FOURTH QUARTER 2016 GROUNDWATER ASSESSMENT MONITORING REPORT NOVEMBER 2016

Environmental Waste Solutions Camden Class II Landfill
TDSWM Permit Number IDL 03-0212
Camden, Tennessee

Prepared for:
Environmental Waste Solutions Camden Class II Landfill
200 Omar Circle
Camden, TN 38320

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EXECUTIVE SUMMARY

This report documents the fourth quarter assessment monitoring event of 2016 for the Environmental Waste Solutions, LLC (EWS) Class II Landfill. The Class II landfill is registered with the Tennessee Division of Solid Waste Management (TDSWM) with permit number IDL 03-0212. The EWS Camden Class II Landfill is located in Benton County at 200 Omar Circle, Camden, Tennessee (latitude 36°03'16" N/longitude 88°05'16" W). The monitoring event was performed in general accordance with the site's Groundwater Quality Assessment Plan (GWQAP), approved by TDEC-DSWM on April 4, 2016. EWS entered the Assessment Monitoring Program as a result of chloride concentrations reported above the 250 mg/L EPA secondary drinking water standard at monitoring well MW-3 during the November 2015 Semi-Annual Monitoring Event.

The following table presents the wells that were used to develop this report.

Upgradient Monitoring Points	Downgradient Monitoring Points
MW-1	MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3

Groundwater samples were collected by Civil & Environmental Consultants, Inc. (CEC) on November 10, 2016. ESC Lab Sciences (ESC) performed the groundwater analysis and reported the results on November 22, 2016. A leachate sample was also collected by CEC on November 10, 2016. ESC performed the leachate analysis and reported the results on November 23, 2016. All permanent groundwater monitoring wells, temporary monitoring wells, and leachate were sampled during the event with the exception of MW-2 which was replaced by MW-4 in April 2013. MW-2 has been removed from the monitoring network because the well routinely yielded insufficient volumes of water for sampling purposes. However, MW-2 remains in place and will continue to be monitored for field parameters and water level data for inclusion in the potentiometric surface interpretation.

Groundwater samples collected from MW-1, MW-3, MW-4, and MW-5 were analyzed for the Appendix I list of parameters plus bromide, chloride, nitrate, sulfate, ammonia, chemical oxygen demand (COD), boron, and a short list of ions. Since additional waste streams have been approved for disposal in the EWS Class II Landfill, the TDSWM requested that EWS add the volatile organic compounds (VOCs) included in the Appendix I *Constituents For Groundwater Monitoring* presented in Rule 0400-11-01-.04 (9.) d of the Rules and Regulations Governing Solid Waste Disposal in Tennessee to the existing list of groundwater monitoring constituents. Groundwater samples collected from TMW-1, TMW-2, and TMW-3 were analyzed only for chloride during this event.

Inter-well prediction interval analysis was used to identify statistically significant increases (SSIs) over background concentrations for the analyzed water quality parameters. Only parameters with a history of analytical results reported above the detection limits (practical quantitation limits) of the laboratory were evaluated. The results of the analysis are summarized as follows.

Review of the statistical analysis performed on the available data indicated that there were two statistically significant increases (SSIs) over background data. The SSIs over background data were limited to barium (MW-3) and chloride (MW-3 and MW-4). The barium detection observed at MW-3 and the chloride detection observed at MW-3 and MW-4 were well below their associated MCLs or National Secondary Drinking Water Standard (2DWS). The chloride concentration reported for MW-3 during this sampling event was 120 mg/L and was below the 2DWS (250 mg/L) for chloride concentrations. In addition, the current reported concentration was less than the concentrations reported during the Second Semi-Annual Monitoring Event in November 2015 (458 mg/L), the supplemental re-sampling event in December 2015 (360 mg/L), and the Third Quarter Assessment Monitoring Event in August 2016 (218 mg/L). However, the current reported concentration is higher than what was observed during the February 2016 (96.1 mg/L) and April 2016 (80.7 mg/L) sampling events. The chloride concentration observed at MW-4 was 6.61 mg/L and is consistent with previous data and below the 2DWS for chloride concentrations (250 mg/L). The chloride concentrations at MW-3 will continue to be closely monitored during future quarterly assessment monitoring events.

The first quarter assessment monitoring event is tentatively scheduled for February 2017 and will consist of collecting a sample from MW-3 for analysis of chloride and additional leachate indicator parameters. To maintain background information, a sample will also be collected from upgradient monitoring well MW-1 during the February 2017 event. The n = 4 background event for recently installed monitoring well MW-5 will be completed during the regularly scheduled 2017 second quarter assessment monitoring event.

Glossary of Terms

Appendix I	Refers to the required regulatory sample list of groundwater parameters
CEC	Civil & Environmental Consultants, Inc.
Class I Landfill	Municipal Solid Waste Landfill
Class II Landfill	Industrial Waste Landfill
Class IV Landfill	Construction/Demolition Waste Landfill
Class III/IV Landfill	Landscaping and Construction/Demolition Waste Landfill
DML	Construction Demolition Landfill
EPA	Environmental Protection Agency
ESC	ESC Lab Sciences
EWS	Environmental Waste Solutions
GW	Groundwater
HDPE	High Density Polyethylene
HI	Hydrogeologic Investigation
MCL	Maximum Contaminant Level
µS•cm-1	micro-Siemens per centimeter
mg/L	milligrams per Liter
MW	Monitor Well
NPPL	Non-parametric prediction limit analysis
ORP	Oxidation Reduction Potential
POTW	Publically Owned Treatment Works
ppm	parts per million*
PQL	Practical Quantitation Limit
QC	Quality Control
SNL	Sanitary Landfill
SSI	Statistically Significant Increase
TDEC	Tennessee Department of Environment and Conservation
TDOG	Tennessee Division of Geology
TDSWM	Tennessee Division of Solid Waste Management
TOC	Top of Casing
VOC	Volatile Organic Compound

* ppm – parts per million* is equivalent to mg/L – milligrams per Liter for water samples

1.0 INTRODUCTION

1.1 SITE LOCATION

Environmental Waste Solutions, LLC (EWS) manages the Camden Class II landfill located just off Highway US 70 at 200 Omar Circle, Camden, Tennessee. The site is located on the Camden, Tennessee USGS quadrangle at north latitude 36° 03' 16" and west longitude 88° 05' 16" at an average elevation of 400 feet above mean sea level datum (MSL). The location of the facility is indicated in Appendix A – Figure 1 – Site Location Map. The landfill footprint can be viewed in Appendix A – Figure 2 – Potentiometric Surface Map.

1.2 CURRENT ACTIVITIES

The EWS Camden Class II Landfill currently receives secondary aluminum smelter waste for disposal including aluminum dross, salt cakes, and other industrial wastes approved by the TDSWM.

2.0 AQUIFER CHARACTERISTICS

2.1 GEOLOGIC AND AQUIFER CHARACTERISTICS

The extensive reworking of the site as a result of the excavation of chert for local road and fill projects has significantly impacted the original site geology. Based upon a review of the Tennessee Division of Geology (TDOG) Geologic Map and site observations it appears that the site is within the Camden and Harriman Formations. It is reported by the TDOG that the Camden and Harriman Formations are lithologically identical and not enough fossils are present to form a convenient basis for subdivision.

2.1.1 Camden and Harriman Formations

The Camden and Harriman Formations are described as follows: chert, gray with specks and mottlings of very light-gray and yellowish-gray (surfaces stained pale to dark yellowish-orange), bedded and blocky (beds 2 to 8 inches thick), dense, conchoidal fracture, contains pods of white to light gray tripolitic clay, locally stained yellow and brown, and fossiliferous. Locally, especially near the top, fragments of chert are cemented into large masses and beds of breccia by dark-brown to moderate-red limonite.

Groundwater potentiometric data collected from the uppermost water bearing zone across the entire proposed waste area footprint during the 1999 and 2006 hydrogeological investigations indicate that the uppermost aquifer is sloped to the south. Comparisons of the water bearing zone elevations to static groundwater elevations indicate an unconfined aquifer.

2.2 MONITOR WELL INTEGRITY & STATIC WATER LEVELS

The groundwater monitoring network for the Class II Landfill consists of monitoring wells MW-1, MW-3, MW-4, and MW-5. Monitoring well MW-1 serves as an upgradient monitoring point while monitoring wells MW-3, MW-4, and MW-5 serve as downgradient monitoring points. Additionally, temporary monitoring points TMW-1, TMW-2, and TMW-3 were installed as part of the groundwater quality assessment plan and were used for potentiometric interpretation during this event along with MW-2 (which has previously been removed from the monitoring network). The integrity of each monitoring well is checked during each sampling event prior to groundwater collection. The physical condition of each wellhead is observed and noted along with the condition and ability of any and all locking mechanisms for each monitoring well. Once the watertight seal is removed from the top of each monitoring well's casing, the well is allowed to de-pressurize. A decontaminated electronic probe is slowly lowered into the well to establish the distance between the established top of casing and the elevation of free groundwater. The distance is then re-checked to ensure that the measurement is of actual static water level and the groundwater is not rising or falling in the monitoring well. The electronic probe is capable of determining this distance to within one-hundredth of one foot (0.01 foot). This distance is written in the site-specific field book as depth-to-water. Upon collection of these data, the electronic water level probe is removed from

the monitoring well and decontaminated from contact with the well casing/screen and groundwater.

The following equation is used to determine the elevation of groundwater at each well:

Established Top of Casing Elevation – Depth to Water = Groundwater Elevation

Top of casing elevation has been determined by a licensed land surveyor and is referenced to Mean Sea Level Datum of the World Geodetic Survey of 1984. The top of casing elevations for all site monitoring wells (MW-1, MW-2, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3) were update by a licensed land surveyor on May 12, 2016. Groundwater elevations are listed in Appendix A – Table 1 – Field Parameters & Potentiometric Data and reflect the most recent survey.

2.3 GROUNDWATER FLOW DIRECTION

Groundwater at the landfill appears to generally flow in a southern direction towards Charlie Creek. Groundwater flow in the vicinity of the Class II Landfill generally flows from a topographic high north of the landfill towards monitor wells MW-3, MW-4, and MW-5 located to the south. Monitoring wells MW-3, MW-4, and MW-5 are positioned to intercept any possible groundwater contaminants leaching from the landfill.

2.4 POTENTIOMETRIC GRADIENT

The potentiometric surface of the first aquifer occurring beneath the Class II Landfill occurs at approximately twenty-four (24) feet below ground surface at the up-gradient monitor well MW-1 to approximately ten (10) feet below ground surface at monitor well MW-5. The groundwater potentiometric data interpreted from the 1999 and 2006 hydrogeological investigations conducted at the site for the uppermost aquifer indicate that the uppermost water bearing zone generally moves in a southern direction. Comparisons of water bearing zone elevations to static groundwater elevations for both investigations indicate an unconfined aquifer. The potentiometric gradient calculated from groundwater elevation data collected on November 10, 2016 is approximately 1.20 %.

The potentiometric gradient is calculated according to the following formula:

$$\frac{\text{Highest GW. Contour Elev. – Lowest GW. Contour Elev.}}{\text{Horizontal Distance between the Potentiometric Contours}} * 100 = \text{Pot. Grad.}$$

$$\frac{(390') - (370')}{1{,}720'} * 100 = 1.20\%$$

The above calculation assumes a perpendicular gradient between the potentiometric contours drawn between 390’ and 370’. These assumptions may provide an artificially higher potentiometric gradient than is likely occurring at the site.

2.5 HYDRAULIC CONDUCTIVITY

Hydraulic conductivity estimations within the first aquifer occurring beneath the landfill have not been determined at this time.

3.0 GROUNDWATER SAMPLING PROCEDURES

3.1 INSTRUMENTATION

Depth to groundwater measurements were collected using a Solinst® electronic water level indicator, model #122. A YSI Professional Plus® multi-parameter probe was used to record pH, conductivity, temperature, dissolved oxygen, and ORP during groundwater sampling events at the landfill. A Hach® model 2100Q turbidity meter was used to collect turbidity readings. Each instrument was either checked against known standards or calibrated per manufacturers' specifications prior to the commencement of sampling activities.

3.2 PURGING AND COLLECTION OF FIELD PARAMETER VALUES

Groundwater was purged using new polyethylene tubing connected to a peristaltic pump, or in the case of a pump malfunction, a new disposable polyethylene bailer. Bailers were factory decontaminated and sealed so as to prevent environmental cross contamination of the bailers. New nylon twine was fixed to each bailer via a tied knot. When purging using a disposable polyethylene bailer, the bailer was slowly lowered into the water column using the nylon twine. The bailer was allowed to completely submerge into the water column prior to extracting the bailer from the monitor well.

The total volume of groundwater residing in each monitor well was calculated as follows: (1) subtracting the depth to water from the total depth of each well and (2) the depth of water in feet was multiplied by 0.163 gallons per foot in a 2 inch (I.D.) monitor well. The initial amount of purged groundwater was collected in a clean, high-density polyethylene (HDPE) flow-through cell where it was measured for temperature, pH, specific conductance, dissolved oxygen, and oxidation-reduction potential (ORP). The turbidity was measured by collecting a small volume of water and using the Hach® model 2100Q turbidimiter. These values were noted in the site specific field book under V_0 and then the collected groundwater was poured onto the ground, down-gradient from the monitor well.

Groundwater was purged from the monitoring well until one calculated well volume of water passed into the flow-through cell. Once this volume of water was purged, the field chemistry parameters were again measured and recorded in the field book as V_1. This procedure for purging groundwater continued for an additional well volume, V_2, if sufficient groundwater was available. After the second purged well volume was observed for field parameter values, the values were checked against values for V_1. If the pH and specific conductance values for each volume purged varied no more than 10% from V_1 to V_2 and the temperature stabilized to within one degree Celsius, preparations were made to collect the groundwater sample for submittal to the analytical laboratory. If the field parameters were not stable, the purging procedures continued until either one of the following conditions were met:

1. Field stabilization occurred;

2. Well was purged dry; or,
3. A maximum of three well volumes were purged.

If the monitor well was purged dry, then the recharging groundwater was collected for analysis within twenty-four hours.

Field parameter values for each well are presented in Table 1 – Groundwater Field Data in Appendix A. A detailed account of each purge and sample procedure conducted at each monitor well is presented in Appendix D – Standard Operating Procedures.

3.3 SAMPLE COLLECTION & PRESERVATION

Groundwater samples were collected from monitor wells when field parameter data indicated that stagnant water has been purged from the well and replaced by groundwater from the adjacent formation that is representative of actual aquifer conditions. Groundwater was placed in laboratory supplied sample vessels in the following order: Appendix I organics – three (3) forty (40) mL amber glass containers preserved with hydrochloric acid (HCl); Appendix I inorganics – one (1) five-hundred (500) ml HDPE container preserved with nitric acid (HNO_3); bromide, chloride, nitrate, and sulfate – one (1) two-hundred fifty (250) ml unpreserved HDPE container; COD & ammonia – one (1) two-hundred fifty (250) ml HDPE jar preserved with sulfuric (H_2SO_4) acid; and dissolved inorganics – one (1) five-hundred (500) ml unpreserved HDPE container.

3.4 QUALITY ASSURANCE AND QUALITY CONTROL

A field blank and a duplicate sample were collected during the monitoring event performed at the EWS Class II Landfill. CEC collected a field blank next to monitoring well MW-3 and a duplicate sample was collected from MW-5. The field blank was collected by pouring deionized water into a set of sample bottles, thereby allowing any airborne contaminants a chance to enter the field blank sample. Laboratory analytical testing of the field blank detected concentrations of alkalinity (392 mg/L), boron (0.0314 mg/L), copper (0.275 mg/L), lead (0.00717 mg/L), and zinc (0.228 mg/L). Copper, lead, and zinc concentrations were not detected at any of the site monitoring wells during this event. However, alkalinity and boron concentrations were reported at each site monitoring well. Since alkalinity and boron concentrations were detected in the field blank sample, the reported concentrations of alkalinity and boron in the site monitoring wells may be elevated due to laboratory interference. The results for the duplicate sample collected from MW-5 were similar to the original MW-5 sample results.

3.5 SAMPLE CHAIN-OF-CUSTODY

A sample Chain-of-Custody (COC) traveled along with the sample kit from ESC to EWS and back to ESC for the sampling event. The CEC SOP 07-01-01 for maintaining sample Chain of Custody may be found in Appendix D – CEC Standard Operating Procedures.

4.0 LABORATORY ANALYTICAL PROCEDURES

4.1 ANALYTICAL METHODS

All laboratory analyses for the November 2016 groundwater assessment monitoring event were completed by ESC Lab Sciences in Mt. Juliet, Tennessee. The analytical methods chosen for these monitoring events were in full compliance with the procedures required by the Tennessee Division of Solid Waste Management (TN-DSWM) and the United States Environmental Protection Agency's publication SW-846, entitled Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (3rd Edition).

The SW-846 methods used for the analysis of groundwater were as follows:

Method 6010b	Inductively Coupled Plasma (ICP) – Atomic Emission Spectrometry
Method 6020	ICP – Mass Spectrometry
Method 2320 B-2011	Alkalinity
Method 7470A	Mercury in Liquid Waste – Manual Cold Vapor Technique
Method 8011	1,2-dibromoethane & 1,2 dibromo-3-chloropropane by Micro-extraction and Gas Chromatography
Method 8260B	Volatile Organic Compounds by Gas Chromatograph/Mass Spectrometry
Method 9056	Determination of Inorganic Anions by Ion Chromatography (Bromide, Chloride, Fluoride, Nitrate, and Sulfate)
Method 350.1	Ammonia Nitrogen
Method 410.4	Chemical Oxygen Demand (COD)

4.2 LABORATORY ANALYTICAL RESULTS

Groundwater samples were collected by Civil & Environmental Consultants, Inc. (CEC) on November 10, 2016. ESC Lab Sciences (ESC) performed the groundwater analysis and reported the results on November 22, 2016. A leachate sample was also collected by CEC on November 10, 2016. ESC performed the leachate analysis and reported the results on November 23, 2016. Copies of the laboratory reports are located in Appendix C – Laboratory Analytical Reports. Constituent values from all inorganic laboratory analyses, along with applicable MCLs or 2DWSs are presented in Table 2 – Analytical Results in Appendix A.

4.3 QUALITY CONTROL QUALIFIER CODES

The EPA Contract Laboratory Program states that sample and result qualifiers should be utilized as part of a total quality control process. ESC complies with this directive and reports all qualifiers along with explanations of QC qualifier codes. Seven QC qualifier codes (B, E, J, J3, J4, P1, and V) were indicated during the laboratory analysis of groundwater samples during this monitoring event, which can be viewed along with the Laboratory Analytical Reports in Appendix C.

5.0 STATISTICAL ANALYSIS

5.1 APPLICABLE METHODS

The Rules of Tennessee Department of Environment and Conservation, Division of Solid Waste Management Chapter 1200-1-7-.04 states, in part, that each landfill must conduct and report statistical analyses as part of the evaluation of groundwater monitoring data. Several methods may be employed for this endeavor. EWS Camden Class II Landfill has chosen to use inter-well and intra-well non-parametric prediction limit analysis (NPPL) at this time.

First, the distribution of the data was evaluated for normality. The test of normality was conducted using the Shapiro-Wilks method if N <50 or Shapiro-Francia method if N>50. The normality test was performed for both raw and log-transformed data with replacement of non-detects to half of the corresponding laboratory detection limit. Data determined to be normally distributed were evaluated using parametric prediction interval analysis. Data that were not normally distributed were evaluated using non-parametric statistical methods. Inter-well and intra-well parametric and non-parametric prediction limit analyses (NPPL) were deemed appropriate for this data set. Inter-well analyses compared the concentrations observed at the down-gradient monitoring locations (MW-3 and MW-4) to the concentrations observed at the up-gradient monitoring location (MW-1) during this monitoring event. Intra-well analysis was utilized only at MW-1 to compare the concentrations observed during the current groundwater sampling event to the established background data set for MW-1 concentrations.

MW-5 was installed on April 26, 2016 and the initial background sampling event (n=1) occurred on April 28, 2016. The second background sampling event (n=3) for MW-5 occurred during this event. At least four separate sampling events are needed at each sampling location in order to establish adequate background data for statistical analysis. Since the n=3 background sampling event for MW-5 occurred during this event, the analytical data for MW-5 were not included in the inter-well statistical analysis during this event. After four separate sampling events at MW-5, the data may be incorporated into the inter-well statistical analysis for the site. A summary of the analytical results at MW-5 are included in Table 2 – Analytical Results in Appendix A.

The percentage of inter-well background non-detects for each parameter determines the primary statistical method utilized for each parameter. If the percentage of non-detects in the background samples is less than 50%, Shewart-CUSUM control charts are utilized. If more than 50% background non-detects exist for the given parameter, non-parametric inter-well prediction limit analysis is conducted on the data.

The computer program ChemStat was used for all statistical computations. Worksheets indicating inter-well and intra-well statistical analysis sheets and time versus concentration charts may be viewed in Appendix B – Statistical Evaluations and Time Series Plots.

5.2 STATISTICAL RESULTS

SSIs over background identified for the current monitoring event include barium and chloride at MW-3 and chloride at MW-4. The barium concentration at MW-3 was 0.188 mg/L during this sampling event. Barium remains below the maximum contaminant level (MCL) for the primary drinking water standard for barium (2 mg/L). The chloride concentration reported at MW-3 was 120 mg/L during this sampling event, which was below the 2DWS for chloride concentrations (250 mg/L), and was less than the concentrations reported during the Second Semi-Annual Monitoring Event in November 2015 (458 mg/L), the supplemental re-sampling event (360 mg/L) in December 2015, and the most recent Third Quarter Assessment Monitoring Event in August 2016 (218 mg/L). However, chloride concentrations at MW-3 exhibit an increasing trend per the Mann-Kendall non-parametric trend procedure. The chloride concentrations at MW-3 will continue to be closely monitored during future quarterly assessment monitoring events. The chloride concentration observed at MW-4 was 6.61 mg/L and is consistent with previous data and below the 2DWS for chloride concentrations (250 mg/L).

The Mann-Kendall trend analysis at the 95% confidence level was utilized by using the data available from past monitoring events. Trend analysis showed no distinct trend for chloride detections at MW-4 and an upward trend in barium and chloride concentrations reported at MW-3.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Representative groundwater samples were collected from permanent monitor wells MW-1, MW-3, MW-4, and MW-5, and temporary monitoring wells TMW-1, TMW-2, and TMW-3. The groundwater samples collected from the permanent monitoring wells were analyzed for Appendix I list of parameters, plus chloride, nitrate, sulfate, ammonia, COD, and a short list of ions. The samples collected from the temporary monitoring wells were analyzed for chloride.

The results of the Fourth Quarter Assessment Monitoring Event of 2016 for MW-3 are summarized as follows.

- The reported concentration of chloride at MW-3 (120 mg/L) did not exceed the 250 mg/L Secondary Drinking Water Standard. The observed concentration is less than the concentration reported during the 2016 3rd Quarter Monitoring Event (218 mg/L) and is significantly less than the concentration reported during the Second Semi-Annual Monitoring Event 2015 (458 mg/L) and supplemental re-sampling event (360 mg/L). The results of the chloride concentrations observed at the temporary monitoring wells are consistent with the previously reported results and well below the 250 mg/L secondary drinking water standard.
- Time series graphs for the leachate indicator parameters collected at MW-3 during the event continue to indicate a reduction in concentrations from what was reported during the Second Semi-Annual Monitoring Event 2015 (November 2015). The chloride concentration in MW-3 has dropped over 70% since the November 2015 event.
- None of the Appendix I parameters analyzed at MW-3 during the event exceeded the established MCLs. Additionally, no Volatile Organic Compounds (VOCs) were detected above their respective laboratory Practicable Quantification Limit (PQL) during the monitoring event.

6.1 EWS GROUNDWATER QUALITY RELATIVE TO THE EPA PRIMARY DRINKING WATER STANDARDS

Laboratory analytical results for the groundwater samples collected in November of 2016 from the EWS Class II Landfill indicate that arsenic in MW-1, the background monitoring well, was detected at concentrations that exceeded the EPA MCL.

Arsenic was detected in MW-1 at a concentration of 0.029 mg/l. The MCL for arsenic is 0.01 mg/l. Arsenic has historically been detected at concentrations exceeding the primary drinking water MCL prior to the disposal of waste in the landfill. Laboratory analytical testing of groundwater samples taken from MW-1 during background testing of the groundwater prior to waste placement in the landfill revealed concentrations of arsenic ranging from 0.024 mg/L to 0.072 mg/L. The presence of arsenic in the local groundwater is considered attributable to naturally

occurring deposits in the soil overburden since there is no immediate development up-gradient of the well.

6.2 EWS GROUNDWATER QUALITY RELATIVE TO THE NATIONAL SECONDARY DRINKING WATER STANDARDS

Laboratory analytical results for the groundwater samples collected in November of 2016 from the EWS Class II Landfill groundwater monitoring well network indicated that three of the site-specific groundwater monitoring list of compounds were detected at concentrations which exceeded the National Secondary Drinking Water Standards (2DWS). Those parameters included iron and manganese in upgradient well MW-1, aluminum in MW-3 and MW-5, and manganese in downgradient wells MW-3 and MW-4. Field data collected from the site monitoring wells during this event indicated slightly elevated turbidity values observed at the time of sampling in monitoring wells MW-1 (42.7 NTU), MW-3 (64.5 NTU), and MW-5 (28.9 NTU). The elevated turbidity observed may have contributed to the reported concentrations of aluminum, iron, and manganese.

Aluminum concentrations observed in MW-3 (0.694 mg/L) and MW-5 (0.229 mg/L) during the November 2016 sampling event were slightly above the 2DWS (0.2 mg/L). However, the aluminum concentrations observed in MW-3 and MW-5 remain less than the highest concentrations observed prior to the placement of waste in upgradient MW-1(1.2 mg/L) and downgradient MW-3 (1.8 mg/L). Additionally, aluminum concentrations do not appear to exhibit an increasing trend via time-series graphs.

Iron was detected at a concentration of 26 mg/L in MW-1 and 1.6 mg/L in MW-3 prior to the placement of waste. Iron was detected in MW-1 (9.93 mg/L), MW-3 (0.837 mg/L), and MW-5 (0.687 mg/L) during the November 2016 monitoring event. The reported concentrations were less than the highest concentrations observed prior to placement of waste, do not appear to exhibit an increasing trend via time-series graphs, and do not appear to be the result of landfill operations.

Manganese has been consistently detected in upgradient well MW-1 and the highest reported concentration was observed during the May 2016 monitoring event (0.952 mg/L). The manganese detections observed in upgradient MW-1 (0.535 mg/L) and downgradient site monitoring wells MW-3 (0.311 mg/L), MW-4 (.0223 mg/L), and MW-5 (0.0505 mg/L) may be contributable to a natural variation in local groundwater.

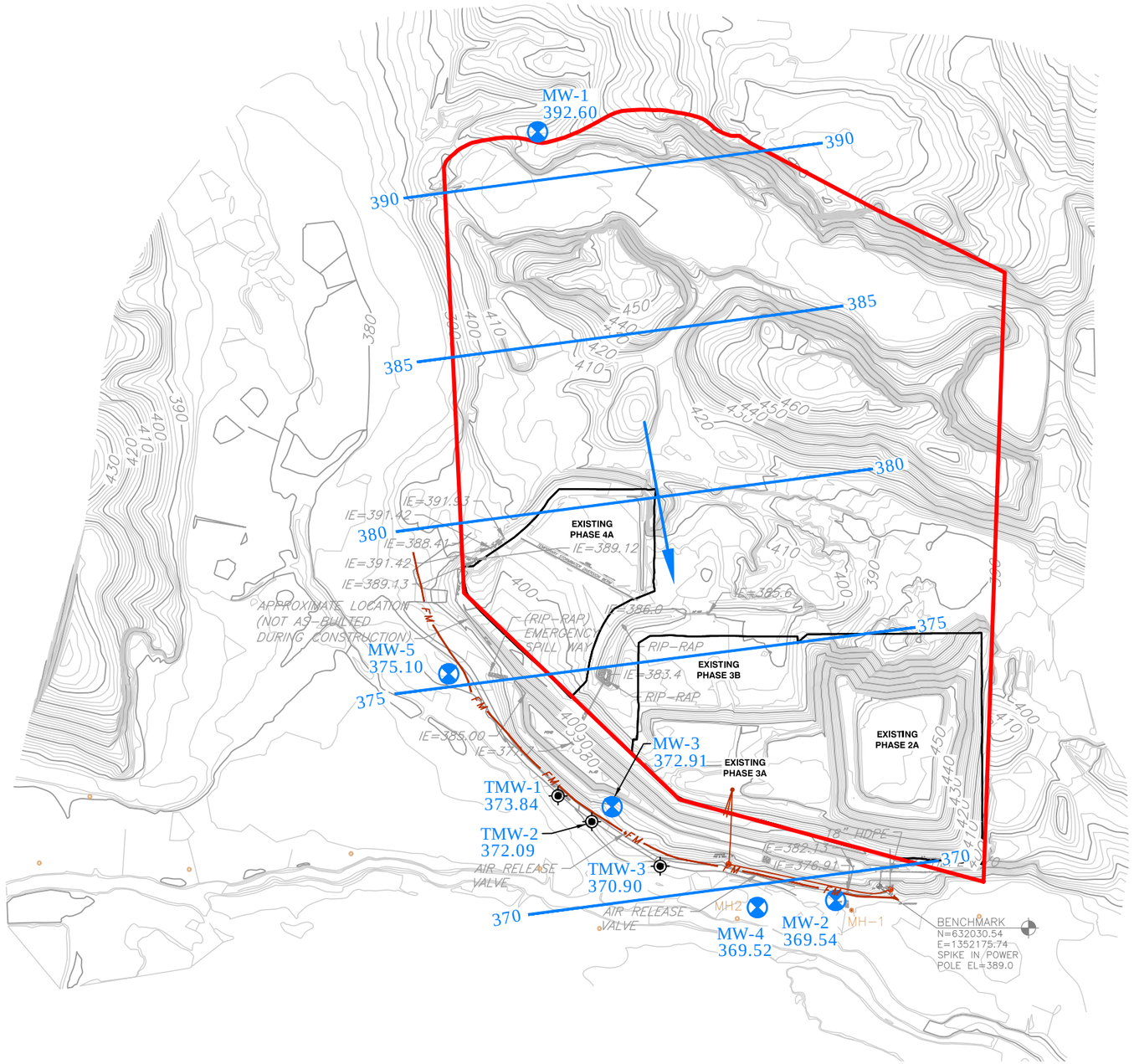
Chloride concentrations have indicated an increasing trend in at MW-3 when considering all data. However, the concentrations have been decreasing with time since the November 2015 event. The chloride concentration reported at MW-3 during this sampling event was 120 mg/L, below the 2DWS for chloride concentrations (250 mg/L), and was less than the concentrations reported during the Second Semi-Annual Monitoring Event in November 2015 (458 mg/L), the supplemental re-sampling event (360 mg/L) in December 2015, and the Third Quarter Assessment

Monitoring Event in August 2016 (218 mg/L). The chloride concentrations at MW-3 will continue to be closely monitored during future quarterly assessment monitoring events. The chloride concentration observed at MW-4 was 6.61 mg/L, is consistent with previous data, and is below the 2DWS for chloride concentrations (250 mg/L).

