



ARM Group Inc.

Engineers and Scientists

February 15, 2019

Ms. Barbara Brown
Project Coordinator
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Re: Rod and Wire Mill Interim Measures
Progress Report—December 2018 (Revision 0)
Tradepoint Atlantic
Sparrows Point, MD 21219
ARM Project No. 190144M

Dear Ms. Brown:

On behalf of EnviroAnalytics Group, ARM Group Inc. is pleased to submit the enclosed document to the Maryland Department of the Environment. Enclosed please find two hard copies (each with an accompanying CD) of the Rod and Wire Mill Interim Measures Progress Report—December 2018 (Revision 0, dated February 15, 2019). This is the first formal submission of this report to the agencies.

If you have any questions, or if we can provide any additional information at this time, please do not hesitate to contact ARM Group Inc. at 410-290-7775.

Respectfully Submitted,
ARM Group, Inc.

Stewart Kabis, G.I.T.
Project Geologist

T. Neil Peters, P.E.
Vice President

cc: Ruth Prince
James Calenda

ROD AND WIRE MILL INTERIM MEASURES PROGRESS REPORT – DECEMBER 2018

TRADEPOINT ATLANTIC
SPARROWS POINT, MARYLAND

Prepared for:



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ARM Project No. 190144M

Revision 0 – February 15, 2019

Respectfully Submitted,

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

Stewart Kabis, G.I.T.
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 Measures 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 remedial measures that operated at the RWM, a description of additional remedial work that was completed in 2016 and 2017 to provide 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 remedial measures.

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 (i.e., 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, and the Maryland Department of the Environment (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 Site. 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 mills 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. In the 1950s through the early 1970s, the acidic leach residue was stored in the Northwest Pond until about 1959 when filters were installed to dewater the residues. Dewatered sludge generated from this process was temporarily stored on the ground outside the north end of the mill in the Former Sludge Bin Storage Area. 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 water table below the Site occurs within recent sedimentary deposits or slag fill material, and includes the unconfined water table at the Site. Monitoring wells and piezometers designated as shallow are screened within this shallow, unconfined 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 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 is the focus of the interim pump and treat 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 Upper Talbot unit. The “intermediate” bottom-of-screen elevations generally range from -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 generally range from -50 to -141 feet amsl. The lower hydrogeologic zone was not a primary focus in 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 have not been identified from former iron and steel operations.

2.2. HISTORICAL INTERIM MEASURES FOR GROUNDWATER CONDITIONS

The aforementioned historical operations in 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, and 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 dismantled in 1999 to support a demolition project at the Rod and Wire Mill, allowing for reassessment of the interim measures. 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 was installed consisting of 31 wells for monitoring 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 consisting of two intermediate zone recovery wells (RW10-PZM020 and RW15-PZM020) that operated at a rate of between 5 and 12 gallons per minute (gpm). The expected normal operating rate for the treatment plant 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 discontinued in 2017 so that additional remedial work could be performed at the RWM.

2.3. GROUNDWATER CONDITIONS PRIOR TO ADDITIONAL REMEDIAL WORK IN 2016

2.3.1. Shallow Groundwater Zone

The RWM Phase II Investigation Report (ARM, 2016) characterized the shallow groundwater zone at the Site based on samples collected in late 2015. Key findings from data collected during the Phase II Investigation are as follows:

- Groundwater in the shallow zone appears to flow radially in all directions from a mounded location in the vicinity of RW10-PZM004. The groundwater elevation contours for the shallow zone during pumping conditions are shown on **Figure 3**.
- Measurements of pH varied significantly, from a maximum of 11.25 at RW09-PZM004 in the central portion of the Site to less than 4 in RW11-PZM004 to the southeast. Generally, wells in the central and southwestern areas exhibited near-neutral or basic pH, while wells to the east and northeast exhibited neutral or acidic pH. The pH of the shallow zone in December 2015 is shown on **Figure 4**.
- Based on samples collected in October and November of 2015, the maximum cadmium concentration, 102 µg/L, was measured in the northern portion of the RWM at RW-002-PZ. The next two highest concentrations were 31.3 µg/L and 20.1 µg/L at RW18-MW(S) and RW-006-PZ, respectively, moving to the southeast away from RW-002-PZ. Sampling locations in the central, western and southern areas had very low or no detectable concentrations of cadmium. Shallow zone cadmium concentrations for the previous interim measures are shown on **Figure 5**.
- Zinc concentrations in the shallow zone vary significantly, with a maximum value of 245,000 µg/L far to the east in RW-006-PZ. Another (albeit lesser) zinc hotspot of 5,520 ug/L is located at RW-002-PZ in the north. Concentrations generally decrease towards the west and south away from the two hotspots. Shallow zone zinc concentrations for the previous interim measures are shown on **Figure 6**.

Groundwater data for samples collected from shallow zone wells and piezometers in late 2015 (prior to installation of the remediation trenches) are summarized in **Table 1**.

2.3.2. Intermediate Groundwater Zone

The Pre-Design Investigation (PDI) Report (ARM, 2016) characterized the intermediate groundwater zone at the Site based on samples collected in late 2015. Key findings from data collected during the PDI are as follows:

- In the intermediate zone, groundwater appeared to flow from the north and east toward the recovery system pumping wells. The western half of the Site is affected by the recovery system as well, as elevations below mean sea level were reported in several wells. The intermediate groundwater elevation contour map is included as **Figure 7**.
- Measurements of pH showed the relatively acidic nature of the groundwater. Out of measurements collected from 12 locations, the highest pH value was 7.48, with the majority of the values being less than 6. The pH of the intermediate zone in December 2015 is shown on **Figure 8**.
- The former sludge bin location appears to be the primary source of cadmium in the intermediate groundwater zone. This can be seen on **Figure 9** near sample location RW-057-PZ.
- The primary source of zinc in the intermediate groundwater zone is the western portion of the east pond (just west of the existing transformer pad). This can be seen on **Figure 10** at sample location RW-067-PZ. A secondary zinc source is located further west near the former sludge bin location. This can also be seen on Figure 10 at sample location RW-057-PZ.

Groundwater data for samples collected from intermediate zone wells and piezometers in late 2015 (prior to installation of the remediation trenches) are summarized in **Table 2**.

3.0 NEW INTERIM MEASURES AND GROUNDWATER CONDITIONS

3.1. INTERIM MEASURES REMEDIAL APPROACH

EAG contracted Advanced GeoServices (AGS) to design and install remediation trenches to serve as the new interim measures 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 remedial measure is to reduce dissolved concentrations of metals focused primarily on groundwater in the intermediate zone and eliminate the potential for future unacceptable groundwater discharges from this zone to surface water. Groundwater in the shallow zone was noted to have a higher pH due to placement of slag fill and as a result the metals contamination in this zone has not migrated. Therefore, the intermediate zone is the primary focus of the new interim measures.

Groundwater extraction from the pumping wells was stopped 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. Alkaline reagents were added into the intermediate groundwater zone at select high concentration areas. Excavated soils were replaced with alkaline charges that react with acidic groundwater to create slightly 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 that is perpendicular to the anticipated groundwater flow. A typical cross-section of a remediation trench is provided as **Figure 11**, and the approximate locations of the trenches are shown on **Figures 12-34**.

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

The interim groundwater treatment goals were to increase the pH above 7 to effect a > 90% reduction in dissolved concentrations of cadmium and zinc within the source areas as compared to existing conditions.

After the completion of remediation trenches, several new groundwater wells were installed in the RWM to facilitate monitoring of the groundwater conditions in the shallow and intermediate zones.

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. The sections below discuss the results from the second half of 2018, which consisted of the October 2018 and December 2018 sampling events.

3.2.1. Flush-Mount Conversions, Well Pad Repairs, Well Development

Due to construction of a new warehouse in close proximity to the RWM wells, several of the wells needed to be converted from having above-ground stick-up protective steel casings to flush-mount surface protections. The primary reason for this was so a large part of the northern area of the former RWM could be paved and made into a parking lot. The flush-mount conversions were completed in March 2018.

Prior to the December 2018 sampling event, several wells had concrete well pads and flush mount surface completions installed to replace the sono-tubes that had been serving as temporary protection around the well PVC. Well pads were installed for the following wells: RW09-MW(S), RW09-MW(I), RW08-MW(S), RW08-MW(I), RW07-MW(S), RW07-MW(I), RW06R-MW(S), RW06-MW(D), RW03-MW(S), RW03-MW(I), and RW04-MW(S). In addition, well pads were installed for the following wells which already had flush mounts surface completions: RW01-MW(S), RW01-MW(I), RW02-MW(S), RW02-MW(I), RW05-MW(S), and RW05-MW(I). After these well pad installations and repairs were completed, all wells were surveyed to obtain up-to-date elevations for the top of PVC casing and ground surface.

High turbidity was noted in a number of the groundwater samples recovered from previous sampling events. Therefore, several wells were developed immediately prior to the December 2018 sampling event. These wells consisted of RW02-MW(S), RW04-MW(S), RW05-MW(I), RW06-MW(I), RW11-MW(I), RW12-MW(S), RW12-MW(I), RW18-MW(S), RW18-MW(I), and RW22-MW(I). Surging and/or purging techniques were used to develop the wells.

During the December 2018 sampling event, total and dissolved samples were collected for both cadmium and zinc at each well location. The analytical results show that in general, the dissolved fraction accounts for nearly all of the total metals concentration at any given well.

3.2.2. Shallow Groundwater Zone

A synoptic round of groundwater level measurements was collected on December 17, 2018. Based on the calculated groundwater elevations, groundwater in the shallow zone appears to flow radially from a mounded high point located at well RW18-MW(S), in the northeastern portion of the Site. In the central, west, and southwest portions of the Site, groundwater generally appears to flow to

the south, southwest or west. Groundwater elevation contours for the shallow zone during the December 2018 sampling event are shown on **Figure 12**.

For the purposes of evaluating trends in groundwater, shallow zone wells have been categorized into three groups. The “perimeter” wells are generally located farthest to west (downgradient). These wells consist of RW01-MW(S), RW02-MW(S), RW03-MW(S), RW04-MW(S), RW05-MW(S), RW06R-MW(S), RW07-MW(S), and RW08-MW(S). The “interior” shallow wells are located in the central portion of the site. These wells consist of RW09-MW(S), RW11-MW(S), RW12-MW(S), RW14-MW(S), RW15-MW(S), RW16-MW(S), and RW18-MW(S). RW19-MW(S) is designated as the “upgradient” well since it is located farthest upgradient.

Measurements of pH collected in December 2018 show that most pH values in the shallow zone exhibited an increase during the October 2018 sampling event followed by a decrease in the December 2018 sampling event. During the December 2018 sampling event, the lowest pH was measured in well RW03-MW(S) in the southwest portion of the site at a value of 5.6. The highest pH was measured at RW16-MW(S) in the north-central portion of the site at 11.5, as this well often has the highest pH in the shallow zone. The pH of the shallow zone groundwater based on measurements collected during the December 2018 sampling event is shown on **Figure 13**.

Results for perimeter shallow zone wells showed that total cadmium increased or stayed relatively the same during the October 2018 and December 2018 sampling events. During the December 2018 sampling event, concentrations of cadmium in perimeter shallow wells were below the relevant surface water criterion of 8.8 µg/L, except for RW06R-MW(S) (23.2 µg/L). Cadmium was not detected in RW04-MW(S) and RW05-MW(S). Since February 2017, cadmium concentrations in perimeter wells generally seem to be remaining stable or decreasing over time. The only exception was the concentration in RW03-MW(S) during the December 2018 event, which was anomalously high. A time-series graph of cadmium concentrations over time in shallow perimeter wells is included as **Figure 14**.

Results for interior shallow zone wells showed that total cadmium increased in some wells, decreased in some wells, and stayed relatively the same in some wells during the October 2018 and December 2018 sampling events. Well RW14-MW(S) continues to have the highest levels of cadmium in the shallow zone (3,710 µg/L during the December 2018 sampling event), with a concentration that was three orders of magnitude greater than the concentration in the majority of shallow zone wells. The second highest concentration (significantly lower, but relatively elevated compared to other shallow zone wells) was nearby at RW15-MW(S) (96.8 µg/L during the December 2018 sampling event). A time-series graph of cadmium concentrations over time in shallow interior wells is included as **Figure 15**.

The total cadmium concentration in upgradient shallow zone well RW19-MW(S) increased during the October 2018 sampling event, then decreased during the December 2018 sampling event. This well is exhibiting an overall decrease in cadmium concentration over time since

February 2017. A time-series graph of cadmium concentrations over time in shallow upgradient well is included as **Figure 16**. Total cadmium concentrations for samples collected in December 2018 from all shallow zone wells are shown on **Figure 17**.

Results for perimeter shallow zone wells showed that total zinc decreased or stayed relatively the same during the October 2018 and December 2018 sampling events. The only exception was the concentration in RW02-MW(S) during the December 2018 event, which exhibited an increase to an unusually high concentration. During the December 2018 sampling event, concentrations of zinc in perimeter shallow wells were well below the relevant surface water criterion of 81 µg/L in wells RW04-MW(S) (38 µg/L) and RW05-MW(S) (6.4 µg/L). A time-series graph of zinc concentrations over time in shallow perimeter wells is included as **Figure 18**.

Results for interior shallow zone wells showed that well RW14-MW(S) has the highest levels of zinc in the shallow zone, detected at 78,800 µg/L during the December 2018 sampling event. The lowest concentration in shallow interior wells during the December 2018 sampling event was detected in RW16-MW(S) at a concentration of 10.8 µg/L. A time-series graph of zinc concentrations over time in shallow interior wells is included as **Figure 19**.

The total zinc concentration in upgradient shallow zone well RW19-MW(S) slightly increased during the October 2018 sampling event, then decreased during the December 2018 sampling event. There is no predominant trend in zinc concentration in this well since the beginning of post-trench monitoring in February 2017. A time-series graph of the zinc concentration over time in the shallow upgradient well is included as **Figure 20**. Zinc concentrations for samples collected in December 2018 from all shallow zone wells are shown on **Figure 21**.

Groundwater data for samples collected from shallow zone wells following installation of the remediation trenches are summarized in **Table 3**. For ease in visualizing trends in pH, total cadmium, and total zinc, individual time-series graphs for each shallow zone monitoring well are presented in **Appendix A**.

3.2.3. Intermediate Groundwater Zone

A synoptic round of groundwater level measurements was collected on December 17, 2018. Based on the calculated groundwater elevations, groundwater in the intermediate zone appears to flow radially from a mounded high point located at well RW16-MW(I) in the northeast/central portion of the Site. In the west and southwest portions of the Site, groundwater generally appears to flow to the west or southwest. Groundwater elevation contours for the intermediate zone during the December 2018 sampling event are shown on **Figure 22**.

For the purposes of evaluating trends in groundwater, intermediate zone wells have been categorized into three groups based on their location. The “perimeter” wells are generally located farthest to west. These wells consist of RW01-MW(I), RW02-MW(I), RW03-MW(I), RW05-

MW(I), RW06-MW(I), RW07-MW(I), RW08-MW(I), and RW22-MW(I). The “performance” wells are located in the central portion of the site. These wells consist of RW09-MW(I), RW11-MW(I), RW12-MW(I), RW13-MW(I), RW15-MW(I), RW16-MW(I), and RW18-MW(I). RW19-MW(I) is designated as the upgradient well.

Measurements of pH collected in December 2018 show that most pH values in the intermediate zone exhibited an increase during the October 2018 sampling event followed by a slight decrease in the December 2018 sampling event. During the December 2018 sampling event, the lowest pH was measured in well RW22-MW(I) at a value of 4.6. The highest pH was measured at RW13-MW(I) at a value of 11.6. The pH of the intermediate zone groundwater based on measurements collected during the December 2018 sampling event is shown on **Figure 23**.

During the December 2018 sampling event, concentrations of cadmium in perimeter intermediate wells were below the relevant surface water criterion of 8.8 µg/L in wells RW05-MW(I) (1.6 µg/L), RW08-MW(I) (not detected) and RW22-MW(I) (not detected). The highest cadmium concentration in perimeter wells in both the October 2018 sampling event and the December 2018 sampling event was detected in well RW06-MW(I), which increased in each of the last two events. Prior to these two events, the highest cadmium concentration in perimeter wells was typically measured in RW03-MW(I), which also continued to increase in the past two events. Well RW07-MW(I) also exhibited an increase in the December 2018 sample event. A time-series graph of cadmium concentrations over time in intermediate perimeter wells is included as **Figure 24**.

The highest cadmium concentration in performance intermediate wells is typically found at RW12-MW(I), which had been gradually decreasing up until the December 2018 sampling event, or RW13-MW(I), which exhibits extreme fluctuations. Well RW12-MW(I) had the highest level of cadmium in the intermediate performance wells in December 2018, but that concentration was still lower than in March 2017. Both are located in the central portion of the Site. RW16-MW(I) was the only intermediate performance well in which cadmium was not detected. Despite increases in a few wells during the December 2018 sampling event, cadmium concentrations in the performance wells have been gradually decreasing overall since the beginning of post-trench monitoring in February 2017. A time-series graph of cadmium concentrations over time in intermediate performance wells is included as **Figure 25**.

The total cadmium concentration in upgradient intermediate zone well RW19-MW(I) increased during the October 2018 sampling event and the December 2018 sampling event. Despite these increases, this well is exhibiting an overall decrease in cadmium concentration over time from the beginning of post-trench monitoring in February 2017. Other than some extreme fluctuations in RW13-MW(I), RW19-MW(I) typically has the highest cadmium concentration in the whole intermediate zone. A time-series graph of the cadmium concentration over time in the intermediate upgradient well is included as **Figure 26**. Total cadmium concentrations for samples collected in December 2018 from the intermediate zone are shown on **Figure 27**.

During the December 2018 sampling event, zinc concentrations in the perimeter intermediate wells were below the relevant surface water criterion of 81 µg/L in RW08-MW(I) (44.3 µg/L) and above the relevant concentration in the other wells.. The highest zinc concentration in perimeter wells in the December 2018 sampling event was measured in well RW06-MW(I), at a concentration of 99,800 µg/L. This well exhibited increases in both the October 2018 sampling event and the December 2018 sampling event. Historically, the highest concentration of zinc in intermediate perimeter wells is typically measured in RW22-MW(I). The lowest concentration of zinc was measured in well RW05-MW(I) during the October 2018 sampling event and in well RW08-MW(I) during the December 2018 sampling event (RW08-MW(I) has historically had the lowest concentrations of zinc in intermediate perimeter wells). Since the beginning of post-trench monitoring in February 2017, zinc concentrations in intermediate perimeter wells overall have stayed relatively the same or increased. A time-series graph of zinc concentrations over time in intermediate perimeter wells is included as **Figure 28**.

Results for performance intermediate zone wells showed that total zinc has decreased substantially since March 2017 in the three wells with the highest initial concentrations (RW18-MW(I), RW11-MW(I), and RW12-MW(I)). Well RW18-MW(I) had the highest level of zinc in the intermediate performance wells, as has typically been the case since the beginning of post-trench monitoring in February 2017. During the October 2018 sampling event and the December 2018 sampling event, RW16-MW(I) had the lowest zinc concentration of intermediate performance wells. The lowest concentration has typically been measured at this well or at RW15-MW(I). Since the beginning of post-trench monitoring in February 2017, zinc concentrations in performance wells overall have generally stayed the same or decreased. A time-series graph of zinc concentrations over time in intermediate performance wells is included as **Figure 29**.

The total zinc concentration in upgradient intermediate zone well RW19-MW(I) increased during the October 2018 sampling event and the December 2018 sampling event. As such, this well has exhibited an overall increase in zinc concentration over time from the beginning of post-trench monitoring in February 2017. RW19-MW(I) typically has the highest zinc concentration in the whole intermediate zone. A time-series graph of the zinc concentration over time in the intermediate upgradient well is included as **Figure 30**. Total zinc concentrations for all samples collected in December 2018 from intermediate zone wells are shown on **Figure 31**.

Groundwater data for samples collected from intermediate zone wells are summarized in **Table 4**. For ease in visualizing trends in pH, total cadmium, and total zinc, individual time-series graphs for each intermediate zone monitoring well are presented in **Appendix B**.

3.3. STATISTICAL TREND EVALUATION

Data for each constituent (total cadmium, total 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-MW(I) and RW11-MW(I)
- total cadmium: RW07-MW(I) and RW08-MW(I)

There were no statistically significant upward trends identified for total zinc. Statistically significant downward trends were identified for the following:

- total cadmium: RW05-MW(I), RW09-MW(I), RW12-MW(I), RW13-MW(I), RW18-MW(I), and RW19-MW(I)
- total zinc: RW06-MW(I), RW09-MW(I), RW10-MW(I), RW11-MW(I), RW12-MW(I), RW16-MW(I), RW18-MW(I), and RW19-MW(I)

There were no statistically significant downward trends for pH. 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. SOURCE AREA REDUCTION

The interim groundwater treatment goals were to effect a >90% reduction in dissolved concentrations of cadmium and zinc within the source areas as compared to existing conditions. Under the assumption that nearly all of the total metals concentration are accounted for by the dissolved fraction, the table below summarizes sample data from three well locations in 2015 and in December 2018.

Source Area Cadmium Concentrations							
Well	May-15	Nov-15	2015 Average	90% Reduction Goal	Dec-18	% Reduction	Goal Met?
RW12-MW(I)	6000	9780	7890	789	1280	83.8	No
RW13-MW(I)	NM	44,500	44,500	4,450	17.7	100.0	Yes
RW18-MW(I)	113	47.2	80.1	8.0	230	N/A	No
Source Area Zinc Concentrations							
RW12-MW(I)	291,000	387,000	339,000	33,900	104,000	69.3	No
RW13-MW(I)	NM	658,000	658,000	65,800	177	100.0	Yes
RW18-MW(I)	708,000	576,000	642,000	64,200	319,000	50.3	No

The November 2015 concentrations included in the table for RW13-MW(I) were actually sample results from RW-057-PZ, a PDI piezometer existing in November 2015 at a location within a few feet of the current location of RW13-MW(I). These three specific monitoring wells were included in this table because they are the only current locations in the source area that were

existing in 2015. The table shows that the goal of a 90% reduction from 2015 levels has been achieved in RW13-MW(I) for both cadmium and zinc. While the goal has not been met for RW12-MW(I) or RW18-MW(I), there has been at least a 50% reduction in metals concentrations in these wells since 2015. In RW18-MW(I), cadmium was detected at an anomalously high concentration during the December 2018 sampling event, but had been gradually decreasing up until that point in time. The October 2018 cadmium concentration for this well, 14.5 µg/L, would yield an 82% reduction from the 2015 level.

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 from approximately 4 to 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 measures 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 still being monitored, although it is not the focus of the interim measures. However, it should be noted that cadmium and zinc concentrations in the shallow zone have increased in interior well RW14-MW(S) and zinc concentrations have increased in RW11-MW(S). In the perimeter shallow zone wells, zinc concentrations have been highest in the southwestern wells (RW01-MW(S), RW02-MW(S) and RW03-MW(S)) since post-trench monitoring began in 2017. Zinc levels in RW01-MW(S) and RW03-MW(S) seem to have peaked and are lower now than they had been in April 2018. Zinc in RW02-MW(S) increased suddenly in December 2018. Cadmium has increased in RW-03MW(S).

Figure 32 compares pH measurements in intermediate zone wells from the September 2017 sampling event to the most recent sampling event (December 2018). The pH in intermediate performance and upgradient wells is mostly unchanged, while noticeable decreases are evident near perimeter wells RW01-MW(I) and RW02-MW(I). It should be noted that the pH in these two wells often fluctuates significantly from event to event.

Figure 33 compares modeled cadmium mass in the intermediate zone groundwater from the September 2017 sampling event to the December 2018 sampling event. This figure shows noticeable increases in mass near perimeter wells, particularly RW02-MW(I), RW06-MW(I), and RW07-MW(I). However, it also depicts decreases in mass in performance wells, particularly RW10-MW(I), RW12-MW(I), and RW13-MW(I). The modeled total mass of cadmium in the intermediate zone for the September 2017 sampling event was 10,213 grams, while the modeled total mass for the December 2018 sampling event was 13,864 grams.

Figure 34 compares modeled zinc mass in the intermediate zone groundwater from the September 2017 sampling event to the December 2018 sampling event. This figure shows noticeable increases in mass of zinc near most of the perimeter wells except for RW08-MW(I). However, it also depicts decreases in mass in performance wells, particularly RW10-MW(I), RW12-MW(I), RW13-MW(I), RW16-MW(I), and RW18-MW(I). The modeled total mass of zinc in the intermediate zone for the September 2017 sampling event was about 2,846 kilograms, while the modeled total mass for the December 2018 sampling event was about 5,109 kilograms. It should be noted that increases over this time period in the concentration in upgradient well

RW19-MW(I) account for a large part of the overall increase in mass between the two sampling events. Excluding RW19-MW(I), the total modeled mass of zinc for the September 2017 sampling event was 1,795 kilograms, compared to 1,915 kilograms for the December 2018 sampling event.

On December 21, 2018, the *RWM Interim Measure Supplemental Investigation Work Plan (Revision 0)* was submitted to the EPA. This Work Plan proposes the installation of new monitoring wells in the RWM to further define the nature and extent of metals concentrations. Specifically, several new locations are proposed along the western property boundary for potential sentinel wells to monitor intermediate groundwater closest to Bear Creek. A new monitoring well location is also proposed north of the RW19 well pair to further define intermediate groundwater conditions in the northern part of the Site. **Figure 22** shows that there may be a portion of groundwater flow in the intermediate zone toward this area. Furthermore, the Work Plan proposes collection of offshore pore water samples to assess any potential impact of groundwater discharges to the offshore environment.

The evaluation of analytical results from the October 2018 and December 2018 sampling events, particularly the results of the Mann-Kendall trend tests, show that noticeable progress is evident in intermediate zone performance wells closest to the remediation trenches. Over time, it is expected that statistically significant downward trends will start being identified in the perimeter wells. It is recommended that monitoring should continue at the Site to assess the overall performance and effectiveness of the remediation trenches.

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
 Private Property

Tradepoint Atlantic
Area A and Area B Parcels

June 21, 2018

Figure
1



ARM Group Inc.
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0 500 1,000 2,000
 Feet

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Baltimore County, MD
EnviroAnalytics Group
Area A: Project 150298M Area B: Project 150300M Development: Project 160443M

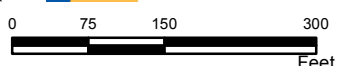


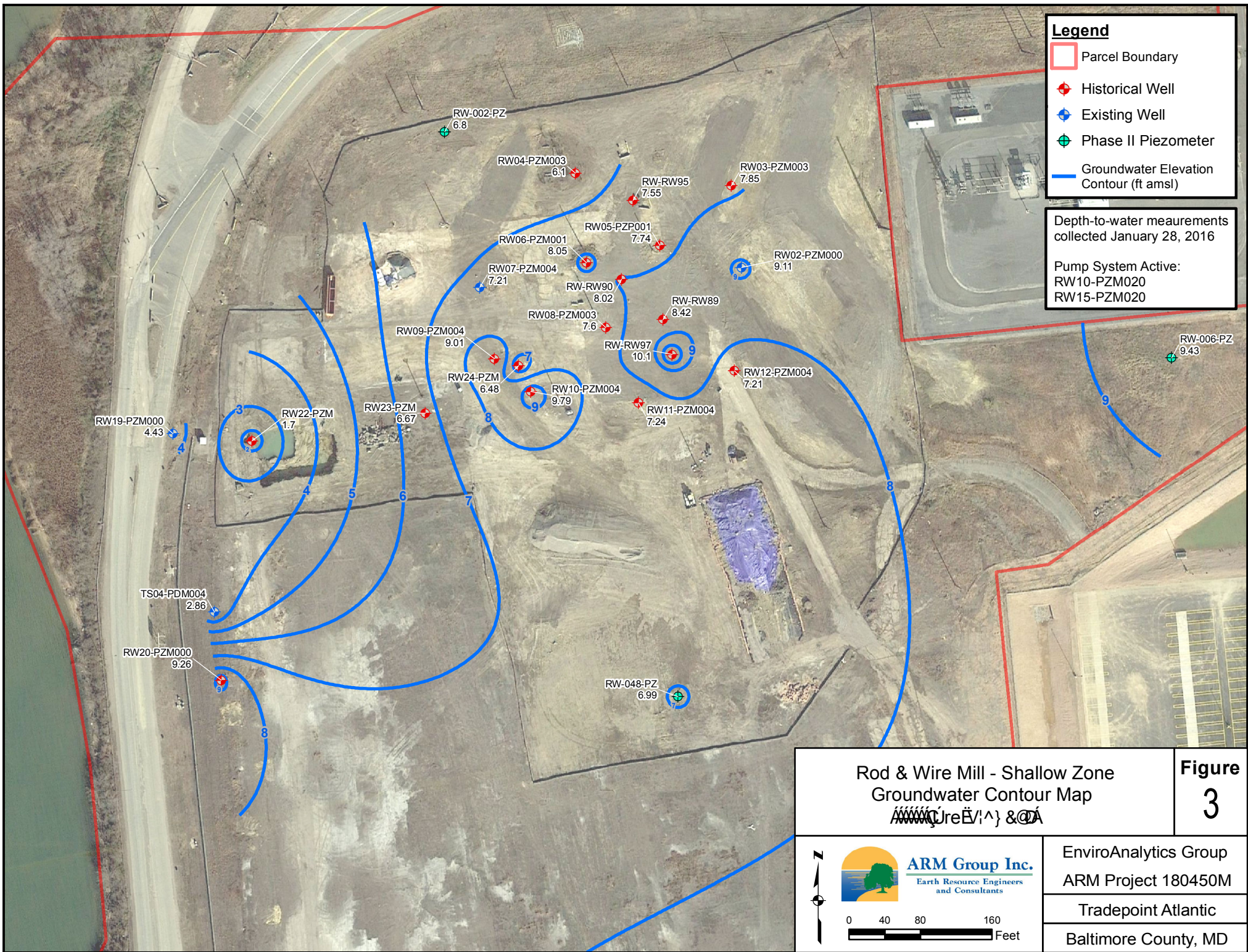
Parcel A3 (Rod & Wire Mill)
Location of Historical Activities
 July 24, 2018

Figure
2

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ARM Project 180450M	Baltimore County, MD

<p>ARM Group Inc. <small>Earth Resource Engineers and Consultants</small></p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20px; border: 1px solid purple; background: repeating-linear-gradient(45deg, transparent, transparent 2px, purple 2px, purple 4px);"></td> <td>Former Northwest Pond</td> </tr> <tr> <td style="width: 20px; border: 1px solid blue; background: repeating-linear-gradient(-45deg, transparent, transparent 2px, blue 2px, blue 4px);"></td> <td>Former East Pond</td> </tr> <tr> <td style="width: 20px; border: 1px solid yellow; background: repeating-linear-gradient(45deg, transparent, transparent 2px, yellow 2px, yellow 4px);"></td> <td>Former Sludge Bin Storage Area</td> </tr> <tr> <td style="width: 20px; border: 2px solid orange;"></td> <td>Approximate Boundary of Remedial Design Area</td> </tr> <tr> <td style="width: 20px; border: 2px solid red;"></td> <td>Parcel A3 (RWM) boundary</td> </tr> </table>		Former Northwest Pond		Former East Pond		Former Sludge Bin Storage Area		Approximate Boundary of Remedial Design Area		Parcel A3 (RWM) boundary
	Former Northwest Pond										
	Former East Pond										
	Former Sludge Bin Storage Area										
	Approximate Boundary of Remedial Design Area										
	Parcel A3 (RWM) boundary										





Legend

- Parcel Boundary
- ◆ Historical Well
- ◆ Existing Well
- ◆ Phase II Piezometer
- Groundwater Elevation Contour (ft amsl)

Depth-to-water measurements collected January 28, 2016

Pump System Active:
RW10-PZM020
RW15-PZM020

**Rod & Wire Mill - Shallow Zone
Groundwater Contour Map**

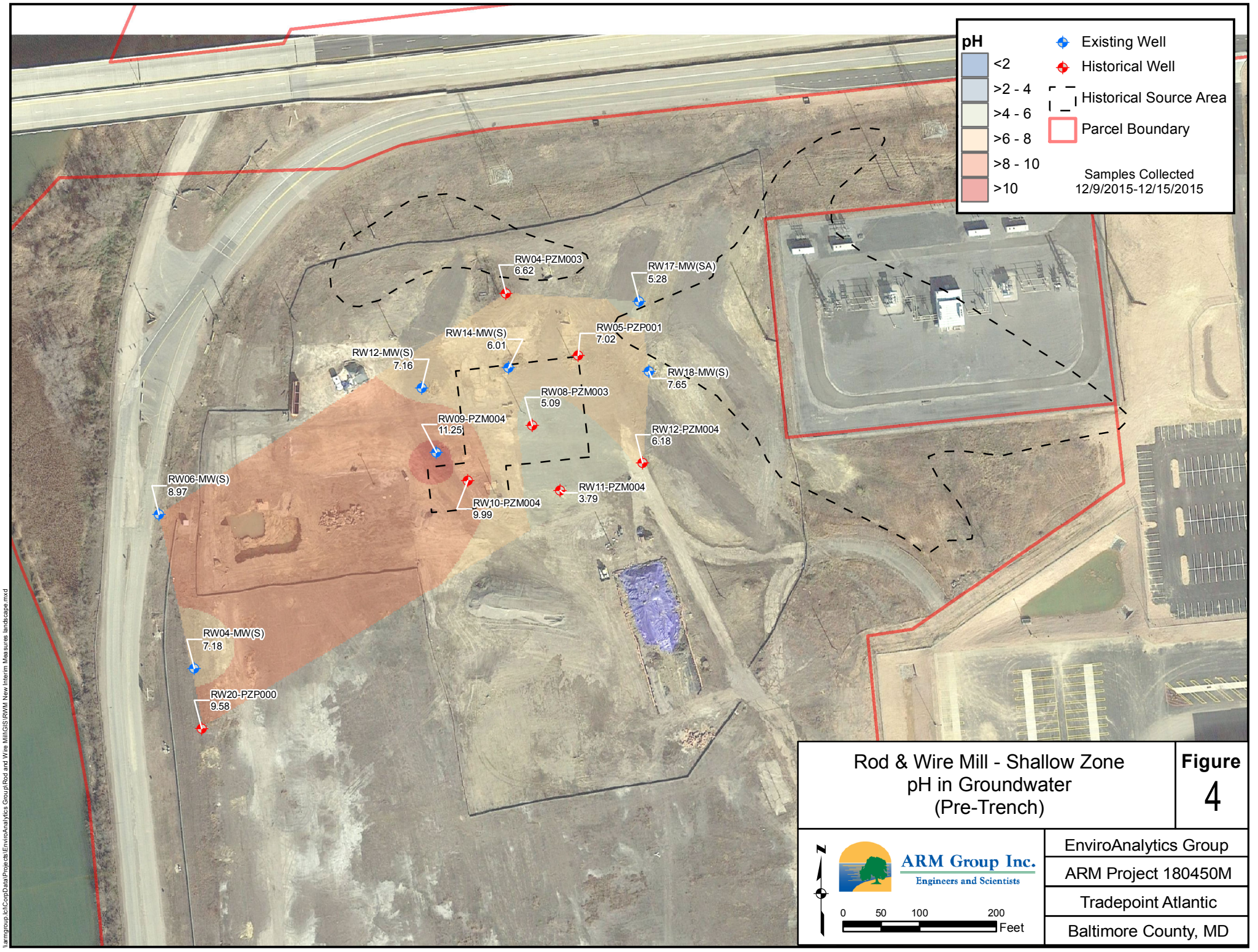
Figure 3

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and Consultants

0 40 80 160
Feet

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ARM Project 180450M

Tradepoint Atlantic
Baltimore County, MD



pH

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

- Existing Well
- Historical Well
- Historical Source Area
- Parcel Boundary

Samples Collected
12/9/2015-12/15/2015

Well ID	pH Value	Well Type
RW04-MW(S)	7.18	Existing Well
RW06-MW(S)	8.97	Existing Well
RW09-PZM004	11.25	Historical Well
RW10-PZM004	9.99	Historical Well
RW11-PZM004	3.79	Historical Well
RW12-MW(S)	7.16	Existing Well
RW12-PZM004	6.18	Historical Well
RW14-MW(S)	6.01	Existing Well
RW17-MW(SA)	5.28	Existing Well
RW18-MW(S)	7.65	Existing Well
RW04-PZM003	6.62	Historical Well
RW05-PZP001	7.02	Historical Well
RW08-PZM003	5.09	Historical Well
RW20-PZP000	9.58	Historical Well

Rod & Wire Mill - Shallow Zone
pH in Groundwater
(Pre-Trench)

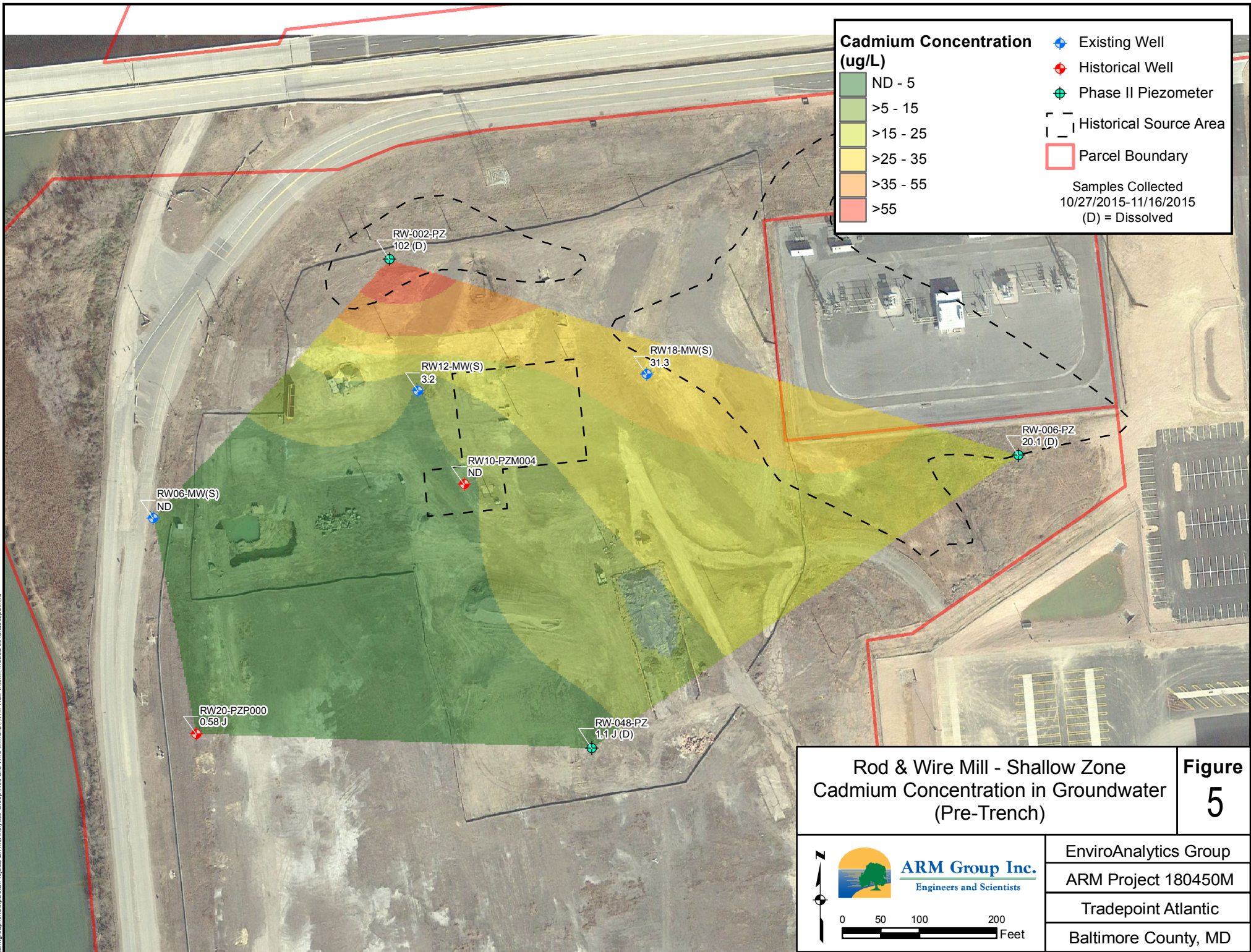
Figure
4

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Baltimore County, MD

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Cadmium Concentration (ug/L)

- ND - 5
- >5 - 15
- >15 - 25
- >25 - 35
- >35 - 55
- >55

- Existing Well
- Historical Well
- Phase II Piezometer
- Historical Source Area
- Parcel Boundary

Samples Collected
10/27/2015-11/16/2015
(D) = Dissolved

Rod & Wire Mill - Shallow Zone
Cadmium Concentration in Groundwater
(Pre-Trench)

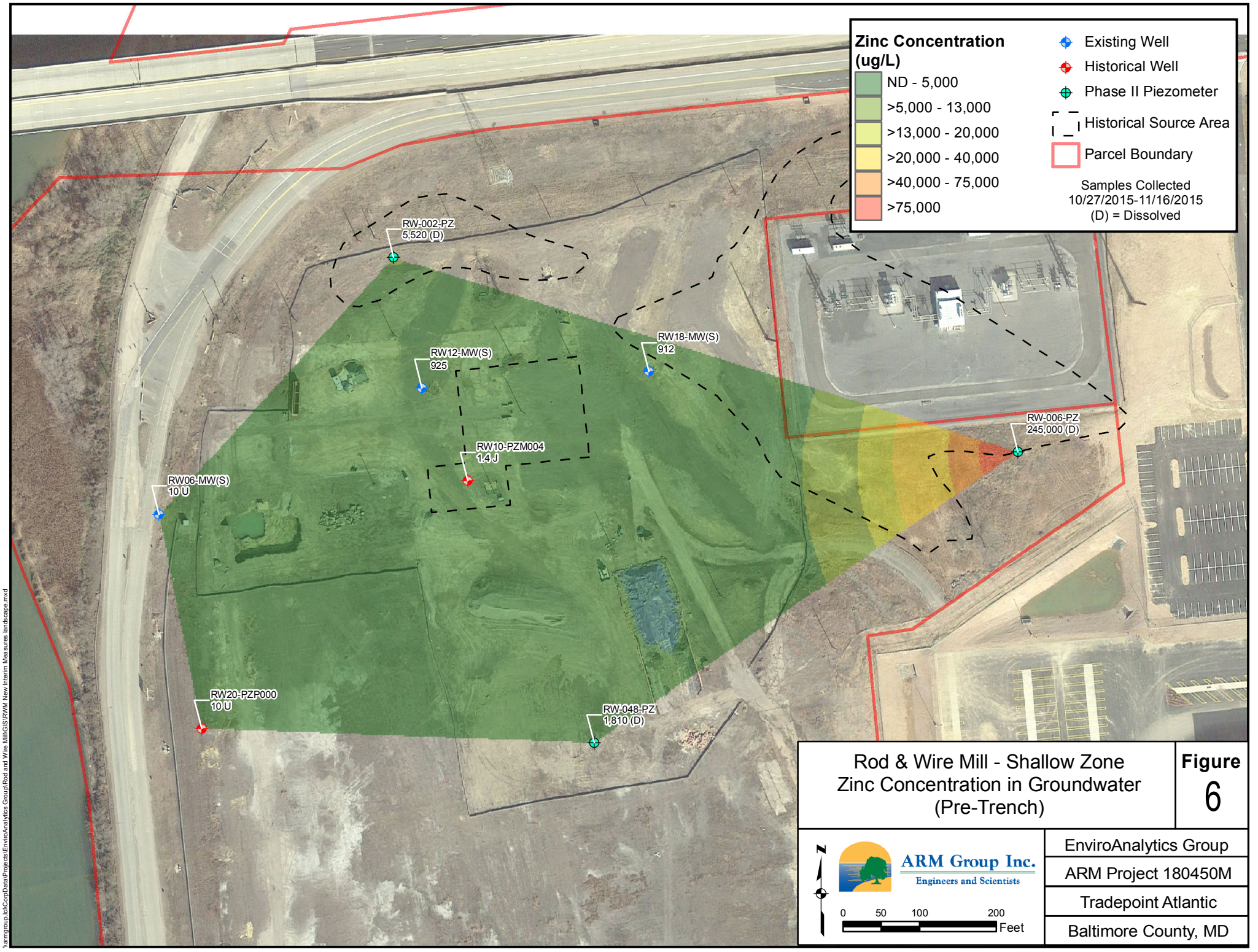
Figure 5

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Baltimore County, MD

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Zinc Concentration (ug/L)

- ND - 5,000
- >5,000 - 13,000
- >13,000 - 20,000
- >20,000 - 40,000
- >40,000 - 75,000
- >75,000

- Existing Well
- Historical Well
- Phase II Piezometer
- Historical Source Area
- Parcel Boundary

Samples Collected
10/27/2015-11/16/2015
(D) = Dissolved

**Rod & Wire Mill - Shallow Zone
Zinc Concentration in Groundwater
(Pre-Trench)**

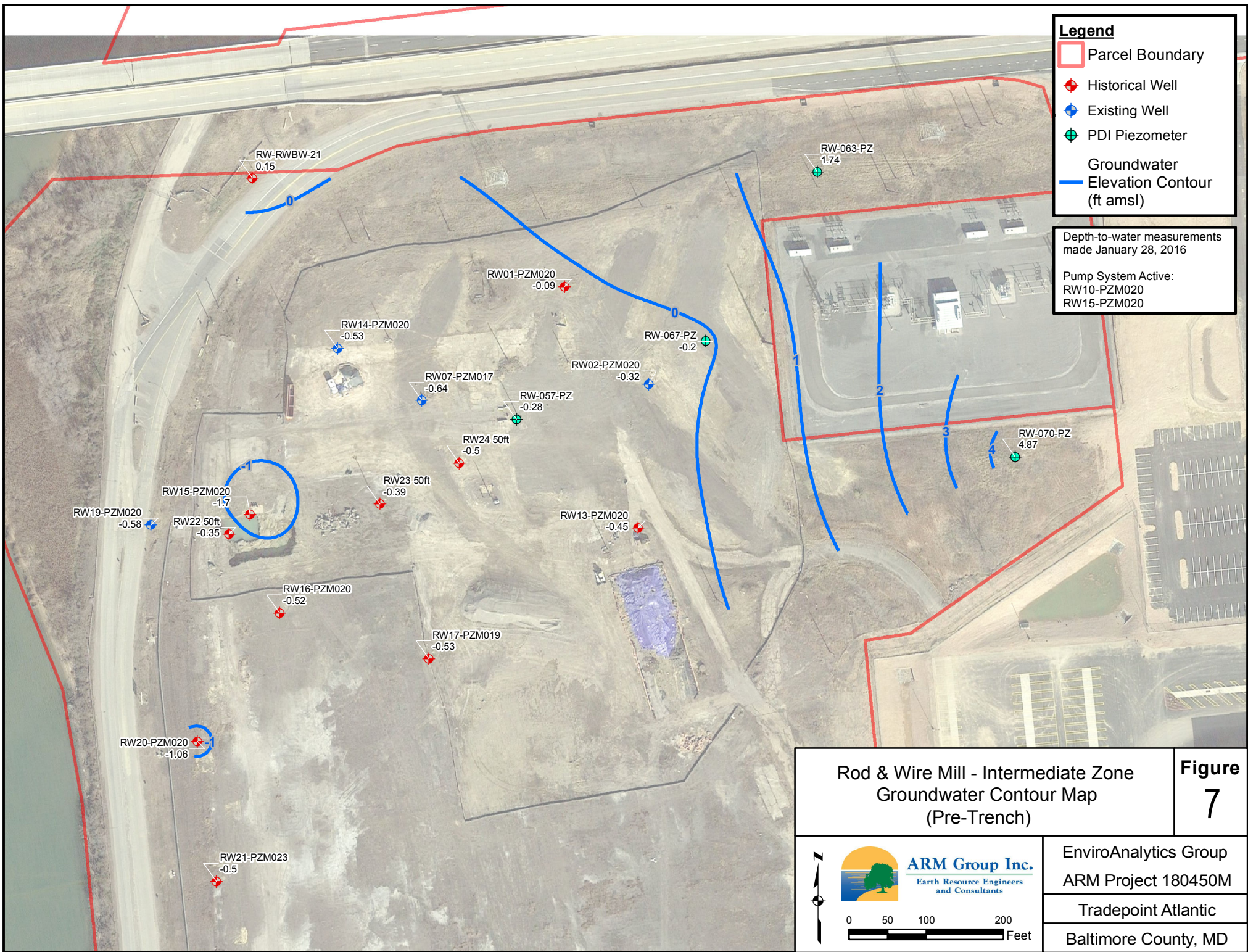
**Figure
6**

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Feet

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Baltimore County, MD

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Legend

- Parcel Boundary
- ◆ Historical Well
- ◆ Existing Well
- ◆ PDI Piezometer

Groundwater

- Elevation Contour (ft amsl)

Depth-to-water measurements made January 28, 2016

Pump System Active:
 RW10-PZM020
 RW15-PZM020

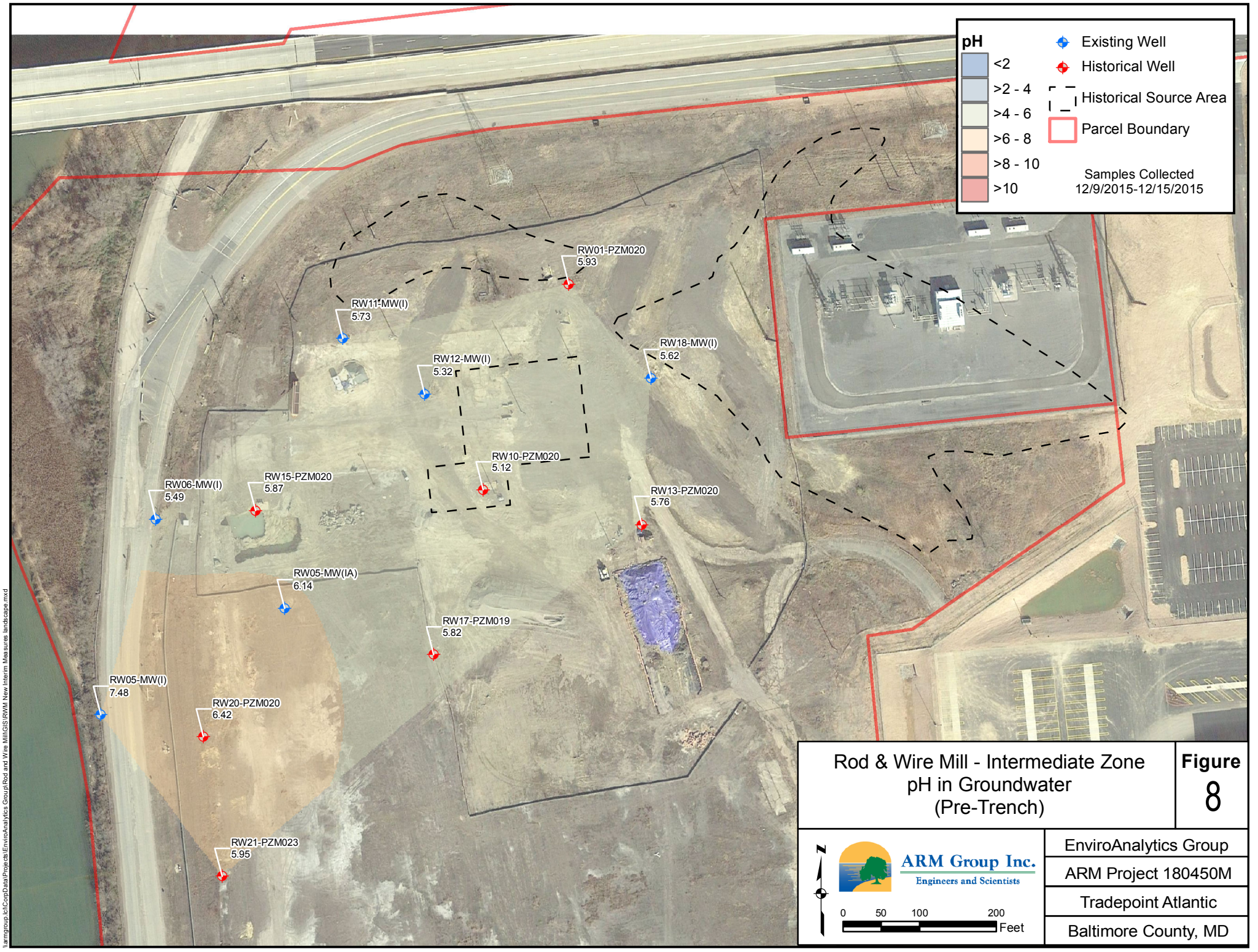
**Rod & Wire Mill - Intermediate Zone
 Groundwater Contour Map
 (Pre-Trench)**

**Figure
 7**

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Rod & Wire Mill - Intermediate Zone
pH in Groundwater
(Pre-Trench)

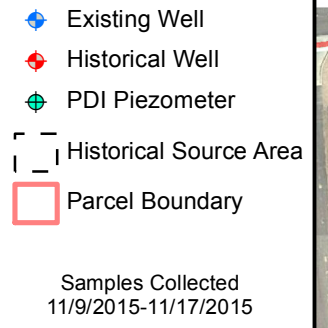
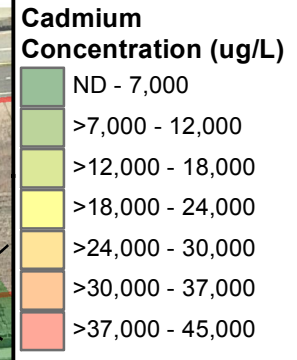
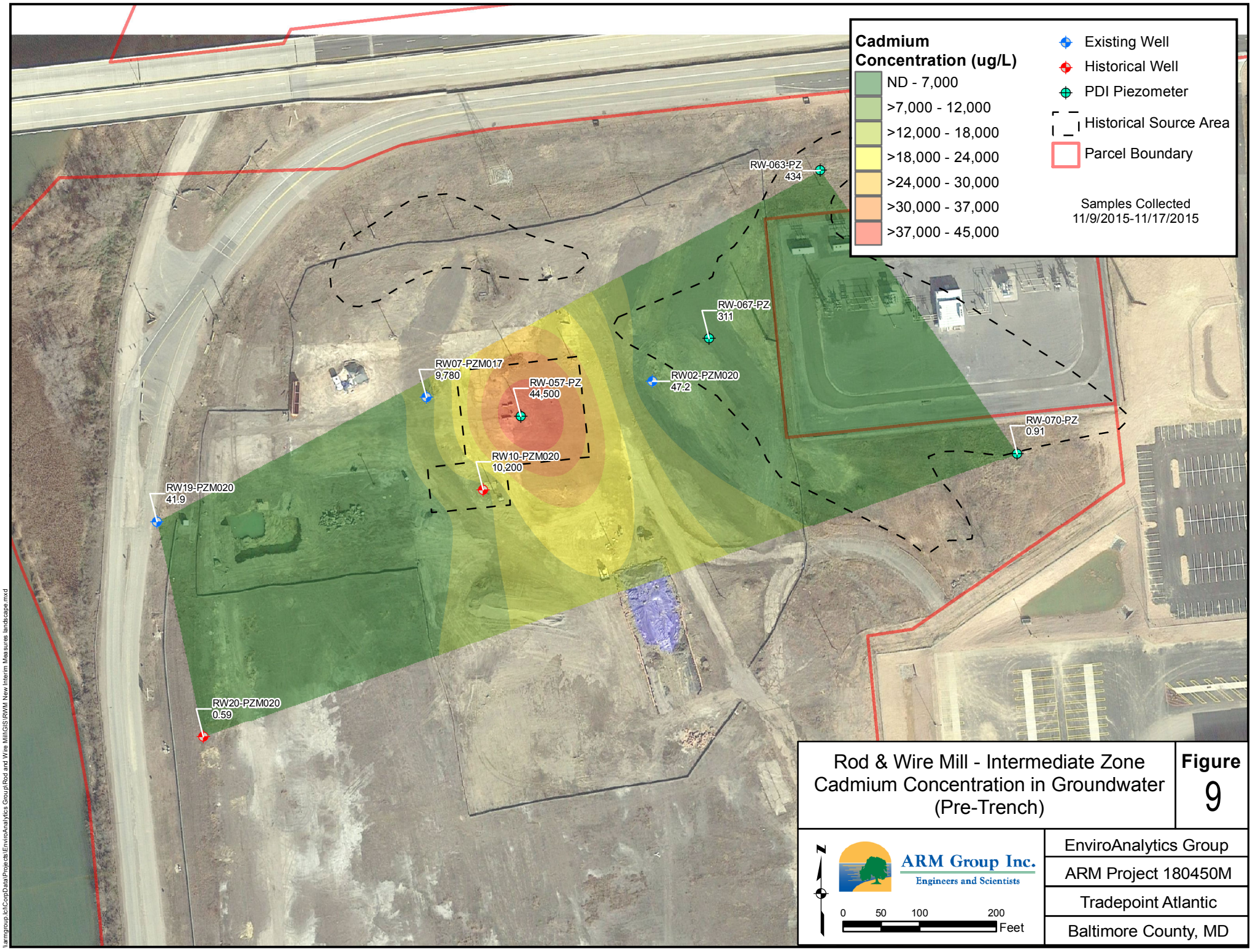
Figure
8

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Rod & Wire Mill - Intermediate Zone
Cadmium Concentration in Groundwater
(Pre-Trench)

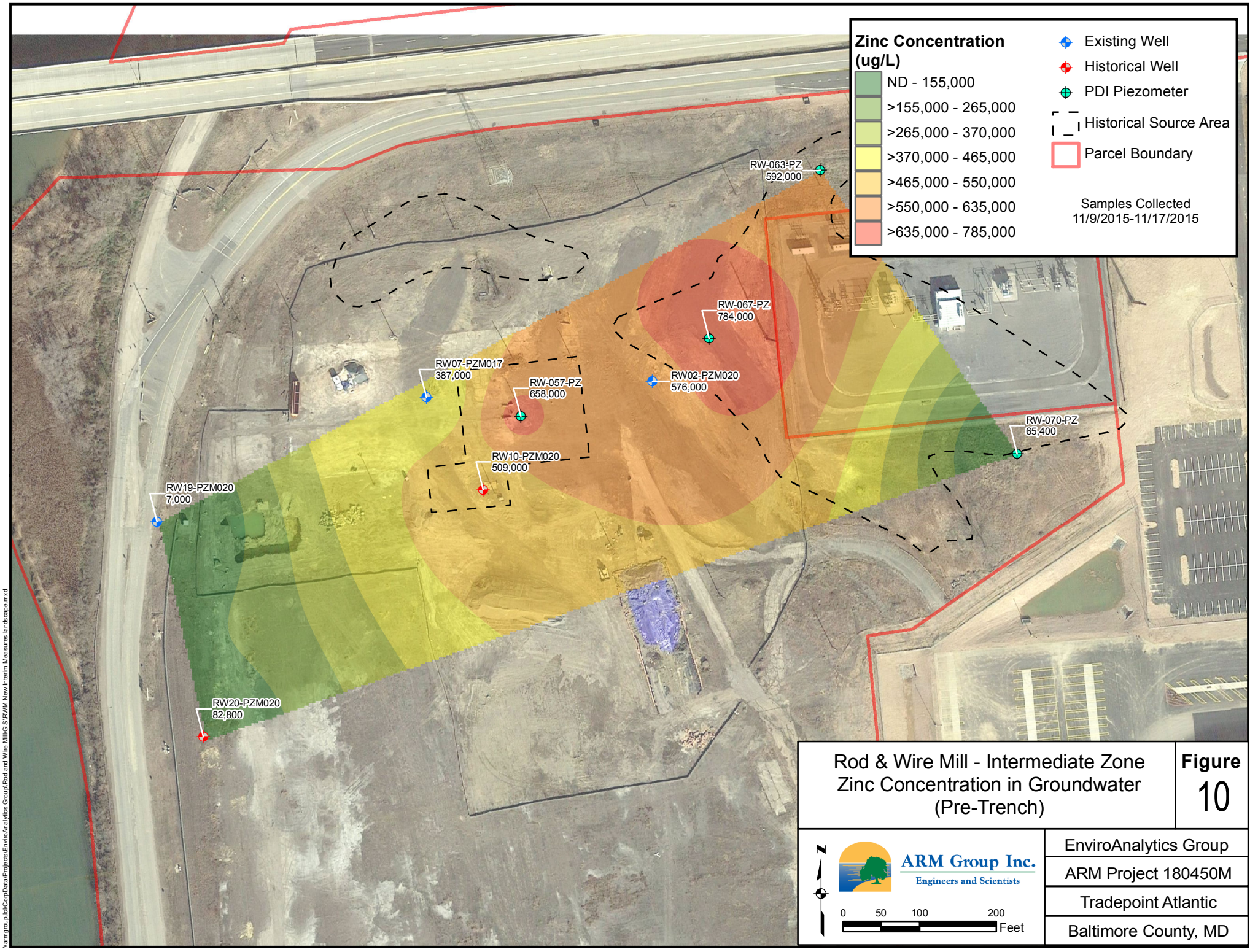
Figure 9

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Zinc Concentration (ug/L)


- ND - 155,000
- >155,000 - 265,000
- >265,000 - 370,000
- >370,000 - 465,000
- >465,000 - 550,000
- >550,000 - 635,000
- >635,000 - 785,000

- ◆ Existing Well
- ◆ Historical Well
- ◆ PDI Piezometer
- - - Historical Source Area
- ▭ Parcel Boundary

Samples Collected
11/9/2015-11/17/2015

**Rod & Wire Mill - Intermediate Zone
Zinc Concentration in Groundwater
(Pre-Trench)**

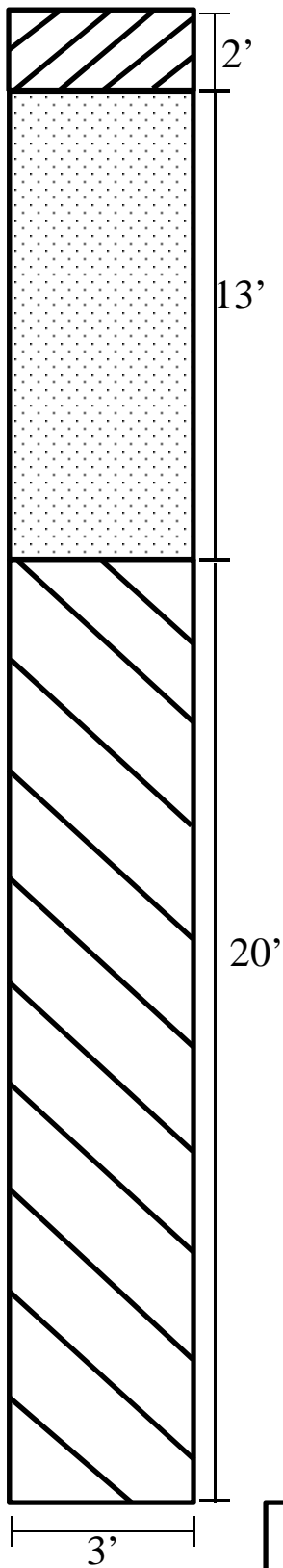
**Figure
10**

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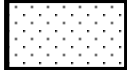

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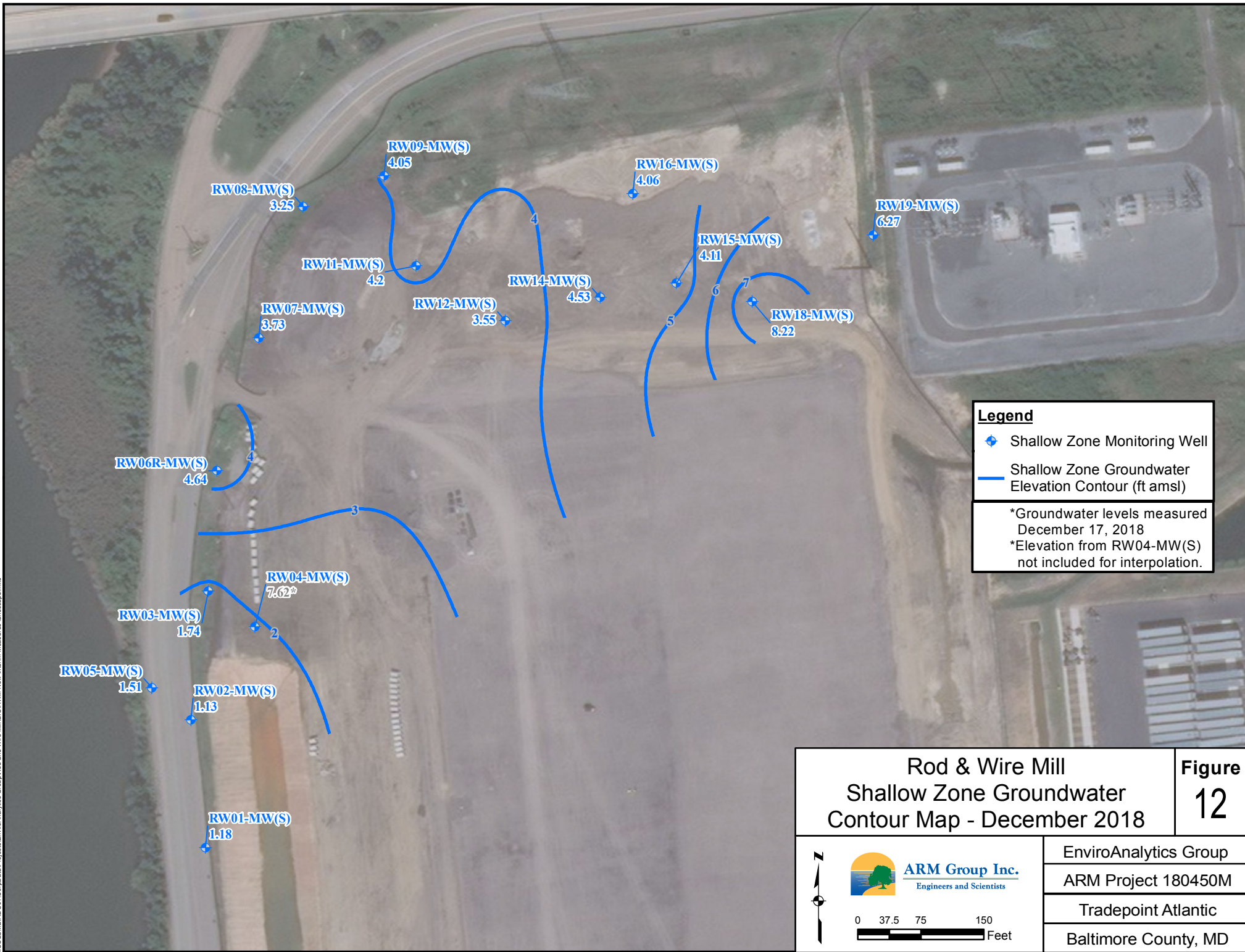


Legend

-  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 11

\\COLUMBIAD01\CorpData\Projects\EnviroAnalytics\GroupRod and Wire Mill\GIS\RW_M New Interim Measures Landscape.mxd

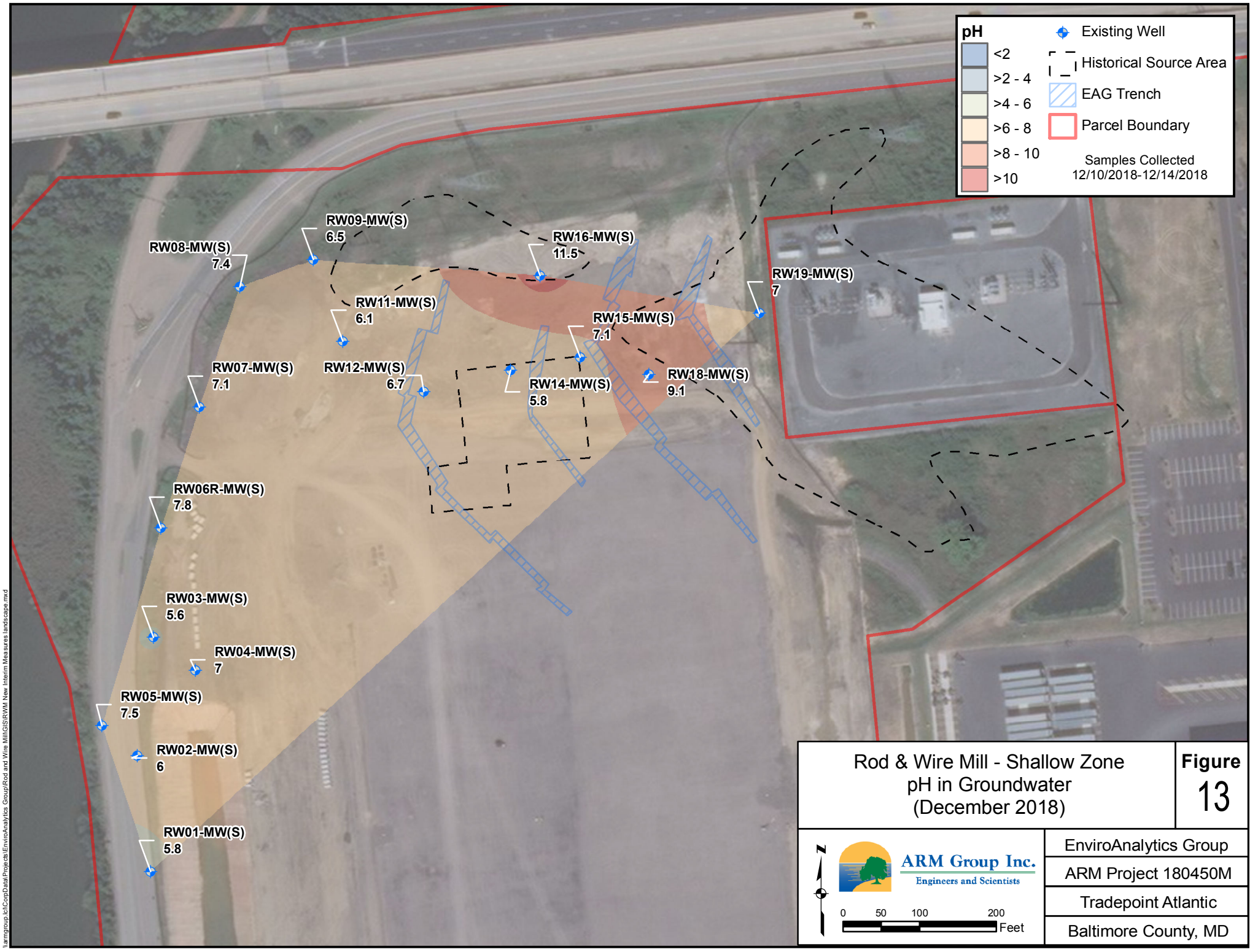


Legend

- Shallow Zone Monitoring Well
- Shallow Zone Groundwater Elevation Contour (ft amsl)

*Groundwater levels measured December 17, 2018
 *Elevation from RW04-MW(S) not included for interpolation.

