 30325617006, 30325617007, 30325617008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	09/23/19 16:29	1c
Zinc	ug/L	2.5J	10.0	2.4	09/23/19 16:29	1c

LABORATORY CONTROL SAMPLE: 1759608

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	527	105	80-120	1c
Zinc	ug/L	500	527	105	80-120	1c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1759610 1759611

Parameter	Units	30325342001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	16.7	500	500	557	564	108	109	75-125	1	20	1c
Zinc	ug/L	19600	500	500	20100	20400	92	154	75-125	2	20	1c, M6

MATRIX SPIKE SAMPLE: 1759613

Parameter	Units	30325617003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	3.0 U	500	536	107	75-125	1c
Zinc	ug/L	19200	500	19700	104	75-125	1c

SAMPLE DUPLICATE: 1759609

Parameter	Units	30325342001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	16.7	17.0	2	20	1c
Zinc	ug/L	19600	19800	1	20	1c

SAMPLE DUPLICATE: 1759612

Parameter	Units	30325617003 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	1c

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM Direct Support
Pace Project No.: 30325617

SAMPLE DUPLICATE: 1759612

Parameter	Units	30325617003 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	19200	18900	1	20	1c

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM Direct Support

Pace Project No.: 30325617

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

BATCH QUALIFIERS

Batch: 362634

[1] The PDS failed for Mn

ANALYTE QUALIFIERS

1c The PDS failed for Mn

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM Direct Support

Pace Project No.: 30325617

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30325617001	RWO-MWS	EPA 3005A	362550	EPA 6010C	362634
30325617002	RWO-MWI	EPA 3005A	362550	EPA 6010C	362634
30325617003	RWK-MWS	EPA 3005A	362550	EPA 6010C	362634
30325617004	RWK-MWI	EPA 3005A	362550	EPA 6010C	362634
30325617005	RWL-MWI	EPA 3005A	362550	EPA 6010C	362634
30325617006	RWJ-MWS	EPA 3005A	362550	EPA 6010C	362634
30325617007	RWJ-MWI	EPA 3005A	362550	EPA 6010C	362634
30325617008	RW13-MWI	EPA 3005A	362550	EPA 6010C	362634

REPORT OF LABORATORY ANALYSIS

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Section A Required Client Information:	Section B Required Project Information:	Section C Invoice Information:
Company: Enviro-Analytics Group	Report To: James Calenda	Attention: Laura Sargent
Address: 1430 Sparrows Point Blvd Sparrows Point, MD 21219	Copy To:	Company Name: Enviro-Analytics Group Address: 1650 Dee Pines Road, Suite 303 St. Louis, MO 63131
Email To: jcalenda@enviroanalyticsgroup.com	PO Number: EAG-SPT-6452	Place Quote Reference:
Phone: 314-620-3056	Project Name: RWM Direct Support	Place Project Manager: Samantha Bayura
Requested Due Date/TAT: 5-2day	Project Number: 190275M-1-1	Place Profile #:

ITEM #	Valid Matrix Codes	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		DATE	TIME	# OF CONTAINERS	Preservatives	Unpreserved	LABORATORY		DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
				COMPOSITE START	COMPOSITE END/GRAB						MATRIX CODE (see valid codes to left)	DATE						TIME	RECEIVED ON	TEMP IN °C	
1	RWG-MNS	WT	G			9/19	0826	1			VOC/8260B										
2	RWC-MWI	WT	G			9/19	1047	1			DRO/8015B										
3	RWK-MNS	WT	G			9/19	1148	1			SVOC 8270D										
4	RWK-MWI	WT	G			9/19	1216	1			GRO/8015B										
5	RWL-MWI	WT	G			9/19	1257	1													
6	RWJ-MNS	WT	G			9/19	1323	1													
7	RWJ-MWI	WT	G			9/19	1348	1													
8	RW13-MWI	WT	G			9/19	1412	1													

NO#: 30325617

30325617

Data Package Required? (Y/N)	Y	Received on	9/19/19	Temp in °C	
Data Validation Required? (Y/N)	Y	Cooler Sealed	Y	Samples Intact	Y

EQUIPMENT NAME AND SIGNATURE:	
PRINT Name of SAMPLER: Joshua Barner	DATE Signed (MM/DD/YY): 09/19/19
SIGNATURE OF SAMPLER: <i>Joshua Barner</i>	

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics

Project # 30325617

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 10 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.8 °C Correction Factor: 0 °C Final Temp: 1.8 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>10D4281</u>	<u>BLM 9-20-19</u>
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Short Hold Time Analysis (<72hr remaining):	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Filtered volume received for Dissolved tests	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	initial when completed <u>BLM</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	initial when completed:	Date:

Client Notification/ Resolution:

Person-Contacted: _____ Date/Time: _____ Contacted-By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

September 27, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM Direct Support
Pace Project No.: 30325833

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on September 20, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM Direct Support
Pace Project No.: 30325833

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM Direct Support

Pace Project No.: 30325833

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30325833001	RWL-MWS	Water	09/20/19 07:40	09/20/19 23:50
30325833002	RW07-MWS	Water	09/20/19 08:18	09/20/19 23:50
30325833003	RW07-MWI	Water	09/20/19 08:52	09/20/19 23:50
30325833004	RW08-MWS	Water	09/20/19 09:52	09/20/19 23:50
30325833005	RW08-MWI	Water	09/20/19 10:13	09/20/19 23:50
30325833006	RW06R-MWS	Water	09/20/19 10:32	09/20/19 23:50
30325833007	RW06R-MWD	Water	09/20/19 11:17	09/20/19 23:50
30325833008	RW06-MWI	Water	09/20/19 11:40	09/20/19 23:50
30325833009	RW18-MWS	Water	09/20/19 12:31	09/20/19 23:50
30325833010	RW18-MWI	Water	09/20/19 13:01	09/20/19 23:50
30325833011	RW04-MWS	Water	09/20/19 13:41	09/20/19 23:50

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM Direct Support

Pace Project No.: 30325833

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30325833001	RWL-MWS	EPA 6010C	KAS	2	PASI-PA
30325833002	RW07-MWS	EPA 6010C	KAS	2	PASI-PA
30325833003	RW07-MWI	EPA 6010C	KAS	2	PASI-PA
30325833004	RW08-MWS	EPA 6010C	KAS	2	PASI-PA
30325833005	RW08-MWI	EPA 6010C	KAS	2	PASI-PA
30325833006	RW06R-MWS	EPA 6010C	KAS	2	PASI-PA
30325833007	RW06R-MWD	EPA 6010C	KAS	2	PASI-PA
30325833008	RW06-MWI	EPA 6010C	KAS	2	PASI-PA
30325833009	RW18-MWS	EPA 6010C	KAS	2	PASI-PA
30325833010	RW18-MWI	EPA 6010C	KAS	2	PASI-PA
30325833011	RW04-MWS	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: RWM Direct Support

Pace Project No.: 30325833

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: September 27, 2019

General Information:

11 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

QC Batch: 362985

B: Analyte was detected in the associated method blank.

- BLANK for HBN 362985 [MPRP/267 (Lab ID: 1761475)]
- Zinc

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325833

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWL-MWS Lab ID: 30325833001 Collected: 09/20/19 07:40 Received: 09/20/19 23:50 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/25/19 06:45	09/26/19 14:46	7440-43-9	
Zinc	9180	ug/L	1000	238	100	09/25/19 06:45	09/26/19 15:53	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325833

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW07-MWS Lab ID: 30325833002 Collected: 09/20/19 08:18 Received: 09/20/19 23:50 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.4	ug/L	3.0	0.34	1	09/25/19 06:45	09/26/19 15:01	7440-43-9	
Zinc	148	ug/L	10.0	2.4	1	09/25/19 06:45	09/26/19 15:01	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325833

Sample: RW07-MWI		Lab ID: 30325833003		Collected: 09/20/19 08:52		Received: 09/20/19 23:50		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	48.7	ug/L	3.0	0.34	1	09/25/19 06:45	09/26/19 15:03	7440-43-9	
Zinc	48300	ug/L	1000	238	100	09/25/19 06:45	09/26/19 16:08	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325833

Sample: RW08-MWS **Lab ID: 30325833004** Collected: 09/20/19 09:52 Received: 09/20/19 23:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	0.39J	ug/L	3.0	0.34	1	09/25/19 06:45	09/26/19 15:15	7440-43-9	
Zinc	1350	ug/L	10.0	2.4	1	09/25/19 06:45	09/26/19 15:15	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325833

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW08-MWI									
Lab ID: 30325833005									
Collected: 09/20/19 10:13 Received: 09/20/19 23:50 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/25/19 06:45	09/26/19 15:17	7440-43-9	
Zinc	11.2	ug/L	10.0	2.4	1	09/25/19 06:45	09/26/19 15:17	7440-66-6	B

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325833

Sample: RW06R-MWS **Lab ID: 30325833006** Collected: 09/20/19 10:32 Received: 09/20/19 23:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/25/19 06:45	09/26/19 15:20	7440-43-9	
Zinc	4.1J	ug/L	10.0	2.4	1	09/25/19 06:45	09/26/19 15:20	7440-66-6	B

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325833

Sample: RW06R-MWD **Lab ID: 30325833007** Collected: 09/20/19 11:17 Received: 09/20/19 23:50 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/25/19 06:45	09/26/19 15:22	7440-43-9	
Zinc	18.2	ug/L	10.0	2.4	1	09/25/19 06:45	09/26/19 15:22	7440-66-6	B

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325833

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW06-MWI									
Lab ID: 30325833008									
Collected: 09/20/19 11:40 Received: 09/20/19 23:50 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	793	ug/L	3.0	0.34	1	09/25/19 06:45	09/26/19 15:25	7440-43-9	
Zinc	122000	ug/L	1000	238	100	09/25/19 06:45	09/26/19 16:10	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325833

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW18-MWS Lab ID: 30325833009 Collected: 09/20/19 12:31 Received: 09/20/19 23:50 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/25/19 06:45	09/26/19 15:37	7440-43-9	
Zinc	4.3J	ug/L	10.0	2.4	1	09/25/19 06:45	09/26/19 15:37	7440-66-6	B

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ANALYTICAL RESULTS

Project: RWM Direct Support
Pace Project No.: 30325833

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW18-MWI									
Lab ID: 30325833010									
Collected: 09/20/19 13:01 Received: 09/20/19 23:50 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	50.4	ug/L	3.0	0.34	1	09/25/19 06:45	09/26/19 15:29	7440-43-9	
Zinc	640000	ug/L	10000	2380	1000	09/25/19 06:45	09/26/19 16:13	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM Direct Support

Pace Project No.: 30325833

Sample: RW04-MWS		Lab ID: 30325833011	Collected: 09/20/19 13:41	Received: 09/20/19 23:50	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	0.55J	ug/L	3.0	0.34	1	09/25/19 06:45	09/26/19 15:39	7440-43-9	
Zinc	313	ug/L	10.0	2.4	1	09/25/19 06:45	09/26/19 15:39	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM Direct Support
Pace Project No.: 30325833

QC Batch: 362985 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30325833001, 30325833002, 30325833003, 30325833004, 30325833005, 30325833006, 30325833007, 30325833008, 30325833009, 30325833010, 30325833011

METHOD BLANK: 1761475 Matrix: Water
Associated Lab Samples: 30325833001, 30325833002, 30325833003, 30325833004, 30325833005, 30325833006, 30325833007, 30325833008, 30325833009, 30325833010, 30325833011

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	09/26/19 14:42	
Zinc	ug/L	2.6J	10.0	2.4	09/26/19 14:42	

LABORATORY CONTROL SAMPLE: 1761476

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	520	104	80-120	
Zinc	ug/L	500	517	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1761478 1761479

Parameter	Units	30325833001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	3.0 U	500	500	529	531	106	106	75-125	0	20	
Zinc	ug/L	9180	500	500	9630	9780	89	119	75-125	2	20	

MATRIX SPIKE SAMPLE: 1761481

Parameter	Units	30325833011 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	0.55J	500	535	107	75-125	
Zinc	ug/L	313	500	808	99	75-125	

SAMPLE DUPLICATE: 1761477

Parameter	Units	30325833001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	
Zinc	ug/L	9180	9350	2	20	

SAMPLE DUPLICATE: 1761480

Parameter	Units	30325833011 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.55J	0.70J		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: RWM Direct Support

Pace Project No.: 30325833

SAMPLE DUPLICATE: 1761480

Parameter	Units	30325833011 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	313	310	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM Direct Support

Pace Project No.: 30325833

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM Direct Support
Pace Project No.: 30325833

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30325833001	RWL-MWS	EPA 3005A	362985	EPA 6010C	363088
30325833002	RW07-MWS	EPA 3005A	362985	EPA 6010C	363088
30325833003	RW07-MWI	EPA 3005A	362985	EPA 6010C	363088
30325833004	RW08-MWS	EPA 3005A	362985	EPA 6010C	363088
30325833005	RW08-MWI	EPA 3005A	362985	EPA 6010C	363088
30325833006	RW06R-MWS	EPA 3005A	362985	EPA 6010C	363088
30325833007	RW06R-MWD	EPA 3005A	362985	EPA 6010C	363088
30325833008	RW06-MWI	EPA 3005A	362985	EPA 6010C	363088
30325833009	RW18-MWS	EPA 3005A	362985	EPA 6010C	363088
30325833010	RW18-MWI	EPA 3005A	362985	EPA 6010C	363088
30325833011	RW04-MWS	EPA 3005A	362985	EPA 6010C	363088

REPORT OF LABORATORY ANALYSIS

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30325833

Section A
Required Client Information:
Company: **EnviroAnalytics Group**
Address: **1430 Sparrows Point Blvd**
Sparrows Point, MD 21219
Email To: **icalenda@enviroanalyticsgroup.com**
Phone: **314-620-3056** Fax
Requested Due Date/TAT: **5/20/19**

Section B
Required Project Information:
Report To: **James Calenda**
Copy To:
Company Name: **EnviroAnalytics Group**
Address: **1650 Oak Point Road, Suite 303 St. Louis, MO 63131**
Piece Quota Reference:
Piece Project Reference:
Project Name: **RWM Direct Support**
Project Number: **190275A-1-1**

Section C
Invoice Information:
Attention: **Laura Sargent**
Company Name: **EnviroAnalytics Group**
Address: **1650 Oak Point Road, Suite 303 St. Louis, MO 63131**
Piece Quota Reference:
Piece Project Reference:
Project Name: **Samantha Bayura**
Project Number: **MD**

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WATER WT WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIFE WP AIR AR OTHER OT TISSUE TS	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	PRESERVATIVES		VOC/8260B SVOC 8270D DRO/8015B GRO/8015B	METALS/6010C Cl-24 Mercury/7471A or 7470A Hexavalent Chromium/7196A Total Cyanide/9012A PCB/8082 (soil) Oil and Grease/1664A (soil) Oil and Grease/9071B (soil) Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.	
		COMPOSITE START	COMPOSITE END/GRAB				DATE	TIME				H ₂ SO ₄
1	RW1-MWS			G	WT G	1	Unpreserved					001
2	RW07-MWS			G	WT G	1						002
3	RW07-MWI			G	WT G	1						003
4	RW08-MWS			G	WT G	1						004
5	RW08-MWI			G	WT G	1						005
6	RW06R-MWS			G	WT G	1						006
7	RW06R-MWD			G	WT G	1						007
8	RW06-MWI			G	WT G	1						008
9	RW19-MWS			G	WT G	1						009
10	RW18-MWI			G	WT G	1						010
11	RW04-MWS			G	WT G	1						011

PERSONAL COMMENTS	DATE	TIME	AFFILIATION	DATE	TIME	AFFILIATION	SAMPLE CONDITIONS
Data Package Required? (Y/N)	9/20/19	1500	EnviroAnalytics Group	9/20/19	1453	EnviroAnalytics Group	
Data Validation Required? (Y/N)	9/20/19	2040	EnviroAnalytics Group	9/20/19	2040	EnviroAnalytics Group	Y
If data package is required, attach data package checklist	9/20/19	2350	EnviroAnalytics Group	09/20/19	2350	EnviroAnalytics Group	Y

SAMPLE NAME AND SIGNATURE:
PRINT Name of SAMPLER: **Joshua Barnes**
SIGNATURE of SAMPLER: *Joshua Barnes*
DATE Signed (MM/DD/YYYY): **09/20/19**

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics Project #

30325833

Courier: Fed Ex UPS USPS Client Commercial Pace Other

Tracking #: N/A

Label <u>OB</u>
LIMS Login <u>OB</u>

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 10 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.0 °C Correction Factor: 0 °C Final Temp: 1.0 °C
Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents:
	Yes	No	N/A	
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1004281 09/24/19 OB
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
-Includes date/time/ID Matrix: <u>WT</u>				
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Short Hold Time Analysis (<72hr remaining):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Filtered volume received for Dissolved tests	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix				
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed <u>OB</u> Date/time of preservation
				Lot # of added preservative
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	17.
Trip Blank Present:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	18.
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed: Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____
 Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)
 *PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

September 27, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM-Direct Support
Pace Project No.: 30326032

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on September 23, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

This project follows the April 5, 2016 revision 3 Quality Assurance Project Plan for Sparrows Point Terminal Site, Sparrows Point, MD prepared for EnviroAnalytics Group and is not for PA DEP compliance reporting.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures

cc: Ms. Penny Gardner, Environmental Data Quality, Inc.
Ms. Shawne M. Rodgers, Environmental Data Quality, Inc.



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM-Direct Support
Pace Project No.: 30326032

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM-Direct Support
Pace Project No.: 30326032

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30326032001	RW01-MWI	Water	09/23/19 08:25	09/23/19 23:00
30326032002	RW01-MWS	Water	09/23/19 08:55	09/23/19 23:00
30326032003	RW02-MWI	Water	09/23/19 09:49	09/23/19 23:00
30326032004	RW02-MWS	Water	09/23/19 10:14	09/23/19 23:00
30326032005	RW05R-MWI	Water	09/23/19 11:15	09/23/19 23:00
30326032006	RW05-MWS	Water	09/23/19 11:53	09/23/19 23:00
30326032007	RW03-MWS	Water	09/23/19 13:25	09/23/19 23:00
30326032008	RW03-MWI	Water	09/23/19 14:16	09/23/19 23:00

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SAMPLE ANALYTE COUNT

Project: RWM-Direct Support

Pace Project No.: 30326032

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30326032001	RW01-MWI	EPA 6010C	KAS	2	PASI-PA
30326032002	RW01-MWS	EPA 6010C	KAS	2	PASI-PA
30326032003	RW02-MWI	EPA 6010C	KAS	2	PASI-PA
30326032004	RW02-MWS	EPA 6010C	KAS	2	PASI-PA
30326032005	RW05R-MWI	EPA 6010C	KAS	2	PASI-PA
30326032006	RW05-MWS	EPA 6010C	KAS	2	PASI-PA
30326032007	RW03-MWS	EPA 6010C	KAS	2	PASI-PA
30326032008	RW03-MWI	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: RWM-Direct Support
Pace Project No.: 30326032

Method: EPA 6010C
Description: 6010C MET ICP
Client: EnviroAnalytics Group, LLC
Date: September 27, 2019

General Information:

8 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3005A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

QC Batch: 363158

- B: Analyte was detected in the associated method blank.
- BLANK for HBN 363158 [MPRP/267 (Lab ID: 1762017)
 - Zinc

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

Batch Comments:

- The serial dilution failed for Cd
- QC Batch: 363228

Analyte Comments:

QC Batch: 363158

- 1c: The precision between the sample and serial dilution exceeded laboratory control limits.
- RW01-MWI (Lab ID: 30326032001)
 - Cadmium

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: RWM-Direct Support

Pace Project No.: 30326032

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: September 27, 2019

Analyte Comments:

QC Batch: 363158

2c: The serial dilution failed for Cd

- BLANK (Lab ID: 1762017)
 - Cadmium
 - Zinc
- DUP (Lab ID: 1762019)
 - Cadmium
 - Zinc
- LCS (Lab ID: 1762018)
 - Cadmium
 - Zinc
- MS (Lab ID: 1762020)
 - Cadmium
 - Zinc
- MSD (Lab ID: 1762021)
 - Cadmium
 - Zinc
- RW01-MWI (Lab ID: 30326032001)
 - Cadmium
 - Zinc
- RW01-MWS (Lab ID: 30326032002)
 - Cadmium
 - Zinc
- RW02-MWI (Lab ID: 30326032003)
 - Cadmium
 - Zinc
- RW02-MWS (Lab ID: 30326032004)
 - Cadmium
 - Zinc
- RW03-MWI (Lab ID: 30326032008)
 - Cadmium
 - Zinc
- RW03-MWS (Lab ID: 30326032007)
 - Cadmium
 - Zinc
- RW05-MWS (Lab ID: 30326032006)
 - Cadmium
 - Zinc
- RW05R-MWI (Lab ID: 30326032005)
 - Cadmium
 - Zinc

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM-Direct Support
Pace Project No.: 30326032

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW01-MWI									
Lab ID: 30326032001									
Collected: 09/23/19 08:25 Received: 09/23/19 23:00 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	20.6	ug/L	3.0	0.34	1	09/25/19 15:37	09/26/19 16:43	7440-43-9	1c,2c
Zinc	5940	ug/L	1000	238	100	09/25/19 15:37	09/26/19 17:30	7440-66-6	2c

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ANALYTICAL RESULTS

Project: RWM-Direct Support

Pace Project No.: 30326032

Sample: RW01-MWS **Lab ID: 30326032002** Collected: 09/23/19 08:55 Received: 09/23/19 23:00 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	4.3	ug/L	3.0	0.34	1	09/25/19 15:37	09/26/19 16:59	7440-43-9	2c
Zinc	16300	ug/L	1000	238	100	09/25/19 15:37	09/26/19 17:52	7440-66-6	2c

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ANALYTICAL RESULTS

Project: RWM-Direct Support

Pace Project No.: 30326032

Sample: RW02-MWI		Lab ID: 30326032003		Collected: 09/23/19 09:49		Received: 09/23/19 23:00		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	873	ug/L	3.0	0.34	1	09/25/19 15:37	09/26/19 17:01	7440-43-9	2c
Zinc	72000	ug/L	1000	238	100	09/25/19 15:37	09/26/19 17:54	7440-66-6	2c

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ANALYTICAL RESULTS

Project: RWM-Direct Support
Pace Project No.: 30326032

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW02-MWS Lab ID: 30326032004 Collected: 09/23/19 10:14 Received: 09/23/19 23:00 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	1.1J	ug/L	3.0	0.34	1	09/25/19 15:37	09/26/19 17:13	7440-43-9	2c
Zinc	27400	ug/L	1000	238	100	09/25/19 15:37	09/26/19 17:57	7440-66-6	2c

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ANALYTICAL RESULTS

Project: RWM-Direct Support
Pace Project No.: 30326032

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW05R-MWI									
Lab ID: 30326032005									
Collected: 09/23/19 11:15 Received: 09/23/19 23:00 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	2820	ug/L	3.0	0.34	1	09/25/19 15:37	09/26/19 17:16	7440-43-9	2c
Zinc	71700	ug/L	1000	238	100	09/25/19 15:37	09/26/19 17:59	7440-66-6	2c

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ANALYTICAL RESULTS

Project: RWM-Direct Support

Pace Project No.: 30326032

Sample: RW05-MWS **Lab ID: 30326032006** Collected: 09/23/19 11:53 Received: 09/23/19 23:00 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	09/25/19 15:37	09/26/19 17:22	7440-43-9	2c
Zinc	8.3J	ug/L	10.0	2.4	1	09/25/19 15:37	09/26/19 17:22	7440-66-6	2c,B

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM-Direct Support
Pace Project No.: 30326032

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW03-MWS Lab ID: 30326032007 Collected: 09/23/19 13:25 Received: 09/23/19 23:00 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	16.3	ug/L	3.0	0.34	1	09/25/19 15:37	09/26/19 17:24	7440-43-9	2c
Zinc	19200	ug/L	1000	238	100	09/25/19 15:37	09/26/19 18:02	7440-66-6	2c

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ANALYTICAL RESULTS

Project: RWM-Direct Support
Pace Project No.: 30326032

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW03-MWI									
Lab ID: 30326032008									
Collected: 09/23/19 14:16 Received: 09/23/19 23:00 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	344	ug/L	3.0	0.34	1	09/25/19 15:37	09/26/19 17:27	7440-43-9	2c
Zinc	10500	ug/L	1000	238	100	09/25/19 15:37	09/26/19 18:04	7440-66-6	2c

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM-Direct Support

Pace Project No.: 30326032

QC Batch: 363158

Analysis Method: EPA 6010C

QC Batch Method: EPA 3005A

Analysis Description: 6010C MET

Associated Lab Samples: 30326032001, 30326032002, 30326032003, 30326032004, 30326032005, 30326032006, 30326032007, 30326032008

METHOD BLANK: 1762017

Matrix: Water

Associated Lab Samples: 30326032001, 30326032002, 30326032003, 30326032004, 30326032005, 30326032006, 30326032007, 30326032008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	09/26/19 16:38	2c
Zinc	ug/L	2.8J	10.0	2.4	09/26/19 16:38	2c

LABORATORY CONTROL SAMPLE: 1762018

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	505	101	80-120	2c
Zinc	ug/L	500	486	97	80-120	2c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1762020 1762021

Parameter	Units	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		Spike Conc.	Result	Spike Conc.	Result						
Cadmium	ug/L	500	20.6	500	570	110	109	75-125	1	20	2c
Zinc	ug/L	500	5940	500	6410	94	105	75-125	1	20	2c

SAMPLE DUPLICATE: 1762019

Parameter	Units	30326032001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	20.6	19.8	4	20	2c
Zinc	ug/L	5940	5700	4	20	2c

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM-Direct Support

Pace Project No.: 30326032

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

BATCH QUALIFIERS

Batch: 363228

[1] The serial dilution failed for Cd

ANALYTE QUALIFIERS

1c The precision between the sample and serial dilution exceeded laboratory control limits.

2c The serial dilution failed for Cd

B Analyte was detected in the associated method blank.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM-Direct Support
Pace Project No.: 30326032

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30326032001	RW01-MWI	EPA 3005A	363158	EPA 6010C	363228
30326032002	RW01-MWS	EPA 3005A	363158	EPA 6010C	363228
30326032003	RW02-MWI	EPA 3005A	363158	EPA 6010C	363228
30326032004	RW02-MWS	EPA 3005A	363158	EPA 6010C	363228
30326032005	RW05R-MWI	EPA 3005A	363158	EPA 6010C	363228
30326032006	RW05-MWS	EPA 3005A	363158	EPA 6010C	363228
30326032007	RW03-MWS	EPA 3005A	363158	EPA 6010C	363228
30326032008	RW03-MWI	EPA 3005A	363158	EPA 6010C	363228

REPORT OF LABORATORY ANALYSIS

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Section A
Required Client Information:
Company: EnviroAnalytix Group
Address: 1430 Sparrows Point Blvd
Sparrows Point, MD 21219
Email To: balendra@enviroanalyticalsquad.com
Phone: 314-620-3056
Requested Due Date/TAT: 5-20-14

Section B
Required Project Information:
Report To: James Calenda
Copy To:
PO Number: EA6 SPT-6452
Project Name: RWM - Direct Support
Project Number: 190275A-1-1

Section C
Invoice Information:
Attention: Laura Sargent
Company Name: EnviroAnalytix Group
Address: 1650 Dea Pines Road, Suite 303 St. Louis, MO 63131
Place Quote Reference:
Place Project Manager: Samantha Bayura
Place Profile #:

Section D
Required Client Information
Valid Matrix Codes:
MATRIX CODE: DW, WW, P, SL, OL, WP, AR, OT, TS
WATER, WASTE WATER, PRODUCT, SOLVENT, OIL, WIFE, AIR, OTHER, TISSUE
SAMPLE ID (A-Z, 0-9, /, -)
Sample IDs MUST BE UNIQUE

ITEM #	Valid Matrix Codes	MATRIX CODE	COLLECTED		SAMPLE TEMP AT COLLECTION		# OF CONTAINERS	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₈	Methanol	DI Water	Analyst's Initials	VOC/8260B	SVOC 8270D	DRO/8015B	GRO/8015B	METALS/6010C Cd/Pb	Mercury/7471A or 7470A	Hexavalent Chromium/7186A	Total Cyanide/9012A	PCB/8082 (soil)	Oil and Grease/1664A (soil)	Oil and Grease/9071B (soil)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.					
			COMPOSITE START	COMPOSITE ENDING	DATE	TIME																								DATE	TIME			
1	RW01-MWI	WT G	9/23	0525	1	1															X								001					
2	RW01-MWS	WT G	9/23	0559	1	1															X								002					
3	RW02-MWI	WT G	9/23	0949	1	1															X								003					
4	RW02-MWS	WT G	9/23	1014	1	1															X								004					
5	RW03-MWI	WT G	9/23	1119	1	1															X								005					
6	RW05-MWS	WT G	9/23	1325	1	1															X								006					
7	RW03-MWS	WT G	9/23	1416	1	1															X								007					
8	RW03-MWI	WT G	9/23	1416	1	1															X								008					
9																																		
10																																		
11																																		
12																																		
CONDITIONAL COMMENTS:																	DATE	TIME	ACCEPTED BY/AFFILIATION	DATE	TIME	SAMPLE CONDITIONS	Temp in °C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Cooler (Y/N)	Samples Intact (Y/N)							
Data Package Required? (Y/N): <i>OM BW ARM</i>																	9/23/14	15:30	<i>OM B/F ACK</i>	9/29/14	13:05													
Data Validation Required? (Y/N): <i>OM B/F PACK</i>																	9/23/14	14:00	<i>OM B/F PACK</i>	9/23/14	13:05													
If data package is required, attach data package checklist:																	9/23/14	23:00	<i>OM B/F PACK</i>	9/23/14	23:00													
SAMPLER NAME AND SIGNATURE: PRINT Name of SAMPLER: <i>Joshua Barne</i> SIGNATURE of SAMPLER: <i>Omni Barum</i>																	DATE Signed (MM/DD/YYYY): <i>09/23/14</i>																	

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics Project # 30320002

30320002

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: N/A

Label <u>AMB</u>
LIMS Login <u>AMB</u>

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 11 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.4 °C Correction Factor: 0 °C Final Temp: 1.4 °C
Temp should be above freezing to 6°C

Comments:	pH paper Lot# <u>1041281</u>			Date and Initials of person examining contents: <u>09/20/19 AMB</u>	
	Yes	No	N/A		
Chain of Custody Present:	/			1.	
Chain of Custody Filled Out:	/			2.	
Chain of Custody Relinquished:	/			3.	
Sampler Name & Signature on COC:	/			4.	
Sample Labels match COC: -Includes date/time/ID Matrix: <u>WT</u>	/			5.	
Samples Arrived within Hold Time:	/			6.	
Short Hold Time Analysis (<72hr remaining):	/			7.	
Rush Turn Around Time Requested:	/			8.	
Sufficient Volume:	/			9.	
Correct Containers Used: -Pace Containers Used:	/			10.	
Containers Intact:	/			11.	
Orthophosphate field filtered			/	12.	
Hex Cr Aqueous sample field filtered			/	13.	
Organic Samples checked for dechlorination:			/	14.	
Filtered volume received for Dissolved tests			/	15.	
All containers have been checked for preservation.	/			16.	
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	/			Initial when completed <u>AMB</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/	17.	
Trip Blank Present:			/	18.	
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 10, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30338635

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 03, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

CERTIFICATIONS

Project: RWM GW Sampling
Pace Project No.: 30338635

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30338635

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30338635001	RWG-MWI	Water	12/03/19 13:35	12/03/19 23:30
30338635002	RWG-MWS	Water	12/03/19 14:15	12/03/19 23:30
30338635003	RWF-MWI	Water	12/03/19 15:00	12/03/19 23:30
30338635004	RWF-MWS	Water	12/03/19 15:45	12/03/19 23:30

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling
Pace Project No.: 30338635

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30338635001	RWG-MWI	EPA 6010C	KAS	2	PASI-PA
30338635002	RWG-MWS	EPA 6010C	KAS	2	PASI-PA
30338635003	RWF-MWI	EPA 6010C	KAS	2	PASI-PA
30338635004	RWF-MWS	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30338635

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWG-MWI									
Lab ID: 30338635001									
Collected: 12/03/19 13:35 Received: 12/03/19 23:30 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	26.0	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 18:07	7440-43-9	
Zinc	362	ug/L	10.0	2.4	1	12/06/19 10:17	12/09/19 18:07	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30338635

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWG-MWS									
Lab ID: 30338635002									
Collected: 12/03/19 14:15 Received: 12/03/19 23:30 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 18:21	7440-43-9	
Zinc	194	ug/L	10.0	2.4	1	12/06/19 10:17	12/09/19 18:21	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338635

Sample: RWF-MWI		Lab ID: 30338635003		Collected: 12/03/19 15:00		Received: 12/03/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1340	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 18:23	7440-43-9	
Zinc	58800	ug/L	1000	238	100	12/06/19 10:17	12/09/19 20:35	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338635

Sample: RWF-MWS		Lab ID: 30338635004		Collected: 12/03/19 15:45		Received: 12/03/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	7.3	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 18:38	7440-43-9	
Zinc	35000	ug/L	1000	238	100	12/06/19 10:17	12/09/19 20:39	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling
Pace Project No.: 30338635

QC Batch: 374262 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30338635001, 30338635002, 30338635003, 30338635004

METHOD BLANK: 1815532 Matrix: Water
Associated Lab Samples: 30338635001, 30338635002, 30338635003, 30338635004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/09/19 18:02	
Zinc	ug/L	10.0 U	10.0	2.4	12/09/19 18:02	

LABORATORY CONTROL SAMPLE: 1815533

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	533	107	80-120	
Zinc	ug/L	500	539	108	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1815535 1815536

Parameter	Units	30338635001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	26.0	500	500	590	584	113	112	75-125	1	20	
Zinc	ug/L	362	500	500	839	830	95	93	75-125	1	20	

MATRIX SPIKE SAMPLE: 1815538

Parameter	Units	30338636007 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	1.2J	500	534	107	75-125	
Zinc	ug/L	2640	500	3210	115	75-125	

SAMPLE DUPLICATE: 1815534

Parameter	Units	30338635001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	26.0	25.8	1	20	
Zinc	ug/L	362	363	0	20	

SAMPLE DUPLICATE: 1815537

Parameter	Units	30338636007 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	1.2J	1.2J		20	
Zinc	ug/L	2640	2720	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30338635

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling

Pace Project No.: 30338635

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30338635001	RWG-MWI	EPA 3005A	374262	EPA 6010C	374397
30338635002	RWG-MWS	EPA 3005A	374262	EPA 6010C	374397
30338635003	RWF-MWI	EPA 3005A	374262	EPA 6010C	374397
30338635004	RWF-MWS	EPA 3005A	374262	EPA 6010C	374397

REPORT OF LABORATORY ANALYSIS

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Section A
Client Information:
Company: **EnviroAnalytics Group**
Address: **1600 Sparrows Point Blvd, Suite B2**
City: **Sparrows Point, MD 21219**
Phone: **314-620-3056**
Fax: **314-620-3056**
Website: **enviroanalyticsgroup.com**
Email: **jcalenda@enviroanalyticsgroup.com**
Project Name: **RWM GW Sampling**
Project Number: **190275M-1**
Requested Date/TAT: **5 Day**

Section B
Required Project Information:
Report To: **James Calenda**
Copy To: **Stewart Kabis**
Purchase Order No.: **EAG-SPT-6452**
Project Name: **RWM GW Sampling**
Project Number: **190275M-1**

Section C
Invoice Information:
Attention: **Laura Sargent**
Company Name: **EnviroAnalytics Group**
Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
Pace Quote Reference: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
Pace Project Manager: **Samantha Bayura**
Pace Profile #:

REGULATORY AGENCY
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER
 Site Location: **MD**
 STATE: **MD**

Section D Required Client Information	Valid Matrix Codes MATRIX DRINKING WATER DW WATER WT WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIPE WP AIR AR OTHER OT TISSUE TS	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	PRESERVATIVES		Analysis Test Y/N	Requested Analysis Filtered (Y/N)	Temp In °C	Received on	Custody Sealed	Cooler (Y/N)	Samples Intact (Y/N)	
		COMPOSITE START	COMPOSITE END/GRAB				DATE	TIME								DATE
RWG-MWI				G	WT G	1										
RWG-mws				G	WT G	1										
RWF-mwi				G	WT G	1										
RWF-mws				G	WT G	1										

ADDITIONAL COMMENTS
No pks

RELINQUISHED BY / AFFILIATION
James Calenda
EnviroAnalytics Group

DATE
12-3-19

TIME
1615

ACCEPTED BY / AFFILIATION
Laura Sargent
EnviroAnalytics Group

DATE
12-3-19

TIME
2330

DATE SIGNED (MM/DD/YY)
12-3-19

SIGNATURE OF SAMPLER
Lisa Perrin

DATE SIGNED (MM/DD/YY)
12-3-19

SIGNATURE OF SAMPLER
James Calenda

DATE SIGNED (MM/DD/YY)
12-3-19

SAMPLER NAME AND SIGNATURE
Lisa Perrin

PRINT Name of SAMPLER
Lisa Perrin

SIGNATURE OF SAMPLER
Lisa Perrin

DATE SIGNED (MM/DD/YY)
12-3-19

SAMPLE CONDITIONS
 Received on: 12-3-19
 Custody Sealed: Y
 Cooler (Y/N): N
 Samples Intact (Y/N): Y

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics Group Project #

#-30338635

Courier: Fed Ex UPS USPS Client Commercial Pace Other

Tracking #: N/A

Label	<u>mll</u>
LIMS Login	<u>mll</u>

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 11 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.1 °C Correction Factor: 0 °C Final Temp: 1.1 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents
				<u>10D0391</u>	<u>mll 12/4/19</u>
Chain of Custody Present:	/				
Chain of Custody Filled Out:	/				
Chain of Custody Relinquished:	/				
Sampler Name & Signature on COC:	/				
Sample Labels match COC:	/				
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	/				
Short Hold Time Analysis (<72hr remaining):	/				
Rush Turn Around Time Requested:		/			
Sufficient Volume:	/				
Correct Containers Used:	/				
-Pace Containers Used:	/				
Containers Intact:	/				
Orthophosphate field filtered			/		
Hex Cr Aqueous sample field filtered			/		
Organic Samples checked for dechlorination:			/		
Filtered volume received for Dissolved tests			/		
All containers have been checked for preservation.	/				
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	/			Initial when completed <u>mll</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/		
Trip Blank Present:			/		
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 10, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30338636

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 03, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

CERTIFICATIONS

Project: RWM GW Sampling
Pace Project No.: 30338636

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30338636

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30338636001	RWS-MWI	Water	12/03/19 09:24	12/03/19 23:30
30338636002	RWS-MWS	Water	12/03/19 09:52	12/03/19 23:30
30338636003	RWR-MWS	Water	12/03/19 10:25	12/03/19 23:30
30338636004	RWR-MWI	Water	12/03/19 10:57	12/03/19 23:30
30338636005	RWP-MWI	Water	12/03/19 11:40	12/03/19 23:30
30338636006	RW19-MWI	Water	12/03/19 12:30	12/03/19 23:30
30338636007	RW19-MWS	Water	12/03/19 13:01	12/03/19 23:30
30338636008	RWQ-MWI	Water	12/03/19 13:48	12/03/19 23:30
30338636009	RWQ-MWS	Water	12/03/19 14:19	12/03/19 23:30

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling
Pace Project No.: 30338636

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30338636001	RWS-MWI	EPA 6010C	KAS	2	PASI-PA
30338636002	RWS-MWS	EPA 6010C	KAS	2	PASI-PA
30338636003	RWR-MWS	EPA 6010C	KAS	2	PASI-PA
30338636004	RWR-MWI	EPA 6010C	KAS	2	PASI-PA
30338636005	RWP-MWI	EPA 6010C	KAS	2	PASI-PA
30338636006	RW19-MWI	EPA 6010C	KAS	2	PASI-PA
30338636007	RW19-MWS	EPA 6010C	KAS	2	PASI-PA
30338636008	RWQ-MWI	EPA 6010C	KAS	2	PASI-PA
30338636009	RWQ-MWS	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338636

Sample: RWS-MWI		Lab ID: 30338636001		Collected: 12/03/19 09:24	Received: 12/03/19 23:30	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1.6J	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 18:41	7440-43-9	
Zinc	946000	ug/L	10000	2380	1000	12/06/19 10:17	12/09/19 20:41	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338636

Sample: RWS-MWS		Lab ID: 30338636002		Collected: 12/03/19 09:52		Received: 12/03/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 18:47	7440-43-9	
Zinc	2970	ug/L	10.0	2.4	1	12/06/19 10:17	12/09/19 18:47	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338636

Sample: RWR-MWS		Lab ID: 30338636003		Collected: 12/03/19 10:25	Received: 12/03/19 23:30	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	42.3	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 18:50	7440-43-9	
Zinc	320000	ug/L	10000	2380	1000	12/06/19 10:17	12/09/19 20:44	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338636

Sample: RWR-MWI		Lab ID: 30338636004		Collected: 12/03/19 10:57	Received: 12/03/19 23:30	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	650	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 18:56	7440-43-9	
Zinc	4050000	ug/L	100000	23800	10000	12/06/19 10:17	12/09/19 21:04	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338636

Sample: RWP-MWI		Lab ID: 30338636005		Collected: 12/03/19 11:40		Received: 12/03/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	8910	ug/L	3000	340	1000	12/06/19 10:17	12/09/19 20:48	7440-43-9	
Zinc	3880000	ug/L	10000	2380	1000	12/06/19 10:17	12/09/19 20:48	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338636

Sample: RW19-MWI		Lab ID: 30338636006		Collected: 12/03/19 12:30	Received: 12/03/19 23:30	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1500	ug/L	30.0	3.4	10	12/06/19 10:17	12/09/19 20:51	7440-43-9	
Zinc	5690000	ug/L	100000	23800	10000	12/06/19 10:17	12/09/19 20:59	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338636

Sample: RW19-MWS **Lab ID: 30338636007** Collected: 12/03/19 13:01 Received: 12/03/19 23:30 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	1.2J	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 19:14	7440-43-9	
Zinc	2640	ug/L	10.0	2.4	1	12/06/19 10:17	12/09/19 19:14	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30338636

Sample: RWQ-MWI		Lab ID: 30338636008		Collected: 12/03/19 13:48		Received: 12/03/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	2.9J	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 19:36	7440-43-9	
Zinc	258000	ug/L	10000	2380	1000	12/06/19 10:17	12/09/19 21:02	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338636

Sample: RWQ-MWS		Lab ID: 30338636009		Collected: 12/03/19 14:19		Received: 12/03/19 23:30		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	4.4	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 19:42	7440-43-9	
Zinc	182	ug/L	10.0	2.4	1	12/06/19 10:17	12/09/19 19:42	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling
Pace Project No.: 30338636

QC Batch: 374262 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30338636001, 30338636002, 30338636003, 30338636004, 30338636005, 30338636006, 30338636007, 30338636008, 30338636009

METHOD BLANK: 1815532 Matrix: Water
Associated Lab Samples: 30338636001, 30338636002, 30338636003, 30338636004, 30338636005, 30338636006, 30338636007, 30338636008, 30338636009

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/09/19 18:02	
Zinc	ug/L	10.0 U	10.0	2.4	12/09/19 18:02	

LABORATORY CONTROL SAMPLE: 1815533

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	533	107	80-120	
Zinc	ug/L	500	539	108	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1815535 1815536

Parameter	Units	30338635001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	26.0	500	500	590	584	113	112	75-125	1	20	
Zinc	ug/L	362	500	500	839	830	95	93	75-125	1	20	

MATRIX SPIKE SAMPLE: 1815538

Parameter	Units	30338636007 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L		1.2J	500	534	107	75-125
Zinc	ug/L		2640	500	3210	115	75-125

SAMPLE DUPLICATE: 1815534

Parameter	Units	30338635001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	26.0	25.8	1	20	
Zinc	ug/L	362	363	0	20	

SAMPLE DUPLICATE: 1815537

Parameter	Units	30338636007 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	1.2J	1.2J		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling

Pace Project No.: 30338636

SAMPLE DUPLICATE: 1815537

Parameter	Units	30338636007 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	2640	2720	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30338636

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling
Pace Project No.: 30338636

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30338636001	RWS-MWI	EPA 3005A	374262	EPA 6010C	374397
30338636002	RWS-MWS	EPA 3005A	374262	EPA 6010C	374397
30338636003	RWR-MWS	EPA 3005A	374262	EPA 6010C	374397
30338636004	RWR-MWI	EPA 3005A	374262	EPA 6010C	374397
30338636005	RWP-MWI	EPA 3005A	374262	EPA 6010C	374397
30338636006	RW19-MWI	EPA 3005A	374262	EPA 6010C	374397
30338636007	RW19-MWS	EPA 3005A	374262	EPA 6010C	374397
30338636008	RWQ-MWI	EPA 3005A	374262	EPA 6010C	374397
30338636009	RWQ-MWS	EPA 3005A	374262	EPA 6010C	374397

REPORT OF LABORATORY ANALYSIS

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Section A
Client Information:
Company Name: **EnviroAnalytics Group**
Address: **1600 Sparrows Point Blvd, Suite B2**
City: **Sparrows Point, MD 21219**
Phone: **314-620-3056**
Fax: **314-620-3056**
Website: **enviroanalyticsgroup.com**
Project Name: **RWM GW Sampling**
Project Number: **19275 M-1**

Section B
Required Project Information:
Report To: **James Calenda**
Copy To: **Stewart Kabis**
Purchase Order No.: **EAG-SPT-6452**
Project Name: **RWM GW Sampling**
Project Number: **19275 M-1**

Section C
Invoice Information:
Attention: **Laura Sargent**
Company Name: **EnviroAnalytics Group**
Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
Pace Quote Reference: **EAG-SPT-6452**
Pace Project Manager: **Samantha Bayura**
Pace Profile #:

REGULATORY AGENCY
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER
 Site Location: **MD**
 STATE: **MD**

Section D Required Client Information	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIPE WP AIR AR OTHER OT TISSUE TS	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives Unpreserved H ₂ SO ₄ HNO ₃ NaOH Na ₂ S ₂ O ₃ Methanol Other	Analysis Test Y/N	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
		COMPOSITE START	COMPOSITE END/GRAB									
RWS-MWI				WT G			1					001
RWS-MWS							1					002
RWR-MWS							1					003
RWR-MWI							1					004
RWP-MWI							1					005
RW19-MWI							1					006
RW19-MWS							1					007
RWQ-MWI							1					008
RWQ-MWS							1					009

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
No p.cgs.	Phil O'Grady	12-3-19	1435	David H. Williams	12-3-19	1630	
	Phil O'Grady	12-3-19	1955	Bill Graham	12-3-19	2000	
	Phil O'Grady	12-3-19	2330	Mano L. O'Grady	12-3-19	2330	Y N Y

Temp in °C: _____
 Received on: _____
 Custody Sealed: _____
 Cooler (Y/N): _____
 Samples Intact (Y/N): _____

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: **Tyler Van Ness**
 SIGNATURE of SAMPLER: *Tyler Van Ness*
 DATE Signed (MM/DD/YY): **12/03/19**

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to take charges of 1.5% per month for any invoices not paid within 30 days.

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics Group

Project #

30338636

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: N/A

Label	<u>MLC</u>
LIMS Login	<u>MLC</u>

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 11 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp .8 °C Correction Factor: 0 °C Final Temp: .8 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>1000391</u>	<u>MLC 12/4/19</u>
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sample Labels match COC: -Includes date/time/ID Matrix: <u>WT</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Short Hold Time Analysis (<72hr remaining):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Correct Containers Used: -Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Filtered volume received for Dissolved tests	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed: <u>MLC</u>	Date/time of preservation:
				Lot # of added preservative:	
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 10, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30338884

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 04, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM GW Sampling
Pace Project No.: 30338884

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30338884

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30338884001	RW05R-MWI	Water	12/04/19 10:05	12/04/19 22:25
30338884002	RWE-MWI	Water	12/04/19 12:00	12/04/19 22:25
30338884003	RWE-MWS	Water	12/04/19 12:25	12/04/19 22:25
30338884004	RWD-MWI	Water	12/04/19 13:00	12/04/19 22:25
30338884005	RWD-MWS	Water	12/04/19 13:40	12/04/19 22:25
30338884006	RW03-MWI	Water	12/04/19 14:20	12/04/19 22:25
30338884007	RW03-MWS	Water	12/04/19 15:05	12/04/19 22:25

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling
Pace Project No.: 30338884

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30338884001	RW05R-MWI	EPA 6010C	KAS	2	PASI-PA
30338884002	RWE-MWI	EPA 6010C	KAS	2	PASI-PA
30338884003	RWE-MWS	EPA 6010C	KAS	2	PASI-PA
30338884004	RWD-MWI	EPA 6010C	KAS	2	PASI-PA
30338884005	RWD-MWS	EPA 6010C	KAS	2	PASI-PA
30338884006	RW03-MWI	EPA 6010C	KAS	2	PASI-PA
30338884007	RW03-MWS	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30338884

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW05R-MWI									
Lab ID: 30338884001									
Collected: 12/04/19 10:05 Received: 12/04/19 22:25 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	2700	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 19:45	7440-43-9	
Zinc	83400	ug/L	1000	238	100	12/06/19 10:17	12/09/19 21:13	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338884

Sample: RWE-MWI **Lab ID: 30338884002** Collected: 12/04/19 12:00 Received: 12/04/19 22:25 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	707	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 19:49	7440-43-9	
Zinc	118000	ug/L	1000	238	100	12/06/19 10:17	12/09/19 21:16	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338884

Sample: RWE-MWS		Lab ID: 30338884003		Collected: 12/04/19 12:25		Received: 12/04/19 22:25		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	2.0J	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 19:55	7440-43-9	
Zinc	261	ug/L	10.0	2.4	1	12/06/19 10:17	12/09/19 19:55	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338884

Sample: RWD-MWI		Lab ID: 30338884004		Collected: 12/04/19 13:00		Received: 12/04/19 22:25		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	586	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 19:58	7440-43-9	
Zinc	52600	ug/L	1000	238	100	12/06/19 10:17	12/09/19 21:18	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338884

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWD-MWS									
Lab ID: 30338884005									
Collected: 12/04/19 13:40 Received: 12/04/19 22:25 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 20:03	7440-43-9	
Zinc	5.4J	ug/L	10.0	2.4	1	12/06/19 10:17	12/09/19 20:03	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30338884

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW03-MWI									
Lab ID: 30338884006									
Collected: 12/04/19 14:20 Received: 12/04/19 22:25 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	546	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 20:06	7440-43-9	
Zinc	16200	ug/L	1000	238	100	12/06/19 10:17	12/09/19 21:21	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30338884

Sample: RW03-MWS		Lab ID: 30338884007		Collected: 12/04/19 15:05		Received: 12/04/19 22:25		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	18.8	ug/L	3.0	0.34	1	12/06/19 10:17	12/09/19 20:10	7440-43-9	
Zinc	19200	ug/L	1000	238	100	12/06/19 10:17	12/09/19 21:23	7440-66-6	

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QUALITY CONTROL DATA

Project: RWM GW Sampling
Pace Project No.: 30338884

QC Batch: 374262 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30338884001, 30338884002, 30338884003, 30338884004, 30338884005, 30338884006, 30338884007

METHOD BLANK: 1815532 Matrix: Water
Associated Lab Samples: 30338884001, 30338884002, 30338884003, 30338884004, 30338884005, 30338884006, 30338884007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/09/19 18:02	
Zinc	ug/L	10.0 U	10.0	2.4	12/09/19 18:02	

LABORATORY CONTROL SAMPLE: 1815533

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	533	107	80-120	
Zinc	ug/L	500	539	108	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1815535 1815536

Parameter	Units	30338635001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	26.0	500	500	590	584	113	112	75-125	1	20	
Zinc	ug/L	362	500	500	839	830	95	93	75-125	1	20	

MATRIX SPIKE SAMPLE: 1815538

Parameter	Units	30338636007 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	1.2J	500	534	107	75-125	
Zinc	ug/L	2640	500	3210	115	75-125	

SAMPLE DUPLICATE: 1815534

Parameter	Units	30338635001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	26.0	25.8	1	20	
Zinc	ug/L	362	363	0	20	

SAMPLE DUPLICATE: 1815537

Parameter	Units	30338636007 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	1.2J	1.2J		20	
Zinc	ug/L	2640	2720	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30338884

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling
Pace Project No.: 30338884

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30338884001	RW05R-MWI	EPA 3005A	374262	EPA 6010C	374397
30338884002	RWE-MWI	EPA 3005A	374262	EPA 6010C	374397
30338884003	RWE-MWS	EPA 3005A	374262	EPA 6010C	374397
30338884004	RWD-MWI	EPA 3005A	374262	EPA 6010C	374397
30338884005	RWD-MWS	EPA 3005A	374262	EPA 6010C	374397
30338884006	RW03-MWI	EPA 3005A	374262	EPA 6010C	374397
30338884007	RW03-MWS	EPA 3005A	374262	EPA 6010C	374397

REPORT OF LABORATORY ANALYSIS

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Section A Required Client Information: Company: EnviroAnalytics Group Address: 1600 Sparrows Point Blvd, Suite B2 Sparrows Point, MD 21219 Email To: jcalenda@enviroanalyticsgroup.com Phone: 314-620-3056 Fax: Requested Due Date/TAT: 5 Day		Section B Required Project Information: Report To: James Calenda Copy To: Stewart Kabis Purchase Order No.: EAG-SPT-6452 Project Name: RWM GW Sampling Project Number: 190825m-1		Section C Invoice Information: Attention: Laura Sargent Company Name: EnviroAnalytics Group Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131 Pace Quote Reference: Pace Project Manager: Samantha Bayura Pace Profile #:	
REGULATORY AGENCY <input type="checkbox"/> NPDES <input type="checkbox"/> GROUND WATER <input type="checkbox"/> DRINKING WATER <input type="checkbox"/> UST <input type="checkbox"/> RCRA <input type="checkbox"/> OTHER		Site Location STATE: MD			

ITEM #	Section D Required Client Information	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW PRODUCT P SOILSOLID SL OIL OL WIPE WP AIR AR OTHER OT TISSUE TS	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	SAMPLE TEMP AT COLLECTION		# OF CONTAINERS	Requested Analysis Filtered (Y/N)							Pace Project No./ Lab I.D.									
			COMPOSITE START	COMPOSITE END/GRAB			DATE	TIME		Y	N	Analysis Test	Preservatives	HNO ₃	HCl	NaOH		Na ₂ S ₂ O ₃	Methanol	Other						
1	RW0SR-MWI				WT G		12-4-19	1005	1				X	X											001	
2	RWE-MWI				WT G			1280	1				X	X												002
3	RWF-MWS				WT G			1225	1				X	X												003
4	RWD-MWI				WT G			1300	1				X	X												004
5	RWD-MWS				WT G			1340	1				X	X												005
6	RW03-MWI				WT G			1420	1				X	X												006
7	RW03-MWS				WT G			1505	1				X	X												007

ITEM #	ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION		DATE		ACCEPTED BY / AFFILIATION		DATE		SAMPLE CONDITIONS			
		PRINT NAME	SIGNATURE	DATE	TIME	PRINT NAME	SIGNATURE	DATE	TIME	Temp in °C	Received on	Cooler (Y/N)	Custody Sealed
1	No pags	Stewart Kabis	[Signature]	12-4-19	15:30	Laura Sargent	[Signature]	12-4-19	16:05	19	Y	Y	Y
2		James Calenda	[Signature]	12-4-19	18:05	Laura Sargent	[Signature]	12-4-19	18:15	19	Y	Y	Y
3		RWD-MWS	[Signature]	12-4-19	20:05	Laura Sargent	[Signature]	12-4-19	22:05	19	Y	Y	Y

SAMPLER NAME AND SIGNATURE PRINT Name of SAMPLER: Lisa Sam SIGNATURE of SAMPLER: [Signature]		DATE Signed (MM/DD/YY): 12-4-19	
---	--	--	--

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviro Analytics Group

Project # #-30338884

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>MCL</u>
LIMS Login	<u>MCL</u>

Tracking #: N/A

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 11 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.9 °C Correction Factor: D °C Final Temp: 1.9 °C
Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents:	
	Yes	No	N/A		
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<u>WD 0391</u>	<u>MCL 12/5/19</u>
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sample Labels match COC: -Includes date/time/ID Matrix: <u>WT</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Short Hold Time Analysis (<72hr remaining):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Correct Containers Used: -Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Filtered volume received for Dissolved tests	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
All containers have been checked for preservation. exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed <u>MCL</u>	Date/time of preservation _____
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 10, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RMW GW Sampling
Pace Project No.: 30338885

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 04, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RMW GW Sampling
Pace Project No.: 30338885

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

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SAMPLE SUMMARY

Project: RMW GW Sampling

Pace Project No.: 30338885

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30338885001	RW18-MWS	Water	12/04/19 08:39	12/04/19 22:25
30338885002	RW18-MWI	Water	12/04/19 09:35	12/04/19 22:25
30338885003	RW25-MWS	Water	12/04/19 12:01	12/04/19 22:25
30338885004	RW25-MWI	Water	12/04/19 12:34	12/04/19 22:25

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SAMPLE ANALYTE COUNT

Project: RMW GW Sampling
Pace Project No.: 30338885

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30338885001	RW18-MWS	EPA 6010C	KAS	2	PASI-PA
30338885002	RW18-MWI	EPA 6010C	KAS	2	PASI-PA
30338885003	RW25-MWS	EPA 6010C	KAS	2	PASI-PA
30338885004	RW25-MWI	EPA 6010C	KAS	2	PASI-PA

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ANALYTICAL RESULTS

Project: RMW GW Sampling

Pace Project No.: 30338885

Sample: RW18-MWS		Lab ID: 30338885001		Collected: 12/04/19 08:39		Received: 12/04/19 22:25		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1.9J	ug/L	3.0	0.34	1	12/06/19 10:20	12/09/19 16:21	7440-43-9	
Zinc	15.2	ug/L	10.0	2.4	1	12/06/19 10:20	12/09/19 16:21	7440-66-6	D6

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ANALYTICAL RESULTS

Project: RMW GW Sampling

Pace Project No.: 30338885

Sample: RW18-MWI		Lab ID: 30338885002		Collected: 12/04/19 09:35	Received: 12/04/19 22:25	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	87.6	ug/L	3.0	0.34	1	12/06/19 10:20	12/09/19 16:35	7440-43-9	
Zinc	849000	ug/L	10000	2380	1000	12/06/19 10:20	12/09/19 17:17	7440-66-6	

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ANALYTICAL RESULTS

Project: RMW GW Sampling

Pace Project No.: 30338885

Sample: RW25-MWS		Lab ID: 30338885003		Collected: 12/04/19 12:01		Received: 12/04/19 22:25		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	9.9	ug/L	3.0	0.34	1	12/06/19 10:20	12/09/19 16:51	7440-43-9	
Zinc	11900	ug/L	1000	238	100	12/06/19 10:20	12/09/19 17:32	7440-66-6	

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ANALYTICAL RESULTS

Project: RMW GW Sampling

Pace Project No.: 30338885

Sample: RW25-MWI		Lab ID: 30338885004		Collected: 12/04/19 12:34	Received: 12/04/19 22:25	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	622	ug/L	3.0	0.34	1	12/06/19 10:20	12/09/19 16:54	7440-43-9	
Zinc	462000	ug/L	10000	2380	1000	12/06/19 10:20	12/09/19 17:35	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RMW GW Sampling
Pace Project No.: 30338885

QC Batch: 374264 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30338885001, 30338885002, 30338885003, 30338885004

METHOD BLANK: 1815540 Matrix: Water
Associated Lab Samples: 30338885001, 30338885002, 30338885003, 30338885004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/09/19 16:14	
Zinc	ug/L	10.0 U	10.0	2.4	12/09/19 16:14	

LABORATORY CONTROL SAMPLE: 1815541

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	527	105	80-120	
Zinc	ug/L	500	523	105	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1815543 1815544

Parameter	Units	30338885001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	1.9J	500	500	543	550	108	110	75-125	1	20	
Zinc	ug/L	15.2	500	500	533	535	104	104	75-125	0	20	

SAMPLE DUPLICATE: 1815542

Parameter	Units	30338885001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	1.9J	1.7J		20	
Zinc	ug/L	15.2	19.8	27	20 D6	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RMW GW Sampling

Pace Project No.: 30338885

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

D6 The precision between the sample and sample duplicate exceeded laboratory control limits.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RMW GW Sampling
Pace Project No.: 30338885

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30338885001	RW18-MWS	EPA 3005A	374264	EPA 6010C	374601
30338885002	RW18-MWI	EPA 3005A	374264	EPA 6010C	374601
30338885003	RW25-MWS	EPA 3005A	374264	EPA 6010C	374601
30338885004	RW25-MWI	EPA 3005A	374264	EPA 6010C	374601

REPORT OF LABORATORY ANALYSIS

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Section B
Required Project Information:

Report To: **James Calenda**
Copy To: **Stewart Kabis**
Purchase Order No.: **EAG-SPT-6452**
Project Name: **RWM GW Sampling**
Project Number: **192275M-1**

Section C
Invoice Information:

Company Name: **EnviroAnalytics Group**
Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
Pace Quote Reference: **Samantha Bayura**
Pace Project Manager: **Samantha Bayura**
Pace Profile #:

Section D
Required Client Information

Valid Matrix Codes
MATRIX CODE
DRINKING WATER DW
WASTE WATER WW
PRODUCT P
SOIL/SOLID SL
OIL OL
WIPE WP
AIR AR
OTHER OT
TISSUE TS

SAMPLE ID
(A-Z, 0-9 / -)
Sample IDs MUST BE UNIQUE

Section D Required Client Information	Valid Matrix Codes MATRIX CODE	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	UNPRESERVED	PRESERVATIVES					ANALYSIS TEST	Requested Analysis Filtered (Y/N)	Pace Project No./ Lab I.D.
		COMPOSITE START	COMPOSITE END/GRAB					DATE	TIME	H ₂ SO ₄	HNO ₃	HCl			
RW18-MWS	WT				WT	1									001
RW18-MWT	WT				WT	1									002
RW25-MWS	WT				WT	1									003
RW25-MWT	WT				WT	1									004

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp In °C	Received on Ice (Y/N)	Coolery Sealed (Y/N)	Samples Intact (Y/N)
	TK No. AL ARM	12-4-19	1300	David H. Kelly	12/4/19	1601				
	David H. Kelly	12/4/19	1805	RDS FACE	12/4/19	1815		Y		
	RDS FACE	12/19/19	0705	M. J. (J. J. J.)	12/19/19	2225	8	Y	Y	Y

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics Group

Project # #-30338885

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: N/A

Label	<u>MLC</u>
LIMS Login	<u>MLC</u>

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 11 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 8 °C Correction Factor: 0 °C Final Temp: 8 °C

Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents:	
	Yes	No	N/A		
				<u>10D0391</u>	<u>MLC 12/5/19</u>
Chain of Custody Present:	<input checked="" type="checkbox"/>				1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>				2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>				3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>				4.
Sample Labels match COC:	<input checked="" type="checkbox"/>				5.
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>				6.
Short Hold Time Analysis (<72hr remaining):		<input checked="" type="checkbox"/>			7.
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>				8.
Sufficient Volume:	<input checked="" type="checkbox"/>				9.
Correct Containers Used:	<input checked="" type="checkbox"/>				10.
-Pace Containers Used:	<input checked="" type="checkbox"/>				
Containers Intact:	<input checked="" type="checkbox"/>				11.
Orthophosphate field filtered			<input checked="" type="checkbox"/>		12.
Hex Cr Aqueous sample field filtered			<input checked="" type="checkbox"/>		13.
Organic Samples checked for dechlorination:			<input checked="" type="checkbox"/>		14.
Filtered volume received for Dissolved tests			<input checked="" type="checkbox"/>		15.
All containers have been checked for preservation.	<input checked="" type="checkbox"/>				16.
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>			Initial when completed <u>MLC</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			<input checked="" type="checkbox"/>		17.
Trip Blank Present:			<input checked="" type="checkbox"/>		18.
Trip Blank Custody Seals Present			<input checked="" type="checkbox"/>		
Rad Samples Screened < 0.5 mrem/hr			<input checked="" type="checkbox"/>	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 12, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30339171

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 05, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
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CERTIFICATIONS

Project: RWM GW Sampling
Pace Project No.: 30339171

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30339171

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30339171001	RW04-MWS	Water	12/05/19 14:40	12/05/19 22:50
30339171002	RW23-MWI	Water	12/05/19 15:40	12/05/19 22:50
30339171003	RW23-MWS	Water	12/05/19 16:15	12/05/19 22:50

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling
Pace Project No.: 30339171

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30339171001	RW04-MWS	EPA 6010C	CTS	2	PASI-PA
30339171002	RW23-MWI	EPA 6010C	CTS	2	PASI-PA
30339171003	RW23-MWS	EPA 6010C	CTS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339171

Sample: RW04-MWS		Lab ID: 30339171001		Collected: 12/05/19 14:40	Received: 12/05/19 22:50	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	1.8J	ug/L	3.0	0.34	1	12/10/19 16:30	12/12/19 08:31	7440-43-9		
Zinc	604	ug/L	10.0	2.4	1	12/10/19 16:30	12/12/19 08:31	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339171

Sample: RW23-MWI		Lab ID: 30339171002		Collected: 12/05/19 15:40	Received: 12/05/19 22:50	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	2680	ug/L	3.0	0.34	1	12/10/19 16:30	12/12/19 08:33	7440-43-9	
Zinc	111000	ug/L	1000	238	100	12/10/19 16:30	12/12/19 09:23	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339171

Sample: RW23-MWS **Lab ID: 30339171003** Collected: 12/05/19 16:15 Received: 12/05/19 22:50 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	1.3J	ug/L	3.0	0.34	1	12/10/19 16:30	12/12/19 08:36	7440-43-9	
Zinc	38.6	ug/L	10.0	2.4	1	12/10/19 16:30	12/12/19 08:36	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling
Pace Project No.: 30339171

QC Batch: 374824 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30339171001, 30339171002, 30339171003

METHOD BLANK: 1818286 Matrix: Water
Associated Lab Samples: 30339171001, 30339171002, 30339171003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/12/19 08:02	
Zinc	ug/L	10.0 U	10.0	2.4	12/12/19 08:02	

LABORATORY CONTROL SAMPLE: 1818287

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	530	106	80-120	
Zinc	ug/L	500	494	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1818289 1818290

Parameter	Units	30339172001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	605	500	500	1140	1220	108	124	75-125	7	20	
Zinc	ug/L	179000	500	500	178000	186000	-180	1260	75-125	4	20 M6	

SAMPLE DUPLICATE: 1818288

Parameter	Units	30339172001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	605	596	1	20	
Zinc	ug/L	179000	180000	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30339171

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling
Pace Project No.: 30339171

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30339171001	RW04-MWS	EPA 3005A	374824	EPA 6010C	374943
30339171002	RW23-MWI	EPA 3005A	374824	EPA 6010C	374943
30339171003	RW23-MWS	EPA 3005A	374824	EPA 6010C	374943

REPORT OF LABORATORY ANALYSIS

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Section B
Client Information:
 Report To: James Calenda
 Copy To: Stewart Kabis
 1600 Sparrows Point Blvd, Suite B2
 Sparrows Point, MD 21219
 jcalenda@enviroanalyticsgroup.com
 114-620-3056
 Fax: 5 Day
 Due Date/TAT:


Section C
Invoice Information:
 Attention: Laura Sargent
 Company Name: EnviroAnalytics Group
 Address: 1650 Dus Peres Road, Suite 303 St. Louis, MO 63131
 Pace Quote Reference:
 Pace Project Manager: Samantha Bayura
 Pace Profile #:
 REGULATORY AGENCY
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER
 Site Location: MD
 STATE:

Section D
 Required Client Information

Valid Matrix Codes
 MATRIX CODE
 DRINKING WATER DW
 WASTE WATER WW
 WASTE WATER PRODUCT P
 SOIL/SOLID SL
 OIL OL
 WIFE WF
 AIR AR
 OTHER OT
 TISSUE TS

SAMPLE ID
 (A-Z, 0-9 / -)
 Sample IDs MUST BE UNIQUE

WO#: 30339171



SAMPLE ID	MATRIX CODE	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	PRESERVATIVES						Analysis Test ↑	Temp in °C	Received on	Cooler Sealed	Samples Intact	
			COMPOSITE START	COMPOSITE END/GRAB			DATE	TIME	UNPRESERVED	H ₂ SO ₄	HNO ₃	HCl						NaOH
RW04-MWS	WTG	G	12-5-19	1440	1													
RW23-MWSI	WTG	G	12-5-19	1540	1													
RW23-MWS	WTG	G	12-5-19	1615	1													

Section E
Additional Information:
 Relinquished By / Affiliation: David J. Hellegren / Pace
 Date: 12-5-19
 Time: 1620
 Accepted By / Affiliation: David J. Hellegren / Pace
 Date: 12-5-19
 Time: 1920
 Signature of Sampler: Lisa Perin
 Date Signed: 12-5-19
 Pace Project No. / Lab I.D.: 001, 002, 003

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics Group

Project # #-30339171

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>MLC</u>
LIMS Login	<u>MLC</u>

Tracking #: N/A

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 11 Type of Ice: (We) Blue None

Cooler Temperature Observed Temp 1.6 °C Correction Factor: 0 °C Final Temp: 1.6 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>1000291</u>	<u>MLC 12/6/19</u>
Chain of Custody Present:	/			1.	
Chain of Custody Filled Out:	/			2.	
Chain of Custody Relinquished:	/			3.	
Sampler Name & Signature on COC:	/			4.	
Sample Labels match COC:	/			5.	
-Includes date/time/ID Matrix: <u>WJ</u>					
Samples Arrived within Hold Time:	/			6.	
Short Hold Time Analysis (<72hr remaining):		/		7.	
Rush Turn Around Time Requested:	/			8.	
Sufficient Volume:	/			9.	
Correct Containers Used:	/			10.	
-Pace Containers Used:	/				
Containers Intact:	/			11.	
Orthophosphate field filtered			/	12.	
Hex Cr Aqueous sample field filtered			/	13.	
Organic Samples checked for dechlorination:			/	14.	
Filtered volume received for Dissolved tests			/	15.	
All containers have been checked for preservation.	/			16.	
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	/			Initial when completed	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/	17.	
Trip Blank Present:			/	18.	
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 12, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RMW GW Sampling
Pace Project No.: 30339172

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 05, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

CERTIFICATIONS

Project: RMW GW Sampling
Pace Project No.: 30339172

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RMW GW Sampling
Pace Project No.: 30339172

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30339172001	RW15-MWI	Water	12/05/19 09:53	12/05/19 22:50
30339172002	RW15-MWS	Water	12/05/19 14:57	12/05/19 22:50
30339172003	RW14-MWS	Water	12/05/19 15:36	12/05/19 22:50

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RMW GW Sampling
Pace Project No.: 30339172

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30339172001	RW15-MWI	EPA 6010C	CTS	2	PASI-PA
30339172002	RW15-MWS	EPA 6010C	CTS	2	PASI-PA
30339172003	RW14-MWS	EPA 6010C	CTS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RMW GW Sampling

Pace Project No.: 30339172

Sample: RW15-MWI **Lab ID: 30339172001** Collected: 12/05/19 09:53 Received: 12/05/19 22:50 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	605	ug/L	3.0	0.34	1	12/10/19 16:30	12/12/19 08:07	7440-43-9	1c
Zinc	179000	ug/L	1000	238	100	12/10/19 16:30	12/12/19 09:05	7440-66-6	M6

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ANALYTICAL RESULTS

Project: RMW GW Sampling

Pace Project No.: 30339172

Sample: RW15-MWS **Lab ID: 30339172002** Collected: 12/05/19 14:57 Received: 12/05/19 22:50 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	8.5	ug/L	3.0	0.34	1	12/10/19 16:30	12/12/19 08:21	7440-43-9	
Zinc	378	ug/L	10.0	2.4	1	12/10/19 16:30	12/12/19 08:21	7440-66-6	

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ANALYTICAL RESULTS

Project: RMW GW Sampling

Pace Project No.: 30339172

Sample: RW14-MWS		Lab ID: 30339172003		Collected: 12/05/19 15:36	Received: 12/05/19 22:50	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3990	ug/L	3.0	0.34	1	12/10/19 16:30	12/12/19 08:24	7440-43-9	
Zinc	77500	ug/L	1000	238	100	12/10/19 16:30	12/12/19 09:20	7440-66-6	

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QUALITY CONTROL DATA

Project: RMW GW Sampling

Pace Project No.: 30339172

QC Batch: 374824 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30339172001, 30339172002, 30339172003

METHOD BLANK: 1818286 Matrix: Water

Associated Lab Samples: 30339172001, 30339172002, 30339172003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/12/19 08:02	
Zinc	ug/L	10.0 U	10.0	2.4	12/12/19 08:02	

LABORATORY CONTROL SAMPLE: 1818287

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	530	106	80-120	
Zinc	ug/L	500	494	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1818289 1818290

Parameter	Units	30339172001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	605	500	500	1140	1220	108	124	75-125	7	20	
Zinc	ug/L	179000	500	500	178000	186000	-180	1260	75-125	4	20 M6	

SAMPLE DUPLICATE: 1818288

Parameter	Units	30339172001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	605	596	1	20	
Zinc	ug/L	179000	180000	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RMW GW Sampling

Pace Project No.: 30339172

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

1c The precision between the sample and serial dilution exceeded laboratory control limits.

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RMW GW Sampling
Pace Project No.: 30339172

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30339172001	RW15-MWI	EPA 3005A	374824	EPA 6010C	374943
30339172002	RW15-MWS	EPA 3005A	374824	EPA 6010C	374943
30339172003	RW14-MWS	EPA 3005A	374824	EPA 6010C	374943

REPORT OF LABORATORY ANALYSIS

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Section B
Client Information: EnviroAnalytics Group
Report To: James Calenda
Copy To: Stewart Kabis
1600 Sparrows Point Blvd, Suite B2
Sparrows Point, MD 21219
jcalenda@enviroanalyticsgroup.com
Purchase Order No.: EAG-SPT-6452
114-620-3056
i Due Date/TAT: 5 Day

Section C
Invoice Information:
Attention: Laura Sargent
Company Name: EnviroAnalytics Group
Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131
Face Quote Reference: Samantha Bayura
Project Name: RWM GW Sampling
Project Number: 190275M-1

REGULATORY AGENCY
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER
 Site Location: MD STATE: _____

Section D Required Client Information	Valid Matrix Codes MATRIX CODE DW WT WW P SL OL WP AR OT TS DRINKING WATER WASTE WATER PRODUCT SOIL/SOLID OIL WIRE AIR OTHER TISSUE	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	Preservatives Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₃ Methanol Other	Analysis Test ↑	Requested Analysis Filtered (Y/N)
		COMPOSITE START	COMPOSITE END/GRAB						
RWIS-MWI		DATE	TIME	DATE	TIME				
RWIS-MWS		12-5-19	0953			1		Total Cadmium 6010 X X	
RW14-MWS			1457			1		X X	
			1536			1		X X	

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION		DATE		ACCEPTED BY / AFFILIATION		DATE		SAMPLE CONDITIONS			
	Signature	Name	Signature	Name	Signature	Name	Signature	Name	Temp in °C	Received on Ice (Y/N)		
	<i>Tyler Van Ness</i>	ARM	<i>David J. Hill</i>	RDS	12-5-19	1630	<i>David J. Hill</i>	RDS	12/5/19	1630		
			<i>David J. Hill</i>	RDS	12-5-19	1915	<i>RDS</i>	RDS	12-5-19	1915	Y	
			<i>RDS</i>	RDS	12-5-19	2250	<i>Manon J. (JRM)</i>		12-5-19	2250	Y	Y

WO#: 30339172

 30339172

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Tyler Van Ness
 SIGNATURE of SAMPLER: *Tyler Van Ness*
 DATE Signed (MM/DD/YYYY): 12/05/19

Temp in °C: _____
 Received on Ice (Y/N): _____
 Cusody Sealed (Y/N): _____
 Samples Intact (Y/N): _____

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics Group

Project # #-30339172

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: N/A

Label	<u>MLC</u>
LIMS Login	<u>MLC</u>

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 11 Type of Ice: (Wei) Blue None

Cooler Temperature Observed Temp 1.8 °C Correction Factor: 0 °C Final Temp: 1.8 °C

Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents
	Yes	No	N/A	
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. <u>1000391</u>
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. <u>MLC 12/16/19</u>
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4.
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5.
-Includes date/time/ID Matrix: <u>WT</u>				
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6.
Short Hold Time Analysis (<72hr remaining):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8.
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9.
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10.
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11.
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	12.
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13.
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14.
Filtered volume received for Dissolved tests	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	15.
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16.
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix				
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed: <u>MLC</u> Date/time of preservation:
				Lot # of added preservative:
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	17.
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	18.
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed: Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 12, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30339387

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 06, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM GW Sampling
Pace Project No.: 30339387

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30339387

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30339387001	RWM-MWI	Water	12/06/19 09:10	12/06/19 23:15
30339387002	RWM-MWS	Water	12/06/19 10:00	12/06/19 23:15
30339387003	RWL-MWI	Water	12/06/19 10:55	12/06/19 23:15
30339387004	RWL-MWS	Water	12/06/19 11:45	12/06/19 23:15
30339387005	RWK-MWI	Water	12/06/19 13:15	12/06/19 23:15
30339387006	RWK-MWS	Water	12/06/19 13:55	12/06/19 23:15
30339387007	RWJ-MWS	Water	12/06/19 14:45	12/06/19 23:15
30339387008	RWJ-MWI	Water	12/06/19 15:40	12/06/19 23:15

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling
Pace Project No.: 30339387

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30339387001	RWM-MWI	EPA 6010C	CTS	2	PASI-PA
30339387002	RWM-MWS	EPA 6010C	CTS	2	PASI-PA
30339387003	RWL-MWI	EPA 6010C	CTS	2	PASI-PA
30339387004	RWL-MWS	EPA 6010C	CTS	2	PASI-PA
30339387005	RWK-MWI	EPA 6010C	CTS	2	PASI-PA
30339387006	RWK-MWS	EPA 6010C	CTS	2	PASI-PA
30339387007	RWJ-MWS	EPA 6010C	CTS	2	PASI-PA
30339387008	RWJ-MWI	EPA 6010C	CTS	2	PASI-PA

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339387

Sample: RWM-MWI		Lab ID: 30339387001		Collected: 12/06/19 09:10	Received: 12/06/19 23:15	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	1230	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 09:44	7440-43-9		
Zinc	152000	ug/L	1000	238	100	12/11/19 10:23	12/12/19 11:14	7440-66-6	1c,M6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339387

Sample: RWM-MWS		Lab ID: 30339387002		Collected: 12/06/19 10:00		Received: 12/06/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	0.36J	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 09:58	7440-43-9	
Zinc	11.6	ug/L	10.0	2.4	1	12/11/19 10:23	12/12/19 09:58	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30339387

Sample: RWL-MWI		Lab ID: 30339387003		Collected: 12/06/19 10:55	Received: 12/06/19 23:15	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	1280	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:01	7440-43-9		
Zinc	124000	ug/L	1000	238	100	12/11/19 10:23	12/12/19 11:29	7440-66-6		

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339387

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWL-MWS									
Lab ID: 30339387004									
Collected: 12/06/19 11:45 Received: 12/06/19 23:15 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:08	7440-43-9	
Zinc	15500	ug/L	1000	238	100	12/11/19 10:23	12/12/19 11:31	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30339387

Sample: RWK-MWI		Lab ID: 30339387005		Collected: 12/06/19 13:15		Received: 12/06/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	99.5	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:10	7440-43-9	
Zinc	21600	ug/L	1000	238	100	12/11/19 10:23	12/12/19 11:34	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30339387

Sample: RWK-MWS		Lab ID: 30339387006		Collected: 12/06/19 13:55	Received: 12/06/19 23:15	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:13	7440-43-9		
Zinc	20600	ug/L	1000	238	100	12/11/19 10:23	12/12/19 11:36	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339387

Sample: RWJ-MWS		Lab ID: 30339387007		Collected: 12/06/19 14:45	Received: 12/06/19 23:15	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:15	7440-43-9	
Zinc	8.3J	ug/L	10.0	2.4	1	12/11/19 10:23	12/12/19 10:15	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339387

Sample: RWJ-MWI **Lab ID: 30339387008** Collected: 12/06/19 15:40 Received: 12/06/19 23:15 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	45.7	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:17	7440-43-9	
Zinc	3140	ug/L	10.0	2.4	1	12/11/19 10:23	12/12/19 10:17	7440-66-6	

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QUALITY CONTROL DATA

Project: RWM GW Sampling
Pace Project No.: 30339387

QC Batch: 374933 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30339387001, 30339387002, 30339387003, 30339387004, 30339387005, 30339387006, 30339387007, 30339387008

METHOD BLANK: 1818678 Matrix: Water
Associated Lab Samples: 30339387001, 30339387002, 30339387003, 30339387004, 30339387005, 30339387006, 30339387007, 30339387008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/12/19 09:39	
Zinc	ug/L	10.0 U	10.0	2.4	12/12/19 09:39	

LABORATORY CONTROL SAMPLE: 1818679

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	543	109	80-120	
Zinc	ug/L	500	517	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1818681 1818682

Parameter	Units	30339387001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	1230	500	500	1810	1800	116	115	75-125	0	20	
Zinc	ug/L	152000	500	500	145000	151000	-1400	-280	75-125	4	20 M6	

MATRIX SPIKE SAMPLE: 1818685

Parameter	Units	30339388003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L		3.0 U	500	545	109	75-125
Zinc	ug/L		460	500	997	107	75-125

SAMPLE DUPLICATE: 1818680

Parameter	Units	30339387001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	1230	1220	1	20	
Zinc	ug/L	152000	150000	1	20	

SAMPLE DUPLICATE: 1818684

Parameter	Units	30339388003 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling

Pace Project No.: 30339387

SAMPLE DUPLICATE: 1818684

Parameter	Units	30339388003 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	460	538	16	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30339387

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

1c The precision between the sample and serial dilution exceeded laboratory control limits.

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling
Pace Project No.: 30339387

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30339387001	RWM-MWI	EPA 3005A	374933	EPA 6010C	375057
30339387002	RWM-MWS	EPA 3005A	374933	EPA 6010C	375057
30339387003	RWL-MWI	EPA 3005A	374933	EPA 6010C	375057
30339387004	RWL-MWS	EPA 3005A	374933	EPA 6010C	375057
30339387005	RWK-MWI	EPA 3005A	374933	EPA 6010C	375057
30339387006	RWK-MWS	EPA 3005A	374933	EPA 6010C	375057
30339387007	RWJ-MWS	EPA 3005A	374933	EPA 6010C	375057
30339387008	RWJ-MWI	EPA 3005A	374933	EPA 6010C	375057

REPORT OF LABORATORY ANALYSIS

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Section A
Client Information:
EnviroAnalytics Group
1600 Sparrows Point Blvd, Suite B2
Sparrows Point, MD 21219
jcalenda@enviroanalyticsgroup.com
314-620-3056 Fax: 5 Day
Due Date/TAT:

Section B
Required Project Information:
Report To: James Calenda
Copy To: Stewart Kabis
Purchase Order No.: EAG-SPT-6452
Project Name: RWM GW Sampling
Project Number: 190275M-1-1

Section C
Invoice Information:
Attention: Laura Sargent
Company Name: EnviroAnalytics Group
Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131
Pace Quote Reference: Samantha Bayura
Pace Project Manager: Samantha Bayura
Pace Profile #: MD

REG.
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: MD
STATE: MD

Section D Required Client Information	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIPE WP AIR AR OTHER OT TISSUE TS	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	Analysis Test ↑	Y/N	Requested Analysis Filtered (Y/N)												Pace Project No./ Lab I.D.		
		COMPOSITE START	COMPOSITE END/GRAB								DATE	TIME	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	Total Cadmium 6010	Total Zinc 6010	Residual Chlorine (Y/N)			
RWM-MWI	DW			WTG	WTG	12-6-19	910	1																001	
RWM-MWS	WW			WTG	WTG		1000	1																	002
RWL-MWI	P			WTG	WTG		1055	1																	003
RWL-MWS	SL			WTG	WTG		1145	1																	004
RWK-MWI	OL			WTG	WTG		1315	1																	005
RWK-MWS	WP			WTG	WTG		1355	1																	006
RWS-MWS	AR			WTG	WTG		1445	1																	007
RWS-MWI	OT			WTG	WTG		1540	1																	008

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS							
							Temp In °C	Received on Ice (Y/N)	Cooler Sealed (Y/N)	Samples Intact (Y/N)				
James Kabis	David S. Williams for Pace	12-6-19	1550	David S. Williams for Pace	12/6/19	1645								
David S. Williams for Pace	RDS	12/6/19	1600	RDS	12/6/19	2010								
RDS	RDS	12-6-19	1715	James Kabis for Pace	12/6/19	2375	1.5	Y	Y					

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Lisa Perrin
 SIGNATURE of SAMPLER: *Lisa Perrin*
 DATE Signed (MM/DD/YYYY): 12-6-19

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics

Project # 30339387

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label JSM
LIMS Login JSM

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.5 °C Correction Factor: 0 °C Final Temp: 1.5 °C
Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents: <u>JSM 12/7/19</u>
	Yes	No	N/A	
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4.
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5.
-Includes date/time/ID Matrix: <u>WT</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6.
Short Hold Time Analysis (<72hr remaining):	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7.
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8.
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9.
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10.
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11.
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	12.
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13.
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14.
Filtered volume received for Dissolved tests	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	15.
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16.
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed: <u>JSM</u> Date/time of preservation: _____
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lot # of added preservative: _____
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	17.
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	18.
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed: <u>JSM</u> Date: <u>12/7/19</u>

Client Notification/ Resolution:
 Person Contacted: _____ Date/Time: _____ Contacted By: _____
 Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in reports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)
 *PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 12, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30339388

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 06, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM GW Sampling
Pace Project No.: 30339388

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30339388

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30339388001	R24-MWS	Water	12/06/19 09:29	12/06/19 23:15
30339388002	R24-MWI	Water	12/06/19 10:17	12/06/19 23:15
30339388003	R16-MWI	Water	12/06/19 11:19	12/06/19 23:15
30339388004	R16-MWS	Water	12/06/19 11:57	12/06/19 23:15
30339388005	RWH-MWS	Water	12/06/19 12:56	12/06/19 23:15
30339388006	RWH-MWI	Water	12/06/19 13:48	12/06/19 23:15
30339388007	R21-MWS	Water	12/06/19 14:40	12/06/19 23:15
30339388008	R21-MWI	Water	12/06/19 15:42	12/06/19 23:15

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling
Pace Project No.: 30339388

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30339388001	R24-MWS	EPA 6010C	CTS	2	PASI-PA
30339388002	R24-MWI	EPA 6010C	CTS	2	PASI-PA
30339388003	R16-MWI	EPA 6010C	CTS	2	PASI-PA
30339388004	R16-MWS	EPA 6010C	CTS	2	PASI-PA
30339388005	RWH-MWS	EPA 6010C	CTS	2	PASI-PA
30339388006	RWH-MWI	EPA 6010C	CTS	2	PASI-PA
30339388007	R21-MWS	EPA 6010C	CTS	2	PASI-PA
30339388008	R21-MWI	EPA 6010C	CTS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339388

Sample: R24-MWS **Lab ID: 30339388001** Collected: 12/06/19 09:29 Received: 12/06/19 23:15 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	0.43J	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:20	7440-43-9	
Zinc	6.7J	ug/L	10.0	2.4	1	12/11/19 10:23	12/12/19 10:20	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339388

Sample: R24-MWI **Lab ID: 30339388002** Collected: 12/06/19 10:17 Received: 12/06/19 23:15 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	1250	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:22	7440-43-9	
Zinc	538000	ug/L	10000	2380	1000	12/11/19 10:23	12/12/19 12:03	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339388

Sample: R16-MWI **Lab ID: 30339388003** Collected: 12/06/19 11:19 Received: 12/06/19 23:15 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 11:46	7440-43-9	
Zinc	460	ug/L	10.0	2.4	1	12/11/19 10:23	12/12/19 11:46	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339388

Sample: R16-MWS **Lab ID: 30339388004** Collected: 12/06/19 11:57 Received: 12/06/19 23:15 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	0.36J	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:37	7440-43-9	
Zinc	22.7	ug/L	10.0	2.4	1	12/11/19 10:23	12/12/19 10:37	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339388

Sample: RWH-MWS		Lab ID: 30339388005		Collected: 12/06/19 12:56		Received: 12/06/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	19.9	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:39	7440-43-9	
Zinc	2600	ug/L	10.0	2.4	1	12/11/19 10:23	12/12/19 10:39	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339388

Sample: RWH-MWI		Lab ID: 30339388006		Collected: 12/06/19 13:48		Received: 12/06/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3580	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:42	7440-43-9	
Zinc	502000	ug/L	10000	2380	1000	12/11/19 10:23	12/12/19 12:05	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339388

Sample: R21-MWS		Lab ID: 30339388007		Collected: 12/06/19 14:40		Received: 12/06/19 23:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	433	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:44	7440-43-9	
Zinc	368000	ug/L	1000	238	100	12/11/19 10:23	12/12/19 11:51	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339388

Sample: R21-MWI		Lab ID: 30339388008		Collected: 12/06/19 15:42	Received: 12/06/19 23:15	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	33.1	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:47	7440-43-9	
Zinc	539000	ug/L	10000	2380	1000	12/11/19 10:23	12/12/19 12:08	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling
Pace Project No.: 30339388

QC Batch: 374933 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30339388001, 30339388002, 30339388003, 30339388004, 30339388005, 30339388006, 30339388007, 30339388008

METHOD BLANK: 1818678 Matrix: Water
Associated Lab Samples: 30339388001, 30339388002, 30339388003, 30339388004, 30339388005, 30339388006, 30339388007, 30339388008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/12/19 09:39	
Zinc	ug/L	10.0 U	10.0	2.4	12/12/19 09:39	

LABORATORY CONTROL SAMPLE: 1818679

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	543	109	80-120	
Zinc	ug/L	500	517	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1818681 1818682

Parameter	Units	30339387001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	1230	500	500	1810	1800	116	115	75-125	0	20	
Zinc	ug/L	152000	500	500	145000	151000	-1400	-280	75-125	4	20 M6	

MATRIX SPIKE SAMPLE: 1818685

Parameter	Units	30339388003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	3.0 U	500	545	109	75-125	
Zinc	ug/L	460	500	997	107	75-125	

SAMPLE DUPLICATE: 1818680

Parameter	Units	30339387001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	1230	1220	1	20	
Zinc	ug/L	152000	150000	1	20	

SAMPLE DUPLICATE: 1818684

Parameter	Units	30339388003 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling

Pace Project No.: 30339388

SAMPLE DUPLICATE: 1818684

Parameter	Units	30339388003 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	460	538	16	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30339388

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling
Pace Project No.: 30339388

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30339388001	R24-MWS	EPA 3005A	374933	EPA 6010C	375057
30339388002	R24-MWI	EPA 3005A	374933	EPA 6010C	375057
30339388003	R16-MWI	EPA 3005A	374933	EPA 6010C	375057
30339388004	R16-MWS	EPA 3005A	374933	EPA 6010C	375057
30339388005	RWH-MWS	EPA 3005A	374933	EPA 6010C	375057
30339388006	RWH-MWI	EPA 3005A	374933	EPA 6010C	375057
30339388007	R21-MWS	EPA 3005A	374933	EPA 6010C	375057
30339388008	R21-MWI	EPA 3005A	374933	EPA 6010C	375057

REPORT OF LABORATORY ANALYSIS

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The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

WO#: 30339388



30339388

Section A Client Information:		Section B Required Project Information:		Section C Invoice Information:	
Company:	EnviroAnalytics Group	Report To:	James Calenda	Attention:	Laura Sargent
Address:	1600 Sparrows Point Blvd, Suite B2	Copy To:	Stewart Kabis	Company Name:	EnviroAnalytics Group
City:	Sparrows Point, MD 21219	Purchase Order No.:	EAG-SPT-6452	Address:	1650 Des Peres Road, Suite 303 St. Louis, MO 63131
Phone:	314-620-3056	Project Name:	RWM GW Sampling	Face Quote Reference:	
Fax:		Project Number:	190275M-1	Pace Project Manager:	Samantha Bayura
Site Due Date/TAT:	5 Day			Face Profile #:	

Section D Required Client Information	Valid Matrix Codes MATRIX DRINKING WATER DW WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIFE WP AIR AR OTHER OT TISSUE TS	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives										Analysis Test ↑ Total Cadmium 6010 Total Zinc 6010	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
		COMPOSITE START	COMPOSITE END/GRAB			DATE	TIME	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₈	Methanol	Other	Y/N			
Rw24-MWS	WT G			12-6-19	0939	1												001
Rw24-MWI	WT G				1017	1												002
Rw16-MWI	WT G				1119	1												003
Rw16-MWS	WT G				1157	1												004
Rw14-MWS	WT G				1256	1												005
Rw14-MWI	WT G				1348	1												006
Rw21-MWS	WT G				1440	1												007
Rw21-MWI	WT G				1542	1												008

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp In °C	Received on	Custody Sealed	Cooler (Y/N)	Samples Inlet (Y/N)
	Tx To M ARM	12-6-19	1605	D. Williams / EnviroAnalytics	12/6/19	1644					
	David H. Williams / Pace	12/6/19	2005	RDS / Pace	12-6-19	2010	1.7	Y			
	RDS / Pace	12-6-19	2315	John / Pace	12/6/19	2315	1.8	Y			Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Tyler Van Ness

SIGNATURE of SAMPLER: *[Signature]*

DATE Signed (MM/DD/YY): 12-06-19

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics

Project # 30339388

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label JSM
LIMS Login JSM

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.8 °C Correction Factor: 0 °C Final Temp: 1.8 °C

Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents: <u>JSM 12/7/19</u>
	Yes	No	N/A	
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4.
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5.
-Includes date/time/ID Matrix: <u>WT</u>				
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6.
Short Hold Time Analysis (<72hr remaining):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.
Rush Turn Around Time Requested:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	8.
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9.
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10.
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11.
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	12.
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13.
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14.
Filtered volume received for Dissolved tests	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	15.
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16.
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix				
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed: <u>JSM</u> Date/time of preservation: _____
				Lot # of added preservative: _____
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	17.
Trip Blank Present:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	18.
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed: <u>JSM</u> Date: <u>12/7/19</u>

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 12, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30339701

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 09, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
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CERTIFICATIONS

Project: RWM GW Sampling

Pace Project No.: 30339701

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ANAB DOD-ELAP Rad Accreditation #: L2417

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California Certification #: 04222CA

Colorado Certification #: PA01547

Connecticut Certification #: PH-0694

Delaware Certification

EPA Region 4 DW Rad

Florida/TNI Certification #: E87683

Georgia Certification #: C040

Florida: Cert E871149 SEKS WET

Guam Certification

Hawaii Certification

Idaho Certification

Illinois Certification

Indiana Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: KY90133

KY WW Permit #: KY0098221

KY WW Permit #: KY0000221

Louisiana DHH/TNI Certification #: LA180012

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: 2017020

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification #: 9991

Missouri Certification #: 235

Montana Certification #: Cert0082

Nebraska Certification #: NE-OS-29-14

Nevada Certification #: PA014572018-1

New Hampshire/TNI Certification #: 297617

New Jersey/TNI Certification #: PA051

New Mexico Certification #: PA01457

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Ohio EPA Rad Approval: #41249

Oregon/TNI Certification #: PA200002-010

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

Rhode Island Certification #: 65-00282

South Dakota Certification

Tennessee Certification #: 02867

Texas/TNI Certification #: T104704188-17-3

Utah/TNI Certification #: PA014572017-9

USDA Soil Permit #: P330-17-00091

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 9526

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin Approve List for Rad

Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30339701

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30339701001	RWO-MWI	Water	12/09/19 10:14	12/09/19 22:15
30339701002	RWO-MWS	Water	12/09/19 11:11	12/09/19 22:15
30339701003	RWN-MWS	Water	12/09/19 12:33	12/09/19 22:15

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling

Pace Project No.: 30339701

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30339701001	RWO-MWI	EPA 6010C	CTS	2	PASI-PA
30339701002	RWO-MWS	EPA 6010C	CTS	2	PASI-PA
30339701003	RWN-MWS	EPA 6010C	CTS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30339701

Sample: RWO-MWI		Lab ID: 30339701001		Collected: 12/09/19 10:14	Received: 12/09/19 22:15	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	55.4	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:49	7440-43-9		
Zinc	204000	ug/L	1000	238	100	12/11/19 10:23	12/12/19 11:56	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339701

Sample: RWO-MWS		Lab ID: 30339701002		Collected: 12/09/19 11:11	Received: 12/09/19 22:15	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	7.6	ug/L	3.0	0.34	1	12/11/19 10:23	12/12/19 10:52	7440-43-9		
Zinc	3720	ug/L	10.0	2.4	1	12/11/19 10:23	12/12/19 10:52	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339701

Sample: RWN-MWS		Lab ID: 30339701003		Collected: 12/09/19 12:33	Received: 12/09/19 22:15	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	11200	ug/L	300	34.0	100	12/11/19 10:23	12/12/19 11:58	7440-43-9	
Zinc	943000	ug/L	10000	2380	1000	12/11/19 10:23	12/12/19 12:16	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling
Pace Project No.: 30339701

QC Batch: 374933 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30339701001, 30339701002, 30339701003

METHOD BLANK: 1818678 Matrix: Water
Associated Lab Samples: 30339701001, 30339701002, 30339701003

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/12/19 09:39	
Zinc	ug/L	10.0 U	10.0	2.4	12/12/19 09:39	

LABORATORY CONTROL SAMPLE: 1818679

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	543	109	80-120	
Zinc	ug/L	500	517	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1818681 1818682

Parameter	Units	30339387001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	1230	500	500	1810	1800	116	115	75-125	0	20	
Zinc	ug/L	152000	500	500	145000	151000	-1400	-280	75-125	4	20 M6	

MATRIX SPIKE SAMPLE: 1818685

Parameter	Units	30339388003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	3.0 U	500	545	109	75-125	
Zinc	ug/L	460	500	997	107	75-125	

SAMPLE DUPLICATE: 1818680

Parameter	Units	30339387001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	1230	1220	1	20	
Zinc	ug/L	152000	150000	1	20	

SAMPLE DUPLICATE: 1818684

Parameter	Units	30339388003 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	
Zinc	ug/L	460	538	16	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30339701

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling
Pace Project No.: 30339701

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30339701001	RWO-MWI	EPA 3005A	374933	EPA 6010C	375057
30339701002	RWO-MWS	EPA 3005A	374933	EPA 6010C	375057
30339701003	RWN-MWS	EPA 3005A	374933	EPA 6010C	375057

REPORT OF LABORATORY ANALYSIS


This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

Section B Required Project Information:
 Client Information: EnviroAnalytics Group
 Report To: James Calenda
 Copy To: Stewart Kabis
 1600 Sparrows Point Blvd, Suite B2
 Sparrows Point, MD 21219
 jcalenda@enviroanalyticsgroup.com
 14-620-3056
 Fax: 5 Day
 Due Date/TAT:


Section C Invoice Information:
 Attention: Laura Sargent
 Company Name: EnviroAnalytics Group
 Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131
 Project Name: RWM GW Sampling
 Project Number: 190275 M-
 Purchase Order No.: EAG-SPT-6452
 Project Name: RWM GW Sampling
 Project Number: 190275 M-
 Preservative Reference: Samantha Bayura
 Pace Profile #:

Section D Required Client Information:
 Regulatory Agency: NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER
 Site Location: MD
 STATE: MD

Valid Matrix Codes MATRIX CODE	Valid Matrix Codes CODE	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved H ₂ SO ₄ HCl NaOH Na ₂ O ₂ Methanol Other	Y/N	Requested Analysis Filtered (Y/N)		Pace Project No./ Lab I.D.
			COMPOSITE START	COMPOSITE END/GRAB					DATE	TIME	
RWO-MWI	DW	WT G	12-9-19	1914	1	1			X	X	001
RWO-MWS	WT	WT G	1	1111	1	1			X	X	002
RWN-MWS	WT	WT G	1	1233	1	1			X	X	003

NO#: 30339701

 30339701

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Samples Intact (Y/N)
	J. Calenda	12-9-19	1305	James Calenda	12-19-19	1545				
	Drinking Water	12-19-19	14:00	RWS	12-19-19	1905		Y		
	RWS	12-19-19	1515	Ben Mountain	12-19-19	2215	21.6	Y	N	Y

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Tyler Van Ness
 SIGNATURE OF SAMPLER: 
 DATE Signed (MM/DD/YYYY): 12/09/19

Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics

Project # 30339701

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 2.6 °C Correction Factor: 0 °C Final Temp: 2.6 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>10D0391</u>	<u>BLM 12-9-19</u>
Chain of Custody Present:	/			1.	
Chain of Custody Filled Out:	/			2.	
Chain of Custody Relinquished:	/			3.	
Sampler Name & Signature on COC:	/			4.	
Sample Labels match COC:	/			5.	
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	/			6.	
Short Hold Time Analysis (<72hr remaining):		/		7.	
Rush Turn Around Time Requested:	/			8.	
Sufficient Volume:	/			9.	
Correct Containers Used:	/			10.	
-Pace Containers Used:	/				
Containers Intact:	/			11.	
Orthophosphate field filtered			/	12.	
Hex Cr Aqueous sample field filtered			/	13.	
Organic Samples checked for dechlorination:			/	14.	
Filtered volume received for Dissolved tests			/	15.	
All containers have been checked for preservation.	/			16.	
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	/			Initial when completed <u>BLM</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/	17.	
Trip Blank Present:			/	18.	
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 16, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30339702

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 09, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, LLC.

CERTIFICATIONS

Project: RWM GW Sampling
Pace Project No.: 30339702

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30339702

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30339702001	RW06-MWD	Water	12/09/19 09:20	12/09/19 22:15
30339702002	RW06-MWS	Water	12/09/19 09:55	12/09/19 22:15
30339702003	RW06-MWI	Water	12/09/19 10:55	12/09/19 22:15
30339702004	RW07-MWI	Water	12/09/19 12:35	12/09/19 22:15
30339702005	RW07-MWS	Water	12/09/19 13:25	12/09/19 22:15
30339702006	RW08-MWI	Water	12/09/19 15:00	12/09/19 22:15

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling
Pace Project No.: 30339702

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30339702001	RW06-MWD	EPA 6010C	KAS	2	PASI-PA
30339702002	RW06-MWS	EPA 6010C	KAS	2	PASI-PA
30339702003	RW06-MWI	EPA 6010C	KAS	2	PASI-PA
30339702004	RW07-MWI	EPA 6010C	KAS	2	PASI-PA
30339702005	RW07-MWS	EPA 6010C	KAS	2	PASI-PA
30339702006	RW08-MWI	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339702

Sample: RW06-MWD **Lab ID: 30339702001** Collected: 12/09/19 09:20 Received: 12/09/19 22:15 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	0.38J	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 15:01	7440-43-9	
Zinc	35.0	ug/L	10.0	2.4	1	12/12/19 16:39	12/13/19 15:01	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30339702

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW06-MWS Lab ID: 30339702002 Collected: 12/09/19 09:55 Received: 12/09/19 22:15 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 15:15	7440-43-9	
Zinc	4.3J	ug/L	10.0	2.4	1	12/12/19 16:39	12/13/19 15:15	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339702

Sample: RW06-MWI		Lab ID: 30339702003		Collected: 12/09/19 10:55		Received: 12/09/19 22:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	673	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 15:17	7440-43-9	
Zinc	116000	ug/L	1000	238	100	12/12/19 16:39	12/13/19 16:35	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339702

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW07-MWI									
Lab ID: 30339702004									
Collected: 12/09/19 12:35 Received: 12/09/19 22:15 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	38.1	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 15:29	7440-43-9	
Zinc	16600	ug/L	1000	238	100	12/12/19 16:39	12/13/19 16:37	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339702

Sample: RW07-MWS **Lab ID: 30339702005** Collected: 12/09/19 13:25 Received: 12/09/19 22:15 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0J	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 15:32	7440-43-9	
Zinc	168	ug/L	10.0	2.4	1	12/12/19 16:39	12/13/19 15:32	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339702

Sample: RW08-MWI		Lab ID: 30339702006		Collected: 12/09/19 15:00		Received: 12/09/19 22:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	0.59J	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 15:34	7440-43-9	
Zinc	48.9	ug/L	10.0	2.4	1	12/12/19 16:39	12/13/19 15:34	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling
Pace Project No.: 30339702

QC Batch: 375268 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30339702001, 30339702002, 30339702003, 30339702004, 30339702005, 30339702006

METHOD BLANK: 1820323 Matrix: Water
Associated Lab Samples: 30339702001, 30339702002, 30339702003, 30339702004, 30339702005, 30339702006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/13/19 14:56	
Zinc	ug/L	10.0 U	10.0	2.4	12/13/19 14:56	

LABORATORY CONTROL SAMPLE: 1820324

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	521	104	80-120	
Zinc	ug/L	500	518	104	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1820326 1820327

Parameter	Units	30339702001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	0.38J	500	500	535	526	107	105	75-125	2	20	
Zinc	ug/L	35.0	500	500	549	538	103	101	75-125	2	20	

MATRIX SPIKE SAMPLE: 1820329

Parameter	Units	30339990005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	420	500	957	107	75-125	
Zinc	ug/L	43500	500	45600	416	75-125 M6	

SAMPLE DUPLICATE: 1820325

Parameter	Units	30339702001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.38J	0.35J		20	
Zinc	ug/L	35.0	34.4	1	20	

SAMPLE DUPLICATE: 1820328

Parameter	Units	30339990005 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	420	410	2	20	
Zinc	ug/L	43500	45000	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30339702

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling
Pace Project No.: 30339702

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30339702001	RW06-MWD	EPA 3005A	375268	EPA 6010C	375356
30339702002	RW06-MWS	EPA 3005A	375268	EPA 6010C	375356
30339702003	RW06-MWI	EPA 3005A	375268	EPA 6010C	375356
30339702004	RW07-MWI	EPA 3005A	375268	EPA 6010C	375356
30339702005	RW07-MWS	EPA 3005A	375268	EPA 6010C	375356
30339702006	RW08-MWI	EPA 3005A	375268	EPA 6010C	375356

REPORT OF LABORATORY ANALYSIS

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Section A
Client Information:
 Company: EnviroAnalytics Group
 Address: 1600 Sparrows Point Blvd, Suite B2
 Sparrows Point, MD 21219
 Contact: James Calenda
 Copy To: Stewart Kabis
 Purchase Order No.: EAG-SPT-6452
 Project Name: RWM GW Sampling
 Project Number: 190275M-1-1
 Fax: 314-620-3056
 Email: jcalenda@enviroanalyticsgroup.com
 Website: www.enviroanalyticsgroup.com
 Lead Time: 5 Day
 State: MD


Section B
Project Information:
 Report To: James Calenda
 Attention: Laura Sargent
 Company Name: EnviroAnalytics Group
 Address: 1650 Des Peres Road, Suite 303 St. Louis, MO 63131
 Project Manager: Samantha Bayura
 State: MD

Section C
Regulatory Agency:
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Section D Required Client Information	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WT WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIPE WP AIR AR OTHER OT TISSUE TS	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		# OF CONTAINERS	Preservatives	Y/N	Requested Analysis Filtered (Y/N)
				COMPOSITE START	COMPOSITE END/GRAB				
RW06-MWD		WT G		DATE	TIME				
RW06-MWS		WT G		12-9-19	920	1			
RW06-MWI		WT G			955	1			
RW07-MWI		WT G			1055	1			
RW07-MWS		WT G			1235	1			
RW08-MWI		WT G			1325	1			
		WT G			1500	1			

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp In °C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Cooler (Y/N)	Samples Intact (Y/N)
NO PLS	JR	12-9-19	1540	Paula H. Bayura	12-9-19	1447					
	David Wilson	12-9-19	14:00	Paula H. Bayura	12-9-19	1405		Y			
	Paula H. Bayura	12-9-19	1415	Paula H. Bayura	12-9-19	1415	2.9	Y	N		Y

WO#: 30339702



30339702

Section E
Sampler Information:
 Sampler Name and Signature: Lisa Perri
 Print Name of Sampler: Lisa Perri
 Signature of Sampler: [Signature]
 Date Signed (MM/DD/YYYY): 12-9-19

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to have charges of 1.5% per month for any invoice not paid within 30 days.