The first quarter assessment monitoring event is tentatively scheduled for February 2017 and will consist of collecting a sample from upgradient MW-1 and downgradient MW-3 for analysis of chloride and additional leachate indicator parameters. The n = 4 background event for recently installed monitoring well MW-5 will be completed during the regularly scheduled second quarter 2017 assessment monitoring event.

APPENDIX A
MAPS & TABLES

NORTH



SCALE IN FEET

0 300' 600'

LEGEND

MW1 392.60	GROUND WATER MONITORING WELL GROUND WATER ELEVATION (FMSL)
TMW-1 373.84	TEMPORARY GROUND WATER MONITORING WELL GROUND WATER ELEVATION (FMSL)
390	POTENTIOMETRIC SURFACE CONTOUR (FMSL)
	GROUND WATER FLOW DIRECTION
MH1	SANITARY SEWER MANHOLE
	APPROXIMATE FILL LIMITS
FM	LEACHATE FORCE MAIN

NOTE:

Hydraulic gradient calculation between contour lines 370' and 390'

$$i = \frac{390'-370'}{1{,}720'} = 0.012 \text{ ft/ft}$$

GROUNDWATER CONDITIONS

THE WATER LEVELS PRESENTED HEREIN ARE APPLICABLE TO THE LOCATION AND TIME OF MEASUREMENT. WATER LEVELS MAY FLUCTUATE THROUGH TIME.

POTENTIOMETRIC CONTOURS GENERATED FROM THESE DATA ARE CONSTRUCTED BY INTERPOLATION BETWEEN POINTS OF KNOWN STATIC WATER LEVEL ELEVATIONS AND USING KNOWLEDGE OF SPECIFIC SITE CONDITIONS. ACTUAL STATIC WATER LEVELS AT LOCATIONS BETWEEN THE MONITORING POINTS MAY DIFFER FROM THOSE DEPICTED.

* HAND SIGNATURE ON FILE

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ENVIRONMENTAL WASTE SOLUTIONS
CAMDEN CLASS II LANDFILL
CAMDEN, TENNESSEE

NOVEMBER 2016
POTENTIOMETRIC SURFACE MAP

DRAWN BY:	PC	CHECKED BY:	MJ	APPROVED BY:	KBW*	FIGURE NO.:	1
DATE:	DECEMBER 2016	DWG SCALE:	1" = 300'	PROJECT NO:	142-059		

P:\2014\142-059\-CADD\DWG\142-059 GROUNDWATER MAP NOVEMBER 2016.DWG[FIG 1]LS:(PCAMPBELL - 1/12/2017) - LP: 1/13/2017_1:23:26_PM

Table 1

Environmental Waste Solutions Camden Class II Landfill IDL 03-0212

Field Parameters and Potentiometric Data - November 10, 2016

Monitoring Well/ Piezometric Well	Date	Sample Time	Top of Casing Elevation (Feet MSL)	Bottom of Well Elevation (Feet)	Well Diameter (Feet)	Well Volume Gallons	Depth to Water (Feet)	Potentiometric Surface (Feet MSL)	Temperature (˚C)	Conductivity (micromhos/cm)	pH (SU)	Dissolved Oxygen (mg/l)	Oxidation Reduction Potential (Millivolts)	Turbidity (NTU)
MW-1	11/10/2016	10:45	416.47	385.97	0.17	1.1	23.87	392.60	16.0	73.8	5.46	5.87	23.2	42.7
MW-2*	11/10/2016	NS	380.35	367.70	0.17	0.3	10.81	369.54	18.4	176.3	6.04	4.89	145.6	235.0
MW-3	11/10/2016	11:45	392.90	369.66	0.17	0.6	19.99	372.91	18.1	532.0	5.22	5.04	170.2	64.5
MW-4	11/10/2016	NS	381.47	357.25	0.17	2.1	11.95	369.52	17.4	57.5	5.70	5.28	140.6	1.18
MW-5	11/10/2016	NS	385.25	351.40	0.17	4.0	10.15	375.10	16.7	137.9	5.53	5.57	175.4	28.9
TMW-1**	11/10/2016	NS	381.19	348.99	0.085	1.1	7.35	373.84	16.4	65.3	5.79	5.71	104.6	823.0
TMW-2**	11/10/2016	NS	384.27	356.77	0.085	0.7	12.18	372.09	16.6	103.6	6.37	5.62	117.3	>1000
TMW-3**	11/10/2016	NS	381.37	353.37	0.085	0.7	10.47	370.90	16.5	173.5	5.53	5.70	149.1	81.6
Leachate	11/10/2016	NS	NA	NA	NA	NA	NA	NA	17.6	263,547	9.77	0.07	24.5	10.9

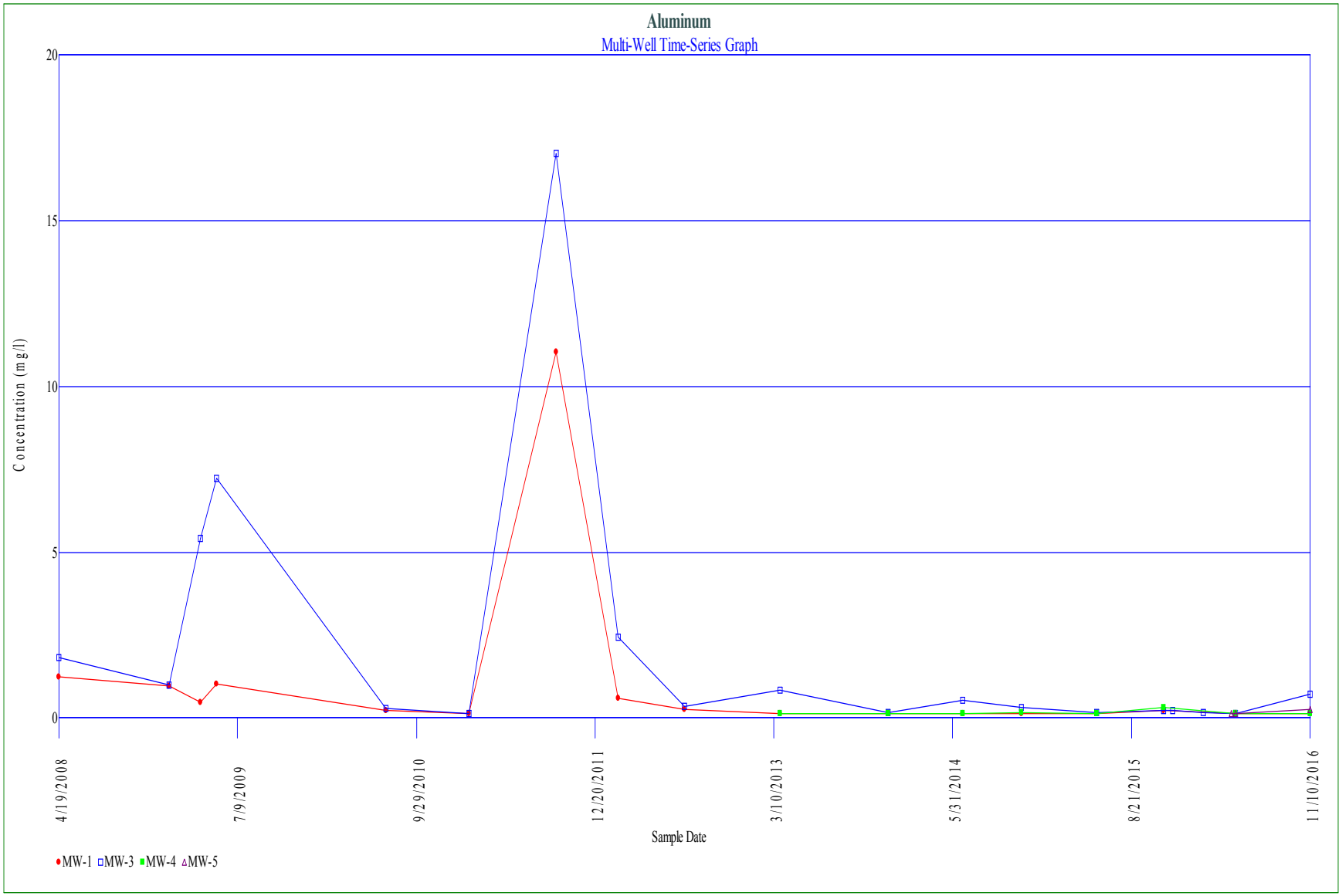
Note 1: Top of Casing Elevations from survey by Civil & Environmental Consultants, Inc. on November 10, 2016.
Note 2: 3rd Quarter sampling for MW-1 and MW-3 only.
* - MW-2 has been removed from monitoring network. Only water level and field parameters collected at MW-2.
**- TMW locations are temporary monitoring wells installed as part of the groundwater quality assessment plan, only water levels, field parameters, and chloride were sampled
NS= Not Sampled
NA= Not Applicable.

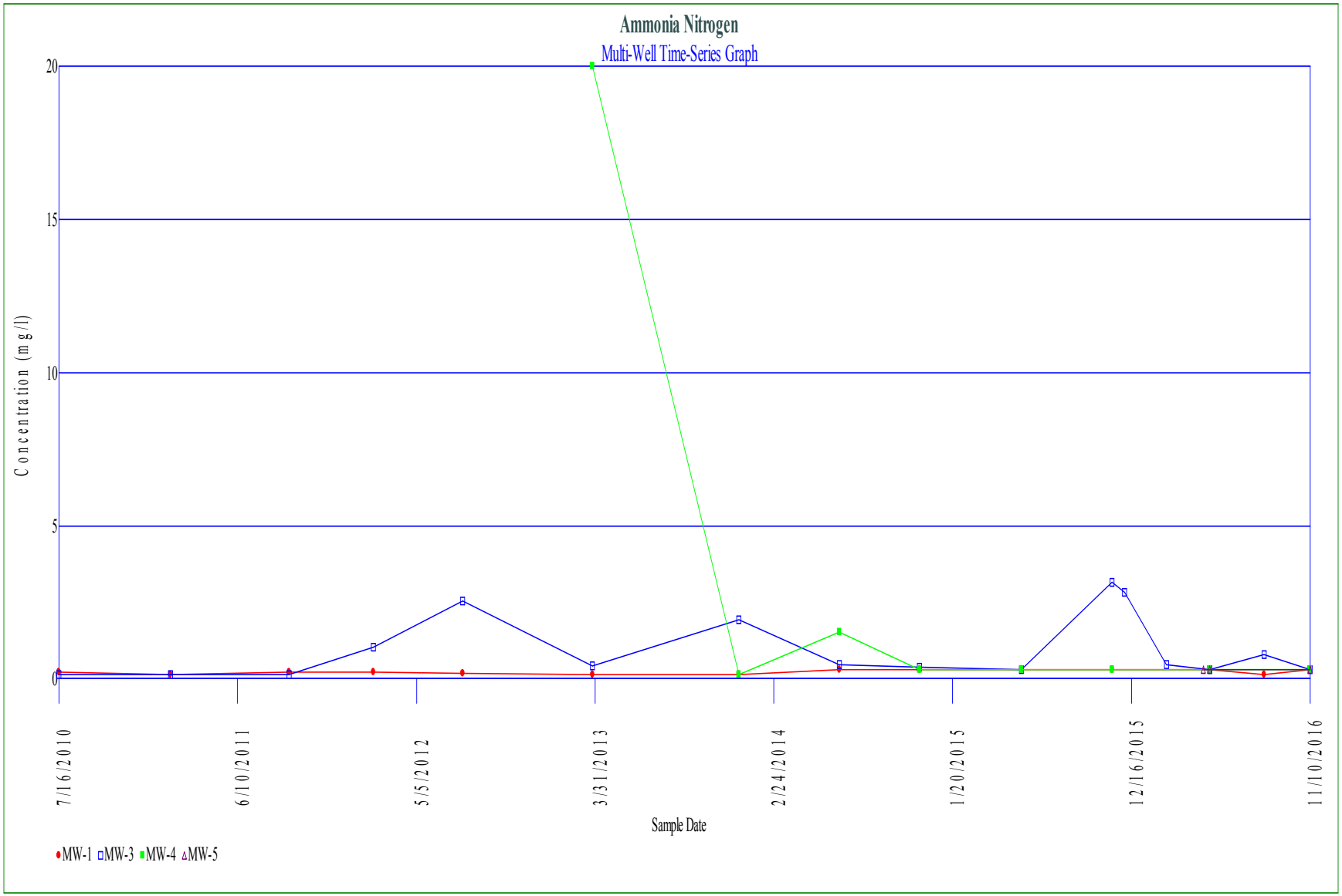
Table 2
Environmental Waste Solutions Camden Class II Landfill IDL 03-0212
Inorganic Analytical Data -November 2016

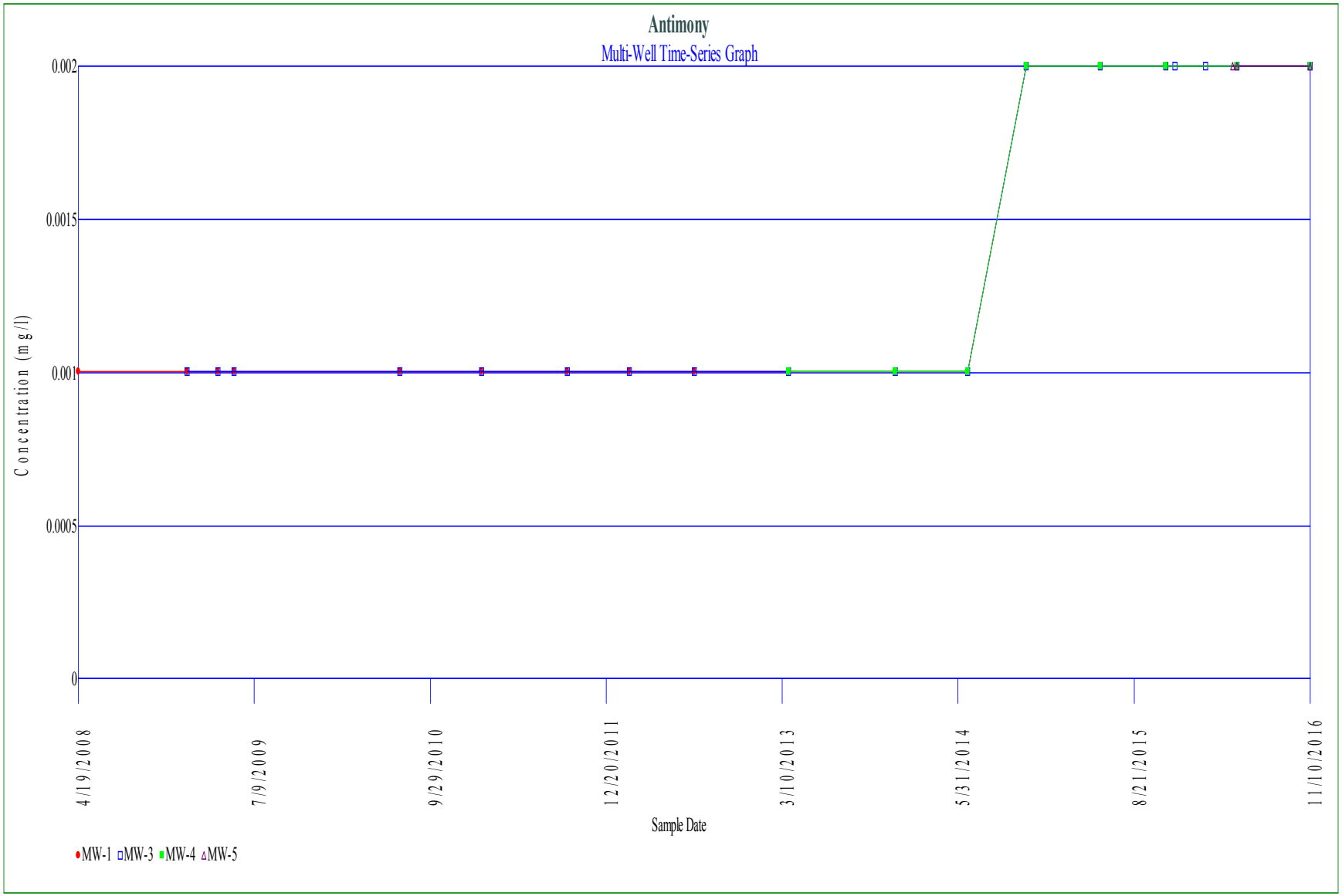
		MW-1	MW-3	MW-4	MW-5	TMW-1	TMW-2	TMW-3	Leachate
		11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016	11/10/2016
Parameter	**MCL/GWPS (mg/l)**	**Value (mg/l)**	**Value (mg/l)**	**Value (mg/l)**	**Value (mg/l)**	**Value (mg/l)**	**Value (mg/l)**	**Value (mg/l)**	**Value (mg/l)**
Alkalinity	-	**34.8**	<20	<20	**28.7**	NS	NS	NS	**12,200**
Ammonia Nitrogen	-	<0.25	<0.25	<0.25	<0.25	NS	NS	NS	**8,180**
COD	-	<10	<10	<10	<10	NS	NS	NS	NS
Bromide	-	<1	<1	<1	<1	NS	NS	NS	<10000
Chloride	250 [2]	**4.59**	**120**	**6.61**	**28.6**	**7.37**	**15.3**	**42.1**	**41,100**
Fluoride	2 [2]	<0.1	<0.1	<0.1	<0.1	NS	NS	NS	<1000
Nitrate	10	<0.1	**4.67**	**0.464**	**0.935**	NS	NS	NS	<1000
Sulfate	250 [2]	**16.5**	**34.0**	<5	<5	NS	NS	NS	**7,790**
Aluminum	0.2 [2]	<0.1	**0.694**	<0.1	**0.229**	NS	NS	NS	<9
Antimony	0.006	<0.002	<0.002	<0.002	<0.002	NS	NS	NS	**0.0697**
Arsenic	0.01	**0.0286**	<0.002	<0.002	<0.002	NS	NS	NS	<0.18
Barium	-	**0.0207**	**0.188**	**0.00738**	**0.0188**	NS	NS	NS	**1.73**
Beryllium	0.004	<0.002	<0.002	<0.002	<0.002	NS	NS	NS	<0.18
Boron	-	**0.0303**	**0.0428**	**0.0297**	**0.0302**	NS	NS	NS	**11.2**
Cadmium	0.005	<0.001	**0.00177**	<0.001	<0.001	NS	NS	NS	**0.41**
Calcium	-	**3.72**	**26.3**	**3.81**	**9.55**	NS	NS	NS	**61.2**
Chromium	0.1	<0.002	<0.002	<0.002	<0.002	NS	NS	NS	<0.18
Copper	1.3	<0.005	<0.005	<0.005	<0.005	NS	NS	NS	**8.78**
Cobalt	-	**0.0196**	**0.00202**	<0.002	**0.00201**	NS	NS	NS	**0.0987**
Iron	0.3 [2]	**9.93**	**0.837**	<0.1	**0.687**	NS	NS	NS	<9
Lead	0.015	<0.002	<0.002	<0.002	<0.002	NS	NS	NS	<0.18
Magnesium	-	**2.86**	**11.1**	**2.48**	**4.95**	NS	NS	NS	<90
Manganese	0.05 [2]	**0.535**	**0.311**	**0.0223**	**0.0504**	NS	NS	NS	**0.0524**
Nickel	-	**0.0112**	<0.002	<0.002	**0.00348**	NS	NS	NS	**0.624**
Potassium	-	<1	**20.8**	<1	<1	NS	NS	NS	**55,700**
Selenium	0.05	<0.002	<0.002	<0.002	<0.002	NS	NS	NS	<0.18
Silver	0.10 [2]	<0.002	<0.002	<0.002	<0.002	NS	NS	NS	<0.18
Sodium	-	**4.94**	**39.7**	**3.87**	**10.3**	NS	NS	NS	**94,800**
Thallium	0.002	<0.002	<0.002	<0.002	<0.002	NS	NS	NS	<0.18
Vanadium	-	<0.005	<0.005	<0.005	<0.005	NS	NS	NS	**0.0896**
Zinc	5 [2]	<0.025	<0.025	<0.025	<0.025	NS	NS	NS	**64.3**
Mercury	0.002	<0.0002	<0.0002	<0.0002	<0.0002	NS	NS	NS	<0.002

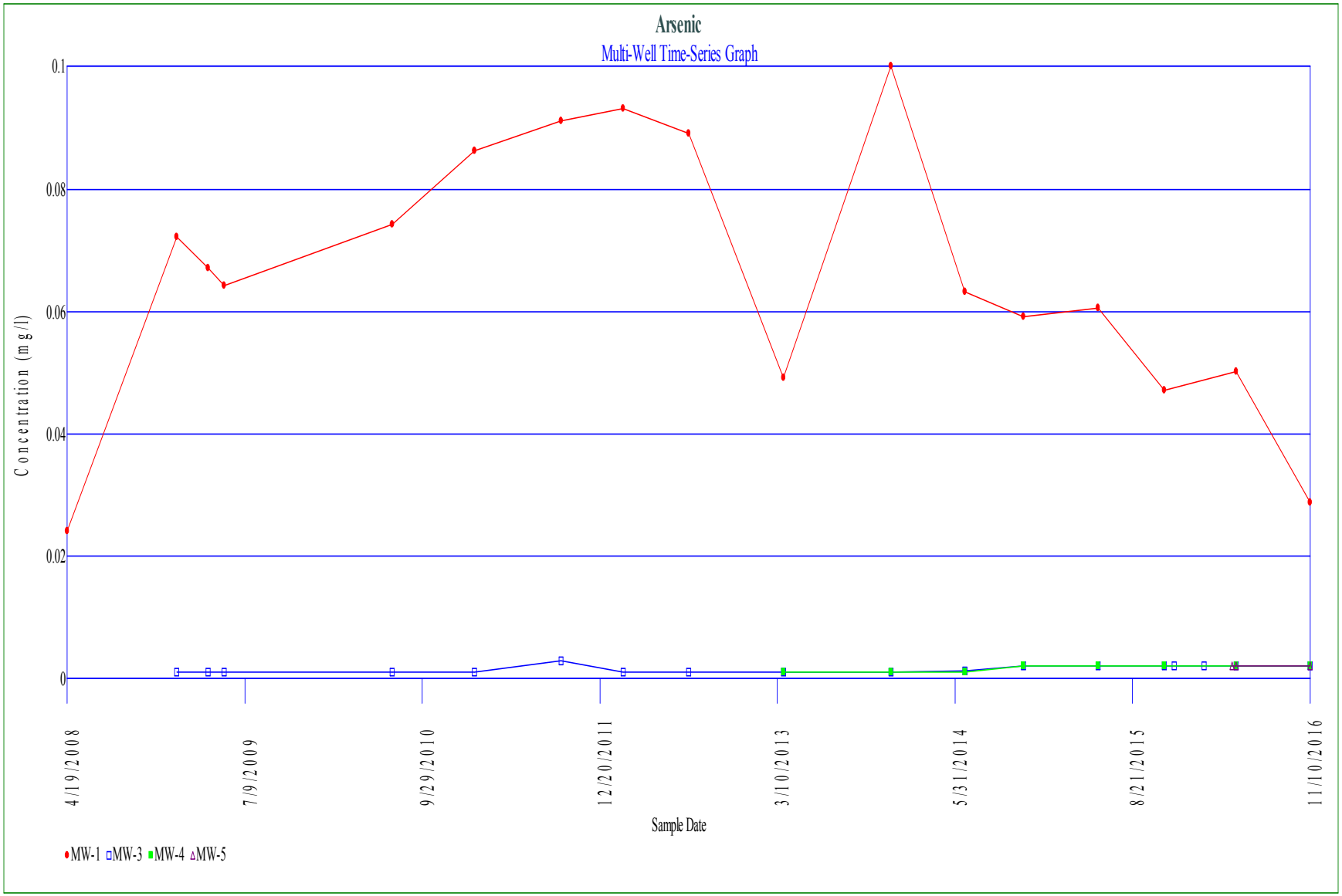
Notes:
MCL: Maximum Contaminant Level Enforceable National Primary Drinking Water Standards
GWPS: Groundwater Protection Standard
2: Non-Enforceable National Secondary Drinking Water Standard
Bold text indicates laboratory analytical detections above the practical quantitation level
Dark gray shaded text indicates detection above respective MCL
Light gray shaded text indicates detection above respective Non-Enforceable National Secondary Drinking Water Standard.
P1: (ESC)- Additional QC Info: The sample concentration is too high to evaluate accurate spike recoveries.

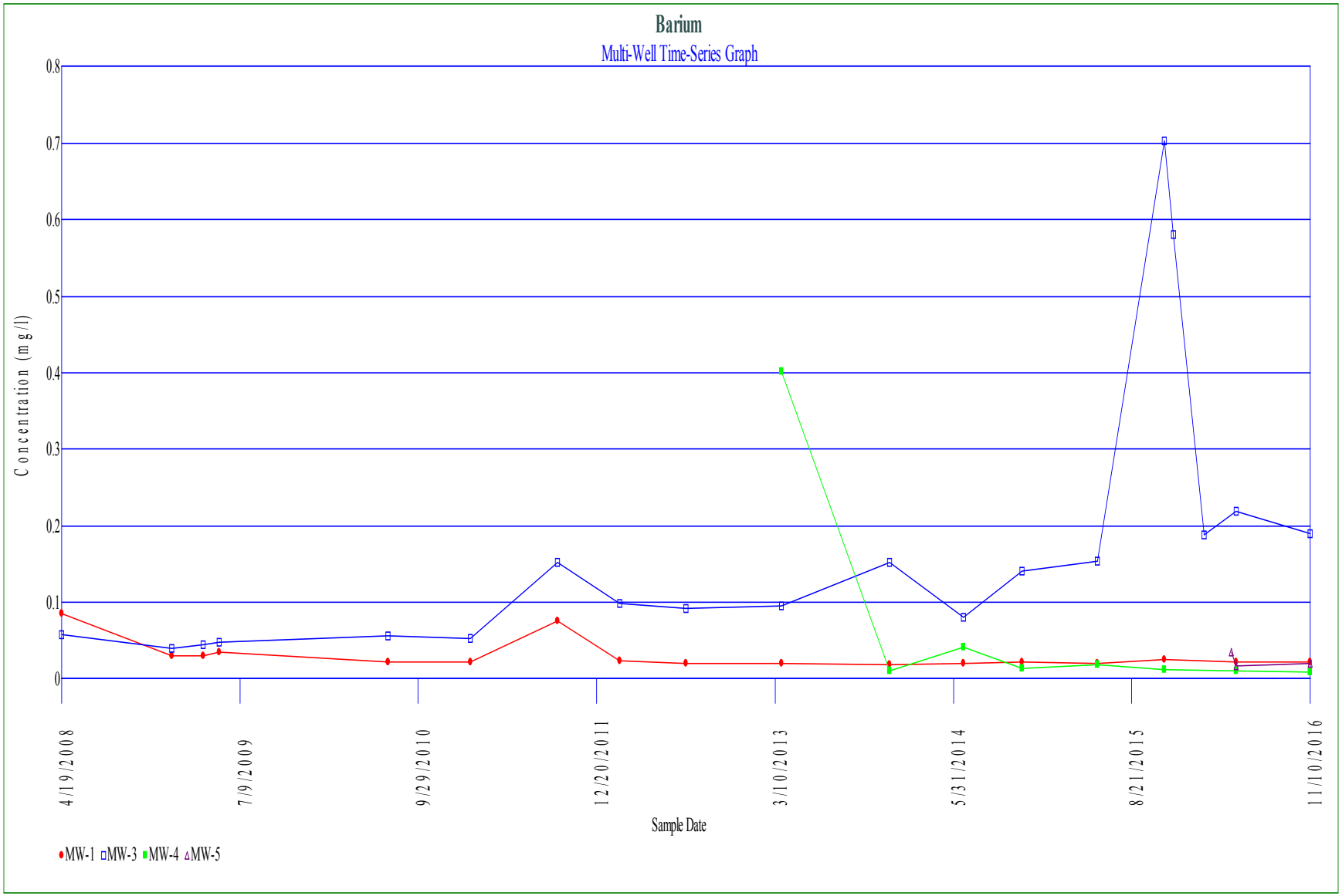
APPENDIX B
STATISTICAL EVALUATIONS & TIME SERIES PLOTS