Rod & Wire Mill Shallow Zone Groundwater Contour Map - December 2018		Figure 12
 	EnviroAnalytics Group	
	ARM Project 180450M	
	Tradepoint Atlantic	
		Baltimore County, MD



Rod & Wire Mill - Shallow Zone
pH in Groundwater
(December 2018)

Figure
13

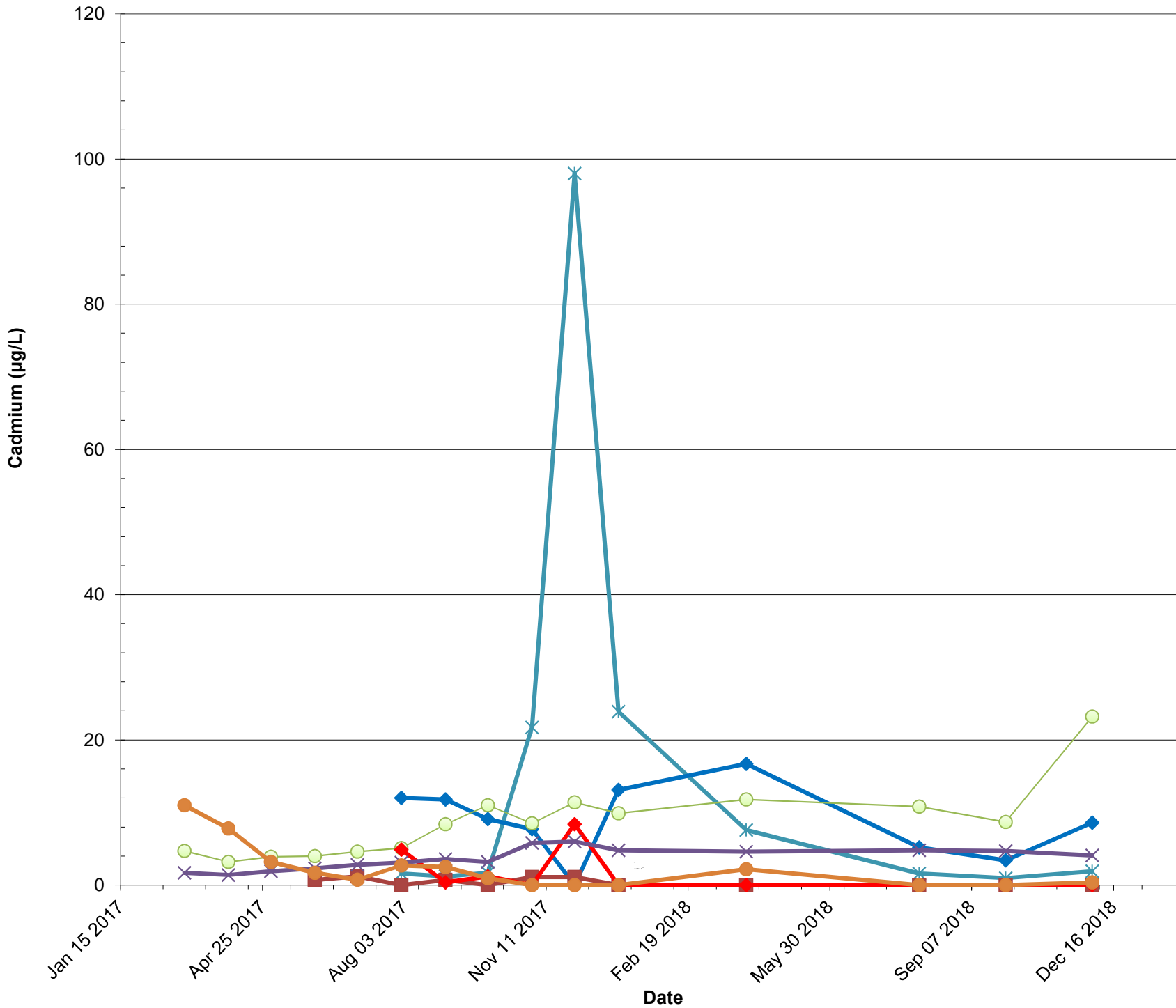
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Shallow Perimeter Wells Cadmium Concentrations



LEGEND

- ✖ RW01-MW(S)
- ◆ RW02-MW(S)
- RW03-MW(S)
- RW04-MW(S)
- ◆ RW05-MW(S)
- ✖ RW07-MW(S)
- RW08-MW(S)



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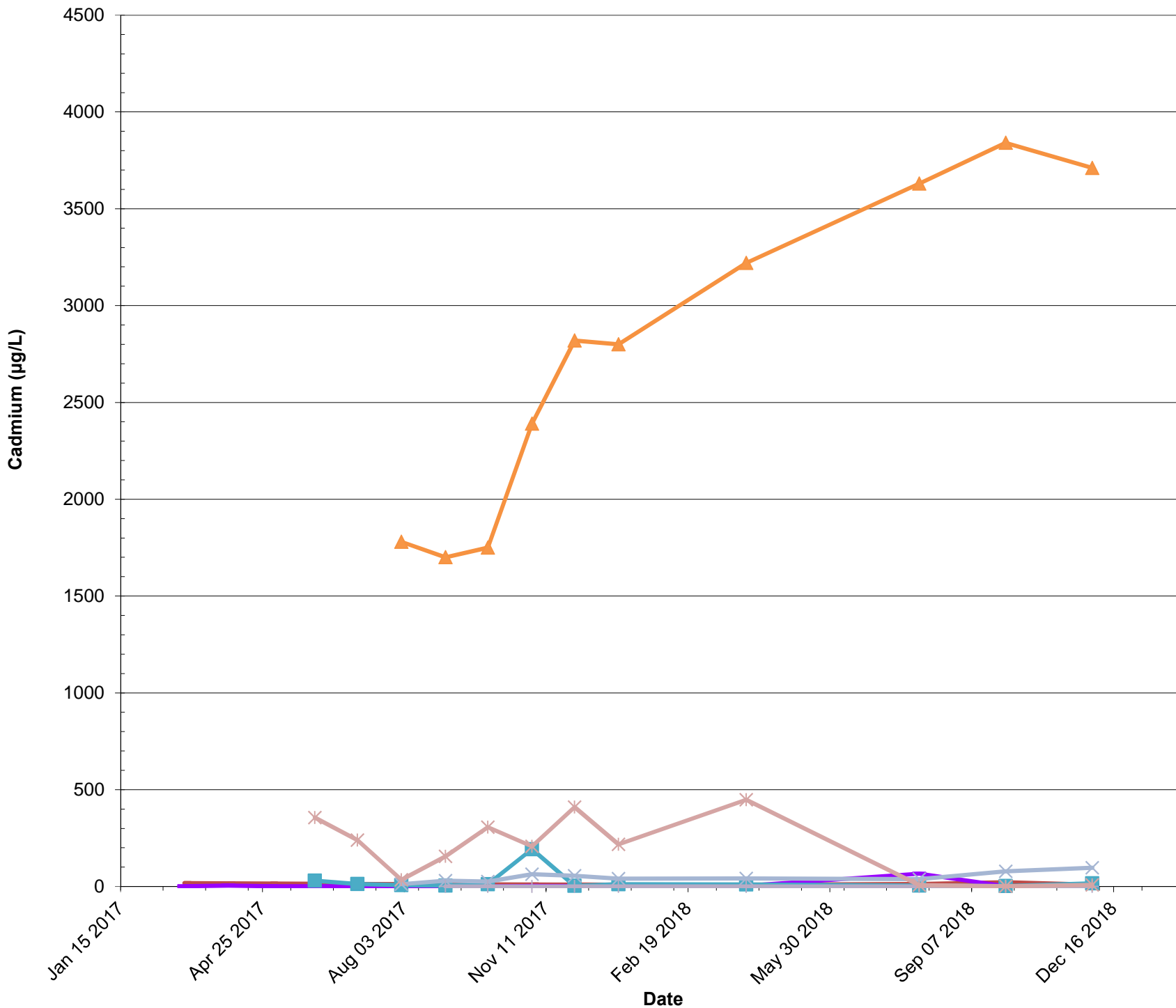
SHALLOW GROUNDWATER
CADMIUM CONCENTRATIONS
RWM INTERIM MEASURES
PROGRESS REPORT

Date
January 2019

Figure
14

PE/RG PM DR

Shallow Interior Wells Cadmium Concentrations



LEGEND

- ▲ RW09-MW(S)
- ▲ RW11-MW(S)
- RW12-MW(S)
- ▲ RW14-MW(S)
- × RW15-MW(S)
- ▲ RW16-MW(S)
- * RW18-MW(S)



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SHALLOW GROUNDWATER
 CADMIUM CONCENTRATIONS
 RWM INTERIM MEASURES
 PROGRESS REPORT

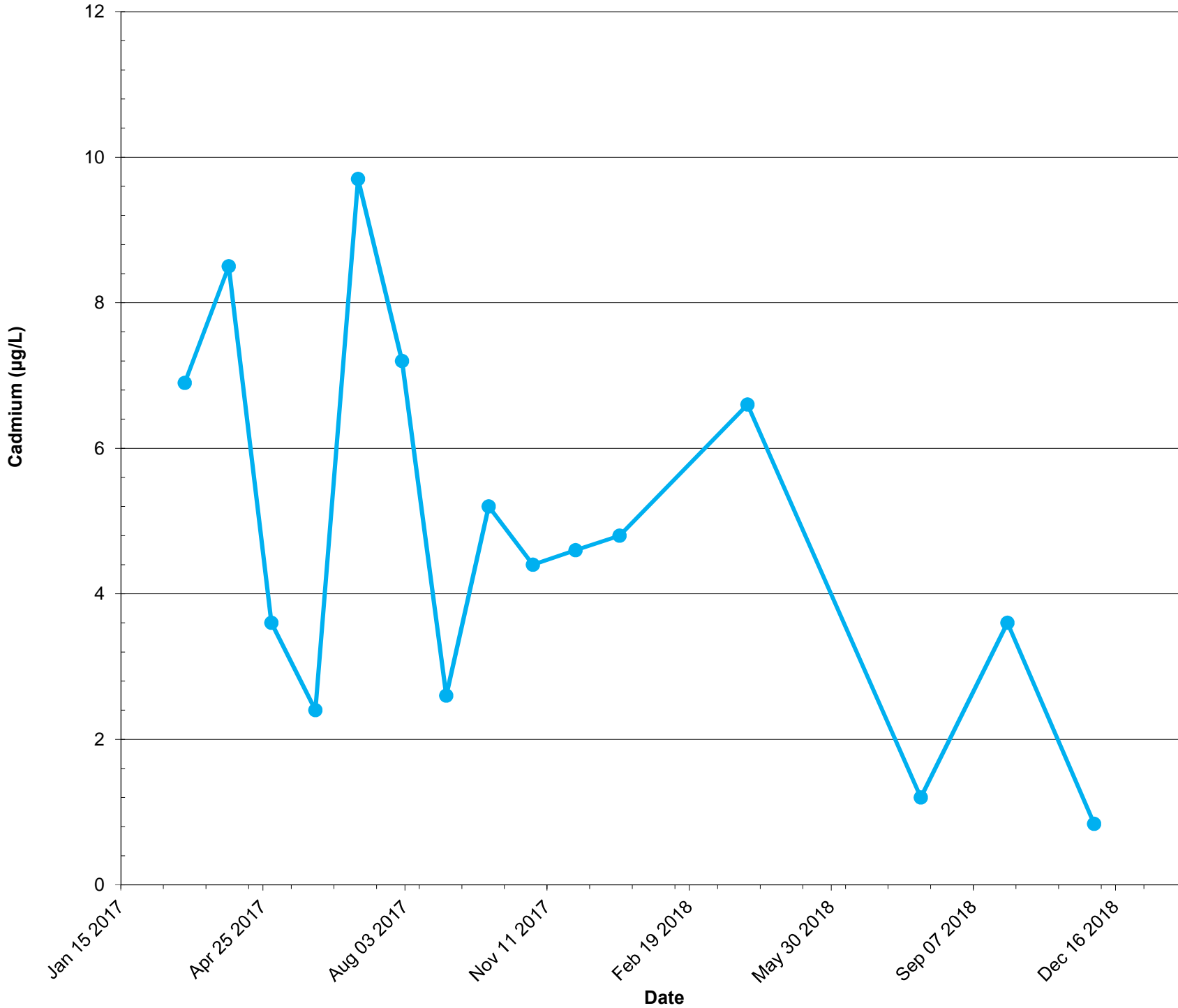
Date
 August 21, 2018

Figure

PE/RG PM DR

15

Shallow Upgradient Well Cadmium Concentration



LEGEND

RW19-MW(S)



Environmental Engineers

Project

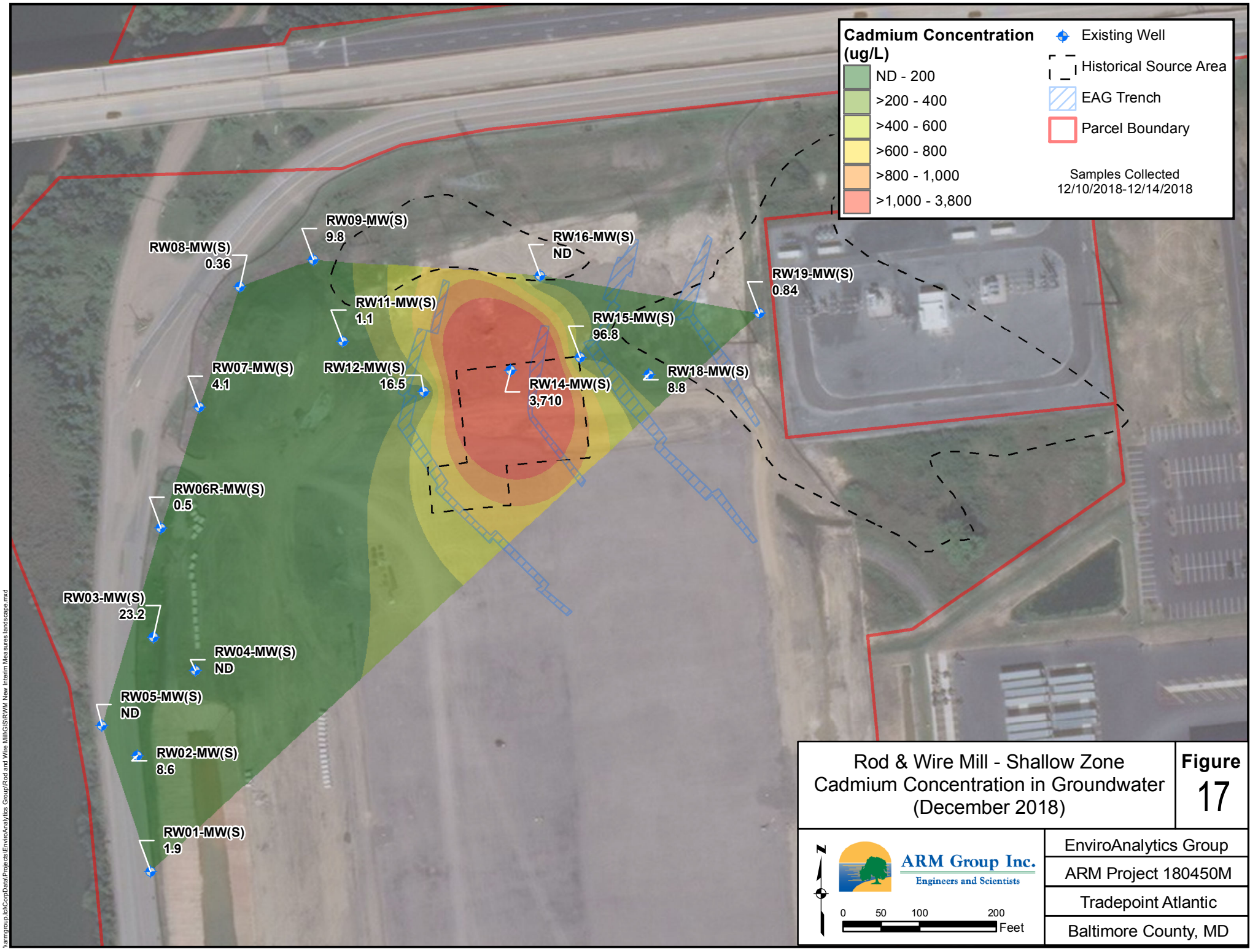
Tradepoint Atlantic
Baltimore, Maryland

SHALLOW GROUNDWATER
CADMIUM CONCENTRATIONS
RWM INTERIM MEASURES
PROGRESS REPORT

Date
August 21, 2018



Figure
16

PE/RG PM DR



Rod & Wire Mill - Shallow Zone
 Cadmium Concentration in Groundwater
 (December 2018)

Figure 17

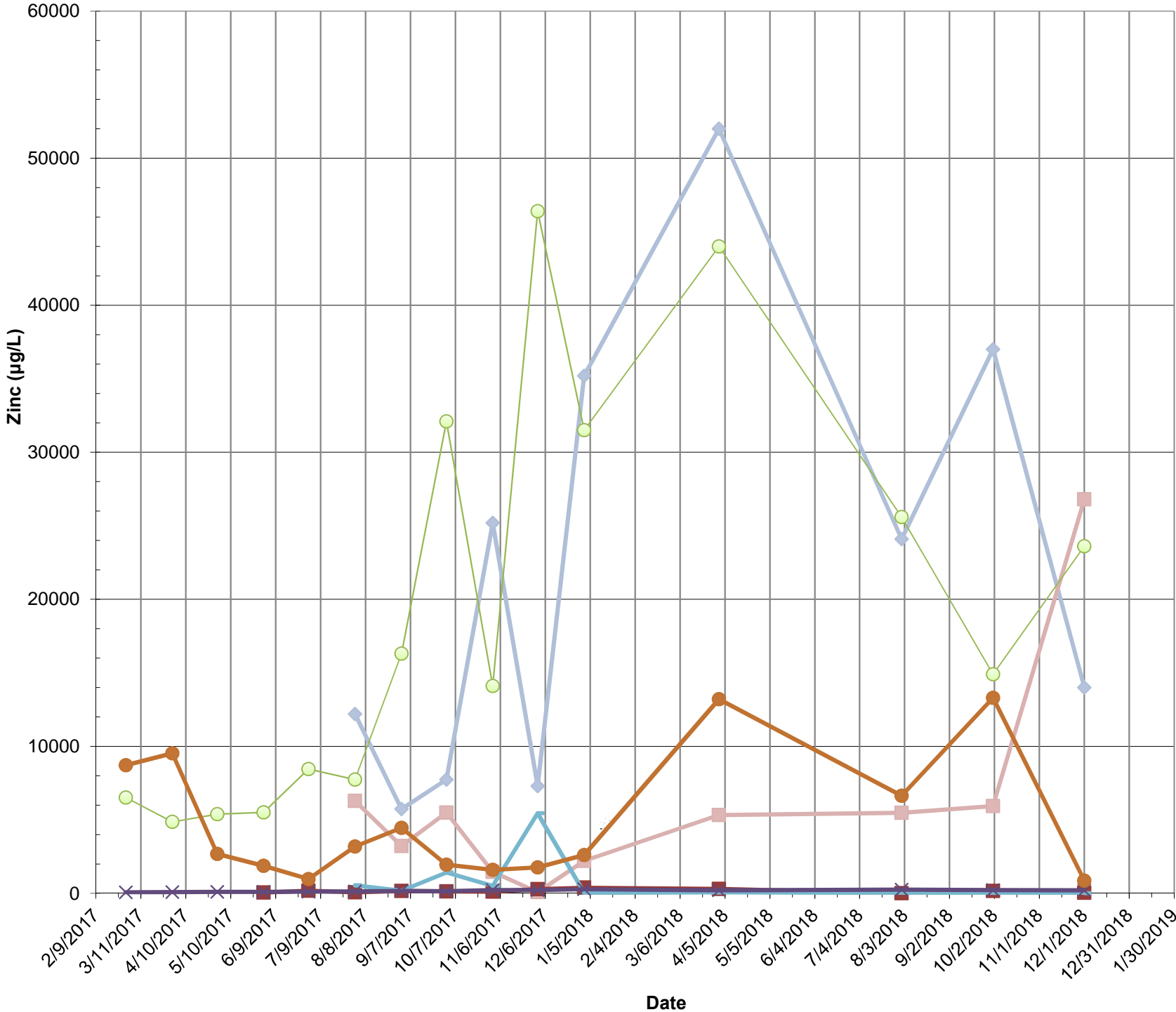


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Shallow Perimeter Wells Zinc Concentrations



LEGEND

- ◆ RW01-MW(S)
- RW02-MW(S)
- RW03-MW(S)
- RW04-MW(S)
- RW05-MW(S)
- × RW07-MW(S)
- RW08-MW(S)

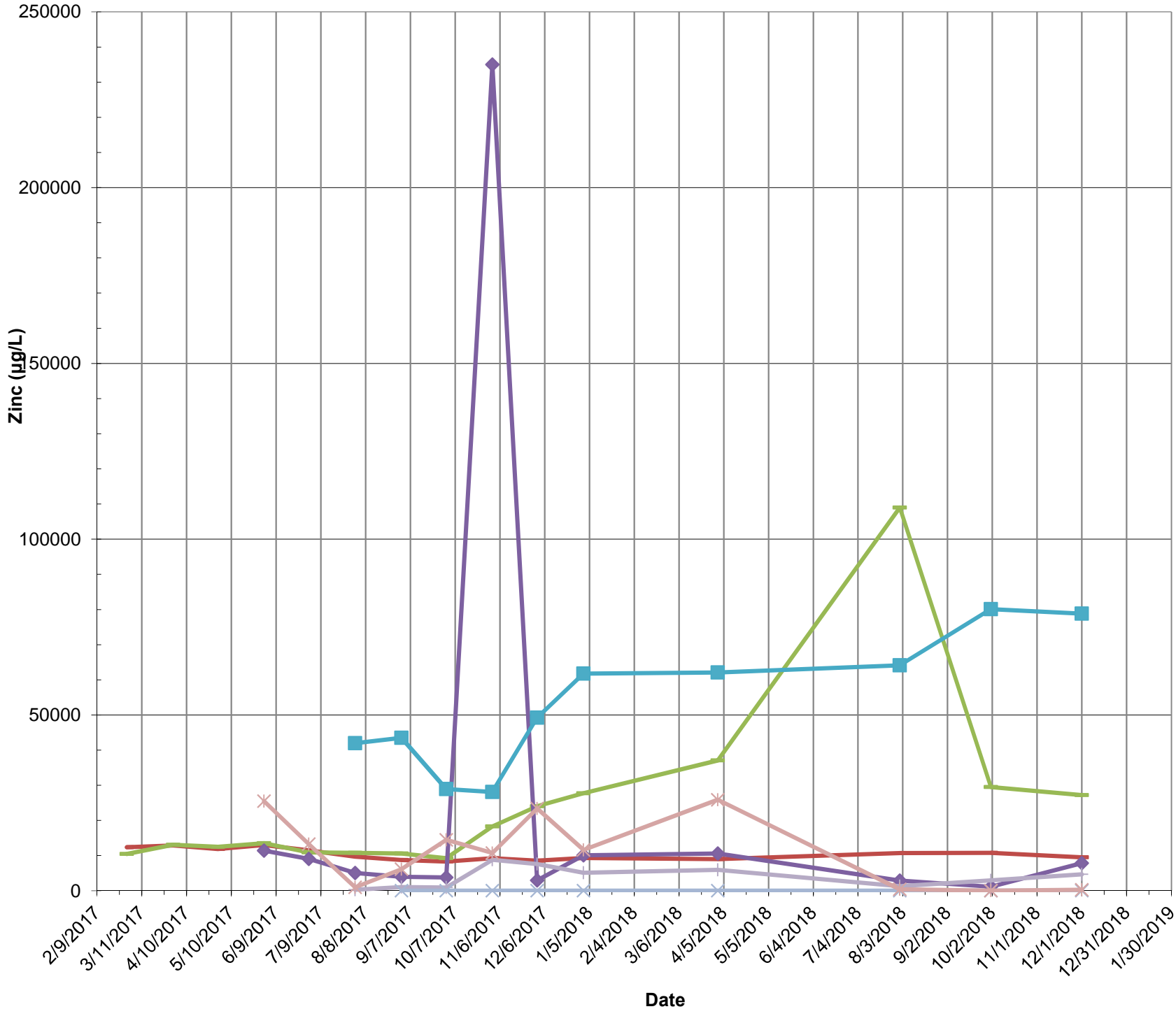


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**SHALLOW GROUNDWATER
ZINC CONCENTRATION
RWM INTERIM MEASURES
PROGRESS REPORT**

Shallow Interior Wells Zinc Concentrations



LEGEND

- RW09-MW(S)
- RW11-MW(S)
- RW12-MW(S)
- RW14-MW(S)
- RW15-MW(S)
- RW16-MW(S)
- RW18-MW(S)



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**SHALLOW GROUNDWATER
ZINC CONCENTRATION
RWM INTERIM MEASURES
PROGRESS REPORT**

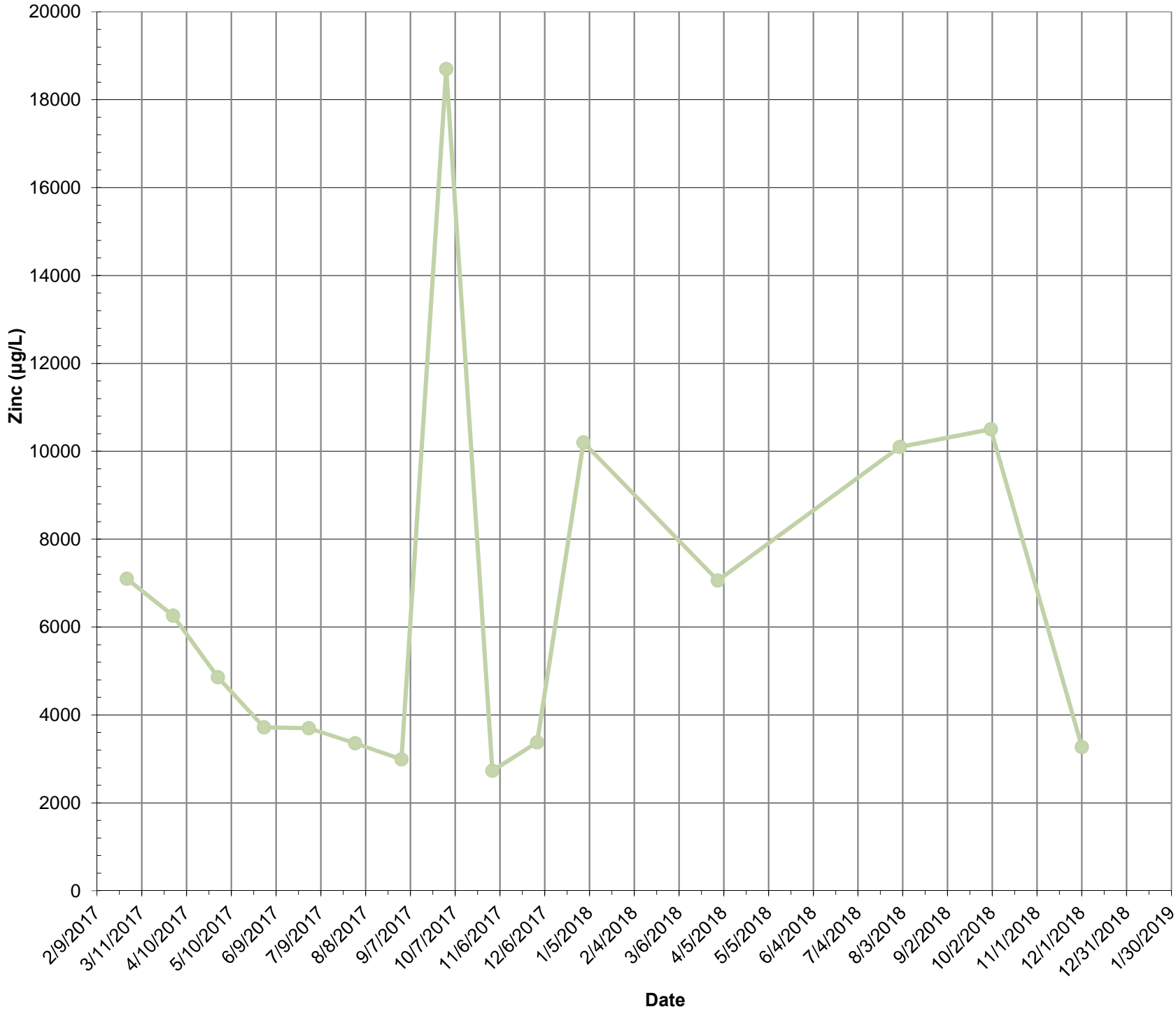
Date
January 2019

Figure

PE/RG PM DR

19

Shallow Upgradient Well Zinc Concentration



LEGEND

RW19-MW(S)



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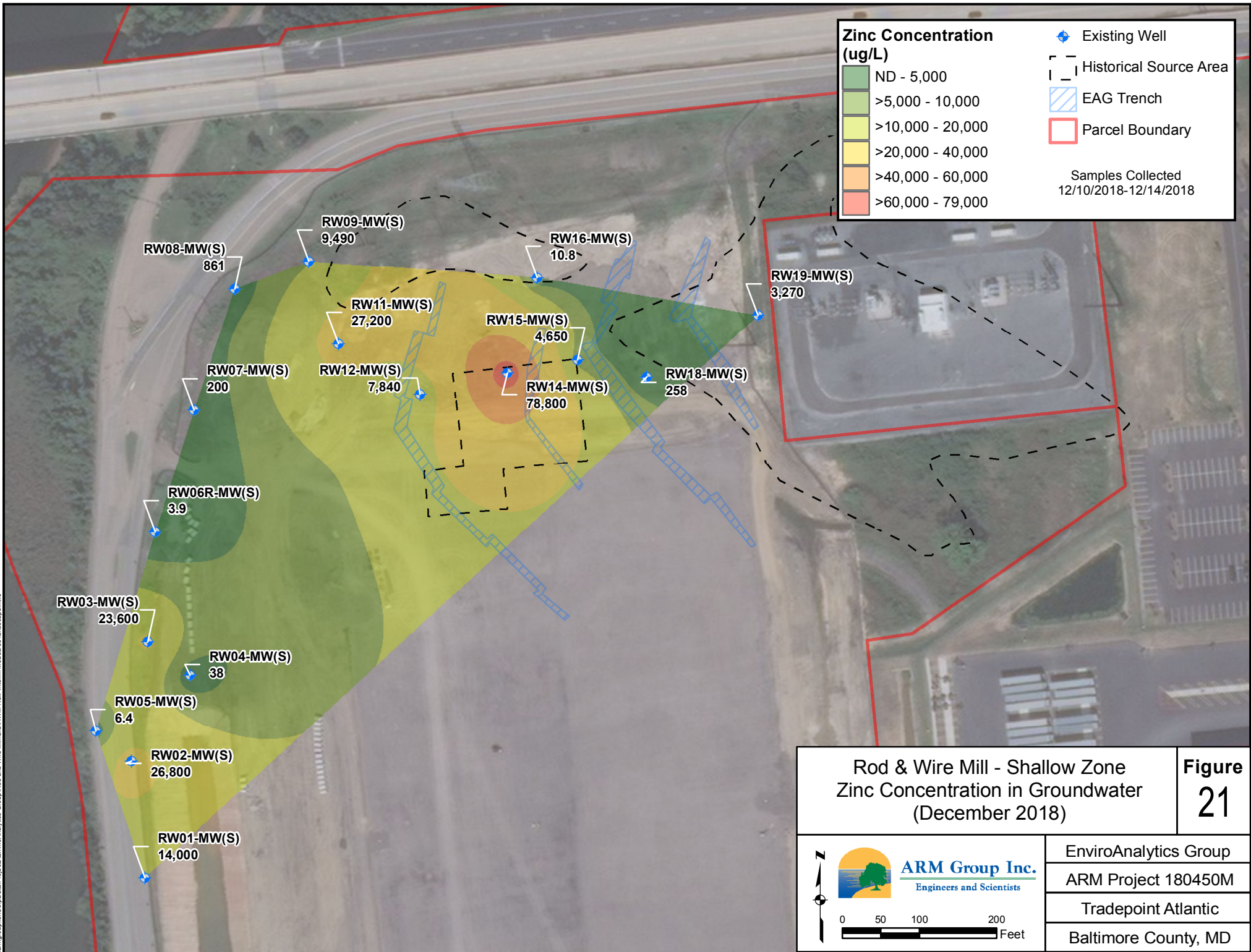
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**SHALLOW GROUNDWATER
ZINC CONCENTRATION
RWM INTERIM MEASURES
PROGRESS REPORT**

Date
January 2019

Figure
20

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Rod & Wire Mill - Shallow Zone
Zinc Concentration in Groundwater
(December 2018)

Figure
21

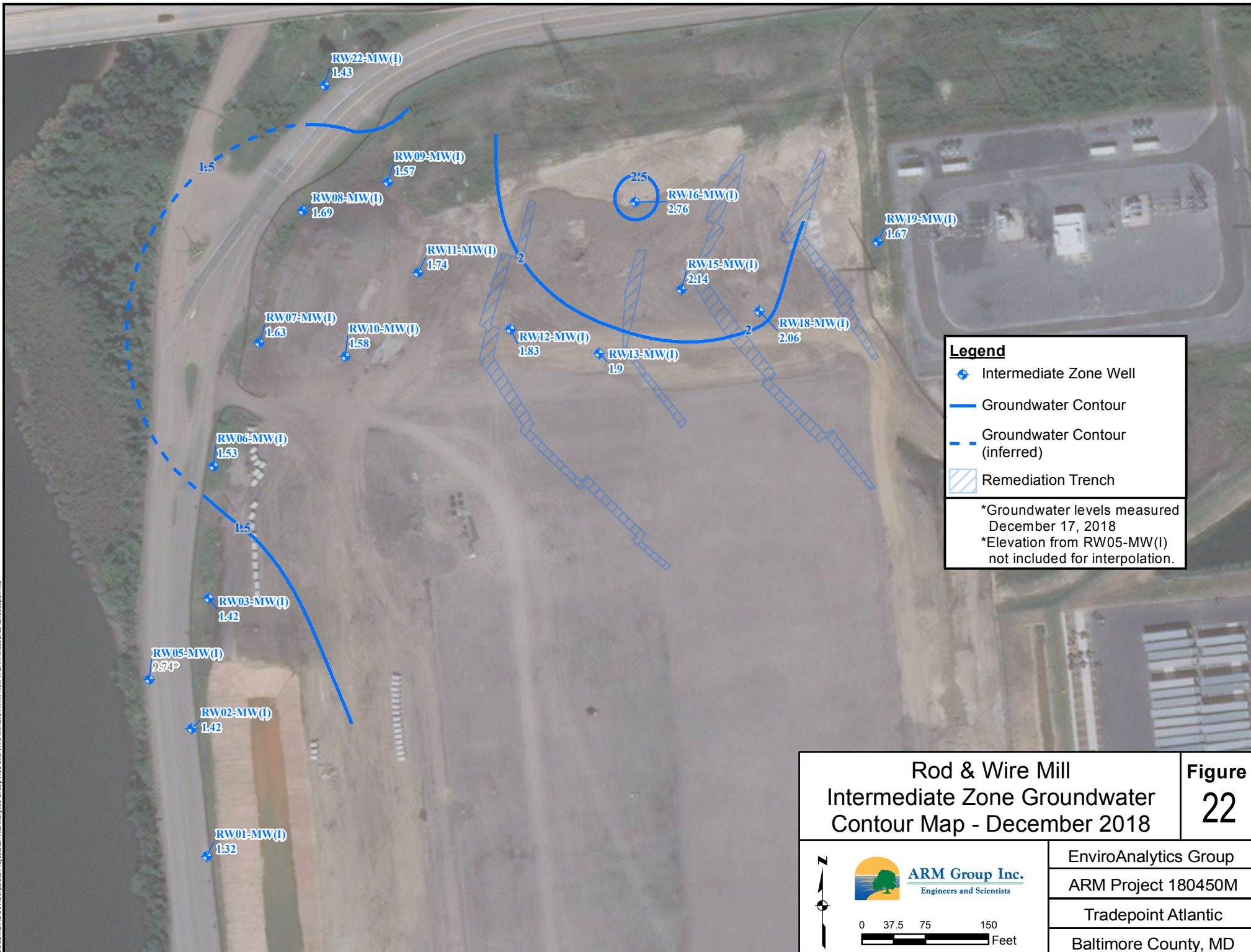
ARM Group Inc.
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0 50 100 200 Feet

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ARM Project 180450M
Tradepoint Atlantic
Baltimore County, MD

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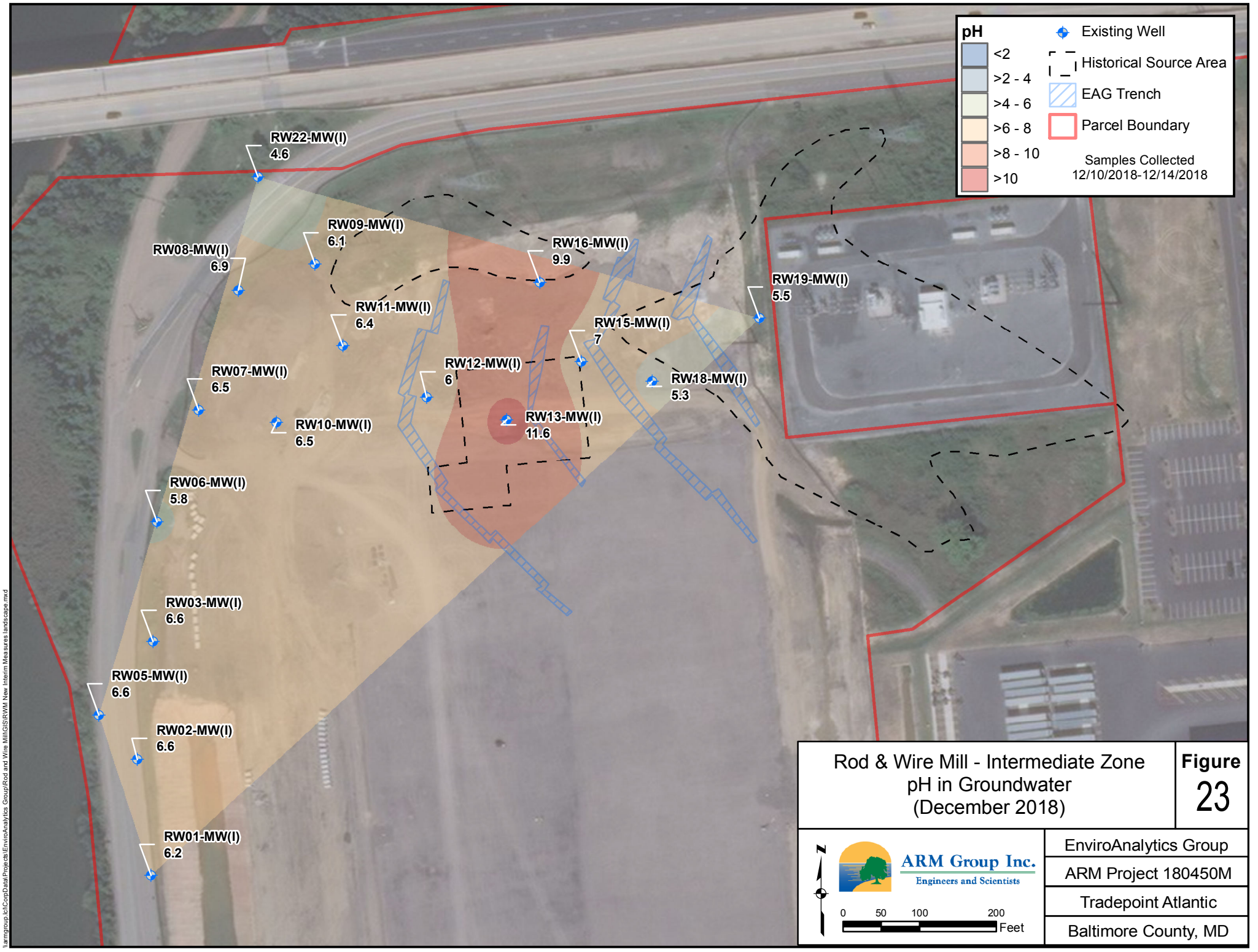


Legend

- Intermediate Zone Well
- Groundwater Contour
- Groundwater Contour (inferred)
- Remediation Trench

*Groundwater levels measured December 17, 2018
 *Elevation from RW05-MW(I) not included for interpolation.

Rod & Wire Mill Intermediate Zone Groundwater Contour Map - December 2018		Figure 22
 	EnviroAnalytics Group	
	ARM Project 180450M	
	Tradepoint Atlantic Baltimore County, MD	



Rod & Wire Mill - Intermediate Zone
pH in Groundwater
(December 2018)

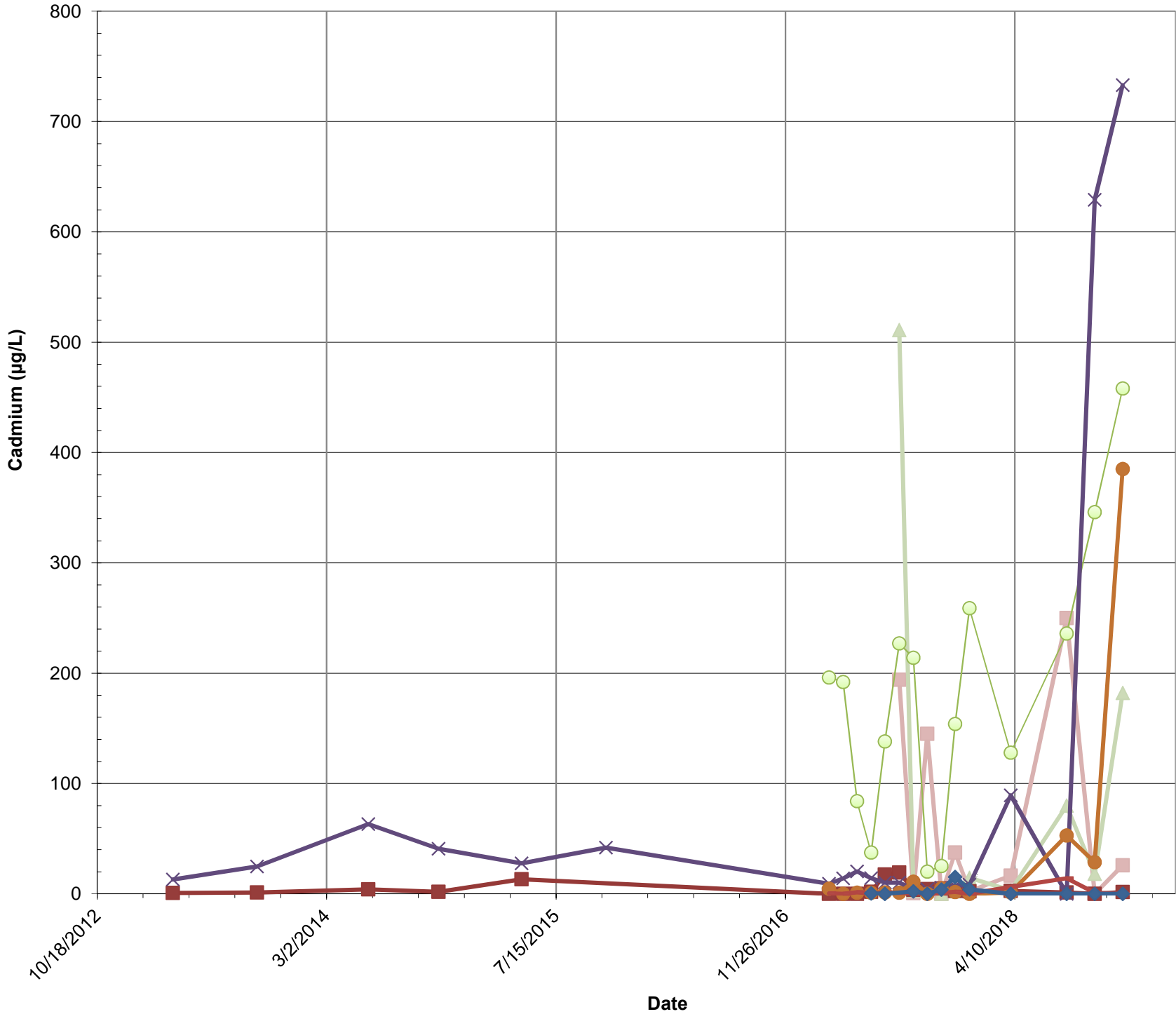
Figure
23

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Baltimore County, MD

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Intermediate Perimeter Wells Cadmium Concentrations



LEGEND

- RW01-MW(I)
- ▲ RW02-MW(I)
- RW03-MW(I)
- RW05-MW(I)
- × RW06-MW(I)
- RW07-MW(I)
- RW08-MW(I)
- ◆ RW22-MW(I)



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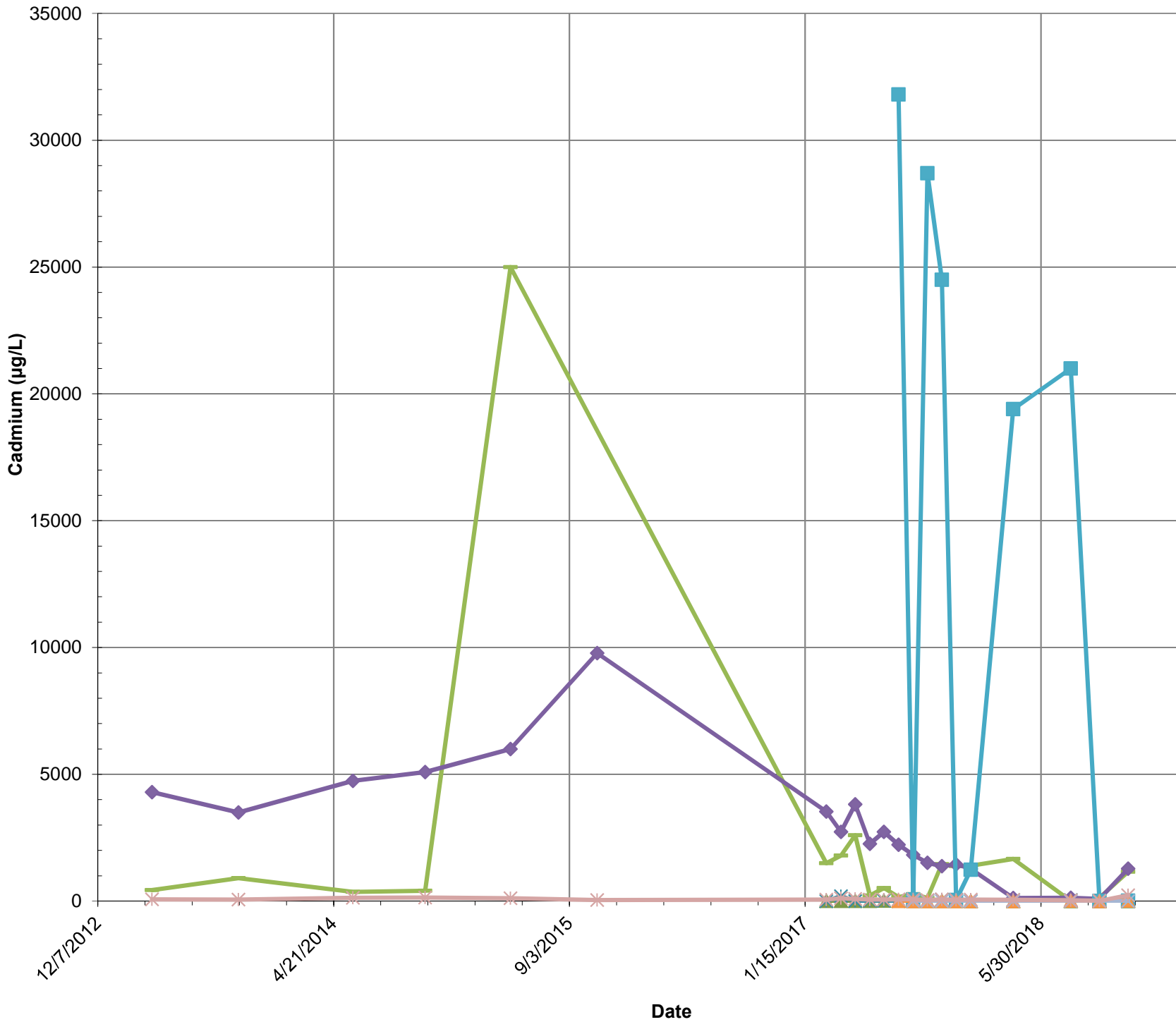
INTERMEDIATE GROUNDWATER
 CADMIUM CONCENTRATION
 RWM INTERIM MEASURES
 PROGRESS REPORT

Date
 January 2019

Figure
 24

PE/RG PM DR

Intermediate Performance Wells Cadmium Concentrations



LEGEND

- ▲ RW09-MW(I)
- ✱ RW10-MW(I)
- RW11-MW(I)
- ◆ RW12-MW(I)
- RW13-MW(I)
- ▲ RW15-MW(I)
- ✱ RW16-MW(I)
- ✱ RW18-MW(I)



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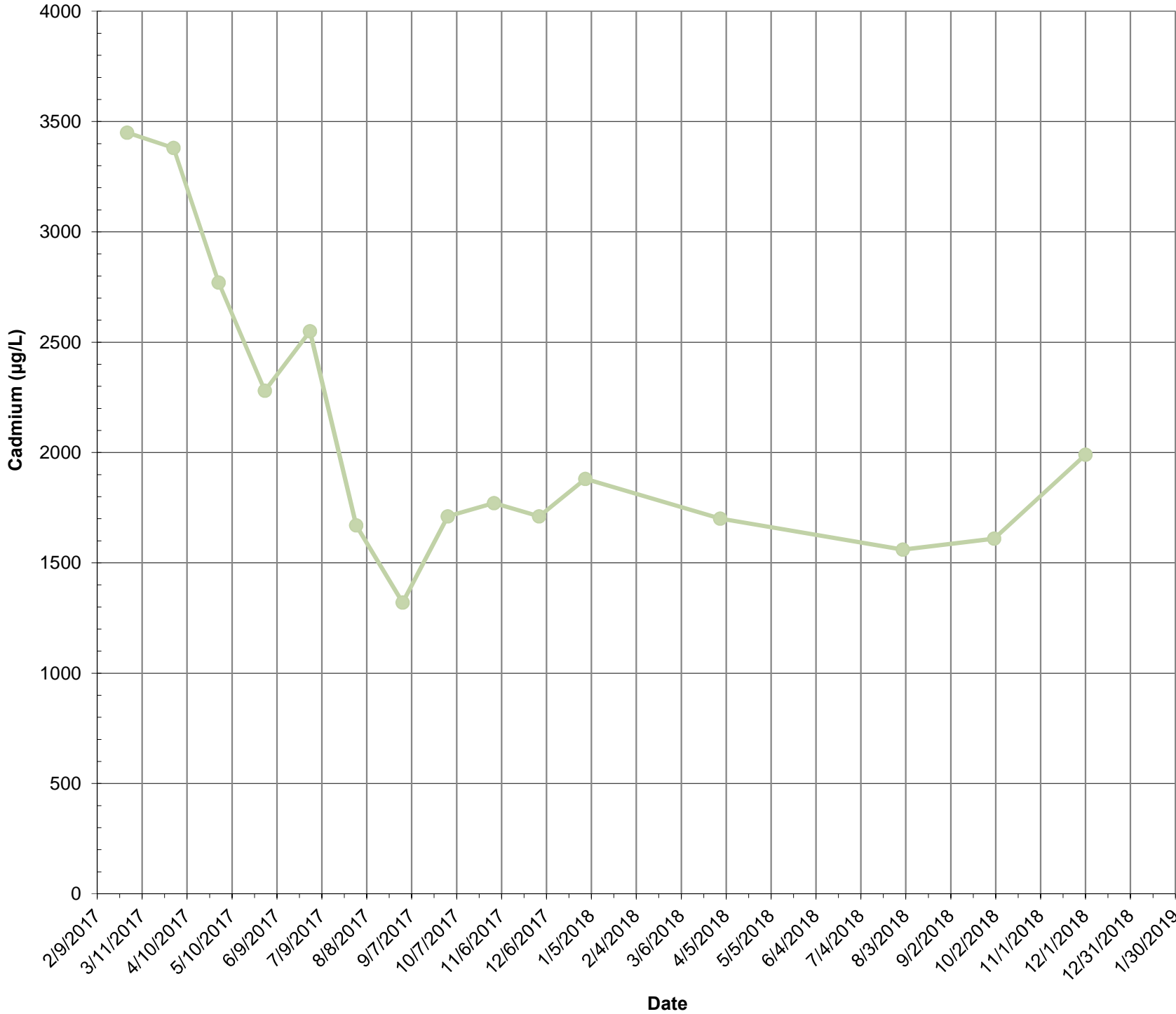
INTERMEDIATE GROUNDWATER
CADMIUM CONCENTRATION
RWM INTERIM MEASURES
PROGRESS REPORT

Date
January 2019

Figure
25

PE/RG PM DR

Intermediate Upgradient Well Cadmium Concentration



LEGEND

—●— RW19-MW(I)



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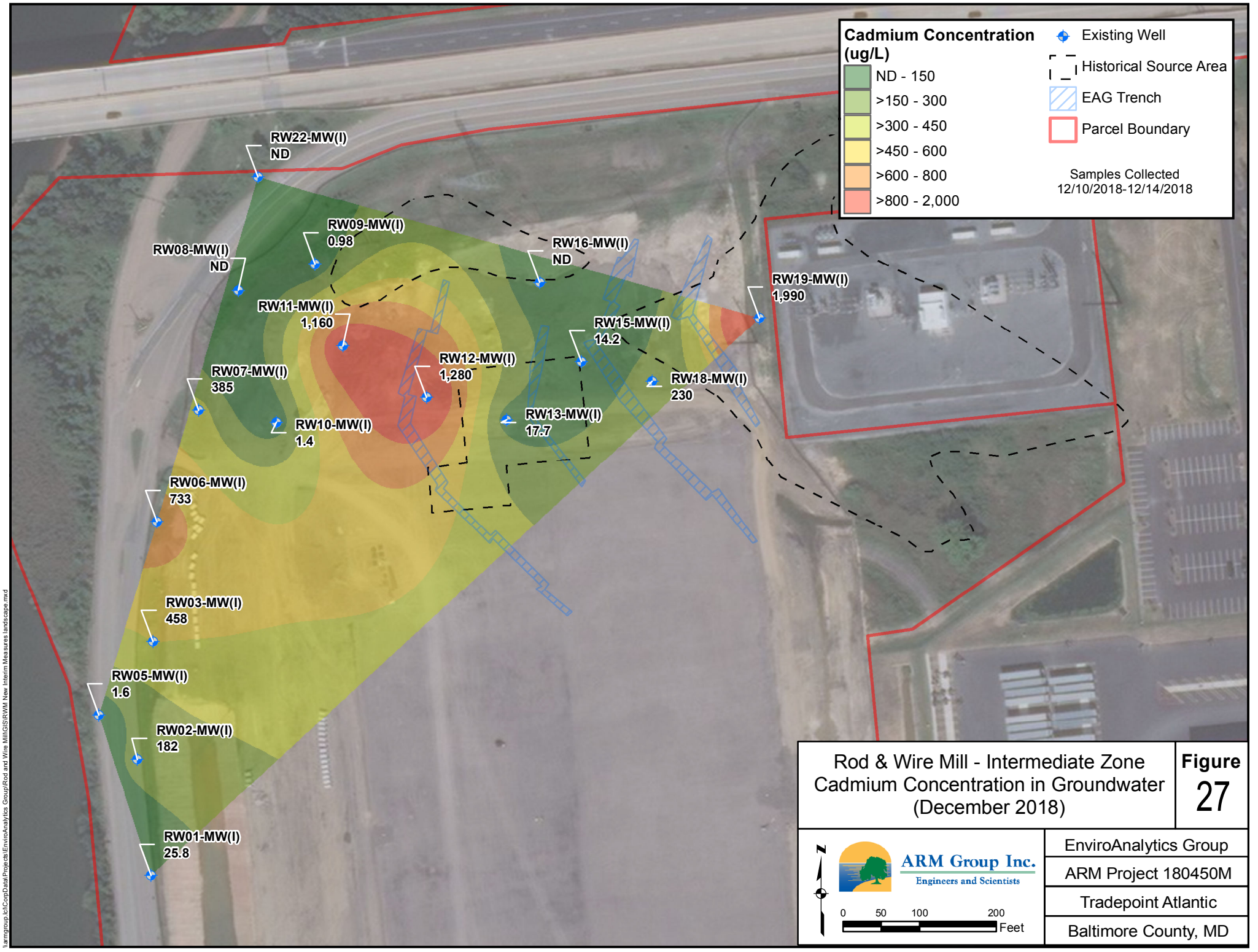
INTERMEDIATE GROUNDWATER
CADMIUM CONCENTRATION
RWM INTERIM MEASURES
PROGRESS REPORT

Date
January 2019

Figure



26

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Rod & Wire Mill - Intermediate Zone
 Cadmium Concentration in Groundwater
 (December 2018)

Figure 27

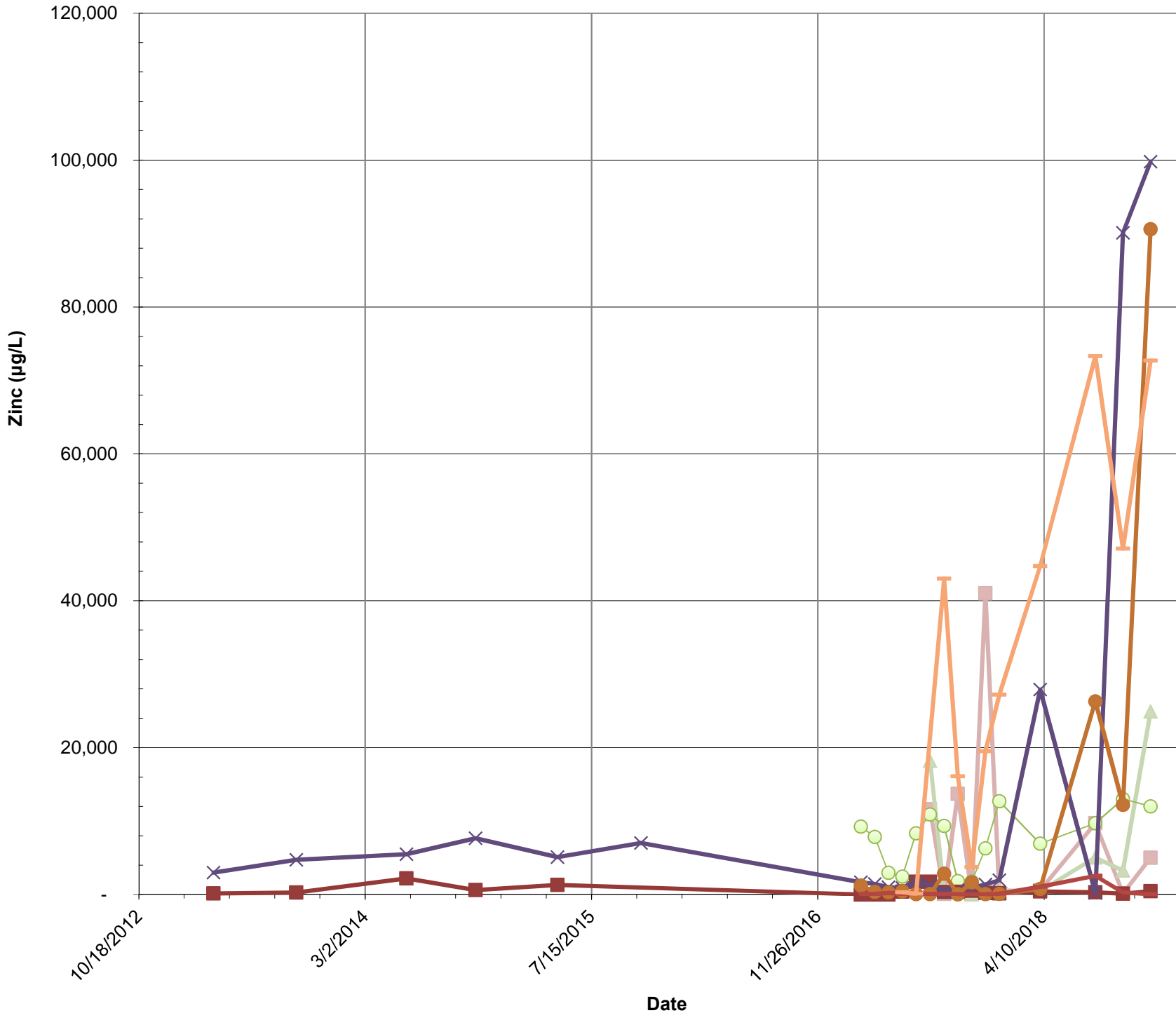


ARM Group Inc.
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0 50 100 200
 Feet

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Intermediate Perimeter Wells Zinc Concentrations



LEGEND

- RW01-MW(I)
- ▲ RW02-MW(I)
- RW03-MW(I)
- RW05-MW(I)
- × RW06-MW(I)
- RW07-MW(I)
- RW08-MW(I)
- RW22-MW(I)



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INTERMEDIATE GROUNDWATER
ZINC CONCENTRATION
RWM INTERIM MEASURES
PROGRESS REPORT

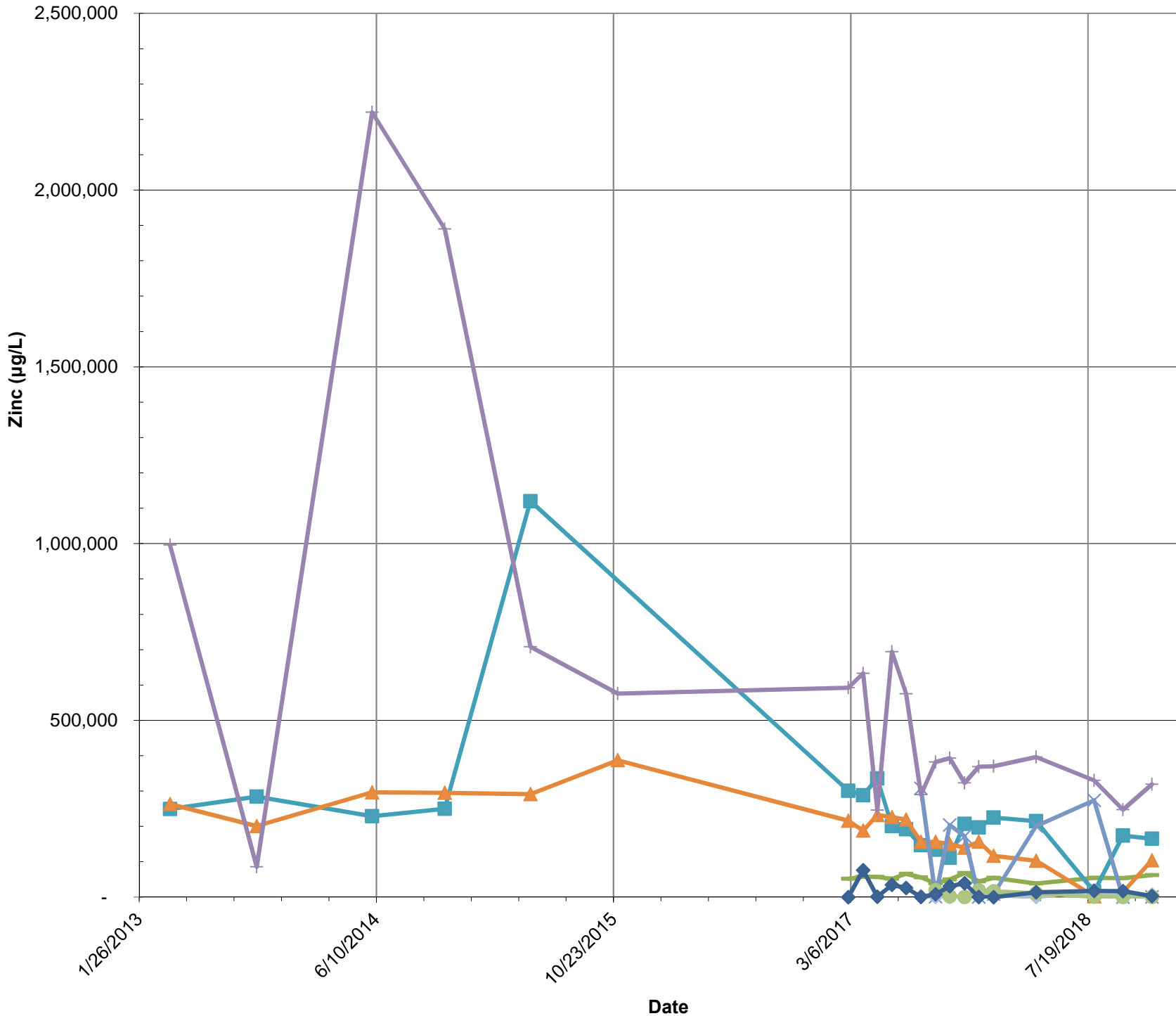
Date
January 2019

Figure

28

PE/RG PM DR

Intermediate Performance Wells Zinc Concentrations



LEGEND

- RW09-MW(I) Zn
- RW11-MW(I) Zn
- ▲ RW12-MW(I) Zn
- × RW13-MW(I) Zn
- ◇ RW15-MW(I) Zn
- RW16-MW(I) Zn
- + RW18-MW(I) Zn
- ◆ RW10-MW(I) Zn



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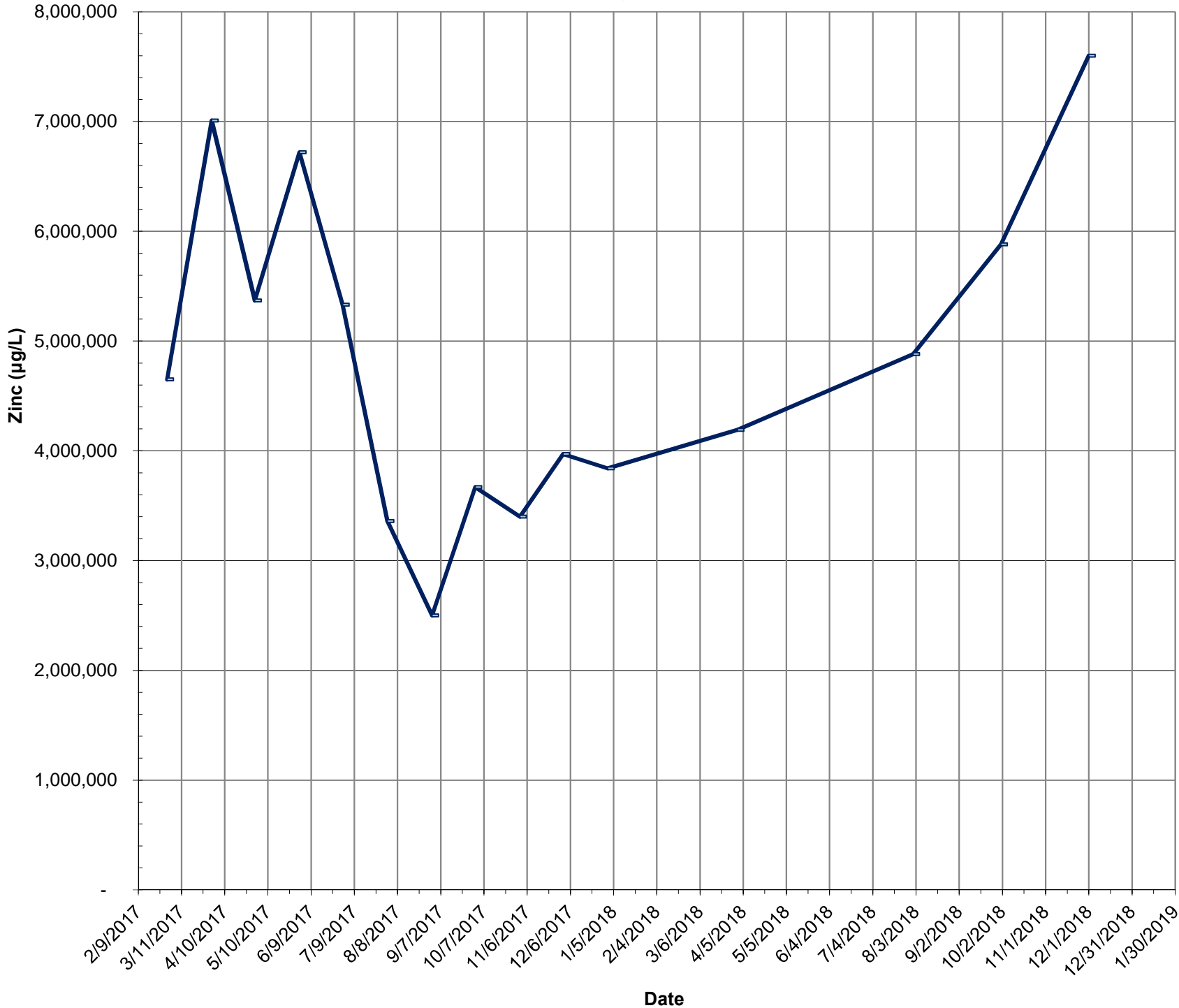
INTERMEDIATE GROUNDWATER
ZINC CONCENTRATION
RWM INTERIM MEASURES
PROGRESS REPORT

Date
January 2019

Figure
29

PE/RG PM DR

Intermediate Upgradient Well Zinc Concentration



LEGEND

— RW19-MW(I) Zn



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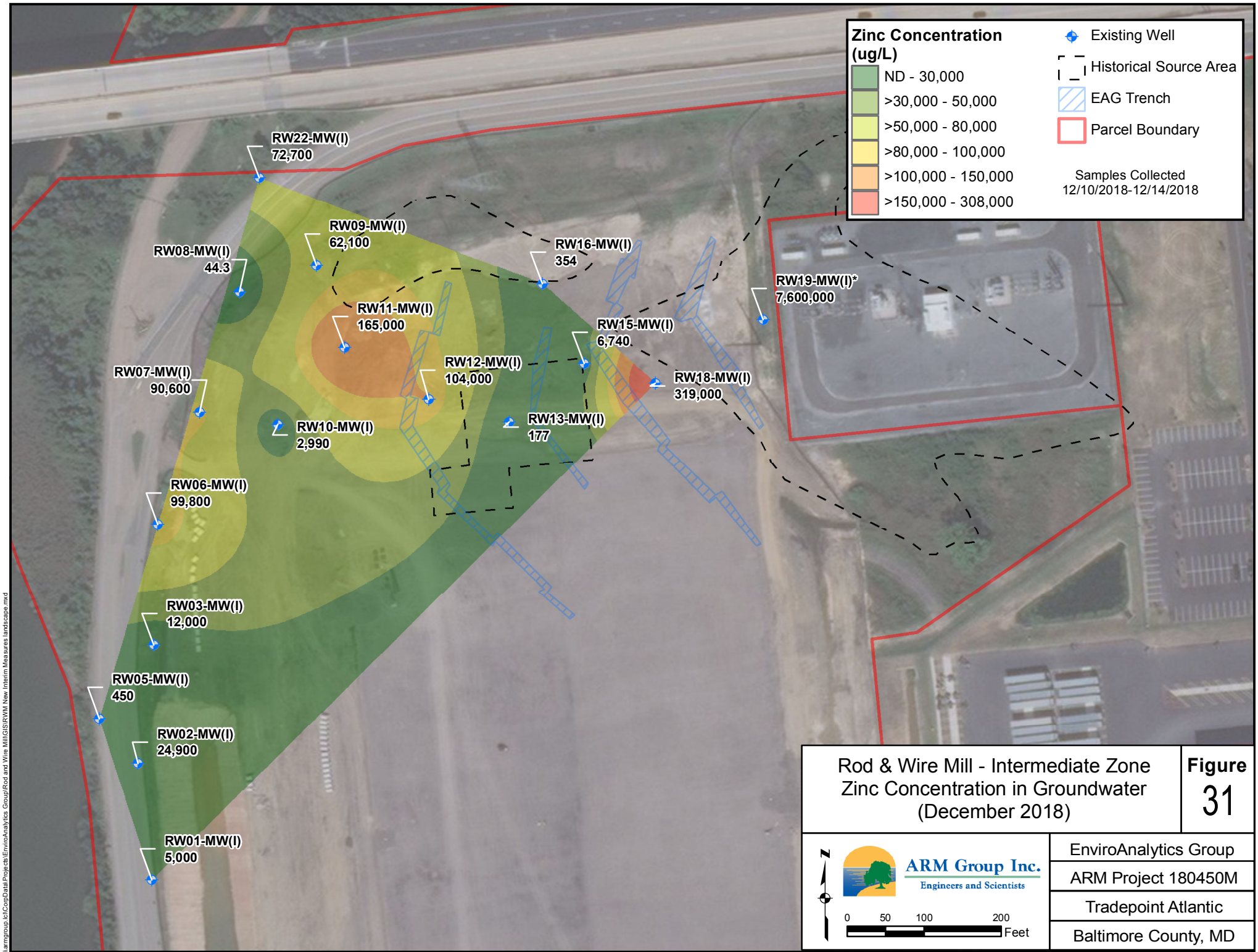
**INTERMEDIATE GROUNDWATER
 ZINC CONCENTRATION
 RWM INTERIM MEASURES
 PROGRESS REPORT**

Date
 January 2019

Figure

30

PE/RG PM DR



Rod & Wire Mill - Intermediate Zone
 Zinc Concentration in Groundwater
 (December 2018)

Figure 31

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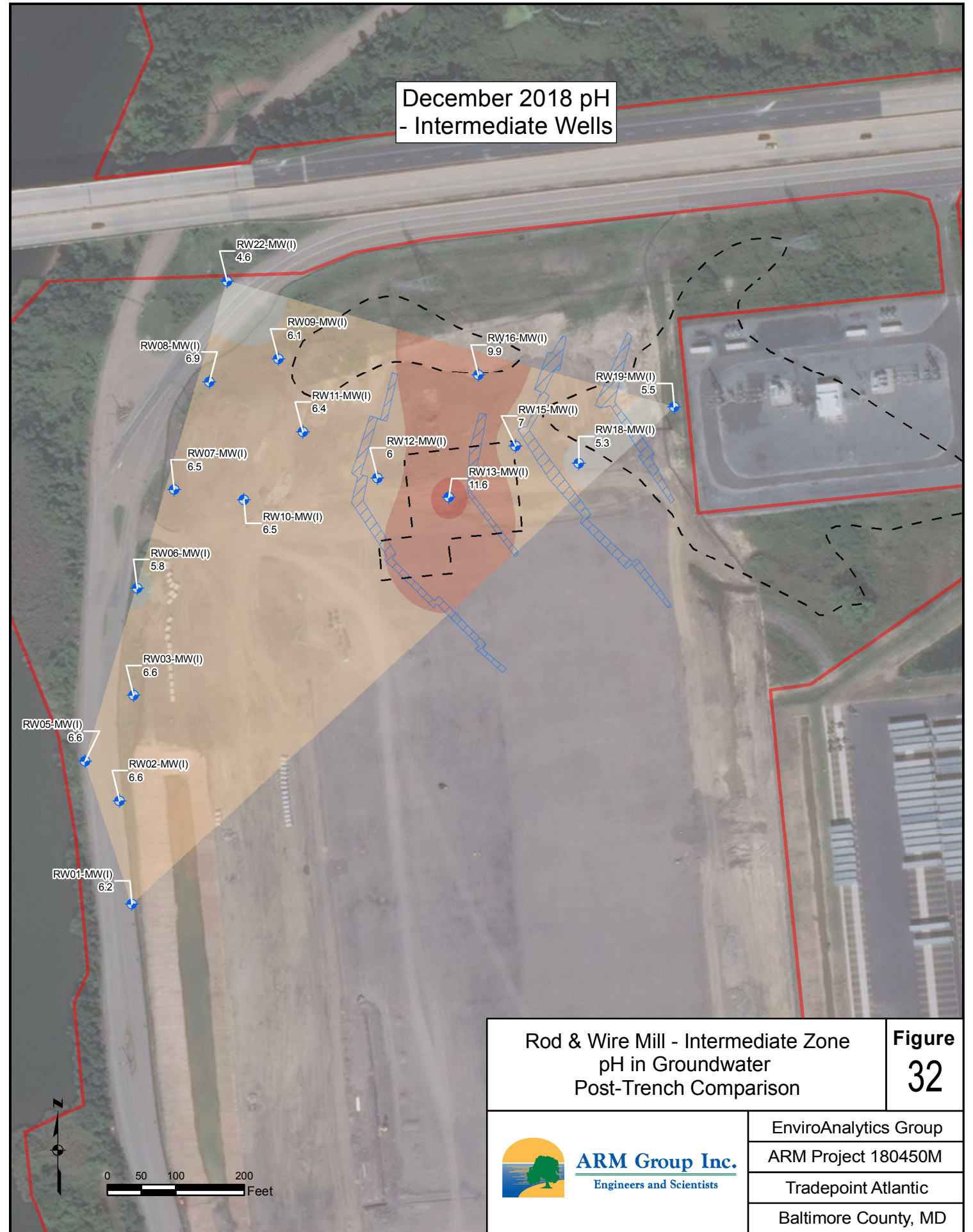
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 Tradepoint Atlantic
 Baltimore County, MD

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September 2017 pH
- Intermediate Wells



December 2018 pH
- Intermediate Wells



Rod & Wire Mill - Intermediate Zone
pH in Groundwater
Post-Trench Comparison

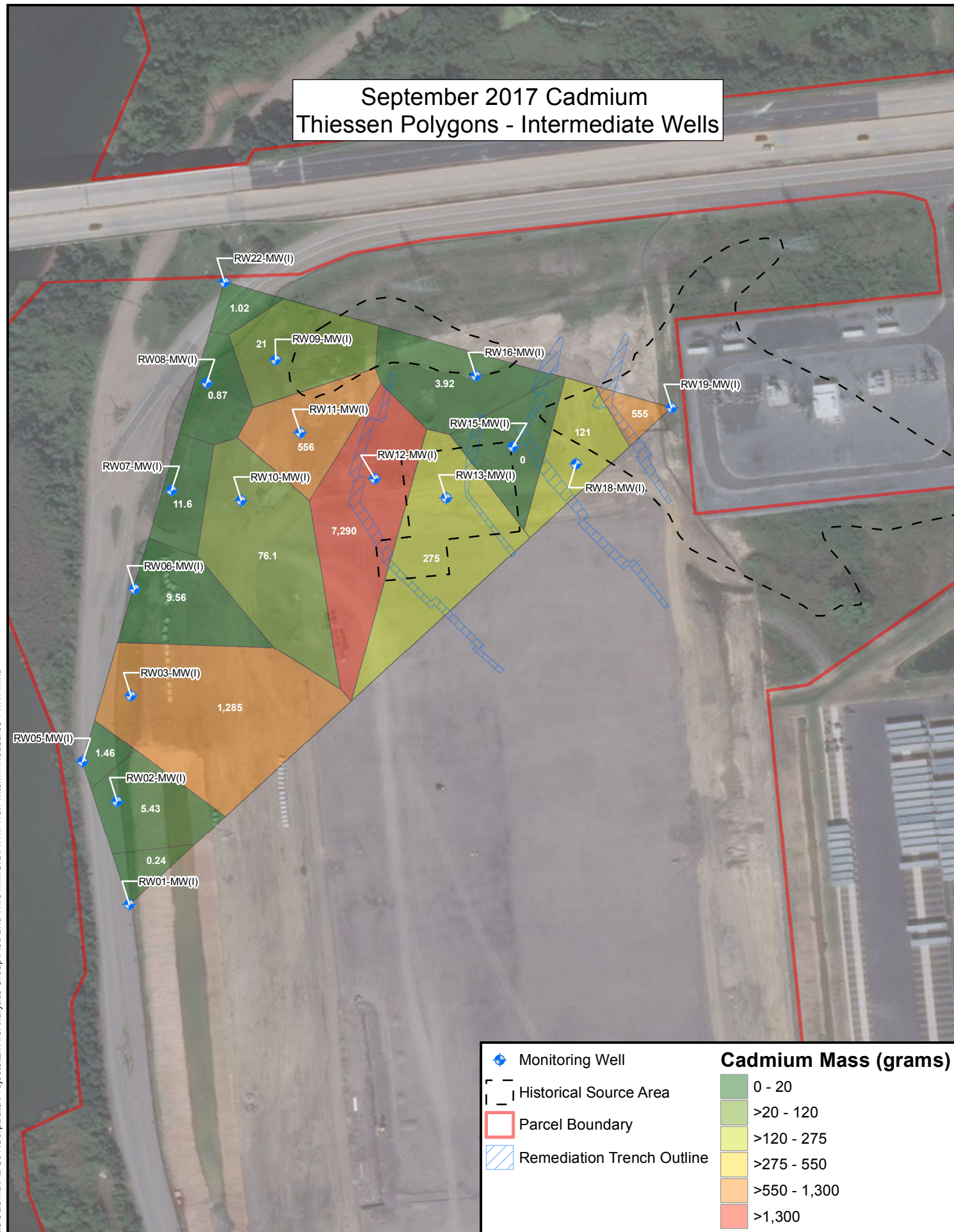
Figure
32



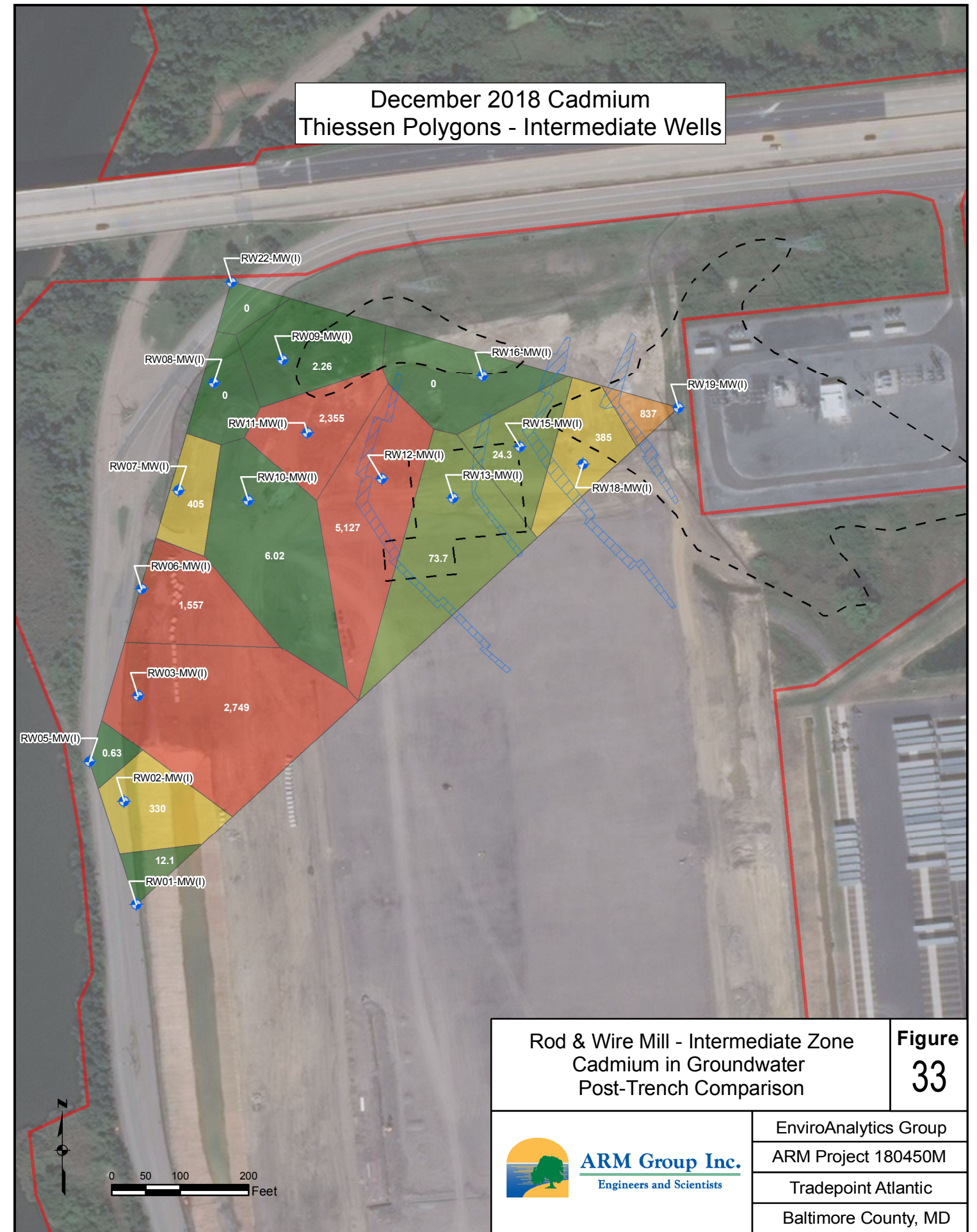
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September 2017 Cadmium
Thiessen Polygons - Intermediate Wells



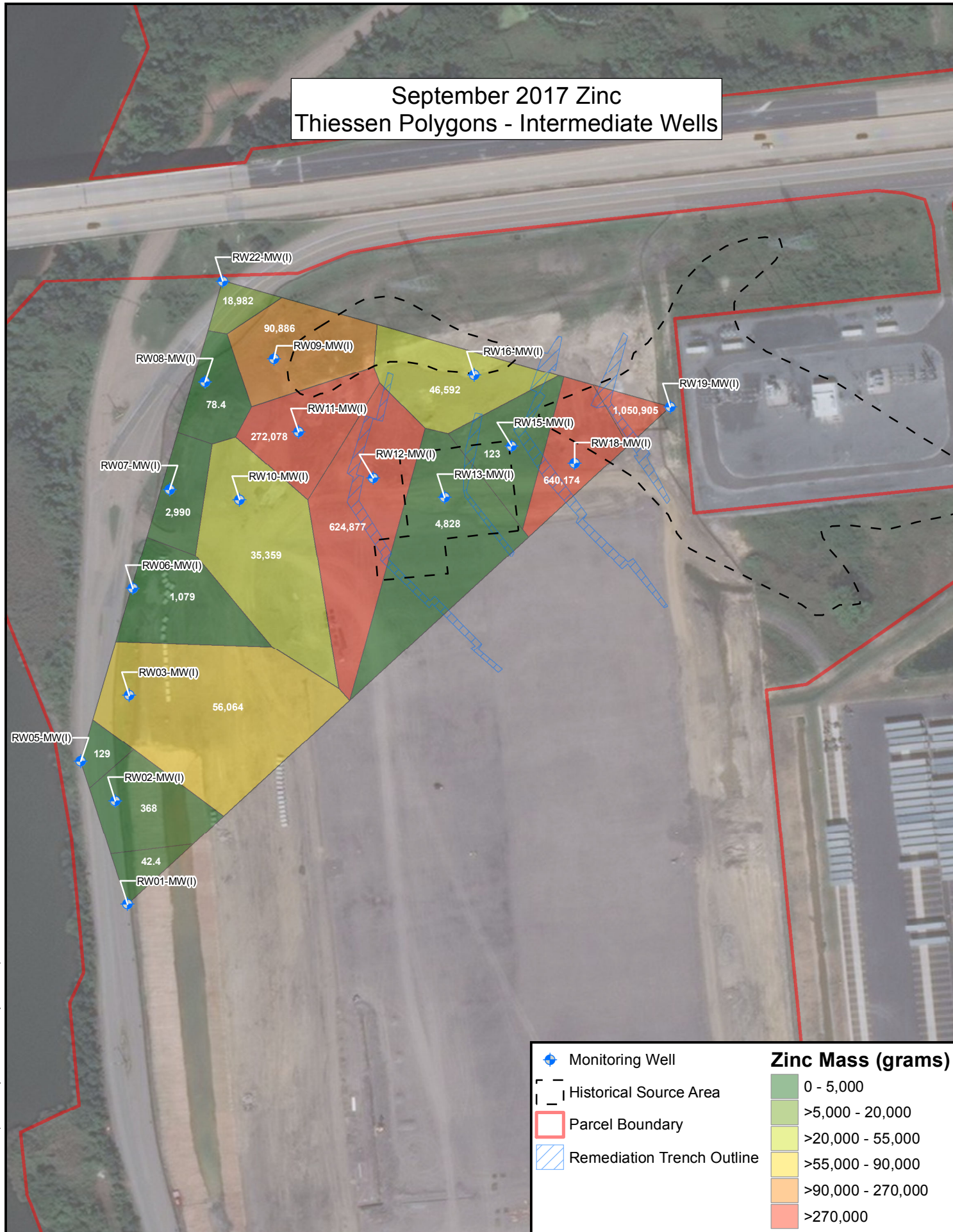
December 2018 Cadmium
Thiessen Polygons - Intermediate Wells