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics

Project # #-30339702

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 2.9 °C Correction Factor: 0 °C Final Temp: 2.9 °C

Temp should be above freezing to 6°C

pH paper Lot# <u>10D0391</u>	Date and Initials of person examining contents: <u>BLM 12-10-11</u>
---------------------------------	--

Comments:

	Yes	No	N/A	
Chain of Custody Present:	/			1.
Chain of Custody Filled Out:	/			2.
Chain of Custody Relinquished:	/			3.
Sampler Name & Signature on COC:	/			4.
Sample Labels match COC:	/			5.
-Includes date/time/ID Matrix: <u>WT</u>				
Samples Arrived within Hold Time:	/			6.
Short Hold Time Analysis (<72hr remaining):	/	/		7.
Rush Turn Around Time Requested:	/			8.
Sufficient Volume:	/			9.
Correct Containers Used:	/			10.
-Pace Containers Used:	/			
Containers Intact:	/			11.
Orthophosphate field filtered			/	12.
Hex Cr Aqueous sample field filtered			/	13.
Organic Samples checked for dechlorination:			/	14.
Filtered volume received for Dissolved tests			/	15.
All containers have been checked for preservation.	/			16.
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix				
All containers meet method preservation requirements.	/			Initial when completed: <u>BLM</u> Date/time of preservation: _____
				Lot # of added preservative: _____
Headspace in VOA Vials (>6mm):			/	17.
Trip Blank Present:			/	18.
Trip Blank Custody Seals Present			/	
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed: _____ Date: _____

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 16, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30339990

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM GW Sampling
Pace Project No.: 30339990

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30339990

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30339990001	RW13-MWI	Water	12/10/19 09:33	12/10/19 22:15
30339990002	RWI-MWS	Water	12/10/19 10:29	12/10/19 22:15
30339990003	RWI-MWI	Water	12/10/19 11:33	12/10/19 22:15
30339990004	RW12-MWS	Water	12/10/19 12:15	12/10/19 22:15
30339990005	RW12-MWI	Water	12/10/19 13:22	12/10/19 22:15
30339990006	RW11-MWS	Water	12/10/19 14:32	12/10/19 22:15
30339990007	RW11-MWI	Water	12/10/19 15:05	12/10/19 22:15
30339990008	RW10-MWI	Water	12/10/19 15:54	12/10/19 22:15

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling

Pace Project No.: 30339990

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30339990001	RW13-MWI	EPA 6010C	KAS	2	PASI-PA
30339990002	RWI-MWS	EPA 6010C	KAS	2	PASI-PA
30339990003	RWI-MWI	EPA 6010C	KAS	2	PASI-PA
30339990004	RW12-MWS	EPA 6010C	KAS	2	PASI-PA
30339990005	RW12-MWI	EPA 6010C	KAS	2	PASI-PA
30339990006	RW11-MWS	EPA 6010C	KAS	2	PASI-PA
30339990007	RW11-MWI	EPA 6010C	KAS	2	PASI-PA
30339990008	RW10-MWI	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339990

Sample: RW13-MWI		Lab ID: 30339990001		Collected: 12/10/19 09:33	Received: 12/10/19 22:15	Matrix: Water			
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	22500	ug/L	300	34.0	100	12/12/19 16:39	12/13/19 16:46	7440-43-9	
Zinc	246000	ug/L	1000	238	100	12/12/19 16:39	12/13/19 16:46	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30339990

Sample: RWI-MWS		Lab ID: 30339990002		Collected: 12/10/19 10:29		Received: 12/10/19 22:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1080	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 15:39	7440-43-9	
Zinc	32400	ug/L	1000	238	100	12/12/19 16:39	12/13/19 16:49	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339990

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWI-MWI									
Lab ID: 30339990003									
Collected: 12/10/19 11:33 Received: 12/10/19 22:15 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	8270	ug/L	30.0	3.4	10	12/12/19 16:39	12/13/19 16:52	7440-43-9	
Zinc	544000	ug/L	10000	2380	1000	12/12/19 16:39	12/13/19 16:55	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339990

Sample: RW12-MWS **Lab ID: 30339990004** Collected: 12/10/19 12:15 Received: 12/10/19 22:15 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	2.5J	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 15:48	7440-43-9	
Zinc	763	ug/L	10.0	2.4	1	12/12/19 16:39	12/13/19 15:48	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30339990

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW12-MWI									
Lab ID: 30339990005									
Collected: 12/10/19 13:22 Received: 12/10/19 22:15 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	420	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 15:51	7440-43-9	
Zinc	43500	ug/L	1000	238	100	12/12/19 16:39	12/13/19 16:58	7440-66-6	M6

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339990

Sample: RW11-MWS		Lab ID: 30339990006		Collected: 12/10/19 14:32		Received: 12/10/19 22:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	1.9J	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 16:08	7440-43-9	
Zinc	37500	ug/L	1000	238	100	12/12/19 16:39	12/13/19 17:05	7440-66-6	

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339990

Sample: RW11-MWI		Lab ID: 30339990007		Collected: 12/10/19 15:05		Received: 12/10/19 22:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	476	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 16:10	7440-43-9	
Zinc	173000	ug/L	1000	238	100	12/12/19 16:39	12/13/19 17:08	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339990

Sample: RW10-MWI		Lab ID: 30339990008		Collected: 12/10/19 15:54		Received: 12/10/19 22:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	13.9	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 16:15	7440-43-9	
Zinc	6020	ug/L	1000	238	100	12/12/19 16:39	12/13/19 17:10	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling
Pace Project No.: 30339990

QC Batch: 375268 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30339990001, 30339990002, 30339990003, 30339990004, 30339990005, 30339990006, 30339990007, 30339990008

METHOD BLANK: 1820323 Matrix: Water
Associated Lab Samples: 30339990001, 30339990002, 30339990003, 30339990004, 30339990005, 30339990006, 30339990007, 30339990008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/13/19 14:56	
Zinc	ug/L	10.0 U	10.0	2.4	12/13/19 14:56	

LABORATORY CONTROL SAMPLE: 1820324

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	521	104	80-120	
Zinc	ug/L	500	518	104	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1820326 1820327

Parameter	Units	30339702001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	0.38J	500	500	535	526	107	105	75-125	2	20	
Zinc	ug/L	35.0	500	500	549	538	103	101	75-125	2	20	

MATRIX SPIKE SAMPLE: 1820329

Parameter	Units	30339990005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L		420	500	957	107	75-125
Zinc	ug/L		43500	500	45600	416	75-125 M6

SAMPLE DUPLICATE: 1820325

Parameter	Units	30339702001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.38J	0.35J		20	
Zinc	ug/L	35.0	34.4	1	20	

SAMPLE DUPLICATE: 1820328

Parameter	Units	30339990005 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	420	410	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALITY CONTROL DATA

Project: RWM GW Sampling

Pace Project No.: 30339990

SAMPLE DUPLICATE: 1820328

Parameter	Units	30339990005 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	43500	45000	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30339990

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling
Pace Project No.: 30339990

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30339990001	RW13-MWI	EPA 3005A	375268	EPA 6010C	375356
30339990002	RWI-MWS	EPA 3005A	375268	EPA 6010C	375356
30339990003	RWI-MWI	EPA 3005A	375268	EPA 6010C	375356
30339990004	RW12-MWS	EPA 3005A	375268	EPA 6010C	375356
30339990005	RW12-MWI	EPA 3005A	375268	EPA 6010C	375356
30339990006	RW11-MWS	EPA 3005A	375268	EPA 6010C	375356
30339990007	RW11-MWI	EPA 3005A	375268	EPA 6010C	375356
30339990008	RW10-MWI	EPA 3005A	375268	EPA 6010C	375356

REPORT OF LABORATORY ANALYSIS

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Section C

Invoice Information:
 Attention: **Laura Sargent**
 Company Name: **EnviroAnalytics Group**
 Address: **1650 Das Peres Road, Suite 303 St. Louis, MO 63131**

Section B

Required Project Information:
 Report To: **James Calenda**
 Copy To: **Stewart Kabis**
 Purchase Order No.: **EAG-SPT-6452**
 Project Name: **RWM GW Sampling**
 Project Number: **190275 M-1**

Section A

Client Information:
EnviroAnalytics Group
1600 Sparrows Point Blvd, Suite B2
Sparrows Point, MD 21219
 jcalenda@enviroanalyticsgroup.com
 314-620-3056 Fax
 5 Day

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: MD
 STATE: MD

Requested Analysis Filtered (Y/N)

Analysis Tests	Y
Preservatives	N

NO#: 30339990



SAMPLE ID

(A-Z, 0-9, /, -)
 Sample IDs MUST BE UNIQUE

Section D Required Client Information	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WT PRODUCT WATER P SOILSOLID SL OIL OL WIPE WP AIR AR OTHER OT TISSUE TS	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see yield codes to left)	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₈ Methanol Other	Analysis Tests	Total Cadmium 6010	Total Zinc 6010	Pace Project No./ Lab I.D.
		COMPOSITE START	COMPOSITE END/GRAB									
RWB-MWI				G	WT	12-10-19	0933			X	X	001
RWE-MWS				G	WT		1029			X	X	002
RWI-MWI				G	WT		1133			X	X	003
RW12-MWS				G	WT		1215			X	X	004
RW12-MWI				G	WT		1322			X	X	005
RW11-MWS				G	WT		1432			X	X	006
RW11-MWI				G	WT		1505			X	X	007
RW10-MWI				G	WT		1554			X	X	008

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION		DATE	TIME	SAMPLE CONDITIONS							
				DATE	TIME			Temp In °C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Cooler (Y/N)	Samples Intact (Y/N)			
T No M, ARM	David Sargent/EnviroAnalytics	12-10-19	1610	David Sargent/EnviroAnalytics	12-10-19	1615									
David Sargent/EnviroAnalytics	RD 5 PACE	12-10-19	1900	David Sargent/EnviroAnalytics	12-10-19	1910									
	RD 5 PACE	12-10-19	2215	Morgan I Clay	12-10-19	2215									

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: **Tyler Van Ness**
 SIGNATURE of SAMPLER: *Tyler Van Ness*
 DATE Signed (MM/DD/YYYY): **12/10/19**

Pittsburgh Lab Sample Condition Upon Receipt

- 30339990



Client Name: EnviroAnalytics Group Project # _____

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>MLC</u>
LIMS Login	<u>MLC</u>

Tracking #: N/A

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 9 °C Correction Factor: 0 °C Final Temp: 9 °C

Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents
	Yes	No	N/A	
				<u>10D03a1</u>
				<u>MLC 12/11/19</u>
Chain of Custody Present:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4.
Sample Labels match COC:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5.
-Includes date/time/ID Matrix: <u>WT</u>				
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6.
Short Hold Time Analysis (<72hr remaining):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	7.
Rush Turn Around Time Requested:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8.
Sufficient Volume:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9.
Correct Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10.
-Pace Containers Used:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Containers Intact:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11.
Orthophosphate field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	12.
Hex Cr Aqueous sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	13.
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	14.
Filtered volume received for Dissolved tests	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	15.
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	16.
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix				
All containers meet method preservation requirements.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Initial when completed <u>MLC</u> Date/time of preservation
				Lot # of added preservative
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	17.
Trip Blank Present:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	18.
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Rad Samples Screened < 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed: Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 16, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30339991

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 10, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM GW Sampling
Pace Project No.: 30339991

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30339991

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30339991001	RWB-MWI	Water	12/10/19 09:00	12/10/19 22:15
30339991002	RWB-MWS	Water	12/10/19 09:20	12/10/19 22:15
30339991003	RWA-MWI	Water	12/10/19 10:10	12/10/19 22:15
30339991004	RWA-MWS	Water	12/10/19 10:40	12/10/19 22:15
30339991005	RW22R-MWI	Water	12/10/19 16:00	12/10/19 22:15

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling

Pace Project No.: 30339991

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30339991001	RWB-MWI	EPA 6010C	KAS	2	PASI-PA
30339991002	RWB-MWS	EPA 6010C	KAS	2	PASI-PA
30339991003	RWA-MWI	EPA 6010C	KAS	2	PASI-PA
30339991004	RWA-MWS	EPA 6010C	KAS	2	PASI-PA
30339991005	RW22R-MWI	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339991

Sample: RWB-MWI		Lab ID: 30339991001		Collected: 12/10/19 09:00	Received: 12/10/19 22:15	Matrix: Water				
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual	
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 16:18	7440-43-9		
Zinc	47.8	ug/L	10.0	2.4	1	12/12/19 16:39	12/13/19 16:18	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339991

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWB-MWS									
Lab ID: 30339991002									
Collected: 12/10/19 09:20 Received: 12/10/19 22:15 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 16:21	7440-43-9	
Zinc	38.7	ug/L	10.0	2.4	1	12/12/19 16:39	12/13/19 16:21	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339991

Sample: RWA-MWI		Lab ID: 30339991003		Collected: 12/10/19 10:10		Received: 12/10/19 22:15		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	9020	ug/L	300	34.0	100	12/12/19 16:39	12/13/19 17:21	7440-43-9	
Zinc	396000	ug/L	10000	2380	1000	12/12/19 16:39	12/13/19 17:25	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339991

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RWA-MWS									
Lab ID: 30339991004									
Collected: 12/10/19 10:40 Received: 12/10/19 22:15 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	4.4	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 16:30	7440-43-9	
Zinc	49.7	ug/L	10.0	2.4	1	12/12/19 16:39	12/13/19 16:30	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30339991

Sample: RW22R-MWI **Lab ID: 30339991005** Collected: 12/10/19 16:00 Received: 12/10/19 22:15 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/12/19 16:39	12/13/19 16:32	7440-43-9	
Zinc	3000	ug/L	10.0	2.4	1	12/12/19 16:39	12/13/19 16:32	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling
Pace Project No.: 30339991

QC Batch: 375268 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30339991001, 30339991002, 30339991003, 30339991004, 30339991005

METHOD BLANK: 1820323 Matrix: Water
Associated Lab Samples: 30339991001, 30339991002, 30339991003, 30339991004, 30339991005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/13/19 14:56	
Zinc	ug/L	10.0 U	10.0	2.4	12/13/19 14:56	

LABORATORY CONTROL SAMPLE: 1820324

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	521	104	80-120	
Zinc	ug/L	500	518	104	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1820326 1820327

Parameter	Units	30339702001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	0.38J	500	500	535	526	107	105	75-125	2	20	
Zinc	ug/L	35.0	500	500	549	538	103	101	75-125	2	20	

MATRIX SPIKE SAMPLE: 1820329

Parameter	Units	30339990005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	420	500	957	107	75-125	
Zinc	ug/L	43500	500	45600	416	75-125 M6	

SAMPLE DUPLICATE: 1820325

Parameter	Units	30339702001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.38J	0.35J		20	
Zinc	ug/L	35.0	34.4	1	20	

SAMPLE DUPLICATE: 1820328

Parameter	Units	30339990005 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	420	410	2	20	
Zinc	ug/L	43500	45000	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30339991

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling
Pace Project No.: 30339991

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30339991001	RWB-MWI	EPA 3005A	375268	EPA 6010C	375356
30339991002	RWB-MWS	EPA 3005A	375268	EPA 6010C	375356
30339991003	RWA-MWI	EPA 3005A	375268	EPA 6010C	375356
30339991004	RWA-MWS	EPA 3005A	375268	EPA 6010C	375356
30339991005	RW22R-MWI	EPA 3005A	375268	EPA 6010C	375356

REPORT OF LABORATORY ANALYSIS

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Section B
Required Client Information:
 Company: **EnviroAnalytics Group**
 Address: **1600 Sparrows Point Blvd, Suite B2 Sparrows Point, MD 21219**
 Phone: **314-620-3056** Fax: **314-620-6452**
 Email: **icalenda@enviroanalyticsgroup.com**
 Requested Due Date/TAT: **5 Day**

Section C
Required Project Information:
 Report To: **James Calenda**
 Copy To: **Stewart Kabis**
 Attention: **Laura Sargent**
 Company Name: **EnviroAnalytics Group**
 Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
 Pace Order No.: **EAG-SPT-6452**
 Project Name: **RWM GW Sampling**
 Project Number: **190275M-1-1**
 Pace Project Manager: **Samantha Bayura**
 Pace Profile #: **MD**

REGULATORY AGENCY
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: **MD**
 STATE: **MD**

Section D
Required Client Information
SAMPLE ID
 (A-Z, 0-9 / -)
 Sample IDs MUST BE UNIQUE

Valid Matrix Codes
 MATRIX CODE
 DRINKING WATER DW
 WASTE WATER WT
 PRODUCT P
 SOIL/SOLID SL
 OIL OL
 WIFE WP
 AIR AR
 OTHER OT
 TISSUE TS

Requested Analysis Filtered (Y/N)

ITEM #	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Temp in °C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Samples Intact (Y/N)
1	RWB-MWI	WTG	COMPOSITE START DATE TIME: 900	James Calenda RWS	12-10-19	1615	DAVID HILGEMAN RWS	12-10-19	1615				
2	RWB-MUS	WTG	COMPOSITE END/GRAB DATE TIME: 920	DAVID HILGEMAN RWS	12-10-19	1900	RDS THE	12-10-19	1910		Y		
3	RWA-MWI	WTG	DATE TIME: 1010	RDS THE	12-10-19	2015	MARSHALL (LEG)	12-10-19	2215	14	Y	N	Y
4	RWA-MUS	WTG	DATE TIME: 1040										
5	RW22R-MWI	WTG	DATE TIME: 1050										

Analysis Test
 Total Cadmium 6010: X
 Total Zinc 6010: X

Preservatives
 H₂SO₄ 1
 HNO₃ 1
 HCl 1
 NaOH 1
 Na₂S₂O₈ 1
 Methanol 1
 Other 1

UNPRESERVED
 Total Zinc 6010: X
 Total Cadmium 6010: X

PACE PROJECT NO./ LAB I.D.
 001
 002
 003
 004
 005

ADDITIONAL COMMENTS
 NO PEGS
 DAVID HILGEMAN RWS
 RDS THE
 MARSHALL (LEG)

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: **Lisa Perron**
 SIGNATURE of SAMPLER: *Lisa Perron*
 DATE Signed (MM/DD/YYYY): **12-10-19**

***Important Note:** By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to rate changes of 15% per month for any invoices not paid within 30 days.

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: EnviroAnalytics Group Project # 30339991

30339991

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: N/A

Label	<u>MLC</u>
LIMS Login	<u>MLC</u>

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 1.4 °C Correction Factor: 0 °C Final Temp: 1.4 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and Initials of person examining contents:
				<u>10.00391</u>	<u>MLC 12/11/19</u>
Chain of Custody Present:	/			1.	
Chain of Custody Filled Out:	/			2.	
Chain of Custody Relinquished:	/			3.	
Sampler Name & Signature on COC:	/			4.	
Sample Labels match COC:	/	/		5.	<u>no date on COC</u>
-Includes date/time/ID Matrix: <u>WT</u>					
Samples Arrived within Hold Time:	/			6.	
Short Hold Time Analysis (<72hr remaining):	/	/		7.	
Rush Turn Around Time Requested:	/			8.	
Sufficient Volume:	/			9.	
Correct Containers Used:	/			10.	
-Pace Containers Used:	/				
Containers Intact:	/			11.	
Orthophosphate field filtered			/	12.	
Hex Cr Aqueous sample field filtered			/	13.	
Organic Samples checked for dechlorination:			/	14.	
Filtered volume received for Dissolved tests			/	15.	
All containers have been checked for preservation.	/			16.	
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	/			Initial when completed	Date/time of preservation
				<u>MLC</u>	
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/	17.	
Trip Blank Present:			/	18.	
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

Client Notification/ Resolution:

Person Contacted: _____ Date/Time: _____ Contacted By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 19, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30340257

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 11, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM GW Sampling
Pace Project No.: 30340257

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30340257

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30340257001	RW22R-MWS	Water	12/11/19 10:40	12/11/19 23:00
30340257002	RW05-MWS	Water	12/11/19 11:30	12/11/19 23:00
30340257003	RW01-MWS	Water	12/11/19 12:35	12/11/19 23:00
30340257004	RW01-MWI	Water	12/11/19 13:10	12/11/19 23:00

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling
Pace Project No.: 30340257

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30340257001	RW22R-MWS	EPA 6010C	KAS	2	PASI-PA
30340257002	RW05-MWS	EPA 6010C	KAS	2	PASI-PA
30340257003	RW01-MWS	EPA 6010C	KAS	2	PASI-PA
30340257004	RW01-MWI	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30340257

Sample: RW22R-MWS **Lab ID: 30340257001** Collected: 12/11/19 10:40 Received: 12/11/19 23:00 Matrix: Water

Comments: • Collection date not listed on COC. Date obtained from samples.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	70.4	ug/L	3.0	0.34	1	12/16/19 17:25	12/18/19 15:29	7440-43-9	
Zinc	112000	ug/L	1000	238	100	12/16/19 17:25	12/18/19 16:20	7440-66-6	M6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30340257

Sample: RW05-MWS **Lab ID: 30340257002** Collected: 12/11/19 11:30 Received: 12/11/19 23:00 Matrix: Water

Comments: • Sample ID on coltainers does not match COC.
• Collection date not listed on COC. Date obtained from samples.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/16/19 17:25	12/18/19 15:45	7440-43-9	
Zinc	41.6	ug/L	10.0	2.4	1	12/16/19 17:25	12/18/19 15:45	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30340257

Sample: RW01-MWS **Lab ID: 30340257003** Collected: 12/11/19 12:35 Received: 12/11/19 23:00 Matrix: Water

Comments: • Collection date not listed on COC. Date obtained from samples.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.9	ug/L	3.0	0.34	1	12/16/19 17:25	12/18/19 15:48	7440-43-9	B
Zinc	10400	ug/L	1000	238	100	12/16/19 17:25	12/18/19 16:41	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30340257

Sample: RW01-MWI **Lab ID: 30340257004** Collected: 12/11/19 13:10 Received: 12/11/19 23:00 Matrix: Water

Comments: • Collection date not listed on COC. Date obtained from samples.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	8.8	ug/L	3.0	0.34	1	12/16/19 17:25	12/18/19 15:58	7440-43-9	
Zinc	2060	ug/L	10.0	2.4	1	12/16/19 17:25	12/18/19 15:58	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling
Pace Project No.: 30340257

QC Batch: 375711 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30340257001, 30340257002, 30340257003, 30340257004

METHOD BLANK: 1822520 Matrix: Water
Associated Lab Samples: 30340257001, 30340257002, 30340257003, 30340257004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	0.43J	3.0	0.34	12/18/19 15:24	
Zinc	ug/L	10.0 U	10.0	2.4	12/18/19 15:24	

LABORATORY CONTROL SAMPLE: 1822521

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	511	102	80-120	
Zinc	ug/L	500	509	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1822523 1822524

Parameter	Units	30340257001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	70.4	500	500	600	595	106	105	75-125	1	20	
Zinc	ug/L	112000	500	500	107000	106000	-940	-1260	75-125	2	20 M6	

SAMPLE DUPLICATE: 1822522

Parameter	Units	30340257001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	70.4	69.9	1	20	
Zinc	ug/L	112000	110000	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30340257

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling
Pace Project No.: 30340257

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30340257001	RW22R-MWS	EPA 3005A	375711	EPA 6010C	376029
30340257002	RW05-MWS	EPA 3005A	375711	EPA 6010C	376029
30340257003	RW01-MWS	EPA 3005A	375711	EPA 6010C	376029
30340257004	RW01-MWI	EPA 3005A	375711	EPA 6010C	376029

REPORT OF LABORATORY ANALYSIS

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Section A
Required Client Information:
Company: **EnviroAnalytics Group**
Address: **1600 Sparrows Point Blvd, Suite B2**
Sparrows Point, MD 21219
Email To: **icalenda@enviroanalyticsgroup.com**
Phone: **314-620-3056** Fax:
Requested Due Date/TAT: **5** Day

Section B
Required Project Information:
Report To: **James Calenda**
Copy To: **Stewart Kabis**
Purchase Order No.: **EAG-SPT-6452**
Project Name: **RWM GW Sampling**
Project Number: **190275M-1**

Section C
Invoice Information:
Attention: **Laura Sargent**
Company Name: **EnviroAnalytics Group**
Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
Pace Quote Reference: **Samantha Bayura**
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: **MD**
STATE:

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIPE WP AIR AR OTHER OT TISSUE TS	SAMPLE ID (A-Z, 0-9 / -) Sample IDs MUST BE UNIQUE	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	SAMPLER TEMP AT COLLECTION		# OF CONTAINERS	Preservatives H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₃ Methanol Other	Analysis Test Total Cadmium 6010 Total Zinc 6010	Temp in °C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Samples Intact (Y/N)	
			COMPOSITE START	COMPOSITE END/GRAB			DATE	TIME								DATE
1		RW22R-MWS			WTG		1040	1040	1		XX					001
2		RW05R-MWS			WTG		1130	1130	1		XX					002
3		RW01-MWS			WTG		1235	1235	1		XX					003
4		RW01-MWI			WTG		1310	1310	1		XX					004
5																
6																
7																
8																
9																
10																
11																
12																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION		ACCEPTED BY / AFFILIATION		DATE		TIME		
	DATE	TIME	DATE	TIME	DATE	TIME	DATE	TIME	
no pgs			12-11-19	1400	David Stille	12-11-19	1633		
			12-11-19	19:35	RDS TACE	12-11-19	1945		
			12-11-19	2300	Ben Munn	12-11-19	2300	3.3	

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: **Jsa Perrin**
SIGNATURE of SAMPLER: *[Signature]*
DATE Signed (MM/DD/YY): **12-11-19**

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviro Analytics Project # 30340257

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None

Cooler Temperature Observed Temp 3.3 °C Correction Factor: 0 °C Final Temp: 3.3 °C

Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents:
	Yes	No	N/A	
Chain of Custody Present:	/			10D0391
Chain of Custody Filled Out:	/			BLM 12-12-19
Chain of Custody Relinquished:	/			
Sampler Name & Signature on COC:	/			
Sample Labels match COC: -Includes date/time/ID Matrix: <u>WT</u>	/			5. RW05R-MWS is the ID on sample RW05-MWS. DATE ON
Samples Arrived within Hold Time:	/			6. SAMPLES IS 12-11-19
Short Hold Time Analysis (<72hr remaining):		/		
Rush Turn Around Time Requested:	/			
Sufficient Volume:	/			
Correct Containers Used:	/			
-Pace Containers Used:	/			
Containers Intact:	/			
Orthophosphate field filtered			/	
Hex Cr Aqueous sample field filtered			/	
Organic Samples checked for dechlorination:			/	
Filtered volume received for Dissolved tests			/	
All containers have been checked for preservation.	/			
exceptions: VOA, collform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix				
All containers meet method preservation requirements.	/			Initial when completed: <u>BLM</u> Date/time of preservation:
				Lot # of added preservative:
Headspace in VOA Vials (>6mm):			/	
Trip Blank Present:			/	
Trip Blank Custody Seals Present			/	
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed: Date:

Client Notification/ Resolution:

Person-Contacted: _____ Date/Time: _____ Contacted-By: _____

Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

*PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

December 19, 2019

Mr. James Calenda
EnviroAnalytics Group, LLC
1600 Sparrows Point Blvd
Suite B2
Sparrows Point, MD 21219

RE: Project: RWM GW Sampling
Pace Project No.: 30340258

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 11, 2019. The results relate only to the samples included in this report. Results reported herein conform to the most current, applicable TNI/NELAC standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Samantha Bayura
samantha.bayura@pacelabs.com
(724)850-5622
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

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CERTIFICATIONS

Project: RWM GW Sampling
Pace Project No.: 30340258

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 04222CA
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
Delaware Certification
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Florida: Cert E871149 SEKS WET
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas/TNI Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA180012
Louisiana DEQ/TNI Certification #: 4086
Maine Certification #: 2017020
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991

Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572018-1
New Hampshire/TNI Certification #: 297617
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-010
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: 02867
Texas/TNI Certification #: T104704188-17-3
Utah/TNI Certification #: PA014572017-9
USDA Soil Permit #: P330-17-00091
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 9526
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad
Wyoming Certification #: 8TMS-L

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: RWM GW Sampling
Pace Project No.: 30340258

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30340258001	RW09-MWS	Water	12/11/19 09:47	12/11/19 23:00
30340258002	RW09-MWI	Water	12/11/19 10:33	12/11/19 23:00
30340258003	RW08-MWS	Water	12/11/19 11:32	12/11/19 23:00
30340258004	RW02-MWI	Water	12/11/19 13:13	12/11/19 23:00
30340258005	RW02-MWS	Water	12/11/19 14:25	12/11/19 23:00

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: RWM GW Sampling
Pace Project No.: 30340258

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30340258001	RW09-MWS	EPA 6010C	KAS	2	PASI-PA
30340258002	RW09-MWI	EPA 6010C	KAS	2	PASI-PA
30340258003	RW08-MWS	EPA 6010C	KAS	2	PASI-PA
30340258004	RW02-MWI	EPA 6010C	KAS	2	PASI-PA
30340258005	RW02-MWS	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30340258

Sample: RW09-MWS		Lab ID: 30340258001		Collected: 12/11/19 09:47		Received: 12/11/19 23:00		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	14.3	ug/L	3.0	0.34	1	12/16/19 17:25	12/18/19 16:01	7440-43-9	
Zinc	20600	ug/L	1000	238	100	12/16/19 17:25	12/18/19 16:44	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30340258

Sample: RW09-MWI		Lab ID: 30340258002		Collected: 12/11/19 10:33		Received: 12/11/19 23:00		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	4.2	ug/L	3.0	0.34	1	12/16/19 17:25	12/18/19 16:04	7440-43-9	B
Zinc	82000	ug/L	1000	238	100	12/16/19 17:25	12/18/19 16:46	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30340258

Sample: RW08-MWS		Lab ID: 30340258003		Collected: 12/11/19 11:32		Received: 12/11/19 23:00		Matrix: Water	
Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium	3.0 U	ug/L	3.0	0.34	1	12/16/19 17:25	12/18/19 16:09	7440-43-9	
Zinc	1250	ug/L	10.0	2.4	1	12/16/19 17:25	12/18/19 16:09	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling

Pace Project No.: 30340258

Sample: RW02-MWI **Lab ID: 30340258004** Collected: 12/11/19 13:13 Received: 12/11/19 23:00 Matrix: Water

Parameters	Results	Units	Report			Prepared	Analyzed	CAS No.	Qual
			Limit	MDL	DF				
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	277	ug/L	3.0	0.34	1	12/16/19 17:25	12/18/19 16:12	7440-43-9	
Zinc	17200	ug/L	1000	238	100	12/16/19 17:25	12/18/19 16:49	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: RWM GW Sampling
Pace Project No.: 30340258

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW02-MWS Lab ID: 30340258005 Collected: 12/11/19 14:25 Received: 12/11/19 23:00 Matrix: Water									
6010C MET ICP Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	0.55J	ug/L	3.0	0.34	1	12/16/19 17:25	12/18/19 16:17	7440-43-9	B
Zinc	594	ug/L	10.0	2.4	1	12/16/19 17:25	12/18/19 16:17	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: RWM GW Sampling

Pace Project No.: 30340258

QC Batch: 375711 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30340258001, 30340258002, 30340258003, 30340258004, 30340258005

METHOD BLANK: 1822520 Matrix: Water
Associated Lab Samples: 30340258001, 30340258002, 30340258003, 30340258004, 30340258005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	0.43J	3.0	0.34	12/18/19 15:24	
Zinc	ug/L	10.0 U	10.0	2.4	12/18/19 15:24	

LABORATORY CONTROL SAMPLE: 1822521

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	511	102	80-120	
Zinc	ug/L	500	509	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1822523 1822524

Parameter	Units	30340257001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	70.4	500	500	600	595	106	105	75-125	1	20	
Zinc	ug/L	112000	500	500	107000	106000	-940	-1260	75-125	2	20 M6	

SAMPLE DUPLICATE: 1822522

Parameter	Units	30340257001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	70.4	69.9	1	20	
Zinc	ug/L	112000	110000	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: RWM GW Sampling

Pace Project No.: 30340258

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-PA Pace Analytical Services - Greensburg

ANALYTE QUALIFIERS

B Analyte was detected in the associated method blank.

M6 Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: RWM GW Sampling

Pace Project No.: 30340258

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30340258001	RW09-MWS	EPA 3005A	375711	EPA 6010C	376029
30340258002	RW09-MWI	EPA 3005A	375711	EPA 6010C	376029
30340258003	RW08-MWS	EPA 3005A	375711	EPA 6010C	376029
30340258004	RW02-MWI	EPA 3005A	375711	EPA 6010C	376029
30340258005	RW02-MWS	EPA 3005A	375711	EPA 6010C	376029

REPORT OF LABORATORY ANALYSIS

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Section A
Client Information:
Company: **EnviroAnalytics Group**
Address: **1600 Sparrows Point Blvd, Suite B2 Sparrows Point, MD 21219**
Contact: **314-620-3056** | Fax: | Email: **jcalenda@enviroanalyticsgroup.com**
Project: **314-620-3056** | Project Name: **RWM GW Sampling** | Project Number: **190275 M-1**
Purchase Order No.: **EAG-SPT-9452**
Report To: **James Calenda**
Copy To: **Stewart Kabis**
Company Name: **EnviroAnalytics Group**
Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
Attention: **Laura Sargent**
Regulatory Agency: **MD**
Site Location: **MD**
State: **MD**

Section B
Required Project Information:
Report To: **James Calenda**
Copy To: **Stewart Kabis**
Purchase Order No.: **EAG-SPT-9452**
Project Name: **RWM GW Sampling**
Project Number: **190275 M-1**

Section C
Invoice Information:
Attention: **Laura Sargent**
Company Name: **EnviroAnalytics Group**
Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**
Attention: **Laura Sargent**
Company Name: **EnviroAnalytics Group**
Address: **1650 Des Peres Road, Suite 303 St. Louis, MO 63131**

Section D
Required Client Information
Valid Matrix Codes: DRINKING WATER, WASTE WATER, WASTE WATER PRODUCT, SOLID, OIL, WIPE, AIR, OTHER, TISSUE
Matrix Codes: DW, WT, WW, P, SL, OL, WP, AR, OT, TS

Section E
Required Analysis Information
Requested Analysis Filtered (Y/N):
Matrix Code (see valid codes to left):
Sample Type (G=Grab C=Comp):
Date: TIME: SAMPLE TEMP AT COLLECTION: # OF CONTAINERS: Unpreserved: H₂O₂: HNO₃: HCl: NaOH: Na₂O₂: Methanol: Other: Y/N:
Total Cadmium 6010: Total Zinc 6010: Analysis Test: Pace Project No./ Lab I.D.

Matrix Code	Sample Type	Date	Time	Sample Temp at Collection	# of Containers	Unpreserved	H ₂ O ₂	HNO ₃	HCl	NaOH	Na ₂ O ₂	Methanol	Other	Total Cadmium 6010	Total Zinc 6010	Analysis Test	Pace Project No./ Lab I.D.
RW09-MWS	WT G	12-11-19	0947		1									X	X		001
RW09-MWI	WT G		1033		1									X	X		002
RW07-MWS	WT G		1132		1									X	X		003
RW02-MWI	WT G		1313		1									X	X		004
RW02-MWS	WT G		1425		1									X	X		005

Section F
Additional Comments: RELINQUISHED BY / AFFILIATION: DATE: TIME: ACCEPTED BY / AFFILIATION: DATE: TIME: SAMPLE CONDITIONS: Received on: Cooler (Y/N): Custody Sealed: Ice (Y/N): Temp in °C: Samples Intact: (Y/N)

Additional Comments	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time	Received on	Cooler (Y/N)	Custody Sealed	Ice (Y/N)	Temp in °C	Samples Intact (Y/N)
	Stewart Kabis ARM	12-11-19	1445	Drew Miller Hellenberg Pace	12-11-19	1453						
	Drew Miller Hellenberg Pace	12-11-19	19:35	RDS FACE	12-11-19	1945						
	RDS FACE	12-11-19	2300	Ben Mumm	12-11-19	2300						

Section G
Sampler Name and Signature: PRINT Name of Sampler: **Tyler Van Ness** | SIGNATURE of Sampler: *[Signature]* | DATE Signed (MM/DD/YY): **12/11/19**

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviro Analytics Project # 30340258

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>BLM</u>
LIMS Login	<u>BLM</u>

Tracking #: _____
 Custody Seal on Cooler/Box Present: yes no Seals intact: yes no

Thermometer Used 9 Type of Ice: Wet Blue None
 Cooler Temperature Observed Temp 2.8 °C Correction Factor: 0 °C Final Temp: 2.8 °C
 Temp should be above freezing to 6°C

Comments:	Yes	No	N/A	pH paper Lot#	Date and initials of person examining contents:
				<u>10D0391</u>	<u>BLM 12-12-19</u>
Chain of Custody Present:	/			1.	
Chain of Custody Filled Out:	/			2.	
Chain of Custody Relinquished:	/			3.	
Sampler Name & Signature on COC:	/			4.	
Sample Labels match COC: -Includes date/time/ID Matrix: <u>WT</u>	/			5.	
Samples Arrived within Hold Time:	/			6.	
Short Hold Time Analysis (<72hr remaining):		/		7.	
Rush Turn Around Time Requested:	/			8.	
Sufficient Volume:	/			9.	
Correct Containers Used: -Pace Containers Used:	/			10.	
Containers Intact:	/			11.	
Orthophosphate field filtered			/	12.	
Hex Cr Aqueous sample field filtered			/	13.	
Organic Samples checked for dechlorination:			/	14.	
Filtered volume received for Dissolved tests			/	15.	
All containers have been checked for preservation.	/			16.	
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, Non-aqueous matrix					
All containers meet method preservation requirements.	/			Initial when completed <u>BLM</u>	Date/time of preservation
				Lot # of added preservative	
Headspace in VOA Vials (>6mm):			/	17.	
Trip Blank Present:			/	18.	
Trip Blank Custody Seals Present			/		
Rad Samples Screened < 0.5 mrem/hr			/	Initial when completed:	Date:

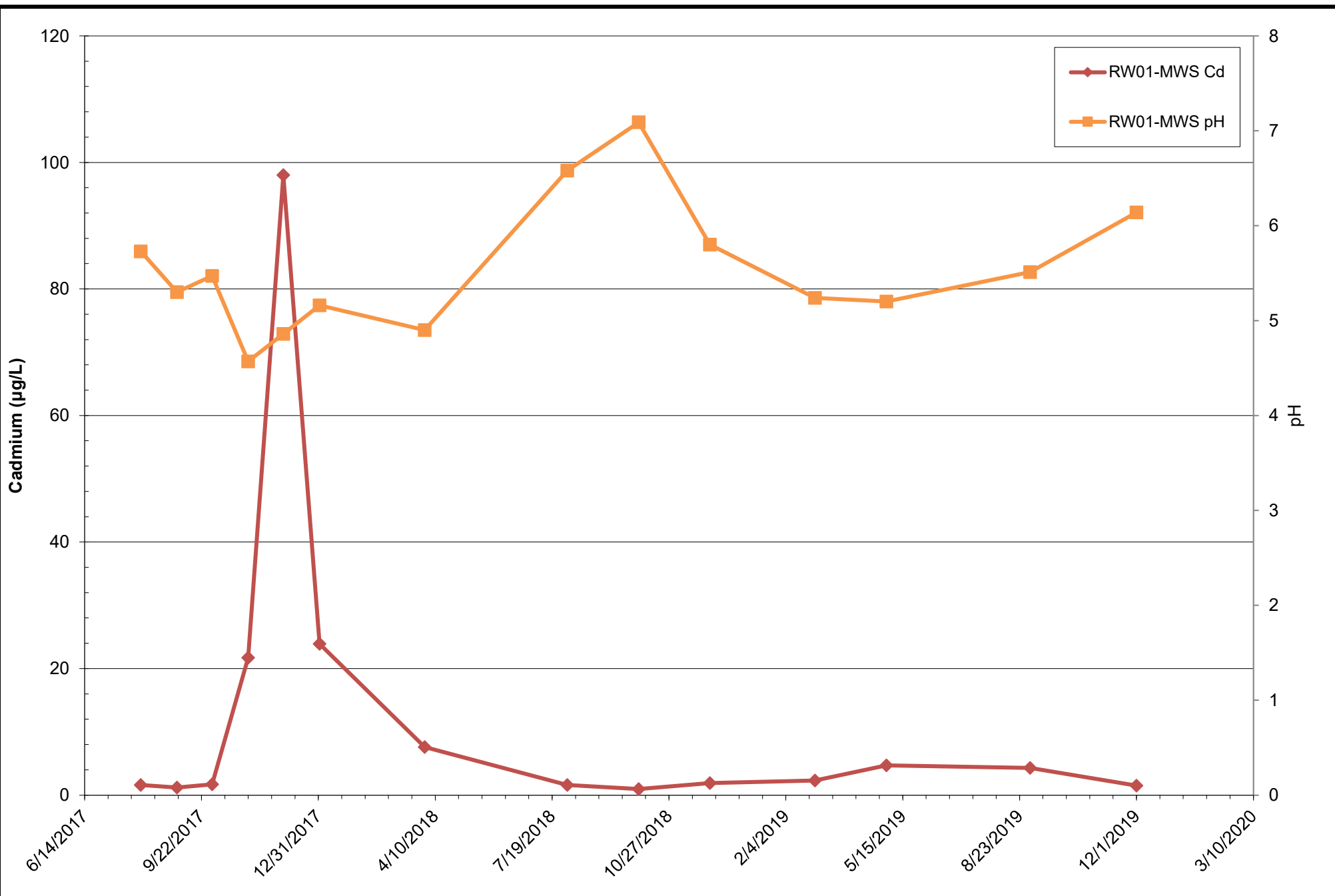
Client Notification/ Resolution:
 Person-Contacted: _____ Date/Time: _____ Contacted-By: _____
 Comments/ Resolution: _____

A check in this box indicates that additional information has been stored in ereports.

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)
 *PM review is documented electronically in LIMS. When the Project Manager closes the SRF Review schedule in LIMS. The review is in the Status section of the Workorder Edit Screen.

APPENDIX B

Shallow Groundwater Time-Series Graphs



ARM Group LLC
Engineers and Scientists

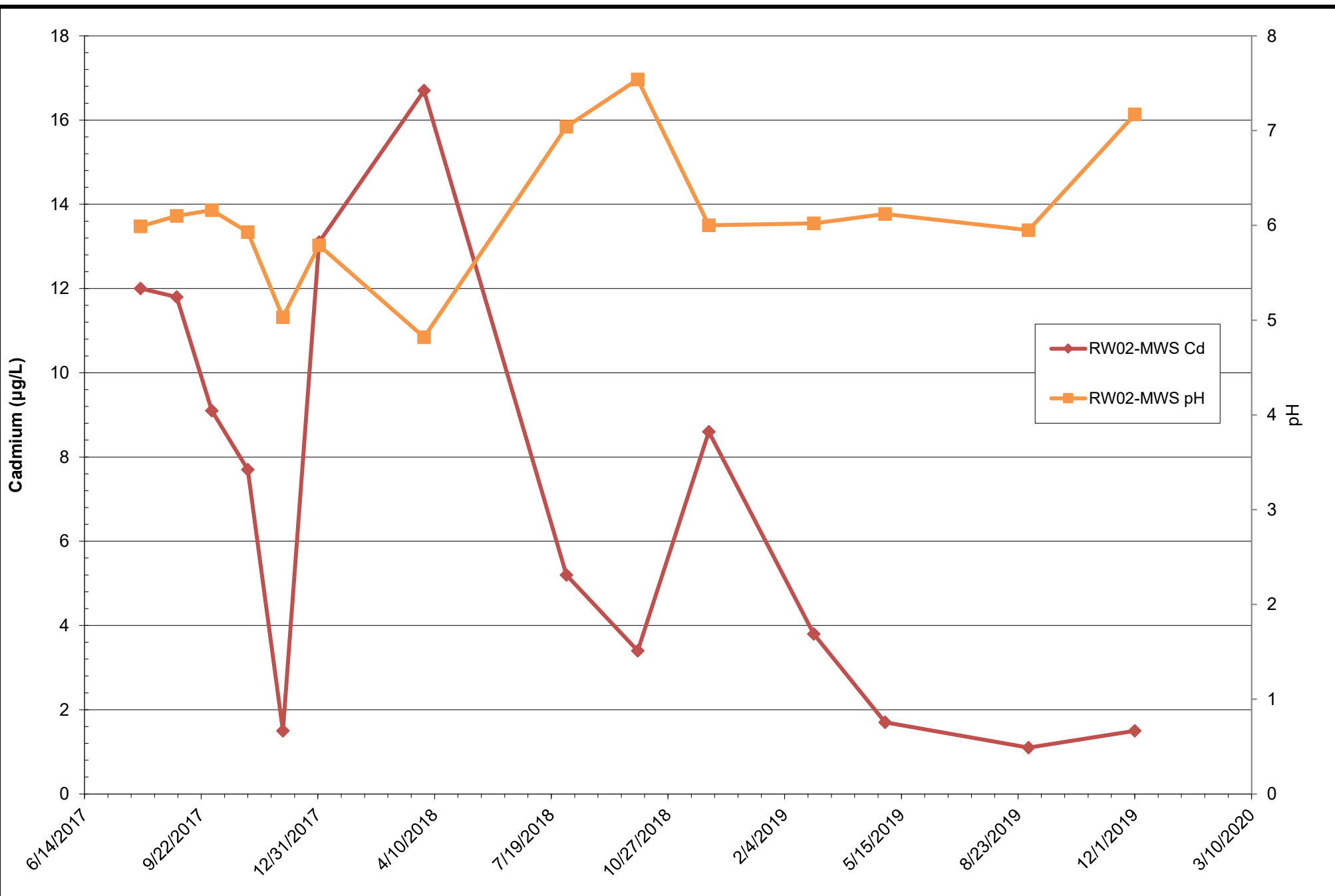
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW01-MWS pH and Cadmium Concentrations

February 13, 2020

Appx B



ARM Group LLC
Engineers and Scientists

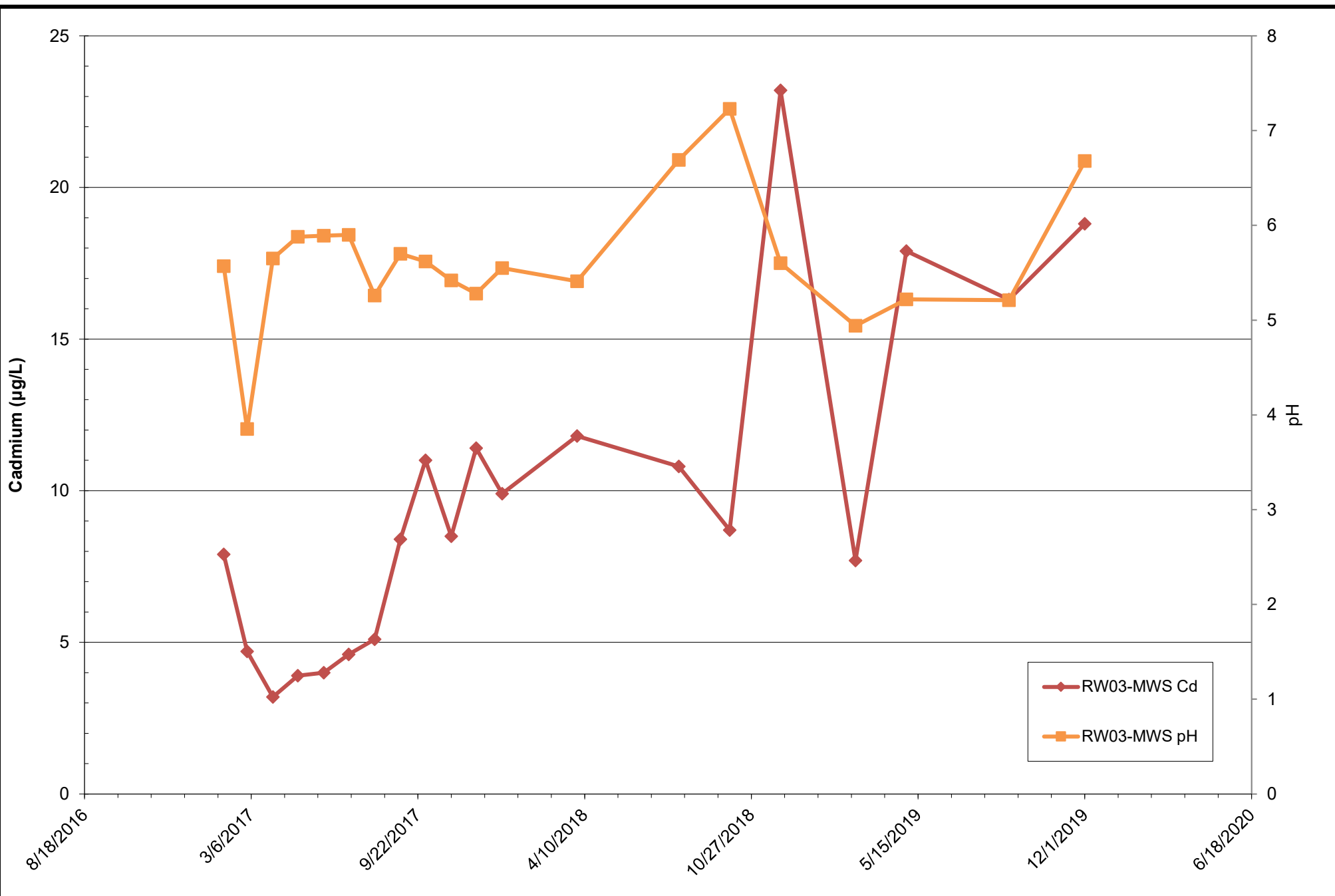
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW02-MWS pH and Cadmium Concentrations

February 13, 2020

**Appx
B**



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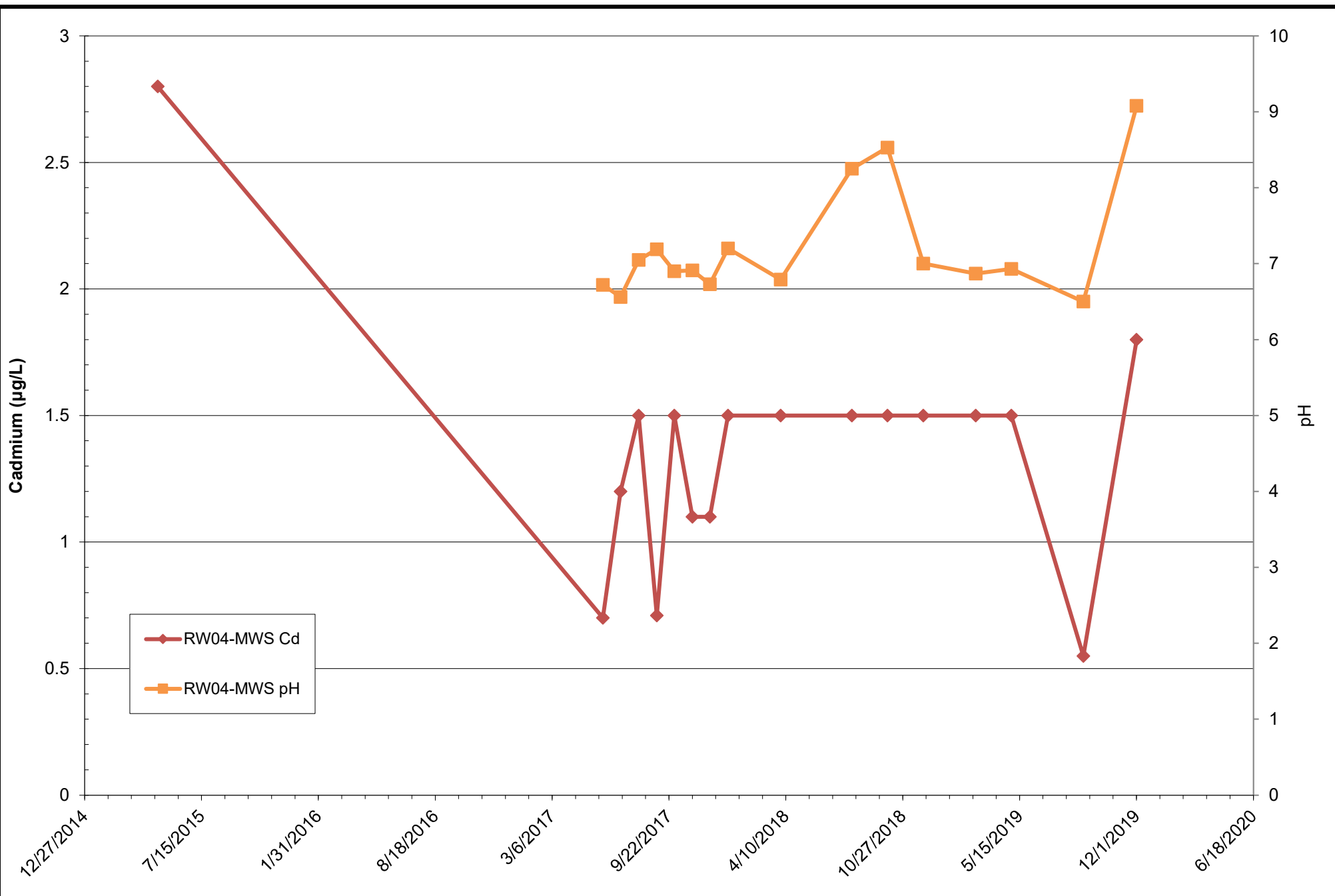
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW03-MWS pH and Cadmium Concentrations

February 13, 2020

**Appx
B**



ARM Group LLC
Engineers and Scientists

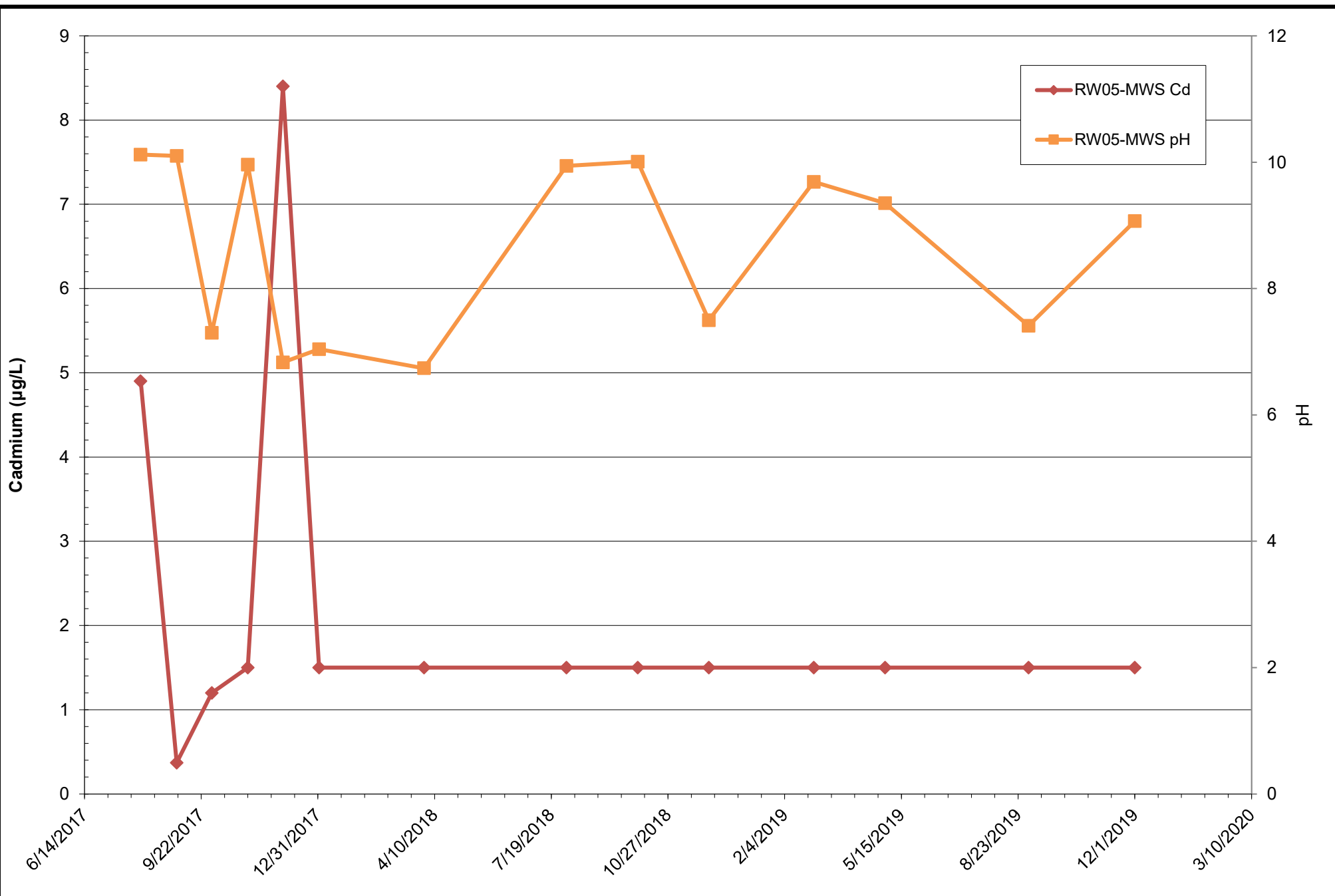
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**RW04-MWS pH and Cadmium
Concentrations**

February 13, 2020

**Appx
B**



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Engineers and Scientists

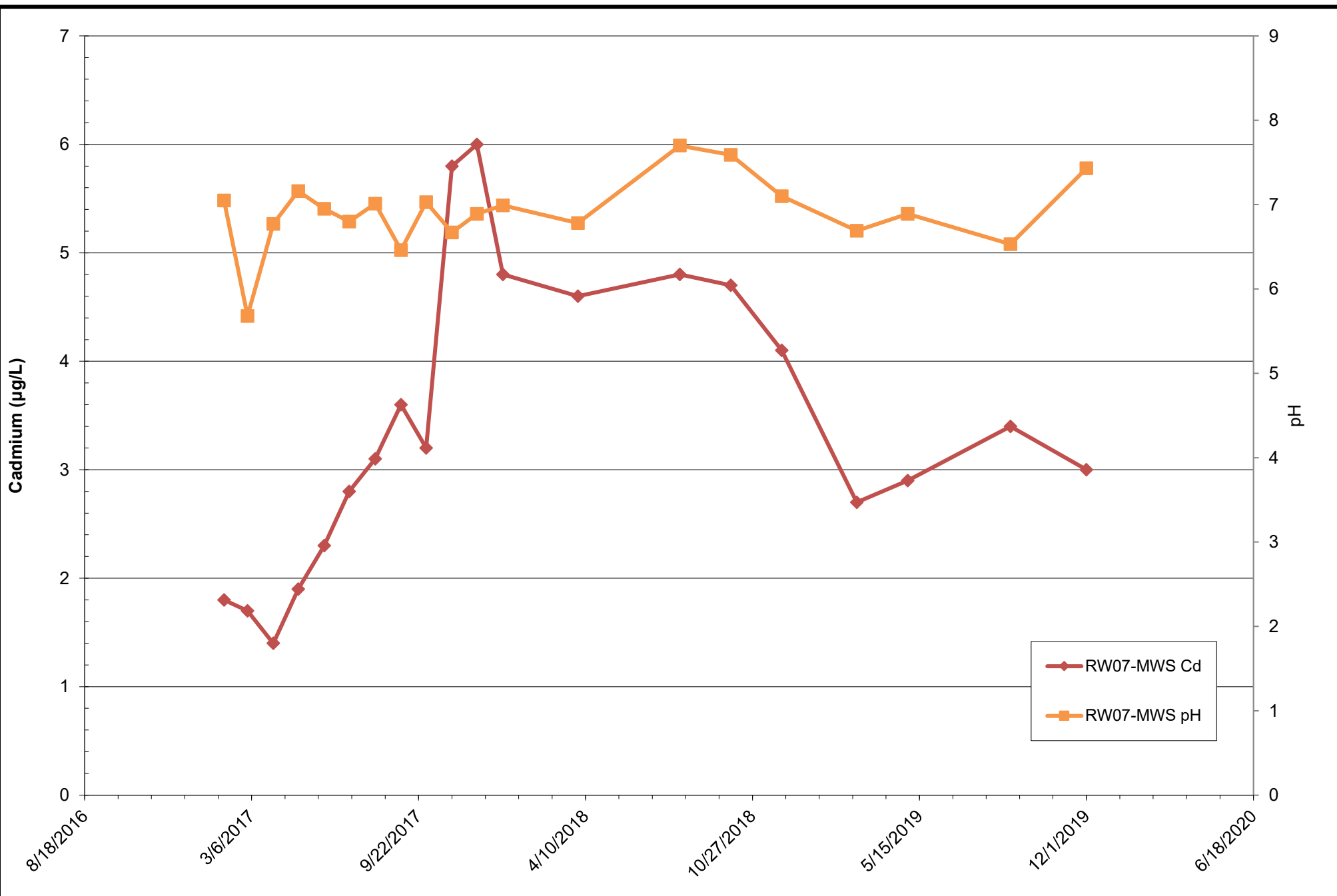
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW05-MWS pH and Cadmium Concentrations

February 13, 2020

Appx B



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Engineers and Scientists

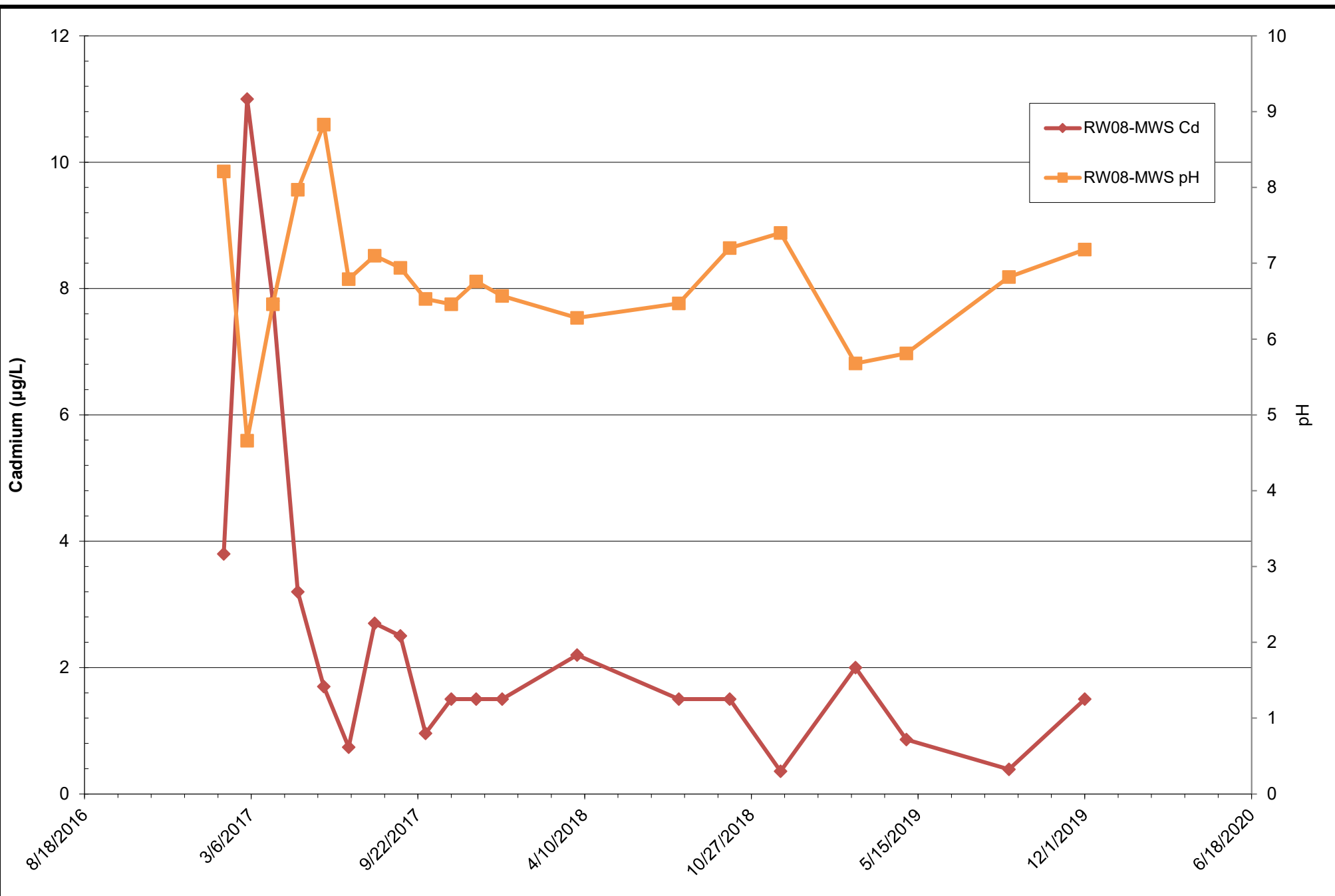
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW07-MWS pH and Cadmium Concentrations

February 13, 2020

Appx B



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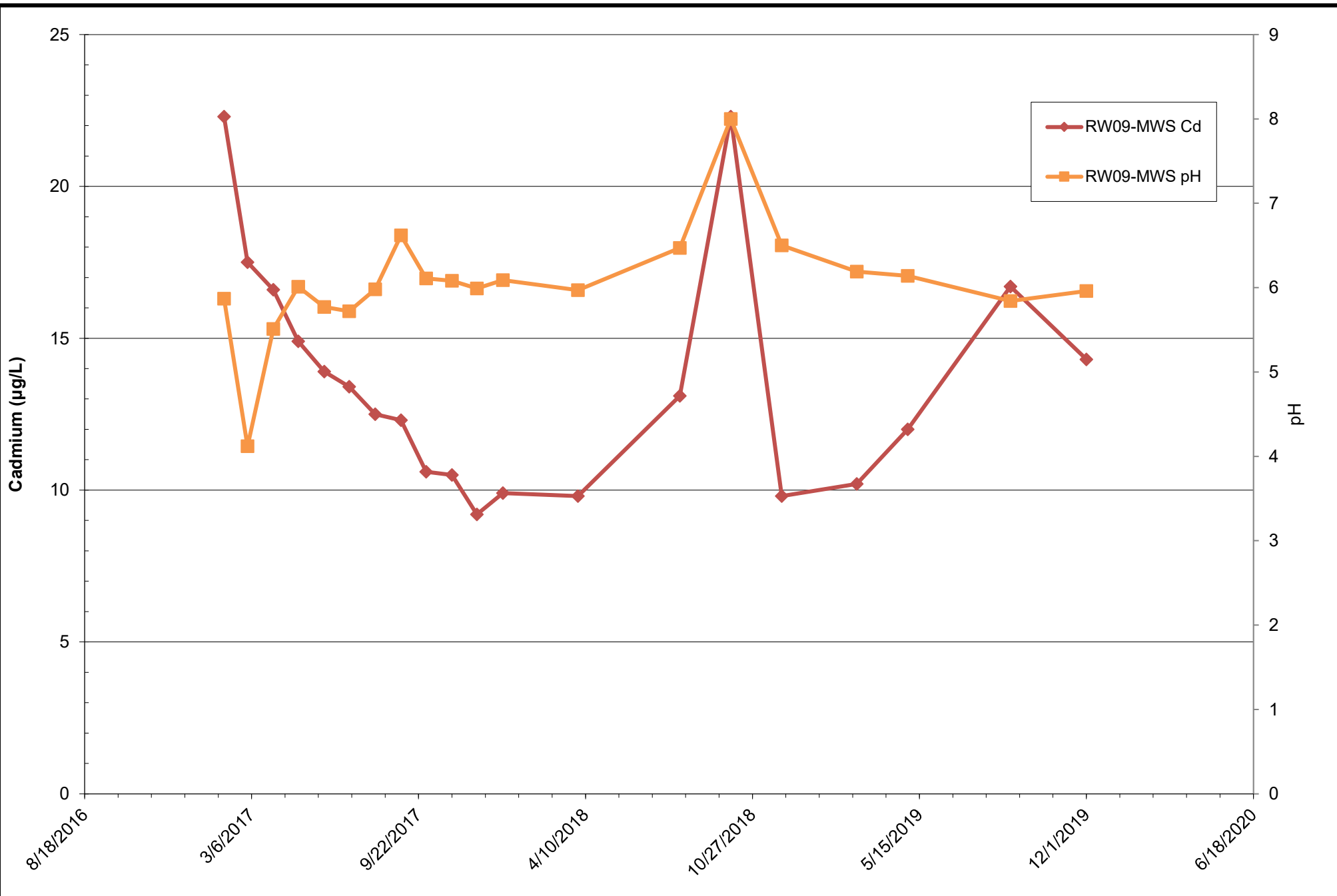
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW08-MWS pH and Cadmium Concentrations

February 13, 2020

**Appx
B**



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Engineers and Scientists

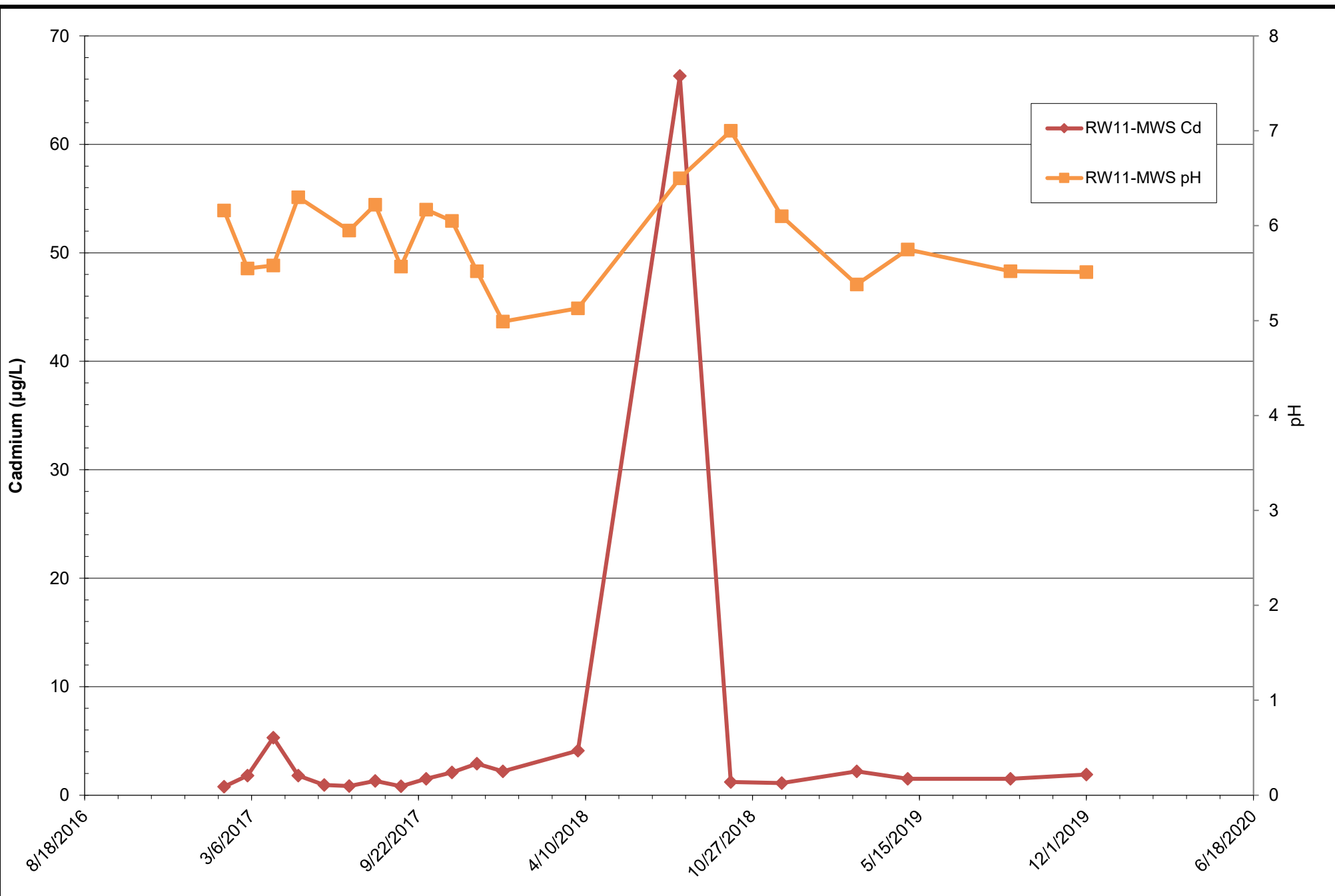
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Tradeport Atlantic

Sparrows Point, Maryland

RW09-MWS pH and Cadmium Concentrations

February 13, 2020

Appx B



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Engineers and Scientists

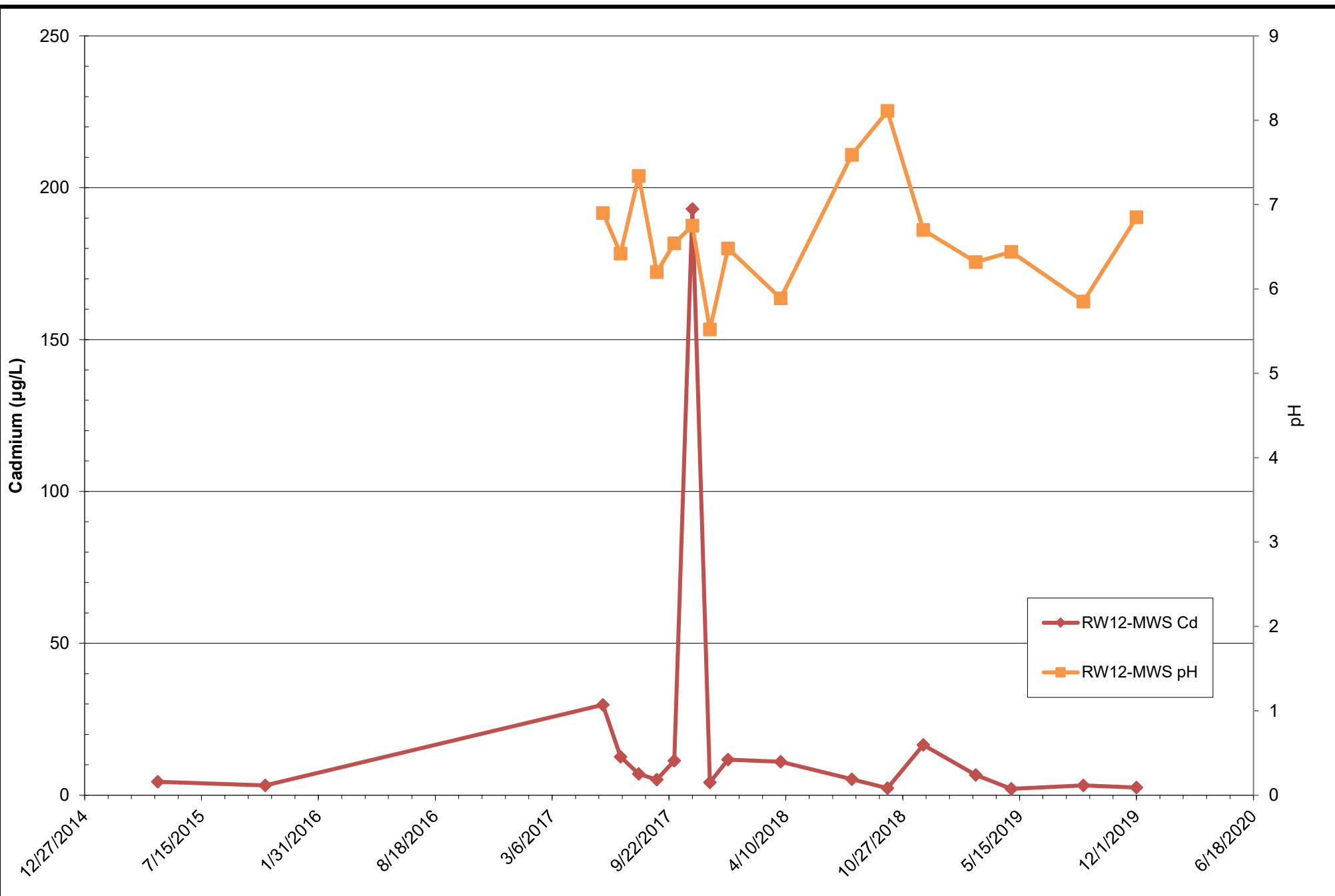
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW11-MWS pH and Cadmium Concentrations

February 13, 2020

Appx B



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Engineers and Scientists

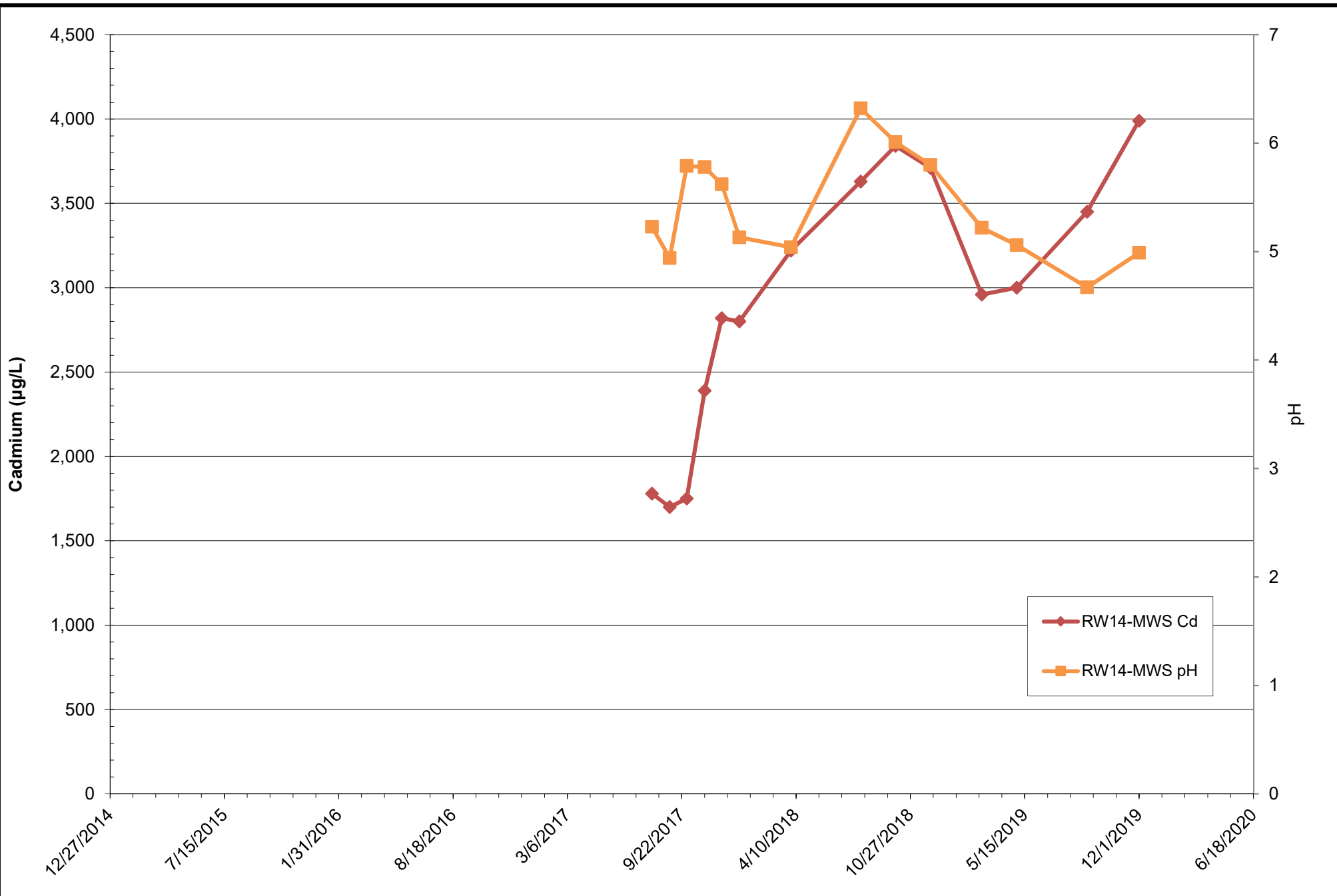
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW12-MWS pH and Cadmium Concentrations

February 13, 2020

**Appx
B**



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Engineers and Scientists

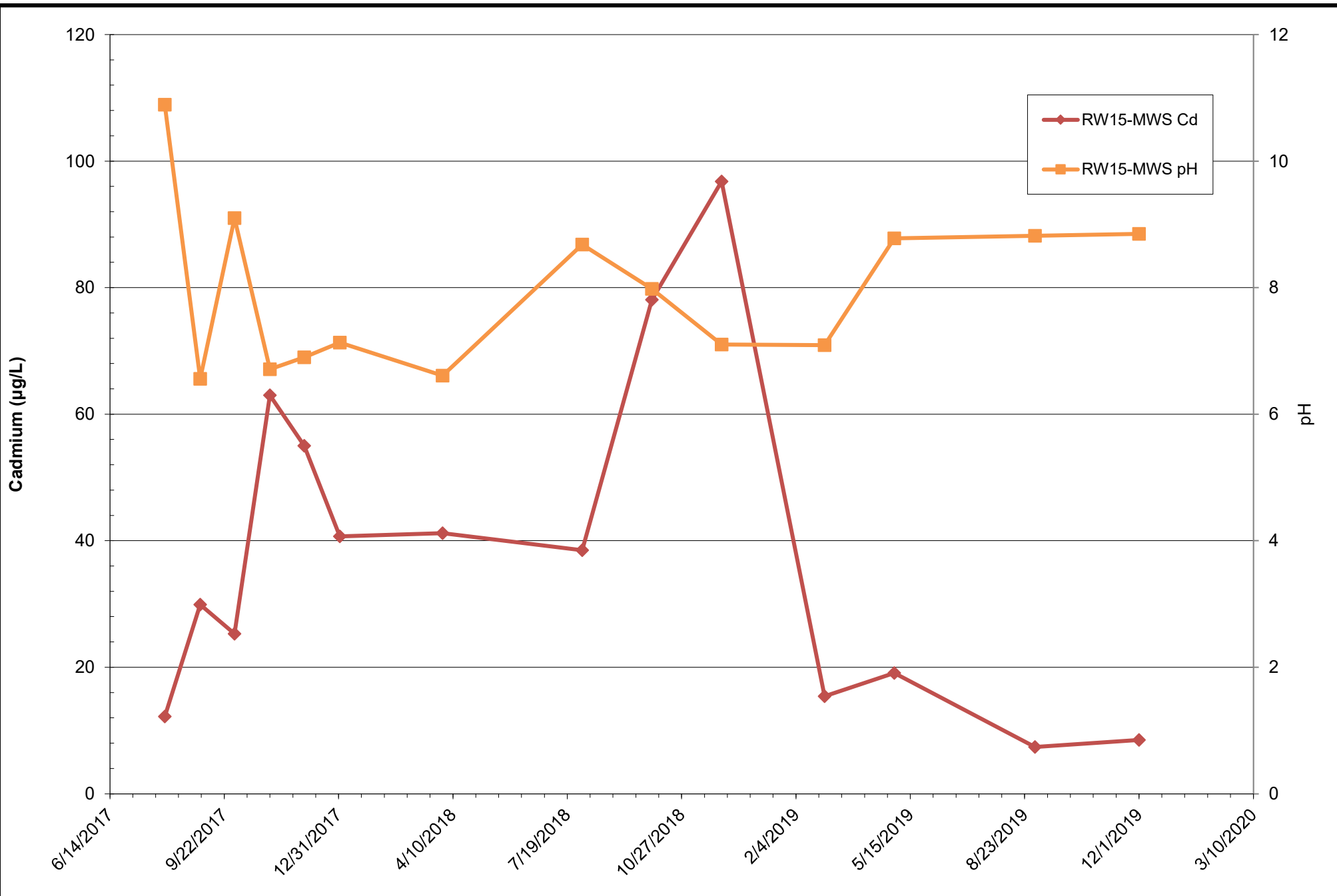
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW14-MWS pH and Cadmium Concentrations

February 13, 2020

**Appx
B**



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Engineers and Scientists

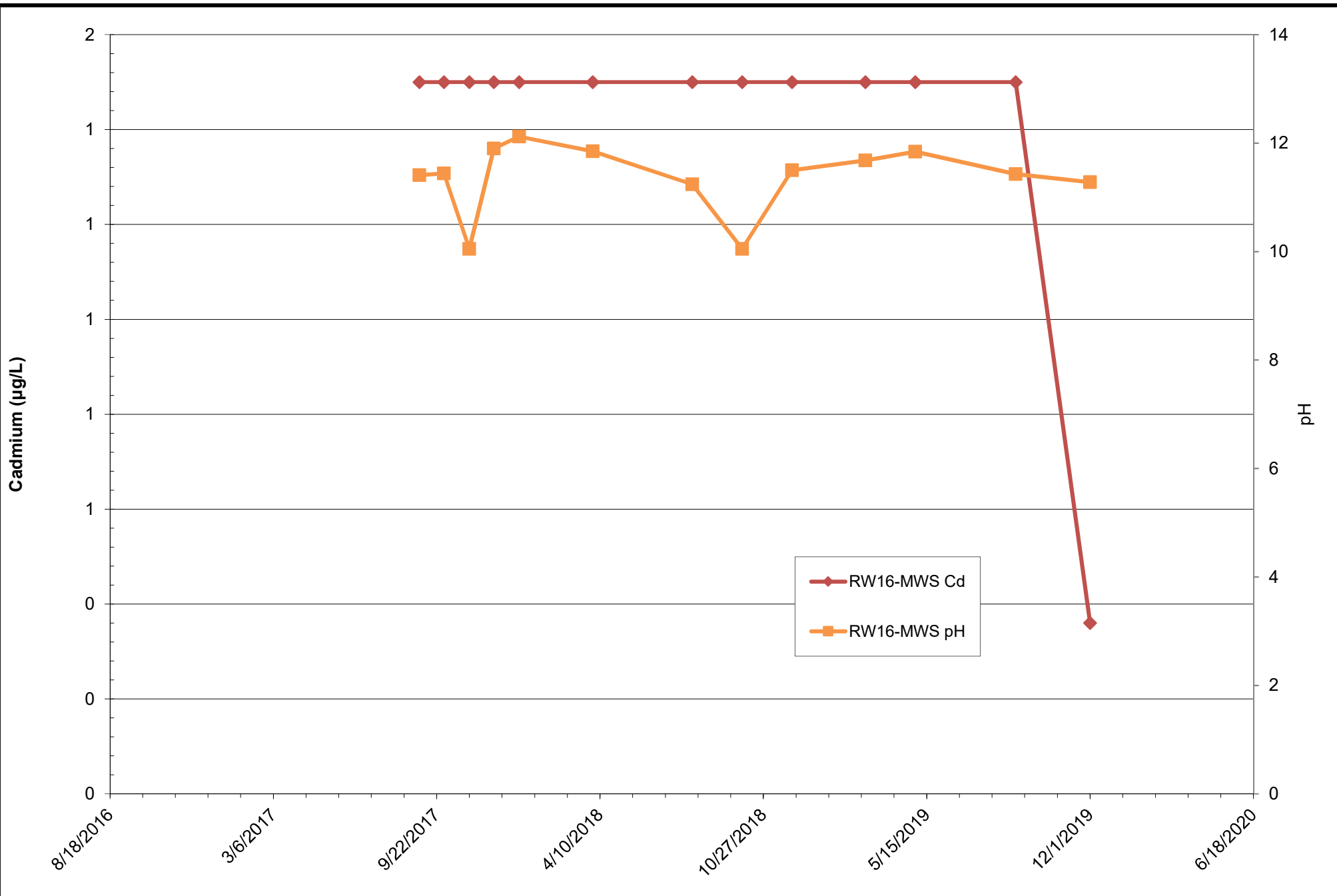
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW15-MWS pH and Cadmium Concentrations

February 13, 2020

**Appx
B**



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Engineers and Scientists

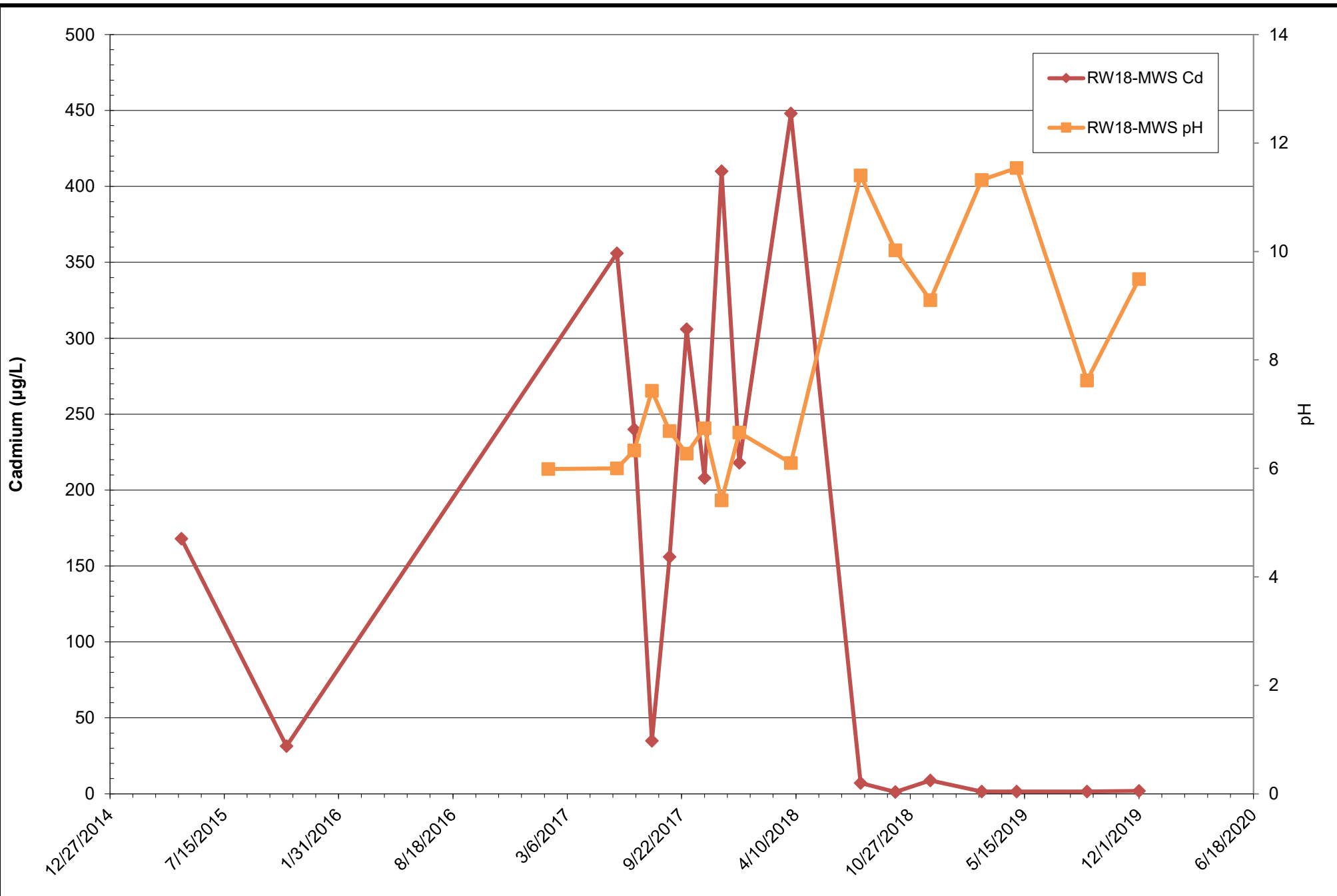
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**RW16-MWS pH and Cadmium
Concentrations**

February 13, 2020

**Appx
B**



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Engineers and Scientists

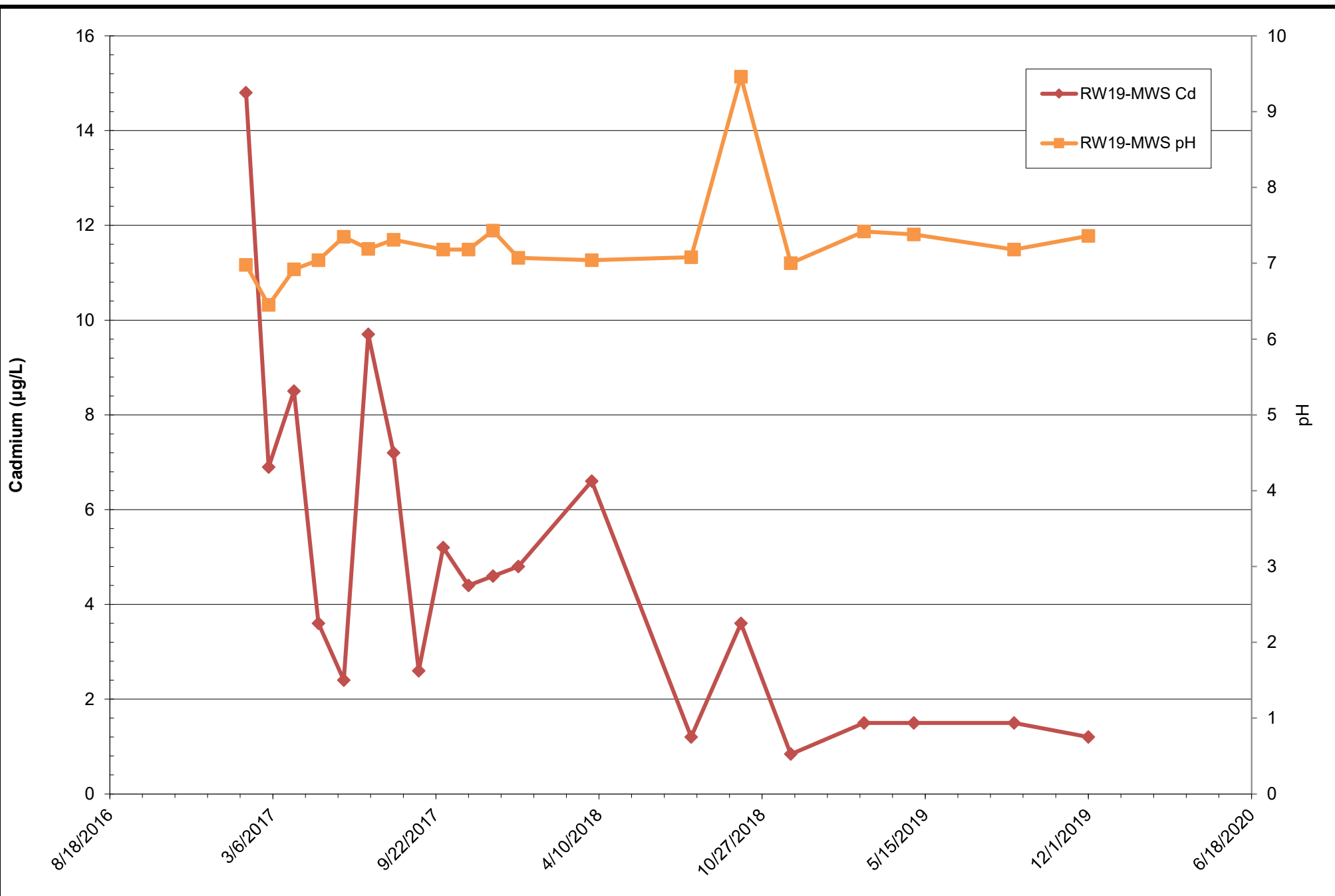
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW18-MWS pH and Cadmium Concentrations

February 13, 2020

Appx B



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Engineers and Scientists

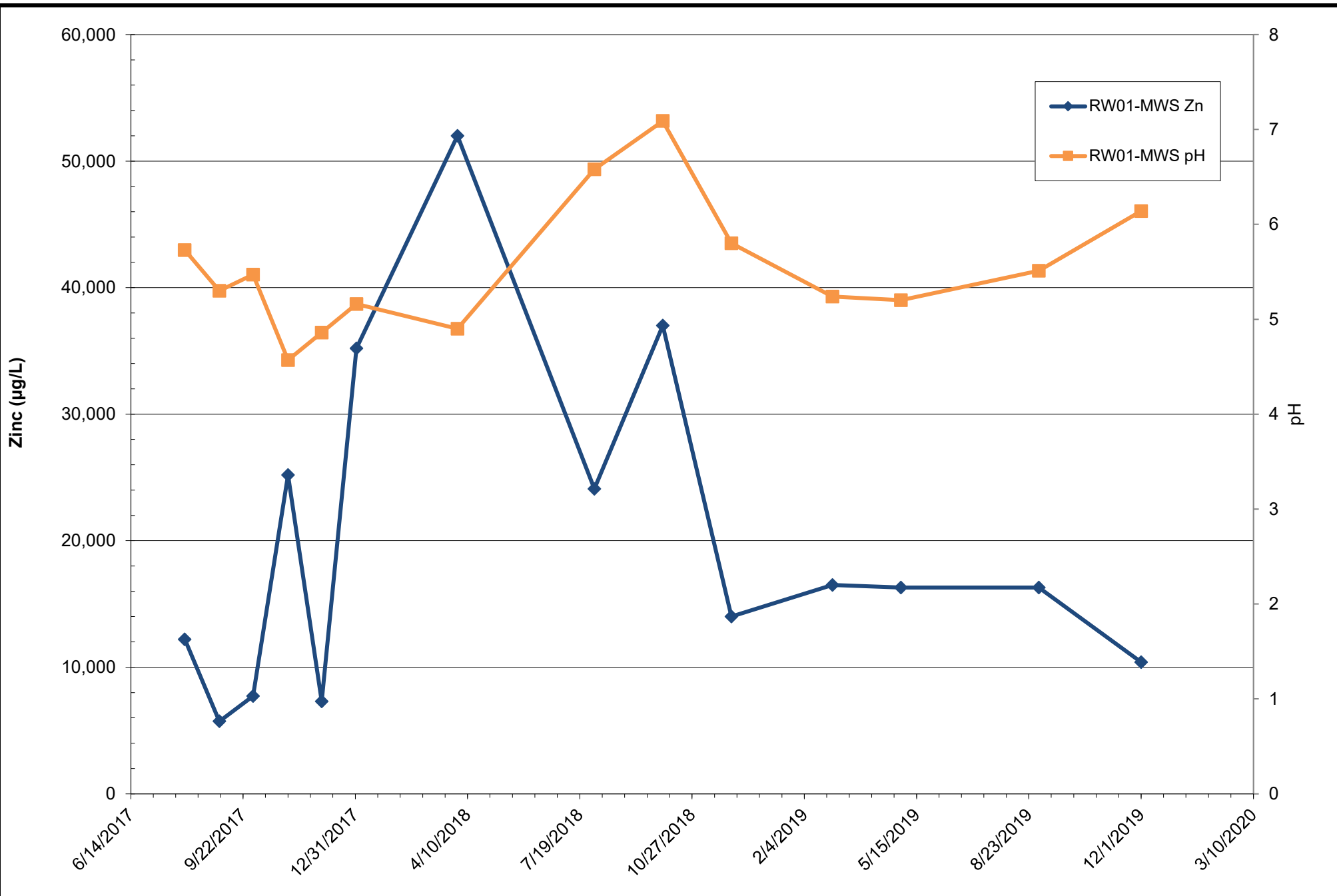
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW19-MWS pH and Cadmium Concentrations

February 13, 2020

**Appx
B**



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Engineers and Scientists

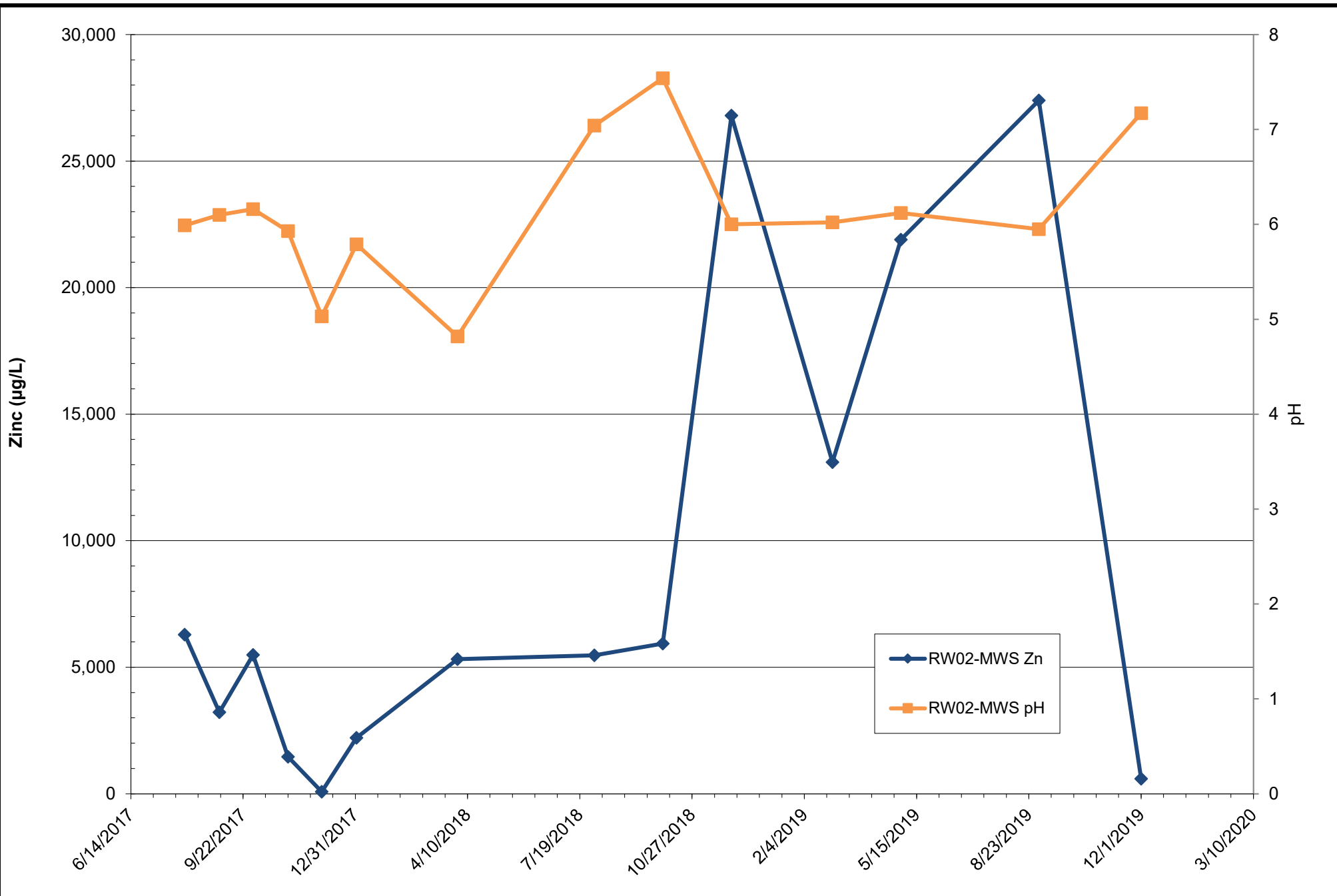
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Sparrows Point, Maryland

RW01-MWS pH and Zinc Concentrations

February 13, 2020

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B**



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Engineers and Scientists

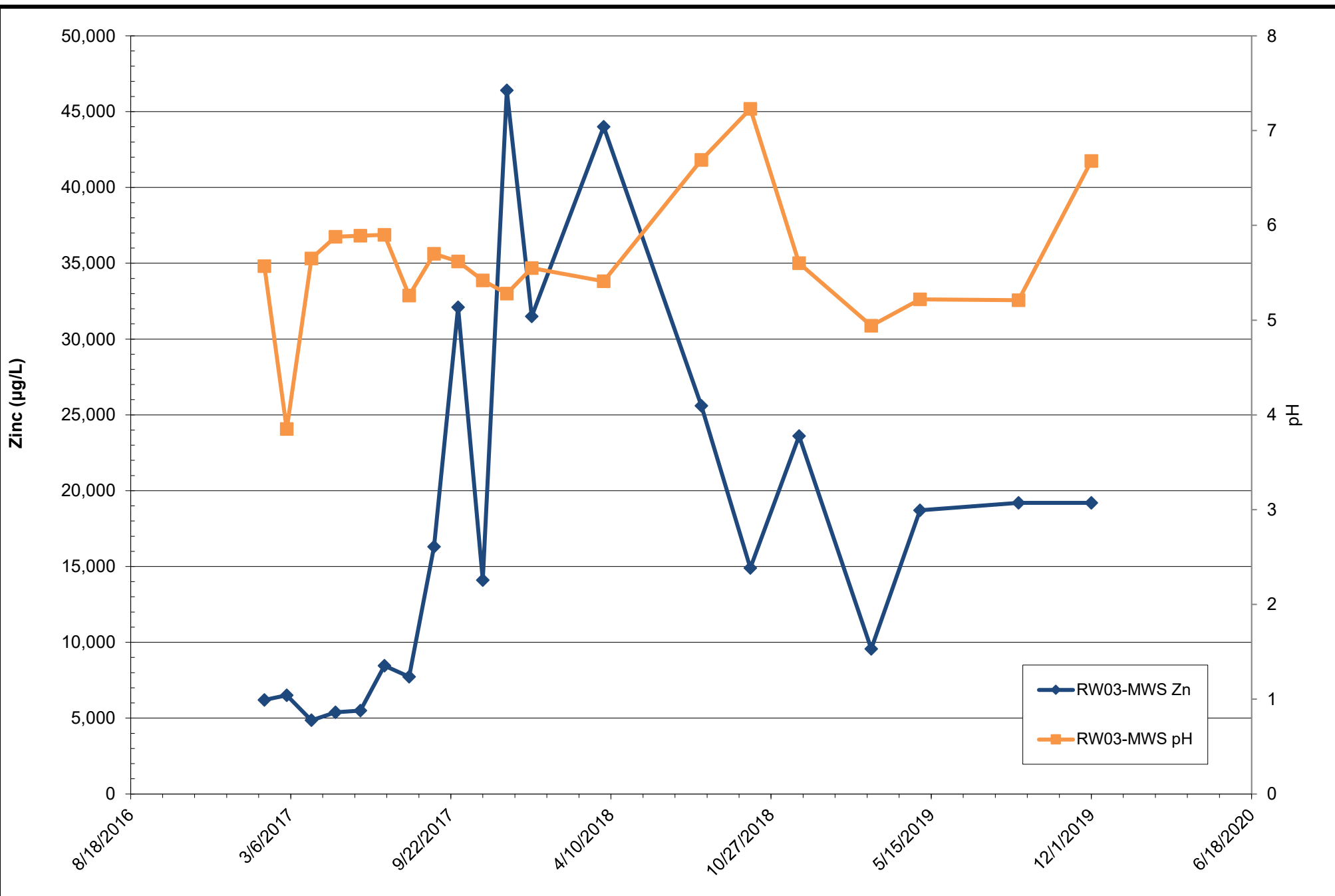
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Tradeport Atlantic

Sparrows Point, Maryland

RW02-MWS pH and Zinc Concentrations

February 13, 2020

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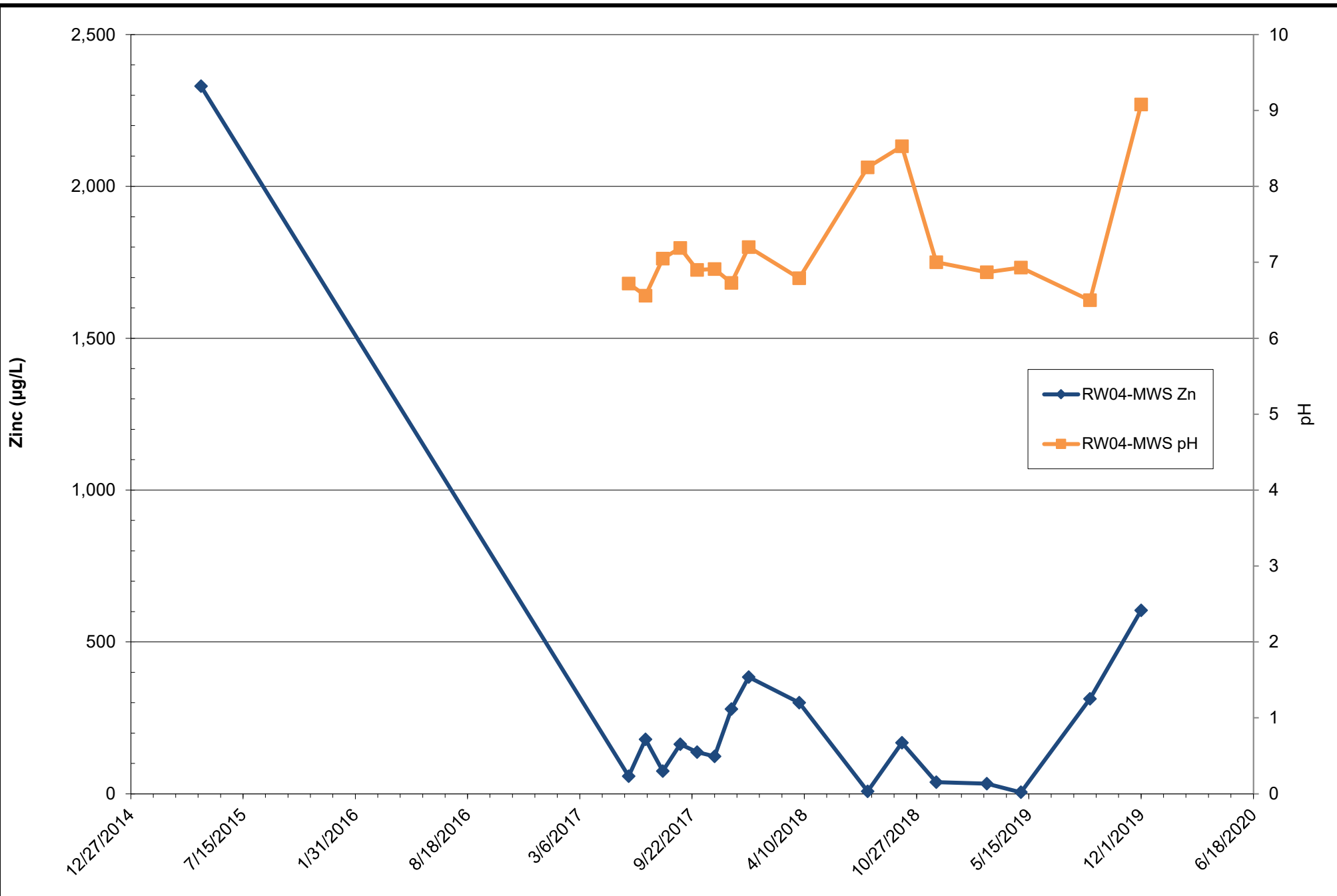
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW03-MWS pH and Zinc Concentrations

February 13, 2020

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Engineers and Scientists

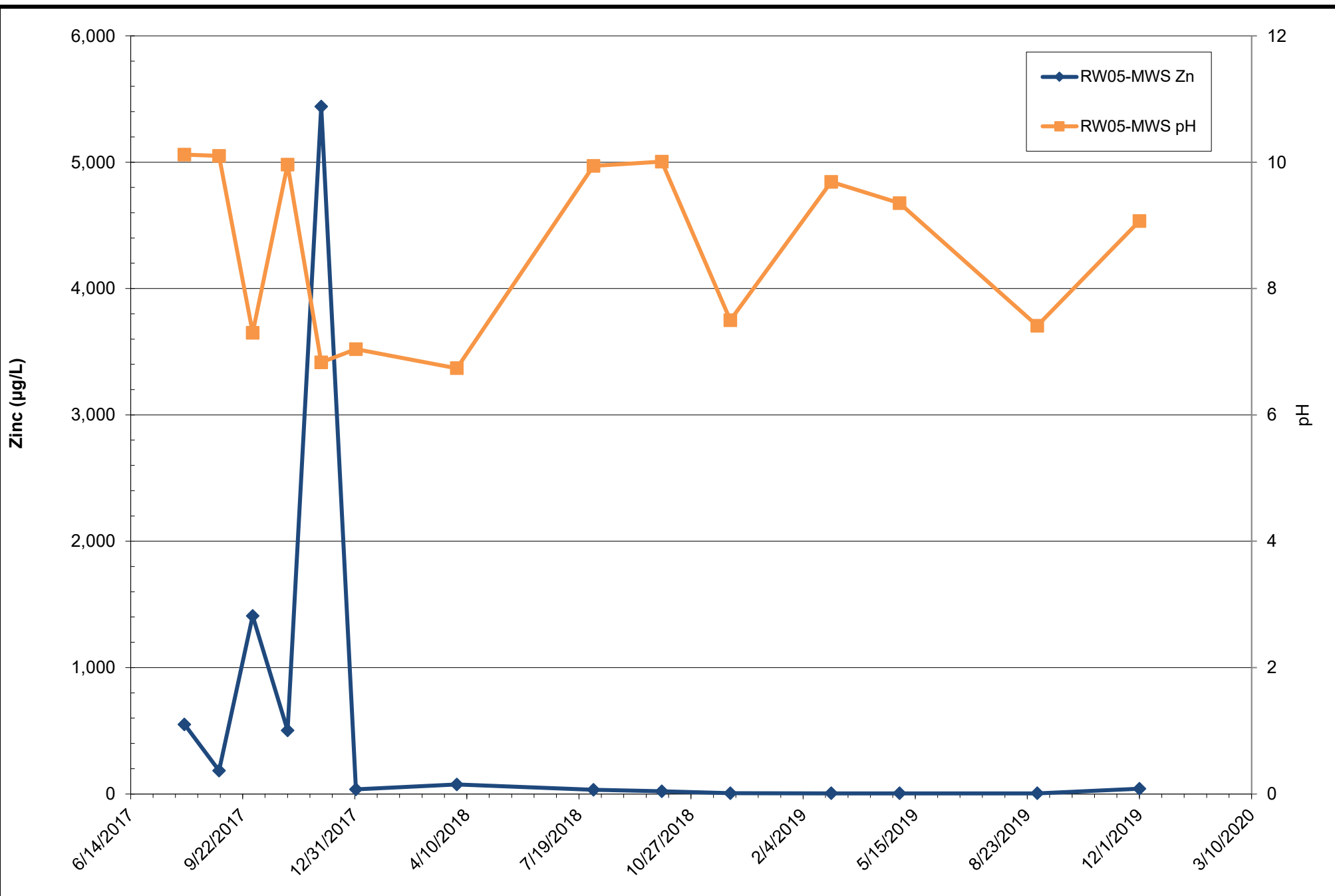
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Sparrows Point, Maryland

RW04-MWS pH and Zinc Concentrations

February 13, 2020

**Appx
B**



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Engineers and Scientists

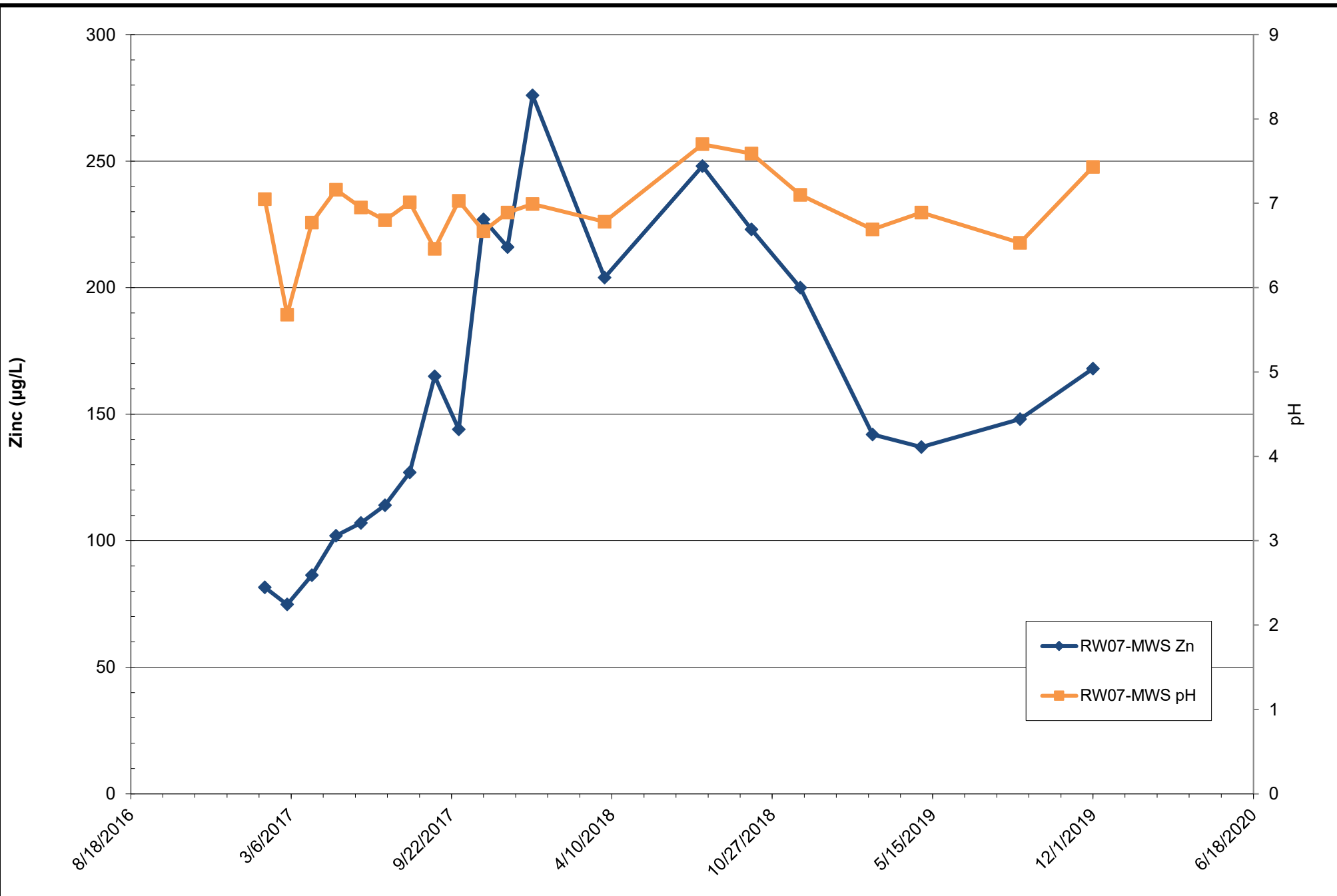
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW05-MWS pH and Zinc Concentrations

February 13, 2020

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Engineers and Scientists

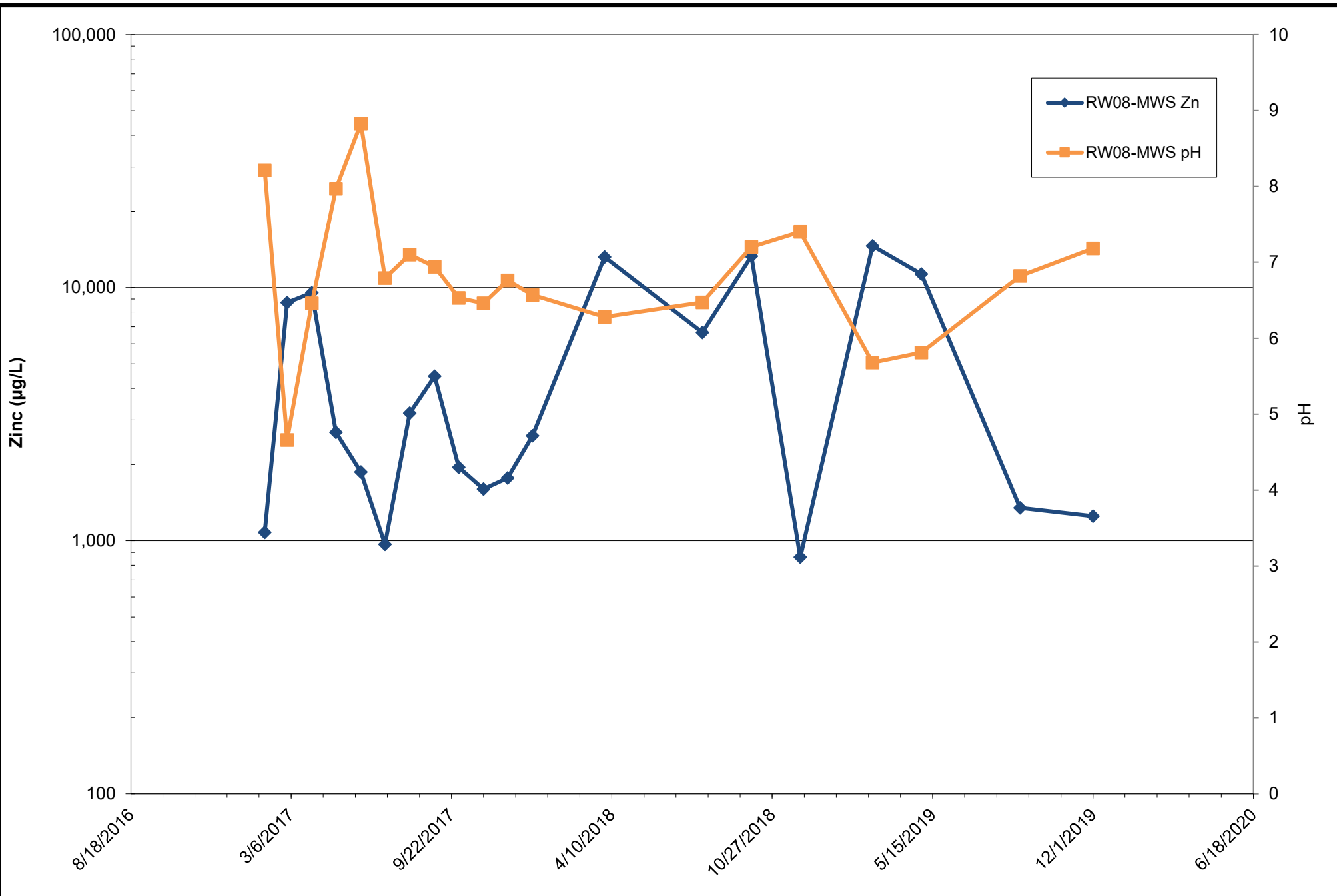
Rod and Wire Mill
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Sparrows Point, Maryland

RW07-MWS pH and Zinc Concentrations

February 13, 2020

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Engineers and Scientists

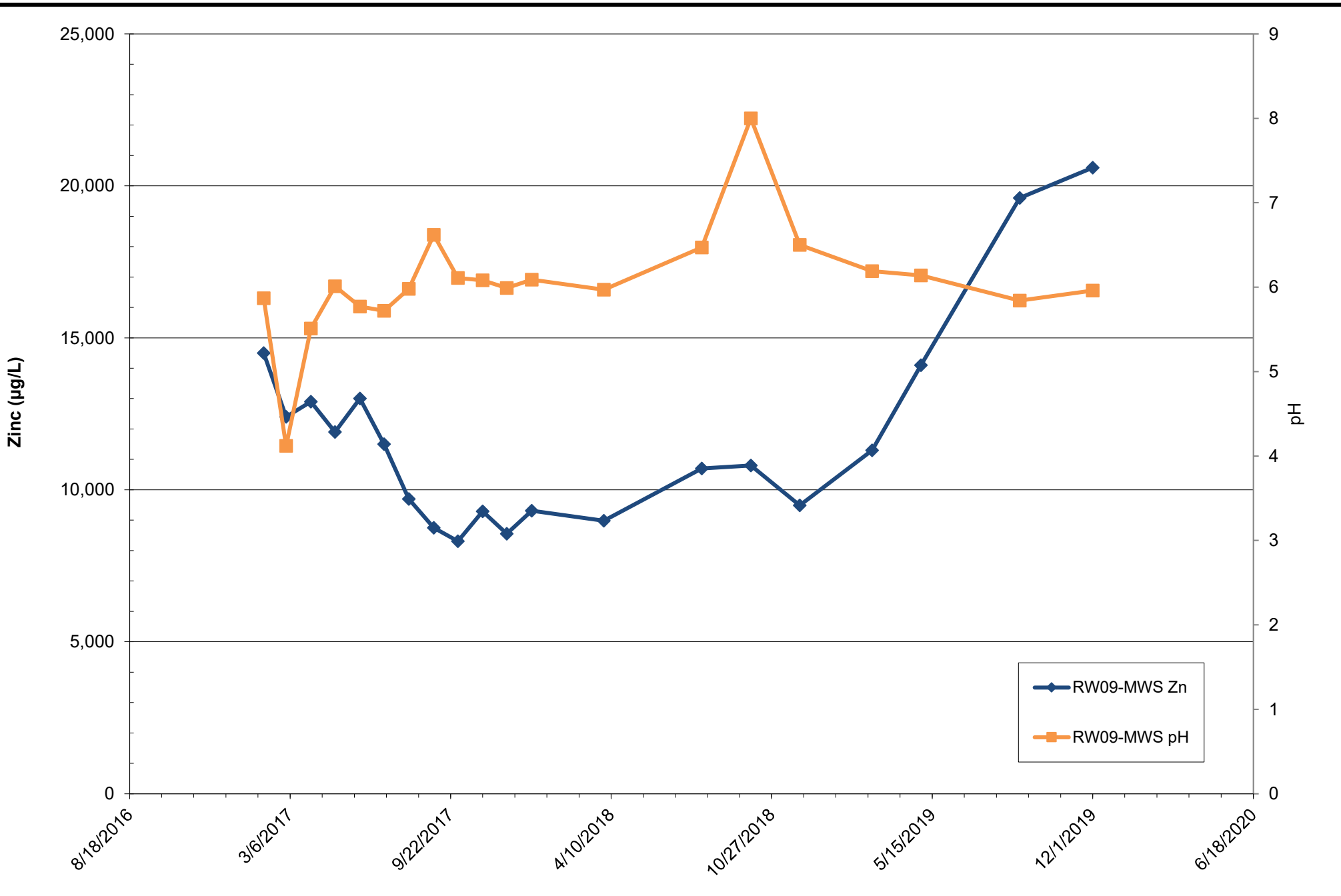
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**RW08-MWS pH and Zinc
Concentrations**