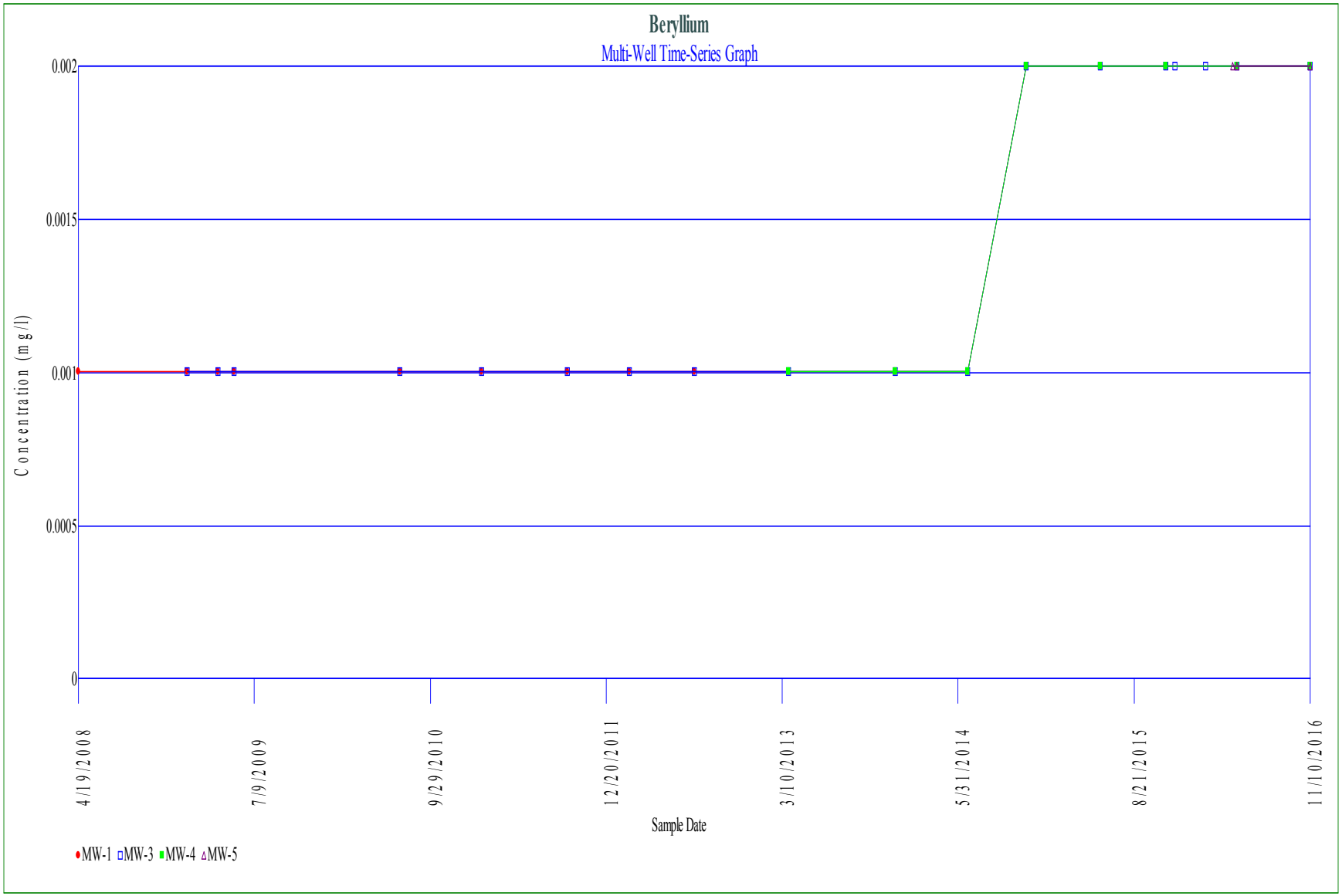

Aluminum
Multi-Well Time-Series Graph
20
15
10
5
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

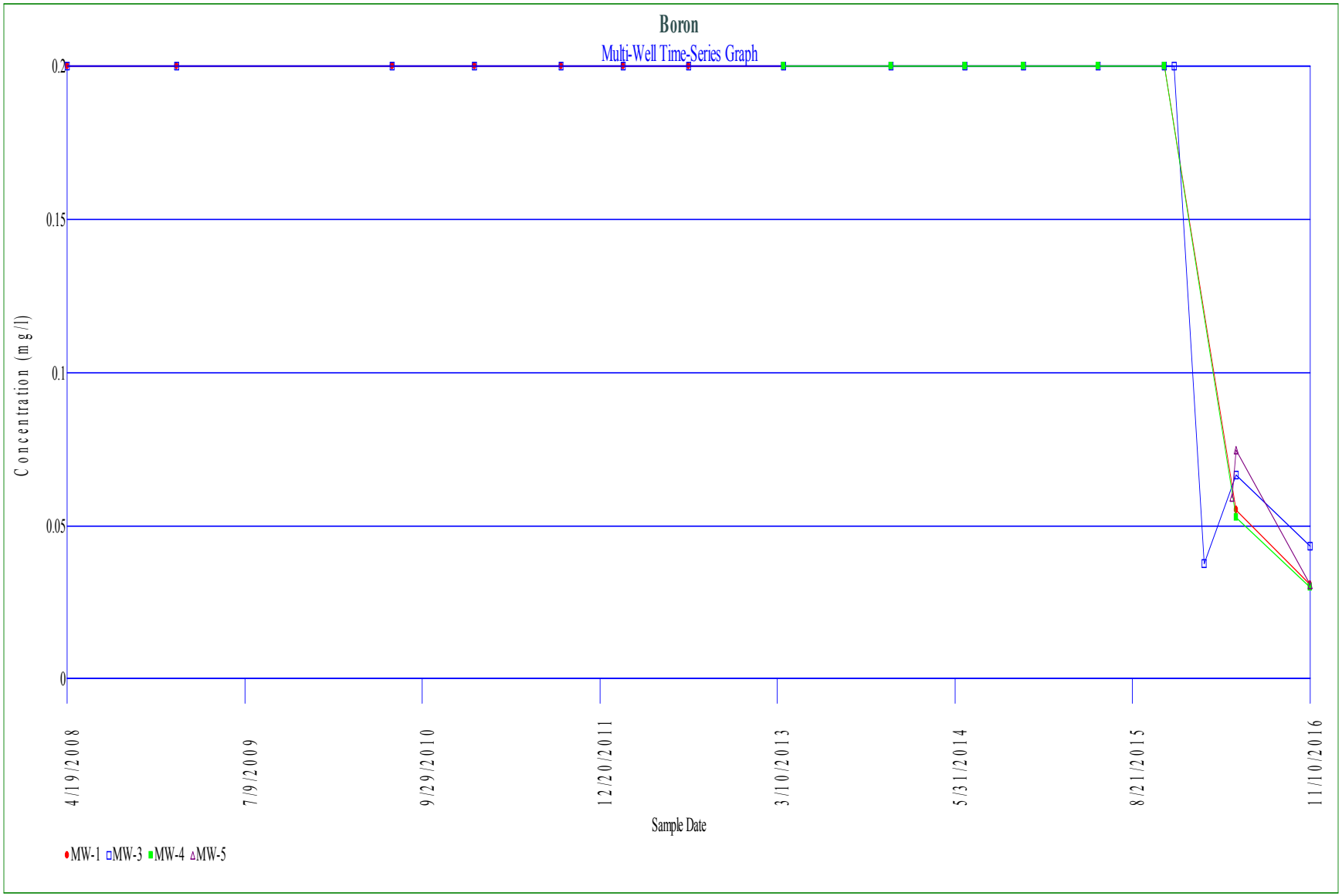

Ammonia Nitrogen
Multi-Well Time-Series Graph
20
15
10
5
0
Concentration (mg/l)
7/16/2010
6/10/2011
5/5/2012
3/31/2013
2/24/2014
1/20/2015
12/16/2015
11/10/2016
Sample Date
MW-1
MW-3
MW-4
MW-5

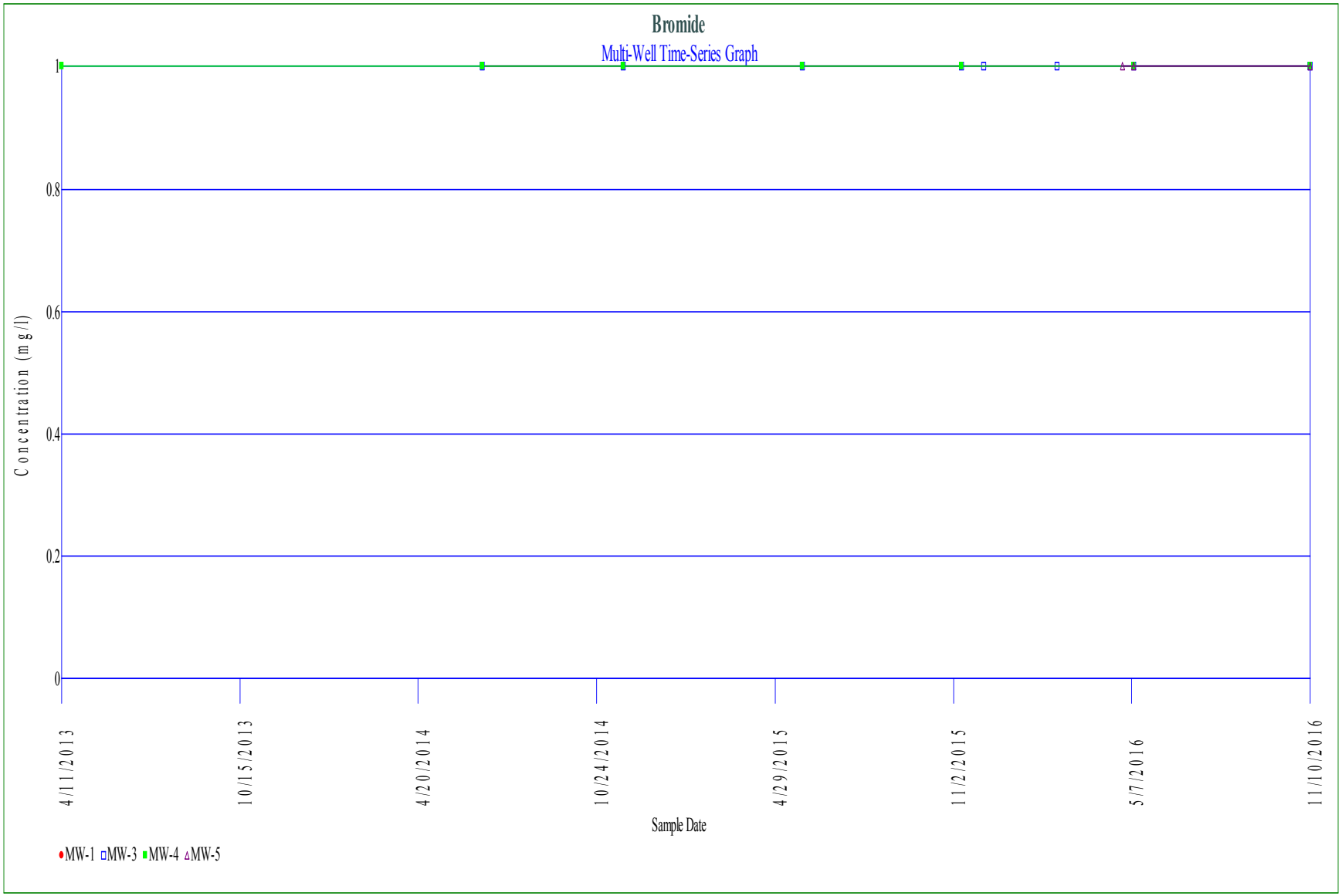

Antimony
Multi-Well Time-Series Graph
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

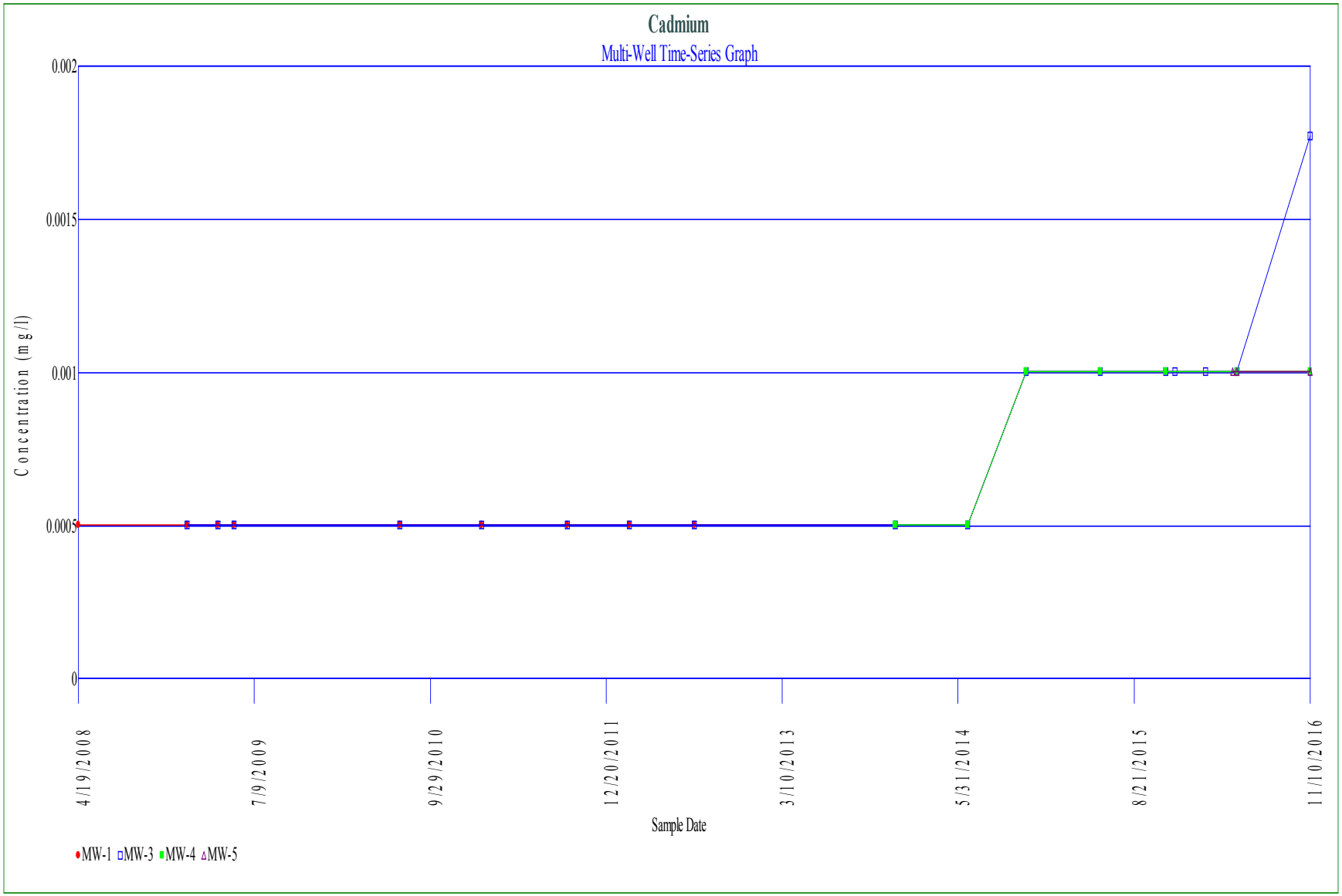

Arsenic
Multi-Well Time-Series Graph
0.1
0.08
0.06
0.04
0.02
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5


Barium
Multi-Well Time-Series Graph
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

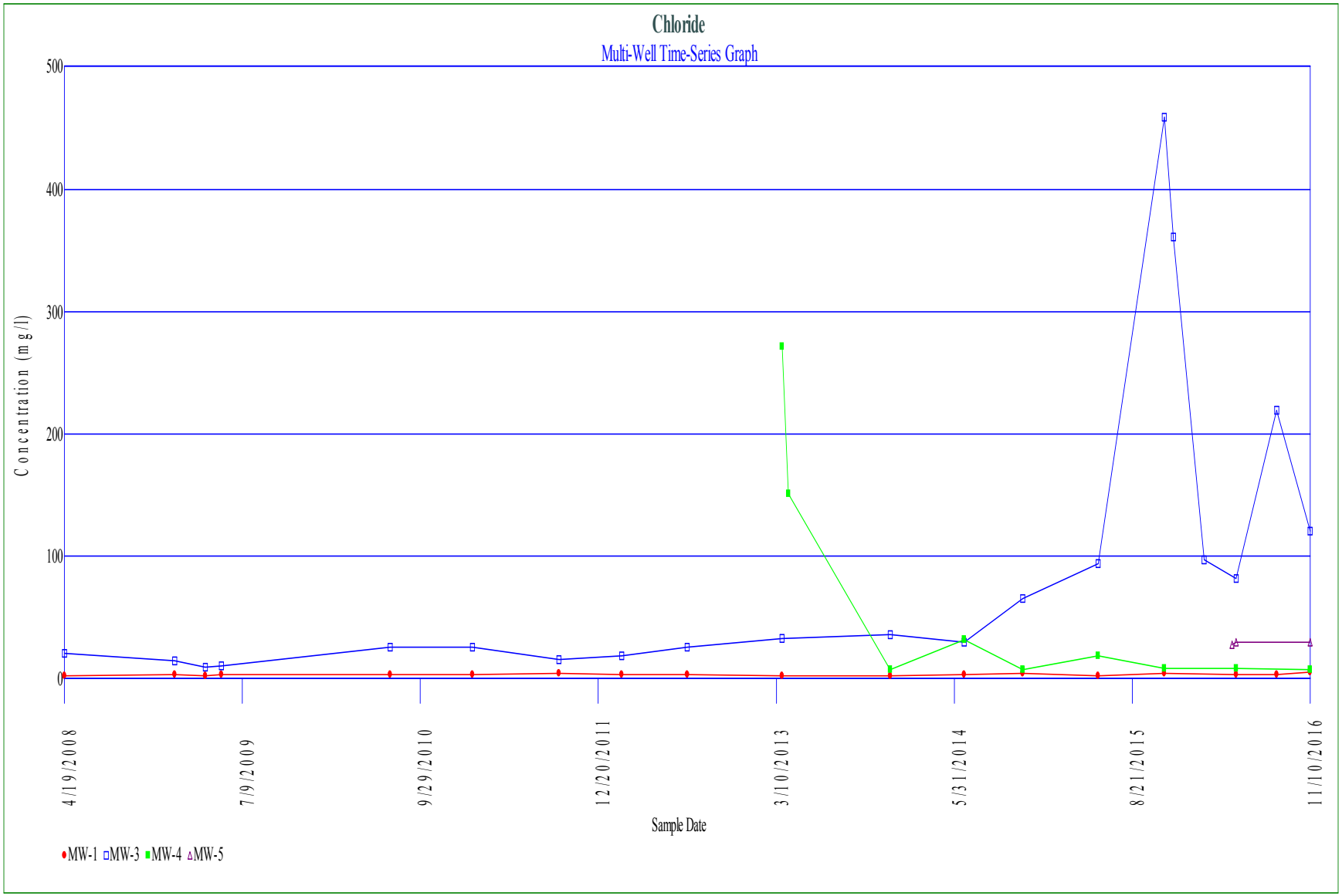

Beryllium
Multi-Well Time-Series Graph
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

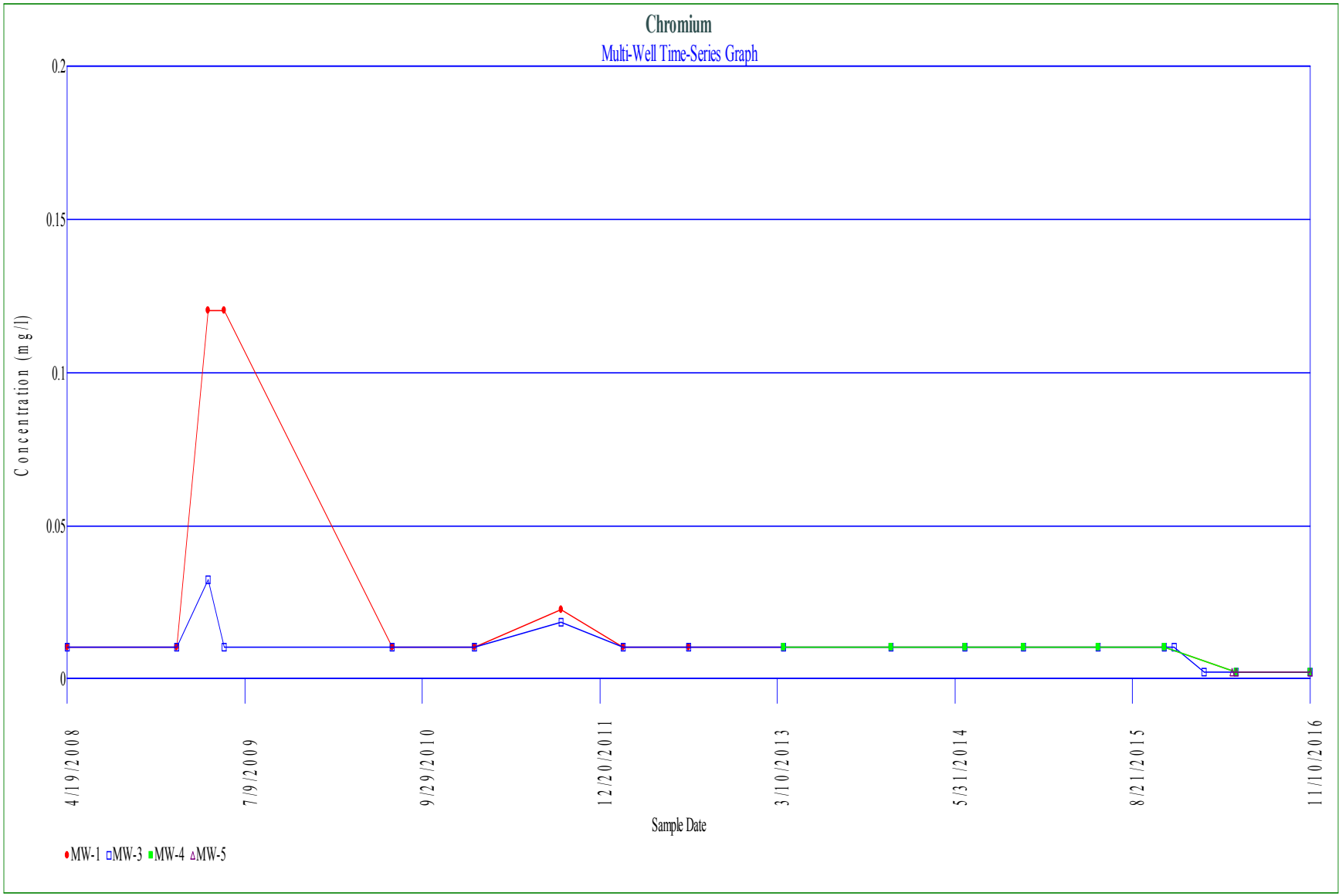

Boron
Multi-Well Time-Series Graph
0.2
0.15
0.1
0.05
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1
MW-3
MW-4
MW-5

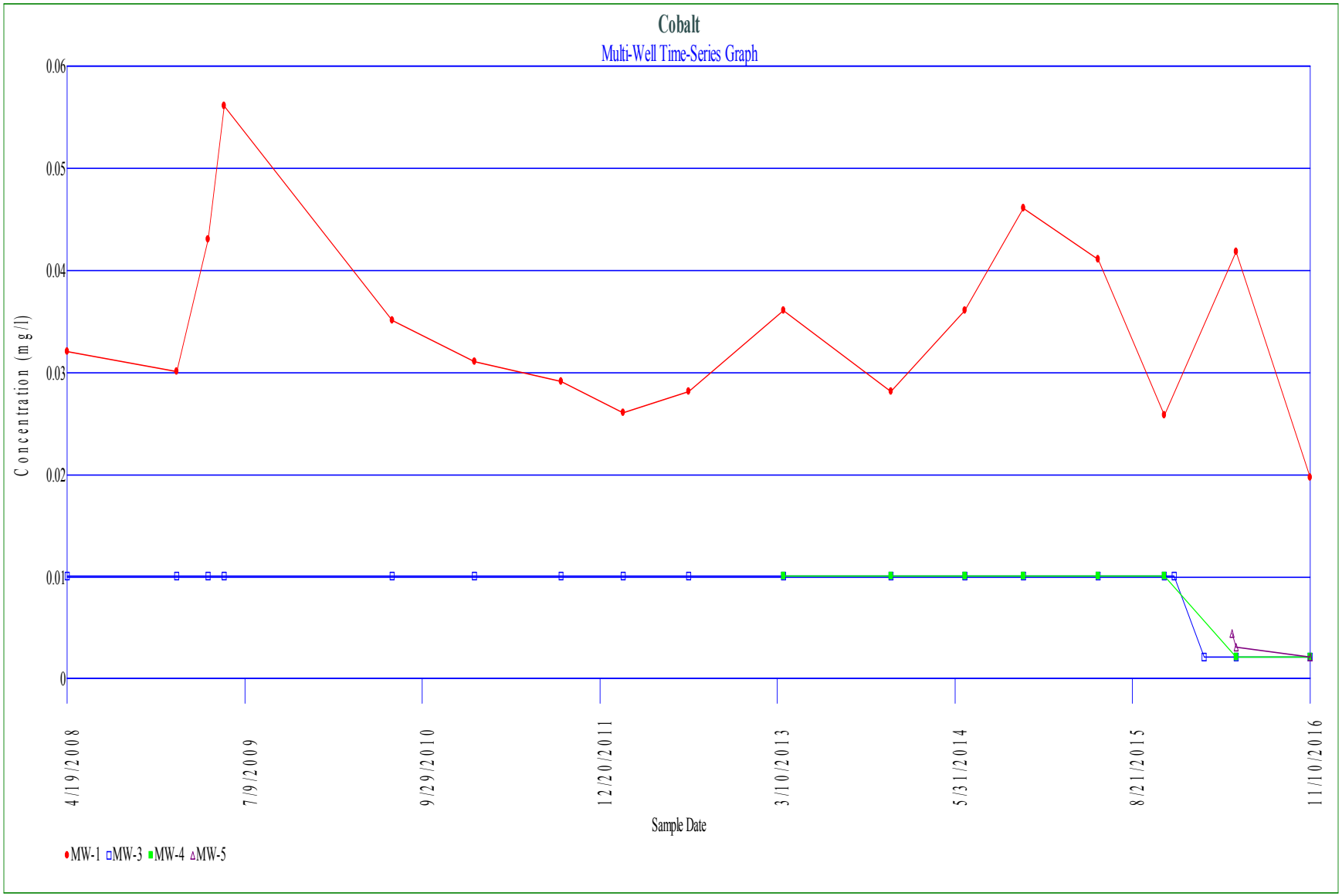

Bromide
Multi-Well Time-Series Graph
1
0.8
0.6
0.4
0.2
0
Concentration (mg/l)
4/11/2013
10/15/2013
4/20/2014
10/24/2014
4/29/2015
11/2/2015
5/7/2016
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

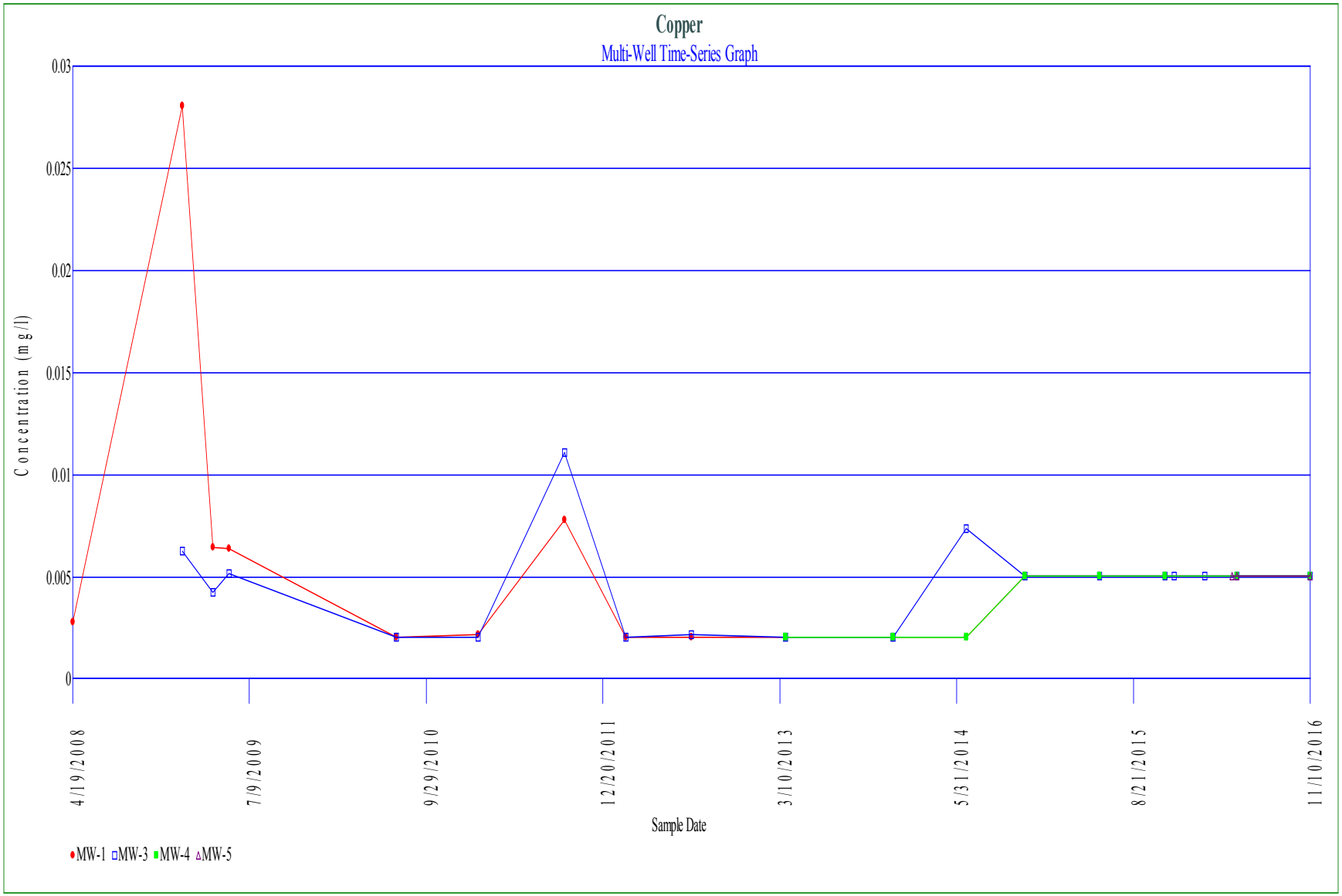

Cadmium
Multi-Well Time-Series Graph
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