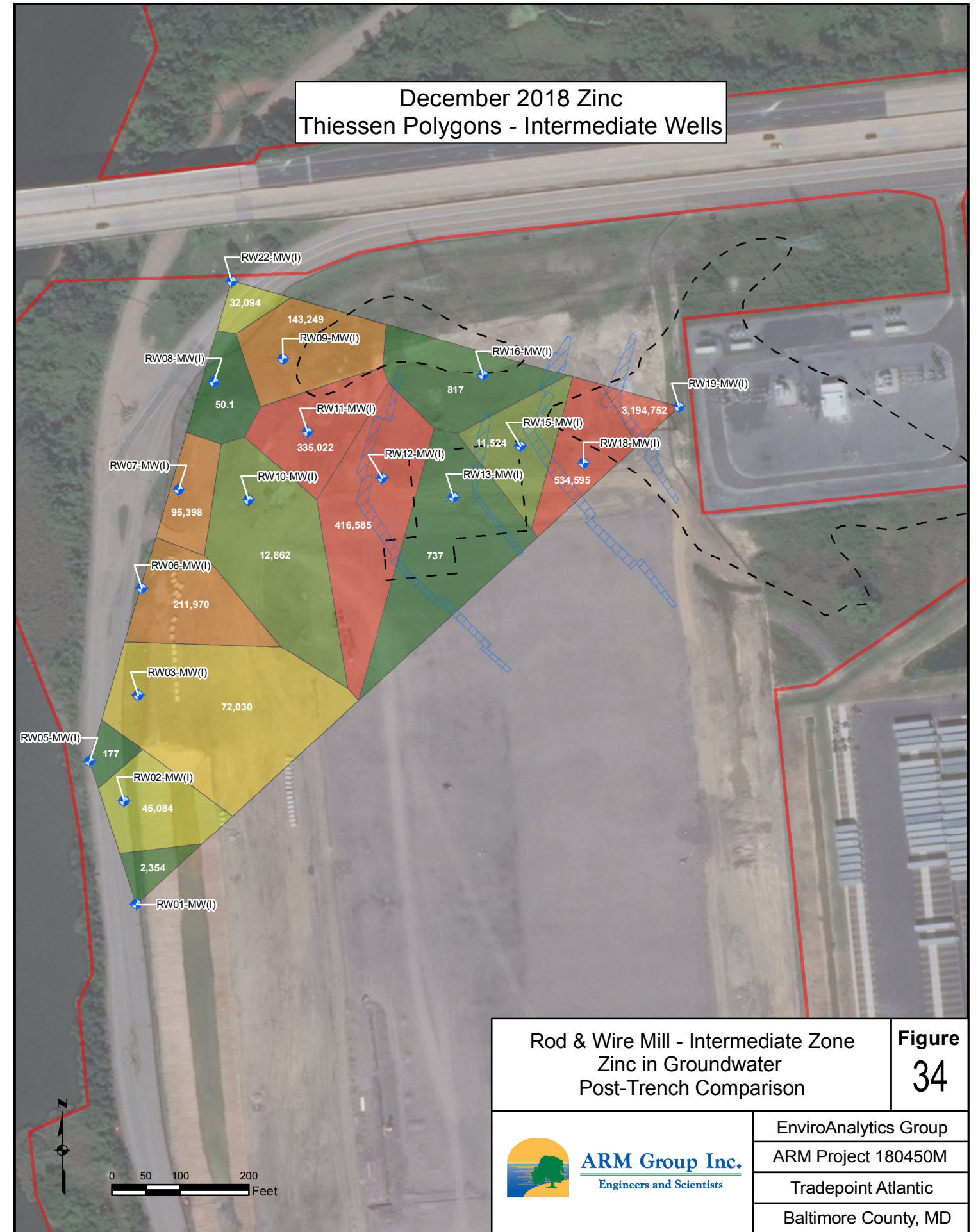
Rod & Wire Mill - Intermediate Zone Cadmium in Groundwater Post-Trench Comparison		Figure 33
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	ARM Project 180450M	
	Tradeport Atlantic	
Baltimore County, MD		

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September 2017 Zinc
Thiessen Polygons - Intermediate Wells

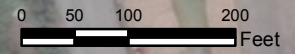


December 2018 Zinc
Thiessen Polygons - Intermediate Wells



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Rod & Wire Mill - Intermediate Zone Zinc in Groundwater Post-Trench Comparison		Figure 34
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	ARM Project 180450M	
	Tradepoint Atlantic	
Baltimore County, MD		



TABLES

TABLE 1
Shallow Groundwater Data - Pre-Trench
Rod Wire Mill Interim Measurement Progress Report

Client Sample ID	Date Collected	Result	Flag
Cadmium (µg/L)			
RW-002-PZ	10/27/2015	102	
RW-006-PZ	10/27/2015	20.1	
RW-048-PZ	10/27/2015	1.1	J
RW06-MW(S)	11/12/2015	3	U
RW10-PZM004	11/12/2015	3	U
RW12-MW(S)	11/13/2015	3.2	
RW18-MW(S)	11/13/2015	31.3	
RW20-PZP000	11/16/2015	0.58	J
Zinc (µg/L)			
RW-002-PZ	10/27/2015	5520	
RW-006-PZ	10/27/2015	245000	
RW-048-PZ	10/27/2015	1810	
RW06-MW(S)	11/12/2015	10	U
RW10-PZM004	11/12/2015	1.4	J
RW12-MW(S)	11/13/2015	925	
RW18-MW(S)	11/13/2015	912	
RW20-PZP000	11/16/2015	10	U
pH			
RW04-MW(S)	12/9/2015	7.18	
RW20-PZM000	12/9/2015	9.58	
RW06-MW(S)	12/10/2015	8.97	
RW09-PZM004	12/10/2015	11.25	
RW10-PZM004	12/10/2015	9.99	
RW12-MW(S)	12/11/2015	7.16	
RW04-PZM003	12/14/2015	6.62	
RW12-PZM004	12/14/2015	6.18	
RW17-MW(SA)	12/14/2015	5.28	
RW18-MW(S)	12/14/2015	7.65	
RW05-PZP001	12/15/2015	7.02	
RW08-PZM003	12/15/2015	5.09	
RW11-PZM004	12/15/2015	3.79	
RW14-MW(S)	12/15/2015	6.01	

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

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

TABLE 2
Intermediate Groundwater Data - Pre-Trench
Rod Wire Mill Interim Measurement Progress Report

Client Sample ID	Date Collected	Result	Flag
Cadmium (µg/L)			
RW-057-PZ	11/9/2015	44,500	
RW-063-PZ	11/9/2015	434	
RW-067-PZ	11/9/2015	311	
RW-070-PZ	11/9/2015	0.91	J
RW10-PZM020	11/12/2015	10,200	
RW19-PZM020	11/12/2015	41.9	
RW02-PZM020	11/13/2015	47.2	
RW07-PZM017	11/13/2015	9,780	
RW20-PZM020	11/17/2015	0.59	J
Zinc (µg/L)			
RW-057-PZ	11/9/2015	658,000	J
RW-063-PZ	11/9/2015	592,000	J
RW-067-PZ	11/9/2015	784,000	J
RW-070-PZ	11/9/2015	65,400	J
RW10-PZM020	11/12/2015	509,000	
RW19-PZM020	11/12/2015	7,000	
RW02-PZM020	11/13/2015	576,000	
RW07-PZM017	11/13/2015	387,000	
RW20-PZM020	11/17/2015	82,800	
pH			
RW05-MW(IA)	12/9/2015	6.14	
RW20-PZM020	12/9/2015	6.42	
RW20-PZM050	12/9/2015	11.23	
RW21-PZM023	12/9/2015	5.95	
RW06-MW(I)	12/10/2015	5.49	
RW10-PZM020	12/10/2015	5.12	
RW10-PZM065	12/10/2015	7.34	
RW15-PZM020	12/10/2015	5.87	
RW17-PZM019	12/10/2015	5.82	
RW11-MW(I)	12/11/2015	5.73	
RW12-MW(I)	12/11/2015	5.32	
RW01-PZM020	12/14/2015	5.93	
RW18-MW(I)	12/14/2015	5.62	
RW05-MW(I)	12/15/2015	7.48	
RW13-PZM020	12/15/2015	5.76	
RW18-PZM047	12/15/2015	6.42	

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

TABLE 3
Shallow Groundwater Data - December 2018
Rod Wire Mill Interim Measurement Progress Report

Event Date	Units	RW01-MW(S)	RW02-MW(S)	RW03-MW(S)	RW04-MW(S)	RW05-MW(S)	RW06R-MW(S)	RW07-MW(S)	RW08-MW(S)
Cadmium									
2/1/2017	µg/L	NS	NS	7.9	NS	NS	NS	1.8 J	3.8
3/1/2017	µg/L	NS	NS	4.7	NS	NS	NS	1.7 J	11
4/1/2017	µg/L	NS	NS	3.2	NS	NS	NS	1.4 J	7.8
5/1/2017	µg/L	NS	NS	3.9	NS	NS	NS	1.9 J	3.2
6/1/2017	µg/L	NS	NS	4	0.7 J	NS	NS	2.3 J	1.7 J
7/1/2017	µg/L	NS	NS	4.6	1.2 J	NS	NS	2.8 J	0.74 J
8/1/2017	µg/L	1.6 J	12	5.1	3 U	4.9	NS	3.1	2.7 J
9/1/2017	µg/L	1.2 J	11.8	8.4	0.71 J	0.37 J	NS	3.6	2.5 J
10/1/2017	µg/L	1.7 J	9.1	11	3 U	1.2 J	NS	3.2	0.96 J
11/1/2017	µg/L	21.7	7.7	8.5	1.1 J	3 U	NS	5.8	3 U
12/1/2017	µg/L	98	3 U	11.4	1.1 J	8.4	NS	6	3 U
1/1/2018	µg/L	23.9	13.1	9.9	3 U	3 U	NS	4.8	3 U
4/1/2018	µg/L	7.6	16.7	11.8	3 U	3 U	NS	4.6	2.2 J
8/1/2018	µg/L	1.6 J	5.2	10.8	3 U	3 U	3 U	4.8	3 U
10/1/2018	µg/L	0.97 J	3.4	8.7	3 U	3 U	3 U	4.7	3 U
12/1/2018	µg/L	1.9 J	8.6	23.2	3 U	3 U	0.50 J	4.1	0.36 J
Zinc									
2/1/2017	µg/L	NS	NS	6,200	NS	NS	NS	81.6	1,080
3/1/2017	µg/L	NS	NS	6,510	NS	NS	NS	74.8	8,710
4/1/2017	µg/L	NS	NS	4,860	NS	NS	NS	86.4	9,520 MH
5/1/2017	µg/L	NS	NS	5,380	NS	NS	NS	102	2,680
6/1/2017	µg/L	NS	NS	5,500	58.2	NS	NS	107	1,870
7/1/2017	µg/L	NS	NS	8,460	179	NS	NS	114	968
8/1/2017	µg/L	12,200 MH	6,290	7,730	74.7	550	NS	127	3,190
9/1/2017	µg/L	5,730	3,220	16,300	163	184	NS	165	4,460
10/1/2017	µg/L	7,730	5,490	32,100	137	1,410	NS	144	1,950
11/1/2017	µg/L	25,200	1,460	14,100	123	503	NS	227	1,600
12/1/2017	µg/L	7,300	79.3	46,400	279	5,440	NS	216	1,770
1/1/2018	µg/L	35,200	2,210	31,500	384	35.7	NS	276	2,600
4/1/2018	µg/L	52,000	5,320	44,000	300	75.3	NS	204	13,200
8/1/2018	µg/L	24,100	5,470	25,600	7.9 J	32.6	22	248	6,640
10/1/2018	µg/L	37000	5930	14900	168	21.7	3.7 J	223	13300
12/1/2018	µg/L	14000	26800	23600	38.0	6.4 JB	3.9 J	200	861
pH									
2/1/2017	SU	NS	NS	5.57	NS	NS	NS	7.05	8.21
3/1/2017	SU	NS	NS	3.85	NS	NS	NS	5.68	4.66
4/1/2017	SU	NS	NS	5.65	NS	NS	NS	6.77	6.46
5/1/2017	SU	NS	NS	5.88	NS	NS	NS	7.16	7.97
6/1/2017	SU	NS	NS	5.89	6.72	NS	NS	6.95	8.83
7/1/2017	SU	NS	NS	5.9	6.56	NS	NS	6.8	6.79
8/1/2017	SU	5.73	5.99	5.26	7.05	10.12	NS	7.01	7.1
9/1/2017	SU	5.3	6.1	5.7	7.19	10.1	NS	6.46	6.94
10/1/2017	SU	5.47	6.16	5.62	6.9	7.3	NS	7.03	6.53
11/1/2017	SU	4.57	5.93	5.42	6.91	9.96	NS	6.67	6.46
12/1/2017	SU	4.86	5.03	5.28	6.73	6.83	NS	6.89	6.76
1/1/2018	SU	5.16	5.79	5.55	7.2	7.04	NS	6.99	6.57
4/1/2018	SU	4.9	4.82	5.41	6.79	6.74	NS	6.78	6.28
8/1/2018	SU	6.58	7.04	6.69	8.25	9.94	NS	7.7	6.47
10/1/2018	SU	7.09	7.54	7.23	8.53	10.01	NS	7.59	7.20
12/1/2018	SU	5.8	6	5.6	7.0	7.5	7.8	7.1	7.4

Bold indicates detection above the reporting limit
 NS indicates not sampled
 NA indicates not applicable

TABLE 3
Shallow Groundwater Data - December 2018
Rod Wire Mill Interim Measurement Progress Report

Event Date	Units	RW09-MW(S)	RW11-MW(S)	RW12-MW(S)	RW14-MW(S)	RW15-MW(S)	RW16-MW(S)	RW18-MW(S)	RW19-MW(S)
Cadmium									
2/1/2017	µg/L	22.3	0.78 J	NS	NS	NS	22.9	NS	14.8
3/1/2017	µg/L	17.5	1.8 J	NS	NS	NS	13.5	NS	6.9
4/1/2017	µg/L	16.6	5.3	NS	NS	NS	11.9	NS	8.5
5/1/2017	µg/L	14.9	1.8 J	NS	NS	NS	64.1	NS	3.6
6/1/2017	µg/L	13.9	0.94 J	29.7	NS	NS	NS	356	2.4 J
7/1/2017	µg/L	13.4	0.84 J	12.6	NS	NS	NS	240	9.7
8/1/2017	µg/L	12.5	1.3 J	7	1,780	12.2	NS	34.9	7.2
9/1/2017	µg/L	12.3	0.81 J	5.1	1,700	29.9	3 U	156	2.6 J
10/1/2017	µg/L	10.6	3 U	11.3	1,750	25.3	3 U	306	5.2
11/1/2017	µg/L	10.5	2.1 J	193	2,390	63	3 U	208	4.4
12/1/2017	µg/L	9.2	2.9 J	4.2	2,820	55	3 U	410	4.6
1/1/2018	µg/L	9.9	2.2 J	11.7	2,800	40.7	3 U	218	4.8
4/1/2018	µg/L	9.8	4.1	11	3,220	41.2	3 U	448	6.6
8/1/2018	µg/L	13.1	66.3	5.2	3,630	38.5	3 U	7.1	1.2 J
10/1/2018	µg/L	22.3	1.2 J	2.3 J	3840	78.1	3 U	1.2 J	3.6
12/1/2018	µg/L	9.8	1.1 J	16.5	3710	96.8	3 U	8.8	0.84 J
Zinc									
2/1/2017	µg/L	14,500	8,790	NS	NS	NS	3,370	NS	10,100
3/1/2017	µg/L	12,400	10,500	NS	NS	NS	4,320	NS	7,100
4/1/2017	µg/L	12,900	13,100	NS	NS	NS	3,350	NS	6,260
5/1/2017	µg/L	11,900	12,500	NS	NS	NS	15,800	NS	4,860
6/1/2017	µg/L	13,000	13,500	11,400	12,200	NS	NS	25,500	3,720
7/1/2017	µg/L	11,500	10,900	9,090	NS	NS	NS	13,300	3,700
8/1/2017	µg/L	9,700	10,800	5,090	42,000	276	NS	964	3,360
9/1/2017	µg/L	8,750	10,600	3,980	43,500	1,080	25.6	6,160	2,990
10/1/2017	µg/L	8,310 ML	9,270	3,790	28,900	900	26.2	14,500	18,700 ML
11/1/2017	µg/L	9,290	18,300	235,000 ML	28,100	8,800	48.6	10,700	2,730
12/1/2017	µg/L	8,550	24,000	2,980	49,200	7,630	27.7	23,400	3,380
1/1/2018	µg/L	9,310	27,700	10,100	61,800	5,150	31.2	11,600	10,200
4/1/2018	µg/L	8,980	37,100	10,600	62,100	5,940	25	25,900	7,060
8/1/2018	µg/L	10,700	109,000	2,900	64,100	1,320	35.9	439	10,100
10/1/2018	µg/L	10800	29500	1140	80100	2950	30.0	44.9	10500
12/1/2018	µg/L	9490	27200	7840	78800	4650	10.8	258	3270
pH									
2/1/2017	SU	5.87	6.16	NS	NS	NS	NS	5.99	6.98
3/1/2017	SU	4.12	5.55	NS	NS	NS	NS	NS	6.45
4/1/2017	SU	5.51	5.58	NS	NS	NS	NS	NS	6.92
5/1/2017	SU	6.01	6.3	NS	NS	NS	NS	NS	7.04
6/1/2017	SU	5.77	NS	6.9	NS	NS	NS	6	7.35
7/1/2017	SU	5.72	5.95	6.42	NS	NS	NS	6.33	7.19
8/1/2017	SU	5.98	6.22	7.34	5.23	10.89	NS	7.43	7.31
9/1/2017	SU	6.62	5.57	6.2	4.94	6.56	11.41	6.69	NS
10/1/2017	SU	6.11	6.17	6.54	5.79	9.1	11.44	6.27	7.18
11/1/2017	SU	6.08	6.05	6.75	5.78	6.71	10.05	6.74	7.18
12/1/2017	SU	5.99	5.52	5.52	5.62	6.9	11.9	5.41	7.43
1/1/2018	SU	6.09	4.99	6.48	5.13	7.13	12.12	6.66	7.07
4/1/2018	SU	5.97	5.13	5.89	5.04	6.61	11.85	6.1	7.04
8/1/2018	SU	6.47	6.5	7.59	6.32	8.68	11.24	11.4	7.08
10/1/2018	SU	8	7	8.11	6.01	7.98	10.05	10.02	9.46
12/1/2018	SU	6.5	6.1	6.7	5.8	7.1	11.5	9.1	7

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TABLE 4
Intermediate Groundwater Data - December 2018
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Event Date	Units	RW01-MW(I)	RW02-MW(I)	RW03-MW(I)	RW05-MW(I)	RW06-MW(I)	RW07-MW(I)	RW08-MW(I)	RW09-MW(I)
Cadmium									
2/1/2017	µg/L	NS	NS	189	NS	12.5	1.2 J	0.49 J	3.1
3/1/2017	µg/L	NS	NS	196	NS	9.2	4.6	0.39 J	4
4/1/2017	µg/L	NS	NS	192	NS	14	3 U	3 U	5
5/1/2017	µg/L	NS	NS	84	NS	20.4	1.1 J	1.5 J	11.1
6/1/2017	µg/L	NS	NS	37.4	1.9 J	14.3	0.91 J	0.48 J	8.1
7/1/2017	µg/L	NS	NS	138	NS	17.5	10.2	1.2 J	1.3 J
8/1/2017	µg/L	194	511	227	19.3	10.1	1 J	0.86 J	18.5
9/1/2017	µg/L	0.51 J	3 J	214	3.7	4.5	11	0.77 J	9.1
10/1/2017	µg/L	145	2.4 J	20.2	4.2	4.2	3 U	3 U	12
11/1/2017	µg/L	3 U	3 U	25.2	4.9	5.4	5.1	0.88 J	8.8
12/1/2017	µg/L	37.5	2.3 J	154	2.7 J	7.1	1.7 J	1.8 J	7.7
1/1/2018	µg/L	2.4 J	14.5	259	2.2 J	8.4	3 U	3 U	2.1 J
4/1/2018	µg/L	16.5	3	128	2.6 J	89.2	1.3 J	6.2	1.8 J
8/1/2018	µg/L	250	79.9	236	1.3 J	3 U	52.9	14.1	3 U
10/1/2018	µg/L	3 U	18	346	3 U	629	28.7	0.92 J	3.7
12/1/2018	µg/L	25.8	182	458	1.6 J	733	385	3 U	0.98 J
Zinc									
2/1/2017	µg/L	NS	NS	9,740	NS	1,900	944	178	51,000
3/1/2017	µg/L	NS	NS	9,240	NS	1,680	1,210	44.6	51,900
4/1/2017	µg/L	NS	NS	7,830	NS	1,420	364	85	57,500
5/1/2017	µg/L	NS	NS	2,960	NS	999	298	188	57,200
6/1/2017	µg/L	NS	NS	2,440	374	876	432	71.9	51,900
7/1/2017	µg/L	NS	NS	8,330	1,730	1,690	45.7	153	65,600
8/1/2017	µg/L	11,600	18,200	10,900	1,730	1,340	62.7	49.8	55,500
9/1/2017	µg/L	90	203	9,340	328	508	2,840	69.4	39,400
10/1/2017	µg/L	13,700	290	1,810	349	615	23.4	16.9	49,700
11/1/2017	µg/L	29	38.6	1,750	502	909	1,650	21.5	67,900
12/1/2017	µg/L	41,000	186	6,270	205	1,360	39.8	21.4	44,500
1/1/2018	µg/L	104	573	12,700	173	1,950	70.6	108	54,700
4/1/2018	µg/L	576	452	6,920	402	27,900	756	1,050	38,400
8/1/2018	µg/L	9,710	5,030 ML	9,710	282	191	26,300	2,540	54,700
10/1/2018	µg/L	143	3,240	13,000	110	90,100	12,200	256	53,800
12/1/2018	µg/L	5,000	24,900	12,000	450	99,800	90,600	44.3	62,100
pH									
2/1/2017	SU	NS	NS	6.41	NS	5.85	6.25	6.06	6.23
3/1/2017	SU	NS	NS	6.04	NS	5.71	6	5.57	5.96
4/1/2017	SU	NS	NS	6.28	NS	5.94	6.05	6.21	5.84
5/1/2017	SU	NS	NS	5.97	NS	6.06	6.61	3.14	6
6/1/2017	SU	NS	NS	5.96	8.05	5.81	6.09	NS	5.8
7/1/2017	SU	NS	NS	6.21	7.97	6.08	6.18	3.88	5.67
8/1/2017	SU	6.68	6.73	6.02	8.71	5.7	6.54	6.31	5.93
9/1/2017	SU	12.3	12.2	6.34	7.2	6.11	5.65	6.78	6.57
10/1/2017	SU	8.03	12.39	5.8	8.02	6.16	6.66	6.34	6.03
11/1/2017	SU	12.07	11.95	5.67	8.9	5.84	5.89	5.99	6.01
12/1/2017	SU	6.74	11.4	5.68	8.01	6	6.6	6.21	5.96
1/1/2018	SU	13.17	12.87	6.4	8.31	5.92	7.11	6.3	5.98
4/1/2018	SU	12.42	10.02	5.82	8.41	5.68	6.18	6.27	5.64
8/1/2018	SU	8.52	7.82	6.26	7.07	7.44	6.47	6.57	6.35
10/1/2018	SU	10.97	8.93	7.57	9.54	6.66	6.55	7.89	7.33
12/1/2018	SU	6.2	6.6	6.6	6.6	5.8	6.5	6.9	6.1

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NS indicates not sampled

NA indicates not applicable

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Event Date	Units	RW10-MW(I)	RW11-MW(I)	RW12-MW(I)	RW13-MW(I)	RW15-MW(I)	RW16-MW(I)	RW18-MW(I)	RW19-MW(I)	RW22-MW(I)
Cadmium										
2/1/2017	µg/L	446	1,690	4,740	NS	NS	12.1	70.3	3,760	NS
3/1/2017	µg/L	3 U	1,490	3,530	NS	NS	28.6	63.8	3,450	NS
4/1/2017	µg/L	198	1,800	2,730	NS	NS	194	119	3,380 MH	NS
5/1/2017	µg/L	2.5 J	2,600	3,820	NS	NS	73.9	92	2,770	NS
6/1/2017	µg/L	27.2	218	2,260	NS	NS	NS	65.1	2,280	0.35 J
7/1/2017	µg/L	16.3	518	2,730	NS	NS	NS	61.7	2,550	3 U
8/1/2017	µg/L	3 U	163	2,220	31,800	10.1	NS	74.4	1,670	NS
9/1/2017	µg/L	17.7	274	1,820	66	3 U	1.7 J	72.2	1,320	2.3 J
10/1/2017	µg/L	24.6	125	1,510	28,700	3 U	3 U	43.7	1,710	3 U
11/1/2017	µg/L	63.7	1,460	1,380	24,500	3 U	3 U	66.6	1,770	3.8
12/1/2017	µg/L	3 U	1,380	1,450	44.2	0.97 J	1.9 J	51.5	1,710	15.2
1/1/2018	µg/L	3 U	1,400	1,270	1,240	1.6 J	1.2 J	63.5	1,880	4.1
4/1/2018	µg/L	44.4	1,660	121	19,400	3 U	1.1 J	55.8	1,700	3 U
8/1/2018	µg/L	44.7	4.7	134	21,000	15.3	3 U	35.1	1,560	3 U
10/1/2018	µg/L	10.8	133	86.3	12.6	3 U	3 U	14.5	1,610	3 U
12/1/2018	µg/L	1.4 J	1160	1280	17.7	14.2	3 U	230	1990	3 U
Zinc										
2/1/2017	µg/L	104,000	368,000 ML	249,000 MH	NS	NS	86,300	728,000	5,900,000	NS
3/1/2017	µg/L	20.4	301,000	216,000	NS	NS	90,300	592,000	4,650,000	NS
4/1/2017	µg/L	75,800	288,000	188,000	NS	NS	314,000	633,000	7,010,000 MH	NS
5/1/2017	µg/L	1,150	336,000	232,000	NS	NS	207,000	246,000	5,370,000 ML	NS
6/1/2017	µg/L	34,600	201,000	226,000	NS	NS	NS	694,000	6,720,000	303
7/1/2017	µg/L	25,900	192,000	219,000	NS	NS	NS	575,000	5,330,000	103
8/1/2017	µg/L	79.7	147,000	156,000	308,000	3,210	NS	290,000	3,360,000	NS
9/1/2017	µg/L	8,220	134,000	156,000	1,160	71.1	20,200	382,000 MHML	2,500,000	43,000
10/1/2017	µg/L	31,000	111,000	150,000 ML	204,000	295	2,000	393,000	3,670,000	16,100
11/1/2017	µg/L	39,000	207,000	140,000	172,000	825	441	323,000	3,400,000	3,700
12/1/2017	µg/L	158	197,000	157,000 ML	237	1,070	19,200	369,000	3,970,000	19,500
1/1/2018	µg/L	26.5	225,000 ML	117,000	8,600	5,540	16,200	370,000	3,840,000 ML	27,200
4/1/2018	µg/L	13,500	215,000	103,000	201,000	252	11,200	396,000	4,190,000	44,700 ML
8/1/2018	µg/L	17,600 MH	15,700	2,410	274,000	18,600	1,230	330,000	4,880,000	73,300
10/1/2018	µg/L	16,600	174,000	14,300	33.4	736	320	247,000	5,880,000	47,100
12/1/2018	µg/L	2,990	165,000	104,000	177	6,740	354	319,000	7,600,000	72,700
pH										
2/1/2017	SU	6.86	6.05	5.27	NS	NS	NS	5.64	5.5	NS
3/1/2017	SU	9.93	5.93	5.26	NS	NS	NS	5.33	5.35	NS
4/1/2017	SU	7.03	5.35	5.34	NS	NS	NS	5.39	5.28	NS
5/1/2017	SU	8.7	6.11	4.18	NS	NS	NS	3.43	5.41	NS
6/1/2017	SU	7.15	5.5	5.39	NS	NS	NS	5.38	5.32	12.97
7/1/2017	SU	6.58	5.66	4.2	NS	NS	NS	5.25	5.15	12.75
8/1/2017	SU	10.92	5.81	4.71	6.72	11.6	NS	5.45	5.58	NS
9/1/2017	SU	7.15	5.21	4.61	12.18	6.68	6.14	5.99	NS	5.4
10/1/2017	SU	6.28	5.92	5.25	6.86	10.17	9.36	5.49	5.37	6.05
11/1/2017	SU	6.67	6.2	5.32	7.32	11.59	9.43	5.84	5.52	5.81
12/1/2017	SU	11.21	6.16	6.06	7.67	11.69	6.47	5.62	5.52	5.68
1/1/2018	SU	10.29	5.61	4.46	11.44	12.13	6.37	5.56	5.41	5.85
4/1/2018	SU	6.39	5.98	4.68	6.46	11.99	6.36	5.27	4.93	5.48
8/1/2018	SU	6.95	6.23	6.37	6.86	NS	10.41	5.46	5.38	6.21
10/1/2018	SU	7.87	7.27	7.45	9.66	10.69	9.43	6.71	6.86	6.62
12/1/2018	SU	6.5	6.4	6	11.6	7	9.9	5.3	5.5	4.6

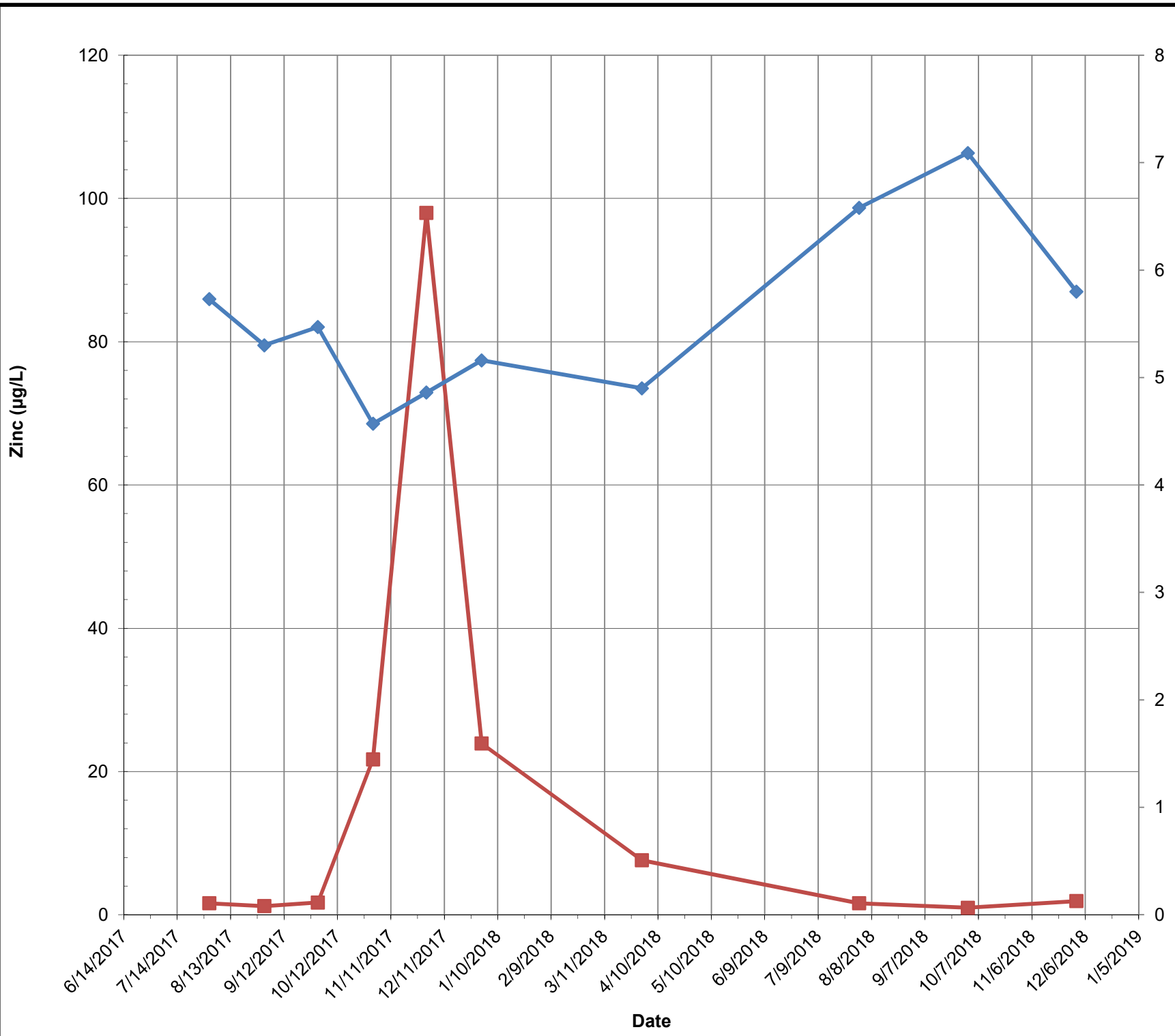
Bold indicates detection above the reporting limit

NS indicates not sampled

NA indicates not applicable

APPENDIX A

Shallow Groundwater Time-Series Graphs



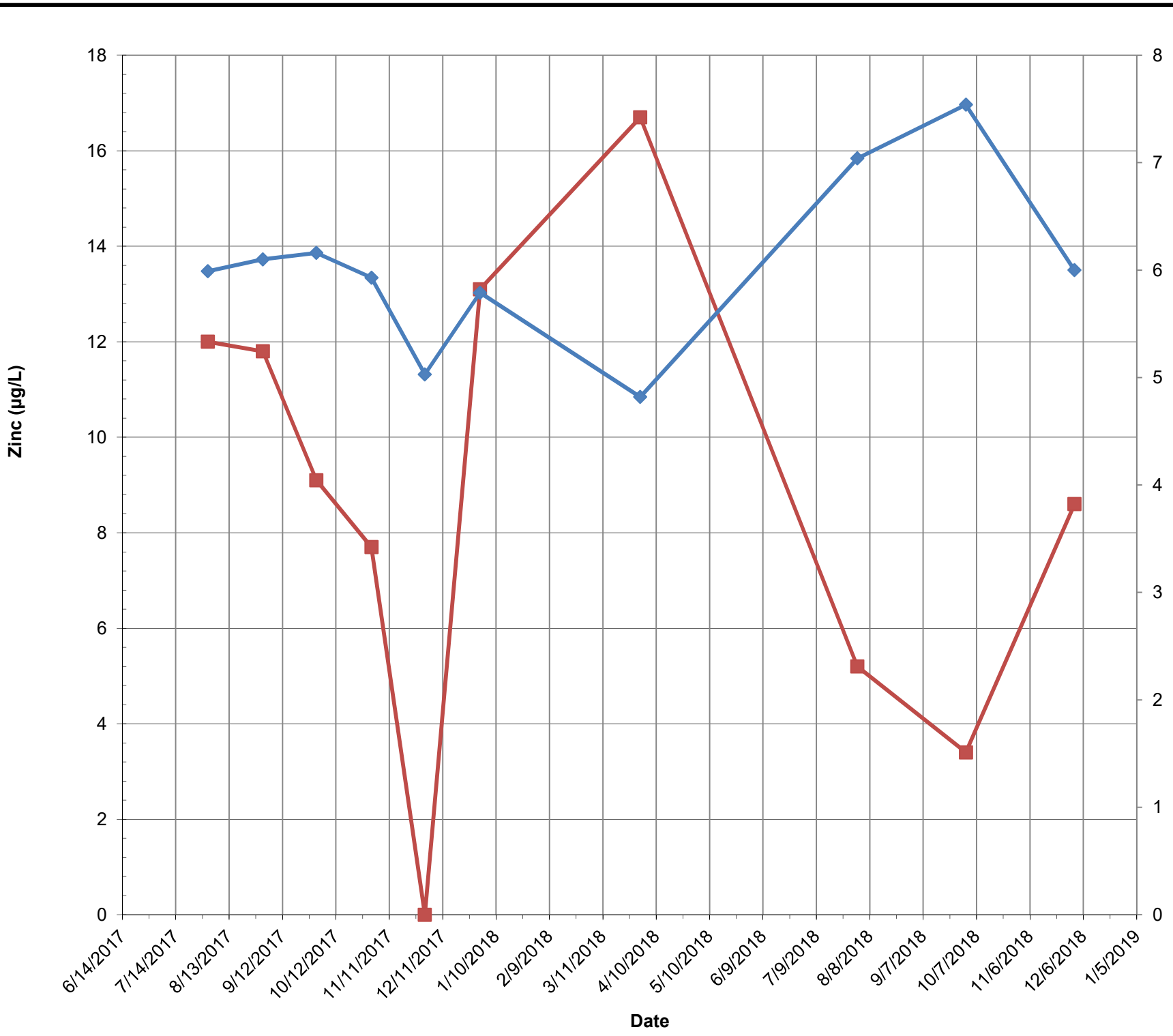
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 ◆ RW01-MW(S) pH



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LEGEND

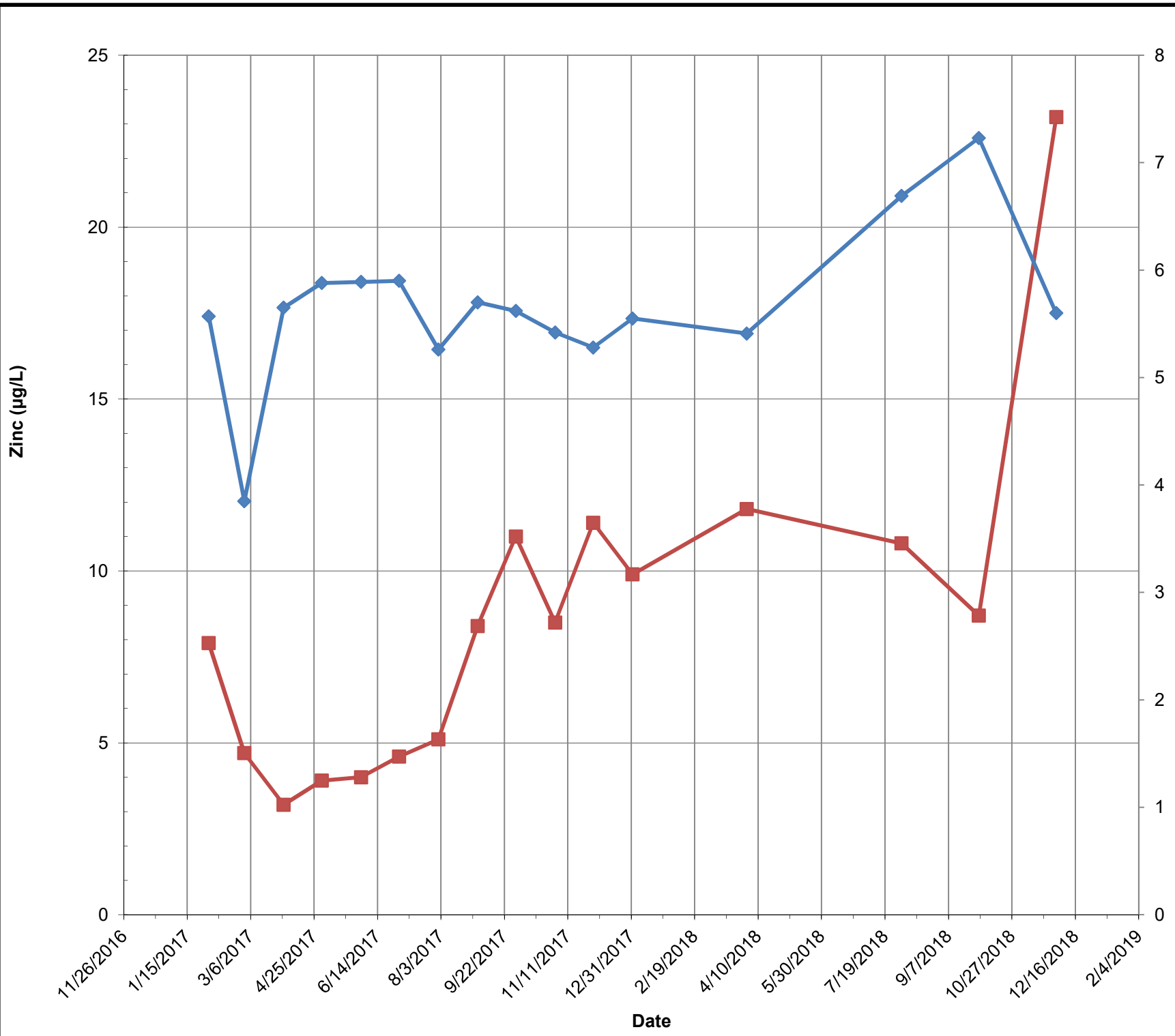
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- ◆ RW02-MW(S) pH



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LEGEND

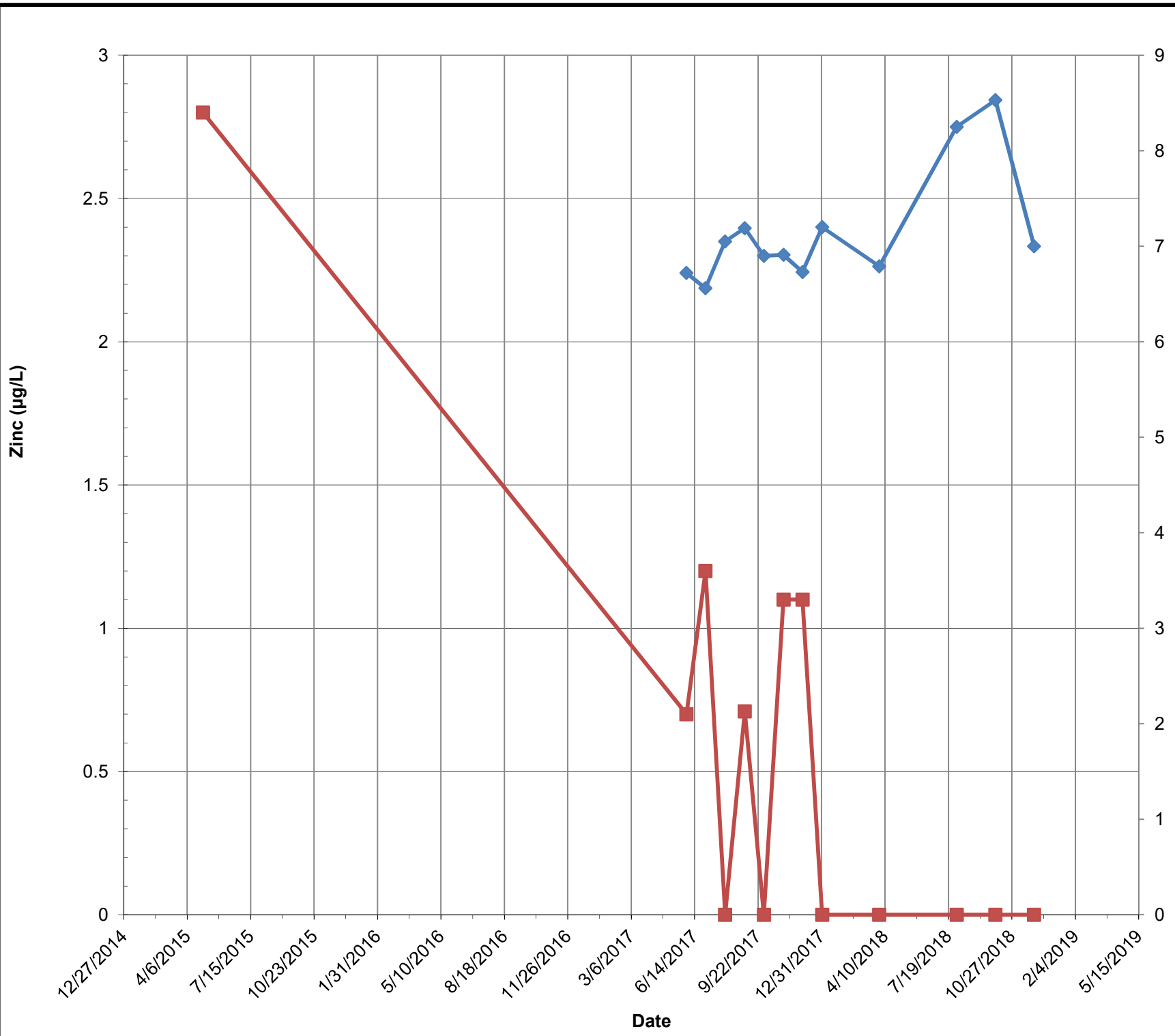
- RW03-MW(S) Cd
- RW03-MW(S) pH



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LEGEND

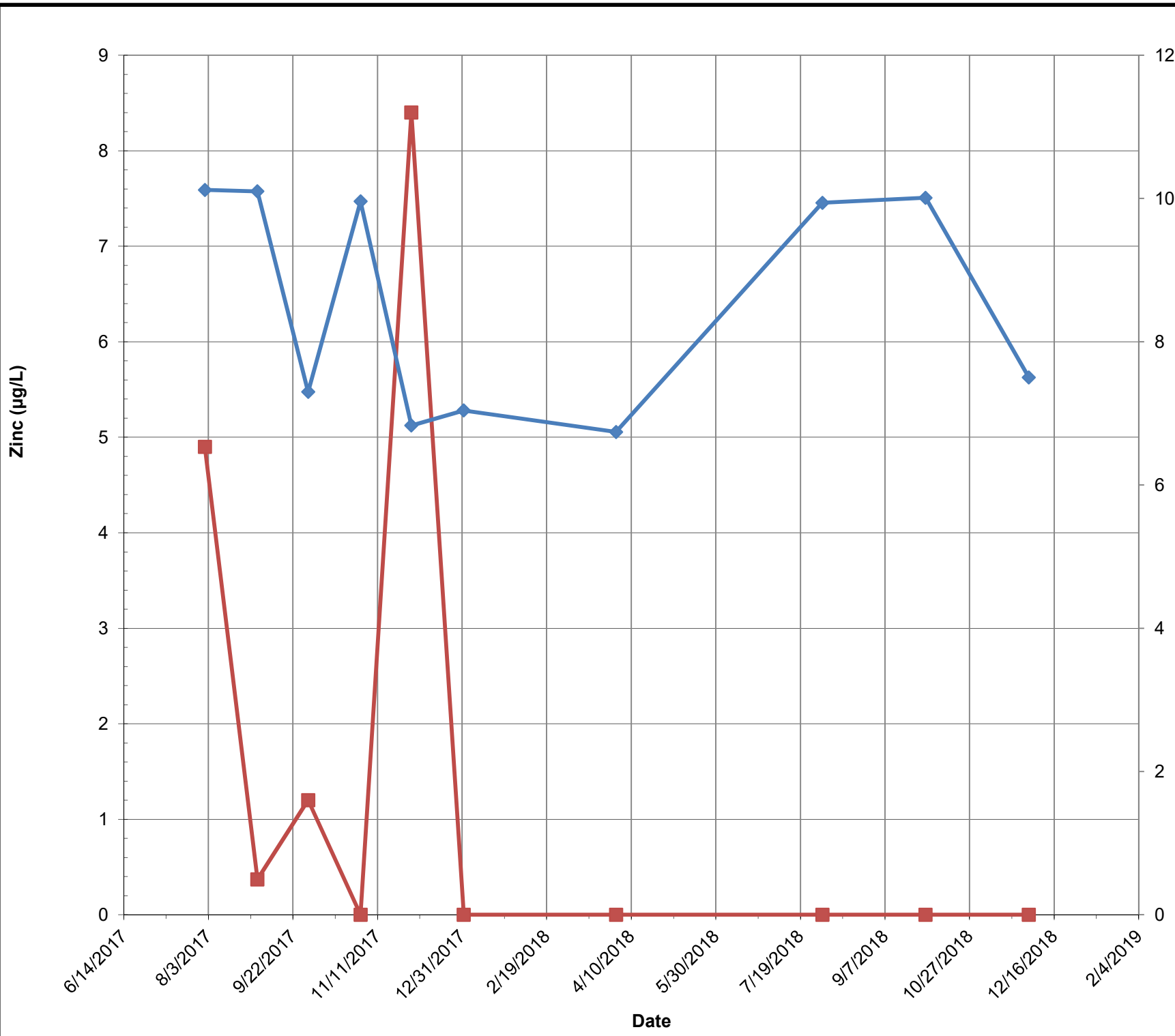
- RW04-MW(S) Cd
- RW04-MW(S) pH



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LEGEND

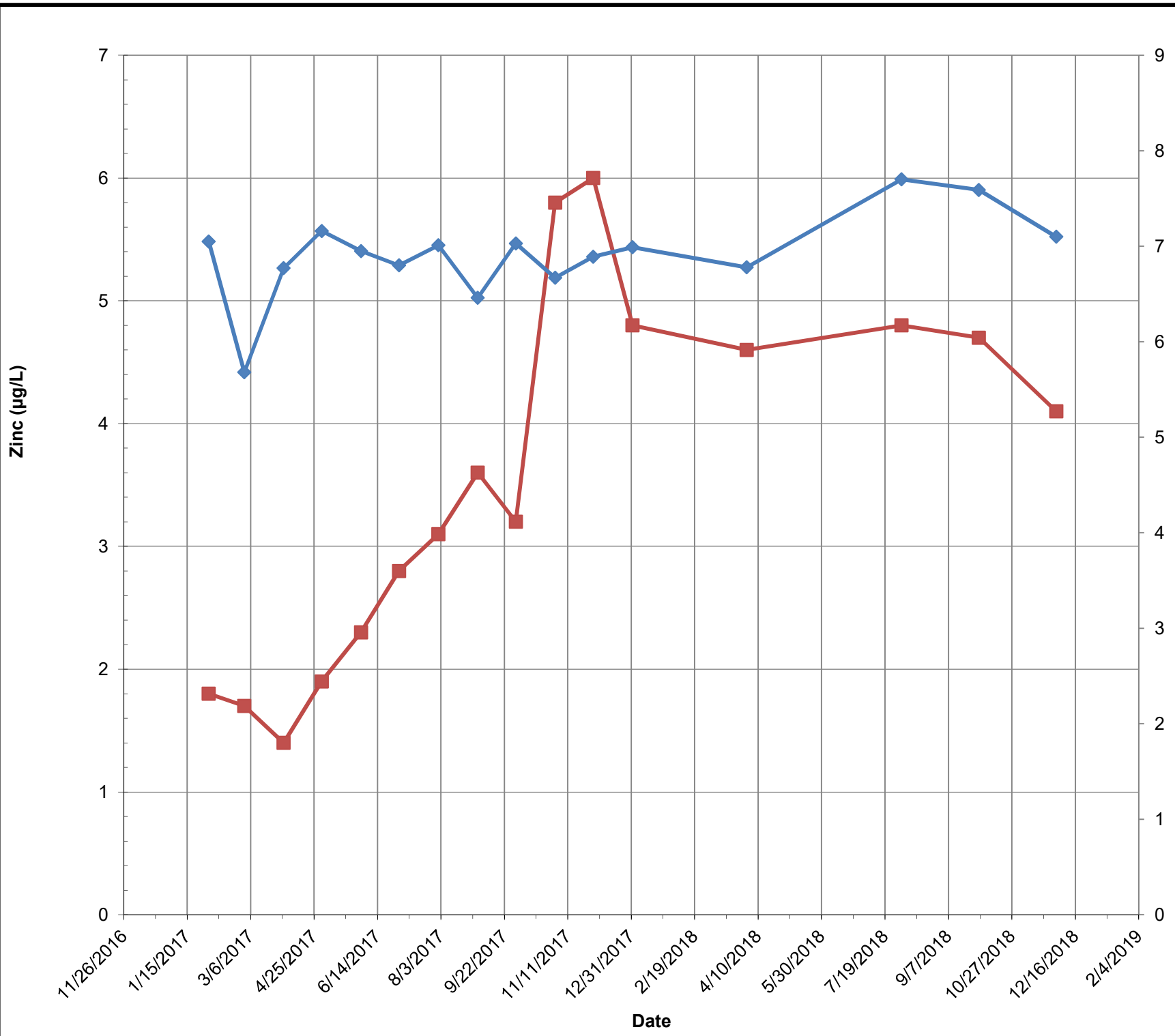
- RW05-MW(S) Cd
- RW05-MW(S) pH



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LEGEND

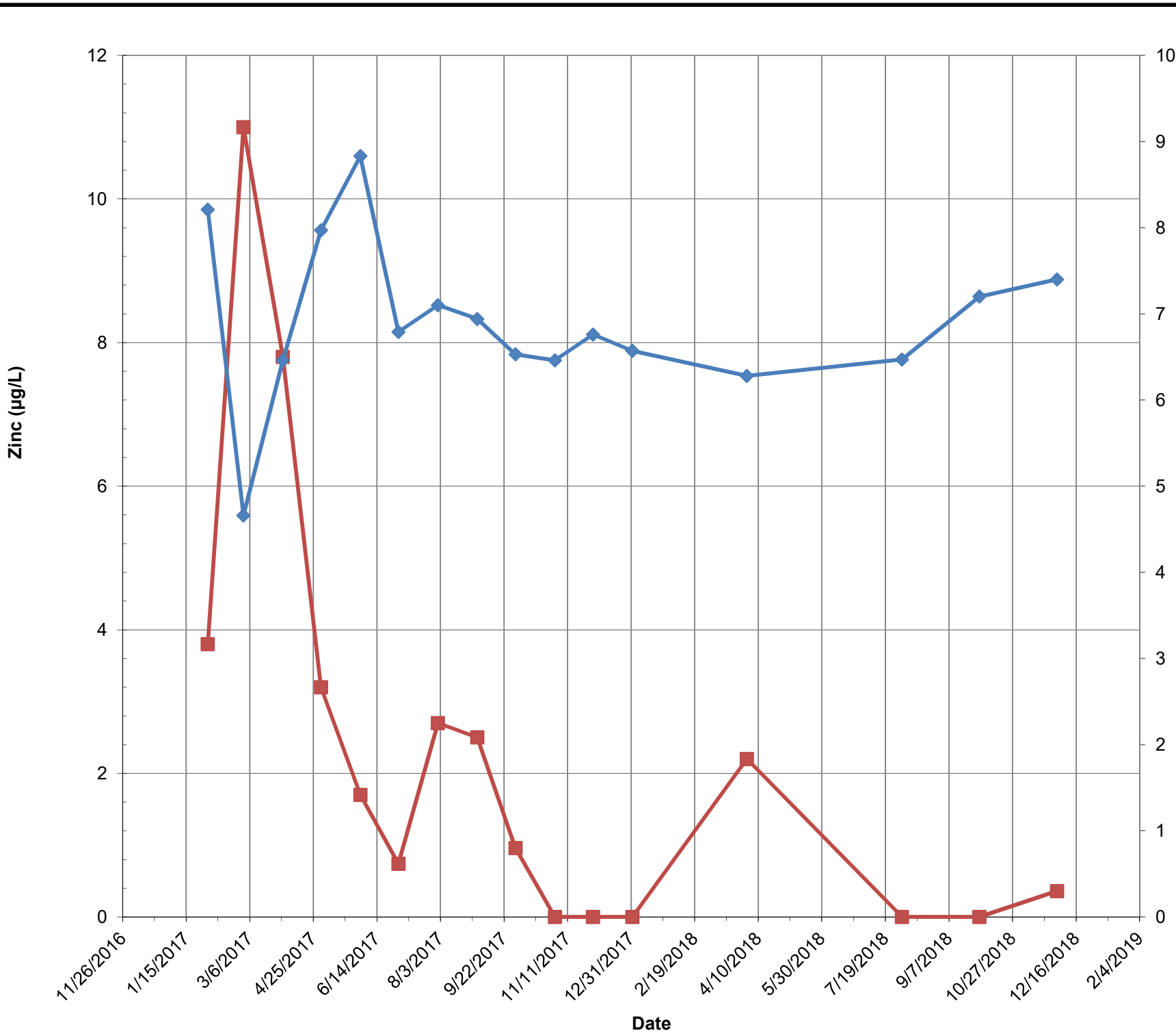
- RW07-MW(S) Cd
- RW07-MW(S) pH



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LEGEND

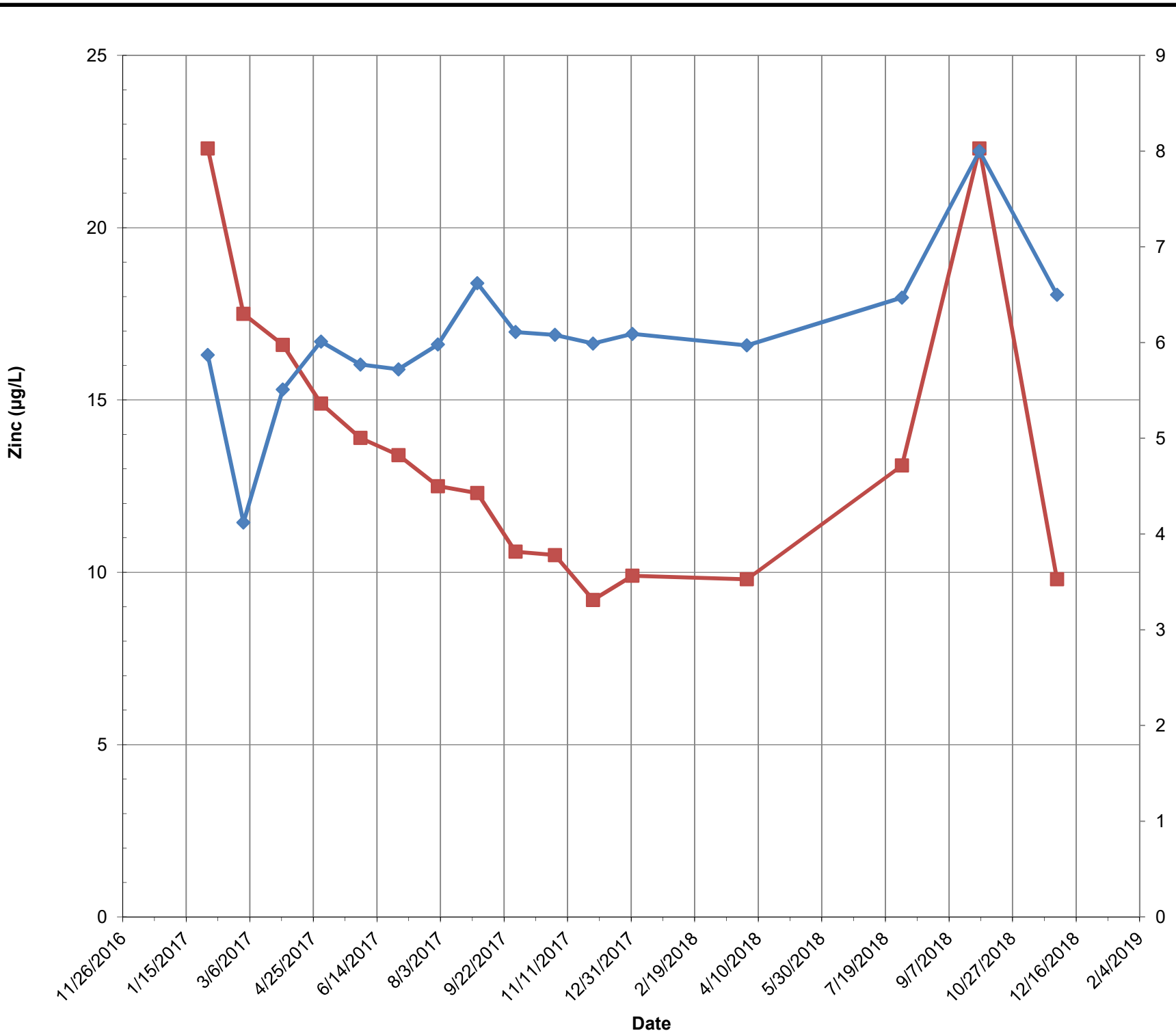
- RW08-MW(S) Cd
- RW08-MW(S) pH



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LEGEND

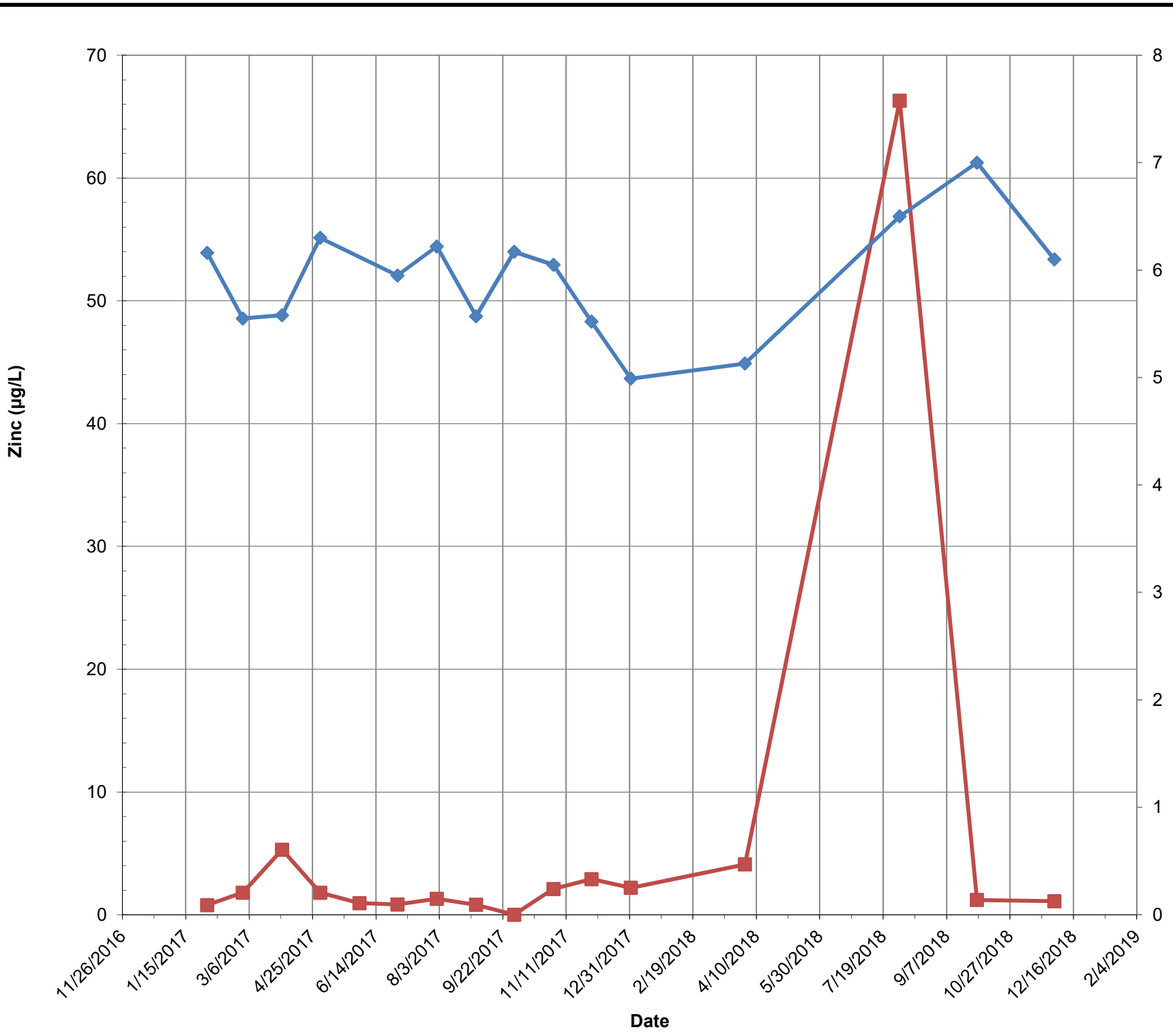
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- RW09-MW(S) pH



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LEGEND

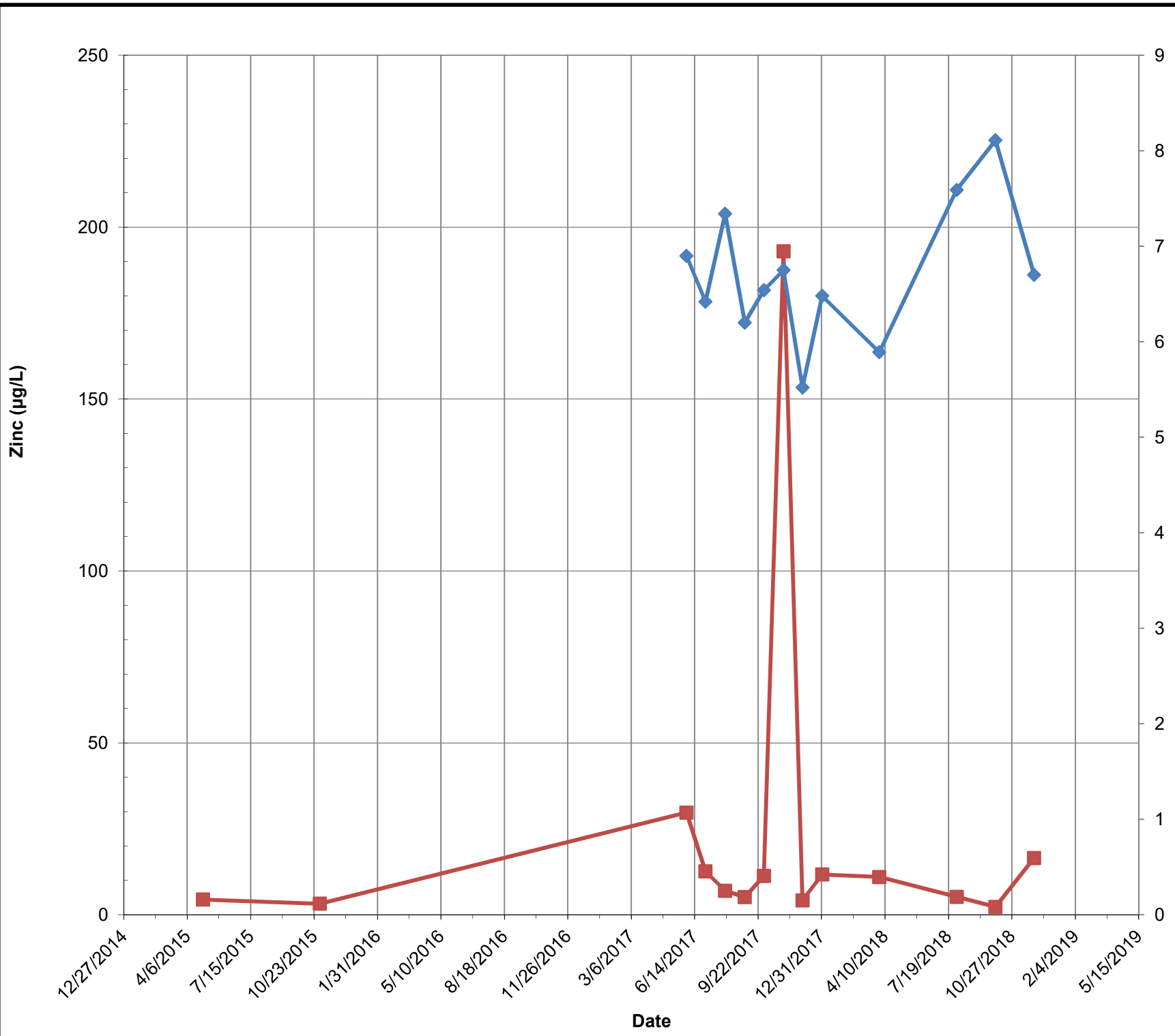
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- RW11-MW(S) pH



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LEGEND

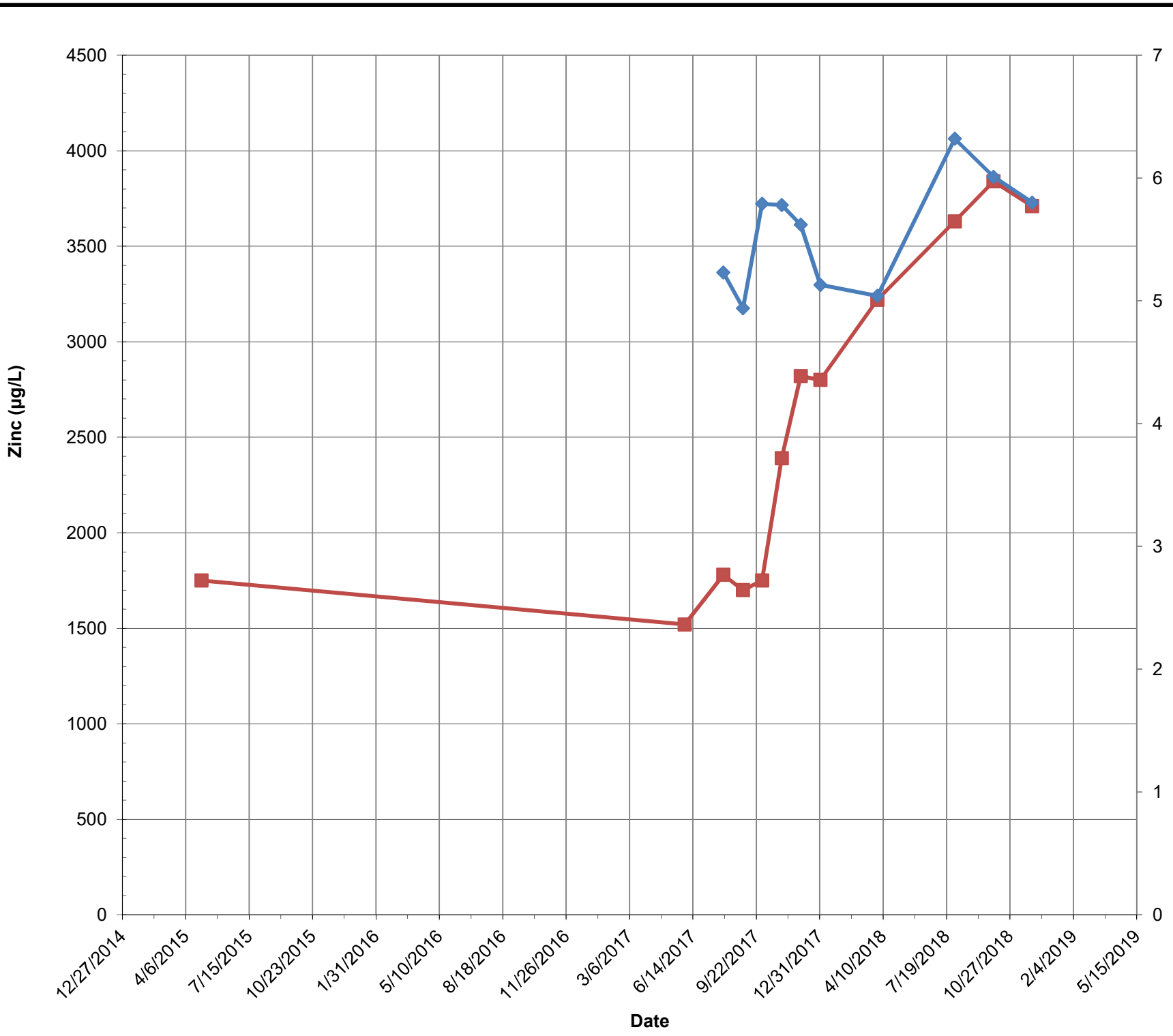
- RW12-MW(S) Cd
- RW12-MW(S) pH



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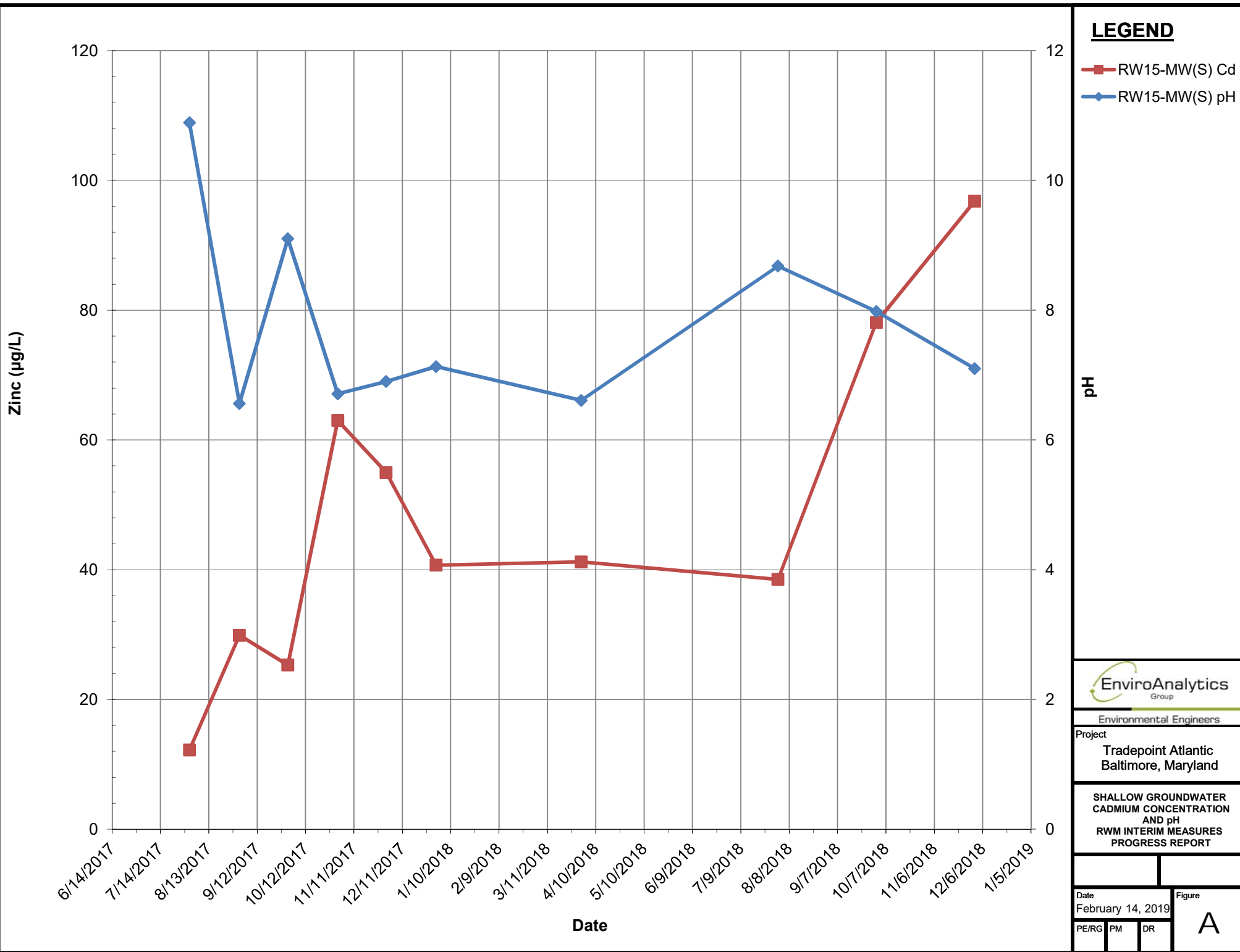
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LEGEND