February 13, 2020

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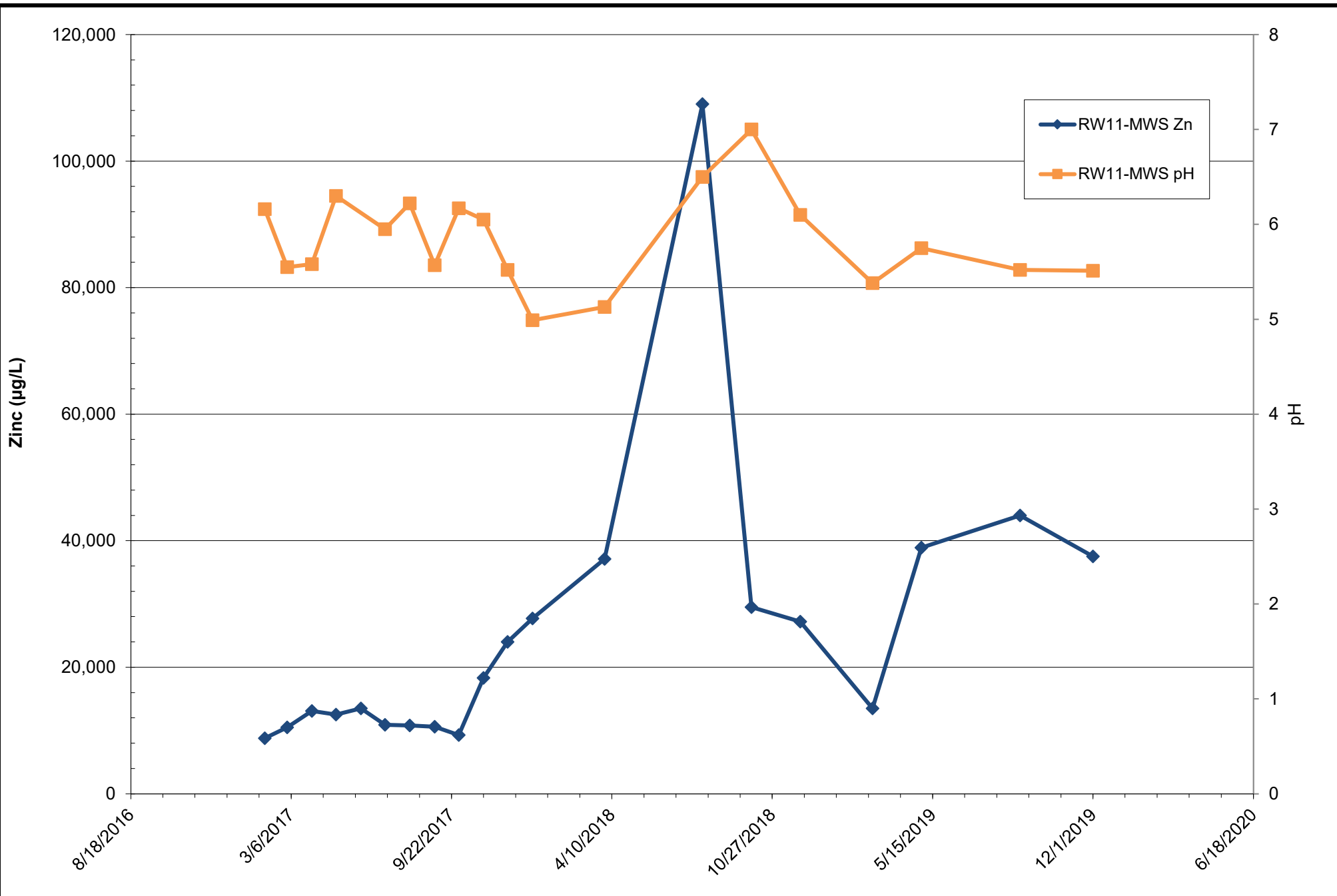
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW09-MWS pH and Zinc Concentrations

February 13, 2020

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Engineers and Scientists

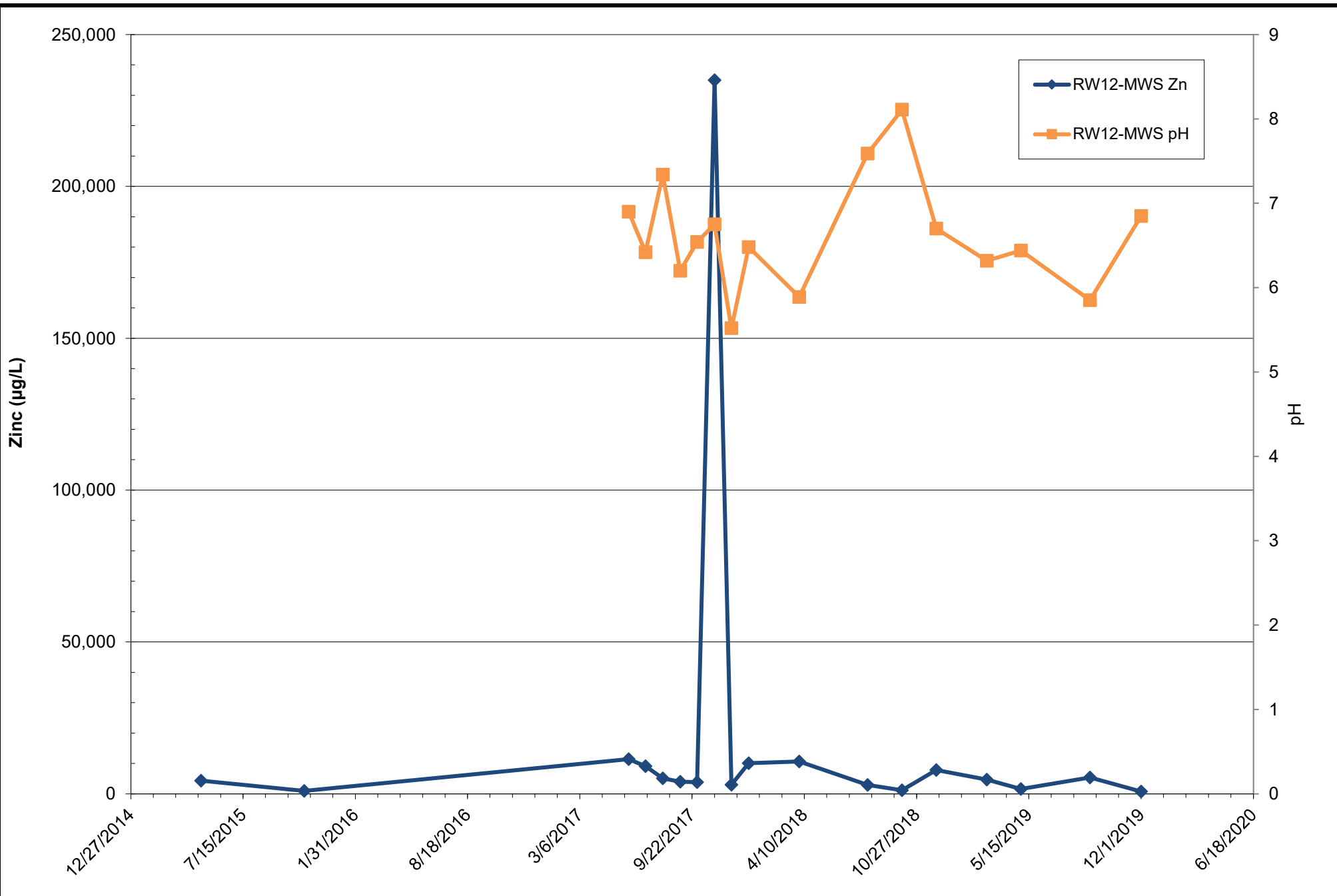
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW11-MWS pH and Zinc Concentrations

February 13, 2020

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B**



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Engineers and Scientists

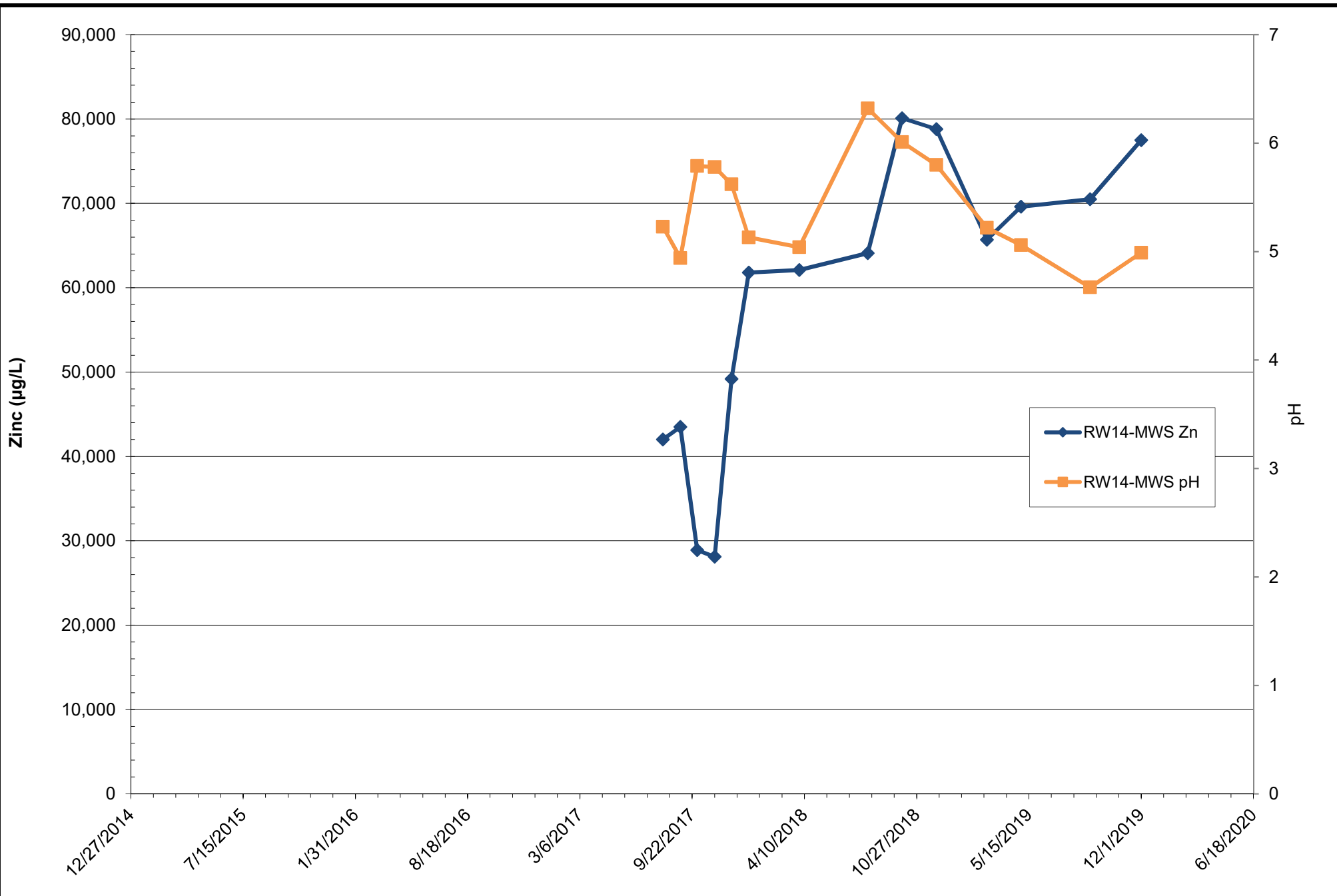
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW12-MWS pH and Zinc Concentrations

February 13, 2020

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B**



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Engineers and Scientists

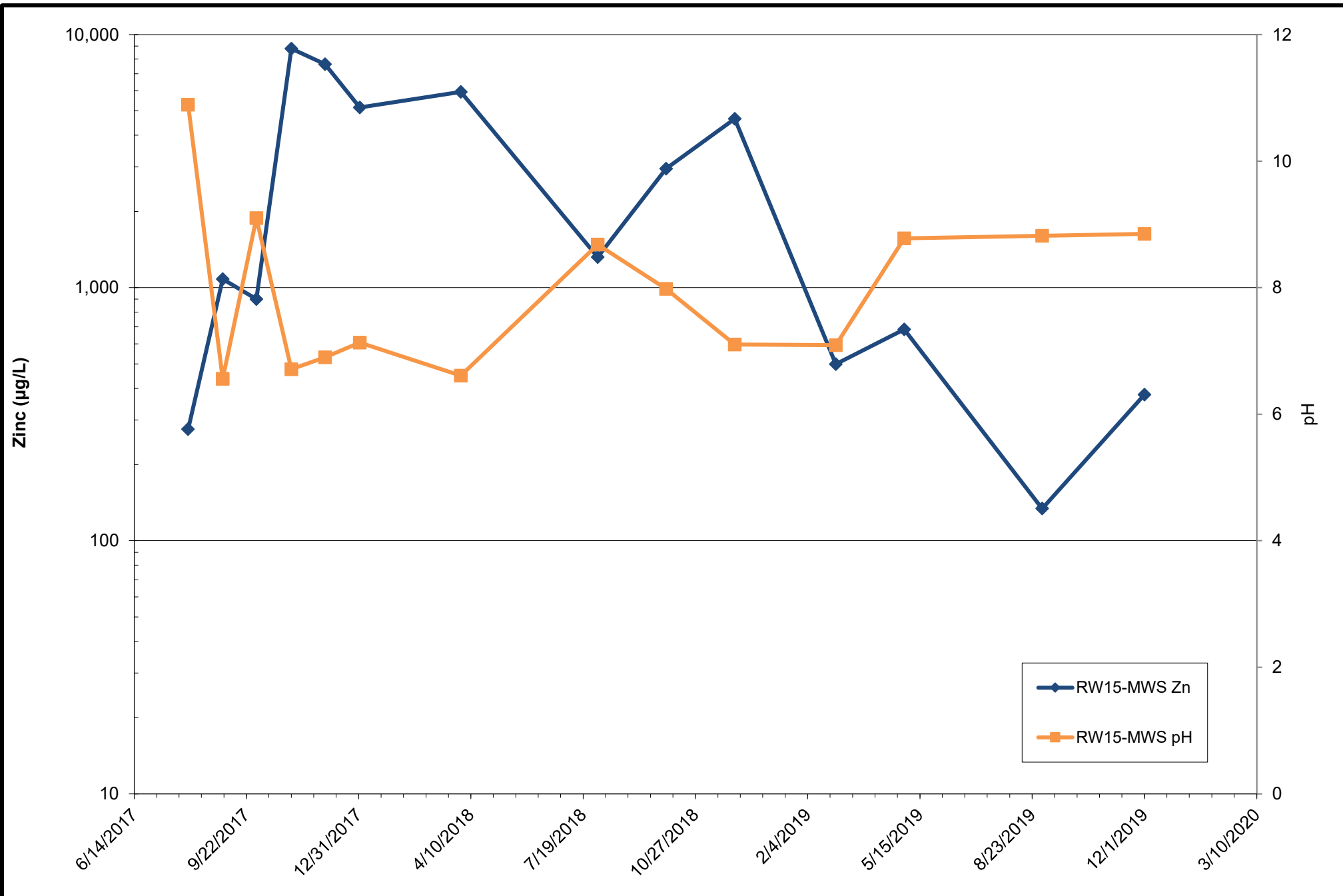
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW14-MWS pH and Zinc Concentrations

February 13, 2020

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Engineers and Scientists

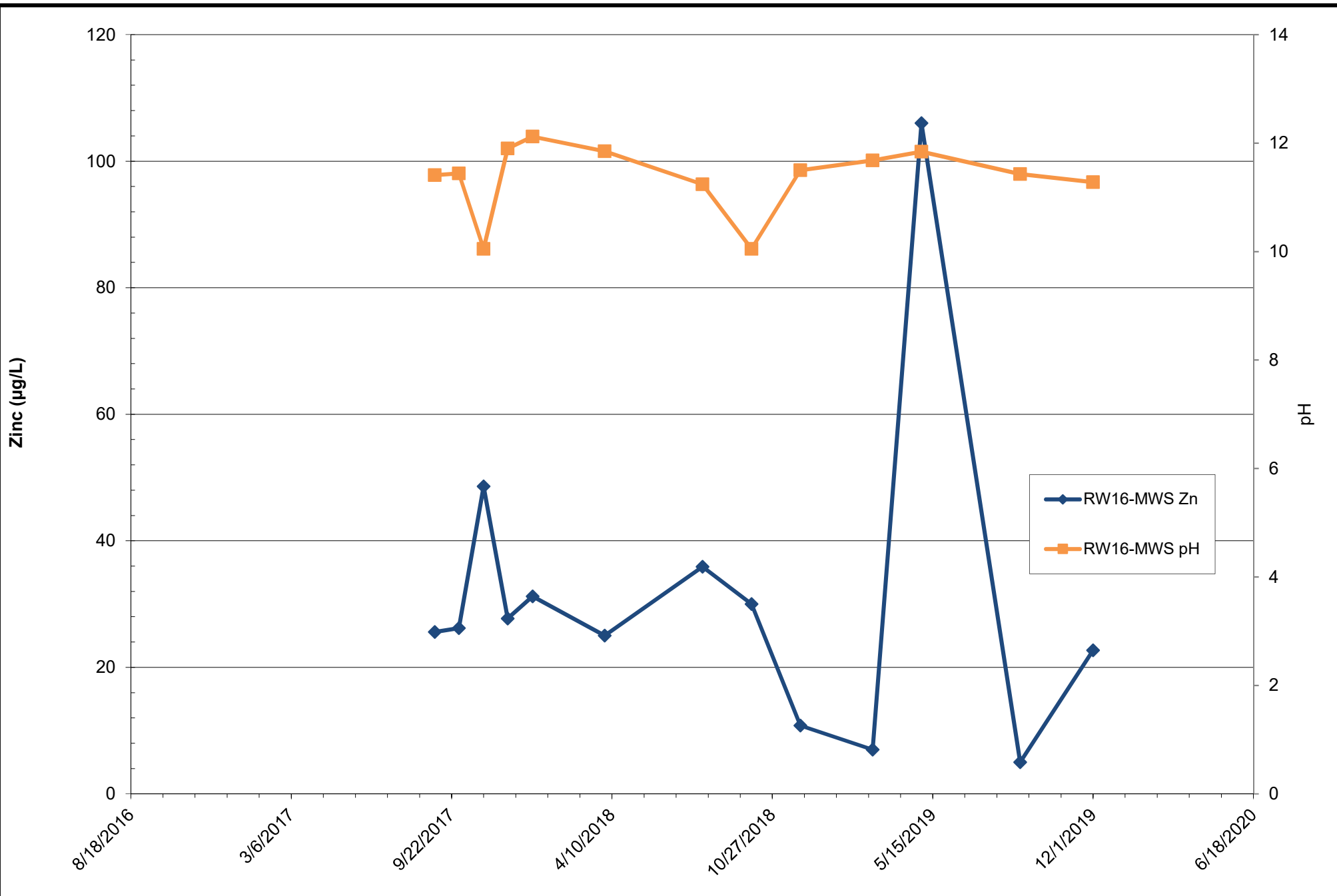
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW15-MWS pH and Zinc Concentrations

February 13, 2020

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Engineers and Scientists

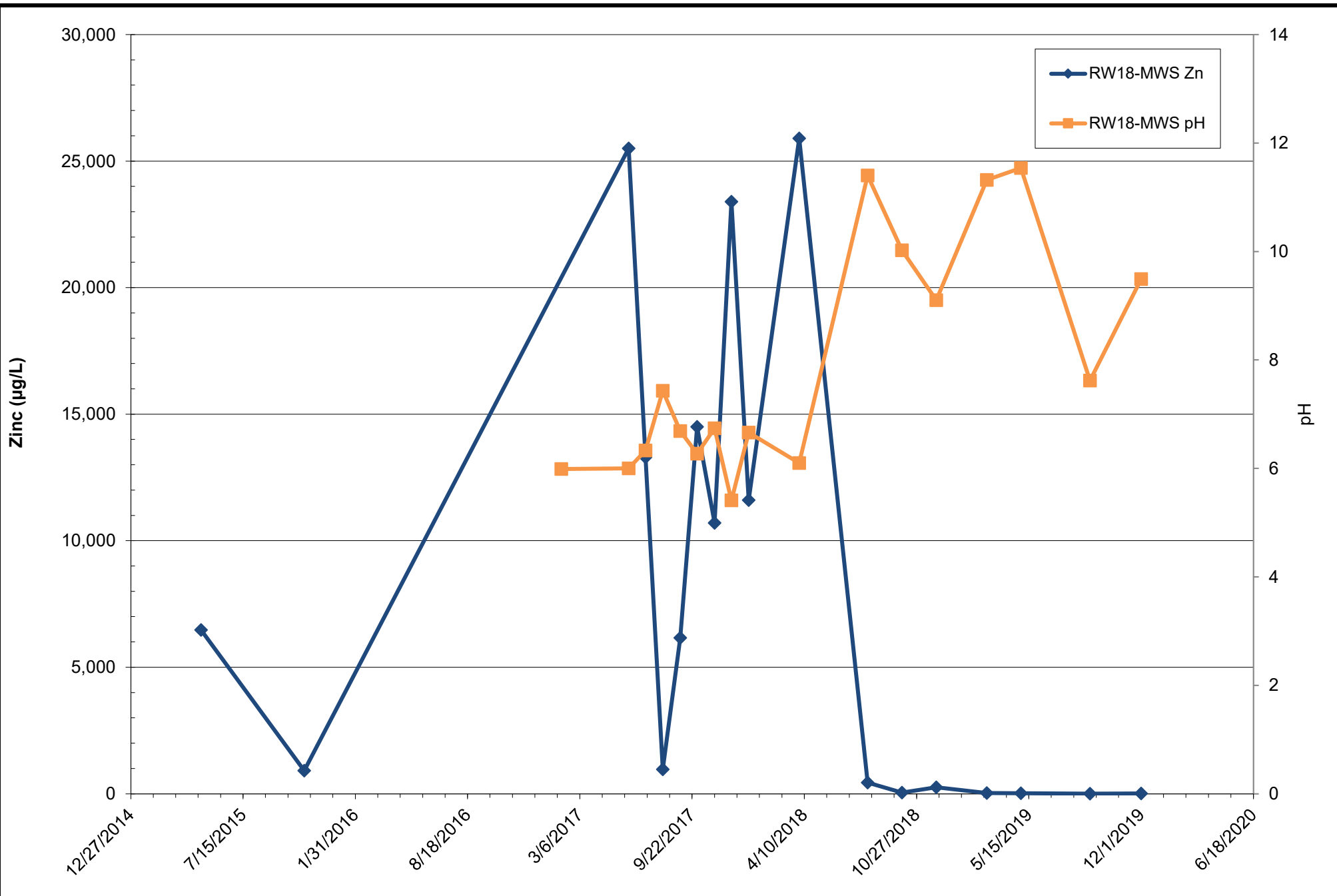
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW16-MWS pH and Zinc Concentrations

February 13, 2020

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Engineers and Scientists

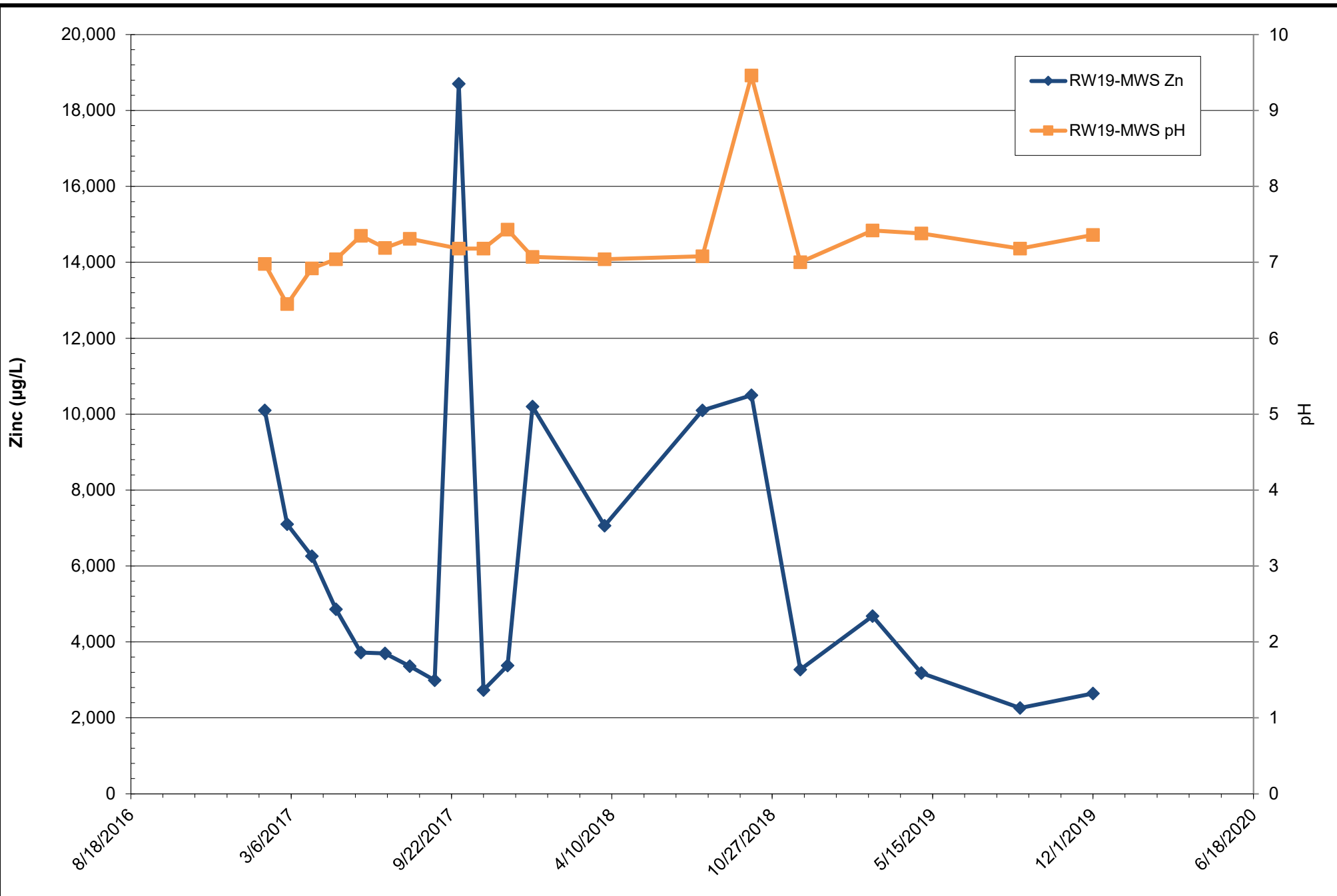
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW18-MWS pH and Zinc Concentrations

February 13, 2020

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Engineers and Scientists

Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

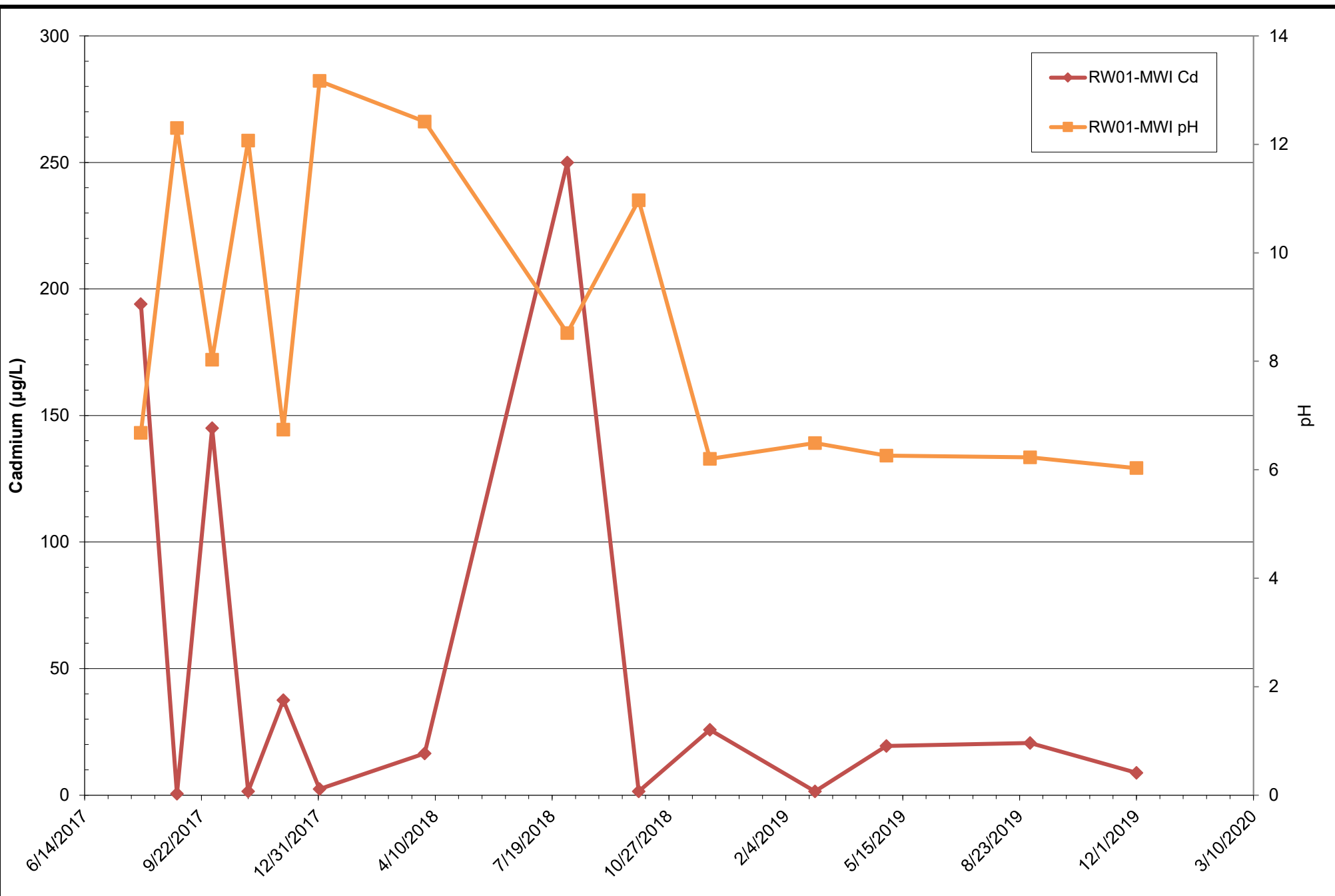
RW19-MWS pH and Zinc Concentrations

February 13, 2020

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APPENDIX C

Intermediate Groundwater Time-Series Graphs



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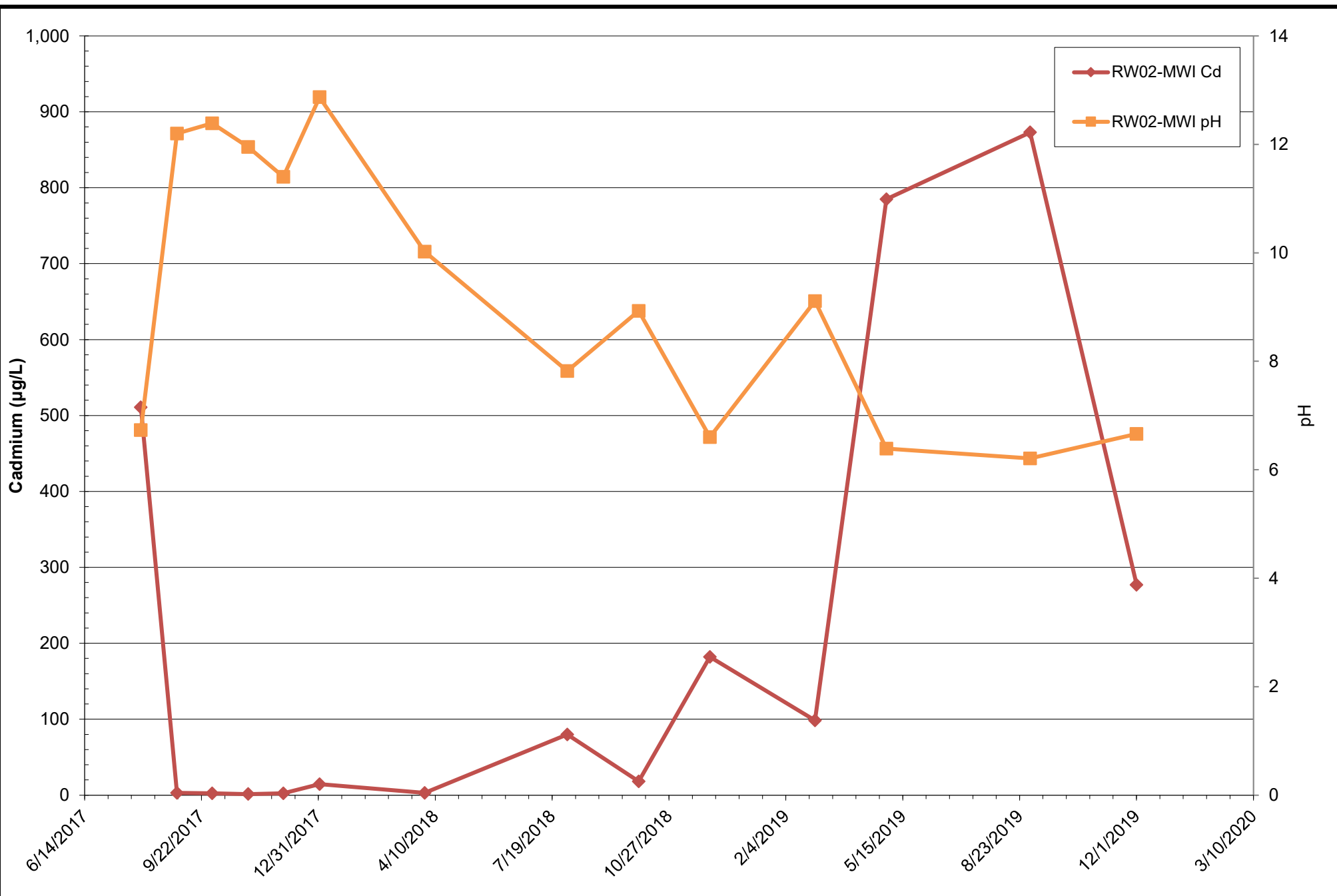
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW01-MWI pH and Cadmium Concentrations

February 12, 2020

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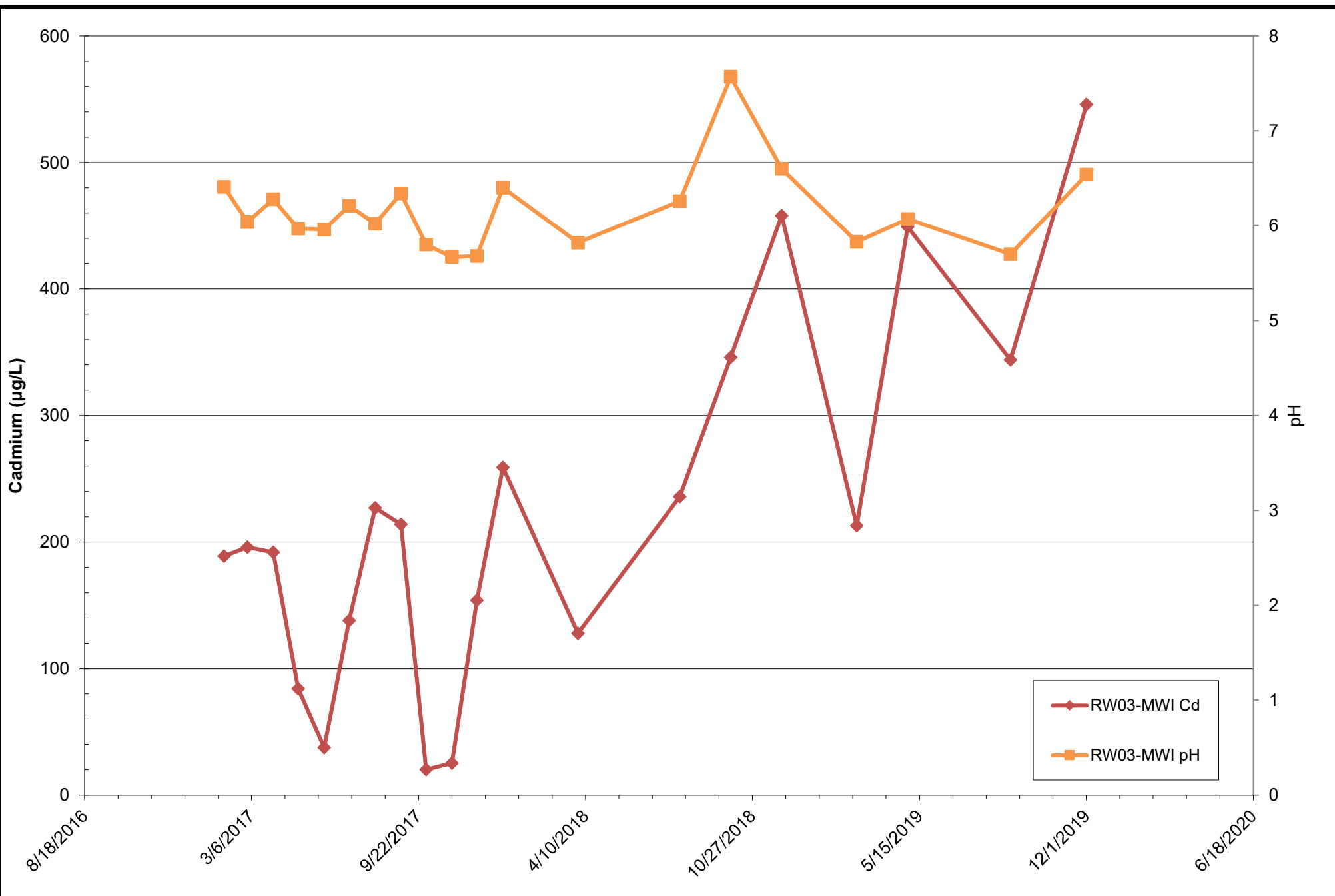
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW02-MWI pH and Cadmium Concentrations

February 12, 2020

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Engineers and Scientists

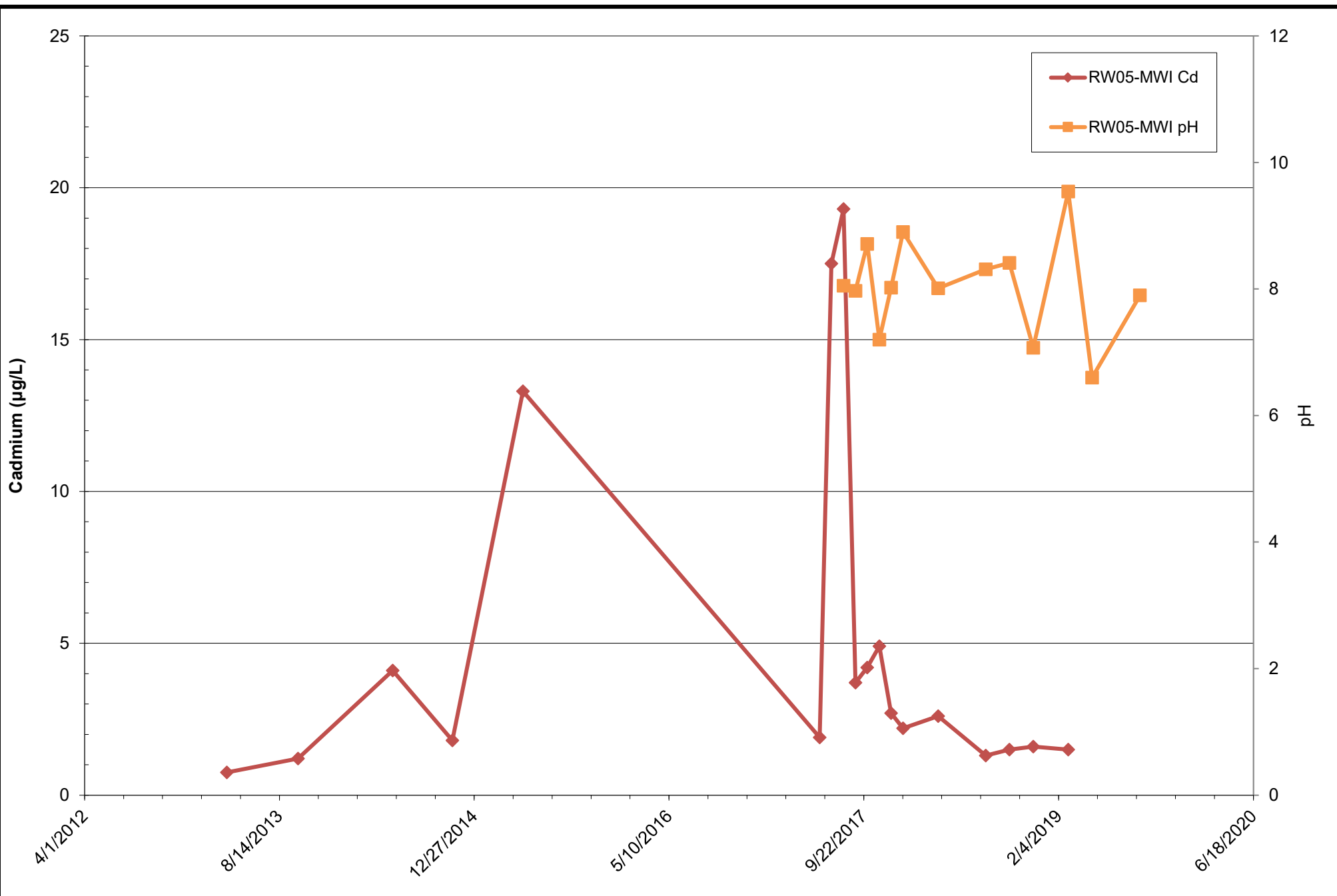
Rod and Wire Mill
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Sparrows Point, Maryland

RW03-MWI pH and Cadmium Concentrations

February 12, 2020

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Engineers and Scientists

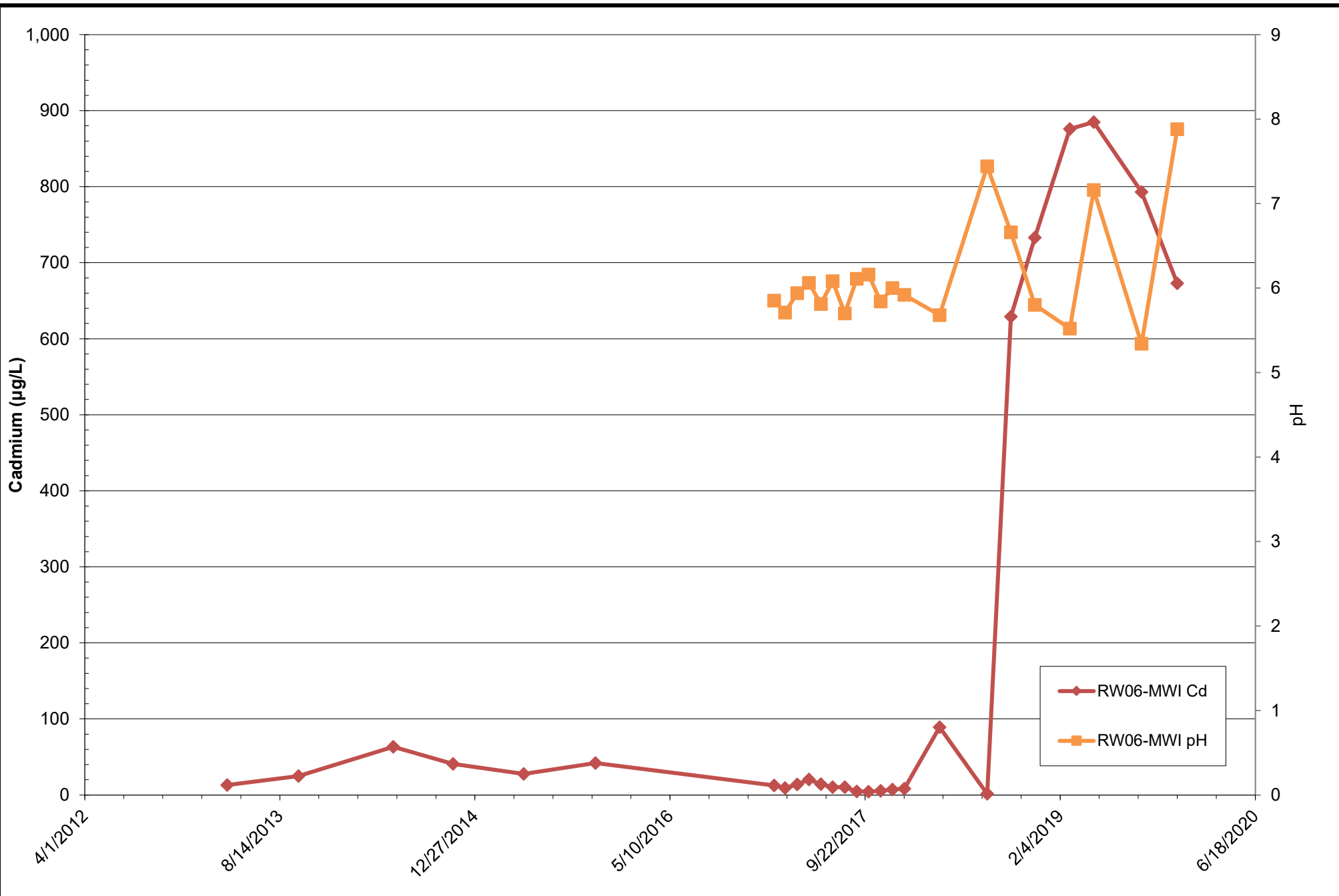
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW05-MWI pH and Cadmium Concentrations

February 12, 2020

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Engineers and Scientists

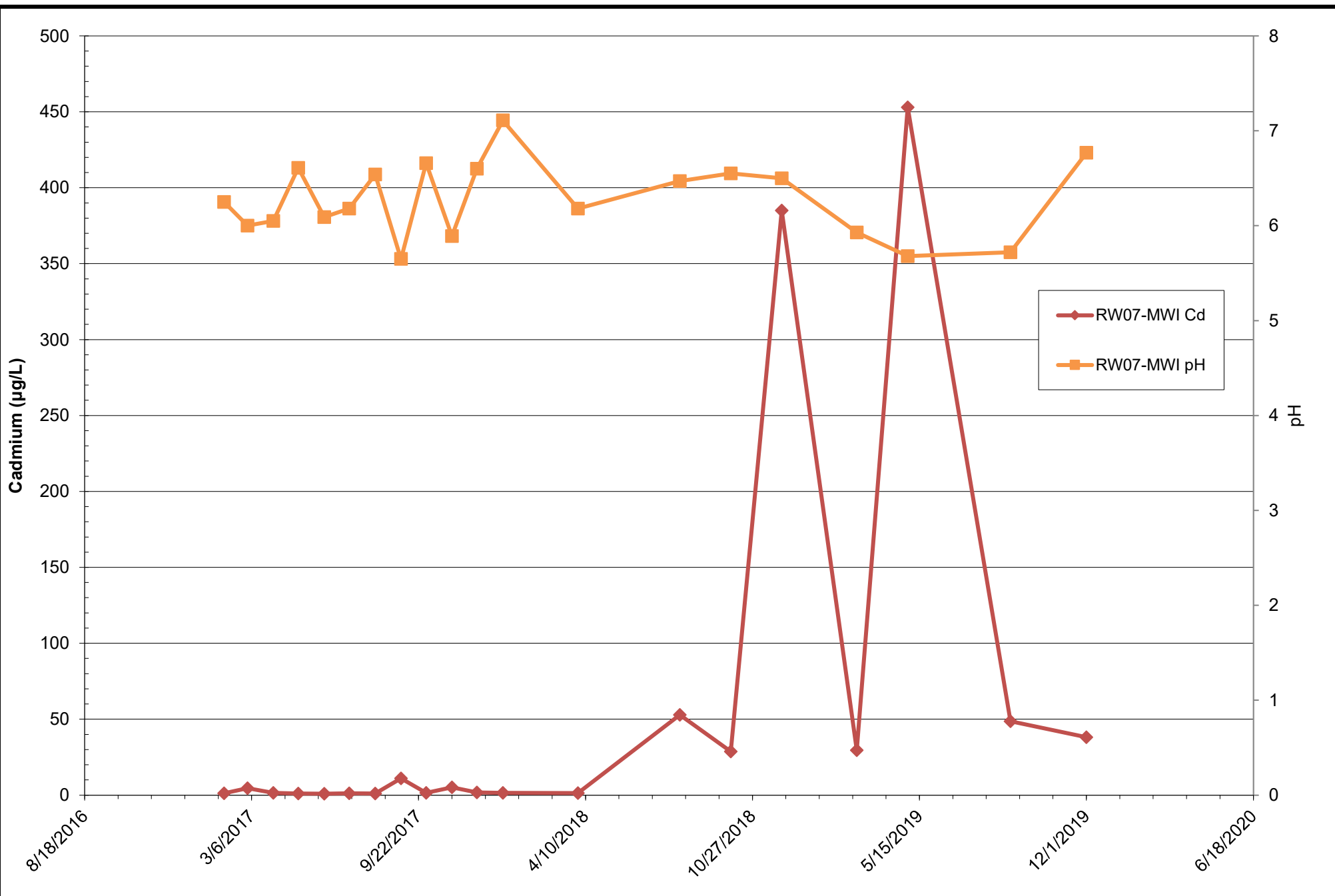
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Tradeport Atlantic

Sparrows Point, Maryland

RW06-MWI pH and Cadmium Concentrations

February 12, 2020

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Engineers and Scientists

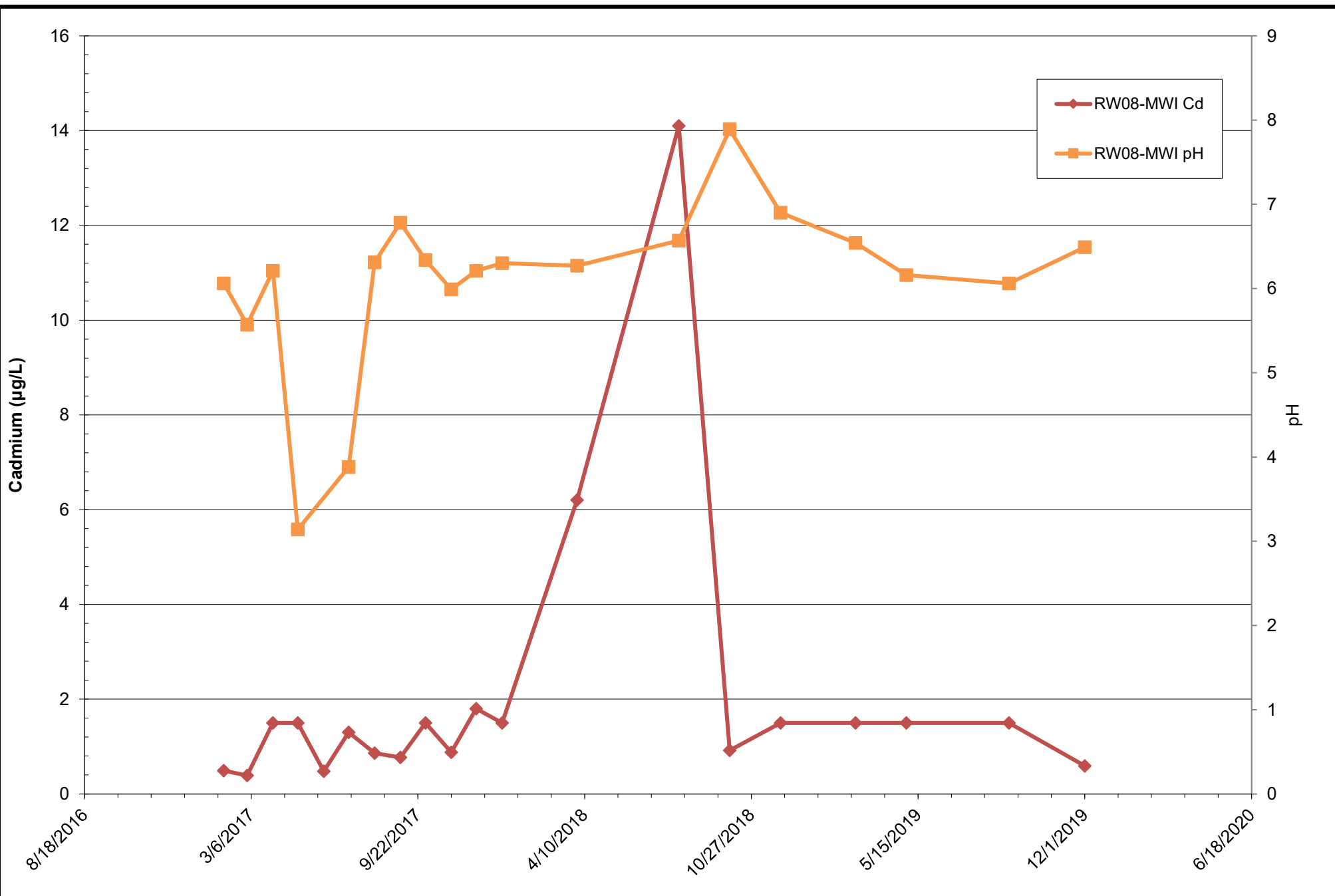
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW07-MWI pH and Cadmium Concentrations

February 12, 2020

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Engineers and Scientists

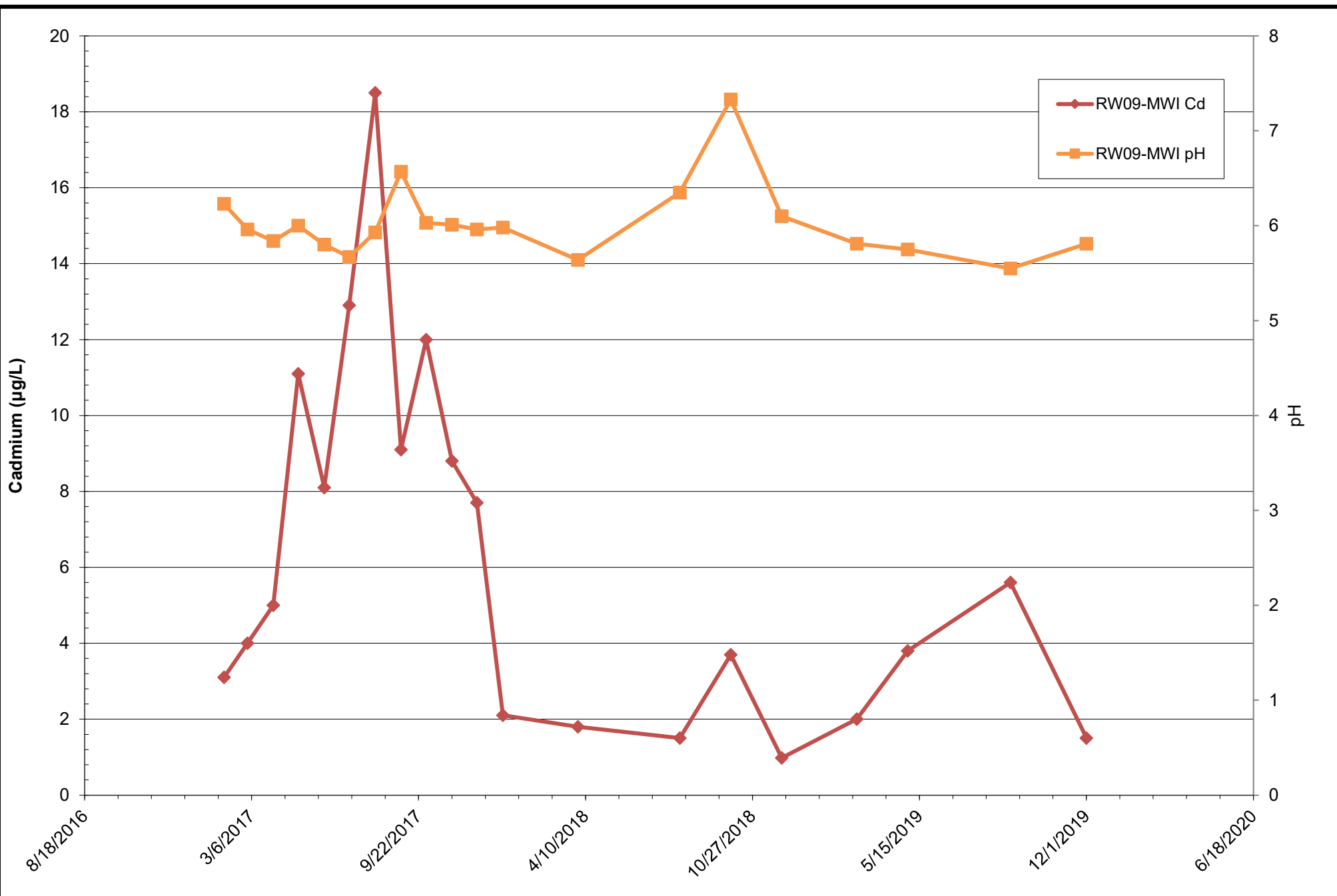
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW08-MWI pH and Cadmium Concentrations

February 12, 2020

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Engineers and Scientists

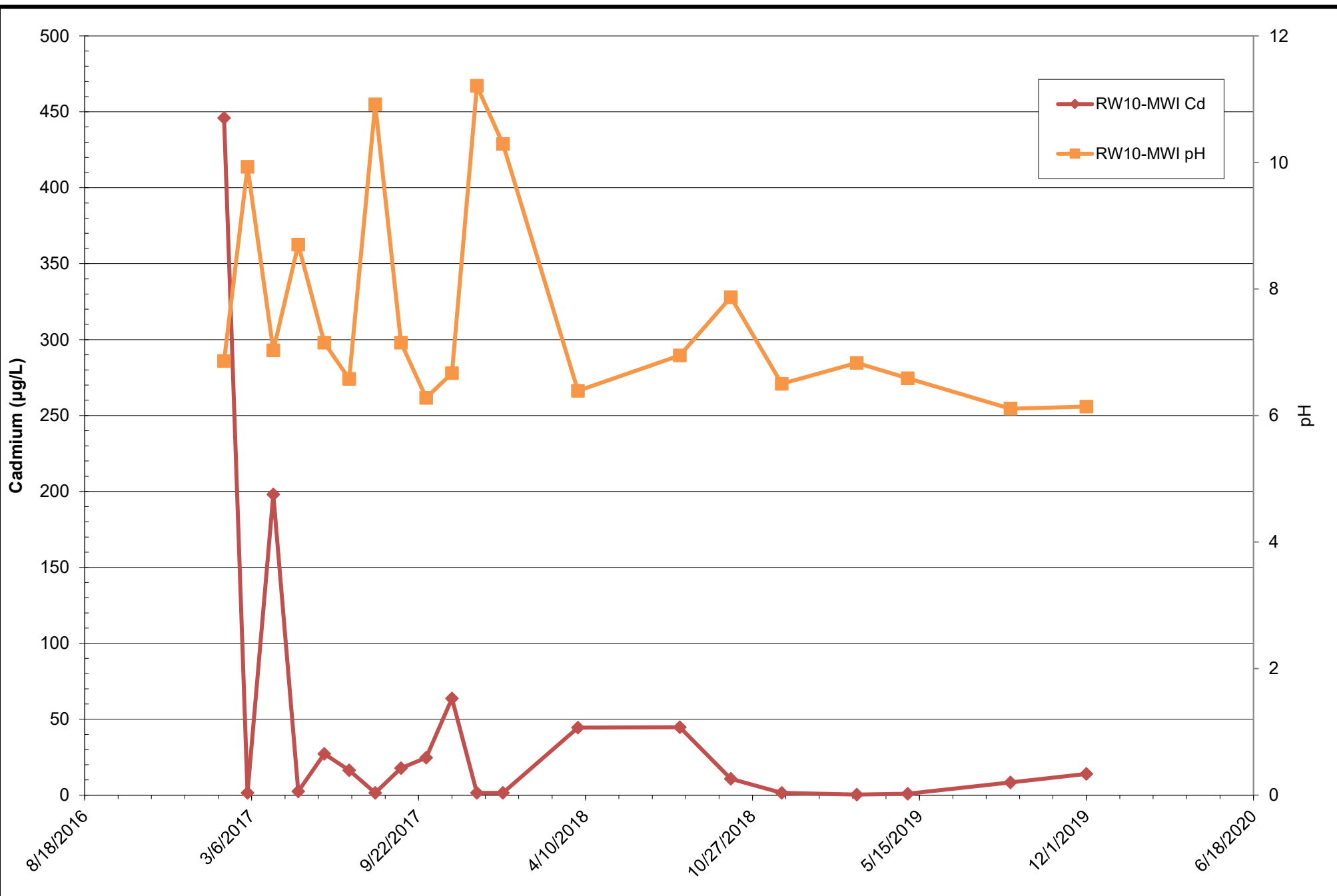
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW09-MWI pH and Cadmium Concentrations

February 12, 2020

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Engineers and Scientists

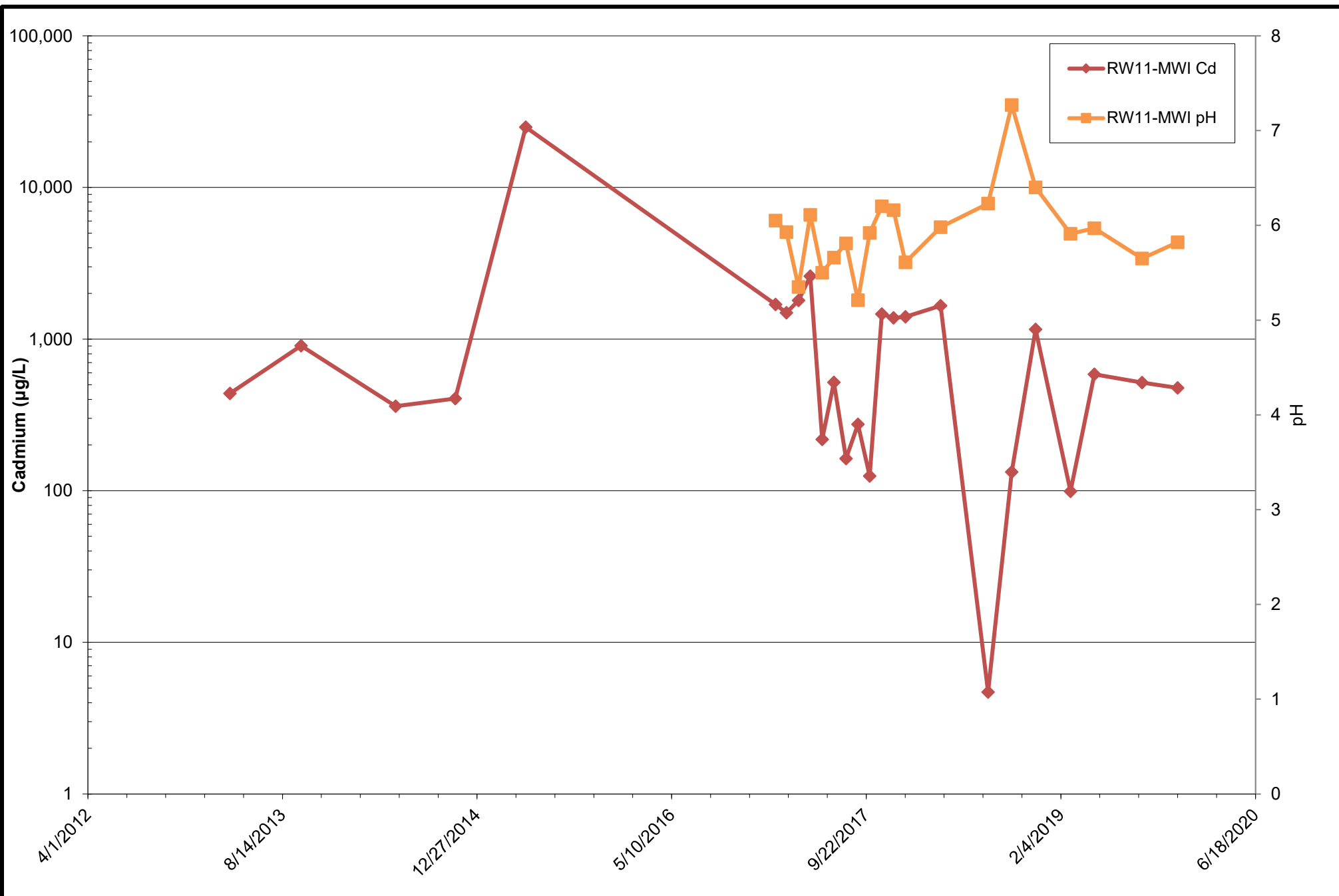
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW10-MWI pH and Cadmium Concentrations

February 12, 2020

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Engineers and Scientists

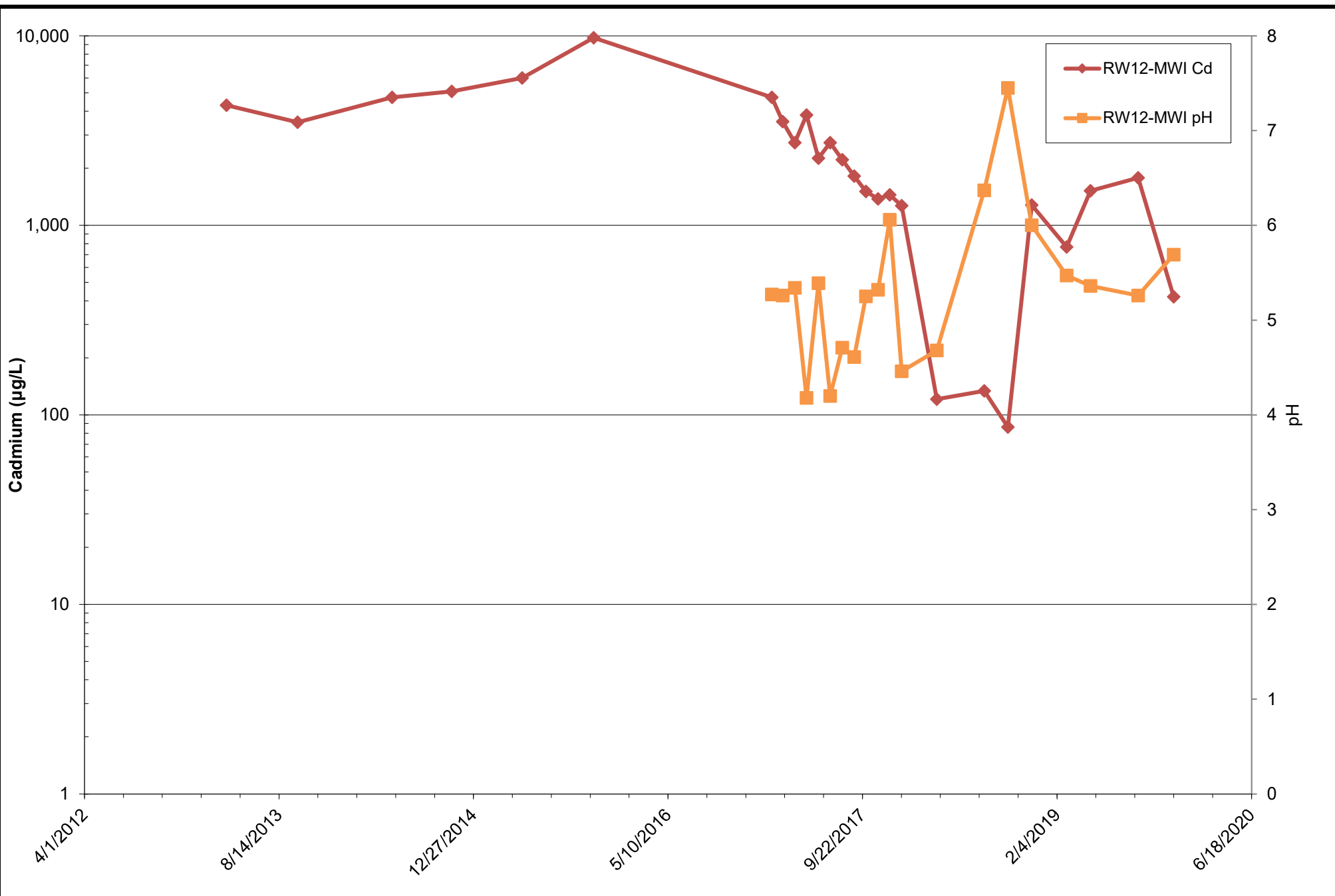
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW11-MWI pH and Cadmium Concentrations

February 12, 2020

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C**



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Engineers and Scientists

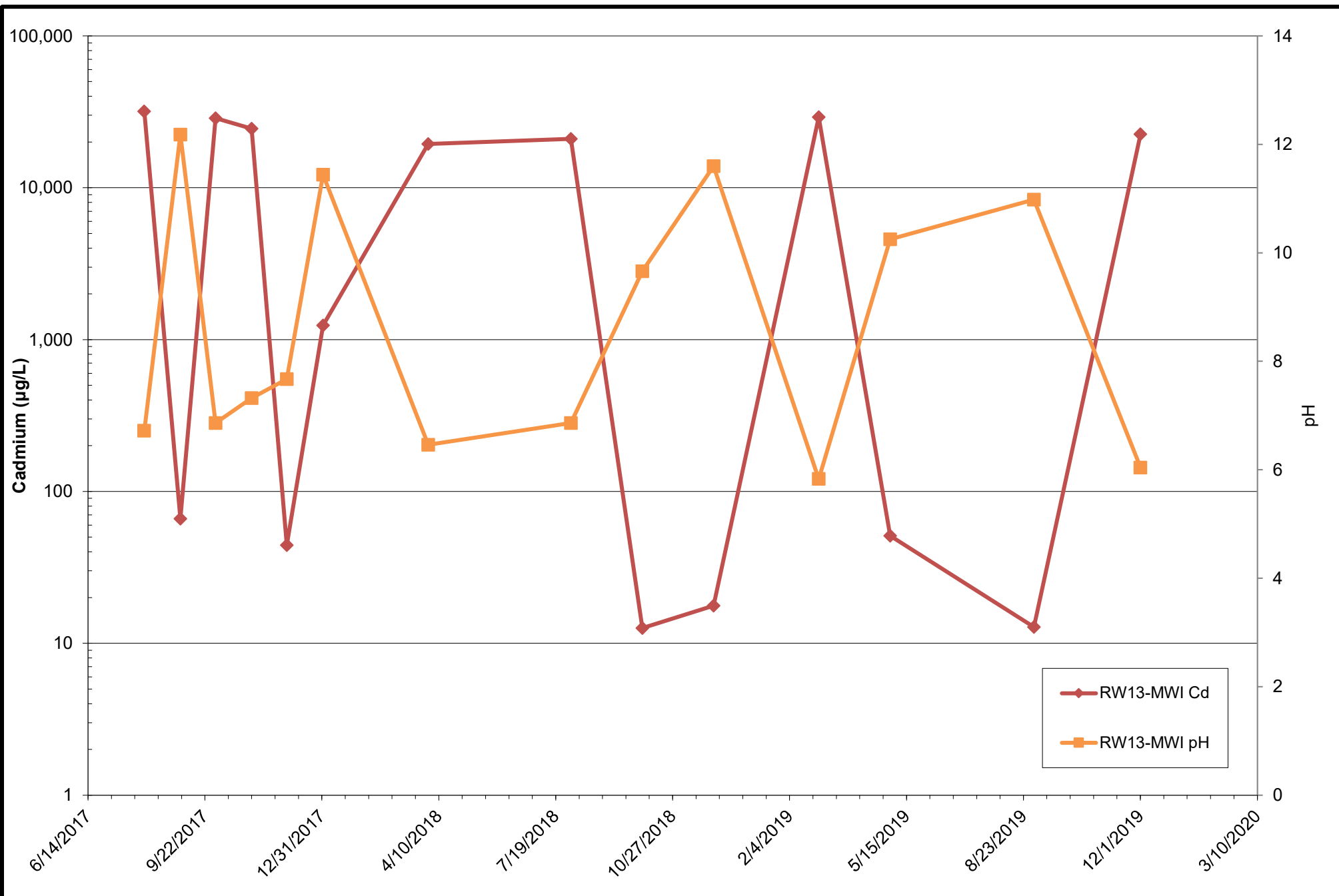
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW12-MWI pH and Cadmium Concentrations

February 12, 2020

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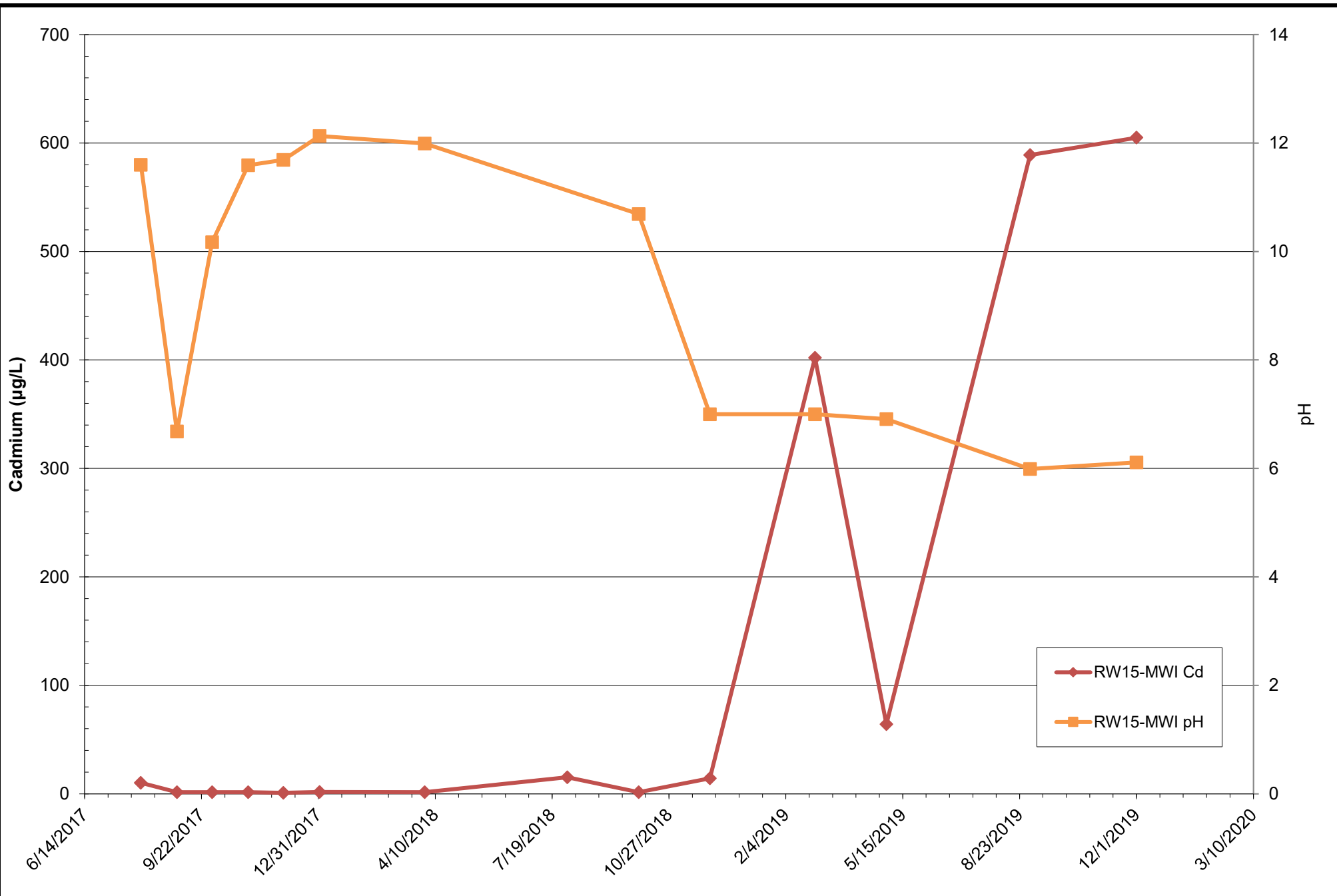
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW13-MWI pH and Cadmium Concentrations

February 12, 2020

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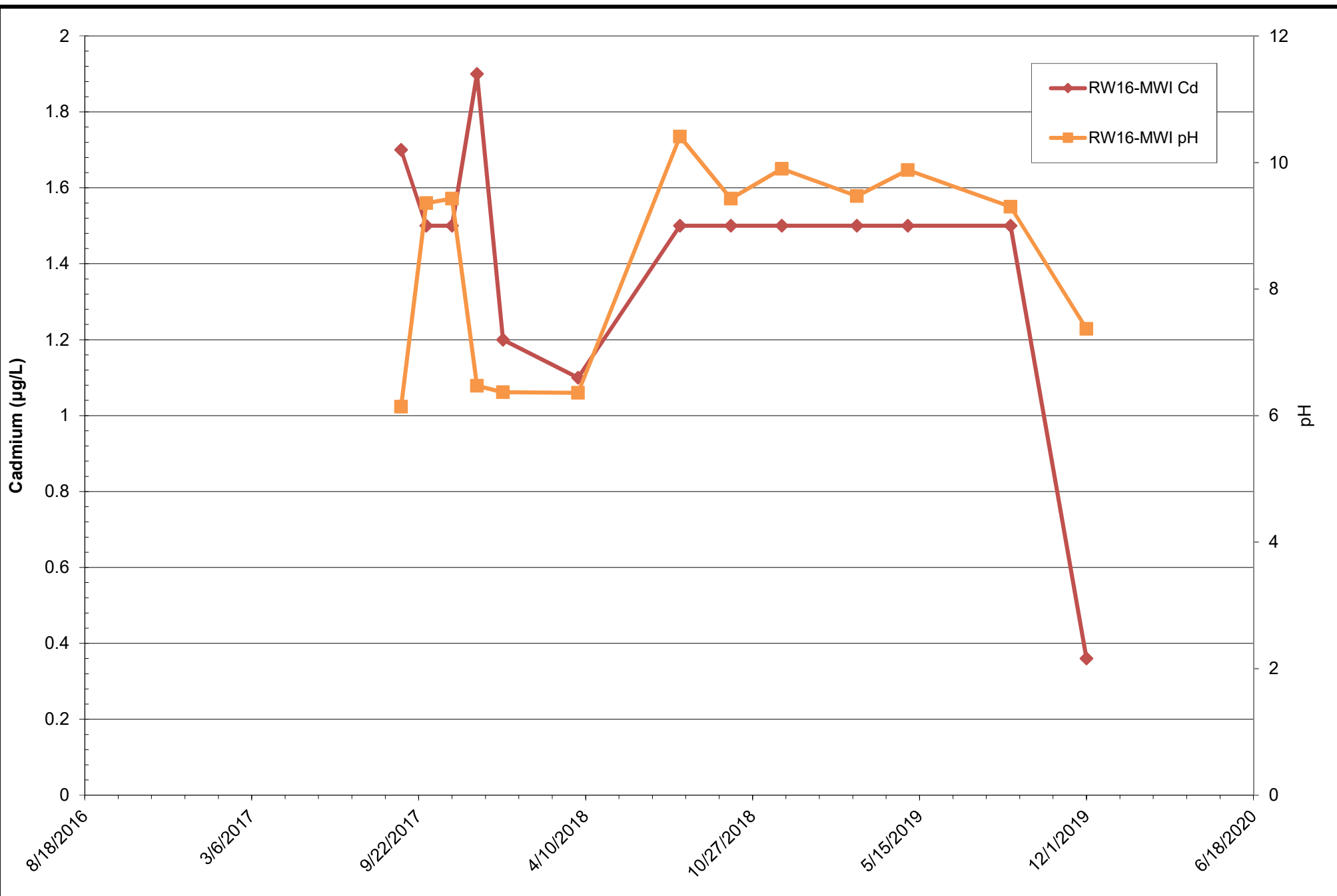
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW15-MWI pH and Cadmium Concentrations

February 12, 2020

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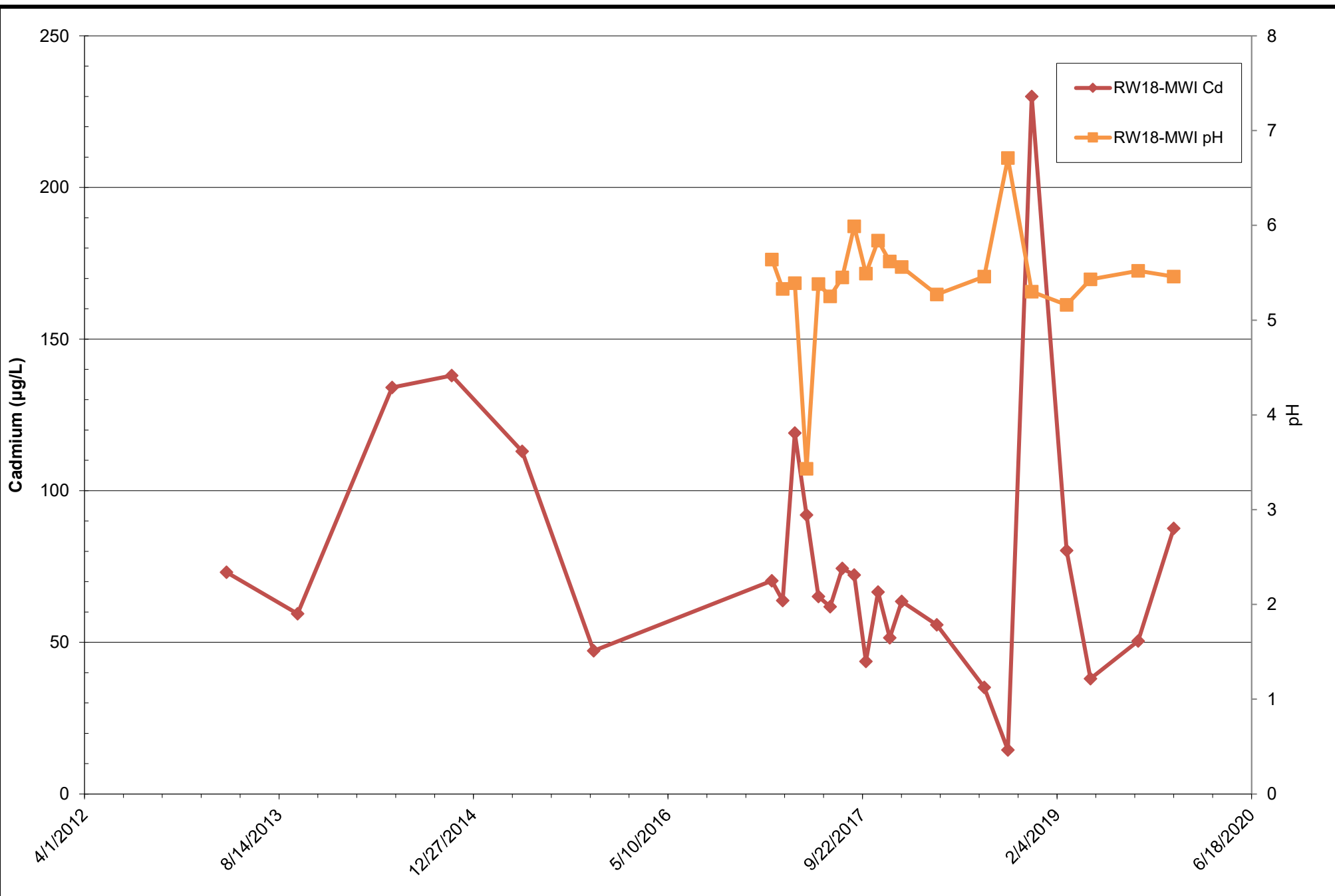
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW16-MWI pH and Cadmium Concentrations

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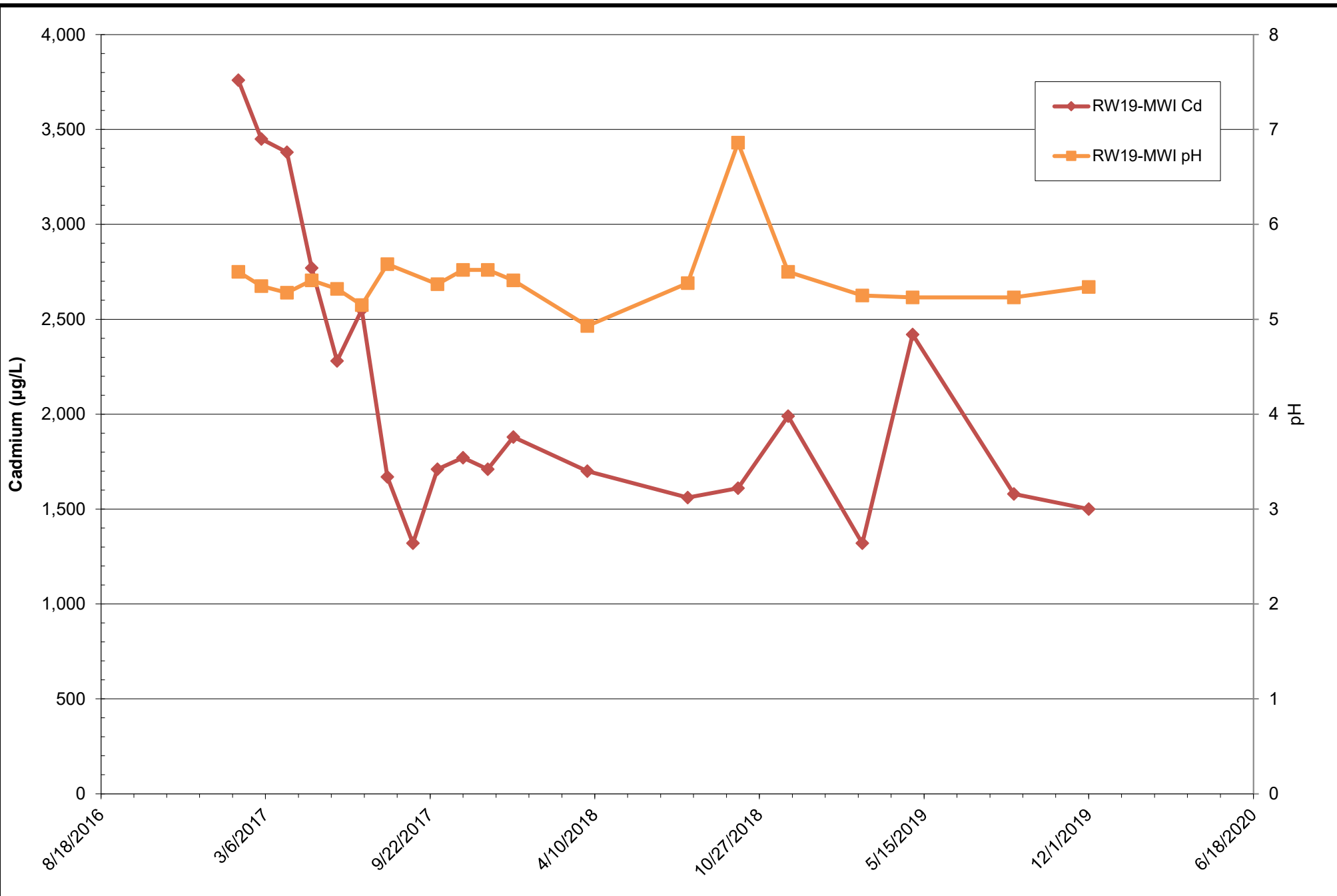
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW18-MWI pH and Cadmium Concentrations

February 12, 2020

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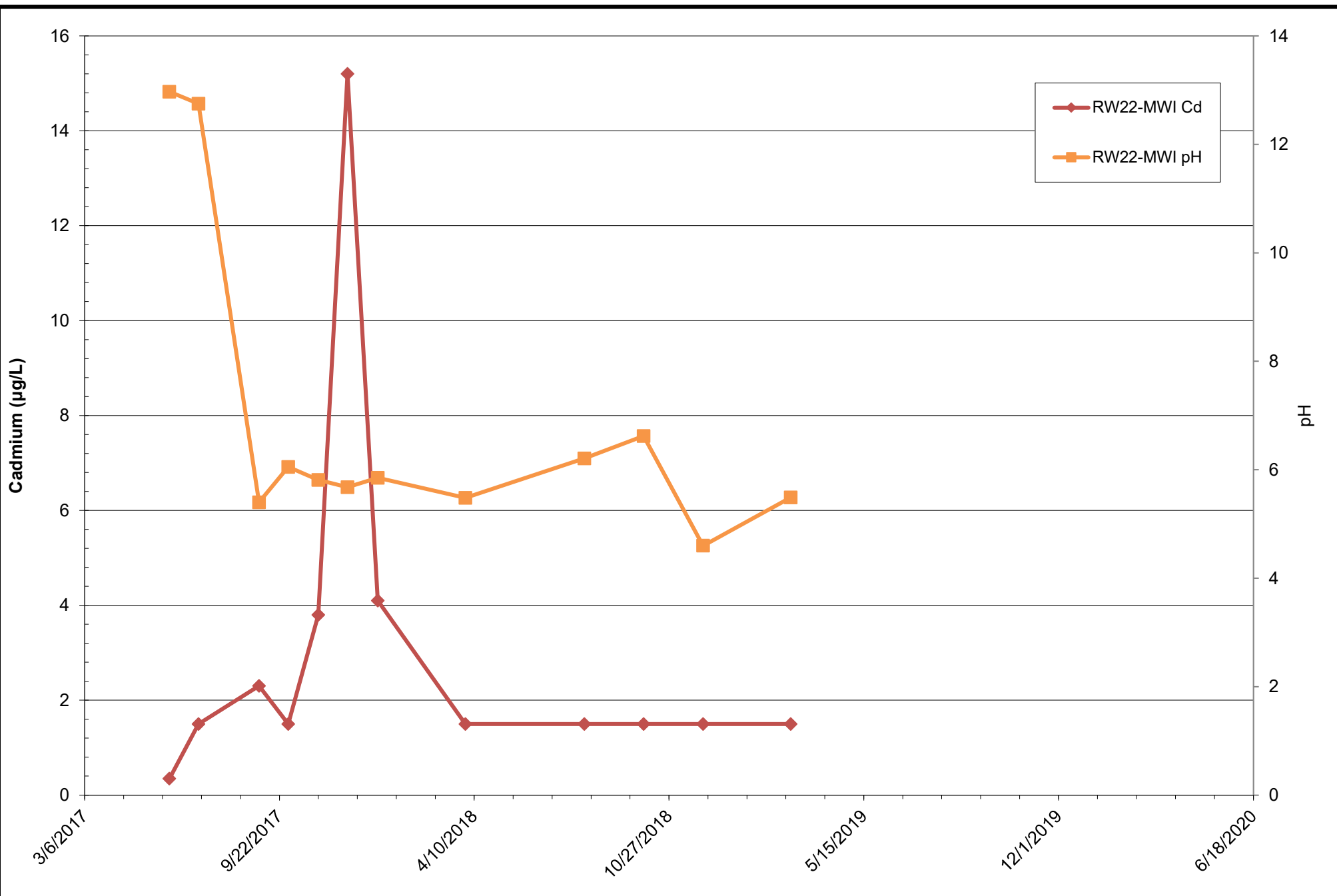
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW19-MWI pH and Cadmium Concentrations

February 12, 2020

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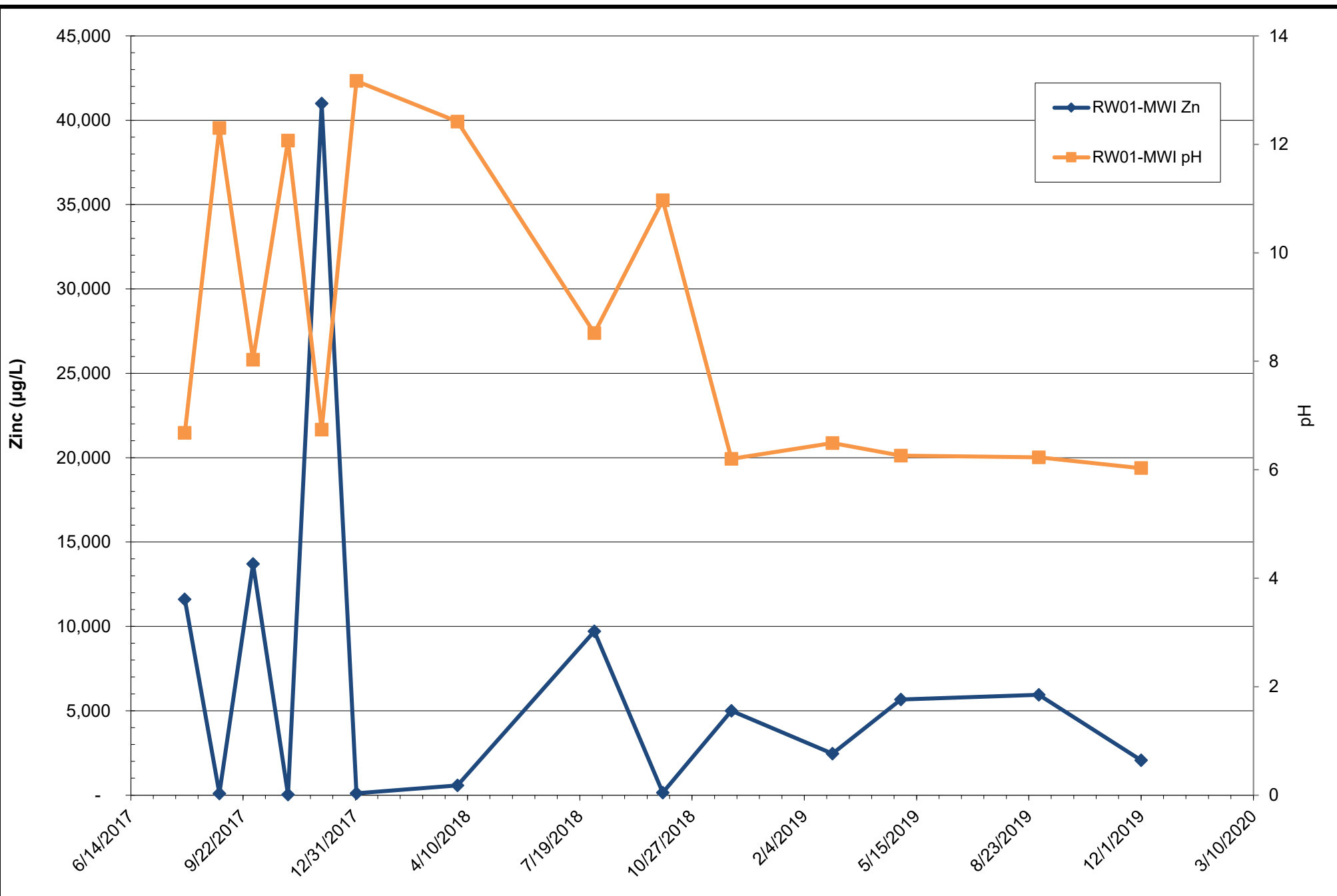
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW22-MWI pH and Cadmium Concentrations

February 12, 2020

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C**



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Engineers and Scientists

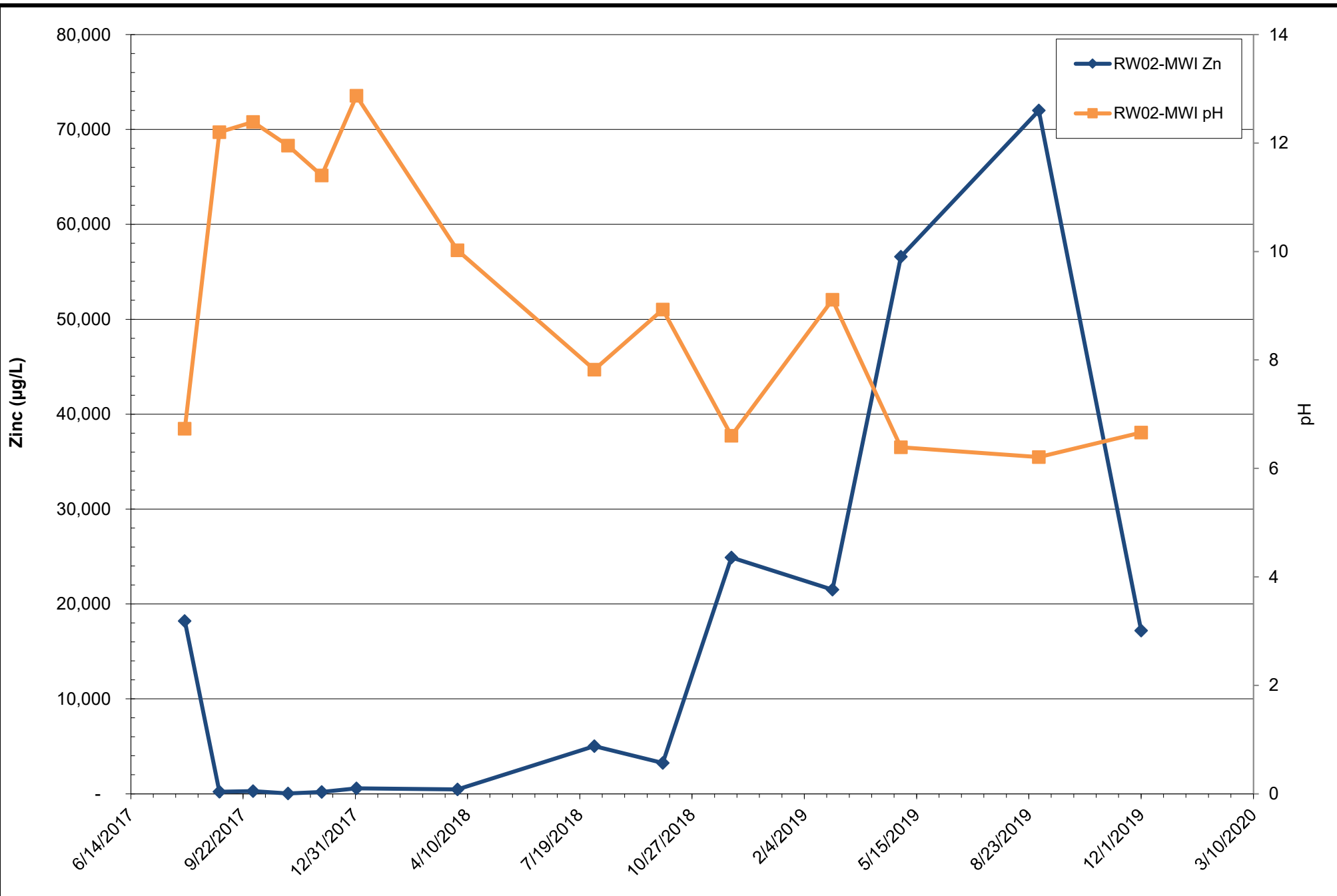
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW01-MWI pH and Zinc Concentrations

February 12, 2020

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C**



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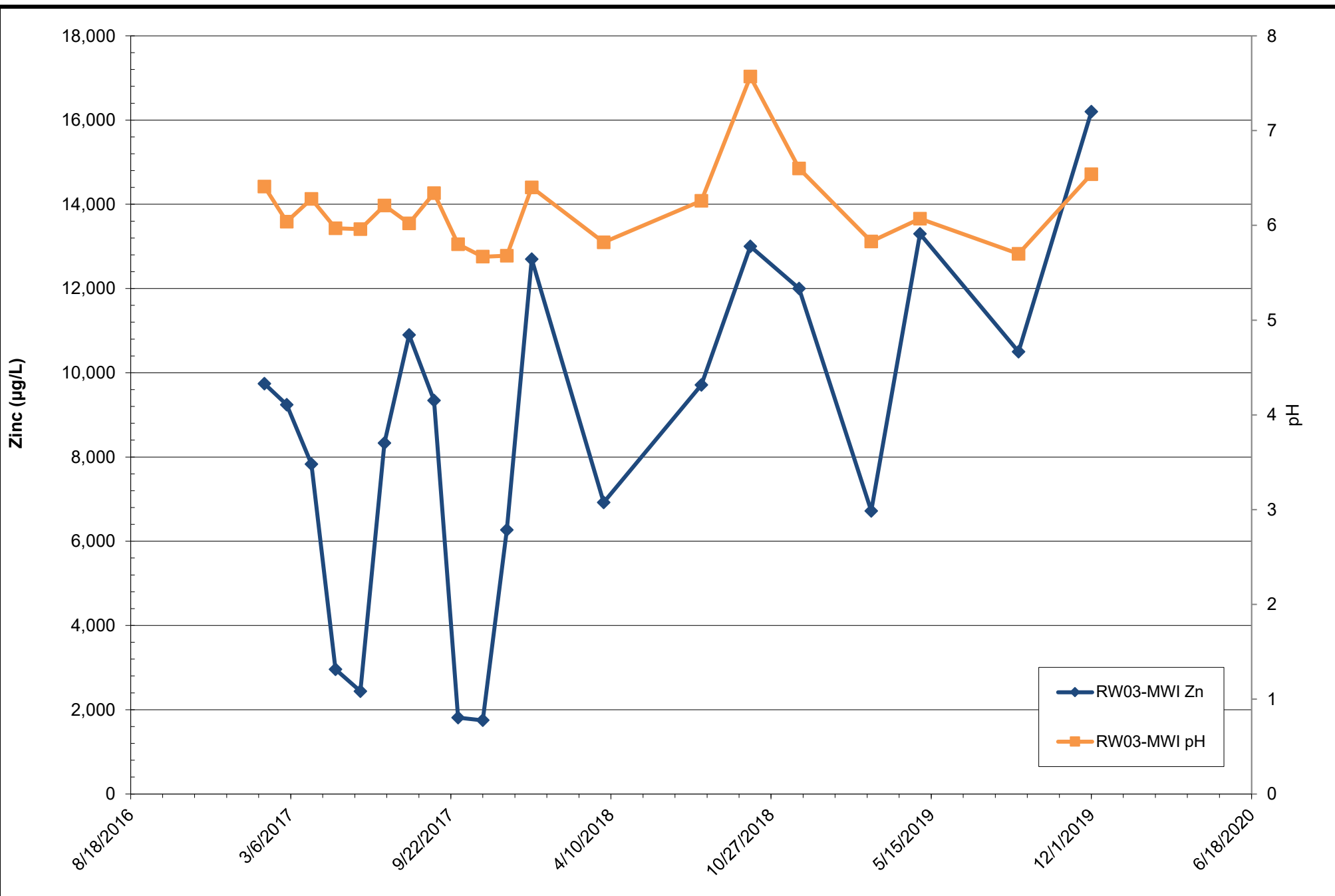
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**RW02-MWI pH and Zinc
Concentrations**

February 12, 2020

**Appx
C**



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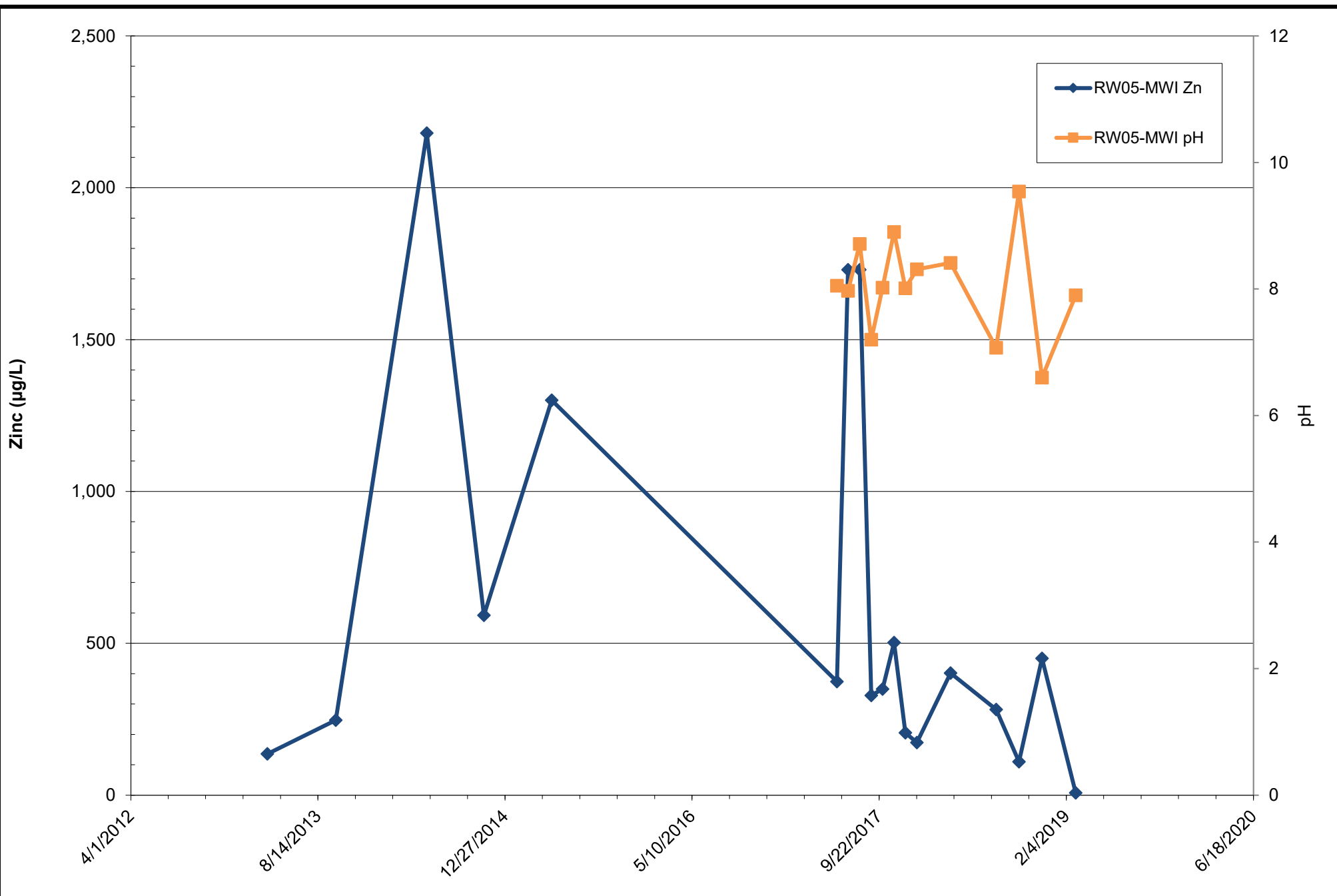
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW03-MWI pH and Zinc Concentrations

February 12, 2020

**Appx
C**



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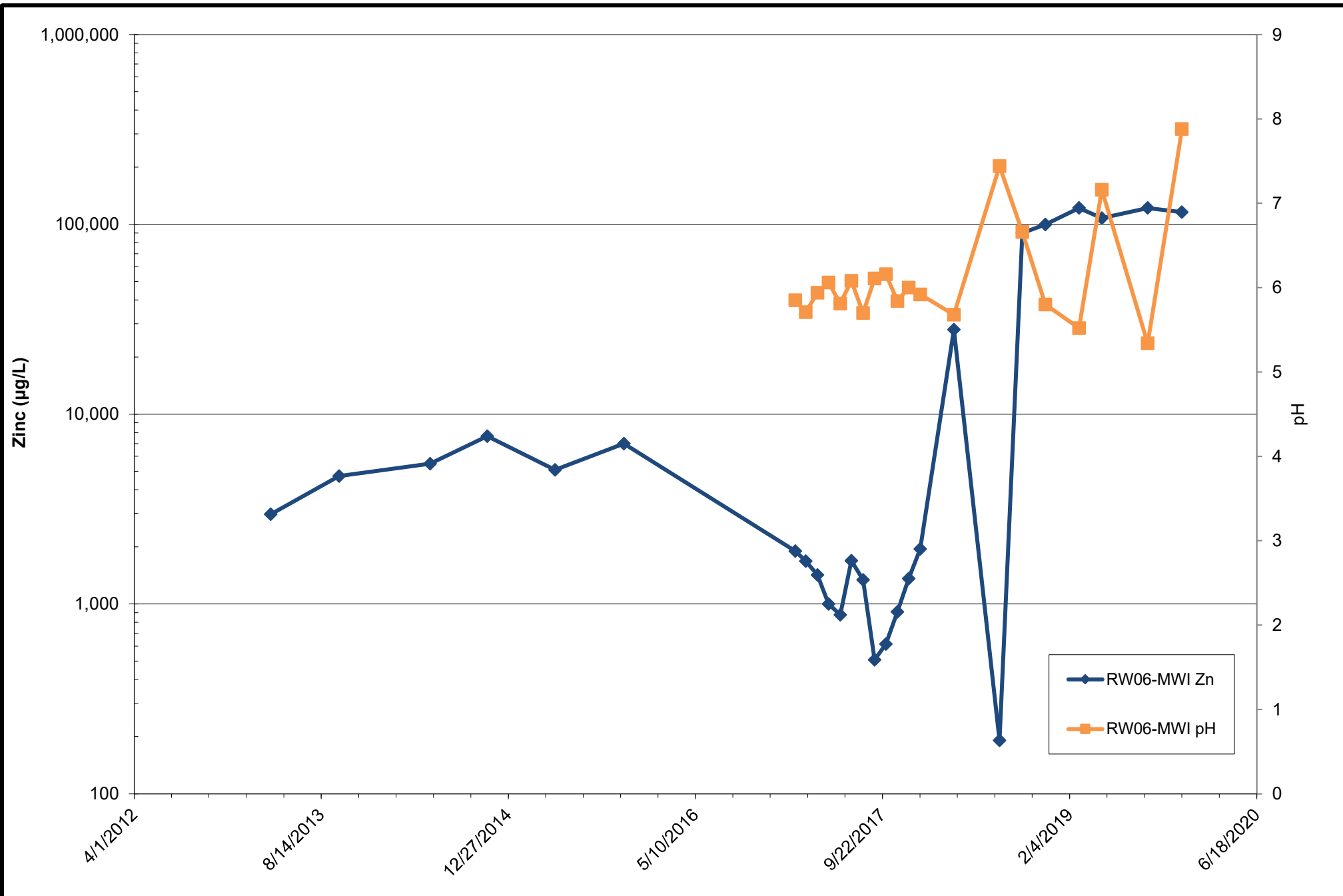
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**RW05-MWI pH and Zinc
Concentrations**

February 12, 2020

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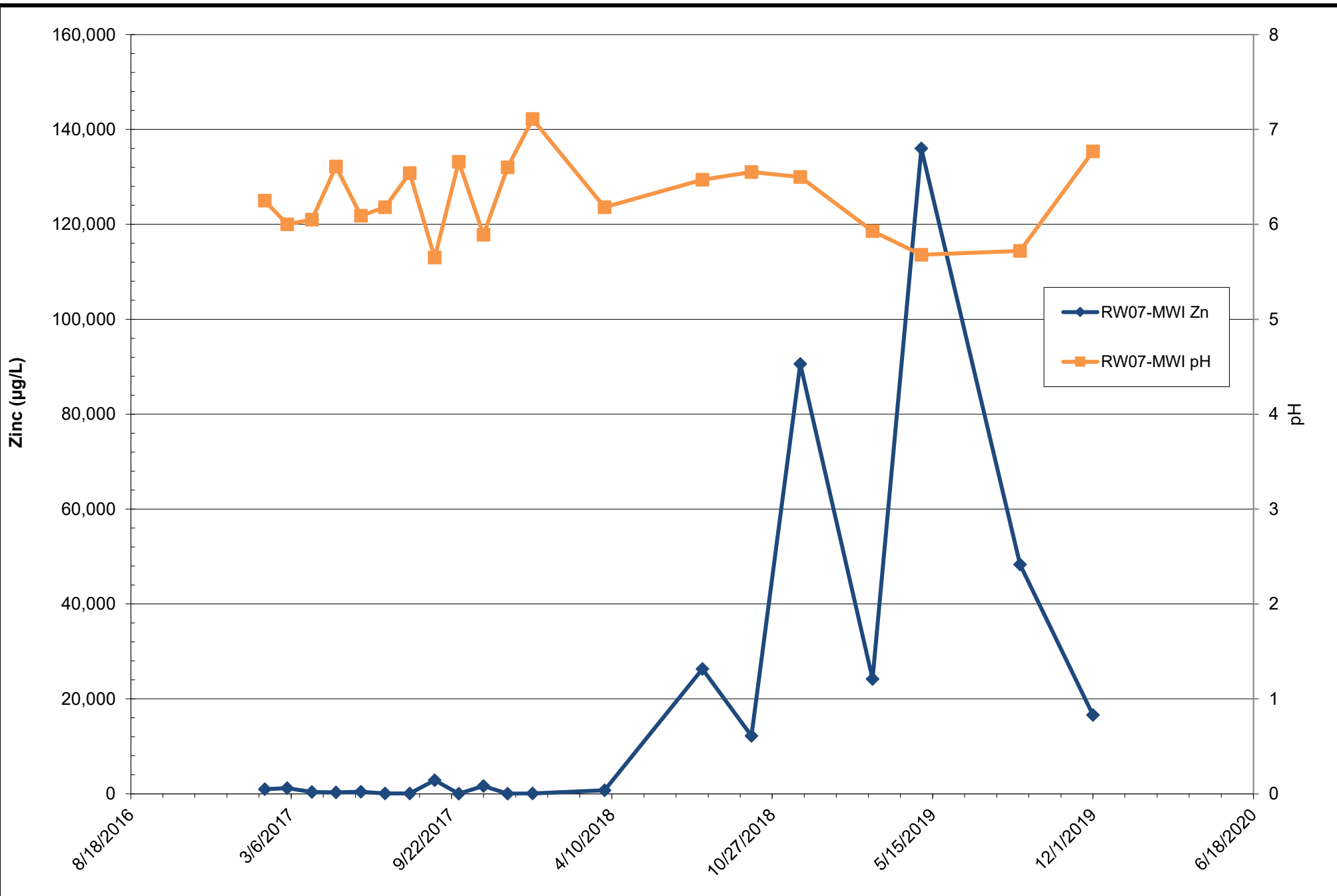
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**RW06-MWI pH and Zinc
Concentrations**

February 12, 2020

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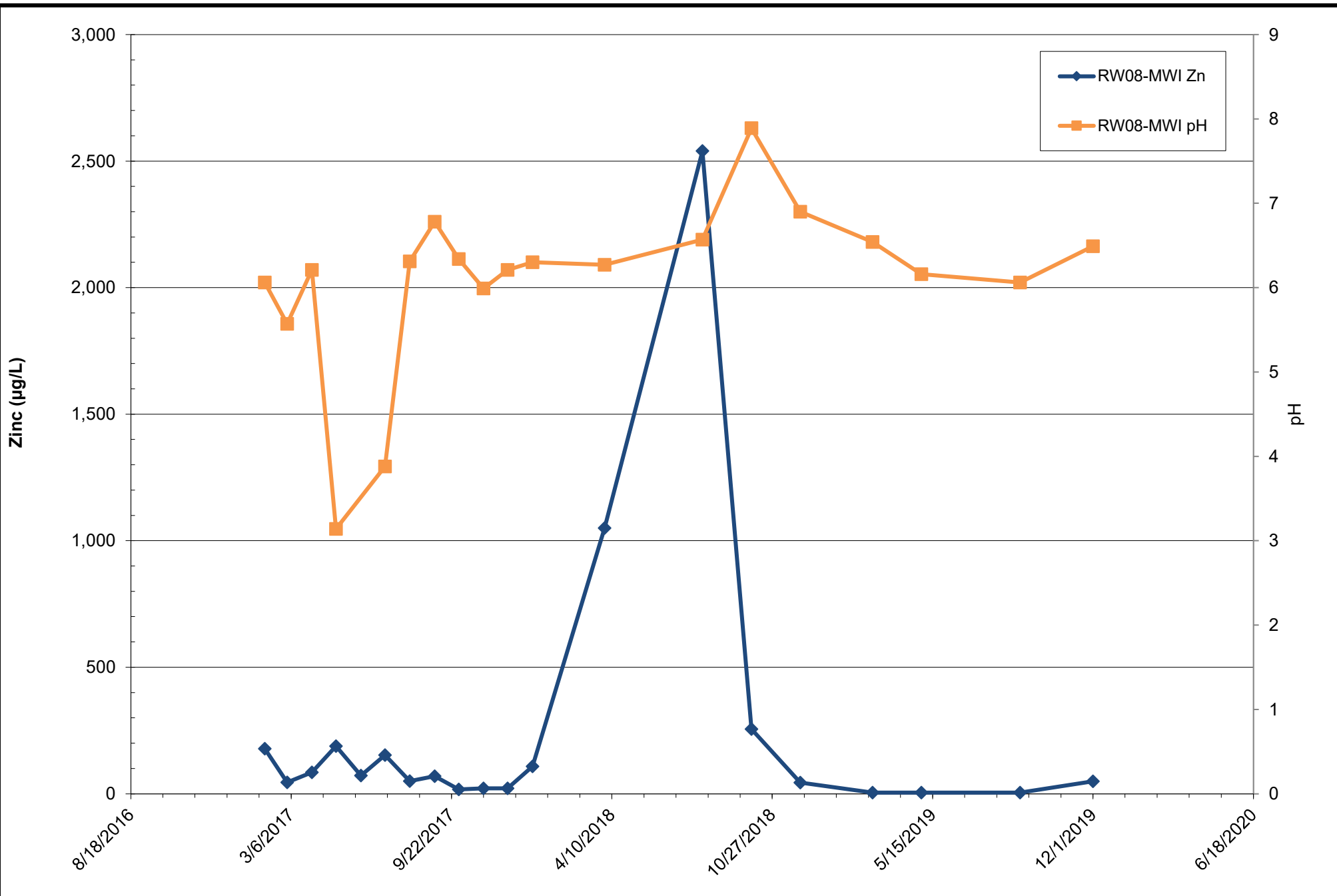
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW07-MWI pH and Zinc Concentrations