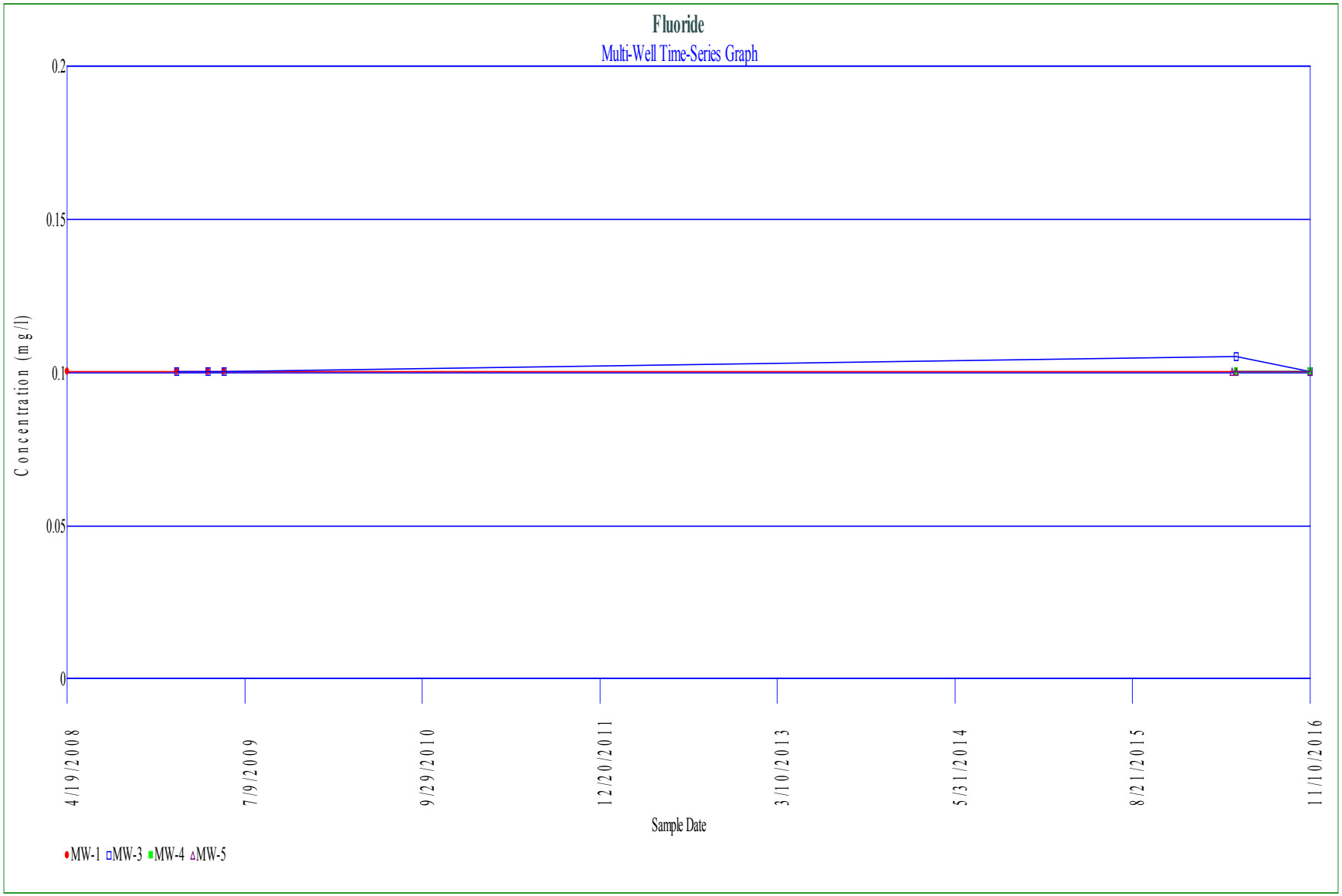

Calcium
Multi-Well Time-Series Graph
Concentration (mg/l)
80
70
60
50
40
30
20
10
0
5/19/2009
6/13/2010
7/8/2011
8/1/2012
8/27/2013
9/21/2014
10/16/2015
11/10/2016
Sample Date
MW-1
MW-3
MW-4
MW-5

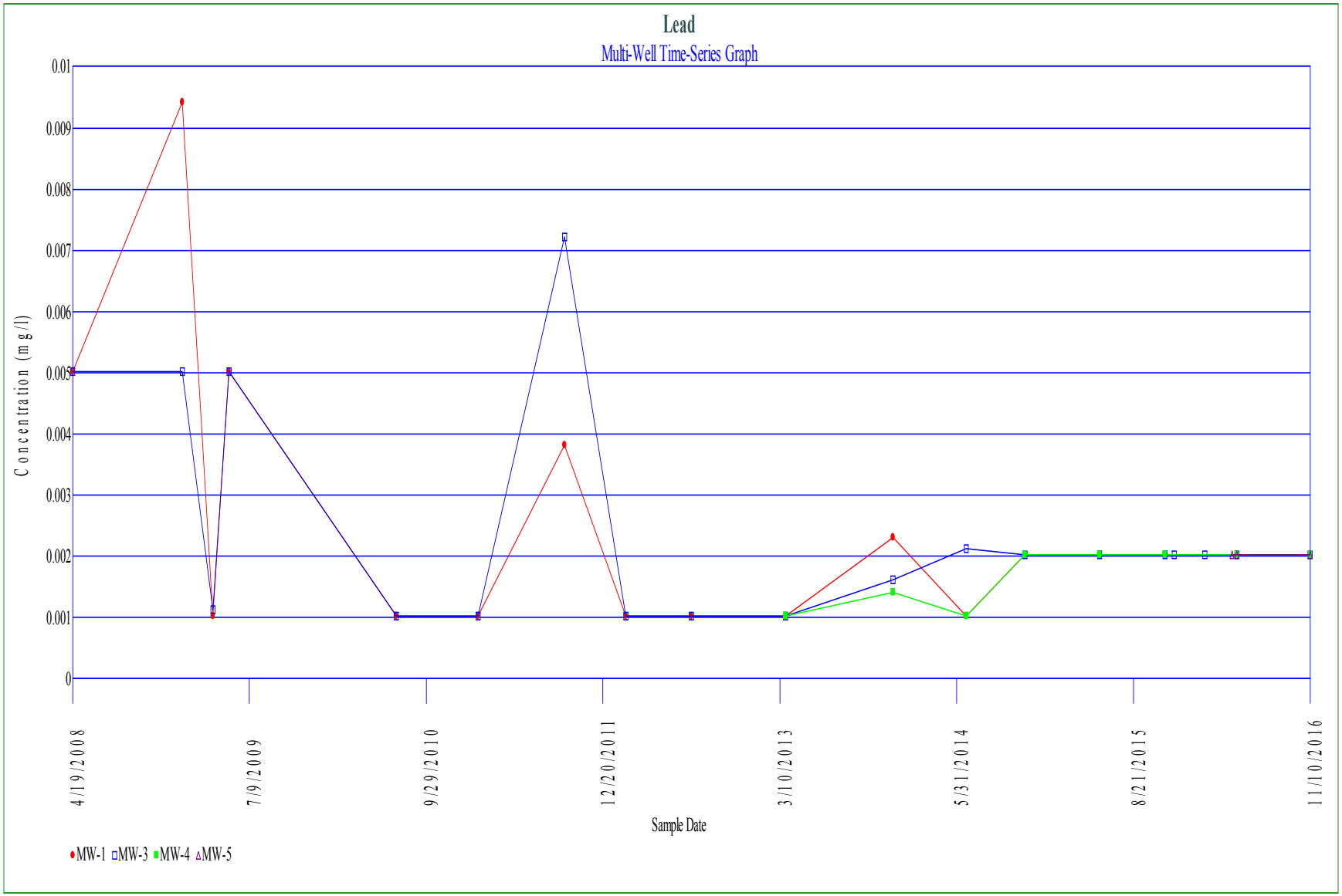

Chloride
Multi-Well Time-Series Graph
500
400
300
200
100
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

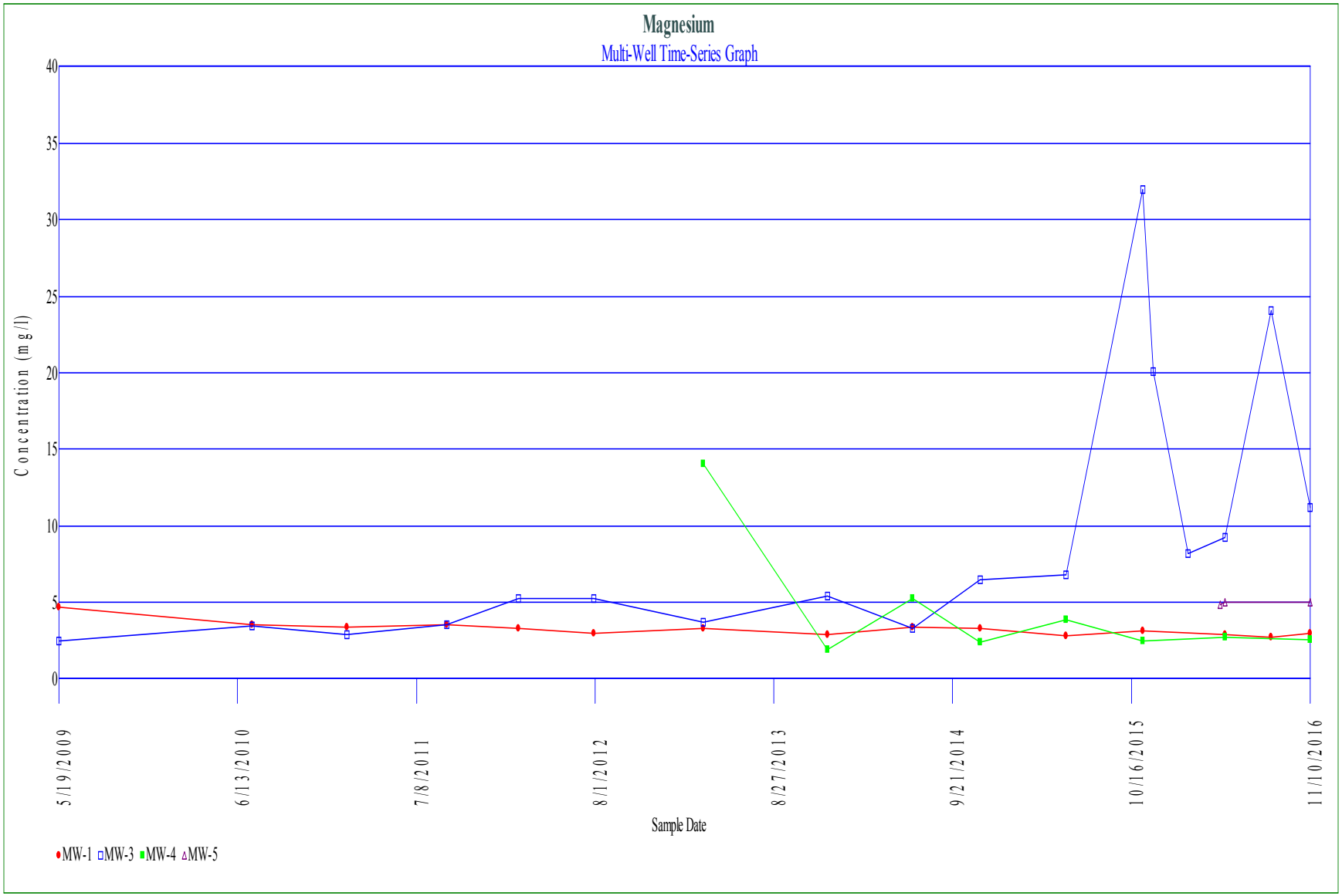

Chromium
Multi-Well Time-Series Graph
0.2
0.15
0.1
0.05
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

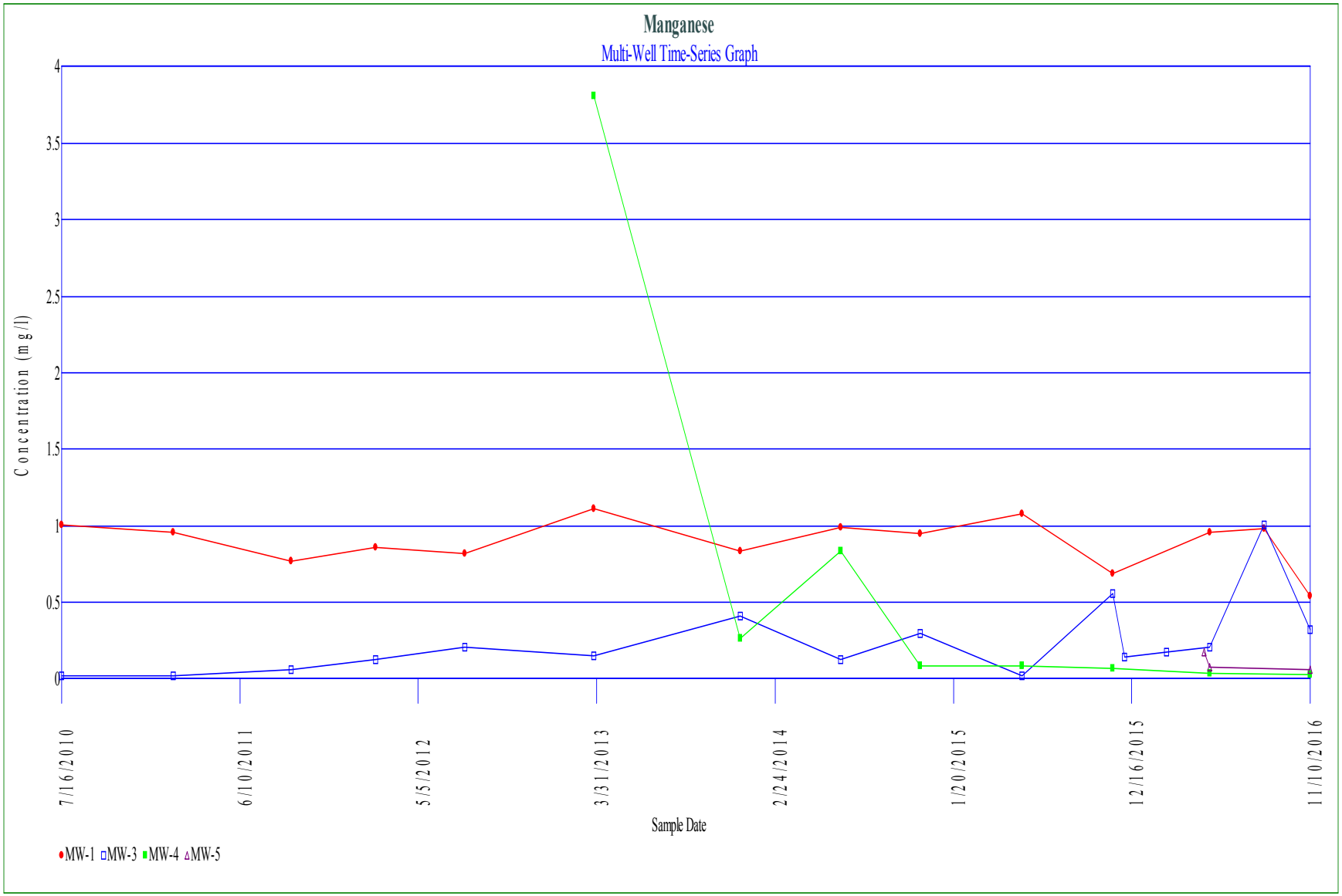

Cobalt
Multi-Well Time-Series Graph
0.06
0.05
0.04
0.03
0.02
0.01
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

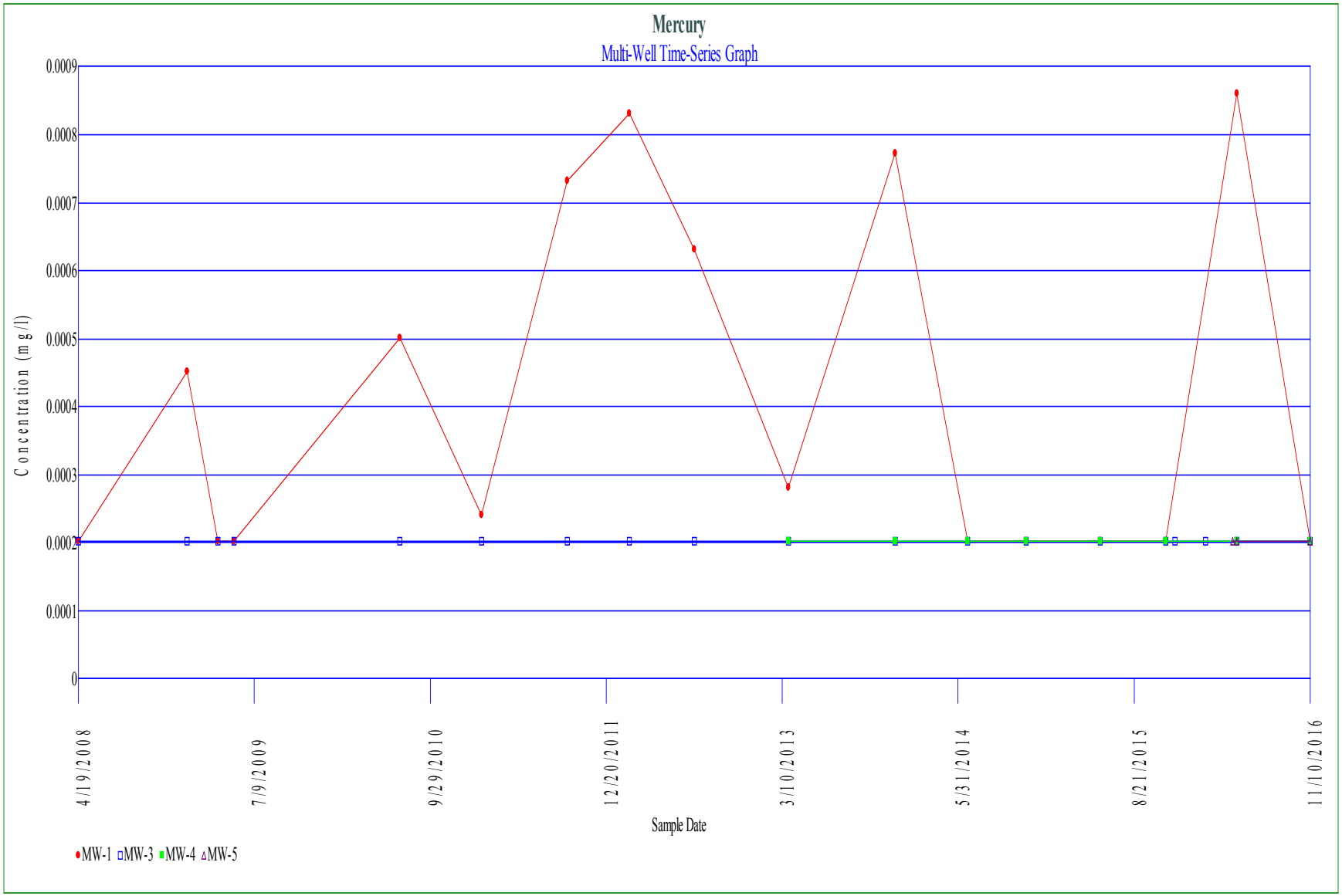

Copper
Multi-Well Time-Series Graph
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

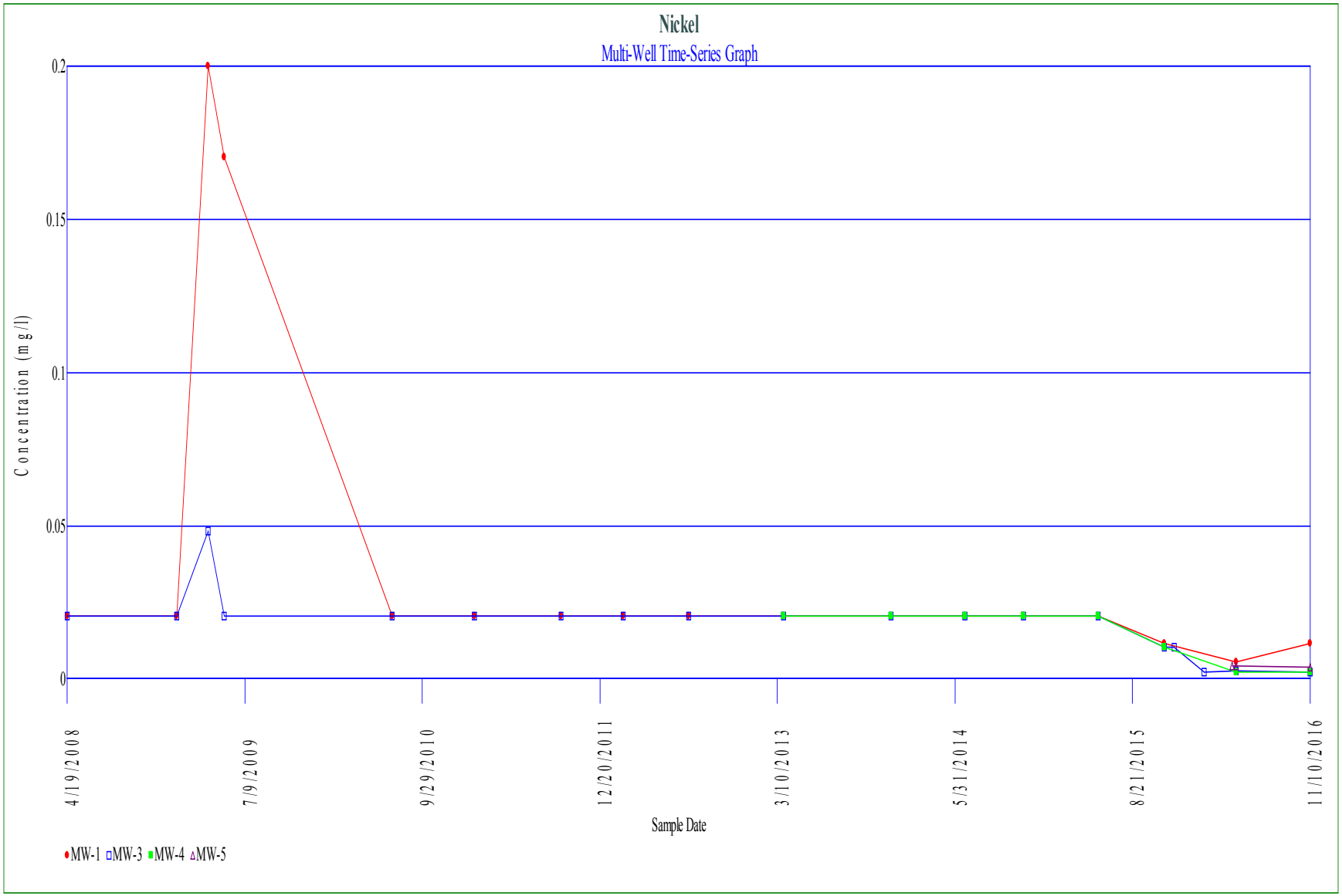

Fluoride
Multi-Well Time-Series Graph
0.2
0.15
0.1
0.05
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

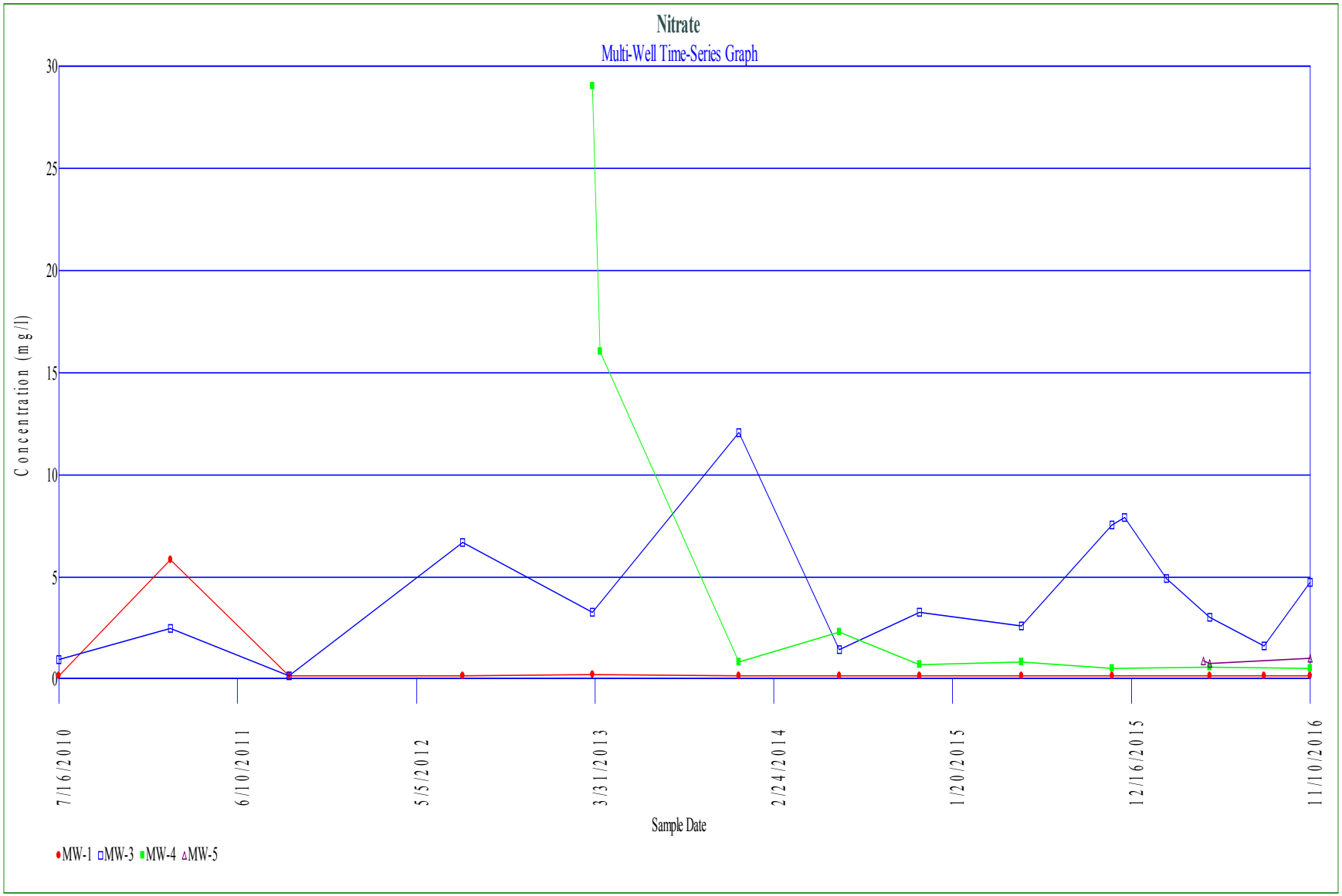

Lead
Multi-Well Time-Series Graph
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

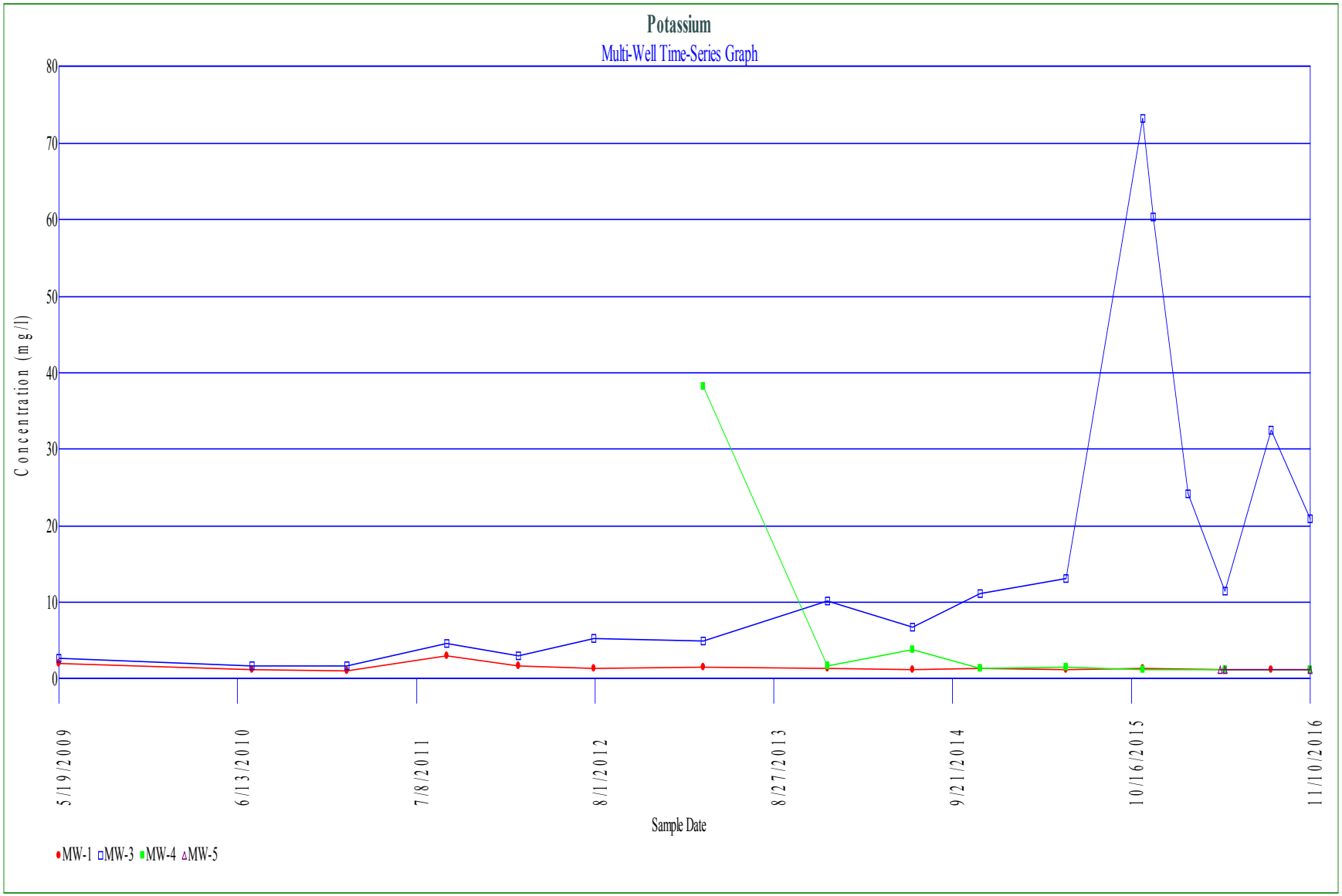

Magnesium
Multi-Well Time-Series Graph
Concentration (mg/l)
40
35
30
25
20
15
10
5
0
5/19/2009
6/13/2010
7/8/2011
8/1/2012
8/27/2013
9/21/2014
10/16/2015
11/10/2016
Sample Date
MW-1
MW-3
MW-4
MW-5