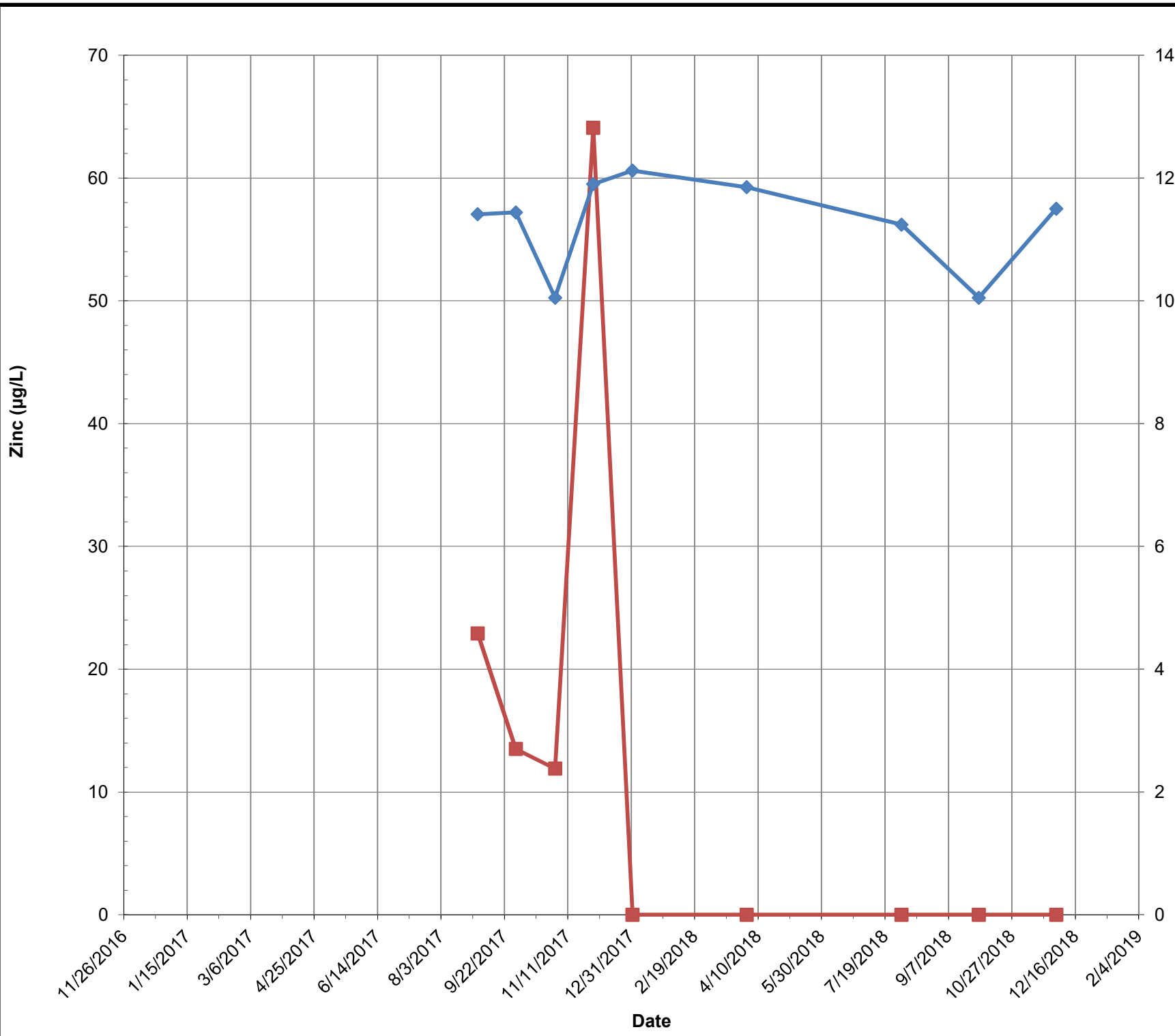
- RW15-MW(S) Cd
- ◆ RW15-MW(S) pH



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LEGEND

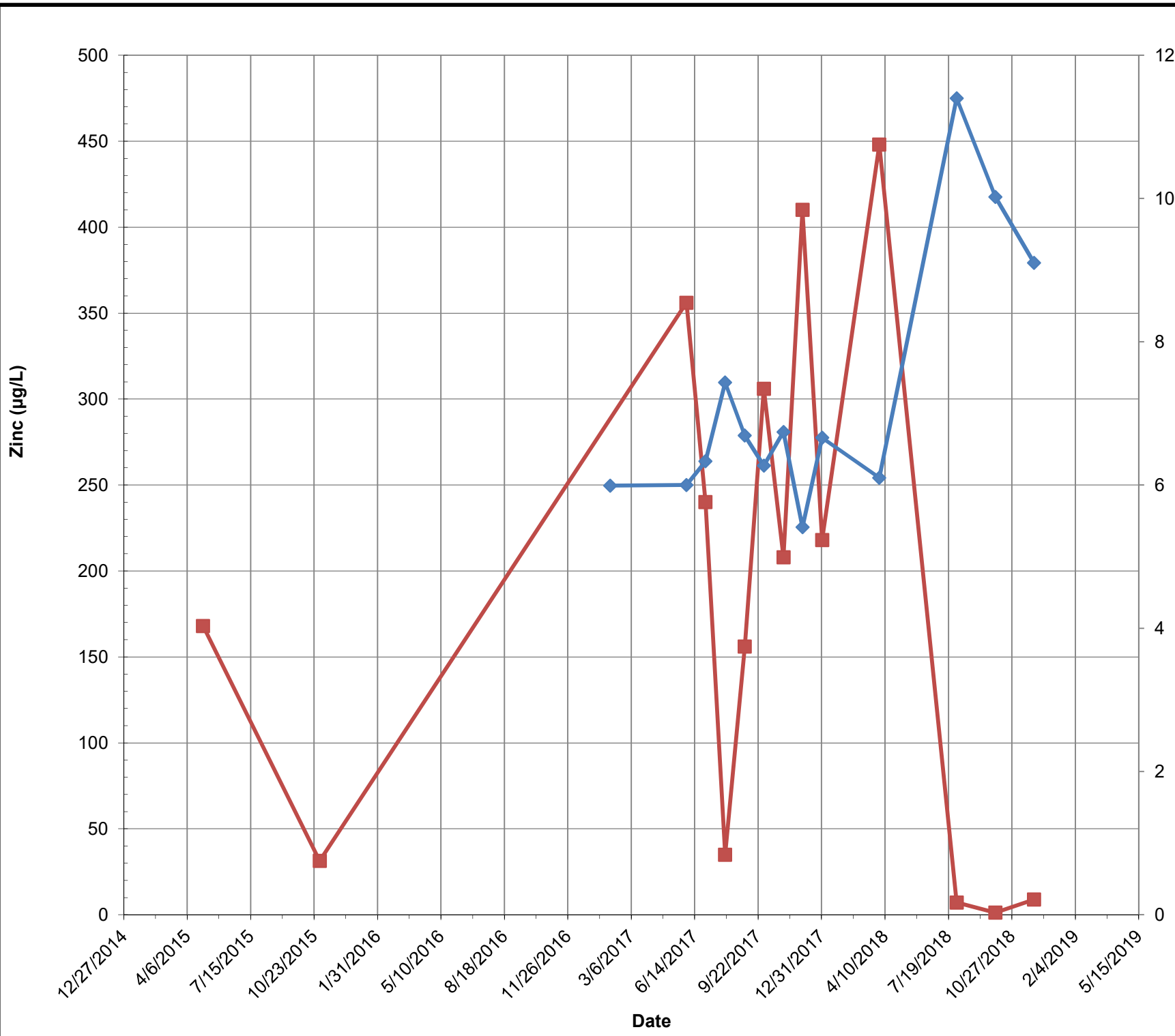
- RW16-MW(S) Cd
- RW16-MW(S) pH



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LEGEND

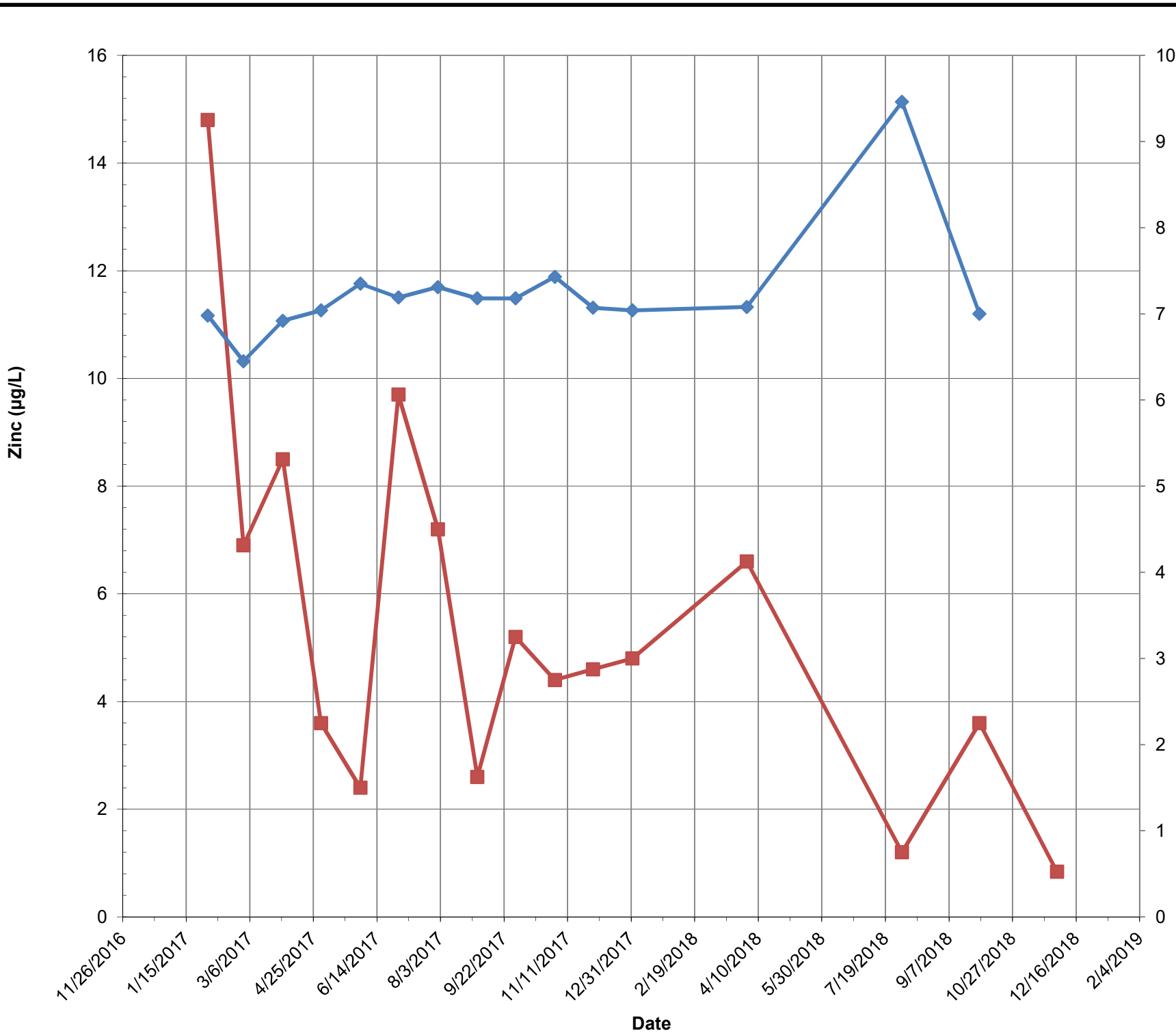
- RW18-MW(S) Cd
- RW18-MW(S) pH



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PE/RG	PM	DR	



LEGEND

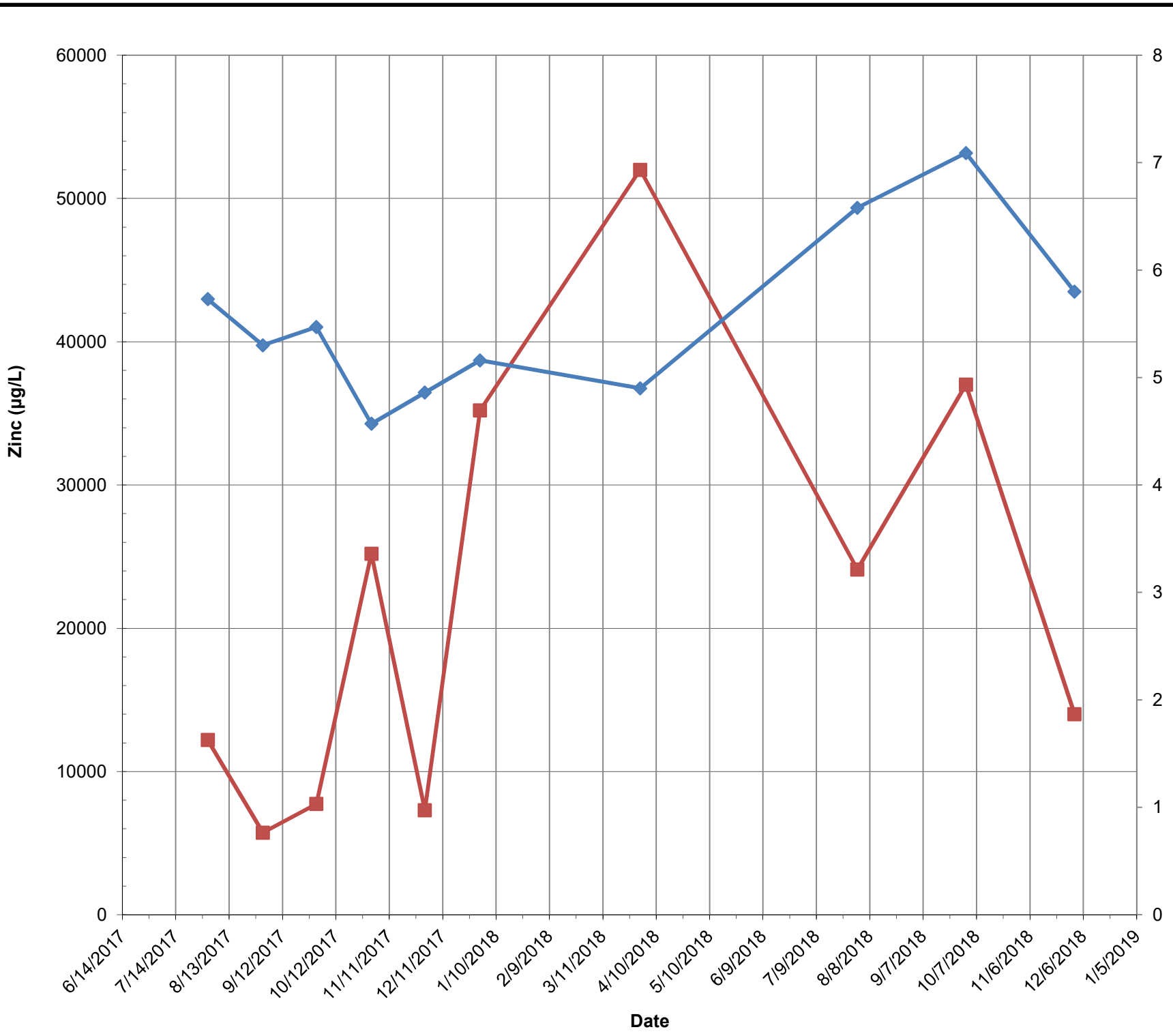
- RW19-MW(S) Cd
- ◆ RW19-MW(S) pH



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**SHALLOW GROUNDWATER
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LEGEND
 ■ RW01-MW(S) Zn
 ◆ RW01-MW(S) pH



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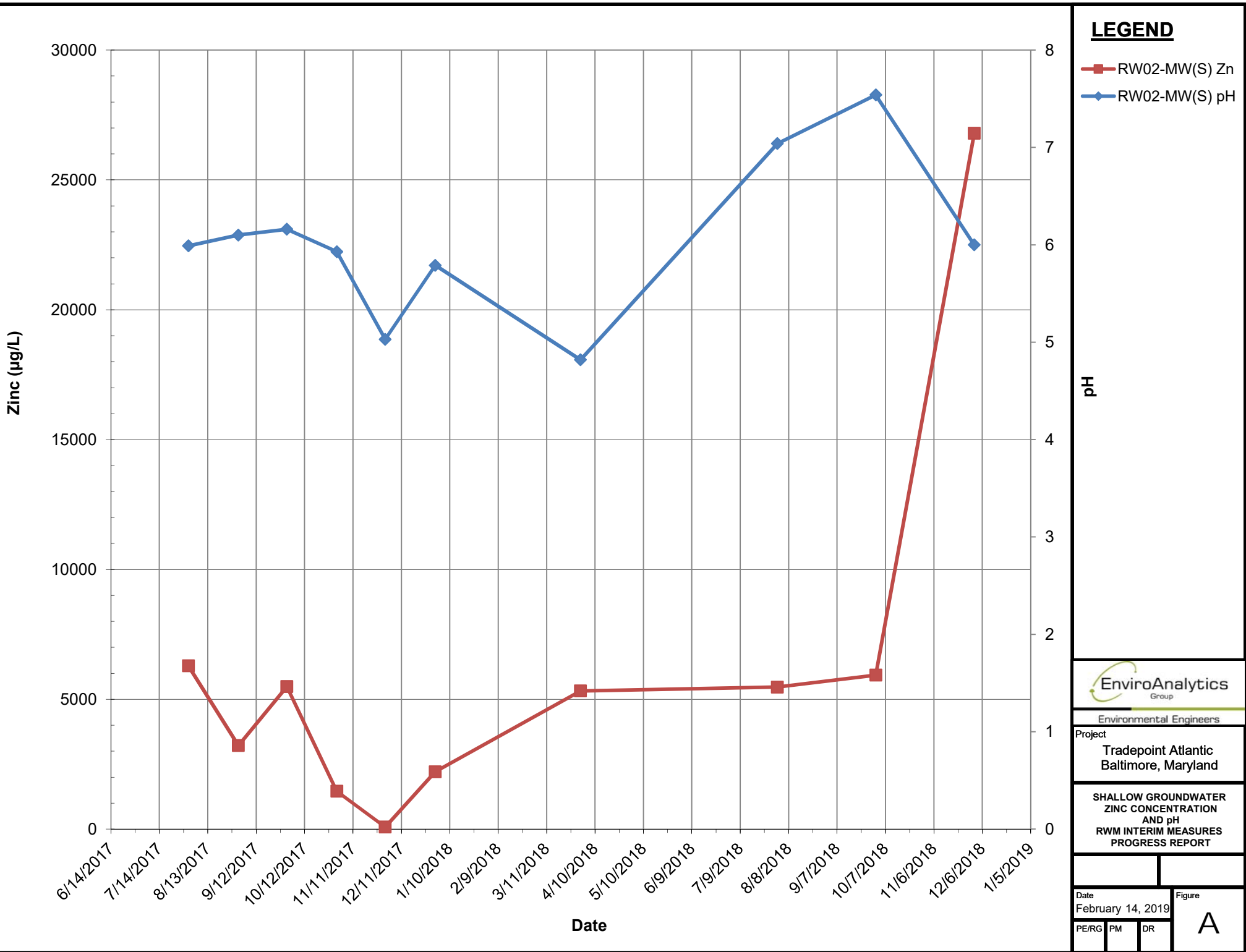
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Date February 14, 2019	Figure A
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LEGEND

- RW02-MW(S) Zn
- ◆ RW02-MW(S) pH

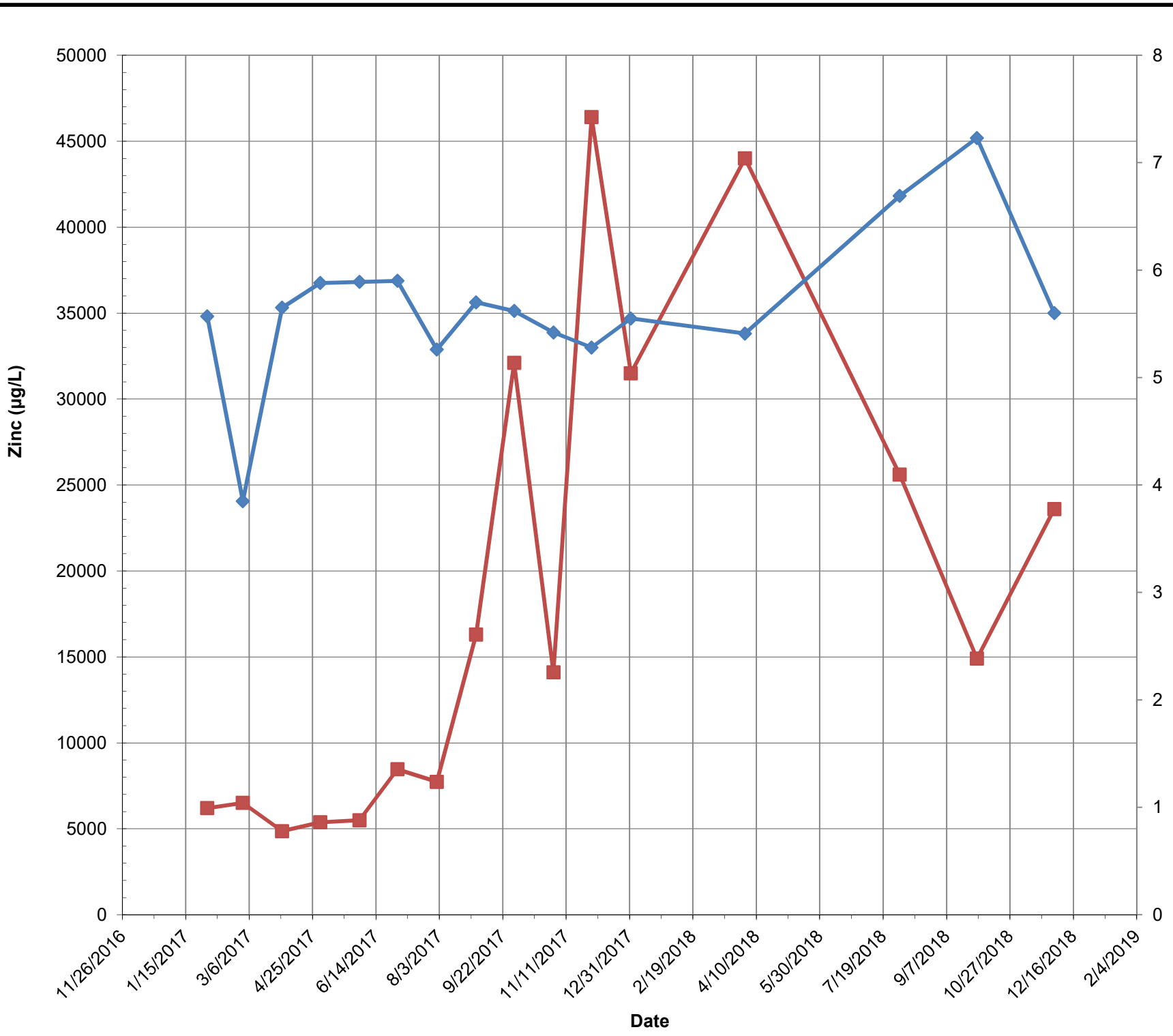


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LEGEND

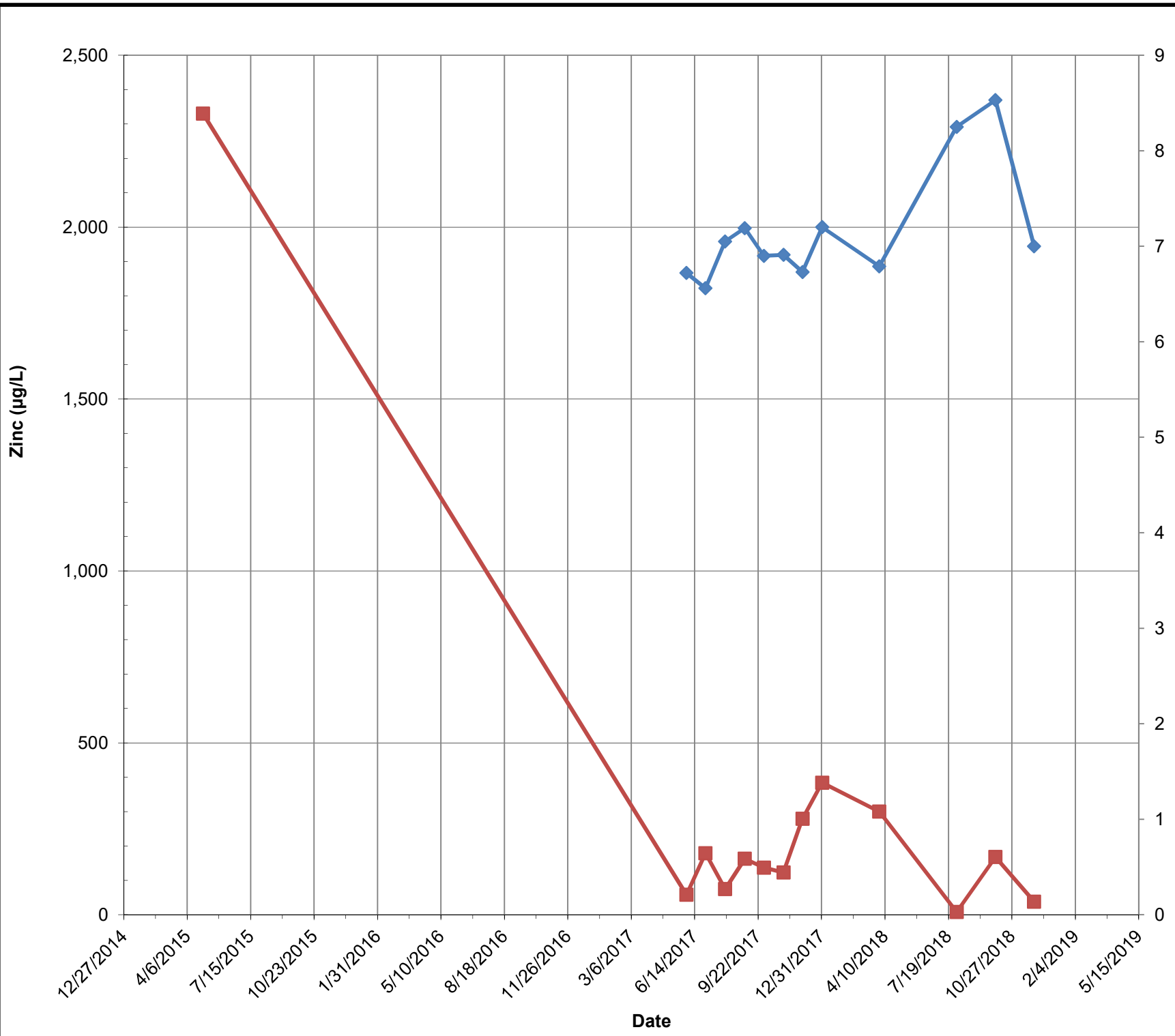
- RW03-MW(S) Zn
- RW03-MW(S) pH



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LEGEND

- RW04-MW(S) Zn
- ◆ RW04-MW(S) pH



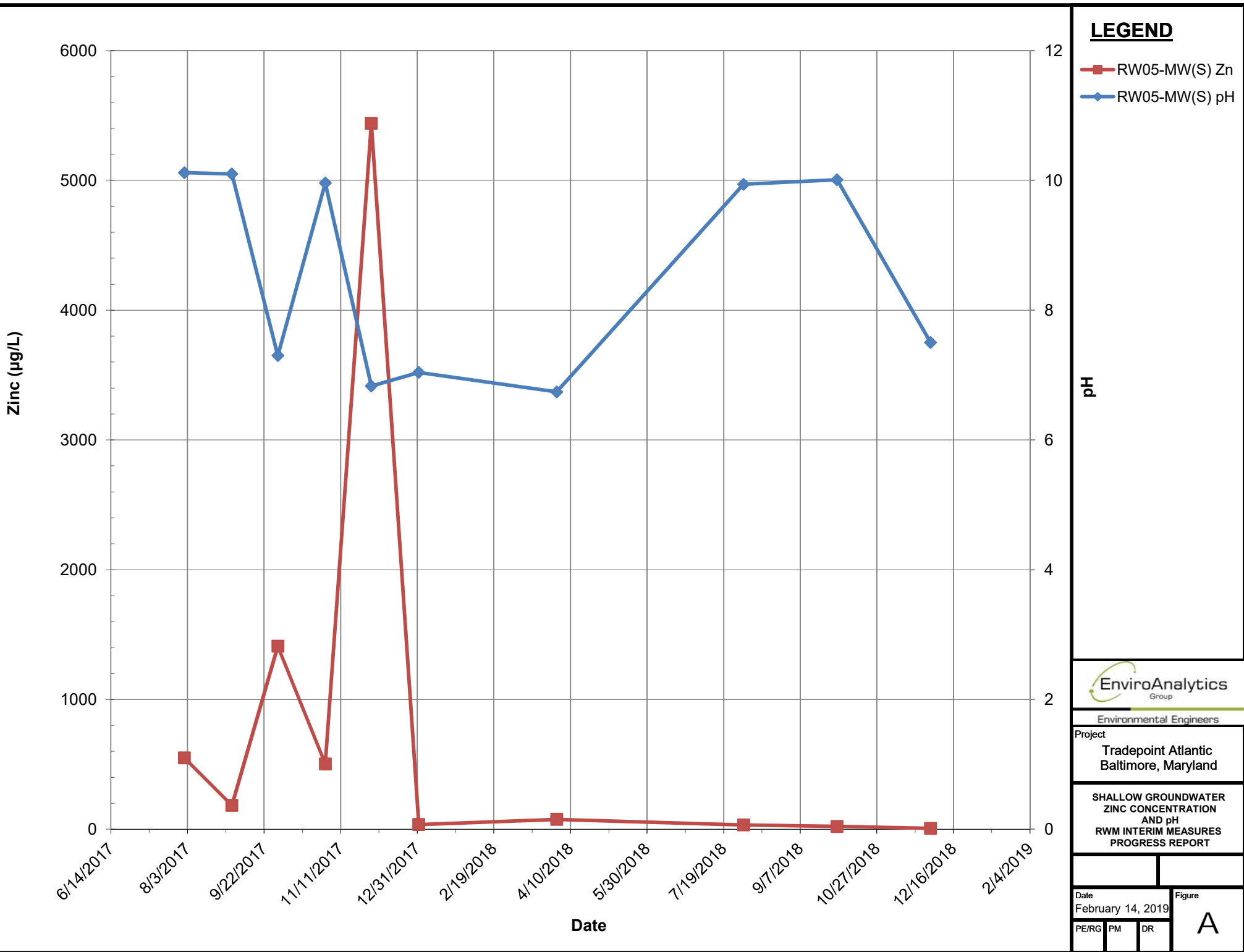
Environmental Engineers

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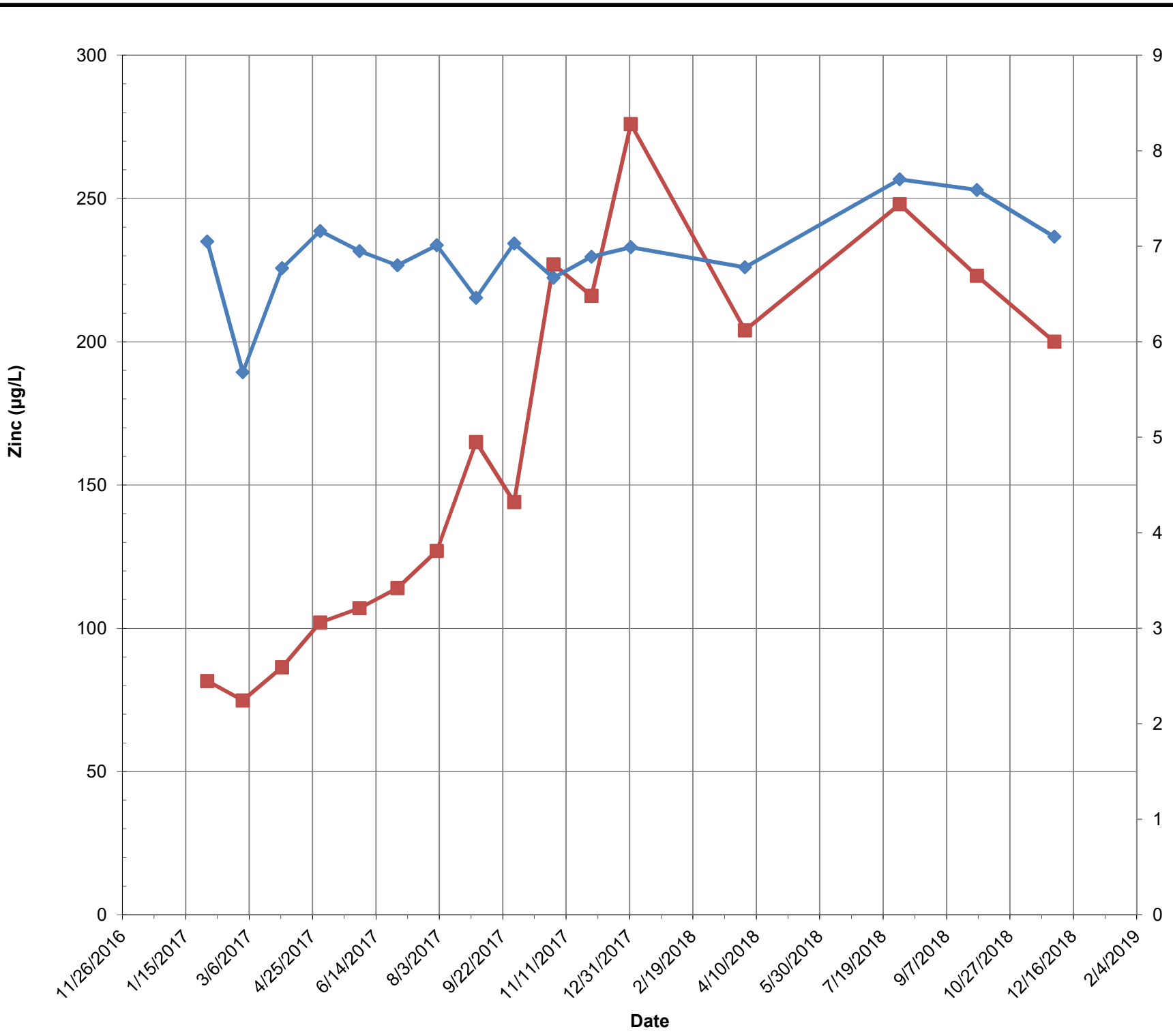
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LEGEND

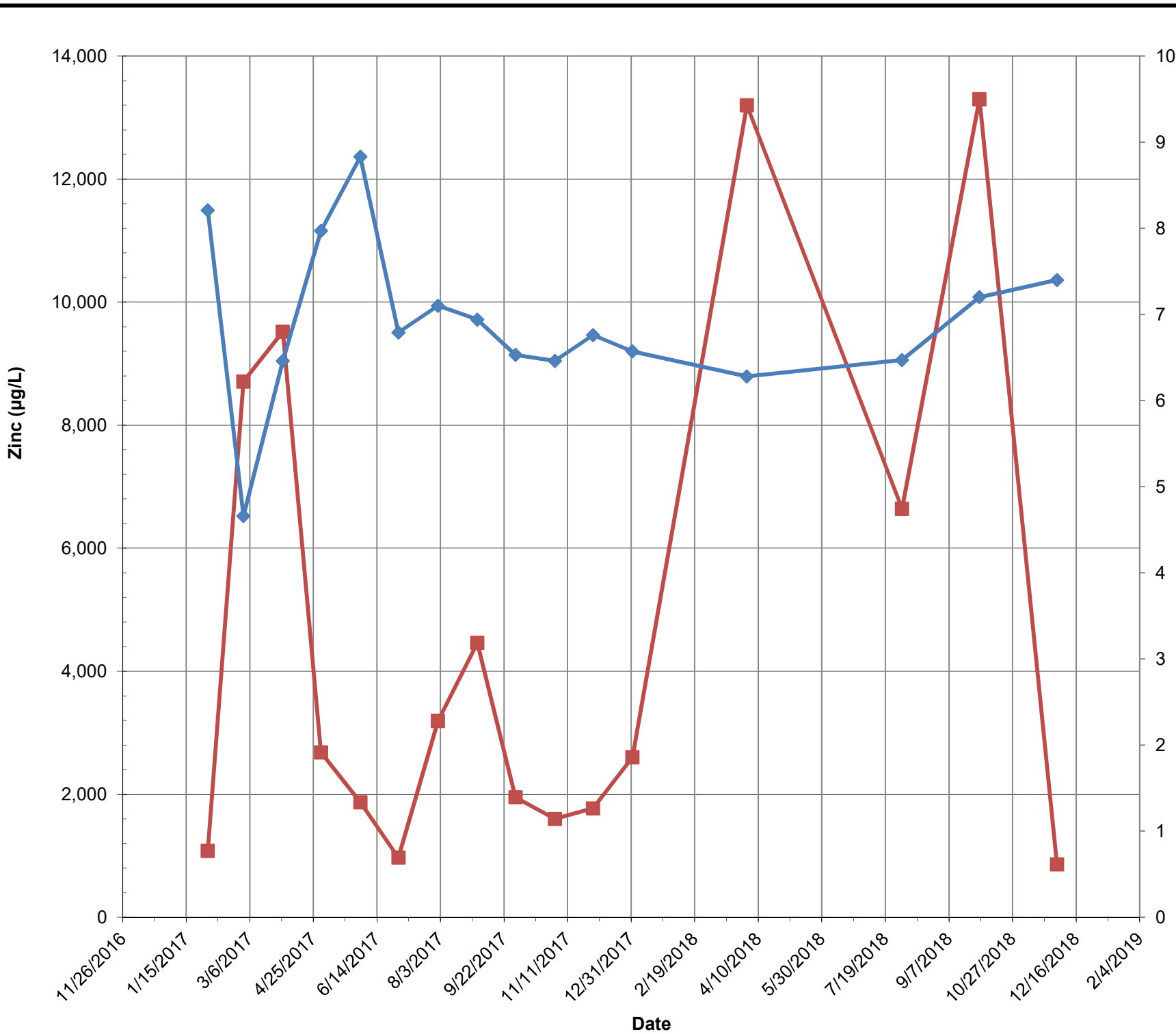
- RW07-MW(S) Zn
- RW07-MW(S) pH



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LEGEND

- RW08-MW(S) Zn
- ◆ RW08-MW(S) pH



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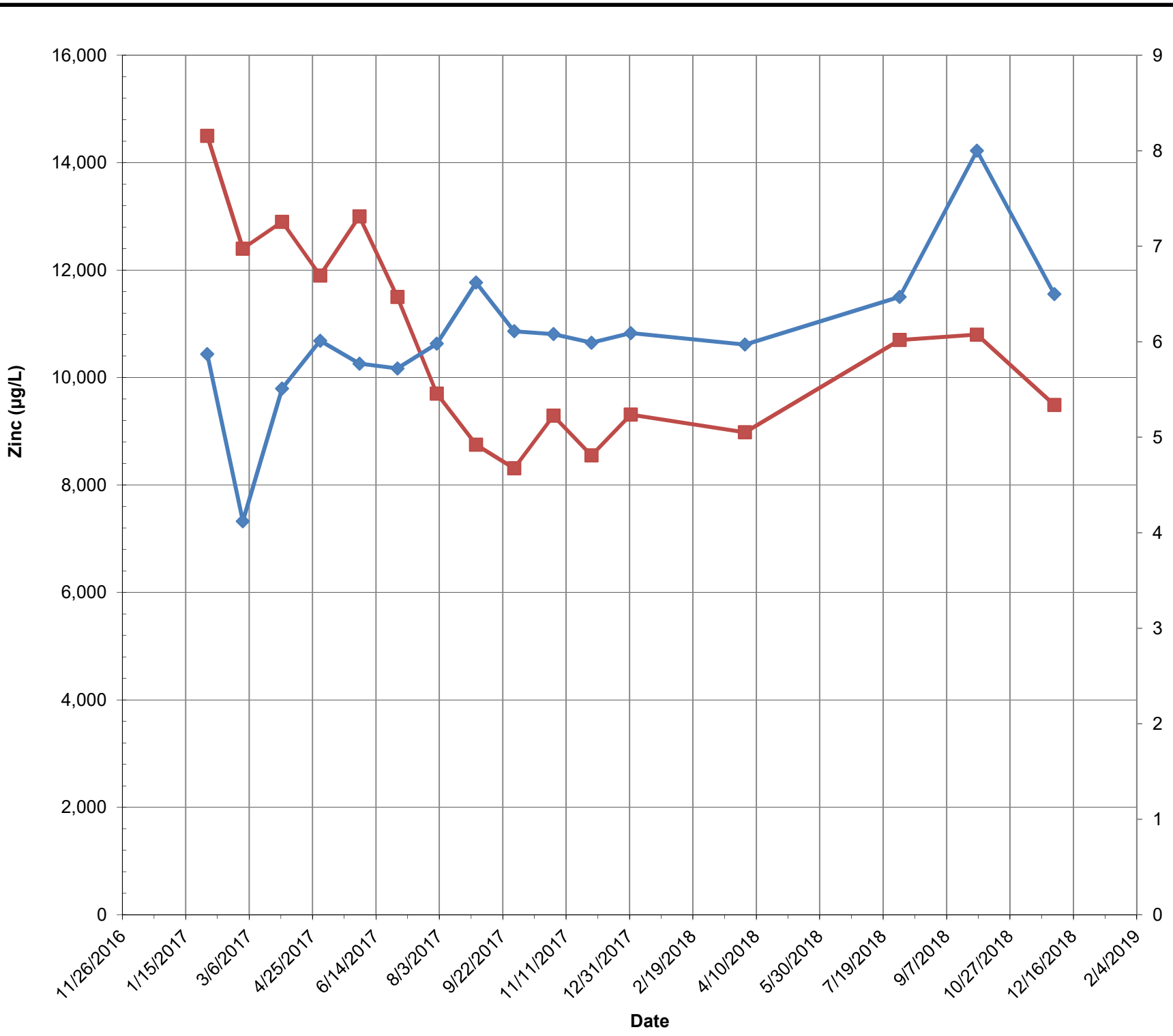
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LEGEND

- RW09-MW(S) Zn
- RW09-MW(S) pH

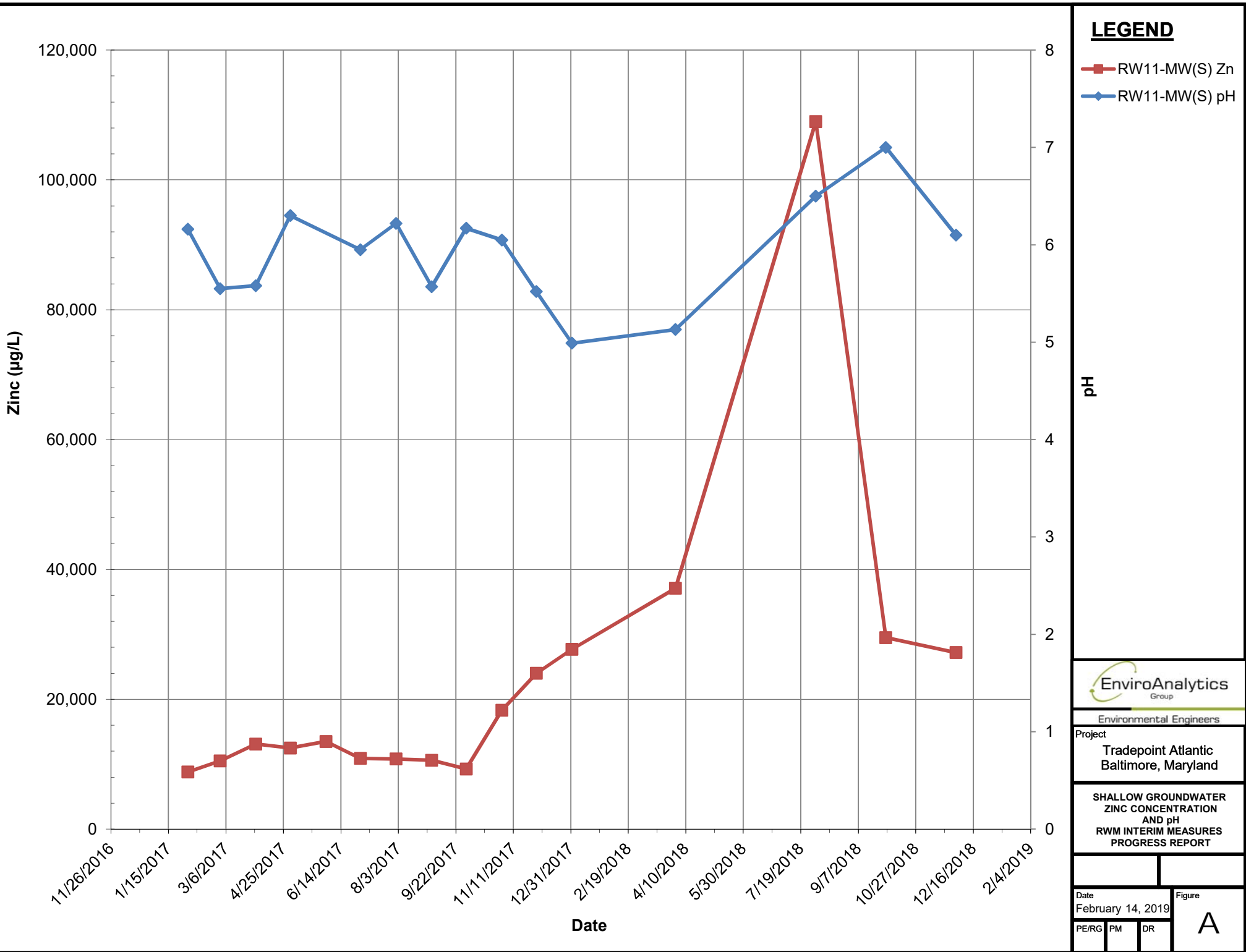


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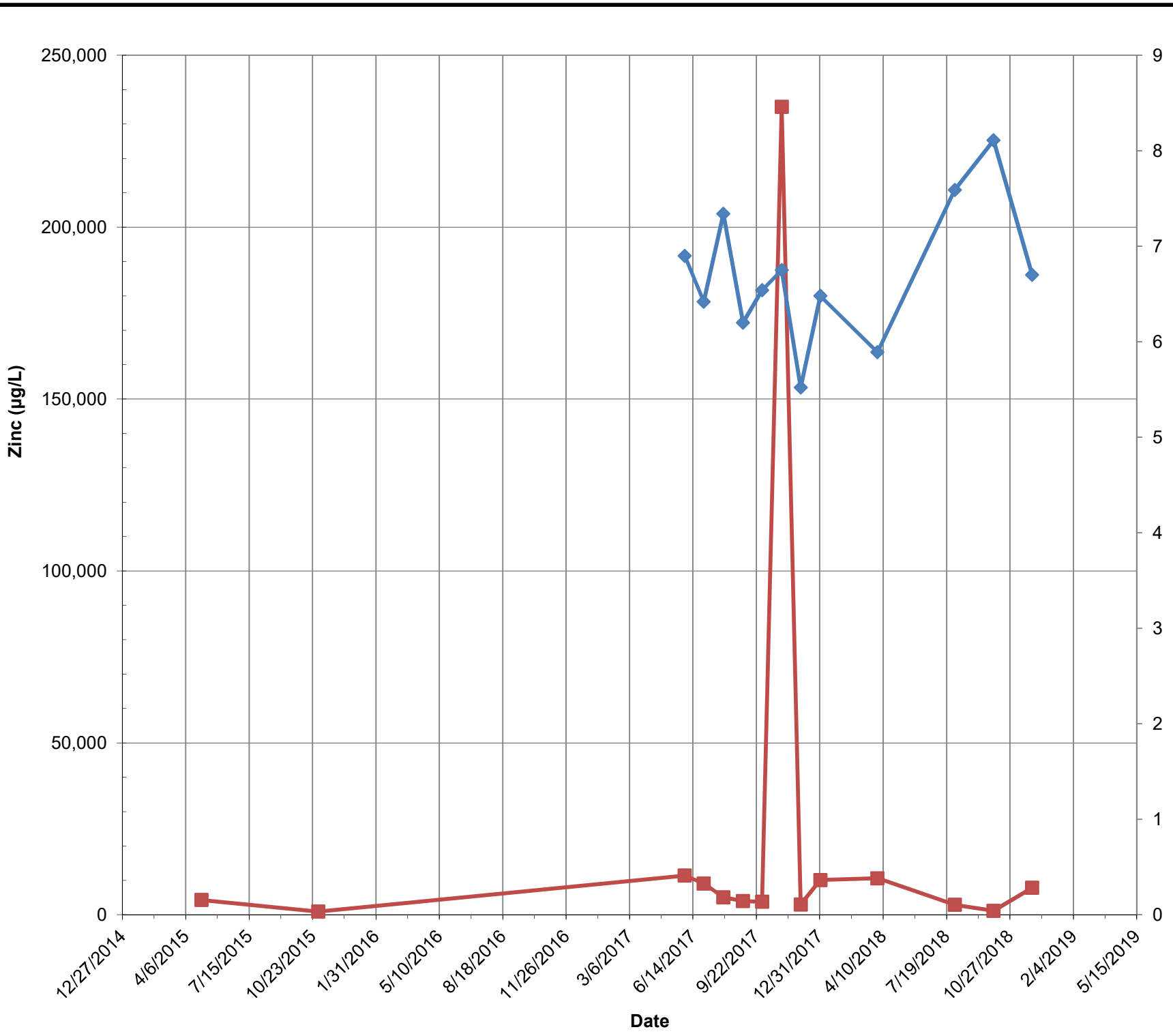


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LEGEND

- RW12-MW(S) Zn
- ◆ RW12-MW(S) pH



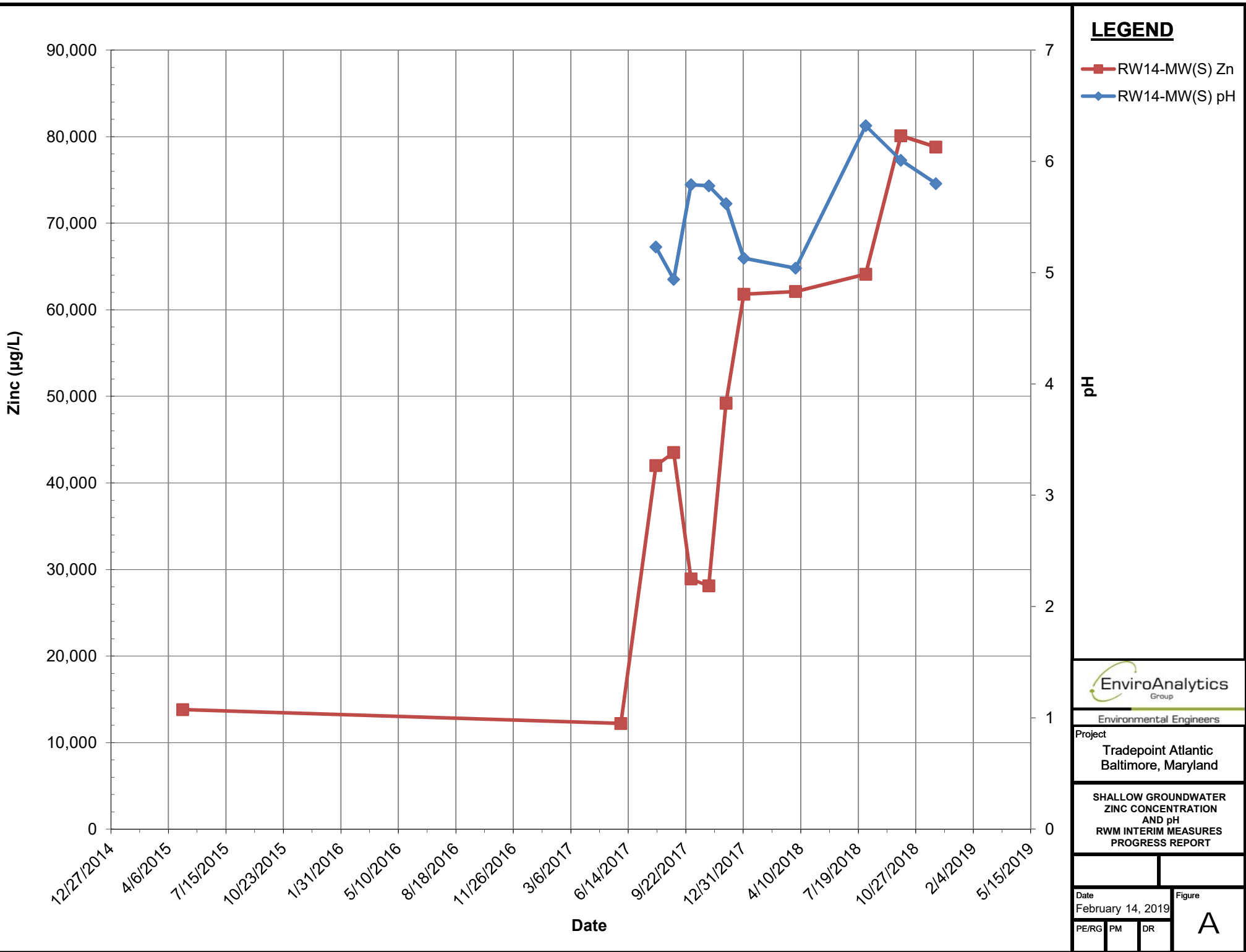
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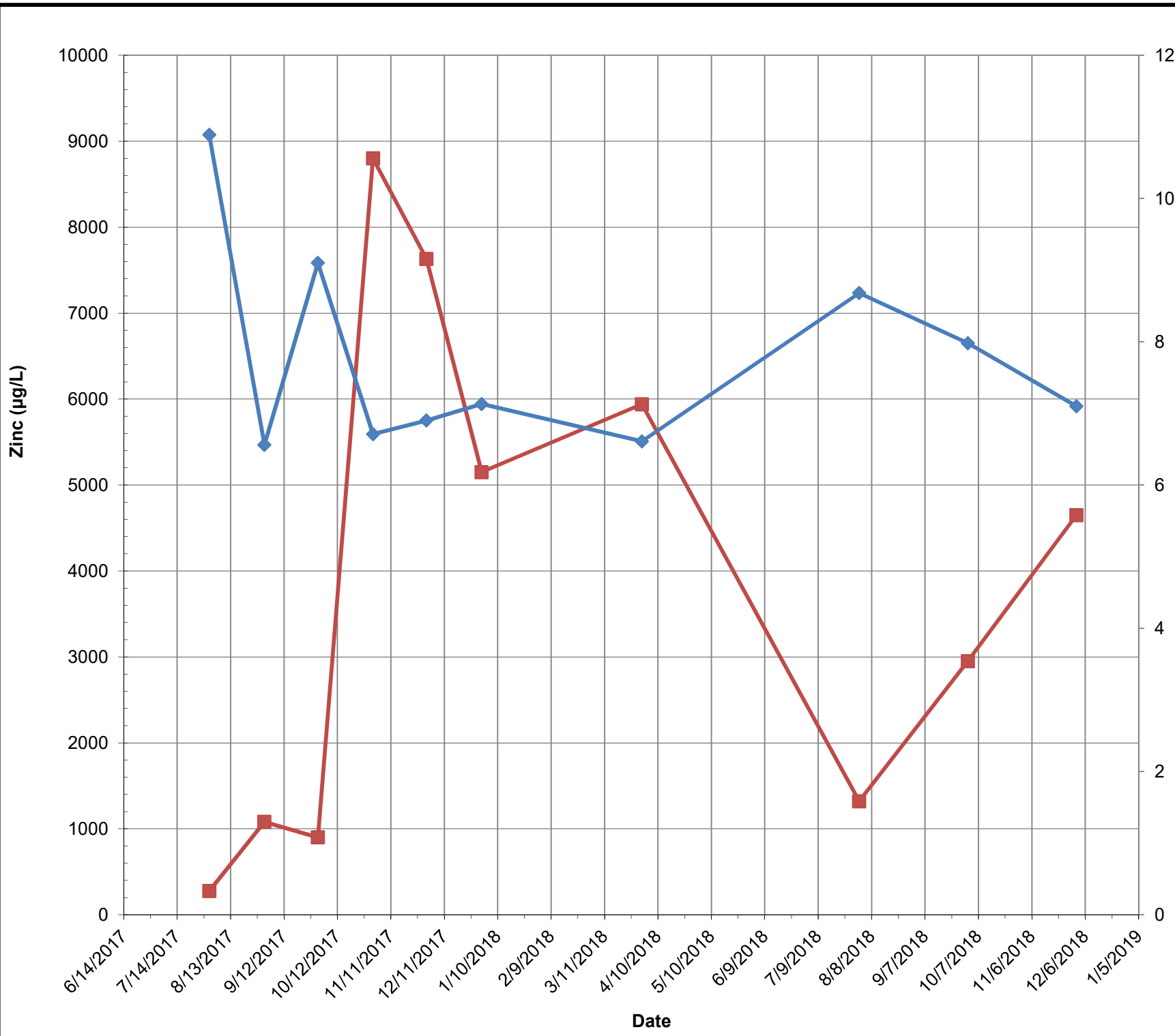
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LEGEND

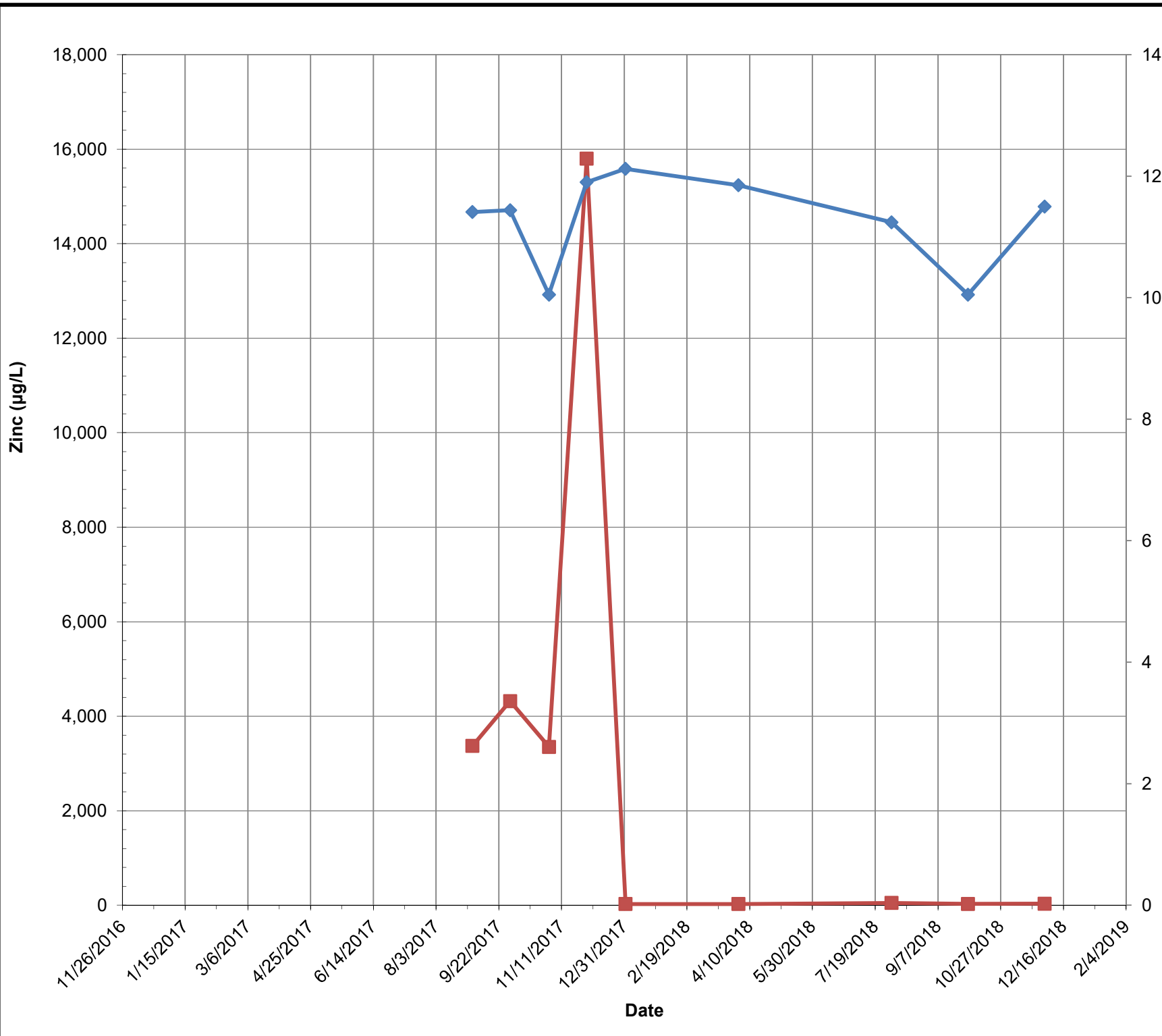
- RW15-MW(S) Zn
- RW15-MW(S) pH



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LEGEND

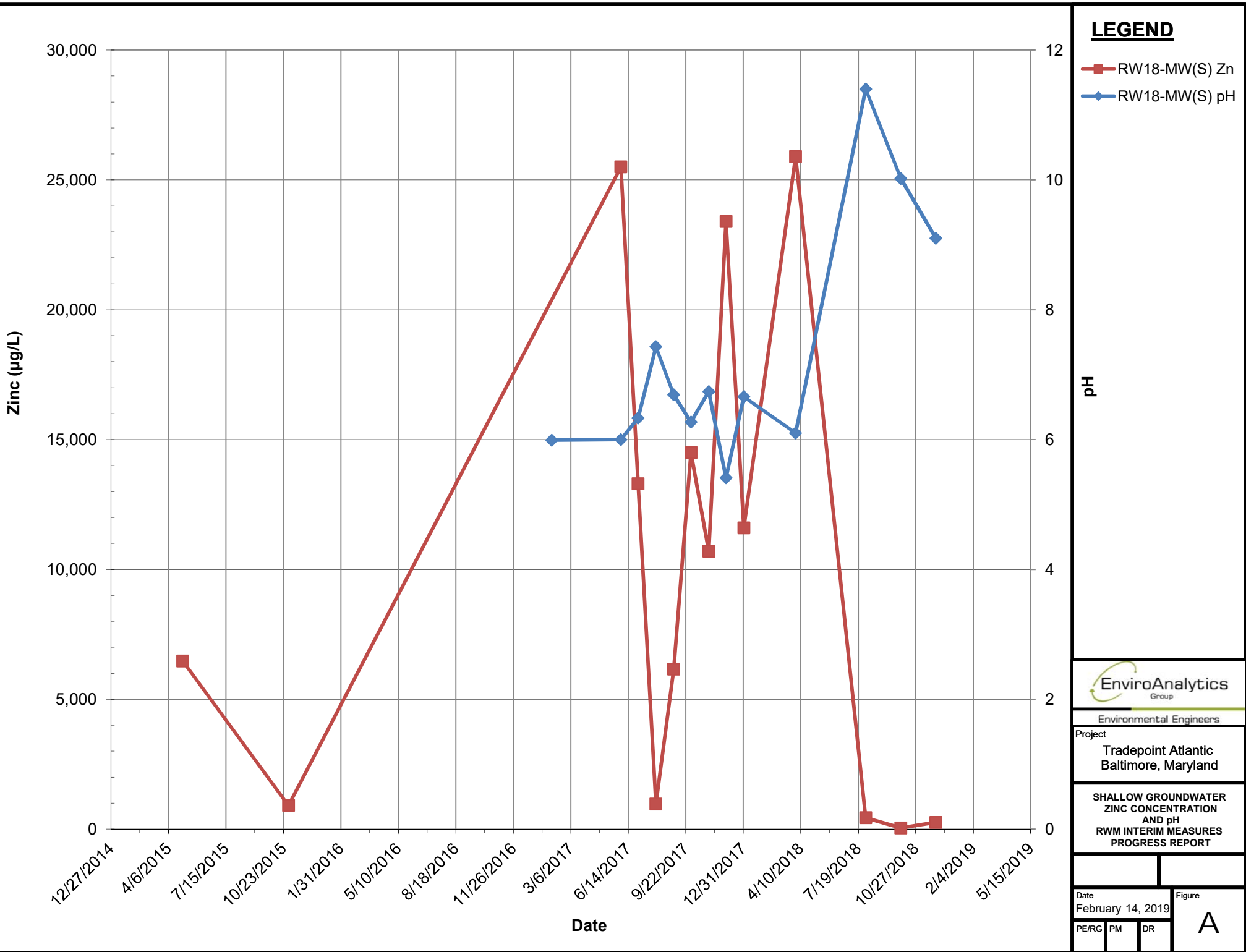
- RW16-MW(S) Zn
- RW16-MW(S) pH



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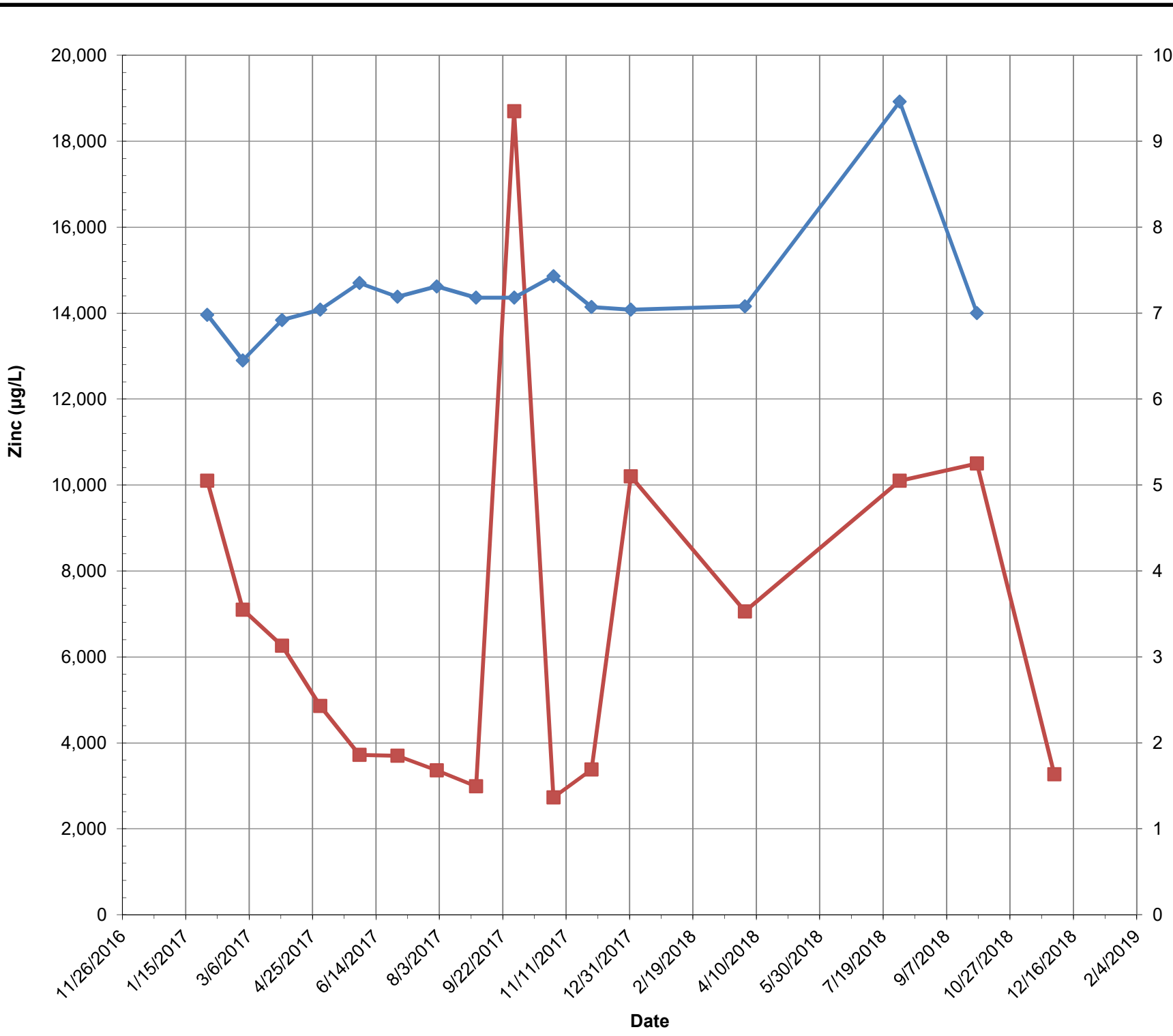
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LEGEND

- RW19-MW(S) Zn
- RW19-MW(S) pH



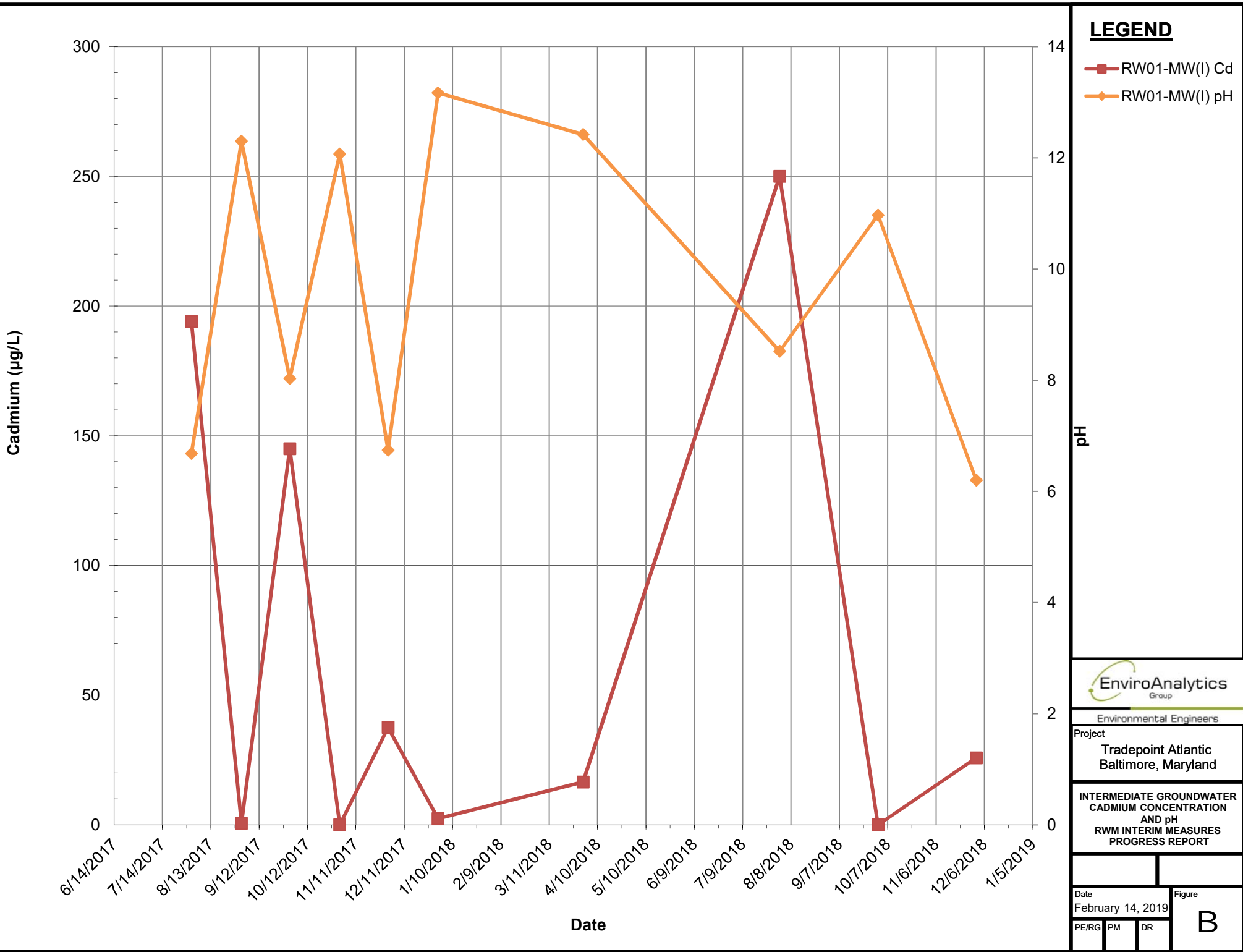
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APPENDIX B

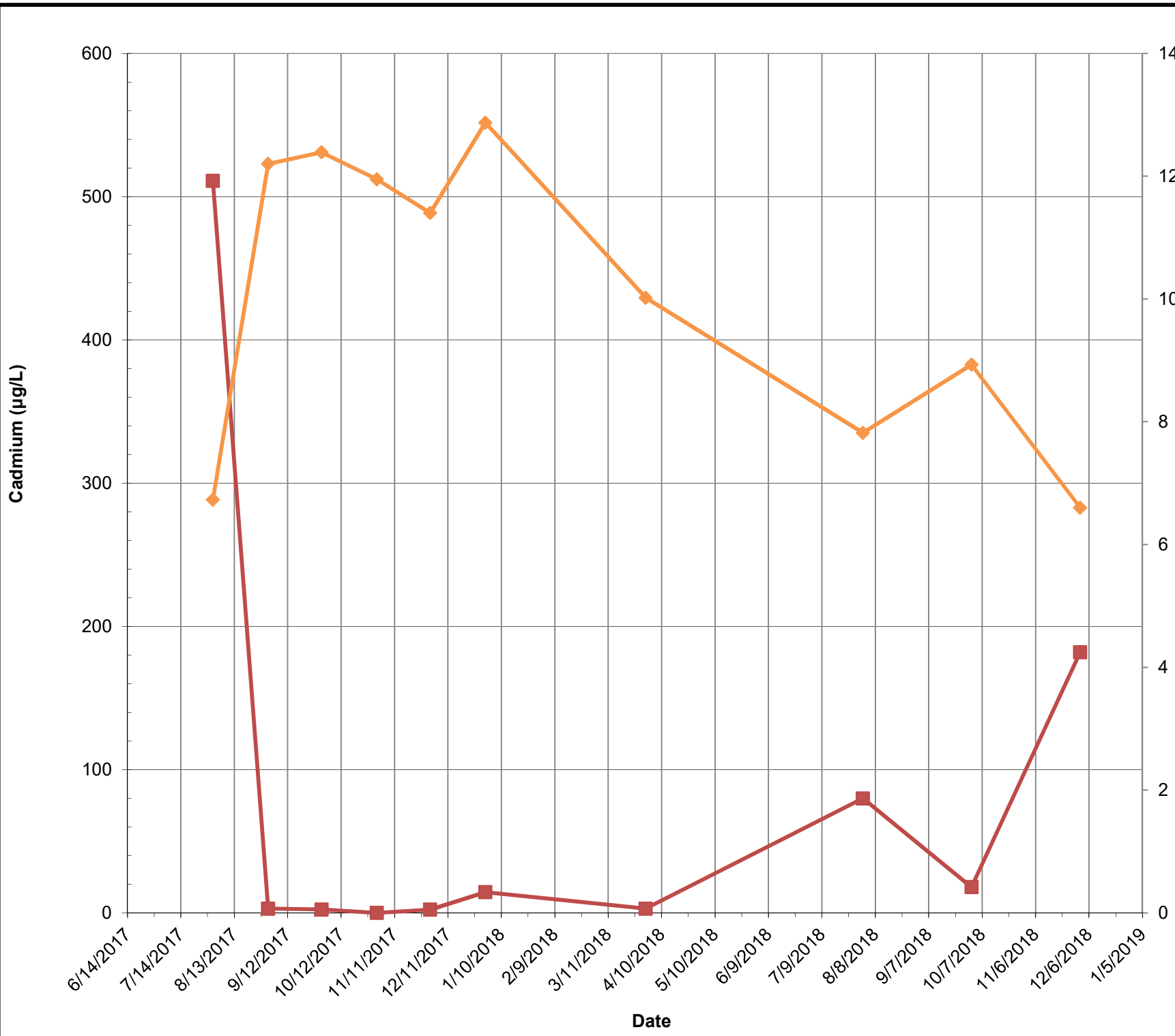
Intermediate Groundwater Time-Series Graphs



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PM	



LEGEND

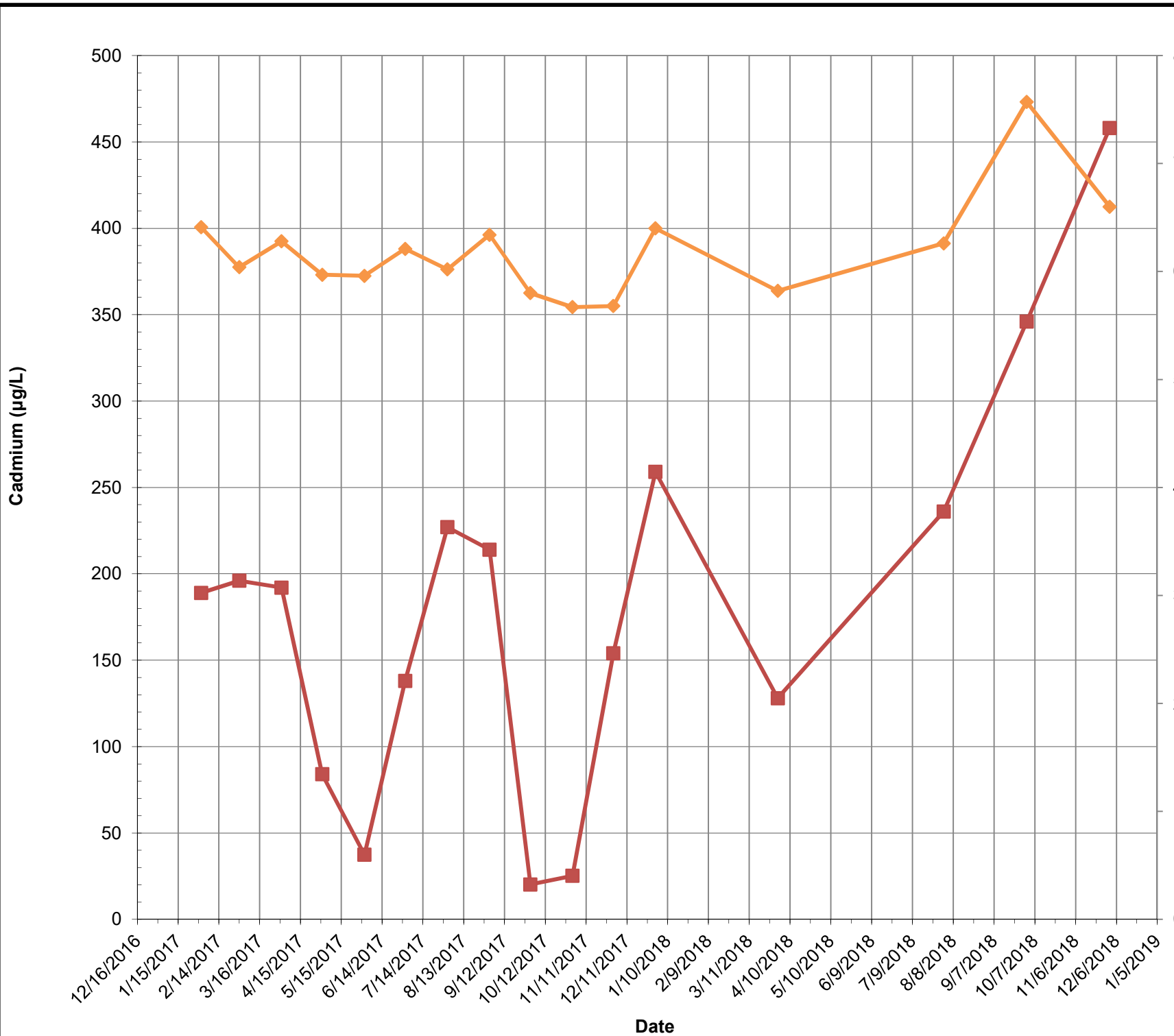
- RW02-MW(I) Cd
- RW02-MW(I) pH



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LEGEND

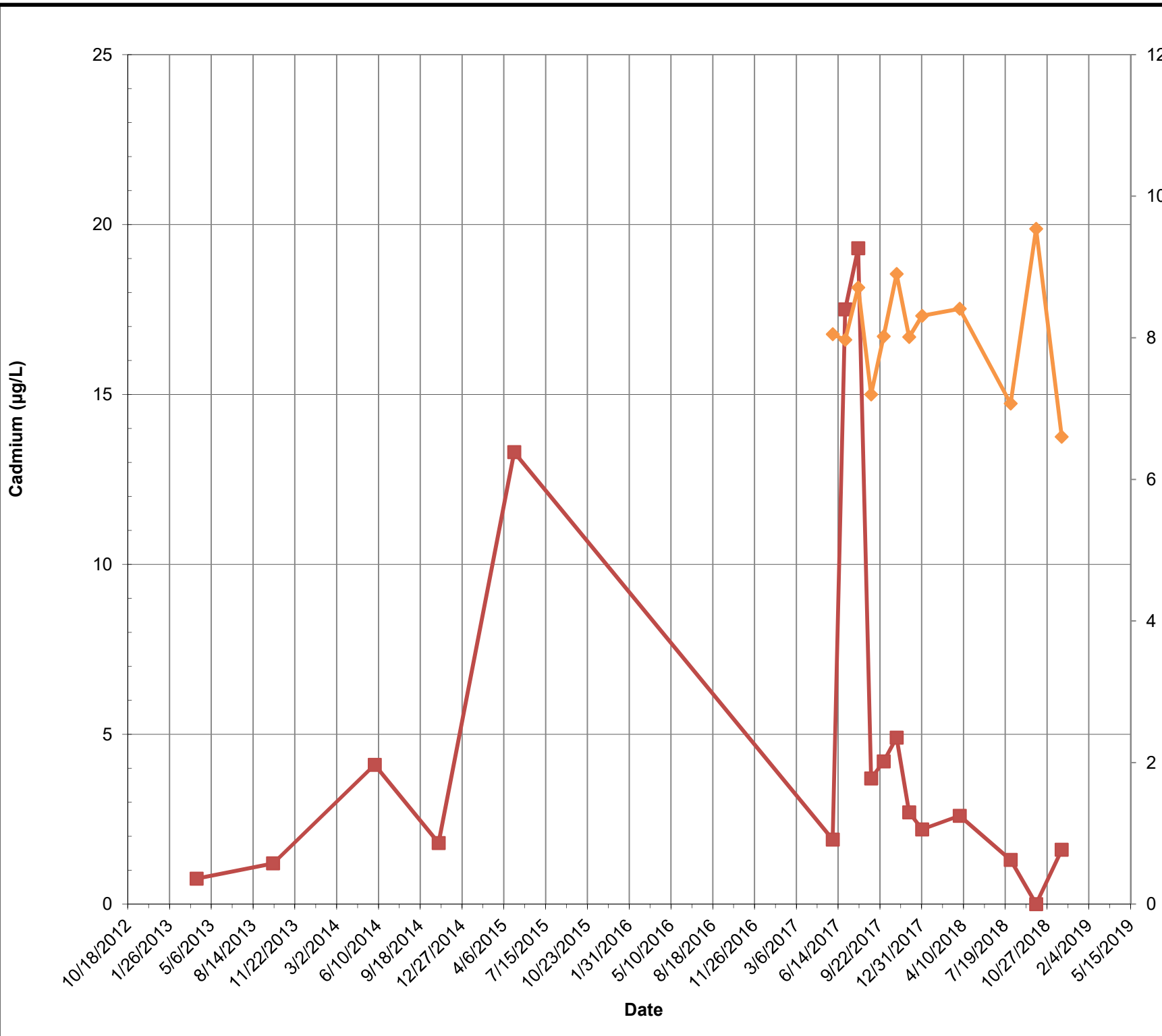
- RW03-MW(I) Cd
- RW03-MW(I) pH



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LEGEND

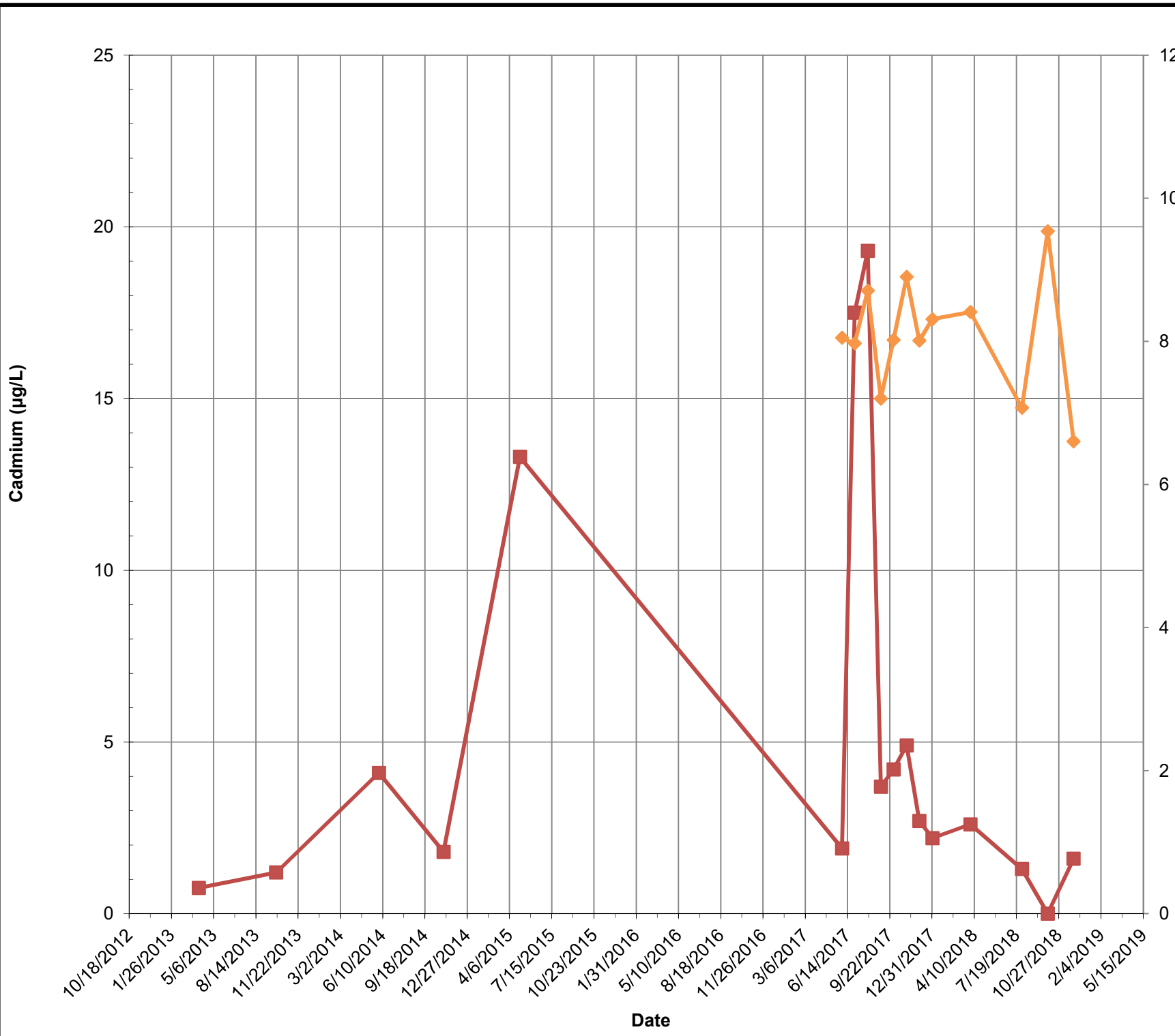
- RW05-MW(I) Cd
- RW05-MW(I) pH



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LEGEND

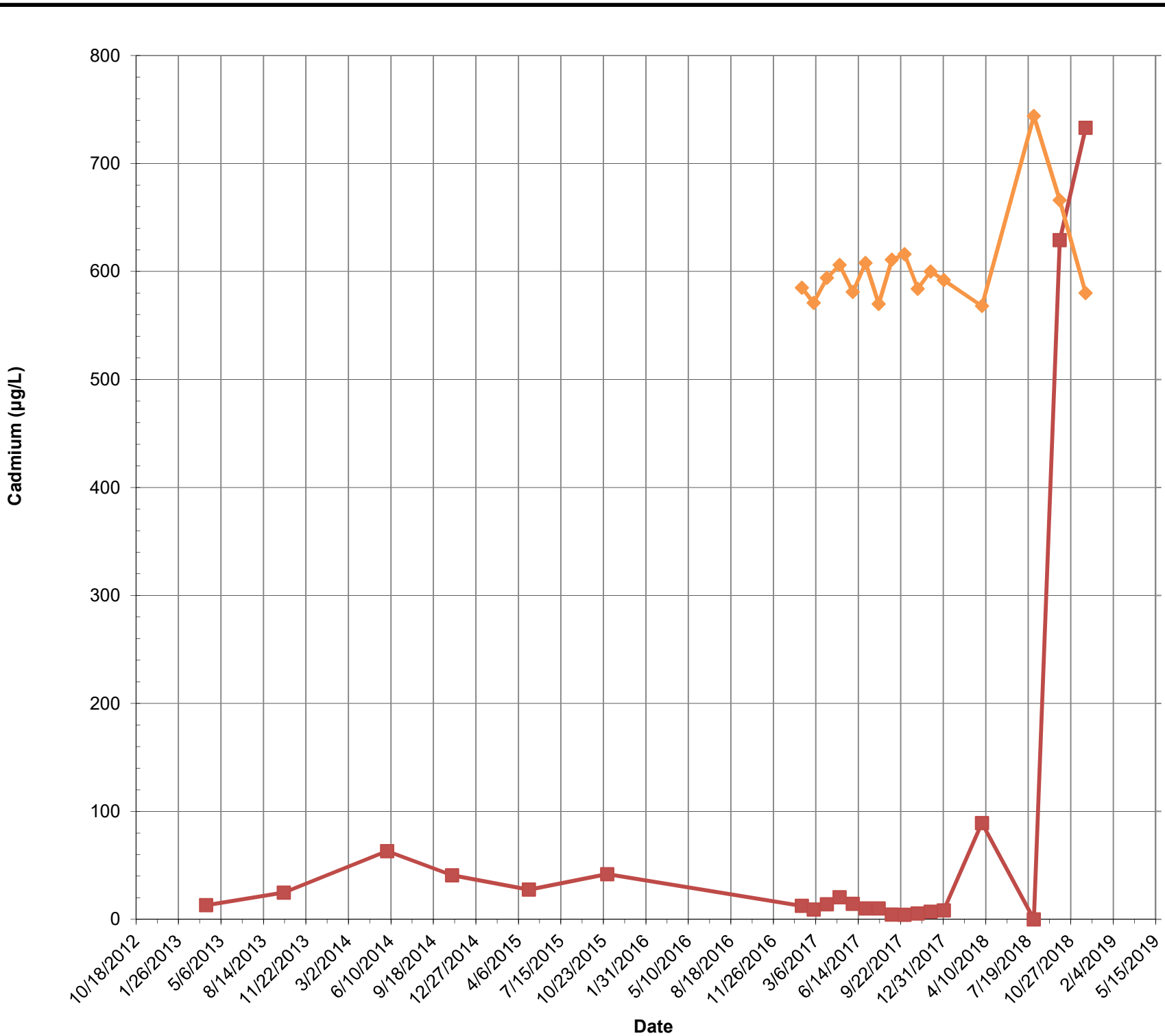
- RW05-MW(I) Cd
- RW05-MW(I) pH



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LEGEND

- RW06-MW(I) Cd
- ◆ RW06-MW(I) pH



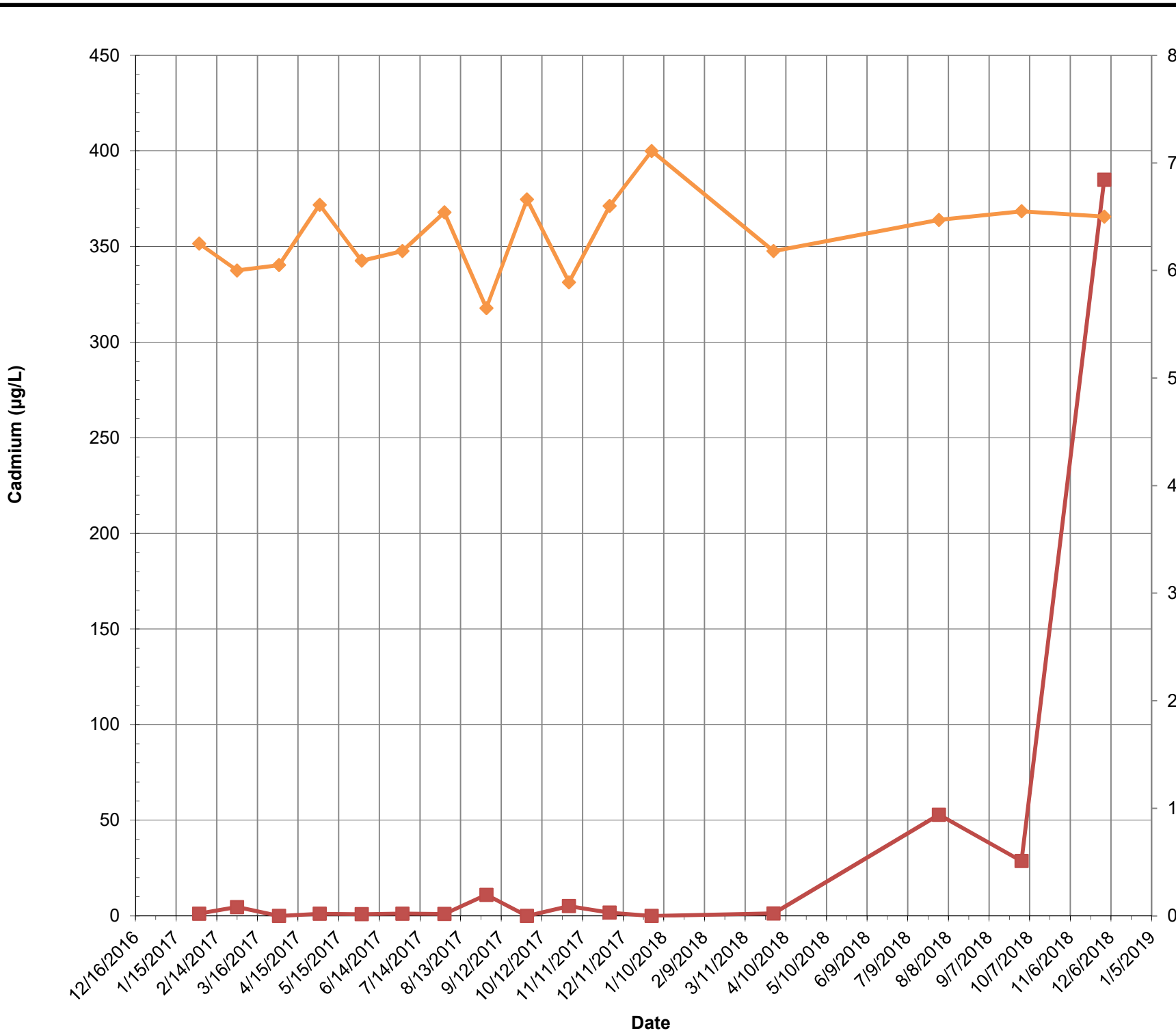
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LEGEND