February 12, 2020

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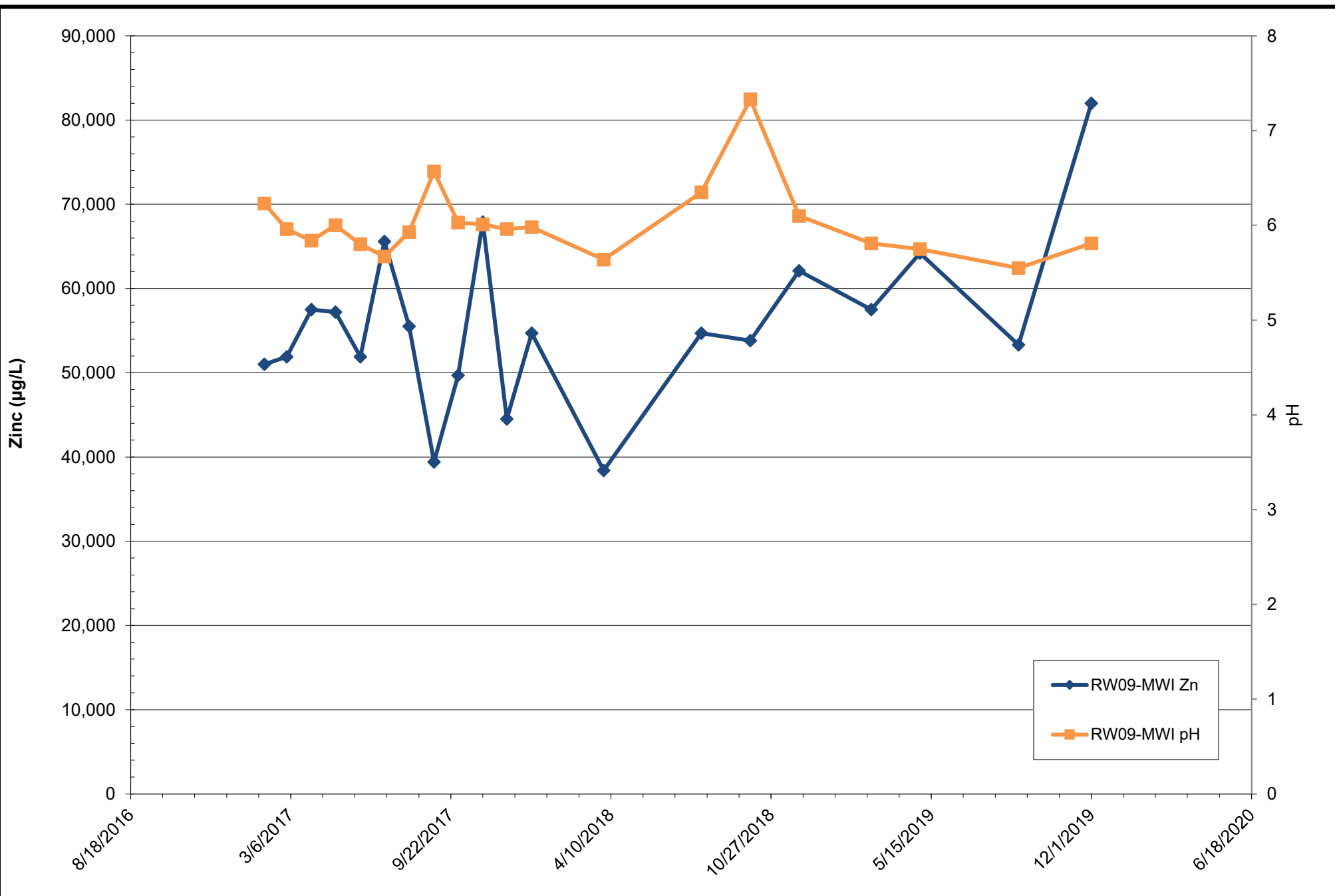
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW08-MWI pH and Zinc Concentrations

February 12, 2020

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Engineers and Scientists

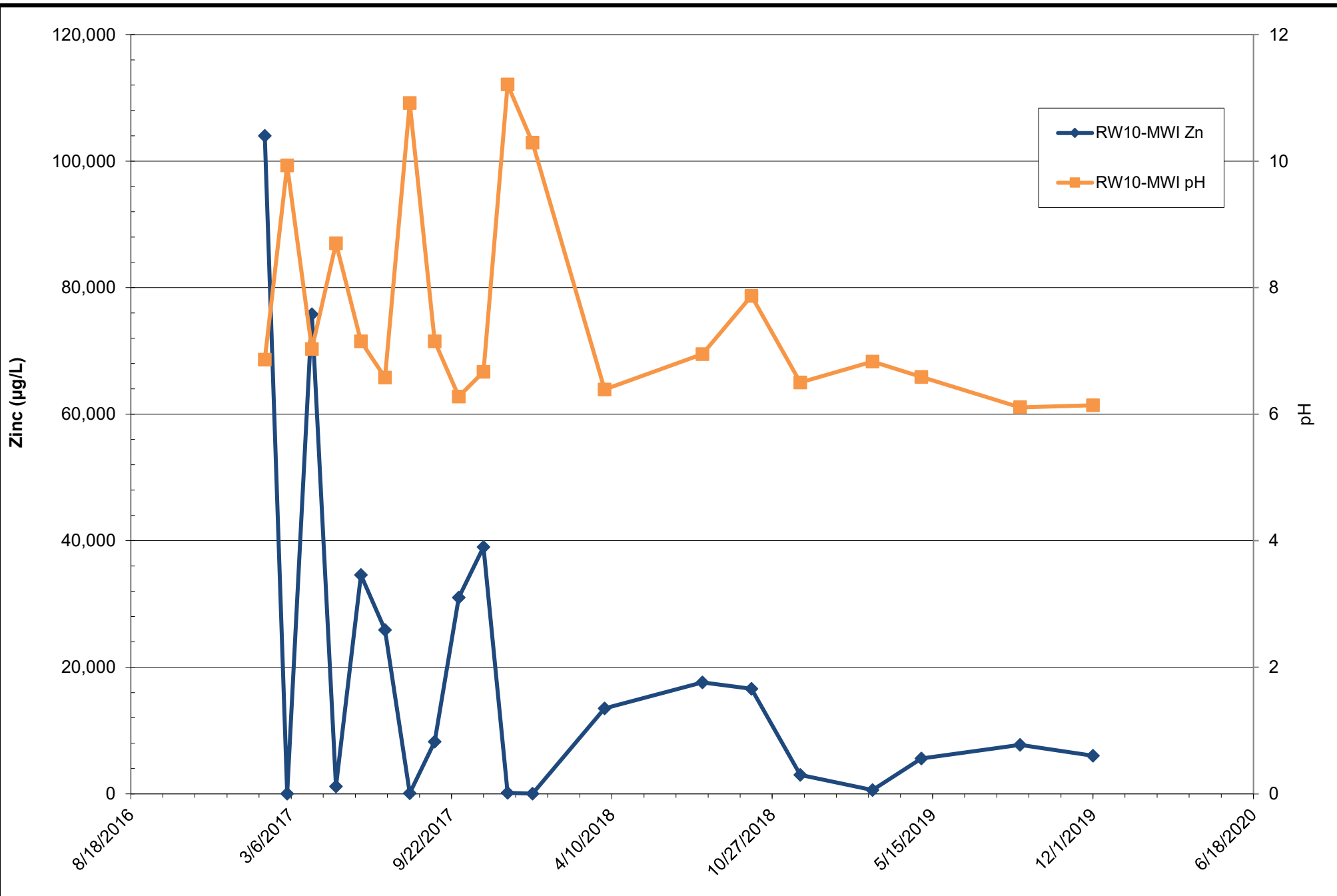
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**RW09-MWI pH and Zinc
Concentrations**

February 12, 2020

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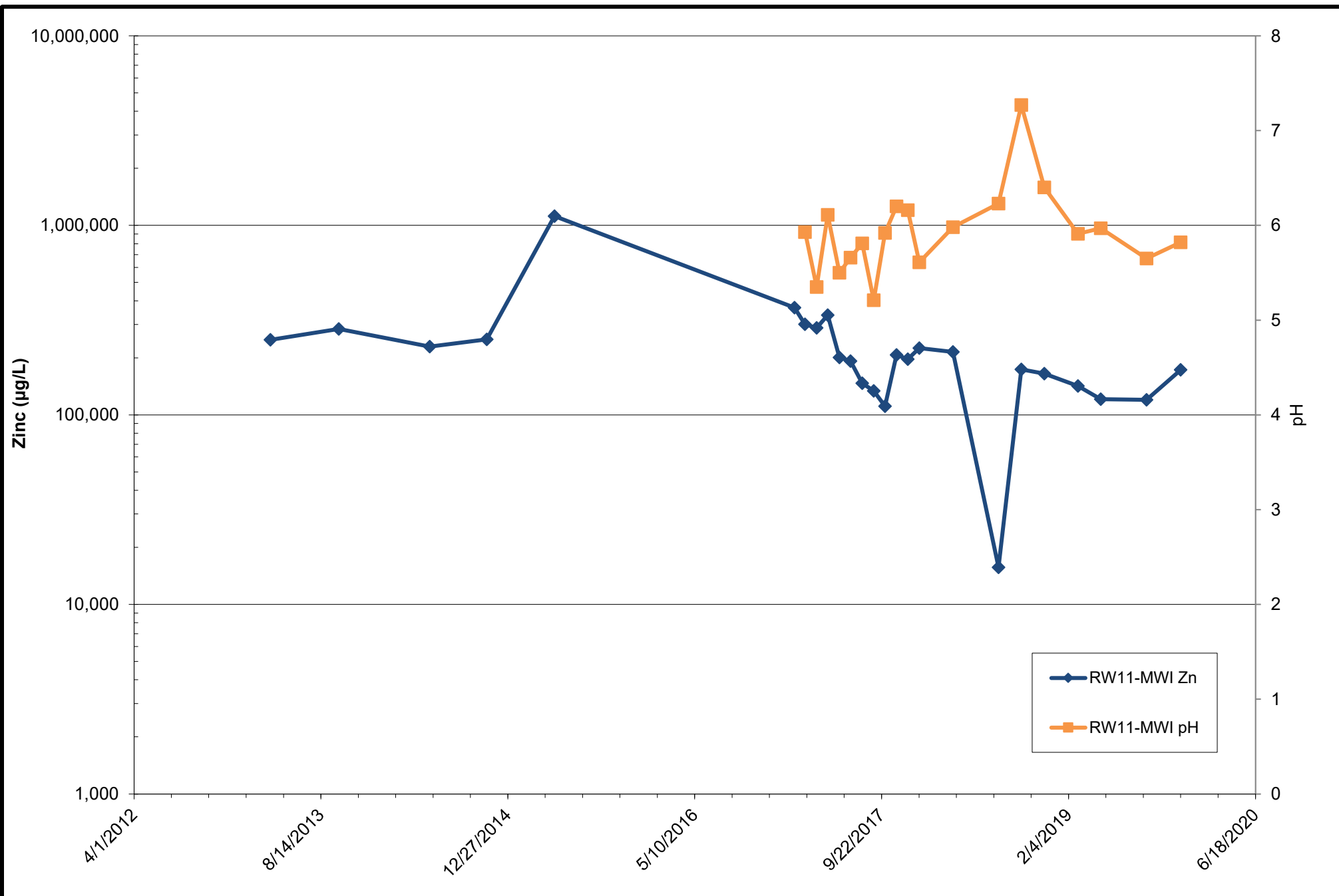
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW10-MWI pH and Zinc Concentrations

February 12, 2020

**Appx
C**



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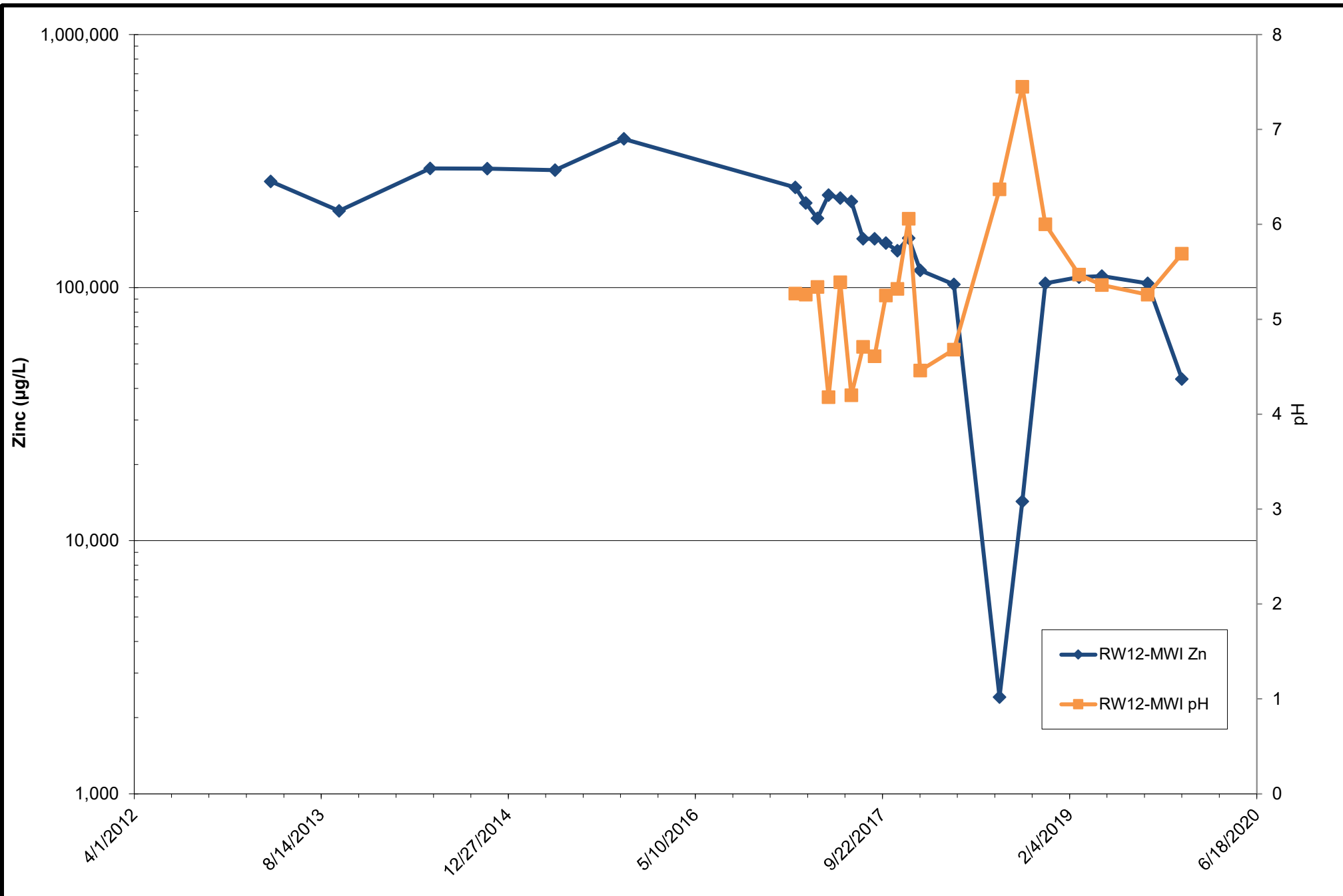
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW11-MWI pH and Zinc Concentrations

February 12, 2020

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Engineers and Scientists

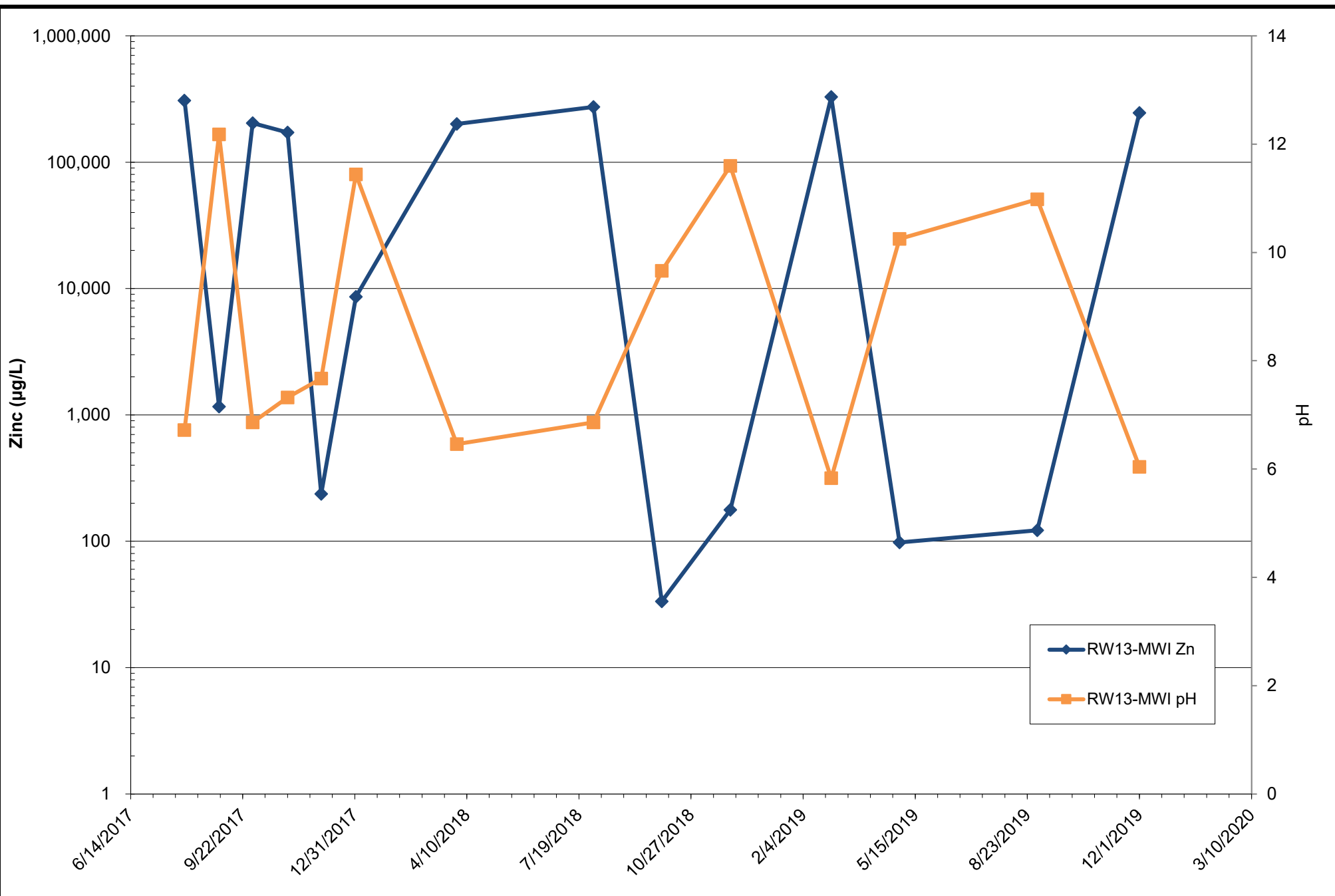
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW12-MWI pH and Zinc Concentrations

February 12, 2020

**Appx
C**



ARM Group LLC
Engineers and Scientists

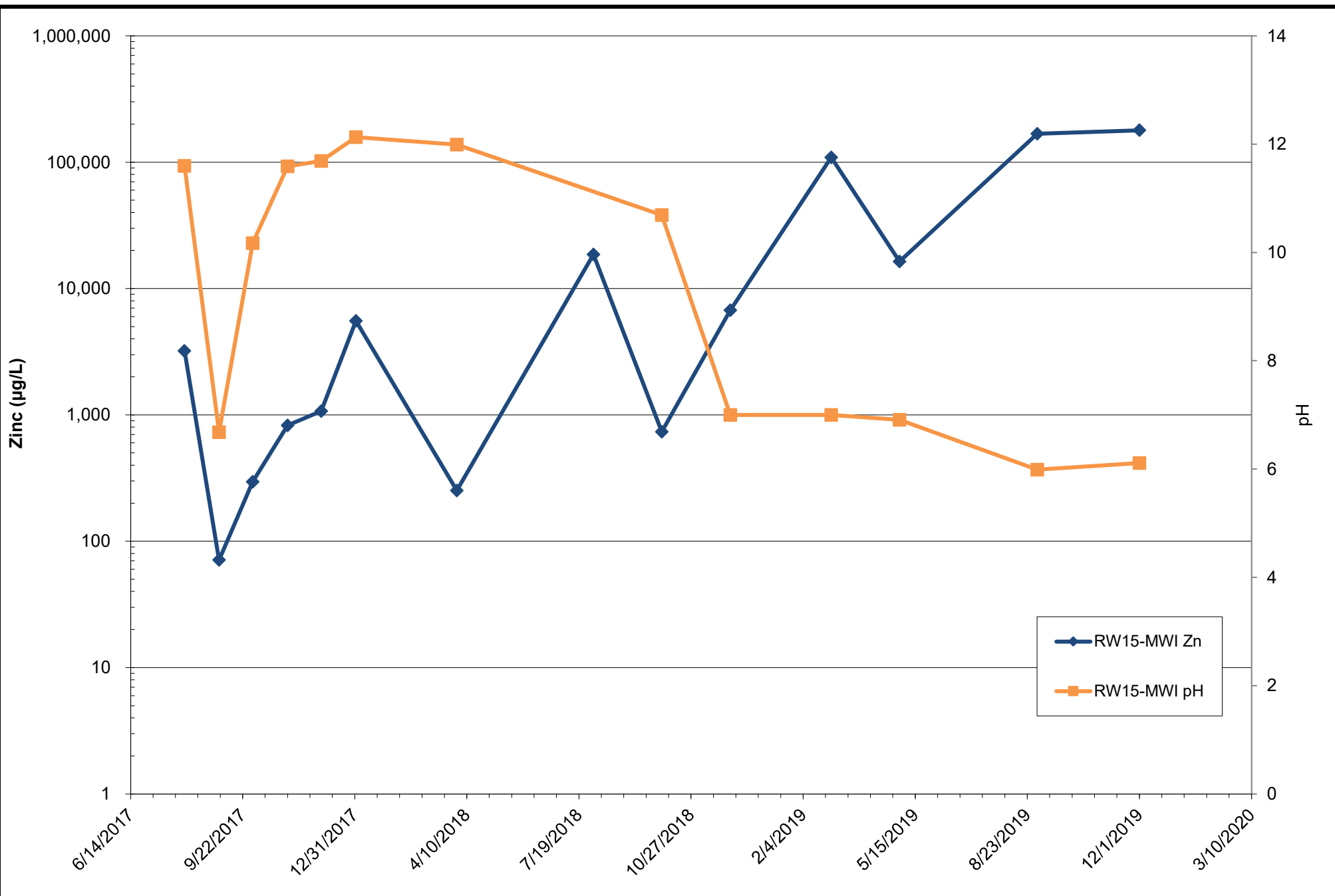
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW13-MWI pH and Zinc Concentrations

February 12, 2020

**Appx
C**



ARM Group LLC
Engineers and Scientists

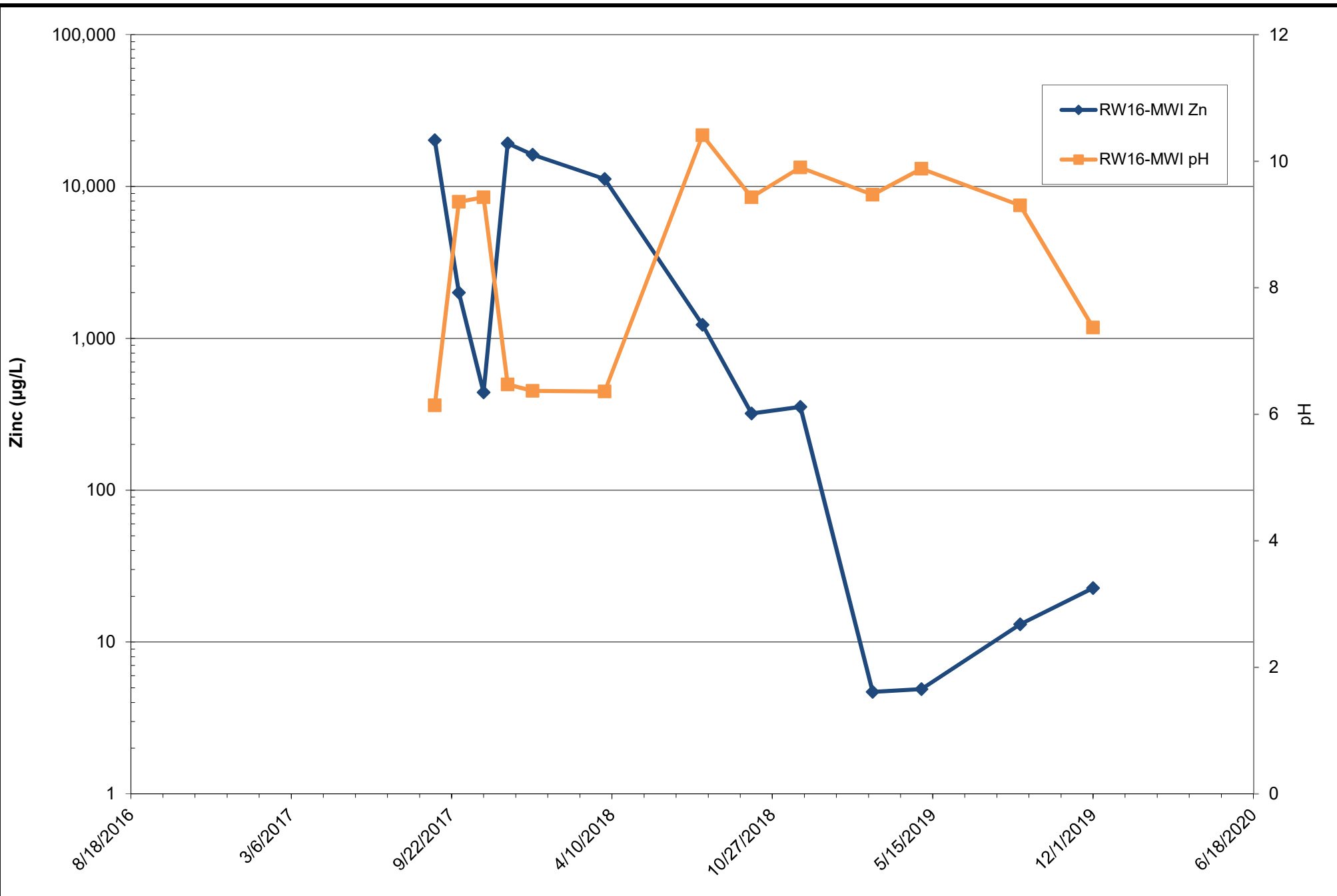
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW15-MWI pH and Zinc Concentrations

February 12, 2020

**Appx
C**



ARM Group LLC
Engineers and Scientists

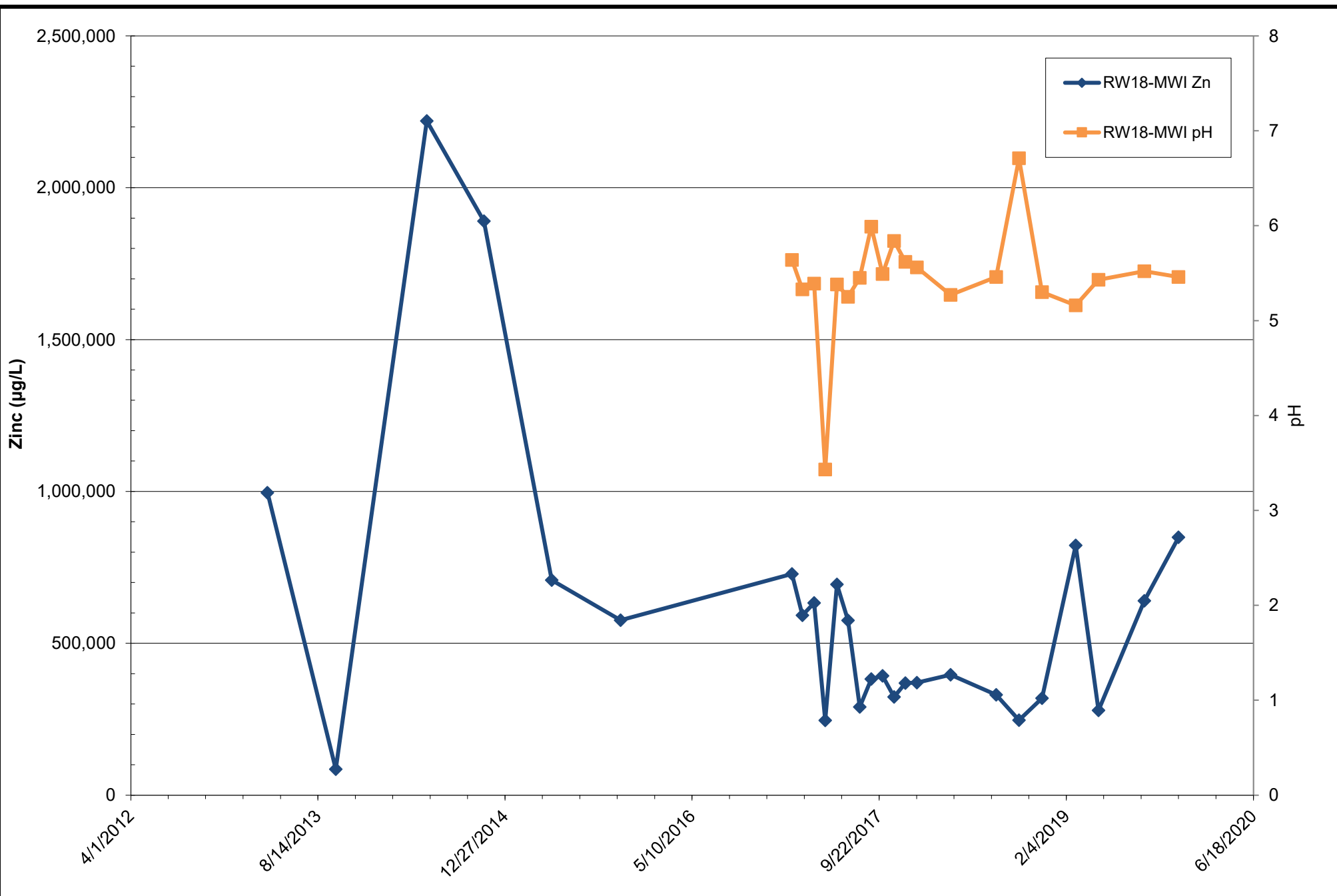
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

RW16-MWI pH and Zinc Concentrations

February 12, 2020

**Appx
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ARM Group LLC
Engineers and Scientists

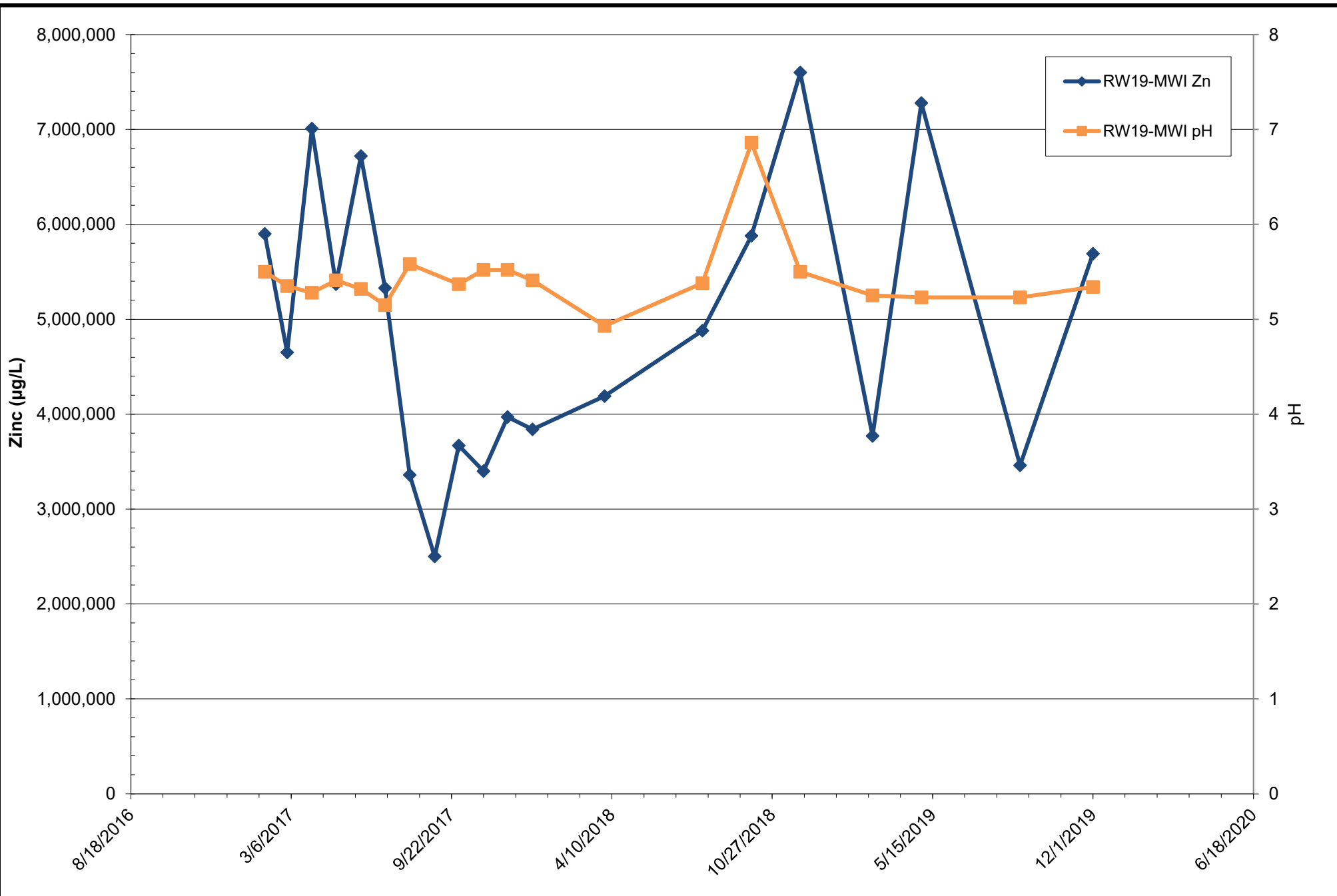
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**RW18-MWI pH and Zinc
Concentrations**

February 12, 2020

**Appx
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ARM Group LLC
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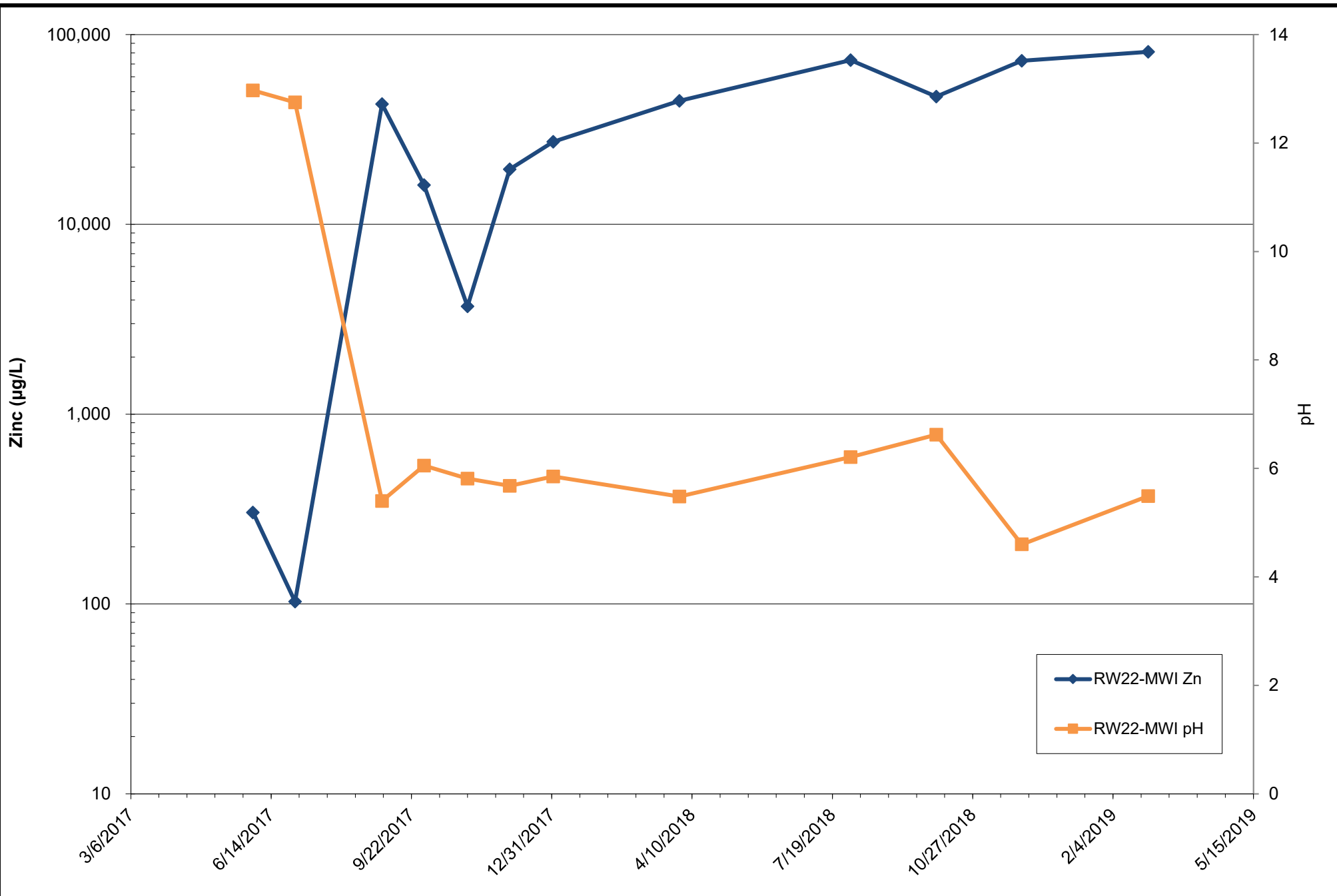
Rod and Wire Mill
Tradeport Atlantic

Sparrows Point, Maryland

**RW19-MWI pH and Zinc
Concentrations**

February 12, 2020

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Tradeport Atlantic

Sparrows Point, Maryland

RW22-MWI pH and Zinc Concentrations

February 12, 2020

**Appx
C**

APPENDIX D

Statistical Trend Test Results

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW01-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
0.51	194	-193.49	0	1
145	194	-49	0	2
3 U	194	-191	0	3
37.5	194	-156.5	0	4
2.4	194	-191.6	0	5
16.5	194	-177.5	0	6
250	194	56	1	6
3 U	194	-191	1	7
9.3	194	-184.7	1	8
3 U	194	-191	1	9
19.4	194	-174.6	1	10
20.6	194	-173.4	1	11
8.8	194	-185.2	1	12
145	0.51	144.49	2	12
3 U	0.51	2.49	3	12
37.5	0.51	36.99	4	12
2.4	0.51	1.89	5	12
16.5	0.51	15.99	6	12
250	0.51	249.49	7	12
3 U	0.51	2.49	8	12
9.3	0.51	8.79	9	12
3 U	0.51	2.49	10	12
19.4	0.51	18.89	11	12
20.6	0.51	20.09	12	12
8.8	0.51	8.29	13	12
3 U	145	-142	13	13
37.5	145	-107.5	13	14
2.4	145	-142.6	13	15
16.5	145	-128.5	13	16
250	145	105	14	16
3 U	145	-142	14	17
9.3	145	-135.7	14	18
3 U	145	-142	14	19
19.4	145	-125.6	14	20
20.6	145	-124.4	14	21
8.8	145	-136.2	14	22
37.5	3 U	34.5	15	22
2.4	3 U	-0.6	15	23
16.5	3 U	13.5	16	23
250	3 U	247	17	23
3 U	3 U	0	17	23
9.3	3 U	6.3	18	23
3 U	3 U	0	18	23
19.4	3 U	16.4	19	23

20.6	3 U	17.6	20	23
8.8	3 U	5.8	21	23
2.4	37.5	-35.1	21	24
16.5	37.5	-21	21	25
250	37.5	212.5	22	25
3 U	37.5	-34.5	22	26
9.3	37.5	-28.2	22	27
3 U	37.5	-34.5	22	28
19.4	37.5	-18.1	22	29
20.6	37.5	-16.9	22	30
8.8	37.5	-28.7	22	31
16.5	2.4	14.1	23	31
250	2.4	247.6	24	31
3 U	2.4	0.6	25	31
9.3	2.4	6.9	26	31
3 U	2.4	0.6	27	31
19.4	2.4	17	28	31
20.6	2.4	18.2	29	31
8.8	2.4	6.4	30	31
250	16.5	233.5	31	31
3 U	16.5	-13.5	31	32
9.3	16.5	-7.2	31	33
3 U	16.5	-13.5	31	34
19.4	16.5	2.9	32	34
20.6	16.5	4.1	33	34
8.8	16.5	-7.7	33	35
3 U	250	-247	33	36
9.3	250	-240.7	33	37
3 U	250	-247	33	38
19.4	250	-230.6	33	39
20.6	250	-229.4	33	40
8.8	250	-241.2	33	41
9.3	3 U	6.3	34	41
3 U	3 U	0	34	41
19.4	3 U	16.4	35	41
20.6	3 U	17.6	36	41
8.8	3 U	5.8	37	41
3 U	9.3	-6.3	37	42
19.4	9.3	10.1	38	42
20.6	9.3	11.3	39	42
8.8	9.3	-0.5	39	43
19.4	3 U	16.4	40	43
20.6	3 U	17.6	41	43
8.8	3 U	5.8	42	43
20.6	19.4	1.2	43	43
8.8	19.4	-10.6	43	44
8.8	20.6	-11.8	43	45

S Statistic = 43 - 45 = -2

Tied Group	Value	Members
1	3	3

Time Period	Observations
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 66

B = 0

C = 6

D = 0

E = 6

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 330

Z-Score = -0.0550482

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-0.0550482 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW02-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3	511	-508	0	1
2.4	511	-508.6	0	2
3 U	511	-508	0	3
2.3	511	-508.7	0	4
14.5	511	-496.5	0	5
3	511	-508	0	6
79.9	511	-431.1	0	7
18	511	-493	0	8
191	511	-320	0	9
98.3	511	-412.7	0	10
785	511	274	1	10
873	511	362	2	10
277	511	-234	2	11
2.4	3	-0.6	2	12
3 U	3	0	2	12
2.3	3	-0.7	2	13
14.5	3	11.5	3	13
3	3	0	3	13
79.9	3	76.9	4	13
18	3	15	5	13
191	3	188	6	13
98.3	3	95.3	7	13
785	3	782	8	13
873	3	870	9	13
277	3	274	10	13
3 U	2.4	0.6	11	13
2.3	2.4	-0.1	11	14
14.5	2.4	12.1	12	14
3	2.4	0.6	13	14
79.9	2.4	77.5	14	14
18	2.4	15.6	15	14
191	2.4	188.6	16	14
98.3	2.4	95.9	17	14
785	2.4	782.6	18	14
873	2.4	870.6	19	14
277	2.4	274.6	20	14
2.3	3 U	-0.7	20	15
14.5	3 U	11.5	21	15
3	3 U	0	21	15
79.9	3 U	76.9	22	15
18	3 U	15	23	15
191	3 U	188	24	15
98.3	3 U	95.3	25	15
785	3 U	782	26	15

873	3 U	870	27	15
277	3 U	274	28	15
14.5	2.3	12.2	29	15
3	2.3	0.7	30	15
79.9	2.3	77.6	31	15
18	2.3	15.7	32	15
191	2.3	188.7	33	15
98.3	2.3	96	34	15
785	2.3	782.7	35	15
873	2.3	870.7	36	15
277	2.3	274.7	37	15
3	14.5	-11.5	37	16
79.9	14.5	65.4	38	16
18	14.5	3.5	39	16
191	14.5	176.5	40	16
98.3	14.5	83.8	41	16
785	14.5	770.5	42	16
873	14.5	858.5	43	16
277	14.5	262.5	44	16
79.9	3	76.9	45	16
18	3	15	46	16
191	3	188	47	16
98.3	3	95.3	48	16
785	3	782	49	16
873	3	870	50	16
277	3	274	51	16
18	79.9	-61.9	51	17
191	79.9	111.1	52	17
98.3	79.9	18.4	53	17
785	79.9	705.1	54	17
873	79.9	793.1	55	17
277	79.9	197.1	56	17
191	18	173	57	17
98.3	18	80.3	58	17
785	18	767	59	17
873	18	855	60	17
277	18	259	61	17
98.3	191	-92.7	61	18
785	191	594	62	18
873	191	682	63	18
277	191	86	64	18
785	98.3	686.7	65	18
873	98.3	774.7	66	18
277	98.3	178.7	67	18
873	785	88	68	18
277	785	-508	68	19
277	873	-596	68	20

S Statistic = 68 - 20 = 48

Tied Group	Value	Members
1	3	3

Time Period	Observations
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 66

B = 0

C = 6

D = 0

E = 6

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 330

Z-Score = 2.58726

Comparison Level at 95% confidence level = -1.65463 (downward trend)

2.58726 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW03-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
196	189	7	1	0
192	189	3	2	0
84	189	-105	2	1
37.4	189	-151.6	2	2
138	189	-51	2	3
227	189	38	3	3
214	189	25	4	3
20.2	189	-168.8	4	4
25.2	189	-163.8	4	5
154	189	-35	4	6
259	189	70	5	6
128	189	-61	5	7
236	189	47	6	7
346	189	157	7	7
342	189	153	8	7
213	189	24	9	7
449	189	260	10	7
344	189	155	11	7
546	189	357	12	7
192	196	-4	12	8
84	196	-112	12	9
37.4	196	-158.6	12	10
138	196	-58	12	11
227	196	31	13	11
214	196	18	14	11
20.2	196	-175.8	14	12
25.2	196	-170.8	14	13
154	196	-42	14	14
259	196	63	15	14
128	196	-68	15	15
236	196	40	16	15
346	196	150	17	15
342	196	146	18	15
213	196	17	19	15
449	196	253	20	15
344	196	148	21	15
546	196	350	22	15
84	192	-108	22	16
37.4	192	-154.6	22	17
138	192	-54	22	18
227	192	35	23	18
214	192	22	24	18
20.2	192	-171.8	24	19
25.2	192	-166.8	24	20
154	192	-38	24	21

259	192	67	25	21
128	192	-64	25	22
236	192	44	26	22
346	192	154	27	22
342	192	150	28	22
213	192	21	29	22
449	192	257	30	22
344	192	152	31	22
546	192	354	32	22
37.4	84	-46.6	32	23
138	84	54	33	23
227	84	143	34	23
214	84	130	35	23
20.2	84	-63.8	35	24
25.2	84	-58.8	35	25
154	84	70	36	25
259	84	175	37	25
128	84	44	38	25
236	84	152	39	25
346	84	262	40	25
342	84	258	41	25
213	84	129	42	25
449	84	365	43	25
344	84	260	44	25
546	84	462	45	25
138	37.4	100.6	46	25
227	37.4	189.6	47	25
214	37.4	176.6	48	25
20.2	37.4	-17.2	48	26
25.2	37.4	-12.2	48	27
154	37.4	116.6	49	27
259	37.4	221.6	50	27
128	37.4	90.6	51	27
236	37.4	198.6	52	27
346	37.4	308.6	53	27
342	37.4	304.6	54	27
213	37.4	175.6	55	27
449	37.4	411.6	56	27
344	37.4	306.6	57	27
546	37.4	508.6	58	27
227	138	89	59	27
214	138	76	60	27
20.2	138	-117.8	60	28
25.2	138	-112.8	60	29
154	138	16	61	29
259	138	121	62	29
128	138	-10	62	30
236	138	98	63	30
346	138	208	64	30
342	138	204	65	30
213	138	75	66	30
449	138	311	67	30
344	138	206	68	30
546	138	408	69	30

214	227	-13	69	31
20.2	227	-206.8	69	32
25.2	227	-201.8	69	33
154	227	-73	69	34
259	227	32	70	34
128	227	-99	70	35
236	227	9	71	35
346	227	119	72	35
342	227	115	73	35
213	227	-14	73	36
449	227	222	74	36
344	227	117	75	36
546	227	319	76	36
20.2	214	-193.8	76	37
25.2	214	-188.8	76	38
154	214	-60	76	39
259	214	45	77	39
128	214	-86	77	40
236	214	22	78	40
346	214	132	79	40
342	214	128	80	40
213	214	-1	80	41
449	214	235	81	41
344	214	130	82	41
546	214	332	83	41
25.2	20.2	5	84	41
154	20.2	133.8	85	41
259	20.2	238.8	86	41
128	20.2	107.8	87	41
236	20.2	215.8	88	41
346	20.2	325.8	89	41
342	20.2	321.8	90	41
213	20.2	192.8	91	41
449	20.2	428.8	92	41
344	20.2	323.8	93	41
546	20.2	525.8	94	41
154	25.2	128.8	95	41
259	25.2	233.8	96	41
128	25.2	102.8	97	41
236	25.2	210.8	98	41
346	25.2	320.8	99	41
342	25.2	316.8	100	41
213	25.2	187.8	101	41
449	25.2	423.8	102	41
344	25.2	318.8	103	41
546	25.2	520.8	104	41
259	154	105	105	41
128	154	-26	105	42
236	154	82	106	42
346	154	192	107	42
342	154	188	108	42
213	154	59	109	42

449	154	295	110	42
344	154	190	111	42
546	154	392	112	42
128	259	-131	112	43
236	259	-23	112	44
346	259	87	113	44
342	259	83	114	44
213	259	-46	114	45
449	259	190	115	45
344	259	85	116	45
546	259	287	117	45
236	128	108	118	45
346	128	218	119	45
342	128	214	120	45
213	128	85	121	45
449	128	321	122	45
344	128	216	123	45
546	128	418	124	45
346	236	110	125	45
342	236	106	126	45
213	236	-23	126	46
449	236	213	127	46
344	236	108	128	46
546	236	310	129	46
342	346	-4	129	47
213	346	-133	129	48
449	346	103	130	48
344	346	-2	130	49
546	346	200	131	49
213	342	-129	131	50
449	342	107	132	50
344	342	2	133	50
546	342	204	134	50
449	213	236	135	50
344	213	131	136	50
546	213	333	137	50
344	449	-105	137	51
546	449	97	138	51
546	344	202	139	51

S Statistic = 139 - 51 = 88

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 2.82265

Comparison Level at 95% confidence level = -1.65463 (downward trend)

2.82265 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW06-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
9.2	12.5	-3.3	0	1
14	12.5	1.5	1	1
20.4	12.5	7.9	2	1
14.3	12.5	1.8	3	1
10.2	12.5	-2.3	3	2
10.1	12.5	-2.4	3	3
4.5	12.5	-8	3	4
4.2	12.5	-8.3	3	5
5.4	12.5	-7.1	3	6
7.1	12.5	-5.4	3	7
8.4	12.5	-4.1	3	8
89.2	12.5	76.7	4	8
3 U	12.5	-9.5	4	9
629	12.5	616.5	5	9
752	12.5	739.5	6	9
876	12.5	863.5	7	9
885	12.5	872.5	8	9
793	12.5	780.5	9	9
673	12.5	660.5	10	9
14	9.2	4.8	11	9
20.4	9.2	11.2	12	9
14.3	9.2	5.1	13	9
10.2	9.2	1	14	9
10.1	9.2	0.9	15	9
4.5	9.2	-4.7	15	10
4.2	9.2	-5	15	11
5.4	9.2	-3.8	15	12
7.1	9.2	-2.1	15	13
8.4	9.2	-0.8	15	14
89.2	9.2	80	16	14
3 U	9.2	-6.2	16	15
629	9.2	619.8	17	15
752	9.2	742.8	18	15
876	9.2	866.8	19	15
885	9.2	875.8	20	15
793	9.2	783.8	21	15
673	9.2	663.8	22	15
20.4	14	6.4	23	15
14.3	14	0.3	24	15
10.2	14	-3.8	24	16
10.1	14	-3.9	24	17
4.5	14	-9.5	24	18
4.2	14	-9.8	24	19
5.4	14	-8.6	24	20
7.1	14	-6.9	24	21

8.4	14	-5.6	24	22
89.2	14	75.2	25	22
3 U	14	-11	25	23
629	14	615	26	23
752	14	738	27	23
876	14	862	28	23
885	14	871	29	23
793	14	779	30	23
673	14	659	31	23
14.3	20.4	-6.1	31	24
10.2	20.4	-10.2	31	25
10.1	20.4	-10.3	31	26
4.5	20.4	-15.9	31	27
4.2	20.4	-16.2	31	28
5.4	20.4	-15	31	29
7.1	20.4	-13.3	31	30
8.4	20.4	-12	31	31
89.2	20.4	68.8	32	31
3 U	20.4	-17.4	32	32
629	20.4	608.6	33	32
752	20.4	731.6	34	32
876	20.4	855.6	35	32
885	20.4	864.6	36	32
793	20.4	772.6	37	32
673	20.4	652.6	38	32
10.2	14.3	-4.1	38	33
10.1	14.3	-4.2	38	34
4.5	14.3	-9.8	38	35
4.2	14.3	-10.1	38	36
5.4	14.3	-8.9	38	37
7.1	14.3	-7.2	38	38
8.4	14.3	-5.9	38	39
89.2	14.3	74.9	39	39
3 U	14.3	-11.3	39	40
629	14.3	614.7	40	40
752	14.3	737.7	41	40
876	14.3	861.7	42	40
885	14.3	870.7	43	40
793	14.3	778.7	44	40
673	14.3	658.7	45	40
10.1	10.2	-0.1	45	41
4.5	10.2	-5.7	45	42
4.2	10.2	-6	45	43
5.4	10.2	-4.8	45	44
7.1	10.2	-3.1	45	45
8.4	10.2	-1.8	45	46
89.2	10.2	79	46	46
3 U	10.2	-7.2	46	47
629	10.2	618.8	47	47
752	10.2	741.8	48	47
876	10.2	865.8	49	47
885	10.2	874.8	50	47
793	10.2	782.8	51	47
673	10.2	662.8	52	47

4.5	10.1	-5.6	52	48
4.2	10.1	-5.9	52	49
5.4	10.1	-4.7	52	50
7.1	10.1	-3	52	51
8.4	10.1	-1.7	52	52
89.2	10.1	79.1	53	52
3 U	10.1	-7.1	53	53
629	10.1	618.9	54	53
752	10.1	741.9	55	53
876	10.1	865.9	56	53
885	10.1	874.9	57	53
793	10.1	782.9	58	53
673	10.1	662.9	59	53
4.2	4.5	-0.3	59	54
5.4	4.5	0.9	60	54
7.1	4.5	2.6	61	54
8.4	4.5	3.9	62	54
89.2	4.5	84.7	63	54
3 U	4.5	-1.5	63	55
629	4.5	624.5	64	55
752	4.5	747.5	65	55
876	4.5	871.5	66	55
885	4.5	880.5	67	55
793	4.5	788.5	68	55
673	4.5	668.5	69	55
5.4	4.2	1.2	70	55
7.1	4.2	2.9	71	55
8.4	4.2	4.2	72	55
89.2	4.2	85	73	55
3 U	4.2	-1.2	73	56
629	4.2	624.8	74	56
752	4.2	747.8	75	56
876	4.2	871.8	76	56
885	4.2	880.8	77	56
793	4.2	788.8	78	56
673	4.2	668.8	79	56
7.1	5.4	1.7	80	56
8.4	5.4	3	81	56
89.2	5.4	83.8	82	56
3 U	5.4	-2.4	82	57
629	5.4	623.6	83	57
752	5.4	746.6	84	57
876	5.4	870.6	85	57
885	5.4	879.6	86	57
793	5.4	787.6	87	57
673	5.4	667.6	88	57
8.4	7.1	1.3	89	57
89.2	7.1	82.1	90	57
3 U	7.1	-4.1	90	58
629	7.1	621.9	91	58
752	7.1	744.9	92	58
876	7.1	868.9	93	58

885	7.1	877.9	94	58
793	7.1	785.9	95	58
673	7.1	665.9	96	58
89.2	8.4	80.8	97	58
3 U	8.4	-5.4	97	59
629	8.4	620.6	98	59
752	8.4	743.6	99	59
876	8.4	867.6	100	59
885	8.4	876.6	101	59
793	8.4	784.6	102	59
673	8.4	664.6	103	59
3 U	89.2	-86.2	103	60
629	89.2	539.8	104	60
752	89.2	662.8	105	60
876	89.2	786.8	106	60
885	89.2	795.8	107	60
793	89.2	703.8	108	60
673	89.2	583.8	109	60
629	3 U	626	110	60
752	3 U	749	111	60
876	3 U	873	112	60
885	3 U	882	113	60
793	3 U	790	114	60
673	3 U	670	115	60
752	629	123	116	60
876	629	247	117	60
885	629	256	118	60
793	629	164	119	60
673	629	44	120	60
876	752	124	121	60
885	752	133	122	60
793	752	41	123	60
673	752	-79	123	61
885	876	9	124	61
793	876	-83	124	62
673	876	-203	124	63
793	885	-92	124	64
673	885	-212	124	65
673	793	-120	124	66

S Statistic = 124 - 66 = 58

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 1.84932

Comparison Level at 95% confidence level = -1.65463 (downward trend)

1.84932 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW07-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
4.6	1.2	3.4	1	0
3 U	1.2	1.8	2	0
1.1	1.2	-0.1	2	1
0.91	1.2	-0.29	2	2
1.2	1.2	0	2	2
1	1.2	-0.2	2	3
11	1.2	9.8	3	3
3 U	1.2	1.8	4	3
5.1	1.2	3.9	5	3
1.7	1.2	0.5	6	3
3 U	1.2	1.8	7	3
1.3	1.2	0.1	8	3
52.9	1.2	51.7	9	3
28.7	1.2	27.5	10	3
344	1.2	342.8	11	3
29.5	1.2	28.3	12	3
453	1.2	451.8	13	3
48.7	1.2	47.5	14	3
38.1	1.2	36.9	15	3
3 U	4.6	-1.6	15	4
1.1	4.6	-3.5	15	5
0.91	4.6	-3.69	15	6
1.2	4.6	-3.4	15	7
1	4.6	-3.6	15	8
11	4.6	6.4	16	8
3 U	4.6	-1.6	16	9
5.1	4.6	0.5	17	9
1.7	4.6	-2.9	17	10
3 U	4.6	-1.6	17	11
1.3	4.6	-3.3	17	12
52.9	4.6	48.3	18	12
28.7	4.6	24.1	19	12
344	4.6	339.4	20	12
29.5	4.6	24.9	21	12
453	4.6	448.4	22	12
48.7	4.6	44.1	23	12
38.1	4.6	33.5	24	12
1.1	3 U	-1.9	24	13
0.91	3 U	-2.09	24	14
1.2	3 U	-1.8	24	15
1	3 U	-2	24	16
11	3 U	8	25	16
3 U	3 U	0	25	16
5.1	3 U	2.1	26	16
1.7	3 U	-1.3	26	17

3 U	3 U	0	26	17
1.3	3 U	-1.7	26	18
52.9	3 U	49.9	27	18
28.7	3 U	25.7	28	18
344	3 U	341	29	18
29.5	3 U	26.5	30	18
453	3 U	450	31	18
48.7	3 U	45.7	32	18
38.1	3 U	35.1	33	18
0.91	1.1	-0.19	33	19
1.2	1.1	0.1	34	19
1	1.1	-0.1	34	20
11	1.1	9.9	35	20
3 U	1.1	1.9	36	20
5.1	1.1	4	37	20
1.7	1.1	0.6	38	20
3 U	1.1	1.9	39	20
1.3	1.1	0.2	40	20
52.9	1.1	51.8	41	20
28.7	1.1	27.6	42	20
344	1.1	342.9	43	20
29.5	1.1	28.4	44	20
453	1.1	451.9	45	20
48.7	1.1	47.6	46	20
38.1	1.1	37	47	20
1.2	0.91	0.29	48	20
1	0.91	0.09	49	20
11	0.91	10.09	50	20
3 U	0.91	2.09	51	20
5.1	0.91	4.19	52	20
1.7	0.91	0.79	53	20
3 U	0.91	2.09	54	20
1.3	0.91	0.39	55	20
52.9	0.91	51.99	56	20
28.7	0.91	27.79	57	20
344	0.91	343.09	58	20
29.5	0.91	28.59	59	20
453	0.91	452.09	60	20
48.7	0.91	47.79	61	20
38.1	0.91	37.19	62	20
1	1.2	-0.2	62	21
11	1.2	9.8	63	21
3 U	1.2	1.8	64	21
5.1	1.2	3.9	65	21
1.7	1.2	0.5	66	21
3 U	1.2	1.8	67	21
1.3	1.2	0.1	68	21
52.9	1.2	51.7	69	21
28.7	1.2	27.5	70	21
344	1.2	342.8	71	21
29.5	1.2	28.3	72	21
453	1.2	451.8	73	21
48.7	1.2	47.5	74	21
38.1	1.2	36.9	75	21

11	1	10	76	21
3 U	1	2	77	21
5.1	1	4.1	78	21
1.7	1	0.7	79	21
3 U	1	2	80	21
1.3	1	0.3	81	21
52.9	1	51.9	82	21
28.7	1	27.7	83	21
344	1	343	84	21
29.5	1	28.5	85	21
453	1	452	86	21
48.7	1	47.7	87	21
38.1	1	37.1	88	21
3 U	11	-8	88	22
5.1	11	-5.9	88	23
1.7	11	-9.3	88	24
3 U	11	-8	88	25
1.3	11	-9.7	88	26
52.9	11	41.9	89	26
28.7	11	17.7	90	26
344	11	333	91	26
29.5	11	18.5	92	26
453	11	442	93	26
48.7	11	37.7	94	26
38.1	11	27.1	95	26
5.1	3 U	2.1	96	26
1.7	3 U	-1.3	96	27
3 U	3 U	0	96	27
1.3	3 U	-1.7	96	28
52.9	3 U	49.9	97	28
28.7	3 U	25.7	98	28
344	3 U	341	99	28
29.5	3 U	26.5	100	28
453	3 U	450	101	28
48.7	3 U	45.7	102	28
38.1	3 U	35.1	103	28
1.7	5.1	-3.4	103	29
3 U	5.1	-2.1	103	30
1.3	5.1	-3.8	103	31
52.9	5.1	47.8	104	31
28.7	5.1	23.6	105	31
344	5.1	338.9	106	31
29.5	5.1	24.4	107	31
453	5.1	447.9	108	31
48.7	5.1	43.6	109	31
38.1	5.1	33	110	31
3 U	1.7	1.3	111	31
1.3	1.7	-0.4	111	32
52.9	1.7	51.2	112	32
28.7	1.7	27	113	32
344	1.7	342.3	114	32
29.5	1.7	27.8	115	32

453	1.7	451.3	116	32
48.7	1.7	47	117	32
38.1	1.7	36.4	118	32
1.3	3 U	-1.7	118	33
52.9	3 U	49.9	119	33
28.7	3 U	25.7	120	33
344	3 U	341	121	33
29.5	3 U	26.5	122	33
453	3 U	450	123	33
48.7	3 U	45.7	124	33
38.1	3 U	35.1	125	33
52.9	1.3	51.6	126	33
28.7	1.3	27.4	127	33
344	1.3	342.7	128	33
29.5	1.3	28.2	129	33
453	1.3	451.7	130	33
48.7	1.3	47.4	131	33
38.1	1.3	36.8	132	33
28.7	52.9	-24.2	132	34
344	52.9	291.1	133	34
29.5	52.9	-23.4	133	35
453	52.9	400.1	134	35
48.7	52.9	-4.2	134	36
38.1	52.9	-14.8	134	37
344	28.7	315.3	135	37
29.5	28.7	0.8	136	37
453	28.7	424.3	137	37
48.7	28.7	20	138	37
38.1	28.7	9.4	139	37
29.5	344	-314.5	139	38
453	344	109	140	38
48.7	344	-295.3	140	39
38.1	344	-305.9	140	40
453	29.5	423.5	141	40
48.7	29.5	19.2	142	40
38.1	29.5	8.6	143	40
48.7	453	-404.3	143	41
38.1	453	-414.9	143	42
38.1	48.7	-10.6	143	43

S Statistic = 143 - 43 = 100

Tied Group	Value	Members
1	1.2	2
2	3	3

Time Period	Observations
2/1/2017	1

3/1/2017	1
4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 84

B = 0

C = 6

D = 0

E = 8

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 945.333

Z-Score = 3.2199

Comparison Level at 95% confidence level = -1.65463 (downward trend)

3.2199 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW08-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
0.39	0.49	-0.1	0	1
3 U	0.49	2.51	1	1
1.5	0.49	1.01	2	1
0.48	0.49	-0.01	2	2
1.3	0.49	0.81	3	2
0.86	0.49	0.37	4	2
0.77	0.49	0.28	5	2
3 U	0.49	2.51	6	2
0.88	0.49	0.39	7	2
1.8	0.49	1.31	8	2
3 U	0.49	2.51	9	2
6.2	0.49	5.71	10	2
14.1	0.49	13.61	11	2
0.92	0.49	0.43	12	2
3 U	0.49	2.51	13	2
3 U	0.49	2.51	14	2
3 U	0.49	2.51	15	2
3 U	0.49	2.51	16	2
0.59	0.49	0.1	17	2
3 U	0.39	2.61	18	2
1.5	0.39	1.11	19	2
0.48	0.39	0.09	20	2
1.3	0.39	0.91	21	2
0.86	0.39	0.47	22	2
0.77	0.39	0.38	23	2
3 U	0.39	2.61	24	2
0.88	0.39	0.49	25	2
1.8	0.39	1.41	26	2
3 U	0.39	2.61	27	2
6.2	0.39	5.81	28	2
14.1	0.39	13.71	29	2
0.92	0.39	0.53	30	2
3 U	0.39	2.61	31	2
3 U	0.39	2.61	32	2
3 U	0.39	2.61	33	2
3 U	0.39	2.61	34	2
0.59	0.39	0.2	35	2
1.5	3 U	-1.5	35	3
0.48	3 U	-2.52	35	4
1.3	3 U	-1.7	35	5
0.86	3 U	-2.14	35	6
0.77	3 U	-2.23	35	7
3 U	3 U	0	35	7
0.88	3 U	-2.12	35	8
1.8	3 U	-1.2	35	9

3 U	3 U	0	35	9
6.2	3 U	3.2	36	9
14.1	3 U	11.1	37	9
0.92	3 U	-2.08	37	10
3 U	3 U	0	37	10
3 U	3 U	0	37	10
3 U	3 U	0	37	10
3 U	3 U	0	37	10
0.59	3 U	-2.41	37	11
0.48	1.5	-1.02	37	12
1.3	1.5	-0.2	37	13
0.86	1.5	-0.64	37	14
0.77	1.5	-0.73	37	15
3 U	1.5	1.5	38	15
0.88	1.5	-0.62	38	16
1.8	1.5	0.3	39	16
3 U	1.5	1.5	40	16
6.2	1.5	4.7	41	16
14.1	1.5	12.6	42	16
0.92	1.5	-0.58	42	17
3 U	1.5	1.5	43	17
3 U	1.5	1.5	44	17
3 U	1.5	1.5	45	17
3 U	1.5	1.5	46	17
0.59	1.5	-0.91	46	18
1.3	0.48	0.82	47	18
0.86	0.48	0.38	48	18
0.77	0.48	0.29	49	18
3 U	0.48	2.52	50	18
0.88	0.48	0.4	51	18
1.8	0.48	1.32	52	18
3 U	0.48	2.52	53	18
6.2	0.48	5.72	54	18
14.1	0.48	13.62	55	18
0.92	0.48	0.44	56	18
3 U	0.48	2.52	57	18
3 U	0.48	2.52	58	18
3 U	0.48	2.52	59	18
3 U	0.48	2.52	60	18
0.59	0.48	0.11	61	18
0.86	1.3	-0.44	61	19
0.77	1.3	-0.53	61	20
3 U	1.3	1.7	62	20
0.88	1.3	-0.42	62	21
1.8	1.3	0.5	63	21
3 U	1.3	1.7	64	21
6.2	1.3	4.9	65	21
14.1	1.3	12.8	66	21
0.92	1.3	-0.38	66	22
3 U	1.3	1.7	67	22
3 U	1.3	1.7	68	22
3 U	1.3	1.7	69	22
3 U	1.3	1.7	70	22
0.59	1.3	-0.71	70	23

0.77	0.86	-0.09	70	24
3 U	0.86	2.14	71	24
0.88	0.86	0.02	72	24
1.8	0.86	0.94	73	24
3 U	0.86	2.14	74	24
6.2	0.86	5.34	75	24
14.1	0.86	13.24	76	24
0.92	0.86	0.06	77	24
3 U	0.86	2.14	78	24
3 U	0.86	2.14	79	24
3 U	0.86	2.14	80	24
3 U	0.86	2.14	81	24
0.59	0.86	-0.27	81	25
3 U	0.77	2.23	82	25
0.88	0.77	0.11	83	25
1.8	0.77	1.03	84	25
3 U	0.77	2.23	85	25
6.2	0.77	5.43	86	25
14.1	0.77	13.33	87	25
0.92	0.77	0.15	88	25
3 U	0.77	2.23	89	25
3 U	0.77	2.23	90	25
3 U	0.77	2.23	91	25
3 U	0.77	2.23	92	25
0.59	0.77	-0.18	92	26
0.88	3 U	-2.12	92	27
1.8	3 U	-1.2	92	28
3 U	3 U	0	92	28
6.2	3 U	3.2	93	28
14.1	3 U	11.1	94	28
0.92	3 U	-2.08	94	29
3 U	3 U	0	94	29
3 U	3 U	0	94	29
3 U	3 U	0	94	29
3 U	3 U	0	94	29
0.59	3 U	-2.41	94	30
1.8	0.88	0.92	95	30
3 U	0.88	2.12	96	30
6.2	0.88	5.32	97	30
14.1	0.88	13.22	98	30
0.92	0.88	0.04	99	30
3 U	0.88	2.12	100	30
3 U	0.88	2.12	101	30
3 U	0.88	2.12	102	30
3 U	0.88	2.12	103	30
0.59	0.88	-0.29	103	31
3 U	1.8	1.2	104	31
6.2	1.8	4.4	105	31
14.1	1.8	12.3	106	31
0.92	1.8	-0.88	106	32
3 U	1.8	1.2	107	32
3 U	1.8	1.2	108	32

3 U	1.8	1.2	109	32
3 U	1.8	1.2	110	32
0.59	1.8	-1.21	110	33
6.2	3 U	3.2	111	33
14.1	3 U	11.1	112	33
0.92	3 U	-2.08	112	34
3 U	3 U	0	112	34
3 U	3 U	0	112	34
3 U	3 U	0	112	34
3 U	3 U	0	112	34
0.59	3 U	-2.41	112	35
14.1	6.2	7.9	113	35
0.92	6.2	-5.28	113	36
3 U	6.2	-3.2	113	37
3 U	6.2	-3.2	113	38
3 U	6.2	-3.2	113	39
3 U	6.2	-3.2	113	40
0.59	6.2	-5.61	113	41
0.92	14.1	-13.18	113	42
3 U	14.1	-11.1	113	43
3 U	14.1	-11.1	113	44
3 U	14.1	-11.1	113	45
3 U	14.1	-11.1	113	46
0.59	14.1	-13.51	113	47
3 U	0.92	2.08	114	47
3 U	0.92	2.08	115	47
3 U	0.92	2.08	116	47
3 U	0.92	2.08	117	47
0.59	0.92	-0.33	117	48
3 U	3 U	0	117	48
3 U	3 U	0	117	48
3 U	3 U	0	117	48
0.59	3 U	-2.41	117	49
3 U	3 U	0	117	49
3 U	3 U	0	117	49
0.59	3 U	-2.41	117	50
3 U	3 U	0	117	50
0.59	3 U	-2.41	117	51
0.59	3 U	-2.41	117	52

S Statistic = 117 - 52 = 65

Tied Group	Value	Members
1	3	7

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 798

B = 0

C = 210

D = 0

E = 42

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 905.667

Z-Score = 2.12665

Comparison Level at 95% confidence level = -1.65463 (downward trend)

2.12665 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW09-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
4	3.1	0.9	1	0
5	3.1	1.9	2	0
11.1	3.1	8	3	0
8.1	3.1	5	4	0
12.9	3.1	9.8	5	0
18.5	3.1	15.4	6	0
9.1	3.1	6	7	0
12	3.1	8.9	8	0
8.8	3.1	5.7	9	0
7.7	3.1	4.6	10	0
2.1	3.1	-1	10	1
1.8	3.1	-1.3	10	2
3 U	3.1	-0.1	10	3
3.7	3.1	0.6	11	3
0.96	3.1	-2.14	11	4
2	3.1	-1.1	11	5
3.8	3.1	0.7	12	5
5.6	3.1	2.5	13	5
4.2	3.1	1.1	14	5
5	4	1	15	5
11.1	4	7.1	16	5
8.1	4	4.1	17	5
12.9	4	8.9	18	5
18.5	4	14.5	19	5
9.1	4	5.1	20	5
12	4	8	21	5
8.8	4	4.8	22	5
7.7	4	3.7	23	5
2.1	4	-1.9	23	6
1.8	4	-2.2	23	7
3 U	4	-1	23	8
3.7	4	-0.3	23	9
0.96	4	-3.04	23	10
2	4	-2	23	11
3.8	4	-0.2	23	12
5.6	4	1.6	24	12
4.2	4	0.2	25	12
11.1	5	6.1	26	12
8.1	5	3.1	27	12
12.9	5	7.9	28	12
18.5	5	13.5	29	12
9.1	5	4.1	30	12
12	5	7	31	12
8.8	5	3.8	32	12
7.7	5	2.7	33	12

2.1	5	-2.9	33	13
1.8	5	-3.2	33	14
3 U	5	-2	33	15
3.7	5	-1.3	33	16
0.96	5	-4.04	33	17
2	5	-3	33	18
3.8	5	-1.2	33	19
5.6	5	0.6	34	19
4.2	5	-0.8	34	20
8.1	11.1	-3	34	21
12.9	11.1	1.8	35	21
18.5	11.1	7.4	36	21
9.1	11.1	-2	36	22
12	11.1	0.9	37	22
8.8	11.1	-2.3	37	23
7.7	11.1	-3.4	37	24
2.1	11.1	-9	37	25
1.8	11.1	-9.3	37	26
3 U	11.1	-8.1	37	27
3.7	11.1	-7.4	37	28
0.96	11.1	-10.14	37	29
2	11.1	-9.1	37	30
3.8	11.1	-7.3	37	31
5.6	11.1	-5.5	37	32
4.2	11.1	-6.9	37	33
12.9	8.1	4.8	38	33
18.5	8.1	10.4	39	33
9.1	8.1	1	40	33
12	8.1	3.9	41	33
8.8	8.1	0.7	42	33
7.7	8.1	-0.4	42	34
2.1	8.1	-6	42	35
1.8	8.1	-6.3	42	36
3 U	8.1	-5.1	42	37
3.7	8.1	-4.4	42	38
0.96	8.1	-7.14	42	39
2	8.1	-6.1	42	40
3.8	8.1	-4.3	42	41
5.6	8.1	-2.5	42	42
4.2	8.1	-3.9	42	43
18.5	12.9	5.6	43	43
9.1	12.9	-3.8	43	44
12	12.9	-0.9	43	45
8.8	12.9	-4.1	43	46
7.7	12.9	-5.2	43	47
2.1	12.9	-10.8	43	48
1.8	12.9	-11.1	43	49
3 U	12.9	-9.9	43	50
3.7	12.9	-9.2	43	51
0.96	12.9	-11.94	43	52
2	12.9	-10.9	43	53
3.8	12.9	-9.1	43	54
5.6	12.9	-7.3	43	55
4.2	12.9	-8.7	43	56

9.1	18.5	-9.4	43	57
12	18.5	-6.5	43	58
8.8	18.5	-9.7	43	59
7.7	18.5	-10.8	43	60
2.1	18.5	-16.4	43	61
1.8	18.5	-16.7	43	62
3 U	18.5	-15.5	43	63
3.7	18.5	-14.8	43	64
0.96	18.5	-17.54	43	65
2	18.5	-16.5	43	66
3.8	18.5	-14.7	43	67
5.6	18.5	-12.9	43	68
4.2	18.5	-14.3	43	69
12	9.1	2.9	44	69
8.8	9.1	-0.3	44	70
7.7	9.1	-1.4	44	71
2.1	9.1	-7	44	72
1.8	9.1	-7.3	44	73
3 U	9.1	-6.1	44	74
3.7	9.1	-5.4	44	75
0.96	9.1	-8.14	44	76
2	9.1	-7.1	44	77
3.8	9.1	-5.3	44	78
5.6	9.1	-3.5	44	79
4.2	9.1	-4.9	44	80
8.8	12	-3.2	44	81
7.7	12	-4.3	44	82
2.1	12	-9.9	44	83
1.8	12	-10.2	44	84
3 U	12	-9	44	85
3.7	12	-8.3	44	86
0.96	12	-11.04	44	87
2	12	-10	44	88
3.8	12	-8.2	44	89
5.6	12	-6.4	44	90
4.2	12	-7.8	44	91
7.7	8.8	-1.1	44	92
2.1	8.8	-6.7	44	93
1.8	8.8	-7	44	94
3 U	8.8	-5.8	44	95
3.7	8.8	-5.1	44	96
0.96	8.8	-7.84	44	97
2	8.8	-6.8	44	98
3.8	8.8	-5	44	99
5.6	8.8	-3.2	44	100
4.2	8.8	-4.6	44	101
2.1	7.7	-5.6	44	102
1.8	7.7	-5.9	44	103
3 U	7.7	-4.7	44	104
3.7	7.7	-4	44	105
0.96	7.7	-6.74	44	106
2	7.7	-5.7	44	107

3.8	7.7	-3.9	44	108
5.6	7.7	-2.1	44	109
4.2	7.7	-3.5	44	110
1.8	2.1	-0.3	44	111
3 U	2.1	0.9	45	111
3.7	2.1	1.6	46	111
0.96	2.1	-1.14	46	112
2	2.1	-0.1	46	113
3.8	2.1	1.7	47	113
5.6	2.1	3.5	48	113
4.2	2.1	2.1	49	113
3 U	1.8	1.2	50	113
3.7	1.8	1.9	51	113
0.96	1.8	-0.84	51	114
2	1.8	0.2	52	114
3.8	1.8	2	53	114
5.6	1.8	3.8	54	114
4.2	1.8	2.4	55	114
3.7	3 U	0.7	56	114
0.96	3 U	-2.04	56	115
2	3 U	-1	56	116
3.8	3 U	0.8	57	116
5.6	3 U	2.6	58	116
4.2	3 U	1.2	59	116
0.96	3.7	-2.74	59	117
2	3.7	-1.7	59	118
3.8	3.7	0.1	60	118
5.6	3.7	1.9	61	118
4.2	3.7	0.5	62	118
2	0.96	1.04	63	118
3.8	0.96	2.84	64	118
5.6	0.96	4.64	65	118
4.2	0.96	3.24	66	118
3.8	2	1.8	67	118
5.6	2	3.6	68	118
4.2	2	2.2	69	118
5.6	3.8	1.8	70	118
4.2	3.8	0.4	71	118
4.2	5.6	-1.4	71	119

S Statistic = 71 - 119 = -48

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -1.52488

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.52488 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW10-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3 U	446	-443	0	1
198	446	-248	0	2
2.5	446	-443.5	0	3
27.2	446	-418.8	0	4
16.3	446	-429.7	0	5
3 U	446	-443	0	6
17.7	446	-428.3	0	7
24.6	446	-421.4	0	8
63.7	446	-382.3	0	9
3 U	446	-443	0	10
3 U	446	-443	0	11
44.4	446	-401.6	0	12
44.7	446	-401.3	0	13
10.8	446	-435.2	0	14
3 U	446	-443	0	15
0.38	446	-445.62	0	16
0.86	446	-445.14	0	17
8.4	446	-437.6	0	18
13.9	446	-432.1	0	19
198	3 U	195	1	19
2.5	3 U	-0.5	1	20
27.2	3 U	24.2	2	20
16.3	3 U	13.3	3	20
3 U	3 U	0	3	20
17.7	3 U	14.7	4	20
24.6	3 U	21.6	5	20
63.7	3 U	60.7	6	20
3 U	3 U	0	6	20
3 U	3 U	0	6	20
44.4	3 U	41.4	7	20
44.7	3 U	41.7	8	20
10.8	3 U	7.8	9	20
3 U	3 U	0	9	20
0.38	3 U	-2.62	9	21
0.86	3 U	-2.14	9	22
8.4	3 U	5.4	10	22
13.9	3 U	10.9	11	22
2.5	198	-195.5	11	23
27.2	198	-170.8	11	24
16.3	198	-181.7	11	25
3 U	198	-195	11	26
17.7	198	-180.3	11	27
24.6	198	-173.4	11	28
63.7	198	-134.3	11	29
3 U	198	-195	11	30

3 U	198	-195	11	31
44.4	198	-153.6	11	32
44.7	198	-153.3	11	33
10.8	198	-187.2	11	34
3 U	198	-195	11	35
0.38	198	-197.62	11	36
0.86	198	-197.14	11	37
8.4	198	-189.6	11	38
13.9	198	-184.1	11	39
27.2	2.5	24.7	12	39
16.3	2.5	13.8	13	39
3 U	2.5	0.5	14	39
17.7	2.5	15.2	15	39
24.6	2.5	22.1	16	39
63.7	2.5	61.2	17	39
3 U	2.5	0.5	18	39
3 U	2.5	0.5	19	39
44.4	2.5	41.9	20	39
44.7	2.5	42.2	21	39
10.8	2.5	8.3	22	39
3 U	2.5	0.5	23	39
0.38	2.5	-2.12	23	40
0.86	2.5	-1.64	23	41
8.4	2.5	5.9	24	41
13.9	2.5	11.4	25	41
16.3	27.2	-10.9	25	42
3 U	27.2	-24.2	25	43
17.7	27.2	-9.5	25	44
24.6	27.2	-2.6	25	45
63.7	27.2	36.5	26	45
3 U	27.2	-24.2	26	46
3 U	27.2	-24.2	26	47
44.4	27.2	17.2	27	47
44.7	27.2	17.5	28	47
10.8	27.2	-16.4	28	48
3 U	27.2	-24.2	28	49
0.38	27.2	-26.82	28	50
0.86	27.2	-26.34	28	51
8.4	27.2	-18.8	28	52
13.9	27.2	-13.3	28	53
3 U	16.3	-13.3	28	54
17.7	16.3	1.4	29	54
24.6	16.3	8.3	30	54
63.7	16.3	47.4	31	54
3 U	16.3	-13.3	31	55
3 U	16.3	-13.3	31	56
44.4	16.3	28.1	32	56
44.7	16.3	28.4	33	56
10.8	16.3	-5.5	33	57
3 U	16.3	-13.3	33	58
0.38	16.3	-15.92	33	59
0.86	16.3	-15.44	33	60
8.4	16.3	-7.9	33	61
13.9	16.3	-2.4	33	62

17.7	3 U	14.7	34	62
24.6	3 U	21.6	35	62
63.7	3 U	60.7	36	62
3 U	3 U	0	36	62
3 U	3 U	0	36	62
44.4	3 U	41.4	37	62
44.7	3 U	41.7	38	62
10.8	3 U	7.8	39	62
3 U	3 U	0	39	62
0.38	3 U	-2.62	39	63
0.86	3 U	-2.14	39	64
8.4	3 U	5.4	40	64
13.9	3 U	10.9	41	64
24.6	17.7	6.9	42	64
63.7	17.7	46	43	64
3 U	17.7	-14.7	43	65
3 U	17.7	-14.7	43	66
44.4	17.7	26.7	44	66
44.7	17.7	27	45	66
10.8	17.7	-6.9	45	67
3 U	17.7	-14.7	45	68
0.38	17.7	-17.32	45	69
0.86	17.7	-16.84	45	70
8.4	17.7	-9.3	45	71
13.9	17.7	-3.8	45	72
63.7	24.6	39.1	46	72
3 U	24.6	-21.6	46	73
3 U	24.6	-21.6	46	74
44.4	24.6	19.8	47	74
44.7	24.6	20.1	48	74
10.8	24.6	-13.8	48	75
3 U	24.6	-21.6	48	76
0.38	24.6	-24.22	48	77
0.86	24.6	-23.74	48	78
8.4	24.6	-16.2	48	79
13.9	24.6	-10.7	48	80
3 U	63.7	-60.7	48	81
3 U	63.7	-60.7	48	82
44.4	63.7	-19.3	48	83
44.7	63.7	-19	48	84
10.8	63.7	-52.9	48	85
3 U	63.7	-60.7	48	86
0.38	63.7	-63.32	48	87
0.86	63.7	-62.84	48	88
8.4	63.7	-55.3	48	89
13.9	63.7	-49.8	48	90
3 U	3 U	0	48	90
44.4	3 U	41.4	49	90
44.7	3 U	41.7	50	90
10.8	3 U	7.8	51	90
3 U	3 U	0	51	90
0.38	3 U	-2.62	51	91

0.86	3 U	-2.14	51	92
8.4	3 U	5.4	52	92
13.9	3 U	10.9	53	92
44.4	3 U	41.4	54	92
44.7	3 U	41.7	55	92
10.8	3 U	7.8	56	92
3 U	3 U	0	56	92
0.38	3 U	-2.62	56	93
0.86	3 U	-2.14	56	94
8.4	3 U	5.4	57	94
13.9	3 U	10.9	58	94
44.7	44.4	0.3	59	94
10.8	44.4	-33.6	59	95
3 U	44.4	-41.4	59	96
0.38	44.4	-44.02	59	97
0.86	44.4	-43.54	59	98
8.4	44.4	-36	59	99
13.9	44.4	-30.5	59	100
10.8	44.7	-33.9	59	101
3 U	44.7	-41.7	59	102
0.38	44.7	-44.32	59	103
0.86	44.7	-43.84	59	104
8.4	44.7	-36.3	59	105
13.9	44.7	-30.8	59	106
3 U	10.8	-7.8	59	107
0.38	10.8	-10.42	59	108
0.86	10.8	-9.94	59	109
8.4	10.8	-2.4	59	110
13.9	10.8	3.1	60	110
0.38	3 U	-2.62	60	111
0.86	3 U	-2.14	60	112
8.4	3 U	5.4	61	112
13.9	3 U	10.9	62	112
0.86	0.38	0.48	63	112
8.4	0.38	8.02	64	112
13.9	0.38	13.52	65	112
8.4	0.86	7.54	66	112
13.9	0.86	13.04	67	112
13.9	8.4	5.5	68	112

S Statistic = 68 - 112 = -44

Tied Group	Value	Members
1	3	5

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 300

B = 0

C = 60

D = 0

E = 20

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 933.333

Z-Score = -1.40751

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.40751 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW11-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1490	1690	-200	0	1
1800	1690	110	1	1
2600	1690	910	2	1
218	1690	-1472	2	2
518	1690	-1172	2	3
163	1690	-1527	2	4
274	1690	-1416	2	5
125	1690	-1565	2	6
1460	1690	-230	2	7
1380	1690	-310	2	8
1400	1690	-290	2	9
1660	1690	-30	2	10
4.7	1690	-1685.3	2	11
133	1690	-1557	2	12
1160	1690	-530	2	13
98.9	1690	-1591.1	2	14
586	1690	-1104	2	15
517	1690	-1173	2	16
476	1690	-1214	2	17
1800	1490	310	3	17
2600	1490	1110	4	17
218	1490	-1272	4	18
518	1490	-972	4	19
163	1490	-1327	4	20
274	1490	-1216	4	21
125	1490	-1365	4	22
1460	1490	-30	4	23
1380	1490	-110	4	24
1400	1490	-90	4	25
1660	1490	170	5	25
4.7	1490	-1485.3	5	26
133	1490	-1357	5	27
1160	1490	-330	5	28
98.9	1490	-1391.1	5	29
586	1490	-904	5	30
517	1490	-973	5	31
476	1490	-1014	5	32
2600	1800	800	6	32
218	1800	-1582	6	33
518	1800	-1282	6	34
163	1800	-1637	6	35
274	1800	-1526	6	36
125	1800	-1675	6	37
1460	1800	-340	6	38
1380	1800	-420	6	39

1400	1800	-400	6	40
1660	1800	-140	6	41
4.7	1800	-1795.3	6	42
133	1800	-1667	6	43
1160	1800	-640	6	44
98.9	1800	-1701.1	6	45
586	1800	-1214	6	46
517	1800	-1283	6	47
476	1800	-1324	6	48
218	2600	-2382	6	49
518	2600	-2082	6	50
163	2600	-2437	6	51
274	2600	-2326	6	52
125	2600	-2475	6	53
1460	2600	-1140	6	54
1380	2600	-1220	6	55
1400	2600	-1200	6	56
1660	2600	-940	6	57
4.7	2600	-2595.3	6	58
133	2600	-2467	6	59
1160	2600	-1440	6	60
98.9	2600	-2501.1	6	61
586	2600	-2014	6	62
517	2600	-2083	6	63
476	2600	-2124	6	64
518	218	300	7	64
163	218	-55	7	65
274	218	56	8	65
125	218	-93	8	66
1460	218	1242	9	66
1380	218	1162	10	66
1400	218	1182	11	66
1660	218	1442	12	66
4.7	218	-213.3	12	67
133	218	-85	12	68
1160	218	942	13	68
98.9	218	-119.1	13	69
586	218	368	14	69
517	218	299	15	69
476	218	258	16	69
163	518	-355	16	70
274	518	-244	16	71
125	518	-393	16	72
1460	518	942	17	72
1380	518	862	18	72
1400	518	882	19	72
1660	518	1142	20	72
4.7	518	-513.3	20	73
133	518	-385	20	74
1160	518	642	21	74
98.9	518	-419.1	21	75
586	518	68	22	75
517	518	-1	22	76
476	518	-42	22	77

274	163	111	23	77
125	163	-38	23	78
1460	163	1297	24	78
1380	163	1217	25	78
1400	163	1237	26	78
1660	163	1497	27	78
4.7	163	-158.3	27	79
133	163	-30	27	80
1160	163	997	28	80
98.9	163	-64.1	28	81
586	163	423	29	81
517	163	354	30	81
476	163	313	31	81
125	274	-149	31	82
1460	274	1186	32	82
1380	274	1106	33	82
1400	274	1126	34	82
1660	274	1386	35	82
4.7	274	-269.3	35	83
133	274	-141	35	84
1160	274	886	36	84
98.9	274	-175.1	36	85
586	274	312	37	85
517	274	243	38	85
476	274	202	39	85
1460	125	1335	40	85
1380	125	1255	41	85
1400	125	1275	42	85
1660	125	1535	43	85
4.7	125	-120.3	43	86
133	125	8	44	86
1160	125	1035	45	86
98.9	125	-26.1	45	87
586	125	461	46	87
517	125	392	47	87
476	125	351	48	87
1380	1460	-80	48	88
1400	1460	-60	48	89
1660	1460	200	49	89
4.7	1460	-1455.3	49	90
133	1460	-1327	49	91
1160	1460	-300	49	92
98.9	1460	-1361.1	49	93
586	1460	-874	49	94
517	1460	-943	49	95
476	1460	-984	49	96
1400	1380	20	50	96
1660	1380	280	51	96
4.7	1380	-1375.3	51	97
133	1380	-1247	51	98
1160	1380	-220	51	99
98.9	1380	-1281.1	51	100

586	1380	-794	51	101
517	1380	-863	51	102
476	1380	-904	51	103
1660	1400	260	52	103
4.7	1400	-1395.3	52	104
133	1400	-1267	52	105
1160	1400	-240	52	106
98.9	1400	-1301.1	52	107
586	1400	-814	52	108
517	1400	-883	52	109
476	1400	-924	52	110
4.7	1660	-1655.3	52	111
133	1660	-1527	52	112
1160	1660	-500	52	113
98.9	1660	-1561.1	52	114
586	1660	-1074	52	115
517	1660	-1143	52	116
476	1660	-1184	52	117
133	4.7	128.3	53	117
1160	4.7	1155.3	54	117
98.9	4.7	94.2	55	117
586	4.7	581.3	56	117
517	4.7	512.3	57	117
476	4.7	471.3	58	117
1160	133	1027	59	117
98.9	133	-34.1	59	118
586	133	453	60	118
517	133	384	61	118
476	133	343	62	118
98.9	1160	-1061.1	62	119
586	1160	-574	62	120
517	1160	-643	62	121
476	1160	-684	62	122
586	98.9	487.1	63	122
517	98.9	418.1	64	122
476	98.9	377.1	65	122
517	586	-69	65	123
476	586	-110	65	124
476	517	-41	65	125

S Statistic = 65 - 125 = -60

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -1.91421

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.91421 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW12-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3530	4740	-1210	0	1
2730	4740	-2010	0	2
3820	4740	-920	0	3
2260	4740	-2480	0	4
2730	4740	-2010	0	5
2220	4740	-2520	0	6
1820	4740	-2920	0	7
1510	4740	-3230	0	8
1380	4740	-3360	0	9
1450	4740	-3290	0	10
1270	4740	-3470	0	11
121	4740	-4619	0	12
134	4740	-4606	0	13
86.3	4740	-4653.7	0	14
1220	4740	-3520	0	15
768	4740	-3972	0	16
1520	4740	-3220	0	17
1780	4740	-2960	0	18
420	4740	-4320	0	19
2730	3530	-800	0	20
3820	3530	290	1	20
2260	3530	-1270	1	21
2730	3530	-800	1	22
2220	3530	-1310	1	23
1820	3530	-1710	1	24
1510	3530	-2020	1	25
1380	3530	-2150	1	26
1450	3530	-2080	1	27
1270	3530	-2260	1	28
121	3530	-3409	1	29
134	3530	-3396	1	30
86.3	3530	-3443.7	1	31
1220	3530	-2310	1	32
768	3530	-2762	1	33
1520	3530	-2010	1	34
1780	3530	-1750	1	35
420	3530	-3110	1	36
3820	2730	1090	2	36
2260	2730	-470	2	37
2730	2730	0	2	37
2220	2730	-510	2	38
1820	2730	-910	2	39
1510	2730	-1220	2	40
1380	2730	-1350	2	41
1450	2730	-1280	2	42

1270	2730	-1460	2	43
121	2730	-2609	2	44
134	2730	-2596	2	45
86.3	2730	-2643.7	2	46
1220	2730	-1510	2	47
768	2730	-1962	2	48
1520	2730	-1210	2	49
1780	2730	-950	2	50
420	2730	-2310	2	51
2260	3820	-1560	2	52
2730	3820	-1090	2	53
2220	3820	-1600	2	54
1820	3820	-2000	2	55
1510	3820	-2310	2	56
1380	3820	-2440	2	57
1450	3820	-2370	2	58
1270	3820	-2550	2	59
121	3820	-3699	2	60
134	3820	-3686	2	61
86.3	3820	-3733.7	2	62
1220	3820	-2600	2	63
768	3820	-3052	2	64
1520	3820	-2300	2	65
1780	3820	-2040	2	66
420	3820	-3400	2	67
2730	2260	470	3	67
2220	2260	-40	3	68
1820	2260	-440	3	69
1510	2260	-750	3	70
1380	2260	-880	3	71
1450	2260	-810	3	72
1270	2260	-990	3	73
121	2260	-2139	3	74
134	2260	-2126	3	75
86.3	2260	-2173.7	3	76
1220	2260	-1040	3	77
768	2260	-1492	3	78
1520	2260	-740	3	79
1780	2260	-480	3	80
420	2260	-1840	3	81
2220	2730	-510	3	82
1820	2730	-910	3	83
1510	2730	-1220	3	84
1380	2730	-1350	3	85
1450	2730	-1280	3	86
1270	2730	-1460	3	87
121	2730	-2609	3	88
134	2730	-2596	3	89
86.3	2730	-2643.7	3	90
1220	2730	-1510	3	91
768	2730	-1962	3	92
1520	2730	-1210	3	93
1780	2730	-950	3	94
420	2730	-2310	3	95

1820	2220	-400	3	96
1510	2220	-710	3	97
1380	2220	-840	3	98
1450	2220	-770	3	99
1270	2220	-950	3	100
121	2220	-2099	3	101
134	2220	-2086	3	102
86.3	2220	-2133.7	3	103
1220	2220	-1000	3	104
768	2220	-1452	3	105
1520	2220	-700	3	106
1780	2220	-440	3	107
420	2220	-1800	3	108
1510	1820	-310	3	109
1380	1820	-440	3	110
1450	1820	-370	3	111
1270	1820	-550	3	112
121	1820	-1699	3	113
134	1820	-1686	3	114
86.3	1820	-1733.7	3	115
1220	1820	-600	3	116
768	1820	-1052	3	117
1520	1820	-300	3	118
1780	1820	-40	3	119
420	1820	-1400	3	120
1380	1510	-130	3	121
1450	1510	-60	3	122
1270	1510	-240	3	123
121	1510	-1389	3	124
134	1510	-1376	3	125
86.3	1510	-1423.7	3	126
1220	1510	-290	3	127
768	1510	-742	3	128
1520	1510	10	4	128
1780	1510	270	5	128
420	1510	-1090	5	129
1450	1380	70	6	129
1270	1380	-110	6	130
121	1380	-1259	6	131
134	1380	-1246	6	132
86.3	1380	-1293.7	6	133
1220	1380	-160	6	134
768	1380	-612	6	135
1520	1380	140	7	135
1780	1380	400	8	135
420	1380	-960	8	136
1270	1450	-180	8	137
121	1450	-1329	8	138
134	1450	-1316	8	139
86.3	1450	-1363.7	8	140
1220	1450	-230	8	141
768	1450	-682	8	142

1520	1450	70	9	142
1780	1450	330	10	142
420	1450	-1030	10	143
121	1270	-1149	10	144
134	1270	-1136	10	145
86.3	1270	-1183.7	10	146
1220	1270	-50	10	147
768	1270	-502	10	148
1520	1270	250	11	148
1780	1270	510	12	148
420	1270	-850	12	149
134	121	13	13	149
86.3	121	-34.7	13	150
1220	121	1099	14	150
768	121	647	15	150
1520	121	1399	16	150
1780	121	1659	17	150
420	121	299	18	150
86.3	134	-47.7	18	151
1220	134	1086	19	151
768	134	634	20	151
1520	134	1386	21	151
1780	134	1646	22	151
420	134	286	23	151
1220	86.3	1133.7	24	151
768	86.3	681.7	25	151
1520	86.3	1433.7	26	151
1780	86.3	1693.7	27	151
420	86.3	333.7	28	151
768	1220	-452	28	152
1520	1220	300	29	152
1780	1220	560	30	152
420	1220	-800	30	153
1520	768	752	31	153
1780	768	1012	32	153
420	768	-348	32	154
1780	1520	260	33	154
420	1520	-1100	33	155
420	1780	-1360	33	156

S Statistic = 33 - 156 = -123

Tied Group	Value	Members
1	2730	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = -3.96029

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-3.96029 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW13-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
66	31800	-31734	0	1
28700	31800	-3100	0	2
24500	31800	-7300	0	3
44.2	31800	-31755.8	0	4
1240	31800	-30560	0	5
19400	31800	-12400	0	6
21000	31800	-10800	0	7
12.6	31800	-31787.4	0	8
3.2	31800	-31796.8	0	9
29200	31800	-2600	0	10
51.1	31800	-31748.9	0	11
12.8	31800	-31787.2	0	12
22500	31800	-9300	0	13
28700	66	28634	1	13
24500	66	24434	2	13
44.2	66	-21.8	2	14
1240	66	1174	3	14
19400	66	19334	4	14
21000	66	20934	5	14
12.6	66	-53.4	5	15
3.2	66	-62.8	5	16
29200	66	29134	6	16
51.1	66	-14.9	6	17
12.8	66	-53.2	6	18
22500	66	22434	7	18
24500	28700	-4200	7	19
44.2	28700	-28655.8	7	20
1240	28700	-27460	7	21
19400	28700	-9300	7	22
21000	28700	-7700	7	23
12.6	28700	-28687.4	7	24
3.2	28700	-28696.8	7	25
29200	28700	500	8	25
51.1	28700	-28648.9	8	26
12.8	28700	-28687.2	8	27
22500	28700	-6200	8	28
44.2	24500	-24455.8	8	29
1240	24500	-23260	8	30
19400	24500	-5100	8	31
21000	24500	-3500	8	32
12.6	24500	-24487.4	8	33
3.2	24500	-24496.8	8	34
29200	24500	4700	9	34
51.1	24500	-24448.9	9	35

12.8	24500	-24487.2	9	36
22500	24500	-2000	9	37
1240	44.2	1195.8	10	37
19400	44.2	19355.8	11	37
21000	44.2	20955.8	12	37
12.6	44.2	-31.6	12	38
3.2	44.2	-41	12	39
29200	44.2	29155.8	13	39
51.1	44.2	6.9	14	39
12.8	44.2	-31.4	14	40
22500	44.2	22455.8	15	40
19400	1240	18160	16	40
21000	1240	19760	17	40
12.6	1240	-1227.4	17	41
3.2	1240	-1236.8	17	42
29200	1240	27960	18	42
51.1	1240	-1188.9	18	43
12.8	1240	-1227.2	18	44
22500	1240	21260	19	44
21000	19400	1600	20	44
12.6	19400	-19387.4	20	45
3.2	19400	-19396.8	20	46
29200	19400	9800	21	46
51.1	19400	-19348.9	21	47
12.8	19400	-19387.2	21	48
22500	19400	3100	22	48
12.6	21000	-20987.4	22	49
3.2	21000	-20996.8	22	50
29200	21000	8200	23	50
51.1	21000	-20948.9	23	51
12.8	21000	-20987.2	23	52
22500	21000	1500	24	52
3.2	12.6	-9.4	24	53
29200	12.6	29187.4	25	53
51.1	12.6	38.5	26	53
12.8	12.6	0.2	27	53
22500	12.6	22487.4	28	53
29200	3.2	29196.8	29	53
51.1	3.2	47.9	30	53
12.8	3.2	9.6	31	53
22500	3.2	22496.8	32	53
51.1	29200	-29148.9	32	54
12.8	29200	-29187.2	32	55
22500	29200	-6700	32	56
12.8	51.1	-38.3	32	57
22500	51.1	22448.9	33	57
22500	12.8	22487.2	34	57

S Statistic = 34 - 57 = -23

Tied Group	Value	Members
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Time Period	Observations
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8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -1.20439

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.20439 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW15-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3 U	10.1	-7.1	0	1
3 U	10.1	-7.1	0	2
3 U	10.1	-7.1	0	3
0.97	10.1	-9.13	0	4
1.6	10.1	-8.5	0	5
3 U	10.1	-7.1	0	6
15.3	10.1	5.2	1	6
3 U	10.1	-7.1	1	7
12.9	10.1	2.8	2	7
402	10.1	391.9	3	7
64.2	10.1	54.1	4	7
589	10.1	578.9	5	7
605	10.1	594.9	6	7
3 U	3 U	0	6	7
3 U	3 U	0	6	7
0.97	3 U	-2.03	6	8
1.6	3 U	-1.4	6	9
3 U	3 U	0	6	9
15.3	3 U	12.3	7	9
3 U	3 U	0	7	9
12.9	3 U	9.9	8	9
402	3 U	399	9	9
64.2	3 U	61.2	10	9
589	3 U	586	11	9
605	3 U	602	12	9
3 U	3 U	0	12	9
0.97	3 U	-2.03	12	10
1.6	3 U	-1.4	12	11
3 U	3 U	0	12	11
15.3	3 U	12.3	13	11
3 U	3 U	0	13	11
12.9	3 U	9.9	14	11
402	3 U	399	15	11
64.2	3 U	61.2	16	11
589	3 U	586	17	11
605	3 U	602	18	11
0.97	3 U	-2.03	18	12
1.6	3 U	-1.4	18	13
3 U	3 U	0	18	13
15.3	3 U	12.3	19	13
3 U	3 U	0	19	13
12.9	3 U	9.9	20	13
402	3 U	399	21	13
64.2	3 U	61.2	22	13

589	3 U	586	23	13
605	3 U	602	24	13
1.6	0.97	0.63	25	13
3 U	0.97	2.03	26	13
15.3	0.97	14.33	27	13
3 U	0.97	2.03	28	13
12.9	0.97	11.93	29	13
402	0.97	401.03	30	13
64.2	0.97	63.23	31	13
589	0.97	588.03	32	13
605	0.97	604.03	33	13
3 U	1.6	1.4	34	13
15.3	1.6	13.7	35	13
3 U	1.6	1.4	36	13
12.9	1.6	11.3	37	13
402	1.6	400.4	38	13
64.2	1.6	62.6	39	13
589	1.6	587.4	40	13
605	1.6	603.4	41	13
15.3	3 U	12.3	42	13
3 U	3 U	0	42	13
12.9	3 U	9.9	43	13
402	3 U	399	44	13
64.2	3 U	61.2	45	13
589	3 U	586	46	13
605	3 U	602	47	13
3 U	15.3	-12.3	47	14
12.9	15.3	-2.4	47	15
402	15.3	386.7	48	15
64.2	15.3	48.9	49	15
589	15.3	573.7	50	15
605	15.3	589.7	51	15
12.9	3 U	9.9	52	15
402	3 U	399	53	15
64.2	3 U	61.2	54	15
589	3 U	586	55	15
605	3 U	602	56	15
402	12.9	389.1	57	15
64.2	12.9	51.3	58	15
589	12.9	576.1	59	15
605	12.9	592.1	60	15
64.2	402	-337.8	60	16
589	402	187	61	16
605	402	203	62	16
589	64.2	524.8	63	16
605	64.2	540.8	64	16
605	589	16	65	16

S Statistic = 65 - 16 = 49

Tied Group	Value	Members
1	3	5

Time Period	Observations
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 300

B = 0

C = 60

D = 0

E = 20

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 317

Z-Score = 2.69595

Comparison Level at 95% confidence level = -1.65463 (downward trend)

2.69595 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW16-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3 U	1.7	1.3	1	0
3 U	1.7	1.3	2	0
1.9	1.7	0.2	3	0
1.2	1.7	-0.5	3	1
1.1	1.7	-0.6	3	2
3 U	1.7	1.3	4	2
3 U	1.7	1.3	5	2
3 U	1.7	1.3	6	2
3 U	1.7	1.3	7	2
3 U	1.7	1.3	8	2
3 U	1.7	1.3	9	2
0.36	1.7	-1.34	9	3
3 U	3 U	0	9	3
1.9	3 U	-1.1	9	4
1.2	3 U	-1.8	9	5
1.1	3 U	-1.9	9	6
3 U	3 U	0	9	6
3 U	3 U	0	9	6
3 U	3 U	0	9	6
3 U	3 U	0	9	6
3 U	3 U	0	9	6
3 U	3 U	0	9	6
0.36	3 U	-2.64	9	7
1.9	3 U	-1.1	9	8
1.2	3 U	-1.8	9	9
1.1	3 U	-1.9	9	10
3 U	3 U	0	9	10
3 U	3 U	0	9	10
3 U	3 U	0	9	10
3 U	3 U	0	9	10
3 U	3 U	0	9	10
3 U	3 U	0	9	10
0.36	3 U	-2.64	9	11
1.2	1.9	-0.7	9	12
1.1	1.9	-0.8	9	13
3 U	1.9	1.1	10	13
3 U	1.9	1.1	11	13
3 U	1.9	1.1	12	13
3 U	1.9	1.1	13	13
3 U	1.9	1.1	14	13
3 U	1.9	1.1	15	13
0.36	1.9	-1.54	15	14
1.1	1.2	-0.1	15	15

3 U	1.2	1.8	16	15
3 U	1.2	1.8	17	15
3 U	1.2	1.8	18	15
3 U	1.2	1.8	19	15
3 U	1.2	1.8	20	15
3 U	1.2	1.8	21	15
0.36	1.2	-0.84	21	16
3 U	1.1	1.9	22	16
3 U	1.1	1.9	23	16
3 U	1.1	1.9	24	16
3 U	1.1	1.9	25	16
3 U	1.1	1.9	26	16
3 U	1.1	1.9	27	16
0.36	1.1	-0.74	27	17
3 U	3 U	0	27	17
3 U	3 U	0	27	17
3 U	3 U	0	27	17
3 U	3 U	0	27	17
3 U	3 U	0	27	17
0.36	3 U	-2.64	27	18
3 U	3 U	0	27	18
3 U	3 U	0	27	18
3 U	3 U	0	27	18
3 U	3 U	0	27	18
0.36	3 U	-2.64	27	19
3 U	3 U	0	27	19
3 U	3 U	0	27	19
3 U	3 U	0	27	19
0.36	3 U	-2.64	27	20
3 U	3 U	0	27	20
3 U	3 U	0	27	20
0.36	3 U	-2.64	27	21
3 U	3 U	0	27	21
0.36	3 U	-2.64	27	22
0.36	3 U	-2.64	27	23

S Statistic = 27 - 23 = 4

Tied Group	Value	Members
1	3	8

Time Period	Observations
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1

10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 1176

B = 0

C = 336

D = 0

E = 56

F = 0

a = 4836

b = 15444

c = 312

Group Variance = 203.333

Z-Score = 0.210386

Comparison Level at 95% confidence level = -1.65463 (downward trend)

0.210386 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW18-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
63.8	70.3	-6.5	0	1
119	70.3	48.7	1	1
92	70.3	21.7	2	1
65.1	70.3	-5.2	2	2
61.7	70.3	-8.6	2	3
74.4	70.3	4.1	3	3
72.2	70.3	1.9	4	3
43.7	70.3	-26.6	4	4
66.6	70.3	-3.7	4	5
51.5	70.3	-18.8	4	6
63.5	70.3	-6.8	4	7
55.8	70.3	-14.5	4	8
35.1	70.3	-35.2	4	9
14.5	70.3	-55.8	4	10
44.7	70.3	-25.6	4	11
80.3	70.3	10	5	11
38	70.3	-32.3	5	12
50.4	70.3	-19.9	5	13
87.6	70.3	17.3	6	13
119	63.8	55.2	7	13
92	63.8	28.2	8	13
65.1	63.8	1.3	9	13
61.7	63.8	-2.1	9	14
74.4	63.8	10.6	10	14
72.2	63.8	8.4	11	14
43.7	63.8	-20.1	11	15
66.6	63.8	2.8	12	15
51.5	63.8	-12.3	12	16
63.5	63.8	-0.3	12	17
55.8	63.8	-8	12	18
35.1	63.8	-28.7	12	19
14.5	63.8	-49.3	12	20
44.7	63.8	-19.1	12	21
80.3	63.8	16.5	13	21
38	63.8	-25.8	13	22
50.4	63.8	-13.4	13	23
87.6	63.8	23.8	14	23
92	119	-27	14	24
65.1	119	-53.9	14	25
61.7	119	-57.3	14	26
74.4	119	-44.6	14	27
72.2	119	-46.8	14	28
43.7	119	-75.3	14	29
66.6	119	-52.4	14	30
51.5	119	-67.5	14	31

63.5	119	-55.5	14	32
55.8	119	-63.2	14	33
35.1	119	-83.9	14	34
14.5	119	-104.5	14	35
44.7	119	-74.3	14	36
80.3	119	-38.7	14	37
38	119	-81	14	38
50.4	119	-68.6	14	39
87.6	119	-31.4	14	40
65.1	92	-26.9	14	41
61.7	92	-30.3	14	42
74.4	92	-17.6	14	43
72.2	92	-19.8	14	44
43.7	92	-48.3	14	45
66.6	92	-25.4	14	46
51.5	92	-40.5	14	47
63.5	92	-28.5	14	48
55.8	92	-36.2	14	49
35.1	92	-56.9	14	50
14.5	92	-77.5	14	51
44.7	92	-47.3	14	52
80.3	92	-11.7	14	53
38	92	-54	14	54
50.4	92	-41.6	14	55
87.6	92	-4.4	14	56
61.7	65.1	-3.4	14	57
74.4	65.1	9.3	15	57
72.2	65.1	7.1	16	57
43.7	65.1	-21.4	16	58
66.6	65.1	1.5	17	58
51.5	65.1	-13.6	17	59
63.5	65.1	-1.6	17	60
55.8	65.1	-9.3	17	61
35.1	65.1	-30	17	62
14.5	65.1	-50.6	17	63
44.7	65.1	-20.4	17	64
80.3	65.1	15.2	18	64
38	65.1	-27.1	18	65
50.4	65.1	-14.7	18	66
87.6	65.1	22.5	19	66
74.4	61.7	12.7	20	66
72.2	61.7	10.5	21	66
43.7	61.7	-18	21	67
66.6	61.7	4.9	22	67
51.5	61.7	-10.2	22	68
63.5	61.7	1.8	23	68
55.8	61.7	-5.9	23	69
35.1	61.7	-26.6	23	70
14.5	61.7	-47.2	23	71
44.7	61.7	-17	23	72
80.3	61.7	18.6	24	72
38	61.7	-23.7	24	73
50.4	61.7	-11.3	24	74
87.6	61.7	25.9	25	74

72.2	74.4	-2.2	25	75
43.7	74.4	-30.7	25	76
66.6	74.4	-7.8	25	77
51.5	74.4	-22.9	25	78
63.5	74.4	-10.9	25	79
55.8	74.4	-18.6	25	80
35.1	74.4	-39.3	25	81
14.5	74.4	-59.9	25	82
44.7	74.4	-29.7	25	83
80.3	74.4	5.9	26	83
38	74.4	-36.4	26	84
50.4	74.4	-24	26	85
87.6	74.4	13.2	27	85
43.7	72.2	-28.5	27	86
66.6	72.2	-5.6	27	87
51.5	72.2	-20.7	27	88
63.5	72.2	-8.7	27	89
55.8	72.2	-16.4	27	90
35.1	72.2	-37.1	27	91
14.5	72.2	-57.7	27	92
44.7	72.2	-27.5	27	93
80.3	72.2	8.1	28	93
38	72.2	-34.2	28	94
50.4	72.2	-21.8	28	95
87.6	72.2	15.4	29	95
66.6	43.7	22.9	30	95
51.5	43.7	7.8	31	95
63.5	43.7	19.8	32	95
55.8	43.7	12.1	33	95
35.1	43.7	-8.6	33	96
14.5	43.7	-29.2	33	97
44.7	43.7	1	34	97
80.3	43.7	36.6	35	97
38	43.7	-5.7	35	98
50.4	43.7	6.7	36	98
87.6	43.7	43.9	37	98
51.5	66.6	-15.1	37	99
63.5	66.6	-3.1	37	100
55.8	66.6	-10.8	37	101
35.1	66.6	-31.5	37	102
14.5	66.6	-52.1	37	103
44.7	66.6	-21.9	37	104
80.3	66.6	13.7	38	104
38	66.6	-28.6	38	105
50.4	66.6	-16.2	38	106
87.6	66.6	21	39	106
63.5	51.5	12	40	106
55.8	51.5	4.3	41	106
35.1	51.5	-16.4	41	107
14.5	51.5	-37	41	108
44.7	51.5	-6.8	41	109
80.3	51.5	28.8	42	109