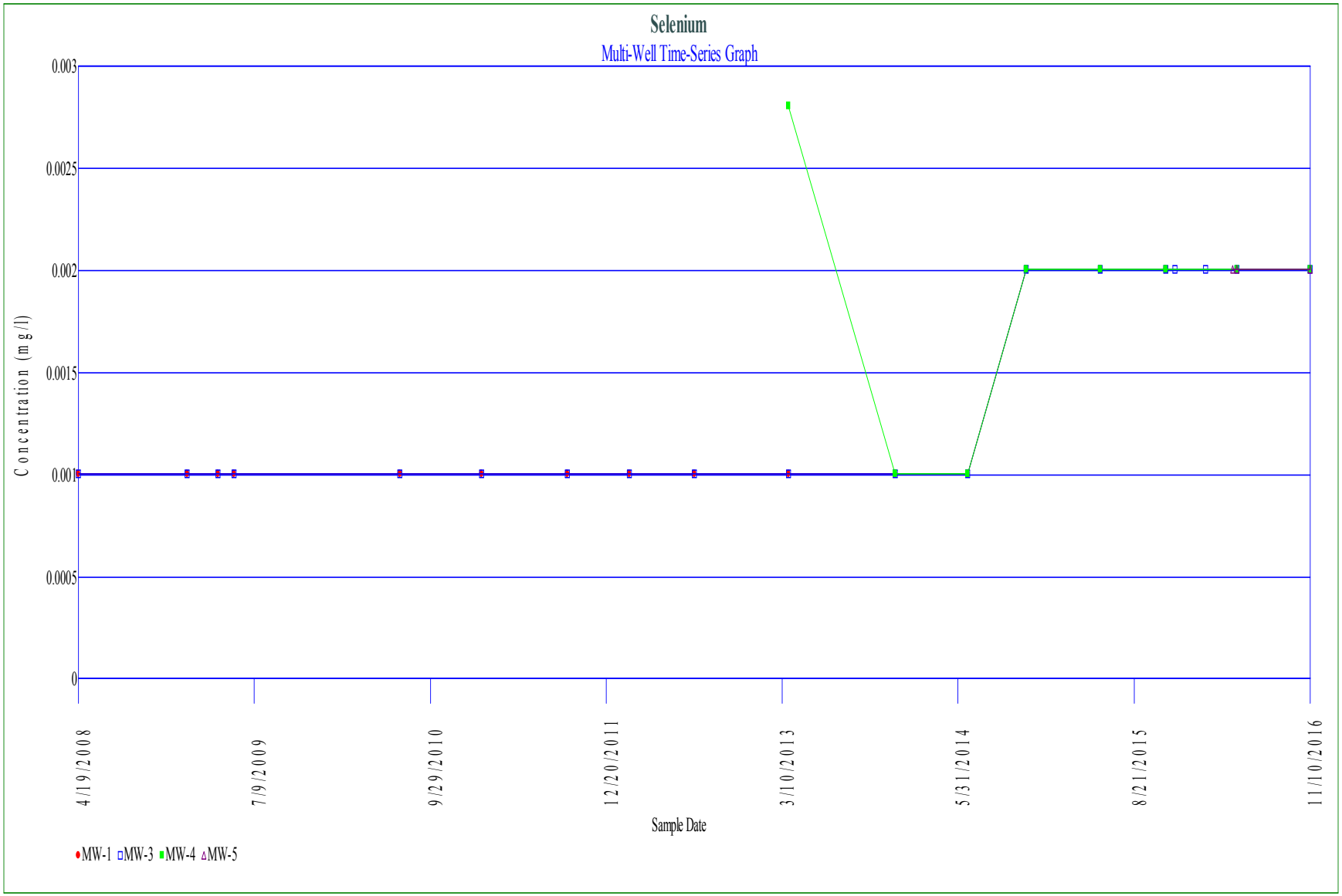

Manganese
Multi-Well Time-Series Graph
Concentration (mg/l)
4
3.5
3
2.5
2
1.5
1
0.5
0
7/16/2010
6/10/2011
5/5/2012
3/31/2013
2/24/2014
1/20/2015
12/16/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

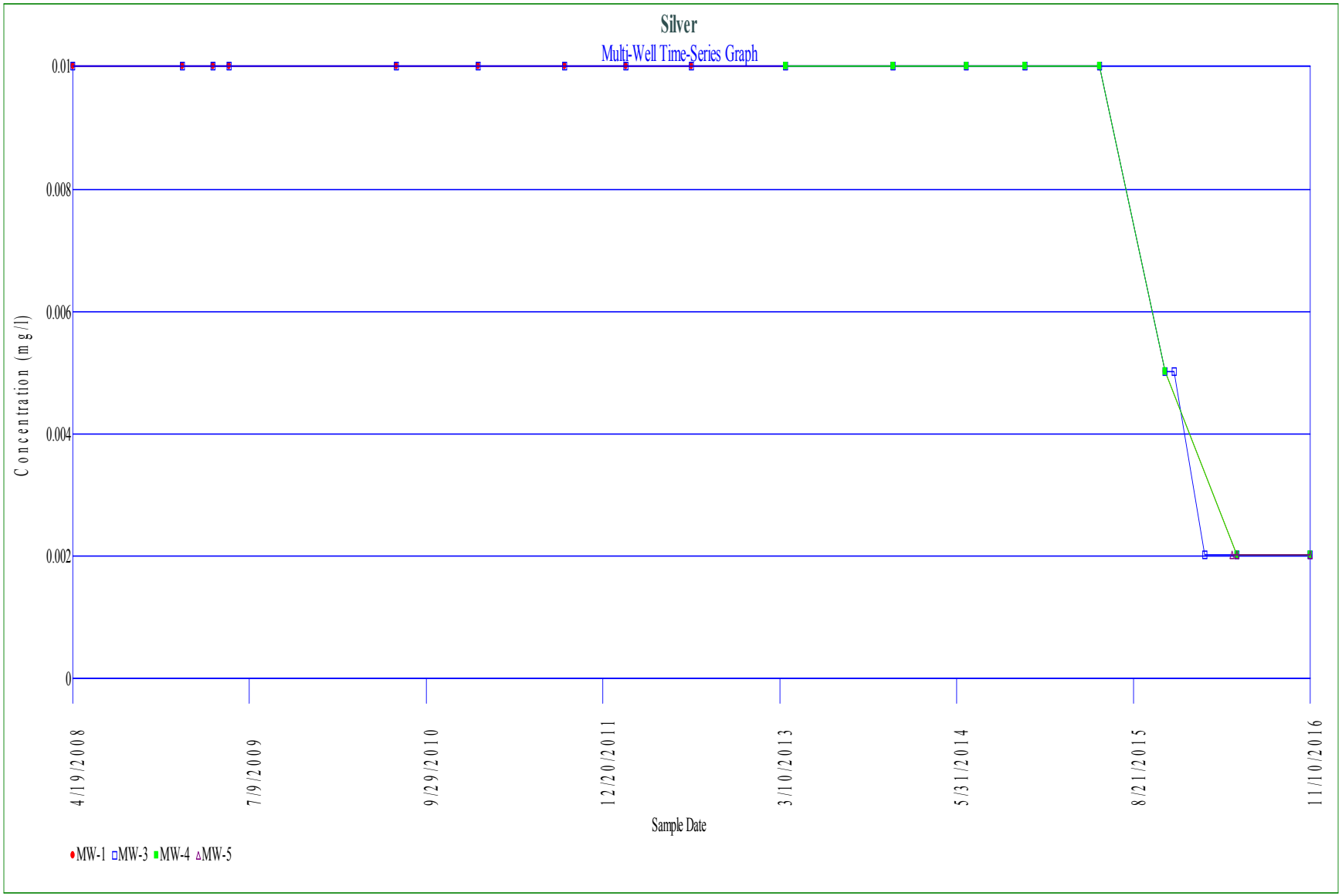

Mercury
Multi-Well Time-Series Graph
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

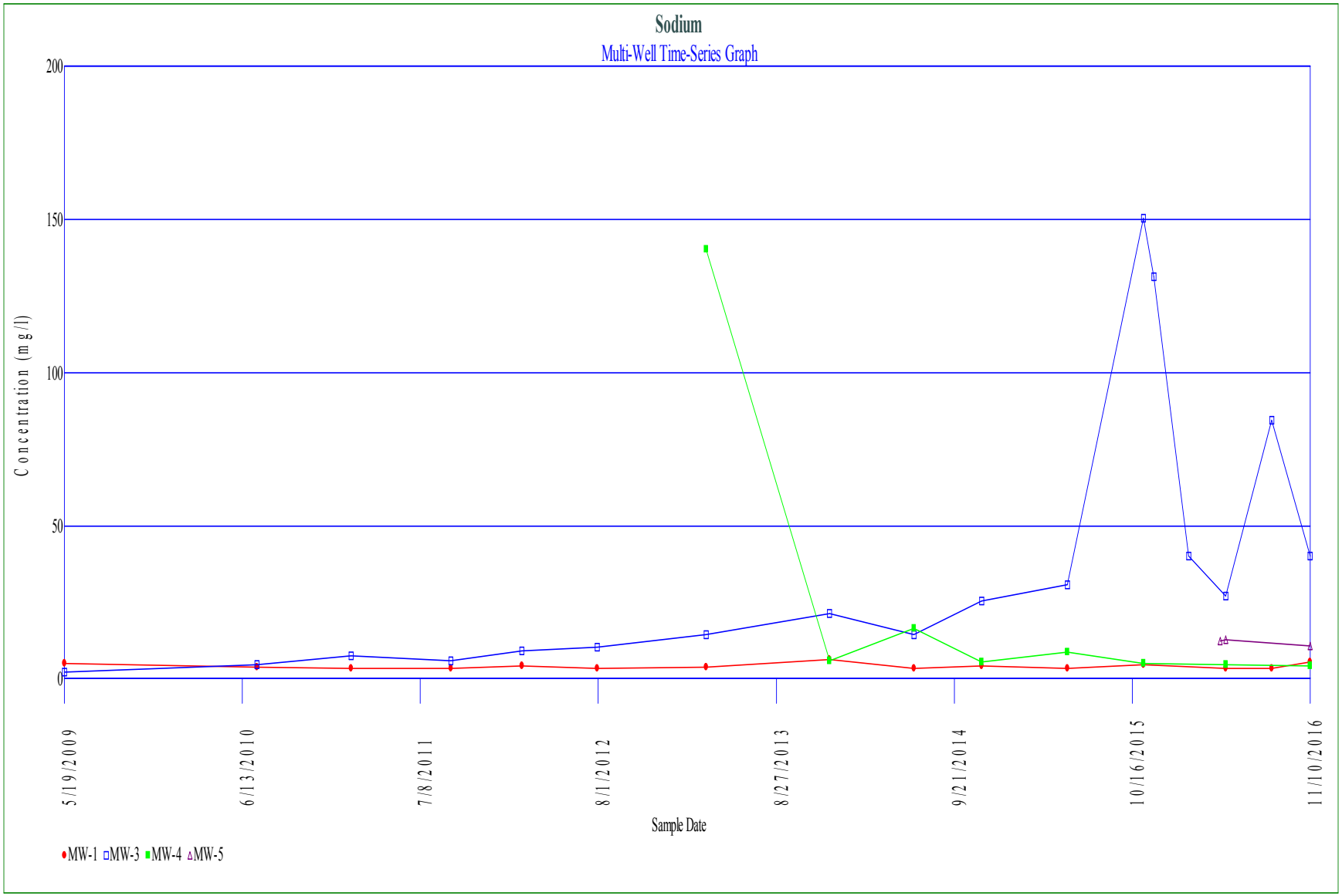

Nickel
Multi-Well Time-Series Graph
0.2
0.15
0.1
0.05
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5


Nitrate
Multi-Well Time-Series Graph
30
25
20
15
10
5
0
Concentration (mg/l)
7/16/2010
6/10/2011
5/5/2012
3/31/2013
2/24/2014
1/20/2015
12/16/2015
11/10/2016
Sample Date
MW-1
MW-3
MW-4
MW-5

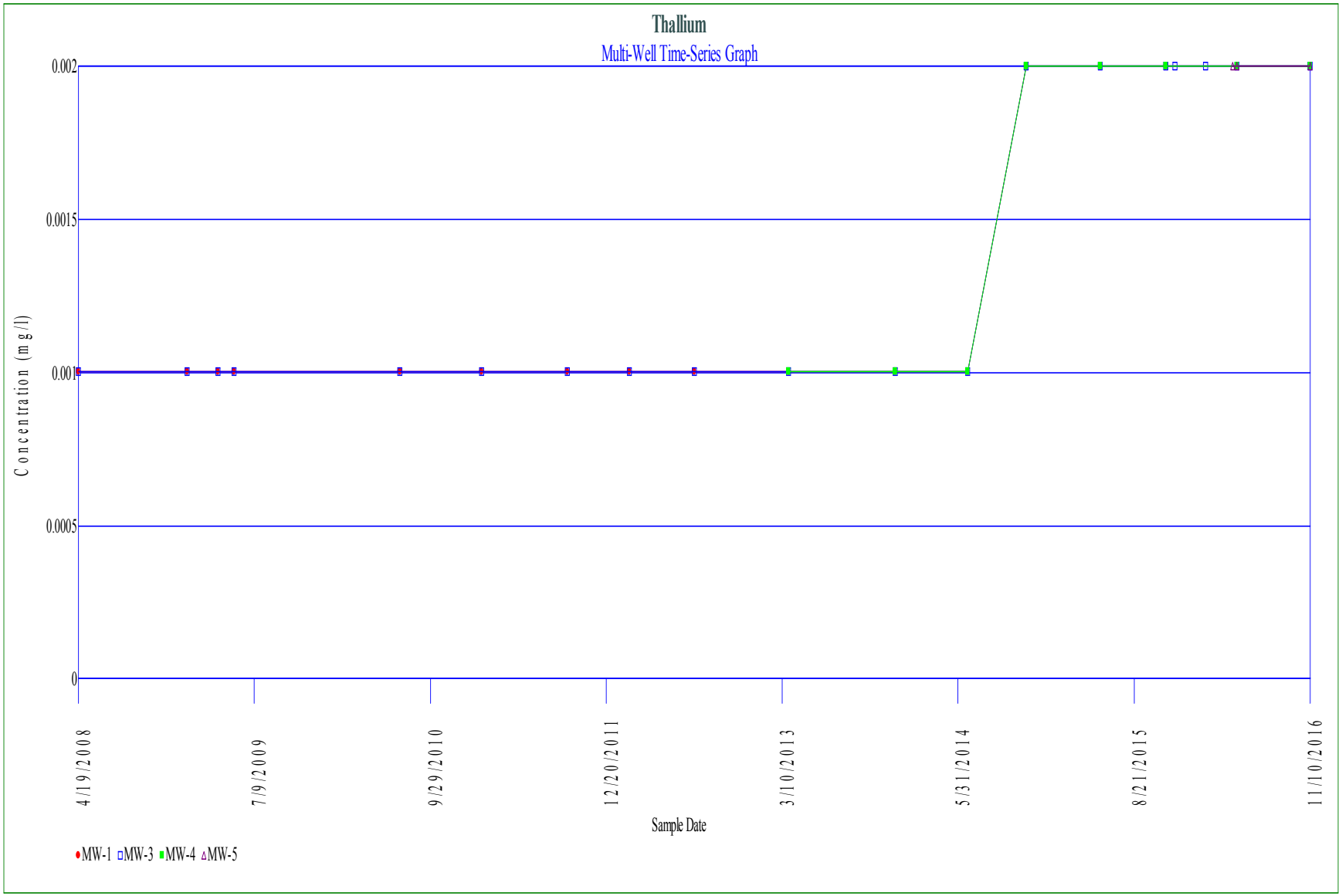

Potassium
Multi-Well Time-Series Graph
Concentration (mg/l)
80
70
60
50
40
30
20
10
0
5/19/2009
6/13/2010
7/8/2011
8/1/2012
8/27/2013
9/21/2014
10/16/2015
11/10/2016
Sample Date
MW-1
MW-3
MW-4
MW-5

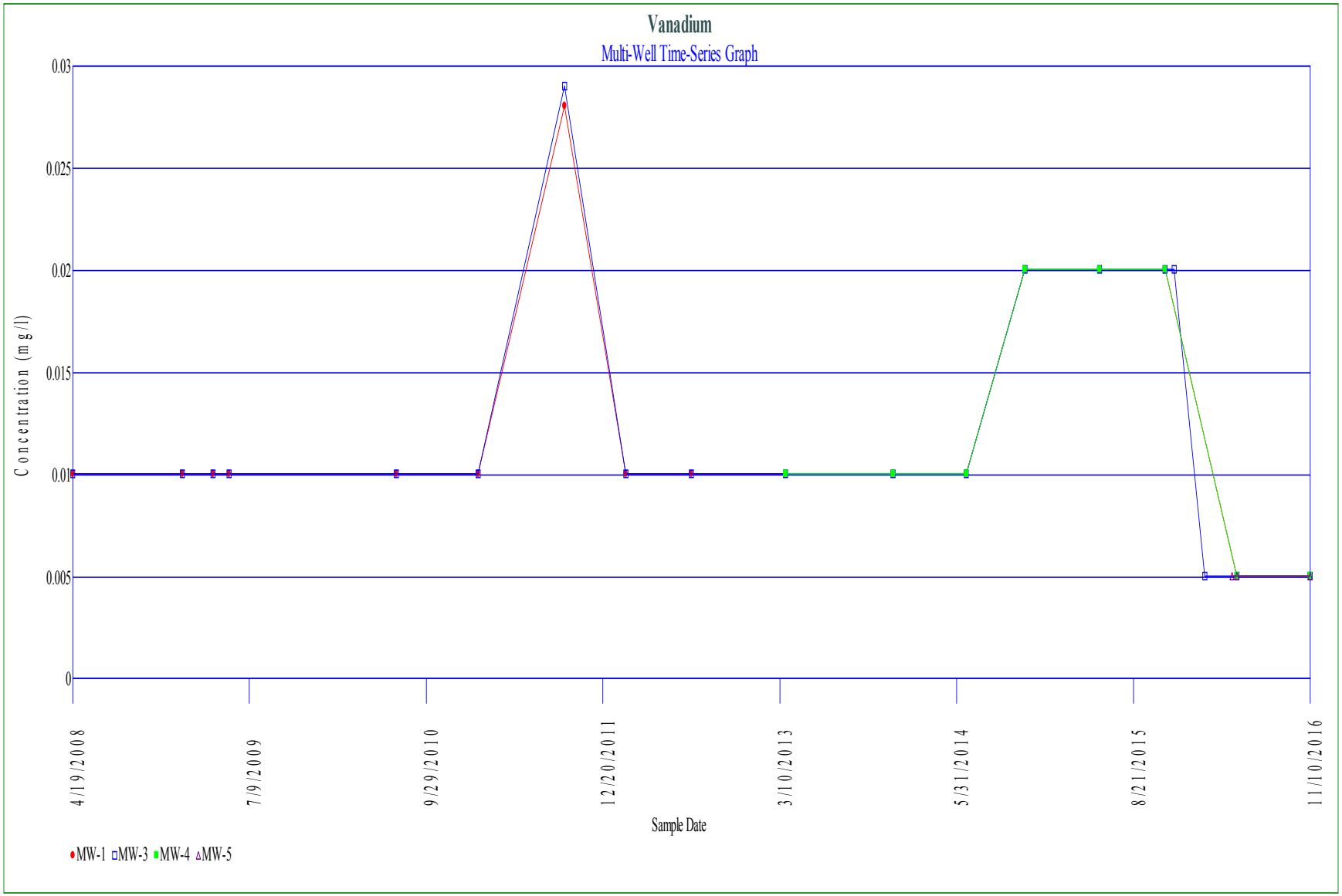

Selenium
Multi-Well Time-Series Graph
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

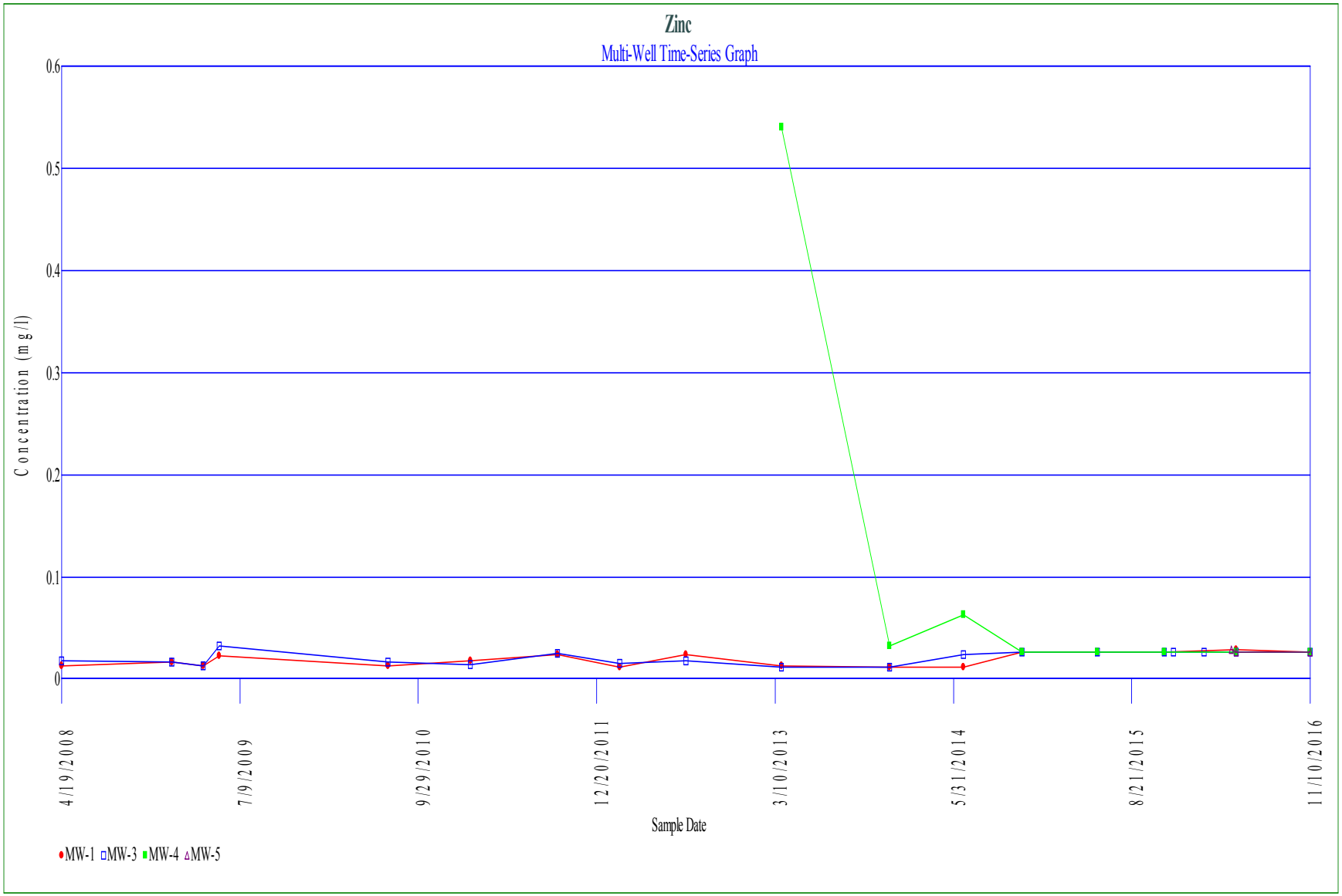

Silver
Multi-Well Time-Series Graph
0.01
0.008
0.006
0.004
0.002
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1
MW-3
MW-4
MW-5

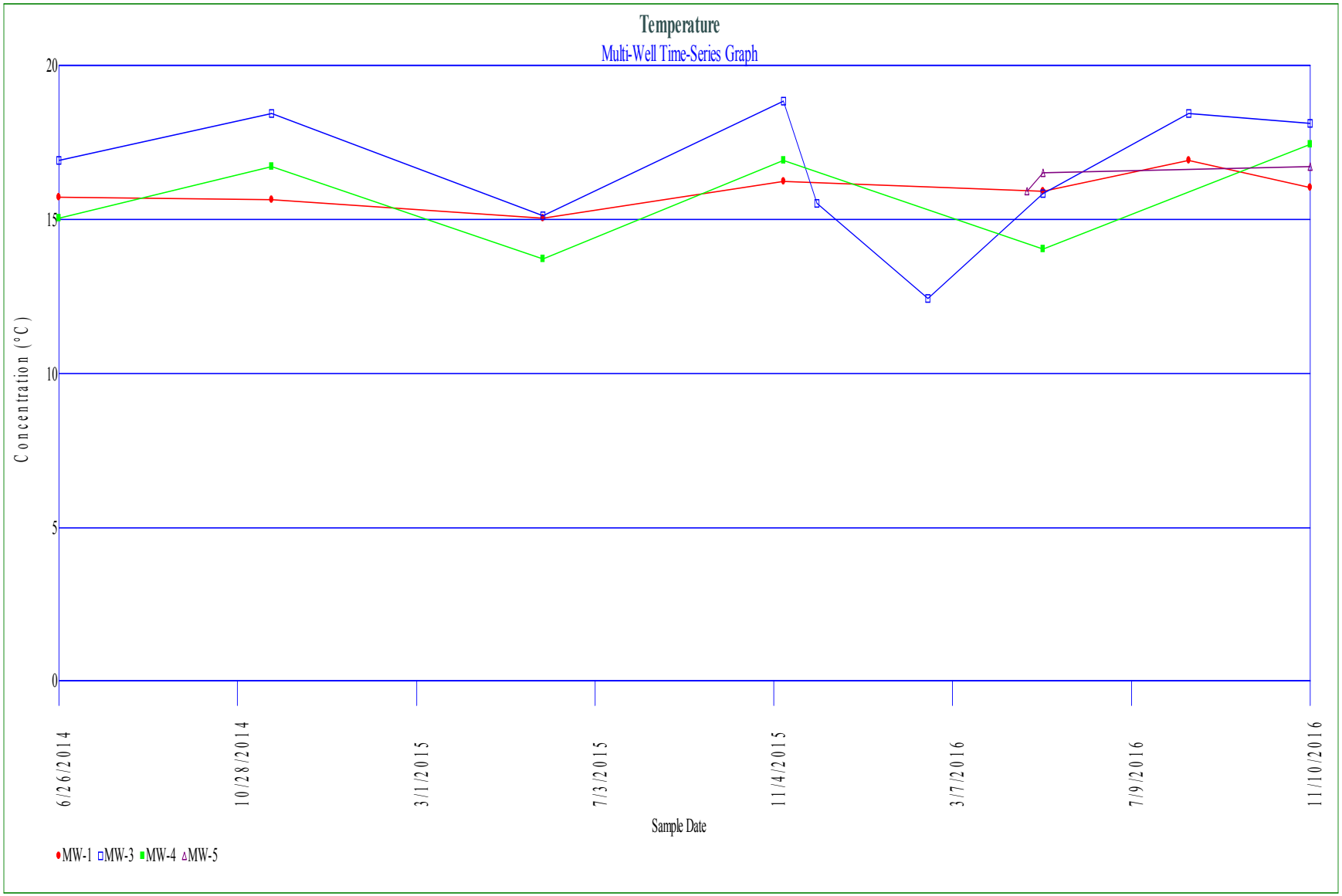

Sodium
Multi-Well Time-Series Graph
200
150
100
50
0
Concentration (mg/l)
5/19/2009
6/13/2010
7/8/2011
8/1/2012
8/27/2013
9/21/2014
10/16/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