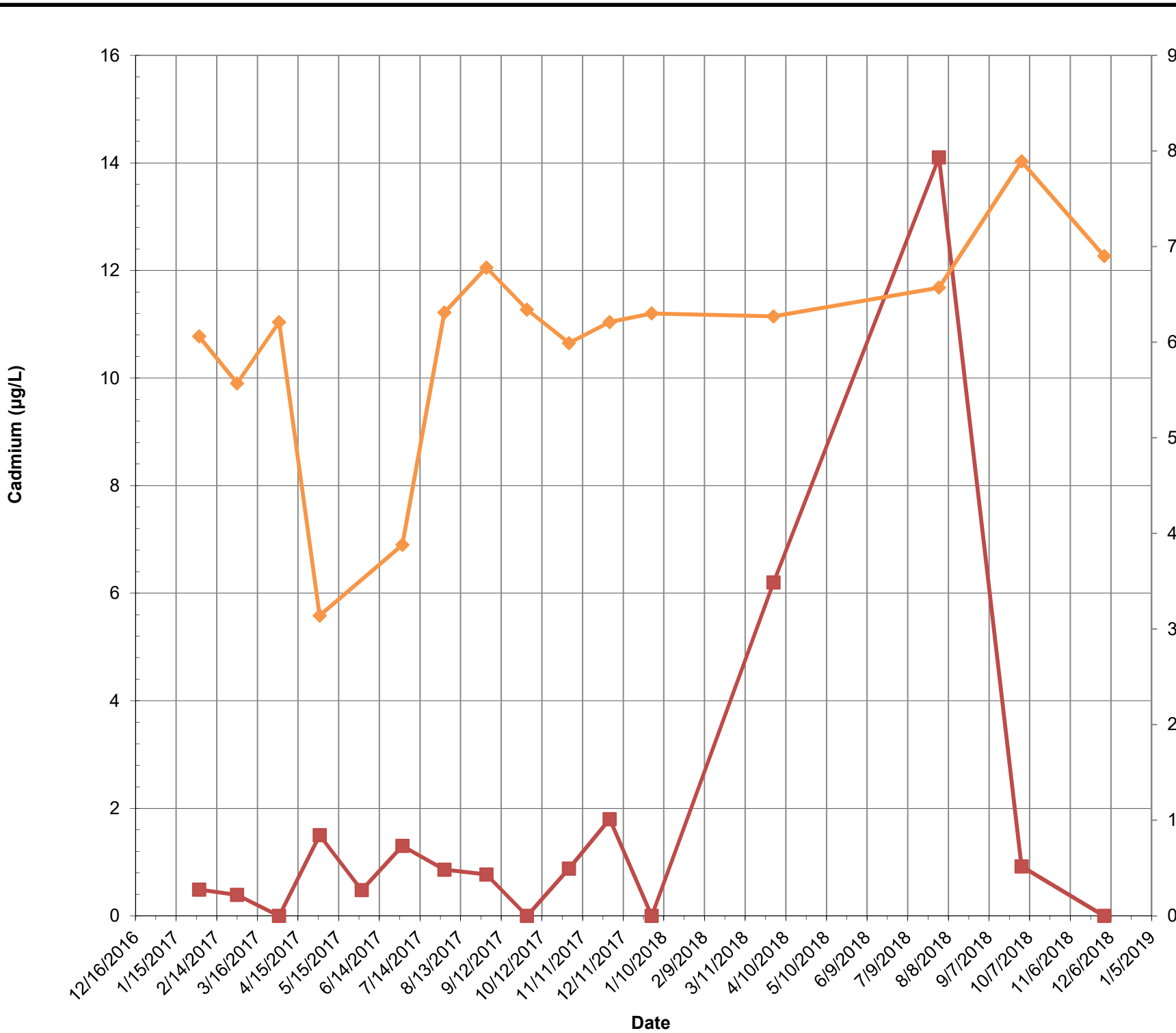
- RW07-MW(I) Cd
- RW07-MW(I) pH



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LEGEND

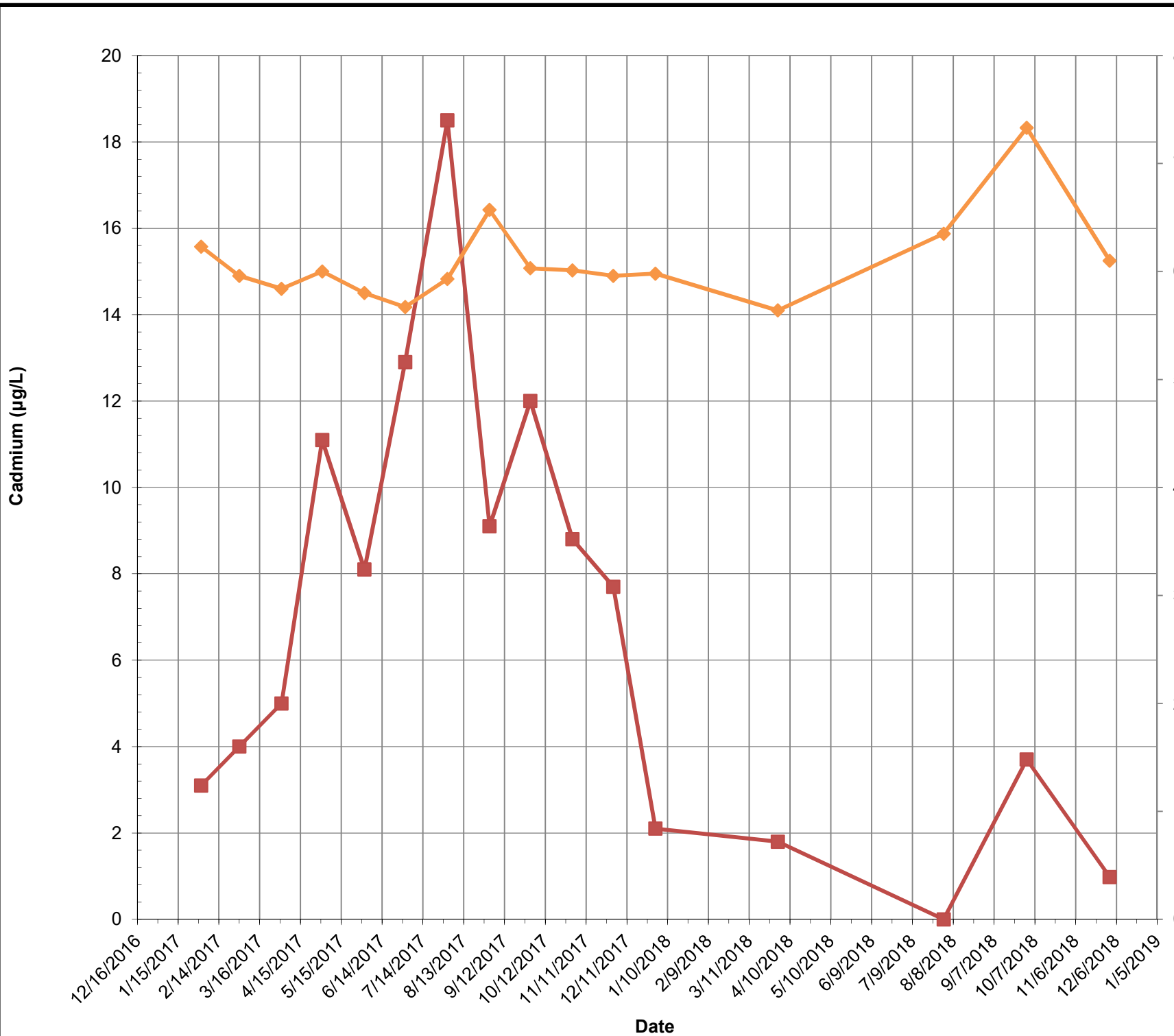
- RW08-MW(I) Cd
- RW08-MW(I) pH



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LEGEND

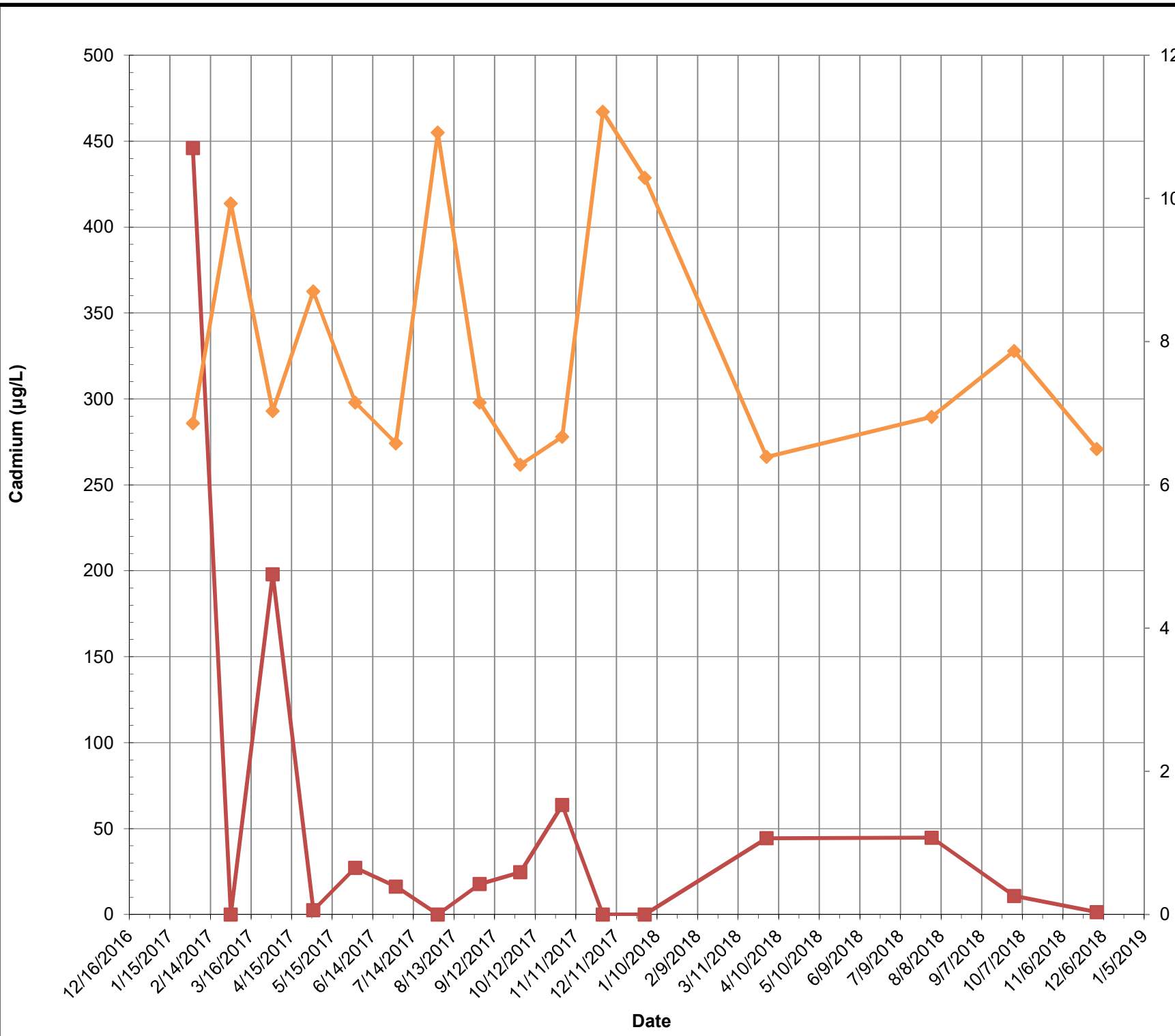
- RW09-MW(I) Cd
- RW09-MW(I) pH



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LEGEND

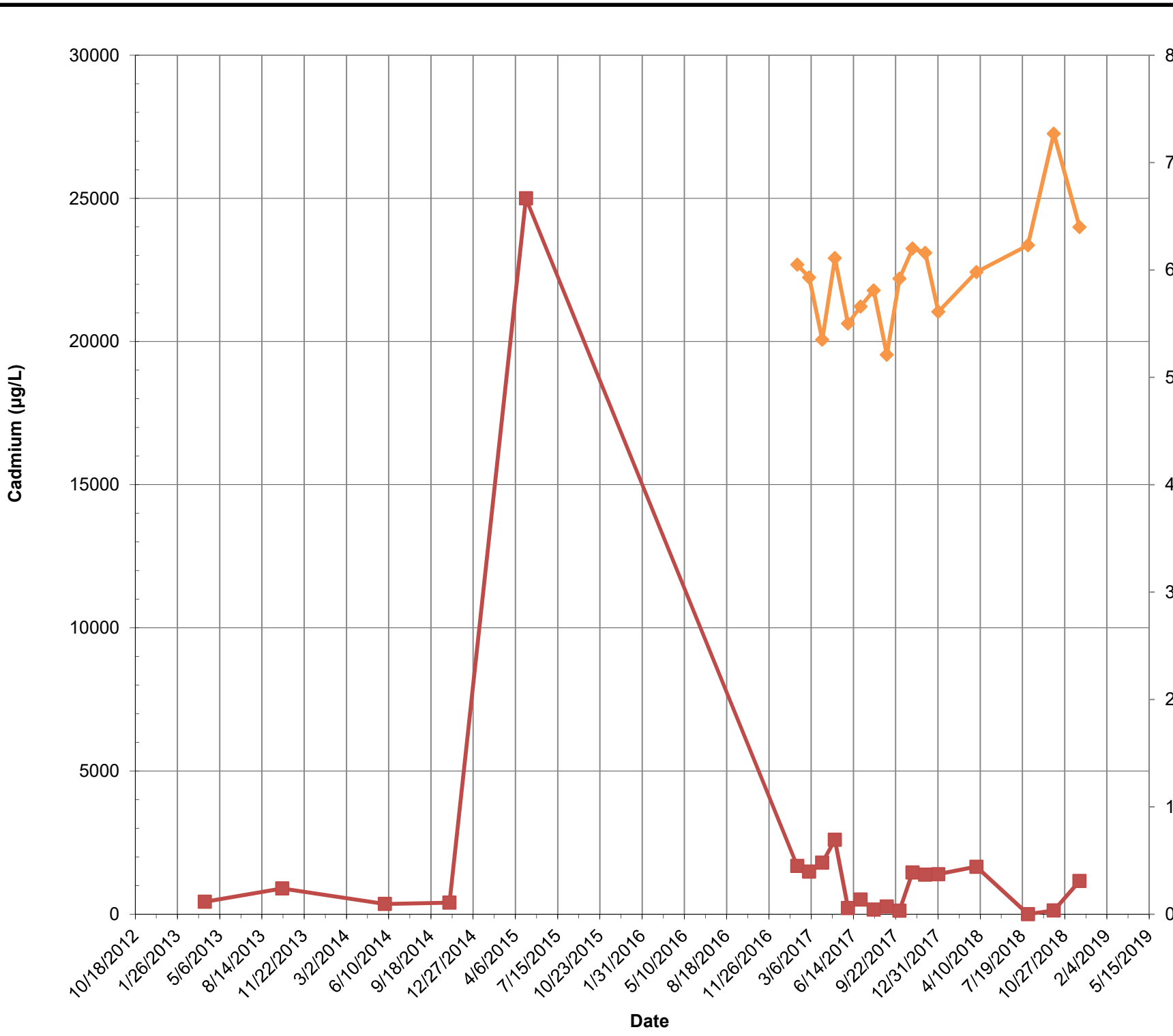
- RW10-MW(I) Cd
- RW10-MW(I) pH



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LEGEND

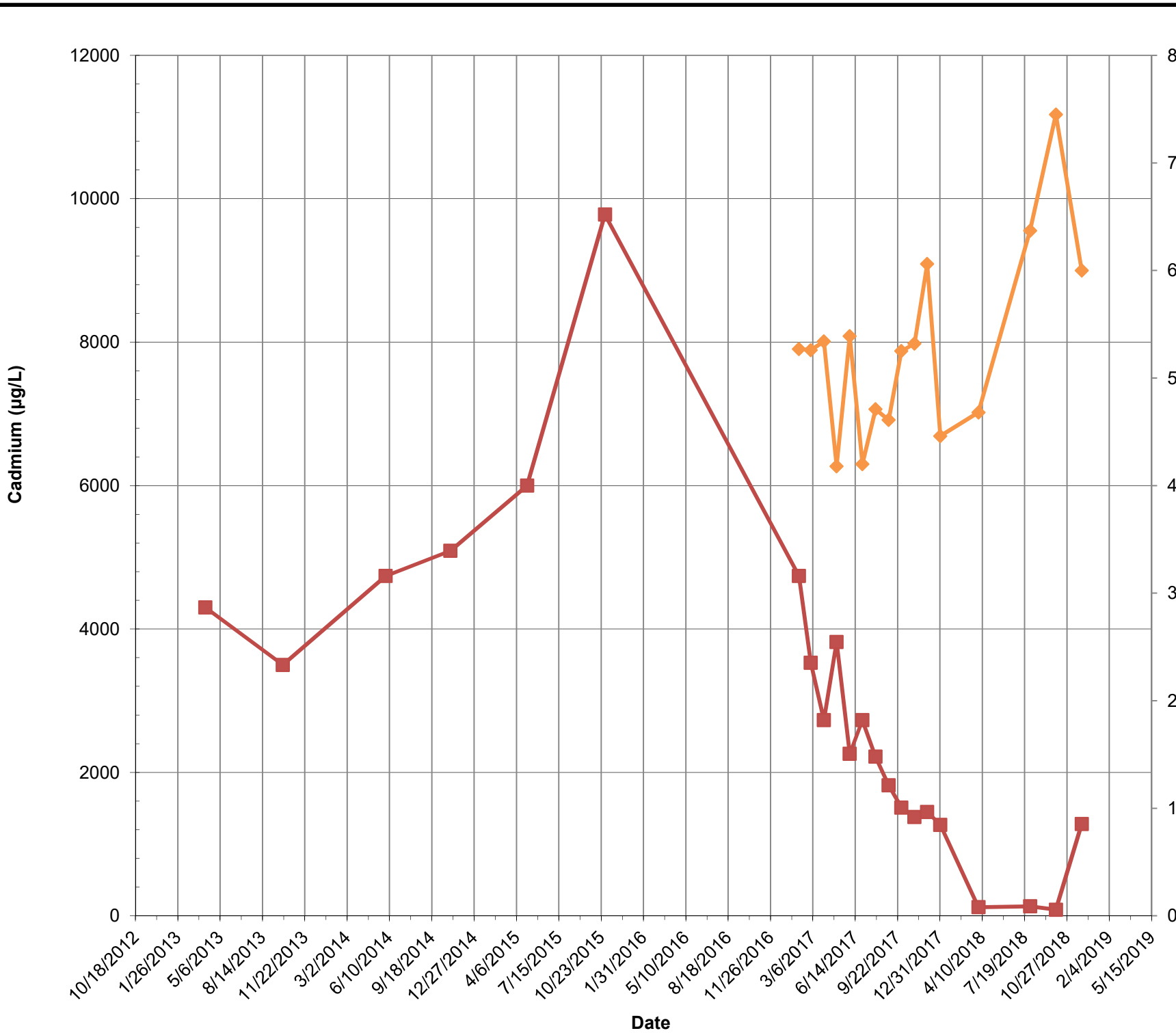
- RW11-MW(I) Cd
- RW11-MW(I) pH



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LEGEND

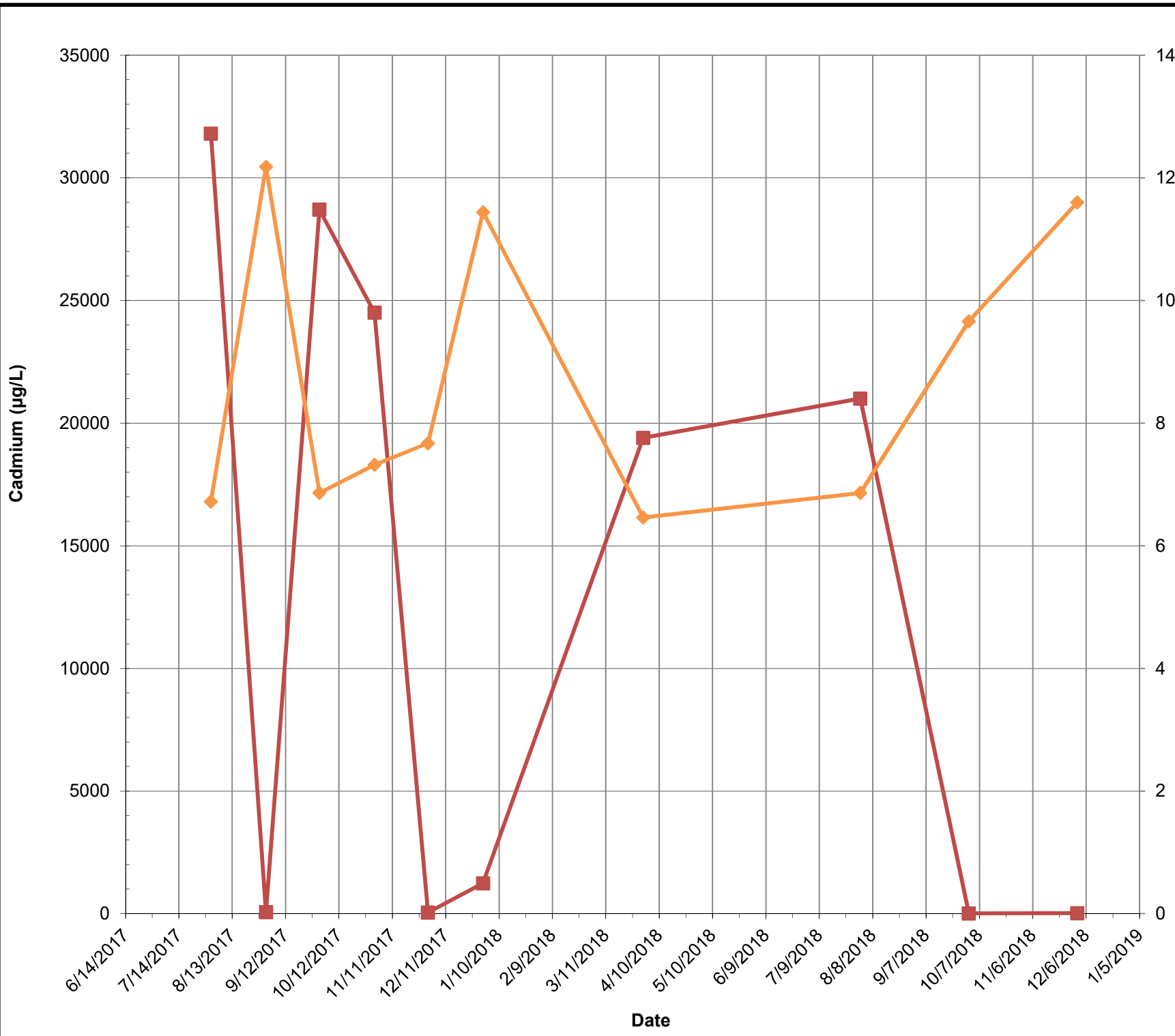
- RW12-MW(I) Cd
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LEGEND

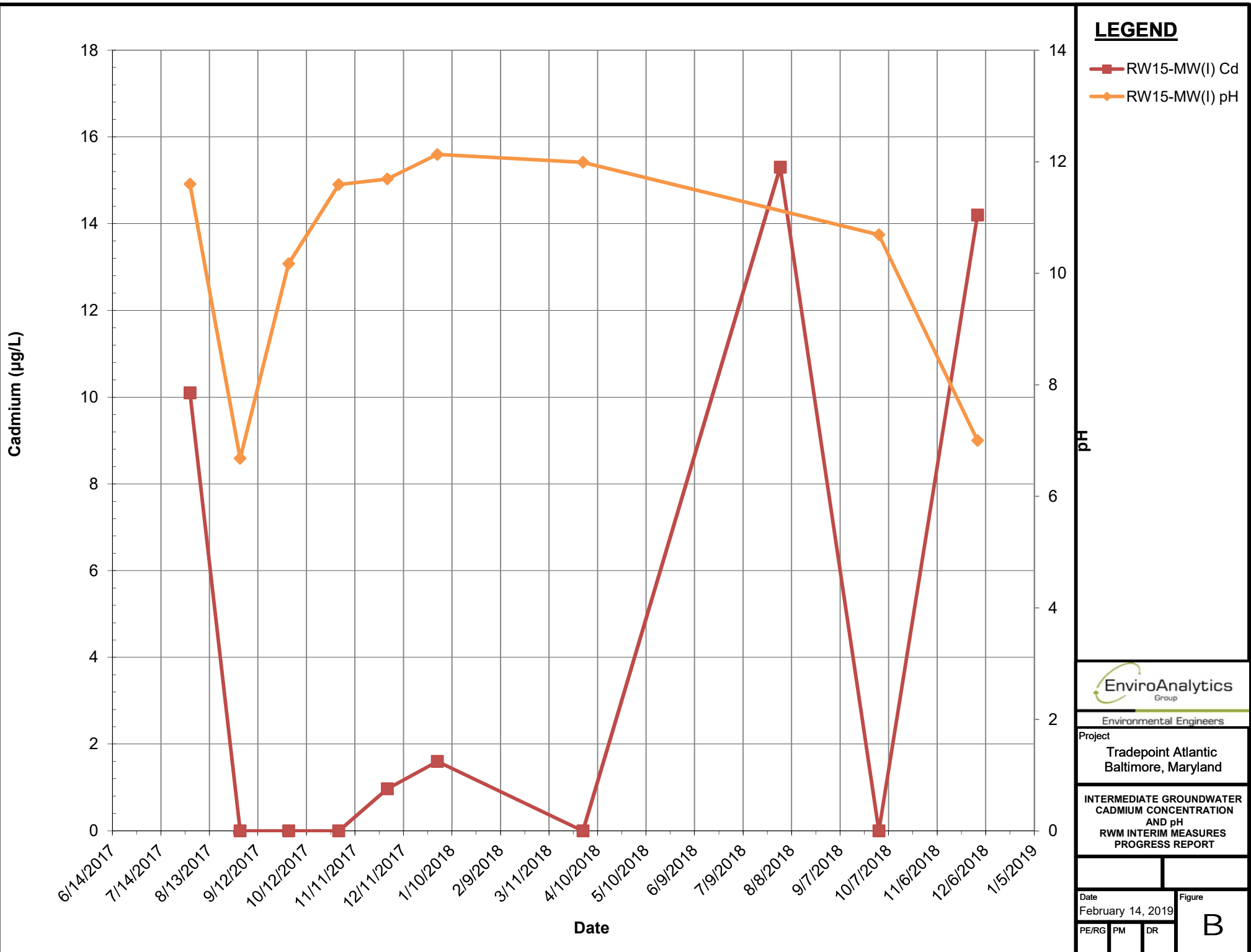
- RW13-MW(I) Cd
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LEGEND

- RW15-MW(I) Cd
- ◆ RW15-MW(I) pH



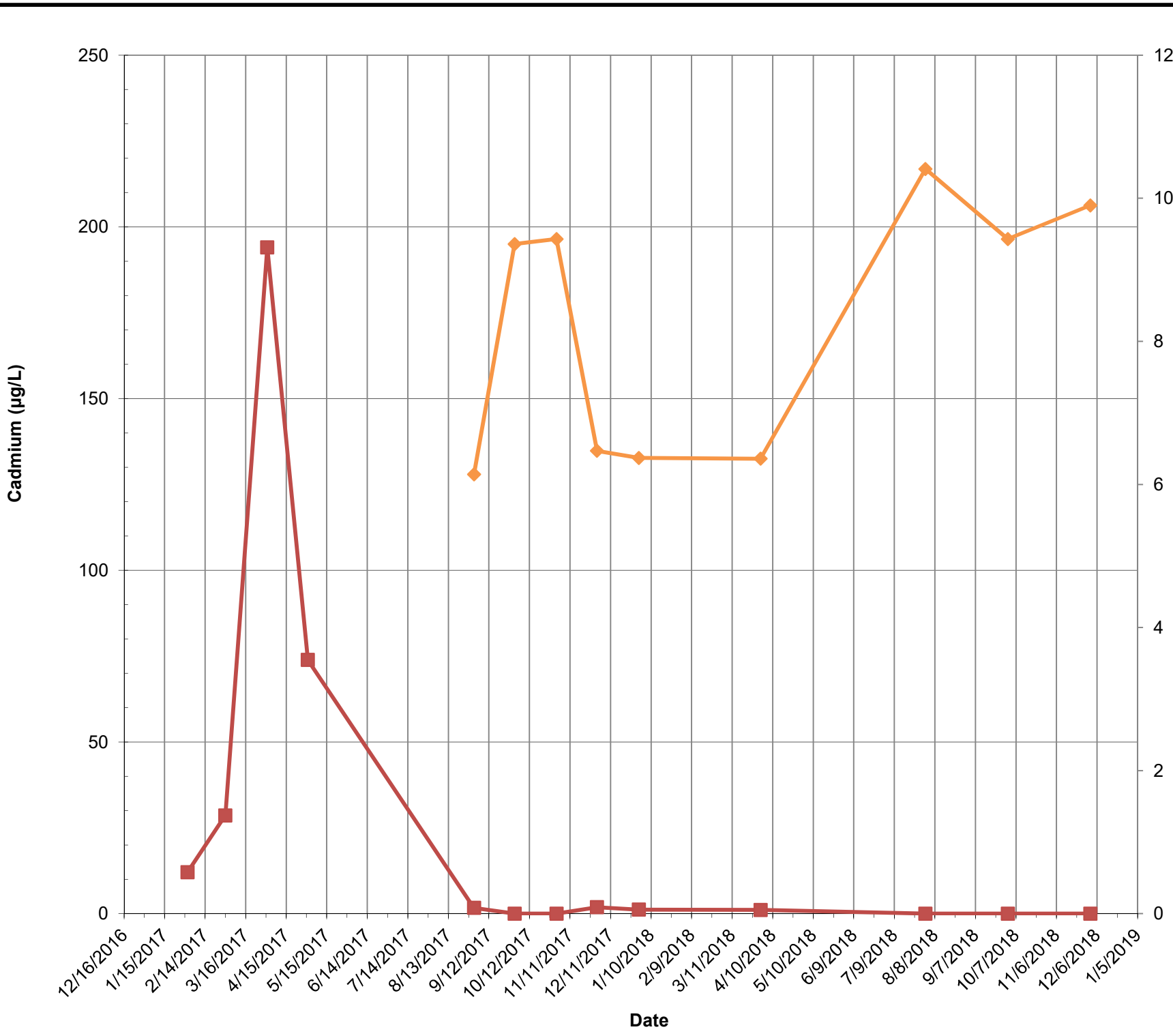
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LEGEND

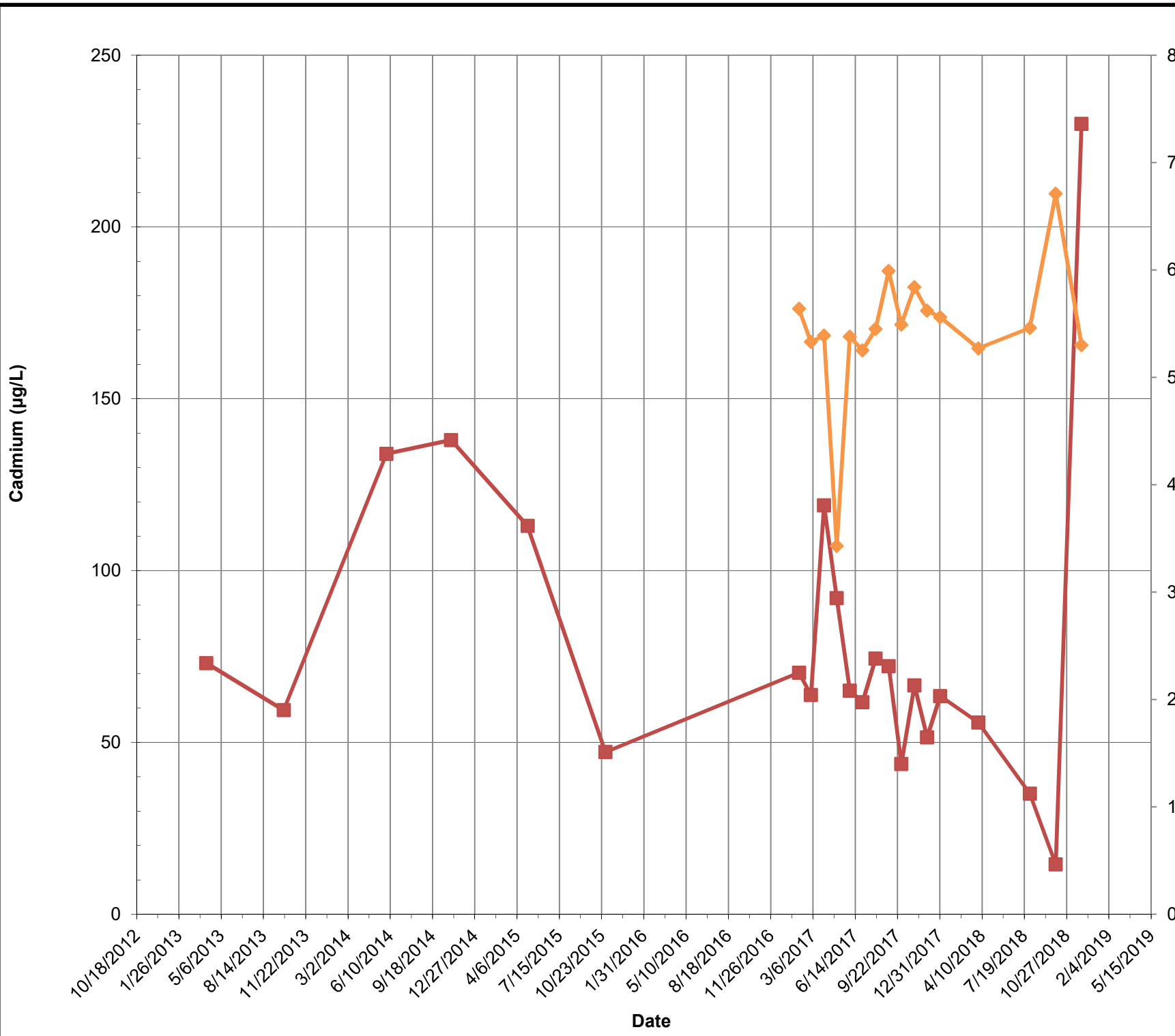
- RW16-MW(I) Cd
- RW16-MW(I) pH



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LEGEND

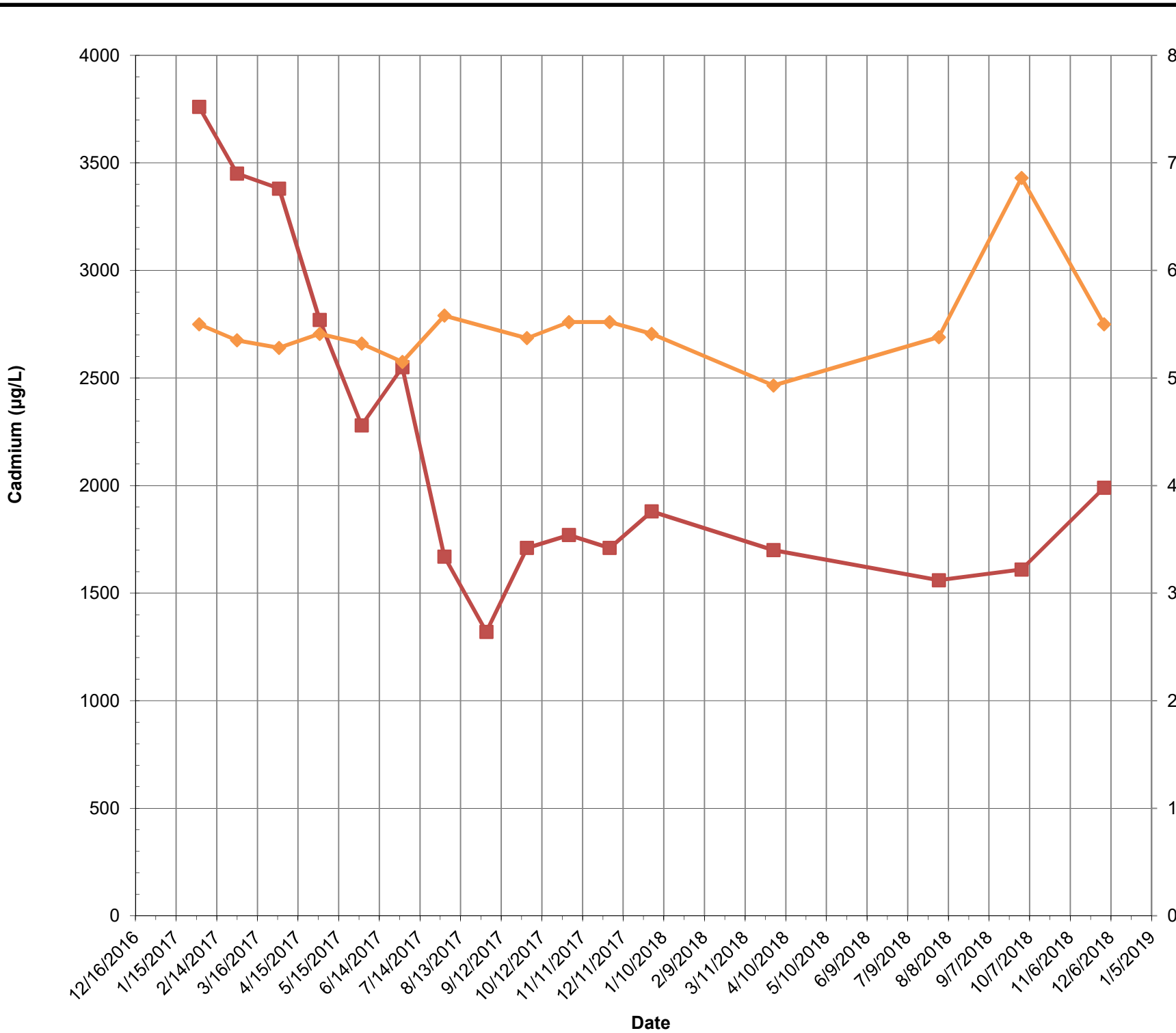
- RW18-MW(I) Cd
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LEGEND

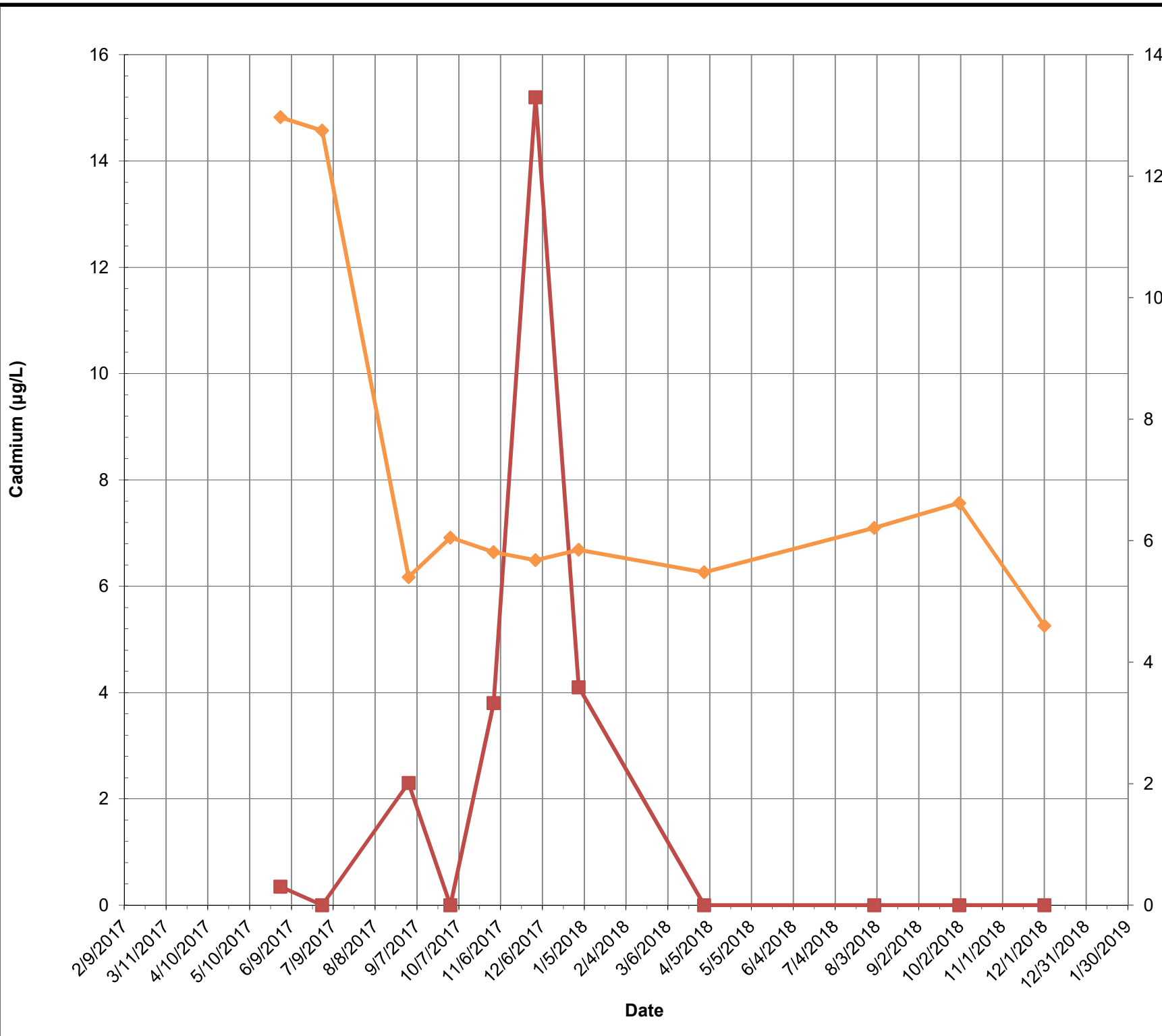
- RW19-MW(I) Cd
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LEGEND

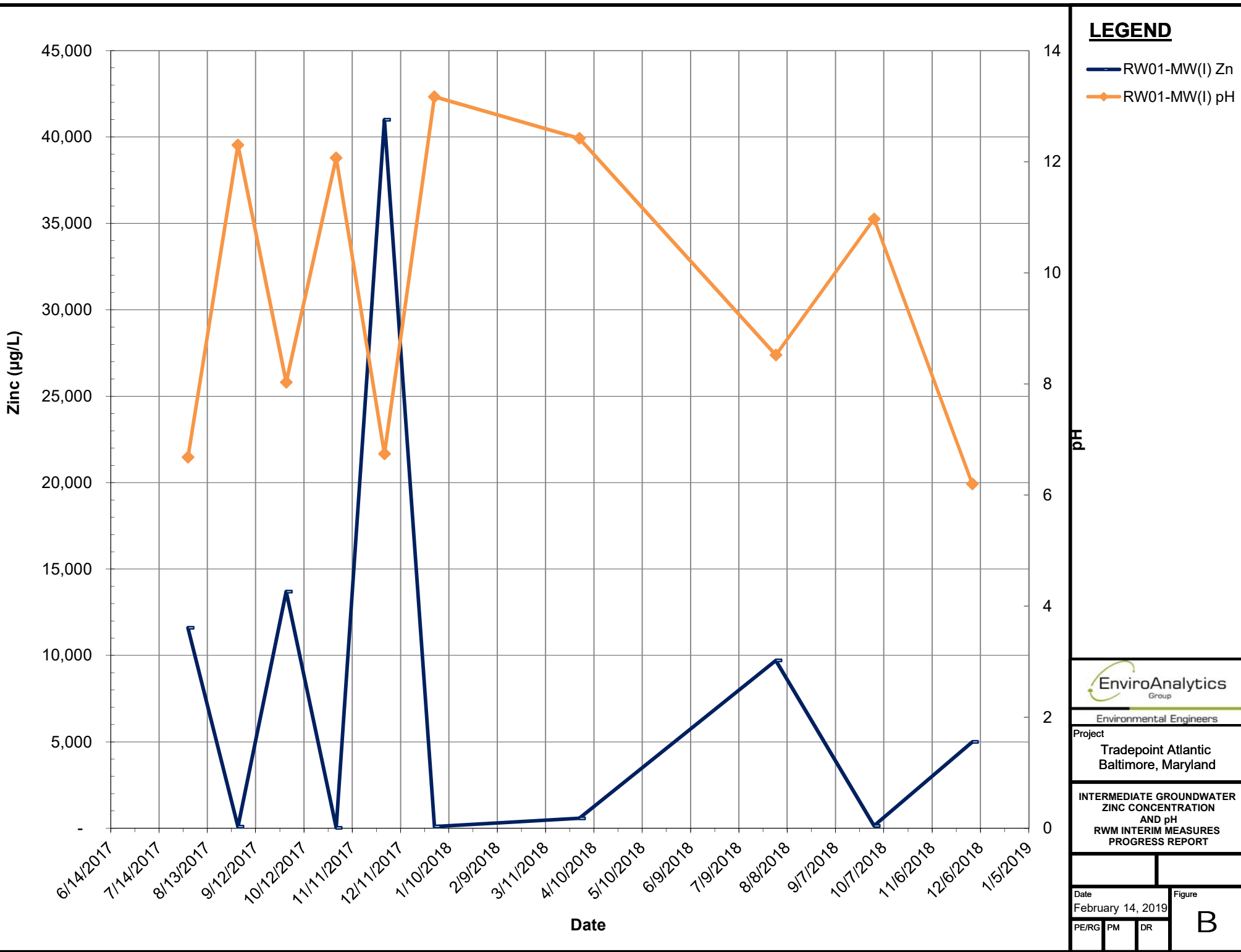
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LEGEND

- RW01-MW(l) Zn
- RW01-MW(l) pH



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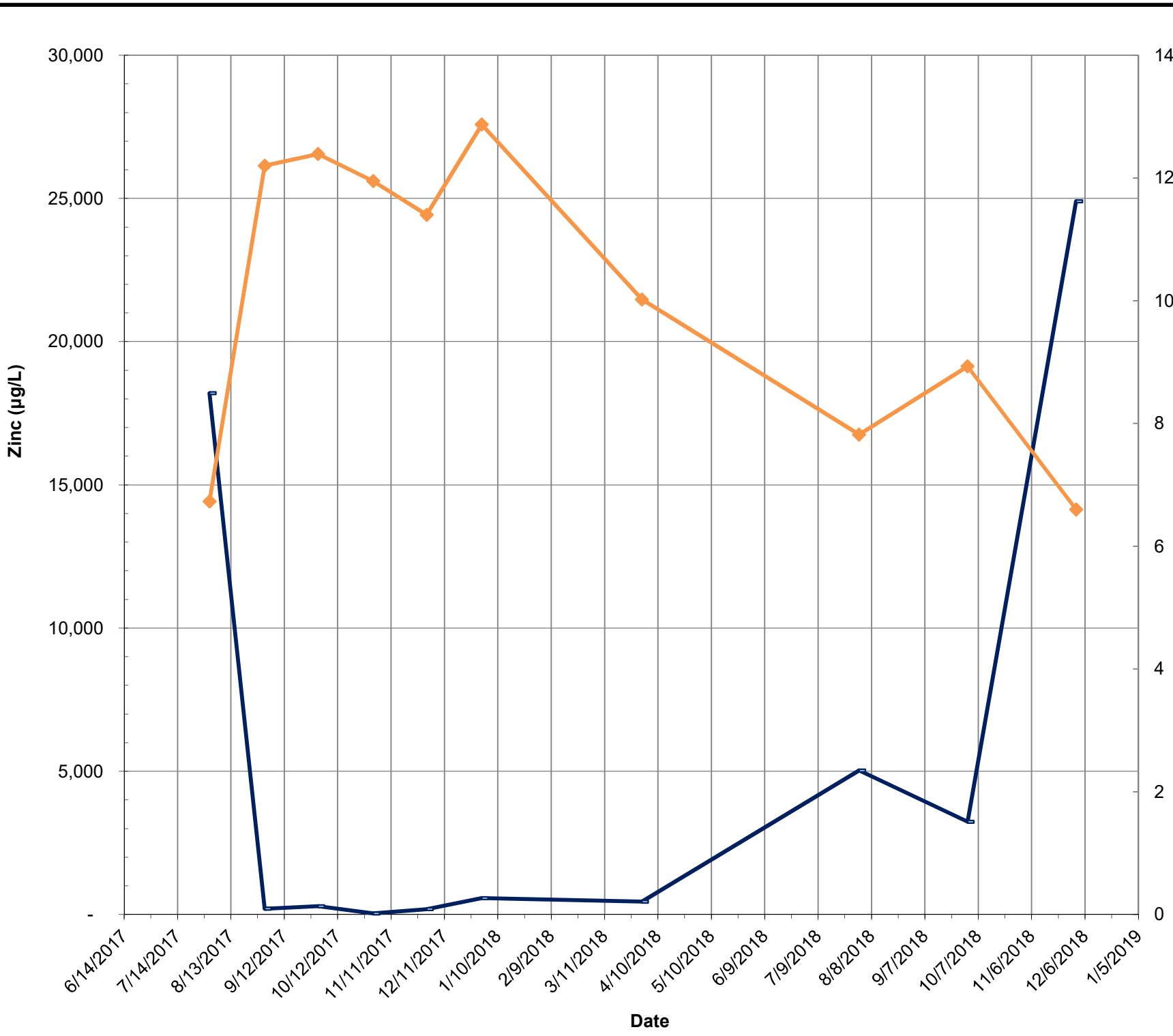
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LEGEND

- RW02-MW(l) Zn
- RW02-MW(l) pH



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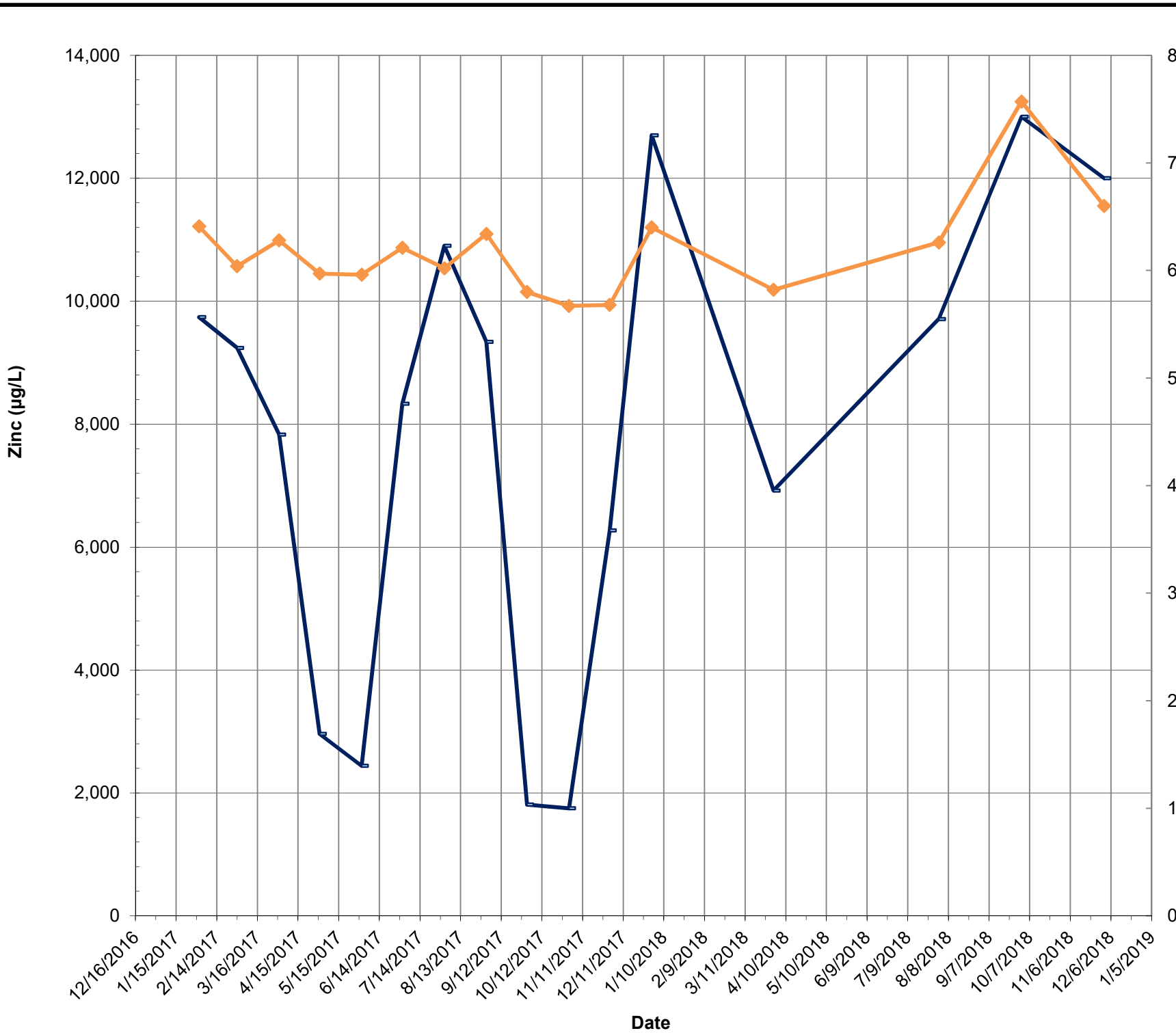
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LEGEND

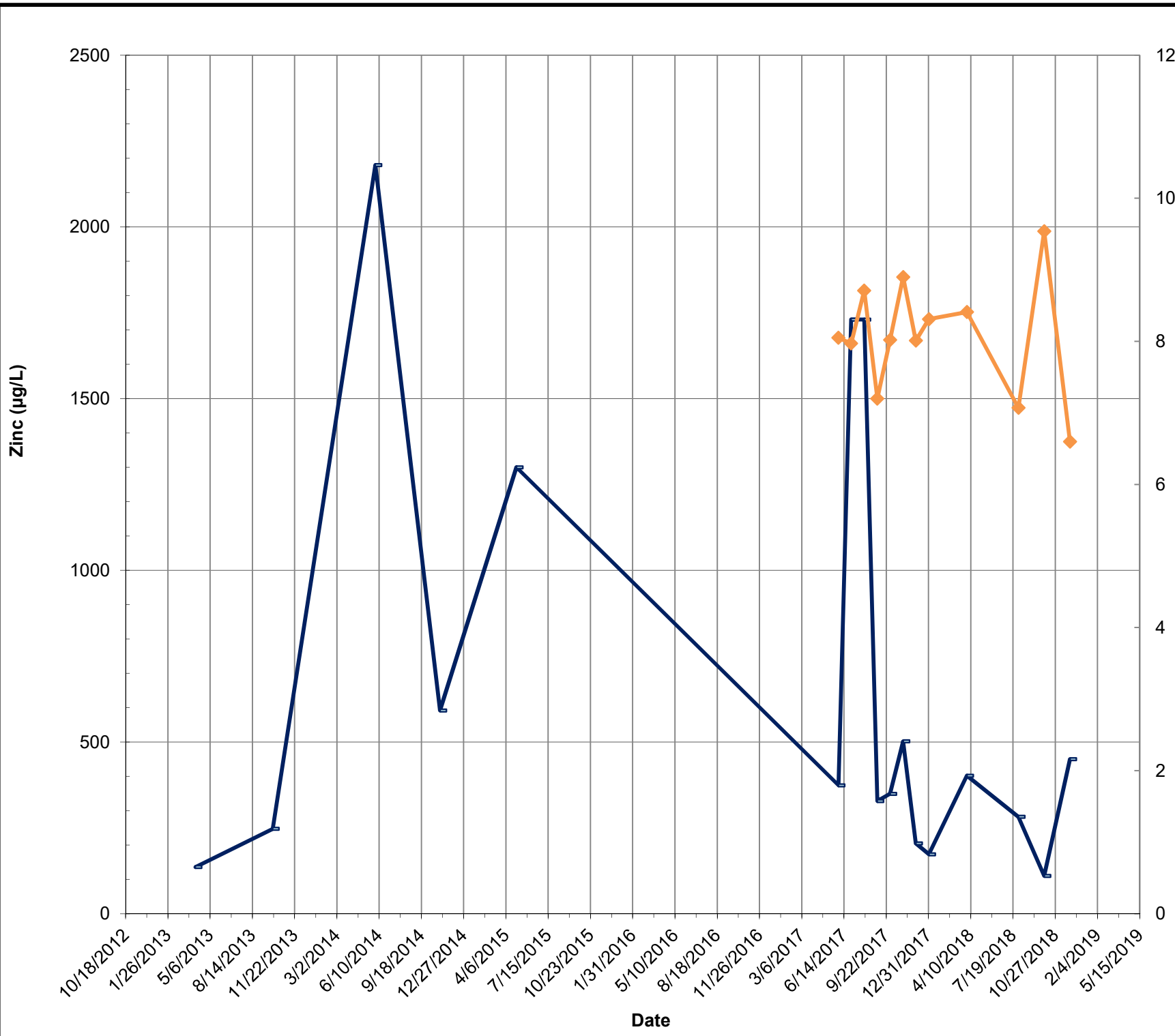
- RW03-MW(l) Zn
- RW03-MW(l) pH



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LEGEND

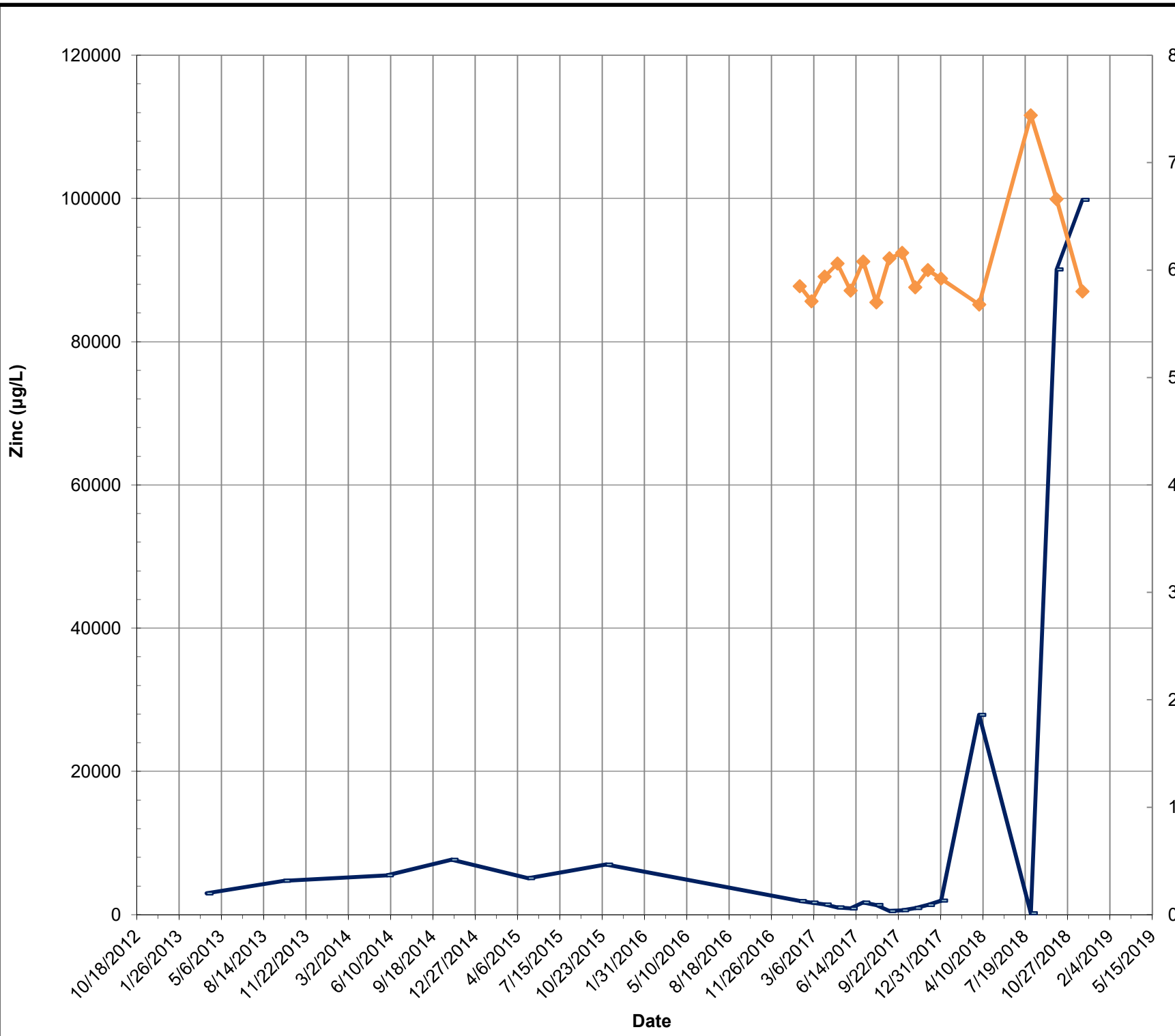
- RW05-MW(l) Zn
- RW05-MW(l) pH



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LEGEND

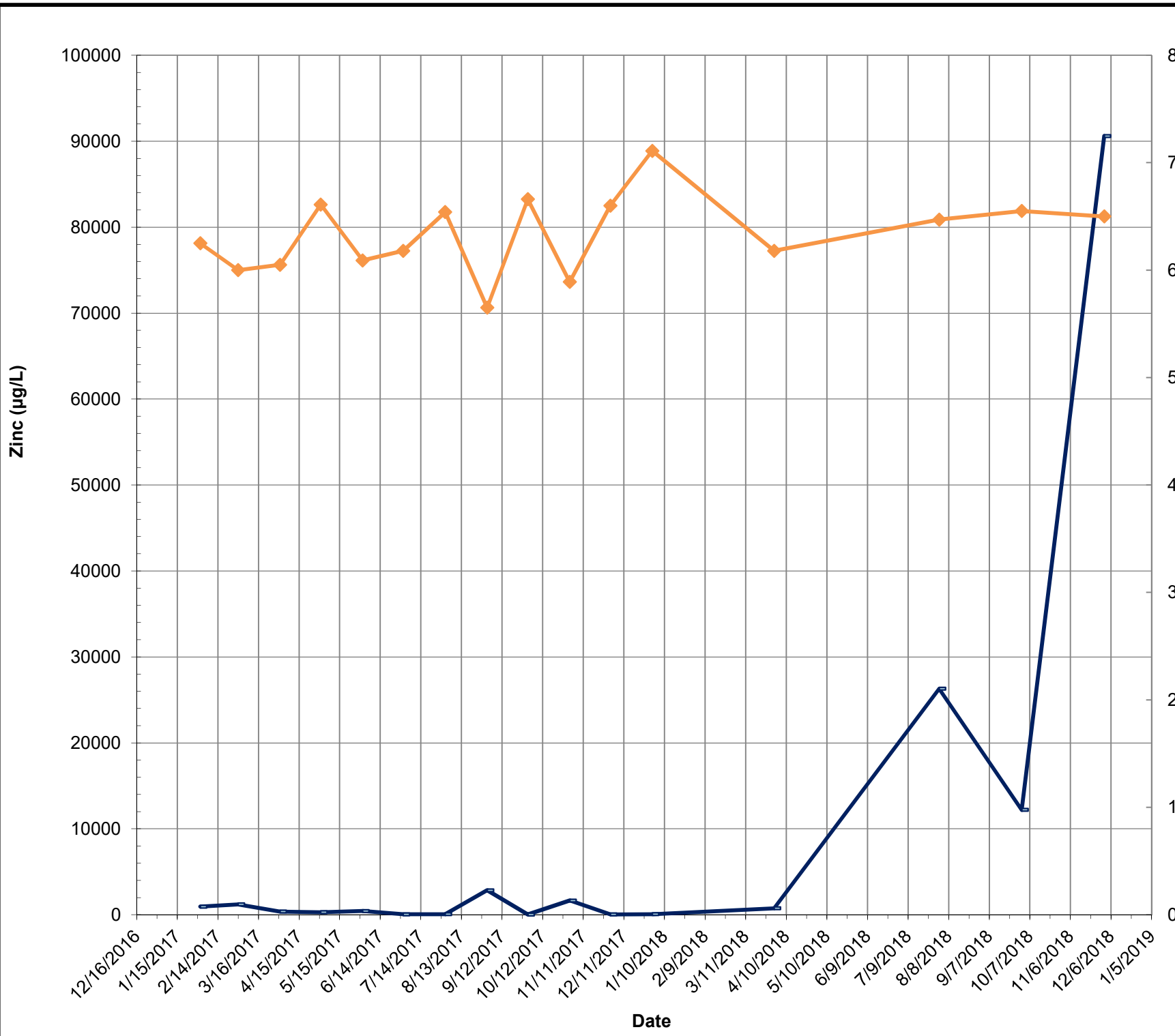
- RW06-MW(I) Zn
- ◆— RW06-MW(I) pH



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LEGEND

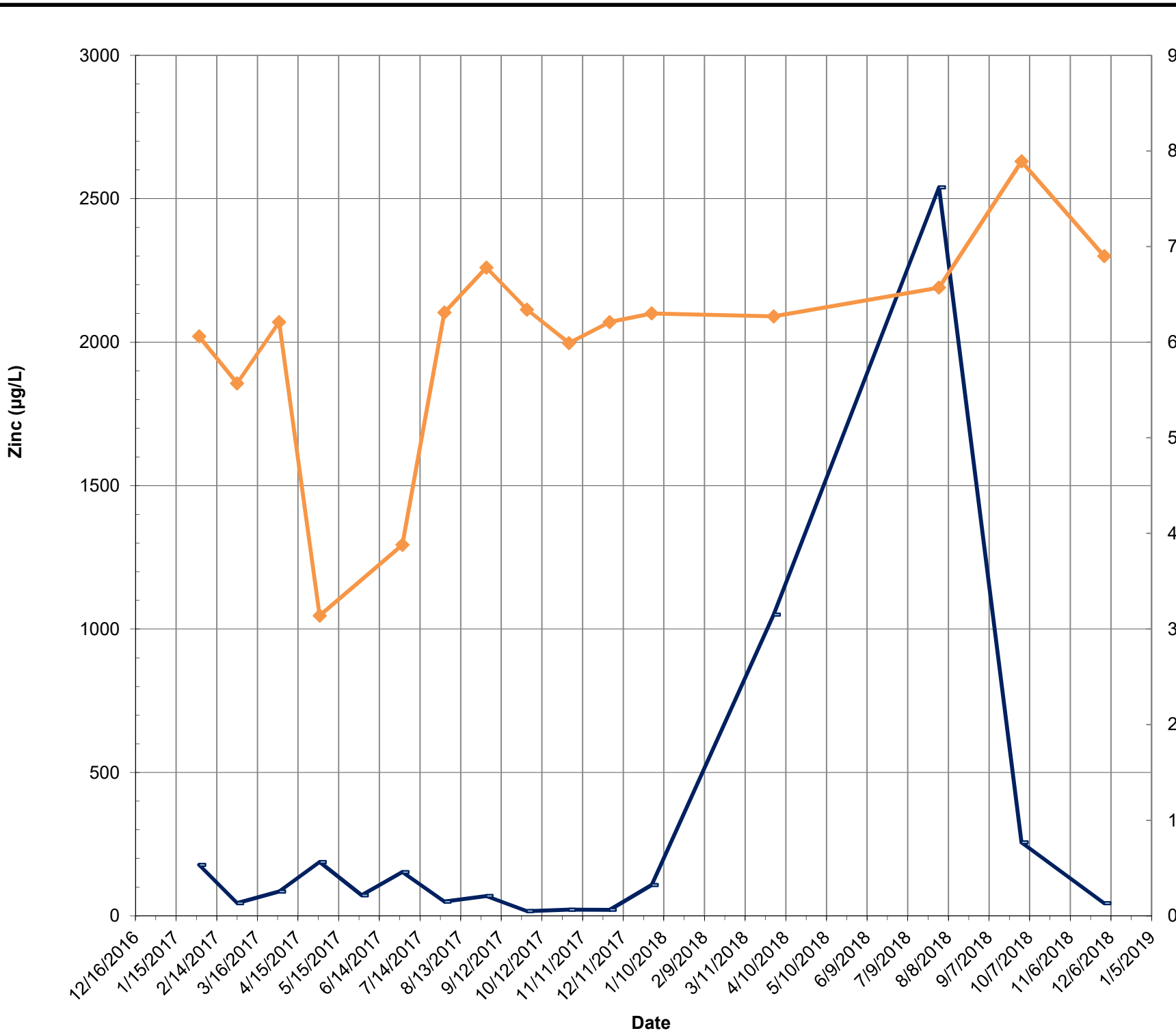
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- RW07-MW(l) pH