38	51.5	-13.5	42	110
50.4	51.5	-1.1	42	111
87.6	51.5	36.1	43	111
55.8	63.5	-7.7	43	112
35.1	63.5	-28.4	43	113
14.5	63.5	-49	43	114
44.7	63.5	-18.8	43	115
80.3	63.5	16.8	44	115
38	63.5	-25.5	44	116
50.4	63.5	-13.1	44	117
87.6	63.5	24.1	45	117
35.1	55.8	-20.7	45	118
14.5	55.8	-41.3	45	119
44.7	55.8	-11.1	45	120
80.3	55.8	24.5	46	120
38	55.8	-17.8	46	121
50.4	55.8	-5.4	46	122
87.6	55.8	31.8	47	122
14.5	35.1	-20.6	47	123
44.7	35.1	9.6	48	123
80.3	35.1	45.2	49	123
38	35.1	2.9	50	123
50.4	35.1	15.3	51	123
87.6	35.1	52.5	52	123
44.7	14.5	30.2	53	123
80.3	14.5	65.8	54	123
38	14.5	23.5	55	123
50.4	14.5	35.9	56	123
87.6	14.5	73.1	57	123
80.3	44.7	35.6	58	123
38	44.7	-6.7	58	124
50.4	44.7	5.7	59	124
87.6	44.7	42.9	60	124
38	80.3	-42.3	60	125
50.4	80.3	-29.9	60	126
87.6	80.3	7.3	61	126
50.4	38	12.4	62	126
87.6	38	49.6	63	126
87.6	50.4	37.2	64	126

S Statistic = 64 - 126 = -62

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -1.9791

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.9791 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW19-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3450	3760	-310	0	1
3380	3760	-380	0	2
2770	3760	-990	0	3
2280	3760	-1480	0	4
2550	3760	-1210	0	5
1670	3760	-2090	0	6
1320	3760	-2440	0	7
1710	3760	-2050	0	8
1770	3760	-1990	0	9
1710	3760	-2050	0	10
1880	3760	-1880	0	11
1700	3760	-2060	0	12
1560	3760	-2200	0	13
1610	3760	-2150	0	14
1900	3760	-1860	0	15
1320	3760	-2440	0	16
2420	3760	-1340	0	17
1580	3760	-2180	0	18
1500	3760	-2260	0	19
3380	3450	-70	0	20
2770	3450	-680	0	21
2280	3450	-1170	0	22
2550	3450	-900	0	23
1670	3450	-1780	0	24
1320	3450	-2130	0	25
1710	3450	-1740	0	26
1770	3450	-1680	0	27
1710	3450	-1740	0	28
1880	3450	-1570	0	29
1700	3450	-1750	0	30
1560	3450	-1890	0	31
1610	3450	-1840	0	32
1900	3450	-1550	0	33
1320	3450	-2130	0	34
2420	3450	-1030	0	35
1580	3450	-1870	0	36
1500	3450	-1950	0	37
2770	3380	-610	0	38
2280	3380	-1100	0	39
2550	3380	-830	0	40
1670	3380	-1710	0	41
1320	3380	-2060	0	42
1710	3380	-1670	0	43
1770	3380	-1610	0	44
1710	3380	-1670	0	45

1880	3380	-1500	0	46
1700	3380	-1680	0	47
1560	3380	-1820	0	48
1610	3380	-1770	0	49
1900	3380	-1480	0	50
1320	3380	-2060	0	51
2420	3380	-960	0	52
1580	3380	-1800	0	53
1500	3380	-1880	0	54
2280	2770	-490	0	55
2550	2770	-220	0	56
1670	2770	-1100	0	57
1320	2770	-1450	0	58
1710	2770	-1060	0	59
1770	2770	-1000	0	60
1710	2770	-1060	0	61
1880	2770	-890	0	62
1700	2770	-1070	0	63
1560	2770	-1210	0	64
1610	2770	-1160	0	65
1900	2770	-870	0	66
1320	2770	-1450	0	67
2420	2770	-350	0	68
1580	2770	-1190	0	69
1500	2770	-1270	0	70
2550	2280	270	1	70
1670	2280	-610	1	71
1320	2280	-960	1	72
1710	2280	-570	1	73
1770	2280	-510	1	74
1710	2280	-570	1	75
1880	2280	-400	1	76
1700	2280	-580	1	77
1560	2280	-720	1	78
1610	2280	-670	1	79
1900	2280	-380	1	80
1320	2280	-960	1	81
2420	2280	140	2	81
1580	2280	-700	2	82
1500	2280	-780	2	83
1670	2550	-880	2	84
1320	2550	-1230	2	85
1710	2550	-840	2	86
1770	2550	-780	2	87
1710	2550	-840	2	88
1880	2550	-670	2	89
1700	2550	-850	2	90
1560	2550	-990	2	91
1610	2550	-940	2	92
1900	2550	-650	2	93
1320	2550	-1230	2	94
2420	2550	-130	2	95
1580	2550	-970	2	96
1500	2550	-1050	2	97

1320	1670	-350	2	98
1710	1670	40	3	98
1770	1670	100	4	98
1710	1670	40	5	98
1880	1670	210	6	98
1700	1670	30	7	98
1560	1670	-110	7	99
1610	1670	-60	7	100
1900	1670	230	8	100
1320	1670	-350	8	101
2420	1670	750	9	101
1580	1670	-90	9	102
1500	1670	-170	9	103
1710	1320	390	10	103
1770	1320	450	11	103
1710	1320	390	12	103
1880	1320	560	13	103
1700	1320	380	14	103
1560	1320	240	15	103
1610	1320	290	16	103
1900	1320	580	17	103
1320	1320	0	17	103
2420	1320	1100	18	103
1580	1320	260	19	103
1500	1320	180	20	103
1770	1710	60	21	103
1710	1710	0	21	103
1880	1710	170	22	103
1700	1710	-10	22	104
1560	1710	-150	22	105
1610	1710	-100	22	106
1900	1710	190	23	106
1320	1710	-390	23	107
2420	1710	710	24	107
1580	1710	-130	24	108
1500	1710	-210	24	109
1710	1770	-60	24	110
1880	1770	110	25	110
1700	1770	-70	25	111
1560	1770	-210	25	112
1610	1770	-160	25	113
1900	1770	130	26	113
1320	1770	-450	26	114
2420	1770	650	27	114
1580	1770	-190	27	115
1500	1770	-270	27	116
1880	1710	170	28	116
1700	1710	-10	28	117
1560	1710	-150	28	118
1610	1710	-100	28	119
1900	1710	190	29	119
1320	1710	-390	29	120

2420	1710	710	30	120
1580	1710	-130	30	121
1500	1710	-210	30	122
1700	1880	-180	30	123
1560	1880	-320	30	124
1610	1880	-270	30	125
1900	1880	20	31	125
1320	1880	-560	31	126
2420	1880	540	32	126
1580	1880	-300	32	127
1500	1880	-380	32	128
1560	1700	-140	32	129
1610	1700	-90	32	130
1900	1700	200	33	130
1320	1700	-380	33	131
2420	1700	720	34	131
1580	1700	-120	34	132
1500	1700	-200	34	133
1610	1560	50	35	133
1900	1560	340	36	133
1320	1560	-240	36	134
2420	1560	860	37	134
1580	1560	20	38	134
1500	1560	-60	38	135
1900	1610	290	39	135
1320	1610	-290	39	136
2420	1610	810	40	136
1580	1610	-30	40	137
1500	1610	-110	40	138
1320	1900	-580	40	139
2420	1900	520	41	139
1580	1900	-320	41	140
1500	1900	-400	41	141
2420	1320	1100	42	141
1580	1320	260	43	141
1500	1320	180	44	141
1580	2420	-840	44	142
1500	2420	-920	44	143
1500	1580	-80	44	144

S Statistic = 44 - 144 = -100

Tied Group	Value	Members
1	1320	2
2	1710	2

Time Period	Observations
2/1/2017	1

3/1/2017	1
4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 36

B = 0

C = 0

D = 0

E = 4

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 948

Z-Score = -3.21537

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-3.21537 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW22-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3 U	0.35	2.65	1	0
2.3	0.35	1.95	2	0
3 U	0.35	2.65	3	0
3.8	0.35	3.45	4	0
15.2	0.35	14.85	5	0
4.1	0.35	3.75	6	0
3 U	0.35	2.65	7	0
3 U	0.35	2.65	8	0
3 U	0.35	2.65	9	0
3 U	0.35	2.65	10	0
3 U	0.35	2.65	11	0
2.3	3 U	-0.7	11	1
3 U	3 U	0	11	1
3.8	3 U	0.8	12	1
15.2	3 U	12.2	13	1
4.1	3 U	1.1	14	1
3 U	3 U	0	14	1
3 U	3 U	0	14	1
3 U	3 U	0	14	1
3 U	3 U	0	14	1
3 U	3 U	0	14	1
3 U	2.3	0.7	15	1
3.8	2.3	1.5	16	1
15.2	2.3	12.9	17	1
4.1	2.3	1.8	18	1
3 U	2.3	0.7	19	1
3 U	2.3	0.7	20	1
3 U	2.3	0.7	21	1
3 U	2.3	0.7	22	1
3 U	2.3	0.7	23	1
3.8	3 U	0.8	24	1
15.2	3 U	12.2	25	1
4.1	3 U	1.1	26	1
3 U	3 U	0	26	1
3 U	3 U	0	26	1
3 U	3 U	0	26	1
3 U	3 U	0	26	1
3 U	3 U	0	26	1
3 U	3 U	0	26	1
15.2	3.8	11.4	27	1
4.1	3.8	0.3	28	1
3 U	3.8	-0.8	28	2
3 U	3.8	-0.8	28	3
3 U	3.8	-0.8	28	4

3 U	3.8	-0.8	28	5
3 U	3.8	-0.8	28	6
4.1	15.2	-11.1	28	7
3 U	15.2	-12.2	28	8
3 U	15.2	-12.2	28	9
3 U	15.2	-12.2	28	10
3 U	15.2	-12.2	28	11
3 U	15.2	-12.2	28	12
3 U	4.1	-1.1	28	13
3 U	4.1	-1.1	28	14
3 U	4.1	-1.1	28	15
3 U	4.1	-1.1	28	16
3 U	4.1	-1.1	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17

S Statistic = 28 - 17 = 11

Tied Group	Value	Members
1	3	7

Time Period	Observations
6/1/2017	1
7/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1

There are 0 time periods with multiple data

A = 798
 B = 0
 C = 210
 D = 0
 E = 42
 F = 0

a = 3828

b = 11880

c = 264

Group Variance = 168.333

Z-Score = 0.770752

Comparison Level at 95% confidence level = -1.65463 (downward trend)

0.770752 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW01-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
12.3	6.68	5.62	1	0
8.03	6.68	1.35	2	0
12.07	6.68	5.39	3	0
6.74	6.68	0.06	4	0
13.17	6.68	6.49	5	0
12.42	6.68	5.74	6	0
8.52	6.68	1.84	7	0
10.97	6.68	4.29	8	0
6.2	6.68	-0.48	8	1
6.49	6.68	-0.19	8	2
6.26	6.68	-0.42	8	3
6.23	6.68	-0.45	8	4
6.03	6.68	-0.65	8	5
8.03	12.3	-4.27	8	6
12.07	12.3	-0.23	8	7
6.74	12.3	-5.56	8	8
13.17	12.3	0.87	9	8
12.42	12.3	0.12	10	8
8.52	12.3	-3.78	10	9
10.97	12.3	-1.33	10	10
6.2	12.3	-6.1	10	11
6.49	12.3	-5.81	10	12
6.26	12.3	-6.04	10	13
6.23	12.3	-6.07	10	14
6.03	12.3	-6.27	10	15
12.07	8.03	4.04	11	15
6.74	8.03	-1.29	11	16
13.17	8.03	5.14	12	16
12.42	8.03	4.39	13	16
8.52	8.03	0.49	14	16
10.97	8.03	2.94	15	16
6.2	8.03	-1.83	15	17
6.49	8.03	-1.54	15	18
6.26	8.03	-1.77	15	19
6.23	8.03	-1.8	15	20
6.03	8.03	-2	15	21
6.74	12.07	-5.33	15	22
13.17	12.07	1.1	16	22
12.42	12.07	0.35	17	22
8.52	12.07	-3.55	17	23
10.97	12.07	-1.1	17	24
6.2	12.07	-5.87	17	25
6.49	12.07	-5.58	17	26
6.26	12.07	-5.81	17	27

6.23	12.07	-5.84	17	28
6.03	12.07	-6.04	17	29
13.17	6.74	6.43	18	29
12.42	6.74	5.68	19	29
8.52	6.74	1.78	20	29
10.97	6.74	4.23	21	29
6.2	6.74	-0.54	21	30
6.49	6.74	-0.25	21	31
6.26	6.74	-0.48	21	32
6.23	6.74	-0.51	21	33
6.03	6.74	-0.71	21	34
12.42	13.17	-0.75	21	35
8.52	13.17	-4.65	21	36
10.97	13.17	-2.2	21	37
6.2	13.17	-6.97	21	38
6.49	13.17	-6.68	21	39
6.26	13.17	-6.91	21	40
6.23	13.17	-6.94	21	41
6.03	13.17	-7.14	21	42
8.52	12.42	-3.9	21	43
10.97	12.42	-1.45	21	44
6.2	12.42	-6.22	21	45
6.49	12.42	-5.93	21	46
6.26	12.42	-6.16	21	47
6.23	12.42	-6.19	21	48
6.03	12.42	-6.39	21	49
10.97	8.52	2.45	22	49
6.2	8.52	-2.32	22	50
6.49	8.52	-2.03	22	51
6.26	8.52	-2.26	22	52
6.23	8.52	-2.29	22	53
6.03	8.52	-2.49	22	54
6.2	10.97	-4.77	22	55
6.49	10.97	-4.48	22	56
6.26	10.97	-4.71	22	57
6.23	10.97	-4.74	22	58
6.03	10.97	-4.94	22	59
6.49	6.2	0.29	23	59
6.26	6.2	0.06	24	59
6.23	6.2	0.03	25	59
6.03	6.2	-0.17	25	60
6.26	6.49	-0.23	25	61
6.23	6.49	-0.26	25	62
6.03	6.49	-0.46	25	63
6.23	6.26	-0.03	25	64
6.03	6.26	-0.23	25	65
6.03	6.23	-0.2	25	66

S Statistic = 25 - 66 = -41

Tied Group	Value	Members
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Time Period	Observations
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8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -2.1898

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-2.1898 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW02-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
12.2	6.73	5.47	1	0
12.39	6.73	5.66	2	0
11.95	6.73	5.22	3	0
11.4	6.73	4.67	4	0
12.87	6.73	6.14	5	0
10.02	6.73	3.29	6	0
7.82	6.73	1.09	7	0
8.93	6.73	2.2	8	0
6.6	6.73	-0.13	8	1
9.11	6.73	2.38	9	1
6.39	6.73	-0.34	9	2
6.21	6.73	-0.52	9	3
6.66	6.73	-0.07	9	4
12.39	12.2	0.19	10	4
11.95	12.2	-0.25	10	5
11.4	12.2	-0.8	10	6
12.87	12.2	0.67	11	6
10.02	12.2	-2.18	11	7
7.82	12.2	-4.38	11	8
8.93	12.2	-3.27	11	9
6.6	12.2	-5.6	11	10
9.11	12.2	-3.09	11	11
6.39	12.2	-5.81	11	12
6.21	12.2	-5.99	11	13
6.66	12.2	-5.54	11	14
11.95	12.39	-0.44	11	15
11.4	12.39	-0.99	11	16
12.87	12.39	0.48	12	16
10.02	12.39	-2.37	12	17
7.82	12.39	-4.57	12	18
8.93	12.39	-3.46	12	19
6.6	12.39	-5.79	12	20
9.11	12.39	-3.28	12	21
6.39	12.39	-6	12	22
6.21	12.39	-6.18	12	23
6.66	12.39	-5.73	12	24
11.4	11.95	-0.55	12	25
12.87	11.95	0.92	13	25
10.02	11.95	-1.93	13	26
7.82	11.95	-4.13	13	27
8.93	11.95	-3.02	13	28
6.6	11.95	-5.35	13	29
9.11	11.95	-2.84	13	30
6.39	11.95	-5.56	13	31

6.21	11.95	-5.74	13	32
6.66	11.95	-5.29	13	33
12.87	11.4	1.47	14	33
10.02	11.4	-1.38	14	34
7.82	11.4	-3.58	14	35
8.93	11.4	-2.47	14	36
6.6	11.4	-4.8	14	37
9.11	11.4	-2.29	14	38
6.39	11.4	-5.01	14	39
6.21	11.4	-5.19	14	40
6.66	11.4	-4.74	14	41
10.02	12.87	-2.85	14	42
7.82	12.87	-5.05	14	43
8.93	12.87	-3.94	14	44
6.6	12.87	-6.27	14	45
9.11	12.87	-3.76	14	46
6.39	12.87	-6.48	14	47
6.21	12.87	-6.66	14	48
6.66	12.87	-6.21	14	49
7.82	10.02	-2.2	14	50
8.93	10.02	-1.09	14	51
6.6	10.02	-3.42	14	52
9.11	10.02	-0.91	14	53
6.39	10.02	-3.63	14	54
6.21	10.02	-3.81	14	55
6.66	10.02	-3.36	14	56
8.93	7.82	1.11	15	56
6.6	7.82	-1.22	15	57
9.11	7.82	1.29	16	57
6.39	7.82	-1.43	16	58
6.21	7.82	-1.61	16	59
6.66	7.82	-1.16	16	60
6.6	8.93	-2.33	16	61
9.11	8.93	0.18	17	61
6.39	8.93	-2.54	17	62
6.21	8.93	-2.72	17	63
6.66	8.93	-2.27	17	64
9.11	6.6	2.51	18	64
6.39	6.6	-0.21	18	65
6.21	6.6	-0.39	18	66
6.66	6.6	0.06	19	66
6.39	9.11	-2.72	19	67
6.21	9.11	-2.9	19	68
6.66	9.11	-2.45	19	69
6.21	6.39	-0.18	19	70
6.66	6.39	0.27	20	70
6.66	6.21	0.45	21	70

S Statistic = 21 - 70 = -49

Tied Group	Value	Members
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Time Period	Observations
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8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -2.62775

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-2.62775 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW03-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
6.04	6.41	-0.37	0	1
6.28	6.41	-0.13	0	2
5.97	6.41	-0.44	0	3
5.96	6.41	-0.45	0	4
6.21	6.41	-0.2	0	5
6.02	6.41	-0.39	0	6
6.34	6.41	-0.07	0	7
5.8	6.41	-0.61	0	8
5.67	6.41	-0.74	0	9
5.68	6.41	-0.73	0	10
6.4	6.41	-0.01	0	11
5.82	6.41	-0.59	0	12
6.26	6.41	-0.15	0	13
7.57	6.41	1.16	1	13
6.6	6.41	0.19	2	13
5.83	6.41	-0.58	2	14
6.07	6.41	-0.34	2	15
5.7	6.41	-0.71	2	16
6.54	6.41	0.13	3	16
6.28	6.04	0.24	4	16
5.97	6.04	-0.07	4	17
5.96	6.04	-0.08	4	18
6.21	6.04	0.17	5	18
6.02	6.04	-0.02	5	19
6.34	6.04	0.3	6	19
5.8	6.04	-0.24	6	20
5.67	6.04	-0.37	6	21
5.68	6.04	-0.36	6	22
6.4	6.04	0.36	7	22
5.82	6.04	-0.22	7	23
6.26	6.04	0.22	8	23
7.57	6.04	1.53	9	23
6.6	6.04	0.56	10	23
5.83	6.04	-0.21	10	24
6.07	6.04	0.03	11	24
5.7	6.04	-0.34	11	25
6.54	6.04	0.5	12	25
5.97	6.28	-0.31	12	26
5.96	6.28	-0.32	12	27
6.21	6.28	-0.07	12	28
6.02	6.28	-0.26	12	29
6.34	6.28	0.06	13	29
5.8	6.28	-0.48	13	30
5.67	6.28	-0.61	13	31
5.68	6.28	-0.6	13	32

6.4	6.28	0.12	14	32
5.82	6.28	-0.46	14	33
6.26	6.28	-0.02	14	34
7.57	6.28	1.29	15	34
6.6	6.28	0.32	16	34
5.83	6.28	-0.45	16	35
6.07	6.28	-0.21	16	36
5.7	6.28	-0.58	16	37
6.54	6.28	0.26	17	37
5.96	5.97	-0.01	17	38
6.21	5.97	0.24	18	38
6.02	5.97	0.05	19	38
6.34	5.97	0.37	20	38
5.8	5.97	-0.17	20	39
5.67	5.97	-0.3	20	40
5.68	5.97	-0.29	20	41
6.4	5.97	0.43	21	41
5.82	5.97	-0.15	21	42
6.26	5.97	0.29	22	42
7.57	5.97	1.6	23	42
6.6	5.97	0.63	24	42
5.83	5.97	-0.14	24	43
6.07	5.97	0.1	25	43
5.7	5.97	-0.27	25	44
6.54	5.97	0.57	26	44
6.21	5.96	0.25	27	44
6.02	5.96	0.06	28	44
6.34	5.96	0.38	29	44
5.8	5.96	-0.16	29	45
5.67	5.96	-0.29	29	46
5.68	5.96	-0.28	29	47
6.4	5.96	0.44	30	47
5.82	5.96	-0.14	30	48
6.26	5.96	0.3	31	48
7.57	5.96	1.61	32	48
6.6	5.96	0.64	33	48
5.83	5.96	-0.13	33	49
6.07	5.96	0.11	34	49
5.7	5.96	-0.26	34	50
6.54	5.96	0.58	35	50
6.02	6.21	-0.19	35	51
6.34	6.21	0.13	36	51
5.8	6.21	-0.41	36	52
5.67	6.21	-0.54	36	53
5.68	6.21	-0.53	36	54
6.4	6.21	0.19	37	54
5.82	6.21	-0.39	37	55
6.26	6.21	0.05	38	55
7.57	6.21	1.36	39	55
6.6	6.21	0.39	40	55
5.83	6.21	-0.38	40	56
6.07	6.21	-0.14	40	57
5.7	6.21	-0.51	40	58
6.54	6.21	0.33	41	58

6.34	6.02	0.32	42	58
5.8	6.02	-0.22	42	59
5.67	6.02	-0.35	42	60
5.68	6.02	-0.34	42	61
6.4	6.02	0.38	43	61
5.82	6.02	-0.2	43	62
6.26	6.02	0.24	44	62
7.57	6.02	1.55	45	62
6.6	6.02	0.58	46	62
5.83	6.02	-0.19	46	63
6.07	6.02	0.05	47	63
5.7	6.02	-0.32	47	64
6.54	6.02	0.52	48	64
5.8	6.34	-0.54	48	65
5.67	6.34	-0.67	48	66
5.68	6.34	-0.66	48	67
6.4	6.34	0.06	49	67
5.82	6.34	-0.52	49	68
6.26	6.34	-0.08	49	69
7.57	6.34	1.23	50	69
6.6	6.34	0.26	51	69
5.83	6.34	-0.51	51	70
6.07	6.34	-0.27	51	71
5.7	6.34	-0.64	51	72
6.54	6.34	0.2	52	72
5.67	5.8	-0.13	52	73
5.68	5.8	-0.12	52	74
6.4	5.8	0.6	53	74
5.82	5.8	0.02	54	74
6.26	5.8	0.46	55	74
7.57	5.8	1.77	56	74
6.6	5.8	0.8	57	74
5.83	5.8	0.03	58	74
6.07	5.8	0.27	59	74
5.7	5.8	-0.1	59	75
6.54	5.8	0.74	60	75
5.68	5.67	0.01	61	75
6.4	5.67	0.73	62	75
5.82	5.67	0.15	63	75
6.26	5.67	0.59	64	75
7.57	5.67	1.9	65	75
6.6	5.67	0.93	66	75
5.83	5.67	0.16	67	75
6.07	5.67	0.4	68	75
5.7	5.67	0.03	69	75
6.54	5.67	0.87	70	75
6.4	5.68	0.72	71	75
5.82	5.68	0.14	72	75
6.26	5.68	0.58	73	75
7.57	5.68	1.89	74	75
6.6	5.68	0.92	75	75
5.83	5.68	0.15	76	75

6.07	5.68	0.39	77	75
5.7	5.68	0.02	78	75
6.54	5.68	0.86	79	75
5.82	6.4	-0.58	79	76
6.26	6.4	-0.14	79	77
7.57	6.4	1.17	80	77
6.6	6.4	0.2	81	77
5.83	6.4	-0.57	81	78
6.07	6.4	-0.33	81	79
5.7	6.4	-0.7	81	80
6.54	6.4	0.14	82	80
6.26	5.82	0.44	83	80
7.57	5.82	1.75	84	80
6.6	5.82	0.78	85	80
5.83	5.82	0.01	86	80
6.07	5.82	0.25	87	80
5.7	5.82	-0.12	87	81
6.54	5.82	0.72	88	81
7.57	6.26	1.31	89	81
6.6	6.26	0.34	90	81
5.83	6.26	-0.43	90	82
6.07	6.26	-0.19	90	83
5.7	6.26	-0.56	90	84
6.54	6.26	0.28	91	84
6.6	7.57	-0.97	91	85
5.83	7.57	-1.74	91	86
6.07	7.57	-1.5	91	87
5.7	7.57	-1.87	91	88
6.54	7.57	-1.03	91	89
5.83	6.6	-0.77	91	90
6.07	6.6	-0.53	91	91
5.7	6.6	-0.9	91	92
6.54	6.6	-0.06	91	93
6.07	5.83	0.24	92	93
5.7	5.83	-0.13	92	94
6.54	5.83	0.71	93	94
5.7	6.07	-0.37	93	95
6.54	6.07	0.47	94	95
6.54	5.7	0.84	95	95

S Statistic = 95 - 95 = 0

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 0

Comparison Level at 95% confidence level = -1.65463 (downward trend)

0 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW06-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.71	5.85	-0.14	0	1
5.94	5.85	0.09	1	1
6.06	5.85	0.21	2	1
5.81	5.85	-0.04	2	2
6.08	5.85	0.23	3	2
5.7	5.85	-0.15	3	3
6.11	5.85	0.26	4	3
6.16	5.85	0.31	5	3
5.84	5.85	-0.01	5	4
6	5.85	0.15	6	4
5.92	5.85	0.07	7	4
5.68	5.85	-0.17	7	5
7.44	5.85	1.59	8	5
6.66	5.85	0.81	9	5
5.8	5.85	-0.05	9	6
5.52	5.85	-0.33	9	7
7.16	5.85	1.31	10	7
5.34	5.85	-0.51	10	8
7.88	5.85	2.03	11	8
5.94	5.71	0.23	12	8
6.06	5.71	0.35	13	8
5.81	5.71	0.1	14	8
6.08	5.71	0.37	15	8
5.7	5.71	-0.01	15	9
6.11	5.71	0.4	16	9
6.16	5.71	0.45	17	9
5.84	5.71	0.13	18	9
6	5.71	0.29	19	9
5.92	5.71	0.21	20	9
5.68	5.71	-0.03	20	10
7.44	5.71	1.73	21	10
6.66	5.71	0.95	22	10
5.8	5.71	0.09	23	10
5.52	5.71	-0.19	23	11
7.16	5.71	1.45	24	11
5.34	5.71	-0.37	24	12
7.88	5.71	2.17	25	12
6.06	5.94	0.12	26	12
5.81	5.94	-0.13	26	13
6.08	5.94	0.14	27	13
5.7	5.94	-0.24	27	14
6.11	5.94	0.17	28	14
6.16	5.94	0.22	29	14
5.84	5.94	-0.1	29	15
6	5.94	0.06	30	15

5.92	5.94	-0.02	30	16
5.68	5.94	-0.26	30	17
7.44	5.94	1.5	31	17
6.66	5.94	0.72	32	17
5.8	5.94	-0.14	32	18
5.52	5.94	-0.42	32	19
7.16	5.94	1.22	33	19
5.34	5.94	-0.6	33	20
7.88	5.94	1.94	34	20
5.81	6.06	-0.25	34	21
6.08	6.06	0.02	35	21
5.7	6.06	-0.36	35	22
6.11	6.06	0.05	36	22
6.16	6.06	0.1	37	22
5.84	6.06	-0.22	37	23
6	6.06	-0.06	37	24
5.92	6.06	-0.14	37	25
5.68	6.06	-0.38	37	26
7.44	6.06	1.38	38	26
6.66	6.06	0.6	39	26
5.8	6.06	-0.26	39	27
5.52	6.06	-0.54	39	28
7.16	6.06	1.1	40	28
5.34	6.06	-0.72	40	29
7.88	6.06	1.82	41	29
6.08	5.81	0.27	42	29
5.7	5.81	-0.11	42	30
6.11	5.81	0.3	43	30
6.16	5.81	0.35	44	30
5.84	5.81	0.03	45	30
6	5.81	0.19	46	30
5.92	5.81	0.11	47	30
5.68	5.81	-0.13	47	31
7.44	5.81	1.63	48	31
6.66	5.81	0.85	49	31
5.8	5.81	-0.01	49	32
5.52	5.81	-0.29	49	33
7.16	5.81	1.35	50	33
5.34	5.81	-0.47	50	34
7.88	5.81	2.07	51	34
5.7	6.08	-0.38	51	35
6.11	6.08	0.03	52	35
6.16	6.08	0.08	53	35
5.84	6.08	-0.24	53	36
6	6.08	-0.08	53	37
5.92	6.08	-0.16	53	38
5.68	6.08	-0.4	53	39
7.44	6.08	1.36	54	39
6.66	6.08	0.58	55	39
5.8	6.08	-0.28	55	40
5.52	6.08	-0.56	55	41
7.16	6.08	1.08	56	41
5.34	6.08	-0.74	56	42
7.88	6.08	1.8	57	42

6.11	5.7	0.41	58	42
6.16	5.7	0.46	59	42
5.84	5.7	0.14	60	42
6	5.7	0.3	61	42
5.92	5.7	0.22	62	42
5.68	5.7	-0.02	62	43
7.44	5.7	1.74	63	43
6.66	5.7	0.96	64	43
5.8	5.7	0.1	65	43
5.52	5.7	-0.18	65	44
7.16	5.7	1.46	66	44
5.34	5.7	-0.36	66	45
7.88	5.7	2.18	67	45
6.16	6.11	0.05	68	45
5.84	6.11	-0.27	68	46
6	6.11	-0.11	68	47
5.92	6.11	-0.19	68	48
5.68	6.11	-0.43	68	49
7.44	6.11	1.33	69	49
6.66	6.11	0.55	70	49
5.8	6.11	-0.31	70	50
5.52	6.11	-0.59	70	51
7.16	6.11	1.05	71	51
5.34	6.11	-0.77	71	52
7.88	6.11	1.77	72	52
5.84	6.16	-0.32	72	53
6	6.16	-0.16	72	54
5.92	6.16	-0.24	72	55
5.68	6.16	-0.48	72	56
7.44	6.16	1.28	73	56
6.66	6.16	0.5	74	56
5.8	6.16	-0.36	74	57
5.52	6.16	-0.64	74	58
7.16	6.16	1	75	58
5.34	6.16	-0.82	75	59
7.88	6.16	1.72	76	59
6	5.84	0.16	77	59
5.92	5.84	0.08	78	59
5.68	5.84	-0.16	78	60
7.44	5.84	1.6	79	60
6.66	5.84	0.82	80	60
5.8	5.84	-0.04	80	61
5.52	5.84	-0.32	80	62
7.16	5.84	1.32	81	62
5.34	5.84	-0.5	81	63
7.88	5.84	2.04	82	63
5.92	6	-0.08	82	64
5.68	6	-0.32	82	65
7.44	6	1.44	83	65
6.66	6	0.66	84	65
5.8	6	-0.2	84	66
5.52	6	-0.48	84	67

7.16	6	1.16	85	67
5.34	6	-0.66	85	68
7.88	6	1.88	86	68
5.68	5.92	-0.24	86	69
7.44	5.92	1.52	87	69
6.66	5.92	0.74	88	69
5.8	5.92	-0.12	88	70
5.52	5.92	-0.4	88	71
7.16	5.92	1.24	89	71
5.34	5.92	-0.58	89	72
7.88	5.92	1.96	90	72
7.44	5.68	1.76	91	72
6.66	5.68	0.98	92	72
5.8	5.68	0.12	93	72
5.52	5.68	-0.16	93	73
7.16	5.68	1.48	94	73
5.34	5.68	-0.34	94	74
7.88	5.68	2.2	95	74
6.66	7.44	-0.78	95	75
5.8	7.44	-1.64	95	76
5.52	7.44	-1.92	95	77
7.16	7.44	-0.28	95	78
5.34	7.44	-2.1	95	79
7.88	7.44	0.44	96	79
5.8	6.66	-0.86	96	80
5.52	6.66	-1.14	96	81
7.16	6.66	0.5	97	81
5.34	6.66	-1.32	97	82
7.88	6.66	1.22	98	82
5.52	5.8	-0.28	98	83
7.16	5.8	1.36	99	83
5.34	5.8	-0.46	99	84
7.88	5.8	2.08	100	84
7.16	5.52	1.64	101	84
5.34	5.52	-0.18	101	85
7.88	5.52	2.36	102	85
5.34	7.16	-1.82	102	86
7.88	7.16	0.72	103	86
7.88	5.34	2.54	104	86

S Statistic = 104 - 86 = 18

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 0.551553

Comparison Level at 95% confidence level = -1.65463 (downward trend)

0.551553 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW07-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
6	6.25	-0.25	0	1
6.05	6.25	-0.2	0	2
6.61	6.25	0.36	1	2
6.09	6.25	-0.16	1	3
6.18	6.25	-0.07	1	4
6.54	6.25	0.29	2	4
5.65	6.25	-0.6	2	5
6.66	6.25	0.41	3	5
5.89	6.25	-0.36	3	6
6.6	6.25	0.35	4	6
7.11	6.25	0.86	5	6
6.18	6.25	-0.07	5	7
6.47	6.25	0.22	6	7
6.55	6.25	0.3	7	7
6.5	6.25	0.25	8	7
5.93	6.25	-0.32	8	8
5.68	6.25	-0.57	8	9
5.72	6.25	-0.53	8	10
6.77	6.25	0.52	9	10
6.05	6	0.05	10	10
6.61	6	0.61	11	10
6.09	6	0.09	12	10
6.18	6	0.18	13	10
6.54	6	0.54	14	10
5.65	6	-0.35	14	11
6.66	6	0.66	15	11
5.89	6	-0.11	15	12
6.6	6	0.6	16	12
7.11	6	1.11	17	12
6.18	6	0.18	18	12
6.47	6	0.47	19	12
6.55	6	0.55	20	12
6.5	6	0.5	21	12
5.93	6	-0.07	21	13
5.68	6	-0.32	21	14
5.72	6	-0.28	21	15
6.77	6	0.77	22	15
6.61	6.05	0.56	23	15
6.09	6.05	0.04	24	15
6.18	6.05	0.13	25	15
6.54	6.05	0.49	26	15
5.65	6.05	-0.4	26	16
6.66	6.05	0.61	27	16
5.89	6.05	-0.16	27	17
6.6	6.05	0.55	28	17

7.11	6.05	1.06	29	17
6.18	6.05	0.13	30	17
6.47	6.05	0.42	31	17
6.55	6.05	0.5	32	17
6.5	6.05	0.45	33	17
5.93	6.05	-0.12	33	18
5.68	6.05	-0.37	33	19
5.72	6.05	-0.33	33	20
6.77	6.05	0.72	34	20
6.09	6.61	-0.52	34	21
6.18	6.61	-0.43	34	22
6.54	6.61	-0.07	34	23
5.65	6.61	-0.96	34	24
6.66	6.61	0.05	35	24
5.89	6.61	-0.72	35	25
6.6	6.61	-0.01	35	26
7.11	6.61	0.5	36	26
6.18	6.61	-0.43	36	27
6.47	6.61	-0.14	36	28
6.55	6.61	-0.06	36	29
6.5	6.61	-0.11	36	30
5.93	6.61	-0.68	36	31
5.68	6.61	-0.93	36	32
5.72	6.61	-0.89	36	33
6.77	6.61	0.16	37	33
6.18	6.09	0.09	38	33
6.54	6.09	0.45	39	33
5.65	6.09	-0.44	39	34
6.66	6.09	0.57	40	34
5.89	6.09	-0.2	40	35
6.6	6.09	0.51	41	35
7.11	6.09	1.02	42	35
6.18	6.09	0.09	43	35
6.47	6.09	0.38	44	35
6.55	6.09	0.46	45	35
6.5	6.09	0.41	46	35
5.93	6.09	-0.16	46	36
5.68	6.09	-0.41	46	37
5.72	6.09	-0.37	46	38
6.77	6.09	0.68	47	38
6.54	6.18	0.36	48	38
5.65	6.18	-0.53	48	39
6.66	6.18	0.48	49	39
5.89	6.18	-0.29	49	40
6.6	6.18	0.42	50	40
7.11	6.18	0.93	51	40
6.18	6.18	0	51	40
6.47	6.18	0.29	52	40
6.55	6.18	0.37	53	40
6.5	6.18	0.32	54	40
5.93	6.18	-0.25	54	41
5.68	6.18	-0.5	54	42
5.72	6.18	-0.46	54	43
6.77	6.18	0.59	55	43

5.65	6.54	-0.89	55	44
6.66	6.54	0.12	56	44
5.89	6.54	-0.65	56	45
6.6	6.54	0.06	57	45
7.11	6.54	0.57	58	45
6.18	6.54	-0.36	58	46
6.47	6.54	-0.07	58	47
6.55	6.54	0.01	59	47
6.5	6.54	-0.04	59	48
5.93	6.54	-0.61	59	49
5.68	6.54	-0.86	59	50
5.72	6.54	-0.82	59	51
6.77	6.54	0.23	60	51
6.66	5.65	1.01	61	51
5.89	5.65	0.24	62	51
6.6	5.65	0.95	63	51
7.11	5.65	1.46	64	51
6.18	5.65	0.53	65	51
6.47	5.65	0.82	66	51
6.55	5.65	0.9	67	51
6.5	5.65	0.85	68	51
5.93	5.65	0.28	69	51
5.68	5.65	0.03	70	51
5.72	5.65	0.07	71	51
6.77	5.65	1.12	72	51
5.89	6.66	-0.77	72	52
6.6	6.66	-0.06	72	53
7.11	6.66	0.45	73	53
6.18	6.66	-0.48	73	54
6.47	6.66	-0.19	73	55
6.55	6.66	-0.11	73	56
6.5	6.66	-0.16	73	57
5.93	6.66	-0.73	73	58
5.68	6.66	-0.98	73	59
5.72	6.66	-0.94	73	60
6.77	6.66	0.11	74	60
6.6	5.89	0.71	75	60
7.11	5.89	1.22	76	60
6.18	5.89	0.29	77	60
6.47	5.89	0.58	78	60
6.55	5.89	0.66	79	60
6.5	5.89	0.61	80	60
5.93	5.89	0.04	81	60
5.68	5.89	-0.21	81	61
5.72	5.89	-0.17	81	62
6.77	5.89	0.88	82	62
7.11	6.6	0.51	83	62
6.18	6.6	-0.42	83	63
6.47	6.6	-0.13	83	64
6.55	6.6	-0.05	83	65
6.5	6.6	-0.1	83	66
5.93	6.6	-0.67	83	67

5.68	6.6	-0.92	83	68
5.72	6.6	-0.88	83	69
6.77	6.6	0.17	84	69
6.18	7.11	-0.93	84	70
6.47	7.11	-0.64	84	71
6.55	7.11	-0.56	84	72
6.5	7.11	-0.61	84	73
5.93	7.11	-1.18	84	74
5.68	7.11	-1.43	84	75
5.72	7.11	-1.39	84	76
6.77	7.11	-0.34	84	77
6.47	6.18	0.29	85	77
6.55	6.18	0.37	86	77
6.5	6.18	0.32	87	77
5.93	6.18	-0.25	87	78
5.68	6.18	-0.5	87	79
5.72	6.18	-0.46	87	80
6.77	6.18	0.59	88	80
6.55	6.47	0.08	89	80
6.5	6.47	0.03	90	80
5.93	6.47	-0.54	90	81
5.68	6.47	-0.79	90	82
5.72	6.47	-0.75	90	83
6.77	6.47	0.3	91	83
6.5	6.55	-0.05	91	84
5.93	6.55	-0.62	91	85
5.68	6.55	-0.87	91	86
5.72	6.55	-0.83	91	87
6.77	6.55	0.22	92	87
5.93	6.5	-0.57	92	88
5.68	6.5	-0.82	92	89
5.72	6.5	-0.78	92	90
6.77	6.5	0.27	93	90
5.68	5.93	-0.25	93	91
5.72	5.93	-0.21	93	92
6.77	5.93	0.84	94	92
5.72	5.68	0.04	95	92
6.77	5.68	1.09	96	92
6.77	5.72	1.05	97	92

S Statistic = 97 - 92 = 5

Tied Group	Value	Members
1	6.18	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = 0.129845

Comparison Level at 95% confidence level = -1.65463 (downward trend)

0.129845 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW08-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.57	6.06	-0.49	0	1
6.21	6.06	0.15	1	1
3.14	6.06	-2.92	1	2
3.88	6.06	-2.18	1	3
6.31	6.06	0.25	2	3
6.78	6.06	0.72	3	3
6.34	6.06	0.28	4	3
5.99	6.06	-0.07	4	4
6.21	6.06	0.15	5	4
6.3	6.06	0.24	6	4
6.27	6.06	0.21	7	4
6.57	6.06	0.51	8	4
7.89	6.06	1.83	9	4
6.9	6.06	0.84	10	4
6.54	6.06	0.48	11	4
6.16	6.06	0.1	12	4
6.06	6.06	0	12	4
6.49	6.06	0.43	13	4
6.21	5.57	0.64	14	4
3.14	5.57	-2.43	14	5
3.88	5.57	-1.69	14	6
6.31	5.57	0.74	15	6
6.78	5.57	1.21	16	6
6.34	5.57	0.77	17	6
5.99	5.57	0.42	18	6
6.21	5.57	0.64	19	6
6.3	5.57	0.73	20	6
6.27	5.57	0.7	21	6
6.57	5.57	1	22	6
7.89	5.57	2.32	23	6
6.9	5.57	1.33	24	6
6.54	5.57	0.97	25	6
6.16	5.57	0.59	26	6
6.06	5.57	0.49	27	6
6.49	5.57	0.92	28	6
3.14	6.21	-3.07	28	7
3.88	6.21	-2.33	28	8
6.31	6.21	0.1	29	8
6.78	6.21	0.57	30	8
6.34	6.21	0.13	31	8
5.99	6.21	-0.22	31	9
6.21	6.21	0	31	9
6.3	6.21	0.09	32	9
6.27	6.21	0.06	33	9
6.57	6.21	0.36	34	9

7.89	6.21	1.68	35	9
6.9	6.21	0.69	36	9
6.54	6.21	0.33	37	9
6.16	6.21	-0.05	37	10
6.06	6.21	-0.15	37	11
6.49	6.21	0.28	38	11
3.88	3.14	0.74	39	11
6.31	3.14	3.17	40	11
6.78	3.14	3.64	41	11
6.34	3.14	3.2	42	11
5.99	3.14	2.85	43	11
6.21	3.14	3.07	44	11
6.3	3.14	3.16	45	11
6.27	3.14	3.13	46	11
6.57	3.14	3.43	47	11
7.89	3.14	4.75	48	11
6.9	3.14	3.76	49	11
6.54	3.14	3.4	50	11
6.16	3.14	3.02	51	11
6.06	3.14	2.92	52	11
6.49	3.14	3.35	53	11
6.31	3.88	2.43	54	11
6.78	3.88	2.9	55	11
6.34	3.88	2.46	56	11
5.99	3.88	2.11	57	11
6.21	3.88	2.33	58	11
6.3	3.88	2.42	59	11
6.27	3.88	2.39	60	11
6.57	3.88	2.69	61	11
7.89	3.88	4.01	62	11
6.9	3.88	3.02	63	11
6.54	3.88	2.66	64	11
6.16	3.88	2.28	65	11
6.06	3.88	2.18	66	11
6.49	3.88	2.61	67	11
6.78	6.31	0.47	68	11
6.34	6.31	0.03	69	11
5.99	6.31	-0.32	69	12
6.21	6.31	-0.1	69	13
6.3	6.31	-0.01	69	14
6.27	6.31	-0.04	69	15
6.57	6.31	0.26	70	15
7.89	6.31	1.58	71	15
6.9	6.31	0.59	72	15
6.54	6.31	0.23	73	15
6.16	6.31	-0.15	73	16
6.06	6.31	-0.25	73	17
6.49	6.31	0.18	74	17
6.34	6.78	-0.44	74	18
5.99	6.78	-0.79	74	19
6.21	6.78	-0.57	74	20
6.3	6.78	-0.48	74	21
6.27	6.78	-0.51	74	22

6.57	6.78	-0.21	74	23
7.89	6.78	1.11	75	23
6.9	6.78	0.12	76	23
6.54	6.78	-0.24	76	24
6.16	6.78	-0.62	76	25
6.06	6.78	-0.72	76	26
6.49	6.78	-0.29	76	27
5.99	6.34	-0.35	76	28
6.21	6.34	-0.13	76	29
6.3	6.34	-0.04	76	30
6.27	6.34	-0.07	76	31
6.57	6.34	0.23	77	31
7.89	6.34	1.55	78	31
6.9	6.34	0.56	79	31
6.54	6.34	0.2	80	31
6.16	6.34	-0.18	80	32
6.06	6.34	-0.28	80	33
6.49	6.34	0.15	81	33
6.21	5.99	0.22	82	33
6.3	5.99	0.31	83	33
6.27	5.99	0.28	84	33
6.57	5.99	0.58	85	33
7.89	5.99	1.9	86	33
6.9	5.99	0.91	87	33
6.54	5.99	0.55	88	33
6.16	5.99	0.17	89	33
6.06	5.99	0.07	90	33
6.49	5.99	0.5	91	33
6.3	6.21	0.09	92	33
6.27	6.21	0.06	93	33
6.57	6.21	0.36	94	33
7.89	6.21	1.68	95	33
6.9	6.21	0.69	96	33
6.54	6.21	0.33	97	33
6.16	6.21	-0.05	97	34
6.06	6.21	-0.15	97	35
6.49	6.21	0.28	98	35
6.27	6.3	-0.03	98	36
6.57	6.3	0.27	99	36
7.89	6.3	1.59	100	36
6.9	6.3	0.6	101	36
6.54	6.3	0.24	102	36
6.16	6.3	-0.14	102	37
6.06	6.3	-0.24	102	38
6.49	6.3	0.19	103	38
6.57	6.27	0.3	104	38
7.89	6.27	1.62	105	38
6.9	6.27	0.63	106	38
6.54	6.27	0.27	107	38
6.16	6.27	-0.11	107	39
6.06	6.27	-0.21	107	40
6.49	6.27	0.22	108	40

7.89	6.57	1.32	109	40
6.9	6.57	0.33	110	40
6.54	6.57	-0.03	110	41
6.16	6.57	-0.41	110	42
6.06	6.57	-0.51	110	43
6.49	6.57	-0.08	110	44
6.9	7.89	-0.99	110	45
6.54	7.89	-1.35	110	46
6.16	7.89	-1.73	110	47
6.06	7.89	-1.83	110	48
6.49	7.89	-1.4	110	49
6.54	6.9	-0.36	110	50
6.16	6.9	-0.74	110	51
6.06	6.9	-0.84	110	52
6.49	6.9	-0.41	110	53
6.16	6.54	-0.38	110	54
6.06	6.54	-0.48	110	55
6.49	6.54	-0.05	110	56
6.06	6.16	-0.1	110	57
6.49	6.16	0.33	111	57
6.49	6.06	0.43	112	57

S Statistic = 112 - 57 = 55

Tied Group	Value	Members
1	6.06	2
2	6.21	2

Time Period	Observations
2/1/2017	1
3/1/2017	1
4/1/2017	1
5/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 36

B = 0

C = 0

D = 0

E = 4

F = 0

a = 14706

b = 52326

c = 684

Group Variance = 815

Z-Score = 1.89154

Comparison Level at 95% confidence level = -1.65463 (downward trend)

1.89154 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW09-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.96	6.23	-0.27	0	1
5.84	6.23	-0.39	0	2
6	6.23	-0.23	0	3
5.8	6.23	-0.43	0	4
5.67	6.23	-0.56	0	5
5.93	6.23	-0.3	0	6
6.57	6.23	0.34	1	6
6.03	6.23	-0.2	1	7
6.01	6.23	-0.22	1	8
5.96	6.23	-0.27	1	9
5.98	6.23	-0.25	1	10
5.64	6.23	-0.59	1	11
6.35	6.23	0.12	2	11
7.33	6.23	1.1	3	11
6.1	6.23	-0.13	3	12
5.81	6.23	-0.42	3	13
5.75	6.23	-0.48	3	14
5.55	6.23	-0.68	3	15
5.81	6.23	-0.42	3	16
5.84	5.96	-0.12	3	17
6	5.96	0.04	4	17
5.8	5.96	-0.16	4	18
5.67	5.96	-0.29	4	19
5.93	5.96	-0.03	4	20
6.57	5.96	0.61	5	20
6.03	5.96	0.07	6	20
6.01	5.96	0.05	7	20
5.96	5.96	0	7	20
5.98	5.96	0.02	8	20
5.64	5.96	-0.32	8	21
6.35	5.96	0.39	9	21
7.33	5.96	1.37	10	21
6.1	5.96	0.14	11	21
5.81	5.96	-0.15	11	22
5.75	5.96	-0.21	11	23
5.55	5.96	-0.41	11	24
5.81	5.96	-0.15	11	25
6	5.84	0.16	12	25
5.8	5.84	-0.04	12	26
5.67	5.84	-0.17	12	27
5.93	5.84	0.09	13	27
6.57	5.84	0.73	14	27
6.03	5.84	0.19	15	27
6.01	5.84	0.17	16	27
5.96	5.84	0.12	17	27

5.98	5.84	0.14	18	27
5.64	5.84	-0.2	18	28
6.35	5.84	0.51	19	28
7.33	5.84	1.49	20	28
6.1	5.84	0.26	21	28
5.81	5.84	-0.03	21	29
5.75	5.84	-0.09	21	30
5.55	5.84	-0.29	21	31
5.81	5.84	-0.03	21	32
5.8	6	-0.2	21	33
5.67	6	-0.33	21	34
5.93	6	-0.07	21	35
6.57	6	0.57	22	35
6.03	6	0.03	23	35
6.01	6	0.01	24	35
5.96	6	-0.04	24	36
5.98	6	-0.02	24	37
5.64	6	-0.36	24	38
6.35	6	0.35	25	38
7.33	6	1.33	26	38
6.1	6	0.1	27	38
5.81	6	-0.19	27	39
5.75	6	-0.25	27	40
5.55	6	-0.45	27	41
5.81	6	-0.19	27	42
5.67	5.8	-0.13	27	43
5.93	5.8	0.13	28	43
6.57	5.8	0.77	29	43
6.03	5.8	0.23	30	43
6.01	5.8	0.21	31	43
5.96	5.8	0.16	32	43
5.98	5.8	0.18	33	43
5.64	5.8	-0.16	33	44
6.35	5.8	0.55	34	44
7.33	5.8	1.53	35	44
6.1	5.8	0.3	36	44
5.81	5.8	0.01	37	44
5.75	5.8	-0.05	37	45
5.55	5.8	-0.25	37	46
5.81	5.8	0.01	38	46
5.93	5.67	0.26	39	46
6.57	5.67	0.9	40	46
6.03	5.67	0.36	41	46
6.01	5.67	0.34	42	46
5.96	5.67	0.29	43	46
5.98	5.67	0.31	44	46
5.64	5.67	-0.03	44	47
6.35	5.67	0.68	45	47
7.33	5.67	1.66	46	47
6.1	5.67	0.43	47	47
5.81	5.67	0.14	48	47
5.75	5.67	0.08	49	47
5.55	5.67	-0.12	49	48
5.81	5.67	0.14	50	48

6.57	5.93	0.64	51	48
6.03	5.93	0.1	52	48
6.01	5.93	0.08	53	48
5.96	5.93	0.03	54	48
5.98	5.93	0.05	55	48
5.64	5.93	-0.29	55	49
6.35	5.93	0.42	56	49
7.33	5.93	1.4	57	49
6.1	5.93	0.17	58	49
5.81	5.93	-0.12	58	50
5.75	5.93	-0.18	58	51
5.55	5.93	-0.38	58	52
5.81	5.93	-0.12	58	53
6.03	6.57	-0.54	58	54
6.01	6.57	-0.56	58	55
5.96	6.57	-0.61	58	56
5.98	6.57	-0.59	58	57
5.64	6.57	-0.93	58	58
6.35	6.57	-0.22	58	59
7.33	6.57	0.76	59	59
6.1	6.57	-0.47	59	60
5.81	6.57	-0.76	59	61
5.75	6.57	-0.82	59	62
5.55	6.57	-1.02	59	63
5.81	6.57	-0.76	59	64
6.01	6.03	-0.02	59	65
5.96	6.03	-0.07	59	66
5.98	6.03	-0.05	59	67
5.64	6.03	-0.39	59	68
6.35	6.03	0.32	60	68
7.33	6.03	1.3	61	68
6.1	6.03	0.07	62	68
5.81	6.03	-0.22	62	69
5.75	6.03	-0.28	62	70
5.55	6.03	-0.48	62	71
5.81	6.03	-0.22	62	72
5.96	6.01	-0.05	62	73
5.98	6.01	-0.03	62	74
5.64	6.01	-0.37	62	75
6.35	6.01	0.34	63	75
7.33	6.01	1.32	64	75
6.1	6.01	0.09	65	75
5.81	6.01	-0.2	65	76
5.75	6.01	-0.26	65	77
5.55	6.01	-0.46	65	78
5.81	6.01	-0.2	65	79
5.98	5.96	0.02	66	79
5.64	5.96	-0.32	66	80
6.35	5.96	0.39	67	80
7.33	5.96	1.37	68	80
6.1	5.96	0.14	69	80
5.81	5.96	-0.15	69	81

5.75	5.96	-0.21	69	82
5.55	5.96	-0.41	69	83
5.81	5.96	-0.15	69	84
5.64	5.98	-0.34	69	85
6.35	5.98	0.37	70	85
7.33	5.98	1.35	71	85
6.1	5.98	0.12	72	85
5.81	5.98	-0.17	72	86
5.75	5.98	-0.23	72	87
5.55	5.98	-0.43	72	88
5.81	5.98	-0.17	72	89
6.35	5.64	0.71	73	89
7.33	5.64	1.69	74	89
6.1	5.64	0.46	75	89
5.81	5.64	0.17	76	89
5.75	5.64	0.11	77	89
5.55	5.64	-0.09	77	90
5.81	5.64	0.17	78	90
7.33	6.35	0.98	79	90
6.1	6.35	-0.25	79	91
5.81	6.35	-0.54	79	92
5.75	6.35	-0.6	79	93
5.55	6.35	-0.8	79	94
5.81	6.35	-0.54	79	95
6.1	7.33	-1.23	79	96
5.81	7.33	-1.52	79	97
5.75	7.33	-1.58	79	98
5.55	7.33	-1.78	79	99
5.81	7.33	-1.52	79	100
5.81	6.1	-0.29	79	101
5.75	6.1	-0.35	79	102
5.55	6.1	-0.55	79	103
5.81	6.1	-0.29	79	104
5.75	5.81	-0.06	79	105
5.55	5.81	-0.26	79	106
5.81	5.81	0	79	106
5.55	5.75	-0.2	79	107
5.81	5.75	0.06	80	107
5.81	5.55	0.26	81	107

S Statistic = 81 - 107 = -26

Tied Group	Value	Members
1	5.96	2
2	5.81	2

Time Period	Observations
2/1/2017	1

3/1/2017	1
4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 36

B = 0

C = 0

D = 0

E = 4

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 948

Z-Score = -0.811962

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-0.811962 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW10-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
9.93	6.86	3.07	1	0
7.03	6.86	0.17	2	0
8.7	6.86	1.84	3	0
7.15	6.86	0.29	4	0
6.58	6.86	-0.28	4	1
10.92	6.86	4.06	5	1
7.15	6.86	0.29	6	1
6.28	6.86	-0.58	6	2
6.67	6.86	-0.19	6	3
11.21	6.86	4.35	7	3
10.29	6.86	3.43	8	3
6.39	6.86	-0.47	8	4
6.95	6.86	0.09	9	4
7.87	6.86	1.01	10	4
6.5	6.86	-0.36	10	5
6.83	6.86	-0.03	10	6
6.59	6.86	-0.27	10	7
6.11	6.86	-0.75	10	8
6.14	6.86	-0.72	10	9
7.03	9.93	-2.9	10	10
8.7	9.93	-1.23	10	11
7.15	9.93	-2.78	10	12
6.58	9.93	-3.35	10	13
10.92	9.93	0.99	11	13
7.15	9.93	-2.78	11	14
6.28	9.93	-3.65	11	15
6.67	9.93	-3.26	11	16
11.21	9.93	1.28	12	16
10.29	9.93	0.36	13	16
6.39	9.93	-3.54	13	17
6.95	9.93	-2.98	13	18
7.87	9.93	-2.06	13	19
6.5	9.93	-3.43	13	20
6.83	9.93	-3.1	13	21
6.59	9.93	-3.34	13	22
6.11	9.93	-3.82	13	23
6.14	9.93	-3.79	13	24
8.7	7.03	1.67	14	24
7.15	7.03	0.12	15	24
6.58	7.03	-0.45	15	25
10.92	7.03	3.89	16	25
7.15	7.03	0.12	17	25
6.28	7.03	-0.75	17	26
6.67	7.03	-0.36	17	27
11.21	7.03	4.18	18	27

10.29	7.03	3.26	19	27
6.39	7.03	-0.64	19	28
6.95	7.03	-0.08	19	29
7.87	7.03	0.84	20	29
6.5	7.03	-0.53	20	30
6.83	7.03	-0.2	20	31
6.59	7.03	-0.44	20	32
6.11	7.03	-0.92	20	33
6.14	7.03	-0.89	20	34
7.15	8.7	-1.55	20	35
6.58	8.7	-2.12	20	36
10.92	8.7	2.22	21	36
7.15	8.7	-1.55	21	37
6.28	8.7	-2.42	21	38
6.67	8.7	-2.03	21	39
11.21	8.7	2.51	22	39
10.29	8.7	1.59	23	39
6.39	8.7	-2.31	23	40
6.95	8.7	-1.75	23	41
7.87	8.7	-0.83	23	42
6.5	8.7	-2.2	23	43
6.83	8.7	-1.87	23	44
6.59	8.7	-2.11	23	45
6.11	8.7	-2.59	23	46
6.14	8.7	-2.56	23	47
6.58	7.15	-0.57	23	48
10.92	7.15	3.77	24	48
7.15	7.15	0	24	48
6.28	7.15	-0.87	24	49
6.67	7.15	-0.48	24	50
11.21	7.15	4.06	25	50
10.29	7.15	3.14	26	50
6.39	7.15	-0.76	26	51
6.95	7.15	-0.2	26	52
7.87	7.15	0.72	27	52
6.5	7.15	-0.65	27	53
6.83	7.15	-0.32	27	54
6.59	7.15	-0.56	27	55
6.11	7.15	-1.04	27	56
6.14	7.15	-1.01	27	57
10.92	6.58	4.34	28	57
7.15	6.58	0.57	29	57
6.28	6.58	-0.3	29	58
6.67	6.58	0.09	30	58
11.21	6.58	4.63	31	58
10.29	6.58	3.71	32	58
6.39	6.58	-0.19	32	59
6.95	6.58	0.37	33	59
7.87	6.58	1.29	34	59
6.5	6.58	-0.08	34	60
6.83	6.58	0.25	35	60
6.59	6.58	0.01	36	60
6.11	6.58	-0.47	36	61
6.14	6.58	-0.44	36	62

7.15	10.92	-3.77	36	63
6.28	10.92	-4.64	36	64
6.67	10.92	-4.25	36	65
11.21	10.92	0.29	37	65
10.29	10.92	-0.63	37	66
6.39	10.92	-4.53	37	67
6.95	10.92	-3.97	37	68
7.87	10.92	-3.05	37	69
6.5	10.92	-4.42	37	70
6.83	10.92	-4.09	37	71
6.59	10.92	-4.33	37	72
6.11	10.92	-4.81	37	73
6.14	10.92	-4.78	37	74
6.28	7.15	-0.87	37	75
6.67	7.15	-0.48	37	76
11.21	7.15	4.06	38	76
10.29	7.15	3.14	39	76
6.39	7.15	-0.76	39	77
6.95	7.15	-0.2	39	78
7.87	7.15	0.72	40	78
6.5	7.15	-0.65	40	79
6.83	7.15	-0.32	40	80
6.59	7.15	-0.56	40	81
6.11	7.15	-1.04	40	82
6.14	7.15	-1.01	40	83
6.67	6.28	0.39	41	83
11.21	6.28	4.93	42	83
10.29	6.28	4.01	43	83
6.39	6.28	0.11	44	83
6.95	6.28	0.67	45	83
7.87	6.28	1.59	46	83
6.5	6.28	0.22	47	83
6.83	6.28	0.55	48	83
6.59	6.28	0.31	49	83
6.11	6.28	-0.17	49	84
6.14	6.28	-0.14	49	85
11.21	6.67	4.54	50	85
10.29	6.67	3.62	51	85
6.39	6.67	-0.28	51	86
6.95	6.67	0.28	52	86
7.87	6.67	1.2	53	86
6.5	6.67	-0.17	53	87
6.83	6.67	0.16	54	87
6.59	6.67	-0.08	54	88
6.11	6.67	-0.56	54	89
6.14	6.67	-0.53	54	90
10.29	11.21	-0.92	54	91
6.39	11.21	-4.82	54	92
6.95	11.21	-4.26	54	93
7.87	11.21	-3.34	54	94
6.5	11.21	-4.71	54	95
6.83	11.21	-4.38	54	96

6.59	11.21	-4.62	54	97
6.11	11.21	-5.1	54	98
6.14	11.21	-5.07	54	99
6.39	10.29	-3.9	54	100
6.95	10.29	-3.34	54	101
7.87	10.29	-2.42	54	102
6.5	10.29	-3.79	54	103
6.83	10.29	-3.46	54	104
6.59	10.29	-3.7	54	105
6.11	10.29	-4.18	54	106
6.14	10.29	-4.15	54	107
6.95	6.39	0.56	55	107
7.87	6.39	1.48	56	107
6.5	6.39	0.11	57	107
6.83	6.39	0.44	58	107
6.59	6.39	0.2	59	107
6.11	6.39	-0.28	59	108
6.14	6.39	-0.25	59	109
7.87	6.95	0.92	60	109
6.5	6.95	-0.45	60	110
6.83	6.95	-0.12	60	111
6.59	6.95	-0.36	60	112
6.11	6.95	-0.84	60	113
6.14	6.95	-0.81	60	114
6.5	7.87	-1.37	60	115
6.83	7.87	-1.04	60	116
6.59	7.87	-1.28	60	117
6.11	7.87	-1.76	60	118
6.14	7.87	-1.73	60	119
6.83	6.5	0.33	61	119
6.59	6.5	0.09	62	119
6.11	6.5	-0.39	62	120
6.14	6.5	-0.36	62	121
6.59	6.83	-0.24	62	122
6.11	6.83	-0.72	62	123
6.14	6.83	-0.69	62	124
6.11	6.59	-0.48	62	125
6.14	6.59	-0.45	62	126
6.14	6.11	0.03	63	126

S Statistic = 63 - 126 = -63

Tied Group	Value	Members
1	7.15	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = -2.01261

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-2.01261 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW11-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.93	6.05	-0.12	0	1
5.35	6.05	-0.7	0	2
6.11	6.05	0.06	1	2
5.5	6.05	-0.55	1	3
5.66	6.05	-0.39	1	4
5.81	6.05	-0.24	1	5
5.21	6.05	-0.84	1	6
5.92	6.05	-0.13	1	7
6.2	6.05	0.15	2	7
6.16	6.05	0.11	3	7
5.61	6.05	-0.44	3	8
5.98	6.05	-0.07	3	9
6.23	6.05	0.18	4	9
7.27	6.05	1.22	5	9
6.4	6.05	0.35	6	9
5.91	6.05	-0.14	6	10
5.97	6.05	-0.08	6	11
5.65	6.05	-0.4	6	12
5.82	6.05	-0.23	6	13
5.35	5.93	-0.58	6	14
6.11	5.93	0.18	7	14
5.5	5.93	-0.43	7	15
5.66	5.93	-0.27	7	16
5.81	5.93	-0.12	7	17
5.21	5.93	-0.72	7	18
5.92	5.93	-0.01	7	19
6.2	5.93	0.27	8	19
6.16	5.93	0.23	9	19
5.61	5.93	-0.32	9	20
5.98	5.93	0.05	10	20
6.23	5.93	0.3	11	20
7.27	5.93	1.34	12	20
6.4	5.93	0.47	13	20
5.91	5.93	-0.02	13	21
5.97	5.93	0.04	14	21
5.65	5.93	-0.28	14	22
5.82	5.93	-0.11	14	23
6.11	5.35	0.76	15	23
5.5	5.35	0.15	16	23
5.66	5.35	0.31	17	23
5.81	5.35	0.46	18	23
5.21	5.35	-0.14	18	24
5.92	5.35	0.57	19	24
6.2	5.35	0.85	20	24
6.16	5.35	0.81	21	24

5.61	5.35	0.26	22	24
5.98	5.35	0.63	23	24
6.23	5.35	0.88	24	24
7.27	5.35	1.92	25	24
6.4	5.35	1.05	26	24
5.91	5.35	0.56	27	24
5.97	5.35	0.62	28	24
5.65	5.35	0.3	29	24
5.82	5.35	0.47	30	24
5.5	6.11	-0.61	30	25
5.66	6.11	-0.45	30	26
5.81	6.11	-0.3	30	27
5.21	6.11	-0.9	30	28
5.92	6.11	-0.19	30	29
6.2	6.11	0.09	31	29
6.16	6.11	0.05	32	29
5.61	6.11	-0.5	32	30
5.98	6.11	-0.13	32	31
6.23	6.11	0.12	33	31
7.27	6.11	1.16	34	31
6.4	6.11	0.29	35	31
5.91	6.11	-0.2	35	32
5.97	6.11	-0.14	35	33
5.65	6.11	-0.46	35	34
5.82	6.11	-0.29	35	35
5.66	5.5	0.16	36	35
5.81	5.5	0.31	37	35
5.21	5.5	-0.29	37	36
5.92	5.5	0.42	38	36
6.2	5.5	0.7	39	36
6.16	5.5	0.66	40	36
5.61	5.5	0.11	41	36
5.98	5.5	0.48	42	36
6.23	5.5	0.73	43	36
7.27	5.5	1.77	44	36
6.4	5.5	0.9	45	36
5.91	5.5	0.41	46	36
5.97	5.5	0.47	47	36
5.65	5.5	0.15	48	36
5.82	5.5	0.32	49	36
5.81	5.66	0.15	50	36
5.21	5.66	-0.45	50	37
5.92	5.66	0.26	51	37
6.2	5.66	0.54	52	37
6.16	5.66	0.5	53	37
5.61	5.66	-0.05	53	38
5.98	5.66	0.32	54	38
6.23	5.66	0.57	55	38
7.27	5.66	1.61	56	38
6.4	5.66	0.74	57	38
5.91	5.66	0.25	58	38
5.97	5.66	0.31	59	38
5.65	5.66	-0.01	59	39
5.82	5.66	0.16	60	39

5.21	5.81	-0.6	60	40
5.92	5.81	0.11	61	40
6.2	5.81	0.39	62	40
6.16	5.81	0.35	63	40
5.61	5.81	-0.2	63	41
5.98	5.81	0.17	64	41
6.23	5.81	0.42	65	41
7.27	5.81	1.46	66	41
6.4	5.81	0.59	67	41
5.91	5.81	0.1	68	41
5.97	5.81	0.16	69	41
5.65	5.81	-0.16	69	42
5.82	5.81	0.01	70	42
5.92	5.21	0.71	71	42
6.2	5.21	0.99	72	42
6.16	5.21	0.95	73	42
5.61	5.21	0.4	74	42
5.98	5.21	0.77	75	42
6.23	5.21	1.02	76	42
7.27	5.21	2.06	77	42
6.4	5.21	1.19	78	42
5.91	5.21	0.7	79	42
5.97	5.21	0.76	80	42
5.65	5.21	0.44	81	42
5.82	5.21	0.61	82	42
6.2	5.92	0.28	83	42
6.16	5.92	0.24	84	42
5.61	5.92	-0.31	84	43
5.98	5.92	0.06	85	43
6.23	5.92	0.31	86	43
7.27	5.92	1.35	87	43
6.4	5.92	0.48	88	43
5.91	5.92	-0.01	88	44
5.97	5.92	0.05	89	44
5.65	5.92	-0.27	89	45
5.82	5.92	-0.1	89	46
6.16	6.2	-0.04	89	47
5.61	6.2	-0.59	89	48
5.98	6.2	-0.22	89	49
6.23	6.2	0.03	90	49
7.27	6.2	1.07	91	49
6.4	6.2	0.2	92	49
5.91	6.2	-0.29	92	50
5.97	6.2	-0.23	92	51
5.65	6.2	-0.55	92	52
5.82	6.2	-0.38	92	53
5.61	6.16	-0.55	92	54
5.98	6.16	-0.18	92	55
6.23	6.16	0.07	93	55
7.27	6.16	1.11	94	55
6.4	6.16	0.24	95	55
5.91	6.16	-0.25	95	56

5.97	6.16	-0.19	95	57
5.65	6.16	-0.51	95	58
5.82	6.16	-0.34	95	59
5.98	5.61	0.37	96	59
6.23	5.61	0.62	97	59
7.27	5.61	1.66	98	59
6.4	5.61	0.79	99	59
5.91	5.61	0.3	100	59
5.97	5.61	0.36	101	59
5.65	5.61	0.04	102	59
5.82	5.61	0.21	103	59
6.23	5.98	0.25	104	59
7.27	5.98	1.29	105	59
6.4	5.98	0.42	106	59
5.91	5.98	-0.07	106	60
5.97	5.98	-0.01	106	61
5.65	5.98	-0.33	106	62
5.82	5.98	-0.16	106	63
7.27	6.23	1.04	107	63
6.4	6.23	0.17	108	63
5.91	6.23	-0.32	108	64
5.97	6.23	-0.26	108	65
5.65	6.23	-0.58	108	66
5.82	6.23	-0.41	108	67
6.4	7.27	-0.87	108	68
5.91	7.27	-1.36	108	69
5.97	7.27	-1.3	108	70
5.65	7.27	-1.62	108	71
5.82	7.27	-1.45	108	72
5.91	6.4	-0.49	108	73
5.97	6.4	-0.43	108	74
5.65	6.4	-0.75	108	75
5.82	6.4	-0.58	108	76
5.97	5.91	0.06	109	76
5.65	5.91	-0.26	109	77
5.82	5.91	-0.09	109	78
5.65	5.97	-0.32	109	79
5.82	5.97	-0.15	109	80
5.82	5.65	0.17	110	80

S Statistic = 110 - 80 = 30

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 0.940884

Comparison Level at 95% confidence level = -1.65463 (downward trend)

0.940884 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW12-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.26	5.27	-0.01	0	1
5.34	5.27	0.07	1	1
4.18	5.27	-1.09	1	2
5.39	5.27	0.12	2	2
4.2	5.27	-1.07	2	3
4.71	5.27	-0.56	2	4
4.61	5.27	-0.66	2	5
5.25	5.27	-0.02	2	6
5.32	5.27	0.05	3	6
6.06	5.27	0.79	4	6
4.46	5.27	-0.81	4	7
4.68	5.27	-0.59	4	8
6.37	5.27	1.1	5	8
7.45	5.27	2.18	6	8
6	5.27	0.73	7	8
5.47	5.27	0.2	8	8
5.36	5.27	0.09	9	8
5.26	5.27	-0.01	9	9
5.69	5.27	0.42	10	9
5.34	5.26	0.08	11	9
4.18	5.26	-1.08	11	10
5.39	5.26	0.13	12	10
4.2	5.26	-1.06	12	11
4.71	5.26	-0.55	12	12
4.61	5.26	-0.65	12	13
5.25	5.26	-0.01	12	14
5.32	5.26	0.06	13	14
6.06	5.26	0.8	14	14
4.46	5.26	-0.8	14	15
4.68	5.26	-0.58	14	16
6.37	5.26	1.11	15	16
7.45	5.26	2.19	16	16
6	5.26	0.74	17	16
5.47	5.26	0.21	18	16
5.36	5.26	0.1	19	16
5.26	5.26	0	19	16
5.69	5.26	0.43	20	16
4.18	5.34	-1.16	20	17
5.39	5.34	0.05	21	17
4.2	5.34	-1.14	21	18
4.71	5.34	-0.63	21	19
4.61	5.34	-0.73	21	20
5.25	5.34	-0.09	21	21
5.32	5.34	-0.02	21	22
6.06	5.34	0.72	22	22

4.46	5.34	-0.88	22	23
4.68	5.34	-0.66	22	24
6.37	5.34	1.03	23	24
7.45	5.34	2.11	24	24
6	5.34	0.66	25	24
5.47	5.34	0.13	26	24
5.36	5.34	0.02	27	24
5.26	5.34	-0.08	27	25
5.69	5.34	0.35	28	25
5.39	4.18	1.21	29	25
4.2	4.18	0.02	30	25
4.71	4.18	0.53	31	25
4.61	4.18	0.43	32	25
5.25	4.18	1.07	33	25
5.32	4.18	1.14	34	25
6.06	4.18	1.88	35	25
4.46	4.18	0.28	36	25
4.68	4.18	0.5	37	25
6.37	4.18	2.19	38	25
7.45	4.18	3.27	39	25
6	4.18	1.82	40	25
5.47	4.18	1.29	41	25
5.36	4.18	1.18	42	25
5.26	4.18	1.08	43	25
5.69	4.18	1.51	44	25
4.2	5.39	-1.19	44	26
4.71	5.39	-0.68	44	27
4.61	5.39	-0.78	44	28
5.25	5.39	-0.14	44	29
5.32	5.39	-0.07	44	30
6.06	5.39	0.67	45	30
4.46	5.39	-0.93	45	31
4.68	5.39	-0.71	45	32
6.37	5.39	0.98	46	32
7.45	5.39	2.06	47	32
6	5.39	0.61	48	32
5.47	5.39	0.08	49	32
5.36	5.39	-0.03	49	33
5.26	5.39	-0.13	49	34
5.69	5.39	0.3	50	34
4.71	4.2	0.51	51	34
4.61	4.2	0.41	52	34
5.25	4.2	1.05	53	34
5.32	4.2	1.12	54	34
6.06	4.2	1.86	55	34
4.46	4.2	0.26	56	34
4.68	4.2	0.48	57	34
6.37	4.2	2.17	58	34
7.45	4.2	3.25	59	34
6	4.2	1.8	60	34
5.47	4.2	1.27	61	34
5.36	4.2	1.16	62	34
5.26	4.2	1.06	63	34
5.69	4.2	1.49	64	34

4.61	4.71	-0.1	64	35
5.25	4.71	0.54	65	35
5.32	4.71	0.61	66	35
6.06	4.71	1.35	67	35
4.46	4.71	-0.25	67	36
4.68	4.71	-0.03	67	37
6.37	4.71	1.66	68	37
7.45	4.71	2.74	69	37
6	4.71	1.29	70	37
5.47	4.71	0.76	71	37
5.36	4.71	0.65	72	37
5.26	4.71	0.55	73	37
5.69	4.71	0.98	74	37
5.25	4.61	0.64	75	37
5.32	4.61	0.71	76	37
6.06	4.61	1.45	77	37
4.46	4.61	-0.15	77	38
4.68	4.61	0.07	78	38
6.37	4.61	1.76	79	38
7.45	4.61	2.84	80	38
6	4.61	1.39	81	38
5.47	4.61	0.86	82	38
5.36	4.61	0.75	83	38
5.26	4.61	0.65	84	38
5.69	4.61	1.08	85	38
5.32	5.25	0.07	86	38
6.06	5.25	0.81	87	38
4.46	5.25	-0.79	87	39
4.68	5.25	-0.57	87	40
6.37	5.25	1.12	88	40
7.45	5.25	2.2	89	40
6	5.25	0.75	90	40
5.47	5.25	0.22	91	40
5.36	5.25	0.11	92	40
5.26	5.25	0.01	93	40
5.69	5.25	0.44	94	40
6.06	5.32	0.74	95	40
4.46	5.32	-0.86	95	41
4.68	5.32	-0.64	95	42
6.37	5.32	1.05	96	42
7.45	5.32	2.13	97	42
6	5.32	0.68	98	42
5.47	5.32	0.15	99	42
5.36	5.32	0.04	100	42
5.26	5.32	-0.06	100	43
5.69	5.32	0.37	101	43
4.46	6.06	-1.6	101	44
4.68	6.06	-1.38	101	45
6.37	6.06	0.31	102	45
7.45	6.06	1.39	103	45
6	6.06	-0.06	103	46
5.47	6.06	-0.59	103	47

5.36	6.06	-0.7	103	48
5.26	6.06	-0.8	103	49
5.69	6.06	-0.37	103	50
4.68	4.46	0.22	104	50
6.37	4.46	1.91	105	50
7.45	4.46	2.99	106	50
6	4.46	1.54	107	50
5.47	4.46	1.01	108	50
5.36	4.46	0.9	109	50
5.26	4.46	0.8	110	50
5.69	4.46	1.23	111	50
6.37	4.68	1.69	112	50
7.45	4.68	2.77	113	50
6	4.68	1.32	114	50
5.47	4.68	0.79	115	50
5.36	4.68	0.68	116	50
5.26	4.68	0.58	117	50
5.69	4.68	1.01	118	50
7.45	6.37	1.08	119	50
6	6.37	-0.37	119	51
5.47	6.37	-0.9	119	52
5.36	6.37	-1.01	119	53
5.26	6.37	-1.11	119	54
5.69	6.37	-0.68	119	55
6	7.45	-1.45	119	56
5.47	7.45	-1.98	119	57
5.36	7.45	-2.09	119	58
5.26	7.45	-2.19	119	59
5.69	7.45	-1.76	119	60
5.47	6	-0.53	119	61
5.36	6	-0.64	119	62
5.26	6	-0.74	119	63
5.69	6	-0.31	119	64
5.36	5.47	-0.11	119	65
5.26	5.47	-0.21	119	66
5.69	5.47	0.22	120	66
5.26	5.36	-0.1	120	67
5.69	5.36	0.33	121	67
5.69	5.26	0.43	122	67

S Statistic = 122 - 67 = 55

Tied Group	Value	Members
1	5.26	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = 1.75291

Comparison Level at 95% confidence level = -1.65463 (downward trend)

1.75291 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW13-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
12.18	6.72	5.46	1	0
6.86	6.72	0.14	2	0
7.32	6.72	0.6	3	0
7.67	6.72	0.95	4	0
11.44	6.72	4.72	5	0
6.46	6.72	-0.26	5	1
6.86	6.72	0.14	6	1
9.66	6.72	2.94	7	1
11.6	6.72	4.88	8	1
5.83	6.72	-0.89	8	2
10.25	6.72	3.53	9	2
10.98	6.72	4.26	10	2
6.04	6.72	-0.68	10	3
6.86	12.18	-5.32	10	4
7.32	12.18	-4.86	10	5
7.67	12.18	-4.51	10	6
11.44	12.18	-0.74	10	7
6.46	12.18	-5.72	10	8
6.86	12.18	-5.32	10	9
9.66	12.18	-2.52	10	10
11.6	12.18	-0.58	10	11
5.83	12.18	-6.35	10	12
10.25	12.18	-1.93	10	13
10.98	12.18	-1.2	10	14
6.04	12.18	-6.14	10	15
7.32	6.86	0.46	11	15
7.67	6.86	0.81	12	15
11.44	6.86	4.58	13	15
6.46	6.86	-0.4	13	16
6.86	6.86	0	13	16
9.66	6.86	2.8	14	16
11.6	6.86	4.74	15	16
5.83	6.86	-1.03	15	17
10.25	6.86	3.39	16	17
10.98	6.86	4.12	17	17
6.04	6.86	-0.82	17	18
7.67	7.32	0.35	18	18
11.44	7.32	4.12	19	18
6.46	7.32	-0.86	19	19
6.86	7.32	-0.46	19	20
9.66	7.32	2.34	20	20
11.6	7.32	4.28	21	20
5.83	7.32	-1.49	21	21
10.25	7.32	2.93	22	21

10.98	7.32	3.66	23	21
6.04	7.32	-1.28	23	22
11.44	7.67	3.77	24	22
6.46	7.67	-1.21	24	23
6.86	7.67	-0.81	24	24
9.66	7.67	1.99	25	24
11.6	7.67	3.93	26	24
5.83	7.67	-1.84	26	25
10.25	7.67	2.58	27	25
10.98	7.67	3.31	28	25
6.04	7.67	-1.63	28	26
6.46	11.44	-4.98	28	27
6.86	11.44	-4.58	28	28
9.66	11.44	-1.78	28	29
11.6	11.44	0.16	29	29
5.83	11.44	-5.61	29	30
10.25	11.44	-1.19	29	31
10.98	11.44	-0.46	29	32
6.04	11.44	-5.4	29	33
6.86	6.46	0.4	30	33
9.66	6.46	3.2	31	33
11.6	6.46	5.14	32	33
5.83	6.46	-0.63	32	34
10.25	6.46	3.79	33	34
10.98	6.46	4.52	34	34
6.04	6.46	-0.42	34	35
9.66	6.86	2.8	35	35
11.6	6.86	4.74	36	35
5.83	6.86	-1.03	36	36
10.25	6.86	3.39	37	36
10.98	6.86	4.12	38	36
6.04	6.86	-0.82	38	37
11.6	9.66	1.94	39	37
5.83	9.66	-3.83	39	38
10.25	9.66	0.59	40	38
10.98	9.66	1.32	41	38
6.04	9.66	-3.62	41	39
5.83	11.6	-5.77	41	40
10.25	11.6	-1.35	41	41
10.98	11.6	-0.62	41	42
6.04	11.6	-5.56	41	43
10.25	5.83	4.42	42	43
10.98	5.83	5.15	43	43
6.04	5.83	0.21	44	43
10.98	10.25	0.73	45	43
6.04	10.25	-4.21	45	44
6.04	10.98	-4.94	45	45

S Statistic = 45 - 45 = 0

Tied Group	Value	Members
1	6.86	2

Time Period	Observations
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 332.667

Z-Score = 0

Comparison Level at 95% confidence level = -1.65463 (downward trend)

0 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW15-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
6.68	11.6	-4.92	0	1
10.17	11.6	-1.43	0	2
11.59	11.6	-0.01	0	3
11.69	11.6	0.09	1	3
12.13	11.6	0.53	2	3
11.99	11.6	0.39	3	3
10.69	11.6	-0.91	3	4
7	11.6	-4.6	3	5
7	11.6	-4.6	3	6
6.91	11.6	-4.69	3	7
5.99	11.6	-5.61	3	8
6.11	11.6	-5.49	3	9
10.17	6.68	3.49	4	9
11.59	6.68	4.91	5	9
11.69	6.68	5.01	6	9
12.13	6.68	5.45	7	9
11.99	6.68	5.31	8	9
10.69	6.68	4.01	9	9
7	6.68	0.32	10	9
7	6.68	0.32	11	9
6.91	6.68	0.23	12	9
5.99	6.68	-0.69	12	10
6.11	6.68	-0.57	12	11
11.59	10.17	1.42	13	11
11.69	10.17	1.52	14	11
12.13	10.17	1.96	15	11
11.99	10.17	1.82	16	11
10.69	10.17	0.52	17	11
7	10.17	-3.17	17	12
7	10.17	-3.17	17	13
6.91	10.17	-3.26	17	14
5.99	10.17	-4.18	17	15
6.11	10.17	-4.06	17	16
11.69	11.59	0.1	18	16
12.13	11.59	0.54	19	16
11.99	11.59	0.4	20	16
10.69	11.59	-0.9	20	17
7	11.59	-4.59	20	18
7	11.59	-4.59	20	19
6.91	11.59	-4.68	20	20
5.99	11.59	-5.6	20	21
6.11	11.59	-5.48	20	22
12.13	11.69	0.44	21	22

11.99	11.69	0.3	22	22
10.69	11.69	-1	22	23
7	11.69	-4.69	22	24
7	11.69	-4.69	22	25
6.91	11.69	-4.78	22	26
5.99	11.69	-5.7	22	27
6.11	11.69	-5.58	22	28
11.99	12.13	-0.14	22	29
10.69	12.13	-1.44	22	30
7	12.13	-5.13	22	31
7	12.13	-5.13	22	32
6.91	12.13	-5.22	22	33
5.99	12.13	-6.14	22	34
6.11	12.13	-6.02	22	35
10.69	11.99	-1.3	22	36
7	11.99	-4.99	22	37
7	11.99	-4.99	22	38
6.91	11.99	-5.08	22	39
5.99	11.99	-6	22	40
6.11	11.99	-5.88	22	41
7	10.69	-3.69	22	42
7	10.69	-3.69	22	43
6.91	10.69	-3.78	22	44
5.99	10.69	-4.7	22	45
6.11	10.69	-4.58	22	46
7	7	0	22	46
6.91	7	-0.09	22	47
5.99	7	-1.01	22	48
6.11	7	-0.89	22	49
6.91	7	-0.09	22	50
5.99	7	-1.01	22	51
6.11	7	-0.89	22	52
5.99	6.91	-0.92	22	53
6.11	6.91	-0.8	22	54
6.11	5.99	0.12	23	54

S Statistic = 23 - 54 = -31

Tied Group	Value	Members
1	7	2

Time Period	Observations
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1

10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 4836

b = 15444

c = 312

Group Variance = 267.667

Z-Score = -1.83368

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.83368 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW16-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
9.36	6.14	3.22	1	0
9.43	6.14	3.29	2	0
6.47	6.14	0.33	3	0
6.37	6.14	0.23	4	0
6.36	6.14	0.22	5	0
10.41	6.14	4.27	6	0
9.43	6.14	3.29	7	0
9.9	6.14	3.76	8	0
9.47	6.14	3.33	9	0
9.88	6.14	3.74	10	0
9.3	6.14	3.16	11	0
7.37	6.14	1.23	12	0
9.43	9.36	0.07	13	0
6.47	9.36	-2.89	13	1
6.37	9.36	-2.99	13	2
6.36	9.36	-3	13	3
10.41	9.36	1.05	14	3
9.43	9.36	0.07	15	3
9.9	9.36	0.54	16	3
9.47	9.36	0.11	17	3
9.88	9.36	0.52	18	3
9.3	9.36	-0.06	18	4
7.37	9.36	-1.99	18	5
6.47	9.43	-2.96	18	6
6.37	9.43	-3.06	18	7
6.36	9.43	-3.07	18	8
10.41	9.43	0.98	19	8
9.43	9.43	0	19	8
9.9	9.43	0.47	20	8
9.47	9.43	0.04	21	8
9.88	9.43	0.45	22	8
9.3	9.43	-0.13	22	9
7.37	9.43	-2.06	22	10
6.37	6.47	-0.1	22	11
6.36	6.47	-0.11	22	12
10.41	6.47	3.94	23	12
9.43	6.47	2.96	24	12
9.9	6.47	3.43	25	12
9.47	6.47	3	26	12
9.88	6.47	3.41	27	12
9.3	6.47	2.83	28	12
7.37	6.47	0.9	29	12
6.36	6.37	-0.01	29	13

10.41	6.37	4.04	30	13
9.43	6.37	3.06	31	13
9.9	6.37	3.53	32	13
9.47	6.37	3.1	33	13
9.88	6.37	3.51	34	13
9.3	6.37	2.93	35	13
7.37	6.37	1	36	13
10.41	6.36	4.05	37	13
9.43	6.36	3.07	38	13
9.9	6.36	3.54	39	13
9.47	6.36	3.11	40	13
9.88	6.36	3.52	41	13
9.3	6.36	2.94	42	13
7.37	6.36	1.01	43	13
9.43	10.41	-0.98	43	14
9.9	10.41	-0.51	43	15
9.47	10.41	-0.94	43	16
9.88	10.41	-0.53	43	17
9.3	10.41	-1.11	43	18
7.37	10.41	-3.04	43	19
9.9	9.43	0.47	44	19
9.47	9.43	0.04	45	19
9.88	9.43	0.45	46	19
9.3	9.43	-0.13	46	20
7.37	9.43	-2.06	46	21
9.47	9.9	-0.43	46	22
9.88	9.9	-0.02	46	23
9.3	9.9	-0.6	46	24
7.37	9.9	-2.53	46	25
9.88	9.47	0.41	47	25
9.3	9.47	-0.17	47	26
7.37	9.47	-2.1	47	27
9.3	9.88	-0.58	47	28
7.37	9.88	-2.51	47	29
7.37	9.3	-1.93	47	30

S Statistic = 47 - 30 = 17

Tied Group	Value	Members
1	9.43	2

Time Period	Observations
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1

10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 4836

b = 15444

c = 312

Group Variance = 267.667

Z-Score = 0.977964

Comparison Level at 95% confidence level = -1.65463 (downward trend)

0.977964 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW18-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.33	5.64	-0.31	0	1
5.39	5.64	-0.25	0	2
3.43	5.64	-2.21	0	3
5.38	5.64	-0.26	0	4
5.25	5.64	-0.39	0	5
5.45	5.64	-0.19	0	6
5.99	5.64	0.35	1	6
5.49	5.64	-0.15	1	7
5.84	5.64	0.2	2	7
5.62	5.64	-0.02	2	8
5.56	5.64	-0.08	2	9
5.27	5.64	-0.37	2	10
5.46	5.64	-0.18	2	11
6.71	5.64	1.07	3	11
5.3	5.64	-0.34	3	12
5.16	5.64	-0.48	3	13
5.43	5.64	-0.21	3	14
5.52	5.64	-0.12	3	15
5.46	5.64	-0.18	3	16
5.39	5.33	0.06	4	16
3.43	5.33	-1.9	4	17
5.38	5.33	0.05	5	17
5.25	5.33	-0.08	5	18
5.45	5.33	0.12	6	18
5.99	5.33	0.66	7	18
5.49	5.33	0.16	8	18
5.84	5.33	0.51	9	18
5.62	5.33	0.29	10	18
5.56	5.33	0.23	11	18
5.27	5.33	-0.06	11	19
5.46	5.33	0.13	12	19
6.71	5.33	1.38	13	19
5.3	5.33	-0.03	13	20
5.16	5.33	-0.17	13	21
5.43	5.33	0.1	14	21
5.52	5.33	0.19	15	21
5.46	5.33	0.13	16	21
3.43	5.39	-1.96	16	22
5.38	5.39	-0.01	16	23
5.25	5.39	-0.14	16	24
5.45	5.39	0.06	17	24
5.99	5.39	0.6	18	24
5.49	5.39	0.1	19	24
5.84	5.39	0.45	20	24
5.62	5.39	0.23	21	24

5.56	5.39	0.17	22	24
5.27	5.39	-0.12	22	25
5.46	5.39	0.07	23	25
6.71	5.39	1.32	24	25
5.3	5.39	-0.09	24	26
5.16	5.39	-0.23	24	27
5.43	5.39	0.04	25	27
5.52	5.39	0.13	26	27
5.46	5.39	0.07	27	27
5.38	3.43	1.95	28	27
5.25	3.43	1.82	29	27
5.45	3.43	2.02	30	27
5.99	3.43	2.56	31	27
5.49	3.43	2.06	32	27
5.84	3.43	2.41	33	27
5.62	3.43	2.19	34	27
5.56	3.43	2.13	35	27
5.27	3.43	1.84	36	27
5.46	3.43	2.03	37	27
6.71	3.43	3.28	38	27
5.3	3.43	1.87	39	27
5.16	3.43	1.73	40	27
5.43	3.43	2	41	27
5.52	3.43	2.09	42	27
5.46	3.43	2.03	43	27
5.25	5.38	-0.13	43	28
5.45	5.38	0.07	44	28
5.99	5.38	0.61	45	28
5.49	5.38	0.11	46	28
5.84	5.38	0.46	47	28
5.62	5.38	0.24	48	28
5.56	5.38	0.18	49	28
5.27	5.38	-0.11	49	29
5.46	5.38	0.08	50	29
6.71	5.38	1.33	51	29
5.3	5.38	-0.08	51	30
5.16	5.38	-0.22	51	31
5.43	5.38	0.05	52	31
5.52	5.38	0.14	53	31
5.46	5.38	0.08	54	31
5.45	5.25	0.2	55	31
5.99	5.25	0.74	56	31
5.49	5.25	0.24	57	31
5.84	5.25	0.59	58	31
5.62	5.25	0.37	59	31
5.56	5.25	0.31	60	31
5.27	5.25	0.02	61	31
5.46	5.25	0.21	62	31
6.71	5.25	1.46	63	31
5.3	5.25	0.05	64	31
5.16	5.25	-0.09	64	32
5.43	5.25	0.18	65	32
5.52	5.25	0.27	66	32
5.46	5.25	0.21	67	32

5.99	5.45	0.54	68	32
5.49	5.45	0.04	69	32
5.84	5.45	0.39	70	32
5.62	5.45	0.17	71	32
5.56	5.45	0.11	72	32
5.27	5.45	-0.18	72	33
5.46	5.45	0.01	73	33
6.71	5.45	1.26	74	33
5.3	5.45	-0.15	74	34
5.16	5.45	-0.29	74	35
5.43	5.45	-0.02	74	36
5.52	5.45	0.07	75	36
5.46	5.45	0.01	76	36
5.49	5.99	-0.5	76	37
5.84	5.99	-0.15	76	38
5.62	5.99	-0.37	76	39
5.56	5.99	-0.43	76	40
5.27	5.99	-0.72	76	41
5.46	5.99	-0.53	76	42
6.71	5.99	0.72	77	42
5.3	5.99	-0.69	77	43
5.16	5.99	-0.83	77	44
5.43	5.99	-0.56	77	45
5.52	5.99	-0.47	77	46
5.46	5.99	-0.53	77	47
5.84	5.49	0.35	78	47
5.62	5.49	0.13	79	47
5.56	5.49	0.07	80	47
5.27	5.49	-0.22	80	48
5.46	5.49	-0.03	80	49
6.71	5.49	1.22	81	49
5.3	5.49	-0.19	81	50
5.16	5.49	-0.33	81	51
5.43	5.49	-0.06	81	52
5.52	5.49	0.03	82	52
5.46	5.49	-0.03	82	53
5.62	5.84	-0.22	82	54
5.56	5.84	-0.28	82	55
5.27	5.84	-0.57	82	56
5.46	5.84	-0.38	82	57
6.71	5.84	0.87	83	57
5.3	5.84	-0.54	83	58
5.16	5.84	-0.68	83	59
5.43	5.84	-0.41	83	60
5.52	5.84	-0.32	83	61
5.46	5.84	-0.38	83	62
5.56	5.62	-0.06	83	63
5.27	5.62	-0.35	83	64
5.46	5.62	-0.16	83	65
6.71	5.62	1.09	84	65
5.3	5.62	-0.32	84	66
5.16	5.62	-0.46	84	67

5.43	5.62	-0.19	84	68
5.52	5.62	-0.1	84	69
5.46	5.62	-0.16	84	70
5.27	5.56	-0.29	84	71
5.46	5.56	-0.1	84	72
6.71	5.56	1.15	85	72
5.3	5.56	-0.26	85	73
5.16	5.56	-0.4	85	74
5.43	5.56	-0.13	85	75
5.52	5.56	-0.04	85	76
5.46	5.56	-0.1	85	77
5.46	5.27	0.19	86	77
6.71	5.27	1.44	87	77
5.3	5.27	0.03	88	77
5.16	5.27	-0.11	88	78
5.43	5.27	0.16	89	78
5.52	5.27	0.25	90	78
5.46	5.27	0.19	91	78
6.71	5.46	1.25	92	78
5.3	5.46	-0.16	92	79
5.16	5.46	-0.3	92	80
5.43	5.46	-0.03	92	81
5.52	5.46	0.06	93	81
5.46	5.46	0	93	81
5.3	6.71	-1.41	93	82
5.16	6.71	-1.55	93	83
5.43	6.71	-1.28	93	84
5.52	6.71	-1.19	93	85
5.46	6.71	-1.25	93	86
5.16	5.3	-0.14	93	87
5.43	5.3	0.13	94	87
5.52	5.3	0.22	95	87
5.46	5.3	0.16	96	87
5.43	5.16	0.27	97	87
5.52	5.16	0.36	98	87
5.46	5.16	0.3	99	87
5.52	5.43	0.09	100	87
5.46	5.43	0.03	101	87
5.46	5.52	-0.06	101	88

S Statistic = 101 - 88 = 13

Tied Group	Value	Members
1	5.46	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = 0.389536

Comparison Level at 95% confidence level = -1.65463 (downward trend)

0.389536 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW19-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.35	5.5	-0.15	0	1
5.28	5.5	-0.22	0	2
5.41	5.5	-0.09	0	3
5.32	5.5	-0.18	0	4
5.15	5.5	-0.35	0	5
5.58	5.5	0.08	1	5
5.37	5.5	-0.13	1	6
5.52	5.5	0.02	2	6
5.52	5.5	0.02	3	6
5.41	5.5	-0.09	3	7
4.93	5.5	-0.57	3	8
5.38	5.5	-0.12	3	9
6.86	5.5	1.36	4	9
5.5	5.5	0	4	9
5.25	5.5	-0.25	4	10
5.23	5.5	-0.27	4	11
5.23	5.5	-0.27	4	12
5.34	5.5	-0.16	4	13
5.28	5.35	-0.07	4	14
5.41	5.35	0.06	5	14
5.32	5.35	-0.03	5	15
5.15	5.35	-0.2	5	16
5.58	5.35	0.23	6	16
5.37	5.35	0.02	7	16
5.52	5.35	0.17	8	16
5.52	5.35	0.17	9	16
5.41	5.35	0.06	10	16
4.93	5.35	-0.42	10	17
5.38	5.35	0.03	11	17
6.86	5.35	1.51	12	17
5.5	5.35	0.15	13	17
5.25	5.35	-0.1	13	18
5.23	5.35	-0.12	13	19
5.23	5.35	-0.12	13	20
5.34	5.35	-0.01	13	21
5.41	5.28	0.13	14	21
5.32	5.28	0.04	15	21
5.15	5.28	-0.13	15	22
5.58	5.28	0.3	16	22
5.37	5.28	0.09	17	22
5.52	5.28	0.24	18	22
5.52	5.28	0.24	19	22
5.41	5.28	0.13	20	22
4.93	5.28	-0.35	20	23
5.38	5.28	0.1	21	23

6.86	5.28	1.58	22	23
5.5	5.28	0.22	23	23
5.25	5.28	-0.03	23	24
5.23	5.28	-0.05	23	25
5.23	5.28	-0.05	23	26
5.34	5.28	0.06	24	26
5.32	5.41	-0.09	24	27
5.15	5.41	-0.26	24	28
5.58	5.41	0.17	25	28
5.37	5.41	-0.04	25	29
5.52	5.41	0.11	26	29
5.52	5.41	0.11	27	29
5.41	5.41	0	27	29
4.93	5.41	-0.48	27	30
5.38	5.41	-0.03	27	31
6.86	5.41	1.45	28	31
5.5	5.41	0.09	29	31
5.25	5.41	-0.16	29	32
5.23	5.41	-0.18	29	33
5.23	5.41	-0.18	29	34
5.34	5.41	-0.07	29	35
5.15	5.32	-0.17	29	36
5.58	5.32	0.26	30	36
5.37	5.32	0.05	31	36
5.52	5.32	0.2	32	36
5.52	5.32	0.2	33	36
5.41	5.32	0.09	34	36
4.93	5.32	-0.39	34	37
5.38	5.32	0.06	35	37
6.86	5.32	1.54	36	37
5.5	5.32	0.18	37	37
5.25	5.32	-0.07	37	38
5.23	5.32	-0.09	37	39
5.23	5.32	-0.09	37	40
5.34	5.32	0.02	38	40
5.58	5.15	0.43	39	40
5.37	5.15	0.22	40	40
5.52	5.15	0.37	41	40
5.52	5.15	0.37	42	40
5.41	5.15	0.26	43	40
4.93	5.15	-0.22	43	41
5.38	5.15	0.23	44	41
6.86	5.15	1.71	45	41
5.5	5.15	0.35	46	41
5.25	5.15	0.1	47	41
5.23	5.15	0.08	48	41
5.23	5.15	0.08	49	41
5.34	5.15	0.19	50	41
5.37	5.58	-0.21	50	42
5.52	5.58	-0.06	50	43
5.52	5.58	-0.06	50	44
5.41	5.58	-0.17	50	45
4.93	5.58	-0.65	50	46

5.38	5.58	-0.2	50	47
6.86	5.58	1.28	51	47
5.5	5.58	-0.08	51	48
5.25	5.58	-0.33	51	49
5.23	5.58	-0.35	51	50
5.23	5.58	-0.35	51	51
5.34	5.58	-0.24	51	52
5.52	5.37	0.15	52	52
5.52	5.37	0.15	53	52
5.41	5.37	0.04	54	52
4.93	5.37	-0.44	54	53
5.38	5.37	0.01	55	53
6.86	5.37	1.49	56	53
5.5	5.37	0.13	57	53
5.25	5.37	-0.12	57	54
5.23	5.37	-0.14	57	55
5.23	5.37	-0.14	57	56
5.34	5.37	-0.03	57	57
5.52	5.52	0	57	57
5.41	5.52	-0.11	57	58
4.93	5.52	-0.59	57	59
5.38	5.52	-0.14	57	60
6.86	5.52	1.34	58	60
5.5	5.52	-0.02	58	61
5.25	5.52	-0.27	58	62
5.23	5.52	-0.29	58	63
5.23	5.52	-0.29	58	64
5.34	5.52	-0.18	58	65
5.41	5.52	-0.11	58	66
4.93	5.52	-0.59	58	67
5.38	5.52	-0.14	58	68
6.86	5.52	1.34	59	68
5.5	5.52	-0.02	59	69
5.25	5.52	-0.27	59	70
5.23	5.52	-0.29	59	71
5.23	5.52	-0.29	59	72
5.34	5.52	-0.18	59	73
4.93	5.41	-0.48	59	74
5.38	5.41	-0.03	59	75
6.86	5.41	1.45	60	75
5.5	5.41	0.09	61	75
5.25	5.41	-0.16	61	76
5.23	5.41	-0.18	61	77
5.23	5.41	-0.18	61	78
5.34	5.41	-0.07	61	79
5.38	4.93	0.45	62	79
6.86	4.93	1.93	63	79
5.5	4.93	0.57	64	79
5.25	4.93	0.32	65	79
5.23	4.93	0.3	66	79
5.23	4.93	0.3	67	79
5.34	4.93	0.41	68	79

6.86	5.38	1.48	69	79
5.5	5.38	0.12	70	79
5.25	5.38	-0.13	70	80
5.23	5.38	-0.15	70	81
5.23	5.38	-0.15	70	82
5.34	5.38	-0.04	70	83
5.5	6.86	-1.36	70	84
5.25	6.86	-1.61	70	85
5.23	6.86	-1.63	70	86
5.23	6.86	-1.63	70	87
5.34	6.86	-1.52	70	88
5.25	5.5	-0.25	70	89
5.23	5.5	-0.27	70	90
5.23	5.5	-0.27	70	91
5.34	5.5	-0.16	70	92
5.23	5.25	-0.02	70	93
5.23	5.25	-0.02	70	94
5.34	5.25	0.09	71	94
5.23	5.23	0	71	94
5.34	5.23	0.11	72	94
5.34	5.23	0.11	73	94

S Statistic = 73 - 94 = -21

Tied Group	Value	Members
1	5.5	2
2	5.41	2
3	5.52	2
4	5.23	2

Time Period	Observations
2/1/2017	1
3/1/2017	1
4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 72

B = 0

C = 0

D = 0

E = 8

F = 0

a = 14706

b = 52326

c = 684

Group Variance = 813

Z-Score = -0.701431

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-0.701431 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW22-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
12.75	12.97	-0.22	0	1
5.4	12.97	-7.57	0	2
6.05	12.97	-6.92	0	3
5.81	12.97	-7.16	0	4
5.68	12.97	-7.29	0	5
5.85	12.97	-7.12	0	6
5.48	12.97	-7.49	0	7
6.21	12.97	-6.76	0	8
6.62	12.97	-6.35	0	9
4.6	12.97	-8.37	0	10
5.49	12.97	-7.48	0	11
5.4	12.75	-7.35	0	12
6.05	12.75	-6.7	0	13
5.81	12.75	-6.94	0	14
5.68	12.75	-7.07	0	15
5.85	12.75	-6.9	0	16
5.48	12.75	-7.27	0	17
6.21	12.75	-6.54	0	18
6.62	12.75	-6.13	0	19
4.6	12.75	-8.15	0	20
5.49	12.75	-7.26	0	21
6.05	5.4	0.65	1	21
5.81	5.4	0.41	2	21
5.68	5.4	0.28	3	21
5.85	5.4	0.45	4	21
5.48	5.4	0.08	5	21
6.21	5.4	0.81	6	21
6.62	5.4	1.22	7	21
4.6	5.4	-0.8	7	22
5.49	5.4	0.09	8	22
5.81	6.05	-0.24	8	23
5.68	6.05	-0.37	8	24
5.85	6.05	-0.2	8	25
5.48	6.05	-0.57	8	26
6.21	6.05	0.16	9	26
6.62	6.05	0.57	10	26
4.6	6.05	-1.45	10	27
5.49	6.05	-0.56	10	28
5.68	5.81	-0.13	10	29
5.85	5.81	0.04	11	29
5.48	5.81	-0.33	11	30
6.21	5.81	0.4	12	30
6.62	5.81	0.81	13	30

4.6	5.81	-1.21	13	31
5.49	5.81	-0.32	13	32
5.85	5.68	0.17	14	32
5.48	5.68	-0.2	14	33
6.21	5.68	0.53	15	33
6.62	5.68	0.94	16	33
4.6	5.68	-1.08	16	34
5.49	5.68	-0.19	16	35
5.48	5.85	-0.37	16	36
6.21	5.85	0.36	17	36
6.62	5.85	0.77	18	36
4.6	5.85	-1.25	18	37
5.49	5.85	-0.36	18	38
6.21	5.48	0.73	19	38
6.62	5.48	1.14	20	38
4.6	5.48	-0.88	20	39
5.49	5.48	0.01	21	39
6.62	6.21	0.41	22	39
4.6	6.21	-1.61	22	40
5.49	6.21	-0.72	22	41
4.6	6.62	-2.02	22	42
5.49	6.62	-1.13	22	43
5.49	4.6	0.89	23	43

S Statistic = 23 - 43 = -20

Tied Group	Value	Members
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Time Period	Observations
6/1/2017	1
7/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1

There are 0 time periods with multiple data

A = 0
 B = 0
 C = 0
 D = 0
 E = 0
 F = 0
 a = 3828

b = 11880

c = 264

Group Variance = 212.667

Z-Score = -1.30288

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.30288 \geq -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW01-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
90	11600	-11510	0	1
13700	11600	2100	1	1
29	11600	-11571	1	2
41000	11600	29400	2	2
104	11600	-11496	2	3
576	11600	-11024	2	4
9710	11600	-1890	2	5
143	11600	-11457	2	6
3880	11600	-7720	2	7
2460	11600	-9140	2	8
5670	11600	-5930	2	9
5940	11600	-5660	2	10
2060	11600	-9540	2	11
13700	90	13610	3	11
29	90	-61	3	12
41000	90	40910	4	12
104	90	14	5	12
576	90	486	6	12
9710	90	9620	7	12
143	90	53	8	12
3880	90	3790	9	12
2460	90	2370	10	12
5670	90	5580	11	12
5940	90	5850	12	12
2060	90	1970	13	12
29	13700	-13671	13	13
41000	13700	27300	14	13
104	13700	-13596	14	14
576	13700	-13124	14	15
9710	13700	-3990	14	16
143	13700	-13557	14	17
3880	13700	-9820	14	18
2460	13700	-11240	14	19
5670	13700	-8030	14	20
5940	13700	-7760	14	21
2060	13700	-11640	14	22
41000	29	40971	15	22
104	29	75	16	22
576	29	547	17	22
9710	29	9681	18	22
143	29	114	19	22
3880	29	3851	20	22
2460	29	2431	21	22
5670	29	5641	22	22

5940	29	5911	23	22
2060	29	2031	24	22
104	41000	-40896	24	23
576	41000	-40424	24	24
9710	41000	-31290	24	25
143	41000	-40857	24	26
3880	41000	-37120	24	27
2460	41000	-38540	24	28
5670	41000	-35330	24	29
5940	41000	-35060	24	30
2060	41000	-38940	24	31
576	104	472	25	31
9710	104	9606	26	31
143	104	39	27	31
3880	104	3776	28	31
2460	104	2356	29	31
5670	104	5566	30	31
5940	104	5836	31	31
2060	104	1956	32	31
9710	576	9134	33	31
143	576	-433	33	32
3880	576	3304	34	32
2460	576	1884	35	32
5670	576	5094	36	32
5940	576	5364	37	32
2060	576	1484	38	32
143	9710	-9567	38	33
3880	9710	-5830	38	34
2460	9710	-7250	38	35
5670	9710	-4040	38	36
5940	9710	-3770	38	37
2060	9710	-7650	38	38
3880	143	3737	39	38
2460	143	2317	40	38
5670	143	5527	41	38
5940	143	5797	42	38
2060	143	1917	43	38
2460	3880	-1420	43	39
5670	3880	1790	44	39
5940	3880	2060	45	39
2060	3880	-1820	45	40
5670	2460	3210	46	40
5940	2460	3480	47	40
2060	2460	-400	47	41
5940	5670	270	48	41
2060	5670	-3610	48	42
2060	5940	-3880	48	43

S Statistic = 48 - 43 = 5

Tied Group	Value	Members
Time Period		Observations
8/1/2017		1
9/1/2017		1
10/1/2017		1
11/1/2017		1
12/1/2017		1
1/1/2018		1
4/1/2018		1
8/1/2018		1
10/1/2018		1
12/1/2018		1
3/1/2019		1
6/1/2019		1
9/1/2019		1
12/1/2019		1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 0.21898

Comparison Level at 95% confidence level = -1.65463 (downward trend)

0.21898 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW02-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
203	18200	-17997	0	1
290	18200	-17910	0	2
38.6	18200	-18161.4	0	3
186	18200	-18014	0	4
573	18200	-17627	0	5
452	18200	-17748	0	6
5030	18200	-13170	0	7
3240	18200	-14960	0	8
25300	18200	7100	1	8
21500	18200	3300	2	8
56600	18200	38400	3	8
72000	18200	53800	4	8
17200	18200	-1000	4	9
290	203	87	5	9
38.6	203	-164.4	5	10
186	203	-17	5	11
573	203	370	6	11
452	203	249	7	11
5030	203	4827	8	11
3240	203	3037	9	11
25300	203	25097	10	11
21500	203	21297	11	11
56600	203	56397	12	11
72000	203	71797	13	11
17200	203	16997	14	11
38.6	290	-251.4	14	12
186	290	-104	14	13
573	290	283	15	13
452	290	162	16	13
5030	290	4740	17	13
3240	290	2950	18	13
25300	290	25010	19	13
21500	290	21210	20	13
56600	290	56310	21	13
72000	290	71710	22	13
17200	290	16910	23	13
186	38.6	147.4	24	13
573	38.6	534.4	25	13
452	38.6	413.4	26	13
5030	38.6	4991.4	27	13
3240	38.6	3201.4	28	13
25300	38.6	25261.4	29	13
21500	38.6	21461.4	30	13
56600	38.6	56561.4	31	13

72000	38.6	71961.4	32	13
17200	38.6	17161.4	33	13
573	186	387	34	13
452	186	266	35	13
5030	186	4844	36	13
3240	186	3054	37	13
25300	186	25114	38	13
21500	186	21314	39	13
56600	186	56414	40	13
72000	186	71814	41	13
17200	186	17014	42	13
452	573	-121	42	14
5030	573	4457	43	14
3240	573	2667	44	14
25300	573	24727	45	14
21500	573	20927	46	14
56600	573	56027	47	14
72000	573	71427	48	14
17200	573	16627	49	14
5030	452	4578	50	14
3240	452	2788	51	14
25300	452	24848	52	14
21500	452	21048	53	14
56600	452	56148	54	14
72000	452	71548	55	14
17200	452	16748	56	14
3240	5030	-1790	56	15
25300	5030	20270	57	15
21500	5030	16470	58	15
56600	5030	51570	59	15
72000	5030	66970	60	15
17200	5030	12170	61	15
25300	3240	22060	62	15
21500	3240	18260	63	15
56600	3240	53360	64	15
72000	3240	68760	65	15
17200	3240	13960	66	15
21500	25300	-3800	66	16
56600	25300	31300	67	16
72000	25300	46700	68	16
17200	25300	-8100	68	17
56600	21500	35100	69	17
72000	21500	50500	70	17
17200	21500	-4300	70	18
72000	56600	15400	71	18
17200	56600	-39400	71	19
17200	72000	-54800	71	20

S Statistic = 71 - 20 = 51

Tied Group	Value	Members
Time Period		Observations
8/1/2017		1
9/1/2017		1
10/1/2017		1
11/1/2017		1
12/1/2017		1
1/1/2018		1
4/1/2018		1
8/1/2018		1
10/1/2018		1
12/1/2018		1
3/1/2019		1
6/1/2019		1
9/1/2019		1
12/1/2019		1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 2.73724

Comparison Level at 95% confidence level = -1.65463 (downward trend)

2.73724 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW03-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
9240	9740	-500	0	1
7830	9740	-1910	0	2
2960	9740	-6780	0	3
2440	9740	-7300	0	4
8330	9740	-1410	0	5
10900	9740	1160	1	5
9340	9740	-400	1	6
1810	9740	-7930	1	7
1750	9740	-7990	1	8
6270	9740	-3470	1	9
12700	9740	2960	2	9
6920	9740	-2820	2	10
9710	9740	-30	2	11
13000	9740	3260	3	11
14900	9740	5160	4	11
6720	9740	-3020	4	12
13300	9740	3560	5	12
10500	9740	760	6	12
16200	9740	6460	7	12
7830	9240	-1410	7	13
2960	9240	-6280	7	14
2440	9240	-6800	7	15
8330	9240	-910	7	16
10900	9240	1660	8	16
9340	9240	100	9	16
1810	9240	-7430	9	17
1750	9240	-7490	9	18
6270	9240	-2970	9	19
12700	9240	3460	10	19
6920	9240	-2320	10	20
9710	9240	470	11	20
13000	9240	3760	12	20
14900	9240	5660	13	20
6720	9240	-2520	13	21
13300	9240	4060	14	21
10500	9240	1260	15	21
16200	9240	6960	16	21
2960	7830	-4870	16	22
2440	7830	-5390	16	23
8330	7830	500	17	23
10900	7830	3070	18	23
9340	7830	1510	19	23
1810	7830	-6020	19	24
1750	7830	-6080	19	25
6270	7830	-1560	19	26

12700	7830	4870	20	26
6920	7830	-910	20	27
9710	7830	1880	21	27
13000	7830	5170	22	27
14900	7830	7070	23	27
6720	7830	-1110	23	28
13300	7830	5470	24	28
10500	7830	2670	25	28
16200	7830	8370	26	28
2440	2960	-520	26	29
8330	2960	5370	27	29
10900	2960	7940	28	29
9340	2960	6380	29	29
1810	2960	-1150	29	30
1750	2960	-1210	29	31
6270	2960	3310	30	31
12700	2960	9740	31	31
6920	2960	3960	32	31
9710	2960	6750	33	31
13000	2960	10040	34	31
14900	2960	11940	35	31
6720	2960	3760	36	31
13300	2960	10340	37	31
10500	2960	7540	38	31
16200	2960	13240	39	31
8330	2440	5890	40	31
10900	2440	8460	41	31
9340	2440	6900	42	31
1810	2440	-630	42	32
1750	2440	-690	42	33
6270	2440	3830	43	33
12700	2440	10260	44	33
6920	2440	4480	45	33
9710	2440	7270	46	33
13000	2440	10560	47	33
14900	2440	12460	48	33
6720	2440	4280	49	33
13300	2440	10860	50	33
10500	2440	8060	51	33
16200	2440	13760	52	33
10900	8330	2570	53	33
9340	8330	1010	54	33
1810	8330	-6520	54	34
1750	8330	-6580	54	35
6270	8330	-2060	54	36
12700	8330	4370	55	36
6920	8330	-1410	55	37
9710	8330	1380	56	37
13000	8330	4670	57	37
14900	8330	6570	58	37
6720	8330	-1610	58	38
13300	8330	4970	59	38
10500	8330	2170	60	38
16200	8330	7870	61	38