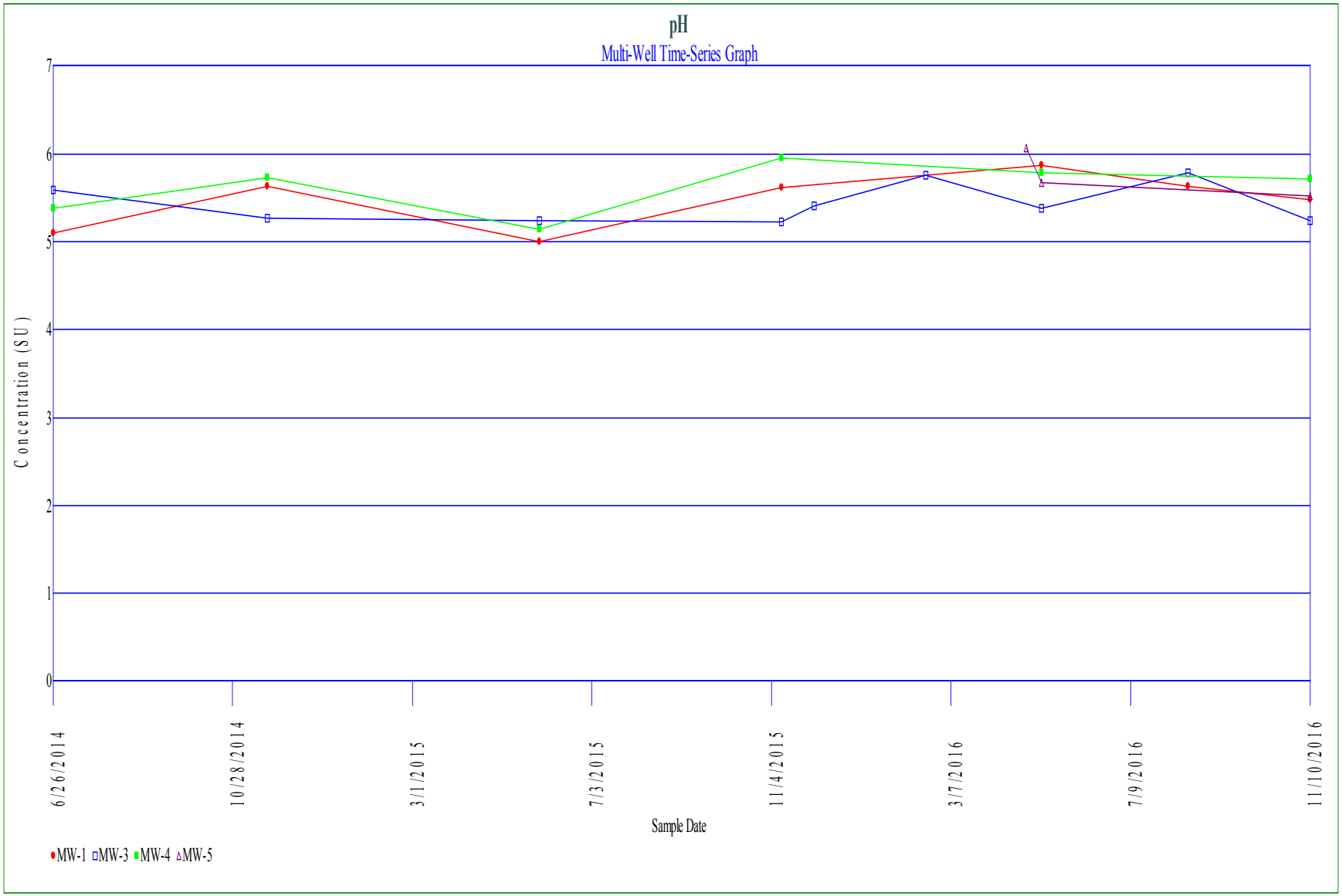

Sulfate
Multi-Well Time-Series Graph
Concentration (mg/l)
100
90
80
70
60
50
40
30
20
10
0
5/19/2009
6/13/2010
7/8/2011
8/1/2012
8/27/2013
9/21/2014
10/16/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5


Thallium
Multi-Well Time-Series Graph
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

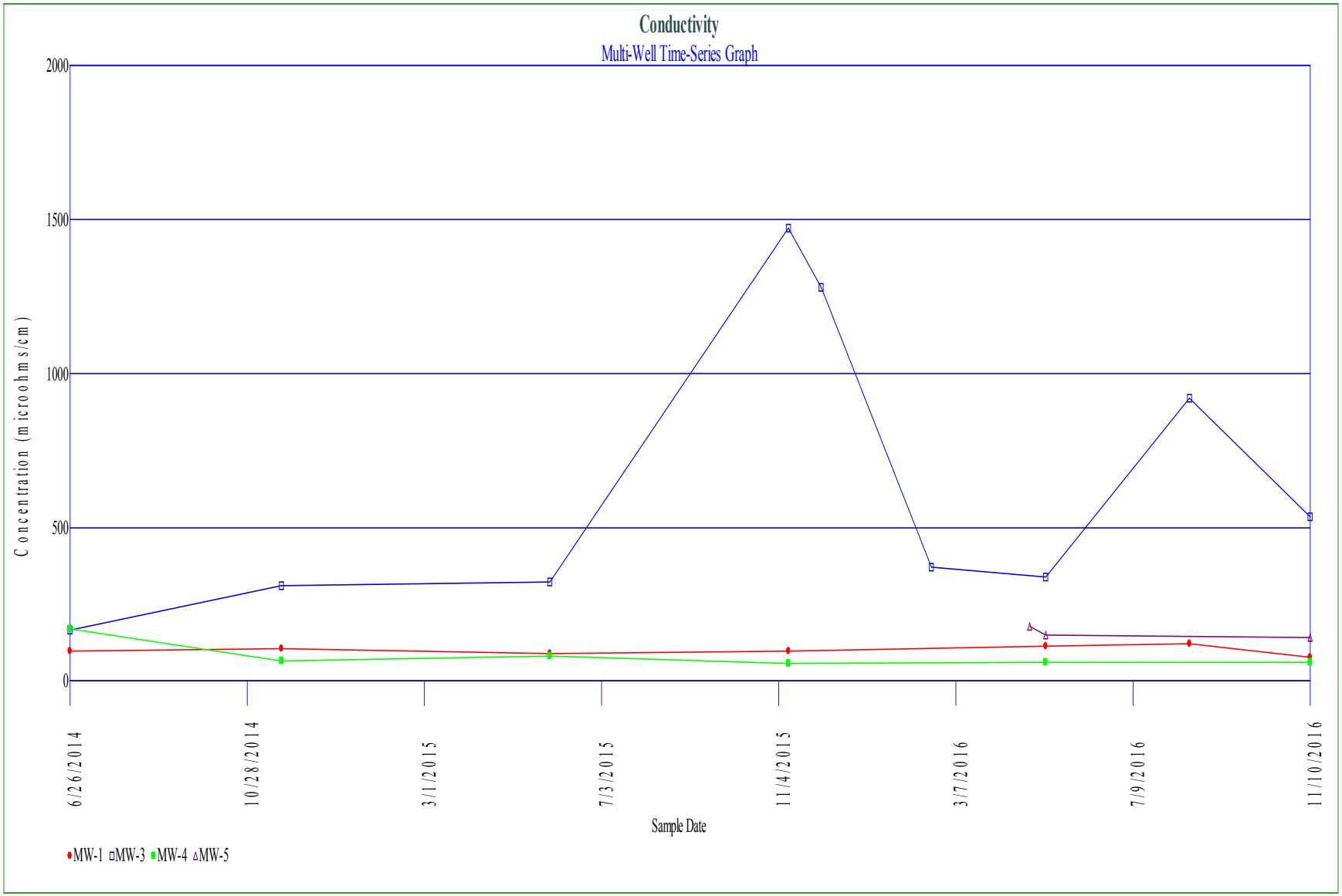

Vanadium
Multi-Well Time-Series Graph
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

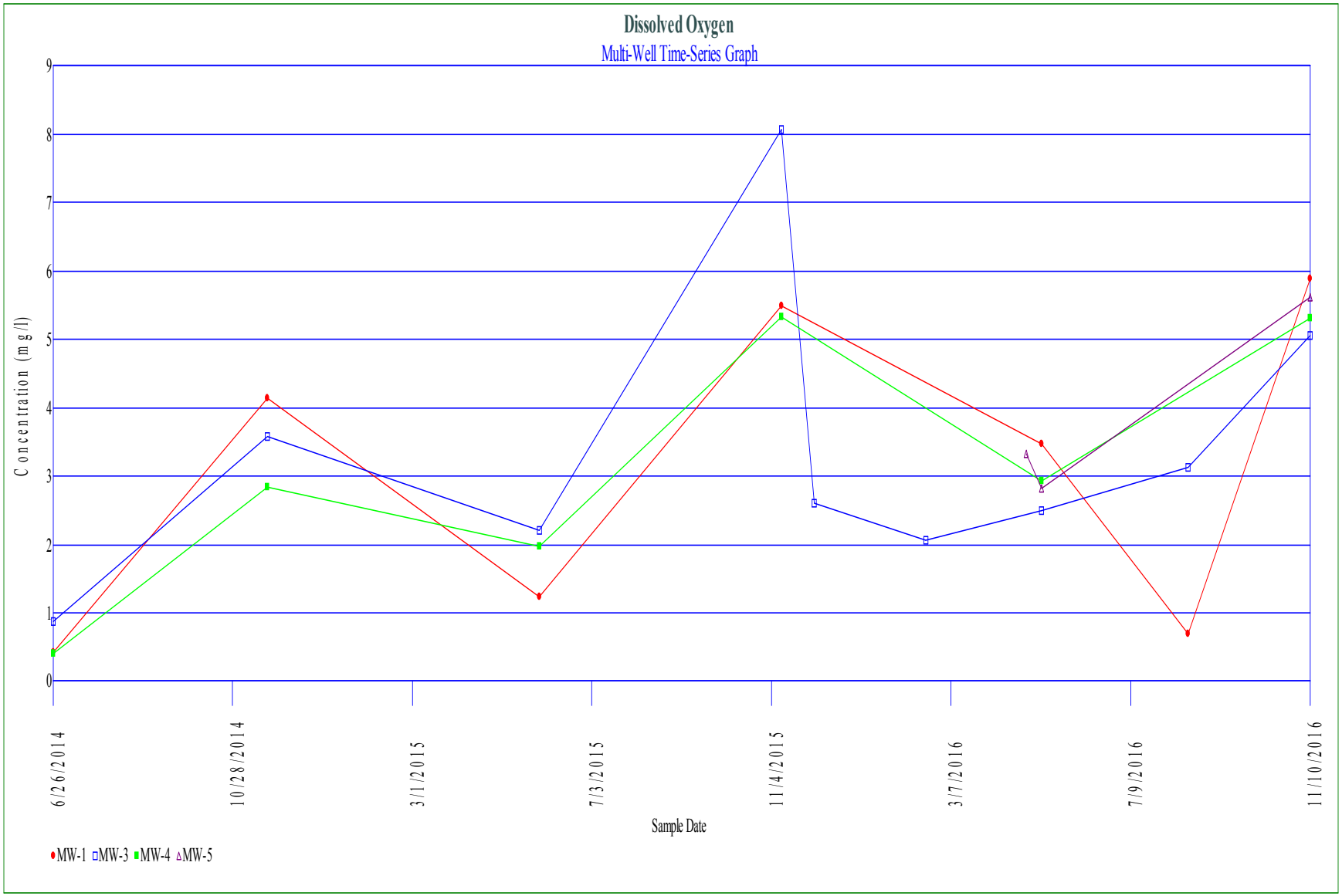

Zinc
Multi-Well Time-Series Graph
0.6
0.5
0.4
0.3
0.2
0.1
0
Concentration (mg/l)
4/19/2008
7/9/2009
9/29/2010
12/20/2011
3/10/2013
5/31/2014
8/21/2015
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

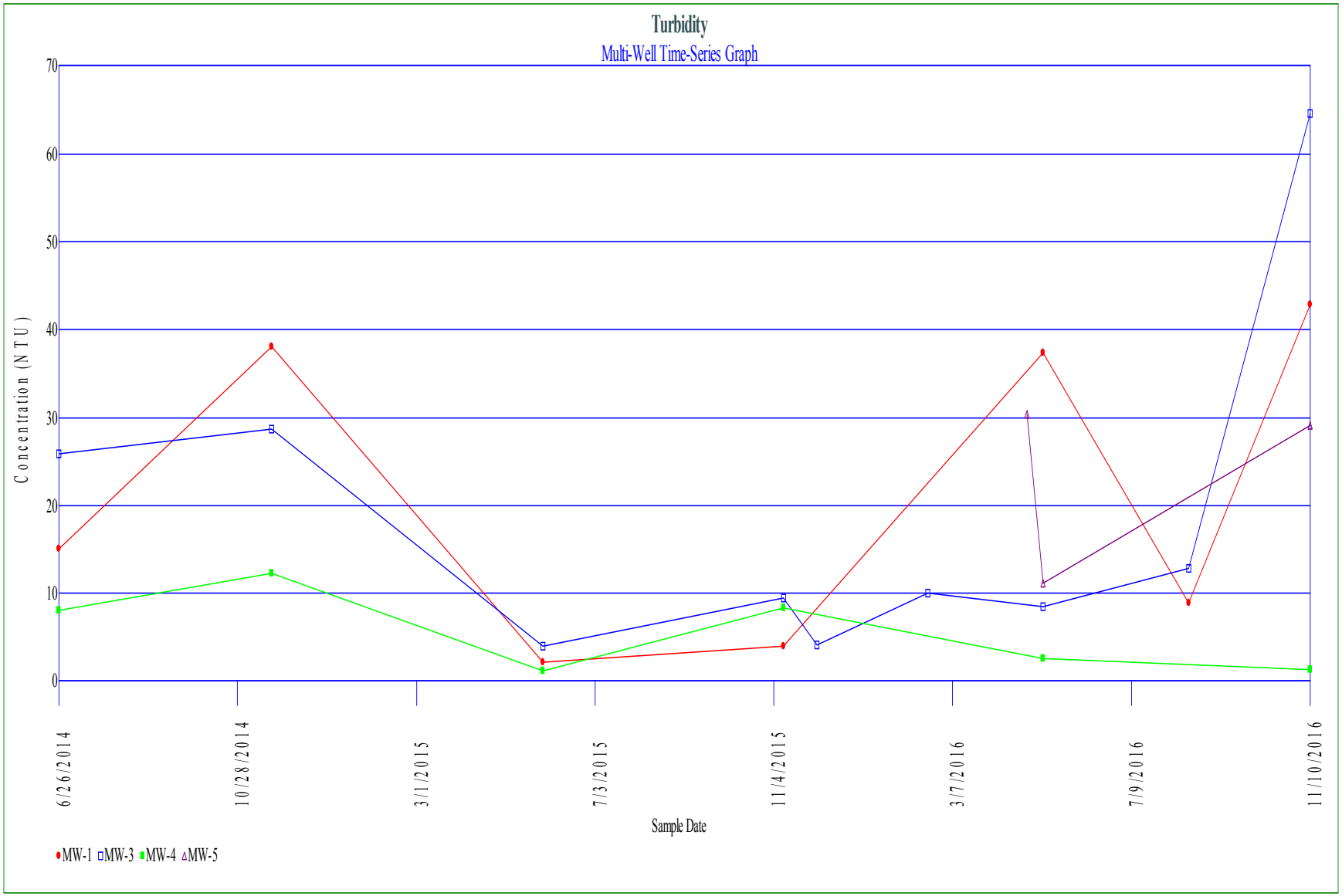

Temperature
Multi-Well Time-Series Graph
20
15
10
5
0
Concentration (°C)
6/26/2014
10/28/2014
3/1/2015
7/3/2015
11/4/2015
3/7/2016
7/9/2016
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5


pH
Multi-Well Time-Series Graph
7
6
5
4
3
2
1
0
Concentration (SU)
6/26/2014
10/28/2014
3/1/2015
7/3/2015
11/4/2015
3/7/2016
7/9/2016
11/10/2016
Sample Date
MW-1
MW-3
MW-4
MW-5


ORP
Multi-Well Time-Series Graph
300
250
200
150
100
50
0
Concentration (mV)
6/26/2014
10/28/2014
3/1/2015
7/3/2015
11/4/2015
3/7/2016
7/9/2016
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5


Conductivity
Multi-Well Time-Series Graph
2000
1500
1000
500
0
Concentration (microohms/cm)
6/26/2014
10/28/2014
3/1/2015
7/3/2015
11/4/2015
3/7/2016
7/9/2016
11/10/2016
Sample Date
MW-1
MW-3
MW-4
MW-5


Dissolved Oxygen
Multi-Well Time-Series Graph
Concentration (mg/l)
0
1
2
3
4
5
6
7
8
9
6/26/2014
10/28/2014
3/1/2015
7/3/2015
11/4/2015
3/7/2016
7/9/2016
11/10/2016
Sample Date
MW-1
MW-3
MW-4
MW-5


Turbidity
Multi-Well Time-Series Graph
70
60
50
40
30
20
10
0
Concentration (NTU)
6/26/2014
10/28/2014
3/1/2015
7/3/2015
11/4/2015
3/7/2016
7/9/2016
11/10/2016
Sample Date
MW-1 MW-3 MW-4 MW-5

Shapiro-Wilks Test of Normality

Parameter: Arsenic
Location: MW-1
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 8 for 17 measurements

Sum of b values = 0.0861228
Sample Standard Deviation = 0.0219437
W Statistic = 0.962715

5% Critical value of 0.892 is less than 0.962715
Data is normally distributed at 95% level of significance

1% Critical value of 0.851 is less than 0.962715
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium
Location: MW-1
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 8 for 17 measurements

Sum of b values = 0.0591911
Sample Standard Deviation = 0.0195117
W Statistic = 0.575178

5% Critical value of 0.892 exceeds 0.575178
Evidence of non-normality at 95% level of significance

1% Critical value of 0.851 exceeds 0.575178
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Cobalt
Location: MW-1
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 8 for 17 measurements

Sum of b values = 0.0351054
Sample Standard Deviation = 0.00898061
W Statistic = 0.955026

5% Critical value of 0.892 is less than 0.955026
Data is normally distributed at 95% level of significance

1% Critical value of 0.851 is less than 0.955026
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Nickel
Location: MW-1
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 8 for 17 measurements

Sum of b values = 0.151027
Sample Standard Deviation = 0.0559405
W Statistic = 0.45555

5% Critical value of 0.892 exceeds 0.45555
Evidence of non-normality at 95% level of significance

1% Critical value of 0.851 exceeds 0.45555
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium
Location: MW-1
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 8 for 17 measurements

Sum of b values = 1.57489
Sample Standard Deviation = 0.466734
W Statistic = 0.711607

5% Critical value of 0.892 exceeds 0.711607
Evidence of non-normality at 95% level of significance

1% Critical value of 0.851 exceeds 0.711607
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Nickel
Location: MW-1
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 8 for 17 measurements

Sum of b values = 2.79948
Sample Standard Deviation = 0.992749
W Statistic = 0.496999

5% Critical value of 0.892 exceeds 0.496999
Evidence of non-normality at 95% level of significance

1% Critical value of 0.851 exceeds 0.496999
Evidence of non-normality at 99% level of significance

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-1

Parameter: Arsenic

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	4/19/2008	0.024
	1/21/2009	0.072
	4/9/2009	0.067
	5/19/2009	0.064
	7/16/2010	0.074
	2/8/2011	0.086
	9/14/2011	0.091
	2/17/2012	0.093
	7/31/2012	0.089
	3/27/2013	0.049
	12/23/2013	0.1
	6/26/2014	0.063
	11/21/2014	0.059
	5/28/2015	0.0604
	11/11/2015	0.0469
	5/9/2016	0.05

From 16 baseline samples
Baseline mean = 0.0680187
Baseline std Dev = 0.0203993

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 16 (background observations) - 1
t(0.95, 16) = 1.75305

Date	Samples	Mean	Interval	Significant
11/10/2016	1	0.0286	[0, 0.10488]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-1

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

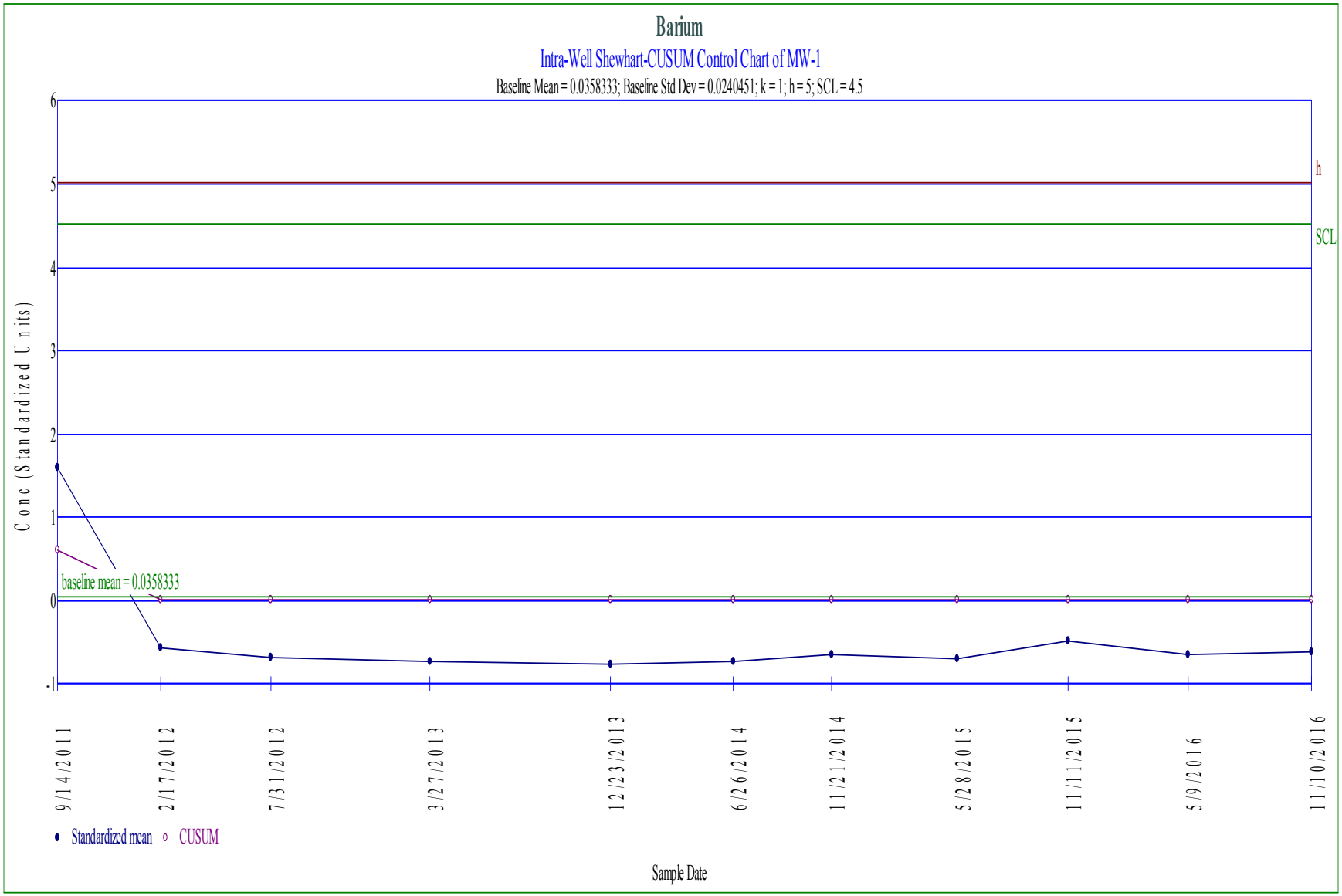
Intra-Well Unified Guid. Formula 95% One-Sided Comparison

Baseline Samples	Date	Result
	4/19/2008	0.032
	1/21/2009	0.03
	4/9/2009	0.043
	5/19/2009	0.056
	7/16/2010	0.035
	2/8/2011	0.031
	9/14/2011	0.029
	2/17/2012	0.026
	7/31/2012	0.028
	3/27/2013	0.036
	12/23/2013	0.028
	6/26/2014	0.036
	11/21/2014	0.046
	5/28/2015	0.041
	11/11/2015	0.0257
	5/9/2016	0.0417

From 16 baseline samples
Baseline mean = 0.035275
Baseline std Dev = 0.00840306

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 16 (background observations) - 1
t(0.95, 16) = 1.75305

Date	Samples	Mean	Interval	Significant
11/10/2016	1	0.0196	[0, 0.0504594]	FALSE


Barium
Intra-Well Shewhart-CUSUM Control Chart of MW-1
Baseline Mean = 0.0358333; Baseline Std Dev = 0.0240451; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
h
SCL
baseline mean = 0.0358333
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
Standardized mean
CUSUM
Sample Date

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Nickel

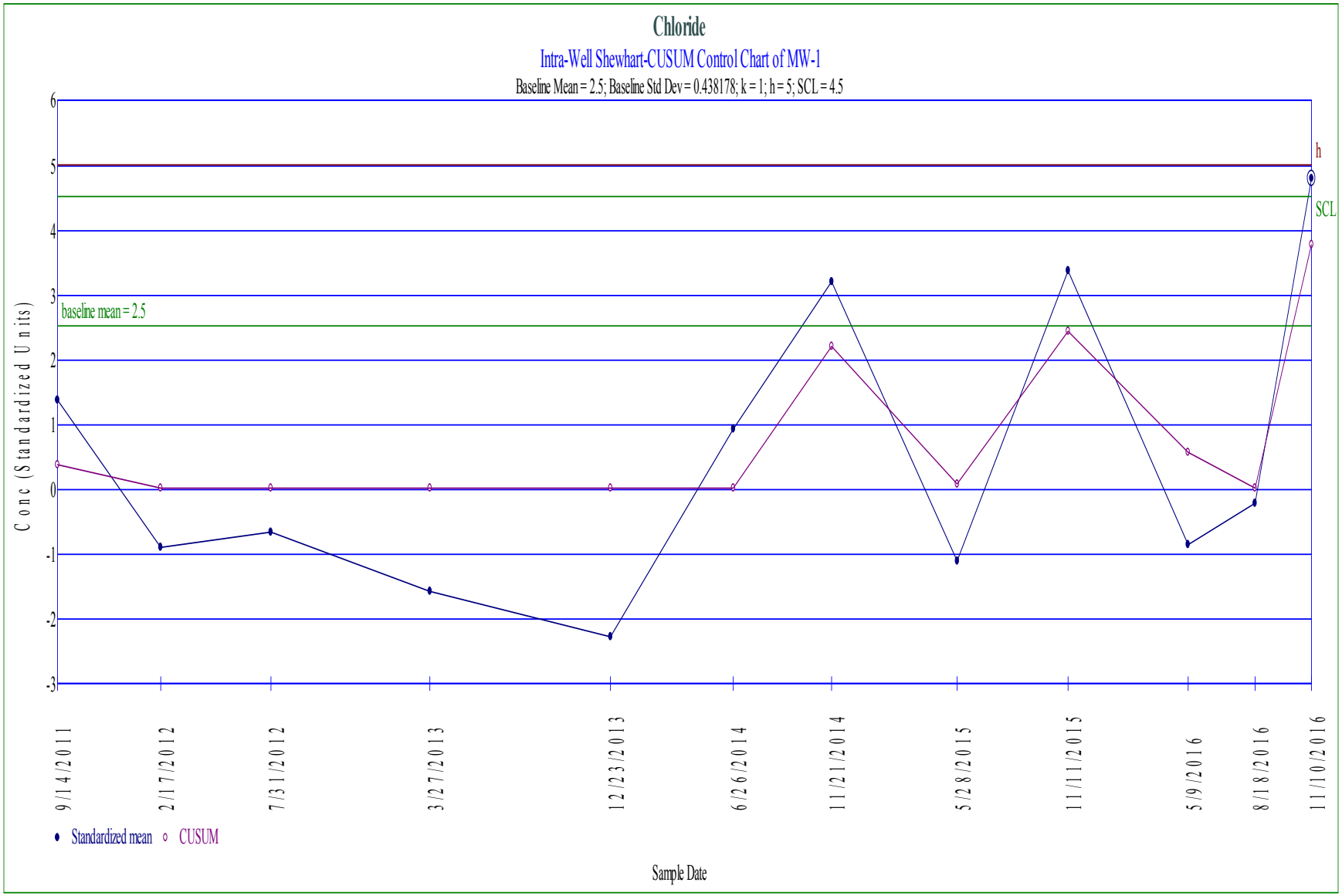
Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 75%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 16
Maximum Baseline Concentration = 0.2
Confidence Level = 94.1%
False Positive Rate = 5.9%

Baseline Measurements	Date	Value
	4/19/2008	ND<0.02
	1/21/2009	ND<0.02
	4/9/2009	0.2
	5/19/2009	0.17
	7/16/2010	ND<0.02
	2/8/2011	ND<0.02
	9/14/2011	ND<0.02
	2/17/2012	ND<0.02
	7/31/2012	ND<0.02
	3/27/2013	ND<0.02
	12/23/2013	ND<0.02
	6/26/2014	ND<0.02
	11/21/2014	ND<0.02
	5/28/2015	ND<0.02
	11/11/2015	0.0112
	5/9/2016	0.00512

Date	Count	Mean	Significant
11/10/2016	1	0.0112	FALSE


Chloride
Intra-Well Shewhart-CUSUM Control Chart of MW-1
Baseline Mean = 2.5; Baseline Std Dev = 0.438178; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
-2
-3
h
SCL
baseline mean = 2.5
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
8/18/2016
11/10/2016
Standardized mean
CUSUM
Sample Date

Wilcoxon Non-Parametric Analysis (Intra-Well)

Parameter: Chloride

Location: MW-1

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total non detects is 0

Non detect rank is 0

Wilcoxon Ranks

Group	Date	Conc.	Rank
Baseline Values	4/19/2008	2	4
	1/21/2009	2.9	13
	4/9/2009	1.9	3
	5/19/2009	2.8	11
Comparison Values	7/16/2010	2.8	12
	2/8/2011	2.6	10
	9/14/2011	3.1	15
	2/17/2012	2.1	6
	7/31/2012	2.2	8
	3/27/2013	1.8	2
	12/23/2013	1.5	1
	6/26/2014	2.9	14
	11/21/2014	3.9	16
	5/28/2015	2.01	5
	11/11/2015	3.97	17
	5/9/2016	2.12	7
	8/18/2016	2.4	9
	11/10/2016	4.59	18

The Wilcoxon Statistic is 35

The Expected value is is 28

The Standard Deviation is 9.4163

The Z Score is 0.690293

The Standard Deviation adjusted for ties is 9.4163

The Z Score adjusted for ties is 0.690293

0.690293 < 2.326 indicating no statistical significance at 1% level

0.690293 < 2.326 indicating no statistical significance at 1% level when adjusted for ties

Shapiro-Wilks Test of Normality

Parameter: Aluminum

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 23 for 47 measurements

Sum of b values = 13.5092

Sample Standard Deviation = 3.08748

W Statistic = 0.416189

5% Critical value of 0.946 exceeds 0.416189

Evidence of non-normality at 95% level of significance

1% Critical value of 0.928 exceeds 0.416189

Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 23 for 47 measurements

Sum of b values = 0.719644

Sample Standard Deviation = 0.13925

W Statistic = 0.580615

5% Critical value of 0.946 exceeds 0.580615

Evidence of non-normality at 95% level of significance

1% Critical value of 0.928 exceeds 0.580615

Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Cadmium
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 21 for 43 measurements

Sum of b values = 0.00159059
Sample Standard Deviation = 0.000295417
W Statistic = 0.690232

5% Critical value of 0.943 exceeds 0.690232
Evidence of non-normality at 95% level of significance

1% Critical value of 0.923 exceeds 0.690232
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Cobalt