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LEGEND

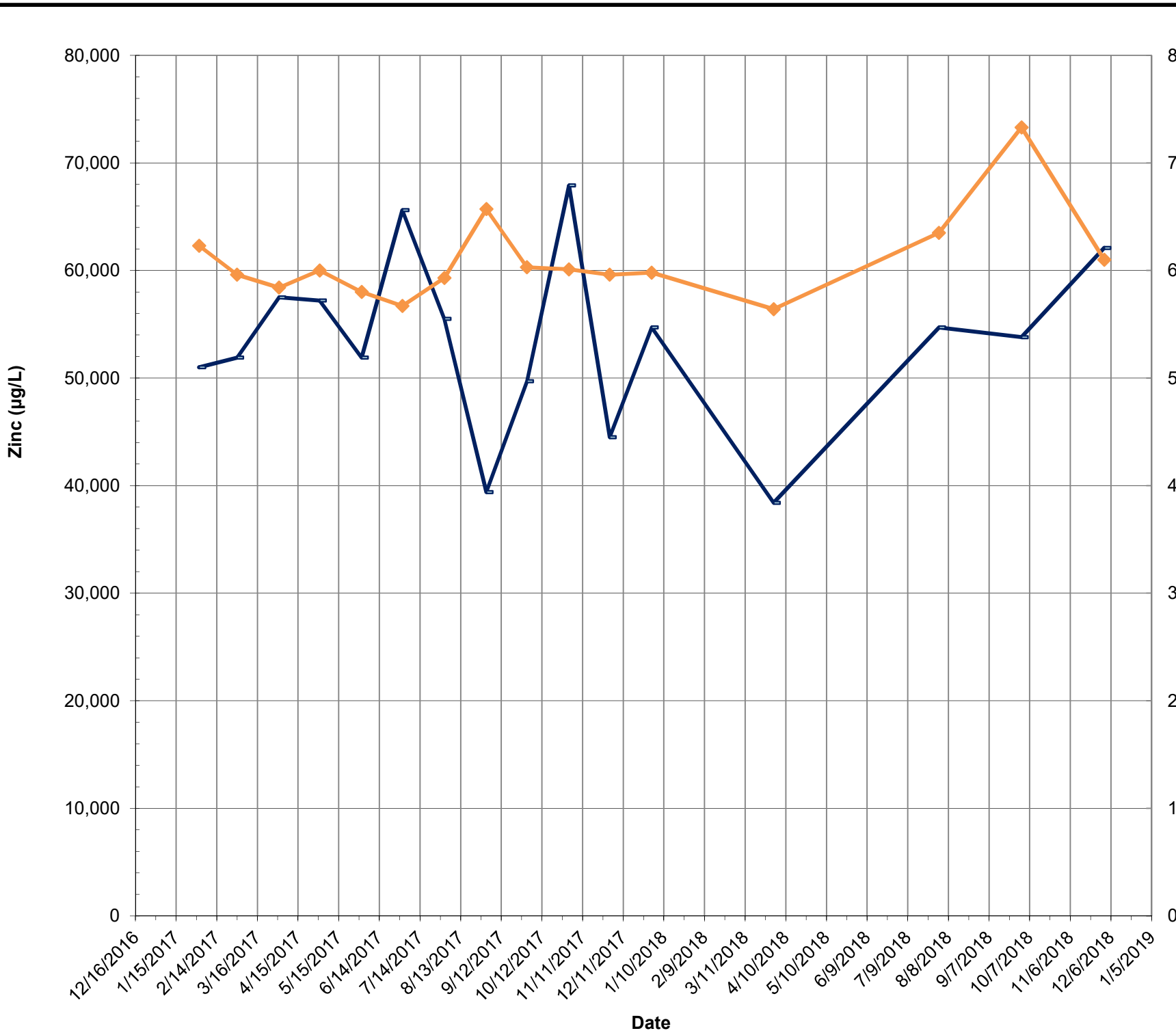
- RW08-MW(l) Zn
- RW08-MW(l) pH



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LEGEND

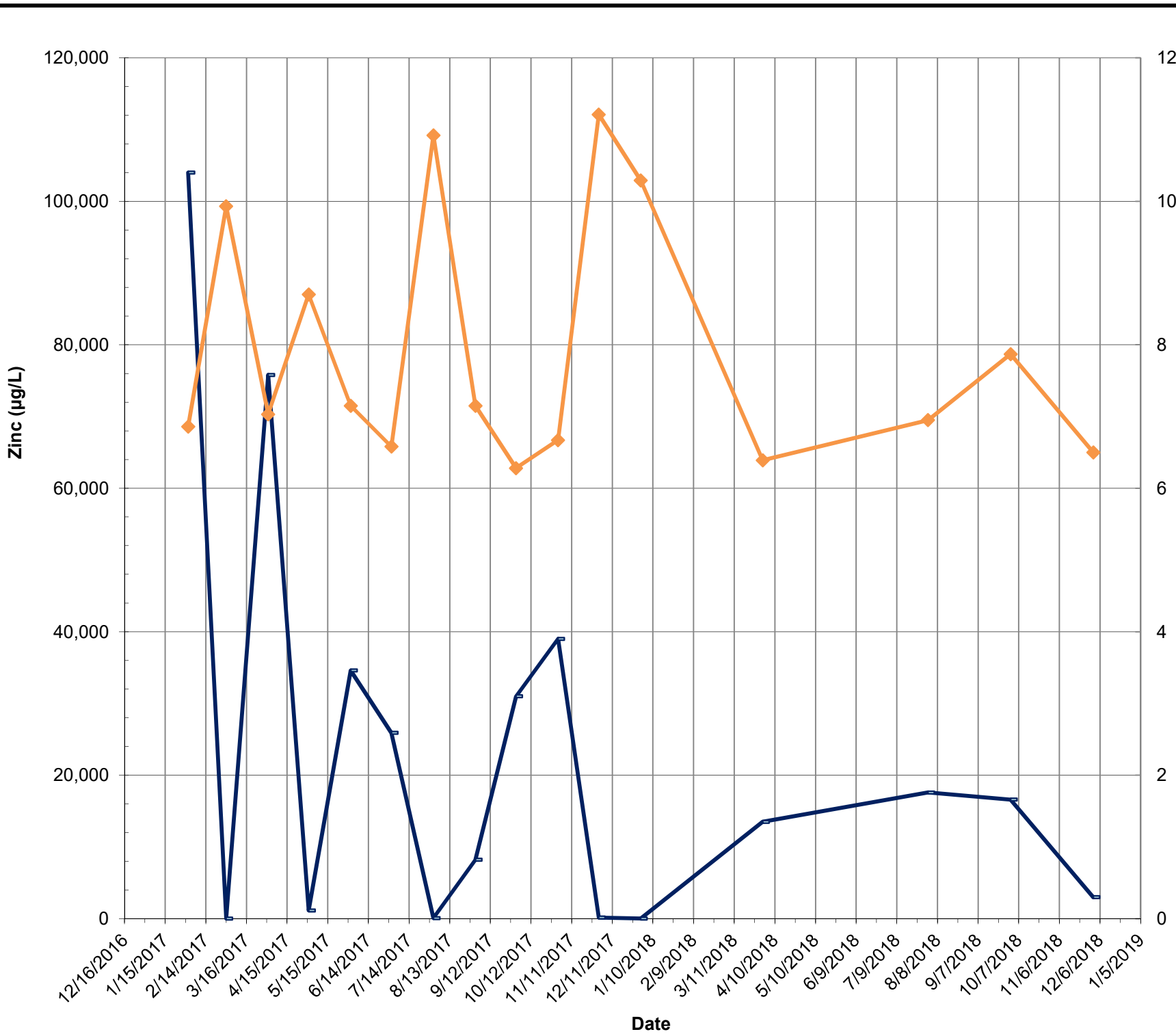
- RW09-MW(l) Zn
- RW09-MW(l) pH



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DR	



LEGEND

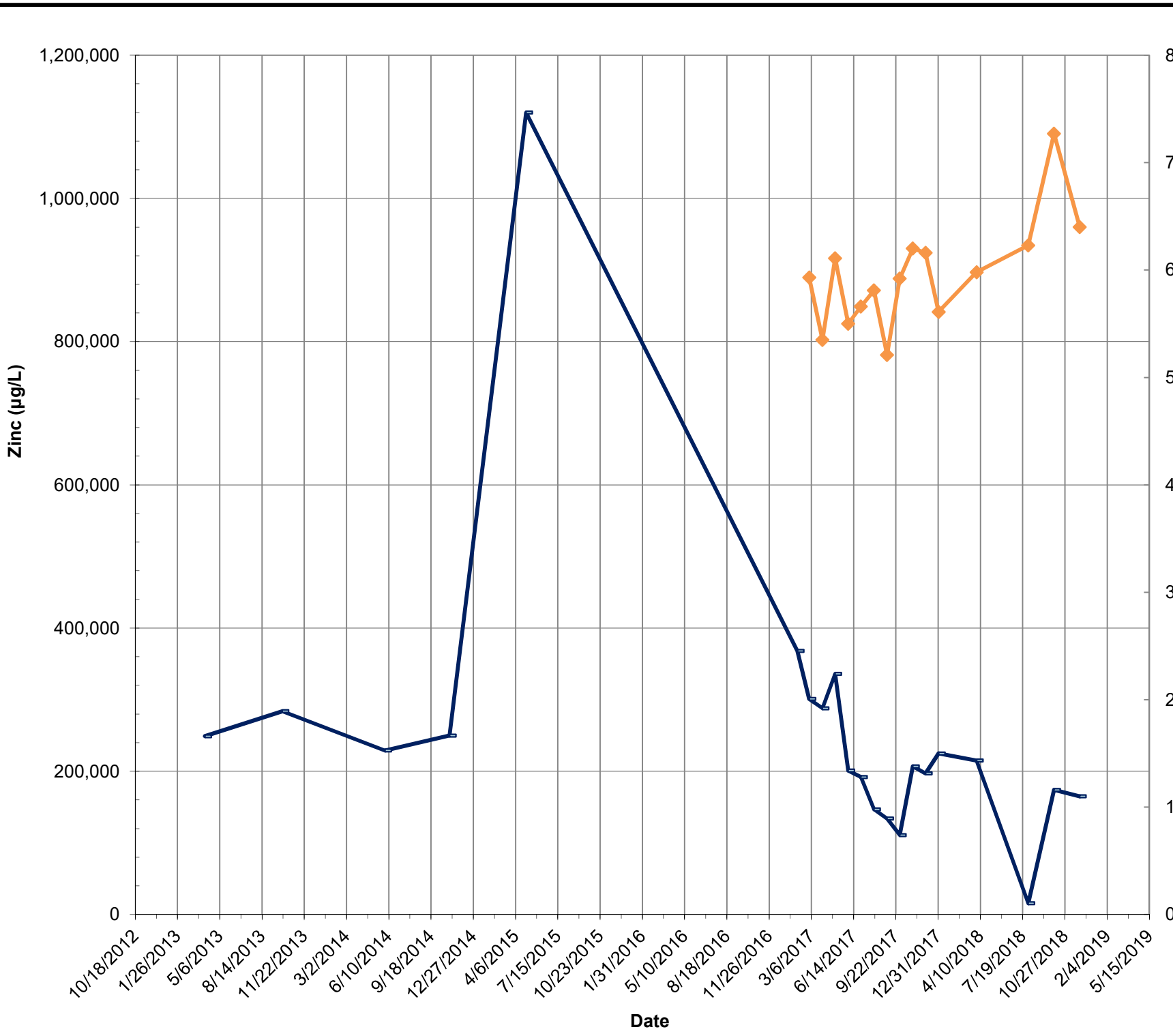
- RW10-MW(l) Zn
- RW10-MW(l) pH

EnviroAnalytics
Group
Environmental Engineers

Project
Tradepoint Atlantic
Baltimore, Maryland

INTERMEDIATE GROUNDWATER
ZINC CONCENTRATION
AND pH
RWM INTERIM MEASURES
PROGRESS REPORT

Date	February 14, 2019	Figure	B
PERG	PM	DR	



LEGEND

- RW11-MW(l) Zn
- RW11-MW(l) pH



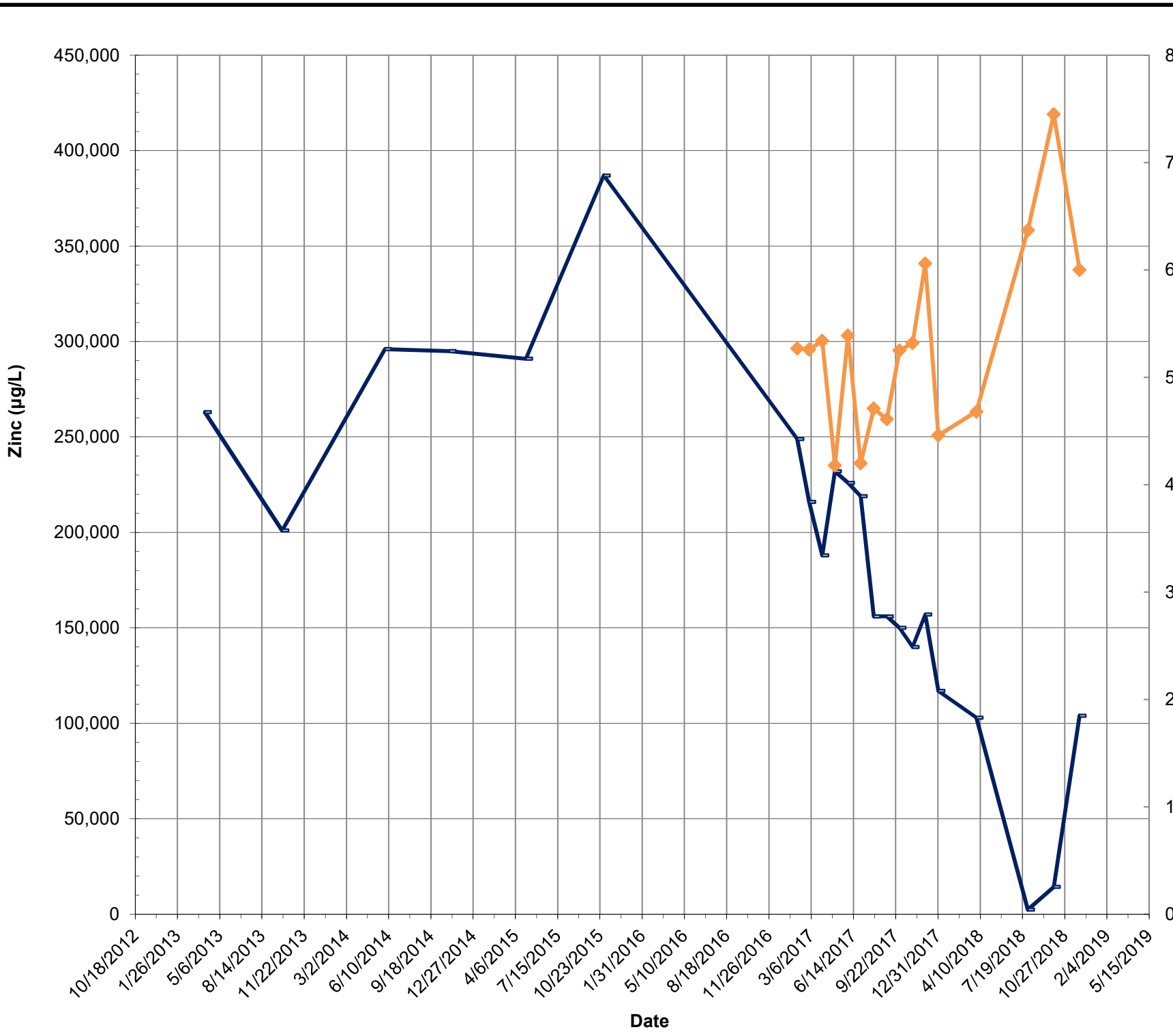
Environmental Engineers
 Project
**Tradepoint Atlantic
 Baltimore, Maryland**

**INTERMEDIATE GROUNDWATER
 ZINC CONCENTRATION
 AND pH
 RWM INTERIM MEASURES
 PROGRESS REPORT**

Date
 February 14, 2019

Figure
B

PE/RG	PM	DR
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LEGEND

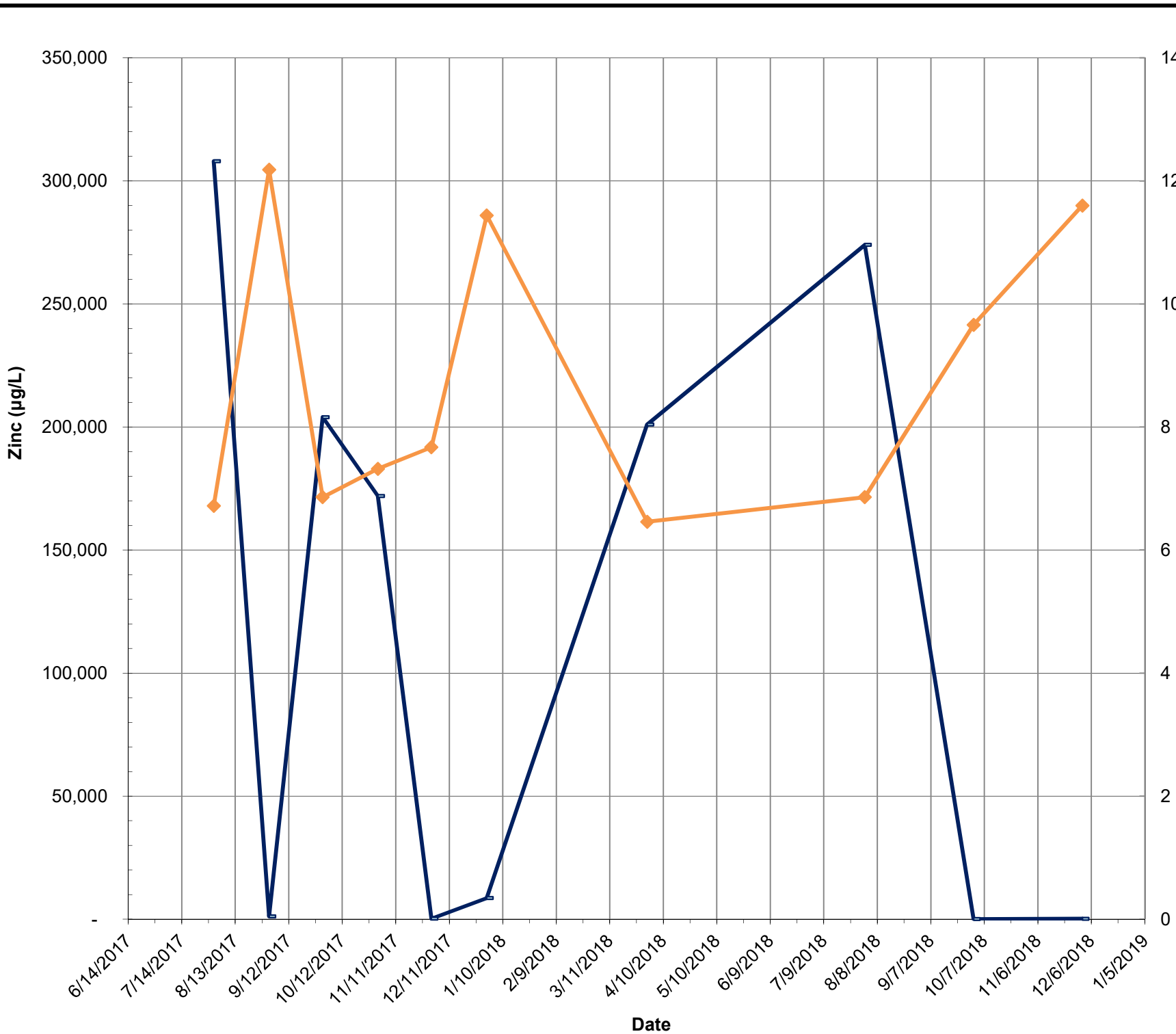
- RW12-MW(I) Zn
- RW12-MW(I) pH



Environmental Engineers
 Project
 Tradepoint Atlantic
 Baltimore, Maryland

INTERMEDIATE GROUNDWATER
 ZINC CONCENTRATION
 AND pH
 RWM INTERIM MEASURES
 PROGRESS REPORT

Date		Figure	
February 14, 2019		B	
PE/RG	PM	DR	



LEGEND

- RW13-MW(l) Zn
- ◆ RW13-MW(l) pH

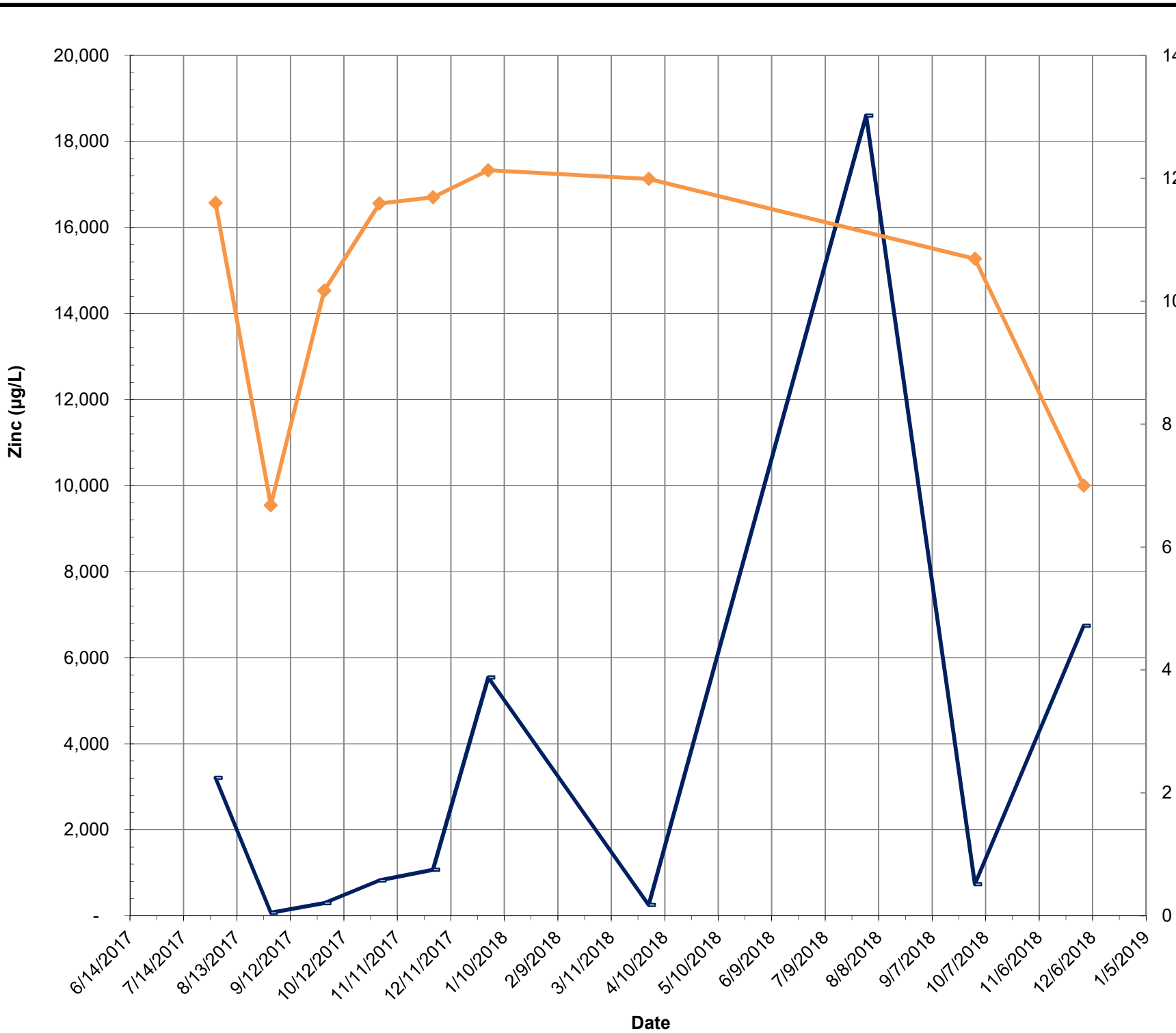


Environmental Engineers

Project
 Tradepoint Atlantic
 Baltimore, Maryland

INTERMEDIATE GROUNDWATER
 ZINC CONCENTRATION
 AND pH
 RWM INTERIM MEASURES
 PROGRESS REPORT

Date February 14, 2019		Figure B	
PE/RG	PM	DR	



LEGEND

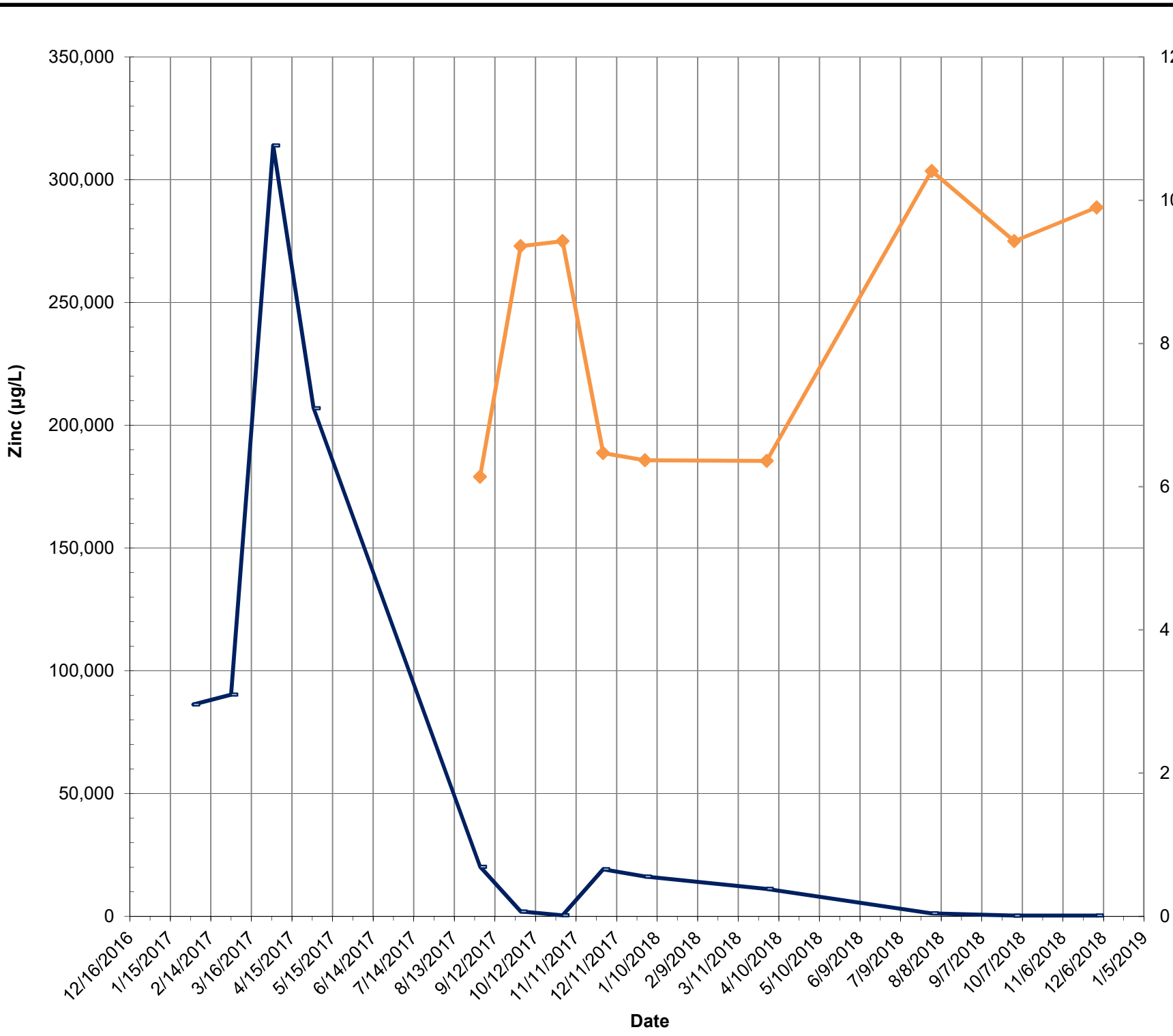
- RW15-MW(l) Zn
- RW15-MW(l) pH

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Baltimore, Maryland

INTERMEDIATE GROUNDWATER
ZINC CONCENTRATION
AND pH
RWM INTERIM MEASURES
PROGRESS REPORT

Date	Figure	
February 14, 2019	B	
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LEGEND

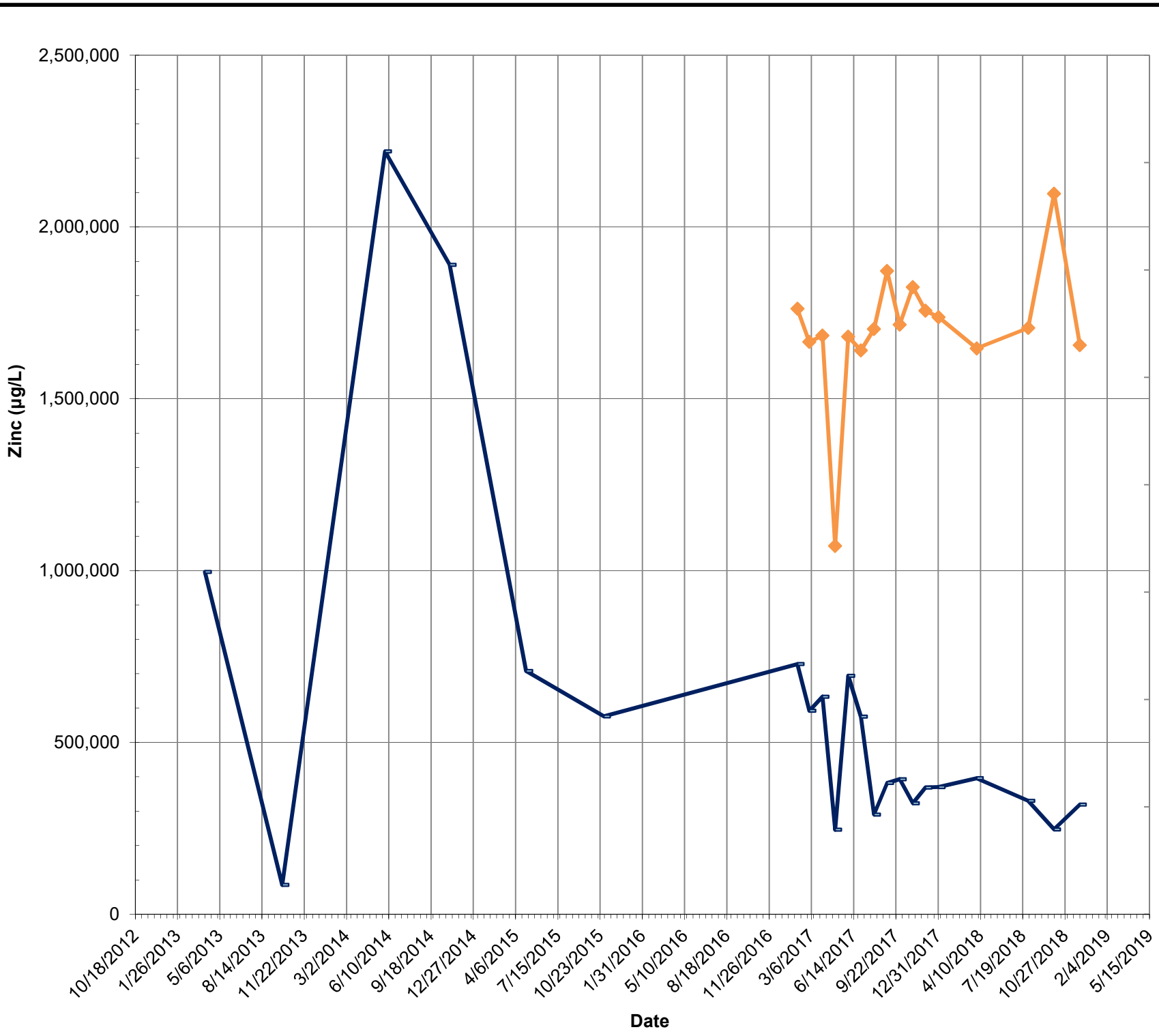
- RW16-MW(l) Zn
- RW16-MW(l) pH



Project
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 Baltimore, Maryland

INTERMEDIATE GROUNDWATER
 ZINC CONCENTRATION
 AND pH
 RWM INTERIM MEASURES
 PROGRESS REPORT

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LEGEND

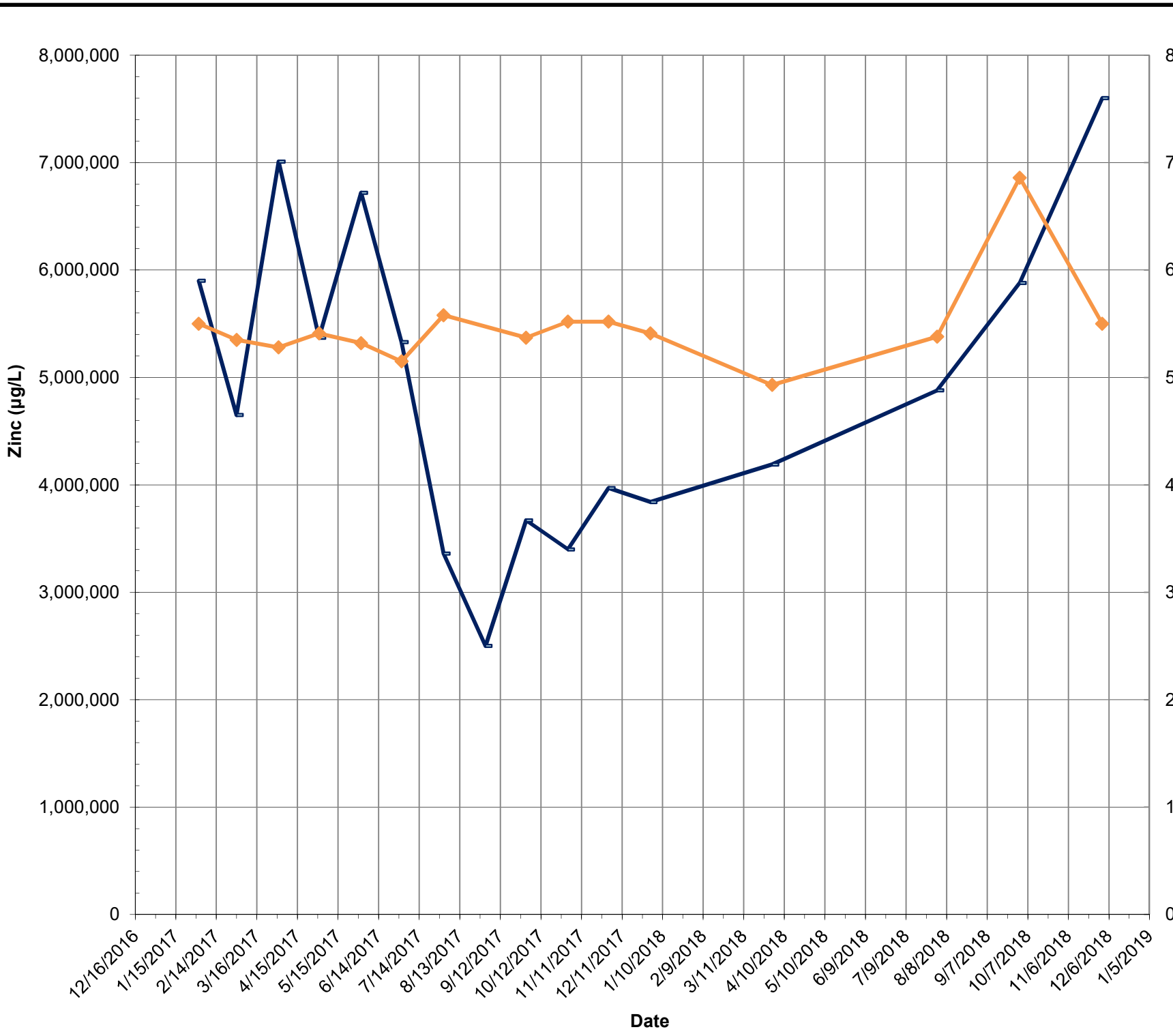
- RW18-MW(l) Zn
- RW18-MW(l) pH



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INTERMEDIATE GROUNDWATER
 ZINC CONCENTRATION
 AND pH
 RWM INTERIM MEASURES
 PROGRESS REPORT

Date February 14, 2019		Figure B	
PE/RG	PM	DR	



LEGEND

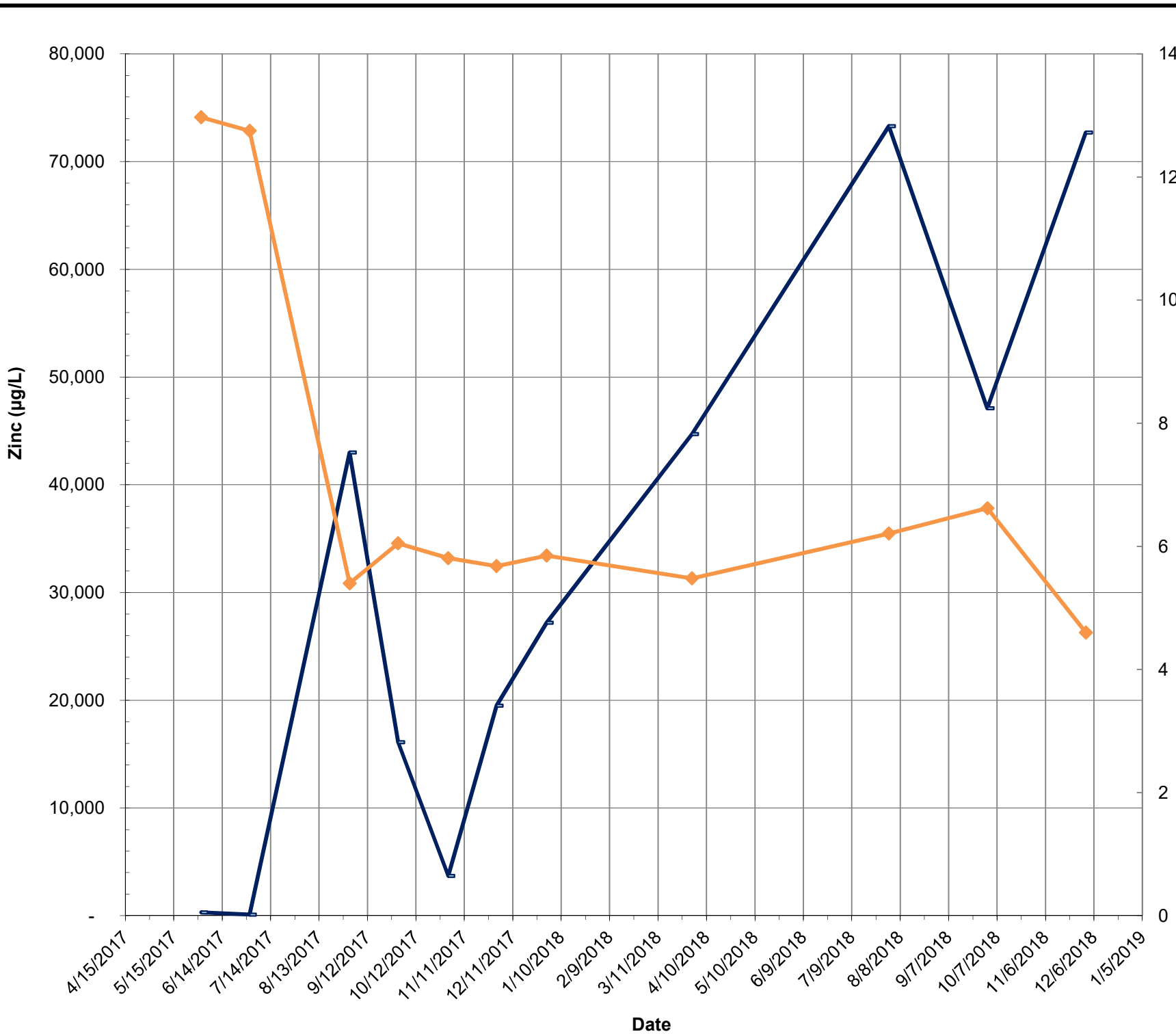
- RW19-MW(l) Zn
- RW19-MW(l) pH



Project
**Tradepoint Atlantic
 Baltimore, Maryland**

**INTERMEDIATE GROUNDWATER
 ZINC CONCENTRATION
 AND pH
 RWM INTERIM MEASURES
 PROGRESS REPORT**

Date	February 14, 2019		Figure
PE/RG	PM	DR	B



LEGEND

- RW22-MW(l) Zn
- RW22-MW(l) pH



Project
**Tradepoint Atlantic
 Baltimore, Maryland**

**INTERMEDIATE GROUNDWATER
 ZINC CONCENTRATION
 AND pH
 RWM INTERIM MEASURES
 PROGRESS REPORT**

Date	February 14, 2019	Figure	B
PE/RG	PM	DR	

APPENDIX C

Laboratory Data from Recent Sampling

January 27, 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-Revised Report
Pace Project No.: 30266769

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on October 01, 2018. 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.

Revision 1 - This report replaces the October 15, 2018 report. This project was revised on January 27, 2019 to add a case narrative as per client request. (Greensburg, PA)

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: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266769

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-Revised Report

Pace Project No.: 30266769

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30266769001	RW08-MW(I)	Water	10/01/18 11:04	10/01/18 23:40
30266769002	RW08-MW(S)	Water	10/01/18 11:29	10/01/18 23:40
30266769003	RW09-MW(S)	Water	10/01/18 12:10	10/01/18 23:40
30266769004	RW09-MW(I)	Water	10/01/18 12:32	10/01/18 23:40
30266769005	RW07-MW(S)	Water	10/01/18 13:55	10/01/18 23:40
30266769006	RW07-MW(I)	Water	10/01/18 14:18	10/01/18 23:40
30266769007	RW10-MW(I)	Water	10/01/18 15:00	10/01/18 23:40

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266769

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30266769001	RW08-MW(I)	EPA 6010C	KAS	2	PASI-PA
30266769002	RW08-MW(S)	EPA 6010C	KAS	2	PASI-PA
30266769003	RW09-MW(S)	EPA 6010C	KAS	2	PASI-PA
30266769004	RW09-MW(I)	EPA 6010C	KAS	2	PASI-PA
30266769005	RW07-MW(S)	EPA 6010C	KAS	2	PASI-PA
30266769006	RW07-MW(I)	EPA 6010C	KAS	2	PASI-PA
30266769007	RW10-MW(I)	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266769

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: January 27, 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:

Analyte Comments:

QC Batch: 315357

1c: The PDS recovery was outside of the laboratory control limits. Result may be biased high

- RW08-MW(I) (Lab ID: 30266769001)
- Cadmium

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-Revised Report

Pace Project No.: 30266769

Sample: RW08-MW(I)		Lab ID: 30266769001		Collected: 10/01/18 11:04		Received: 10/01/18 23:40		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	0.92J	ug/L	3.0	0.87	1	10/03/18 16:12	10/04/18 18:48	7440-43-9	1c
Zinc	256	ug/L	10.0	1.0	1	10/03/18 16:12	10/04/18 18:48	7440-66-6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266769

Sample: RW08-MW(S)		Lab ID: 30266769002		Collected: 10/01/18 11:29		Received: 10/01/18 23:40		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	0.87	1	10/03/18 16:12	10/04/18 19:02	7440-43-9	
Zinc	13300	ug/L	1000	104	100	10/03/18 16:12	10/04/18 20:00	7440-66-6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266769

Sample: RW09-MW(S)		Lab ID: 30266769003		Collected: 10/01/18 12:10		Received: 10/01/18 23:40		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	22.3	ug/L	3.0	0.87	1	10/03/18 16:12	10/04/18 19:05	7440-43-9	
Zinc	10800	ug/L	1000	104	100	10/03/18 16:12	10/04/18 20:02	7440-66-6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report
Pace Project No.: 30266769

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW09-MW(I)									
Lab ID: 30266769004									
Collected: 10/01/18 12:32 Received: 10/01/18 23:40 Matrix: Water									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.7	ug/L	3.0	0.87	1	10/03/18 16:12	10/04/18 19:15	7440-43-9	
Zinc	53800	ug/L	1000	104	100	10/03/18 16:12	10/04/18 20:05	7440-66-6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266769

Sample: RW07-MW(S)		Lab ID: 30266769005		Collected: 10/01/18 13:55		Received: 10/01/18 23:40		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	0.87	1	10/03/18 16:12	10/04/18 19:17	7440-43-9	
Zinc	223	ug/L	10.0	1.0	1	10/03/18 16:12	10/04/18 19:17	7440-66-6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266769

Sample: RW07-MW(I)		Lab ID: 30266769006		Collected: 10/01/18 14:18		Received: 10/01/18 23:40		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	28.7	ug/L	3.0	0.87	1	10/03/18 16:12	10/04/18 19:20	7440-43-9	
Zinc	12200	ug/L	1000	104	100	10/03/18 16:12	10/04/18 20:07	7440-66-6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266769

Sample: RW10-MW(I)		Lab ID: 30266769007		Collected: 10/01/18 15:00		Received: 10/01/18 23:40		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	10.8	ug/L	3.0	0.87	1	10/03/18 16:12	10/04/18 19:22	7440-43-9	
Zinc	16600	ug/L	1000	104	100	10/03/18 16:12	10/04/18 20:10	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling-Revised Report
Pace Project No.: 30266769

QC Batch: 315357 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30266769001, 30266769002, 30266769003, 30266769004, 30266769005, 30266769006, 30266769007

METHOD BLANK: 1539029 Matrix: Water
Associated Lab Samples: 30266769001, 30266769002, 30266769003, 30266769004, 30266769005, 30266769006, 30266769007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.87	10/04/18 18:43	
Zinc	ug/L	1.2J	10.0	1.0	10/04/18 18:43	

LABORATORY CONTROL SAMPLE: 1539030

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	534	107	80-120	
Zinc	ug/L	500	511	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1539032 1539033

Parameter	Units	30266769001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	0.92J	500	500	551	551	110	110	75-125	0	20	
Zinc	ug/L	256	500	500	756	759	100	101	75-125	0	20	

MATRIX SPIKE SAMPLE: 1539035

Parameter	Units	30266866004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	3.0 U	500	548	110	75-125	
Zinc	ug/L	30.0	500	531	100	75-125	

SAMPLE DUPLICATE: 1539031

Parameter	Units	30266769001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.92J	1.1J		20	
Zinc	ug/L	256	251	2	20	

SAMPLE DUPLICATE: 1539034

Parameter	Units	30266866004 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	
Zinc	ug/L	30.0	30.9	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-Revised Report

Pace Project No.: 30266769

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

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266769

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30266769001	RW08-MW(I)	EPA 3005A	315357	EPA 6010C	315380
30266769002	RW08-MW(S)	EPA 3005A	315357	EPA 6010C	315380
30266769003	RW09-MW(S)	EPA 3005A	315357	EPA 6010C	315380
30266769004	RW09-MW(I)	EPA 3005A	315357	EPA 6010C	315380
30266769005	RW07-MW(S)	EPA 3005A	315357	EPA 6010C	315380
30266769006	RW07-MW(I)	EPA 3005A	315357	EPA 6010C	315380
30266769007	RW10-MW(I)	EPA 3005A	315357	EPA 6010C	315380

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CHAIN-OF-CUSTODY
 The Chain-of-Custody is a
WO#: 30266769

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: 18027M

Section C
 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: MD

ITEM #	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)	# OF CONTAINERS	Preservatives Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₃ Methanol Other	Analysis Test ↑ Total Cadmium 6010 Total Zinc 6010	Requested Analysis Filtered (Y/N)	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
			COMPOSITE START	COMPOSITE END/GRAB								
			DATE	TIME								
1	RW08-MW(1)		10/18	1104	G	WT 6	1		X			001
2	RW08-MW(5)			1129			1		X			002
3	RW09-MW(5)			1240			1		X			003
4	RW09-MW(1)			1232			1		X			004
5	RW07-MW(5)			1355			1		X			005
6	RW07-MW(1)			1418			1		X			006
7	RW10-MW(1)			1500			1		X			007
8												
9												
10												
11												
12												

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
	James Calenda	10/11/18	15:30	Laura Sargent	10/18	15:35	Y
	James Calenda	10/18	19:15	Laura Sargent	11/18	19:35	Y
	James Calenda	10/18	23:10	Laura Sargent	11/18	23:40	Y
					10/11/18	13:24	N
					10/11/18	13:24	Y

Section E
 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 F
 Required Project Information:
 Report To: James Calenda
 Copy To: Stewart Kabis
 Purchase Order No.:
 Project Name: Rod and Wire Mill GW Sampling
 Project Number: 18027M

Section G
 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: MD

Temp in °C: _____
 Received on Ice (Y/N): _____
 Custody Sealed (Y/N): _____
 Samples Intact (Y/N): _____

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Laura M. Glunas
 SIGNATURE of SAMPLER: *Laura M. Glunas*
 DATE Signed (MM/DD/YYYY): 10/01/18

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: enviroanalytical

Project # **30266769**

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: N/A

Label	<u>BHH</u>
LIMS Login	<u>BHH</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 1.7 °C Correction Factor: +0.0 °C Final Temp: 1.7 °C

Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents: <u>BHH 10/2/18</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>WWT</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 checked="" type="checkbox"/>	<input type="checkbox"/>	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	13.
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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>BHH</u> Date/time of preservation: _____
				Lot # of added preservative: _____
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input type="checkbox"/>	
Rad Aqueous Samples Screened > 0.5 mrem/hr	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Initial when completed: <u>BHH</u> Date: <u>10/2/18</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.

January 27, 2019

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

RE: Project: Rod & Wire Mill GW Sampling-Revised Report
Pace Project No.: 30266866

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on October 02, 2018. 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.

Revision 1 - This report replaces the October 5, 2018 report. This project was revised on January 27, 2019 to add a case narrative as per client request. (Greensburg, PA)

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: Rod & Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266866

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-Revised Report
Pace Project No.: 30266866

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30266866001	RW13-MW(I)	Water	10/02/18 09:46	10/02/18 23:55
30266866002	RW18-MW(S)	Water	10/02/18 10:31	10/02/18 23:55
30266866003	RW18-MW(I)	Water	10/02/18 11:08	10/02/18 23:55
30266866004	RW16-MW(S)	Water	10/02/18 12:22	10/02/18 23:55
30266866005	RW16-MW(1)	Water	10/02/18 12:39	10/02/18 23:55
30266866006	RW19-MW(S)	Water	10/02/18 13:50	10/02/18 23:55
30266866007	RW19-MW(I)	Water	10/02/18 14:14	10/02/18 23:55
30266866008	RW14-MW(S)	Water	10/02/18 15:28	10/02/18 23:55

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SAMPLE ANALYTE COUNT

Project: Rod & Wire Mill GW Sampling-Revised Report
Pace Project No.: 30266866

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30266866001	RW13-MW(I)	EPA 6010C	KAS	2	PASI-PA
30266866002	RW18-MW(S)	EPA 6010C	KAS	2	PASI-PA
30266866003	RW18-MW(I)	EPA 6010C	KAS	2	PASI-PA
30266866004	RW16-MW(S)	EPA 6010C	KAS	2	PASI-PA
30266866005	RW16-MW(1)	EPA 6010C	KAS	2	PASI-PA
30266866006	RW19-MW(S)	EPA 6010C	KAS	2	PASI-PA
30266866007	RW19-MW(I)	EPA 6010C	KAS	2	PASI-PA
30266866008	RW14-MW(S)	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod & Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266866

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: January 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.

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 & Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266866

Sample: RW13-MW(I)		Lab ID: 30266866001		Collected: 10/02/18 09:46	Received: 10/02/18 23:55	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	12.6	ug/L	3.0	0.87	1	10/03/18 16:12	10/04/18 19:25	7440-43-9	
Zinc	33.4	ug/L	10.0	1.0	1	10/03/18 16:12	10/04/18 19:25	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling-Revised Report
Pace Project No.: 30266866

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW18-MW(S)									
Lab ID: 30266866002									
Collected: 10/02/18 10:31 Received: 10/02/18 23:55 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	1.2J	ug/L	3.0	0.87	1	10/03/18 16:12	10/04/18 19:27	7440-43-9	
Zinc	44.9	ug/L	10.0	1.0	1	10/03/18 16:12	10/04/18 19:27	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266866

Sample: RW18-MW(I)		Lab ID: 30266866003		Collected: 10/02/18 11:08		Received: 10/02/18 23:55		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	14.5	ug/L	3.0	0.87	1	10/03/18 16:12	10/04/18 19:29	7440-43-9	
Zinc	247000	ug/L	10000	1040	1000	10/03/18 16:12	10/04/18 20:12	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266866

Sample: RW16-MW(S)		Lab ID: 30266866004		Collected: 10/02/18 12:22		Received: 10/02/18 23:55		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	0.87	1	10/03/18 16:12	10/04/18 20:19	7440-43-9	
Zinc	30.0	ug/L	10.0	1.0	1	10/03/18 16:12	10/04/18 20:19	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266866

Sample: RW16-MW(1)		Lab ID: 30266866005		Collected: 10/02/18 12:39		Received: 10/02/18 23:55		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	0.87	1	10/03/18 16:12	10/04/18 19:46	7440-43-9	
Zinc	320	ug/L	10.0	1.0	1	10/03/18 16:12	10/04/18 19:46	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266866

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW19-MW(S)									
Lab ID: 30266866006									
Collected: 10/02/18 13:50 Received: 10/02/18 23:55 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.6	ug/L	3.0	0.87	1	10/03/18 16:12	10/04/18 19:48	7440-43-9	
Zinc	10500	ug/L	1000	104	100	10/03/18 16:12	10/04/18 20:22	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266866

Sample: RW19-MW(I)		Lab ID: 30266866007		Collected: 10/02/18 14:14		Received: 10/02/18 23:55		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	1610	ug/L	30.0	8.7	10	10/03/18 16:12	10/04/18 20:24	7440-43-9	
Zinc	5880000	ug/L	20000	2080	2000	10/03/18 16:12	10/04/18 20:35	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling-Revised Report
Pace Project No.: 30266866

Sample: RW14-MW(S)		Lab ID: 30266866008		Collected: 10/02/18 15:28		Received: 10/02/18 23:55		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	3840	ug/L	3.0	0.87	1	10/03/18 16:12	10/04/18 19:57	7440-43-9	
Zinc	80100	ug/L	1000	104	100	10/03/18 16:12	10/04/18 20:29	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod & Wire Mill GW Sampling-Revised Report

Pace Project No.: 30266866

QC Batch: 315357 Analysis Method: EPA 6010C
 QC Batch Method: EPA 3005A Analysis Description: 6010C MET
 Associated Lab Samples: 30266866001, 30266866002, 30266866003, 30266866004, 30266866005, 30266866006, 30266866007, 30266866008

METHOD BLANK: 1539029 Matrix: Water
 Associated Lab Samples: 30266866001, 30266866002, 30266866003, 30266866004, 30266866005, 30266866006, 30266866007, 30266866008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.87	10/04/18 18:43	
Zinc	ug/L	1.2J	10.0	1.0	10/04/18 18:43	

LABORATORY CONTROL SAMPLE: 1539030

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	534	107	80-120	
Zinc	ug/L	500	511	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1539032 1539033

Parameter	Units	30266769001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	0.92J	500	500	551	551	110	110	75-125	0	20	
Zinc	ug/L	256	500	500	756	759	100	101	75-125	0	20	

MATRIX SPIKE SAMPLE: 1539035

Parameter	Units	30266866004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	3.0 U	500	548	110	75-125	
Zinc	ug/L	30.0	500	531	100	75-125	

SAMPLE DUPLICATE: 1539031

Parameter	Units	30266769001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.92J	1.1J		20	
Zinc	ug/L	256	251	2	20	

SAMPLE DUPLICATE: 1539034

Parameter	Units	30266866004 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: Rod & Wire Mill GW Sampling-Revised Report
Pace Project No.: 30266866

SAMPLE DUPLICATE: 1539034

Parameter	Units	30266866004 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	30.0	30.9	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 & Wire Mill GW Sampling-Revised Report
Pace Project No.: 30266866

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: Rod & Wire Mill GW Sampling-Revised Report
Pace Project No.: 30266866

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30266866001	RW13-MW(I)	EPA 3005A	315357	EPA 6010C	315380
30266866002	RW18-MW(S)	EPA 3005A	315357	EPA 6010C	315380
30266866003	RW18-MW(I)	EPA 3005A	315357	EPA 6010C	315380
30266866004	RW16-MW(S)	EPA 3005A	315357	EPA 6010C	315380
30266866005	RW16-MW(1)	EPA 3005A	315357	EPA 6010C	315380
30266866006	RW19-MW(S)	EPA 3005A	315357	EPA 6010C	315380
30266866007	RW19-MW(I)	EPA 3005A	315357	EPA 6010C	315380
30266866008	RW14-MW(S)	EPA 3005A	315357	EPA 6010C	315380

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	Company Name: EnviroAnalytics Group	Attention: Laura Sargent	Company Name: EnviroAnalytics Group	Address: 1850 Des Peres Road, Suite 303 St. Louis, MO 63131
Address: 1600 Sparrows Point Blvd, Suite B2	Copy To: Stewart Kabis	Address: 1600 Sparrows Point Blvd, Suite B2		Address: 1850 Des Peres Road, Suite 303 St. Louis, MO 63131	
Sparrows Point, MD 21219	Purchase Order No.:	Sparrows Point, MD 21219		Price Quote Reference:	Price Profile #:
Email To: jcalenda@enviroanalyticsgroup.com	Project Name: Rod and Wire Mill GW Sampling	Project Name: Rod and Wire Mill GW Sampling		Price Profile #:	
Phone: 314-620-3066	Project Number: 180227M	Project Number: 180227M		Price Profile #:	
Requested Due Date/TAT: 5 Day					

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 ↑	Y/N ↑	Requested Analysis Filtered (Y/N)	Temp in °C	Received on	Cooler (Y/N)	Custody Sealed	Samples Intact (Y/N)
					DATE	TIME											
1	RW13 - MW(1)	DRINKING WATER	DW	G	10/2/18	0946		1	Unpreserved	Total Cadmium 6010	X		001				
2	RW18 - MW(5)	WASTE WATER	WW	G		1031		1	HCl	Total Zinc 6010	X		002				
3	RW18 - MW(1)	WASTE WATER	WW	G		1108		1	HNO ₃		X		003				
4	RW16 - MW(5)	WASTE WATER	WW	G		1222		1	H ₂ SO ₄		X		004				
5	RW11e - MW(1)	WASTE WATER	WW	G		1239		1	NaOH		X		005				
6	RW19 - MW(5)	WASTE WATER	WW	G		1350		1	Na ₂ S ₂ O ₃		X		006				
7	RW19 - MW(1)	WASTE WATER	WW	G		1414		1	HCl		X		007				
8	RW14 - MW(5)	WASTE WATER	WW	G		1528		1	HNO ₃		X		008				
9																	
10																	
11																	
12																	

WO#: 30266866



30266866

Handwritten notes in the table:

- Row 1: Laura M. Gilman, 10/2/18, 1005
- Row 2: David F. Williams, 10/2/18, 1029
- Row 3: David F. Williams, 10/2/18, 1940
- Row 4: Randy Z...
- Row 5: Randy Z...
- Row 6: Randy Z...
- Row 7: Randy Z...
- Row 8: Randy Z...

SAMPLER NAME AND SIGNATURE		DATE SIGNED
PRINT Name of SAMPLER: Laura M. Gilman		(MM/DD/YYYY): 10/02/18
SIGNATURE of SAMPLER: <i>Laura M. Gilman</i>		

Pittsburgh Lab Sample Condition Upon Receipt

Face Analytical

Client Name: emiroanalytics

Project # 30266866

Courier: Fed Ex UPS USPS Client Commercial Pace Other

Tracking #: N/A

Label	<u>BPH</u>
LIMS Login	<u>BPH</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 2.9 °C Correction Factor: 10.0 °C Final Temp: 2.9 °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>10D41071</u>	<u>BPH 10/3/18</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 Compliance/NPDES 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"/>		
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>BPH</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 checked="" type="checkbox"/>	<input type="checkbox"/>		
Trip Blank Custody Seals Present	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Rad Aqueous Samples Screened > 0.5 mrem/hr	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Initial when completed: <u>BPH</u>	Date: <u>10/3/18</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.

January 27, 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-Revised Report
Pace Project No.: 30267019

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on October 03, 2018. 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.

Revision 1 - This report replaces the October 9, 2018 report. This project was revised on January 27, 2019 to add a case narrative as per client request. (Greensburg, PA)

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: Rod and Wire Mill GW Sampling-Revised Report
Pace Project No.: 30267019

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-Revised Report
Pace Project No.: 30267019

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30267019001	RW22-MW(I)	Water	10/03/18 09:25	10/03/18 23:50
30267019002	RW05-MW(S)	Water	10/03/18 10:29	10/03/18 23:50
30267019003	RW05-MW(I)	Water	10/03/18 10:53	10/03/18 23:50
30267019004	RW01-MW(S)	Water	10/03/18 11:25	10/03/18 23:50
30267019005	RW01-MW(I)	Water	10/03/18 11:50	10/03/18 23:50
30267019006	RW02-MW(S)	Water	10/03/18 13:25	10/03/18 23:50
30267019007	RW02-MW(I)	Water	10/03/18 14:50	10/03/18 23:50

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30267019001	RW22-MW(I)	EPA 6010C	KAS	2	PASI-PA
30267019002	RW05-MW(S)	EPA 6010C	KAS	2	PASI-PA
30267019003	RW05-MW(I)	EPA 6010C	KAS	2	PASI-PA
30267019004	RW01-MW(S)	EPA 6010C	KAS	2	PASI-PA
30267019005	RW01-MW(I)	EPA 6010C	KAS	2	PASI-PA
30267019006	RW02-MW(S)	EPA 6010C	KAS	2	PASI-PA
30267019007	RW02-MW(I)	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: January 27, 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: 315663

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30267019001,30267196004

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

- MS (Lab ID: 1540620)
 - Zinc
- MSD (Lab ID: 1540621)
 - 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 Cd and Zn
- QC Batch: 315692

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: January 27, 2019

Analyte Comments:

QC Batch: 315663

1c: The PDS failed for Cd and Zn

- BLANK (Lab ID: 1540617)
 - Cadmium
 - Zinc
- DUP (Lab ID: 1540619)
 - Cadmium
 - Zinc
- DUP (Lab ID: 1540622)
 - Cadmium
 - Zinc
- LCS (Lab ID: 1540618)
 - Cadmium
 - Zinc
- MS (Lab ID: 1540620)
 - Cadmium
 - Zinc
- MS (Lab ID: 1540623)
 - Cadmium
 - Zinc
- MSD (Lab ID: 1540621)
 - Cadmium
 - Zinc
- RW01-MW(I) (Lab ID: 30267019005)
 - Cadmium
 - Zinc
- RW01-MW(S) (Lab ID: 30267019004)
 - Cadmium
 - Zinc
- RW02-MW(I) (Lab ID: 30267019007)
 - Cadmium
 - Zinc
- RW02-MW(S) (Lab ID: 30267019006)
 - Cadmium
 - Zinc
- RW05-MW(I) (Lab ID: 30267019003)
 - Cadmium
 - Zinc
- RW05-MW(S) (Lab ID: 30267019002)
 - Cadmium
 - Zinc
- RW22-MW(I) (Lab ID: 30267019001)
 - Cadmium
 - Zinc

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: January 27, 2019

Analyte Comments:

QC Batch: 315663

2c: The PDS recovery was outside of the laboratory control limits. Result may be biased high

- RW22-MW(I) (Lab ID: 30267019001)

- 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: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

Sample: RW22-MW(I) Lab ID: 30267019001 Collected: 10/03/18 09:25 Received: 10/03/18 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	0.87	1	10/05/18 16:19	10/08/18 18:35	7440-43-9	1c,2c
Zinc	47100	ug/L	1000	104	100	10/05/18 16:19	10/08/18 19:44	7440-66-6	1c,2c, ML

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

Sample: RW05-MW(S)		Lab ID: 30267019002		Collected: 10/03/18 10:29		Received: 10/03/18 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	0.87	1	10/05/18 16:19	10/08/18 18:53	7440-43-9	1c
Zinc	21.7	ug/L	10.0	1.0	1	10/05/18 16:19	10/08/18 18:53	7440-66-6	1c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

Sample: RW05-MW(I)		Lab ID: 30267019003		Collected: 10/03/18 10:53		Received: 10/03/18 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	0.87	1	10/05/18 16:19	10/08/18 19:03	7440-43-9	1c
Zinc	110	ug/L	10.0	1.0	1	10/05/18 16:19	10/08/18 19:03	7440-66-6	1c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

Sample: RW01-MW(S)		Lab ID: 30267019004	Collected: 10/03/18 11:25	Received: 10/03/18 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	0.97J	ug/L	3.0	0.87	1	10/05/18 16:19	10/08/18 19:06	7440-43-9	1c	
Zinc	37000	ug/L	1000	104	100	10/05/18 16:19	10/08/18 20:04	7440-66-6	1c	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

Sample: RW01-MW(I)		Lab ID: 30267019005		Collected: 10/03/18 11:50	Received: 10/03/18 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	0.87	1	10/05/18 16:19	10/08/18 19:08	7440-43-9	1c	
Zinc	143	ug/L	10.0	1.0	1	10/05/18 16:19	10/08/18 19:08	7440-66-6	1c	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

Sample: RW02-MW(S)		Lab ID: 30267019006		Collected: 10/03/18 13:25	Received: 10/03/18 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	3.4	ug/L	3.0	0.87	1	10/05/18 16:19	10/08/18 19:10	7440-43-9	1c	
Zinc	5930	ug/L	1000	104	100	10/05/18 16:19	10/08/18 20:07	7440-66-6	1c	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

Sample: RW02-MW(I)		Lab ID: 30267019007		Collected: 10/03/18 14:50		Received: 10/03/18 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	18.0	ug/L	3.0	0.87	1	10/05/18 16:19	10/08/18 19:13	7440-43-9	1c
Zinc	3240	ug/L	10.0	1.0	1	10/05/18 16:19	10/08/18 19:13	7440-66-6	1c

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling-Revised Report
Pace Project No.: 30267019

QC Batch: 315663 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30267019001, 30267019002, 30267019003, 30267019004, 30267019005, 30267019006, 30267019007

METHOD BLANK: 1540617 Matrix: Water
Associated Lab Samples: 30267019001, 30267019002, 30267019003, 30267019004, 30267019005, 30267019006, 30267019007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.87	10/08/18 18:26	1c
Zinc	ug/L	10.0 U	10.0	1.0	10/08/18 18:26	1c

LABORATORY CONTROL SAMPLE: 1540618

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	521	104	80-120	1c
Zinc	ug/L	500	516	103	80-120	1c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1540620 1540621

Parameter	Units	30267019001 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	583	591	117	118	75-125	1	20	1c
Zinc	ug/L	47100	500	500	44700	45800	-480	-258	75-125	2	20	1c, ML

MATRIX SPIKE SAMPLE: 1540623

Parameter	Units	30267196004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	3.0 U	500	542	108	75-125	1c
Zinc	ug/L	3.7J	500	510	101	75-125	1c

SAMPLE DUPLICATE: 1540619

Parameter	Units	30267019001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	1c
Zinc	ug/L	47100	45700	3	20	1c

SAMPLE DUPLICATE: 1540622

Parameter	Units	30267196004 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	1c
Zinc	ug/L	3.7J	3.5J		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: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267019

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: 315692

[1] The PDS failed for Cd and Zn

ANALYTE QUALIFIERS

1c The PDS failed for Cd and Zn

2c The PDS recovery was outside of the 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-Revised Report

Pace Project No.: 30267019

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30267019001	RW22-MW(I)	EPA 3005A	315663	EPA 6010C	315692
30267019002	RW05-MW(S)	EPA 3005A	315663	EPA 6010C	315692
30267019003	RW05-MW(I)	EPA 3005A	315663	EPA 6010C	315692
30267019004	RW01-MW(S)	EPA 3005A	315663	EPA 6010C	315692
30267019005	RW01-MW(I)	EPA 3005A	315663	EPA 6010C	315692
30267019006	RW02-MW(S)	EPA 3005A	315663	EPA 6010C	315692
30267019007	RW02-MW(I)	EPA 3005A	315663	EPA 6010C	315692

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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.

7

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: **314-620-3086** 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: **150207M**

Section C
Invoice Information:
 Attention: **Laura Sargent**
 Company Name: **EnviroAnalytics Group**
 Address: **1850 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 #	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	Required Client Information	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		# OF CONTAINERS	PRESERVATIVES	ANALYSIS TEST	Requested Analysis Filtered (Y/N)	Residual	Pace Project No./ Lab I.D.
				DATE	TIME						
1	RW22 - MW(1)		G	10/3/18	0925	1	Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₈ Methanol Other	Total Cadmium 6010 Total Zinc 6010	Y		001
2	RW05 - MW(5)		G	10/3/18	1029	1			Y		002
3	RW05 - MW(1)		G	10/3/18	1053	1			Y		003
4	RW01 - MW(5)		G	10/3/18	1125	1			Y		004
5	RW01 - MW(1)		G	10/3/18	1150	1			Y		005
6	RW02 - MW(5)		G	10/3/18	1325	1			Y		006
7	RW02 - MW(1)		G	10/3/18	1450	1			Y		007
8											
9											
10											
11											
12											

ADDITIONAL COMMENTS

RELINQUISHED BY / AFFILIATION: *Shandra Shuman Alden* DATE: 10/3/18 TIME: 1030
David J. Nillberger DATE: 10/3/18 TIME: 1510
Henry Sully DATE: 10/3/18 TIME: 2340

ACCEPTED BY / AFFILIATION: *David J. Nillberger* DATE: 10/3/18 TIME: 1530
Henry Sully DATE: 10/3/18 TIME: 2350

Temp In °C: 7.3
 Received on Ice (Y/N): Y
 Custody Sealed (Y/N): Y
 Samples Intact (Y/N): Y

SAMPLER NAME AND SIGNATURE: *Shandra Shuman Alden*
 PRINT Name of SAMPLER: **Shandra M. Shuman**
 SIGNATURE of SAMPLER: *Shandra M. Shuman*
 DATE Signed (MM/DD/YYYY): 10/03/18

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: enviroanalytics

Project # **30267019**

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label	<u>BZH</u>
LIMS Login	<u>BZH</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 2.4 °C Correction Factor: -0.1 °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>10D41071</u>	<u>BZH 10/4/18</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>BZH</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 Aqueous Samples Screened > 0.5 mrem/hr			/	Initial when completed: <u>BZH</u>	Date: <u>10/4/18</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.

January 27, 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-Revised Report
Pace Project No.: 30267196

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on October 05, 2018. 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.

Revision 1 - This report replaces the October 9, 2018 report. This project was revised on January 27, 2019 to add a case narrative as per client request. (Greensburg, PA)

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: Rod and Wire Mill GW Sampling-Revised Report
Pace Project No.: 30267196

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-Revised Report

Pace Project No.: 30267196

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30267196001	RW04-MW(S)	Water	10/04/18 09:52	10/05/18 00:45
30267196002	RW03-MW(S)	Water	10/04/18 10:53	10/05/18 00:45
30267196003	RW03-MW(I)	Water	10/04/18 11:30	10/05/18 00:45
30267196004	RW06-MW(S)	Water	10/04/18 12:36	10/05/18 00:45
30267196005	RW06-MW(D)	Water	10/04/18 13:00	10/05/18 00:45
30267196006	RW06-MW(I)	Water	10/04/18 14:18	10/05/18 00:45
30267196007	RW11-MW(S)	Water	10/04/18 14:55	10/05/18 00:45

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267196

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30267196001	RW04-MW(S)	EPA 6010C	KAS	2	PASI-PA
30267196002	RW03-MW(S)	EPA 6010C	KAS	2	PASI-PA
30267196003	RW03-MW(I)	EPA 6010C	KAS	2	PASI-PA
30267196004	RW06-MW(S)	EPA 6010C	KAS	2	PASI-PA
30267196005	RW06-MW(D)	EPA 6010C	KAS	2	PASI-PA
30267196006	RW06-MW(I)	EPA 6010C	KAS	2	PASI-PA
30267196007	RW11-MW(S)	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267196

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: January 27, 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: 315663

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30267019001,30267196004

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

- MS (Lab ID: 1540620)
 - Zinc
- MSD (Lab ID: 1540621)
 - 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 Cd and Zn
- QC Batch: 315692

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267196

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: January 27, 2019

Analyte Comments:

QC Batch: 315663

1c: The PDS failed for Cd and Zn

- BLANK (Lab ID: 1540617)
 - Cadmium
 - Zinc
- DUP (Lab ID: 1540619)
 - Cadmium
 - Zinc
- DUP (Lab ID: 1540622)
 - Cadmium
 - Zinc
- LCS (Lab ID: 1540618)
 - Cadmium
 - Zinc
- MS (Lab ID: 1540620)
 - Cadmium
 - Zinc
- MS (Lab ID: 1540623)
 - Cadmium
 - Zinc
- MSD (Lab ID: 1540621)
 - Cadmium
 - Zinc
- RW03-MW(I) (Lab ID: 30267196003)
 - Cadmium
 - Zinc
- RW03-MW(S) (Lab ID: 30267196002)
 - Cadmium
 - Zinc
- RW04-MW(S) (Lab ID: 30267196001)
 - Cadmium
 - Zinc
- RW06-MW(D) (Lab ID: 30267196005)
 - Cadmium
 - Zinc
- RW06-MW(I) (Lab ID: 30267196006)
 - Cadmium
 - Zinc
- RW06-MW(S) (Lab ID: 30267196004)
 - Cadmium
 - Zinc
- RW11-MW(S) (Lab ID: 30267196007)
 - Cadmium
 - Zinc

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267196

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: January 27, 2019

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-Revised Report

Pace Project No.: 30267196

Sample: RW04-MW(S)		Lab ID: 30267196001		Collected: 10/04/18 09:52	Received: 10/05/18 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	3.0 U	ug/L	3.0	0.87	1	10/05/18 16:19	10/08/18 19:15	7440-43-9	1c	
Zinc	168	ug/L	10.0	1.0	1	10/05/18 16:19	10/08/18 19:15	7440-66-6	1c	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267196

Sample: RW03-MW(S)		Lab ID: 30267196002		Collected: 10/04/18 10:53		Received: 10/05/18 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	8.7	ug/L	3.0	0.87	1	10/05/18 16:19	10/08/18 19:18	7440-43-9	1c
Zinc	14900	ug/L	1000	104	100	10/05/18 16:19	10/08/18 20:09	7440-66-6	1c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report
Pace Project No.: 30267196

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW03-MW(I)									
Lab ID: 30267196003									
Collected: 10/04/18 11:30 Received: 10/05/18 00:45 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	346	ug/L	3.0	0.87	1	10/05/18 16:19	10/08/18 19:20	7440-43-9	1c
Zinc	13000	ug/L	1000	104	100	10/05/18 16:19	10/08/18 20:12	7440-66-6	1c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267196

Sample: RW06-MW(S) **Lab ID: 30267196004** Collected: 10/04/18 12:36 Received: 10/05/18 00:45 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	0.87	1	10/05/18 16:19	10/08/18 19:24	7440-43-9	1c
Zinc	3.7J	ug/L	10.0	1.0	1	10/05/18 16:19	10/08/18 19:24	7440-66-6	1c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267196

Sample: RW06-MW(D) **Lab ID: 30267196005** Collected: 10/04/18 13:00 Received: 10/05/18 00:45 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	0.87	1	10/05/18 16:19	10/08/18 19:37	7440-43-9	1c
Zinc	103	ug/L	10.0	1.0	1	10/05/18 16:19	10/08/18 19:37	7440-66-6	1c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267196

Sample: RW06-MW(I)		Lab ID: 30267196006		Collected: 10/04/18 14:18		Received: 10/05/18 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	629	ug/L	3.0	0.87	1	10/05/18 16:19	10/08/18 19:39	7440-43-9	1c
Zinc	90100	ug/L	1000	104	100	10/05/18 16:19	10/08/18 20:14	7440-66-6	1c

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267196

Sample: RW11-MW(S)		Lab ID: 30267196007		Collected: 10/04/18 14:55	Received: 10/05/18 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	1.2J	ug/L	3.0	0.87	1	10/05/18 16:19	10/08/18 19:42	7440-43-9	1c	
Zinc	29500	ug/L	1000	104	100	10/05/18 16:19	10/08/18 20:17	7440-66-6	1c	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267196

QC Batch:	315663	Analysis Method:	EPA 6010C
QC Batch Method:	EPA 3005A	Analysis Description:	6010C MET
Associated Lab Samples:	30267196001, 30267196002, 30267196003, 30267196004, 30267196005, 30267196006, 30267196007		

METHOD BLANK: 1540617 Matrix: Water
Associated Lab Samples: 30267196001, 30267196002, 30267196003, 30267196004, 30267196005, 30267196006, 30267196007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.87	10/08/18 18:26	1c
Zinc	ug/L	10.0 U	10.0	1.0	10/08/18 18:26	1c

LABORATORY CONTROL SAMPLE: 1540618

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	521	104	80-120	1c
Zinc	ug/L	500	516	103	80-120	1c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1540620 1540621

Parameter	Units	30267019001 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	583	591	117	118	75-125	1	20	1c
Zinc	ug/L	47100	500	500	44700	45800	-480	-258	75-125	2	20	1c, ML

MATRIX SPIKE SAMPLE: 1540623

Parameter	Units	30267196004 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	3.0 U	500	542	108	75-125	1c
Zinc	ug/L	3.7J	500	510	101	75-125	1c

SAMPLE DUPLICATE: 1540619

Parameter	Units	30267019001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	1c
Zinc	ug/L	47100	45700	3	20	1c

SAMPLE DUPLICATE: 1540622

Parameter	Units	30267196004 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	3.0 U	3.0 U		20	1c
Zinc	ug/L	3.7J	3.5J		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: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267196

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: 315692

[1] The PDS failed for Cd and Zn

ANALYTE QUALIFIERS

1c The PDS failed for Cd and Zn

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-Revised Report

Pace Project No.: 30267196

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30267196001	RW04-MW(S)	EPA 3005A	315663	EPA 6010C	315692
30267196002	RW03-MW(S)	EPA 3005A	315663	EPA 6010C	315692
30267196003	RW03-MW(I)	EPA 3005A	315663	EPA 6010C	315692
30267196004	RW06-MW(S)	EPA 3005A	315663	EPA 6010C	315692
30267196005	RW06-MW(D)	EPA 3005A	315663	EPA 6010C	315692
30267196006	RW06-MW(I)	EPA 3005A	315663	EPA 6010C	315692
30267196007	RW11-MW(S)	EPA 3005A	315663	EPA 6010C	315692

REPORT OF LABORATORY ANALYSIS

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CHAIN-OF-CUSTODY

The Chain-of-Custody is



30267196

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

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: 180223M

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 Baylura

Pace Profile #:

Page: | of |

REGULATORY AGENCY

NPDES GROUND WATER DRINKING WATER

UST RCRA OTHER

Site Location

STATE: MD

Requested Analysis Filtered (Y/N)

ITEM #	Section D Required Client Information	Valid Matrix Codes	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	PRESERVATIVES	ANALYSIS TESTS	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
			COMPOSITE START	COMPOSITE END/GRAB							
1	RW04-MWS	DW DRINKING WATER	10/4/18	1058	G	W16	1	Unpreserved	Total Zinc 6010 X X		001
2	RW03-MWS	WT WASTE WATER	10/4/18	1058	G	W16	1	Unpreserved	Total Cadmium 6010 X X		002
3	RW03-MWS	W WASTE WATER	11/30	1130	G	W16	1	Unpreserved	Total Zinc 6010 X X		003
4	RW06-MWS	P PRODUCT	12/36	1236	G	W16	1	Unpreserved	Total Zinc 6010 X X		004
5	RW06-MWS	SL SOIL/SOLID	1300	1300	G	W16	1	Unpreserved	Total Zinc 6010 X X		005
6	RW06-MWS	OL OIL	1418	1418	G	W16	1	Unpreserved	Total Zinc 6010 X X		006
7	RW11-MWS	WP WIPE	1455	1455	G	W16	1	Unpreserved	Total Zinc 6010 X X		007
8		AR AIR									
9		OT OTHER									
10		TS TISSUE									
11											
12											

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)
Sharon VA / Pace	Sharon VA / Pace	10/4/18	1530	Paris of the Pace	10/4/18	1556		Y		
Diana of the Pace	Diana of the Pace	10/4/18	2030	Thomas of the Pace	10/4/18	2045				
William of the Pace	William of the Pace	10/5/18	0415	Emily of the Pace	10/5/18	0445	2.2	Y	N	Y

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Leandra M. Gilman
 SIGNATURE of SAMPLER: Leandra M. Gilman
 DATE Signed: 10/04/18
 (MM/DD/YY)

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Sparrows

Project # 30267196

Courier: Fed Ex UPS USPS Client Commercial Pace Other

Tracking #: N/A

Label	<u>ET</u>
LIMS Login	<u>BLM</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 2.1 °C Correction Factor: 10.1 °C Final Temp: 2.2 °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:	/			<u>1004671</u>	<u>ET 10-5-18</u>
Chain of Custody Filled Out:	/				<u>ET 10-5-18</u>
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 Compliance/NPDES sample field filtered			/		
Organic Samples checked for dechlorination:			/		
Filtered volume received for Dissolved tests			/		
All containers have been checked for preservation.	/				
All containers needing preservation are found to be in compliance with EPA recommendation.	/				
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed: <u>ET</u>	Date/time of preservation:
				Lot # of added preservative:	
Headspace in VOA Vials (>6mm):			/		
Trip Blank Present:			/		
Trip Blank Custody Seals Present			/		
Rad Aqueous 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.

January 27, 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-Revised Report
Pace Project No.: 30267343

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on October 06, 2018. 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.