9340	10900	-1560	61	39
1810	10900	-9090	61	40
1750	10900	-9150	61	41
6270	10900	-4630	61	42
12700	10900	1800	62	42
6920	10900	-3980	62	43
9710	10900	-1190	62	44
13000	10900	2100	63	44
14900	10900	4000	64	44
6720	10900	-4180	64	45
13300	10900	2400	65	45
10500	10900	-400	65	46
16200	10900	5300	66	46
1810	9340	-7530	66	47
1750	9340	-7590	66	48
6270	9340	-3070	66	49
12700	9340	3360	67	49
6920	9340	-2420	67	50
9710	9340	370	68	50
13000	9340	3660	69	50
14900	9340	5560	70	50
6720	9340	-2620	70	51
13300	9340	3960	71	51
10500	9340	1160	72	51
16200	9340	6860	73	51
1750	1810	-60	73	52
6270	1810	4460	74	52
12700	1810	10890	75	52
6920	1810	5110	76	52
9710	1810	7900	77	52
13000	1810	11190	78	52
14900	1810	13090	79	52
6720	1810	4910	80	52
13300	1810	11490	81	52
10500	1810	8690	82	52
16200	1810	14390	83	52
6270	1750	4520	84	52
12700	1750	10950	85	52
6920	1750	5170	86	52
9710	1750	7960	87	52
13000	1750	11250	88	52
14900	1750	13150	89	52
6720	1750	4970	90	52
13300	1750	11550	91	52
10500	1750	8750	92	52
16200	1750	14450	93	52
12700	6270	6430	94	52
6920	6270	650	95	52
9710	6270	3440	96	52
13000	6270	6730	97	52
14900	6270	8630	98	52
6720	6270	450	99	52

13300	6270	7030	100	52
10500	6270	4230	101	52
16200	6270	9930	102	52
6920	12700	-5780	102	53
9710	12700	-2990	102	54
13000	12700	300	103	54
14900	12700	2200	104	54
6720	12700	-5980	104	55
13300	12700	600	105	55
10500	12700	-2200	105	56
16200	12700	3500	106	56
9710	6920	2790	107	56
13000	6920	6080	108	56
14900	6920	7980	109	56
6720	6920	-200	109	57
13300	6920	6380	110	57
10500	6920	3580	111	57
16200	6920	9280	112	57
13000	9710	3290	113	57
14900	9710	5190	114	57
6720	9710	-2990	114	58
13300	9710	3590	115	58
10500	9710	790	116	58
16200	9710	6490	117	58
14900	13000	1900	118	58
6720	13000	-6280	118	59
13300	13000	300	119	59
10500	13000	-2500	119	60
16200	13000	3200	120	60
6720	14900	-8180	120	61
13300	14900	-1600	120	62
10500	14900	-4400	120	63
16200	14900	1300	121	63
13300	6720	6580	122	63
10500	6720	3780	123	63
16200	6720	9480	124	63
10500	13300	-2800	124	64
16200	13300	2900	125	64
16200	10500	5700	126	64

S Statistic = 126 - 64 = 62

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 1.9791

Comparison Level at 95% confidence level = -1.65463 (downward trend)

1.9791 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW06-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1680	1900	-220	0	1
1420	1900	-480	0	2
999	1900	-901	0	3
876	1900	-1024	0	4
1690	1900	-210	0	5
1340	1900	-560	0	6
508	1900	-1392	0	7
615	1900	-1285	0	8
909	1900	-991	0	9
1360	1900	-540	0	10
1950	1900	50	1	10
27900	1900	26000	2	10
191	1900	-1709	2	11
90100	1900	88200	3	11
99600	1900	97700	4	11
122000	1900	120100	5	11
108000	1900	106100	6	11
122000	1900	120100	7	11
116000	1900	114100	8	11
1420	1680	-260	8	12
999	1680	-681	8	13
876	1680	-804	8	14
1690	1680	10	9	14
1340	1680	-340	9	15
508	1680	-1172	9	16
615	1680	-1065	9	17
909	1680	-771	9	18
1360	1680	-320	9	19
1950	1680	270	10	19
27900	1680	26220	11	19
191	1680	-1489	11	20
90100	1680	88420	12	20
99600	1680	97920	13	20
122000	1680	120320	14	20
108000	1680	106320	15	20
122000	1680	120320	16	20
116000	1680	114320	17	20
999	1420	-421	17	21
876	1420	-544	17	22
1690	1420	270	18	22
1340	1420	-80	18	23
508	1420	-912	18	24
615	1420	-805	18	25
909	1420	-511	18	26
1360	1420	-60	18	27

1950	1420	530	19	27
27900	1420	26480	20	27
191	1420	-1229	20	28
90100	1420	88680	21	28
99600	1420	98180	22	28
122000	1420	120580	23	28
108000	1420	106580	24	28
122000	1420	120580	25	28
116000	1420	114580	26	28
876	999	-123	26	29
1690	999	691	27	29
1340	999	341	28	29
508	999	-491	28	30
615	999	-384	28	31
909	999	-90	28	32
1360	999	361	29	32
1950	999	951	30	32
27900	999	26901	31	32
191	999	-808	31	33
90100	999	89101	32	33
99600	999	98601	33	33
122000	999	121001	34	33
108000	999	107001	35	33
122000	999	121001	36	33
116000	999	115001	37	33
1690	876	814	38	33
1340	876	464	39	33
508	876	-368	39	34
615	876	-261	39	35
909	876	33	40	35
1360	876	484	41	35
1950	876	1074	42	35
27900	876	27024	43	35
191	876	-685	43	36
90100	876	89224	44	36
99600	876	98724	45	36
122000	876	121124	46	36
108000	876	107124	47	36
122000	876	121124	48	36
116000	876	115124	49	36
1340	1690	-350	49	37
508	1690	-1182	49	38
615	1690	-1075	49	39
909	1690	-781	49	40
1360	1690	-330	49	41
1950	1690	260	50	41
27900	1690	26210	51	41
191	1690	-1499	51	42
90100	1690	88410	52	42
99600	1690	97910	53	42
122000	1690	120310	54	42
108000	1690	106310	55	42
122000	1690	120310	56	42
116000	1690	114310	57	42

508	1340	-832	57	43
615	1340	-725	57	44
909	1340	-431	57	45
1360	1340	20	58	45
1950	1340	610	59	45
27900	1340	26560	60	45
191	1340	-1149	60	46
90100	1340	88760	61	46
99600	1340	98260	62	46
122000	1340	120660	63	46
108000	1340	106660	64	46
122000	1340	120660	65	46
116000	1340	114660	66	46
615	508	107	67	46
909	508	401	68	46
1360	508	852	69	46
1950	508	1442	70	46
27900	508	27392	71	46
191	508	-317	71	47
90100	508	89592	72	47
99600	508	99092	73	47
122000	508	121492	74	47
108000	508	107492	75	47
122000	508	121492	76	47
116000	508	115492	77	47
909	615	294	78	47
1360	615	745	79	47
1950	615	1335	80	47
27900	615	27285	81	47
191	615	-424	81	48
90100	615	89485	82	48
99600	615	98985	83	48
122000	615	121385	84	48
108000	615	107385	85	48
122000	615	121385	86	48
116000	615	115385	87	48
1360	909	451	88	48
1950	909	1041	89	48
27900	909	26991	90	48
191	909	-718	90	49
90100	909	89191	91	49
99600	909	98691	92	49
122000	909	121091	93	49
108000	909	107091	94	49
122000	909	121091	95	49
116000	909	115091	96	49
1950	1360	590	97	49
27900	1360	26540	98	49
191	1360	-1169	98	50
90100	1360	88740	99	50
99600	1360	98240	100	50
122000	1360	120640	101	50

108000	1360	106640	102	50
122000	1360	120640	103	50
116000	1360	114640	104	50
27900	1950	25950	105	50
191	1950	-1759	105	51
90100	1950	88150	106	51
99600	1950	97650	107	51
122000	1950	120050	108	51
108000	1950	106050	109	51
122000	1950	120050	110	51
116000	1950	114050	111	51
191	27900	-27709	111	52
90100	27900	62200	112	52
99600	27900	71700	113	52
122000	27900	94100	114	52
108000	27900	80100	115	52
122000	27900	94100	116	52
116000	27900	88100	117	52
90100	191	89909	118	52
99600	191	99409	119	52
122000	191	121809	120	52
108000	191	107809	121	52
122000	191	121809	122	52
116000	191	115809	123	52
99600	90100	9500	124	52
122000	90100	31900	125	52
108000	90100	17900	126	52
122000	90100	31900	127	52
116000	90100	25900	128	52
122000	99600	22400	129	52
108000	99600	8400	130	52
122000	99600	22400	131	52
116000	99600	16400	132	52
108000	122000	-14000	132	53
122000	122000	0	132	53
116000	122000	-6000	132	54
122000	108000	14000	133	54
116000	108000	8000	134	54
116000	122000	-6000	134	55

S Statistic = 134 - 55 = 79

Tied Group	Value	Members
1	122000	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = 2.53199

Comparison Level at 95% confidence level = -1.65463 (downward trend)

2.53199 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW07-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1210	944	266	1	0
364	944	-580	1	1
298	944	-646	1	2
432	944	-512	1	3
45.7	944	-898.3	1	4
62.7	944	-881.3	1	5
2840	944	1896	2	5
23.4	944	-920.6	2	6
1650	944	706	3	6
39.8	944	-904.2	3	7
70.6	944	-873.4	3	8
756	944	-188	3	9
26300	944	25356	4	9
12200	944	11256	5	9
86000	944	85056	6	9
24200	944	23256	7	9
136000	944	135056	8	9
48300	944	47356	9	9
16600	944	15656	10	9
364	1210	-846	10	10
298	1210	-912	10	11
432	1210	-778	10	12
45.7	1210	-1164.3	10	13
62.7	1210	-1147.3	10	14
2840	1210	1630	11	14
23.4	1210	-1186.6	11	15
1650	1210	440	12	15
39.8	1210	-1170.2	12	16
70.6	1210	-1139.4	12	17
756	1210	-454	12	18
26300	1210	25090	13	18
12200	1210	10990	14	18
86000	1210	84790	15	18
24200	1210	22990	16	18
136000	1210	134790	17	18
48300	1210	47090	18	18
16600	1210	15390	19	18
298	364	-66	19	19
432	364	68	20	19
45.7	364	-318.3	20	20
62.7	364	-301.3	20	21
2840	364	2476	21	21
23.4	364	-340.6	21	22
1650	364	1286	22	22
39.8	364	-324.2	22	23

70.6	364	-293.4	22	24
756	364	392	23	24
26300	364	25936	24	24
12200	364	11836	25	24
86000	364	85636	26	24
24200	364	23836	27	24
136000	364	135636	28	24
48300	364	47936	29	24
16600	364	16236	30	24
432	298	134	31	24
45.7	298	-252.3	31	25
62.7	298	-235.3	31	26
2840	298	2542	32	26
23.4	298	-274.6	32	27
1650	298	1352	33	27
39.8	298	-258.2	33	28
70.6	298	-227.4	33	29
756	298	458	34	29
26300	298	26002	35	29
12200	298	11902	36	29
86000	298	85702	37	29
24200	298	23902	38	29
136000	298	135702	39	29
48300	298	48002	40	29
16600	298	16302	41	29
45.7	432	-386.3	41	30
62.7	432	-369.3	41	31
2840	432	2408	42	31
23.4	432	-408.6	42	32
1650	432	1218	43	32
39.8	432	-392.2	43	33
70.6	432	-361.4	43	34
756	432	324	44	34
26300	432	25868	45	34
12200	432	11768	46	34
86000	432	85568	47	34
24200	432	23768	48	34
136000	432	135568	49	34
48300	432	47868	50	34
16600	432	16168	51	34
62.7	45.7	17	52	34
2840	45.7	2794.3	53	34
23.4	45.7	-22.3	53	35
1650	45.7	1604.3	54	35
39.8	45.7	-5.9	54	36
70.6	45.7	24.9	55	36
756	45.7	710.3	56	36
26300	45.7	26254.3	57	36
12200	45.7	12154.3	58	36
86000	45.7	85954.3	59	36
24200	45.7	24154.3	60	36
136000	45.7	135954	61	36
48300	45.7	48254.3	62	36
16600	45.7	16554.3	63	36

2840	62.7	2777.3	64	36
23.4	62.7	-39.3	64	37
1650	62.7	1587.3	65	37
39.8	62.7	-22.9	65	38
70.6	62.7	7.9	66	38
756	62.7	693.3	67	38
26300	62.7	26237.3	68	38
12200	62.7	12137.3	69	38
86000	62.7	85937.3	70	38
24200	62.7	24137.3	71	38
136000	62.7	135937	72	38
48300	62.7	48237.3	73	38
16600	62.7	16537.3	74	38
23.4	2840	-2816.6	74	39
1650	2840	-1190	74	40
39.8	2840	-2800.2	74	41
70.6	2840	-2769.4	74	42
756	2840	-2084	74	43
26300	2840	23460	75	43
12200	2840	9360	76	43
86000	2840	83160	77	43
24200	2840	21360	78	43
136000	2840	133160	79	43
48300	2840	45460	80	43
16600	2840	13760	81	43
1650	23.4	1626.6	82	43
39.8	23.4	16.4	83	43
70.6	23.4	47.2	84	43
756	23.4	732.6	85	43
26300	23.4	26276.6	86	43
12200	23.4	12176.6	87	43
86000	23.4	85976.6	88	43
24200	23.4	24176.6	89	43
136000	23.4	135977	90	43
48300	23.4	48276.6	91	43
16600	23.4	16576.6	92	43
39.8	1650	-1610.2	92	44
70.6	1650	-1579.4	92	45
756	1650	-894	92	46
26300	1650	24650	93	46
12200	1650	10550	94	46
86000	1650	84350	95	46
24200	1650	22550	96	46
136000	1650	134350	97	46
48300	1650	46650	98	46
16600	1650	14950	99	46
70.6	39.8	30.8	100	46
756	39.8	716.2	101	46
26300	39.8	26260.2	102	46
12200	39.8	12160.2	103	46
86000	39.8	85960.2	104	46
24200	39.8	24160.2	105	46

136000	39.8	135960	106	46
48300	39.8	48260.2	107	46
16600	39.8	16560.2	108	46
756	70.6	685.4	109	46
26300	70.6	26229.4	110	46
12200	70.6	12129.4	111	46
86000	70.6	85929.4	112	46
24200	70.6	24129.4	113	46
136000	70.6	135929	114	46
48300	70.6	48229.4	115	46
16600	70.6	16529.4	116	46
26300	756	25544	117	46
12200	756	11444	118	46
86000	756	85244	119	46
24200	756	23444	120	46
136000	756	135244	121	46
48300	756	47544	122	46
16600	756	15844	123	46
12200	26300	-14100	123	47
86000	26300	59700	124	47
24200	26300	-2100	124	48
136000	26300	109700	125	48
48300	26300	22000	126	48
16600	26300	-9700	126	49
86000	12200	73800	127	49
24200	12200	12000	128	49
136000	12200	123800	129	49
48300	12200	36100	130	49
16600	12200	4400	131	49
24200	86000	-61800	131	50
136000	86000	50000	132	50
48300	86000	-37700	132	51
16600	86000	-69400	132	52
136000	24200	111800	133	52
48300	24200	24100	134	52
16600	24200	-7600	134	53
48300	136000	-87700	134	54
16600	136000	-119400	134	55
16600	48300	-31700	134	56

S Statistic = 134 - 56 = 78

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 2.49821

Comparison Level at 95% confidence level = -1.65463 (downward trend)

2.49821 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW08-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
44.6	178	-133.4	0	1
85	178	-93	0	2
188	178	10	1	2
71.9	178	-106.1	1	3
153	178	-25	1	4
49.8	178	-128.2	1	5
69.4	178	-108.6	1	6
16.9	178	-161.1	1	7
21.5	178	-156.5	1	8
21.4	178	-156.6	1	9
108	178	-70	1	10
1050	178	872	2	10
2540	178	2362	3	10
256	178	78	4	10
11	178	-167	4	11
10 U	178	-168	4	12
10 U	178	-168	4	13
11.2	178	-166.8	4	14
48.9	178	-129.1	4	15
85	44.6	40.4	5	15
188	44.6	143.4	6	15
71.9	44.6	27.3	7	15
153	44.6	108.4	8	15
49.8	44.6	5.2	9	15
69.4	44.6	24.8	10	15
16.9	44.6	-27.7	10	16
21.5	44.6	-23.1	10	17
21.4	44.6	-23.2	10	18
108	44.6	63.4	11	18
1050	44.6	1005.4	12	18
2540	44.6	2495.4	13	18
256	44.6	211.4	14	18
11	44.6	-33.6	14	19
10 U	44.6	-34.6	14	20
10 U	44.6	-34.6	14	21
11.2	44.6	-33.4	14	22
48.9	44.6	4.3	15	22
188	85	103	16	22
71.9	85	-13.1	16	23
153	85	68	17	23
49.8	85	-35.2	17	24
69.4	85	-15.6	17	25
16.9	85	-68.1	17	26
21.5	85	-63.5	17	27
21.4	85	-63.6	17	28

108	85	23	18	28
1050	85	965	19	28
2540	85	2455	20	28
256	85	171	21	28
11	85	-74	21	29
10 U	85	-75	21	30
10 U	85	-75	21	31
11.2	85	-73.8	21	32
48.9	85	-36.1	21	33
71.9	188	-116.1	21	34
153	188	-35	21	35
49.8	188	-138.2	21	36
69.4	188	-118.6	21	37
16.9	188	-171.1	21	38
21.5	188	-166.5	21	39
21.4	188	-166.6	21	40
108	188	-80	21	41
1050	188	862	22	41
2540	188	2352	23	41
256	188	68	24	41
11	188	-177	24	42
10 U	188	-178	24	43
10 U	188	-178	24	44
11.2	188	-176.8	24	45
48.9	188	-139.1	24	46
153	71.9	81.1	25	46
49.8	71.9	-22.1	25	47
69.4	71.9	-2.5	25	48
16.9	71.9	-55	25	49
21.5	71.9	-50.4	25	50
21.4	71.9	-50.5	25	51
108	71.9	36.1	26	51
1050	71.9	978.1	27	51
2540	71.9	2468.1	28	51
256	71.9	184.1	29	51
11	71.9	-60.9	29	52
10 U	71.9	-61.9	29	53
10 U	71.9	-61.9	29	54
11.2	71.9	-60.7	29	55
48.9	71.9	-23	29	56
49.8	153	-103.2	29	57
69.4	153	-83.6	29	58
16.9	153	-136.1	29	59
21.5	153	-131.5	29	60
21.4	153	-131.6	29	61
108	153	-45	29	62
1050	153	897	30	62
2540	153	2387	31	62
256	153	103	32	62
11	153	-142	32	63
10 U	153	-143	32	64
10 U	153	-143	32	65
11.2	153	-141.8	32	66
48.9	153	-104.1	32	67

69.4	49.8	19.6	33	67
16.9	49.8	-32.9	33	68
21.5	49.8	-28.3	33	69
21.4	49.8	-28.4	33	70
108	49.8	58.2	34	70
1050	49.8	1000.2	35	70
2540	49.8	2490.2	36	70
256	49.8	206.2	37	70
11	49.8	-38.8	37	71
10 U	49.8	-39.8	37	72
10 U	49.8	-39.8	37	73
11.2	49.8	-38.6	37	74
48.9	49.8	-0.9	37	75
16.9	69.4	-52.5	37	76
21.5	69.4	-47.9	37	77
21.4	69.4	-48	37	78
108	69.4	38.6	38	78
1050	69.4	980.6	39	78
2540	69.4	2470.6	40	78
256	69.4	186.6	41	78
11	69.4	-58.4	41	79
10 U	69.4	-59.4	41	80
10 U	69.4	-59.4	41	81
11.2	69.4	-58.2	41	82
48.9	69.4	-20.5	41	83
21.5	16.9	4.6	42	83
21.4	16.9	4.5	43	83
108	16.9	91.1	44	83
1050	16.9	1033.1	45	83
2540	16.9	2523.1	46	83
256	16.9	239.1	47	83
11	16.9	-5.9	47	84
10 U	16.9	-6.9	47	85
10 U	16.9	-6.9	47	86
11.2	16.9	-5.7	47	87
48.9	16.9	32	48	87
21.4	21.5	-0.1	48	88
108	21.5	86.5	49	88
1050	21.5	1028.5	50	88
2540	21.5	2518.5	51	88
256	21.5	234.5	52	88
11	21.5	-10.5	52	89
10 U	21.5	-11.5	52	90
10 U	21.5	-11.5	52	91
11.2	21.5	-10.3	52	92
48.9	21.5	27.4	53	92
108	21.4	86.6	54	92
1050	21.4	1028.6	55	92
2540	21.4	2518.6	56	92
256	21.4	234.6	57	92
11	21.4	-10.4	57	93
10 U	21.4	-11.4	57	94

10 U	21.4	-11.4	57	95
11.2	21.4	-10.2	57	96
48.9	21.4	27.5	58	96
1050	108	942	59	96
2540	108	2432	60	96
256	108	148	61	96
11	108	-97	61	97
10 U	108	-98	61	98
10 U	108	-98	61	99
11.2	108	-96.8	61	100
48.9	108	-59.1	61	101
2540	1050	1490	62	101
256	1050	-794	62	102
11	1050	-1039	62	103
10 U	1050	-1040	62	104
10 U	1050	-1040	62	105
11.2	1050	-1038.8	62	106
48.9	1050	-1001.1	62	107
256	2540	-2284	62	108
11	2540	-2529	62	109
10 U	2540	-2530	62	110
10 U	2540	-2530	62	111
11.2	2540	-2528.8	62	112
48.9	2540	-2491.1	62	113
11	256	-245	62	114
10 U	256	-246	62	115
10 U	256	-246	62	116
11.2	256	-244.8	62	117
48.9	256	-207.1	62	118
10 U	11	-1	62	119
10 U	11	-1	62	120
11.2	11	0.2	63	120
48.9	11	37.9	64	120
10 U	10 U	0	64	120
11.2	10 U	1.2	65	120
48.9	10 U	38.9	66	120
11.2	10 U	1.2	67	120
48.9	10 U	38.9	68	120
48.9	11.2	37.7	69	120

S Statistic = 69 - 120 = -51

Tied Group	Value	Members
1	10	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = -1.62307

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.62307 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW09-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
51900	51000	900	1	0
57500	51000	6500	2	0
57200	51000	6200	3	0
51900	51000	900	4	0
65600	51000	14600	5	0
55500	51000	4500	6	0
39400	51000	-11600	6	1
49700	51000	-1300	6	2
67900	51000	16900	7	2
44500	51000	-6500	7	3
54700	51000	3700	8	3
38400	51000	-12600	8	4
54700	51000	3700	9	4
53800	51000	2800	10	4
66600	51000	15600	11	4
57500	51000	6500	12	4
64200	51000	13200	13	4
53300	51000	2300	14	4
82000	51000	31000	15	4
57500	51900	5600	16	4
57200	51900	5300	17	4
51900	51900	0	17	4
65600	51900	13700	18	4
55500	51900	3600	19	4
39400	51900	-12500	19	5
49700	51900	-2200	19	6
67900	51900	16000	20	6
44500	51900	-7400	20	7
54700	51900	2800	21	7
38400	51900	-13500	21	8
54700	51900	2800	22	8
53800	51900	1900	23	8
66600	51900	14700	24	8
57500	51900	5600	25	8
64200	51900	12300	26	8
53300	51900	1400	27	8
82000	51900	30100	28	8
57200	57500	-300	28	9
51900	57500	-5600	28	10
65600	57500	8100	29	10
55500	57500	-2000	29	11
39400	57500	-18100	29	12
49700	57500	-7800	29	13
67900	57500	10400	30	13
44500	57500	-13000	30	14

54700	57500	-2800	30	15
38400	57500	-19100	30	16
54700	57500	-2800	30	17
53800	57500	-3700	30	18
66600	57500	9100	31	18
57500	57500	0	31	18
64200	57500	6700	32	18
53300	57500	-4200	32	19
82000	57500	24500	33	19
51900	57200	-5300	33	20
65600	57200	8400	34	20
55500	57200	-1700	34	21
39400	57200	-17800	34	22
49700	57200	-7500	34	23
67900	57200	10700	35	23
44500	57200	-12700	35	24
54700	57200	-2500	35	25
38400	57200	-18800	35	26
54700	57200	-2500	35	27
53800	57200	-3400	35	28
66600	57200	9400	36	28
57500	57200	300	37	28
64200	57200	7000	38	28
53300	57200	-3900	38	29
82000	57200	24800	39	29
65600	51900	13700	40	29
55500	51900	3600	41	29
39400	51900	-12500	41	30
49700	51900	-2200	41	31
67900	51900	16000	42	31
44500	51900	-7400	42	32
54700	51900	2800	43	32
38400	51900	-13500	43	33
54700	51900	2800	44	33
53800	51900	1900	45	33
66600	51900	14700	46	33
57500	51900	5600	47	33
64200	51900	12300	48	33
53300	51900	1400	49	33
82000	51900	30100	50	33
55500	65600	-10100	50	34
39400	65600	-26200	50	35
49700	65600	-15900	50	36
67900	65600	2300	51	36
44500	65600	-21100	51	37
54700	65600	-10900	51	38
38400	65600	-27200	51	39
54700	65600	-10900	51	40
53800	65600	-11800	51	41
66600	65600	1000	52	41
57500	65600	-8100	52	42
64200	65600	-1400	52	43
53300	65600	-12300	52	44
82000	65600	16400	53	44

39400	55500	-16100	53	45
49700	55500	-5800	53	46
67900	55500	12400	54	46
44500	55500	-11000	54	47
54700	55500	-800	54	48
38400	55500	-17100	54	49
54700	55500	-800	54	50
53800	55500	-1700	54	51
66600	55500	11100	55	51
57500	55500	2000	56	51
64200	55500	8700	57	51
53300	55500	-2200	57	52
82000	55500	26500	58	52
49700	39400	10300	59	52
67900	39400	28500	60	52
44500	39400	5100	61	52
54700	39400	15300	62	52
38400	39400	-1000	62	53
54700	39400	15300	63	53
53800	39400	14400	64	53
66600	39400	27200	65	53
57500	39400	18100	66	53
64200	39400	24800	67	53
53300	39400	13900	68	53
82000	39400	42600	69	53
67900	49700	18200	70	53
44500	49700	-5200	70	54
54700	49700	5000	71	54
38400	49700	-11300	71	55
54700	49700	5000	72	55
53800	49700	4100	73	55
66600	49700	16900	74	55
57500	49700	7800	75	55
64200	49700	14500	76	55
53300	49700	3600	77	55
82000	49700	32300	78	55
44500	67900	-23400	78	56
54700	67900	-13200	78	57
38400	67900	-29500	78	58
54700	67900	-13200	78	59
53800	67900	-14100	78	60
66600	67900	-1300	78	61
57500	67900	-10400	78	62
64200	67900	-3700	78	63
53300	67900	-14600	78	64
82000	67900	14100	79	64
54700	44500	10200	80	64
38400	44500	-6100	80	65
54700	44500	10200	81	65
53800	44500	9300	82	65
66600	44500	22100	83	65
57500	44500	13000	84	65

64200	44500	19700	85	65
53300	44500	8800	86	65
82000	44500	37500	87	65
38400	54700	-16300	87	66
54700	54700	0	87	66
53800	54700	-900	87	67
66600	54700	11900	88	67
57500	54700	2800	89	67
64200	54700	9500	90	67
53300	54700	-1400	90	68
82000	54700	27300	91	68
54700	38400	16300	92	68
53800	38400	15400	93	68
66600	38400	28200	94	68
57500	38400	19100	95	68
64200	38400	25800	96	68
53300	38400	14900	97	68
82000	38400	43600	98	68
53800	54700	-900	98	69
66600	54700	11900	99	69
57500	54700	2800	100	69
64200	54700	9500	101	69
53300	54700	-1400	101	70
82000	54700	27300	102	70
66600	53800	12800	103	70
57500	53800	3700	104	70
64200	53800	10400	105	70
53300	53800	-500	105	71
82000	53800	28200	106	71
57500	66600	-9100	106	72
64200	66600	-2400	106	73
53300	66600	-13300	106	74
82000	66600	15400	107	74
64200	57500	6700	108	74
53300	57500	-4200	108	75
82000	57500	24500	109	75
53300	64200	-10900	109	76
82000	64200	17800	110	76
82000	53300	28700	111	76

S Statistic = 111 - 76 = 35

Tied Group	Value	Members
1	51900	2
2	57500	2
3	54700	2

Time Period **Observations**

2/1/2017	1
3/1/2017	1
4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 54

B = 0

C = 0

D = 0

E = 6

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 947

Z-Score = 1.10485

Comparison Level at 95% confidence level = -1.65463 (downward trend)

1.10485 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW10-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
20.4	104000	-103980	0	1
75800	104000	-28200	0	2
1150	104000	-102850	0	3
34600	104000	-69400	0	4
25900	104000	-78100	0	5
79.7	104000	-103920	0	6
8220	104000	-95780	0	7
31000	104000	-73000	0	8
39000	104000	-65000	0	9
158	104000	-103842	0	10
26.5	104000	-103974	0	11
13500	104000	-90500	0	12
17600	104000	-86400	0	13
16600	104000	-87400	0	14
2520	104000	-101480	0	15
591	104000	-103409	0	16
5560	104000	-98440	0	17
7730	104000	-96270	0	18
6020	104000	-97980	0	19
75800	20.4	75779.6	1	19
1150	20.4	1129.6	2	19
34600	20.4	34579.6	3	19
25900	20.4	25879.6	4	19
79.7	20.4	59.3	5	19
8220	20.4	8199.6	6	19
31000	20.4	30979.6	7	19
39000	20.4	38979.6	8	19
158	20.4	137.6	9	19
26.5	20.4	6.1	10	19
13500	20.4	13479.6	11	19
17600	20.4	17579.6	12	19
16600	20.4	16579.6	13	19
2520	20.4	2499.6	14	19
591	20.4	570.6	15	19
5560	20.4	5539.6	16	19
7730	20.4	7709.6	17	19
6020	20.4	5999.6	18	19
1150	75800	-74650	18	20
34600	75800	-41200	18	21
25900	75800	-49900	18	22
79.7	75800	-75720.3	18	23
8220	75800	-67580	18	24
31000	75800	-44800	18	25
39000	75800	-36800	18	26
158	75800	-75642	18	27

26.5	75800	-75773.5	18	28
13500	75800	-62300	18	29
17600	75800	-58200	18	30
16600	75800	-59200	18	31
2520	75800	-73280	18	32
591	75800	-75209	18	33
5560	75800	-70240	18	34
7730	75800	-68070	18	35
6020	75800	-69780	18	36
34600	1150	33450	19	36
25900	1150	24750	20	36
79.7	1150	-1070.3	20	37
8220	1150	7070	21	37
31000	1150	29850	22	37
39000	1150	37850	23	37
158	1150	-992	23	38
26.5	1150	-1123.5	23	39
13500	1150	12350	24	39
17600	1150	16450	25	39
16600	1150	15450	26	39
2520	1150	1370	27	39
591	1150	-559	27	40
5560	1150	4410	28	40
7730	1150	6580	29	40
6020	1150	4870	30	40
25900	34600	-8700	30	41
79.7	34600	-34520.3	30	42
8220	34600	-26380	30	43
31000	34600	-3600	30	44
39000	34600	4400	31	44
158	34600	-34442	31	45
26.5	34600	-34573.5	31	46
13500	34600	-21100	31	47
17600	34600	-17000	31	48
16600	34600	-18000	31	49
2520	34600	-32080	31	50
591	34600	-34009	31	51
5560	34600	-29040	31	52
7730	34600	-26870	31	53
6020	34600	-28580	31	54
79.7	25900	-25820.3	31	55
8220	25900	-17680	31	56
31000	25900	5100	32	56
39000	25900	13100	33	56
158	25900	-25742	33	57
26.5	25900	-25873.5	33	58
13500	25900	-12400	33	59
17600	25900	-8300	33	60
16600	25900	-9300	33	61
2520	25900	-23380	33	62
591	25900	-25309	33	63
5560	25900	-20340	33	64
7730	25900	-18170	33	65
6020	25900	-19880	33	66

8220	79.7	8140.3	34	66
31000	79.7	30920.3	35	66
39000	79.7	38920.3	36	66
158	79.7	78.3	37	66
26.5	79.7	-53.2	37	67
13500	79.7	13420.3	38	67
17600	79.7	17520.3	39	67
16600	79.7	16520.3	40	67
2520	79.7	2440.3	41	67
591	79.7	511.3	42	67
5560	79.7	5480.3	43	67
7730	79.7	7650.3	44	67
6020	79.7	5940.3	45	67
31000	8220	22780	46	67
39000	8220	30780	47	67
158	8220	-8062	47	68
26.5	8220	-8193.5	47	69
13500	8220	5280	48	69
17600	8220	9380	49	69
16600	8220	8380	50	69
2520	8220	-5700	50	70
591	8220	-7629	50	71
5560	8220	-2660	50	72
7730	8220	-490	50	73
6020	8220	-2200	50	74
39000	31000	8000	51	74
158	31000	-30842	51	75
26.5	31000	-30973.5	51	76
13500	31000	-17500	51	77
17600	31000	-13400	51	78
16600	31000	-14400	51	79
2520	31000	-28480	51	80
591	31000	-30409	51	81
5560	31000	-25440	51	82
7730	31000	-23270	51	83
6020	31000	-24980	51	84
158	39000	-38842	51	85
26.5	39000	-38973.5	51	86
13500	39000	-25500	51	87
17600	39000	-21400	51	88
16600	39000	-22400	51	89
2520	39000	-36480	51	90
591	39000	-38409	51	91
5560	39000	-33440	51	92
7730	39000	-31270	51	93
6020	39000	-32980	51	94
26.5	158	-131.5	51	95
13500	158	13342	52	95
17600	158	17442	53	95
16600	158	16442	54	95
2520	158	2362	55	95
591	158	433	56	95

5560	158	5402	57	95
7730	158	7572	58	95
6020	158	5862	59	95
13500	26.5	13473.5	60	95
17600	26.5	17573.5	61	95
16600	26.5	16573.5	62	95
2520	26.5	2493.5	63	95
591	26.5	564.5	64	95
5560	26.5	5533.5	65	95
7730	26.5	7703.5	66	95
6020	26.5	5993.5	67	95
17600	13500	4100	68	95
16600	13500	3100	69	95
2520	13500	-10980	69	96
591	13500	-12909	69	97
5560	13500	-7940	69	98
7730	13500	-5770	69	99
6020	13500	-7480	69	100
16600	17600	-1000	69	101
2520	17600	-15080	69	102
591	17600	-17009	69	103
5560	17600	-12040	69	104
7730	17600	-9870	69	105
6020	17600	-11580	69	106
2520	16600	-14080	69	107
591	16600	-16009	69	108
5560	16600	-11040	69	109
7730	16600	-8870	69	110
6020	16600	-10580	69	111
591	2520	-1929	69	112
5560	2520	3040	70	112
7730	2520	5210	71	112
6020	2520	3500	72	112
5560	591	4969	73	112
7730	591	7139	74	112
6020	591	5429	75	112
7730	5560	2170	76	112
6020	5560	460	77	112
6020	7730	-1710	77	113

S Statistic = 77 - 113 = -36

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -1.13555

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.13555 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW11-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
301000	368000	-67000	0	1
288000	368000	-80000	0	2
336000	368000	-32000	0	3
201000	368000	-167000	0	4
192000	368000	-176000	0	5
147000	368000	-221000	0	6
134000	368000	-234000	0	7
111000	368000	-257000	0	8
207000	368000	-161000	0	9
197000	368000	-171000	0	10
225000	368000	-143000	0	11
215000	368000	-153000	0	12
15700	368000	-352300	0	13
174000	368000	-194000	0	14
176000	368000	-192000	0	15
142000	368000	-226000	0	16
121000	368000	-247000	0	17
120000	368000	-248000	0	18
173000	368000	-195000	0	19
288000	301000	-13000	0	20
336000	301000	35000	1	20
201000	301000	-100000	1	21
192000	301000	-109000	1	22
147000	301000	-154000	1	23
134000	301000	-167000	1	24
111000	301000	-190000	1	25
207000	301000	-94000	1	26
197000	301000	-104000	1	27
225000	301000	-76000	1	28
215000	301000	-86000	1	29
15700	301000	-285300	1	30
174000	301000	-127000	1	31
176000	301000	-125000	1	32
142000	301000	-159000	1	33
121000	301000	-180000	1	34
120000	301000	-181000	1	35
173000	301000	-128000	1	36
336000	288000	48000	2	36
201000	288000	-87000	2	37
192000	288000	-96000	2	38
147000	288000	-141000	2	39
134000	288000	-154000	2	40
111000	288000	-177000	2	41
207000	288000	-81000	2	42
197000	288000	-91000	2	43

225000	288000	-63000	2	44
215000	288000	-73000	2	45
15700	288000	-272300	2	46
174000	288000	-114000	2	47
176000	288000	-112000	2	48
142000	288000	-146000	2	49
121000	288000	-167000	2	50
120000	288000	-168000	2	51
173000	288000	-115000	2	52
201000	336000	-135000	2	53
192000	336000	-144000	2	54
147000	336000	-189000	2	55
134000	336000	-202000	2	56
111000	336000	-225000	2	57
207000	336000	-129000	2	58
197000	336000	-139000	2	59
225000	336000	-111000	2	60
215000	336000	-121000	2	61
15700	336000	-320300	2	62
174000	336000	-162000	2	63
176000	336000	-160000	2	64
142000	336000	-194000	2	65
121000	336000	-215000	2	66
120000	336000	-216000	2	67
173000	336000	-163000	2	68
192000	201000	-9000	2	69
147000	201000	-54000	2	70
134000	201000	-67000	2	71
111000	201000	-90000	2	72
207000	201000	6000	3	72
197000	201000	-4000	3	73
225000	201000	24000	4	73
215000	201000	14000	5	73
15700	201000	-185300	5	74
174000	201000	-27000	5	75
176000	201000	-25000	5	76
142000	201000	-59000	5	77
121000	201000	-80000	5	78
120000	201000	-81000	5	79
173000	201000	-28000	5	80
147000	192000	-45000	5	81
134000	192000	-58000	5	82
111000	192000	-81000	5	83
207000	192000	15000	6	83
197000	192000	5000	7	83
225000	192000	33000	8	83
215000	192000	23000	9	83
15700	192000	-176300	9	84
174000	192000	-18000	9	85
176000	192000	-16000	9	86
142000	192000	-50000	9	87
121000	192000	-71000	9	88
120000	192000	-72000	9	89
173000	192000	-19000	9	90

134000	147000	-13000	9	91
111000	147000	-36000	9	92
207000	147000	60000	10	92
197000	147000	50000	11	92
225000	147000	78000	12	92
215000	147000	68000	13	92
15700	147000	-131300	13	93
174000	147000	27000	14	93
176000	147000	29000	15	93
142000	147000	-5000	15	94
121000	147000	-26000	15	95
120000	147000	-27000	15	96
173000	147000	26000	16	96
111000	134000	-23000	16	97
207000	134000	73000	17	97
197000	134000	63000	18	97
225000	134000	91000	19	97
215000	134000	81000	20	97
15700	134000	-118300	20	98
174000	134000	40000	21	98
176000	134000	42000	22	98
142000	134000	8000	23	98
121000	134000	-13000	23	99
120000	134000	-14000	23	100
173000	134000	39000	24	100
207000	111000	96000	25	100
197000	111000	86000	26	100
225000	111000	114000	27	100
215000	111000	104000	28	100
15700	111000	-95300	28	101
174000	111000	63000	29	101
176000	111000	65000	30	101
142000	111000	31000	31	101
121000	111000	10000	32	101
120000	111000	9000	33	101
173000	111000	62000	34	101
197000	207000	-10000	34	102
225000	207000	18000	35	102
215000	207000	8000	36	102
15700	207000	-191300	36	103
174000	207000	-33000	36	104
176000	207000	-31000	36	105
142000	207000	-65000	36	106
121000	207000	-86000	36	107
120000	207000	-87000	36	108
173000	207000	-34000	36	109
225000	197000	28000	37	109
215000	197000	18000	38	109
15700	197000	-181300	38	110
174000	197000	-23000	38	111
176000	197000	-21000	38	112
142000	197000	-55000	38	113

121000	197000	-76000	38	114
120000	197000	-77000	38	115
173000	197000	-24000	38	116
215000	225000	-10000	38	117
15700	225000	-209300	38	118
174000	225000	-51000	38	119
176000	225000	-49000	38	120
142000	225000	-83000	38	121
121000	225000	-104000	38	122
120000	225000	-105000	38	123
173000	225000	-52000	38	124
15700	215000	-199300	38	125
174000	215000	-41000	38	126
176000	215000	-39000	38	127
142000	215000	-73000	38	128
121000	215000	-94000	38	129
120000	215000	-95000	38	130
173000	215000	-42000	38	131
174000	15700	158300	39	131
176000	15700	160300	40	131
142000	15700	126300	41	131
121000	15700	105300	42	131
120000	15700	104300	43	131
173000	15700	157300	44	131
176000	174000	2000	45	131
142000	174000	-32000	45	132
121000	174000	-53000	45	133
120000	174000	-54000	45	134
173000	174000	-1000	45	135
142000	176000	-34000	45	136
121000	176000	-55000	45	137
120000	176000	-56000	45	138
173000	176000	-3000	45	139
121000	142000	-21000	45	140
120000	142000	-22000	45	141
173000	142000	31000	46	141
120000	121000	-1000	46	142
173000	121000	52000	47	142
173000	120000	53000	48	142

S Statistic = 48 - 142 = -94

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -3.01732

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-3.01732 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW12-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
216000	249000	-33000	0	1
188000	249000	-61000	0	2
232000	249000	-17000	0	3
226000	249000	-23000	0	4
219000	249000	-30000	0	5
156000	249000	-93000	0	6
156000	249000	-93000	0	7
150000	249000	-99000	0	8
140000	249000	-109000	0	9
157000	249000	-92000	0	10
117000	249000	-132000	0	11
103000	249000	-146000	0	12
2410	249000	-246590	0	13
14300	249000	-234700	0	14
109000	249000	-140000	0	15
110000	249000	-139000	0	16
111000	249000	-138000	0	17
104000	249000	-145000	0	18
43500	249000	-205500	0	19
188000	216000	-28000	0	20
232000	216000	16000	1	20
226000	216000	10000	2	20
219000	216000	3000	3	20
156000	216000	-60000	3	21
156000	216000	-60000	3	22
150000	216000	-66000	3	23
140000	216000	-76000	3	24
157000	216000	-59000	3	25
117000	216000	-99000	3	26
103000	216000	-113000	3	27
2410	216000	-213590	3	28
14300	216000	-201700	3	29
109000	216000	-107000	3	30
110000	216000	-106000	3	31
111000	216000	-105000	3	32
104000	216000	-112000	3	33
43500	216000	-172500	3	34
232000	188000	44000	4	34
226000	188000	38000	5	34
219000	188000	31000	6	34
156000	188000	-32000	6	35
156000	188000	-32000	6	36
150000	188000	-38000	6	37
140000	188000	-48000	6	38
157000	188000	-31000	6	39

117000	188000	-71000	6	40
103000	188000	-85000	6	41
2410	188000	-185590	6	42
14300	188000	-173700	6	43
109000	188000	-79000	6	44
110000	188000	-78000	6	45
111000	188000	-77000	6	46
104000	188000	-84000	6	47
43500	188000	-144500	6	48
226000	232000	-6000	6	49
219000	232000	-13000	6	50
156000	232000	-76000	6	51
156000	232000	-76000	6	52
150000	232000	-82000	6	53
140000	232000	-92000	6	54
157000	232000	-75000	6	55
117000	232000	-115000	6	56
103000	232000	-129000	6	57
2410	232000	-229590	6	58
14300	232000	-217700	6	59
109000	232000	-123000	6	60
110000	232000	-122000	6	61
111000	232000	-121000	6	62
104000	232000	-128000	6	63
43500	232000	-188500	6	64
219000	226000	-7000	6	65
156000	226000	-70000	6	66
156000	226000	-70000	6	67
150000	226000	-76000	6	68
140000	226000	-86000	6	69
157000	226000	-69000	6	70
117000	226000	-109000	6	71
103000	226000	-123000	6	72
2410	226000	-223590	6	73
14300	226000	-211700	6	74
109000	226000	-117000	6	75
110000	226000	-116000	6	76
111000	226000	-115000	6	77
104000	226000	-122000	6	78
43500	226000	-182500	6	79
156000	219000	-63000	6	80
156000	219000	-63000	6	81
150000	219000	-69000	6	82
140000	219000	-79000	6	83
157000	219000	-62000	6	84
117000	219000	-102000	6	85
103000	219000	-116000	6	86
2410	219000	-216590	6	87
14300	219000	-204700	6	88
109000	219000	-110000	6	89
110000	219000	-109000	6	90
111000	219000	-108000	6	91
104000	219000	-115000	6	92
43500	219000	-175500	6	93

156000	156000	0	6	93
150000	156000	-6000	6	94
140000	156000	-16000	6	95
157000	156000	1000	7	95
117000	156000	-39000	7	96
103000	156000	-53000	7	97
2410	156000	-153590	7	98
14300	156000	-141700	7	99
109000	156000	-47000	7	100
110000	156000	-46000	7	101
111000	156000	-45000	7	102
104000	156000	-52000	7	103
43500	156000	-112500	7	104
150000	156000	-6000	7	105
140000	156000	-16000	7	106
157000	156000	1000	8	106
117000	156000	-39000	8	107
103000	156000	-53000	8	108
2410	156000	-153590	8	109
14300	156000	-141700	8	110
109000	156000	-47000	8	111
110000	156000	-46000	8	112
111000	156000	-45000	8	113
104000	156000	-52000	8	114
43500	156000	-112500	8	115
140000	150000	-10000	8	116
157000	150000	7000	9	116
117000	150000	-33000	9	117
103000	150000	-47000	9	118
2410	150000	-147590	9	119
14300	150000	-135700	9	120
109000	150000	-41000	9	121
110000	150000	-40000	9	122
111000	150000	-39000	9	123
104000	150000	-46000	9	124
43500	150000	-106500	9	125
157000	140000	17000	10	125
117000	140000	-23000	10	126
103000	140000	-37000	10	127
2410	140000	-137590	10	128
14300	140000	-125700	10	129
109000	140000	-31000	10	130
110000	140000	-30000	10	131
111000	140000	-29000	10	132
104000	140000	-36000	10	133
43500	140000	-96500	10	134
117000	157000	-40000	10	135
103000	157000	-54000	10	136
2410	157000	-154590	10	137
14300	157000	-142700	10	138
109000	157000	-48000	10	139
110000	157000	-47000	10	140

111000	157000	-46000	10	141
104000	157000	-53000	10	142
43500	157000	-113500	10	143
103000	117000	-14000	10	144
2410	117000	-114590	10	145
14300	117000	-102700	10	146
109000	117000	-8000	10	147
110000	117000	-7000	10	148
111000	117000	-6000	10	149
104000	117000	-13000	10	150
43500	117000	-73500	10	151
2410	103000	-100590	10	152
14300	103000	-88700	10	153
109000	103000	6000	11	153
110000	103000	7000	12	153
111000	103000	8000	13	153
104000	103000	1000	14	153
43500	103000	-59500	14	154
14300	2410	11890	15	154
109000	2410	106590	16	154
110000	2410	107590	17	154
111000	2410	108590	18	154
104000	2410	101590	19	154
43500	2410	41090	20	154
109000	14300	94700	21	154
110000	14300	95700	22	154
111000	14300	96700	23	154
104000	14300	89700	24	154
43500	14300	29200	25	154
110000	109000	1000	26	154
111000	109000	2000	27	154
104000	109000	-5000	27	155
43500	109000	-65500	27	156
111000	110000	1000	28	156
104000	110000	-6000	28	157
43500	110000	-66500	28	158
104000	111000	-7000	28	159
43500	111000	-67500	28	160
43500	104000	-60500	28	161

S Statistic = 28 - 161 = -133

Tied Group	Value	Members
1	156000	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = -4.2849

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-4.2849 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW13-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1160	308000	-306840	0	1
204000	308000	-104000	0	2
172000	308000	-136000	0	3
237	308000	-307763	0	4
8600	308000	-299400	0	5
201000	308000	-107000	0	6
274000	308000	-34000	0	7
33.4	308000	-307967	0	8
116	308000	-307884	0	9
328000	308000	20000	1	9
97.7	308000	-307902	1	10
122	308000	-307878	1	11
246000	308000	-62000	1	12
204000	1160	202840	2	12
172000	1160	170840	3	12
237	1160	-923	3	13
8600	1160	7440	4	13
201000	1160	199840	5	13
274000	1160	272840	6	13
33.4	1160	-1126.6	6	14
116	1160	-1044	6	15
328000	1160	326840	7	15
97.7	1160	-1062.3	7	16
122	1160	-1038	7	17
246000	1160	244840	8	17
172000	204000	-32000	8	18
237	204000	-203763	8	19
8600	204000	-195400	8	20
201000	204000	-3000	8	21
274000	204000	70000	9	21
33.4	204000	-203967	9	22
116	204000	-203884	9	23
328000	204000	124000	10	23
97.7	204000	-203902	10	24
122	204000	-203878	10	25
246000	204000	42000	11	25
237	172000	-171763	11	26
8600	172000	-163400	11	27
201000	172000	29000	12	27
274000	172000	102000	13	27
33.4	172000	-171967	13	28
116	172000	-171884	13	29
328000	172000	156000	14	29
97.7	172000	-171902	14	30

122	172000	-171878	14	31
246000	172000	74000	15	31
8600	237	8363	16	31
201000	237	200763	17	31
274000	237	273763	18	31
33.4	237	-203.6	18	32
116	237	-121	18	33
328000	237	327763	19	33
97.7	237	-139.3	19	34
122	237	-115	19	35
246000	237	245763	20	35
201000	8600	192400	21	35
274000	8600	265400	22	35
33.4	8600	-8566.6	22	36
116	8600	-8484	22	37
328000	8600	319400	23	37
97.7	8600	-8502.3	23	38
122	8600	-8478	23	39
246000	8600	237400	24	39
274000	201000	73000	25	39
33.4	201000	-200967	25	40
116	201000	-200884	25	41
328000	201000	127000	26	41
97.7	201000	-200902	26	42
122	201000	-200878	26	43
246000	201000	45000	27	43
33.4	274000	-273967	27	44
116	274000	-273884	27	45
328000	274000	54000	28	45
97.7	274000	-273902	28	46
122	274000	-273878	28	47
246000	274000	-28000	28	48
116	33.4	82.6	29	48
328000	33.4	327967	30	48
97.7	33.4	64.3	31	48
122	33.4	88.6	32	48
246000	33.4	245967	33	48
328000	116	327884	34	48
97.7	116	-18.3	34	49
122	116	6	35	49
246000	116	245884	36	49
97.7	328000	-327902	36	50
122	328000	-327878	36	51
246000	328000	-82000	36	52
122	97.7	24.3	37	52
246000	97.7	245902	38	52
246000	122	245878	39	52

S Statistic = 39 - 52 = -13

Tied Group	Value	Members
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Time Period	Observations
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8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -0.656939

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-0.656939 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW15-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
71.1	3210	-3138.9	0	1
295	3210	-2915	0	2
825	3210	-2385	0	3
1070	3210	-2140	0	4
5540	3210	2330	1	4
252	3210	-2958	1	5
18600	3210	15390	2	5
736	3210	-2474	2	6
6540	3210	3330	3	6
109000	3210	105790	4	6
16400	3210	13190	5	6
168000	3210	164790	6	6
179000	3210	175790	7	6
295	71.1	223.9	8	6
825	71.1	753.9	9	6
1070	71.1	998.9	10	6
5540	71.1	5468.9	11	6
252	71.1	180.9	12	6
18600	71.1	18528.9	13	6
736	71.1	664.9	14	6
6540	71.1	6468.9	15	6
109000	71.1	108929	16	6
16400	71.1	16328.9	17	6
168000	71.1	167929	18	6
179000	71.1	178929	19	6
825	295	530	20	6
1070	295	775	21	6
5540	295	5245	22	6
252	295	-43	22	7
18600	295	18305	23	7
736	295	441	24	7
6540	295	6245	25	7
109000	295	108705	26	7
16400	295	16105	27	7
168000	295	167705	28	7
179000	295	178705	29	7
1070	825	245	30	7
5540	825	4715	31	7
252	825	-573	31	8
18600	825	17775	32	8
736	825	-89	32	9
6540	825	5715	33	9
109000	825	108175	34	9
16400	825	15575	35	9

168000	825	167175	36	9
179000	825	178175	37	9
5540	1070	4470	38	9
252	1070	-818	38	10
18600	1070	17530	39	10
736	1070	-334	39	11
6540	1070	5470	40	11
109000	1070	107930	41	11
16400	1070	15330	42	11
168000	1070	166930	43	11
179000	1070	177930	44	11
252	5540	-5288	44	12
18600	5540	13060	45	12
736	5540	-4804	45	13
6540	5540	1000	46	13
109000	5540	103460	47	13
16400	5540	10860	48	13
168000	5540	162460	49	13
179000	5540	173460	50	13
18600	252	18348	51	13
736	252	484	52	13
6540	252	6288	53	13
109000	252	108748	54	13
16400	252	16148	55	13
168000	252	167748	56	13
179000	252	178748	57	13
736	18600	-17864	57	14
6540	18600	-12060	57	15
109000	18600	90400	58	15
16400	18600	-2200	58	16
168000	18600	149400	59	16
179000	18600	160400	60	16
6540	736	5804	61	16
109000	736	108264	62	16
16400	736	15664	63	16
168000	736	167264	64	16
179000	736	178264	65	16
109000	6540	102460	66	16
16400	6540	9860	67	16
168000	6540	161460	68	16
179000	6540	172460	69	16
16400	109000	-92600	69	17
168000	109000	59000	70	17
179000	109000	70000	71	17
168000	16400	151600	72	17
179000	16400	162600	73	17
179000	168000	11000	74	17

S Statistic = 74 - 17 = 57

Tied Group	Value	Members
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Time Period	Observations
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8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 3.06571

Comparison Level at 95% confidence level = -1.65463 (downward trend)

3.06571 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis
Parameter: Zinc
Location: RW16-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
2000	20200	-18200	0	1
441	20200	-19759	0	2
19200	20200	-1000	0	3
16200	20200	-4000	0	4
11200	20200	-9000	0	5
1230	20200	-18970	0	6
320	20200	-19880	0	7
6	20200	-20194	0	8
4.7	20200	-20195.3	0	9
4.9	20200	-20195.1	0	10
13.1	20200	-20186.9	0	11
22.7	20200	-20177.3	0	12
441	2000	-1559	0	13
19200	2000	17200	1	13
16200	2000	14200	2	13
11200	2000	9200	3	13
1230	2000	-770	3	14
320	2000	-1680	3	15
6	2000	-1994	3	16
4.7	2000	-1995.3	3	17
4.9	2000	-1995.1	3	18
13.1	2000	-1986.9	3	19
22.7	2000	-1977.3	3	20
19200	441	18759	4	20
16200	441	15759	5	20
11200	441	10759	6	20
1230	441	789	7	20
320	441	-121	7	21
6	441	-435	7	22
4.7	441	-436.3	7	23
4.9	441	-436.1	7	24
13.1	441	-427.9	7	25
22.7	441	-418.3	7	26
16200	19200	-3000	7	27
11200	19200	-8000	7	28
1230	19200	-17970	7	29
320	19200	-18880	7	30
6	19200	-19194	7	31
4.7	19200	-19195.3	7	32
4.9	19200	-19195.1	7	33
13.1	19200	-19186.9	7	34
22.7	19200	-19177.3	7	35
11200	16200	-5000	7	36

1230	16200	-14970	7	37
320	16200	-15880	7	38
6	16200	-16194	7	39
4.7	16200	-16195.3	7	40
4.9	16200	-16195.1	7	41
13.1	16200	-16186.9	7	42
22.7	16200	-16177.3	7	43
1230	11200	-9970	7	44
320	11200	-10880	7	45
6	11200	-11194	7	46
4.7	11200	-11195.3	7	47
4.9	11200	-11195.1	7	48
13.1	11200	-11186.9	7	49
22.7	11200	-11177.3	7	50
320	1230	-910	7	51
6	1230	-1224	7	52
4.7	1230	-1225.3	7	53
4.9	1230	-1225.1	7	54
13.1	1230	-1216.9	7	55
22.7	1230	-1207.3	7	56
6	320	-314	7	57
4.7	320	-315.3	7	58
4.9	320	-315.1	7	59
13.1	320	-306.9	7	60
22.7	320	-297.3	7	61
4.7	6	-1.3	7	62
4.9	6	-1.1	7	63
13.1	6	7.1	8	63
22.7	6	16.7	9	63
4.9	4.7	0.2	10	63
13.1	4.7	8.4	11	63
22.7	4.7	18	12	63
13.1	4.9	8.2	13	63
22.7	4.9	17.8	14	63
22.7	13.1	9.6	15	63

S Statistic = 15 - 63 = -48

Tied Group	Value	Members
Time Period		Observations
9/1/2017		1
10/1/2017		1
11/1/2017		1
12/1/2017		1
1/1/2018		1
4/1/2018		1
8/1/2018		1
10/1/2018		1

12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 4836

b = 15444

c = 312

Group Variance = 268.667

Z-Score = -2.86742

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-2.86742 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW18-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
592000	728000	-136000	0	1
633000	728000	-95000	0	2
246000	728000	-482000	0	3
694000	728000	-34000	0	4
575000	728000	-153000	0	5
290000	728000	-438000	0	6
382000	728000	-346000	0	7
393000	728000	-335000	0	8
323000	728000	-405000	0	9
369000	728000	-359000	0	10
370000	728000	-358000	0	11
396000	728000	-332000	0	12
330000	728000	-398000	0	13
247000	728000	-481000	0	14
318000	728000	-410000	0	15
822000	728000	94000	1	15
279000	728000	-449000	1	16
640000	728000	-88000	1	17
849000	728000	121000	2	17
633000	592000	41000	3	17
246000	592000	-346000	3	18
694000	592000	102000	4	18
575000	592000	-17000	4	19
290000	592000	-302000	4	20
382000	592000	-210000	4	21
393000	592000	-199000	4	22
323000	592000	-269000	4	23
369000	592000	-223000	4	24
370000	592000	-222000	4	25
396000	592000	-196000	4	26
330000	592000	-262000	4	27
247000	592000	-345000	4	28
318000	592000	-274000	4	29
822000	592000	230000	5	29
279000	592000	-313000	5	30
640000	592000	48000	6	30
849000	592000	257000	7	30
246000	633000	-387000	7	31
694000	633000	61000	8	31
575000	633000	-58000	8	32
290000	633000	-343000	8	33
382000	633000	-251000	8	34
393000	633000	-240000	8	35
323000	633000	-310000	8	36
369000	633000	-264000	8	37

370000	633000	-263000	8	38
396000	633000	-237000	8	39
330000	633000	-303000	8	40
247000	633000	-386000	8	41
318000	633000	-315000	8	42
822000	633000	189000	9	42
279000	633000	-354000	9	43
640000	633000	7000	10	43
849000	633000	216000	11	43
694000	246000	448000	12	43
575000	246000	329000	13	43
290000	246000	44000	14	43
382000	246000	136000	15	43
393000	246000	147000	16	43
323000	246000	77000	17	43
369000	246000	123000	18	43
370000	246000	124000	19	43
396000	246000	150000	20	43
330000	246000	84000	21	43
247000	246000	1000	22	43
318000	246000	72000	23	43
822000	246000	576000	24	43
279000	246000	33000	25	43
640000	246000	394000	26	43
849000	246000	603000	27	43
575000	694000	-119000	27	44
290000	694000	-404000	27	45
382000	694000	-312000	27	46
393000	694000	-301000	27	47
323000	694000	-371000	27	48
369000	694000	-325000	27	49
370000	694000	-324000	27	50
396000	694000	-298000	27	51
330000	694000	-364000	27	52
247000	694000	-447000	27	53
318000	694000	-376000	27	54
822000	694000	128000	28	54
279000	694000	-415000	28	55
640000	694000	-54000	28	56
849000	694000	155000	29	56
290000	575000	-285000	29	57
382000	575000	-193000	29	58
393000	575000	-182000	29	59
323000	575000	-252000	29	60
369000	575000	-206000	29	61
370000	575000	-205000	29	62
396000	575000	-179000	29	63
330000	575000	-245000	29	64
247000	575000	-328000	29	65
318000	575000	-257000	29	66
822000	575000	247000	30	66
279000	575000	-296000	30	67
640000	575000	65000	31	67
849000	575000	274000	32	67

382000	290000	92000	33	67
393000	290000	103000	34	67
323000	290000	33000	35	67
369000	290000	79000	36	67
370000	290000	80000	37	67
396000	290000	106000	38	67
330000	290000	40000	39	67
247000	290000	-43000	39	68
318000	290000	28000	40	68
822000	290000	532000	41	68
279000	290000	-11000	41	69
640000	290000	350000	42	69
849000	290000	559000	43	69
393000	382000	11000	44	69
323000	382000	-59000	44	70
369000	382000	-13000	44	71
370000	382000	-12000	44	72
396000	382000	14000	45	72
330000	382000	-52000	45	73
247000	382000	-135000	45	74
318000	382000	-64000	45	75
822000	382000	440000	46	75
279000	382000	-103000	46	76
640000	382000	258000	47	76
849000	382000	467000	48	76
323000	393000	-70000	48	77
369000	393000	-24000	48	78
370000	393000	-23000	48	79
396000	393000	3000	49	79
330000	393000	-63000	49	80
247000	393000	-146000	49	81
318000	393000	-75000	49	82
822000	393000	429000	50	82
279000	393000	-114000	50	83
640000	393000	247000	51	83
849000	393000	456000	52	83
369000	323000	46000	53	83
370000	323000	47000	54	83
396000	323000	73000	55	83
330000	323000	7000	56	83
247000	323000	-76000	56	84
318000	323000	-5000	56	85
822000	323000	499000	57	85
279000	323000	-44000	57	86
640000	323000	317000	58	86
849000	323000	526000	59	86
370000	369000	1000	60	86
396000	369000	27000	61	86
330000	369000	-39000	61	87
247000	369000	-122000	61	88
318000	369000	-51000	61	89
822000	369000	453000	62	89

279000	369000	-90000	62	90
640000	369000	271000	63	90
849000	369000	480000	64	90
396000	370000	26000	65	90
330000	370000	-40000	65	91
247000	370000	-123000	65	92
318000	370000	-52000	65	93
822000	370000	452000	66	93
279000	370000	-91000	66	94
640000	370000	270000	67	94
849000	370000	479000	68	94
330000	396000	-66000	68	95
247000	396000	-149000	68	96
318000	396000	-78000	68	97
822000	396000	426000	69	97
279000	396000	-117000	69	98
640000	396000	244000	70	98
849000	396000	453000	71	98
247000	330000	-83000	71	99
318000	330000	-12000	71	100
822000	330000	492000	72	100
279000	330000	-51000	72	101
640000	330000	310000	73	101
849000	330000	519000	74	101
318000	247000	71000	75	101
822000	247000	575000	76	101
279000	247000	32000	77	101
640000	247000	393000	78	101
849000	247000	602000	79	101
822000	318000	504000	80	101
279000	318000	-39000	80	102
640000	318000	322000	81	102
849000	318000	531000	82	102
279000	822000	-543000	82	103
640000	822000	-182000	82	104
849000	822000	27000	83	104
640000	279000	361000	84	104
849000	279000	570000	85	104
849000	640000	209000	86	104

S Statistic = 86 - 104 = -18

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -0.551553

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-0.551553 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW19-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
4.65e+006	5.9e+006	-1.25e+006	0	1
7.01e+006	5.9e+006	1.11e+006	1	1
5.37e+006	5.9e+006	-530000	1	2
6.72e+006	5.9e+006	820000	2	2
5.33e+006	5.9e+006	-570000	2	3
3.36e+006	5.9e+006	-2.54e+006	2	4
2.5e+006	5.9e+006	-3.4e+006	2	5
3.67e+006	5.9e+006	-2.23e+006	2	6
3.4e+006	5.9e+006	-2.5e+006	2	7
3.97e+006	5.9e+006	-1.93e+006	2	8
3.84e+006	5.9e+006	-2.06e+006	2	9
4.19e+006	5.9e+006	-1.71e+006	2	10
4.88e+006	5.9e+006	-1.02e+006	2	11
5.88e+006	5.9e+006	-20000	2	12
7.58e+006	5.9e+006	1.68e+006	3	12
3.77e+006	5.9e+006	-2.13e+006	3	13
7.28e+006	5.9e+006	1.38e+006	4	13
3.46e+006	5.9e+006	-2.44e+006	4	14
5.69e+006	5.9e+006	-210000	4	15
7.01e+006	4.65e+006	2.36e+006	5	15
5.37e+006	4.65e+006	720000	6	15
6.72e+006	4.65e+006	2.07e+006	7	15
5.33e+006	4.65e+006	680000	8	15
3.36e+006	4.65e+006	-1.29e+006	8	16
2.5e+006	4.65e+006	-2.15e+006	8	17
3.67e+006	4.65e+006	-980000	8	18
3.4e+006	4.65e+006	-1.25e+006	8	19
3.97e+006	4.65e+006	-680000	8	20
3.84e+006	4.65e+006	-810000	8	21
4.19e+006	4.65e+006	-460000	8	22
4.88e+006	4.65e+006	230000	9	22
5.88e+006	4.65e+006	1.23e+006	10	22
7.58e+006	4.65e+006	2.93e+006	11	22
3.77e+006	4.65e+006	-880000	11	23
7.28e+006	4.65e+006	2.63e+006	12	23
3.46e+006	4.65e+006	-1.19e+006	12	24
5.69e+006	4.65e+006	1.04e+006	13	24
5.37e+006	7.01e+006	-1.64e+006	13	25
6.72e+006	7.01e+006	-290000	13	26
5.33e+006	7.01e+006	-1.68e+006	13	27
3.36e+006	7.01e+006	-3.65e+006	13	28
2.5e+006	7.01e+006	-4.51e+006	13	29
3.67e+006	7.01e+006	-3.34e+006	13	30
3.4e+006	7.01e+006	-3.61e+006	13	31
3.97e+006	7.01e+006	-3.04e+006	13	32

3.84e+006	7.01e+006	-3.17e+006	13	33
4.19e+006	7.01e+006	-2.82e+006	13	34
4.88e+006	7.01e+006	-2.13e+006	13	35
5.88e+006	7.01e+006	-1.13e+006	13	36
7.58e+006	7.01e+006	570000	14	36
3.77e+006	7.01e+006	-3.24e+006	14	37
7.28e+006	7.01e+006	270000	15	37
3.46e+006	7.01e+006	-3.55e+006	15	38
5.69e+006	7.01e+006	-1.32e+006	15	39
6.72e+006	5.37e+006	1.35e+006	16	39
5.33e+006	5.37e+006	-40000	16	40
3.36e+006	5.37e+006	-2.01e+006	16	41
2.5e+006	5.37e+006	-2.87e+006	16	42
3.67e+006	5.37e+006	-1.7e+006	16	43
3.4e+006	5.37e+006	-1.97e+006	16	44
3.97e+006	5.37e+006	-1.4e+006	16	45
3.84e+006	5.37e+006	-1.53e+006	16	46
4.19e+006	5.37e+006	-1.18e+006	16	47
4.88e+006	5.37e+006	-490000	16	48
5.88e+006	5.37e+006	510000	17	48
7.58e+006	5.37e+006	2.21e+006	18	48
3.77e+006	5.37e+006	-1.6e+006	18	49
7.28e+006	5.37e+006	1.91e+006	19	49
3.46e+006	5.37e+006	-1.91e+006	19	50
5.69e+006	5.37e+006	320000	20	50
5.33e+006	6.72e+006	-1.39e+006	20	51
3.36e+006	6.72e+006	-3.36e+006	20	52
2.5e+006	6.72e+006	-4.22e+006	20	53
3.67e+006	6.72e+006	-3.05e+006	20	54
3.4e+006	6.72e+006	-3.32e+006	20	55
3.97e+006	6.72e+006	-2.75e+006	20	56
3.84e+006	6.72e+006	-2.88e+006	20	57
4.19e+006	6.72e+006	-2.53e+006	20	58
4.88e+006	6.72e+006	-1.84e+006	20	59
5.88e+006	6.72e+006	-840000	20	60
7.58e+006	6.72e+006	860000	21	60
3.77e+006	6.72e+006	-2.95e+006	21	61
7.28e+006	6.72e+006	560000	22	61
3.46e+006	6.72e+006	-3.26e+006	22	62
5.69e+006	6.72e+006	-1.03e+006	22	63
3.36e+006	5.33e+006	-1.97e+006	22	64
2.5e+006	5.33e+006	-2.83e+006	22	65
3.67e+006	5.33e+006	-1.66e+006	22	66
3.4e+006	5.33e+006	-1.93e+006	22	67
3.97e+006	5.33e+006	-1.36e+006	22	68
3.84e+006	5.33e+006	-1.49e+006	22	69
4.19e+006	5.33e+006	-1.14e+006	22	70
4.88e+006	5.33e+006	-450000	22	71
5.88e+006	5.33e+006	550000	23	71
7.58e+006	5.33e+006	2.25e+006	24	71
3.77e+006	5.33e+006	-1.56e+006	24	72
7.28e+006	5.33e+006	1.95e+006	25	72
3.46e+006	5.33e+006	-1.87e+006	25	73
5.69e+006	5.33e+006	360000	26	73

2.5e+006	3.36e+006	-860000	26	74
3.67e+006	3.36e+006	310000	27	74
3.4e+006	3.36e+006	40000	28	74
3.97e+006	3.36e+006	610000	29	74
3.84e+006	3.36e+006	480000	30	74
4.19e+006	3.36e+006	830000	31	74
4.88e+006	3.36e+006	1.52e+006	32	74
5.88e+006	3.36e+006	2.52e+006	33	74
7.58e+006	3.36e+006	4.22e+006	34	74
3.77e+006	3.36e+006	410000	35	74
7.28e+006	3.36e+006	3.92e+006	36	74
3.46e+006	3.36e+006	100000	37	74
5.69e+006	3.36e+006	2.33e+006	38	74
3.67e+006	2.5e+006	1.17e+006	39	74
3.4e+006	2.5e+006	900000	40	74
3.97e+006	2.5e+006	1.47e+006	41	74
3.84e+006	2.5e+006	1.34e+006	42	74
4.19e+006	2.5e+006	1.69e+006	43	74
4.88e+006	2.5e+006	2.38e+006	44	74
5.88e+006	2.5e+006	3.38e+006	45	74
7.58e+006	2.5e+006	5.08e+006	46	74
3.77e+006	2.5e+006	1.27e+006	47	74
7.28e+006	2.5e+006	4.78e+006	48	74
3.46e+006	2.5e+006	960000	49	74
5.69e+006	2.5e+006	3.19e+006	50	74
3.4e+006	3.67e+006	-270000	50	75
3.97e+006	3.67e+006	300000	51	75
3.84e+006	3.67e+006	170000	52	75
4.19e+006	3.67e+006	520000	53	75
4.88e+006	3.67e+006	1.21e+006	54	75
5.88e+006	3.67e+006	2.21e+006	55	75
7.58e+006	3.67e+006	3.91e+006	56	75
3.77e+006	3.67e+006	100000	57	75
7.28e+006	3.67e+006	3.61e+006	58	75
3.46e+006	3.67e+006	-210000	58	76
5.69e+006	3.67e+006	2.02e+006	59	76
3.97e+006	3.4e+006	570000	60	76
3.84e+006	3.4e+006	440000	61	76
4.19e+006	3.4e+006	790000	62	76
4.88e+006	3.4e+006	1.48e+006	63	76
5.88e+006	3.4e+006	2.48e+006	64	76
7.58e+006	3.4e+006	4.18e+006	65	76
3.77e+006	3.4e+006	370000	66	76
7.28e+006	3.4e+006	3.88e+006	67	76
3.46e+006	3.4e+006	60000	68	76
5.69e+006	3.4e+006	2.29e+006	69	76
3.84e+006	3.97e+006	-130000	69	77
4.19e+006	3.97e+006	220000	70	77
4.88e+006	3.97e+006	910000	71	77
5.88e+006	3.97e+006	1.91e+006	72	77
7.58e+006	3.97e+006	3.61e+006	73	77
3.77e+006	3.97e+006	-200000	73	78

7.28e+006	3.97e+006	3.31e+006	74	78
3.46e+006	3.97e+006	-510000	74	79
5.69e+006	3.97e+006	1.72e+006	75	79
4.19e+006	3.84e+006	350000	76	79
4.88e+006	3.84e+006	1.04e+006	77	79
5.88e+006	3.84e+006	2.04e+006	78	79
7.58e+006	3.84e+006	3.74e+006	79	79
3.77e+006	3.84e+006	-70000	79	80
7.28e+006	3.84e+006	3.44e+006	80	80
3.46e+006	3.84e+006	-380000	80	81
5.69e+006	3.84e+006	1.85e+006	81	81
4.88e+006	4.19e+006	690000	82	81
5.88e+006	4.19e+006	1.69e+006	83	81
7.58e+006	4.19e+006	3.39e+006	84	81
3.77e+006	4.19e+006	-420000	84	82
7.28e+006	4.19e+006	3.09e+006	85	82
3.46e+006	4.19e+006	-730000	85	83
5.69e+006	4.19e+006	1.5e+006	86	83
5.88e+006	4.88e+006	1e+006	87	83
7.58e+006	4.88e+006	2.7e+006	88	83
3.77e+006	4.88e+006	-1.11e+006	88	84
7.28e+006	4.88e+006	2.4e+006	89	84
3.46e+006	4.88e+006	-1.42e+006	89	85
5.69e+006	4.88e+006	810000	90	85
7.58e+006	5.88e+006	1.7e+006	91	85
3.77e+006	5.88e+006	-2.11e+006	91	86
7.28e+006	5.88e+006	1.4e+006	92	86
3.46e+006	5.88e+006	-2.42e+006	92	87
5.69e+006	5.88e+006	-190000	92	88
3.77e+006	7.58e+006	-3.81e+006	92	89
7.28e+006	7.58e+006	-300000	92	90
3.46e+006	7.58e+006	-4.12e+006	92	91
5.69e+006	7.58e+006	-1.89e+006	92	92
7.28e+006	3.77e+006	3.51e+006	93	92
3.46e+006	3.77e+006	-310000	93	93
5.69e+006	3.77e+006	1.92e+006	94	93
3.46e+006	7.28e+006	-3.82e+006	94	94
5.69e+006	7.28e+006	-1.59e+006	94	95
5.69e+006	3.46e+006	2.23e+006	95	95

S Statistic = 95 - 95 = 0

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 0

Comparison Level at 95% confidence level = -1.65463 (downward trend)

0 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW22-MWI

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
103	303	-200	0	1
43000	303	42697	1	1
16100	303	15797	2	1
3700	303	3397	3	1
19500	303	19197	4	1
27200	303	26897	5	1
44700	303	44397	6	1
73300	303	72997	7	1
47100	303	46797	8	1
68100	303	67797	9	1
81100	303	80797	10	1
43000	103	42897	11	1
16100	103	15997	12	1
3700	103	3597	13	1
19500	103	19397	14	1
27200	103	27097	15	1
44700	103	44597	16	1
73300	103	73197	17	1
47100	103	46997	18	1
68100	103	67997	19	1
81100	103	80997	20	1
16100	43000	-26900	20	2
3700	43000	-39300	20	3
19500	43000	-23500	20	4
27200	43000	-15800	20	5
44700	43000	1700	21	5
73300	43000	30300	22	5
47100	43000	4100	23	5
68100	43000	25100	24	5
81100	43000	38100	25	5
3700	16100	-12400	25	6
19500	16100	3400	26	6
27200	16100	11100	27	6
44700	16100	28600	28	6
73300	16100	57200	29	6
47100	16100	31000	30	6
68100	16100	52000	31	6
81100	16100	65000	32	6
19500	3700	15800	33	6
27200	3700	23500	34	6
44700	3700	41000	35	6
73300	3700	69600	36	6
47100	3700	43400	37	6

68100	3700	64400	38	6
81100	3700	77400	39	6
27200	19500	7700	40	6
44700	19500	25200	41	6
73300	19500	53800	42	6
47100	19500	27600	43	6
68100	19500	48600	44	6
81100	19500	61600	45	6
44700	27200	17500	46	6
73300	27200	46100	47	6
47100	27200	19900	48	6
68100	27200	40900	49	6
81100	27200	53900	50	6
73300	44700	28600	51	6
47100	44700	2400	52	6
68100	44700	23400	53	6
81100	44700	36400	54	6
47100	73300	-26200	54	7
68100	73300	-5200	54	8
81100	73300	7800	55	8
68100	47100	21000	56	8
81100	47100	34000	57	8
81100	68100	13000	58	8

S Statistic = 58 - 8 = 50

Tied Group	Value	Members
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Time Period	Observations
6/1/2017	1
7/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 3828

b = 11880

c = 264

Group Variance = 212.667

Z-Score = 3.36005

Comparison Level at 95% confidence level = -1.65463 (downward trend)

3.36005 >= -1.65463 indicating no evidence of a downward trend

Mann-Kendall Trend Analysis

Parameter: Cadmium

Location: RW01-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
0.51	194	-193.49	0	1
145	194	-49	0	2
3 U	194	-191	0	3
37.5	194	-156.5	0	4
2.4	194	-191.6	0	5
16.5	194	-177.5	0	6
250	194	56	1	6
3 U	194	-191	1	7
9.3	194	-184.7	1	8
3 U	194	-191	1	9
19.4	194	-174.6	1	10
20.6	194	-173.4	1	11
8.8	194	-185.2	1	12
145	0.51	144.49	2	12
3 U	0.51	2.49	3	12
37.5	0.51	36.99	4	12
2.4	0.51	1.89	5	12
16.5	0.51	15.99	6	12
250	0.51	249.49	7	12
3 U	0.51	2.49	8	12
9.3	0.51	8.79	9	12
3 U	0.51	2.49	10	12
19.4	0.51	18.89	11	12
20.6	0.51	20.09	12	12
8.8	0.51	8.29	13	12
3 U	145	-142	13	13
37.5	145	-107.5	13	14
2.4	145	-142.6	13	15
16.5	145	-128.5	13	16
250	145	105	14	16
3 U	145	-142	14	17
9.3	145	-135.7	14	18
3 U	145	-142	14	19
19.4	145	-125.6	14	20
20.6	145	-124.4	14	21
8.8	145	-136.2	14	22
37.5	3 U	34.5	15	22
2.4	3 U	-0.6	15	23
16.5	3 U	13.5	16	23
250	3 U	247	17	23
3 U	3 U	0	17	23
9.3	3 U	6.3	18	23
3 U	3 U	0	18	23
19.4	3 U	16.4	19	23

20.6	3 U	17.6	20	23
8.8	3 U	5.8	21	23
2.4	37.5	-35.1	21	24
16.5	37.5	-21	21	25
250	37.5	212.5	22	25
3 U	37.5	-34.5	22	26
9.3	37.5	-28.2	22	27
3 U	37.5	-34.5	22	28
19.4	37.5	-18.1	22	29
20.6	37.5	-16.9	22	30
8.8	37.5	-28.7	22	31
16.5	2.4	14.1	23	31
250	2.4	247.6	24	31
3 U	2.4	0.6	25	31
9.3	2.4	6.9	26	31
3 U	2.4	0.6	27	31
19.4	2.4	17	28	31
20.6	2.4	18.2	29	31
8.8	2.4	6.4	30	31
250	16.5	233.5	31	31
3 U	16.5	-13.5	31	32
9.3	16.5	-7.2	31	33
3 U	16.5	-13.5	31	34
19.4	16.5	2.9	32	34
20.6	16.5	4.1	33	34
8.8	16.5	-7.7	33	35
3 U	250	-247	33	36
9.3	250	-240.7	33	37
3 U	250	-247	33	38
19.4	250	-230.6	33	39
20.6	250	-229.4	33	40
8.8	250	-241.2	33	41
9.3	3 U	6.3	34	41
3 U	3 U	0	34	41
19.4	3 U	16.4	35	41
20.6	3 U	17.6	36	41
8.8	3 U	5.8	37	41
3 U	9.3	-6.3	37	42
19.4	9.3	10.1	38	42
20.6	9.3	11.3	39	42
8.8	9.3	-0.5	39	43
19.4	3 U	16.4	40	43
20.6	3 U	17.6	41	43
8.8	3 U	5.8	42	43
20.6	19.4	1.2	43	43
8.8	19.4	-10.6	43	44
8.8	20.6	-11.8	43	45

S Statistic = 43 - 45 = -2

Tied Group	Value	Members
1	3	3

Time Period	Observations
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 66

B = 0

C = 6

D = 0

E = 6

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 330

Z-Score = -0.0550482

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-0.0550482 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW02-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3	511	-508	0	1
2.4	511	-508.6	0	2
3 U	511	-508	0	3
2.3	511	-508.7	0	4
14.5	511	-496.5	0	5
3	511	-508	0	6
79.9	511	-431.1	0	7
18	511	-493	0	8
191	511	-320	0	9
98.3	511	-412.7	0	10
785	511	274	1	10
873	511	362	2	10
277	511	-234	2	11
2.4	3	-0.6	2	12
3 U	3	0	2	12
2.3	3	-0.7	2	13
14.5	3	11.5	3	13
3	3	0	3	13
79.9	3	76.9	4	13
18	3	15	5	13
191	3	188	6	13
98.3	3	95.3	7	13
785	3	782	8	13
873	3	870	9	13
277	3	274	10	13
3 U	2.4	0.6	11	13
2.3	2.4	-0.1	11	14
14.5	2.4	12.1	12	14
3	2.4	0.6	13	14
79.9	2.4	77.5	14	14
18	2.4	15.6	15	14
191	2.4	188.6	16	14
98.3	2.4	95.9	17	14
785	2.4	782.6	18	14
873	2.4	870.6	19	14
277	2.4	274.6	20	14
2.3	3 U	-0.7	20	15
14.5	3 U	11.5	21	15
3	3 U	0	21	15
79.9	3 U	76.9	22	15
18	3 U	15	23	15
191	3 U	188	24	15
98.3	3 U	95.3	25	15
785	3 U	782	26	15

873	3 U	870	27	15
277	3 U	274	28	15
14.5	2.3	12.2	29	15
3	2.3	0.7	30	15
79.9	2.3	77.6	31	15
18	2.3	15.7	32	15
191	2.3	188.7	33	15
98.3	2.3	96	34	15
785	2.3	782.7	35	15
873	2.3	870.7	36	15
277	2.3	274.7	37	15
3	14.5	-11.5	37	16
79.9	14.5	65.4	38	16
18	14.5	3.5	39	16
191	14.5	176.5	40	16
98.3	14.5	83.8	41	16
785	14.5	770.5	42	16
873	14.5	858.5	43	16
277	14.5	262.5	44	16
79.9	3	76.9	45	16
18	3	15	46	16
191	3	188	47	16
98.3	3	95.3	48	16
785	3	782	49	16
873	3	870	50	16
277	3	274	51	16
18	79.9	-61.9	51	17
191	79.9	111.1	52	17
98.3	79.9	18.4	53	17
785	79.9	705.1	54	17
873	79.9	793.1	55	17
277	79.9	197.1	56	17
191	18	173	57	17
98.3	18	80.3	58	17
785	18	767	59	17
873	18	855	60	17
277	18	259	61	17
98.3	191	-92.7	61	18
785	191	594	62	18
873	191	682	63	18
277	191	86	64	18
785	98.3	686.7	65	18
873	98.3	774.7	66	18
277	98.3	178.7	67	18
873	785	88	68	18
277	785	-508	68	19
277	873	-596	68	20

S Statistic = 68 - 20 = 48

Tied Group	Value	Members
1	3	3

Time Period	Observations
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 66

B = 0

C = 6

D = 0

E = 6

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 330

Z-Score = 2.58726

Comparison Level at 95% confidence level = 1.65463 (upward trend)

2.58726 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW03-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
196	189	7	1	0
192	189	3	2	0
84	189	-105	2	1
37.4	189	-151.6	2	2
138	189	-51	2	3
227	189	38	3	3
214	189	25	4	3
20.2	189	-168.8	4	4
25.2	189	-163.8	4	5
154	189	-35	4	6
259	189	70	5	6
128	189	-61	5	7
236	189	47	6	7
346	189	157	7	7
342	189	153	8	7
213	189	24	9	7
449	189	260	10	7
344	189	155	11	7
546	189	357	12	7
192	196	-4	12	8
84	196	-112	12	9
37.4	196	-158.6	12	10
138	196	-58	12	11
227	196	31	13	11
214	196	18	14	11
20.2	196	-175.8	14	12
25.2	196	-170.8	14	13
154	196	-42	14	14
259	196	63	15	14
128	196	-68	15	15
236	196	40	16	15
346	196	150	17	15
342	196	146	18	15
213	196	17	19	15
449	196	253	20	15
344	196	148	21	15
546	196	350	22	15
84	192	-108	22	16
37.4	192	-154.6	22	17
138	192	-54	22	18
227	192	35	23	18
214	192	22	24	18
20.2	192	-171.8	24	19
25.2	192	-166.8	24	20
154	192	-38	24	21

259	192	67	25	21
128	192	-64	25	22
236	192	44	26	22
346	192	154	27	22
342	192	150	28	22
213	192	21	29	22
449	192	257	30	22
344	192	152	31	22
546	192	354	32	22
37.4	84	-46.6	32	23
138	84	54	33	23
227	84	143	34	23
214	84	130	35	23
20.2	84	-63.8	35	24
25.2	84	-58.8	35	25
154	84	70	36	25
259	84	175	37	25
128	84	44	38	25
236	84	152	39	25
346	84	262	40	25
342	84	258	41	25
213	84	129	42	25
449	84	365	43	25
344	84	260	44	25
546	84	462	45	25
138	37.4	100.6	46	25
227	37.4	189.6	47	25
214	37.4	176.6	48	25
20.2	37.4	-17.2	48	26
25.2	37.4	-12.2	48	27
154	37.4	116.6	49	27
259	37.4	221.6	50	27
128	37.4	90.6	51	27
236	37.4	198.6	52	27
346	37.4	308.6	53	27
342	37.4	304.6	54	27
213	37.4	175.6	55	27
449	37.4	411.6	56	27
344	37.4	306.6	57	27
546	37.4	508.6	58	27
227	138	89	59	27
214	138	76	60	27
20.2	138	-117.8	60	28
25.2	138	-112.8	60	29
154	138	16	61	29
259	138	121	62	29
128	138	-10	62	30
236	138	98	63	30
346	138	208	64	30
342	138	204	65	30
213	138	75	66	30
449	138	311	67	30
344	138	206	68	30
546	138	408	69	30

214	227	-13	69	31
20.2	227	-206.8	69	32
25.2	227	-201.8	69	33
154	227	-73	69	34
259	227	32	70	34
128	227	-99	70	35
236	227	9	71	35
346	227	119	72	35
342	227	115	73	35
213	227	-14	73	36
449	227	222	74	36
344	227	117	75	36
546	227	319	76	36
20.2	214	-193.8	76	37
25.2	214	-188.8	76	38
154	214	-60	76	39
259	214	45	77	39
128	214	-86	77	40
236	214	22	78	40
346	214	132	79	40
342	214	128	80	40
213	214	-1	80	41
449	214	235	81	41
344	214	130	82	41
546	214	332	83	41
25.2	20.2	5	84	41
154	20.2	133.8	85	41
259	20.2	238.8	86	41
128	20.2	107.8	87	41
236	20.2	215.8	88	41
346	20.2	325.8	89	41
342	20.2	321.8	90	41
213	20.2	192.8	91	41
449	20.2	428.8	92	41
344	20.2	323.8	93	41
546	20.2	525.8	94	41
154	25.2	128.8	95	41
259	25.2	233.8	96	41
128	25.2	102.8	97	41
236	25.2	210.8	98	41
346	25.2	320.8	99	41
342	25.2	316.8	100	41
213	25.2	187.8	101	41
449	25.2	423.8	102	41
344	25.2	318.8	103	41
546	25.2	520.8	104	41
259	154	105	105	41
128	154	-26	105	42
236	154	82	106	42
346	154	192	107	42
342	154	188	108	42
213	154	59	109	42

449	154	295	110	42
344	154	190	111	42
546	154	392	112	42
128	259	-131	112	43
236	259	-23	112	44
346	259	87	113	44
342	259	83	114	44
213	259	-46	114	45
449	259	190	115	45
344	259	85	116	45
546	259	287	117	45
236	128	108	118	45
346	128	218	119	45
342	128	214	120	45
213	128	85	121	45
449	128	321	122	45
344	128	216	123	45
546	128	418	124	45
346	236	110	125	45
342	236	106	126	45
213	236	-23	126	46
449	236	213	127	46
344	236	108	128	46
546	236	310	129	46
342	346	-4	129	47
213	346	-133	129	48
449	346	103	130	48
344	346	-2	130	49
546	346	200	131	49
213	342	-129	131	50
449	342	107	132	50
344	342	2	133	50
546	342	204	134	50
449	213	236	135	50
344	213	131	136	50
546	213	333	137	50
344	449	-105	137	51
546	449	97	138	51
546	344	202	139	51

S Statistic = 139 - 51 = 88

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 2.82265

Comparison Level at 95% confidence level = 1.65463 (upward trend)

2.82265 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW06-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
9.2	12.5	-3.3	0	1
14	12.5	1.5	1	1
20.4	12.5	7.9	2	1
14.3	12.5	1.8	3	1
10.2	12.5	-2.3	3	2
10.1	12.5	-2.4	3	3
4.5	12.5	-8	3	4
4.2	12.5	-8.3	3	5
5.4	12.5	-7.1	3	6
7.1	12.5	-5.4	3	7
8.4	12.5	-4.1	3	8
89.2	12.5	76.7	4	8
3 U	12.5	-9.5	4	9
629	12.5	616.5	5	9
752	12.5	739.5	6	9
876	12.5	863.5	7	9
885	12.5	872.5	8	9
793	12.5	780.5	9	9
673	12.5	660.5	10	9
14	9.2	4.8	11	9
20.4	9.2	11.2	12	9
14.3	9.2	5.1	13	9
10.2	9.2	1	14	9
10.1	9.2	0.9	15	9
4.5	9.2	-4.7	15	10
4.2	9.2	-5	15	11
5.4	9.2	-3.8	15	12
7.1	9.2	-2.1	15	13
8.4	9.2	-0.8	15	14
89.2	9.2	80	16	14
3 U	9.2	-6.2	16	15
629	9.2	619.8	17	15
752	9.2	742.8	18	15
876	9.2	866.8	19	15
885	9.2	875.8	20	15
793	9.2	783.8	21	15
673	9.2	663.8	22	15
20.4	14	6.4	23	15
14.3	14	0.3	24	15
10.2	14	-3.8	24	16
10.1	14	-3.9	24	17
4.5	14	-9.5	24	18
4.2	14	-9.8	24	19
5.4	14	-8.6	24	20
7.1	14	-6.9	24	21

8.4	14	-5.6	24	22
89.2	14	75.2	25	22
3 U	14	-11	25	23
629	14	615	26	23
752	14	738	27	23
876	14	862	28	23
885	14	871	29	23
793	14	779	30	23
673	14	659	31	23
14.3	20.4	-6.1	31	24
10.2	20.4	-10.2	31	25
10.1	20.4	-10.3	31	26
4.5	20.4	-15.9	31	27
4.2	20.4	-16.2	31	28
5.4	20.4	-15	31	29
7.1	20.4	-13.3	31	30
8.4	20.4	-12	31	31
89.2	20.4	68.8	32	31
3 U	20.4	-17.4	32	32
629	20.4	608.6	33	32
752	20.4	731.6	34	32
876	20.4	855.6	35	32
885	20.4	864.6	36	32
793	20.4	772.6	37	32
673	20.4	652.6	38	32
10.2	14.3	-4.1	38	33
10.1	14.3	-4.2	38	34
4.5	14.3	-9.8	38	35
4.2	14.3	-10.1	38	36
5.4	14.3	-8.9	38	37
7.1	14.3	-7.2	38	38
8.4	14.3	-5.9	38	39
89.2	14.3	74.9	39	39
3 U	14.3	-11.3	39	40
629	14.3	614.7	40	40
752	14.3	737.7	41	40
876	14.3	861.7	42	40
885	14.3	870.7	43	40
793	14.3	778.7	44	40
673	14.3	658.7	45	40
10.1	10.2	-0.1	45	41
4.5	10.2	-5.7	45	42
4.2	10.2	-6	45	43
5.4	10.2	-4.8	45	44
7.1	10.2	-3.1	45	45
8.4	10.2	-1.8	45	46
89.2	10.2	79	46	46
3 U	10.2	-7.2	46	47
629	10.2	618.8	47	47
752	10.2	741.8	48	47
876	10.2	865.8	49	47
885	10.2	874.8	50	47
793	10.2	782.8	51	47
673	10.2	662.8	52	47

4.5	10.1	-5.6	52	48
4.2	10.1	-5.9	52	49
5.4	10.1	-4.7	52	50
7.1	10.1	-3	52	51
8.4	10.1	-1.7	52	52
89.2	10.1	79.1	53	52
3 U	10.1	-7.1	53	53
629	10.1	618.9	54	53
752	10.1	741.9	55	53
876	10.1	865.9	56	53
885	10.1	874.9	57	53
793	10.1	782.9	58	53
673	10.1	662.9	59	53
4.2	4.5	-0.3	59	54
5.4	4.5	0.9	60	54
7.1	4.5	2.6	61	54
8.4	4.5	3.9	62	54
89.2	4.5	84.7	63	54
3 U	4.5	-1.5	63	55
629	4.5	624.5	64	55
752	4.5	747.5	65	55
876	4.5	871.5	66	55
885	4.5	880.5	67	55
793	4.5	788.5	68	55
673	4.5	668.5	69	55
5.4	4.2	1.2	70	55
7.1	4.2	2.9	71	55
8.4	4.2	4.2	72	55
89.2	4.2	85	73	55
3 U	4.2	-1.2	73	56
629	4.2	624.8	74	56
752	4.2	747.8	75	56
876	4.2	871.8	76	56
885	4.2	880.8	77	56
793	4.2	788.8	78	56
673	4.2	668.8	79	56
7.1	5.4	1.7	80	56
8.4	5.4	3	81	56
89.2	5.4	83.8	82	56
3 U	5.4	-2.4	82	57
629	5.4	623.6	83	57
752	5.4	746.6	84	57
876	5.4	870.6	85	57
885	5.4	879.6	86	57
793	5.4	787.6	87	57
673	5.4	667.6	88	57
8.4	7.1	1.3	89	57
89.2	7.1	82.1	90	57
3 U	7.1	-4.1	90	58
629	7.1	621.9	91	58
752	7.1	744.9	92	58
876	7.1	868.9	93	58

885	7.1	877.9	94	58
793	7.1	785.9	95	58
673	7.1	665.9	96	58
89.2	8.4	80.8	97	58
3 U	8.4	-5.4	97	59
629	8.4	620.6	98	59
752	8.4	743.6	99	59
876	8.4	867.6	100	59
885	8.4	876.6	101	59
793	8.4	784.6	102	59
673	8.4	664.6	103	59
3 U	89.2	-86.2	103	60
629	89.2	539.8	104	60
752	89.2	662.8	105	60
876	89.2	786.8	106	60
885	89.2	795.8	107	60
793	89.2	703.8	108	60
673	89.2	583.8	109	60
629	3 U	626	110	60
752	3 U	749	111	60
876	3 U	873	112	60
885	3 U	882	113	60
793	3 U	790	114	60
673	3 U	670	115	60
752	629	123	116	60
876	629	247	117	60
885	629	256	118	60
793	629	164	119	60
673	629	44	120	60
876	752	124	121	60
885	752	133	122	60
793	752	41	123	60
673	752	-79	123	61
885	876	9	124	61
793	876	-83	124	62
673	876	-203	124	63
793	885	-92	124	64
673	885	-212	124	65
673	793	-120	124	66

S Statistic = 124 - 66 = 58

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 1.84932

Comparison Level at 95% confidence level = 1.65463 (upward trend)

1.84932 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW07-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
4.6	1.2	3.4	1	0
3 U	1.2	1.8	2	0
1.1	1.2	-0.1	2	1
0.91	1.2	-0.29	2	2
1.2	1.2	0	2	2
1	1.2	-0.2	2	3
11	1.2	9.8	3	3
3 U	1.2	1.8	4	3
5.1	1.2	3.9	5	3
1.7	1.2	0.5	6	3
3 U	1.2	1.8	7	3
1.3	1.2	0.1	8	3
52.9	1.2	51.7	9	3
28.7	1.2	27.5	10	3
344	1.2	342.8	11	3
29.5	1.2	28.3	12	3
453	1.2	451.8	13	3
48.7	1.2	47.5	14	3
38.1	1.2	36.9	15	3
3 U	4.6	-1.6	15	4
1.1	4.6	-3.5	15	5
0.91	4.6	-3.69	15	6
1.2	4.6	-3.4	15	7
1	4.6	-3.6	15	8
11	4.6	6.4	16	8
3 U	4.6	-1.6	16	9
5.1	4.6	0.5	17	9
1.7	4.6	-2.9	17	10
3 U	4.6	-1.6	17	11
1.3	4.6	-3.3	17	12
52.9	4.6	48.3	18	12
28.7	4.6	24.1	19	12
344	4.6	339.4	20	12
29.5	4.6	24.9	21	12
453	4.6	448.4	22	12
48.7	4.6	44.1	23	12
38.1	4.6	33.5	24	12
1.1	3 U	-1.9	24	13
0.91	3 U	-2.09	24	14
1.2	3 U	-1.8	24	15
1	3 U	-2	24	16
11	3 U	8	25	16
3 U	3 U	0	25	16
5.1	3 U	2.1	26	16
1.7	3 U	-1.3	26	17

3 U	3 U	0	26	17
1.3	3 U	-1.7	26	18
52.9	3 U	49.9	27	18
28.7	3 U	25.7	28	18
344	3 U	341	29	18
29.5	3 U	26.5	30	18
453	3 U	450	31	18
48.7	3 U	45.7	32	18
38.1	3 U	35.1	33	18
0.91	1.1	-0.19	33	19
1.2	1.1	0.1	34	19
1	1.1	-0.1	34	20
11	1.1	9.9	35	20
3 U	1.1	1.9	36	20
5.1	1.1	4	37	20
1.7	1.1	0.6	38	20
3 U	1.1	1.9	39	20
1.3	1.1	0.2	40	20
52.9	1.1	51.8	41	20
28.7	1.1	27.6	42	20
344	1.1	342.9	43	20
29.5	1.1	28.4	44	20
453	1.1	451.9	45	20
48.7	1.1	47.6	46	20
38.1	1.1	37	47	20
1.2	0.91	0.29	48	20
1	0.91	0.09	49	20
11	0.91	10.09	50	20
3 U	0.91	2.09	51	20
5.1	0.91	4.19	52	20
1.7	0.91	0.79	53	20
3 U	0.91	2.09	54	20
1.3	0.91	0.39	55	20
52.9	0.91	51.99	56	20
28.7	0.91	27.79	57	20
344	0.91	343.09	58	20
29.5	0.91	28.59	59	20
453	0.91	452.09	60	20
48.7	0.91	47.79	61	20
38.1	0.91	37.19	62	20
1	1.2	-0.2	62	21
11	1.2	9.8	63	21
3 U	1.2	1.8	64	21
5.1	1.2	3.9	65	21
1.7	1.2	0.5	66	21
3 U	1.2	1.8	67	21
1.3	1.2	0.1	68	21
52.9	1.2	51.7	69	21
28.7	1.2	27.5	70	21
344	1.2	342.8	71	21
29.5	1.2	28.3	72	21
453	1.2	451.8	73	21
48.7	1.2	47.5	74	21
38.1	1.2	36.9	75	21

11	1	10	76	21
3 U	1	2	77	21
5.1	1	4.1	78	21
1.7	1	0.7	79	21
3 U	1	2	80	21
1.3	1	0.3	81	21
52.9	1	51.9	82	21
28.7	1	27.7	83	21
344	1	343	84	21
29.5	1	28.5	85	21
453	1	452	86	21
48.7	1	47.7	87	21
38.1	1	37.1	88	21
3 U	11	-8	88	22
5.1	11	-5.9	88	23
1.7	11	-9.3	88	24
3 U	11	-8	88	25
1.3	11	-9.7	88	26
52.9	11	41.9	89	26
28.7	11	17.7	90	26
344	11	333	91	26
29.5	11	18.5	92	26
453	11	442	93	26
48.7	11	37.7	94	26
38.1	11	27.1	95	26
5.1	3 U	2.1	96	26
1.7	3 U	-1.3	96	27
3 U	3 U	0	96	27
1.3	3 U	-1.7	96	28
52.9	3 U	49.9	97	28
28.7	3 U	25.7	98	28
344	3 U	341	99	28
29.5	3 U	26.5	100	28
453	3 U	450	101	28
48.7	3 U	45.7	102	28
38.1	3 U	35.1	103	28
1.7	5.1	-3.4	103	29
3 U	5.1	-2.1	103	30
1.3	5.1	-3.8	103	31
52.9	5.1	47.8	104	31
28.7	5.1	23.6	105	31
344	5.1	338.9	106	31
29.5	5.1	24.4	107	31
453	5.1	447.9	108	31
48.7	5.1	43.6	109	31
38.1	5.1	33	110	31
3 U	1.7	1.3	111	31
1.3	1.7	-0.4	111	32
52.9	1.7	51.2	112	32
28.7	1.7	27	113	32
344	1.7	342.3	114	32
29.5	1.7	27.8	115	32

453	1.7	451.3	116	32
48.7	1.7	47	117	32
38.1	1.7	36.4	118	32
1.3	3 U	-1.7	118	33
52.9	3 U	49.9	119	33
28.7	3 U	25.7	120	33
344	3 U	341	121	33
29.5	3 U	26.5	122	33
453	3 U	450	123	33
48.7	3 U	45.7	124	33
38.1	3 U	35.1	125	33
52.9	1.3	51.6	126	33
28.7	1.3	27.4	127	33
344	1.3	342.7	128	33
29.5	1.3	28.2	129	33
453	1.3	451.7	130	33
48.7	1.3	47.4	131	33
38.1	1.3	36.8	132	33
28.7	52.9	-24.2	132	34
344	52.9	291.1	133	34
29.5	52.9	-23.4	133	35
453	52.9	400.1	134	35
48.7	52.9	-4.2	134	36
38.1	52.9	-14.8	134	37
344	28.7	315.3	135	37
29.5	28.7	0.8	136	37
453	28.7	424.3	137	37
48.7	28.7	20	138	37
38.1	28.7	9.4	139	37
29.5	344	-314.5	139	38
453	344	109	140	38
48.7	344	-295.3	140	39
38.1	344	-305.9	140	40
453	29.5	423.5	141	40
48.7	29.5	19.2	142	40
38.1	29.5	8.6	143	40
48.7	453	-404.3	143	41
38.1	453	-414.9	143	42
38.1	48.7	-10.6	143	43

S Statistic = 143 - 43 = 100

Tied Group	Value	Members
1	1.2	2
2	3	3

Time Period	Observations
2/1/2017	1

3/1/2017	1
4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 84

B = 0

C = 6

D = 0

E = 8

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 945.333

Z-Score = 3.2199

Comparison Level at 95% confidence level = 1.65463 (upward trend)

3.2199 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW08-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
0.39	0.49	-0.1	0	1
3 U	0.49	2.51	1	1
1.5	0.49	1.01	2	1
0.48	0.49	-0.01	2	2
1.3	0.49	0.81	3	2
0.86	0.49	0.37	4	2
0.77	0.49	0.28	5	2
3 U	0.49	2.51	6	2
0.88	0.49	0.39	7	2
1.8	0.49	1.31	8	2
3 U	0.49	2.51	9	2
6.2	0.49	5.71	10	2
14.1	0.49	13.61	11	2
0.92	0.49	0.43	12	2
3 U	0.49	2.51	13	2
3 U	0.49	2.51	14	2
3 U	0.49	2.51	15	2
3 U	0.49	2.51	16	2
0.59	0.49	0.1	17	2
3 U	0.39	2.61	18	2
1.5	0.39	1.11	19	2
0.48	0.39	0.09	20	2
1.3	0.39	0.91	21	2
0.86	0.39	0.47	22	2
0.77	0.39	0.38	23	2
3 U	0.39	2.61	24	2
0.88	0.39	0.49	25	2
1.8	0.39	1.41	26	2
3 U	0.39	2.61	27	2
6.2	0.39	5.81	28	2
14.1	0.39	13.71	29	2
0.92	0.39	0.53	30	2
3 U	0.39	2.61	31	2
3 U	0.39	2.61	32	2
3 U	0.39	2.61	33	2
3 U	0.39	2.61	34	2
0.59	0.39	0.2	35	2
1.5	3 U	-1.5	35	3
0.48	3 U	-2.52	35	4
1.3	3 U	-1.7	35	5
0.86	3 U	-2.14	35	6
0.77	3 U	-2.23	35	7
3 U	3 U	0	35	7
0.88	3 U	-2.12	35	8
1.8	3 U	-1.2	35	9

3 U	3 U	0	35	9
6.2	3 U	3.2	36	9
14.1	3 U	11.1	37	9
0.92	3 U	-2.08	37	10
3 U	3 U	0	37	10
3 U	3 U	0	37	10
3 U	3 U	0	37	10
3 U	3 U	0	37	10
0.59	3 U	-2.41	37	11
0.48	1.5	-1.02	37	12
1.3	1.5	-0.2	37	13
0.86	1.5	-0.64	37	14
0.77	1.5	-0.73	37	15
3 U	1.5	1.5	38	15
0.88	1.5	-0.62	38	16
1.8	1.5	0.3	39	16
3 U	1.5	1.5	40	16
6.2	1.5	4.7	41	16
14.1	1.5	12.6	42	16
0.92	1.5	-0.58	42	17
3 U	1.5	1.5	43	17
3 U	1.5	1.5	44	17
3 U	1.5	1.5	45	17
3 U	1.5	1.5	46	17
0.59	1.5	-0.91	46	18
1.3	0.48	0.82	47	18
0.86	0.48	0.38	48	18
0.77	0.48	0.29	49	18
3 U	0.48	2.52	50	18
0.88	0.48	0.4	51	18
1.8	0.48	1.32	52	18
3 U	0.48	2.52	53	18
6.2	0.48	5.72	54	18
14.1	0.48	13.62	55	18
0.92	0.48	0.44	56	18
3 U	0.48	2.52	57	18
3 U	0.48	2.52	58	18
3 U	0.48	2.52	59	18
3 U	0.48	2.52	60	18
0.59	0.48	0.11	61	18
0.86	1.3	-0.44	61	19
0.77	1.3	-0.53	61	20
3 U	1.3	1.7	62	20
0.88	1.3	-0.42	62	21
1.8	1.3	0.5	63	21
3 U	1.3	1.7	64	21
6.2	1.3	4.9	65	21
14.1	1.3	12.8	66	21
0.92	1.3	-0.38	66	22
3 U	1.3	1.7	67	22
3 U	1.3	1.7	68	22
3 U	1.3	1.7	69	22
3 U	1.3	1.7	70	22
0.59	1.3	-0.71	70	23

0.77	0.86	-0.09	70	24
3 U	0.86	2.14	71	24
0.88	0.86	0.02	72	24
1.8	0.86	0.94	73	24
3 U	0.86	2.14	74	24
6.2	0.86	5.34	75	24
14.1	0.86	13.24	76	24
0.92	0.86	0.06	77	24
3 U	0.86	2.14	78	24
3 U	0.86	2.14	79	24
3 U	0.86	2.14	80	24
3 U	0.86	2.14	81	24
0.59	0.86	-0.27	81	25
3 U	0.77	2.23	82	25
0.88	0.77	0.11	83	25
1.8	0.77	1.03	84	25
3 U	0.77	2.23	85	25
6.2	0.77	5.43	86	25
14.1	0.77	13.33	87	25
0.92	0.77	0.15	88	25
3 U	0.77	2.23	89	25
3 U	0.77	2.23	90	25
3 U	0.77	2.23	91	25
3 U	0.77	2.23	92	25
0.59	0.77	-0.18	92	26
0.88	3 U	-2.12	92	27
1.8	3 U	-1.2	92	28
3 U	3 U	0	92	28
6.2	3 U	3.2	93	28
14.1	3 U	11.1	94	28
0.92	3 U	-2.08	94	29
3 U	3 U	0	94	29
3 U	3 U	0	94	29
3 U	3 U	0	94	29
3 U	3 U	0	94	29
0.59	3 U	-2.41	94	30
1.8	0.88	0.92	95	30
3 U	0.88	2.12	96	30
6.2	0.88	5.32	97	30
14.1	0.88	13.22	98	30
0.92	0.88	0.04	99	30
3 U	0.88	2.12	100	30
3 U	0.88	2.12	101	30
3 U	0.88	2.12	102	30
3 U	0.88	2.12	103	30
0.59	0.88	-0.29	103	31
3 U	1.8	1.2	104	31
6.2	1.8	4.4	105	31
14.1	1.8	12.3	106	31
0.92	1.8	-0.88	106	32
3 U	1.8	1.2	107	32
3 U	1.8	1.2	108	32

3 U	1.8	1.2	109	32
3 U	1.8	1.2	110	32
0.59	1.8	-1.21	110	33
6.2	3 U	3.2	111	33
14.1	3 U	11.1	112	33
0.92	3 U	-2.08	112	34
3 U	3 U	0	112	34
3 U	3 U	0	112	34
3 U	3 U	0	112	34
3 U	3 U	0	112	34
0.59	3 U	-2.41	112	35
14.1	6.2	7.9	113	35
0.92	6.2	-5.28	113	36
3 U	6.2	-3.2	113	37
3 U	6.2	-3.2	113	38
3 U	6.2	-3.2	113	39
3 U	6.2	-3.2	113	40
0.59	6.2	-5.61	113	41
0.92	14.1	-13.18	113	42
3 U	14.1	-11.1	113	43
3 U	14.1	-11.1	113	44
3 U	14.1	-11.1	113	45
3 U	14.1	-11.1	113	46
0.59	14.1	-13.51	113	47
3 U	0.92	2.08	114	47
3 U	0.92	2.08	115	47
3 U	0.92	2.08	116	47
3 U	0.92	2.08	117	47
0.59	0.92	-0.33	117	48
3 U	3 U	0	117	48
3 U	3 U	0	117	48
3 U	3 U	0	117	48
0.59	3 U	-2.41	117	49
3 U	3 U	0	117	49
3 U	3 U	0	117	49
0.59	3 U	-2.41	117	50
3 U	3 U	0	117	50
0.59	3 U	-2.41	117	51
0.59	3 U	-2.41	117	52

S Statistic = 117 - 52 = 65

Tied Group	Value	Members
1	3	7

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 798

B = 0

C = 210

D = 0

E = 42

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 905.667

Z-Score = 2.12665

Comparison Level at 95% confidence level = 1.65463 (upward trend)

2.12665 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW09-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
4	3.1	0.9	1	0
5	3.1	1.9	2	0
11.1	3.1	8	3	0
8.1	3.1	5	4	0
12.9	3.1	9.8	5	0
18.5	3.1	15.4	6	0
9.1	3.1	6	7	0
12	3.1	8.9	8	0
8.8	3.1	5.7	9	0
7.7	3.1	4.6	10	0
2.1	3.1	-1	10	1
1.8	3.1	-1.3	10	2
3 U	3.1	-0.1	10	3
3.7	3.1	0.6	11	3
0.96	3.1	-2.14	11	4
2	3.1	-1.1	11	5
3.8	3.1	0.7	12	5
5.6	3.1	2.5	13	5
4.2	3.1	1.1	14	5
5	4	1	15	5
11.1	4	7.1	16	5
8.1	4	4.1	17	5
12.9	4	8.9	18	5
18.5	4	14.5	19	5
9.1	4	5.1	20	5
12	4	8	21	5
8.8	4	4.8	22	5
7.7	4	3.7	23	5
2.1	4	-1.9	23	6
1.8	4	-2.2	23	7
3 U	4	-1	23	8
3.7	4	-0.3	23	9
0.96	4	-3.04	23	10
2	4	-2	23	11
3.8	4	-0.2	23	12
5.6	4	1.6	24	12
4.2	4	0.2	25	12
11.1	5	6.1	26	12
8.1	5	3.1	27	12
12.9	5	7.9	28	12
18.5	5	13.5	29	12
9.1	5	4.1	30	12
12	5	7	31	12
8.8	5	3.8	32	12
7.7	5	2.7	33	12

2.1	5	-2.9	33	13
1.8	5	-3.2	33	14
3 U	5	-2	33	15
3.7	5	-1.3	33	16
0.96	5	-4.04	33	17
2	5	-3	33	18
3.8	5	-1.2	33	19
5.6	5	0.6	34	19
4.2	5	-0.8	34	20
8.1	11.1	-3	34	21
12.9	11.1	1.8	35	21
18.5	11.1	7.4	36	21
9.1	11.1	-2	36	22
12	11.1	0.9	37	22
8.8	11.1	-2.3	37	23
7.7	11.1	-3.4	37	24
2.1	11.1	-9	37	25
1.8	11.1	-9.3	37	26
3 U	11.1	-8.1	37	27
3.7	11.1	-7.4	37	28
0.96	11.1	-10.14	37	29
2	11.1	-9.1	37	30
3.8	11.1	-7.3	37	31
5.6	11.1	-5.5	37	32
4.2	11.1	-6.9	37	33
12.9	8.1	4.8	38	33
18.5	8.1	10.4	39	33
9.1	8.1	1	40	33
12	8.1	3.9	41	33
8.8	8.1	0.7	42	33
7.7	8.1	-0.4	42	34
2.1	8.1	-6	42	35
1.8	8.1	-6.3	42	36
3 U	8.1	-5.1	42	37
3.7	8.1	-4.4	42	38
0.96	8.1	-7.14	42	39
2	8.1	-6.1	42	40
3.8	8.1	-4.3	42	41
5.6	8.1	-2.5	42	42
4.2	8.1	-3.9	42	43
18.5	12.9	5.6	43	43
9.1	12.9	-3.8	43	44
12	12.9	-0.9	43	45
8.8	12.9	-4.1	43	46
7.7	12.9	-5.2	43	47
2.1	12.9	-10.8	43	48
1.8	12.9	-11.1	43	49
3 U	12.9	-9.9	43	50
3.7	12.9	-9.2	43	51
0.96	12.9	-11.94	43	52
2	12.9	-10.9	43	53
3.8	12.9	-9.1	43	54
5.6	12.9	-7.3	43	55
4.2	12.9	-8.7	43	56

9.1	18.5	-9.4	43	57
12	18.5	-6.5	43	58
8.8	18.5	-9.7	43	59
7.7	18.5	-10.8	43	60
2.1	18.5	-16.4	43	61
1.8	18.5	-16.7	43	62
3 U	18.5	-15.5	43	63
3.7	18.5	-14.8	43	64
0.96	18.5	-17.54	43	65
2	18.5	-16.5	43	66
3.8	18.5	-14.7	43	67
5.6	18.5	-12.9	43	68
4.2	18.5	-14.3	43	69
12	9.1	2.9	44	69
8.8	9.1	-0.3	44	70
7.7	9.1	-1.4	44	71
2.1	9.1	-7	44	72
1.8	9.1	-7.3	44	73
3 U	9.1	-6.1	44	74
3.7	9.1	-5.4	44	75
0.96	9.1	-8.14	44	76
2	9.1	-7.1	44	77
3.8	9.1	-5.3	44	78
5.6	9.1	-3.5	44	79
4.2	9.1	-4.9	44	80
8.8	12	-3.2	44	81
7.7	12	-4.3	44	82
2.1	12	-9.9	44	83
1.8	12	-10.2	44	84
3 U	12	-9	44	85
3.7	12	-8.3	44	86
0.96	12	-11.04	44	87
2	12	-10	44	88
3.8	12	-8.2	44	89
5.6	12	-6.4	44	90
4.2	12	-7.8	44	91
7.7	8.8	-1.1	44	92
2.1	8.8	-6.7	44	93
1.8	8.8	-7	44	94
3 U	8.8	-5.8	44	95
3.7	8.8	-5.1	44	96
0.96	8.8	-7.84	44	97
2	8.8	-6.8	44	98
3.8	8.8	-5	44	99
5.6	8.8	-3.2	44	100
4.2	8.8	-4.6	44	101
2.1	7.7	-5.6	44	102
1.8	7.7	-5.9	44	103
3 U	7.7	-4.7	44	104
3.7	7.7	-4	44	105
0.96	7.7	-6.74	44	106
2	7.7	-5.7	44	107