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 23 for 47 measurements

Sum of b values = 0.0872181

Sample Standard Deviation = 0.0141287

W Statistic = 0.828418

5% Critical value of 0.946 exceeds 0.828418

Evidence of non-normality at 95% level of significance

1% Critical value of 0.928 exceeds 0.828418

Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Nickel
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 23 for 47 measurements

Sum of b values = 0.151267
Sample Standard Deviation = 0.0355854
W Statistic = 0.392814

5% Critical value of 0.946 exceeds 0.392814
Evidence of non-normality at 95% level of significance

1% Critical value of 0.928 exceeds 0.392814
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Aluminum
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 23 for 47 measurements

Sum of b values = 10.0396
Sample Standard Deviation = 1.59311
W Statistic = 0.863344

5% Critical value of 0.946 exceeds 0.863344
Evidence of non-normality at 95% level of significance

1% Critical value of 0.928 exceeds 0.863344
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 23 for 47 measurements

Sum of b values = 7.35692
Sample Standard Deviation = 1.11948
W Statistic = 0.938857

5% Critical value of 0.946 exceeds 0.938857
Evidence of non-normality at 95% level of significance

1% Critical value of 0.928 is less than 0.938857
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Cadmium
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 21 for 43 measurements

Sum of b values = 2.28161
Sample Standard Deviation = 0.426445
W Statistic = 0.681564

5% Critical value of 0.943 exceeds 0.681564
Evidence of non-normality at 95% level of significance

1% Critical value of 0.923 exceeds 0.681564
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Cobalt
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 23 for 47 measurements

Sum of b values = 7.30992
Sample Standard Deviation = 1.16971
W Statistic = 0.849007

5% Critical value of 0.946 exceeds 0.849007
Evidence of non-normality at 95% level of significance

1% Critical value of 0.928 exceeds 0.849007
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Nickel
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 23 for 47 measurements

Sum of b values = 5.83833
Sample Standard Deviation = 1.00389
W Statistic = 0.73527

5% Critical value of 0.946 exceeds 0.73527
Evidence of non-normality at 95% level of significance

1% Critical value of 0.928 exceeds 0.73527
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Chloride

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 25 for 50 measurements

Sum of b values = 480.67

Sample Standard Deviation = 92.8098

W Statistic = 0.547407

5% Critical value of 0.947 exceeds 0.547407

Evidence of non-normality at 95% level of significance

1% Critical value of 0.93 exceeds 0.547407

Evidence of non-normality at 99% level of significance

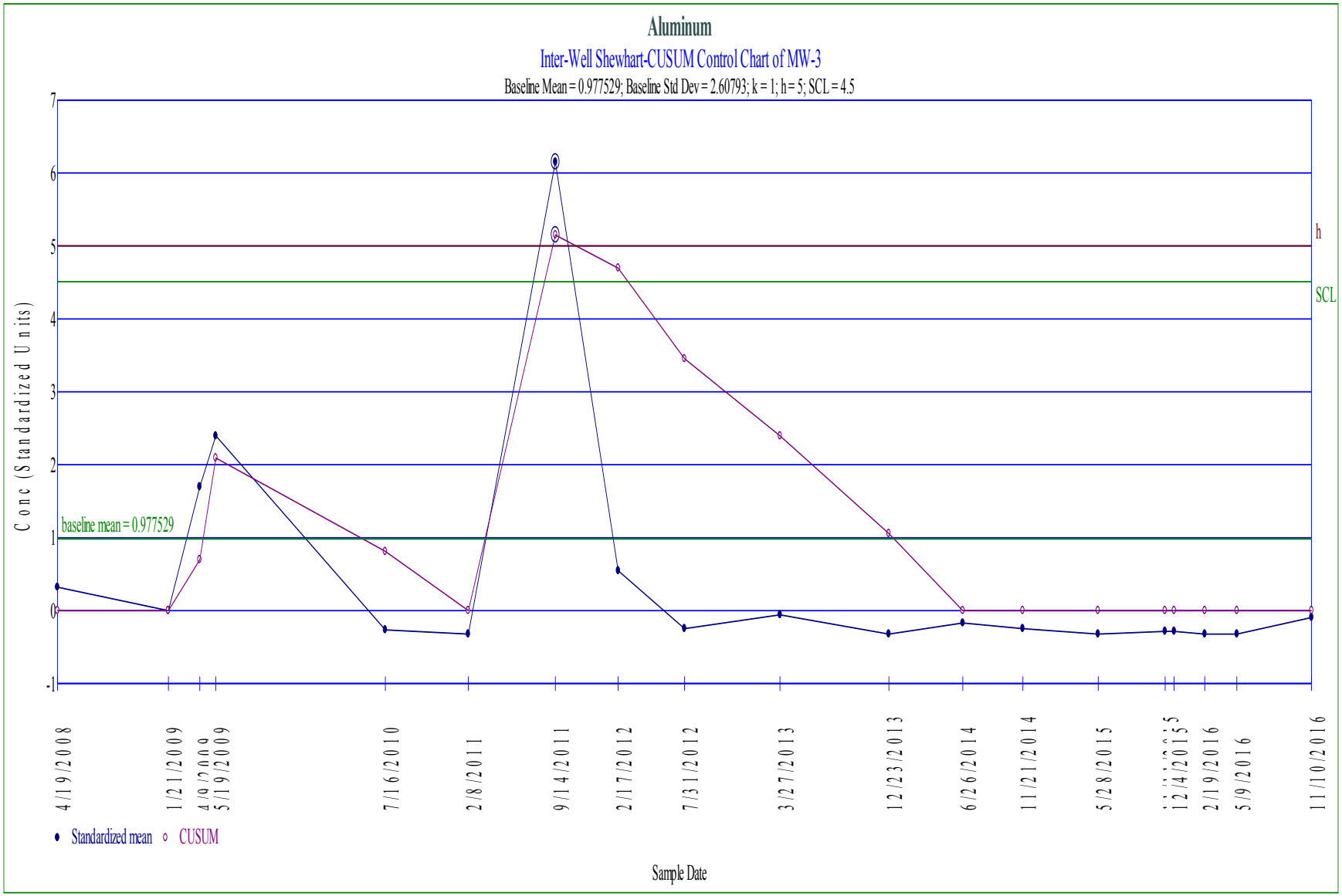
Shapiro-Wilks Test of Normality

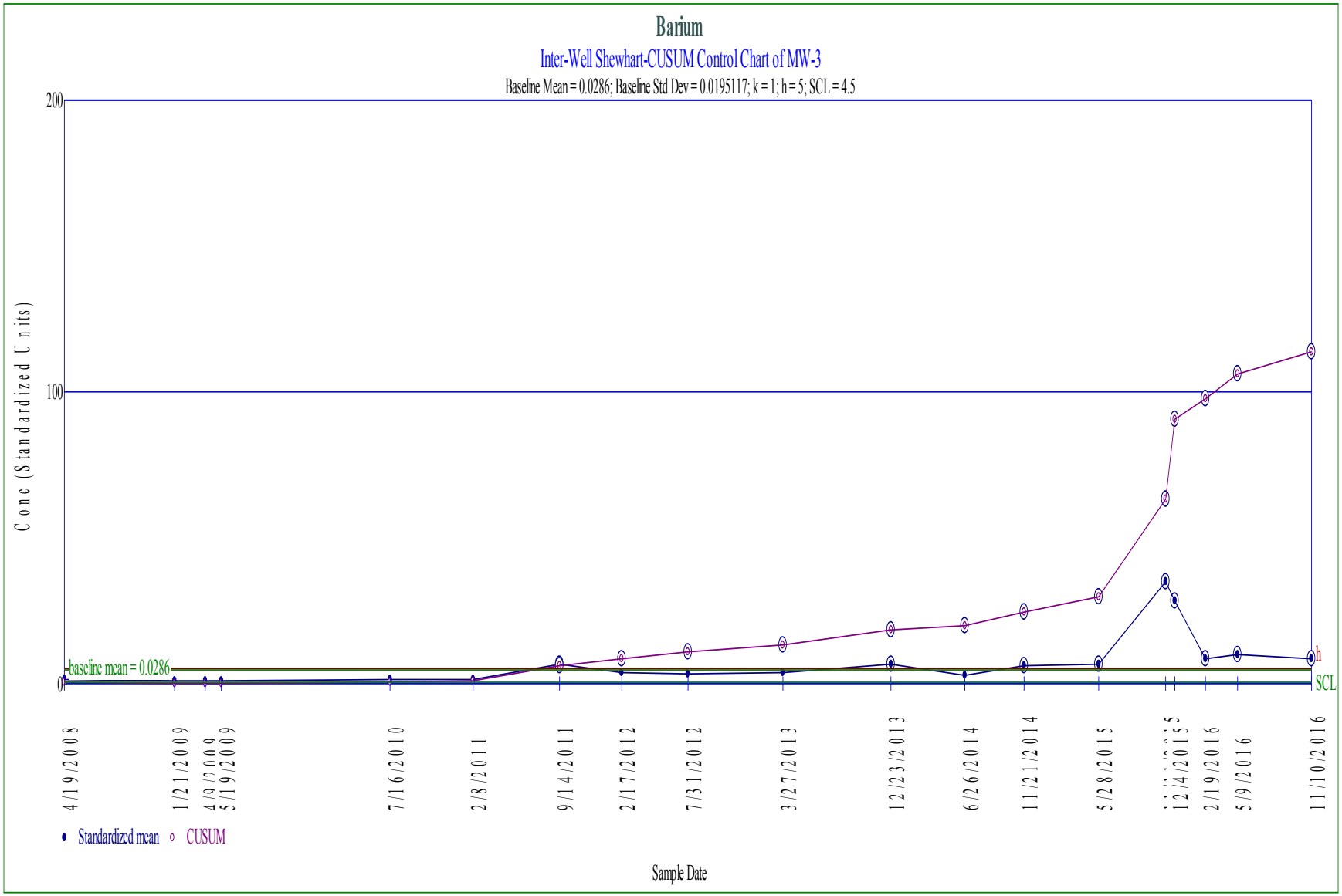
Parameter: Chloride
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 25 for 50 measurements

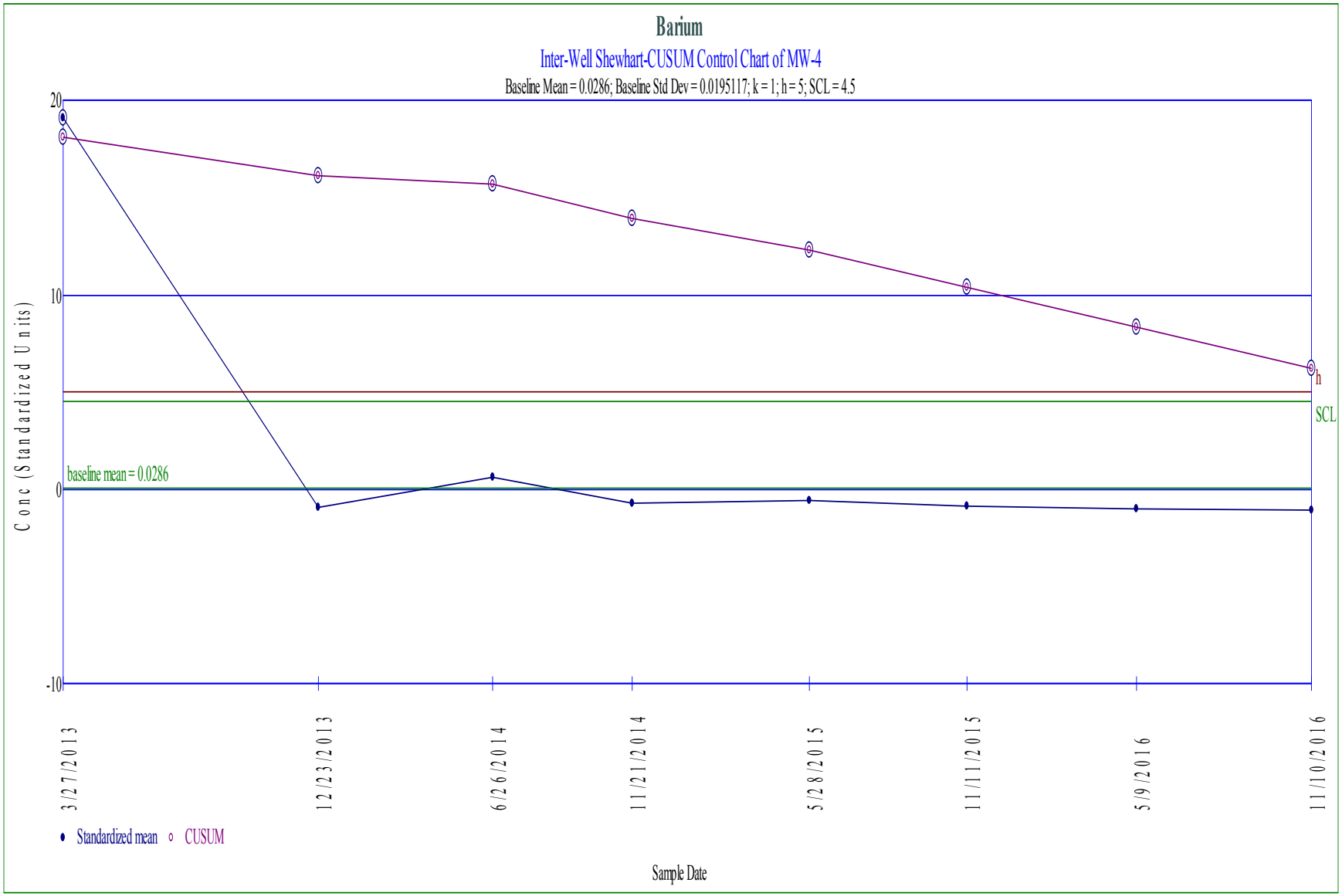
Sum of b values = 10.6958
Sample Standard Deviation = 1.592
W Statistic = 0.921173

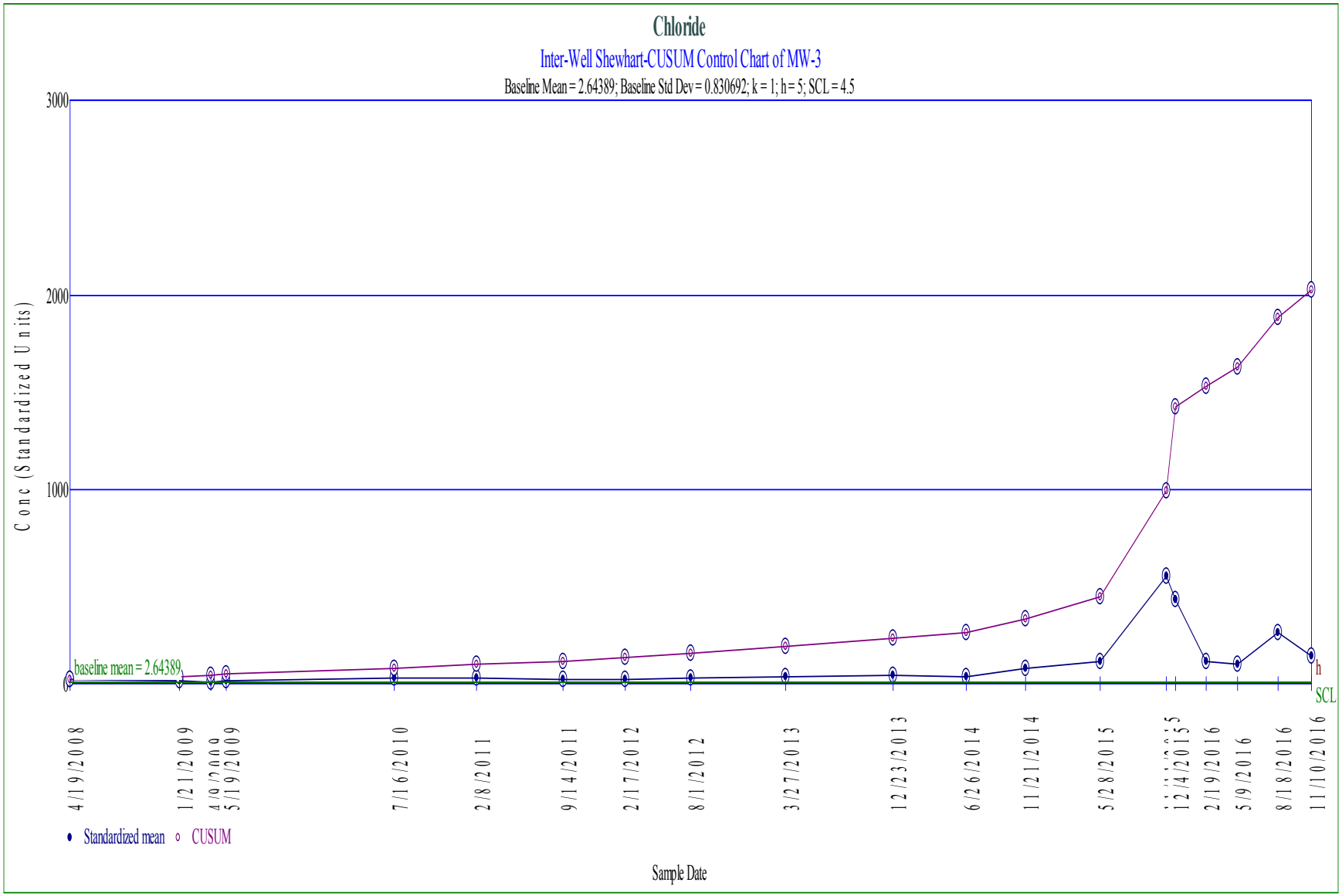
5% Critical value of 0.947 exceeds 0.921173
Evidence of non-normality at 95% level of significance

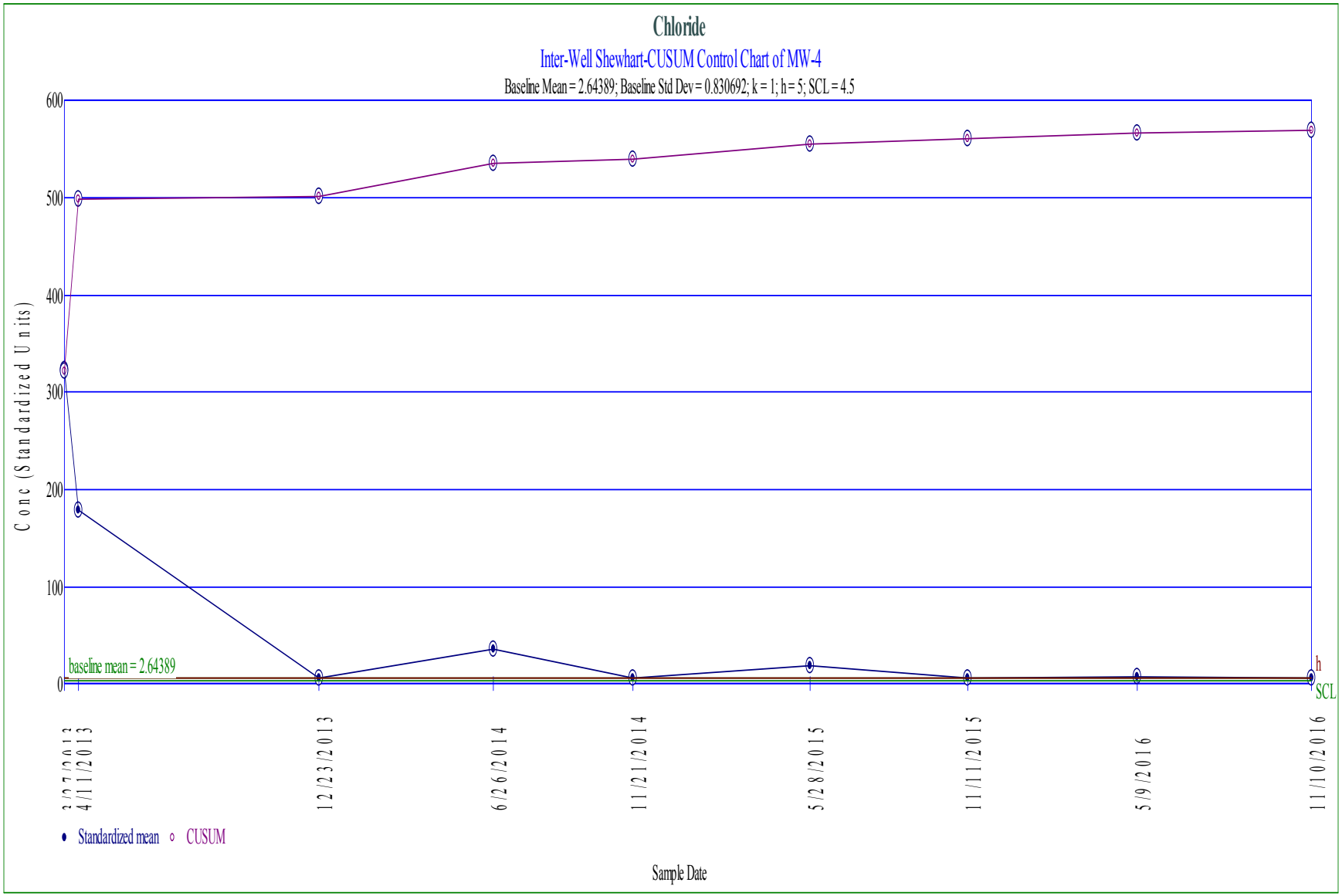
1% Critical value of 0.93 exceeds 0.921173
Evidence of non-normality at 99% level of significance


Aluminum
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 0.977529; Baseline Std Dev = 2.60793; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
baseline mean = 0.977529
h
SCL
Standardized mean
CUSUM
Sample Date


Barium
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 0.0286; Baseline Std Dev = 0.0195117; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
200
100
0
baseline mean = 0.0286
h
SCL
4/19/2008
1/21/2009
4/9/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
12/4/2015
2/19/2016
5/9/2016
11/10/2016
Standardized mean
CUSUM
Sample Date


Barium
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 0.0286; Baseline Std Dev = 0.0195117; k = 1; h = 5; SCL = 4.5
20
10
0
-10
Conc (Standardized Units)
h
SCL
baseline mean = 0.0286
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
Standardized mean
CUSUM
Sample Date


Chloride
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 2.64389; Baseline Std Dev = 0.830692; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
3000
2000
1000
0
baseline mean = 2.64389
h
SCL
4/19/2008
1/21/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
8/1/2012
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
12/4/2015
2/19/2016
5/9/2016
8/18/2016
11/10/2016
Standardized mean
CUSUM
Sample Date


Chloride
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 2.64389; Baseline Std Dev = 0.830692; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
600
500
400
300
200
100
0
baseline mean = 2.64389
h
SCL
3/27/2013
4/11/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
Standardized mean
CUSUM
Sample Date

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Cadmium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 97.6744%
Number of comparisons = 3
Future Samples (k) = 3
Recent Dates = 1
Background Measurements (n) = 16
Maximum Background Value = 0.001
Confidence Level = 84.2%
False Positive Rate = 15.8%

Location	Date	Count	Mean	Significant
MW-3	**11/10/2016**	**1**	**0.00177**	**TRUE**
MW-4	11/10/2016	1	0.001	FALSE
MW-5	11/10/2016	1	0.001	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 55.3191%
Number of comparisons = 3
Future Samples (k) = 3
Recent Dates = 1
Background Measurements (n) = 17
Maximum Background Value = 0.056
Confidence Level = 85%
False Positive Rate = 15%

Location	Date	Count	Mean	Significant
MW-3	11/10/2016	1	0.00202	FALSE
MW-4	11/10/2016	1	0.002	FALSE
MW-5	11/10/2016	1	0.00201	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Nickel

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 78.7234%
Number of comparisons = 3
Future Samples (k) = 3
Recent Dates = 1
Background Measurements (n) = 17
Maximum Background Value = 0.2
Confidence Level = 85%
False Positive Rate = 15%

Location	Date	Count	Mean	Significant
MW-3	11/10/2016	1	0.002	FALSE
MW-4	11/10/2016	1	0.002	FALSE
MW-5	11/10/2016	1	0.00348	FALSE

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Barium

Location: MW-3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total non detects is 0

Non detect rank is 15

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.084	24
	1/21/2009	0.028	13
	4/9/2009	0.028	14
	5/19/2009	0.033	15
	7/16/2010	0.021	9
	2/8/2011	0.021	10
	9/14/2011	0.074	22
	2/17/2012	0.022	11
	7/31/2012	0.019	5
	3/27/2013	0.018	2
	12/23/2013	0.017	1
	6/26/2014	0.018	3
	11/21/2014	0.02	6
	5/28/2015	0.0188	4
	11/11/2015	0.0237	12
	5/9/2016	0.02	7
	11/10/2016	0.0207	8
MW-3	4/19/2008	0.056	21
	1/21/2009	0.039	16
	4/9/2009	0.043	17
	5/19/2009	0.047	18
	7/16/2010	0.055	20
	2/8/2011	0.052	19
	9/14/2011	0.15	29
	2/17/2012	0.097	27
	7/31/2012	0.091	25
	3/27/2013	0.094	26
	12/23/2013	0.15	30
	6/26/2014	0.079	23
	11/21/2014	0.14	28
	5/28/2015	0.152	31
	11/11/2015	0.701	36
	12/4/2015	0.579	35
	2/19/2016	0.186	32
	5/9/2016	0.218	34
	11/10/2016	0.188	33

The Wilcoxon Statistic is 310

The Expected value is is 161.5

The Standard Deviation is 31.5581

The Z Score is 4.68976
The Standard Deviation adjusted for ties is 31.5581
The Z Score adjusted for ties is 4.68976
4.68976 > 2.326 indicating statistical significance at 1% level
4.68976 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Barium

Location: MW-4

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total non detects is 0

Non detect rank is 15

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.084	24
	1/21/2009	0.028	19
	4/9/2009	0.028	20
	5/19/2009	0.033	21
	7/16/2010	0.021	15
	2/8/2011	0.021	16
	9/14/2011	0.074	23
	2/17/2012	0.022	17
	7/31/2012	0.019	11
	3/27/2013	0.018	8
	12/23/2013	0.017	7
	6/26/2014	0.018	9
	11/21/2014	0.02	12
	5/28/2015	0.0188	10
	11/11/2015	0.0237	18
	5/9/2016	0.02	13
	11/10/2016	0.0207	14
MW-4	3/27/2013	0.4	25
	12/23/2013	0.0096	3
	6/26/2014	0.04	22
	11/21/2014	0.013	5
	5/28/2015	0.0169	6
	11/11/2015	0.0105	4
	5/9/2016	0.00821	2
	11/10/2016	0.00738	1

The Wilcoxon Statistic is 32

The Expected value is is 68

The Standard Deviation is 17.1659

The Z Score is -2.12631

The Standard Deviation adjusted for ties is 17.1659

The Z Score adjusted for ties is -2.12631

-2.12631 < 2.326 indicating no statistical significance at 1% level

-2.12631 < 2.326 indicating no statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Cadmium

Location: MW-3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total non detects is 32

Non detect rank is 16.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	ND<0.0005	16.5
	1/21/2009	ND<0.0005	16.5
	4/9/2009	ND<0.0005	16.5
	5/19/2009	ND<0.0005	16.5
	7/16/2010	ND<0.0005	16.5
	2/8/2011	ND<0.0005	16.5
	9/14/2011	ND<0.0005	16.5
	2/17/2012	ND<0.0005	16.5
	7/31/2012	ND<0.0005	16.5
	12/23/2013	ND<0.0005	16.5
	6/26/2014	ND<0.0005	16.5
	11/21/2014	ND<0.001	16.5
	5/28/2015	ND<0.001	16.5
	11/11/2015	ND<0.001	16.5
	5/9/2016	ND<0.001	16.5
	11/10/2016	ND<0.001	16.5
MW-3	1/21/2009	ND<0.0005	16.5
	4/9/2009	ND<0.0005	16.5
	5/19/2009	ND<0.0005	16.5
	7/16/2010	ND<0.0005	16.5
	2/8/2011	ND<0.0005	16.5
	9/14/2011	ND<0.0005	16.5
	2/17/2012	ND<0.0005	16.5
	7/31/2012	ND<0.0005	16.5
	12/23/2013	ND<0.0005	16.5
	6/26/2014	ND<0.0005	16.5
	11/21/2014	ND<0.001	16.5
	5/28/2015	ND<0.001	16.5
	11/11/2015	ND<0.001	16.5
	12/4/2015	ND<0.001	16.5
	2/19/2016	ND<0.001	16.5
	5/9/2016	ND<0.001	16.5
	11/10/2016	0.00177	33

The Wilcoxon Statistic is 144

The Expected value is is 136

The Standard Deviation is 27.7609

The Z Score is 0.270164

The Standard Deviation adjusted for ties is 8.24621

The Z Score adjusted for ties is 0.909509

0.270164 < 2.326 indicating no statistical significance at 1% level
0.909509 < 2.326 indicating no statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Chloride

Location: MW-3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total non detects is 0

Non detect rank is 0

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	2	4
	1/21/2009	2.9	13
	4/9/2009	1.9	3
	5/19/2009	2.8	11
	7/16/2010	2.8	12
	2/8/2011	2.6	10
	9/14/2011	3.1	15
	2/17/2012	2.1	6
	7/31/2012	2.2	8
	3/27/2013	1.8	2
	12/23/2013	1.5	1
	6/26/2014	2.9	14
	11/21/2014	3.9	16
	5/28/2015	2.01	5
	11/11/2015	3.97	17
	5/9/2016	2.12	7
	8/18/2016	2.4	9
	11/10/2016	4.59	18
MW-3	4/19/2008	20	24
	1/21/2009	14	21
	4/9/2009	8.2	19
	5/19/2009	10	20
	7/16/2010	25	25
	2/8/2011	25	26
	9/14/2011	15	22
	2/17/2012	18	23
	8/1/2012	25	27
	3/27/2013	32	29
	12/23/2013	35	30
	6/26/2014	29	28
	11/21/2014	65	31
	5/28/2015	92.8	33
	11/11/2015	458	38
	12/4/2015	360	37
	2/19/2016	96.1	34
	5/9/2016	80.7	32
	8/18/2016	218	36
	11/10/2016	120	35