Revision 1 - This report replaces the October 12, 2018 report. This project was revised on January 27, 2019 to add a case narrative as per client request. (Greensburg, PA)

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: Rod and Wire Mill GW Sampling-Revised Report
Pace Project No.: 30267343

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-Revised Report

Pace Project No.: 30267343

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30267343001	RW15-MW(S)	Water	10/05/18 10:26	10/06/18 00:35
30267343002	RW15-MW(I)	Water	10/05/18 11:11	10/06/18 00:35
30267343003	RW12-MW(S)	Water	10/05/18 11:57	10/06/18 00:35
30267343004	RW12-MW(I)	Water	10/05/18 12:37	10/06/18 00:35
30267343005	RW11-MW(I)	Water	10/05/18 13:55	10/06/18 00:35

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267343

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
30267343001	RW15-MW(S)	EPA 6010C	KAS	2	PASI-PA
30267343002	RW15-MW(I)	EPA 6010C	KAS	2	PASI-PA
30267343003	RW12-MW(S)	EPA 6010C	KAS	2	PASI-PA
30267343004	RW12-MW(I)	EPA 6010C	KAS	2	PASI-PA
30267343005	RW11-MW(I)	EPA 6010C	KAS	2	PASI-PA

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267343

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: January 27, 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:

Analyte Comments:

QC Batch: 316190

1c: The PDS recovery was outside of the laboratory control limits. Result may be biased high

- RW15-MW(S) (Lab ID: 30267343001)
- Cadmium

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-Revised Report
Pace Project No.: 30267343

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW15-MW(S)									
Lab ID: 30267343001									
Collected: 10/05/18 10:26 Received: 10/06/18 00:35 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	78.1	ug/L	3.0	0.87	1	10/10/18 15:28	10/11/18 16:50	7440-43-9	1c
Zinc	2950	ug/L	10.0	1.0	1	10/10/18 15:28	10/11/18 16:50	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report
Pace Project No.: 30267343

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sample: RW15-MW(I)									
Lab ID: 30267343002									
Collected: 10/05/18 11:11 Received: 10/06/18 00:35 Matrix: Water									
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	3.0 U	ug/L	3.0	0.87	1	10/10/18 15:28	10/11/18 17:05	7440-43-9	
Zinc	736	ug/L	10.0	1.0	1	10/10/18 15:28	10/11/18 17:05	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267343

Sample: RW12-MW(S)		Lab ID: 30267343003		Collected: 10/05/18 11:57	Received: 10/06/18 00:35	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	2.3J	ug/L	3.0	0.87	1	10/10/18 15:28	10/11/18 17:07	7440-43-9		
Zinc	1140	ug/L	10.0	1.0	1	10/10/18 15:28	10/11/18 17:07	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267343

Sample: RW12-MW(I)		Lab ID: 30267343004		Collected: 10/05/18 12:37		Received: 10/06/18 00:35		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	86.3	ug/L	3.0	0.87	1	10/10/18 15:28	10/11/18 17:16	7440-43-9	
Zinc	14300	ug/L	1000	104	100	10/10/18 15:28	10/11/18 17:22	7440-66-6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267343

Sample: RW11-MW(I)		Lab ID: 30267343005		Collected: 10/05/18 13:55	Received: 10/06/18 00:35	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	133	ug/L	3.0	0.87	1	10/10/18 15:28	10/11/18 17:19	7440-43-9		
Zinc	174000	ug/L	1000	104	100	10/10/18 15:28	10/11/18 17:24	7440-66-6		

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267343

QC Batch: 316190 Analysis Method: EPA 6010C
 QC Batch Method: EPA 3005A Analysis Description: 6010C MET
 Associated Lab Samples: 30267343001, 30267343002, 30267343003, 30267343004, 30267343005

METHOD BLANK: 1543063 Matrix: Water
 Associated Lab Samples: 30267343001, 30267343002, 30267343003, 30267343004, 30267343005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.87	10/11/18 16:45	
Zinc	ug/L	10.0 U	10.0	1.0	10/11/18 16:45	

LABORATORY CONTROL SAMPLE: 1543064

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	535	107	80-120	
Zinc	ug/L	500	548	110	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1543066 1543067

Parameter	Units	30267343001		MSD		MS		MSD		% Rec		Max		Qual
		Result	Spike Conc.	Spike Conc.	Result	Result	% Rec	% Rec	Limits	RPD	RPD			
Cadmium	ug/L	78.1	500	500	620	610	108	106	75-125	2	20			
Zinc	ug/L	2950	500	500	3430	3400	95	91	75-125	1	20			

SAMPLE DUPLICATE: 1543065

Parameter	Units	30267343001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	78.1	78.7	1	20	
Zinc	ug/L	2950	2960	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-Revised Report
Pace Project No.: 30267343

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

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling-Revised Report

Pace Project No.: 30267343

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30267343001	RW15-MW(S)	EPA 3005A	316190	EPA 6010C	316226
30267343002	RW15-MW(I)	EPA 3005A	316190	EPA 6010C	316226
30267343003	RW12-MW(S)	EPA 3005A	316190	EPA 6010C	316226
30267343004	RW12-MW(I)	EPA 3005A	316190	EPA 6010C	316226
30267343005	RW11-MW(I)	EPA 3005A	316190	EPA 6010C	316226

REPORT OF LABORATORY ANALYSIS

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CHAIN-OF-CUSTODY
 The Chain-of-Custody is a
30267343

NO#: 30267343

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

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:
 Face Project Manager: **Samantha Bayura**
 Face Profile #:

REGULATORY AGENCY
 NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: **MD**
 STATE: **MD**

ITEM #	Section D Required Client Information SAMPLE ID (A-Z, 0-9 / -) Sample IDs MUST BE UNIQUE	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WATER WT WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OL WIPE WP AIR AK OTHER OT TISSUE TS	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₈ Methanol Other	Y/N	Requested Analysis: Filtered (Y/N)		Pace Project No./ Lab I.D.
			COMPOSITE START	COMPOSITE END/GRAB						DATE	TIME	
1	RW15-mw(5)		10/12/18	1036	G	WT	1					001
2	RW15-mw(1)		11/1		G	WT	1					002
3	RW12-mw(5)		11/5		G	WT	1					003
4	RW12-mw(1)		12/7		G	WT	1					004
5	RW11-mw(1)		13/5		G	WT	1					005
6												
7												
8												
9												
10												
11												
12												

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
	<i>Stewart Kabis / EnviroAnalytics Group</i>	10/15/18		<i>David S. Kulligan / Pace</i>	10/19/18	1657	
	<i>David S. Kulligan / Pace</i>	10/15/18	2030	<i>Stewart Kabis</i>	10/18/18	2030	X
	<i>Stewart Kabis</i>	10/16/18	0735	<i>Agnes M. Murchoney / Pace</i>	10/18/18	0035	Y
					3.4		Y
							N
							Y

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

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: *Leandra M Glumac* DATE Signed: *10/05/18*
 SIGNATURE of SAMPLER: *Leandra M Glumac*

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Spanan's

Project # **30267343**

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Label AKM
LIMS Login BUN

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 3.3 °C Correction Factor: +0.0 °C Final Temp: 3.4 °C
Temp should be above freezing to 6°C +0.1 AKM 10/16/18

Comments:	pH paper Lot#			Date and Initials of person examining contents:
	Yes	No	N/A	
Chain of Custody Present:	/			1054671
Chain of Custody Filled Out:	/			AKM 10/16/18
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 Compliance/NPDES sample field filtered			/	
Organic Samples checked for dechlorination:			/	
Filtered volume received for Dissolved tests			/	
All containers have been checked for preservation.	/			
All containers needing preservation are found to be in compliance with EPA recommendation.	/			
exceptions: VOA, coliform, TOC, O&G, Phenolics				Initial when completed: <u>AKM</u> Date/time of preservation: _____ Lot # of added preservative: _____
Headspace in VOA Vials (>6mm):			/	
Trip Blank Present:			/	
Trip Blank Custody Seals Present			/	
Rad Aqueous 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 13, 2018

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.: 30273967

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 10, 2018. 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.: 30273967

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.: 30273967

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30273967001	RW15-MW(S)	Water	12/10/18 10:32	12/10/18 23:45
30273967002	RW15-MW(I)	Water	12/10/18 12:20	12/10/18 23:45
30273967003	RW19-MW(S)	Water	12/10/18 13:52	12/10/18 23:45
30273967004	RW19-MW(I)	Water	12/10/18 15:10	12/10/18 23:45
30273967005	RW09-MW(S)	Water	12/10/18 16:18	12/10/18 23:45

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30273967

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30273967001	RW15-MW(S)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30273967002	RW15-MW(I)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30273967003	RW19-MW(S)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30273967004	RW19-MW(I)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30273967005	RW09-MW(S)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30273967

Method: EPA 6010C
Description: 6010C MET ICP
Client: EnviroAnalytics Group, LLC
Date: December 13, 2018

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.

QC Batch: 323599

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30273967001

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

- MSD (Lab ID: 1577412)
- Zinc

Duplicate Sample:

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

Additional Comments:

Analyte Comments:

QC Batch: 323599

3c: Zn was present in the blank at a concentration greater than 1/2 the RL. All associated samples had concentrations of at least ten times greater than the blank or were below the reporting limit.

- BLANK (Lab ID: 1577408)
 - Zinc
- RW09-MW(S) (Lab ID: 30273967005)
 - Zinc

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30273967

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: December 13, 2018

Analyte Comments:

QC Batch: 323599

3c: Zn was present in the blank at a concentration greater than 1/2 the RL. All associated samples had concentrations of at least ten times greater than the blank or were below the reporting limit.

- RW15-MW(I) (Lab ID: 30273967002)
 - Zinc
- RW15-MW(S) (Lab ID: 30273967001)
 - Zinc
- RW19-MW(I) (Lab ID: 30273967004)
 - Zinc
- RW19-MW(S) (Lab ID: 30273967003)
 - Zinc

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30273967

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: December 13, 2018

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.

QC Batch: 323598

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30273967001

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

- MS (Lab ID: 1577405)
 - Zinc, Dissolved
- MSD (Lab ID: 1577406)
 - 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: 323632

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30273967

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: December 13, 2018

Analyte Comments:

QC Batch: 323598

1c: The PDS failed for Zn.

- BLANK (Lab ID: 1577402)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- DUP (Lab ID: 1577404)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- LCS (Lab ID: 1577403)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- MS (Lab ID: 1577405)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- MSD (Lab ID: 1577406)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW09-MW(S) (Lab ID: 30273967005)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW15-MW(I) (Lab ID: 30273967002)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW15-MW(S) (Lab ID: 30273967001)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW19-MW(I) (Lab ID: 30273967004)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW19-MW(S) (Lab ID: 30273967003)
 - Cadmium, Dissolved
 - Zinc, Dissolved

2c: The PDS recovery was outside of the laboratory control limits. Result may be biased high

- RW15-MW(S) (Lab ID: 30273967001)
 - Zinc, Dissolved

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30273967

Method: SM4500H+B-2011
Description: 4500H+ pH, Electrometric
Client: EnviroAnalytics Group, LLC
Date: December 13, 2018

General Information:

5 samples were analyzed for SM4500H+B-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.

H1: Analysis conducted outside the EPA method holding time.

- RW09-MW(S) (Lab ID: 30273967005)
- RW15-MW(I) (Lab ID: 30273967002)
- RW15-MW(S) (Lab ID: 30273967001)
- RW19-MW(I) (Lab ID: 30273967004)
- RW19-MW(S) (Lab ID: 30273967003)

H6: Analysis initiated outside of the 15 minute EPA required holding time.

- RW09-MW(S) (Lab ID: 30273967005)
- RW15-MW(I) (Lab ID: 30273967002)
- RW15-MW(S) (Lab ID: 30273967001)
- RW19-MW(I) (Lab ID: 30273967004)
- RW19-MW(S) (Lab ID: 30273967003)

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.: 30273967

Sample: RW15-MW(S)		Lab ID: 30273967001		Collected: 12/10/18 10:32		Received: 12/10/18 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	96.8	ug/L	3.0	0.34	1	12/11/18 16:19	12/12/18 16:36	7440-43-9	
Zinc	4650	ug/L	100	23.8	10	12/11/18 16:19	12/12/18 17:47	7440-66-6	3c,MH
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	94.4	ug/L	3.0	0.34	1	12/11/18 16:07	12/12/18 15:53	7440-43-9	1c
Zinc, Dissolved	4380	ug/L	100	23.8	10	12/11/18 16:07	12/12/18 17:09	7440-66-6	1c,2c, MH
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	7.1	Std. Units	2.0	2.0	1		12/11/18 20:48		H1,H6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30273967

Sample: RW15-MW(I) Lab ID: 30273967002 Collected: 12/10/18 12:20 Received: 12/10/18 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	14.2	ug/L	3.0	0.34	1	12/11/18 16:19	12/12/18 16:57	7440-43-9	
Zinc	6740	ug/L	100	23.8	10	12/11/18 16:19	12/12/18 18:08	7440-66-6	3c
6010C MET ICP,Dissolved Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	12.9	ug/L	3.0	0.34	1	12/11/18 16:07	12/12/18 16:07	7440-43-9	1c
Zinc, Dissolved	6540	ug/L	100	23.8	10	12/11/18 16:07	12/12/18 17:30	7440-66-6	1c
4500H+ pH, Electrometric Analytical Method: SM4500H+B-2011									
pH at 25 Degrees C	7.0	Std. Units	2.0	2.0	1		12/11/18 20:52		H1,H6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30273967

Sample: RW19-MW(S) **Lab ID: 30273967003** Collected: 12/10/18 13:52 Received: 12/10/18 23:45 Matrix: Water

Comments: • Sample ID on unpreserved bottle does not match COC, date and time matches.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium	0.84J	ug/L	3.0	0.34	1	12/11/18 16:19	12/12/18 16:59	7440-43-9	
Zinc	3270	ug/L	10.0	2.4	1	12/11/18 16:19	12/12/18 16:59	7440-66-6	3c
6010C MET ICP,Dissolved									
Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	12/11/18 16:07	12/12/18 16:10	7440-43-9	1c
Zinc, Dissolved	3390	ug/L	10.0	2.4	1	12/11/18 16:07	12/12/18 16:10	7440-66-6	1c
4500H+ pH, Electrometric									
Analytical Method: SM4500H+B-2011									
pH at 25 Degrees C	7.0	Std. Units	2.0	2.0	1		12/11/18 20:55		H1,H6

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30273967

Sample: RW19-MW(I)		Lab ID: 30273967004		Collected: 12/10/18 15:10	Received: 12/10/18 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	1990	ug/L	30.0	3.4	10	12/11/18 16:19	12/12/18 17:02	7440-43-9		
Zinc	7600000	ug/L	100000	23800	10000	12/11/18 16:19	12/12/18 18:10	7440-66-6	3c	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	1900	ug/L	30.0	3.4	10	12/11/18 16:07	12/12/18 17:32	7440-43-9	1c	
Zinc, Dissolved	7580000	ug/L	100000	23800	10000	12/11/18 16:07	12/12/18 17:42	7440-66-6	1c	
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011								
pH at 25 Degrees C	5.5	Std. Units	2.0	2.0	1		12/11/18 20:57		H1,H6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30273967

Sample: RW09-MW(S)		Lab ID: 30273967005		Collected: 12/10/18 16:18	Received: 12/10/18 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	9.8	ug/L	3.0	0.34	1	12/11/18 16:19	12/12/18 17:06	7440-43-9		
Zinc	9490	ug/L	100	23.8	10	12/11/18 16:19	12/12/18 18:13	7440-66-6	3c	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	9.3	ug/L	3.0	0.34	1	12/11/18 16:07	12/12/18 16:27	7440-43-9	1c	
Zinc, Dissolved	9200	ug/L	100	23.8	10	12/11/18 16:07	12/12/18 17:44	7440-66-6	1c	
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011								
pH at 25 Degrees C	6.5	Std. Units	2.0	2.0	1		12/11/18 21:00		H1,H6	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30273967

QC Batch: 323599 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30273967001, 30273967002, 30273967003, 30273967004, 30273967005

METHOD BLANK: 1577408 Matrix: Water
Associated Lab Samples: 30273967001, 30273967002, 30273967003, 30273967004, 30273967005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/12/18 16:31	
Zinc	ug/L	7.0J	10.0	2.4	12/12/18 16:31	3c

LABORATORY CONTROL SAMPLE: 1577409

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	519	104	80-120	
Zinc	ug/L	500	552	110	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1577411 1577412

Parameter	Units	30273967001 Result	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
			Spike Conc.	MS Result	MSD Result	MSD Result						
Cadmium	ug/L	96.8	500	609	607	102	102	75-125	0	20		
Zinc	ug/L	4650	500	5200	5300	111	130	75-125	2	20 MH		

SAMPLE DUPLICATE: 1577410

Parameter	Units	30273967001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	96.8	98.1	1	20	
Zinc	ug/L	4650	4610	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.: 30273967

QC Batch: 323598 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30273967001, 30273967002, 30273967003, 30273967004, 30273967005

METHOD BLANK: 1577402 Matrix: Water
Associated Lab Samples: 30273967001, 30273967002, 30273967003, 30273967004, 30273967005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	12/12/18 15:49	1c
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	12/12/18 15:49	1c

LABORATORY CONTROL SAMPLE: 1577403

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	470	94	80-120	1c
Zinc, Dissolved	ug/L	500	470	94	80-120	1c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1577405 1577406

Parameter	Units	30273967001 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	94.4	500	500	626	611	106	103	75-125	2	20	1c
Zinc, Dissolved	ug/L	4380	500	500	5170	5180	157	160	75-125	0	20	1c, MH

SAMPLE DUPLICATE: 1577404

Parameter	Units	30273967001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	94.4	93.9	1	20	1c
Zinc, Dissolved	ug/L	4380	4540	3	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 and Wire Mill GW Sampling

Pace Project No.: 30273967

QC Batch: 323623 Analysis Method: SM4500H+B-2011

QC Batch Method: SM4500H+B-2011 Analysis Description: 4500H+B pH

Associated Lab Samples: 30273967001, 30273967002, 30273967003, 30273967004, 30273967005

SAMPLE DUPLICATE: 1577564

Parameter	Units	30273967001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.1	7.2	1	10	H1,H6

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.: 30273967

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: 323632

[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 high

3c Zn was present in the blank at a concentration greater than 1/2 the RL. All associated samples had concentrations of at least ten times greater than the blank or were below the reporting limit.

H1 Analysis conducted outside the EPA method holding time.

H6 Analysis initiated outside of the 15 minute EPA required holding time.

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

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30273967

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30273967001	RW15-MW(S)	EPA 3005A	323599	EPA 6010C	323633
30273967002	RW15-MW(I)	EPA 3005A	323599	EPA 6010C	323633
30273967003	RW19-MW(S)	EPA 3005A	323599	EPA 6010C	323633
30273967004	RW19-MW(I)	EPA 3005A	323599	EPA 6010C	323633
30273967005	RW09-MW(S)	EPA 3005A	323599	EPA 6010C	323633
30273967001	RW15-MW(S)	EPA 3005A	323598	EPA 6010C	323632
30273967002	RW15-MW(I)	EPA 3005A	323598	EPA 6010C	323632
30273967003	RW19-MW(S)	EPA 3005A	323598	EPA 6010C	323632
30273967004	RW19-MW(I)	EPA 3005A	323598	EPA 6010C	323632
30273967005	RW09-MW(S)	EPA 3005A	323598	EPA 6010C	323632
30273967001	RW15-MW(S)	SM4500H+B-2011	323623		
30273967002	RW15-MW(I)	SM4500H+B-2011	323623		
30273967003	RW19-MW(S)	SM4500H+B-2011	323623		
30273967004	RW19-MW(I)	SM4500H+B-2011	323623		
30273967005	RW09-MW(S)	SM4500H+B-2011	323623		

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

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

NPDES GROUND WATER DRINKING WATER
 UST RORA OTHER

Site Location
STATE: **MD**

Section D
Required Client Information

Valid Matrix Codes
MATRIX CODE
DRINKING WATER DW
WATER WATER WW
WASTE WATER P
PRODUCT P
SOILSOLID SL
OIL OL
WIPE WP
AIR AR
OTHER OT
TISSUE TS

SAMPLE ID
(A-Z, 0-9 / -)
Sample IDs MUST BE UNIQUE

ITEM #	MATRIX CODE	COLLECTED		SAMPLE TYPE (G=GRAB C=COMP)	MATRIX CODE (see valid codes to left)	# OF CONTAINERS	Preservatives							Analysis Test ↑	Total Cadmium 6010	Total Zinc 6010	pH	Dissolved Cd 6010	Dissolved Zn 6010	Requested Analysis Filtered (Y/N)	Pace Project No./ Lab I.D.
		COMPOSITE START	COMPOSITE END/ENG				DATE	TIME	DATE	TIME	DATE	TIME	DATE								
1	RW15-mw(S)			WT G		3	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	X	X	X	X	X	X	001
2	RW15-mw(I)			WT G		3	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	X	X	X	X	X	X	002
3	RW19-mw(S)			WT G		3	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	X	X	X	X	X	X	003
4	RW19-mw(I)			WT G		3	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	X	X	X	X	X	X	004
5	RW09-mw(S)			WT G		3	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	X	X	X	X	X	X	005

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	RECEIVED ON	Temp in °C	Ice (Y/N)	Custody Sealed	Cooler (Y/N)	Samples Intact
data packages required	Liana Agrios / ARMB	12/10/18	16:56	David S. Hilligan / Pace	12/10/18	16:56	✓					
	David S. Hilligan / Pace	12/10/18	20:10	Liana Agrios	12/10/18	20:10						
	David S. Hilligan / Pace	12/10/18	23:45	Liana Agrios	12/10/18	23:45						

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: **Liana Agrios**
SIGNATURE of SAMPLER: *Liana Agrios*

DATE Signed (MM/DD/YYYY): **12/10/18**

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: Enviroanalytics

Project # 30273967

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 1.4 °C Correction Factor: 0.2 °C Final Temp: 1.2 °C

Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents: <u>BLM 12/1/18</u>
	Yes	No	N/A	
Chain of Custody Present:	<u>K</u>			1.
Chain of Custody Filled Out:	<u>X</u>			2.
Chain of Custody Relinquished:	<u>X</u>			3.
Sampler Name & Signature on COC:	<u>X</u>			4.
Sample Labels match COC: -Includes date/time/ID Matrix: <u>WT</u>		<u>X</u>		5. <u>SAMPLE 003 HAS AN ID OF RWA-MW(x) ON THE 250ml UNPRESERVED BOTTLE</u>
Samples Arrived within Hold Time:	<u>/</u>			6.
Short Hold Time Analysis (<72hr remaining):	<u>/</u>			7.
Rush Turn Around Time Requested:	<u>/</u>			8.
Sufficient Volume:	<u>/</u>			9.
Correct Containers Used: -Pace Containers Used:	<u>/</u>			10.
Containers Intact:	<u>/</u>			11.
Orthophosphate field filtered			<u>/</u>	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered			<u>/</u>	13.
Organic Samples checked for dechlorination:			<u>/</u>	14.
Filtered volume received for Dissolved tests	<u>/</u>			15.
All containers have been checked for preservation.	<u>/</u>			16.
All containers needing preservation are found to be in compliance with EPA recommendation.	<u>/</u>			
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):			<u>/</u>	17.
Trip Blank Present:			<u>/</u>	18.
Trip Blank Custody Seals Present			<u>/</u>	
Rad Aqueous Samples Screened > 0.5 mrem/hr			<u>/</u>	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 17, 2018

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.: 30274061

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 11, 2018. 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 & Wire Mill GW Sampling

Pace Project No.: 30274061

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.: 30274061

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30274061001	RW08-MW(S)	Water	12/11/18 10:15	12/11/18 22:50
30274061002	RW08-MW(I)	Water	12/11/18 11:14	12/11/18 22:50
30274061003	RW07-MW(S)	Water	12/11/18 12:12	12/11/18 22:50
30274061004	RW07-MW(I)	Water	12/11/18 13:20	12/11/18 22:50
30274061005	RW02-MW(I)	Water	12/11/18 16:10	12/11/18 22:50

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SAMPLE ANALYTE COUNT

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30274061

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30274061001	RW08-MW(S)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274061002	RW08-MW(I)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274061003	RW07-MW(S)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274061004	RW07-MW(I)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274061005	RW02-MW(I)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod & Wire Mill GW Sampling

Pace Project No.: 30274061

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: December 17, 2018

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 & Wire Mill GW Sampling

Pace Project No.: 30274061

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: December 17, 2018

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 & Wire Mill GW Sampling

Pace Project No.: 30274061

Method: SM4500H+B-2011

Description: 4500H+ pH, Electrometric

Client: EnviroAnalytics Group, LLC

Date: December 17, 2018

General Information:

5 samples were analyzed for SM4500H+B-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.

H1: Analysis conducted outside the EPA method holding time.

- RW02-MW(I) (Lab ID: 30274061005)
- RW07-MW(I) (Lab ID: 30274061004)
- RW07-MW(S) (Lab ID: 30274061003)
- RW08-MW(I) (Lab ID: 30274061002)
- RW08-MW(S) (Lab ID: 30274061001)

H6: Analysis initiated outside of the 15 minute EPA required holding time.

- RW02-MW(I) (Lab ID: 30274061005)
- RW07-MW(I) (Lab ID: 30274061004)
- RW07-MW(S) (Lab ID: 30274061003)
- RW08-MW(I) (Lab ID: 30274061002)
- RW08-MW(S) (Lab ID: 30274061001)

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 & Wire Mill GW Sampling

Pace Project No.: 30274061

Sample: RW08-MW(S)		Lab ID: 30274061001		Collected: 12/11/18 10:15	Received: 12/11/18 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	0.36J	ug/L	3.0	0.34	1	12/12/18 16:10	12/13/18 14:31	7440-43-9		
Zinc	861	ug/L	10.0	2.4	1	12/12/18 16:10	12/13/18 14:31	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	12/12/18 16:02	12/13/18 13:45	7440-43-9		
Zinc, Dissolved	931	ug/L	10.0	2.4	1	12/12/18 16:02	12/13/18 13:45	7440-66-6		
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011								
pH at 25 Degrees C	7.4	Std. Units	2.0	2.0	1		12/12/18 21:19		H1,H6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30274061

Sample: RW08-MW(I) **Lab ID: 30274061002** Collected: 12/11/18 11:14 Received: 12/11/18 22:50 Matrix: Water

Comments: • Sample ID on bottles does not match COC received from Client. Client provided revised 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	3.0 U	ug/L	3.0	0.34	1	12/12/18 16:10	12/13/18 14:45	7440-43-9	
Zinc	44.3	ug/L	10.0	2.4	1	12/12/18 16:10	12/13/18 14:45	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	12/12/18 16:02	12/13/18 13:59	7440-43-9	
Zinc, Dissolved	11.0	ug/L	10.0	2.4	1	12/12/18 16:02	12/13/18 13:59	7440-66-6	
4500H+ pH, Electrometric									
Analytical Method: SM4500H+B-2011									
pH at 25 Degrees C	6.9	Std. Units	2.0	2.0	1		12/12/18 21:20		H1,H6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling

Pace Project No.: 30274061

Sample: RW07-MW(S)		Lab ID: 30274061003		Collected: 12/11/18 12:12	Received: 12/11/18 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	4.1	ug/L	3.0	0.34	1	12/12/18 16:10	12/13/18 14:48	7440-43-9		
Zinc	200	ug/L	10.0	2.4	1	12/12/18 16:10	12/13/18 14:48	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	4.1	ug/L	3.0	0.34	1	12/12/18 16:02	12/13/18 14:02	7440-43-9		
Zinc, Dissolved	176	ug/L	10.0	2.4	1	12/12/18 16:02	12/13/18 14:02	7440-66-6		
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011								
pH at 25 Degrees C	7.1	Std. Units	2.0	2.0	1		12/12/18 21:23		H1,H6	

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling

Pace Project No.: 30274061

Sample: RW07-MW(I)		Lab ID: 30274061004		Collected: 12/11/18 13:20		Received: 12/11/18 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	385	ug/L	3.0	0.34	1	12/12/18 16:10	12/13/18 14:55	7440-43-9	
Zinc	90600	ug/L	1000	238	100	12/12/18 16:10	12/13/18 15:03	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	344	ug/L	3.0	0.34	1	12/12/18 16:02	12/13/18 14:09	7440-43-9	
Zinc, Dissolved	86000	ug/L	1000	238	100	12/12/18 16:02	12/13/18 14:15	7440-66-6	
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	6.5	Std. Units	2.0	2.0	1		12/12/18 21:24		H1,H6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30274061

Sample: RW02-MW(l) Lab ID: 30274061005 Collected: 12/11/18 16:10 Received: 12/11/18 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	182	ug/L	3.0	0.34	1	12/12/18 16:10	12/13/18 14:58	7440-43-9	
Zinc	24900	ug/L	1000	238	100	12/12/18 16:10	12/13/18 15:05	7440-66-6	
6010C MET ICP,Dissolved Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	191	ug/L	3.0	0.34	1	12/12/18 16:02	12/13/18 14:12	7440-43-9	
Zinc, Dissolved	25300	ug/L	1000	238	100	12/12/18 16:02	12/13/18 14:18	7440-66-6	
4500H+ pH, Electrometric Analytical Method: SM4500H+B-2011									
pH at 25 Degrees C	6.6	Std. Units	2.0	2.0	1		12/12/18 21:28		H1,H6

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30274061

QC Batch: 323779 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30274061001, 30274061002, 30274061003, 30274061004, 30274061005

METHOD BLANK: 1578103 Matrix: Water
Associated Lab Samples: 30274061001, 30274061002, 30274061003, 30274061004, 30274061005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/13/18 14:27	
Zinc	ug/L	10.0 U	10.0	2.4	12/13/18 14:27	

LABORATORY CONTROL SAMPLE: 1578104

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	508	102	80-120	
Zinc	ug/L	500	503	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1578106 1578107

Parameter	Units	30274061001 Result	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
			Spike Conc.	Conc.	Result	Result						
Cadmium	ug/L	0.36J	500	500	517	516	103	103	75-125	0	20	
Zinc	ug/L	861	500	500	1380	1360	103	101	75-125	1	20	

SAMPLE DUPLICATE: 1578105

Parameter	Units	30274061001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.36J	3.0 U		20	
Zinc	ug/L	861	873	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 & Wire Mill GW Sampling
Pace Project No.: 30274061

QC Batch: 323778 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30274061001, 30274061002, 30274061003, 30274061004, 30274061005

METHOD BLANK: 1578098 Matrix: Water
Associated Lab Samples: 30274061001, 30274061002, 30274061003, 30274061004, 30274061005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	12/13/18 13:40	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	12/13/18 13:40	

LABORATORY CONTROL SAMPLE: 1578099

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	472	94	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1578101 1578102

Parameter	Units	30274061001 Result	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
			Spike Conc.	Spike Conc.	MS Result	MSD Result						
Cadmium, Dissolved	ug/L	3.0 U	500	500	521	512	104	102	75-125	2	20	
Zinc, Dissolved	ug/L	931	500	500	1410	1400	96	93	75-125	1	20	

SAMPLE DUPLICATE: 1578100

Parameter	Units	30274061001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0 U		20	
Zinc, Dissolved	ug/L	931	925	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 & Wire Mill GW Sampling

Pace Project No.: 30274061

QC Batch: 323802 Analysis Method: SM4500H+B-2011

QC Batch Method: SM4500H+B-2011 Analysis Description: 4500H+B pH

Associated Lab Samples: 30274061001, 30274061002, 30274061003, 30274061004, 30274061005

SAMPLE DUPLICATE: 1578273

Parameter	Units	30270415002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.7	7.8	1	10	H3,H6

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 & Wire Mill GW Sampling

Pace Project No.: 30274061

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

H1 Analysis conducted outside the EPA method holding time.

H3 Sample was received or analysis requested beyond the recognized method holding time.

H6 Analysis initiated outside of the 15 minute EPA required holding time.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod & Wire Mill GW Sampling
Pace Project No.: 30274061

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30274061001	RW08-MW(S)	EPA 3005A	323779	EPA 6010C	323815
30274061002	RW08-MW(I)	EPA 3005A	323779	EPA 6010C	323815
30274061003	RW07-MW(S)	EPA 3005A	323779	EPA 6010C	323815
30274061004	RW07-MW(I)	EPA 3005A	323779	EPA 6010C	323815
30274061005	RW02-MW(I)	EPA 3005A	323779	EPA 6010C	323815
30274061001	RW08-MW(S)	EPA 3005A	323778	EPA 6010C	323814
30274061002	RW08-MW(I)	EPA 3005A	323778	EPA 6010C	323814
30274061003	RW07-MW(S)	EPA 3005A	323778	EPA 6010C	323814
30274061004	RW07-MW(I)	EPA 3005A	323778	EPA 6010C	323814
30274061005	RW02-MW(I)	EPA 3005A	323778	EPA 6010C	323814
30274061001	RW08-MW(S)	SM4500H+B-2011	323802		
30274061002	RW08-MW(I)	SM4500H+B-2011	323802		
30274061003	RW07-MW(S)	SM4500H+B-2011	323802		
30274061004	RW07-MW(I)	SM4500H+B-2011	323802		
30274061005	RW02-MW(I)	SM4500H+B-2011	323802		

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.:
 Project Name: Rod and Wire Mill GW Sampling
 Project Number: 180227M

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

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WT WATER WW PRODUCT P SOLID S 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							Analysis Test ↑	Requested Analysis Filtered (Y/N)	Pace Project No./ Lab I.D.	
				DATE	TIME			DATE	TIME	DATE	TIME	DATE	TIME	DATE				TIME
1	RW08-mw(S)	WTG	G	12/11/18	10:15		3	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	Analysis Test ↑	Y	001
2	RW08-mw(S)	WTG	G	12/11/18	11:14		3	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	Analysis Test ↑	Y	002
3	RW07-mw(S)	WTG	G	12/11/18	12:12		3	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	Analysis Test ↑	Y	003
4	RW07-mw(I)	WTG	G	12/11/18	13:20		3	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	Analysis Test ↑	Y	004
5	RW02-mw(I)	WTG	G	12/11/18	16:10		3	Unpreserved	H ₂ SO ₄	HNO ₃	HCl	NaOH	Na ₂ S ₂ O ₃	Methanol	Other	Analysis Test ↑	Y	005

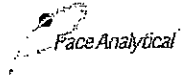
WO#: 30274061

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
data packages required	Liana Agrios/ARm	12/11/18	16:43	Liana Agrios/ARm	12/11/18	16:43	
	Liana Agrios/ARm	12/11/18	19:25	Liana Agrios/ARm	12/11/18	19:30	Y
	Liana Agrios/ARm	12/11/18	18:50	Liana Agrios/ARm	12/11/18	22:50	Y
							N
							Y

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Liana Agrios
 SIGNATURE of SAMPLER: *Liana Agrios*
 DATE Signed (MM/DD/YY): 12/11/18

Temp in °C: _____
 Received on Ice (Y/N): _____
 Cusody Sealed Cooler (Y/N): _____
 Samples Intact (Y/N): _____

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: enviroanalytical

Project # 30274061

Courier: Fed Ex UPS USPS Client Commercial Face Other

Tracking #: N/A

Label	<u>BPH</u>
LIMS Login	<u>BPH</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 2.4 °C Correction Factor: -0.1 °C Final Temp: 2.3 °C
 Temp should be above freezing to 6°C

pH paper Lot#	<u>10D2981</u>
Date and Initials of person examining contents:	<u>BPH 12/12/18</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: -Includes date/time/ID Matrix: <u>WT</u>		/		5. <u>Sample 002 ID on bottles - RW08 - MW(I) date and time match.</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: <u>BPH</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 Aqueous Samples Screened > 0.5 mrem/hr		/		Initial when completed: <u>BPH</u> Date: <u>12/12/18</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.



REVISED
 By Samantha Bayura at 9:55 am, 12/12/18
 www.paceabds.com

CHAIN-OF-CUSTODY / Analytical Request Document

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

Section A Required Client Information: Company: **EnviroAnalytics Group** Report To: **James Calenda** Attention: **Laura Sargent**

Section B Project Name: **Rod and Wire Mill GW Sampling** Project Number: **150227M**

Section C Invoice Information: Address: **1600 Sparrows Point Blvd, Suite B2 Sparrows Point, MD 21219** Copy To: **Stewart Kabis** Company Name: **EnviroAnalytics Group**

Address: **1850 Des Peres Road, Suite 303 St. Louis, MO 63131** Address: **1850 Des Peres Road, Suite 303 St. Louis, MO 63131**

Email To: **jcalenda@enviroanalyticsgroup.com** Project Name: **Rod and Wire Mill GW Sampling** Reference: **Samantha Bayura**

Phone: **314-620-3056** Fax: **5 Day** Requested Due Date/TAT:

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**

ITEM #	Valid Matrix Codes MATRIX CODE DRINKING WATER DW WASTE WATER WW PRODUCT P SOIL/SOLID SL OIL OI 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	ANALYSIS TEST	Requested Analysis Filtered (Y/N)	Pace Project No./ Lab I.D.
				DATE	TIME					
1	RW08-mw(S)	WT G		12/11/18	10:15	3	Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ SO ₃ Methanol Other	PH Dissolved Cd (e610) Dissolved Zn (e10)	Y	
2	RW08-mw(I)	WT G		12/11/18	11:14	3			Y	
3	RW07-mw(S)	WT G		12/11/18	13:12	3				
4	RW07-mw(I)	WT G		12/11/18	13:20	3				
5	RW02-mw(I)	WT G		12/11/18	16:10	3				
6										
7										
8										
9										
10										
11										
12										

ADDITIONAL COMMENTS: *data packages required*

RELINQUISHED BY / AFFILIATION: *Diana Aguiar/PRM* **DATE:** *12/11/18 16:43*

ACCEPTED BY / AFFILIATION: *Diana Aguiar* **DATE:** *12/11/18*

SAMPLE CONDITIONS:

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

SAMPLER NAME AND SIGNATURE: *Liana Agrios*

PRINT Name of SAMPLER: *Liana Agrios*

SIGNATURE of SAMPLER: *Diana Aguiar*

DATE Signed (MM/DD/YYYY): *12/11/18*

December 18, 2018

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.: 30274168

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 12, 2018. 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.: 30274168

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.: 30274168

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30274168001	RW06R-MW(D)	Water	12/12/18 11:40	12/12/18 23:50
30274168002	RW06R-MW(S)	Water	12/12/18 12:35	12/12/18 23:50
30274168003	RW03-MW(S)	Water	12/12/18 14:00	12/12/18 23:50
30274168004	RW04-MW(S)	Water	12/12/18 15:25	12/12/18 23:50
30274168005	RW14-MW(S)	Water	12/12/18 16:40	12/12/18 23:50

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274168

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30274168001	RW06R-MW(D)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274168002	RW06R-MW(S)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274168003	RW03-MW(S)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274168004	RW04-MW(S)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274168005	RW14-MW(S)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274168

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: December 18, 2018

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.: 30274168

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: December 18, 2018

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.: 30274168

Method: SM4500H+B-2011
Description: 4500H+ pH, Electrometric
Client: EnviroAnalytics Group, LLC
Date: December 18, 2018

General Information:

5 samples were analyzed for SM4500H+B-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.

H1: Analysis conducted outside the EPA method holding time.

- RW03-MW(S) (Lab ID: 30274168003)
- RW04-MW(S) (Lab ID: 30274168004)
- RW06R-MW(D) (Lab ID: 30274168001)
- RW06R-MW(S) (Lab ID: 30274168002)
- RW14-MW(S) (Lab ID: 30274168005)

H6: Analysis initiated outside of the 15 minute EPA required holding time.

- RW03-MW(S) (Lab ID: 30274168003)
- RW04-MW(S) (Lab ID: 30274168004)
- RW06R-MW(D) (Lab ID: 30274168001)
- RW06R-MW(S) (Lab ID: 30274168002)
- RW14-MW(S) (Lab ID: 30274168005)

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.: 30274168

Sample: RW06R-MW(D) Lab ID: 30274168001 Collected: 12/12/18 11:40 Received: 12/12/18 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	0.94J	ug/L	3.0	0.34	1	12/14/18 09:50	12/17/18 14:34	7440-43-9	
Zinc	163	ug/L	10.0	2.4	1	12/14/18 09:50	12/17/18 14:34	7440-66-6	
6010C MET ICP,Dissolved Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	0.81J	ug/L	3.0	0.34	1	12/14/18 09:47	12/17/18 13:48	7440-43-9	
Zinc, Dissolved	79.7	ug/L	10.0	2.4	1	12/14/18 09:47	12/17/18 13:48	7440-66-6	
4500H+ pH, Electrometric Analytical Method: SM4500H+B-2011									
pH at 25 Degrees C	6.2	Std. Units	2.0	2.0	1		12/13/18 23:31		H1,H6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274168

Sample: RW06R-MW(S)		Lab ID: 30274168002		Collected: 12/12/18 12:35		Received: 12/12/18 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	0.50J	ug/L	3.0	0.34	1	12/14/18 09:50	12/17/18 14:46	7440-43-9	
Zinc	3.9J	ug/L	10.0	2.4	1	12/14/18 09:50	12/17/18 14:46	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	0.56J	ug/L	3.0	0.34	1	12/14/18 09:47	12/17/18 14:01	7440-43-9	
Zinc, Dissolved	10.0 U	ug/L	10.0	2.4	1	12/14/18 09:47	12/17/18 14:01	7440-66-6	
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	7.8	Std. Units	2.0	2.0	1		12/13/18 23:32		H1,H6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274168

Sample: RW03-MW(S) Lab ID: 30274168003 Collected: 12/12/18 14:00 Received: 12/12/18 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	23.2	ug/L	3.0	0.34	1	12/14/18 09:50	12/17/18 14:49	7440-43-9	
Zinc	23600	ug/L	1000	238	100	12/14/18 09:50	12/17/18 15:00	7440-66-6	
6010C MET ICP,Dissolved Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	24.0	ug/L	3.0	0.34	1	12/14/18 09:47	12/17/18 14:03	7440-43-9	
Zinc, Dissolved	23300	ug/L	1000	238	100	12/14/18 09:47	12/17/18 14:16	7440-66-6	
4500H+ pH, Electrometric Analytical Method: SM4500H+B-2011									
pH at 25 Degrees C	5.6	Std. Units	2.0	2.0	1		12/13/18 23:33		H1,H6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274168

Sample: RW04-MW(S)									
Lab ID: 30274168004									
Collected: 12/12/18 15:25 Received: 12/12/18 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	12/14/18 09:50	12/17/18 14:55	7440-43-9	
Zinc	38.0	ug/L	10.0	2.4	1	12/14/18 09:50	12/17/18 14:55	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	12/14/18 09:47	12/17/18 14:10	7440-43-9	
Zinc, Dissolved	23.5	ug/L	10.0	2.4	1	12/14/18 09:47	12/17/18 14:10	7440-66-6	
4500H+ pH, Electrometric									
Analytical Method: SM4500H+B-2011									
pH at 25 Degrees C	7.0	Std. Units	2.0	2.0	1		12/13/18 23:34		H1,H6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274168

Sample: RW14-MW(S)		Lab ID: 30274168005		Collected: 12/12/18 16:40		Received: 12/12/18 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	3710	ug/L	3.0	0.34	1	12/14/18 09:50	12/17/18 14:57	7440-43-9	
Zinc	78800	ug/L	1000	238	100	12/14/18 09:50	12/17/18 15:03	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	3730	ug/L	3.0	0.34	1	12/14/18 09:47	12/17/18 14:12	7440-43-9	
Zinc, Dissolved	79200	ug/L	1000	238	100	12/14/18 09:47	12/17/18 14:18	7440-66-6	
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	5.8	Std. Units	2.0	2.0	1		12/13/18 23:35		H1,H6

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274168

QC Batch: 323979 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30274168001, 30274168002, 30274168003, 30274168004, 30274168005

METHOD BLANK: 1579230 Matrix: Water
Associated Lab Samples: 30274168001, 30274168002, 30274168003, 30274168004, 30274168005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/17/18 14:30	
Zinc	ug/L	10.0 U	10.0	2.4	12/17/18 14:30	

LABORATORY CONTROL SAMPLE: 1579231

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	523	105	80-120	
Zinc	ug/L	500	517	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1579233 1579234

Parameter	Units	30274168001 Result	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
			Spike Conc.	Spike Conc.	MS Result	MSD Result						
Cadmium	ug/L	0.94J	500	500	518	520	103	104	75-125	0	20	
Zinc	ug/L	163	500	500	650	652	97	98	75-125	0	20	

SAMPLE DUPLICATE: 1579232

Parameter	Units	30274168001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	0.94J	0.95J		20	
Zinc	ug/L	163	162	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.: 30274168

QC Batch: 323977 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30274168001, 30274168002, 30274168003, 30274168004, 30274168005

METHOD BLANK: 1579221 Matrix: Water
Associated Lab Samples: 30274168001, 30274168002, 30274168003, 30274168004, 30274168005

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	12/17/18 13:44	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	12/17/18 13:44	

LABORATORY CONTROL SAMPLE: 1579222

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	472	94	80-120	
Zinc, Dissolved	ug/L	500	462	92	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1579224 1579225

Parameter	Units	30274168001 Result	MS		MSD		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
			Spike Conc.	Conc.	Result	Result						
Cadmium, Dissolved	ug/L	0.81J	500	500	524	526	105	105	75-125	0	20	
Zinc, Dissolved	ug/L	79.7	500	500	574	581	99	100	75-125	1	20	

SAMPLE DUPLICATE: 1579223

Parameter	Units	30274168001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	0.81J	0.54J		20	
Zinc, Dissolved	ug/L	79.7	78.4	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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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274168

QC Batch: 323949 Analysis Method: SM4500H+B-2011

QC Batch Method: SM4500H+B-2011 Analysis Description: 4500H+B pH

Associated Lab Samples: 30274168001, 30274168002, 30274168003, 30274168004, 30274168005

SAMPLE DUPLICATE: 1579081

Parameter	Units	30274237001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	6.6	6.6	1	10	H3,H6

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.: 30274168

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

H1 Analysis conducted outside the EPA method holding time.

H3 Sample was received or analysis requested beyond the recognized method holding time.

H6 Analysis initiated outside of the 15 minute EPA required holding time.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274168

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30274168001	RW06R-MW(D)	EPA 3005A	323979	EPA 6010C	324063
30274168002	RW06R-MW(S)	EPA 3005A	323979	EPA 6010C	324063
30274168003	RW03-MW(S)	EPA 3005A	323979	EPA 6010C	324063
30274168004	RW04-MW(S)	EPA 3005A	323979	EPA 6010C	324063
30274168005	RW14-MW(S)	EPA 3005A	323979	EPA 6010C	324063
30274168001	RW06R-MW(D)	EPA 3005A	323977	EPA 6010C	324062
30274168002	RW06R-MW(S)	EPA 3005A	323977	EPA 6010C	324062
30274168003	RW03-MW(S)	EPA 3005A	323977	EPA 6010C	324062
30274168004	RW04-MW(S)	EPA 3005A	323977	EPA 6010C	324062
30274168005	RW14-MW(S)	EPA 3005A	323977	EPA 6010C	324062
30274168001	RW06R-MW(D)	SM4500H+B-2011	323949		
30274168002	RW06R-MW(S)	SM4500H+B-2011	323949		
30274168003	RW03-MW(S)	SM4500H+B-2011	323949		
30274168004	RW04-MW(S)	SM4500H+B-2011	323949		
30274168005	RW14-MW(S)	SM4500H+B-2011	323949		

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:

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 Wine Mill GW Sampling
 Project Number: 150227M

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

NPDES GROUND WATER DRINKING WATER
 UST RCRA OTHER

Site Location: MD
 STATE: MD

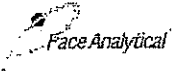
ITEM #	Section D Required Client Information	Valid Matrix Codes	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED		SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives	Analysis Test ↑	Requested Analysis Filtered (Y/N)	Temp In °C	Received on	Ice (Y/N)	Cooler (Y/N)	Samples Intact (Y/N)
					COMPOSITE START	COMPOSITE END/GRAB										
1	RW06R-mw(D)	DRINKING WATER WATER WASTE WATER PRODUCT SOIL/SOLID OIL WIPE AIR OTHER TISSUE	WT G	G	12/12/18 11:40			3	Unpreserved H ₂ SO ₄ HNO ₃ HCl NaOH Na ₂ S ₂ O ₃ Methanol Other	Total Cadmium 6010 Total Zinc 6010 OH Dissolved Cd led Dissolved Zn lead	Y	0.7	12/12/18 17:04	Y	N	Y
2	RW06R-mw(S)		WT G	G	12-35		3			X						
3	RW03-mw(S)		WT G	G	14-00		3			X						
4	RW04-mw(S)		WT G	G	15-25		3			X						
5	RW14-mw(S)		WT G	G	16-40		3			X						
6										X						
7										X						
8										X						
9										X						
10										X						
11										X						
12										X						
ADDITIONAL COMMENTS: data packages required Relinquished by: Liana Agrios Date: 12/12/18 17:04 Accepted by: Liana Agrios Date: 12/12/18 19:15 Signature: Liana Agrios Date: 12/12/18 2350																

WO#: 30274168

Temp In °C: 0.7
 Received on: 12/12/18 17:04
 Ice (Y/N): Y
 Cooler (Y/N): N
 Samples Intact (Y/N): Y

SAMPLER NAME AND SIGNATURE: Liana Agrios
 PRINT Name of SAMPLER: Liana Agrios
 SIGNATURE OF CARD NO. 12/12/18
 DATE SIGNED: 12/12/18

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: enviroanalytics

Project # **30274168**

Courier: Fed Ex UPS USPS Client Commercial Face Other _____

Tracking #: N/A

Label	<u>BPH</u>
LIMS Login	<u>BPH</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 0.7 °C Correction Factor: +0.0 °C Final Temp: 0.7 °C

Temp should be above freezing to 6°C

Comments:	pH paper Lot#			Date and Initials of person examining contents: <u>BPH 12/13/18</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 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.
-Face 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 checked="" type="checkbox"/>	<input type="checkbox"/>	12.
Hex Cr Aqueous Compliance/NPDES sample field filtered	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	13.
Organic Samples checked for dechlorination:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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>BPH</u> Date/time of preservation
				Lot # of added preservative
Headspace in VOA Vials (>6mm):	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input type="checkbox"/>	
Rad Aqueous Samples Screened > 0.5 mrem/hr	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input 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 19, 2018

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.: 30274344

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 13, 2018. 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.: 30274344

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.: 30274344

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30274344001	RW03-MW(I)	Water	12/13/18 09:50	12/13/18 22:50
30274344002	RW11-MW(I)	Water	12/13/18 10:49	12/13/18 22:50
30274344003	RW12-MW(S)	Water	12/13/18 11:22	12/13/18 22:50
30274344004	RW11-MW(S)	Water	12/13/18 11:53	12/13/18 22:50
30274344005	RW12-MW(I)	Water	12/13/18 12:49	12/13/18 22:50
30274344006	RW09-MW(I)	Water	12/13/18 13:03	12/13/18 22:50
30274344007	RW16-MW(S)	Water	12/13/18 14:47	12/13/18 22:50
30274344008	RW18-MW(S)	Water	12/13/18 14:16	12/13/18 22:50
30274344009	RW13-MW(I)	Water	12/13/18 15:29	12/13/18 22:50
30274344010	RW16-MW(I)	Water	12/13/18 16:00	12/13/18 22:50

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274344

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30274344001	RW03-MW(I)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274344002	RW11-MW(I)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274344003	RW12-MW(S)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274344004	RW11-MW(S)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274344005	RW12-MW(I)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274344006	RW09-MW(I)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274344007	RW16-MW(S)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274344008	RW18-MW(S)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274344009	RW13-MW(I)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1
30274344010	RW16-MW(I)	EPA 6010C	CTS	2
		EPA 6010C	CTS	2
		SM4500H+B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274344

Method: EPA 6010C
Description: 6010C MET ICP
Client: EnviroAnalytics Group, LLC
Date: December 19, 2018

General Information:

10 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: 324200

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30274342011,30274344001

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

- MS (Lab ID: 1580474)
 - Zinc
- MSD (Lab ID: 1580475)
 - 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.: 30274344

Method: EPA 6010C
Description: 6010C MET ICP,Dissolved
Client: EnviroAnalytics Group, LLC
Date: December 19, 2018

General Information:

10 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: 324121

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30274344001

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

- MS (Lab ID: 1580241)
 - 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: 1580242)
 - Zinc, Dissolved

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.: 30274344

Method: SM4500H+B-2011

Description: 4500H+ pH, Electrometric

Client: EnviroAnalytics Group, LLC

Date: December 19, 2018

General Information:

10 samples were analyzed for SM4500H+B-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.

H1: Analysis conducted outside the EPA method holding time.

- RW03-MW(I) (Lab ID: 30274344001)
- RW09-MW(I) (Lab ID: 30274344006)
- RW11-MW(I) (Lab ID: 30274344002)
- RW11-MW(S) (Lab ID: 30274344004)
- RW12-MW(I) (Lab ID: 30274344005)
- RW12-MW(S) (Lab ID: 30274344003)
- RW13-MW(I) (Lab ID: 30274344009)
- RW16-MW(I) (Lab ID: 30274344010)
- RW16-MW(S) (Lab ID: 30274344007)
- RW18-MW(S) (Lab ID: 30274344008)

H6: Analysis initiated outside of the 15 minute EPA required holding time.

- RW03-MW(I) (Lab ID: 30274344001)
- RW09-MW(I) (Lab ID: 30274344006)
- RW11-MW(I) (Lab ID: 30274344002)
- RW11-MW(S) (Lab ID: 30274344004)
- RW12-MW(I) (Lab ID: 30274344005)
- RW12-MW(S) (Lab ID: 30274344003)
- RW13-MW(I) (Lab ID: 30274344009)
- RW16-MW(I) (Lab ID: 30274344010)
- RW16-MW(S) (Lab ID: 30274344007)
- RW18-MW(S) (Lab ID: 30274344008)

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.: 30274344

Sample: RW03-MW(I) Lab ID: 30274344001 Collected: 12/13/18 09:50 Received: 12/13/18 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	458	ug/L	3.0	0.34	1	12/17/18 13:19	12/18/18 10:32	7440-43-9	
Zinc	12000	ug/L	50.0	11.9	5	12/17/18 13:19	12/18/18 11:36	7440-66-6	MH
6010C MET ICP,Dissolved Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	342	ug/L	3.0	0.34	1	12/17/18 09:26	12/18/18 08:02	7440-43-9	
Zinc, Dissolved	14900	ug/L	1000	238	100	12/17/18 09:26	12/18/18 08:55	7440-66-6	MH,ML
4500H+ pH, Electrometric Analytical Method: SM4500H+B-2011									
pH at 25 Degrees C	6.6	Std. Units	2.0	2.0	1		12/14/18 20:55		H1,H6

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274344

Sample: RW11-MW(l)		Lab ID: 30274344002		Collected: 12/13/18 10:49		Received: 12/13/18 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	1160	ug/L	3.0	0.34	1	12/17/18 13:19	12/18/18 10:46	7440-43-9	
Zinc	165000	ug/L	1000	238	100	12/17/18 13:19	12/18/18 11:50	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	1160	ug/L	3.0	0.34	1	12/17/18 09:26	12/18/18 08:16	7440-43-9	
Zinc, Dissolved	176000	ug/L	1000	238	100	12/17/18 09:26	12/18/18 09:09	7440-66-6	
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	6.4	Std. Units	2.0	2.0	1		12/14/18 20:57		H1,H6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274344

Sample: RW12-MW(S)		Lab ID: 30274344003		Collected: 12/13/18 11:22		Received: 12/13/18 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	16.5	ug/L	3.0	0.34	1	12/17/18 13:19	12/18/18 10:48	7440-43-9	
Zinc	7840	ug/L	1000	238	100	12/17/18 13:19	12/18/18 11:52	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	15.3	ug/L	3.0	0.34	1	12/17/18 09:26	12/18/18 08:19	7440-43-9	
Zinc, Dissolved	8570	ug/L	1000	238	100	12/17/18 09:26	12/18/18 09:12	7440-66-6	
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	6.7	Std. Units	2.0	2.0	1		12/14/18 20:58		H1,H6

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274344

Sample: RW11-MW(S)		Lab ID: 30274344004		Collected: 12/13/18 11:53	Received: 12/13/18 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	1.1J	ug/L	3.0	0.34	1	12/17/18 13:19	12/18/18 10:59	7440-43-9		
Zinc	27200	ug/L	1000	238	100	12/17/18 13:19	12/18/18 11:55	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	0.81J	ug/L	3.0	0.34	1	12/17/18 09:26	12/18/18 08:27	7440-43-9		
Zinc, Dissolved	28900	ug/L	1000	238	100	12/17/18 09:26	12/18/18 09:14	7440-66-6		
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011								
pH at 25 Degrees C	6.1	Std. Units	2.0	2.0	1		12/14/18 21:00		H1,H6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274344

Sample: RW12-MW(I)		Lab ID: 30274344005		Collected: 12/13/18 12:49	Received: 12/13/18 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	1280	ug/L	3.0	0.34	1	12/17/18 13:19	12/18/18 11:02	7440-43-9		
Zinc	104000	ug/L	1000	238	100	12/17/18 13:19	12/18/18 12:08	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	1220	ug/L	3.0	0.34	1	12/17/18 09:26	12/18/18 08:30	7440-43-9		
Zinc, Dissolved	109000	ug/L	1000	238	100	12/17/18 09:26	12/18/18 09:17	7440-66-6		
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011								
pH at 25 Degrees C	6.0	Std. Units	2.0	2.0	1		12/14/18 21:01		H1,H6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274344

Sample: RW09-MW(I)		Lab ID: 30274344006		Collected: 12/13/18 13:03	Received: 12/13/18 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	0.98J	ug/L	3.0	0.34	1	12/17/18 13:19	12/18/18 11:04	7440-43-9		
Zinc	62100	ug/L	1000	238	100	12/17/18 13:19	12/18/18 12:11	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	0.96J	ug/L	3.0	0.34	1	12/17/18 09:26	12/18/18 08:32	7440-43-9		
Zinc, Dissolved	66600	ug/L	1000	238	100	12/17/18 09:26	12/18/18 09:24	7440-66-6		
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011								
pH at 25 Degrees C	6.1	Std. Units	2.0	2.0	1		12/14/18 21:04		H1,H6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274344

Sample: RW16-MW(S)		Lab ID: 30274344007		Collected: 12/13/18 14:47	Received: 12/13/18 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	3.0 U	ug/L	3.0	0.34	1	12/17/18 13:19	12/18/18 11:07	7440-43-9		
Zinc	10.8	ug/L	10.0	2.4	1	12/17/18 13:19	12/18/18 11:07	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	12/17/18 09:26	12/18/18 08:35	7440-43-9		
Zinc, Dissolved	5.5J	ug/L	10.0	2.4	1	12/17/18 09:26	12/18/18 08:35	7440-66-6		
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011								
pH at 25 Degrees C	11.5	Std. Units	2.0	2.0	1		12/14/18 21:06		H1,H6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274344

Sample: RW18-MW(S)		Lab ID: 30274344008		Collected: 12/13/18 14:16	Received: 12/13/18 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	8.8	ug/L	3.0	0.34	1	12/17/18 13:19	12/18/18 11:10	7440-43-9		
Zinc	258	ug/L	10.0	2.4	1	12/17/18 13:19	12/18/18 11:10	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	1.5J	ug/L	3.0	0.34	1	12/17/18 09:26	12/18/18 08:38	7440-43-9		
Zinc, Dissolved	12.7	ug/L	10.0	2.4	1	12/17/18 09:26	12/18/18 08:38	7440-66-6		
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011								
pH at 25 Degrees C	9.1	Std. Units	2.0	2.0	1		12/14/18 21:05		H1,H6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274344

Sample: RW13-MW(I)		Lab ID: 30274344009		Collected: 12/13/18 15:29		Received: 12/13/18 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	17.7	ug/L	3.0	0.34	1	12/17/18 13:19	12/18/18 11:12	7440-43-9	
Zinc	177	ug/L	10.0	2.4	1	12/17/18 13:19	12/18/18 11:12	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	3.2	ug/L	3.0	0.34	1	12/17/18 09:26	12/18/18 08:40	7440-43-9	
Zinc, Dissolved	116	ug/L	10.0	2.4	1	12/17/18 09:26	12/18/18 08:40	7440-66-6	
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	11.6	Std. Units	2.0	2.0	1		12/14/18 21:08		H1,H6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274344

Sample: RW16-MW(I)									
Lab ID: 30274344010									
Collected: 12/13/18 16:00 Received: 12/13/18 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	3.0 U	ug/L	3.0	0.34	1	12/17/18 13:19	12/18/18 11:15	7440-43-9	
Zinc	354	ug/L	10.0	2.4	1	12/17/18 13:19	12/18/18 11:15	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	12/17/18 09:26	12/18/18 08:43	7440-43-9	
Zinc, Dissolved	6.0J	ug/L	10.0	2.4	1	12/17/18 09:26	12/18/18 08:43	7440-66-6	
4500H+ pH, Electrometric									
Analytical Method: SM4500H+B-2011									
pH at 25 Degrees C	9.9	Std. Units	2.0	2.0	1		12/14/18 21:09		H1,H6

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274344

QC Batch: 324200 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30274344001, 30274344002, 30274344003, 30274344004, 30274344005, 30274344006, 30274344007, 30274344008, 30274344009, 30274344010

METHOD BLANK: 1580471 Matrix: Water
Associated Lab Samples: 30274344001, 30274344002, 30274344003, 30274344004, 30274344005, 30274344006, 30274344007, 30274344008, 30274344009, 30274344010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/18/18 10:27	
Zinc	ug/L	10.0 U	10.0	2.4	12/18/18 10:27	

LABORATORY CONTROL SAMPLE: 1580472

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	517	103	80-120	
Zinc	ug/L	500	510	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1580474 1580475

Parameter	Units	30274344001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	458	500	500	997	1000	108	109	75-125	0	20	
Zinc	ug/L	12000	500	500	12700	13000	136	190	75-125	2	20 MH	

MATRIX SPIKE SAMPLE: 1580477

Parameter	Units	30274342011 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	3.0 U	500	514	103	75-125	
Zinc	ug/L	10.0 U	500	508	101	75-125	

SAMPLE DUPLICATE: 1580473

Parameter	Units	30274344001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	458	454	1	20	
Zinc	ug/L	12000	12300	2	20	

SAMPLE DUPLICATE: 1580476

Parameter	Units	30274342011 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: Rod and Wire Mill GW Sampling
Pace Project No.: 30274344

SAMPLE DUPLICATE: 1580476

Parameter	Units	30274342011 Result	Dup Result	RPD	Max RPD	Qualifiers
Zinc	ug/L	10.0 U	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.: 30274344

QC Batch: 324121 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30274344001, 30274344002, 30274344003, 30274344004, 30274344005, 30274344006, 30274344007, 30274344008, 30274344009, 30274344010

METHOD BLANK: 1580238 Matrix: Water
Associated Lab Samples: 30274344001, 30274344002, 30274344003, 30274344004, 30274344005, 30274344006, 30274344007, 30274344008, 30274344009, 30274344010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	12/18/18 07:58	
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	12/18/18 07:58	

LABORATORY CONTROL SAMPLE: 1580239

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	468	94	80-120	
Zinc, Dissolved	ug/L	500	506	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1580241 1580242

Parameter	Units	30274344001 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	342	500	500	851	836	102	99	75-125	2	20	
Zinc, Dissolved	ug/L	14900	500	500	15600	15100	136	32	75-125	3	20	MH,ML

SAMPLE DUPLICATE: 1580240

Parameter	Units	30274344001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	342	342	0	20	
Zinc, Dissolved	ug/L	14900	15200	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.: 30274344

QC Batch:	324082	Analysis Method:	SM4500H+B-2011
QC Batch Method:	SM4500H+B-2011	Analysis Description:	4500H+B pH
Associated Lab Samples:	30274344001, 30274344002, 30274344003, 30274344004, 30274344005, 30274344006, 30274344007, 30274344008, 30274344009, 30274344010		

SAMPLE DUPLICATE: 1579753

Parameter	Units	30274421001 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	7.1	7.2	0	10	H3,H6

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.: 30274344

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

H1 Analysis conducted outside the EPA method holding time.

H3 Sample was received or analysis requested beyond the recognized method holding time.

H6 Analysis initiated outside of the 15 minute EPA required holding time.

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.: 30274344

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30274344001	RW03-MW(I)	EPA 3005A	324200	EPA 6010C	324260
30274344002	RW11-MW(I)	EPA 3005A	324200	EPA 6010C	324260
30274344003	RW12-MW(S)	EPA 3005A	324200	EPA 6010C	324260
30274344004	RW11-MW(S)	EPA 3005A	324200	EPA 6010C	324260
30274344005	RW12-MW(I)	EPA 3005A	324200	EPA 6010C	324260
30274344006	RW09-MW(I)	EPA 3005A	324200	EPA 6010C	324260
30274344007	RW16-MW(S)	EPA 3005A	324200	EPA 6010C	324260
30274344008	RW18-MW(S)	EPA 3005A	324200	EPA 6010C	324260
30274344009	RW13-MW(I)	EPA 3005A	324200	EPA 6010C	324260
30274344010	RW16-MW(I)	EPA 3005A	324200	EPA 6010C	324260
30274344001	RW03-MW(I)	EPA 3005A	324121	EPA 6010C	324231
30274344002	RW11-MW(I)	EPA 3005A	324121	EPA 6010C	324231
30274344003	RW12-MW(S)	EPA 3005A	324121	EPA 6010C	324231
30274344004	RW11-MW(S)	EPA 3005A	324121	EPA 6010C	324231
30274344005	RW12-MW(I)	EPA 3005A	324121	EPA 6010C	324231
30274344006	RW09-MW(I)	EPA 3005A	324121	EPA 6010C	324231
30274344007	RW16-MW(S)	EPA 3005A	324121	EPA 6010C	324231
30274344008	RW18-MW(S)	EPA 3005A	324121	EPA 6010C	324231
30274344009	RW13-MW(I)	EPA 3005A	324121	EPA 6010C	324231
30274344010	RW16-MW(I)	EPA 3005A	324121	EPA 6010C	324231
30274344001	RW03-MW(I)	SM4500H+B-2011	324082		
30274344002	RW11-MW(I)	SM4500H+B-2011	324082		
30274344003	RW12-MW(S)	SM4500H+B-2011	324082		
30274344004	RW11-MW(S)	SM4500H+B-2011	324082		
30274344005	RW12-MW(I)	SM4500H+B-2011	324082		
30274344006	RW09-MW(I)	SM4500H+B-2011	324082		
30274344007	RW16-MW(S)	SM4500H+B-2011	324082		
30274344008	RW18-MW(S)	SM4500H+B-2011	324082		
30274344009	RW13-MW(I)	SM4500H+B-2011	324082		
30274344010	RW16-MW(I)	SM4500H+B-2011	324082		

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.



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: 180227M

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:
 Manager:
 Pace Profile #:

REGULATORY AGENCY

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

Requested Analysis Filtered (Y/N)

WO#: 30274344

Requested Analysis Filtered (Y/N)

Analysis Test ↑
 Total Cadmium 6010
 Total Zinc 6010
 pH
 Dissolved Cd 6010
 Dissolved Zn 6010

Requested Analysis Filtered (Y/N)

Residual

Requested Analysis Filtered (Y/N)

Residual

Requested Analysis Filtered (Y/N)

Residual

Requested Analysis Filtered (Y/N)

Residual

Requested Analysis Filtered (Y/N)

Residual

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 ₃ Methanol Other	ACCEPTED BY / AFFILIATION	DATE	TIME	DATE	TIME	SAMPLE CONDITIONS	Temp In °C	Received on Ice (Y/N)	Custody Sealed (Y/N)	Samples Intact (Y/N)											
				COMPOSITE START	COMPOSITE END/GRAB																								
1		WT G		DATE	TIME		3																						
				12/13/18	9:50		3																						
2		WT G					3																						
					10:49		3																						
3		WT G					3																						
					11:20		3																						
4		WT G					3																						
					11:53		3																						
5		WT G					3																						
					12:49		3																						
6		WT G					3																						
					13:03		3																						
7		WT G					3																						
					14:47		3																						
8		WT G					3																						
					14:16		3																						
9		WT G					3																						
					15:29		3																						
10		WT G					3																						
					16:00		3																						
11																													
12																													
ADDITIONAL COMMENTS: data packages required Liana Agrios David S. Hellebrand Wendy S. Kelly 12/13/18 10:57 David S. Hellebrand Wendy S. Kelly 12/13/18 19:15 12/13/18 20:50																													

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Liana Agrios
 SIGNATURE of SAMPLER: Liana Agrios
 DATE Signed (MM/DD/YYYY): 12/13/18

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Liana Agrios
 SIGNATURE of SAMPLER: Liana Agrios
 DATE Signed (MM/DD/YYYY): 12/13/18

Pittsburgh Lab Sample Condition Upon Receipt



Client Name: enviroanalytics

Project # 30274344

Courier: Fed Ex UPS USPS Client Commercial Pace Other _____

Tracking #: N/A

Label <u>BJH</u>
LIMS Login <u>BJH</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 1.2 °C Correction Factor: -0.1 °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>BJH 12/19/18</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 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>BJH</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 Aqueous Samples Screened > 0.5 mrem/hr			/	Initial when completed: <u>BJH</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.

December 20, 2018

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.: 30274558

Dear Mr. Calenda:

Enclosed are the analytical results for sample(s) received by the laboratory on December 14, 2018. 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.: 30274558

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.: 30274558

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30274558001	RW06-MW(I)	Water	12/14/18 09:53	12/14/18 23:45
30274558002	RW10-MW(I)	Water	12/14/18 10:14	12/14/18 23:45
30274558003	RW18-MW(I)	Water	12/14/18 11:28	12/14/18 23:45
30274558004	RW22-MW(I)	Water	12/14/18 11:48	12/14/18 23:45
30274558005	RW05-MW(S)	Water	12/14/18 13:18	12/14/18 23:45
30274558006	RW01-MW(S)	Water	12/14/18 13:30	12/14/18 23:45
30274558007	RW05-MW(I)	Water	12/14/18 13:59	12/14/18 23:45
30274558008	RW01-MW(I)	Water	12/14/18 14:50	12/14/18 23:45
30274558009	RW02-MW(S)	Water	12/14/18 16:25	12/14/18 23:45

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274558

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30274558001	RW06-MW(I)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30274558002	RW10-MW(I)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30274558003	RW18-MW(I)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30274558004	RW22-MW(I)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30274558005	RW05-MW(S)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30274558006	RW01-MW(S)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30274558007	RW05-MW(I)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30274558008	RW01-MW(I)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1
30274558009	RW02-MW(S)	EPA 6010C	KAS	2
		EPA 6010C	KAS	2
		SM4500H+B-2011	ZMH	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

Method: EPA 6010C

Description: 6010C MET ICP

Client: EnviroAnalytics Group, LLC

Date: December 20, 2018

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.

QC Batch: 324274

B: Analyte was detected in the associated method blank.

- BLANK for HBN 324274 [MPRP/247 (Lab ID: 1580779)]
- 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.

QC Batch: 324274

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30274558001

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

- MSD (Lab ID: 1580783)
- Zinc

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

- MS (Lab ID: 1580782)
- 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.: 30274558

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: December 20, 2018

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.

QC Batch: 324273

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 30274558001

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

- MS (Lab ID: 1580777)
 - Zinc, Dissolved
- MSD (Lab ID: 1580778)
 - 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: 324358

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: December 20, 2018

Analyte Comments:

QC Batch: 324273

1c: The PDS failed for Zn

- BLANK (Lab ID: 1580774)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- DUP (Lab ID: 1580776)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- LCS (Lab ID: 1580775)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- MS (Lab ID: 1580777)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- MSD (Lab ID: 1580778)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW01-MW(I) (Lab ID: 30274558008)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW01-MW(S) (Lab ID: 30274558006)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW02-MW(S) (Lab ID: 30274558009)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW05-MW(I) (Lab ID: 30274558007)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW05-MW(S) (Lab ID: 30274558005)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW06-MW(I) (Lab ID: 30274558001)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW10-MW(I) (Lab ID: 30274558002)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW18-MW(I) (Lab ID: 30274558003)
 - Cadmium, Dissolved
 - Zinc, Dissolved
- RW22-MW(I) (Lab ID: 30274558004)
 - Cadmium, Dissolved
 - Zinc, Dissolved

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

Method: EPA 6010C

Description: 6010C MET ICP,Dissolved

Client: EnviroAnalytics Group, LLC

Date: December 20, 2018

Analyte Comments:

QC Batch: 324273

2c: The PDS recovery was outside of the laboratory control limits. Result may be biased high

- RW06-MW(I) (Lab ID: 30274558001)
 - Zinc, Dissolved

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

Method: SM4500H+B-2011

Description: 4500H+ pH, Electrometric

Client: EnviroAnalytics Group, LLC

Date: December 20, 2018

General Information:

9 samples were analyzed for SM4500H+B-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.

H1: Analysis conducted outside the EPA method holding time.

- RW01-MW(I) (Lab ID: 30274558008)
- RW01-MW(S) (Lab ID: 30274558006)
- RW02-MW(S) (Lab ID: 30274558009)
- RW05-MW(I) (Lab ID: 30274558007)
- RW05-MW(S) (Lab ID: 30274558005)
- RW06-MW(I) (Lab ID: 30274558001)
- RW10-MW(I) (Lab ID: 30274558002)
- RW18-MW(I) (Lab ID: 30274558003)
- RW22-MW(I) (Lab ID: 30274558004)

H6: Analysis initiated outside of the 15 minute EPA required holding time.

- RW01-MW(I) (Lab ID: 30274558008)
- RW01-MW(S) (Lab ID: 30274558006)
- RW02-MW(S) (Lab ID: 30274558009)
- RW05-MW(I) (Lab ID: 30274558007)
- RW05-MW(S) (Lab ID: 30274558005)
- RW06-MW(I) (Lab ID: 30274558001)
- RW10-MW(I) (Lab ID: 30274558002)
- RW18-MW(I) (Lab ID: 30274558003)
- RW22-MW(I) (Lab ID: 30274558004)

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.: 30274558

Sample: RW06-MW(I) Lab ID: 30274558001 Collected: 12/14/18 09:53 Received: 12/14/18 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	733	ug/L	3.0	0.34	1	12/18/18 07:54	12/19/18 17:05	7440-43-9	
Zinc	99800	ug/L	1000	238	100	12/18/18 07:54	12/19/18 17:47	7440-66-6	MH,ML
6010C MET ICP,Dissolved Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	752	ug/L	3.0	0.34	1	12/18/18 07:52	12/19/18 15:39	7440-43-9	1c
Zinc, Dissolved	99600	ug/L	1000	238	100	12/18/18 07:52	12/19/18 16:23	7440-66-6	1c,2c,ML
4500H+ pH, Electrometric Analytical Method: SM4500H+B-2011									
pH at 25 Degrees C	5.8	Std. Units	2.0	2.0	1		12/17/18 21:42		H1,H6

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

Sample: RW10-MW(I)		Lab ID: 30274558002		Collected: 12/14/18 10:14		Received: 12/14/18 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	1.4J	ug/L	3.0	0.34	1	12/18/18 07:54	12/19/18 17:19	7440-43-9	
Zinc	2990	ug/L	10.0	2.4	1	12/18/18 07:54	12/19/18 17:19	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	12/18/18 07:52	12/19/18 15:54	7440-43-9	1c
Zinc, Dissolved	2520	ug/L	10.0	2.4	1	12/18/18 07:52	12/19/18 15:54	7440-66-6	1c
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	6.5	Std. Units	2.0	2.0	1		12/17/18 21:43		H1,H6

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

Sample: RW18-MW(I)		Lab ID: 30274558003		Collected: 12/14/18 11:28		Received: 12/14/18 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	230	ug/L	3.0	0.34	1	12/18/18 07:54	12/19/18 17:21	7440-43-9	
Zinc	319000	ug/L	1000	238	100	12/18/18 07:54	12/19/18 18:07	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	44.7	ug/L	3.0	0.34	1	12/18/18 07:52	12/19/18 15:56	7440-43-9	1c
Zinc, Dissolved	318000	ug/L	1000	238	100	12/18/18 07:52	12/19/18 16:43	7440-66-6	1c
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	5.3	Std. Units	2.0	2.0	1		12/17/18 21:44		H1,H6

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

Sample: RW22-MW(I)		Lab ID: 30274558004		Collected: 12/14/18 11:48		Received: 12/14/18 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	12/18/18 07:54	12/19/18 17:32	7440-43-9	
Zinc	72700	ug/L	1000	238	100	12/18/18 07:54	12/19/18 18:10	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	12/18/18 07:52	12/19/18 16:07	7440-43-9	1c
Zinc, Dissolved	68100	ug/L	1000	238	100	12/18/18 07:52	12/19/18 16:46	7440-66-6	1c
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	4.6	Std. Units	2.0	2.0	1		12/17/18 21:47		H1,H6

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

Sample: RW05-MW(S) Lab ID: 30274558005 Collected: 12/14/18 13:18 Received: 12/14/18 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	12/18/18 07:54	12/19/18 18:19	7440-43-9	
Zinc	6.4J	ug/L	10.0	2.4	1	12/18/18 07:54	12/19/18 18:19	7440-66-6	B
6010C MET ICP,Dissolved Analytical Method: EPA 6010C Preparation Method: EPA 3005A									
Cadmium, Dissolved	3.0 U	ug/L	3.0	0.34	1	12/18/18 07:52	12/19/18 16:11	7440-43-9	1c
Zinc, Dissolved	10.0 U	ug/L	10.0	2.4	1	12/18/18 07:52	12/19/18 16:11	7440-66-6	1c
4500H+ pH, Electrometric Analytical Method: SM4500H+B-2011									
pH at 25 Degrees C	7.5	Std. Units	2.0	2.0	1		12/17/18 21:48		H1,H6

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

Sample: RW01-MW(S)		Lab ID: 30274558006		Collected: 12/14/18 13:30	Received: 12/14/18 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	1.9J	ug/L	3.0	0.34	1	12/18/18 07:54	12/19/18 17:37	7440-43-9		
Zinc	14000	ug/L	1000	238	100	12/18/18 07:54	12/19/18 18:12	7440-66-6		
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A								
Cadmium, Dissolved	1.8J	ug/L	3.0	0.34	1	12/18/18 07:52	12/19/18 16:14	7440-43-9	1c	
Zinc, Dissolved	13700	ug/L	1000	238	100	12/18/18 07:52	12/19/18 16:48	7440-66-6	1c	
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011								
pH at 25 Degrees C	5.8	Std. Units	2.0	2.0	1		12/17/18 21:50		H1,H6	

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

Sample: RW05-MW(I)		Lab ID: 30274558007		Collected: 12/14/18 13:59		Received: 12/14/18 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	1.6J	ug/L	3.0	0.34	1	12/18/18 07:54	12/19/18 17:40	7440-43-9	
Zinc	450	ug/L	10.0	2.4	1	12/18/18 07:54	12/19/18 17:40	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	0.76J	ug/L	3.0	0.34	1	12/18/18 07:52	12/19/18 16:16	7440-43-9	1c
Zinc, Dissolved	177	ug/L	10.0	2.4	1	12/18/18 07:52	12/19/18 16:16	7440-66-6	1c
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	6.6	Std. Units	2.0	2.0	1		12/17/18 21:51		H1,H6

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

Sample: RW01-MW(I)		Lab ID: 30274558008		Collected: 12/14/18 14:50		Received: 12/14/18 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	25.8	ug/L	3.0	0.34	1	12/18/18 07:54	12/19/18 17:42	7440-43-9	
Zinc	5000	ug/L	1000	238	100	12/18/18 07:54	12/19/18 18:14	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	9.3	ug/L	3.0	0.34	1	12/18/18 07:52	12/19/18 16:19	7440-43-9	1c
Zinc, Dissolved	3880	ug/L	10.0	2.4	1	12/18/18 07:52	12/19/18 16:19	7440-66-6	1c
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	6.2	Std. Units	2.0	2.0	1		12/17/18 21:51		H1,H6

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ANALYTICAL RESULTS

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274558

Sample: RW02-MW(S)		Lab ID: 30274558009		Collected: 12/14/18 16:25		Received: 12/14/18 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	8.6	ug/L	3.0	0.34	1	12/18/18 07:54	12/19/18 17:44	7440-43-9	
Zinc	26800	ug/L	1000	238	100	12/18/18 07:54	12/19/18 18:17	7440-66-6	
6010C MET ICP,Dissolved		Analytical Method: EPA 6010C Preparation Method: EPA 3005A							
Cadmium, Dissolved	9.0	ug/L	3.0	0.34	1	12/18/18 07:52	12/19/18 16:21	7440-43-9	1c
Zinc, Dissolved	27400	ug/L	1000	238	100	12/18/18 07:52	12/19/18 16:51	7440-66-6	1c
4500H+ pH, Electrometric		Analytical Method: SM4500H+B-2011							
pH at 25 Degrees C	6.0	Std. Units	2.0	2.0	1		12/17/18 21:53		H1,H6

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274558

QC Batch: 324274 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET
Associated Lab Samples: 30274558001, 30274558002, 30274558003, 30274558004, 30274558005, 30274558006, 30274558007, 30274558008, 30274558009

METHOD BLANK: 1580779 Matrix: Water
Associated Lab Samples: 30274558001, 30274558002, 30274558003, 30274558004, 30274558005, 30274558006, 30274558007, 30274558008, 30274558009

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium	ug/L	3.0 U	3.0	0.34	12/19/18 17:00	
Zinc	ug/L	2.6J	10.0	2.4	12/19/18 17:00	

LABORATORY CONTROL SAMPLE: 1580780

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium	ug/L	500	512	102	80-120	
Zinc	ug/L	500	517	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1580782 1580783

Parameter	Units	30274558001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	ug/L	733	500	500	1210	1260	96	106	75-125	4	20	
Zinc	ug/L	99800	500	500	100000	101000	42	222	75-125	1	20	MH,ML

SAMPLE DUPLICATE: 1580781

Parameter	Units	30274558001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium	ug/L	733	751	2	20	
Zinc	ug/L	99800	102000	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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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling
Pace Project No.: 30274558

QC Batch: 324273 Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A Analysis Description: 6010C MET Dissolved
Associated Lab Samples: 30274558001, 30274558002, 30274558003, 30274558004, 30274558005, 30274558006, 30274558007, 30274558008, 30274558009

METHOD BLANK: 1580774 Matrix: Water
Associated Lab Samples: 30274558001, 30274558002, 30274558003, 30274558004, 30274558005, 30274558006, 30274558007, 30274558008, 30274558009

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Cadmium, Dissolved	ug/L	3.0 U	3.0	0.34	12/19/18 15:35	1c
Zinc, Dissolved	ug/L	10.0 U	10.0	2.4	12/19/18 15:35	1c

LABORATORY CONTROL SAMPLE: 1580775

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cadmium, Dissolved	ug/L	500	471	94	80-120	1c
Zinc, Dissolved	ug/L	500	472	94	80-120	1c

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1580777 1580778

Parameter	Units	30274558001 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	752	500	500	1270	1260	103	101	75-125	1	20	1c
Zinc, Dissolved	ug/L	99600	500	500	98900	98800	-138	-162	75-125	0	20	1c, ML

SAMPLE DUPLICATE: 1580776

Parameter	Units	30274558001 Result	Dup Result	RPD	Max RPD	Qualifiers
Cadmium, Dissolved	ug/L	752	762	1	20	1c
Zinc, Dissolved	ug/L	99600	100000	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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QUALITY CONTROL DATA

Project: Rod and Wire Mill GW Sampling

Pace Project No.: 30274558

QC Batch: 324263

Analysis Method: SM4500H+B-2011

QC Batch Method: SM4500H+B-2011

Analysis Description: 4500H+B pH

Associated Lab Samples: 30274558001, 30274558002, 30274558003, 30274558004, 30274558005, 30274558006, 30274558007, 30274558008, 30274558009

SAMPLE DUPLICATE: 1580723

Parameter	Units	30274604002 Result	Dup Result	RPD	Max RPD	Qualifiers
pH at 25 Degrees C	Std. Units	9.7	9.7	0	10	H3,H6

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.: 30274558

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: 324358

[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 high

B Analyte was detected in the associated method blank.