3.8	7.7	-3.9	44	108
5.6	7.7	-2.1	44	109
4.2	7.7	-3.5	44	110
1.8	2.1	-0.3	44	111
3 U	2.1	0.9	45	111
3.7	2.1	1.6	46	111
0.96	2.1	-1.14	46	112
2	2.1	-0.1	46	113
3.8	2.1	1.7	47	113
5.6	2.1	3.5	48	113
4.2	2.1	2.1	49	113
3 U	1.8	1.2	50	113
3.7	1.8	1.9	51	113
0.96	1.8	-0.84	51	114
2	1.8	0.2	52	114
3.8	1.8	2	53	114
5.6	1.8	3.8	54	114
4.2	1.8	2.4	55	114
3.7	3 U	0.7	56	114
0.96	3 U	-2.04	56	115
2	3 U	-1	56	116
3.8	3 U	0.8	57	116
5.6	3 U	2.6	58	116
4.2	3 U	1.2	59	116
0.96	3.7	-2.74	59	117
2	3.7	-1.7	59	118
3.8	3.7	0.1	60	118
5.6	3.7	1.9	61	118
4.2	3.7	0.5	62	118
2	0.96	1.04	63	118
3.8	0.96	2.84	64	118
5.6	0.96	4.64	65	118
4.2	0.96	3.24	66	118
3.8	2	1.8	67	118
5.6	2	3.6	68	118
4.2	2	2.2	69	118
5.6	3.8	1.8	70	118
4.2	3.8	0.4	71	118
4.2	5.6	-1.4	71	119

S Statistic = 71 - 119 = -48

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -1.52488

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-1.52488 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW10-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3 U	446	-443	0	1
198	446	-248	0	2
2.5	446	-443.5	0	3
27.2	446	-418.8	0	4
16.3	446	-429.7	0	5
3 U	446	-443	0	6
17.7	446	-428.3	0	7
24.6	446	-421.4	0	8
63.7	446	-382.3	0	9
3 U	446	-443	0	10
3 U	446	-443	0	11
44.4	446	-401.6	0	12
44.7	446	-401.3	0	13
10.8	446	-435.2	0	14
3 U	446	-443	0	15
0.38	446	-445.62	0	16
0.86	446	-445.14	0	17
8.4	446	-437.6	0	18
13.9	446	-432.1	0	19
198	3 U	195	1	19
2.5	3 U	-0.5	1	20
27.2	3 U	24.2	2	20
16.3	3 U	13.3	3	20
3 U	3 U	0	3	20
17.7	3 U	14.7	4	20
24.6	3 U	21.6	5	20
63.7	3 U	60.7	6	20
3 U	3 U	0	6	20
3 U	3 U	0	6	20
44.4	3 U	41.4	7	20
44.7	3 U	41.7	8	20
10.8	3 U	7.8	9	20
3 U	3 U	0	9	20
0.38	3 U	-2.62	9	21
0.86	3 U	-2.14	9	22
8.4	3 U	5.4	10	22
13.9	3 U	10.9	11	22
2.5	198	-195.5	11	23
27.2	198	-170.8	11	24
16.3	198	-181.7	11	25
3 U	198	-195	11	26
17.7	198	-180.3	11	27
24.6	198	-173.4	11	28
63.7	198	-134.3	11	29
3 U	198	-195	11	30

3 U	198	-195	11	31
44.4	198	-153.6	11	32
44.7	198	-153.3	11	33
10.8	198	-187.2	11	34
3 U	198	-195	11	35
0.38	198	-197.62	11	36
0.86	198	-197.14	11	37
8.4	198	-189.6	11	38
13.9	198	-184.1	11	39
27.2	2.5	24.7	12	39
16.3	2.5	13.8	13	39
3 U	2.5	0.5	14	39
17.7	2.5	15.2	15	39
24.6	2.5	22.1	16	39
63.7	2.5	61.2	17	39
3 U	2.5	0.5	18	39
3 U	2.5	0.5	19	39
44.4	2.5	41.9	20	39
44.7	2.5	42.2	21	39
10.8	2.5	8.3	22	39
3 U	2.5	0.5	23	39
0.38	2.5	-2.12	23	40
0.86	2.5	-1.64	23	41
8.4	2.5	5.9	24	41
13.9	2.5	11.4	25	41
16.3	27.2	-10.9	25	42
3 U	27.2	-24.2	25	43
17.7	27.2	-9.5	25	44
24.6	27.2	-2.6	25	45
63.7	27.2	36.5	26	45
3 U	27.2	-24.2	26	46
3 U	27.2	-24.2	26	47
44.4	27.2	17.2	27	47
44.7	27.2	17.5	28	47
10.8	27.2	-16.4	28	48
3 U	27.2	-24.2	28	49
0.38	27.2	-26.82	28	50
0.86	27.2	-26.34	28	51
8.4	27.2	-18.8	28	52
13.9	27.2	-13.3	28	53
3 U	16.3	-13.3	28	54
17.7	16.3	1.4	29	54
24.6	16.3	8.3	30	54
63.7	16.3	47.4	31	54
3 U	16.3	-13.3	31	55
3 U	16.3	-13.3	31	56
44.4	16.3	28.1	32	56
44.7	16.3	28.4	33	56
10.8	16.3	-5.5	33	57
3 U	16.3	-13.3	33	58
0.38	16.3	-15.92	33	59
0.86	16.3	-15.44	33	60
8.4	16.3	-7.9	33	61
13.9	16.3	-2.4	33	62

17.7	3 U	14.7	34	62
24.6	3 U	21.6	35	62
63.7	3 U	60.7	36	62
3 U	3 U	0	36	62
3 U	3 U	0	36	62
44.4	3 U	41.4	37	62
44.7	3 U	41.7	38	62
10.8	3 U	7.8	39	62
3 U	3 U	0	39	62
0.38	3 U	-2.62	39	63
0.86	3 U	-2.14	39	64
8.4	3 U	5.4	40	64
13.9	3 U	10.9	41	64
24.6	17.7	6.9	42	64
63.7	17.7	46	43	64
3 U	17.7	-14.7	43	65
3 U	17.7	-14.7	43	66
44.4	17.7	26.7	44	66
44.7	17.7	27	45	66
10.8	17.7	-6.9	45	67
3 U	17.7	-14.7	45	68
0.38	17.7	-17.32	45	69
0.86	17.7	-16.84	45	70
8.4	17.7	-9.3	45	71
13.9	17.7	-3.8	45	72
63.7	24.6	39.1	46	72
3 U	24.6	-21.6	46	73
3 U	24.6	-21.6	46	74
44.4	24.6	19.8	47	74
44.7	24.6	20.1	48	74
10.8	24.6	-13.8	48	75
3 U	24.6	-21.6	48	76
0.38	24.6	-24.22	48	77
0.86	24.6	-23.74	48	78
8.4	24.6	-16.2	48	79
13.9	24.6	-10.7	48	80
3 U	63.7	-60.7	48	81
3 U	63.7	-60.7	48	82
44.4	63.7	-19.3	48	83
44.7	63.7	-19	48	84
10.8	63.7	-52.9	48	85
3 U	63.7	-60.7	48	86
0.38	63.7	-63.32	48	87
0.86	63.7	-62.84	48	88
8.4	63.7	-55.3	48	89
13.9	63.7	-49.8	48	90
3 U	3 U	0	48	90
44.4	3 U	41.4	49	90
44.7	3 U	41.7	50	90
10.8	3 U	7.8	51	90
3 U	3 U	0	51	90
0.38	3 U	-2.62	51	91

0.86	3 U	-2.14	51	92
8.4	3 U	5.4	52	92
13.9	3 U	10.9	53	92
44.4	3 U	41.4	54	92
44.7	3 U	41.7	55	92
10.8	3 U	7.8	56	92
3 U	3 U	0	56	92
0.38	3 U	-2.62	56	93
0.86	3 U	-2.14	56	94
8.4	3 U	5.4	57	94
13.9	3 U	10.9	58	94
44.7	44.4	0.3	59	94
10.8	44.4	-33.6	59	95
3 U	44.4	-41.4	59	96
0.38	44.4	-44.02	59	97
0.86	44.4	-43.54	59	98
8.4	44.4	-36	59	99
13.9	44.4	-30.5	59	100
10.8	44.7	-33.9	59	101
3 U	44.7	-41.7	59	102
0.38	44.7	-44.32	59	103
0.86	44.7	-43.84	59	104
8.4	44.7	-36.3	59	105
13.9	44.7	-30.8	59	106
3 U	10.8	-7.8	59	107
0.38	10.8	-10.42	59	108
0.86	10.8	-9.94	59	109
8.4	10.8	-2.4	59	110
13.9	10.8	3.1	60	110
0.38	3 U	-2.62	60	111
0.86	3 U	-2.14	60	112
8.4	3 U	5.4	61	112
13.9	3 U	10.9	62	112
0.86	0.38	0.48	63	112
8.4	0.38	8.02	64	112
13.9	0.38	13.52	65	112
8.4	0.86	7.54	66	112
13.9	0.86	13.04	67	112
13.9	8.4	5.5	68	112

S Statistic = 68 - 112 = -44

Tied Group	Value	Members
1	3	5

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 300

B = 0

C = 60

D = 0

E = 20

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 933.333

Z-Score = -1.40751

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-1.40751 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW11-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1490	1690	-200	0	1
1800	1690	110	1	1
2600	1690	910	2	1
218	1690	-1472	2	2
518	1690	-1172	2	3
163	1690	-1527	2	4
274	1690	-1416	2	5
125	1690	-1565	2	6
1460	1690	-230	2	7
1380	1690	-310	2	8
1400	1690	-290	2	9
1660	1690	-30	2	10
4.7	1690	-1685.3	2	11
133	1690	-1557	2	12
1160	1690	-530	2	13
98.9	1690	-1591.1	2	14
586	1690	-1104	2	15
517	1690	-1173	2	16
476	1690	-1214	2	17
1800	1490	310	3	17
2600	1490	1110	4	17
218	1490	-1272	4	18
518	1490	-972	4	19
163	1490	-1327	4	20
274	1490	-1216	4	21
125	1490	-1365	4	22
1460	1490	-30	4	23
1380	1490	-110	4	24
1400	1490	-90	4	25
1660	1490	170	5	25
4.7	1490	-1485.3	5	26
133	1490	-1357	5	27
1160	1490	-330	5	28
98.9	1490	-1391.1	5	29
586	1490	-904	5	30
517	1490	-973	5	31
476	1490	-1014	5	32
2600	1800	800	6	32
218	1800	-1582	6	33
518	1800	-1282	6	34
163	1800	-1637	6	35
274	1800	-1526	6	36
125	1800	-1675	6	37
1460	1800	-340	6	38
1380	1800	-420	6	39

1400	1800	-400	6	40
1660	1800	-140	6	41
4.7	1800	-1795.3	6	42
133	1800	-1667	6	43
1160	1800	-640	6	44
98.9	1800	-1701.1	6	45
586	1800	-1214	6	46
517	1800	-1283	6	47
476	1800	-1324	6	48
218	2600	-2382	6	49
518	2600	-2082	6	50
163	2600	-2437	6	51
274	2600	-2326	6	52
125	2600	-2475	6	53
1460	2600	-1140	6	54
1380	2600	-1220	6	55
1400	2600	-1200	6	56
1660	2600	-940	6	57
4.7	2600	-2595.3	6	58
133	2600	-2467	6	59
1160	2600	-1440	6	60
98.9	2600	-2501.1	6	61
586	2600	-2014	6	62
517	2600	-2083	6	63
476	2600	-2124	6	64
518	218	300	7	64
163	218	-55	7	65
274	218	56	8	65
125	218	-93	8	66
1460	218	1242	9	66
1380	218	1162	10	66
1400	218	1182	11	66
1660	218	1442	12	66
4.7	218	-213.3	12	67
133	218	-85	12	68
1160	218	942	13	68
98.9	218	-119.1	13	69
586	218	368	14	69
517	218	299	15	69
476	218	258	16	69
163	518	-355	16	70
274	518	-244	16	71
125	518	-393	16	72
1460	518	942	17	72
1380	518	862	18	72
1400	518	882	19	72
1660	518	1142	20	72
4.7	518	-513.3	20	73
133	518	-385	20	74
1160	518	642	21	74
98.9	518	-419.1	21	75
586	518	68	22	75
517	518	-1	22	76
476	518	-42	22	77

274	163	111	23	77
125	163	-38	23	78
1460	163	1297	24	78
1380	163	1217	25	78
1400	163	1237	26	78
1660	163	1497	27	78
4.7	163	-158.3	27	79
133	163	-30	27	80
1160	163	997	28	80
98.9	163	-64.1	28	81
586	163	423	29	81
517	163	354	30	81
476	163	313	31	81
125	274	-149	31	82
1460	274	1186	32	82
1380	274	1106	33	82
1400	274	1126	34	82
1660	274	1386	35	82
4.7	274	-269.3	35	83
133	274	-141	35	84
1160	274	886	36	84
98.9	274	-175.1	36	85
586	274	312	37	85
517	274	243	38	85
476	274	202	39	85
1460	125	1335	40	85
1380	125	1255	41	85
1400	125	1275	42	85
1660	125	1535	43	85
4.7	125	-120.3	43	86
133	125	8	44	86
1160	125	1035	45	86
98.9	125	-26.1	45	87
586	125	461	46	87
517	125	392	47	87
476	125	351	48	87
1380	1460	-80	48	88
1400	1460	-60	48	89
1660	1460	200	49	89
4.7	1460	-1455.3	49	90
133	1460	-1327	49	91
1160	1460	-300	49	92
98.9	1460	-1361.1	49	93
586	1460	-874	49	94
517	1460	-943	49	95
476	1460	-984	49	96
1400	1380	20	50	96
1660	1380	280	51	96
4.7	1380	-1375.3	51	97
133	1380	-1247	51	98
1160	1380	-220	51	99
98.9	1380	-1281.1	51	100

586	1380	-794	51	101
517	1380	-863	51	102
476	1380	-904	51	103
1660	1400	260	52	103
4.7	1400	-1395.3	52	104
133	1400	-1267	52	105
1160	1400	-240	52	106
98.9	1400	-1301.1	52	107
586	1400	-814	52	108
517	1400	-883	52	109
476	1400	-924	52	110
4.7	1660	-1655.3	52	111
133	1660	-1527	52	112
1160	1660	-500	52	113
98.9	1660	-1561.1	52	114
586	1660	-1074	52	115
517	1660	-1143	52	116
476	1660	-1184	52	117
133	4.7	128.3	53	117
1160	4.7	1155.3	54	117
98.9	4.7	94.2	55	117
586	4.7	581.3	56	117
517	4.7	512.3	57	117
476	4.7	471.3	58	117
1160	133	1027	59	117
98.9	133	-34.1	59	118
586	133	453	60	118
517	133	384	61	118
476	133	343	62	118
98.9	1160	-1061.1	62	119
586	1160	-574	62	120
517	1160	-643	62	121
476	1160	-684	62	122
586	98.9	487.1	63	122
517	98.9	418.1	64	122
476	98.9	377.1	65	122
517	586	-69	65	123
476	586	-110	65	124
476	517	-41	65	125

S Statistic = 65 - 125 = -60

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -1.91421

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-1.91421 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW12-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3530	4740	-1210	0	1
2730	4740	-2010	0	2
3820	4740	-920	0	3
2260	4740	-2480	0	4
2730	4740	-2010	0	5
2220	4740	-2520	0	6
1820	4740	-2920	0	7
1510	4740	-3230	0	8
1380	4740	-3360	0	9
1450	4740	-3290	0	10
1270	4740	-3470	0	11
121	4740	-4619	0	12
134	4740	-4606	0	13
86.3	4740	-4653.7	0	14
1220	4740	-3520	0	15
768	4740	-3972	0	16
1520	4740	-3220	0	17
1780	4740	-2960	0	18
420	4740	-4320	0	19
2730	3530	-800	0	20
3820	3530	290	1	20
2260	3530	-1270	1	21
2730	3530	-800	1	22
2220	3530	-1310	1	23
1820	3530	-1710	1	24
1510	3530	-2020	1	25
1380	3530	-2150	1	26
1450	3530	-2080	1	27
1270	3530	-2260	1	28
121	3530	-3409	1	29
134	3530	-3396	1	30
86.3	3530	-3443.7	1	31
1220	3530	-2310	1	32
768	3530	-2762	1	33
1520	3530	-2010	1	34
1780	3530	-1750	1	35
420	3530	-3110	1	36
3820	2730	1090	2	36
2260	2730	-470	2	37
2730	2730	0	2	37
2220	2730	-510	2	38
1820	2730	-910	2	39
1510	2730	-1220	2	40
1380	2730	-1350	2	41
1450	2730	-1280	2	42

1270	2730	-1460	2	43
121	2730	-2609	2	44
134	2730	-2596	2	45
86.3	2730	-2643.7	2	46
1220	2730	-1510	2	47
768	2730	-1962	2	48
1520	2730	-1210	2	49
1780	2730	-950	2	50
420	2730	-2310	2	51
2260	3820	-1560	2	52
2730	3820	-1090	2	53
2220	3820	-1600	2	54
1820	3820	-2000	2	55
1510	3820	-2310	2	56
1380	3820	-2440	2	57
1450	3820	-2370	2	58
1270	3820	-2550	2	59
121	3820	-3699	2	60
134	3820	-3686	2	61
86.3	3820	-3733.7	2	62
1220	3820	-2600	2	63
768	3820	-3052	2	64
1520	3820	-2300	2	65
1780	3820	-2040	2	66
420	3820	-3400	2	67
2730	2260	470	3	67
2220	2260	-40	3	68
1820	2260	-440	3	69
1510	2260	-750	3	70
1380	2260	-880	3	71
1450	2260	-810	3	72
1270	2260	-990	3	73
121	2260	-2139	3	74
134	2260	-2126	3	75
86.3	2260	-2173.7	3	76
1220	2260	-1040	3	77
768	2260	-1492	3	78
1520	2260	-740	3	79
1780	2260	-480	3	80
420	2260	-1840	3	81
2220	2730	-510	3	82
1820	2730	-910	3	83
1510	2730	-1220	3	84
1380	2730	-1350	3	85
1450	2730	-1280	3	86
1270	2730	-1460	3	87
121	2730	-2609	3	88
134	2730	-2596	3	89
86.3	2730	-2643.7	3	90
1220	2730	-1510	3	91
768	2730	-1962	3	92
1520	2730	-1210	3	93
1780	2730	-950	3	94
420	2730	-2310	3	95

1820	2220	-400	3	96
1510	2220	-710	3	97
1380	2220	-840	3	98
1450	2220	-770	3	99
1270	2220	-950	3	100
121	2220	-2099	3	101
134	2220	-2086	3	102
86.3	2220	-2133.7	3	103
1220	2220	-1000	3	104
768	2220	-1452	3	105
1520	2220	-700	3	106
1780	2220	-440	3	107
420	2220	-1800	3	108
1510	1820	-310	3	109
1380	1820	-440	3	110
1450	1820	-370	3	111
1270	1820	-550	3	112
121	1820	-1699	3	113
134	1820	-1686	3	114
86.3	1820	-1733.7	3	115
1220	1820	-600	3	116
768	1820	-1052	3	117
1520	1820	-300	3	118
1780	1820	-40	3	119
420	1820	-1400	3	120
1380	1510	-130	3	121
1450	1510	-60	3	122
1270	1510	-240	3	123
121	1510	-1389	3	124
134	1510	-1376	3	125
86.3	1510	-1423.7	3	126
1220	1510	-290	3	127
768	1510	-742	3	128
1520	1510	10	4	128
1780	1510	270	5	128
420	1510	-1090	5	129
1450	1380	70	6	129
1270	1380	-110	6	130
121	1380	-1259	6	131
134	1380	-1246	6	132
86.3	1380	-1293.7	6	133
1220	1380	-160	6	134
768	1380	-612	6	135
1520	1380	140	7	135
1780	1380	400	8	135
420	1380	-960	8	136
1270	1450	-180	8	137
121	1450	-1329	8	138
134	1450	-1316	8	139
86.3	1450	-1363.7	8	140
1220	1450	-230	8	141
768	1450	-682	8	142

1520	1450	70	9	142
1780	1450	330	10	142
420	1450	-1030	10	143
121	1270	-1149	10	144
134	1270	-1136	10	145
86.3	1270	-1183.7	10	146
1220	1270	-50	10	147
768	1270	-502	10	148
1520	1270	250	11	148
1780	1270	510	12	148
420	1270	-850	12	149
134	121	13	13	149
86.3	121	-34.7	13	150
1220	121	1099	14	150
768	121	647	15	150
1520	121	1399	16	150
1780	121	1659	17	150
420	121	299	18	150
86.3	134	-47.7	18	151
1220	134	1086	19	151
768	134	634	20	151
1520	134	1386	21	151
1780	134	1646	22	151
420	134	286	23	151
1220	86.3	1133.7	24	151
768	86.3	681.7	25	151
1520	86.3	1433.7	26	151
1780	86.3	1693.7	27	151
420	86.3	333.7	28	151
768	1220	-452	28	152
1520	1220	300	29	152
1780	1220	560	30	152
420	1220	-800	30	153
1520	768	752	31	153
1780	768	1012	32	153
420	768	-348	32	154
1780	1520	260	33	154
420	1520	-1100	33	155
420	1780	-1360	33	156

S Statistic = 33 - 156 = -123

Tied Group	Value	Members
1	2730	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = -3.96029

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-3.96029 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW13-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
66	31800	-31734	0	1
28700	31800	-3100	0	2
24500	31800	-7300	0	3
44.2	31800	-31755.8	0	4
1240	31800	-30560	0	5
19400	31800	-12400	0	6
21000	31800	-10800	0	7
12.6	31800	-31787.4	0	8
3.2	31800	-31796.8	0	9
29200	31800	-2600	0	10
51.1	31800	-31748.9	0	11
12.8	31800	-31787.2	0	12
22500	31800	-9300	0	13
28700	66	28634	1	13
24500	66	24434	2	13
44.2	66	-21.8	2	14
1240	66	1174	3	14
19400	66	19334	4	14
21000	66	20934	5	14
12.6	66	-53.4	5	15
3.2	66	-62.8	5	16
29200	66	29134	6	16
51.1	66	-14.9	6	17
12.8	66	-53.2	6	18
22500	66	22434	7	18
24500	28700	-4200	7	19
44.2	28700	-28655.8	7	20
1240	28700	-27460	7	21
19400	28700	-9300	7	22
21000	28700	-7700	7	23
12.6	28700	-28687.4	7	24
3.2	28700	-28696.8	7	25
29200	28700	500	8	25
51.1	28700	-28648.9	8	26
12.8	28700	-28687.2	8	27
22500	28700	-6200	8	28
44.2	24500	-24455.8	8	29
1240	24500	-23260	8	30
19400	24500	-5100	8	31
21000	24500	-3500	8	32
12.6	24500	-24487.4	8	33
3.2	24500	-24496.8	8	34
29200	24500	4700	9	34
51.1	24500	-24448.9	9	35

12.8	24500	-24487.2	9	36
22500	24500	-2000	9	37
1240	44.2	1195.8	10	37
19400	44.2	19355.8	11	37
21000	44.2	20955.8	12	37
12.6	44.2	-31.6	12	38
3.2	44.2	-41	12	39
29200	44.2	29155.8	13	39
51.1	44.2	6.9	14	39
12.8	44.2	-31.4	14	40
22500	44.2	22455.8	15	40
19400	1240	18160	16	40
21000	1240	19760	17	40
12.6	1240	-1227.4	17	41
3.2	1240	-1236.8	17	42
29200	1240	27960	18	42
51.1	1240	-1188.9	18	43
12.8	1240	-1227.2	18	44
22500	1240	21260	19	44
21000	19400	1600	20	44
12.6	19400	-19387.4	20	45
3.2	19400	-19396.8	20	46
29200	19400	9800	21	46
51.1	19400	-19348.9	21	47
12.8	19400	-19387.2	21	48
22500	19400	3100	22	48
12.6	21000	-20987.4	22	49
3.2	21000	-20996.8	22	50
29200	21000	8200	23	50
51.1	21000	-20948.9	23	51
12.8	21000	-20987.2	23	52
22500	21000	1500	24	52
3.2	12.6	-9.4	24	53
29200	12.6	29187.4	25	53
51.1	12.6	38.5	26	53
12.8	12.6	0.2	27	53
22500	12.6	22487.4	28	53
29200	3.2	29196.8	29	53
51.1	3.2	47.9	30	53
12.8	3.2	9.6	31	53
22500	3.2	22496.8	32	53
51.1	29200	-29148.9	32	54
12.8	29200	-29187.2	32	55
22500	29200	-6700	32	56
12.8	51.1	-38.3	32	57
22500	51.1	22448.9	33	57
22500	12.8	22487.2	34	57

S Statistic = 34 - 57 = -23

Tied Group	Value	Members
Time Period		Observations
8/1/2017		1
9/1/2017		1
10/1/2017		1
11/1/2017		1
12/1/2017		1
1/1/2018		1
4/1/2018		1
8/1/2018		1
10/1/2018		1
12/1/2018		1
3/1/2019		1
6/1/2019		1
9/1/2019		1
12/1/2019		1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -1.20439

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-1.20439 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW15-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3 U	10.1	-7.1	0	1
3 U	10.1	-7.1	0	2
3 U	10.1	-7.1	0	3
0.97	10.1	-9.13	0	4
1.6	10.1	-8.5	0	5
3 U	10.1	-7.1	0	6
15.3	10.1	5.2	1	6
3 U	10.1	-7.1	1	7
12.9	10.1	2.8	2	7
402	10.1	391.9	3	7
64.2	10.1	54.1	4	7
589	10.1	578.9	5	7
605	10.1	594.9	6	7
3 U	3 U	0	6	7
3 U	3 U	0	6	7
0.97	3 U	-2.03	6	8
1.6	3 U	-1.4	6	9
3 U	3 U	0	6	9
15.3	3 U	12.3	7	9
3 U	3 U	0	7	9
12.9	3 U	9.9	8	9
402	3 U	399	9	9
64.2	3 U	61.2	10	9
589	3 U	586	11	9
605	3 U	602	12	9
3 U	3 U	0	12	9
0.97	3 U	-2.03	12	10
1.6	3 U	-1.4	12	11
3 U	3 U	0	12	11
15.3	3 U	12.3	13	11
3 U	3 U	0	13	11
12.9	3 U	9.9	14	11
402	3 U	399	15	11
64.2	3 U	61.2	16	11
589	3 U	586	17	11
605	3 U	602	18	11
0.97	3 U	-2.03	18	12
1.6	3 U	-1.4	18	13
3 U	3 U	0	18	13
15.3	3 U	12.3	19	13
3 U	3 U	0	19	13
12.9	3 U	9.9	20	13
402	3 U	399	21	13
64.2	3 U	61.2	22	13

589	3 U	586	23	13
605	3 U	602	24	13
1.6	0.97	0.63	25	13
3 U	0.97	2.03	26	13
15.3	0.97	14.33	27	13
3 U	0.97	2.03	28	13
12.9	0.97	11.93	29	13
402	0.97	401.03	30	13
64.2	0.97	63.23	31	13
589	0.97	588.03	32	13
605	0.97	604.03	33	13
3 U	1.6	1.4	34	13
15.3	1.6	13.7	35	13
3 U	1.6	1.4	36	13
12.9	1.6	11.3	37	13
402	1.6	400.4	38	13
64.2	1.6	62.6	39	13
589	1.6	587.4	40	13
605	1.6	603.4	41	13
15.3	3 U	12.3	42	13
3 U	3 U	0	42	13
12.9	3 U	9.9	43	13
402	3 U	399	44	13
64.2	3 U	61.2	45	13
589	3 U	586	46	13
605	3 U	602	47	13
3 U	15.3	-12.3	47	14
12.9	15.3	-2.4	47	15
402	15.3	386.7	48	15
64.2	15.3	48.9	49	15
589	15.3	573.7	50	15
605	15.3	589.7	51	15
12.9	3 U	9.9	52	15
402	3 U	399	53	15
64.2	3 U	61.2	54	15
589	3 U	586	55	15
605	3 U	602	56	15
402	12.9	389.1	57	15
64.2	12.9	51.3	58	15
589	12.9	576.1	59	15
605	12.9	592.1	60	15
64.2	402	-337.8	60	16
589	402	187	61	16
605	402	203	62	16
589	64.2	524.8	63	16
605	64.2	540.8	64	16
605	589	16	65	16

S Statistic = 65 - 16 = 49

Tied Group	Value	Members
1	3	5

Time Period	Observations
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 300

B = 0

C = 60

D = 0

E = 20

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 317

Z-Score = 2.69595

Comparison Level at 95% confidence level = 1.65463 (upward trend)

2.69595 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW16-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3 U	1.7	1.3	1	0
3 U	1.7	1.3	2	0
1.9	1.7	0.2	3	0
1.2	1.7	-0.5	3	1
1.1	1.7	-0.6	3	2
3 U	1.7	1.3	4	2
3 U	1.7	1.3	5	2
3 U	1.7	1.3	6	2
3 U	1.7	1.3	7	2
3 U	1.7	1.3	8	2
3 U	1.7	1.3	9	2
0.36	1.7	-1.34	9	3
3 U	3 U	0	9	3
1.9	3 U	-1.1	9	4
1.2	3 U	-1.8	9	5
1.1	3 U	-1.9	9	6
3 U	3 U	0	9	6
3 U	3 U	0	9	6
3 U	3 U	0	9	6
3 U	3 U	0	9	6
3 U	3 U	0	9	6
3 U	3 U	0	9	6
0.36	3 U	-2.64	9	7
1.9	3 U	-1.1	9	8
1.2	3 U	-1.8	9	9
1.1	3 U	-1.9	9	10
3 U	3 U	0	9	10
3 U	3 U	0	9	10
3 U	3 U	0	9	10
3 U	3 U	0	9	10
3 U	3 U	0	9	10
3 U	3 U	0	9	10
0.36	3 U	-2.64	9	11
1.2	1.9	-0.7	9	12
1.1	1.9	-0.8	9	13
3 U	1.9	1.1	10	13
3 U	1.9	1.1	11	13
3 U	1.9	1.1	12	13
3 U	1.9	1.1	13	13
3 U	1.9	1.1	14	13
3 U	1.9	1.1	15	13
0.36	1.9	-1.54	15	14
1.1	1.2	-0.1	15	15

3 U	1.2	1.8	16	15
3 U	1.2	1.8	17	15
3 U	1.2	1.8	18	15
3 U	1.2	1.8	19	15
3 U	1.2	1.8	20	15
3 U	1.2	1.8	21	15
0.36	1.2	-0.84	21	16
3 U	1.1	1.9	22	16
3 U	1.1	1.9	23	16
3 U	1.1	1.9	24	16
3 U	1.1	1.9	25	16
3 U	1.1	1.9	26	16
3 U	1.1	1.9	27	16
0.36	1.1	-0.74	27	17
3 U	3 U	0	27	17
3 U	3 U	0	27	17
3 U	3 U	0	27	17
3 U	3 U	0	27	17
3 U	3 U	0	27	17
0.36	3 U	-2.64	27	18
3 U	3 U	0	27	18
3 U	3 U	0	27	18
3 U	3 U	0	27	18
3 U	3 U	0	27	18
0.36	3 U	-2.64	27	19
3 U	3 U	0	27	19
3 U	3 U	0	27	19
3 U	3 U	0	27	19
0.36	3 U	-2.64	27	20
3 U	3 U	0	27	20
3 U	3 U	0	27	20
0.36	3 U	-2.64	27	21
3 U	3 U	0	27	21
0.36	3 U	-2.64	27	22
0.36	3 U	-2.64	27	23

S Statistic = 27 - 23 = 4

Tied Group	Value	Members
1	3	8

Time Period	Observations
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1

10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 1176

B = 0

C = 336

D = 0

E = 56

F = 0

a = 4836

b = 15444

c = 312

Group Variance = 203.333

Z-Score = 0.210386

Comparison Level at 95% confidence level = 1.65463 (upward trend)

0.210386 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW18-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
63.8	70.3	-6.5	0	1
119	70.3	48.7	1	1
92	70.3	21.7	2	1
65.1	70.3	-5.2	2	2
61.7	70.3	-8.6	2	3
74.4	70.3	4.1	3	3
72.2	70.3	1.9	4	3
43.7	70.3	-26.6	4	4
66.6	70.3	-3.7	4	5
51.5	70.3	-18.8	4	6
63.5	70.3	-6.8	4	7
55.8	70.3	-14.5	4	8
35.1	70.3	-35.2	4	9
14.5	70.3	-55.8	4	10
44.7	70.3	-25.6	4	11
80.3	70.3	10	5	11
38	70.3	-32.3	5	12
50.4	70.3	-19.9	5	13
87.6	70.3	17.3	6	13
119	63.8	55.2	7	13
92	63.8	28.2	8	13
65.1	63.8	1.3	9	13
61.7	63.8	-2.1	9	14
74.4	63.8	10.6	10	14
72.2	63.8	8.4	11	14
43.7	63.8	-20.1	11	15
66.6	63.8	2.8	12	15
51.5	63.8	-12.3	12	16
63.5	63.8	-0.3	12	17
55.8	63.8	-8	12	18
35.1	63.8	-28.7	12	19
14.5	63.8	-49.3	12	20
44.7	63.8	-19.1	12	21
80.3	63.8	16.5	13	21
38	63.8	-25.8	13	22
50.4	63.8	-13.4	13	23
87.6	63.8	23.8	14	23
92	119	-27	14	24
65.1	119	-53.9	14	25
61.7	119	-57.3	14	26
74.4	119	-44.6	14	27
72.2	119	-46.8	14	28
43.7	119	-75.3	14	29
66.6	119	-52.4	14	30
51.5	119	-67.5	14	31

63.5	119	-55.5	14	32
55.8	119	-63.2	14	33
35.1	119	-83.9	14	34
14.5	119	-104.5	14	35
44.7	119	-74.3	14	36
80.3	119	-38.7	14	37
38	119	-81	14	38
50.4	119	-68.6	14	39
87.6	119	-31.4	14	40
65.1	92	-26.9	14	41
61.7	92	-30.3	14	42
74.4	92	-17.6	14	43
72.2	92	-19.8	14	44
43.7	92	-48.3	14	45
66.6	92	-25.4	14	46
51.5	92	-40.5	14	47
63.5	92	-28.5	14	48
55.8	92	-36.2	14	49
35.1	92	-56.9	14	50
14.5	92	-77.5	14	51
44.7	92	-47.3	14	52
80.3	92	-11.7	14	53
38	92	-54	14	54
50.4	92	-41.6	14	55
87.6	92	-4.4	14	56
61.7	65.1	-3.4	14	57
74.4	65.1	9.3	15	57
72.2	65.1	7.1	16	57
43.7	65.1	-21.4	16	58
66.6	65.1	1.5	17	58
51.5	65.1	-13.6	17	59
63.5	65.1	-1.6	17	60
55.8	65.1	-9.3	17	61
35.1	65.1	-30	17	62
14.5	65.1	-50.6	17	63
44.7	65.1	-20.4	17	64
80.3	65.1	15.2	18	64
38	65.1	-27.1	18	65
50.4	65.1	-14.7	18	66
87.6	65.1	22.5	19	66
74.4	61.7	12.7	20	66
72.2	61.7	10.5	21	66
43.7	61.7	-18	21	67
66.6	61.7	4.9	22	67
51.5	61.7	-10.2	22	68
63.5	61.7	1.8	23	68
55.8	61.7	-5.9	23	69
35.1	61.7	-26.6	23	70
14.5	61.7	-47.2	23	71
44.7	61.7	-17	23	72
80.3	61.7	18.6	24	72
38	61.7	-23.7	24	73
50.4	61.7	-11.3	24	74
87.6	61.7	25.9	25	74

72.2	74.4	-2.2	25	75
43.7	74.4	-30.7	25	76
66.6	74.4	-7.8	25	77
51.5	74.4	-22.9	25	78
63.5	74.4	-10.9	25	79
55.8	74.4	-18.6	25	80
35.1	74.4	-39.3	25	81
14.5	74.4	-59.9	25	82
44.7	74.4	-29.7	25	83
80.3	74.4	5.9	26	83
38	74.4	-36.4	26	84
50.4	74.4	-24	26	85
87.6	74.4	13.2	27	85
43.7	72.2	-28.5	27	86
66.6	72.2	-5.6	27	87
51.5	72.2	-20.7	27	88
63.5	72.2	-8.7	27	89
55.8	72.2	-16.4	27	90
35.1	72.2	-37.1	27	91
14.5	72.2	-57.7	27	92
44.7	72.2	-27.5	27	93
80.3	72.2	8.1	28	93
38	72.2	-34.2	28	94
50.4	72.2	-21.8	28	95
87.6	72.2	15.4	29	95
66.6	43.7	22.9	30	95
51.5	43.7	7.8	31	95
63.5	43.7	19.8	32	95
55.8	43.7	12.1	33	95
35.1	43.7	-8.6	33	96
14.5	43.7	-29.2	33	97
44.7	43.7	1	34	97
80.3	43.7	36.6	35	97
38	43.7	-5.7	35	98
50.4	43.7	6.7	36	98
87.6	43.7	43.9	37	98
51.5	66.6	-15.1	37	99
63.5	66.6	-3.1	37	100
55.8	66.6	-10.8	37	101
35.1	66.6	-31.5	37	102
14.5	66.6	-52.1	37	103
44.7	66.6	-21.9	37	104
80.3	66.6	13.7	38	104
38	66.6	-28.6	38	105
50.4	66.6	-16.2	38	106
87.6	66.6	21	39	106
63.5	51.5	12	40	106
55.8	51.5	4.3	41	106
35.1	51.5	-16.4	41	107
14.5	51.5	-37	41	108
44.7	51.5	-6.8	41	109
80.3	51.5	28.8	42	109

38	51.5	-13.5	42	110
50.4	51.5	-1.1	42	111
87.6	51.5	36.1	43	111
55.8	63.5	-7.7	43	112
35.1	63.5	-28.4	43	113
14.5	63.5	-49	43	114
44.7	63.5	-18.8	43	115
80.3	63.5	16.8	44	115
38	63.5	-25.5	44	116
50.4	63.5	-13.1	44	117
87.6	63.5	24.1	45	117
35.1	55.8	-20.7	45	118
14.5	55.8	-41.3	45	119
44.7	55.8	-11.1	45	120
80.3	55.8	24.5	46	120
38	55.8	-17.8	46	121
50.4	55.8	-5.4	46	122
87.6	55.8	31.8	47	122
14.5	35.1	-20.6	47	123
44.7	35.1	9.6	48	123
80.3	35.1	45.2	49	123
38	35.1	2.9	50	123
50.4	35.1	15.3	51	123
87.6	35.1	52.5	52	123
44.7	14.5	30.2	53	123
80.3	14.5	65.8	54	123
38	14.5	23.5	55	123
50.4	14.5	35.9	56	123
87.6	14.5	73.1	57	123
80.3	44.7	35.6	58	123
38	44.7	-6.7	58	124
50.4	44.7	5.7	59	124
87.6	44.7	42.9	60	124
38	80.3	-42.3	60	125
50.4	80.3	-29.9	60	126
87.6	80.3	7.3	61	126
50.4	38	12.4	62	126
87.6	38	49.6	63	126
87.6	50.4	37.2	64	126

S Statistic = 64 - 126 = -62

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -1.9791

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-1.9791 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW19-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3450	3760	-310	0	1
3380	3760	-380	0	2
2770	3760	-990	0	3
2280	3760	-1480	0	4
2550	3760	-1210	0	5
1670	3760	-2090	0	6
1320	3760	-2440	0	7
1710	3760	-2050	0	8
1770	3760	-1990	0	9
1710	3760	-2050	0	10
1880	3760	-1880	0	11
1700	3760	-2060	0	12
1560	3760	-2200	0	13
1610	3760	-2150	0	14
1900	3760	-1860	0	15
1320	3760	-2440	0	16
2420	3760	-1340	0	17
1580	3760	-2180	0	18
1500	3760	-2260	0	19
3380	3450	-70	0	20
2770	3450	-680	0	21
2280	3450	-1170	0	22
2550	3450	-900	0	23
1670	3450	-1780	0	24
1320	3450	-2130	0	25
1710	3450	-1740	0	26
1770	3450	-1680	0	27
1710	3450	-1740	0	28
1880	3450	-1570	0	29
1700	3450	-1750	0	30
1560	3450	-1890	0	31
1610	3450	-1840	0	32
1900	3450	-1550	0	33
1320	3450	-2130	0	34
2420	3450	-1030	0	35
1580	3450	-1870	0	36
1500	3450	-1950	0	37
2770	3380	-610	0	38
2280	3380	-1100	0	39
2550	3380	-830	0	40
1670	3380	-1710	0	41
1320	3380	-2060	0	42
1710	3380	-1670	0	43
1770	3380	-1610	0	44
1710	3380	-1670	0	45

1880	3380	-1500	0	46
1700	3380	-1680	0	47
1560	3380	-1820	0	48
1610	3380	-1770	0	49
1900	3380	-1480	0	50
1320	3380	-2060	0	51
2420	3380	-960	0	52
1580	3380	-1800	0	53
1500	3380	-1880	0	54
2280	2770	-490	0	55
2550	2770	-220	0	56
1670	2770	-1100	0	57
1320	2770	-1450	0	58
1710	2770	-1060	0	59
1770	2770	-1000	0	60
1710	2770	-1060	0	61
1880	2770	-890	0	62
1700	2770	-1070	0	63
1560	2770	-1210	0	64
1610	2770	-1160	0	65
1900	2770	-870	0	66
1320	2770	-1450	0	67
2420	2770	-350	0	68
1580	2770	-1190	0	69
1500	2770	-1270	0	70
2550	2280	270	1	70
1670	2280	-610	1	71
1320	2280	-960	1	72
1710	2280	-570	1	73
1770	2280	-510	1	74
1710	2280	-570	1	75
1880	2280	-400	1	76
1700	2280	-580	1	77
1560	2280	-720	1	78
1610	2280	-670	1	79
1900	2280	-380	1	80
1320	2280	-960	1	81
2420	2280	140	2	81
1580	2280	-700	2	82
1500	2280	-780	2	83
1670	2550	-880	2	84
1320	2550	-1230	2	85
1710	2550	-840	2	86
1770	2550	-780	2	87
1710	2550	-840	2	88
1880	2550	-670	2	89
1700	2550	-850	2	90
1560	2550	-990	2	91
1610	2550	-940	2	92
1900	2550	-650	2	93
1320	2550	-1230	2	94
2420	2550	-130	2	95
1580	2550	-970	2	96
1500	2550	-1050	2	97

1320	1670	-350	2	98
1710	1670	40	3	98
1770	1670	100	4	98
1710	1670	40	5	98
1880	1670	210	6	98
1700	1670	30	7	98
1560	1670	-110	7	99
1610	1670	-60	7	100
1900	1670	230	8	100
1320	1670	-350	8	101
2420	1670	750	9	101
1580	1670	-90	9	102
1500	1670	-170	9	103
1710	1320	390	10	103
1770	1320	450	11	103
1710	1320	390	12	103
1880	1320	560	13	103
1700	1320	380	14	103
1560	1320	240	15	103
1610	1320	290	16	103
1900	1320	580	17	103
1320	1320	0	17	103
2420	1320	1100	18	103
1580	1320	260	19	103
1500	1320	180	20	103
1770	1710	60	21	103
1710	1710	0	21	103
1880	1710	170	22	103
1700	1710	-10	22	104
1560	1710	-150	22	105
1610	1710	-100	22	106
1900	1710	190	23	106
1320	1710	-390	23	107
2420	1710	710	24	107
1580	1710	-130	24	108
1500	1710	-210	24	109
1710	1770	-60	24	110
1880	1770	110	25	110
1700	1770	-70	25	111
1560	1770	-210	25	112
1610	1770	-160	25	113
1900	1770	130	26	113
1320	1770	-450	26	114
2420	1770	650	27	114
1580	1770	-190	27	115
1500	1770	-270	27	116
1880	1710	170	28	116
1700	1710	-10	28	117
1560	1710	-150	28	118
1610	1710	-100	28	119
1900	1710	190	29	119
1320	1710	-390	29	120

2420	1710	710	30	120
1580	1710	-130	30	121
1500	1710	-210	30	122
1700	1880	-180	30	123
1560	1880	-320	30	124
1610	1880	-270	30	125
1900	1880	20	31	125
1320	1880	-560	31	126
2420	1880	540	32	126
1580	1880	-300	32	127
1500	1880	-380	32	128
1560	1700	-140	32	129
1610	1700	-90	32	130
1900	1700	200	33	130
1320	1700	-380	33	131
2420	1700	720	34	131
1580	1700	-120	34	132
1500	1700	-200	34	133
1610	1560	50	35	133
1900	1560	340	36	133
1320	1560	-240	36	134
2420	1560	860	37	134
1580	1560	20	38	134
1500	1560	-60	38	135
1900	1610	290	39	135
1320	1610	-290	39	136
2420	1610	810	40	136
1580	1610	-30	40	137
1500	1610	-110	40	138
1320	1900	-580	40	139
2420	1900	520	41	139
1580	1900	-320	41	140
1500	1900	-400	41	141
2420	1320	1100	42	141
1580	1320	260	43	141
1500	1320	180	44	141
1580	2420	-840	44	142
1500	2420	-920	44	143
1500	1580	-80	44	144

S Statistic = 44 - 144 = -100

Tied Group	Value	Members
1	1320	2
2	1710	2

Time Period	Observations
2/1/2017	1

3/1/2017	1
4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 36

B = 0

C = 0

D = 0

E = 4

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 948

Z-Score = -3.21537

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-3.21537 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Cadmium
Location: RW22-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
3 U	0.35	2.65	1	0
2.3	0.35	1.95	2	0
3 U	0.35	2.65	3	0
3.8	0.35	3.45	4	0
15.2	0.35	14.85	5	0
4.1	0.35	3.75	6	0
3 U	0.35	2.65	7	0
3 U	0.35	2.65	8	0
3 U	0.35	2.65	9	0
3 U	0.35	2.65	10	0
3 U	0.35	2.65	11	0
2.3	3 U	-0.7	11	1
3 U	3 U	0	11	1
3.8	3 U	0.8	12	1
15.2	3 U	12.2	13	1
4.1	3 U	1.1	14	1
3 U	3 U	0	14	1
3 U	3 U	0	14	1
3 U	3 U	0	14	1
3 U	3 U	0	14	1
3 U	3 U	0	14	1
3 U	2.3	0.7	15	1
3.8	2.3	1.5	16	1
15.2	2.3	12.9	17	1
4.1	2.3	1.8	18	1
3 U	2.3	0.7	19	1
3 U	2.3	0.7	20	1
3 U	2.3	0.7	21	1
3 U	2.3	0.7	22	1
3 U	2.3	0.7	23	1
3.8	3 U	0.8	24	1
15.2	3 U	12.2	25	1
4.1	3 U	1.1	26	1
3 U	3 U	0	26	1
3 U	3 U	0	26	1
3 U	3 U	0	26	1
3 U	3 U	0	26	1
3 U	3 U	0	26	1
3 U	3 U	0	26	1
15.2	3.8	11.4	27	1
4.1	3.8	0.3	28	1
3 U	3.8	-0.8	28	2
3 U	3.8	-0.8	28	3
3 U	3.8	-0.8	28	4

3 U	3.8	-0.8	28	5
3 U	3.8	-0.8	28	6
4.1	15.2	-11.1	28	7
3 U	15.2	-12.2	28	8
3 U	15.2	-12.2	28	9
3 U	15.2	-12.2	28	10
3 U	15.2	-12.2	28	11
3 U	15.2	-12.2	28	12
3 U	4.1	-1.1	28	13
3 U	4.1	-1.1	28	14
3 U	4.1	-1.1	28	15
3 U	4.1	-1.1	28	16
3 U	4.1	-1.1	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17
3 U	3 U	0	28	17

S Statistic = 28 - 17 = 11

Tied Group	Value	Members
1	3	7

Time Period	Observations
6/1/2017	1
7/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1

There are 0 time periods with multiple data

A = 798
 B = 0
 C = 210
 D = 0
 E = 42
 F = 0

a = 3828

b = 11880

c = 264

Group Variance = 168.333

Z-Score = 0.770752

Comparison Level at 95% confidence level = 1.65463 (upward trend)

0.770752 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW01-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
12.3	6.68	5.62	1	0
8.03	6.68	1.35	2	0
12.07	6.68	5.39	3	0
6.74	6.68	0.06	4	0
13.17	6.68	6.49	5	0
12.42	6.68	5.74	6	0
8.52	6.68	1.84	7	0
10.97	6.68	4.29	8	0
6.2	6.68	-0.48	8	1
6.49	6.68	-0.19	8	2
6.26	6.68	-0.42	8	3
6.23	6.68	-0.45	8	4
6.03	6.68	-0.65	8	5
8.03	12.3	-4.27	8	6
12.07	12.3	-0.23	8	7
6.74	12.3	-5.56	8	8
13.17	12.3	0.87	9	8
12.42	12.3	0.12	10	8
8.52	12.3	-3.78	10	9
10.97	12.3	-1.33	10	10
6.2	12.3	-6.1	10	11
6.49	12.3	-5.81	10	12
6.26	12.3	-6.04	10	13
6.23	12.3	-6.07	10	14
6.03	12.3	-6.27	10	15
12.07	8.03	4.04	11	15
6.74	8.03	-1.29	11	16
13.17	8.03	5.14	12	16
12.42	8.03	4.39	13	16
8.52	8.03	0.49	14	16
10.97	8.03	2.94	15	16
6.2	8.03	-1.83	15	17
6.49	8.03	-1.54	15	18
6.26	8.03	-1.77	15	19
6.23	8.03	-1.8	15	20
6.03	8.03	-2	15	21
6.74	12.07	-5.33	15	22
13.17	12.07	1.1	16	22
12.42	12.07	0.35	17	22
8.52	12.07	-3.55	17	23
10.97	12.07	-1.1	17	24
6.2	12.07	-5.87	17	25
6.49	12.07	-5.58	17	26
6.26	12.07	-5.81	17	27

6.23	12.07	-5.84	17	28
6.03	12.07	-6.04	17	29
13.17	6.74	6.43	18	29
12.42	6.74	5.68	19	29
8.52	6.74	1.78	20	29
10.97	6.74	4.23	21	29
6.2	6.74	-0.54	21	30
6.49	6.74	-0.25	21	31
6.26	6.74	-0.48	21	32
6.23	6.74	-0.51	21	33
6.03	6.74	-0.71	21	34
12.42	13.17	-0.75	21	35
8.52	13.17	-4.65	21	36
10.97	13.17	-2.2	21	37
6.2	13.17	-6.97	21	38
6.49	13.17	-6.68	21	39
6.26	13.17	-6.91	21	40
6.23	13.17	-6.94	21	41
6.03	13.17	-7.14	21	42
8.52	12.42	-3.9	21	43
10.97	12.42	-1.45	21	44
6.2	12.42	-6.22	21	45
6.49	12.42	-5.93	21	46
6.26	12.42	-6.16	21	47
6.23	12.42	-6.19	21	48
6.03	12.42	-6.39	21	49
10.97	8.52	2.45	22	49
6.2	8.52	-2.32	22	50
6.49	8.52	-2.03	22	51
6.26	8.52	-2.26	22	52
6.23	8.52	-2.29	22	53
6.03	8.52	-2.49	22	54
6.2	10.97	-4.77	22	55
6.49	10.97	-4.48	22	56
6.26	10.97	-4.71	22	57
6.23	10.97	-4.74	22	58
6.03	10.97	-4.94	22	59
6.49	6.2	0.29	23	59
6.26	6.2	0.06	24	59
6.23	6.2	0.03	25	59
6.03	6.2	-0.17	25	60
6.26	6.49	-0.23	25	61
6.23	6.49	-0.26	25	62
6.03	6.49	-0.46	25	63
6.23	6.26	-0.03	25	64
6.03	6.26	-0.23	25	65
6.03	6.23	-0.2	25	66

S Statistic = 25 - 66 = -41

Tied Group	Value	Members
Time Period		Observations
8/1/2017		1
9/1/2017		1
10/1/2017		1
11/1/2017		1
12/1/2017		1
1/1/2018		1
4/1/2018		1
8/1/2018		1
10/1/2018		1
12/1/2018		1
3/1/2019		1
6/1/2019		1
9/1/2019		1
12/1/2019		1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -2.1898

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-2.1898 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW02-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
12.2	6.73	5.47	1	0
12.39	6.73	5.66	2	0
11.95	6.73	5.22	3	0
11.4	6.73	4.67	4	0
12.87	6.73	6.14	5	0
10.02	6.73	3.29	6	0
7.82	6.73	1.09	7	0
8.93	6.73	2.2	8	0
6.6	6.73	-0.13	8	1
9.11	6.73	2.38	9	1
6.39	6.73	-0.34	9	2
6.21	6.73	-0.52	9	3
6.66	6.73	-0.07	9	4
12.39	12.2	0.19	10	4
11.95	12.2	-0.25	10	5
11.4	12.2	-0.8	10	6
12.87	12.2	0.67	11	6
10.02	12.2	-2.18	11	7
7.82	12.2	-4.38	11	8
8.93	12.2	-3.27	11	9
6.6	12.2	-5.6	11	10
9.11	12.2	-3.09	11	11
6.39	12.2	-5.81	11	12
6.21	12.2	-5.99	11	13
6.66	12.2	-5.54	11	14
11.95	12.39	-0.44	11	15
11.4	12.39	-0.99	11	16
12.87	12.39	0.48	12	16
10.02	12.39	-2.37	12	17
7.82	12.39	-4.57	12	18
8.93	12.39	-3.46	12	19
6.6	12.39	-5.79	12	20
9.11	12.39	-3.28	12	21
6.39	12.39	-6	12	22
6.21	12.39	-6.18	12	23
6.66	12.39	-5.73	12	24
11.4	11.95	-0.55	12	25
12.87	11.95	0.92	13	25
10.02	11.95	-1.93	13	26
7.82	11.95	-4.13	13	27
8.93	11.95	-3.02	13	28
6.6	11.95	-5.35	13	29
9.11	11.95	-2.84	13	30
6.39	11.95	-5.56	13	31

6.21	11.95	-5.74	13	32
6.66	11.95	-5.29	13	33
12.87	11.4	1.47	14	33
10.02	11.4	-1.38	14	34
7.82	11.4	-3.58	14	35
8.93	11.4	-2.47	14	36
6.6	11.4	-4.8	14	37
9.11	11.4	-2.29	14	38
6.39	11.4	-5.01	14	39
6.21	11.4	-5.19	14	40
6.66	11.4	-4.74	14	41
10.02	12.87	-2.85	14	42
7.82	12.87	-5.05	14	43
8.93	12.87	-3.94	14	44
6.6	12.87	-6.27	14	45
9.11	12.87	-3.76	14	46
6.39	12.87	-6.48	14	47
6.21	12.87	-6.66	14	48
6.66	12.87	-6.21	14	49
7.82	10.02	-2.2	14	50
8.93	10.02	-1.09	14	51
6.6	10.02	-3.42	14	52
9.11	10.02	-0.91	14	53
6.39	10.02	-3.63	14	54
6.21	10.02	-3.81	14	55
6.66	10.02	-3.36	14	56
8.93	7.82	1.11	15	56
6.6	7.82	-1.22	15	57
9.11	7.82	1.29	16	57
6.39	7.82	-1.43	16	58
6.21	7.82	-1.61	16	59
6.66	7.82	-1.16	16	60
6.6	8.93	-2.33	16	61
9.11	8.93	0.18	17	61
6.39	8.93	-2.54	17	62
6.21	8.93	-2.72	17	63
6.66	8.93	-2.27	17	64
9.11	6.6	2.51	18	64
6.39	6.6	-0.21	18	65
6.21	6.6	-0.39	18	66
6.66	6.6	0.06	19	66
6.39	9.11	-2.72	19	67
6.21	9.11	-2.9	19	68
6.66	9.11	-2.45	19	69
6.21	6.39	-0.18	19	70
6.66	6.39	0.27	20	70
6.66	6.21	0.45	21	70

S Statistic = 21 - 70 = -49

Tied Group	Value	Members
Time Period		Observations
8/1/2017		1
9/1/2017		1
10/1/2017		1
11/1/2017		1
12/1/2017		1
1/1/2018		1
4/1/2018		1
8/1/2018		1
10/1/2018		1
12/1/2018		1
3/1/2019		1
6/1/2019		1
9/1/2019		1
12/1/2019		1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -2.62775

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-2.62775 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW03-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
6.04	6.41	-0.37	0	1
6.28	6.41	-0.13	0	2
5.97	6.41	-0.44	0	3
5.96	6.41	-0.45	0	4
6.21	6.41	-0.2	0	5
6.02	6.41	-0.39	0	6
6.34	6.41	-0.07	0	7
5.8	6.41	-0.61	0	8
5.67	6.41	-0.74	0	9
5.68	6.41	-0.73	0	10
6.4	6.41	-0.01	0	11
5.82	6.41	-0.59	0	12
6.26	6.41	-0.15	0	13
7.57	6.41	1.16	1	13
6.6	6.41	0.19	2	13
5.83	6.41	-0.58	2	14
6.07	6.41	-0.34	2	15
5.7	6.41	-0.71	2	16
6.54	6.41	0.13	3	16
6.28	6.04	0.24	4	16
5.97	6.04	-0.07	4	17
5.96	6.04	-0.08	4	18
6.21	6.04	0.17	5	18
6.02	6.04	-0.02	5	19
6.34	6.04	0.3	6	19
5.8	6.04	-0.24	6	20
5.67	6.04	-0.37	6	21
5.68	6.04	-0.36	6	22
6.4	6.04	0.36	7	22
5.82	6.04	-0.22	7	23
6.26	6.04	0.22	8	23
7.57	6.04	1.53	9	23
6.6	6.04	0.56	10	23
5.83	6.04	-0.21	10	24
6.07	6.04	0.03	11	24
5.7	6.04	-0.34	11	25
6.54	6.04	0.5	12	25
5.97	6.28	-0.31	12	26
5.96	6.28	-0.32	12	27
6.21	6.28	-0.07	12	28
6.02	6.28	-0.26	12	29
6.34	6.28	0.06	13	29
5.8	6.28	-0.48	13	30
5.67	6.28	-0.61	13	31
5.68	6.28	-0.6	13	32

6.4	6.28	0.12	14	32
5.82	6.28	-0.46	14	33
6.26	6.28	-0.02	14	34
7.57	6.28	1.29	15	34
6.6	6.28	0.32	16	34
5.83	6.28	-0.45	16	35
6.07	6.28	-0.21	16	36
5.7	6.28	-0.58	16	37
6.54	6.28	0.26	17	37
5.96	5.97	-0.01	17	38
6.21	5.97	0.24	18	38
6.02	5.97	0.05	19	38
6.34	5.97	0.37	20	38
5.8	5.97	-0.17	20	39
5.67	5.97	-0.3	20	40
5.68	5.97	-0.29	20	41
6.4	5.97	0.43	21	41
5.82	5.97	-0.15	21	42
6.26	5.97	0.29	22	42
7.57	5.97	1.6	23	42
6.6	5.97	0.63	24	42
5.83	5.97	-0.14	24	43
6.07	5.97	0.1	25	43
5.7	5.97	-0.27	25	44
6.54	5.97	0.57	26	44
6.21	5.96	0.25	27	44
6.02	5.96	0.06	28	44
6.34	5.96	0.38	29	44
5.8	5.96	-0.16	29	45
5.67	5.96	-0.29	29	46
5.68	5.96	-0.28	29	47
6.4	5.96	0.44	30	47
5.82	5.96	-0.14	30	48
6.26	5.96	0.3	31	48
7.57	5.96	1.61	32	48
6.6	5.96	0.64	33	48
5.83	5.96	-0.13	33	49
6.07	5.96	0.11	34	49
5.7	5.96	-0.26	34	50
6.54	5.96	0.58	35	50
6.02	6.21	-0.19	35	51
6.34	6.21	0.13	36	51
5.8	6.21	-0.41	36	52
5.67	6.21	-0.54	36	53
5.68	6.21	-0.53	36	54
6.4	6.21	0.19	37	54
5.82	6.21	-0.39	37	55
6.26	6.21	0.05	38	55
7.57	6.21	1.36	39	55
6.6	6.21	0.39	40	55
5.83	6.21	-0.38	40	56
6.07	6.21	-0.14	40	57
5.7	6.21	-0.51	40	58
6.54	6.21	0.33	41	58

6.34	6.02	0.32	42	58
5.8	6.02	-0.22	42	59
5.67	6.02	-0.35	42	60
5.68	6.02	-0.34	42	61
6.4	6.02	0.38	43	61
5.82	6.02	-0.2	43	62
6.26	6.02	0.24	44	62
7.57	6.02	1.55	45	62
6.6	6.02	0.58	46	62
5.83	6.02	-0.19	46	63
6.07	6.02	0.05	47	63
5.7	6.02	-0.32	47	64
6.54	6.02	0.52	48	64
5.8	6.34	-0.54	48	65
5.67	6.34	-0.67	48	66
5.68	6.34	-0.66	48	67
6.4	6.34	0.06	49	67
5.82	6.34	-0.52	49	68
6.26	6.34	-0.08	49	69
7.57	6.34	1.23	50	69
6.6	6.34	0.26	51	69
5.83	6.34	-0.51	51	70
6.07	6.34	-0.27	51	71
5.7	6.34	-0.64	51	72
6.54	6.34	0.2	52	72
5.67	5.8	-0.13	52	73
5.68	5.8	-0.12	52	74
6.4	5.8	0.6	53	74
5.82	5.8	0.02	54	74
6.26	5.8	0.46	55	74
7.57	5.8	1.77	56	74
6.6	5.8	0.8	57	74
5.83	5.8	0.03	58	74
6.07	5.8	0.27	59	74
5.7	5.8	-0.1	59	75
6.54	5.8	0.74	60	75
5.68	5.67	0.01	61	75
6.4	5.67	0.73	62	75
5.82	5.67	0.15	63	75
6.26	5.67	0.59	64	75
7.57	5.67	1.9	65	75
6.6	5.67	0.93	66	75
5.83	5.67	0.16	67	75
6.07	5.67	0.4	68	75
5.7	5.67	0.03	69	75
6.54	5.67	0.87	70	75
6.4	5.68	0.72	71	75
5.82	5.68	0.14	72	75
6.26	5.68	0.58	73	75
7.57	5.68	1.89	74	75
6.6	5.68	0.92	75	75
5.83	5.68	0.15	76	75

6.07	5.68	0.39	77	75
5.7	5.68	0.02	78	75
6.54	5.68	0.86	79	75
5.82	6.4	-0.58	79	76
6.26	6.4	-0.14	79	77
7.57	6.4	1.17	80	77
6.6	6.4	0.2	81	77
5.83	6.4	-0.57	81	78
6.07	6.4	-0.33	81	79
5.7	6.4	-0.7	81	80
6.54	6.4	0.14	82	80
6.26	5.82	0.44	83	80
7.57	5.82	1.75	84	80
6.6	5.82	0.78	85	80
5.83	5.82	0.01	86	80
6.07	5.82	0.25	87	80
5.7	5.82	-0.12	87	81
6.54	5.82	0.72	88	81
7.57	6.26	1.31	89	81
6.6	6.26	0.34	90	81
5.83	6.26	-0.43	90	82
6.07	6.26	-0.19	90	83
5.7	6.26	-0.56	90	84
6.54	6.26	0.28	91	84
6.6	7.57	-0.97	91	85
5.83	7.57	-1.74	91	86
6.07	7.57	-1.5	91	87
5.7	7.57	-1.87	91	88
6.54	7.57	-1.03	91	89
5.83	6.6	-0.77	91	90
6.07	6.6	-0.53	91	91
5.7	6.6	-0.9	91	92
6.54	6.6	-0.06	91	93
6.07	5.83	0.24	92	93
5.7	5.83	-0.13	92	94
6.54	5.83	0.71	93	94
5.7	6.07	-0.37	93	95
6.54	6.07	0.47	94	95
6.54	5.7	0.84	95	95

S Statistic = 95 - 95 = 0

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 0

Comparison Level at 95% confidence level = 1.65463 (upward trend)

0 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: pH
Location: RW06-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.71	5.85	-0.14	0	1
5.94	5.85	0.09	1	1
6.06	5.85	0.21	2	1
5.81	5.85	-0.04	2	2
6.08	5.85	0.23	3	2
5.7	5.85	-0.15	3	3
6.11	5.85	0.26	4	3
6.16	5.85	0.31	5	3
5.84	5.85	-0.01	5	4
6	5.85	0.15	6	4
5.92	5.85	0.07	7	4
5.68	5.85	-0.17	7	5
7.44	5.85	1.59	8	5
6.66	5.85	0.81	9	5
5.8	5.85	-0.05	9	6
5.52	5.85	-0.33	9	7
7.16	5.85	1.31	10	7
5.34	5.85	-0.51	10	8
7.88	5.85	2.03	11	8
5.94	5.71	0.23	12	8
6.06	5.71	0.35	13	8
5.81	5.71	0.1	14	8
6.08	5.71	0.37	15	8
5.7	5.71	-0.01	15	9
6.11	5.71	0.4	16	9
6.16	5.71	0.45	17	9
5.84	5.71	0.13	18	9
6	5.71	0.29	19	9
5.92	5.71	0.21	20	9
5.68	5.71	-0.03	20	10
7.44	5.71	1.73	21	10
6.66	5.71	0.95	22	10
5.8	5.71	0.09	23	10
5.52	5.71	-0.19	23	11
7.16	5.71	1.45	24	11
5.34	5.71	-0.37	24	12
7.88	5.71	2.17	25	12
6.06	5.94	0.12	26	12
5.81	5.94	-0.13	26	13
6.08	5.94	0.14	27	13
5.7	5.94	-0.24	27	14
6.11	5.94	0.17	28	14
6.16	5.94	0.22	29	14
5.84	5.94	-0.1	29	15
6	5.94	0.06	30	15

5.92	5.94	-0.02	30	16
5.68	5.94	-0.26	30	17
7.44	5.94	1.5	31	17
6.66	5.94	0.72	32	17
5.8	5.94	-0.14	32	18
5.52	5.94	-0.42	32	19
7.16	5.94	1.22	33	19
5.34	5.94	-0.6	33	20
7.88	5.94	1.94	34	20
5.81	6.06	-0.25	34	21
6.08	6.06	0.02	35	21
5.7	6.06	-0.36	35	22
6.11	6.06	0.05	36	22
6.16	6.06	0.1	37	22
5.84	6.06	-0.22	37	23
6	6.06	-0.06	37	24
5.92	6.06	-0.14	37	25
5.68	6.06	-0.38	37	26
7.44	6.06	1.38	38	26
6.66	6.06	0.6	39	26
5.8	6.06	-0.26	39	27
5.52	6.06	-0.54	39	28
7.16	6.06	1.1	40	28
5.34	6.06	-0.72	40	29
7.88	6.06	1.82	41	29
6.08	5.81	0.27	42	29
5.7	5.81	-0.11	42	30
6.11	5.81	0.3	43	30
6.16	5.81	0.35	44	30
5.84	5.81	0.03	45	30
6	5.81	0.19	46	30
5.92	5.81	0.11	47	30
5.68	5.81	-0.13	47	31
7.44	5.81	1.63	48	31
6.66	5.81	0.85	49	31
5.8	5.81	-0.01	49	32
5.52	5.81	-0.29	49	33
7.16	5.81	1.35	50	33
5.34	5.81	-0.47	50	34
7.88	5.81	2.07	51	34
5.7	6.08	-0.38	51	35
6.11	6.08	0.03	52	35
6.16	6.08	0.08	53	35
5.84	6.08	-0.24	53	36
6	6.08	-0.08	53	37
5.92	6.08	-0.16	53	38
5.68	6.08	-0.4	53	39
7.44	6.08	1.36	54	39
6.66	6.08	0.58	55	39
5.8	6.08	-0.28	55	40
5.52	6.08	-0.56	55	41
7.16	6.08	1.08	56	41
5.34	6.08	-0.74	56	42
7.88	6.08	1.8	57	42

6.11	5.7	0.41	58	42
6.16	5.7	0.46	59	42
5.84	5.7	0.14	60	42
6	5.7	0.3	61	42
5.92	5.7	0.22	62	42
5.68	5.7	-0.02	62	43
7.44	5.7	1.74	63	43
6.66	5.7	0.96	64	43
5.8	5.7	0.1	65	43
5.52	5.7	-0.18	65	44
7.16	5.7	1.46	66	44
5.34	5.7	-0.36	66	45
7.88	5.7	2.18	67	45
6.16	6.11	0.05	68	45
5.84	6.11	-0.27	68	46
6	6.11	-0.11	68	47
5.92	6.11	-0.19	68	48
5.68	6.11	-0.43	68	49
7.44	6.11	1.33	69	49
6.66	6.11	0.55	70	49
5.8	6.11	-0.31	70	50
5.52	6.11	-0.59	70	51
7.16	6.11	1.05	71	51
5.34	6.11	-0.77	71	52
7.88	6.11	1.77	72	52
5.84	6.16	-0.32	72	53
6	6.16	-0.16	72	54
5.92	6.16	-0.24	72	55
5.68	6.16	-0.48	72	56
7.44	6.16	1.28	73	56
6.66	6.16	0.5	74	56
5.8	6.16	-0.36	74	57
5.52	6.16	-0.64	74	58
7.16	6.16	1	75	58
5.34	6.16	-0.82	75	59
7.88	6.16	1.72	76	59
6	5.84	0.16	77	59
5.92	5.84	0.08	78	59
5.68	5.84	-0.16	78	60
7.44	5.84	1.6	79	60
6.66	5.84	0.82	80	60
5.8	5.84	-0.04	80	61
5.52	5.84	-0.32	80	62
7.16	5.84	1.32	81	62
5.34	5.84	-0.5	81	63
7.88	5.84	2.04	82	63
5.92	6	-0.08	82	64
5.68	6	-0.32	82	65
7.44	6	1.44	83	65
6.66	6	0.66	84	65
5.8	6	-0.2	84	66
5.52	6	-0.48	84	67

7.16	6	1.16	85	67
5.34	6	-0.66	85	68
7.88	6	1.88	86	68
5.68	5.92	-0.24	86	69
7.44	5.92	1.52	87	69
6.66	5.92	0.74	88	69
5.8	5.92	-0.12	88	70
5.52	5.92	-0.4	88	71
7.16	5.92	1.24	89	71
5.34	5.92	-0.58	89	72
7.88	5.92	1.96	90	72
7.44	5.68	1.76	91	72
6.66	5.68	0.98	92	72
5.8	5.68	0.12	93	72
5.52	5.68	-0.16	93	73
7.16	5.68	1.48	94	73
5.34	5.68	-0.34	94	74
7.88	5.68	2.2	95	74
6.66	7.44	-0.78	95	75
5.8	7.44	-1.64	95	76
5.52	7.44	-1.92	95	77
7.16	7.44	-0.28	95	78
5.34	7.44	-2.1	95	79
7.88	7.44	0.44	96	79
5.8	6.66	-0.86	96	80
5.52	6.66	-1.14	96	81
7.16	6.66	0.5	97	81
5.34	6.66	-1.32	97	82
7.88	6.66	1.22	98	82
5.52	5.8	-0.28	98	83
7.16	5.8	1.36	99	83
5.34	5.8	-0.46	99	84
7.88	5.8	2.08	100	84
7.16	5.52	1.64	101	84
5.34	5.52	-0.18	101	85
7.88	5.52	2.36	102	85
5.34	7.16	-1.82	102	86
7.88	7.16	0.72	103	86
7.88	5.34	2.54	104	86

S Statistic = 104 - 86 = 18

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 0.551553

Comparison Level at 95% confidence level = 1.65463 (upward trend)

0.551553 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW07-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
6	6.25	-0.25	0	1
6.05	6.25	-0.2	0	2
6.61	6.25	0.36	1	2
6.09	6.25	-0.16	1	3
6.18	6.25	-0.07	1	4
6.54	6.25	0.29	2	4
5.65	6.25	-0.6	2	5
6.66	6.25	0.41	3	5
5.89	6.25	-0.36	3	6
6.6	6.25	0.35	4	6
7.11	6.25	0.86	5	6
6.18	6.25	-0.07	5	7
6.47	6.25	0.22	6	7
6.55	6.25	0.3	7	7
6.5	6.25	0.25	8	7
5.93	6.25	-0.32	8	8
5.68	6.25	-0.57	8	9
5.72	6.25	-0.53	8	10
6.77	6.25	0.52	9	10
6.05	6	0.05	10	10
6.61	6	0.61	11	10
6.09	6	0.09	12	10
6.18	6	0.18	13	10
6.54	6	0.54	14	10
5.65	6	-0.35	14	11
6.66	6	0.66	15	11
5.89	6	-0.11	15	12
6.6	6	0.6	16	12
7.11	6	1.11	17	12
6.18	6	0.18	18	12
6.47	6	0.47	19	12
6.55	6	0.55	20	12
6.5	6	0.5	21	12
5.93	6	-0.07	21	13
5.68	6	-0.32	21	14
5.72	6	-0.28	21	15
6.77	6	0.77	22	15
6.61	6.05	0.56	23	15
6.09	6.05	0.04	24	15
6.18	6.05	0.13	25	15
6.54	6.05	0.49	26	15
5.65	6.05	-0.4	26	16
6.66	6.05	0.61	27	16
5.89	6.05	-0.16	27	17
6.6	6.05	0.55	28	17

7.11	6.05	1.06	29	17
6.18	6.05	0.13	30	17
6.47	6.05	0.42	31	17
6.55	6.05	0.5	32	17
6.5	6.05	0.45	33	17
5.93	6.05	-0.12	33	18
5.68	6.05	-0.37	33	19
5.72	6.05	-0.33	33	20
6.77	6.05	0.72	34	20
6.09	6.61	-0.52	34	21
6.18	6.61	-0.43	34	22
6.54	6.61	-0.07	34	23
5.65	6.61	-0.96	34	24
6.66	6.61	0.05	35	24
5.89	6.61	-0.72	35	25
6.6	6.61	-0.01	35	26
7.11	6.61	0.5	36	26
6.18	6.61	-0.43	36	27
6.47	6.61	-0.14	36	28
6.55	6.61	-0.06	36	29
6.5	6.61	-0.11	36	30
5.93	6.61	-0.68	36	31
5.68	6.61	-0.93	36	32
5.72	6.61	-0.89	36	33
6.77	6.61	0.16	37	33
6.18	6.09	0.09	38	33
6.54	6.09	0.45	39	33
5.65	6.09	-0.44	39	34
6.66	6.09	0.57	40	34
5.89	6.09	-0.2	40	35
6.6	6.09	0.51	41	35
7.11	6.09	1.02	42	35
6.18	6.09	0.09	43	35
6.47	6.09	0.38	44	35
6.55	6.09	0.46	45	35
6.5	6.09	0.41	46	35
5.93	6.09	-0.16	46	36
5.68	6.09	-0.41	46	37
5.72	6.09	-0.37	46	38
6.77	6.09	0.68	47	38
6.54	6.18	0.36	48	38
5.65	6.18	-0.53	48	39
6.66	6.18	0.48	49	39
5.89	6.18	-0.29	49	40
6.6	6.18	0.42	50	40
7.11	6.18	0.93	51	40
6.18	6.18	0	51	40
6.47	6.18	0.29	52	40
6.55	6.18	0.37	53	40
6.5	6.18	0.32	54	40
5.93	6.18	-0.25	54	41
5.68	6.18	-0.5	54	42
5.72	6.18	-0.46	54	43
6.77	6.18	0.59	55	43

5.65	6.54	-0.89	55	44
6.66	6.54	0.12	56	44
5.89	6.54	-0.65	56	45
6.6	6.54	0.06	57	45
7.11	6.54	0.57	58	45
6.18	6.54	-0.36	58	46
6.47	6.54	-0.07	58	47
6.55	6.54	0.01	59	47
6.5	6.54	-0.04	59	48
5.93	6.54	-0.61	59	49
5.68	6.54	-0.86	59	50
5.72	6.54	-0.82	59	51
6.77	6.54	0.23	60	51
6.66	5.65	1.01	61	51
5.89	5.65	0.24	62	51
6.6	5.65	0.95	63	51
7.11	5.65	1.46	64	51
6.18	5.65	0.53	65	51
6.47	5.65	0.82	66	51
6.55	5.65	0.9	67	51
6.5	5.65	0.85	68	51
5.93	5.65	0.28	69	51
5.68	5.65	0.03	70	51
5.72	5.65	0.07	71	51
6.77	5.65	1.12	72	51
5.89	6.66	-0.77	72	52
6.6	6.66	-0.06	72	53
7.11	6.66	0.45	73	53
6.18	6.66	-0.48	73	54
6.47	6.66	-0.19	73	55
6.55	6.66	-0.11	73	56
6.5	6.66	-0.16	73	57
5.93	6.66	-0.73	73	58
5.68	6.66	-0.98	73	59
5.72	6.66	-0.94	73	60
6.77	6.66	0.11	74	60
6.6	5.89	0.71	75	60
7.11	5.89	1.22	76	60
6.18	5.89	0.29	77	60
6.47	5.89	0.58	78	60
6.55	5.89	0.66	79	60
6.5	5.89	0.61	80	60
5.93	5.89	0.04	81	60
5.68	5.89	-0.21	81	61
5.72	5.89	-0.17	81	62
6.77	5.89	0.88	82	62
7.11	6.6	0.51	83	62
6.18	6.6	-0.42	83	63
6.47	6.6	-0.13	83	64
6.55	6.6	-0.05	83	65
6.5	6.6	-0.1	83	66
5.93	6.6	-0.67	83	67

5.68	6.6	-0.92	83	68
5.72	6.6	-0.88	83	69
6.77	6.6	0.17	84	69
6.18	7.11	-0.93	84	70
6.47	7.11	-0.64	84	71
6.55	7.11	-0.56	84	72
6.5	7.11	-0.61	84	73
5.93	7.11	-1.18	84	74
5.68	7.11	-1.43	84	75
5.72	7.11	-1.39	84	76
6.77	7.11	-0.34	84	77
6.47	6.18	0.29	85	77
6.55	6.18	0.37	86	77
6.5	6.18	0.32	87	77
5.93	6.18	-0.25	87	78
5.68	6.18	-0.5	87	79
5.72	6.18	-0.46	87	80
6.77	6.18	0.59	88	80
6.55	6.47	0.08	89	80
6.5	6.47	0.03	90	80
5.93	6.47	-0.54	90	81
5.68	6.47	-0.79	90	82
5.72	6.47	-0.75	90	83
6.77	6.47	0.3	91	83
6.5	6.55	-0.05	91	84
5.93	6.55	-0.62	91	85
5.68	6.55	-0.87	91	86
5.72	6.55	-0.83	91	87
6.77	6.55	0.22	92	87
5.93	6.5	-0.57	92	88
5.68	6.5	-0.82	92	89
5.72	6.5	-0.78	92	90
6.77	6.5	0.27	93	90
5.68	5.93	-0.25	93	91
5.72	5.93	-0.21	93	92
6.77	5.93	0.84	94	92
5.72	5.68	0.04	95	92
6.77	5.68	1.09	96	92
6.77	5.72	1.05	97	92

S Statistic = 97 - 92 = 5

Tied Group	Value	Members
1	6.18	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = 0.129845

Comparison Level at 95% confidence level = 1.65463 (upward trend)

0.129845 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW08-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.57	6.06	-0.49	0	1
6.21	6.06	0.15	1	1
3.14	6.06	-2.92	1	2
3.88	6.06	-2.18	1	3
6.31	6.06	0.25	2	3
6.78	6.06	0.72	3	3
6.34	6.06	0.28	4	3
5.99	6.06	-0.07	4	4
6.21	6.06	0.15	5	4
6.3	6.06	0.24	6	4
6.27	6.06	0.21	7	4
6.57	6.06	0.51	8	4
7.89	6.06	1.83	9	4
6.9	6.06	0.84	10	4
6.54	6.06	0.48	11	4
6.16	6.06	0.1	12	4
6.06	6.06	0	12	4
6.49	6.06	0.43	13	4
6.21	5.57	0.64	14	4
3.14	5.57	-2.43	14	5
3.88	5.57	-1.69	14	6
6.31	5.57	0.74	15	6
6.78	5.57	1.21	16	6
6.34	5.57	0.77	17	6
5.99	5.57	0.42	18	6
6.21	5.57	0.64	19	6
6.3	5.57	0.73	20	6
6.27	5.57	0.7	21	6
6.57	5.57	1	22	6
7.89	5.57	2.32	23	6
6.9	5.57	1.33	24	6
6.54	5.57	0.97	25	6
6.16	5.57	0.59	26	6
6.06	5.57	0.49	27	6
6.49	5.57	0.92	28	6
3.14	6.21	-3.07	28	7
3.88	6.21	-2.33	28	8
6.31	6.21	0.1	29	8
6.78	6.21	0.57	30	8
6.34	6.21	0.13	31	8
5.99	6.21	-0.22	31	9
6.21	6.21	0	31	9
6.3	6.21	0.09	32	9
6.27	6.21	0.06	33	9
6.57	6.21	0.36	34	9

7.89	6.21	1.68	35	9
6.9	6.21	0.69	36	9
6.54	6.21	0.33	37	9
6.16	6.21	-0.05	37	10
6.06	6.21	-0.15	37	11
6.49	6.21	0.28	38	11
3.88	3.14	0.74	39	11
6.31	3.14	3.17	40	11
6.78	3.14	3.64	41	11
6.34	3.14	3.2	42	11
5.99	3.14	2.85	43	11
6.21	3.14	3.07	44	11
6.3	3.14	3.16	45	11
6.27	3.14	3.13	46	11
6.57	3.14	3.43	47	11
7.89	3.14	4.75	48	11
6.9	3.14	3.76	49	11
6.54	3.14	3.4	50	11
6.16	3.14	3.02	51	11
6.06	3.14	2.92	52	11
6.49	3.14	3.35	53	11
6.31	3.88	2.43	54	11
6.78	3.88	2.9	55	11
6.34	3.88	2.46	56	11
5.99	3.88	2.11	57	11
6.21	3.88	2.33	58	11
6.3	3.88	2.42	59	11
6.27	3.88	2.39	60	11
6.57	3.88	2.69	61	11
7.89	3.88	4.01	62	11
6.9	3.88	3.02	63	11
6.54	3.88	2.66	64	11
6.16	3.88	2.28	65	11
6.06	3.88	2.18	66	11
6.49	3.88	2.61	67	11
6.78	6.31	0.47	68	11
6.34	6.31	0.03	69	11
5.99	6.31	-0.32	69	12
6.21	6.31	-0.1	69	13
6.3	6.31	-0.01	69	14
6.27	6.31	-0.04	69	15
6.57	6.31	0.26	70	15
7.89	6.31	1.58	71	15
6.9	6.31	0.59	72	15
6.54	6.31	0.23	73	15
6.16	6.31	-0.15	73	16
6.06	6.31	-0.25	73	17
6.49	6.31	0.18	74	17
6.34	6.78	-0.44	74	18
5.99	6.78	-0.79	74	19
6.21	6.78	-0.57	74	20
6.3	6.78	-0.48	74	21
6.27	6.78	-0.51	74	22

6.57	6.78	-0.21	74	23
7.89	6.78	1.11	75	23
6.9	6.78	0.12	76	23
6.54	6.78	-0.24	76	24
6.16	6.78	-0.62	76	25
6.06	6.78	-0.72	76	26
6.49	6.78	-0.29	76	27
5.99	6.34	-0.35	76	28
6.21	6.34	-0.13	76	29
6.3	6.34	-0.04	76	30
6.27	6.34	-0.07	76	31
6.57	6.34	0.23	77	31
7.89	6.34	1.55	78	31
6.9	6.34	0.56	79	31
6.54	6.34	0.2	80	31
6.16	6.34	-0.18	80	32
6.06	6.34	-0.28	80	33
6.49	6.34	0.15	81	33
6.21	5.99	0.22	82	33
6.3	5.99	0.31	83	33
6.27	5.99	0.28	84	33
6.57	5.99	0.58	85	33
7.89	5.99	1.9	86	33
6.9	5.99	0.91	87	33
6.54	5.99	0.55	88	33
6.16	5.99	0.17	89	33
6.06	5.99	0.07	90	33
6.49	5.99	0.5	91	33
6.3	6.21	0.09	92	33
6.27	6.21	0.06	93	33
6.57	6.21	0.36	94	33
7.89	6.21	1.68	95	33
6.9	6.21	0.69	96	33
6.54	6.21	0.33	97	33
6.16	6.21	-0.05	97	34
6.06	6.21	-0.15	97	35
6.49	6.21	0.28	98	35
6.27	6.3	-0.03	98	36
6.57	6.3	0.27	99	36
7.89	6.3	1.59	100	36
6.9	6.3	0.6	101	36
6.54	6.3	0.24	102	36
6.16	6.3	-0.14	102	37
6.06	6.3	-0.24	102	38
6.49	6.3	0.19	103	38
6.57	6.27	0.3	104	38
7.89	6.27	1.62	105	38
6.9	6.27	0.63	106	38
6.54	6.27	0.27	107	38
6.16	6.27	-0.11	107	39
6.06	6.27	-0.21	107	40
6.49	6.27	0.22	108	40

7.89	6.57	1.32	109	40
6.9	6.57	0.33	110	40
6.54	6.57	-0.03	110	41
6.16	6.57	-0.41	110	42
6.06	6.57	-0.51	110	43
6.49	6.57	-0.08	110	44
6.9	7.89	-0.99	110	45
6.54	7.89	-1.35	110	46
6.16	7.89	-1.73	110	47
6.06	7.89	-1.83	110	48
6.49	7.89	-1.4	110	49
6.54	6.9	-0.36	110	50
6.16	6.9	-0.74	110	51
6.06	6.9	-0.84	110	52
6.49	6.9	-0.41	110	53
6.16	6.54	-0.38	110	54
6.06	6.54	-0.48	110	55
6.49	6.54	-0.05	110	56
6.06	6.16	-0.1	110	57
6.49	6.16	0.33	111	57
6.49	6.06	0.43	112	57

S Statistic = 112 - 57 = 55

Tied Group	Value	Members
1	6.06	2
2	6.21	2

Time Period	Observations
2/1/2017	1
3/1/2017	1
4/1/2017	1
5/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 36
B = 0
C = 0
D = 0
E = 4
F = 0
a = 14706
b = 52326
c = 684
Group Variance = 815
Z-Score = 1.89154
Comparison Level at 95% confidence level = 1.65463 (upward trend)
1.89154 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW09-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.96	6.23	-0.27	0	1
5.84	6.23	-0.39	0	2
6	6.23	-0.23	0	3
5.8	6.23	-0.43	0	4
5.67	6.23	-0.56	0	5
5.93	6.23	-0.3	0	6
6.57	6.23	0.34	1	6
6.03	6.23	-0.2	1	7
6.01	6.23	-0.22	1	8
5.96	6.23	-0.27	1	9
5.98	6.23	-0.25	1	10
5.64	6.23	-0.59	1	11
6.35	6.23	0.12	2	11
7.33	6.23	1.1	3	11
6.1	6.23	-0.13	3	12
5.81	6.23	-0.42	3	13
5.75	6.23	-0.48	3	14
5.55	6.23	-0.68	3	15
5.81	6.23	-0.42	3	16
5.84	5.96	-0.12	3	17
6	5.96	0.04	4	17
5.8	5.96	-0.16	4	18
5.67	5.96	-0.29	4	19
5.93	5.96	-0.03	4	20
6.57	5.96	0.61	5	20
6.03	5.96	0.07	6	20
6.01	5.96	0.05	7	20
5.96	5.96	0	7	20
5.98	5.96	0.02	8	20
5.64	5.96	-0.32	8	21
6.35	5.96	0.39	9	21
7.33	5.96	1.37	10	21
6.1	5.96	0.14	11	21
5.81	5.96	-0.15	11	22
5.75	5.96	-0.21	11	23
5.55	5.96	-0.41	11	24
5.81	5.96	-0.15	11	25
6	5.84	0.16	12	25
5.8	5.84	-0.04	12	26
5.67	5.84	-0.17	12	27
5.93	5.84	0.09	13	27
6.57	5.84	0.73	14	27
6.03	5.84	0.19	15	27
6.01	5.84	0.17	16	27
5.96	5.84	0.12	17	27

5.98	5.84	0.14	18	27
5.64	5.84	-0.2	18	28
6.35	5.84	0.51	19	28
7.33	5.84	1.49	20	28
6.1	5.84	0.26	21	28
5.81	5.84	-0.03	21	29
5.75	5.84	-0.09	21	30
5.55	5.84	-0.29	21	31
5.81	5.84	-0.03	21	32
5.8	6	-0.2	21	33
5.67	6	-0.33	21	34
5.93	6	-0.07	21	35
6.57	6	0.57	22	35
6.03	6	0.03	23	35
6.01	6	0.01	24	35
5.96	6	-0.04	24	36
5.98	6	-0.02	24	37
5.64	6	-0.36	24	38
6.35	6	0.35	25	38
7.33	6	1.33	26	38
6.1	6	0.1	27	38
5.81	6	-0.19	27	39
5.75	6	-0.25	27	40
5.55	6	-0.45	27	41
5.81	6	-0.19	27	42
5.67	5.8	-0.13	27	43
5.93	5.8	0.13	28	43
6.57	5.8	0.77	29	43
6.03	5.8	0.23	30	43
6.01	5.8	0.21	31	43
5.96	5.8	0.16	32	43
5.98	5.8	0.18	33	43
5.64	5.8	-0.16	33	44
6.35	5.8	0.55	34	44
7.33	5.8	1.53	35	44
6.1	5.8	0.3	36	44
5.81	5.8	0.01	37	44
5.75	5.8	-0.05	37	45
5.55	5.8	-0.25	37	46
5.81	5.8	0.01	38	46
5.93	5.67	0.26	39	46
6.57	5.67	0.9	40	46
6.03	5.67	0.36	41	46
6.01	5.67	0.34	42	46
5.96	5.67	0.29	43	46
5.98	5.67	0.31	44	46
5.64	5.67	-0.03	44	47
6.35	5.67	0.68	45	47
7.33	5.67	1.66	46	47
6.1	5.67	0.43	47	47
5.81	5.67	0.14	48	47
5.75	5.67	0.08	49	47
5.55	5.67	-0.12	49	48
5.81	5.67	0.14	50	48

6.57	5.93	0.64	51	48
6.03	5.93	0.1	52	48
6.01	5.93	0.08	53	48
5.96	5.93	0.03	54	48
5.98	5.93	0.05	55	48
5.64	5.93	-0.29	55	49
6.35	5.93	0.42	56	49
7.33	5.93	1.4	57	49
6.1	5.93	0.17	58	49
5.81	5.93	-0.12	58	50
5.75	5.93	-0.18	58	51
5.55	5.93	-0.38	58	52
5.81	5.93	-0.12	58	53
6.03	6.57	-0.54	58	54
6.01	6.57	-0.56	58	55
5.96	6.57	-0.61	58	56
5.98	6.57	-0.59	58	57
5.64	6.57	-0.93	58	58
6.35	6.57	-0.22	58	59
7.33	6.57	0.76	59	59
6.1	6.57	-0.47	59	60
5.81	6.57	-0.76	59	61
5.75	6.57	-0.82	59	62
5.55	6.57	-1.02	59	63
5.81	6.57	-0.76	59	64
6.01	6.03	-0.02	59	65
5.96	6.03	-0.07	59	66
5.98	6.03	-0.05	59	67
5.64	6.03	-0.39	59	68
6.35	6.03	0.32	60	68
7.33	6.03	1.3	61	68
6.1	6.03	0.07	62	68
5.81	6.03	-0.22	62	69
5.75	6.03	-0.28	62	70
5.55	6.03	-0.48	62	71
5.81	6.03	-0.22	62	72
5.96	6.01	-0.05	62	73
5.98	6.01	-0.03	62	74
5.64	6.01	-0.37	62	75
6.35	6.01	0.34	63	75
7.33	6.01	1.32	64	75
6.1	6.01	0.09	65	75
5.81	6.01	-0.2	65	76
5.75	6.01	-0.26	65	77
5.55	6.01	-0.46	65	78
5.81	6.01	-0.2	65	79
5.98	5.96	0.02	66	79
5.64	5.96	-0.32	66	80
6.35	5.96	0.39	67	80
7.33	5.96	1.37	68	80
6.1	5.96	0.14	69	80
5.81	5.96	-0.15	69	81

5.75	5.96	-0.21	69	82
5.55	5.96	-0.41	69	83
5.81	5.96	-0.15	69	84
5.64	5.98	-0.34	69	85
6.35	5.98	0.37	70	85
7.33	5.98	1.35	71	85
6.1	5.98	0.12	72	85
5.81	5.98	-0.17	72	86
5.75	5.98	-0.23	72	87
5.55	5.98	-0.43	72	88
5.81	5.98	-0.17	72	89
6.35	5.64	0.71	73	89
7.33	5.64	1.69	74	89
6.1	5.64	0.46	75	89
5.81	5.64	0.17	76	89
5.75	5.64	0.11	77	89
5.55	5.64	-0.09	77	90
5.81	5.64	0.17	78	90
7.33	6.35	0.98	79	90
6.1	6.35	-0.25	79	91
5.81	6.35	-0.54	79	92
5.75	6.35	-0.6	79	93
5.55	6.35	-0.8	79	94
5.81	6.35	-0.54	79	95
6.1	7.33	-1.23	79	96
5.81	7.33	-1.52	79	97
5.75	7.33	-1.58	79	98
5.55	7.33	-1.78	79	99
5.81	7.33	-1.52	79	100
5.81	6.1	-0.29	79	101
5.75	6.1	-0.35	79	102
5.55	6.1	-0.55	79	103
5.81	6.1	-0.29	79	104
5.75	5.81	-0.06	79	105
5.55	5.81	-0.26	79	106
5.81	5.81	0	79	106
5.55	5.75	-0.2	79	107
5.81	5.75	0.06	80	107
5.81	5.55	0.26	81	107

S Statistic = 81 - 107 = -26

Tied Group	Value	Members
1	5.96	2
2	5.81	2

Time Period	Observations
2/1/2017	1

3/1/2017	1
4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 36

B = 0

C = 0

D = 0

E = 4

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 948

Z-Score = -0.811962

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-0.811962 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW10-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
9.93	6.86	3.07	1	0
7.03	6.86	0.17	2	0
8.7	6.86	1.84	3	0
7.15	6.86	0.29	4	0
6.58	6.86	-0.28	4	1
10.92	6.86	4.06	5	1
7.15	6.86	0.29	6	1
6.28	6.86	-0.58	6	2
6.67	6.86	-0.19	6	3
11.21	6.86	4.35	7	3
10.29	6.86	3.43	8	3
6.39	6.86	-0.47	8	4
6.95	6.86	0.09	9	4
7.87	6.86	1.01	10	4
6.5	6.86	-0.36	10	5
6.83	6.86	-0.03	10	6
6.59	6.86	-0.27	10	7
6.11	6.86	-0.75	10	8
6.14	6.86	-0.72	10	9
7.03	9.93	-2.9	10	10
8.7	9.93	-1.23	10	11
7.15	9.93	-2.78	10	12
6.58	9.93	-3.35	10	13
10.92	9.93	0.99	11	13
7.15	9.93	-2.78	11	14
6.28	9.93	-3.65	11	15
6.67	9.93	-3.26	11	16
11.21	9.93	1.28	12	16
10.29	9.93	0.36	13	16
6.39	9.93	-3.54	13	17
6.95	9.93	-2.98	13	18
7.87	9.93	-2.06	13	19
6.5	9.93	-3.43	13	20
6.83	9.93	-3.1	13	21
6.59	9.93	-3.34	13	22
6.11	9.93	-3.82	13	23
6.14	9.93	-3.79	13	24
8.7	7.03	1.67	14	24
7.15	7.03	0.12	15	24
6.58	7.03	-0.45	15	25
10.92	7.03	3.89	16	25
7.15	7.03	0.12	17	25
6.28	7.03	-0.75	17	26
6.67	7.03	-0.36	17	27
11.21	7.03	4.18	18	27

10.29	7.03	3.26	19	27
6.39	7.03	-0.64	19	28
6.95	7.03	-0.08	19	29
7.87	7.03	0.84	20	29
6.5	7.03	-0.53	20	30
6.83	7.03	-0.2	20	31
6.59	7.03	-0.44	20	32
6.11	7.03	-0.92	20	33
6.14	7.03	-0.89	20	34
7.15	8.7	-1.55	20	35
6.58	8.7	-2.12	20	36
10.92	8.7	2.22	21	36
7.15	8.7	-1.55	21	37
6.28	8.7	-2.42	21	38
6.67	8.7	-2.03	21	39
11.21	8.7	2.51	22	39
10.29	8.7	1.59	23	39
6.39	8.7	-2.31	23	40
6.95	8.7	-1.75	23	41
7.87	8.7	-0.83	23	42
6.5	8.7	-2.2	23	43
6.83	8.7	-1.87	23	44
6.59	8.7	-2.11	23	45
6.11	8.7	-2.59	23	46
6.14	8.7	-2.56	23	47
6.58	7.15	-0.57	23	48
10.92	7.15	3.77	24	48
7.15	7.15	0	24	48
6.28	7.15	-0.87	24	49
6.67	7.15	-0.48	24	50
11.21	7.15	4.06	25	50
10.29	7.15	3.14	26	50
6.39	7.15	-0.76	26	51
6.95	7.15	-0.2	26	52
7.87	7.15	0.72	27	52
6.5	7.15	-0.65	27	53
6.83	7.15	-0.32	27	54
6.59	7.15	-0.56	27	55
6.11	7.15	-1.04	27	56
6.14	7.15	-1.01	27	57
10.92	6.58	4.34	28	57
7.15	6.58	0.57	29	57
6.28	6.58	-0.3	29	58
6.67	6.58	0.09	30	58
11.21	6.58	4.63	31	58
10.29	6.58	3.71	32	58
6.39	6.58	-0.19	32	59
6.95	6.58	0.37	33	59
7.87	6.58	1.29	34	59
6.5	6.58	-0.08	34	60
6.83	6.58	0.25	35	60
6.59	6.58	0.01	36	60
6.11	6.58	-0.47	36	61
6.14	6.58	-0.44	36	62

7.15	10.92	-3.77	36	63
6.28	10.92	-4.64	36	64
6.67	10.92	-4.25	36	65
11.21	10.92	0.29	37	65
10.29	10.92	-0.63	37	66
6.39	10.92	-4.53	37	67
6.95	10.92	-3.97	37	68
7.87	10.92	-3.05	37	69
6.5	10.92	-4.42	37	70
6.83	10.92	-4.09	37	71
6.59	10.92	-4.33	37	72
6.11	10.92	-4.81	37	73
6.14	10.92	-4.78	37	74
6.28	7.15	-0.87	37	75
6.67	7.15	-0.48	37	76
11.21	7.15	4.06	38	76
10.29	7.15	3.14	39	76
6.39	7.15	-0.76	39	77
6.95	7.15	-0.2	39	78
7.87	7.15	0.72	40	78
6.5	7.15	-0.65	40	79
6.83	7.15	-0.32	40	80
6.59	7.15	-0.56	40	81
6.11	7.15	-1.04	40	82
6.14	7.15	-1.01	40	83
6.67	6.28	0.39	41	83
11.21	6.28	4.93	42	83
10.29	6.28	4.01	43	83
6.39	6.28	0.11	44	83
6.95	6.28	0.67	45	83
7.87	6.28	1.59	46	83
6.5	6.28	0.22	47	83
6.83	6.28	0.55	48	83
6.59	6.28	0.31	49	83
6.11	6.28	-0.17	49	84
6.14	6.28	-0.14	49	85
11.21	6.67	4.54	50	85
10.29	6.67	3.62	51	85
6.39	6.67	-0.28	51	86
6.95	6.67	0.28	52	86
7.87	6.67	1.2	53	86
6.5	6.67	-0.17	53	87
6.83	6.67	0.16	54	87
6.59	6.67	-0.08	54	88
6.11	6.67	-0.56	54	89
6.14	6.67	-0.53	54	90
10.29	11.21	-0.92	54	91
6.39	11.21	-4.82	54	92
6.95	11.21	-4.26	54	93
7.87	11.21	-3.34	54	94
6.5	11.21	-4.71	54	95
6.83	11.21	-4.38	54	96

6.59	11.21	-4.62	54	97
6.11	11.21	-5.1	54	98
6.14	11.21	-5.07	54	99
6.39	10.29	-3.9	54	100
6.95	10.29	-3.34	54	101
7.87	10.29	-2.42	54	102
6.5	10.29	-3.79	54	103
6.83	10.29	-3.46	54	104
6.59	10.29	-3.7	54	105
6.11	10.29	-4.18	54	106
6.14	10.29	-4.15	54	107
6.95	6.39	0.56	55	107
7.87	6.39	1.48	56	107
6.5	6.39	0.11	57	107
6.83	6.39	0.44	58	107
6.59	6.39	0.2	59	107
6.11	6.39	-0.28	59	108
6.14	6.39	-0.25	59	109
7.87	6.95	0.92	60	109
6.5	6.95	-0.45	60	110
6.83	6.95	-0.12	60	111
6.59	6.95	-0.36	60	112
6.11	6.95	-0.84	60	113
6.14	6.95	-0.81	60	114
6.5	7.87	-1.37	60	115
6.83	7.87	-1.04	60	116
6.59	7.87	-1.28	60	117
6.11	7.87	-1.76	60	118
6.14	7.87	-1.73	60	119
6.83	6.5	0.33	61	119
6.59	6.5	0.09	62	119
6.11	6.5	-0.39	62	120
6.14	6.5	-0.36	62	121
6.59	6.83	-0.24	62	122
6.11	6.83	-0.72	62	123
6.14	6.83	-0.69	62	124
6.11	6.59	-0.48	62	125
6.14	6.59	-0.45	62	126
6.14	6.11	0.03	63	126

S Statistic = 63 - 126 = -63

Tied Group	Value	Members
1	7.15	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = -2.01261

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-2.01261 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW11-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.93	6.05	-0.12	0	1
5.35	6.05	-0.7	0	2
6.11	6.05	0.06	1	2
5.5	6.05	-0.55	1	3
5.66	6.05	-0.39	1	4
5.81	6.05	-0.24	1	5
5.21	6.05	-0.84	1	6
5.92	6.05	-0.13	1	7
6.2	6.05	0.15	2	7
6.16	6.05	0.11	3	7
5.61	6.05	-0.44	3	8
5.98	6.05	-0.07	3	9
6.23	6.05	0.18	4	9
7.27	6.05	1.22	5	9
6.4	6.05	0.35	6	9
5.91	6.05	-0.14	6	10
5.97	6.05	-0.08	6	11
5.65	6.05	-0.4	6	12
5.82	6.05	-0.23	6	13
5.35	5.93	-0.58	6	14
6.11	5.93	0.18	7	14
5.5	5.93	-0.43	7	15
5.66	5.93	-0.27	7	16
5.81	5.93	-0.12	7	17
5.21	5.93	-0.72	7	18
5.92	5.93	-0.01	7	19
6.2	5.93	0.27	8	19
6.16	5.93	0.23	9	19
5.61	5.93	-0.32	9	20
5.98	5.93	0.05	10	20
6.23	5.93	0.3	11	20
7.27	5.93	1.34	12	20
6.4	5.93	0.47	13	20
5.91	5.93	-0.02	13	21
5.97	5.93	0.04	14	21
5.65	5.93	-0.28	14	22
5.82	5.93	-0.11	14	23
6.11	5.35	0.76	15	23
5.5	5.35	0.15	16	23
5.66	5.35	0.31	17	23
5.81	5.35	0.46	18	23
5.21	5.35	-0.14	18	24
5.92	5.35	0.57	19	24
6.2	5.35	0.85	20	24
6.16	5.35	0.81	21	24

5.61	5.35	0.26	22	24
5.98	5.35	0.63	23	24
6.23	5.35	0.88	24	24
7.27	5.35	1.92	25	24
6.4	5.35	1.05	26	24
5.91	5.35	0.56	27	24
5.97	5.35	0.62	28	24
5.65	5.35	0.3	29	24
5.82	5.35	0.47	30	24
5.5	6.11	-0.61	30	25
5.66	6.11	-0.45	30	26
5.81	6.11	-0.3	30	27
5.21	6.11	-0.9	30	28
5.92	6.11	-0.19	30	29
6.2	6.11	0.09	31	29
6.16	6.11	0.05	32	29
5.61	6.11	-0.5	32	30
5.98	6.11	-0.13	32	31
6.23	6.11	0.12	33	31
7.27	6.11	1.16	34	31
6.4	6.11	0.29	35	31
5.91	6.11	-0.2	35	32
5.97	6.11	-0.14	35	33
5.65	6.11	-0.46	35	34
5.82	6.11	-0.29	35	35
5.66	5.5	0.16	36	35
5.81	5.5	0.31	37	35
5.21	5.5	-0.29	37	36
5.92	5.5	0.42	38	36
6.2	5.5	0.7	39	36
6.16	5.5	0.66	40	36
5.61	5.5	0.11	41	36
5.98	5.5	0.48	42	36
6.23	5.5	0.73	43	36
7.27	5.5	1.77	44	36
6.4	5.5	0.9	45	36
5.91	5.5	0.41	46	36
5.97	5.5	0.47	47	36
5.65	5.5	0.15	48	36
5.82	5.5	0.32	49	36
5.81	5.66	0.15	50	36
5.21	5.66	-0.45	50	37
5.92	5.66	0.26	51	37
6.2	5.66	0.54	52	37
6.16	5.66	0.5	53	37
5.61	5.66	-0.05	53	38
5.98	5.66	0.32	54	38
6.23	5.66	0.57	55	38
7.27	5.66	1.61	56	38
6.4	5.66	0.74	57	38
5.91	5.66	0.25	58	38
5.97	5.66	0.31	59	38
5.65	5.66	-0.01	59	39
5.82	5.66	0.16	60	39

5.21	5.81	-0.6	60	40
5.92	5.81	0.11	61	40
6.2	5.81	0.39	62	40
6.16	5.81	0.35	63	40
5.61	5.81	-0.2	63	41
5.98	5.81	0.17	64	41
6.23	5.81	0.42	65	41
7.27	5.81	1.46	66	41
6.4	5.81	0.59	67	41
5.91	5.81	0.1	68	41
5.97	5.81	0.16	69	41
5.65	5.81	-0.16	69	42
5.82	5.81	0.01	70	42
5.92	5.21	0.71	71	42
6.2	5.21	0.99	72	42
6.16	5.21	0.95	73	42
5.61	5.21	0.4	74	42
5.98	5.21	0.77	75	42
6.23	5.21	1.02	76	42
7.27	5.21	2.06	77	42
6.4	5.21	1.19	78	42
5.91	5.21	0.7	79	42
5.97	5.21	0.76	80	42
5.65	5.21	0.44	81	42
5.82	5.21	0.61	82	42
6.2	5.92	0.28	83	42
6.16	5.92	0.24	84	42
5.61	5.92	-0.31	84	43
5.98	5.92	0.06	85	43
6.23	5.92	0.31	86	43
7.27	5.92	1.35	87	43
6.4	5.92	0.48	88	43
5.91	5.92	-0.01	88	44
5.97	5.92	0.05	89	44
5.65	5.92	-0.27	89	45
5.82	5.92	-0.1	89	46
6.16	6.2	-0.04	89	47
5.61	6.2	-0.59	89	48
5.98	6.2	-0.22	89	49
6.23	6.2	0.03	90	49
7.27	6.2	1.07	91	49
6.4	6.2	0.2	92	49
5.91	6.2	-0.29	92	50
5.97	6.2	-0.23	92	51
5.65	6.2	-0.55	92	52
5.82	6.2	-0.38	92	53
5.61	6.16	-0.55	92	54
5.98	6.16	-0.18	92	55
6.23	6.16	0.07	93	55
7.27	6.16	1.11	94	55
6.4	6.16	0.24	95	55
5.91	6.16	-0.25	95	56

5.97	6.16	-0.19	95	57
5.65	6.16	-0.51	95	58
5.82	6.16	-0.34	95	59
5.98	5.61	0.37	96	59
6.23	5.61	0.62	97	59
7.27	5.61	1.66	98	59
6.4	5.61	0.79	99	59
5.91	5.61	0.3	100	59
5.97	5.61	0.36	101	59
5.65	5.61	0.04	102	59
5.82	5.61	0.21	103	59
6.23	5.98	0.25	104	59
7.27	5.98	1.29	105	59
6.4	5.98	0.42	106	59
5.91	5.98	-0.07	106	60
5.97	5.98	-0.01	106	61
5.65	5.98	-0.33	106	62
5.82	5.98	-0.16	106	63
7.27	6.23	1.04	107	63
6.4	6.23	0.17	108	63
5.91	6.23	-0.32	108	64
5.97	6.23	-0.26	108	65
5.65	6.23	-0.58	108	66
5.82	6.23	-0.41	108	67
6.4	7.27	-0.87	108	68
5.91	7.27	-1.36	108	69
5.97	7.27	-1.3	108	70
5.65	7.27	-1.62	108	71
5.82	7.27	-1.45	108	72
5.91	6.4	-0.49	108	73
5.97	6.4	-0.43	108	74
5.65	6.4	-0.75	108	75
5.82	6.4	-0.58	108	76
5.97	5.91	0.06	109	76
5.65	5.91	-0.26	109	77
5.82	5.91	-0.09	109	78
5.65	5.97	-0.32	109	79
5.82	5.97	-0.15	109	80
5.82	5.65	0.17	110	80

S Statistic = 110 - 80 = 30

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 0.940884

Comparison Level at 95% confidence level = 1.65463 (upward trend)

0.940884 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW12-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.26	5.27	-0.01	0	1
5.34	5.27	0.07	1	1
4.18	5.27	-1.09	1	2
5.39	5.27	0.12	2	2
4.2	5.27	-1.07	2	3
4.71	5.27	-0.56	2	4
4.61	5.27	-0.66	2	5
5.25	5.27	-0.02	2	6
5.32	5.27	0.05	3	6
6.06	5.27	0.79	4	6
4.46	5.27	-0.81	4	7
4.68	5.27	-0.59	4	8
6.37	5.27	1.1	5	8
7.45	5.27	2.18	6	8
6	5.27	0.73	7	8
5.47	5.27	0.2	8	8
5.36	5.27	0.09	9	8
5.26	5.27	-0.01	9	9
5.69	5.27	0.42	10	9
5.34	5.26	0.08	11	9
4.18	5.26	-1.08	11	10
5.39	5.26	0.13	12	10
4.2	5.26	-1.06	12	11
4.71	5.26	-0.55	12	12
4.61	5.26	-0.65	12	13
5.25	5.26	-0.01	12	14
5.32	5.26	0.06	13	14
6.06	5.26	0.8	14	14
4.46	5.26	-0.8	14	15
4.68	5.26	-0.58	14	16
6.37	5.26	1.11	15	16
7.45	5.26	2.19	16	16
6	5.26	0.74	17	16
5.47	5.26	0.21	18	16
5.36	5.26	0.1	19	16
5.26	5.26	0	19	16
5.69	5.26	0.43	20	16
4.18	5.34	-1.16	20	17
5.39	5.34	0.05	21	17
4.2	5.34	-1.14	21	18
4.71	5.34	-0.63	21	19
4.61	5.34	-0.73	21	20
5.25	5.34	-0.09	21	21
5.32	5.34	-0.02	21	22
6.06	5.34	0.72	22	22

4.46	5.34	-0.88	22	23
4.68	5.34	-0.66	22	24
6.37	5.34	1.03	23	24
7.45	5.34	2.11	24	24
6	5.34	0.66	25	24
5.47	5.34	0.13	26	24
5.36	5.34	0.02	27	24
5.26	5.34	-0.08	27	25
5.69	5.34	0.35	28	25
5.39	4.18	1.21	29	25
4.2	4.18	0.02	30	25
4.71	4.18	0.53	31	25
4.61	4.18	0.43	32	25
5.25	4.18	1.07	33	25
5.32	4.18	1.14	34	25
6.06	4.18	1.88	35	25
4.46	4.18	0.28	36	25
4.68	4.18	0.5	37	25
6.37	4.18	2.19	38	25
7.45	4.18	3.27	39	25
6	4.18	1.82	40	25
5.47	4.18	1.29	41	25
5.36	4.18	1.18	42	25
5.26	4.18	1.08	43	25
5.69	4.18	1.51	44	25
4.2	5.39	-1.19	44	26
4.71	5.39	-0.68	44	27
4.61	5.39	-0.78	44	28
5.25	5.39	-0.14	44	29
5.32	5.39	-0.07	44	30
6.06	5.39	0.67	45	30
4.46	5.39	-0.93	45	31
4.68	5.39	-0.71	45	32
6.37	5.39	0.98	46	32
7.45	5.39	2.06	47	32
6	5.39	0.61	48	32
5.47	5.39	0.08	49	32
5.36	5.39	-0.03	49	33
5.26	5.39	-0.13	49	34
5.69	5.39	0.3	50	34
4.71	4.2	0.51	51	34
4.61	4.2	0.41	52	34
5.25	4.2	1.05	53	34
5.32	4.2	1.12	54	34
6.06	4.2	1.86	55	34
4.46	4.2	0.26	56	34
4.68	4.2	0.48	57	34
6.37	4.2	2.17	58	34
7.45	4.2	3.25	59	34
6	4.2	1.8	60	34
5.47	4.2	1.27	61	34
5.36	4.2	1.16	62	34
5.26	4.2	1.06	63	34
5.69	4.2	1.49	64	34

4.61	4.71	-0.1	64	35
5.25	4.71	0.54	65	35
5.32	4.71	0.61	66	35
6.06	4.71	1.35	67	35
4.46	4.71	-0.25	67	36
4.68	4.71	-0.03	67	37
6.37	4.71	1.66	68	37
7.45	4.71	2.74	69	37
6	4.71	1.29	70	37
5.47	4.71	0.76	71	37
5.36	4.71	0.65	72	37
5.26	4.71	0.55	73	37
5.69	4.71	0.98	74	37
5.25	4.61	0.64	75	37
5.32	4.61	0.71	76	37
6.06	4.61	1.45	77	37
4.46	4.61	-0.15	77	38
4.68	4.61	0.07	78	38
6.37	4.61	1.76	79	38
7.45	4.61	2.84	80	38
6	4.61	1.39	81	38
5.47	4.61	0.86	82	38
5.36	4.61	0.75	83	38
5.26	4.61	0.65	84	38
5.69	4.61	1.08	85	38
5.32	5.25	0.07	86	38
6.06	5.25	0.81	87	38
4.46	5.25	-0.79	87	39
4.68	5.25	-0.57	87	40
6.37	5.25	1.12	88	40
7.45	5.25	2.2	89	40
6	5.25	0.75	90	40
5.47	5.25	0.22	91	40
5.36	5.25	0.11	92	40
5.26	5.25	0.01	93	40
5.69	5.25	0.44	94	40
6.06	5.32	0.74	95	40
4.46	5.32	-0.86	95	41
4.68	5.32	-0.64	95	42
6.37	5.32	1.05	96	42
7.45	5.32	2.13	97	42
6	5.32	0.68	98	42
5.47	5.32	0.15	99	42
5.36	5.32	0.04	100	42
5.26	5.32	-0.06	100	43
5.69	5.32	0.37	101	43
4.46	6.06	-1.6	101	44
4.68	6.06	-1.38	101	45
6.37	6.06	0.31	102	45
7.45	6.06	1.39	103	45
6	6.06	-0.06	103	46
5.47	6.06	-0.59	103	47

5.36	6.06	-0.7	103	48
5.26	6.06	-0.8	103	49
5.69	6.06	-0.37	103	50
4.68	4.46	0.22	104	50
6.37	4.46	1.91	105	50
7.45	4.46	2.99	106	50
6	4.46	1.54	107	50
5.47	4.46	1.01	108	50
5.36	4.46	0.9	109	50
5.26	4.46	0.8	110	50
5.69	4.46	1.23	111	50
6.37	4.68	1.69	112	50
7.45	4.68	2.77	113	50
6	4.68	1.32	114	50
5.47	4.68	0.79	115	50
5.36	4.68	0.68	116	50
5.26	4.68	0.58	117	50
5.69	4.68	1.01	118	50
7.45	6.37	1.08	119	50
6	6.37	-0.37	119	51
5.47	6.37	-0.9	119	52
5.36	6.37	-1.01	119	53
5.26	6.37	-1.11	119	54
5.69	6.37	-0.68	119	55
6	7.45	-1.45	119	56
5.47	7.45	-1.98	119	57
5.36	7.45	-2.09	119	58
5.26	7.45	-2.19	119	59
5.69	7.45	-1.76	119	60
5.47	6	-0.53	119	61
5.36	6	-0.64	119	62
5.26	6	-0.74	119	63
5.69	6	-0.31	119	64
5.36	5.47	-0.11	119	65
5.26	5.47	-0.21	119	66
5.69	5.47	0.22	120	66
5.26	5.36	-0.1	120	67
5.69	5.36	0.33	121	67
5.69	5.26	0.43	122	67

S Statistic = 122 - 67 = 55

Tied Group	Value	Members
1	5.26	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = 1.75291

Comparison Level at 95% confidence level = 1.65463 (upward trend)

1.75291 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW13-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
12.18	6.72	5.46	1	0
6.86	6.72	0.14	2	0
7.32	6.72	0.6	3	0
7.67	6.72	0.95	4	0
11.44	6.72	4.72	5	0
6.46	6.72	-0.26	5	1
6.86	6.72	0.14	6	1
9.66	6.72	2.94	7	1
11.6	6.72	4.88	8	1
5.83	6.72	-0.89	8	2
10.25	6.72	3.53	9	2
10.98	6.72	4.26	10	2
6.04	6.72	-0.68	10	3
6.86	12.18	-5.32	10	4
7.32	12.18	-4.86	10	5
7.67	12.18	-4.51	10	6
11.44	12.18	-0.74	10	7
6.46	12.18	-5.72	10	8
6.86	12.18	-5.32	10	9
9.66	12.18	-2.52	10	10
11.6	12.18	-0.58	10	11
5.83	12.18	-6.35	10	12
10.25	12.18	-1.93	10	13
10.98	12.18	-1.2	10	14
6.04	12.18	-6.14	10	15
7.32	6.86	0.46	11	15
7.67	6.86	0.81	12	15
11.44	6.86	4.58	13	15
6.46	6.86	-0.4	13	16
6.86	6.86	0	13	16
9.66	6.86	2.8	14	16
11.6	6.86	4.74	15	16
5.83	6.86	-1.03	15	17
10.25	6.86	3.39	16	17
10.98	6.86	4.12	17	17
6.04	6.86	-0.82	17	18
7.67	7.32	0.35	18	18
11.44	7.32	4.12	19	18
6.46	7.32	-0.86	19	19
6.86	7.32	-0.46	19	20
9.66	7.32	2.34	20	20
11.6	7.32	4.28	21	20
5.83	7.32	-1.49	21	21
10.25	7.32	2.93	22	21

10.98	7.32	3.66	23	21
6.04	7.32	-1.28	23	22
11.44	7.67	3.77	24	22
6.46	7.67	-1.21	24	23
6.86	7.67	-0.81	24	24
9.66	7.67	1.99	25	24
11.6	7.67	3.93	26	24
5.83	7.67	-1.84	26	25
10.25	7.67	2.58	27	25
10.98	7.67	3.31	28	25
6.04	7.67	-1.63	28	26
6.46	11.44	-4.98	28	27
6.86	11.44	-4.58	28	28
9.66	11.44	-1.78	28	29
11.6	11.44	0.16	29	29
5.83	11.44	-5.61	29	30
10.25	11.44	-1.19	29	31
10.98	11.44	-0.46	29	32
6.04	11.44	-5.4	29	33
6.86	6.46	0.4	30	33
9.66	6.46	3.2	31	33
11.6	6.46	5.14	32	33
5.83	6.46	-0.63	32	34
10.25	6.46	3.79	33	34
10.98	6.46	4.52	34	34
6.04	6.46	-0.42	34	35
9.66	6.86	2.8	35	35
11.6	6.86	4.74	36	35
5.83	6.86	-1.03	36	36
10.25	6.86	3.39	37	36
10.98	6.86	4.12	38	36
6.04	6.86	-0.82	38	37
11.6	9.66	1.94	39	37
5.83	9.66	-3.83	39	38
10.25	9.66	0.59	40	38
10.98	9.66	1.32	41	38
6.04	9.66	-3.62	41	39
5.83	11.6	-5.77	41	40
10.25	11.6	-1.35	41	41
10.98	11.6	-0.62	41	42
6.04	11.6	-5.56	41	43
10.25	5.83	4.42	42	43
10.98	5.83	5.15	43	43
6.04	5.83	0.21	44	43
10.98	10.25	0.73	45	43
6.04	10.25	-4.21	45	44
6.04	10.98	-4.94	45	45

S Statistic = 45 - 45 = 0

Tied Group	Value	Members
1	6.86	2

Time Period	Observations
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 332.667

Z-Score = 0

Comparison Level at 95% confidence level = 1.65463 (upward trend)

0 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW15-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
6.68	11.6	-4.92	0	1
10.17	11.6	-1.43	0	2
11.59	11.6	-0.01	0	3
11.69	11.6	0.09	1	3
12.13	11.6	0.53	2	3
11.99	11.6	0.39	3	3
10.69	11.6	-0.91	3	4
7	11.6	-4.6	3	5
7	11.6	-4.6	3	6
6.91	11.6	-4.69	3	7
5.99	11.6	-5.61	3	8
6.11	11.6	-5.49	3	9
10.17	6.68	3.49	4	9
11.59	6.68	4.91	5	9
11.69	6.68	5.01	6	9
12.13	6.68	5.45	7	9
11.99	6.68	5.31	8	9
10.69	6.68	4.01	9	9
7	6.68	0.32	10	9
7	6.68	0.32	11	9
6.91	6.68	0.23	12	9
5.99	6.68	-0.69	12	10
6.11	6.68	-0.57	12	11
11.59	10.17	1.42	13	11
11.69	10.17	1.52	14	11
12.13	10.17	1.96	15	11
11.99	10.17	1.82	16	11
10.69	10.17	0.52	17	11
7	10.17	-3.17	17	12
7	10.17	-3.17	17	13
6.91	10.17	-3.26	17	14
5.99	10.17	-4.18	17	15
6.11	10.17	-4.06	17	16
11.69	11.59	0.1	18	16
12.13	11.59	0.54	19	16
11.99	11.59	0.4	20	16
10.69	11.59	-0.9	20	17
7	11.59	-4.59	20	18
7	11.59	-4.59	20	19
6.91	11.59	-4.68	20	20
5.99	11.59	-5.6	20	21
6.11	11.59	-5.48	20	22
12.13	11.69	0.44	21	22

11.99	11.69	0.3	22	22
10.69	11.69	-1	22	23
7	11.69	-4.69	22	24
7	11.69	-4.69	22	25
6.91	11.69	-4.78	22	26
5.99	11.69	-5.7	22	27
6.11	11.69	-5.58	22	28
11.99	12.13	-0.14	22	29
10.69	12.13	-1.44	22	30
7	12.13	-5.13	22	31
7	12.13	-5.13	22	32
6.91	12.13	-5.22	22	33
5.99	12.13	-6.14	22	34
6.11	12.13	-6.02	22	35
10.69	11.99	-1.3	22	36
7	11.99	-4.99	22	37
7	11.99	-4.99	22	38
6.91	11.99	-5.08	22	39
5.99	11.99	-6	22	40
6.11	11.99	-5.88	22	41
7	10.69	-3.69	22	42
7	10.69	-3.69	22	43
6.91	10.69	-3.78	22	44
5.99	10.69	-4.7	22	45
6.11	10.69	-4.58	22	46
7	7	0	22	46
6.91	7	-0.09	22	47
5.99	7	-1.01	22	48
6.11	7	-0.89	22	49
6.91	7	-0.09	22	50
5.99	7	-1.01	22	51
6.11	7	-0.89	22	52
5.99	6.91	-0.92	22	53
6.11	6.91	-0.8	22	54
6.11	5.99	0.12	23	54

S Statistic = 23 - 54 = -31

Tied Group	Value	Members
1	7	2

Time Period	Observations
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1

10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 4836

b = 15444

c = 312

Group Variance = 267.667

Z-Score = -1.83368

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-1.83368 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW16-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
9.36	6.14	3.22	1	0
9.43	6.14	3.29	2	0
6.47	6.14	0.33	3	0
6.37	6.14	0.23	4	0
6.36	6.14	0.22	5	0
10.41	6.14	4.27	6	0
9.43	6.14	3.29	7	0
9.9	6.14	3.76	8	0
9.47	6.14	3.33	9	0
9.88	6.14	3.74	10	0
9.3	6.14	3.16	11	0
7.37	6.14	1.23	12	0
9.43	9.36	0.07	13	0
6.47	9.36	-2.89	13	1
6.37	9.36	-2.99	13	2
6.36	9.36	-3	13	3
10.41	9.36	1.05	14	3
9.43	9.36	0.07	15	3
9.9	9.36	0.54	16	3
9.47	9.36	0.11	17	3
9.88	9.36	0.52	18	3
9.3	9.36	-0.06	18	4
7.37	9.36	-1.99	18	5
6.47	9.43	-2.96	18	6
6.37	9.43	-3.06	18	7
6.36	9.43	-3.07	18	8
10.41	9.43	0.98	19	8
9.43	9.43	0	19	8
9.9	9.43	0.47	20	8
9.47	9.43	0.04	21	8
9.88	9.43	0.45	22	8
9.3	9.43	-0.13	22	9
7.37	9.43	-2.06	22	10
6.37	6.47	-0.1	22	11
6.36	6.47	-0.11	22	12
10.41	6.47	3.94	23	12
9.43	6.47	2.96	24	12
9.9	6.47	3.43	25	12
9.47	6.47	3	26	12
9.88	6.47	3.41	27	12
9.3	6.47	2.83	28	12
7.37	6.47	0.9	29	12
6.36	6.37	-0.01	29	13

10.41	6.37	4.04	30	13
9.43	6.37	3.06	31	13
9.9	6.37	3.53	32	13
9.47	6.37	3.1	33	13
9.88	6.37	3.51	34	13
9.3	6.37	2.93	35	13
7.37	6.37	1	36	13
10.41	6.36	4.05	37	13
9.43	6.36	3.07	38	13
9.9	6.36	3.54	39	13
9.47	6.36	3.11	40	13
9.88	6.36	3.52	41	13
9.3	6.36	2.94	42	13
7.37	6.36	1.01	43	13
9.43	10.41	-0.98	43	14
9.9	10.41	-0.51	43	15
9.47	10.41	-0.94	43	16
9.88	10.41	-0.53	43	17
9.3	10.41	-1.11	43	18
7.37	10.41	-3.04	43	19
9.9	9.43	0.47	44	19
9.47	9.43	0.04	45	19
9.88	9.43	0.45	46	19
9.3	9.43	-0.13	46	20
7.37	9.43	-2.06	46	21
9.47	9.9	-0.43	46	22
9.88	9.9	-0.02	46	23
9.3	9.9	-0.6	46	24
7.37	9.9	-2.53	46	25
9.88	9.47	0.41	47	25
9.3	9.47	-0.17	47	26
7.37	9.47	-2.1	47	27
9.3	9.88	-0.58	47	28
7.37	9.88	-2.51	47	29
7.37	9.3	-1.93	47	30

S Statistic = 47 - 30 = 17

Tied Group	Value	Members
1	9.43	2

Time Period	Observations
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1

10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 4836

b = 15444

c = 312

Group Variance = 267.667

Z-Score = 0.977964

Comparison Level at 95% confidence level = 1.65463 (upward trend)

0.977964 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: pH
Location: RW18-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.33	5.64	-0.31	0	1
5.39	5.64	-0.25	0	2
3.43	5.64	-2.21	0	3
5.38	5.64	-0.26	0	4
5.25	5.64	-0.39	0	5
5.45	5.64	-0.19	0	6
5.99	5.64	0.35	1	6
5.49	5.64	-0.15	1	7
5.84	5.64	0.2	2	7
5.62	5.64	-0.02	2	8
5.56	5.64	-0.08	2	9
5.27	5.64	-0.37	2	10
5.46	5.64	-0.18	2	11
6.71	5.64	1.07	3	11
5.3	5.64	-0.34	3	12
5.16	5.64	-0.48	3	13
5.43	5.64	-0.21	3	14
5.52	5.64	-0.12	3	15
5.46	5.64	-0.18	3	16
5.39	5.33	0.06	4	16
3.43	5.33	-1.9	4	17
5.38	5.33	0.05	5	17
5.25	5.33	-0.08	5	18
5.45	5.33	0.12	6	18
5.99	5.33	0.66	7	18
5.49	5.33	0.16	8	18
5.84	5.33	0.51	9	18
5.62	5.33	0.29	10	18
5.56	5.33	0.23	11	18
5.27	5.33	-0.06	11	19
5.46	5.33	0.13	12	19
6.71	5.33	1.38	13	19
5.3	5.33	-0.03	13	20
5.16	5.33	-0.17	13	21
5.43	5.33	0.1	14	21
5.52	5.33	0.19	15	21
5.46	5.33	0.13	16	21
3.43	5.39	-1.96	16	22
5.38	5.39	-0.01	16	23
5.25	5.39	-0.14	16	24
5.45	5.39	0.06	17	24
5.99	5.39	0.6	18	24
5.49	5.39	0.1	19	24
5.84	5.39	0.45	20	24
5.62	5.39	0.23	21	24

5.56	5.39	0.17	22	24
5.27	5.39	-0.12	22	25
5.46	5.39	0.07	23	25
6.71	5.39	1.32	24	25
5.3	5.39	-0.09	24	26
5.16	5.39	-0.23	24	27
5.43	5.39	0.04	25	27
5.52	5.39	0.13	26	27
5.46	5.39	0.07	27	27
5.38	3.43	1.95	28	27
5.25	3.43	1.82	29	27
5.45	3.43	2.02	30	27
5.99	3.43	2.56	31	27
5.49	3.43	2.06	32	27
5.84	3.43	2.41	33	27
5.62	3.43	2.19	34	27
5.56	3.43	2.13	35	27
5.27	3.43	1.84	36	27
5.46	3.43	2.03	37	27
6.71	3.43	3.28	38	27
5.3	3.43	1.87	39	27
5.16	3.43	1.73	40	27
5.43	3.43	2	41	27
5.52	3.43	2.09	42	27
5.46	3.43	2.03	43	27
5.25	5.38	-0.13	43	28
5.45	5.38	0.07	44	28
5.99	5.38	0.61	45	28
5.49	5.38	0.11	46	28
5.84	5.38	0.46	47	28
5.62	5.38	0.24	48	28
5.56	5.38	0.18	49	28
5.27	5.38	-0.11	49	29
5.46	5.38	0.08	50	29
6.71	5.38	1.33	51	29
5.3	5.38	-0.08	51	30
5.16	5.38	-0.22	51	31
5.43	5.38	0.05	52	31
5.52	5.38	0.14	53	31
5.46	5.38	0.08	54	31
5.45	5.25	0.2	55	31
5.99	5.25	0.74	56	31
5.49	5.25	0.24	57	31
5.84	5.25	0.59	58	31
5.62	5.25	0.37	59	31
5.56	5.25	0.31	60	31
5.27	5.25	0.02	61	31
5.46	5.25	0.21	62	31
6.71	5.25	1.46	63	31
5.3	5.25	0.05	64	31
5.16	5.25	-0.09	64	32
5.43	5.25	0.18	65	32
5.52	5.25	0.27	66	32
5.46	5.25	0.21	67	32

5.99	5.45	0.54	68	32
5.49	5.45	0.04	69	32
5.84	5.45	0.39	70	32
5.62	5.45	0.17	71	32
5.56	5.45	0.11	72	32
5.27	5.45	-0.18	72	33
5.46	5.45	0.01	73	33
6.71	5.45	1.26	74	33
5.3	5.45	-0.15	74	34
5.16	5.45	-0.29	74	35
5.43	5.45	-0.02	74	36
5.52	5.45	0.07	75	36
5.46	5.45	0.01	76	36
5.49	5.99	-0.5	76	37
5.84	5.99	-0.15	76	38
5.62	5.99	-0.37	76	39
5.56	5.99	-0.43	76	40
5.27	5.99	-0.72	76	41
5.46	5.99	-0.53	76	42
6.71	5.99	0.72	77	42
5.3	5.99	-0.69	77	43
5.16	5.99	-0.83	77	44
5.43	5.99	-0.56	77	45
5.52	5.99	-0.47	77	46
5.46	5.99	-0.53	77	47
5.84	5.49	0.35	78	47
5.62	5.49	0.13	79	47
5.56	5.49	0.07	80	47
5.27	5.49	-0.22	80	48
5.46	5.49	-0.03	80	49
6.71	5.49	1.22	81	49
5.3	5.49	-0.19	81	50
5.16	5.49	-0.33	81	51
5.43	5.49	-0.06	81	52
5.52	5.49	0.03	82	52
5.46	5.49	-0.03	82	53
5.62	5.84	-0.22	82	54
5.56	5.84	-0.28	82	55
5.27	5.84	-0.57	82	56
5.46	5.84	-0.38	82	57
6.71	5.84	0.87	83	57
5.3	5.84	-0.54	83	58
5.16	5.84	-0.68	83	59
5.43	5.84	-0.41	83	60
5.52	5.84	-0.32	83	61
5.46	5.84	-0.38	83	62
5.56	5.62	-0.06	83	63
5.27	5.62	-0.35	83	64
5.46	5.62	-0.16	83	65
6.71	5.62	1.09	84	65
5.3	5.62	-0.32	84	66
5.16	5.62	-0.46	84	67

5.43	5.62	-0.19	84	68
5.52	5.62	-0.1	84	69
5.46	5.62	-0.16	84	70
5.27	5.56	-0.29	84	71
5.46	5.56	-0.1	84	72
6.71	5.56	1.15	85	72
5.3	5.56	-0.26	85	73
5.16	5.56	-0.4	85	74
5.43	5.56	-0.13	85	75
5.52	5.56	-0.04	85	76
5.46	5.56	-0.1	85	77
5.46	5.27	0.19	86	77
6.71	5.27	1.44	87	77
5.3	5.27	0.03	88	77
5.16	5.27	-0.11	88	78
5.43	5.27	0.16	89	78
5.52	5.27	0.25	90	78
5.46	5.27	0.19	91	78
6.71	5.46	1.25	92	78
5.3	5.46	-0.16	92	79
5.16	5.46	-0.3	92	80
5.43	5.46	-0.03	92	81
5.52	5.46	0.06	93	81
5.46	5.46	0	93	81
5.3	6.71	-1.41	93	82
5.16	6.71	-1.55	93	83
5.43	6.71	-1.28	93	84
5.52	6.71	-1.19	93	85
5.46	6.71	-1.25	93	86
5.16	5.3	-0.14	93	87
5.43	5.3	0.13	94	87
5.52	5.3	0.22	95	87
5.46	5.3	0.16	96	87
5.43	5.16	0.27	97	87
5.52	5.16	0.36	98	87
5.46	5.16	0.3	99	87
5.52	5.43	0.09	100	87
5.46	5.43	0.03	101	87
5.46	5.52	-0.06	101	88

S Statistic = 101 - 88 = 13

Tied Group	Value	Members
1	5.46	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = 0.389536

Comparison Level at 95% confidence level = 1.65463 (upward trend)

0.389536 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW19-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
5.35	5.5	-0.15	0	1
5.28	5.5	-0.22	0	2
5.41	5.5	-0.09	0	3
5.32	5.5	-0.18	0	4
5.15	5.5	-0.35	0	5
5.58	5.5	0.08	1	5
5.37	5.5	-0.13	1	6
5.52	5.5	0.02	2	6
5.52	5.5	0.02	3	6
5.41	5.5	-0.09	3	7
4.93	5.5	-0.57	3	8
5.38	5.5	-0.12	3	9
6.86	5.5	1.36	4	9
5.5	5.5	0	4	9
5.25	5.5	-0.25	4	10
5.23	5.5	-0.27	4	11
5.23	5.5	-0.27	4	12
5.34	5.5	-0.16	4	13
5.28	5.35	-0.07	4	14
5.41	5.35	0.06	5	14
5.32	5.35	-0.03	5	15
5.15	5.35	-0.2	5	16
5.58	5.35	0.23	6	16
5.37	5.35	0.02	7	16
5.52	5.35	0.17	8	16
5.52	5.35	0.17	9	16
5.41	5.35	0.06	10	16
4.93	5.35	-0.42	10	17
5.38	5.35	0.03	11	17
6.86	5.35	1.51	12	17
5.5	5.35	0.15	13	17
5.25	5.35	-0.1	13	18
5.23	5.35	-0.12	13	19
5.23	5.35	-0.12	13	20
5.34	5.35	-0.01	13	21
5.41	5.28	0.13	14	21
5.32	5.28	0.04	15	21
5.15	5.28	-0.13	15	22
5.58	5.28	0.3	16	22
5.37	5.28	0.09	17	22
5.52	5.28	0.24	18	22
5.52	5.28	0.24	19	22
5.41	5.28	0.13	20	22
4.93	5.28	-0.35	20	23
5.38	5.28	0.1	21	23

6.86	5.28	1.58	22	23
5.5	5.28	0.22	23	23
5.25	5.28	-0.03	23	24
5.23	5.28	-0.05	23	25
5.23	5.28	-0.05	23	26
5.34	5.28	0.06	24	26
5.32	5.41	-0.09	24	27
5.15	5.41	-0.26	24	28
5.58	5.41	0.17	25	28
5.37	5.41	-0.04	25	29
5.52	5.41	0.11	26	29
5.52	5.41	0.11	27	29
5.41	5.41	0	27	29
4.93	5.41	-0.48	27	30
5.38	5.41	-0.03	27	31
6.86	5.41	1.45	28	31
5.5	5.41	0.09	29	31
5.25	5.41	-0.16	29	32
5.23	5.41	-0.18	29	33
5.23	5.41	-0.18	29	34
5.34	5.41	-0.07	29	35
5.15	5.32	-0.17	29	36
5.58	5.32	0.26	30	36
5.37	5.32	0.05	31	36
5.52	5.32	0.2	32	36
5.52	5.32	0.2	33	36
5.41	5.32	0.09	34	36
4.93	5.32	-0.39	34	37
5.38	5.32	0.06	35	37
6.86	5.32	1.54	36	37
5.5	5.32	0.18	37	37
5.25	5.32	-0.07	37	38
5.23	5.32	-0.09	37	39
5.23	5.32	-0.09	37	40
5.34	5.32	0.02	38	40
5.58	5.15	0.43	39	40
5.37	5.15	0.22	40	40
5.52	5.15	0.37	41	40
5.52	5.15	0.37	42	40
5.41	5.15	0.26	43	40
4.93	5.15	-0.22	43	41
5.38	5.15	0.23	44	41
6.86	5.15	1.71	45	41
5.5	5.15	0.35	46	41
5.25	5.15	0.1	47	41
5.23	5.15	0.08	48	41
5.23	5.15	0.08	49	41
5.34	5.15	0.19	50	41
5.37	5.58	-0.21	50	42
5.52	5.58	-0.06	50	43
5.52	5.58	-0.06	50	44
5.41	5.58	-0.17	50	45
4.93	5.58	-0.65	50	46

5.38	5.58	-0.2	50	47
6.86	5.58	1.28	51	47
5.5	5.58	-0.08	51	48
5.25	5.58	-0.33	51	49
5.23	5.58	-0.35	51	50
5.23	5.58	-0.35	51	51
5.34	5.58	-0.24	51	52
5.52	5.37	0.15	52	52
5.52	5.37	0.15	53	52
5.41	5.37	0.04	54	52
4.93	5.37	-0.44	54	53
5.38	5.37	0.01	55	53
6.86	5.37	1.49	56	53
5.5	5.37	0.13	57	53
5.25	5.37	-0.12	57	54
5.23	5.37	-0.14	57	55
5.23	5.37	-0.14	57	56
5.34	5.37	-0.03	57	57
5.52	5.52	0	57	57
5.41	5.52	-0.11	57	58
4.93	5.52	-0.59	57	59
5.38	5.52	-0.14	57	60
6.86	5.52	1.34	58	60
5.5	5.52	-0.02	58	61
5.25	5.52	-0.27	58	62
5.23	5.52	-0.29	58	63
5.23	5.52	-0.29	58	64
5.34	5.52	-0.18	58	65
5.41	5.52	-0.11	58	66
4.93	5.52	-0.59	58	67
5.38	5.52	-0.14	58	68
6.86	5.52	1.34	59	68
5.5	5.52	-0.02	59	69
5.25	5.52	-0.27	59	70
5.23	5.52	-0.29	59	71
5.23	5.52	-0.29	59	72
5.34	5.52	-0.18	59	73
4.93	5.41	-0.48	59	74
5.38	5.41	-0.03	59	75
6.86	5.41	1.45	60	75
5.5	5.41	0.09	61	75
5.25	5.41	-0.16	61	76
5.23	5.41	-0.18	61	77
5.23	5.41	-0.18	61	78
5.34	5.41	-0.07	61	79
5.38	4.93	0.45	62	79
6.86	4.93	1.93	63	79
5.5	4.93	0.57	64	79
5.25	4.93	0.32	65	79
5.23	4.93	0.3	66	79
5.23	4.93	0.3	67	79
5.34	4.93	0.41	68	79

6.86	5.38	1.48	69	79
5.5	5.38	0.12	70	79
5.25	5.38	-0.13	70	80
5.23	5.38	-0.15	70	81
5.23	5.38	-0.15	70	82
5.34	5.38	-0.04	70	83
5.5	6.86	-1.36	70	84
5.25	6.86	-1.61	70	85
5.23	6.86	-1.63	70	86
5.23	6.86	-1.63	70	87
5.34	6.86	-1.52	70	88
5.25	5.5	-0.25	70	89
5.23	5.5	-0.27	70	90
5.23	5.5	-0.27	70	91
5.34	5.5	-0.16	70	92
5.23	5.25	-0.02	70	93
5.23	5.25	-0.02	70	94
5.34	5.25	0.09	71	94
5.23	5.23	0	71	94
5.34	5.23	0.11	72	94
5.34	5.23	0.11	73	94

S Statistic = 73 - 94 = -21

Tied Group	Value	Members
1	5.5	2
2	5.41	2
3	5.52	2
4	5.23	2

Time Period	Observations
2/1/2017	1
3/1/2017	1
4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 72

B = 0

C = 0

D = 0

E = 8

F = 0

a = 14706

b = 52326

c = 684

Group Variance = 813

Z-Score = -0.701431

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-0.701431 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW22-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
12.75	12.97	-0.22	0	1
5.4	12.97	-7.57	0	2
6.05	12.97	-6.92	0	3
5.81	12.97	-7.16	0	4
5.68	12.97	-7.29	0	5
5.85	12.97	-7.12	0	6
5.48	12.97	-7.49	0	7
6.21	12.97	-6.76	0	8
6.62	12.97	-6.35	0	9
4.6	12.97	-8.37	0	10
5.49	12.97	-7.48	0	11
5.4	12.75	-7.35	0	12
6.05	12.75	-6.7	0	13
5.81	12.75	-6.94	0	14
5.68	12.75	-7.07	0	15
5.85	12.75	-6.9	0	16
5.48	12.75	-7.27	0	17
6.21	12.75	-6.54	0	18
6.62	12.75	-6.13	0	19
4.6	12.75	-8.15	0	20
5.49	12.75	-7.26	0	21
6.05	5.4	0.65	1	21
5.81	5.4	0.41	2	21
5.68	5.4	0.28	3	21
5.85	5.4	0.45	4	21
5.48	5.4	0.08	5	21
6.21	5.4	0.81	6	21
6.62	5.4	1.22	7	21
4.6	5.4	-0.8	7	22
5.49	5.4	0.09	8	22
5.81	6.05	-0.24	8	23
5.68	6.05	-0.37	8	24
5.85	6.05	-0.2	8	25
5.48	6.05	-0.57	8	26
6.21	6.05	0.16	9	26
6.62	6.05	0.57	10	26
4.6	6.05	-1.45	10	27
5.49	6.05	-0.56	10	28
5.68	5.81	-0.13	10	29
5.85	5.81	0.04	11	29
5.48	5.81	-0.33	11	30
6.21	5.81	0.4	12	30
6.62	5.81	0.81	13	30

4.6	5.81	-1.21	13	31
5.49	5.81	-0.32	13	32
5.85	5.68	0.17	14	32
5.48	5.68	-0.2	14	33
6.21	5.68	0.53	15	33
6.62	5.68	0.94	16	33
4.6	5.68	-1.08	16	34
5.49	5.68	-0.19	16	35
5.48	5.85	-0.37	16	36
6.21	5.85	0.36	17	36
6.62	5.85	0.77	18	36
4.6	5.85	-1.25	18	37
5.49	5.85	-0.36	18	38
6.21	5.48	0.73	19	38
6.62	5.48	1.14	20	38
4.6	5.48	-0.88	20	39
5.49	5.48	0.01	21	39
6.62	6.21	0.41	22	39
4.6	6.21	-1.61	22	40
5.49	6.21	-0.72	22	41
4.6	6.62	-2.02	22	42
5.49	6.62	-1.13	22	43
5.49	4.6	0.89	23	43

S Statistic = 23 - 43 = -20

Tied Group	Value	Members
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Time Period	Observations
6/1/2017	1
7/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1

There are 0 time periods with multiple data

A = 0
 B = 0
 C = 0
 D = 0
 E = 0
 F = 0
 a = 3828

b = 11880

c = 264

Group Variance = 212.667

Z-Score = -1.30288

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-1.30288 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW01-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
90	11600	-11510	0	1
13700	11600	2100	1	1
29	11600	-11571	1	2
41000	11600	29400	2	2
104	11600	-11496	2	3
576	11600	-11024	2	4
9710	11600	-1890	2	5
143	11600	-11457	2	6
3880	11600	-7720	2	7
2460	11600	-9140	2	8
5670	11600	-5930	2	9
5940	11600	-5660	2	10
2060	11600	-9540	2	11
13700	90	13610	3	11
29	90	-61	3	12
41000	90	40910	4	12
104	90	14	5	12
576	90	486	6	12
9710	90	9620	7	12
143	90	53	8	12
3880	90	3790	9	12
2460	90	2370	10	12
5670	90	5580	11	12
5940	90	5850	12	12
2060	90	1970	13	12
29	13700	-13671	13	13
41000	13700	27300	14	13
104	13700	-13596	14	14
576	13700	-13124	14	15
9710	13700	-3990	14	16
143	13700	-13557	14	17
3880	13700	-9820	14	18
2460	13700	-11240	14	19
5670	13700	-8030	14	20
5940	13700	-7760	14	21
2060	13700	-11640	14	22
41000	29	40971	15	22
104	29	75	16	22
576	29	547	17	22
9710	29	9681	18	22
143	29	114	19	22
3880	29	3851	20	22
2460	29	2431	21	22
5670	29	5641	22	22

5940	29	5911	23	22
2060	29	2031	24	22
104	41000	-40896	24	23
576	41000	-40424	24	24
9710	41000	-31290	24	25
143	41000	-40857	24	26
3880	41000	-37120	24	27
2460	41000	-38540	24	28
5670	41000	-35330	24	29
5940	41000	-35060	24	30
2060	41000	-38940	24	31
576	104	472	25	31
9710	104	9606	26	31
143	104	39	27	31
3880	104	3776	28	31
2460	104	2356	29	31
5670	104	5566	30	31
5940	104	5836	31	31
2060	104	1956	32	31
9710	576	9134	33	31
143	576	-433	33	32
3880	576	3304	34	32
2460	576	1884	35	32
5670	576	5094	36	32
5940	576	5364	37	32
2060	576	1484	38	32
143	9710	-9567	38	33
3880	9710	-5830	38	34
2460	9710	-7250	38	35
5670	9710	-4040	38	36
5940	9710	-3770	38	37
2060	9710	-7650	38	38
3880	143	3737	39	38
2460	143	2317	40	38
5670	143	5527	41	38
5940	143	5797	42	38
2060	143	1917	43	38
2460	3880	-1420	43	39
5670	3880	1790	44	39
5940	3880	2060	45	39
2060	3880	-1820	45	40
5670	2460	3210	46	40
5940	2460	3480	47	40
2060	2460	-400	47	41
5940	5670	270	48	41
2060	5670	-3610	48	42
2060	5940	-3880	48	43

S Statistic = 48 - 43 = 5

Tied Group	Value	Members
Time Period		Observations
8/1/2017		1
9/1/2017		1
10/1/2017		1
11/1/2017		1
12/1/2017		1
1/1/2018		1
4/1/2018		1
8/1/2018		1
10/1/2018		1
12/1/2018		1
3/1/2019		1
6/1/2019		1
9/1/2019		1
12/1/2019		1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 0.21898

Comparison Level at 95% confidence level = 1.65463 (upward trend)

0.21898 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Zinc
Location: RW02-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
203	18200	-17997	0	1
290	18200	-17910	0	2
38.6	18200	-18161.4	0	3
186	18200	-18014	0	4
573	18200	-17627	0	5
452	18200	-17748	0	6
5030	18200	-13170	0	7
3240	18200	-14960	0	8
25300	18200	7100	1	8
21500	18200	3300	2	8
56600	18200	38400	3	8
72000	18200	53800	4	8
17200	18200	-1000	4	9
290	203	87	5	9
38.6	203	-164.4	5	10
186	203	-17	5	11
573	203	370	6	11
452	203	249	7	11
5030	203	4827	8	11
3240	203	3037	9	11
25300	203	25097	10	11
21500	203	21297	11	11
56600	203	56397	12	11
72000	203	71797	13	11
17200	203	16997	14	11
38.6	290	-251.4	14	12
186	290	-104	14	13
573	290	283	15	13
452	290	162	16	13
5030	290	4740	17	13
3240	290	2950	18	13
25300	290	25010	19	13
21500	290	21210	20	13
56600	290	56310	21	13
72000	290	71710	22	13
17200	290	16910	23	13
186	38.6	147.4	24	13
573	38.6	534.4	25	13
452	38.6	413.4	26	13
5030	38.6	4991.4	27	13
3240	38.6	3201.4	28	13
25300	38.6	25261.4	29	13
21500	38.6	21461.4	30	13
56600	38.6	56561.4	31	13

72000	38.6	71961.4	32	13
17200	38.6	17161.4	33	13
573	186	387	34	13
452	186	266	35	13
5030	186	4844	36	13
3240	186	3054	37	13
25300	186	25114	38	13
21500	186	21314	39	13
56600	186	56414	40	13
72000	186	71814	41	13
17200	186	17014	42	13
452	573	-121	42	14
5030	573	4457	43	14
3240	573	2667	44	14
25300	573	24727	45	14
21500	573	20927	46	14
56600	573	56027	47	14
72000	573	71427	48	14
17200	573	16627	49	14
5030	452	4578	50	14
3240	452	2788	51	14
25300	452	24848	52	14
21500	452	21048	53	14
56600	452	56148	54	14
72000	452	71548	55	14
17200	452	16748	56	14
3240	5030	-1790	56	15
25300	5030	20270	57	15
21500	5030	16470	58	15
56600	5030	51570	59	15
72000	5030	66970	60	15
17200	5030	12170	61	15
25300	3240	22060	62	15
21500	3240	18260	63	15
56600	3240	53360	64	15
72000	3240	68760	65	15
17200	3240	13960	66	15
21500	25300	-3800	66	16
56600	25300	31300	67	16
72000	25300	46700	68	16
17200	25300	-8100	68	17
56600	21500	35100	69	17
72000	21500	50500	70	17
17200	21500	-4300	70	18
72000	56600	15400	71	18
17200	56600	-39400	71	19
17200	72000	-54800	71	20

S Statistic = 71 - 20 = 51

Tied Group	Value	Members
Time Period		Observations
8/1/2017		1
9/1/2017		1
10/1/2017		1
11/1/2017		1
12/1/2017		1
1/1/2018		1
4/1/2018		1
8/1/2018		1
10/1/2018		1
12/1/2018		1
3/1/2019		1
6/1/2019		1
9/1/2019		1
12/1/2019		1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 2.73724

Comparison Level at 95% confidence level = 1.65463 (upward trend)

2.73724 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW03-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
9240	9740	-500	0	1
7830	9740	-1910	0	2
2960	9740	-6780	0	3
2440	9740	-7300	0	4
8330	9740	-1410	0	5
10900	9740	1160	1	5
9340	9740	-400	1	6
1810	9740	-7930	1	7
1750	9740	-7990	1	8
6270	9740	-3470	1	9
12700	9740	2960	2	9
6920	9740	-2820	2	10
9710	9740	-30	2	11
13000	9740	3260	3	11
14900	9740	5160	4	11
6720	9740	-3020	4	12
13300	9740	3560	5	12
10500	9740	760	6	12
16200	9740	6460	7	12
7830	9240	-1410	7	13
2960	9240	-6280	7	14
2440	9240	-6800	7	15
8330	9240	-910	7	16
10900	9240	1660	8	16
9340	9240	100	9	16
1810	9240	-7430	9	17
1750	9240	-7490	9	18
6270	9240	-2970	9	19
12700	9240	3460	10	19
6920	9240	-2320	10	20
9710	9240	470	11	20
13000	9240	3760	12	20
14900	9240	5660	13	20
6720	9240	-2520	13	21
13300	9240	4060	14	21
10500	9240	1260	15	21
16200	9240	6960	16	21
2960	7830	-4870	16	22
2440	7830	-5390	16	23
8330	7830	500	17	23
10900	7830	3070	18	23
9340	7830	1510	19	23
1810	7830	-6020	19	24
1750	7830	-6080	19	25
6270	7830	-1560	19	26

12700	7830	4870	20	26
6920	7830	-910	20	27
9710	7830	1880	21	27
13000	7830	5170	22	27
14900	7830	7070	23	27
6720	7830	-1110	23	28
13300	7830	5470	24	28
10500	7830	2670	25	28
16200	7830	8370	26	28
2440	2960	-520	26	29
8330	2960	5370	27	29
10900	2960	7940	28	29
9340	2960	6380	29	29
1810	2960	-1150	29	30
1750	2960	-1210	29	31
6270	2960	3310	30	31
12700	2960	9740	31	31
6920	2960	3960	32	31
9710	2960	6750	33	31
13000	2960	10040	34	31
14900	2960	11940	35	31
6720	2960	3760	36	31
13300	2960	10340	37	31
10500	2960	7540	38	31
16200	2960	13240	39	31
8330	2440	5890	40	31
10900	2440	8460	41	31
9340	2440	6900	42	31
1810	2440	-630	42	32
1750	2440	-690	42	33
6270	2440	3830	43	33
12700	2440	10260	44	33
6920	2440	4480	45	33
9710	2440	7270	46	33
13000	2440	10560	47	33
14900	2440	12460	48	33
6720	2440	4280	49	33
13300	2440	10860	50	33
10500	2440	8060	51	33
16200	2440	13760	52	33
10900	8330	2570	53	33
9340	8330	1010	54	33
1810	8330	-6520	54	34
1750	8330	-6580	54	35
6270	8330	-2060	54	36
12700	8330	4370	55	36
6920	8330	-1410	55	37
9710	8330	1380	56	37
13000	8330	4670	57	37
14900	8330	6570	58	37
6720	8330	-1610	58	38
13300	8330	4970	59	38
10500	8330	2170	60	38
16200	8330	7870	61	38

9340	10900	-1560	61	39
1810	10900	-9090	61	40
1750	10900	-9150	61	41
6270	10900	-4630	61	42
12700	10900	1800	62	42
6920	10900	-3980	62	43
9710	10900	-1190	62	44
13000	10900	2100	63	44
14900	10900	4000	64	44
6720	10900	-4180	64	45
13300	10900	2400	65	45
10500	10900	-400	65	46
16200	10900	5300	66	46
1810	9340	-7530	66	47
1750	9340	-7590	66	48
6270	9340	-3070	66	49
12700	9340	3360	67	49
6920	9340	-2420	67	50
9710	9340	370	68	50
13000	9340	3660	69	50
14900	9340	5560	70	50
6720	9340	-2620	70	51
13300	9340	3960	71	51
10500	9340	1160	72	51
16200	9340	6860	73	51
1750	1810	-60	73	52
6270	1810	4460	74	52
12700	1810	10890	75	52
6920	1810	5110	76	52
9710	1810	7900	77	52
13000	1810	11190	78	52
14900	1810	13090	79	52
6720	1810	4910	80	52
13300	1810	11490	81	52
10500	1810	8690	82	52
16200	1810	14390	83	52
6270	1750	4520	84	52
12700	1750	10950	85	52
6920	1750	5170	86	52
9710	1750	7960	87	52
13000	1750	11250	88	52
14900	1750	13150	89	52
6720	1750	4970	90	52
13300	1750	11550	91	52
10500	1750	8750	92	52
16200	1750	14450	93	52
12700	6270	6430	94	52
6920	6270	650	95	52
9710	6270	3440	96	52
13000	6270	6730	97	52
14900	6270	8630	98	52
6720	6270	450	99	52

13300	6270	7030	100	52
10500	6270	4230	101	52
16200	6270	9930	102	52
6920	12700	-5780	102	53
9710	12700	-2990	102	54
13000	12700	300	103	54
14900	12700	2200	104	54
6720	12700	-5980	104	55
13300	12700	600	105	55
10500	12700	-2200	105	56
16200	12700	3500	106	56
9710	6920	2790	107	56
13000	6920	6080	108	56
14900	6920	7980	109	56
6720	6920	-200	109	57
13300	6920	6380	110	57
10500	6920	3580	111	57
16200	6920	9280	112	57
13000	9710	3290	113	57
14900	9710	5190	114	57
6720	9710	-2990	114	58
13300	9710	3590	115	58
10500	9710	790	116	58
16200	9710	6490	117	58
14900	13000	1900	118	58
6720	13000	-6280	118	59
13300	13000	300	119	59
10500	13000	-2500	119	60
16200	13000	3200	120	60
6720	14900	-8180	120	61
13300	14900	-1600	120	62
10500	14900	-4400	120	63
16200	14900	1300	121	63
13300	6720	6580	122	63
10500	6720	3780	123	63
16200	6720	9480	124	63
10500	13300	-2800	124	64
16200	13300	2900	125	64
16200	10500	5700	126	64

S Statistic = 126 - 64 = 62

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 1.9791

Comparison Level at 95% confidence level = 1.65463 (upward trend)

1.9791 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis
Parameter: Zinc
Location: RW06-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1680	1900	-220	0	1
1420	1900	-480	0	2
999	1900	-901	0	3
876	1900	-1024	0	4
1690	1900	-210	0	5
1340	1900	-560	0	6
508	1900	-1392	0	7
615	1900	-1285	0	8
909	1900	-991	0	9
1360	1900	-540	0	10
1950	1900	50	1	10
27900	1900	26000	2	10
191	1900	-1709	2	11
90100	1900	88200	3	11
99600	1900	97700	4	11
122000	1900	120100	5	11
108000	1900	106100	6	11
122000	1900	120100	7	11
116000	1900	114100	8	11
1420	1680	-260	8	12
999	1680	-681	8	13
876	1680	-804	8	14
1690	1680	10	9	14
1340	1680	-340	9	15
508	1680	-1172	9	16
615	1680	-1065	9	17
909	1680	-771	9	18
1360	1680	-320	9	19
1950	1680	270	10	19
27900	1680	26220	11	19
191	1680	-1489	11	20
90100	1680	88420	12	20
99600	1680	97920	13	20
122000	1680	120320	14	20
108000	1680	106320	15	20
122000	1680	120320	16	20
116000	1680	114320	17	20
999	1420	-421	17	21
876	1420	-544	17	22
1690	1420	270	18	22
1340	1420	-80	18	23
508	1420	-912	18	24
615	1420	-805	18	25
909	1420	-511	18	26
1360	1420	-60	18	27

1950	1420	530	19	27
27900	1420	26480	20	27
191	1420	-1229	20	28
90100	1420	88680	21	28
99600	1420	98180	22	28
122000	1420	120580	23	28
108000	1420	106580	24	28
122000	1420	120580	25	28
116000	1420	114580	26	28
876	999	-123	26	29
1690	999	691	27	29
1340	999	341	28	29
508	999	-491	28	30
615	999	-384	28	31
909	999	-90	28	32
1360	999	361	29	32
1950	999	951	30	32
27900	999	26901	31	32
191	999	-808	31	33
90100	999	89101	32	33
99600	999	98601	33	33
122000	999	121001	34	33
108000	999	107001	35	33
122000	999	121001	36	33
116000	999	115001	37	33
1690	876	814	38	33
1340	876	464	39	33
508	876	-368	39	34
615	876	-261	39	35
909	876	33	40	35
1360	876	484	41	35
1950	876	1074	42	35
27900	876	27024	43	35
191	876	-685	43	36
90100	876	89224	44	36
99600	876	98724	45	36
122000	876	121124	46	36
108000	876	107124	47	36
122000	876	121124	48	36
116000	876	115124	49	36
1340	1690	-350	49	37
508	1690	-1182	49	38
615	1690	-1075	49	39
909	1690	-781	49	40
1360	1690	-330	49	41
1950	1690	260	50	41
27900	1690	26210	51	41
191	1690	-1499	51	42
90100	1690	88410	52	42
99600	1690	97910	53	42
122000	1690	120310	54	42
108000	1690	106310	55	42
122000	1690	120310	56	42
116000	1690	114310	57	42

508	1340	-832	57	43
615	1340	-725	57	44
909	1340	-431	57	45
1360	1340	20	58	45
1950	1340	610	59	45
27900	1340	26560	60	45
191	1340	-1149	60	46
90100	1340	88760	61	46
99600	1340	98260	62	46
122000	1340	120660	63	46
108000	1340	106660	64	46
122000	1340	120660	65	46
116000	1340	114660	66	46
615	508	107	67	46
909	508	401	68	46
1360	508	852	69	46
1950	508	1442	70	46
27900	508	27392	71	46
191	508	-317	71	47
90100	508	89592	72	47
99600	508	99092	73	47
122000	508	121492	74	47
108000	508	107492	75	47
122000	508	121492	76	47
116000	508	115492	77	47
909	615	294	78	47
1360	615	745	79	47
1950	615	1335	80	47
27900	615	27285	81	47
191	615	-424	81	48
90100	615	89485	82	48
99600	615	98985	83	48
122000	615	121385	84	48
108000	615	107385	85	48
122000	615	121385	86	48
116000	615	115385	87	48
1360	909	451	88	48
1950	909	1041	89	48
27900	909	26991	90	48
191	909	-718	90	49
90100	909	89191	91	49
99600	909	98691	92	49
122000	909	121091	93	49
108000	909	107091	94	49
122000	909	121091	95	49
116000	909	115091	96	49
1950	1360	590	97	49
27900	1360	26540	98	49
191	1360	-1169	98	50
90100	1360	88740	99	50
99600	1360	98240	100	50
122000	1360	120640	101	50

108000	1360	106640	102	50
122000	1360	120640	103	50
116000	1360	114640	104	50
27900	1950	25950	105	50
191	1950	-1759	105	51
90100	1950	88150	106	51
99600	1950	97650	107	51
122000	1950	120050	108	51
108000	1950	106050	109	51
122000	1950	120050	110	51
116000	1950	114050	111	51
191	27900	-27709	111	52
90100	27900	62200	112	52
99600	27900	71700	113	52
122000	27900	94100	114	52
108000	27900	80100	115	52
122000	27900	94100	116	52
116000	27900	88100	117	52
90100	191	89909	118	52
99600	191	99409	119	52
122000	191	121809	120	52
108000	191	107809	121	52
122000	191	121809	122	52
116000	191	115809	123	52
99600	90100	9500	124	52
122000	90100	31900	125	52
108000	90100	17900	126	52
122000	90100	31900	127	52
116000	90100	25900	128	52
122000	99600	22400	129	52
108000	99600	8400	130	52
122000	99600	22400	131	52
116000	99600	16400	132	52
108000	122000	-14000	132	53
122000	122000	0	132	53
116000	122000	-6000	132	54
122000	108000	14000	133	54
116000	108000	8000	134	54
116000	122000	-6000	134	55

S Statistic = 134 - 55 = 79

Tied Group	Value	Members
1	122000	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = 2.53199

Comparison Level at 95% confidence level = 1.65463 (upward trend)

2.53199 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis
Parameter: Zinc
Location: RW07-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1210	944	266	1	0
364	944	-580	1	1
298	944	-646	1	2
432	944	-512	1	3
45.7	944	-898.3	1	4
62.7	944	-881.3	1	5
2840	944	1896	2	5
23.4	944	-920.6	2	6
1650	944	706	3	6
39.8	944	-904.2	3	7
70.6	944	-873.4	3	8
756	944	-188	3	9
26300	944	25356	4	9
12200	944	11256	5	9
86000	944	85056	6	9
24200	944	23256	7	9
136000	944	135056	8	9
48300	944	47356	9	9
16600	944	15656	10	9
364	1210	-846	10	10
298	1210	-912	10	11
432	1210	-778	10	12
45.7	1210	-1164.3	10	13
62.7	1210	-1147.3	10	14
2840	1210	1630	11	14
23.4	1210	-1186.6	11	15
1650	1210	440	12	15
39.8	1210	-1170.2	12	16
70.6	1210	-1139.4	12	17
756	1210	-454	12	18
26300	1210	25090	13	18
12200	1210	10990	14	18
86000	1210	84790	15	18
24200	1210	22990	16	18
136000	1210	134790	17	18
48300	1210	47090	18	18
16600	1210	15390	19	18
298	364	-66	19	19
432	364	68	20	19
45.7	364	-318.3	20	20
62.7	364	-301.3	20	21
2840	364	2476	21	21
23.4	364	-340.6	21	22
1650	364	1286	22	22
39.8	364	-324.2	22	23

70.6	364	-293.4	22	24
756	364	392	23	24
26300	364	25936	24	24
12200	364	11836	25	24
86000	364	85636	26	24
24200	364	23836	27	24
136000	364	135636	28	24
48300	364	47936	29	24
16600	364	16236	30	24
432	298	134	31	24
45.7	298	-252.3	31	25
62.7	298	-235.3	31	26
2840	298	2542	32	26
23.4	298	-274.6	32	27
1650	298	1352	33	27
39.8	298	-258.2	33	28
70.6	298	-227.4	33	29
756	298	458	34	29
26300	298	26002	35	29
12200	298	11902	36	29
86000	298	85702	37	29
24200	298	23902	38	29
136000	298	135702	39	29
48300	298	48002	40	29
16600	298	16302	41	29
45.7	432	-386.3	41	30
62.7	432	-369.3	41	31
2840	432	2408	42	31
23.4	432	-408.6	42	32
1650	432	1218	43	32
39.8	432	-392.2	43	33
70.6	432	-361.4	43	34
756	432	324	44	34
26300	432	25868	45	34
12200	432	11768	46	34
86000	432	85568	47	34
24200	432	23768	48	34
136000	432	135568	49	34
48300	432	47868	50	34
16600	432	16168	51	34
62.7	45.7	17	52	34
2840	45.7	2794.3	53	34
23.4	45.7	-22.3	53	35
1650	45.7	1604.3	54	35
39.8	45.7	-5.9	54	36
70.6	45.7	24.9	55	36
756	45.7	710.3	56	36
26300	45.7	26254.3	57	36
12200	45.7	12154.3	58	36
86000	45.7	85954.3	59	36
24200	45.7	24154.3	60	36
136000	45.7	135954	61	36
48300	45.7	48254.3	62	36
16600	45.7	16554.3	63	36

2840	62.7	2777.3	64	36
23.4	62.7	-39.3	64	37
1650	62.7	1587.3	65	37
39.8	62.7	-22.9	65	38
70.6	62.7	7.9	66	38
756	62.7	693.3	67	38
26300	62.7	26237.3	68	38
12200	62.7	12137.3	69	38
86000	62.7	85937.3	70	38
24200	62.7	24137.3	71	38
136000	62.7	135937	72	38
48300	62.7	48237.3	73	38
16600	62.7	16537.3	74	38
23.4	2840	-2816.6	74	39
1650	2840	-1190	74	40
39.8	2840	-2800.2	74	41
70.6	2840	-2769.4	74	42
756	2840	-2084	74	43
26300	2840	23460	75	43
12200	2840	9360	76	43
86000	2840	83160	77	43
24200	2840	21360	78	43
136000	2840	133160	79	43
48300	2840	45460	80	43
16600	2840	13760	81	43
1650	23.4	1626.6	82	43
39.8	23.4	16.4	83	43
70.6	23.4	47.2	84	43
756	23.4	732.6	85	43
26300	23.4	26276.6	86	43
12200	23.4	12176.6	87	43
86000	23.4	85976.6	88	43
24200	23.4	24176.6	89	43
136000	23.4	135977	90	43
48300	23.4	48276.6	91	43
16600	23.4	16576.6	92	43
39.8	1650	-1610.2	92	44
70.6	1650	-1579.4	92	45
756	1650	-894	92	46
26300	1650	24650	93	46
12200	1650	10550	94	46
86000	1650	84350	95	46
24200	1650	22550	96	46
136000	1650	134350	97	46
48300	1650	46650	98	46
16600	1650	14950	99	46
70.6	39.8	30.8	100	46
756	39.8	716.2	101	46
26300	39.8	26260.2	102	46
12200	39.8	12160.2	103	46
86000	39.8	85960.2	104	46
24200	39.8	24160.2	105	46

136000	39.8	135960	106	46
48300	39.8	48260.2	107	46
16600	39.8	16560.2	108	46
756	70.6	685.4	109	46
26300	70.6	26229.4	110	46
12200	70.6	12129.4	111	46
86000	70.6	85929.4	112	46
24200	70.6	24129.4	113	46
136000	70.6	135929	114	46
48300	70.6	48229.4	115	46
16600	70.6	16529.4	116	46
26300	756	25544	117	46
12200	756	11444	118	46
86000	756	85244	119	46
24200	756	23444	120	46
136000	756	135244	121	46
48300	756	47544	122	46
16600	756	15844	123	46
12200	26300	-14100	123	47
86000	26300	59700	124	47
24200	26300	-2100	124	48
136000	26300	109700	125	48
48300	26300	22000	126	48
16600	26300	-9700	126	49
86000	12200	73800	127	49
24200	12200	12000	128	49
136000	12200	123800	129	49
48300	12200	36100	130	49
16600	12200	4400	131	49
24200	86000	-61800	131	50
136000	86000	50000	132	50
48300	86000	-37700	132	51
16600	86000	-69400	132	52
136000	24200	111800	133	52
48300	24200	24100	134	52
16600	24200	-7600	134	53
48300	136000	-87700	134	54
16600	136000	-119400	134	55
16600	48300	-31700	134	56

S Statistic = 134 - 56 = 78

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 2.49821

Comparison Level at 95% confidence level = 1.65463 (upward trend)

2.49821 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW08-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
44.6	178	-133.4	0	1
85	178	-93	0	2
188	178	10	1	2
71.9	178	-106.1	1	3
153	178	-25	1	4
49.8	178	-128.2	1	5
69.4	178	-108.6	1	6
16.9	178	-161.1	1	7
21.5	178	-156.5	1	8
21.4	178	-156.6	1	9
108	178	-70	1	10
1050	178	872	2	10
2540	178	2362	3	10
256	178	78	4	10
11	178	-167	4	11
10 U	178	-168	4	12
10 U	178	-168	4	13
11.2	178	-166.8	4	14
48.9	178	-129.1	4	15
85	44.6	40.4	5	15
188	44.6	143.4	6	15
71.9	44.6	27.3	7	15
153	44.6	108.4	8	15
49.8	44.6	5.2	9	15
69.4	44.6	24.8	10	15
16.9	44.6	-27.7	10	16
21.5	44.6	-23.1	10	17
21.4	44.6	-23.2	10	18
108	44.6	63.4	11	18
1050	44.6	1005.4	12	18
2540	44.6	2495.4	13	18
256	44.6	211.4	14	18
11	44.6	-33.6	14	19
10 U	44.6	-34.6	14	20
10 U	44.6	-34.6	14	21
11.2	44.6	-33.4	14	22
48.9	44.6	4.3	15	22
188	85	103	16	22
71.9	85	-13.1	16	23
153	85	68	17	23
49.8	85	-35.2	17	24
69.4	85	-15.6	17	25
16.9	85	-68.1	17	26
21.5	85	-63.5	17	27
21.4	85	-63.6	17	28

108	85	23	18	28
1050	85	965	19	28
2540	85	2455	20	28
256	85	171	21	28
11	85	-74	21	29
10 U	85	-75	21	30
10 U	85	-75	21	31
11.2	85	-73.8	21	32
48.9	85	-36.1	21	33
71.9	188	-116.1	21	34
153	188	-35	21	35
49.8	188	-138.2	21	36
69.4	188	-118.6	21	37
16.9	188	-171.1	21	38
21.5	188	-166.5	21	39
21.4	188	-166.6	21	40
108	188	-80	21	41
1050	188	862	22	41
2540	188	2352	23	41
256	188	68	24	41
11	188	-177	24	42
10 U	188	-178	24	43
10 U	188	-178	24	44
11.2	188	-176.8	24	45
48.9	188	-139.1	24	46
153	71.9	81.1	25	46
49.8	71.9	-22.1	25	47
69.4	71.9	-2.5	25	48
16.9	71.9	-55	25	49
21.5	71.9	-50.4	25	50
21.4	71.9	-50.5	25	51
108	71.9	36.1	26	51
1050	71.9	978.1	27	51
2540	71.9	2468.1	28	51
256	71.9	184.1	29	51
11	71.9	-60.9	29	52
10 U	71.9	-61.9	29	53
10 U	71.9	-61.9	29	54
11.2	71.9	-60.7	29	55
48.9	71.9	-23	29	56
49.8	153	-103.2	29	57
69.4	153	-83.6	29	58
16.9	153	-136.1	29	59
21.5	153	-131.5	29	60
21.4	153	-131.6	29	61
108	153	-45	29	62
1050	153	897	30	62
2540	153	2387	31	62
256	153	103	32	62
11	153	-142	32	63
10 U	153	-143	32	64
10 U	153	-143	32	65
11.2	153	-141.8	32	66
48.9	153	-104.1	32	67

69.4	49.8	19.6	33	67
16.9	49.8	-32.9	33	68
21.5	49.8	-28.3	33	69
21.4	49.8	-28.4	33	70
108	49.8	58.2	34	70
1050	49.8	1000.2	35	70
2540	49.8	2490.2	36	70
256	49.8	206.2	37	70
11	49.8	-38.8	37	71
10 U	49.8	-39.8	37	72
10 U	49.8	-39.8	37	73
11.2	49.8	-38.6	37	74
48.9	49.8	-0.9	37	75
16.9	69.4	-52.5	37	76
21.5	69.4	-47.9	37	77
21.4	69.4	-48	37	78
108	69.4	38.6	38	78
1050	69.4	980.6	39	78
2540	69.4	2470.6	40	78
256	69.4	186.6	41	78
11	69.4	-58.4	41	79
10 U	69.4	-59.4	41	80
10 U	69.4	-59.4	41	81
11.2	69.4	-58.2	41	82
48.9	69.4	-20.5	41	83
21.5	16.9	4.6	42	83
21.4	16.9	4.5	43	83
108	16.9	91.1	44	83
1050	16.9	1033.1	45	83
2540	16.9	2523.1	46	83
256	16.9	239.1	47	83
11	16.9	-5.9	47	84
10 U	16.9	-6.9	47	85
10 U	16.9	-6.9	47	86
11.2	16.9	-5.7	47	87
48.9	16.9	32	48	87
21.4	21.5	-0.1	48	88
108	21.5	86.5	49	88
1050	21.5	1028.5	50	88
2540	21.5	2518.5	51	88
256	21.5	234.5	52	88
11	21.5	-10.5	52	89
10 U	21.5	-11.5	52	90
10 U	21.5	-11.5	52	91
11.2	21.5	-10.3	52	92
48.9	21.5	27.4	53	92
108	21.4	86.6	54	92
1050	21.4	1028.6	55	92
2540	21.4	2518.6	56	92
256	21.4	234.6	57	92
11	21.4	-10.4	57	93
10 U	21.4	-11.4	57	94

10 U	21.4	-11.4	57	95
11.2	21.4	-10.2	57	96
48.9	21.4	27.5	58	96
1050	108	942	59	96
2540	108	2432	60	96
256	108	148	61	96
11	108	-97	61	97
10 U	108	-98	61	98
10 U	108	-98	61	99
11.2	108	-96.8	61	100
48.9	108	-59.1	61	101
2540	1050	1490	62	101
256	1050	-794	62	102
11	1050	-1039	62	103
10 U	1050	-1040	62	104
10 U	1050	-1040	62	105
11.2	1050	-1038.8	62	106
48.9	1050	-1001.1	62	107
256	2540	-2284	62	108
11	2540	-2529	62	109
10 U	2540	-2530	62	110
10 U	2540	-2530	62	111
11.2	2540	-2528.8	62	112
48.9	2540	-2491.1	62	113
11	256	-245	62	114
10 U	256	-246	62	115
10 U	256	-246	62	116
11.2	256	-244.8	62	117
48.9	256	-207.1	62	118
10 U	11	-1	62	119
10 U	11	-1	62	120
11.2	11	0.2	63	120
48.9	11	37.9	64	120
10 U	10 U	0	64	120
11.2	10 U	1.2	65	120
48.9	10 U	38.9	66	120
11.2	10 U	1.2	67	120
48.9	10 U	38.9	68	120
48.9	11.2	37.7	69	120

S Statistic = 69 - 120 = -51

Tied Group	Value	Members
1	10	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = -1.62307

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-1.62307 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW09-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
51900	51000	900	1	0
57500	51000	6500	2	0
57200	51000	6200	3	0
51900	51000	900	4	0
65600	51000	14600	5	0
55500	51000	4500	6	0
39400	51000	-11600	6	1
49700	51000	-1300	6	2
67900	51000	16900	7	2
44500	51000	-6500	7	3
54700	51000	3700	8	3
38400	51000	-12600	8	4
54700	51000	3700	9	4
53800	51000	2800	10	4
66600	51000	15600	11	4
57500	51000	6500	12	4
64200	51000	13200	13	4
53300	51000	2300	14	4
82000	51000	31000	15	4
57500	51900	5600	16	4
57200	51900	5300	17	4
51900	51900	0	17	4
65600	51900	13700	18	4
55500	51900	3600	19	4
39400	51900	-12500	19	5
49700	51900	-2200	19	6
67900	51900	16000	20	6
44500	51900	-7400	20	7
54700	51900	2800	21	7
38400	51900	-13500	21	8
54700	51900	2800	22	8
53800	51900	1900	23	8
66600	51900	14700	24	8
57500	51900	5600	25	8
64200	51900	12300	26	8
53300	51900	1400	27	8
82000	51900	30100	28	8
57200	57500	-300	28	9
51900	57500	-5600	28	10
65600	57500	8100	29	10
55500	57500	-2000	29	11
39400	57500	-18100	29	12
49700	57500	-7800	29	13
67900	57500	10400	30	13
44500	57500	-13000	30	14

54700	57500	-2800	30	15
38400	57500	-19100	30	16
54700	57500	-2800	30	17
53800	57500	-3700	30	18
66600	57500	9100	31	18
57500	57500	0	31	18
64200	57500	6700	32	18
53300	57500	-4200	32	19
82000	57500	24500	33	19
51900	57200	-5300	33	20
65600	57200	8400	34	20
55500	57200	-1700	34	21
39400	57200	-17800	34	22
49700	57200	-7500	34	23
67900	57200	10700	35	23
44500	57200	-12700	35	24
54700	57200	-2500	35	25
38400	57200	-18800	35	26
54700	57200	-2500	35	27
53800	57200	-3400	35	28
66600	57200	9400	36	28
57500	57200	300	37	28
64200	57200	7000	38	28
53300	57200	-3900	38	29
82000	57200	24800	39	29
65600	51900	13700	40	29
55500	51900	3600	41	29
39400	51900	-12500	41	30
49700	51900	-2200	41	31
67900	51900	16000	42	31
44500	51900	-7400	42	32
54700	51900	2800	43	32
38400	51900	-13500	43	33
54700	51900	2800	44	33
53800	51900	1900	45	33
66600	51900	14700	46	33
57500	51900	5600	47	33
64200	51900	12300	48	33
53300	51900	1400	49	33
82000	51900	30100	50	33
55500	65600	-10100	50	34
39400	65600	-26200	50	35
49700	65600	-15900	50	36
67900	65600	2300	51	36
44500	65600	-21100	51	37
54700	65600	-10900	51	38
38400	65600	-27200	51	39
54700	65600	-10900	51	40
53800	65600	-11800	51	41
66600	65600	1000	52	41
57500	65600	-8100	52	42
64200	65600	-1400	52	43
53300	65600	-12300	52	44
82000	65600	16400	53	44

39400	55500	-16100	53	45
49700	55500	-5800	53	46
67900	55500	12400	54	46
44500	55500	-11000	54	47
54700	55500	-800	54	48
38400	55500	-17100	54	49
54700	55500	-800	54	50
53800	55500	-1700	54	51
66600	55500	11100	55	51
57500	55500	2000	56	51
64200	55500	8700	57	51
53300	55500	-2200	57	52
82000	55500	26500	58	52
49700	39400	10300	59	52
67900	39400	28500	60	52
44500	39400	5100	61	52
54700	39400	15300	62	52
38400	39400	-1000	62	53
54700	39400	15300	63	53
53800	39400	14400	64	53
66600	39400	27200	65	53
57500	39400	18100	66	53
64200	39400	24800	67	53
53300	39400	13900	68	53
82000	39400	42600	69	53
67900	49700	18200	70	53
44500	49700	-5200	70	54
54700	49700	5000	71	54
38400	49700	-11300	71	55
54700	49700	5000	72	55
53800	49700	4100	73	55
66600	49700	16900	74	55
57500	49700	7800	75	55
64200	49700	14500	76	55
53300	49700	3600	77	55
82000	49700	32300	78	55
44500	67900	-23400	78	56
54700	67900	-13200	78	57
38400	67900	-29500	78	58
54700	67900	-13200	78	59
53800	67900	-14100	78	60
66600	67900	-1300	78	61
57500	67900	-10400	78	62
64200	67900	-3700	78	63
53300	67900	-14600	78	64
82000	67900	14100	79	64
54700	44500	10200	80	64
38400	44500	-6100	80	65
54700	44500	10200	81	65
53800	44500	9300	82	65
66600	44500	22100	83	65
57500	44500	13000	84	65

64200	44500	19700	85	65
53300	44500	8800	86	65
82000	44500	37500	87	65
38400	54700	-16300	87	66
54700	54700	0	87	66
53800	54700	-900	87	67
66600	54700	11900	88	67
57500	54700	2800	89	67
64200	54700	9500	90	67
53300	54700	-1400	90	68
82000	54700	27300	91	68
54700	38400	16300	92	68
53800	38400	15400	93	68
66600	38400	28200	94	68
57500	38400	19100	95	68
64200	38400	25800	96	68
53300	38400	14900	97	68
82000	38400	43600	98	68
53800	54700	-900	98	69
66600	54700	11900	99	69
57500	54700	2800	100	69
64200	54700	9500	101	69
53300	54700	-1400	101	70
82000	54700	27300	102	70
66600	53800	12800	103	70
57500	53800	3700	104	70
64200	53800	10400	105	70
53300	53800	-500	105	71
82000	53800	28200	106	71
57500	66600	-9100	106	72
64200	66600	-2400	106	73
53300	66600	-13300	106	74
82000	66600	15400	107	74
64200	57500	6700	108	74
53300	57500	-4200	108	75
82000	57500	24500	109	75
53300	64200	-10900	109	76
82000	64200	17800	110	76
82000	53300	28700	111	76

S Statistic = 111 - 76 = 35

Tied Group	Value	Members
1	51900	2
2	57500	2
3	54700	2

Time Period **Observations**

2/1/2017	1
3/1/2017	1
4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 54

B = 0

C = 0

D = 0

E = 6

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 947

Z-Score = 1.10485

Comparison Level at 95% confidence level = 1.65463 (upward trend)

1.10485 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Zinc
Location: RW10-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
20.4	104000	-103980	0	1
75800	104000	-28200	0	2
1150	104000	-102850	0	3
34600	104000	-69400	0	4
25900	104000	-78100	0	5
79.7	104000	-103920	0	6
8220	104000	-95780	0	7
31000	104000	-73000	0	8
39000	104000	-65000	0	9
158	104000	-103842	0	10
26.5	104000	-103974	0	11
13500	104000	-90500	0	12
17600	104000	-86400	0	13
16600	104000	-87400	0	14
2520	104000	-101480	0	15
591	104000	-103409	0	16
5560	104000	-98440	0	17
7730	104000	-96270	0	18
6020	104000	-97980	0	19
75800	20.4	75779.6	1	19
1150	20.4	1129.6	2	19
34600	20.4	34579.6	3	19
25900	20.4	25879.6	4	19
79.7	20.4	59.3	5	19
8220	20.4	8199.6	6	19
31000	20.4	30979.6	7	19
39000	20.4	38979.6	8	19
158	20.4	137.6	9	19
26.5	20.4	6.1	10	19
13500	20.4	13479.6	11	19
17600	20.4	17579.6	12	19
16600	20.4	16579.6	13	19
2520	20.4	2499.6	14	19
591	20.4	570.6	15	19
5560	20.4	5539.6	16	19
7730	20.4	7709.6	17	19
6020	20.4	5999.6	18	19
1150	75800	-74650	18	20
34600	75800	-41200	18	21
25900	75800	-49900	18	22
79.7	75800	-75720.3	18	23
8220	75800	-67580	18	24
31000	75800	-44800	18	25
39000	75800	-36800	18	26
158	75800	-75642	18	27

26.5	75800	-75773.5	18	28
13500	75800	-62300	18	29
17600	75800	-58200	18	30
16600	75800	-59200	18	31
2520	75800	-73280	18	32
591	75800	-75209	18	33
5560	75800	-70240	18	34
7730	75800	-68070	18	35
6020	75800	-69780	18	36
34600	1150	33450	19	36
25900	1150	24750	20	36
79.7	1150	-1070.3	20	37
8220	1150	7070	21	37
31000	1150	29850	22	37
39000	1150	37850	23	37
158	1150	-992	23	38
26.5	1150	-1123.5	23	39
13500	1150	12350	24	39
17600	1150	16450	25	39
16600	1150	15450	26	39
2520	1150	1370	27	39
591	1150	-559	27	40
5560	1150	4410	28	40
7730	1150	6580	29	40
6020	1150	4870	30	40
25900	34600	-8700	30	41
79.7	34600	-34520.3	30	42
8220	34600	-26380	30	43
31000	34600	-3600	30	44
39000	34600	4400	31	44
158	34600	-34442	31	45
26.5	34600	-34573.5	31	46
13500	34600	-21100	31	47
17600	34600	-17000	31	48
16600	34600	-18000	31	49
2520	34600	-32080	31	50
591	34600	-34009	31	51
5560	34600	-29040	31	52
7730	34600	-26870	31	53
6020	34600	-28580	31	54
79.7	25900	-25820.3	31	55
8220	25900	-17680	31	56
31000	25900	5100	32	56
39000	25900	13100	33	56
158	25900	-25742	33	57
26.5	25900	-25873.5	33	58
13500	25900	-12400	33	59
17600	25900	-8300	33	60
16600	25900	-9300	33	61
2520	25900	-23380	33	62
591	25900	-25309	33	63
5560	25900	-20340	33	64
7730	25900	-18170	33	65
6020	25900	-19880	33	66

8220	79.7	8140.3	34	66
31000	79.7	30920.3	35	66
39000	79.7	38920.3	36	66
158	79.7	78.3	37	66
26.5	79.7	-53.2	37	67
13500	79.7	13420.3	38	67
17600	79.7	17520.3	39	67
16600	79.7	16520.3	40	67
2520	79.7	2440.3	41	67
591	79.7	511.3	42	67
5560	79.7	5480.3	43	67
7730	79.7	7650.3	44	67
6020	79.7	5940.3	45	67
31000	8220	22780	46	67
39000	8220	30780	47	67
158	8220	-8062	47	68
26.5	8220	-8193.5	47	69
13500	8220	5280	48	69
17600	8220	9380	49	69
16600	8220	8380	50	69
2520	8220	-5700	50	70
591	8220	-7629	50	71
5560	8220	-2660	50	72
7730	8220	-490	50	73
6020	8220	-2200	50	74
39000	31000	8000	51	74
158	31000	-30842	51	75
26.5	31000	-30973.5	51	76
13500	31000	-17500	51	77
17600	31000	-13400	51	78
16600	31000	-14400	51	79
2520	31000	-28480	51	80
591	31000	-30409	51	81
5560	31000	-25440	51	82
7730	31000	-23270	51	83
6020	31000	-24980	51	84
158	39000	-38842	51	85
26.5	39000	-38973.5	51	86
13500	39000	-25500	51	87
17600	39000	-21400	51	88
16600	39000	-22400	51	89
2520	39000	-36480	51	90
591	39000	-38409	51	91
5560	39000	-33440	51	92
7730	39000	-31270	51	93
6020	39000	-32980	51	94
26.5	158	-131.5	51	95
13500	158	13342	52	95
17600	158	17442	53	95
16600	158	16442	54	95
2520	158	2362	55	95
591	158	433	56	95

5560	158	5402	57	95
7730	158	7572	58	95
6020	158	5862	59	95
13500	26.5	13473.5	60	95
17600	26.5	17573.5	61	95
16600	26.5	16573.5	62	95
2520	26.5	2493.5	63	95
591	26.5	564.5	64	95
5560	26.5	5533.5	65	95
7730	26.5	7703.5	66	95
6020	26.5	5993.5	67	95
17600	13500	4100	68	95
16600	13500	3100	69	95
2520	13500	-10980	69	96
591	13500	-12909	69	97
5560	13500	-7940	69	98
7730	13500	-5770	69	99
6020	13500	-7480	69	100
16600	17600	-1000	69	101
2520	17600	-15080	69	102
591	17600	-17009	69	103
5560	17600	-12040	69	104
7730	17600	-9870	69	105
6020	17600	-11580	69	106
2520	16600	-14080	69	107
591	16600	-16009	69	108
5560	16600	-11040	69	109
7730	16600	-8870	69	110
6020	16600	-10580	69	111
591	2520	-1929	69	112
5560	2520	3040	70	112
7730	2520	5210	71	112
6020	2520	3500	72	112
5560	591	4969	73	112
7730	591	7139	74	112
6020	591	5429	75	112
7730	5560	2170	76	112
6020	5560	460	77	112
6020	7730	-1710	77	113

S Statistic = 77 - 113 = -36

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -1.13555

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-1.13555 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Zinc
Location: RW11-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
301000	368000	-67000	0	1
288000	368000	-80000	0	2
336000	368000	-32000	0	3
201000	368000	-167000	0	4
192000	368000	-176000	0	5
147000	368000	-221000	0	6
134000	368000	-234000	0	7
111000	368000	-257000	0	8
207000	368000	-161000	0	9
197000	368000	-171000	0	10
225000	368000	-143000	0	11
215000	368000	-153000	0	12
15700	368000	-352300	0	13
174000	368000	-194000	0	14
176000	368000	-192000	0	15
142000	368000	-226000	0	16
121000	368000	-247000	0	17
120000	368000	-248000	0	18
173000	368000	-195000	0	19
288000	301000	-13000	0	20
336000	301000	35000	1	20
201000	301000	-100000	1	21
192000	301000	-109000	1	22
147000	301000	-154000	1	23
134000	301000	-167000	1	24
111000	301000	-190000	1	25
207000	301000	-94000	1	26
197000	301000	-104000	1	27
225000	301000	-76000	1	28
215000	301000	-86000	1	29
15700	301000	-285300	1	30
174000	301000	-127000	1	31
176000	301000	-125000	1	32
142000	301000	-159000	1	33
121000	301000	-180000	1	34
120000	301000	-181000	1	35
173000	301000	-128000	1	36
336000	288000	48000	2	36
201000	288000	-87000	2	37
192000	288000	-96000	2	38
147000	288000	-141000	2	39
134000	288000	-154000	2	40
111000	288000	-177000	2	41
207000	288000	-81000	2	42
197000	288000	-91000	2	43

225000	288000	-63000	2	44
215000	288000	-73000	2	45
15700	288000	-272300	2	46
174000	288000	-114000	2	47
176000	288000	-112000	2	48
142000	288000	-146000	2	49
121000	288000	-167000	2	50
120000	288000	-168000	2	51
173000	288000	-115000	2	52
201000	336000	-135000	2	53
192000	336000	-144000	2	54
147000	336000	-189000	2	55
134000	336000	-202000	2	56
111000	336000	-225000	2	57
207000	336000	-129000	2	58
197000	336000	-139000	2	59
225000	336000	-111000	2	60
215000	336000	-121000	2	61
15700	336000	-320300	2	62
174000	336000	-162000	2	63
176000	336000	-160000	2	64
142000	336000	-194000	2	65
121000	336000	-215000	2	66
120000	336000	-216000	2	67
173000	336000	-163000	2	68
192000	201000	-9000	2	69
147000	201000	-54000	2	70
134000	201000	-67000	2	71
111000	201000	-90000	2	72
207000	201000	6000	3	72
197000	201000	-4000	3	73
225000	201000	24000	4	73
215000	201000	14000	5	73
15700	201000	-185300	5	74
174000	201000	-27000	5	75
176000	201000	-25000	5	76
142000	201000	-59000	5	77
121000	201000	-80000	5	78
120000	201000	-81000	5	79
173000	201000	-28000	5	80
147000	192000	-45000	5	81
134000	192000	-58000	5	82
111000	192000	-81000	5	83
207000	192000	15000	6	83
197000	192000	5000	7	83
225000	192000	33000	8	83
215000	192000	23000	9	83
15700	192000	-176300	9	84
174000	192000	-18000	9	85
176000	192000	-16000	9	86
142000	192000	-50000	9	87
121000	192000	-71000	9	88
120000	192000	-72000	9	89
173000	192000	-19000	9	90

134000	147000	-13000	9	91
111000	147000	-36000	9	92
207000	147000	60000	10	92
197000	147000	50000	11	92
225000	147000	78000	12	92
215000	147000	68000	13	92
15700	147000	-131300	13	93
174000	147000	27000	14	93
176000	147000	29000	15	93
142000	147000	-5000	15	94
121000	147000	-26000	15	95
120000	147000	-27000	15	96
173000	147000	26000	16	96
111000	134000	-23000	16	97
207000	134000	73000	17	97
197000	134000	63000	18	97
225000	134000	91000	19	97
215000	134000	81000	20	97
15700	134000	-118300	20	98
174000	134000	40000	21	98
176000	134000	42000	22	98
142000	134000	8000	23	98
121000	134000	-13000	23	99
120000	134000	-14000	23	100
173000	134000	39000	24	100
207000	111000	96000	25	100
197000	111000	86000	26	100
225000	111000	114000	27	100
215000	111000	104000	28	100
15700	111000	-95300	28	101
174000	111000	63000	29	101
176000	111000	65000	30	101
142000	111000	31000	31	101
121000	111000	10000	32	101
120000	111000	9000	33	101
173000	111000	62000	34	101
197000	207000	-10000	34	102
225000	207000	18000	35	102
215000	207000	8000	36	102
15700	207000	-191300	36	103
174000	207000	-33000	36	104
176000	207000	-31000	36	105
142000	207000	-65000	36	106
121000	207000	-86000	36	107
120000	207000	-87000	36	108
173000	207000	-34000	36	109
225000	197000	28000	37	109
215000	197000	18000	38	109
15700	197000	-181300	38	110
174000	197000	-23000	38	111
176000	197000	-21000	38	112
142000	197000	-55000	38	113

121000	197000	-76000	38	114
120000	197000	-77000	38	115
173000	197000	-24000	38	116
215000	225000	-10000	38	117
15700	225000	-209300	38	118
174000	225000	-51000	38	119
176000	225000	-49000	38	120
142000	225000	-83000	38	121
121000	225000	-104000	38	122
120000	225000	-105000	38	123
173000	225000	-52000	38	124
15700	215000	-199300	38	125
174000	215000	-41000	38	126
176000	215000	-39000	38	127
142000	215000	-73000	38	128
121000	215000	-94000	38	129
120000	215000	-95000	38	130
173000	215000	-42000	38	131
174000	15700	158300	39	131
176000	15700	160300	40	131
142000	15700	126300	41	131
121000	15700	105300	42	131
120000	15700	104300	43	131
173000	15700	157300	44	131
176000	174000	2000	45	131
142000	174000	-32000	45	132
121000	174000	-53000	45	133
120000	174000	-54000	45	134
173000	174000	-1000	45	135
142000	176000	-34000	45	136
121000	176000	-55000	45	137
120000	176000	-56000	45	138
173000	176000	-3000	45	139
121000	142000	-21000	45	140
120000	142000	-22000	45	141
173000	142000	31000	46	141
120000	121000	-1000	46	142
173000	121000	52000	47	142
173000	120000	53000	48	142

S Statistic = 48 - 142 = -94

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -3.01732

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-3.01732 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW12-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
216000	249000	-33000	0	1
188000	249000	-61000	0	2
232000	249000	-17000	0	3
226000	249000	-23000	0	4
219000	249000	-30000	0	5
156000	249000	-93000	0	6
156000	249000	-93000	0	7
150000	249000	-99000	0	8
140000	249000	-109000	0	9
157000	249000	-92000	0	10
117000	249000	-132000	0	11
103000	249000	-146000	0	12
2410	249000	-246590	0	13
14300	249000	-234700	0	14
109000	249000	-140000	0	15
110000	249000	-139000	0	16
111000	249000	-138000	0	17
104000	249000	-145000	0	18
43500	249000	-205500	0	19
188000	216000	-28000	0	20
232000	216000	16000	1	20
226000	216000	10000	2	20
219000	216000	3000	3	20
156000	216000	-60000	3	21
156000	216000	-60000	3	22
150000	216000	-66000	3	23
140000	216000	-76000	3	24
157000	216000	-59000	3	25
117000	216000	-99000	3	26
103000	216000	-113000	3	27
2410	216000	-213590	3	28
14300	216000	-201700	3	29
109000	216000	-107000	3	30
110000	216000	-106000	3	31
111000	216000	-105000	3	32
104000	216000	-112000	3	33
43500	216000	-172500	3	34
232000	188000	44000	4	34
226000	188000	38000	5	34
219000	188000	31000	6	34
156000	188000	-32000	6	35
156000	188000	-32000	6	36
150000	188000	-38000	6	37
140000	188000	-48000	6	38
157000	188000	-31000	6	39

117000	188000	-71000	6	40
103000	188000	-85000	6	41
2410	188000	-185590	6	42
14300	188000	-173700	6	43
109000	188000	-79000	6	44
110000	188000	-78000	6	45
111000	188000	-77000	6	46
104000	188000	-84000	6	47
43500	188000	-144500	6	48
226000	232000	-6000	6	49
219000	232000	-13000	6	50
156000	232000	-76000	6	51
156000	232000	-76000	6	52
150000	232000	-82000	6	53
140000	232000	-92000	6	54
157000	232000	-75000	6	55
117000	232000	-115000	6	56
103000	232000	-129000	6	57
2410	232000	-229590	6	58
14300	232000	-217700	6	59
109000	232000	-123000	6	60
110000	232000	-122000	6	61
111000	232000	-121000	6	62
104000	232000	-128000	6	63
43500	232000	-188500	6	64
219000	226000	-7000	6	65
156000	226000	-70000	6	66
156000	226000	-70000	6	67
150000	226000	-76000	6	68
140000	226000	-86000	6	69
157000	226000	-69000	6	70
117000	226000	-109000	6	71
103000	226000	-123000	6	72
2410	226000	-223590	6	73
14300	226000	-211700	6	74
109000	226000	-117000	6	75
110000	226000	-116000	6	76
111000	226000	-115000	6	77
104000	226000	-122000	6	78
43500	226000	-182500	6	79
156000	219000	-63000	6	80
156000	219000	-63000	6	81
150000	219000	-69000	6	82
140000	219000	-79000	6	83
157000	219000	-62000	6	84
117000	219000	-102000	6	85
103000	219000	-116000	6	86
2410	219000	-216590	6	87
14300	219000	-204700	6	88
109000	219000	-110000	6	89
110000	219000	-109000	6	90
111000	219000	-108000	6	91
104000	219000	-115000	6	92
43500	219000	-175500	6	93

156000	156000	0	6	93
150000	156000	-6000	6	94
140000	156000	-16000	6	95
157000	156000	1000	7	95
117000	156000	-39000	7	96
103000	156000	-53000	7	97
2410	156000	-153590	7	98
14300	156000	-141700	7	99
109000	156000	-47000	7	100
110000	156000	-46000	7	101
111000	156000	-45000	7	102
104000	156000	-52000	7	103
43500	156000	-112500	7	104
150000	156000	-6000	7	105
140000	156000	-16000	7	106
157000	156000	1000	8	106
117000	156000	-39000	8	107
103000	156000	-53000	8	108
2410	156000	-153590	8	109
14300	156000	-141700	8	110
109000	156000	-47000	8	111
110000	156000	-46000	8	112
111000	156000	-45000	8	113
104000	156000	-52000	8	114
43500	156000	-112500	8	115
140000	150000	-10000	8	116
157000	150000	7000	9	116
117000	150000	-33000	9	117
103000	150000	-47000	9	118
2410	150000	-147590	9	119
14300	150000	-135700	9	120
109000	150000	-41000	9	121
110000	150000	-40000	9	122
111000	150000	-39000	9	123
104000	150000	-46000	9	124
43500	150000	-106500	9	125
157000	140000	17000	10	125
117000	140000	-23000	10	126
103000	140000	-37000	10	127
2410	140000	-137590	10	128
14300	140000	-125700	10	129
109000	140000	-31000	10	130
110000	140000	-30000	10	131
111000	140000	-29000	10	132
104000	140000	-36000	10	133
43500	140000	-96500	10	134
117000	157000	-40000	10	135
103000	157000	-54000	10	136
2410	157000	-154590	10	137
14300	157000	-142700	10	138
109000	157000	-48000	10	139
110000	157000	-47000	10	140

111000	157000	-46000	10	141
104000	157000	-53000	10	142
43500	157000	-113500	10	143
103000	117000	-14000	10	144
2410	117000	-114590	10	145
14300	117000	-102700	10	146
109000	117000	-8000	10	147
110000	117000	-7000	10	148
111000	117000	-6000	10	149
104000	117000	-13000	10	150
43500	117000	-73500	10	151
2410	103000	-100590	10	152
14300	103000	-88700	10	153
109000	103000	6000	11	153
110000	103000	7000	12	153
111000	103000	8000	13	153
104000	103000	1000	14	153
43500	103000	-59500	14	154
14300	2410	11890	15	154
109000	2410	106590	16	154
110000	2410	107590	17	154
111000	2410	108590	18	154
104000	2410	101590	19	154
43500	2410	41090	20	154
109000	14300	94700	21	154
110000	14300	95700	22	154
111000	14300	96700	23	154
104000	14300	89700	24	154
43500	14300	29200	25	154
110000	109000	1000	26	154
111000	109000	2000	27	154
104000	109000	-5000	27	155
43500	109000	-65500	27	156
111000	110000	1000	28	156
104000	110000	-6000	28	157
43500	110000	-66500	28	158
104000	111000	-7000	28	159
43500	111000	-67500	28	160
43500	104000	-60500	28	161

S Statistic = 28 - 161 = -133

Tied Group	Value	Members
1	156000	2

Time Period	Observations
2/1/2017	1
3/1/2017	1

4/1/2017	1
5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 949

Z-Score = -4.2849

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-4.2849 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Zinc
Location: RW13-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
1160	308000	-306840	0	1
204000	308000	-104000	0	2
172000	308000	-136000	0	3
237	308000	-307763	0	4
8600	308000	-299400	0	5
201000	308000	-107000	0	6
274000	308000	-34000	0	7
33.4	308000	-307967	0	8
116	308000	-307884	0	9
328000	308000	20000	1	9
97.7	308000	-307902	1	10
122	308000	-307878	1	11
246000	308000	-62000	1	12
204000	1160	202840	2	12
172000	1160	170840	3	12
237	1160	-923	3	13
8600	1160	7440	4	13
201000	1160	199840	5	13
274000	1160	272840	6	13
33.4	1160	-1126.6	6	14
116	1160	-1044	6	15
328000	1160	326840	7	15
97.7	1160	-1062.3	7	16
122	1160	-1038	7	17
246000	1160	244840	8	17
172000	204000	-32000	8	18
237	204000	-203763	8	19
8600	204000	-195400	8	20
201000	204000	-3000	8	21
274000	204000	70000	9	21
33.4	204000	-203967	9	22
116	204000	-203884	9	23
328000	204000	124000	10	23
97.7	204000	-203902	10	24
122	204000	-203878	10	25
246000	204000	42000	11	25
237	172000	-171763	11	26
8600	172000	-163400	11	27
201000	172000	29000	12	27
274000	172000	102000	13	27
33.4	172000	-171967	13	28
116	172000	-171884	13	29
328000	172000	156000	14	29
97.7	172000	-171902	14	30

122	172000	-171878	14	31
246000	172000	74000	15	31
8600	237	8363	16	31
201000	237	200763	17	31
274000	237	273763	18	31
33.4	237	-203.6	18	32
116	237	-121	18	33
328000	237	327763	19	33
97.7	237	-139.3	19	34
122	237	-115	19	35
246000	237	245763	20	35
201000	8600	192400	21	35
274000	8600	265400	22	35
33.4	8600	-8566.6	22	36
116	8600	-8484	22	37
328000	8600	319400	23	37
97.7	8600	-8502.3	23	38
122	8600	-8478	23	39
246000	8600	237400	24	39
274000	201000	73000	25	39
33.4	201000	-200967	25	40
116	201000	-200884	25	41
328000	201000	127000	26	41
97.7	201000	-200902	26	42
122	201000	-200878	26	43
246000	201000	45000	27	43
33.4	274000	-273967	27	44
116	274000	-273884	27	45
328000	274000	54000	28	45
97.7	274000	-273902	28	46
122	274000	-273878	28	47
246000	274000	-28000	28	48
116	33.4	82.6	29	48
328000	33.4	327967	30	48
97.7	33.4	64.3	31	48
122	33.4	88.6	32	48
246000	33.4	245967	33	48
328000	116	327884	34	48
97.7	116	-18.3	34	49
122	116	6	35	49
246000	116	245884	36	49
97.7	328000	-327902	36	50
122	328000	-327878	36	51
246000	328000	-82000	36	52
122	97.7	24.3	37	52
246000	97.7	245902	38	52
246000	122	245878	39	52

S Statistic = 39 - 52 = -13

Tied Group	Value	Members
Time Period		Observations
8/1/2017		1
9/1/2017		1
10/1/2017		1
11/1/2017		1
12/1/2017		1
1/1/2018		1
4/1/2018		1
8/1/2018		1
10/1/2018		1
12/1/2018		1
3/1/2019		1
6/1/2019		1
9/1/2019		1
12/1/2019		1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = -0.656939

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-0.656939 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Zinc

Location: RW15-MWI

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
71.1	3210	-3138.9	0	1
295	3210	-2915	0	2
825	3210	-2385	0	3
1070	3210	-2140	0	4
5540	3210	2330	1	4
252	3210	-2958	1	5
18600	3210	15390	2	5
736	3210	-2474	2	6
6540	3210	3330	3	6
109000	3210	105790	4	6
16400	3210	13190	5	6
168000	3210	164790	6	6
179000	3210	175790	7	6
295	71.1	223.9	8	6
825	71.1	753.9	9	6
1070	71.1	998.9	10	6
5540	71.1	5468.9	11	6
252	71.1	180.9	12	6
18600	71.1	18528.9	13	6
736	71.1	664.9	14	6
6540	71.1	6468.9	15	6
109000	71.1	108929	16	6
16400	71.1	16328.9	17	6
168000	71.1	167929	18	6
179000	71.1	178929	19	6
825	295	530	20	6
1070	295	775	21	6
5540	295	5245	22	6
252	295	-43	22	7
18600	295	18305	23	7
736	295	441	24	7
6540	295	6245	25	7
109000	295	108705	26	7
16400	295	16105	27	7
168000	295	167705	28	7
179000	295	178705	29	7
1070	825	245	30	7
5540	825	4715	31	7
252	825	-573	31	8
18600	825	17775	32	8
736	825	-89	32	9
6540	825	5715	33	9
109000	825	108175	34	9
16400	825	15575	35	9

168000	825	167175	36	9
179000	825	178175	37	9
5540	1070	4470	38	9
252	1070	-818	38	10
18600	1070	17530	39	10
736	1070	-334	39	11
6540	1070	5470	40	11
109000	1070	107930	41	11
16400	1070	15330	42	11
168000	1070	166930	43	11
179000	1070	177930	44	11
252	5540	-5288	44	12
18600	5540	13060	45	12
736	5540	-4804	45	13
6540	5540	1000	46	13
109000	5540	103460	47	13
16400	5540	10860	48	13
168000	5540	162460	49	13
179000	5540	173460	50	13
18600	252	18348	51	13
736	252	484	52	13
6540	252	6288	53	13
109000	252	108748	54	13
16400	252	16148	55	13
168000	252	167748	56	13
179000	252	178748	57	13
736	18600	-17864	57	14
6540	18600	-12060	57	15
109000	18600	90400	58	15
16400	18600	-2200	58	16
168000	18600	149400	59	16
179000	18600	160400	60	16
6540	736	5804	61	16
109000	736	108264	62	16
16400	736	15664	63	16
168000	736	167264	64	16
179000	736	178264	65	16
109000	6540	102460	66	16
16400	6540	9860	67	16
168000	6540	161460	68	16
179000	6540	172460	69	16
16400	109000	-92600	69	17
168000	109000	59000	70	17
179000	109000	70000	71	17
168000	16400	151600	72	17
179000	16400	162600	73	17
179000	168000	11000	74	17

S Statistic = 74 - 17 = 57

Tied Group	Value	Members
Time Period		Observations
8/1/2017		1
9/1/2017		1
10/1/2017		1
11/1/2017		1
12/1/2017		1
1/1/2018		1
4/1/2018		1
8/1/2018		1
10/1/2018		1
12/1/2018		1
3/1/2019		1
6/1/2019		1
9/1/2019		1
12/1/2019		1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 6006

b = 19656

c = 364

Group Variance = 333.667

Z-Score = 3.06571

Comparison Level at 95% confidence level = 1.65463 (upward trend)

3.06571 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis
Parameter: Zinc
Location: RW16-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
2000	20200	-18200	0	1
441	20200	-19759	0	2
19200	20200	-1000	0	3
16200	20200	-4000	0	4
11200	20200	-9000	0	5
1230	20200	-18970	0	6
320	20200	-19880	0	7
6	20200	-20194	0	8
4.7	20200	-20195.3	0	9
4.9	20200	-20195.1	0	10
13.1	20200	-20186.9	0	11
22.7	20200	-20177.3	0	12
441	2000	-1559	0	13
19200	2000	17200	1	13
16200	2000	14200	2	13
11200	2000	9200	3	13
1230	2000	-770	3	14
320	2000	-1680	3	15
6	2000	-1994	3	16
4.7	2000	-1995.3	3	17
4.9	2000	-1995.1	3	18
13.1	2000	-1986.9	3	19
22.7	2000	-1977.3	3	20
19200	441	18759	4	20
16200	441	15759	5	20
11200	441	10759	6	20
1230	441	789	7	20
320	441	-121	7	21
6	441	-435	7	22
4.7	441	-436.3	7	23
4.9	441	-436.1	7	24
13.1	441	-427.9	7	25
22.7	441	-418.3	7	26
16200	19200	-3000	7	27
11200	19200	-8000	7	28
1230	19200	-17970	7	29
320	19200	-18880	7	30
6	19200	-19194	7	31
4.7	19200	-19195.3	7	32
4.9	19200	-19195.1	7	33
13.1	19200	-19186.9	7	34
22.7	19200	-19177.3	7	35
11200	16200	-5000	7	36

1230	16200	-14970	7	37
320	16200	-15880	7	38
6	16200	-16194	7	39
4.7	16200	-16195.3	7	40
4.9	16200	-16195.1	7	41
13.1	16200	-16186.9	7	42
22.7	16200	-16177.3	7	43
1230	11200	-9970	7	44
320	11200	-10880	7	45
6	11200	-11194	7	46
4.7	11200	-11195.3	7	47
4.9	11200	-11195.1	7	48
13.1	11200	-11186.9	7	49
22.7	11200	-11177.3	7	50
320	1230	-910	7	51
6	1230	-1224	7	52
4.7	1230	-1225.3	7	53
4.9	1230	-1225.1	7	54
13.1	1230	-1216.9	7	55
22.7	1230	-1207.3	7	56
6	320	-314	7	57
4.7	320	-315.3	7	58
4.9	320	-315.1	7	59
13.1	320	-306.9	7	60
22.7	320	-297.3	7	61
4.7	6	-1.3	7	62
4.9	6	-1.1	7	63
13.1	6	7.1	8	63
22.7	6	16.7	9	63
4.9	4.7	0.2	10	63
13.1	4.7	8.4	11	63
22.7	4.7	18	12	63
13.1	4.9	8.2	13	63
22.7	4.9	17.8	14	63
22.7	13.1	9.6	15	63

S Statistic = 15 - 63 = -48

Tied Group	Value	Members
Time Period		Observations
9/1/2017		1
10/1/2017		1
11/1/2017		1
12/1/2017		1
1/1/2018		1
4/1/2018		1
8/1/2018		1
10/1/2018		1

12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 4836

b = 15444

c = 312

Group Variance = 268.667

Z-Score = -2.86742

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-2.86742 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Zinc
Location: RW18-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
592000	728000	-136000	0	1
633000	728000	-95000	0	2
246000	728000	-482000	0	3
694000	728000	-34000	0	4
575000	728000	-153000	0	5
290000	728000	-438000	0	6
382000	728000	-346000	0	7
393000	728000	-335000	0	8
323000	728000	-405000	0	9
369000	728000	-359000	0	10
370000	728000	-358000	0	11
396000	728000	-332000	0	12
330000	728000	-398000	0	13
247000	728000	-481000	0	14
318000	728000	-410000	0	15
822000	728000	94000	1	15
279000	728000	-449000	1	16
640000	728000	-88000	1	17
849000	728000	121000	2	17
633000	592000	41000	3	17
246000	592000	-346000	3	18
694000	592000	102000	4	18
575000	592000	-17000	4	19
290000	592000	-302000	4	20
382000	592000	-210000	4	21
393000	592000	-199000	4	22
323000	592000	-269000	4	23
369000	592000	-223000	4	24
370000	592000	-222000	4	25
396000	592000	-196000	4	26
330000	592000	-262000	4	27
247000	592000	-345000	4	28
318000	592000	-274000	4	29
822000	592000	230000	5	29
279000	592000	-313000	5	30
640000	592000	48000	6	30
849000	592000	257000	7	30
246000	633000	-387000	7	31
694000	633000	61000	8	31
575000	633000	-58000	8	32
290000	633000	-343000	8	33
382000	633000	-251000	8	34
393000	633000	-240000	8	35
323000	633000	-310000	8	36
369000	633000	-264000	8	37

370000	633000	-263000	8	38
396000	633000	-237000	8	39
330000	633000	-303000	8	40
247000	633000	-386000	8	41
318000	633000	-315000	8	42
822000	633000	189000	9	42
279000	633000	-354000	9	43
640000	633000	7000	10	43
849000	633000	216000	11	43
694000	246000	448000	12	43
575000	246000	329000	13	43
290000	246000	44000	14	43
382000	246000	136000	15	43
393000	246000	147000	16	43
323000	246000	77000	17	43
369000	246000	123000	18	43
370000	246000	124000	19	43
396000	246000	150000	20	43
330000	246000	84000	21	43
247000	246000	1000	22	43
318000	246000	72000	23	43
822000	246000	576000	24	43
279000	246000	33000	25	43
640000	246000	394000	26	43
849000	246000	603000	27	43
575000	694000	-119000	27	44
290000	694000	-404000	27	45
382000	694000	-312000	27	46
393000	694000	-301000	27	47
323000	694000	-371000	27	48
369000	694000	-325000	27	49
370000	694000	-324000	27	50
396000	694000	-298000	27	51
330000	694000	-364000	27	52
247000	694000	-447000	27	53
318000	694000	-376000	27	54
822000	694000	128000	28	54
279000	694000	-415000	28	55
640000	694000	-54000	28	56
849000	694000	155000	29	56
290000	575000	-285000	29	57
382000	575000	-193000	29	58
393000	575000	-182000	29	59
323000	575000	-252000	29	60
369000	575000	-206000	29	61
370000	575000	-205000	29	62
396000	575000	-179000	29	63
330000	575000	-245000	29	64
247000	575000	-328000	29	65
318000	575000	-257000	29	66
822000	575000	247000	30	66
279000	575000	-296000	30	67
640000	575000	65000	31	67
849000	575000	274000	32	67

382000	290000	92000	33	67
393000	290000	103000	34	67
323000	290000	33000	35	67
369000	290000	79000	36	67
370000	290000	80000	37	67
396000	290000	106000	38	67
330000	290000	40000	39	67
247000	290000	-43000	39	68
318000	290000	28000	40	68
822000	290000	532000	41	68
279000	290000	-11000	41	69
640000	290000	350000	42	69
849000	290000	559000	43	69
393000	382000	11000	44	69
323000	382000	-59000	44	70
369000	382000	-13000	44	71
370000	382000	-12000	44	72
396000	382000	14000	45	72
330000	382000	-52000	45	73
247000	382000	-135000	45	74
318000	382000	-64000	45	75
822000	382000	440000	46	75
279000	382000	-103000	46	76
640000	382000	258000	47	76
849000	382000	467000	48	76
323000	393000	-70000	48	77
369000	393000	-24000	48	78
370000	393000	-23000	48	79
396000	393000	3000	49	79
330000	393000	-63000	49	80
247000	393000	-146000	49	81
318000	393000	-75000	49	82
822000	393000	429000	50	82
279000	393000	-114000	50	83
640000	393000	247000	51	83
849000	393000	456000	52	83
369000	323000	46000	53	83
370000	323000	47000	54	83
396000	323000	73000	55	83
330000	323000	7000	56	83
247000	323000	-76000	56	84
318000	323000	-5000	56	85
822000	323000	499000	57	85
279000	323000	-44000	57	86
640000	323000	317000	58	86
849000	323000	526000	59	86
370000	369000	1000	60	86
396000	369000	27000	61	86
330000	369000	-39000	61	87
247000	369000	-122000	61	88
318000	369000	-51000	61	89
822000	369000	453000	62	89

279000	369000	-90000	62	90
640000	369000	271000	63	90
849000	369000	480000	64	90
396000	370000	26000	65	90
330000	370000	-40000	65	91
247000	370000	-123000	65	92
318000	370000	-52000	65	93
822000	370000	452000	66	93
279000	370000	-91000	66	94
640000	370000	270000	67	94
849000	370000	479000	68	94
330000	396000	-66000	68	95
247000	396000	-149000	68	96
318000	396000	-78000	68	97
822000	396000	426000	69	97
279000	396000	-117000	69	98
640000	396000	244000	70	98
849000	396000	453000	71	98
247000	330000	-83000	71	99
318000	330000	-12000	71	100
822000	330000	492000	72	100
279000	330000	-51000	72	101
640000	330000	310000	73	101
849000	330000	519000	74	101
318000	247000	71000	75	101
822000	247000	575000	76	101
279000	247000	32000	77	101
640000	247000	393000	78	101
849000	247000	602000	79	101
822000	318000	504000	80	101
279000	318000	-39000	80	102
640000	318000	322000	81	102
849000	318000	531000	82	102
279000	822000	-543000	82	103
640000	822000	-182000	82	104
849000	822000	27000	83	104
640000	279000	361000	84	104
849000	279000	570000	85	104
849000	640000	209000	86	104

S Statistic = 86 - 104 = -18

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = -0.551553

Comparison Level at 95% confidence level = 1.65463 (upward trend)

-0.551553 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Zinc
Location: RW19-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
4.65e+006	5.9e+006	-1.25e+006	0	1
7.01e+006	5.9e+006	1.11e+006	1	1
5.37e+006	5.9e+006	-530000	1	2
6.72e+006	5.9e+006	820000	2	2
5.33e+006	5.9e+006	-570000	2	3
3.36e+006	5.9e+006	-2.54e+006	2	4
2.5e+006	5.9e+006	-3.4e+006	2	5
3.67e+006	5.9e+006	-2.23e+006	2	6
3.4e+006	5.9e+006	-2.5e+006	2	7
3.97e+006	5.9e+006	-1.93e+006	2	8
3.84e+006	5.9e+006	-2.06e+006	2	9
4.19e+006	5.9e+006	-1.71e+006	2	10
4.88e+006	5.9e+006	-1.02e+006	2	11
5.88e+006	5.9e+006	-20000	2	12
7.58e+006	5.9e+006	1.68e+006	3	12
3.77e+006	5.9e+006	-2.13e+006	3	13
7.28e+006	5.9e+006	1.38e+006	4	13
3.46e+006	5.9e+006	-2.44e+006	4	14
5.69e+006	5.9e+006	-210000	4	15
7.01e+006	4.65e+006	2.36e+006	5	15
5.37e+006	4.65e+006	720000	6	15
6.72e+006	4.65e+006	2.07e+006	7	15
5.33e+006	4.65e+006	680000	8	15
3.36e+006	4.65e+006	-1.29e+006	8	16
2.5e+006	4.65e+006	-2.15e+006	8	17
3.67e+006	4.65e+006	-980000	8	18
3.4e+006	4.65e+006	-1.25e+006	8	19
3.97e+006	4.65e+006	-680000	8	20
3.84e+006	4.65e+006	-810000	8	21
4.19e+006	4.65e+006	-460000	8	22
4.88e+006	4.65e+006	230000	9	22
5.88e+006	4.65e+006	1.23e+006	10	22
7.58e+006	4.65e+006	2.93e+006	11	22
3.77e+006	4.65e+006	-880000	11	23
7.28e+006	4.65e+006	2.63e+006	12	23
3.46e+006	4.65e+006	-1.19e+006	12	24
5.69e+006	4.65e+006	1.04e+006	13	24
5.37e+006	7.01e+006	-1.64e+006	13	25
6.72e+006	7.01e+006	-290000	13	26
5.33e+006	7.01e+006	-1.68e+006	13	27
3.36e+006	7.01e+006	-3.65e+006	13	28
2.5e+006	7.01e+006	-4.51e+006	13	29
3.67e+006	7.01e+006	-3.34e+006	13	30
3.4e+006	7.01e+006	-3.61e+006	13	31
3.97e+006	7.01e+006	-3.04e+006	13	32

3.84e+006	7.01e+006	-3.17e+006	13	33
4.19e+006	7.01e+006	-2.82e+006	13	34
4.88e+006	7.01e+006	-2.13e+006	13	35
5.88e+006	7.01e+006	-1.13e+006	13	36
7.58e+006	7.01e+006	570000	14	36
3.77e+006	7.01e+006	-3.24e+006	14	37
7.28e+006	7.01e+006	270000	15	37
3.46e+006	7.01e+006	-3.55e+006	15	38
5.69e+006	7.01e+006	-1.32e+006	15	39
6.72e+006	5.37e+006	1.35e+006	16	39
5.33e+006	5.37e+006	-40000	16	40
3.36e+006	5.37e+006	-2.01e+006	16	41
2.5e+006	5.37e+006	-2.87e+006	16	42
3.67e+006	5.37e+006	-1.7e+006	16	43
3.4e+006	5.37e+006	-1.97e+006	16	44
3.97e+006	5.37e+006	-1.4e+006	16	45
3.84e+006	5.37e+006	-1.53e+006	16	46
4.19e+006	5.37e+006	-1.18e+006	16	47
4.88e+006	5.37e+006	-490000	16	48
5.88e+006	5.37e+006	510000	17	48
7.58e+006	5.37e+006	2.21e+006	18	48
3.77e+006	5.37e+006	-1.6e+006	18	49
7.28e+006	5.37e+006	1.91e+006	19	49
3.46e+006	5.37e+006	-1.91e+006	19	50
5.69e+006	5.37e+006	320000	20	50
5.33e+006	6.72e+006	-1.39e+006	20	51
3.36e+006	6.72e+006	-3.36e+006	20	52
2.5e+006	6.72e+006	-4.22e+006	20	53
3.67e+006	6.72e+006	-3.05e+006	20	54
3.4e+006	6.72e+006	-3.32e+006	20	55
3.97e+006	6.72e+006	-2.75e+006	20	56
3.84e+006	6.72e+006	-2.88e+006	20	57
4.19e+006	6.72e+006	-2.53e+006	20	58
4.88e+006	6.72e+006	-1.84e+006	20	59
5.88e+006	6.72e+006	-840000	20	60
7.58e+006	6.72e+006	860000	21	60
3.77e+006	6.72e+006	-2.95e+006	21	61
7.28e+006	6.72e+006	560000	22	61
3.46e+006	6.72e+006	-3.26e+006	22	62
5.69e+006	6.72e+006	-1.03e+006	22	63
3.36e+006	5.33e+006	-1.97e+006	22	64
2.5e+006	5.33e+006	-2.83e+006	22	65
3.67e+006	5.33e+006	-1.66e+006	22	66
3.4e+006	5.33e+006	-1.93e+006	22	67
3.97e+006	5.33e+006	-1.36e+006	22	68
3.84e+006	5.33e+006	-1.49e+006	22	69
4.19e+006	5.33e+006	-1.14e+006	22	70
4.88e+006	5.33e+006	-450000	22	71
5.88e+006	5.33e+006	550000	23	71
7.58e+006	5.33e+006	2.25e+006	24	71
3.77e+006	5.33e+006	-1.56e+006	24	72
7.28e+006	5.33e+006	1.95e+006	25	72
3.46e+006	5.33e+006	-1.87e+006	25	73
5.69e+006	5.33e+006	360000	26	73

2.5e+006	3.36e+006	-860000	26	74
3.67e+006	3.36e+006	310000	27	74
3.4e+006	3.36e+006	40000	28	74
3.97e+006	3.36e+006	610000	29	74
3.84e+006	3.36e+006	480000	30	74
4.19e+006	3.36e+006	830000	31	74
4.88e+006	3.36e+006	1.52e+006	32	74
5.88e+006	3.36e+006	2.52e+006	33	74
7.58e+006	3.36e+006	4.22e+006	34	74
3.77e+006	3.36e+006	410000	35	74
7.28e+006	3.36e+006	3.92e+006	36	74
3.46e+006	3.36e+006	100000	37	74
5.69e+006	3.36e+006	2.33e+006	38	74
3.67e+006	2.5e+006	1.17e+006	39	74
3.4e+006	2.5e+006	900000	40	74
3.97e+006	2.5e+006	1.47e+006	41	74
3.84e+006	2.5e+006	1.34e+006	42	74
4.19e+006	2.5e+006	1.69e+006	43	74
4.88e+006	2.5e+006	2.38e+006	44	74
5.88e+006	2.5e+006	3.38e+006	45	74
7.58e+006	2.5e+006	5.08e+006	46	74
3.77e+006	2.5e+006	1.27e+006	47	74
7.28e+006	2.5e+006	4.78e+006	48	74
3.46e+006	2.5e+006	960000	49	74
5.69e+006	2.5e+006	3.19e+006	50	74
3.4e+006	3.67e+006	-270000	50	75
3.97e+006	3.67e+006	300000	51	75
3.84e+006	3.67e+006	170000	52	75
4.19e+006	3.67e+006	520000	53	75
4.88e+006	3.67e+006	1.21e+006	54	75
5.88e+006	3.67e+006	2.21e+006	55	75
7.58e+006	3.67e+006	3.91e+006	56	75
3.77e+006	3.67e+006	100000	57	75
7.28e+006	3.67e+006	3.61e+006	58	75
3.46e+006	3.67e+006	-210000	58	76
5.69e+006	3.67e+006	2.02e+006	59	76
3.97e+006	3.4e+006	570000	60	76
3.84e+006	3.4e+006	440000	61	76
4.19e+006	3.4e+006	790000	62	76
4.88e+006	3.4e+006	1.48e+006	63	76
5.88e+006	3.4e+006	2.48e+006	64	76
7.58e+006	3.4e+006	4.18e+006	65	76
3.77e+006	3.4e+006	370000	66	76
7.28e+006	3.4e+006	3.88e+006	67	76
3.46e+006	3.4e+006	60000	68	76
5.69e+006	3.4e+006	2.29e+006	69	76
3.84e+006	3.97e+006	-130000	69	77
4.19e+006	3.97e+006	220000	70	77
4.88e+006	3.97e+006	910000	71	77
5.88e+006	3.97e+006	1.91e+006	72	77
7.58e+006	3.97e+006	3.61e+006	73	77
3.77e+006	3.97e+006	-200000	73	78

7.28e+006	3.97e+006	3.31e+006	74	78
3.46e+006	3.97e+006	-510000	74	79
5.69e+006	3.97e+006	1.72e+006	75	79
4.19e+006	3.84e+006	350000	76	79
4.88e+006	3.84e+006	1.04e+006	77	79
5.88e+006	3.84e+006	2.04e+006	78	79
7.58e+006	3.84e+006	3.74e+006	79	79
3.77e+006	3.84e+006	-70000	79	80
7.28e+006	3.84e+006	3.44e+006	80	80
3.46e+006	3.84e+006	-380000	80	81
5.69e+006	3.84e+006	1.85e+006	81	81
4.88e+006	4.19e+006	690000	82	81
5.88e+006	4.19e+006	1.69e+006	83	81
7.58e+006	4.19e+006	3.39e+006	84	81
3.77e+006	4.19e+006	-420000	84	82
7.28e+006	4.19e+006	3.09e+006	85	82
3.46e+006	4.19e+006	-730000	85	83
5.69e+006	4.19e+006	1.5e+006	86	83
5.88e+006	4.88e+006	1e+006	87	83
7.58e+006	4.88e+006	2.7e+006	88	83
3.77e+006	4.88e+006	-1.11e+006	88	84
7.28e+006	4.88e+006	2.4e+006	89	84
3.46e+006	4.88e+006	-1.42e+006	89	85
5.69e+006	4.88e+006	810000	90	85
7.58e+006	5.88e+006	1.7e+006	91	85
3.77e+006	5.88e+006	-2.11e+006	91	86
7.28e+006	5.88e+006	1.4e+006	92	86
3.46e+006	5.88e+006	-2.42e+006	92	87
5.69e+006	5.88e+006	-190000	92	88
3.77e+006	7.58e+006	-3.81e+006	92	89
7.28e+006	7.58e+006	-300000	92	90
3.46e+006	7.58e+006	-4.12e+006	92	91
5.69e+006	7.58e+006	-1.89e+006	92	92
7.28e+006	3.77e+006	3.51e+006	93	92
3.46e+006	3.77e+006	-310000	93	93
5.69e+006	3.77e+006	1.92e+006	94	93
3.46e+006	7.28e+006	-3.82e+006	94	94
5.69e+006	7.28e+006	-1.59e+006	94	95
5.69e+006	3.46e+006	2.23e+006	95	95

S Statistic = 95 - 95 = 0

Tied Group	Value	Members
Time Period		Observations
2/1/2017		1
3/1/2017		1
4/1/2017		1

5/1/2017	1
6/1/2017	1
7/1/2017	1
8/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1
6/1/2019	1
9/1/2019	1
12/1/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 17100

b = 61560

c = 760

Group Variance = 950

Z-Score = 0

Comparison Level at 95% confidence level = 1.65463 (upward trend)

0 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis
Parameter: Zinc
Location: RW22-MWI
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
103	303	-200	0	1
43000	303	42697	1	1
16100	303	15797	2	1
3700	303	3397	3	1
19500	303	19197	4	1
27200	303	26897	5	1
44700	303	44397	6	1
73300	303	72997	7	1
47100	303	46797	8	1
68100	303	67797	9	1
81100	303	80797	10	1
43000	103	42897	11	1
16100	103	15997	12	1
3700	103	3597	13	1
19500	103	19397	14	1
27200	103	27097	15	1
44700	103	44597	16	1
73300	103	73197	17	1
47100	103	46997	18	1
68100	103	67997	19	1
81100	103	80997	20	1
16100	43000	-26900	20	2
3700	43000	-39300	20	3
19500	43000	-23500	20	4
27200	43000	-15800	20	5
44700	43000	1700	21	5
73300	43000	30300	22	5
47100	43000	4100	23	5
68100	43000	25100	24	5
81100	43000	38100	25	5
3700	16100	-12400	25	6
19500	16100	3400	26	6
27200	16100	11100	27	6
44700	16100	28600	28	6
73300	16100	57200	29	6
47100	16100	31000	30	6
68100	16100	52000	31	6
81100	16100	65000	32	6
19500	3700	15800	33	6
27200	3700	23500	34	6
44700	3700	41000	35	6
73300	3700	69600	36	6
47100	3700	43400	37	6

68100	3700	64400	38	6
81100	3700	77400	39	6
27200	19500	7700	40	6
44700	19500	25200	41	6
73300	19500	53800	42	6
47100	19500	27600	43	6
68100	19500	48600	44	6
81100	19500	61600	45	6
44700	27200	17500	46	6
73300	27200	46100	47	6
47100	27200	19900	48	6
68100	27200	40900	49	6
81100	27200	53900	50	6
73300	44700	28600	51	6
47100	44700	2400	52	6
68100	44700	23400	53	6
81100	44700	36400	54	6
47100	73300	-26200	54	7
68100	73300	-5200	54	8
81100	73300	7800	55	8
68100	47100	21000	56	8
81100	47100	34000	57	8
81100	68100	13000	58	8

S Statistic = 58 - 8 = 50

Tied Group	Value	Members
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Time Period	Observations
6/1/2017	1
7/1/2017	1
9/1/2017	1
10/1/2017	1
11/1/2017	1
12/1/2017	1
1/1/2018	1
4/1/2018	1
8/1/2018	1
10/1/2018	1
12/1/2018	1
3/1/2019	1

There are 0 time periods with multiple data

A = 0
 B = 0
 C = 0
 D = 0
 E = 0
 F = 0
 a = 3828

b = 11880

c = 264

Group Variance = 212.667

Z-Score = 3.36005

Comparison Level at 95% confidence level = 1.65463 (upward trend)

3.36005 > 1.65463 indicating an upward trend