H1 Analysis conducted outside the EPA method holding time.

H3 Sample was received or analysis requested beyond the recognized method holding time.

H6 Analysis initiated outside of the 15 minute EPA required holding time.

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.: 30274558

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
30274558001	RW06-MW(I)	EPA 3005A	324274	EPA 6010C	324359
30274558002	RW10-MW(I)	EPA 3005A	324274	EPA 6010C	324359
30274558003	RW18-MW(I)	EPA 3005A	324274	EPA 6010C	324359
30274558004	RW22-MW(I)	EPA 3005A	324274	EPA 6010C	324359
30274558005	RW05-MW(S)	EPA 3005A	324274	EPA 6010C	324359
30274558006	RW01-MW(S)	EPA 3005A	324274	EPA 6010C	324359
30274558007	RW05-MW(I)	EPA 3005A	324274	EPA 6010C	324359
30274558008	RW01-MW(I)	EPA 3005A	324274	EPA 6010C	324359
30274558009	RW02-MW(S)	EPA 3005A	324274	EPA 6010C	324359
30274558001	RW06-MW(I)	EPA 3005A	324273	EPA 6010C	324358
30274558002	RW10-MW(I)	EPA 3005A	324273	EPA 6010C	324358
30274558003	RW18-MW(I)	EPA 3005A	324273	EPA 6010C	324358
30274558004	RW22-MW(I)	EPA 3005A	324273	EPA 6010C	324358
30274558005	RW05-MW(S)	EPA 3005A	324273	EPA 6010C	324358
30274558006	RW01-MW(S)	EPA 3005A	324273	EPA 6010C	324358
30274558007	RW05-MW(I)	EPA 3005A	324273	EPA 6010C	324358
30274558008	RW01-MW(I)	EPA 3005A	324273	EPA 6010C	324358
30274558009	RW02-MW(S)	EPA 3005A	324273	EPA 6010C	324358
30274558001	RW06-MW(I)	SM4500H+B-2011	324263		
30274558002	RW10-MW(I)	SM4500H+B-2011	324263		
30274558003	RW18-MW(I)	SM4500H+B-2011	324263		
30274558004	RW22-MW(I)	SM4500H+B-2011	324263		
30274558005	RW05-MW(S)	SM4500H+B-2011	324263		
30274558006	RW01-MW(S)	SM4500H+B-2011	324263		
30274558007	RW05-MW(I)	SM4500H+B-2011	324263		
30274558008	RW01-MW(I)	SM4500H+B-2011	324263		
30274558009	RW02-MW(S)	SM4500H+B-2011	324263		

REPORT OF LABORATORY ANALYSIS

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WO#: 30274558



30274558

CHAIN-OF-CUSTODY / Analytical Request Document

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

30274558

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: lcalenda@enviroanalyticsgroup.com
 Phone: 314-620-3056 Fax:
 Requested 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
 PACE Quote Reference: Samantha Bayura
 PACE Profile #: 180327M

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

SAMPLE ID
 (A-Z, 0-9 / -)
 Sample IDs MUST BE UNIQUE

ITEM #	MATRIX CODE	SAMPLE TYPE (G-GRAB C-COMP)	COLLECTED		DATE	TIME	DATE	TIME	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	DATE	TIME	SAMPLE CONDITIONS	
			COMPOSITE START	COMPOSITE END/GRAB													
1	RW04-MW(I)	WT G			12/14/18	16:53			12/14/18	16:51	David H. Agrios	12/14/18	16:51				
2	RW10-MW(I)	WT G			10/4												
3	RW18-MW(I)	WT G			11/28												
4	RW23-MW(I)	WT G			11/48												
5	RW05-MW(S)	WT G			13/18												
6	RW01-MW(S)	WT G			13/30												
7	RW05-MW(I)	WT G			13/59												
8	RW01-MW(I)	WT G			14/50												
9	RW02-MW(S)	WT G			16/25												

ITEM #	MATRIX CODE	SAMPLE TYPE (G-GRAB C-COMP)	DATE	TIME	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	DATE	TIME	SAMPLE CONDITIONS	
																		COMPOSITE START
1	RW04-MW(I)	WT G	12/14/18	16:53	12/14/18	16:51	David H. Agrios	12/14/18	16:51									
2	RW10-MW(I)	WT G	10/4															
3	RW18-MW(I)	WT G	11/28															
4	RW23-MW(I)	WT G	11/48															
5	RW05-MW(S)	WT G	13/18															
6	RW01-MW(S)	WT G	13/30															
7	RW05-MW(I)	WT G	13/59															
8	RW01-MW(I)	WT G	14/50															
9	RW02-MW(S)	WT G	16/25															

ITEM #	MATRIX CODE	SAMPLE TYPE (G-GRAB C-COMP)	DATE	TIME	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	DATE	TIME	SAMPLE CONDITIONS	
																		COMPOSITE START
1	RW04-MW(I)	WT G	12/14/18	16:53	12/14/18	16:51	David H. Agrios	12/14/18	16:51									
2	RW10-MW(I)	WT G	10/4															
3	RW18-MW(I)	WT G	11/28															
4	RW23-MW(I)	WT G	11/48															
5	RW05-MW(S)	WT G	13/18															
6	RW01-MW(S)	WT G	13/30															
7	RW05-MW(I)	WT G	13/59															
8	RW01-MW(I)	WT G	14/50															
9	RW02-MW(S)	WT G	16/25															

ITEM #	MATRIX CODE	SAMPLE TYPE (G-GRAB C-COMP)	DATE	TIME	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	DATE	TIME	SAMPLE CONDITIONS	
1	RW04-MW(I)	WT G	12/14/18	16:53	12/14/18	16:51	David H. Agrios	12/14/18	16:51									
2	RW10-MW(I)	WT G	10/4															
3	RW18-MW(I)	WT G	11/28															
4	RW23-MW(I)	WT G	11/48															
5	RW05-MW(S)	WT G	13/18															
6	RW01-MW(S)	WT G	13/30															
7	RW05-MW(I)	WT G	13/59															
8	RW01-MW(I)	WT G	14/50															
9	RW02-MW(S)	WT G	16/25															

data packages required

SAMPLER NAME AND SIGNATURE
 PRINT Name of SAMPLER: Liana Agrios
 DATE Signed 12/14/18

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

Pittsburgh Lab Sample Condition Upon Receipt

Face Analytical

Client Name: SPAWANS

Project # 30274558

Courier: Fed Ex UPS USPS Client Commercial Pace Other

Label JRM
LIMS Login JRM

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 2.7 °C Correction Factor: 10.0 °C Final Temp: 2.7 °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"/>	10D2981	JRM 12/15/18
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 checked="" type="checkbox"/>	<input type="checkbox"/>		JRM 12/15/18
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 Compliance/NPDES sample field filtered	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Organic Samples checked for dechlorination:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Filtered volume received for Dissolved tests	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		JRM 12/15/18
All containers have been checked for preservation.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
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>JRM</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 Aqueous 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.

APPENDIX D

Statistical Trend Test Results

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW08-MW(I)

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
6.21	5.57	0.64	11	4
3.14	5.57	-2.43	11	5
3.88	5.57	-1.69	11	6
6.31	5.57	0.74	12	6
6.78	5.57	1.21	13	6
6.34	5.57	0.77	14	6
5.99	5.57	0.42	15	6
6.21	5.57	0.64	16	6
6.3	5.57	0.73	17	6
6.27	5.57	0.7	18	6
6.57	5.57	1	19	6
7.89	5.57	2.32	20	6
6.9	5.57	1.33	21	6
3.14	6.21	-3.07	21	7
3.88	6.21	-2.33	21	8
6.31	6.21	0.1	22	8
6.78	6.21	0.57	23	8
6.34	6.21	0.13	24	8
5.99	6.21	-0.22	24	9
6.21	6.21	0	24	9
6.3	6.21	0.09	25	9
6.27	6.21	0.06	26	9
6.57	6.21	0.36	27	9
7.89	6.21	1.68	28	9
6.9	6.21	0.69	29	9
3.88	3.14	0.74	30	9
6.31	3.14	3.17	31	9
6.78	3.14	3.64	32	9
6.34	3.14	3.2	33	9
5.99	3.14	2.85	34	9
6.21	3.14	3.07	35	9
6.3	3.14	3.16	36	9
6.27	3.14	3.13	37	9
6.57	3.14	3.43	38	9
7.89	3.14	4.75	39	9
6.9	3.14	3.76	40	9
6.31	3.88	2.43	41	9
6.78	3.88	2.9	42	9
6.34	3.88	2.46	43	9
5.99	3.88	2.11	44	9
6.21	3.88	2.33	45	9
6.3	3.88	2.42	46	9
6.27	3.88	2.39	47	9

6.57	3.88	2.69	48	9
7.89	3.88	4.01	49	9
6.9	3.88	3.02	50	9
6.78	6.31	0.47	51	9
6.34	6.31	0.03	52	9
5.99	6.31	-0.32	52	10
6.21	6.31	-0.1	52	11
6.3	6.31	-0.01	52	12
6.27	6.31	-0.04	52	13
6.57	6.31	0.26	53	13
7.89	6.31	1.58	54	13
6.9	6.31	0.59	55	13
6.34	6.78	-0.44	55	14
5.99	6.78	-0.79	55	15
6.21	6.78	-0.57	55	16
6.3	6.78	-0.48	55	17
6.27	6.78	-0.51	55	18
6.57	6.78	-0.21	55	19
7.89	6.78	1.11	56	19
6.9	6.78	0.12	57	19
5.99	6.34	-0.35	57	20
6.21	6.34	-0.13	57	21
6.3	6.34	-0.04	57	22
6.27	6.34	-0.07	57	23
6.57	6.34	0.23	58	23
7.89	6.34	1.55	59	23
6.9	6.34	0.56	60	23
6.21	5.99	0.22	61	23
6.3	5.99	0.31	62	23
6.27	5.99	0.28	63	23
6.57	5.99	0.58	64	23
7.89	5.99	1.9	65	23
6.9	5.99	0.91	66	23
6.3	6.21	0.09	67	23
6.27	6.21	0.06	68	23
6.57	6.21	0.36	69	23
7.89	6.21	1.68	70	23
6.9	6.21	0.69	71	23
6.27	6.3	-0.03	71	24
6.57	6.3	0.27	72	24
7.89	6.3	1.59	73	24
6.9	6.3	0.6	74	24
6.57	6.27	0.3	75	24
7.89	6.27	1.62	76	24
6.9	6.27	0.63	77	24
7.89	6.57	1.32	78	24
6.9	6.57	0.33	79	24
6.9	7.89	-0.99	79	25

S Statistic = 79 - 25 = 54

Tied Group	Value	Members
1	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

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 7350

b = 24570

c = 420

Group Variance = 407.333

Z-Score = 2.62604

Comparison Level at 95% confidence level = 1.65463 (upward trend)

2.62604 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: pH

Location: RW11-MW(I)

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
5.35	5.93	-0.58	6	10
6.11	5.93	0.18	7	10
5.5	5.93	-0.43	7	11
5.66	5.93	-0.27	7	12
5.81	5.93	-0.12	7	13
5.21	5.93	-0.72	7	14
5.92	5.93	-0.01	7	15
6.2	5.93	0.27	8	15
6.16	5.93	0.23	9	15
5.61	5.93	-0.32	9	16
5.98	5.93	0.05	10	16
6.23	5.93	0.3	11	16
7.27	5.93	1.34	12	16
6.4	5.93	0.47	13	16
6.11	5.35	0.76	14	16
5.5	5.35	0.15	15	16
5.66	5.35	0.31	16	16
5.81	5.35	0.46	17	16
5.21	5.35	-0.14	17	17
5.92	5.35	0.57	18	17
6.2	5.35	0.85	19	17
6.16	5.35	0.81	20	17
5.61	5.35	0.26	21	17
5.98	5.35	0.63	22	17
6.23	5.35	0.88	23	17
7.27	5.35	1.92	24	17
6.4	5.35	1.05	25	17
5.5	6.11	-0.61	25	18
5.66	6.11	-0.45	25	19
5.81	6.11	-0.3	25	20
5.21	6.11	-0.9	25	21
5.92	6.11	-0.19	25	22
6.2	6.11	0.09	26	22
6.16	6.11	0.05	27	22
5.61	6.11	-0.5	27	23
5.98	6.11	-0.13	27	24
6.23	6.11	0.12	28	24
7.27	6.11	1.16	29	24
6.4	6.11	0.29	30	24
5.66	5.5	0.16	31	24
5.81	5.5	0.31	32	24
5.21	5.5	-0.29	32	25

5.92	5.5	0.42	33	25
6.2	5.5	0.7	34	25
6.16	5.5	0.66	35	25
5.61	5.5	0.11	36	25
5.98	5.5	0.48	37	25
6.23	5.5	0.73	38	25
7.27	5.5	1.77	39	25
6.4	5.5	0.9	40	25
5.81	5.66	0.15	41	25
5.21	5.66	-0.45	41	26
5.92	5.66	0.26	42	26
6.2	5.66	0.54	43	26
6.16	5.66	0.5	44	26
5.61	5.66	-0.05	44	27
5.98	5.66	0.32	45	27
6.23	5.66	0.57	46	27
7.27	5.66	1.61	47	27
6.4	5.66	0.74	48	27
5.21	5.81	-0.6	48	28
5.92	5.81	0.11	49	28
6.2	5.81	0.39	50	28
6.16	5.81	0.35	51	28
5.61	5.81	-0.2	51	29
5.98	5.81	0.17	52	29
6.23	5.81	0.42	53	29
7.27	5.81	1.46	54	29
6.4	5.81	0.59	55	29
5.92	5.21	0.71	56	29
6.2	5.21	0.99	57	29
6.16	5.21	0.95	58	29
5.61	5.21	0.4	59	29
5.98	5.21	0.77	60	29
6.23	5.21	1.02	61	29
7.27	5.21	2.06	62	29
6.4	5.21	1.19	63	29
6.2	5.92	0.28	64	29
6.16	5.92	0.24	65	29
5.61	5.92	-0.31	65	30
5.98	5.92	0.06	66	30
6.23	5.92	0.31	67	30
7.27	5.92	1.35	68	30
6.4	5.92	0.48	69	30
6.16	6.2	-0.04	69	31
5.61	6.2	-0.59	69	32
5.98	6.2	-0.22	69	33
6.23	6.2	0.03	70	33
7.27	6.2	1.07	71	33
6.4	6.2	0.2	72	33
5.61	6.16	-0.55	72	34
5.98	6.16	-0.18	72	35
6.23	6.16	0.07	73	35
7.27	6.16	1.11	74	35
6.4	6.16	0.24	75	35
5.98	5.61	0.37	76	35
6.23	5.61	0.62	77	35
7.27	5.61	1.66	78	35
6.4	5.61	0.79	79	35
6.23	5.98	0.25	80	35
7.27	5.98	1.29	81	35
6.4	5.98	0.42	82	35
7.27	6.23	1.04	83	35
6.4	6.23	0.17	84	35

6.4 7.27 -0.87 84 36

S Statistic = 84 - 36 = 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

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 493.333
Z-Score = 2.11606
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.11606 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: total cadmium

Location: RW07-MW(I)

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
4.6	1.2 J	3.4	1	0
ND<1.5 U	1.2 J	0.3	2	0
1.1 J	1.2 J	-0.1	2	1
0.91 J	1.2 J	-0.29	2	2
1.2 J	1.2 J	0	2	2
1 J	1.2 J	-0.2	2	3
11	1.2 J	9.8	3	3
ND<1.5 U	1.2 J	0.3	4	3
5.1	1.2 J	3.9	5	3
1.7 J	1.2 J	0.5	6	3
ND<1.5 U	1.2 J	0.3	7	3
1.3 J	1.2 J	0.1	8	3
52.9	1.2 J	51.7	9	3
28.7	1.2 J	27.5	10	3
385	1.2 J	383.8	11	3
ND<1.5 U	4.6	-3.1	11	4
1.1 J	4.6	-3.5	11	5
0.91 J	4.6	-3.69	11	6
1.2 J	4.6	-3.4	11	7
1 J	4.6	-3.6	11	8
11	4.6	6.4	12	8
ND<1.5 U	4.6	-3.1	12	9
5.1	4.6	0.5	13	9
1.7 J	4.6	-2.9	13	10
ND<1.5 U	4.6	-3.1	13	11
1.3 J	4.6	-3.3	13	12
52.9	4.6	48.3	14	12
28.7	4.6	24.1	15	12
385	4.6	380.4	16	12
1.1 J	ND<1.5 U	-0.4	16	13
0.91 J	ND<1.5 U	-0.59	16	14
1.2 J	ND<1.5 U	-0.3	16	15
1 J	ND<1.5 U	-0.5	16	16
11	ND<1.5 U	9.5	17	16
ND<1.5 U	ND<1.5 U	0	17	16
5.1	ND<1.5 U	3.6	18	16
1.7 J	ND<1.5 U	0.2	19	16
ND<1.5 U	ND<1.5 U	0	19	16
1.3 J	ND<1.5 U	-0.2	19	17
52.9	ND<1.5 U	51.4	20	17
28.7	ND<1.5 U	27.2	21	17
385	ND<1.5 U	383.5	22	17
0.91 J	1.1 J	-0.19	22	18
1.2 J	1.1 J	0.1	23	18
1 J	1.1 J	-0.1	23	19
11	1.1 J	9.9	24	19
ND<1.5 U	1.1 J	0.4	25	19
5.1	1.1 J	4	26	19
1.7 J	1.1 J	0.6	27	19
ND<1.5 U	1.1 J	0.4	28	19
1.3 J	1.1 J	0.2	29	19
52.9	1.1 J	51.8	30	19
28.7	1.1 J	27.6	31	19
385	1.1 J	383.9	32	19
1.2 J	0.91 J	0.29	33	19
1 J	0.91 J	0.09	34	19
11	0.91 J	10.09	35	19

ND<1.5 U	0.91 J	0.59	36	19
5.1	0.91 J	4.19	37	19
1.7 J	0.91 J	0.79	38	19
ND<1.5 U	0.91 J	0.59	39	19
1.3 J	0.91 J	0.39	40	19
52.9	0.91 J	51.99	41	19
28.7	0.91 J	27.79	42	19
385	0.91 J	384.09	43	19
1 J	1.2 J	-0.2	43	20
11	1.2 J	9.8	44	20
ND<1.5 U	1.2 J	0.3	45	20
5.1	1.2 J	3.9	46	20
1.7 J	1.2 J	0.5	47	20
ND<1.5 U	1.2 J	0.3	48	20
1.3 J	1.2 J	0.1	49	20
52.9	1.2 J	51.7	50	20
28.7	1.2 J	27.5	51	20
385	1.2 J	383.8	52	20
11	1 J	10	53	20
ND<1.5 U	1 J	0.5	54	20
5.1	1 J	4.1	55	20
1.7 J	1 J	0.7	56	20
ND<1.5 U	1 J	0.5	57	20
1.3 J	1 J	0.3	58	20
52.9	1 J	51.9	59	20
28.7	1 J	27.7	60	20
385	1 J	384	61	20
ND<1.5 U	11	-9.5	61	21
5.1	11	-5.9	61	22
1.7 J	11	-9.3	61	23
ND<1.5 U	11	-9.5	61	24
1.3 J	11	-9.7	61	25
52.9	11	41.9	62	25
28.7	11	17.7	63	25
385	11	374	64	25
5.1	ND<1.5 U	3.6	65	25
1.7 J	ND<1.5 U	0.2	66	25
ND<1.5 U	ND<1.5 U	0	66	25
1.3 J	ND<1.5 U	-0.2	66	26
52.9	ND<1.5 U	51.4	67	26
28.7	ND<1.5 U	27.2	68	26
385	ND<1.5 U	383.5	69	26
1.7 J	5.1	-3.4	69	27
ND<1.5 U	5.1	-3.6	69	28
1.3 J	5.1	-3.8	69	29
52.9	5.1	47.8	70	29
28.7	5.1	23.6	71	29
385	5.1	379.9	72	29
ND<1.5 U	1.7 J	-0.2	72	30
1.3 J	1.7 J	-0.4	72	31
52.9	1.7 J	51.2	73	31
28.7	1.7 J	27	74	31
385	1.7 J	383.3	75	31
1.3 J	ND<1.5 U	-0.2	75	32
52.9	ND<1.5 U	51.4	76	32
28.7	ND<1.5 U	27.2	77	32
385	ND<1.5 U	383.5	78	32
52.9	1.3 J	51.6	79	32
28.7	1.3 J	27.4	80	32
385	1.3 J	383.7	81	32
28.7	52.9	-24.2	81	33
385	52.9	332.1	82	33

385 28.7 356.3 83 33

S Statistic = 83 - 33 = 50

Tied Group	Value	Members
1	1.2	2
2	1.5	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

There are 0 time periods with multiple data

A = 84
B = 0
C = 6
D = 0
E = 8
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 488.667
Z-Score = 2.21661
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.21661 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: total cadmium

Location: RW08-MW(I)

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
0.39 J	0.49 J	-0.1	0	1
ND<1.5 U	0.49 J	1.01	1	1
1.5 J	0.49 J	1.01	2	1
0.48 J	0.49 J	-0.01	2	2
1.3 J	0.49 J	0.81	3	2
0.86 J	0.49 J	0.37	4	2
0.77 J	0.49 J	0.28	5	2
ND<1.5 U	0.49 J	1.01	6	2
0.88 J	0.49 J	0.39	7	2
1.8 J	0.49 J	1.31	8	2
ND<1.5 U	0.49 J	1.01	9	2
6.2	0.49 J	5.71	10	2
14.1	0.49 J	13.61	11	2
0.92	0.49 J	0.43	12	2
ND<1.5 U	0.49 J	1.01	13	2
ND<1.5 U	0.39 J	1.11	14	2
1.5 J	0.39 J	1.11	15	2
0.48 J	0.39 J	0.09	16	2
1.3 J	0.39 J	0.91	17	2
0.86 J	0.39 J	0.47	18	2
0.77 J	0.39 J	0.38	19	2
ND<1.5 U	0.39 J	1.11	20	2
0.88 J	0.39 J	0.49	21	2
1.8 J	0.39 J	1.41	22	2
ND<1.5 U	0.39 J	1.11	23	2
6.2	0.39 J	5.81	24	2
14.1	0.39 J	13.71	25	2
0.92	0.39 J	0.53	26	2
ND<1.5 U	0.39 J	1.11	27	2
1.5 J	ND<1.5 U	0	27	2
0.48 J	ND<1.5 U	-1.02	27	3
1.3 J	ND<1.5 U	-0.2	27	4
0.86 J	ND<1.5 U	-0.64	27	5
0.77 J	ND<1.5 U	-0.73	27	6
ND<1.5 U	ND<1.5 U	0	27	6
0.88 J	ND<1.5 U	-0.62	27	7
1.8 J	ND<1.5 U	0.3	28	7
ND<1.5 U	ND<1.5 U	0	28	7
6.2	ND<1.5 U	4.7	29	7
14.1	ND<1.5 U	12.6	30	7
0.92	ND<1.5 U	-0.58	30	8
ND<1.5 U	ND<1.5 U	0	30	8
0.48 J	1.5 J	-1.02	30	9
1.3 J	1.5 J	-0.2	30	10
0.86 J	1.5 J	-0.64	30	11
0.77 J	1.5 J	-0.73	30	12
ND<1.5 U	1.5 J	0	30	12
0.88 J	1.5 J	-0.62	30	13
1.8 J	1.5 J	0.3	31	13
ND<1.5 U	1.5 J	0	31	13
6.2	1.5 J	4.7	32	13
14.1	1.5 J	12.6	33	13
0.92	1.5 J	-0.58	33	14
ND<1.5 U	1.5 J	0	33	14
1.3 J	0.48 J	0.82	34	14
0.86 J	0.48 J	0.38	35	14
0.77 J	0.48 J	0.29	36	14

ND<1.5 U	0.48 J	1.02	37	14
0.88 J	0.48 J	0.4	38	14
1.8 J	0.48 J	1.32	39	14
ND<1.5 U	0.48 J	1.02	40	14
6.2	0.48 J	5.72	41	14
14.1	0.48 J	13.62	42	14
0.92	0.48 J	0.44	43	14
ND<1.5 U	0.48 J	1.02	44	14
0.86 J	1.3 J	-0.44	44	15
0.77 J	1.3 J	-0.53	44	16
ND<1.5 U	1.3 J	0.2	45	16
0.88 J	1.3 J	-0.42	45	17
1.8 J	1.3 J	0.5	46	17
ND<1.5 U	1.3 J	0.2	47	17
6.2	1.3 J	4.9	48	17
14.1	1.3 J	12.8	49	17
0.92	1.3 J	-0.38	49	18
ND<1.5 U	1.3 J	0.2	50	18
0.77 J	0.86 J	-0.09	50	19
ND<1.5 U	0.86 J	0.64	51	19
0.88 J	0.86 J	0.02	52	19
1.8 J	0.86 J	0.94	53	19
ND<1.5 U	0.86 J	0.64	54	19
6.2	0.86 J	5.34	55	19
14.1	0.86 J	13.24	56	19
0.92	0.86 J	0.06	57	19
ND<1.5 U	0.86 J	0.64	58	19
ND<1.5 U	0.77 J	0.73	59	19
0.88 J	0.77 J	0.11	60	19
1.8 J	0.77 J	1.03	61	19
ND<1.5 U	0.77 J	0.73	62	19
6.2	0.77 J	5.43	63	19
14.1	0.77 J	13.33	64	19
0.92	0.77 J	0.15	65	19
ND<1.5 U	0.77 J	0.73	66	19
0.88 J	ND<1.5 U	-0.62	66	20
1.8 J	ND<1.5 U	0.3	67	20
ND<1.5 U	ND<1.5 U	0	67	20
6.2	ND<1.5 U	4.7	68	20
14.1	ND<1.5 U	12.6	69	20
0.92	ND<1.5 U	-0.58	69	21
ND<1.5 U	ND<1.5 U	0	69	21
1.8 J	0.88 J	0.92	70	21
ND<1.5 U	0.88 J	0.62	71	21
6.2	0.88 J	5.32	72	21
14.1	0.88 J	13.22	73	21
0.92	0.88 J	0.04	74	21
ND<1.5 U	0.88 J	0.62	75	21
ND<1.5 U	1.8 J	-0.3	75	22
6.2	1.8 J	4.4	76	22
14.1	1.8 J	12.3	77	22
0.92	1.8 J	-0.88	77	23
ND<1.5 U	1.8 J	-0.3	77	24
6.2	ND<1.5 U	4.7	78	24
14.1	ND<1.5 U	12.6	79	24
0.92	ND<1.5 U	-0.58	79	25
ND<1.5 U	ND<1.5 U	0	79	25
14.1	6.2	7.9	80	25
0.92	6.2	-5.28	80	26
ND<1.5 U	6.2	-4.7	80	27
0.92	14.1	-13.18	80	28
ND<1.5 U	14.1	-12.6	80	29

ND<1.5 U 0.92 0.58 81 29

S Statistic = 81 - 29 = 52

Tied Group	Value	Members
1	1.5	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

There are 0 time periods with multiple data

A = 300
B = 0
C = 60
D = 0
E = 20
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 476.667
Z-Score = 2.33595
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.33595 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: total cadmium

Location: RW05-MW(I)

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
17.5	1.9 J	15.6	1	0
19.3	1.9 J	17.4	2	0
3.7	1.9 J	1.8	3	0
4.2	1.9 J	2.3	4	0
4.9	1.9 J	3	5	0
2.7 J	1.9 J	0.8	6	0
2.2 J	1.9 J	0.3	7	0
2.6 J	1.9 J	0.7	8	0
1.3 J	1.9 J	-0.6	8	1
ND<1.5 U	1.9 J	-0.4	8	2
1.6	1.9 J	-0.3	8	3
19.3	17.5	1.8	9	3
3.7	17.5	-13.8	9	4
4.2	17.5	-13.3	9	5
4.9	17.5	-12.6	9	6
2.7 J	17.5	-14.8	9	7
2.2 J	17.5	-15.3	9	8
2.6 J	17.5	-14.9	9	9
1.3 J	17.5	-16.2	9	10
ND<1.5 U	17.5	-16	9	11
1.6	17.5	-15.9	9	12
3.7	19.3	-15.6	9	13
4.2	19.3	-15.1	9	14
4.9	19.3	-14.4	9	15
2.7 J	19.3	-16.6	9	16
2.2 J	19.3	-17.1	9	17
2.6 J	19.3	-16.7	9	18
1.3 J	19.3	-18	9	19
ND<1.5 U	19.3	-17.8	9	20
1.6	19.3	-17.7	9	21
4.2	3.7	0.5	10	21
4.9	3.7	1.2	11	21
2.7 J	3.7	-1	11	22
2.2 J	3.7	-1.5	11	23
2.6 J	3.7	-1.1	11	24
1.3 J	3.7	-2.4	11	25
ND<1.5 U	3.7	-2.2	11	26
1.6	3.7	-2.1	11	27
4.9	4.2	0.7	12	27
2.7 J	4.2	-1.5	12	28
2.2 J	4.2	-2	12	29
2.6 J	4.2	-1.6	12	30
1.3 J	4.2	-2.9	12	31
ND<1.5 U	4.2	-2.7	12	32
1.6	4.2	-2.6	12	33
2.7 J	4.9	-2.2	12	34
2.2 J	4.9	-2.7	12	35
2.6 J	4.9	-2.3	12	36
1.3 J	4.9	-3.6	12	37
ND<1.5 U	4.9	-3.4	12	38
1.6	4.9	-3.3	12	39
2.2 J	2.7 J	-0.5	12	40
2.6 J	2.7 J	-0.1	12	41
1.3 J	2.7 J	-1.4	12	42
ND<1.5 U	2.7 J	-1.2	12	43

1.6	2.7 J	-1.1	12	44
2.6 J	2.2 J	0.4	13	44
1.3 J	2.2 J	-0.9	13	45
ND<1.5 U	2.2 J	-0.7	13	46
1.6	2.2 J	-0.6	13	47
1.3 J	2.6 J	-1.3	13	48
ND<1.5 U	2.6 J	-1.1	13	49
1.6	2.6 J	-1	13	50
ND<1.5 U	1.3 J	0.2	14	50
1.6	1.3 J	0.3	15	50
1.6	ND<1.5 U	0.1	16	50

S Statistic = 16 - 50 = -34

Tied Group	Value	Members
Time Period		Observations
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
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 = -2.26289
 Comparison Level at 95% confidence level = -1.65463 (downward trend)
-2.26289 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total cadmium

Location: RW09-MW(I)

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 J	3.1	-1	10	1
1.8 J	3.1	-1.3	10	2
ND<1.5 U	3.1	-1.6	10	3
3.7	3.1	0.6	11	3
0.98	3.1	-2.12	11	4
5	4	1	12	4
11.1	4	7.1	13	4
8.1	4	4.1	14	4
12.9	4	8.9	15	4
18.5	4	14.5	16	4
9.1	4	5.1	17	4
12	4	8	18	4
8.8	4	4.8	19	4
7.7	4	3.7	20	4
2.1 J	4	-1.9	20	5
1.8 J	4	-2.2	20	6
ND<1.5 U	4	-2.5	20	7
3.7	4	-0.3	20	8
0.98	4	-3.02	20	9
11.1	5	6.1	21	9
8.1	5	3.1	22	9
12.9	5	7.9	23	9
18.5	5	13.5	24	9
9.1	5	4.1	25	9
12	5	7	26	9
8.8	5	3.8	27	9
7.7	5	2.7	28	9
2.1 J	5	-2.9	28	10
1.8 J	5	-3.2	28	11
ND<1.5 U	5	-3.5	28	12
3.7	5	-1.3	28	13
0.98	5	-4.02	28	14
8.1	11.1	-3	28	15
12.9	11.1	1.8	29	15
18.5	11.1	7.4	30	15
9.1	11.1	-2	30	16
12	11.1	0.9	31	16
8.8	11.1	-2.3	31	17
7.7	11.1	-3.4	31	18
2.1 J	11.1	-9	31	19
1.8 J	11.1	-9.3	31	20
ND<1.5 U	11.1	-9.6	31	21
3.7	11.1	-7.4	31	22
0.98	11.1	-10.12	31	23
12.9	8.1	4.8	32	23
18.5	8.1	10.4	33	23
9.1	8.1	1	34	23

12	8.1	3.9	35	23
8.8	8.1	0.7	36	23
7.7	8.1	-0.4	36	24
2.1 J	8.1	-6	36	25
1.8 J	8.1	-6.3	36	26
ND<1.5 U	8.1	-6.6	36	27
3.7	8.1	-4.4	36	28
0.98	8.1	-7.12	36	29
18.5	12.9	5.6	37	29
9.1	12.9	-3.8	37	30
12	12.9	-0.9	37	31
8.8	12.9	-4.1	37	32
7.7	12.9	-5.2	37	33
2.1 J	12.9	-10.8	37	34
1.8 J	12.9	-11.1	37	35
ND<1.5 U	12.9	-11.4	37	36
3.7	12.9	-9.2	37	37
0.98	12.9	-11.92	37	38
9.1	18.5	-9.4	37	39
12	18.5	-6.5	37	40
8.8	18.5	-9.7	37	41
7.7	18.5	-10.8	37	42
2.1 J	18.5	-16.4	37	43
1.8 J	18.5	-16.7	37	44
ND<1.5 U	18.5	-17	37	45
3.7	18.5	-14.8	37	46
0.98	18.5	-17.52	37	47
12	9.1	2.9	38	47
8.8	9.1	-0.3	38	48
7.7	9.1	-1.4	38	49
2.1 J	9.1	-7	38	50
1.8 J	9.1	-7.3	38	51
ND<1.5 U	9.1	-7.6	38	52
3.7	9.1	-5.4	38	53
0.98	9.1	-8.12	38	54
8.8	12	-3.2	38	55
7.7	12	-4.3	38	56
2.1 J	12	-9.9	38	57
1.8 J	12	-10.2	38	58
ND<1.5 U	12	-10.5	38	59
3.7	12	-8.3	38	60
0.98	12	-11.02	38	61
7.7	8.8	-1.1	38	62
2.1 J	8.8	-6.7	38	63
1.8 J	8.8	-7	38	64
ND<1.5 U	8.8	-7.3	38	65
3.7	8.8	-5.1	38	66
0.98	8.8	-7.82	38	67
2.1 J	7.7	-5.6	38	68
1.8 J	7.7	-5.9	38	69
ND<1.5 U	7.7	-6.2	38	70
3.7	7.7	-4	38	71
0.98	7.7	-6.72	38	72
1.8 J	2.1 J	-0.3	38	73
ND<1.5 U	2.1 J	-0.6	38	74
3.7	2.1 J	1.6	39	74
0.98	2.1 J	-1.12	39	75
ND<1.5 U	1.8 J	-0.3	39	76
3.7	1.8 J	1.9	40	76
0.98	1.8 J	-0.82	40	77
3.7	ND<1.5 U	2.2	41	77
0.98	ND<1.5 U	-0.52	41	78

0.98 3.7 -2.72 41 79

S Statistic = 41 - 79 = -38

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

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 493.333
Z-Score = -1.66583
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-1.66583 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total cadmium

Location: RW12-MW(I)

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
1280	4740	-3460	0	15
2730	3530	-800	0	16
3820	3530	290	1	16
2260	3530	-1270	1	17
2730	3530	-800	1	18
2220	3530	-1310	1	19
1820	3530	-1710	1	20
1510	3530	-2020	1	21
1380	3530	-2150	1	22
1450	3530	-2080	1	23
1270	3530	-2260	1	24
121	3530	-3409	1	25
134	3530	-3396	1	26
86.3	3530	-3443.7	1	27
1280	3530	-2250	1	28
3820	2730	1090	2	28
2260	2730	-470	2	29
2730	2730	0	2	29
2220	2730	-510	2	30
1820	2730	-910	2	31
1510	2730	-1220	2	32
1380	2730	-1350	2	33
1450	2730	-1280	2	34
1270	2730	-1460	2	35
121	2730	-2609	2	36
134	2730	-2596	2	37
86.3	2730	-2643.7	2	38
1280	2730	-1450	2	39
2260	3820	-1560	2	40
2730	3820	-1090	2	41
2220	3820	-1600	2	42
1820	3820	-2000	2	43
1510	3820	-2310	2	44
1380	3820	-2440	2	45
1450	3820	-2370	2	46
1270	3820	-2550	2	47
121	3820	-3699	2	48
134	3820	-3686	2	49
86.3	3820	-3733.7	2	50
1280	3820	-2540	2	51
2730	2260	470	3	51
2220	2260	-40	3	52
1820	2260	-440	3	53

1510	2260	-750	3	54
1380	2260	-880	3	55
1450	2260	-810	3	56
1270	2260	-990	3	57
121	2260	-2139	3	58
134	2260	-2126	3	59
86.3	2260	-2173.7	3	60
1280	2260	-980	3	61
2220	2730	-510	3	62
1820	2730	-910	3	63
1510	2730	-1220	3	64
1380	2730	-1350	3	65
1450	2730	-1280	3	66
1270	2730	-1460	3	67
121	2730	-2609	3	68
134	2730	-2596	3	69
86.3	2730	-2643.7	3	70
1280	2730	-1450	3	71
1820	2220	-400	3	72
1510	2220	-710	3	73
1380	2220	-840	3	74
1450	2220	-770	3	75
1270	2220	-950	3	76
121	2220	-2099	3	77
134	2220	-2086	3	78
86.3	2220	-2133.7	3	79
1280	2220	-940	3	80
1510	1820	-310	3	81
1380	1820	-440	3	82
1450	1820	-370	3	83
1270	1820	-550	3	84
121	1820	-1699	3	85
134	1820	-1686	3	86
86.3	1820	-1733.7	3	87
1280	1820	-540	3	88
1380	1510	-130	3	89
1450	1510	-60	3	90
1270	1510	-240	3	91
121	1510	-1389	3	92
134	1510	-1376	3	93
86.3	1510	-1423.7	3	94
1280	1510	-230	3	95
1450	1380	70	4	95
1270	1380	-110	4	96
121	1380	-1259	4	97
134	1380	-1246	4	98
86.3	1380	-1293.7	4	99
1280	1380	-100	4	100
1270	1450	-180	4	101
121	1450	-1329	4	102
134	1450	-1316	4	103
86.3	1450	-1363.7	4	104
1280	1450	-170	4	105
121	1270	-1149	4	106
134	1270	-1136	4	107
86.3	1270	-1183.7	4	108
1280	1270	10	5	108
134	121	13	6	108
86.3	121	-34.7	6	109
1280	121	1159	7	109
86.3	134	-47.7	7	110
1280	134	1146	8	110

1280 86.3 1193.7 9 110

S Statistic = 9 - 110 = -101

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

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 492.333
Z-Score = -4.50682
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-4.50682 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total cadmium

Location: RW13-MW(I)

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
17.7	31800	-31782.3	0	9
28700	66	28634	1	9
24500	66	24434	2	9
44.2	66	-21.8	2	10
1240	66	1174	3	10
19400	66	19334	4	10
21000	66	20934	5	10
12.6	66	-53.4	5	11
17.7	66	-48.3	5	12
24500	28700	-4200	5	13
44.2	28700	-28655.8	5	14
1240	28700	-27460	5	15
19400	28700	-9300	5	16
21000	28700	-7700	5	17
12.6	28700	-28687.4	5	18
17.7	28700	-28682.3	5	19
44.2	24500	-24455.8	5	20
1240	24500	-23260	5	21
19400	24500	-5100	5	22
21000	24500	-3500	5	23
12.6	24500	-24487.4	5	24
17.7	24500	-24482.3	5	25
1240	44.2	1195.8	6	25
19400	44.2	19355.8	7	25
21000	44.2	20955.8	8	25
12.6	44.2	-31.6	8	26
17.7	44.2	-26.5	8	27
19400	1240	18160	9	27
21000	1240	19760	10	27
12.6	1240	-1227.4	10	28
17.7	1240	-1222.3	10	29
21000	19400	1600	11	29
12.6	19400	-19387.4	11	30
17.7	19400	-19382.3	11	31
12.6	21000	-20987.4	11	32
17.7	21000	-20982.3	11	33
17.7	12.6	5.1	12	33

S Statistic = 12 - 33 = -21

Comparing at 95% confidence level (downward trend)

Probability of obtaining S >= 21 is 0.036

S < 0 and 0.036 < 0.05 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total cadmium

Location: RW18-MW(I)

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
230	70.3	159.7	5	10
119	63.8	55.2	6	10
92	63.8	28.2	7	10
65.1	63.8	1.3	8	10
61.7	63.8	-2.1	8	11
74.4	63.8	10.6	9	11
72.2	63.8	8.4	10	11
43.7	63.8	-20.1	10	12
66.6	63.8	2.8	11	12
51.5	63.8	-12.3	11	13
63.5	63.8	-0.3	11	14
55.8	63.8	-8	11	15
35.1	63.8	-28.7	11	16
14.5	63.8	-49.3	11	17
230	63.8	166.2	12	17
92	119	-27	12	18
65.1	119	-53.9	12	19
61.7	119	-57.3	12	20
74.4	119	-44.6	12	21
72.2	119	-46.8	12	22
43.7	119	-75.3	12	23
66.6	119	-52.4	12	24
51.5	119	-67.5	12	25
63.5	119	-55.5	12	26
55.8	119	-63.2	12	27
35.1	119	-83.9	12	28
14.5	119	-104.5	12	29
230	119	111	13	29
65.1	92	-26.9	13	30
61.7	92	-30.3	13	31
74.4	92	-17.6	13	32
72.2	92	-19.8	13	33
43.7	92	-48.3	13	34
66.6	92	-25.4	13	35
51.5	92	-40.5	13	36
63.5	92	-28.5	13	37
55.8	92	-36.2	13	38
35.1	92	-56.9	13	39
14.5	92	-77.5	13	40
230	92	138	14	40
61.7	65.1	-3.4	14	41
74.4	65.1	9.3	15	41
72.2	65.1	7.1	16	41

43.7	65.1	-21.4	16	42
66.6	65.1	1.5	17	42
51.5	65.1	-13.6	17	43
63.5	65.1	-1.6	17	44
55.8	65.1	-9.3	17	45
35.1	65.1	-30	17	46
14.5	65.1	-50.6	17	47
230	65.1	164.9	18	47
74.4	61.7	12.7	19	47
72.2	61.7	10.5	20	47
43.7	61.7	-18	20	48
66.6	61.7	4.9	21	48
51.5	61.7	-10.2	21	49
63.5	61.7	1.8	22	49
55.8	61.7	-5.9	22	50
35.1	61.7	-26.6	22	51
14.5	61.7	-47.2	22	52
230	61.7	168.3	23	52
72.2	74.4	-2.2	23	53
43.7	74.4	-30.7	23	54
66.6	74.4	-7.8	23	55
51.5	74.4	-22.9	23	56
63.5	74.4	-10.9	23	57
55.8	74.4	-18.6	23	58
35.1	74.4	-39.3	23	59
14.5	74.4	-59.9	23	60
230	74.4	155.6	24	60
43.7	72.2	-28.5	24	61
66.6	72.2	-5.6	24	62
51.5	72.2	-20.7	24	63
63.5	72.2	-8.7	24	64
55.8	72.2	-16.4	24	65
35.1	72.2	-37.1	24	66
14.5	72.2	-57.7	24	67
230	72.2	157.8	25	67
66.6	43.7	22.9	26	67
51.5	43.7	7.8	27	67
63.5	43.7	19.8	28	67
55.8	43.7	12.1	29	67
35.1	43.7	-8.6	29	68
14.5	43.7	-29.2	29	69
230	43.7	186.3	30	69
51.5	66.6	-15.1	30	70
63.5	66.6	-3.1	30	71
55.8	66.6	-10.8	30	72
35.1	66.6	-31.5	30	73
14.5	66.6	-52.1	30	74
230	66.6	163.4	31	74
63.5	51.5	12	32	74
55.8	51.5	4.3	33	74
35.1	51.5	-16.4	33	75
14.5	51.5	-37	33	76
230	51.5	178.5	34	76
55.8	63.5	-7.7	34	77
35.1	63.5	-28.4	34	78
14.5	63.5	-49	34	79
230	63.5	166.5	35	79
35.1	55.8	-20.7	35	80
14.5	55.8	-41.3	35	81
230	55.8	174.2	36	81
14.5	35.1	-20.6	36	82
230	35.1	194.9	37	82

230

14.5

215.5

38

82

S Statistic = 38 - 82 = -44

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

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 8880

b = 30240

c = 480

Group Variance = 493.333

Z-Score = -1.93597

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.93597 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total cadmium

Location: RW19-MW(I)

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 MH	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
1990	3760	-1770	0	15
3380 MH	3450	-70	0	16
2770	3450	-680	0	17
2280	3450	-1170	0	18
2550	3450	-900	0	19
1670	3450	-1780	0	20
1320	3450	-2130	0	21
1710	3450	-1740	0	22
1770	3450	-1680	0	23
1710	3450	-1740	0	24
1880	3450	-1570	0	25
1700	3450	-1750	0	26
1560	3450	-1890	0	27
1610	3450	-1840	0	28
1990	3450	-1460	0	29
2770	3380 MH	-610	0	30
2280	3380 MH	-1100	0	31
2550	3380 MH	-830	0	32
1670	3380 MH	-1710	0	33
1320	3380 MH	-2060	0	34
1710	3380 MH	-1670	0	35
1770	3380 MH	-1610	0	36
1710	3380 MH	-1670	0	37
1880	3380 MH	-1500	0	38
1700	3380 MH	-1680	0	39
1560	3380 MH	-1820	0	40
1610	3380 MH	-1770	0	41
1990	3380 MH	-1390	0	42
2280	2770	-490	0	43
2550	2770	-220	0	44
1670	2770	-1100	0	45
1320	2770	-1450	0	46
1710	2770	-1060	0	47
1770	2770	-1000	0	48
1710	2770	-1060	0	49
1880	2770	-890	0	50
1700	2770	-1070	0	51
1560	2770	-1210	0	52
1610	2770	-1160	0	53
1990	2770	-780	0	54
2550	2280	270	1	54
1670	2280	-610	1	55
1320	2280	-960	1	56

1710	2280	-570	1	57
1770	2280	-510	1	58
1710	2280	-570	1	59
1880	2280	-400	1	60
1700	2280	-580	1	61
1560	2280	-720	1	62
1610	2280	-670	1	63
1990	2280	-290	1	64
1670	2550	-880	1	65
1320	2550	-1230	1	66
1710	2550	-840	1	67
1770	2550	-780	1	68
1710	2550	-840	1	69
1880	2550	-670	1	70
1700	2550	-850	1	71
1560	2550	-990	1	72
1610	2550	-940	1	73
1990	2550	-560	1	74
1320	1670	-350	1	75
1710	1670	40	2	75
1770	1670	100	3	75
1710	1670	40	4	75
1880	1670	210	5	75
1700	1670	30	6	75
1560	1670	-110	6	76
1610	1670	-60	6	77
1990	1670	320	7	77
1710	1320	390	8	77
1770	1320	450	9	77
1710	1320	390	10	77
1880	1320	560	11	77
1700	1320	380	12	77
1560	1320	240	13	77
1610	1320	290	14	77
1990	1320	670	15	77
1770	1710	60	16	77
1710	1710	0	16	77
1880	1710	170	17	77
1700	1710	-10	17	78
1560	1710	-150	17	79
1610	1710	-100	17	80
1990	1710	280	18	80
1710	1770	-60	18	81
1880	1770	110	19	81
1700	1770	-70	19	82
1560	1770	-210	19	83
1610	1770	-160	19	84
1990	1770	220	20	84
1880	1710	170	21	84
1700	1710	-10	21	85
1560	1710	-150	21	86
1610	1710	-100	21	87
1990	1710	280	22	87
1700	1880	-180	22	88
1560	1880	-320	22	89
1610	1880	-270	22	90
1990	1880	110	23	90
1560	1700	-140	23	91
1610	1700	-90	23	92
1990	1700	290	24	92
1610	1560	50	25	92
1990	1560	430	26	92

1990 1610 380 27 92

S Statistic = 27 - 92 = -65

Tied Group	Value	Members
1	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

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 492.333
Z-Score = -2.88437
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-2.88437 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total zinc

Location: RW06-MW(I)

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
90	1900	-1810	2	12
99	1900	-1801	2	13
1420	1680	-260	2	14
999	1680	-681	2	15
876	1680	-804	2	16
1690	1680	10	3	16
1340	1680	-340	3	17
508	1680	-1172	3	18
615	1680	-1065	3	19
909	1680	-771	3	20
1360	1680	-320	3	21
1950	1680	270	4	21
27900	1680	26220	5	21
191	1680	-1489	5	22
90	1680	-1590	5	23
99	1680	-1581	5	24
999	1420	-421	5	25
876	1420	-544	5	26
1690	1420	270	6	26
1340	1420	-80	6	27
508	1420	-912	6	28
615	1420	-805	6	29
909	1420	-511	6	30
1360	1420	-60	6	31
1950	1420	530	7	31
27900	1420	26480	8	31
191	1420	-1229	8	32
90	1420	-1330	8	33
99	1420	-1321	8	34
876	999	-123	8	35
1690	999	691	9	35
1340	999	341	10	35
508	999	-491	10	36
615	999	-384	10	37
909	999	-90	10	38
1360	999	361	11	38
1950	999	951	12	38
27900	999	26901	13	38
191	999	-808	13	39
90	999	-909	13	40
99	999	-900	13	41
1690	876	814	14	41
1340	876	464	15	41
508	876	-368	15	42

615	876	-261	15	43
909	876	33	16	43
1360	876	484	17	43
1950	876	1074	18	43
27900	876	27024	19	43
191	876	-685	19	44
90	876	-786	19	45
99	876	-777	19	46
1340	1690	-350	19	47
508	1690	-1182	19	48
615	1690	-1075	19	49
909	1690	-781	19	50
1360	1690	-330	19	51
1950	1690	260	20	51
27900	1690	26210	21	51
191	1690	-1499	21	52
90	1690	-1600	21	53
99	1690	-1591	21	54
508	1340	-832	21	55
615	1340	-725	21	56
909	1340	-431	21	57
1360	1340	20	22	57
1950	1340	610	23	57
27900	1340	26560	24	57
191	1340	-1149	24	58
90	1340	-1250	24	59
99	1340	-1241	24	60
615	508	107	25	60
909	508	401	26	60
1360	508	852	27	60
1950	508	1442	28	60
27900	508	27392	29	60
191	508	-317	29	61
90	508	-418	29	62
99	508	-409	29	63
909	615	294	30	63
1360	615	745	31	63
1950	615	1335	32	63
27900	615	27285	33	63
191	615	-424	33	64
90	615	-525	33	65
99	615	-516	33	66
1360	909	451	34	66
1950	909	1041	35	66
27900	909	26991	36	66
191	909	-718	36	67
90	909	-819	36	68
99	909	-810	36	69
1950	1360	590	37	69
27900	1360	26540	38	69
191	1360	-1169	38	70
90	1360	-1270	38	71
99	1360	-1261	38	72
27900	1950	25950	39	72
191	1950	-1759	39	73
90	1950	-1860	39	74
99	1950	-1851	39	75
191	27900	-27709	39	76
90	27900	-27810	39	77
99	27900	-27801	39	78
90	191	-101	39	79
99	191	-92	39	80

99

90

9

40

80

S Statistic = 40 - 80 = -40

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

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 8880

b = 30240

c = 480

Group Variance = 493.333

Z-Score = -1.75588

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.75588 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total zinc

Location: RW09-MW(I)

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
53	51000	-50947	9	5
62	51000	-50938	9	6
57500	51900	5600	10	6
57200	51900	5300	11	6
51900	51900	0	11	6
65600	51900	13700	12	6
55500	51900	3600	13	6
39400	51900	-12500	13	7
49700	51900	-2200	13	8
67900	51900	16000	14	8
44500	51900	-7400	14	9
54700	51900	2800	15	9
38400	51900	-13500	15	10
54700	51900	2800	16	10
53	51900	-51847	16	11
62	51900	-51838	16	12
57200	57500	-300	16	13
51900	57500	-5600	16	14
65600	57500	8100	17	14
55500	57500	-2000	17	15
39400	57500	-18100	17	16
49700	57500	-7800	17	17
67900	57500	10400	18	17
44500	57500	-13000	18	18
54700	57500	-2800	18	19
38400	57500	-19100	18	20
54700	57500	-2800	18	21
53	57500	-57447	18	22
62	57500	-57438	18	23
51900	57200	-5300	18	24
65600	57200	8400	19	24
55500	57200	-1700	19	25
39400	57200	-17800	19	26
49700	57200	-7500	19	27
67900	57200	10700	20	27
44500	57200	-12700	20	28
54700	57200	-2500	20	29
38400	57200	-18800	20	30
54700	57200	-2500	20	31
53	57200	-57147	20	32
62	57200	-57138	20	33
65600	51900	13700	21	33
55500	51900	3600	22	33
39400	51900	-12500	22	34

49700	51900	-2200	22	35
67900	51900	16000	23	35
44500	51900	-7400	23	36
54700	51900	2800	24	36
38400	51900	-13500	24	37
54700	51900	2800	25	37
53	51900	-51847	25	38
62	51900	-51838	25	39
55500	65600	-10100	25	40
39400	65600	-26200	25	41
49700	65600	-15900	25	42
67900	65600	2300	26	42
44500	65600	-21100	26	43
54700	65600	-10900	26	44
38400	65600	-27200	26	45
54700	65600	-10900	26	46
53	65600	-65547	26	47
62	65600	-65538	26	48
39400	55500	-16100	26	49
49700	55500	-5800	26	50
67900	55500	12400	27	50
44500	55500	-11000	27	51
54700	55500	-800	27	52
38400	55500	-17100	27	53
54700	55500	-800	27	54
53	55500	-55447	27	55
62	55500	-55438	27	56
49700	39400	10300	28	56
67900	39400	28500	29	56
44500	39400	5100	30	56
54700	39400	15300	31	56
38400	39400	-1000	31	57
54700	39400	15300	32	57
53	39400	-39347	32	58
62	39400	-39338	32	59
67900	49700	18200	33	59
44500	49700	-5200	33	60
54700	49700	5000	34	60
38400	49700	-11300	34	61
54700	49700	5000	35	61
53	49700	-49647	35	62
62	49700	-49638	35	63
44500	67900	-23400	35	64
54700	67900	-13200	35	65
38400	67900	-29500	35	66
54700	67900	-13200	35	67
53	67900	-67847	35	68
62	67900	-67838	35	69
54700	44500	10200	36	69
38400	44500	-6100	36	70
54700	44500	10200	37	70
53	44500	-44447	37	71
62	44500	-44438	37	72
38400	54700	-16300	37	73
54700	54700	0	37	73
53	54700	-54647	37	74
62	54700	-54638	37	75
54700	38400	16300	38	75
53	38400	-38347	38	76
62	38400	-38338	38	77
53	54700	-54647	38	78
62	54700	-54638	38	79

62

53

9

39

79

S Statistic = 39 - 79 = -40

Tied Group	Value	Members
1	51900	2
2	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

There are 0 time periods with multiple data

A = 36

B = 0

C = 0

D = 0

E = 4

F = 0

a = 8880

b = 30240

c = 480

Group Variance = 491.333

Z-Score = -1.75945

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-1.75945 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total zinc

Location: RW10-MW(I)

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 MH	104000	-86400	0	13
16	104000	-103984	0	14
2	104000	-103998	0	15
75800	20.4	75779.6	1	15
1150	20.4	1129.6	2	15
34600	20.4	34579.6	3	15
25900	20.4	25879.6	4	15
79.7	20.4	59.3	5	15
8220	20.4	8199.6	6	15
31000	20.4	30979.6	7	15
39000	20.4	38979.6	8	15
158	20.4	137.6	9	15
26.5	20.4	6.1	10	15
13500	20.4	13479.6	11	15
17600 MH	20.4	17579.6	12	15
16	20.4	-4.4	12	16
2	20.4	-18.4	12	17
1150	75800	-74650	12	18
34600	75800	-41200	12	19
25900	75800	-49900	12	20
79.7	75800	-75720.3	12	21
8220	75800	-67580	12	22
31000	75800	-44800	12	23
39000	75800	-36800	12	24
158	75800	-75642	12	25
26.5	75800	-75773.5	12	26
13500	75800	-62300	12	27
17600 MH	75800	-58200	12	28
16	75800	-75784	12	29
2	75800	-75798	12	30
34600	1150	33450	13	30
25900	1150	24750	14	30
79.7	1150	-1070.3	14	31
8220	1150	7070	15	31
31000	1150	29850	16	31
39000	1150	37850	17	31
158	1150	-992	17	32
26.5	1150	-1123.5	17	33
13500	1150	12350	18	33
17600 MH	1150	16450	19	33
16	1150	-1134	19	34
2	1150	-1148	19	35
25900	34600	-8700	19	36
79.7	34600	-34520.3	19	37
8220	34600	-26380	19	38

31000	34600	-3600	19	39
39000	34600	4400	20	39
158	34600	-34442	20	40
26.5	34600	-34573.5	20	41
13500	34600	-21100	20	42
17600 MH	34600	-17000	20	43
16	34600	-34584	20	44
2	34600	-34598	20	45
79.7	25900	-25820.3	20	46
8220	25900	-17680	20	47
31000	25900	5100	21	47
39000	25900	13100	22	47
158	25900	-25742	22	48
26.5	25900	-25873.5	22	49
13500	25900	-12400	22	50
17600 MH	25900	-8300	22	51
16	25900	-25884	22	52
2	25900	-25898	22	53
8220	79.7	8140.3	23	53
31000	79.7	30920.3	24	53
39000	79.7	38920.3	25	53
158	79.7	78.3	26	53
26.5	79.7	-53.2	26	54
13500	79.7	13420.3	27	54
17600 MH	79.7	17520.3	28	54
16	79.7	-63.7	28	55
2	79.7	-77.7	28	56
31000	8220	22780	29	56
39000	8220	30780	30	56
158	8220	-8062	30	57
26.5	8220	-8193.5	30	58
13500	8220	5280	31	58
17600 MH	8220	9380	32	58
16	8220	-8204	32	59
2	8220	-8218	32	60
39000	31000	8000	33	60
158	31000	-30842	33	61
26.5	31000	-30973.5	33	62
13500	31000	-17500	33	63
17600 MH	31000	-13400	33	64
16	31000	-30984	33	65
2	31000	-30998	33	66
158	39000	-38842	33	67
26.5	39000	-38973.5	33	68
13500	39000	-25500	33	69
17600 MH	39000	-21400	33	70
16	39000	-38984	33	71
2	39000	-38998	33	72
26.5	158	-131.5	33	73
13500	158	13342	34	73
17600 MH	158	17442	35	73
16	158	-142	35	74
2	158	-156	35	75
13500	26.5	13473.5	36	75
17600 MH	26.5	17573.5	37	75
16	26.5	-10.5	37	76
2	26.5	-24.5	37	77
17600 MH	13500	4100	38	77
16	13500	-13484	38	78
2	13500	-13498	38	79
16	17600 MH	-17584	38	80
2	17600 MH	-17598	38	81

2 16 -14 38 82

S Statistic = 38 - 82 = -44

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

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 493.333
Z-Score = -1.93597
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-1.93597 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total zinc

Location: RW11-MW(I)

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
301000	368000 ML	-67000	0	1
288000	368000 ML	-80000	0	2
336000	368000 ML	-32000	0	3
201000	368000 ML	-167000	0	4
192000	368000 ML	-176000	0	5
147000	368000 ML	-221000	0	6
134000	368000 ML	-234000	0	7
111000	368000 ML	-257000	0	8
207000	368000 ML	-161000	0	9
197000	368000 ML	-171000	0	10
225000 ML	368000 ML	-143000	0	11
215000	368000 ML	-153000	0	12
15700	368000 ML	-352300	0	13
174	368000 ML	-367826	0	14
165	368000 ML	-367835	0	15
288000	301000	-13000	0	16
336000	301000	35000	1	16
201000	301000	-100000	1	17
192000	301000	-109000	1	18
147000	301000	-154000	1	19
134000	301000	-167000	1	20
111000	301000	-190000	1	21
207000	301000	-94000	1	22
197000	301000	-104000	1	23
225000 ML	301000	-76000	1	24
215000	301000	-86000	1	25
15700	301000	-285300	1	26
174	301000	-300826	1	27
165	301000	-300835	1	28
336000	288000	48000	2	28
201000	288000	-87000	2	29
192000	288000	-96000	2	30
147000	288000	-141000	2	31
134000	288000	-154000	2	32
111000	288000	-177000	2	33
207000	288000	-81000	2	34
197000	288000	-91000	2	35
225000 ML	288000	-63000	2	36
215000	288000	-73000	2	37
15700	288000	-272300	2	38
174	288000	-287826	2	39
165	288000	-287835	2	40
201000	336000	-135000	2	41
192000	336000	-144000	2	42
147000	336000	-189000	2	43
134000	336000	-202000	2	44
111000	336000	-225000	2	45
207000	336000	-129000	2	46
197000	336000	-139000	2	47
225000 ML	336000	-111000	2	48
215000	336000	-121000	2	49
15700	336000	-320300	2	50
174	336000	-335826	2	51
165	336000	-335835	2	52
192000	201000	-9000	2	53
147000	201000	-54000	2	54
134000	201000	-67000	2	55

111000	201000	-90000	2	56
207000	201000	6000	3	56
197000	201000	-4000	3	57
225000 ML	201000	24000	4	57
215000	201000	14000	5	57
15700	201000	-185300	5	58
174	201000	-200826	5	59
165	201000	-200835	5	60
147000	192000	-45000	5	61
134000	192000	-58000	5	62
111000	192000	-81000	5	63
207000	192000	15000	6	63
197000	192000	5000	7	63
225000 ML	192000	33000	8	63
215000	192000	23000	9	63
15700	192000	-176300	9	64
174	192000	-191826	9	65
165	192000	-191835	9	66
134000	147000	-13000	9	67
111000	147000	-36000	9	68
207000	147000	60000	10	68
197000	147000	50000	11	68
225000 ML	147000	78000	12	68
215000	147000	68000	13	68
15700	147000	-131300	13	69
174	147000	-146826	13	70
165	147000	-146835	13	71
111000	134000	-23000	13	72
207000	134000	73000	14	72
197000	134000	63000	15	72
225000 ML	134000	91000	16	72
215000	134000	81000	17	72
15700	134000	-118300	17	73
174	134000	-133826	17	74
165	134000	-133835	17	75
207000	111000	96000	18	75
197000	111000	86000	19	75
225000 ML	111000	114000	20	75
215000	111000	104000	21	75
15700	111000	-95300	21	76
174	111000	-110826	21	77
165	111000	-110835	21	78
197000	207000	-10000	21	79
225000 ML	207000	18000	22	79
215000	207000	8000	23	79
15700	207000	-191300	23	80
174	207000	-206826	23	81
165	207000	-206835	23	82
225000 ML	197000	28000	24	82
215000	197000	18000	25	82
15700	197000	-181300	25	83
174	197000	-196826	25	84
165	197000	-196835	25	85
215000	225000 ML	-10000	25	86
15700	225000 ML	-209300	25	87
174	225000 ML	-224826	25	88
165	225000 ML	-224835	25	89
15700	215000	-199300	25	90
174	215000	-214826	25	91
165	215000	-214835	25	92
174	15700	-15526	25	93
165	15700	-15535	25	94

165

174

-9

25

95

S Statistic = 25 - 95 = -70

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

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 8880

b = 30240

c = 480

Group Variance = 493.333

Z-Score = -3.10655

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-3.10655 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total zinc

Location: RW12-MW(I)

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

95% Confidence Level

Xj	Xk	Xj - Xk	Positives	Negatives
216000	249000 MH	-33000	0	1
188000	249000 MH	-61000	0	2
232000	249000 MH	-17000	0	3
226000	249000 MH	-23000	0	4
219000	249000 MH	-30000	0	5
156000	249000 MH	-93000	0	6
156000	249000 MH	-93000	0	7
150000 ML	249000 MH	-99000	0	8
140000	249000 MH	-109000	0	9
157000 ML	249000 MH	-92000	0	10
117000	249000 MH	-132000	0	11
103000	249000 MH	-146000	0	12
2410	249000 MH	-246590	0	13
14	249000 MH	-248986	0	14
104	249000 MH	-248896	0	15
188000	216000	-28000	0	16
232000	216000	16000	1	16
226000	216000	10000	2	16
219000	216000	3000	3	16
156000	216000	-60000	3	17
156000	216000	-60000	3	18
150000 ML	216000	-66000	3	19
140000	216000	-76000	3	20
157000 ML	216000	-59000	3	21
117000	216000	-99000	3	22
103000	216000	-113000	3	23
2410	216000	-213590	3	24
14	216000	-215986	3	25
104	216000	-215896	3	26
232000	188000	44000	4	26
226000	188000	38000	5	26
219000	188000	31000	6	26
156000	188000	-32000	6	27
156000	188000	-32000	6	28
150000 ML	188000	-38000	6	29
140000	188000	-48000	6	30
157000 ML	188000	-31000	6	31
117000	188000	-71000	6	32
103000	188000	-85000	6	33
2410	188000	-185590	6	34
14	188000	-187986	6	35
104	188000	-187896	6	36
226000	232000	-6000	6	37
219000	232000	-13000	6	38
156000	232000	-76000	6	39
156000	232000	-76000	6	40
150000 ML	232000	-82000	6	41
140000	232000	-92000	6	42
157000 ML	232000	-75000	6	43
117000	232000	-115000	6	44
103000	232000	-129000	6	45
2410	232000	-229590	6	46
14	232000	-231986	6	47
104	232000	-231896	6	48
219000	226000	-7000	6	49
156000	226000	-70000	6	50
156000	226000	-70000	6	51

150000 ML	226000	-76000	6	52
140000	226000	-86000	6	53
157000 ML	226000	-69000	6	54
117000	226000	-109000	6	55
103000	226000	-123000	6	56
2410	226000	-223590	6	57
14	226000	-225986	6	58
104	226000	-225896	6	59
156000	219000	-63000	6	60
156000	219000	-63000	6	61
150000 ML	219000	-69000	6	62
140000	219000	-79000	6	63
157000 ML	219000	-62000	6	64
117000	219000	-102000	6	65
103000	219000	-116000	6	66
2410	219000	-216590	6	67
14	219000	-218986	6	68
104	219000	-218896	6	69
156000	156000	0	6	69
150000 ML	156000	-6000	6	70
140000	156000	-16000	6	71
157000 ML	156000	1000	7	71
117000	156000	-39000	7	72
103000	156000	-53000	7	73
2410	156000	-153590	7	74
14	156000	-155986	7	75
104	156000	-155896	7	76
150000 ML	156000	-6000	7	77
140000	156000	-16000	7	78
157000 ML	156000	1000	8	78
117000	156000	-39000	8	79
103000	156000	-53000	8	80
2410	156000	-153590	8	81
14	156000	-155986	8	82
104	156000	-155896	8	83
140000	150000 ML	-10000	8	84
157000 ML	150000 ML	7000	9	84
117000	150000 ML	-33000	9	85
103000	150000 ML	-47000	9	86
2410	150000 ML	-147590	9	87
14	150000 ML	-149986	9	88
104	150000 ML	-149896	9	89
157000 ML	140000	17000	10	89
117000	140000	-23000	10	90
103000	140000	-37000	10	91
2410	140000	-137590	10	92
14	140000	-139986	10	93
104	140000	-139896	10	94
117000	157000 ML	-40000	10	95
103000	157000 ML	-54000	10	96
2410	157000 ML	-154590	10	97
14	157000 ML	-156986	10	98
104	157000 ML	-156896	10	99
103000	117000	-14000	10	100
2410	117000	-114590	10	101
14	117000	-116986	10	102
104	117000	-116896	10	103
2410	103000	-100590	10	104
14	103000	-102986	10	105
104	103000	-102896	10	106
14	2410	-2396	10	107
104	2410	-2306	10	108

104

14

90

11

108

S Statistic = 11 - 108 = -97

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

There are 0 time periods with multiple data

A = 18

B = 0

C = 0

D = 0

E = 2

F = 0

a = 8880

b = 30240

c = 480

Group Variance = 492.333

Z-Score = -4.32655

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-4.32655 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total zinc

Location: RW16-MW(I)

Original Data (Not Transformed)

Non-Detects Replaced with 1/2 DL

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
354	20200	-19846	0	8
441	2000	-1559	0	9
19200	2000	17200	1	9
16200	2000	14200	2	9
11200	2000	9200	3	9
1230	2000	-770	3	10
320	2000	-1680	3	11
354	2000	-1646	3	12
19200	441	18759	4	12
16200	441	15759	5	12
11200	441	10759	6	12
1230	441	789	7	12
320	441	-121	7	13
354	441	-87	7	14
16200	19200	-3000	7	15
11200	19200	-8000	7	16
1230	19200	-17970	7	17
320	19200	-18880	7	18
354	19200	-18846	7	19
11200	16200	-5000	7	20
1230	16200	-14970	7	21
320	16200	-15880	7	22
354	16200	-15846	7	23
1230	11200	-9970	7	24
320	11200	-10880	7	25
354	11200	-10846	7	26
320	1230	-910	7	27
354	1230	-876	7	28
354	320	34	8	28

S Statistic = 8 - 28 = -20

Comparing at 95% confidence level (downward trend)

Probability of obtaining S >= 20 is 0.022

S < 0 and 0.022 < 0.05 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total zinc

Location: RW18-MW(I)

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 MHML	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
247	728000	-727753	0	14
319	728000	-727681	0	15
633000	592000	41000	1	15
246000	592000	-346000	1	16
694000	592000	102000	2	16
575000	592000	-17000	2	17
290000	592000	-302000	2	18
382000 MHML	592000	-210000	2	19
393000	592000	-199000	2	20
323000	592000	-269000	2	21
369000	592000	-223000	2	22
370000	592000	-222000	2	23
396000	592000	-196000	2	24
330000	592000	-262000	2	25
247	592000	-591753	2	26
319	592000	-591681	2	27
246000	633000	-387000	2	28
694000	633000	61000	3	28
575000	633000	-58000	3	29
290000	633000	-343000	3	30
382000 MHML	633000	-251000	3	31
393000	633000	-240000	3	32
323000	633000	-310000	3	33
369000	633000	-264000	3	34
370000	633000	-263000	3	35
396000	633000	-237000	3	36
330000	633000	-303000	3	37
247	633000	-632753	3	38
319	633000	-632681	3	39
694000	246000	448000	4	39
575000	246000	329000	5	39
290000	246000	44000	6	39
382000 MHML	246000	136000	7	39
393000	246000	147000	8	39
323000	246000	77000	9	39
369000	246000	123000	10	39
370000	246000	124000	11	39
396000	246000	150000	12	39
330000	246000	84000	13	39
247	246000	-245753	13	40
319	246000	-245681	13	41
575000	694000	-119000	13	42
290000	694000	-404000	13	43
382000 MHML	694000	-312000	13	44

393000	694000	-301000	13	45
323000	694000	-371000	13	46
369000	694000	-325000	13	47
370000	694000	-324000	13	48
396000	694000	-298000	13	49
330000	694000	-364000	13	50
247	694000	-693753	13	51
319	694000	-693681	13	52
290000	575000	-285000	13	53
382000 MHML	575000	-193000	13	54
393000	575000	-182000	13	55
323000	575000	-252000	13	56
369000	575000	-206000	13	57
370000	575000	-205000	13	58
396000	575000	-179000	13	59
330000	575000	-245000	13	60
247	575000	-574753	13	61
319	575000	-574681	13	62
382000 MHML	290000	92000	14	62
393000	290000	103000	15	62
323000	290000	33000	16	62
369000	290000	79000	17	62
370000	290000	80000	18	62
396000	290000	106000	19	62
330000	290000	40000	20	62
247	290000	-289753	20	63
319	290000	-289681	20	64
393000	382000 MHML	11000	21	64
323000	382000 MHML	-59000	21	65
369000	382000 MHML	-13000	21	66
370000	382000 MHML	-12000	21	67
396000	382000 MHML	14000	22	67
330000	382000 MHML	-52000	22	68
247	382000 MHML	-381753	22	69
319	382000 MHML	-381681	22	70
323000	393000	-70000	22	71
369000	393000	-24000	22	72
370000	393000	-23000	22	73
396000	393000	3000	23	73
330000	393000	-63000	23	74
247	393000	-392753	23	75
319	393000	-392681	23	76
369000	323000	46000	24	76
370000	323000	47000	25	76
396000	323000	73000	26	76
330000	323000	7000	27	76
247	323000	-322753	27	77
319	323000	-322681	27	78
370000	369000	1000	28	78
396000	369000	27000	29	78
330000	369000	-39000	29	79
247	369000	-368753	29	80
319	369000	-368681	29	81
396000	370000	26000	30	81
330000	370000	-40000	30	82
247	370000	-369753	30	83
319	370000	-369681	30	84
330000	396000	-66000	30	85
247	396000	-395753	30	86
319	396000	-395681	30	87
247	330000	-329753	30	88
319	330000	-329681	30	89

319

247

72

31

89

S Statistic = 31 - 89 = -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

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 8880

b = 30240

c = 480

Group Variance = 493.333

Z-Score = -2.56628

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-2.56628 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: total zinc

Location: RW19-MW(I)

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 MH	5.9e+006	1.11e+006	1	1
5.37e+006 ML	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 ML	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	5.9e+006	-5.9e+006	2	12
7	5.9e+006	-5.89999e+006	2	13
7.01e+006 MH	4.65e+006	2.36e+006	3	13
5.37e+006 ML	4.65e+006	720000	4	13
6.72e+006	4.65e+006	2.07e+006	5	13
5.33e+006	4.65e+006	680000	6	13
3.36e+006	4.65e+006	-1.29e+006	6	14
2.5e+006	4.65e+006	-2.15e+006	6	15
3.67e+006	4.65e+006	-980000	6	16
3.4e+006	4.65e+006	-1.25e+006	6	17
3.97e+006	4.65e+006	-680000	6	18
3.84e+006 ML	4.65e+006	-810000	6	19
4.19e+006	4.65e+006	-460000	6	20
4.88e+006	4.65e+006	230000	7	20
5	4.65e+006	-4.65e+006	7	21
7	4.65e+006	-4.64999e+006	7	22
5.37e+006 ML	7.01e+006 MH	-1.64e+006	7	23
6.72e+006	7.01e+006 MH	-290000	7	24
5.33e+006	7.01e+006 MH	-1.68e+006	7	25
3.36e+006	7.01e+006 MH	-3.65e+006	7	26
2.5e+006	7.01e+006 MH	-4.51e+006	7	27
3.67e+006	7.01e+006 MH	-3.34e+006	7	28
3.4e+006	7.01e+006 MH	-3.61e+006	7	29
3.97e+006	7.01e+006 MH	-3.04e+006	7	30
3.84e+006 ML	7.01e+006 MH	-3.17e+006	7	31
4.19e+006	7.01e+006 MH	-2.82e+006	7	32
4.88e+006	7.01e+006 MH	-2.13e+006	7	33
5	7.01e+006 MH	-7.01e+006	7	34
7	7.01e+006 MH	-7.00999e+006	7	35
6.72e+006	5.37e+006 ML	1.35e+006	8	35
5.33e+006	5.37e+006 ML	-40000	8	36
3.36e+006	5.37e+006 ML	-2.01e+006	8	37
2.5e+006	5.37e+006 ML	-2.87e+006	8	38
3.67e+006	5.37e+006 ML	-1.7e+006	8	39
3.4e+006	5.37e+006 ML	-1.97e+006	8	40
3.97e+006	5.37e+006 ML	-1.4e+006	8	41
3.84e+006 ML	5.37e+006 ML	-1.53e+006	8	42
4.19e+006	5.37e+006 ML	-1.18e+006	8	43
4.88e+006	5.37e+006 ML	-490000	8	44
5	5.37e+006 ML	-5.37e+006	8	45
7	5.37e+006 ML	-5.36999e+006	8	46
5.33e+006	6.72e+006	-1.39e+006	8	47
3.36e+006	6.72e+006	-3.36e+006	8	48
2.5e+006	6.72e+006	-4.22e+006	8	49

3.67e+006	6.72e+006	-3.05e+006	8	50
3.4e+006	6.72e+006	-3.32e+006	8	51
3.97e+006	6.72e+006	-2.75e+006	8	52
3.84e+006 ML	6.72e+006	-2.88e+006	8	53
4.19e+006	6.72e+006	-2.53e+006	8	54
4.88e+006	6.72e+006	-1.84e+006	8	55
5	6.72e+006	-6.72e+006	8	56
7	6.72e+006	-6.71999e+006	8	57
3.36e+006	5.33e+006	-1.97e+006	8	58
2.5e+006	5.33e+006	-2.83e+006	8	59
3.67e+006	5.33e+006	-1.66e+006	8	60
3.4e+006	5.33e+006	-1.93e+006	8	61
3.97e+006	5.33e+006	-1.36e+006	8	62
3.84e+006 ML	5.33e+006	-1.49e+006	8	63
4.19e+006	5.33e+006	-1.14e+006	8	64
4.88e+006	5.33e+006	-450000	8	65
5	5.33e+006	-5.33e+006	8	66
7	5.33e+006	-5.32999e+006	8	67
2.5e+006	3.36e+006	-860000	8	68
3.67e+006	3.36e+006	310000	9	68
3.4e+006	3.36e+006	40000	10	68
3.97e+006	3.36e+006	610000	11	68
3.84e+006 ML	3.36e+006	480000	12	68
4.19e+006	3.36e+006	830000	13	68
4.88e+006	3.36e+006	1.52e+006	14	68
5	3.36e+006	-3.36e+006	14	69
7	3.36e+006	-3.35999e+006	14	70
3.67e+006	2.5e+006	1.17e+006	15	70
3.4e+006	2.5e+006	900000	16	70
3.97e+006	2.5e+006	1.47e+006	17	70
3.84e+006 ML	2.5e+006	1.34e+006	18	70
4.19e+006	2.5e+006	1.69e+006	19	70
4.88e+006	2.5e+006	2.38e+006	20	70
5	2.5e+006	-2.5e+006	20	71
7	2.5e+006	-2.49999e+006	20	72
3.4e+006	3.67e+006	-270000	20	73
3.97e+006	3.67e+006	300000	21	73
3.84e+006 ML	3.67e+006	170000	22	73
4.19e+006	3.67e+006	520000	23	73
4.88e+006	3.67e+006	1.21e+006	24	73
5	3.67e+006	-3.67e+006	24	74
7	3.67e+006	-3.66999e+006	24	75
3.97e+006	3.4e+006	570000	25	75
3.84e+006 ML	3.4e+006	440000	26	75
4.19e+006	3.4e+006	790000	27	75
4.88e+006	3.4e+006	1.48e+006	28	75
5	3.4e+006	-3.4e+006	28	76
7	3.4e+006	-3.39999e+006	28	77
3.84e+006 ML	3.97e+006	-130000	28	78
4.19e+006	3.97e+006	220000	29	78
4.88e+006	3.97e+006	910000	30	78
5	3.97e+006	-3.97e+006	30	79
7	3.97e+006	-3.96999e+006	30	80
4.19e+006	3.84e+006 ML	350000	31	80
4.88e+006	3.84e+006 ML	1.04e+006	32	80
5	3.84e+006 ML	-3.84e+006	32	81
7	3.84e+006 ML	-3.83999e+006	32	82
4.88e+006	4.19e+006	690000	33	82
5	4.19e+006	-4.19e+006	33	83
7	4.19e+006	-4.18999e+006	33	84
5	4.88e+006	-4.88e+006	33	85
7	4.88e+006	-4.87999e+006	33	86

7

5

2

34

86

S Statistic = 34 - 86 = -52

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

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 8880

b = 30240

c = 480

Group Variance = 493.333

Z-Score = -2.29615

Comparison Level at 95% confidence level = -1.65463 (downward trend)

-2.29615 < -1.65463 indicating a downward trend