The Wilcoxon Statistic is 360

The Expected value is is 180
The Standard Deviation is 34.2053
The Z Score is 5.24773
The Standard Deviation adjusted for ties is 34.2053
The Z Score adjusted for ties is 5.24773
5.24773 > 2.326 indicating statistical significance at 1% level
5.24773 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Chloride

Location: MW-4

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total non detects is 0

Non detect rank is 0

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	2	4
	1/21/2009	2.9	13
	4/9/2009	1.9	3
	5/19/2009	2.8	11
	7/16/2010	2.8	12
	2/8/2011	2.6	10
	9/14/2011	3.1	15
	2/17/2012	2.1	6
	7/31/2012	2.2	8
	3/27/2013	1.8	2
	12/23/2013	1.5	1
	6/26/2014	2.9	14
	11/21/2014	3.9	16
	5/28/2015	2.01	5
	11/11/2015	3.97	17
	5/9/2016	2.12	7
	8/18/2016	2.4	9
	11/10/2016	4.59	18
MW-4	3/27/2013	270	27
	4/11/2013	150	26
	12/23/2013	6.4	19
	6/26/2014	31	25
	11/21/2014	6.7	21
	5/28/2015	17.5	24
	11/11/2015	7.34	22
	5/9/2016	7.91	23
	11/10/2016	6.61	20

The Wilcoxon Statistic is 162

The Expected value is is 81

The Standard Deviation is 19.4422

The Z Score is 4.14047

The Standard Deviation adjusted for ties is 19.4422

The Z Score adjusted for ties is 4.14047

4.14047 > 2.326 indicating statistical significance at 1% level

4.14047 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Mann-Kendall Trend Analysis

Parameter: Barium
Location: MW-3
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 144 - 26 = 118

Tied Group	Value	Members
1	0.15	2

Time Period	Observations
4/19/2008	1
1/21/2009	1
4/9/2009	1
5/19/2009	1
7/16/2010	1
2/8/2011	1
9/14/2011	1
2/17/2012	1
7/31/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
11/10/2016	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 14706
b = 52326
c = 684
Group Variance = 816
Z-Score = 4.09582
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.09582 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: MW-3
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 162 - 25 = 137

Tied Group	Value	Members
1	25	3

Time Period	Observations
4/19/2008	1
1/21/2009	1
4/9/2009	1
5/19/2009	1
7/16/2010	1
2/8/2011	1
9/14/2011	1
2/17/2012	1
8/1/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
8/18/2016	1
11/10/2016	1

There are 0 time periods with multiple data

A = 66
B = 0
C = 6
D = 0
E = 6
F = 0
a = 17100
b = 61560
c = 760
Group Variance = 946.333
Z-Score = 4.42096
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.42096 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: MW-4
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 10 - 26 = -16
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= -16 is 0.06
S < 0 or 0.06 >= 0.05 indicating no evidence of an upward trend

APPENDIX C
LABORATORY ANALYTICAL REPORT & FIELD INFORMATION LOGS

ANALYTICAL REPORT

January 13, 2017

Civil & Environmental Consultants - TN

Sample Delivery Group:	L872094
Samples Received:	11/11/2016
Project Number:	142-059
Description:	EWS Landfill

Report To: Philip Campbell
325 Seaboard Lane, Suite 170
Franklin, TN 37067

Entire Report Reviewed By:

Jimmy Hunt
Technical Service Representative

FIELD BLANK L872094-01 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 16:30
Received date/time: 11/11/16 10:36

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
EDB / DBCP by Method 8011	WG926143	1	11/13/16 10:32	11/14/16 18:08	HMH
Mercury by Method 7470A	WG925917	1	11/12/16 06:25	11/14/16 13:39	NJB
Metals (ICPMS) by Method 6020	WG926439	1	11/15/16 13:12	11/17/16 15:02	VSS
Volatile Organic Compounds (GC/MS) by Method 8260B	WG926517	1	11/16/16 22:07	11/16/16 22:07	ACG
Wet Chemistry by Method 2320 B-2011	WG925804	1	11/14/16 18:53	11/14/16 18:53	AMC
Wet Chemistry by Method 350.1	WG927642	1	11/18/16 09:46	11/18/16 09:46	DR
Wet Chemistry by Method 410.4	WG925886	1	11/11/16 18:16	11/11/16 20:34	MZ
Wet Chemistry by Method 9056A	WG925823	1	11/11/16 18:06	11/11/16 18:06	SAM

TRIP BLANK L872094-02 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 00:00
Received date/time: 11/11/16 10:36

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG926517	1	11/16/16 17:25	11/16/16 17:25	BMB

MW-1 L872094-04 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 15:15
Received date/time: 11/11/16 10:36

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
EDB / DBCP by Method 8011	WG926143	1	11/13/16 10:32	11/14/16 18:19	HMH
Mercury by Method 7470A	WG925917	1	11/12/16 06:25	11/14/16 13:42	NJB
Metals (ICPMS) by Method 6020	WG926439	1	11/15/16 13:12	11/17/16 15:16	VSS
Volatile Organic Compounds (GC/MS) by Method 8260B	WG926517	1	11/16/16 22:31	11/16/16 22:31	ACG
Wet Chemistry by Method 2320 B-2011	WG925804	1	11/14/16 19:01	11/14/16 19:01	AMC
Wet Chemistry by Method 350.1	WG927642	1	11/18/16 08:56	11/18/16 08:56	DR
Wet Chemistry by Method 410.4	WG925886	1	11/11/16 18:16	11/11/16 20:34	MZ
Wet Chemistry by Method 9056A	WG925823	1	11/11/16 18:21	11/11/16 18:21	SAM

MW-3 L872094-05 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 16:15
Received date/time: 11/11/16 10:36

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
EDB / DBCP by Method 8011	WG926143	1	11/13/16 10:32	11/14/16 18:30	HMH
Mercury by Method 7470A	WG925917	1	11/12/16 06:25	11/14/16 13:45	NJB
Metals (ICPMS) by Method 6020	WG926439	1	11/15/16 13:12	11/17/16 15:20	VSS
Volatile Organic Compounds (GC/MS) by Method 8260B	WG926517	1	11/16/16 22:55	11/16/16 22:55	ACG
Wet Chemistry by Method 2320 B-2011	WG925804	1	11/14/16 19:07	11/14/16 19:07	AMC
Wet Chemistry by Method 350.1	WG927642	1	11/18/16 08:57	11/18/16 08:57	DR
Wet Chemistry by Method 410.4	WG925886	1	11/11/16 18:16	11/11/16 20:34	MZ
Wet Chemistry by Method 9056A	WG925823	1	11/11/16 18:36	11/11/16 18:36	SAM
Wet Chemistry by Method 9056A	WG925823	5	11/11/16 18:51	11/11/16 18:51	SAM

MW-4 L872094-06 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 12:10
Received date/time: 11/11/16 10:36

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
EDB / DBCP by Method 8011	WG926143	1	11/13/16 10:32	11/14/16 18:41	HMH
Mercury by Method 7470A	WG925917	1	11/12/16 06:25	11/14/16 13:21	NJB
Metals (ICPMS) by Method 6020	WG926439	1	11/15/16 13:12	11/17/16 15:23	VSS
Volatile Organic Compounds (GC/MS) by Method 8260B	WG926517	1	11/16/16 23:18	11/16/16 23:18	ACG
Wet Chemistry by Method 2320 B-2011	WG926340	1	11/15/16 08:12	11/15/16 08:12	AMC

MW-4 L872094-06 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 12:10
Received date/time: 11/11/16 10:36

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 350.1	WG926779	1	11/16/16 13:22	11/16/16 13:22	DR
Wet Chemistry by Method 410.4	WG925886	1	11/11/16 18:16	11/11/16 20:34	MZ
Wet Chemistry by Method 9056A	WG925823	1	11/11/16 20:20	11/11/16 20:20	SAM

MW-5 L872094-07 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 14:00
Received date/time: 11/11/16 10:36

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
EDB / DBCP by Method 8011	WG926143	1	11/13/16 10:32	11/14/16 18:52	HMH
Mercury by Method 7470A	WG925917	1	11/12/16 06:25	11/14/16 13:48	NJB
Metals (ICPMS) by Method 6020	WG926439	1	11/15/16 13:12	11/17/16 16:09	VSS
Volatile Organic Compounds (GC/MS) by Method 8260B	WG926517	1	11/16/16 23:42	11/16/16 23:42	ACG
Wet Chemistry by Method 2320 B-2011	WG926340	1	11/15/16 09:04	11/15/16 09:04	AMC
Wet Chemistry by Method 350.1	WG926779	1	11/16/16 13:25	11/16/16 13:25	DR
Wet Chemistry by Method 410.4	WG925886	1	11/11/16 18:16	11/11/16 20:35	MZ
Wet Chemistry by Method 9056A	WG925823	1	11/11/16 20:35	11/11/16 20:35	SAM

DUPLICATE L872094-08 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 00:00
Received date/time: 11/11/16 10:36

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
EDB / DBCP by Method 8011	WG926143	1	11/13/16 10:32	11/14/16 19:03	HMH
Mercury by Method 7470A	WG925917	1	11/12/16 06:25	11/14/16 13:51	NJB
Metals (ICPMS) by Method 6020	WG926439	1	11/15/16 13:12	11/17/16 16:13	VSS
Volatile Organic Compounds (GC/MS) by Method 8260B	WG926517	1	11/17/16 00:05	11/17/16 00:05	ACG
Wet Chemistry by Method 2320 B-2011	WG926340	1	11/15/16 09:24	11/15/16 09:24	AMC
Wet Chemistry by Method 350.1	WG926779	1	11/16/16 13:26	11/16/16 13:26	DR
Wet Chemistry by Method 410.4	WG926294	1	11/14/16 11:59	11/14/16 15:20	KK
Wet Chemistry by Method 9056A	WG925823	1	11/11/16 20:50	11/11/16 20:50	SAM

TMW-1 L872094-09 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 10:45
Received date/time: 11/11/16 10:36

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG928330	1	11/20/16 10:07	11/20/16 10:07	KCF

TMW-2 L872094-10 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 15:00
Received date/time: 11/11/16 10:36

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG926357	1	11/16/16 03:57	11/16/16 03:57	SAM

TMW-3 L872094-11 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 15:45
Received date/time: 11/11/16 10:36

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG926357	1	11/16/16 04:12	11/16/16 04:12	SAM

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times. All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jimmy Hunt
Technical Service Representative

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	392		20.0	1	11/14/2016 18:53	WG925804

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND	P1	0.250	1	11/18/2016 09:46	WG927642

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	11/11/2016 20:34	WG925886

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	11/11/2016 18:06	WG925823
Chloride	ND		1.00	1	11/11/2016 18:06	WG925823
Fluoride	ND		0.100	1	11/11/2016 18:06	WG925823
Nitrate	ND		0.100	1	11/11/2016 18:06	WG925823
Sulfate	ND		5.00	1	11/11/2016 18:06	WG925823

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	11/14/2016 13:39	WG925917

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	11/17/2016 15:02	WG926439
Antimony	ND		0.00200	1	11/17/2016 15:02	WG926439
Arsenic	ND		0.00200	1	11/17/2016 15:02	WG926439
Barium	ND		0.00500	1	11/17/2016 15:02	WG926439
Beryllium	ND		0.00200	1	11/17/2016 15:02	WG926439
Boron	0.0314		0.0200	1	11/17/2016 15:02	WG926439
Cadmium	ND		0.00100	1	11/17/2016 15:02	WG926439
Calcium	ND		1.00	1	11/17/2016 15:02	WG926439
Chromium	ND		0.00200	1	11/17/2016 15:02	WG926439
Copper	0.275		0.00500	1	11/17/2016 15:02	WG926439
Cobalt	ND		0.00200	1	11/17/2016 15:02	WG926439
Iron	ND		0.100	1	11/17/2016 15:02	WG926439
Lead	0.00717		0.00200	1	11/17/2016 15:02	WG926439
Magnesium	ND		1.00	1	11/17/2016 15:02	WG926439
Manganese	ND		0.00500	1	11/17/2016 15:02	WG926439
Nickel	ND		0.00200	1	11/17/2016 15:02	WG926439
Potassium	ND		1.00	1	11/17/2016 15:02	WG926439
Selenium	ND		0.00200	1	11/17/2016 15:02	WG926439
Silver	ND		0.00200	1	11/17/2016 15:02	WG926439
Sodium	ND		1.00	1	11/17/2016 15:02	WG926439
Thallium	ND		0.00200	1	11/17/2016 15:02	WG926439
Vanadium	ND		0.00500	1	11/17/2016 15:02	WG926439
Zinc	0.228		0.0250	1	11/17/2016 15:02	WG926439

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J3 J4	0.0500	1	11/16/2016 22:07	WG926517
Acrylonitrile	ND		0.0100	1	11/16/2016 22:07	WG926517
Benzene	ND		0.00100	1	11/16/2016 22:07	WG926517
Bromochloromethane	ND		0.00100	1	11/16/2016 22:07	WG926517
Bromodichloromethane	ND		0.00100	1	11/16/2016 22:07	WG926517
Bromoform	ND		0.00100	1	11/16/2016 22:07	WG926517
Bromomethane	ND		0.00500	1	11/16/2016 22:07	WG926517
Carbon disulfide	ND		0.00100	1	11/16/2016 22:07	WG926517
Carbon tetrachloride	ND		0.00100	1	11/16/2016 22:07	WG926517
Chlorobenzene	ND		0.00100	1	11/16/2016 22:07	WG926517
Chlorodibromomethane	ND		0.00100	1	11/16/2016 22:07	WG926517
Chloroethane	ND		0.00500	1	11/16/2016 22:07	WG926517
Chloroform	ND		0.00500	1	11/16/2016 22:07	WG926517
Chloromethane	ND		0.00250	1	11/16/2016 22:07	WG926517
Dibromomethane	ND		0.00100	1	11/16/2016 22:07	WG926517
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	11/16/2016 22:07	WG926517
1,2-Dibromoethane	ND		0.00100	1	11/16/2016 22:07	WG926517
1,2-Dichlorobenzene	ND		0.00100	1	11/16/2016 22:07	WG926517
1,4-Dichlorobenzene	ND		0.00100	1	11/16/2016 22:07	WG926517
trans-1,4-Dichloro-2-butene	ND		0.00250	1	11/16/2016 22:07	WG926517
1,1-Dichloroethane	ND		0.00100	1	11/16/2016 22:07	WG926517
1,2-Dichloroethane	ND		0.00100	1	11/16/2016 22:07	WG926517
1,1-Dichloroethene	ND		0.00100	1	11/16/2016 22:07	WG926517
cis-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 22:07	WG926517
trans-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 22:07	WG926517
1,2-Dichloropropane	ND		0.00100	1	11/16/2016 22:07	WG926517
cis-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 22:07	WG926517
trans-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 22:07	WG926517
Ethylbenzene	ND		0.00100	1	11/16/2016 22:07	WG926517
2-Hexanone	ND		0.0100	1	11/16/2016 22:07	WG926517
Iodomethane	ND		0.0100	1	11/16/2016 22:07	WG926517
2-Butanone (MEK)	ND		0.0100	1	11/16/2016 22:07	WG926517
Methylene Chloride	ND		0.00500	1	11/16/2016 22:07	WG926517
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	11/16/2016 22:07	WG926517
Styrene	ND		0.00100	1	11/16/2016 22:07	WG926517
1,1,1,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 22:07	WG926517
1,1,2,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 22:07	WG926517
Tetrachloroethene	ND		0.00100	1	11/16/2016 22:07	WG926517
Toluene	ND		0.00500	1	11/16/2016 22:07	WG926517
1,1,1-Trichloroethane	ND		0.00100	1	11/16/2016 22:07	WG926517
1,1,2-Trichloroethane	ND		0.00100	1	11/16/2016 22:07	WG926517
Trichloroethene	ND		0.00100	1	11/16/2016 22:07	WG926517
Trichlorofluoromethane	ND	J3	0.00500	1	11/16/2016 22:07	WG926517
1,2,3-Trichloropropane	ND		0.00250	1	11/16/2016 22:07	WG926517
Vinyl acetate	ND		0.0100	1	11/16/2016 22:07	WG926517
Vinyl chloride	ND		0.00100	1	11/16/2016 22:07	WG926517
Xylenes, Total	ND		0.00300	1	11/16/2016 22:07	WG926517
(S) Toluene-d8	*103*		*90.0-115*		*11/16/2016 22:07*	WG926517
(S) Dibromofluoromethane	*106*		*79.0-121*		*11/16/2016 22:07*	WG926517
(S) a,a,a-Trifluorotoluene	*102*		*90.4-116*		*11/16/2016 22:07*	WG926517
(S) 4-Bromofluorobenzene	*85.3*		*80.1-120*		*11/16/2016 22:07*	WG926517

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	11/14/2016 18:08	WG926143

EDB / DBCP by Method 8011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	11/14/2016 18:08	WG926143

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J3 J4	0.0500	1	11/16/2016 17:25	WG926517
Acrylonitrile	ND		0.0100	1	11/16/2016 17:25	WG926517
Benzene	ND		0.00100	1	11/16/2016 17:25	WG926517
Bromochloromethane	ND		0.00100	1	11/16/2016 17:25	WG926517
Bromodichloromethane	ND		0.00100	1	11/16/2016 17:25	WG926517
Bromoform	ND		0.00100	1	11/16/2016 17:25	WG926517
Bromomethane	ND		0.00500	1	11/16/2016 17:25	WG926517
Carbon disulfide	ND		0.00100	1	11/16/2016 17:25	WG926517
Carbon tetrachloride	ND		0.00100	1	11/16/2016 17:25	WG926517
Chlorobenzene	ND		0.00100	1	11/16/2016 17:25	WG926517
Chlorodibromomethane	ND		0.00100	1	11/16/2016 17:25	WG926517
Chloroethane	ND		0.00500	1	11/16/2016 17:25	WG926517
Chloroform	ND		0.00500	1	11/16/2016 17:25	WG926517
Chloromethane	ND		0.00250	1	11/16/2016 17:25	WG926517
Dibromomethane	ND		0.00100	1	11/16/2016 17:25	WG926517
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	11/16/2016 17:25	WG926517
1,2-Dibromoethane	ND		0.00100	1	11/16/2016 17:25	WG926517
1,2-Dichlorobenzene	ND		0.00100	1	11/16/2016 17:25	WG926517
1,4-Dichlorobenzene	ND		0.00100	1	11/16/2016 17:25	WG926517
trans-1,4-Dichloro-2-butene	ND		0.00250	1	11/16/2016 17:25	WG926517
1,1-Dichloroethane	ND		0.00100	1	11/16/2016 17:25	WG926517
1,2-Dichloroethane	ND		0.00100	1	11/16/2016 17:25	WG926517
1,1-Dichloroethene	ND		0.00100	1	11/16/2016 17:25	WG926517
cis-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 17:25	WG926517
trans-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 17:25	WG926517
1,2-Dichloropropane	ND		0.00100	1	11/16/2016 17:25	WG926517
cis-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 17:25	WG926517
trans-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 17:25	WG926517
Ethylbenzene	ND		0.00100	1	11/16/2016 17:25	WG926517
2-Hexanone	ND		0.0100	1	11/16/2016 17:25	WG926517
Iodomethane	ND		0.0100	1	11/16/2016 17:25	WG926517
2-Butanone (MEK)	ND		0.0100	1	11/16/2016 17:25	WG926517
Methylene Chloride	ND		0.00500	1	11/16/2016 17:25	WG926517
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	11/16/2016 17:25	WG926517
Styrene	ND		0.00100	1	11/16/2016 17:25	WG926517
1,1,1,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 17:25	WG926517
1,1,2,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 17:25	WG926517
Tetrachloroethene	ND		0.00100	1	11/16/2016 17:25	WG926517
Toluene	ND		0.00500	1	11/16/2016 17:25	WG926517
1,1,1-Trichloroethane	ND		0.00100	1	11/16/2016 17:25	WG926517
1,1,2-Trichloroethane	ND		0.00100	1	11/16/2016 17:25	WG926517
Trichloroethene	ND		0.00100	1	11/16/2016 17:25	WG926517
Trichlorofluoromethane	ND	J3	0.00500	1	11/16/2016 17:25	WG926517
1,2,3-Trichloropropane	ND		0.00250	1	11/16/2016 17:25	WG926517
Vinyl acetate	ND		0.0100	1	11/16/2016 17:25	WG926517
Vinyl chloride	ND		0.00100	1	11/16/2016 17:25	WG926517
Xylenes, Total	ND		0.00300	1	11/16/2016 17:25	WG926517
(S) Toluene-d8	*104*		*90.0-115*		*11/16/2016 17:25*	WG926517
(S) Dibromofluoromethane	*105*		*79.0-121*		*11/16/2016 17:25*	WG926517
(S) a,a,a-Trifluorotoluene	*100*		*90.4-116*		*11/16/2016 17:25*	WG926517
(S) 4-Bromofluorobenzene	*92.4*		*80.1-120*		*11/16/2016 17:25*	WG926517

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	34.8		20.0	1	11/14/2016 19:01	WG925804

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.250	1	11/18/2016 08:56	WG927642

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	11/11/2016 20:34	WG925886

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	11/11/2016 18:21	WG925823
Chloride	4.59		1.00	1	11/11/2016 18:21	WG925823
Fluoride	ND		0.100	1	11/11/2016 18:21	WG925823
Nitrate	ND		0.100	1	11/11/2016 18:21	WG925823
Sulfate	16.5		5.00	1	11/11/2016 18:21	WG925823

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/14/2016 13:42	WG925917

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	11/17/2016 15:16	WG926439
Antimony	ND		0.00200	1	11/17/2016 15:16	WG926439
Arsenic	0.0286		0.00200	1	11/17/2016 15:16	WG926439
Barium	0.0207		0.00500	1	11/17/2016 15:16	WG926439
Beryllium	ND		0.00200	1	11/17/2016 15:16	WG926439
Boron	0.0303		0.0200	1	11/17/2016 15:16	WG926439
Cadmium	ND		0.00100	1	11/17/2016 15:16	WG926439
Calcium	3.72		1.00	1	11/17/2016 15:16	WG926439
Chromium	ND		0.00200	1	11/17/2016 15:16	WG926439
Copper	ND		0.00500	1	11/17/2016 15:16	WG926439
Cobalt	0.0196		0.00200	1	11/17/2016 15:16	WG926439
Iron	9.93		0.100	1	11/17/2016 15:16	WG926439
Lead	ND		0.00200	1	11/17/2016 15:16	WG926439
Magnesium	2.86		1.00	1	11/17/2016 15:16	WG926439
Manganese	0.535		0.00500	1	11/17/2016 15:16	WG926439
Nickel	0.0112		0.00200	1	11/17/2016 15:16	WG926439
Potassium	ND		1.00	1	11/17/2016 15:16	WG926439
Selenium	ND		0.00200	1	11/17/2016 15:16	WG926439
Silver	ND		0.00200	1	11/17/2016 15:16	WG926439
Sodium	4.94		1.00	1	11/17/2016 15:16	WG926439
Thallium	ND		0.00200	1	11/17/2016 15:16	WG926439
Vanadium	ND		0.00500	1	11/17/2016 15:16	WG926439
Zinc	ND		0.0250	1	11/17/2016 15:16	WG926439

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J3 J4	0.0500	1	11/16/2016 22:31	WG926517
Acrylonitrile	ND		0.0100	1	11/16/2016 22:31	WG926517
Benzene	ND		0.00100	1	11/16/2016 22:31	WG926517
Bromochloromethane	ND		0.00100	1	11/16/2016 22:31	WG926517
Bromodichloromethane	ND		0.00100	1	11/16/2016 22:31	WG926517
Bromoform	ND		0.00100	1	11/16/2016 22:31	WG926517
Bromomethane	ND		0.00500	1	11/16/2016 22:31	WG926517
Carbon disulfide	ND		0.00100	1	11/16/2016 22:31	WG926517
Carbon tetrachloride	ND		0.00100	1	11/16/2016 22:31	WG926517
Chlorobenzene	ND		0.00100	1	11/16/2016 22:31	WG926517
Chlorodibromomethane	ND		0.00100	1	11/16/2016 22:31	WG926517
Chloroethane	ND		0.00500	1	11/16/2016 22:31	WG926517
Chloroform	ND		0.00500	1	11/16/2016 22:31	WG926517
Chloromethane	ND		0.00250	1	11/16/2016 22:31	WG926517
Dibromomethane	ND		0.00100	1	11/16/2016 22:31	WG926517
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	11/16/2016 22:31	WG926517
1,2-Dibromoethane	ND		0.00100	1	11/16/2016 22:31	WG926517
1,2-Dichlorobenzene	ND		0.00100	1	11/16/2016 22:31	WG926517
1,4-Dichlorobenzene	ND		0.00100	1	11/16/2016 22:31	WG926517
trans-1,4-Dichloro-2-butene	ND		0.00250	1	11/16/2016 22:31	WG926517
1,1-Dichloroethane	ND		0.00100	1	11/16/2016 22:31	WG926517
1,2-Dichloroethane	ND		0.00100	1	11/16/2016 22:31	WG926517
1,1-Dichloroethene	ND		0.00100	1	11/16/2016 22:31	WG926517
cis-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 22:31	WG926517
trans-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 22:31	WG926517
1,2-Dichloropropane	ND		0.00100	1	11/16/2016 22:31	WG926517
cis-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 22:31	WG926517
trans-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 22:31	WG926517
Ethylbenzene	ND		0.00100	1	11/16/2016 22:31	WG926517
2-Hexanone	ND		0.0100	1	11/16/2016 22:31	WG926517
Iodomethane	ND		0.0100	1	11/16/2016 22:31	WG926517
2-Butanone (MEK)	ND		0.0100	1	11/16/2016 22:31	WG926517
Methylene Chloride	ND		0.00500	1	11/16/2016 22:31	WG926517
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	11/16/2016 22:31	WG926517
Styrene	ND		0.00100	1	11/16/2016 22:31	WG926517
1,1,1,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 22:31	WG926517
1,1,2,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 22:31	WG926517
Tetrachloroethene	ND		0.00100	1	11/16/2016 22:31	WG926517
Toluene	ND		0.00500	1	11/16/2016 22:31	WG926517
1,1,1-Trichloroethane	ND		0.00100	1	11/16/2016 22:31	WG926517
1,1,2-Trichloroethane	ND		0.00100	1	11/16/2016 22:31	WG926517
Trichloroethene	ND		0.00100	1	11/16/2016 22:31	WG926517
Trichlorofluoromethane	ND	J3	0.00500	1	11/16/2016 22:31	WG926517
1,2,3-Trichloropropane	ND		0.00250	1	11/16/2016 22:31	WG926517
Vinyl acetate	ND		0.0100	1	11/16/2016 22:31	WG926517
Vinyl chloride	ND		0.00100	1	11/16/2016 22:31	WG926517
Xylenes, Total	ND		0.00300	1	11/16/2016 22:31	WG926517
(S) Toluene-d8	*103*		*90.0-115*		*11/16/2016 22:31*	WG926517
(S) Dibromofluoromethane	*98.2*		*79.0-121*		*11/16/2016 22:31*	WG926517
(S) a,a,a-Trifluorotoluene	*103*		*90.4-116*		*11/16/2016 22:31*	WG926517
(S) 4-Bromofluorobenzene	*86.0*		*80.1-120*		*11/16/2016 22:31*	WG926517

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	11/14/2016 18:19	WG926143

EDB / DBCP by Method 8011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	11/14/2016 18:19	WG926143

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	11/14/2016 19:07	WG925804

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.250	1	11/18/2016 08:57	WG927642

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	11/11/2016 20:34	WG925886

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	11/11/2016 18:36	WG925823
Chloride	120		5.00	5	11/11/2016 18:51	WG925823
Fluoride	ND		0.100	1	11/11/2016 18:36	WG925823
Nitrate	4.67		0.100	1	11/11/2016 18:36	WG925823
Sulfate	34.0		5.00	1	11/11/2016 18:36	WG925823

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/14/2016 13:45	WG925917

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.694		0.100	1	11/17/2016 15:20	WG926439
Antimony	ND		0.00200	1	11/17/2016 15:20	WG926439
Arsenic	ND		0.00200	1	11/17/2016 15:20	WG926439
Barium	0.188		0.00500	1	11/17/2016 15:20	WG926439
Beryllium	ND		0.00200	1	11/17/2016 15:20	WG926439
Boron	0.0428		0.0200	1	11/17/2016 15:20	WG926439
Cadmium	0.00177		0.00100	1	11/17/2016 15:20	WG926439
Calcium	26.3		1.00	1	11/17/2016 15:20	WG926439
Chromium	ND		0.00200	1	11/17/2016 15:20	WG926439
Copper	ND		0.00500	1	11/17/2016 15:20	WG926439
Cobalt	0.00202		0.00200	1	11/17/2016 15:20	WG926439
Iron	0.837		0.100	1	11/17/2016 15:20	WG926439
Lead	ND		0.00200	1	11/17/2016 15:20	WG926439
Magnesium	11.1		1.00	1	11/17/2016 15:20	WG926439
Manganese	0.311		0.00500	1	11/17/2016 15:20	WG926439
Nickel	ND		0.00200	1	11/17/2016 15:20	WG926439
Potassium	20.8		1.00	1	11/17/2016 15:20	WG926439
Selenium	ND		0.00200	1	11/17/2016 15:20	WG926439
Silver	ND		0.00200	1	11/17/2016 15:20	WG926439
Sodium	39.7		1.00	1	11/17/2016 15:20	WG926439
Thallium	ND		0.00200	1	11/17/2016 15:20	WG926439
Vanadium	ND		0.00500	1	11/17/2016 15:20	WG926439
Zinc	ND		0.0250	1	11/17/2016 15:20	WG926439

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J3 J4	0.0500	1	11/16/2016 22:55	WG926517
Acrylonitrile	ND		0.0100	1	11/16/2016 22:55	WG926517
Benzene	ND		0.00100	1	11/16/2016 22:55	WG926517
Bromochloromethane	ND		0.00100	1	11/16/2016 22:55	WG926517
Bromodichloromethane	ND		0.00100	1	11/16/2016 22:55	WG926517
Bromoform	ND		0.00100	1	11/16/2016 22:55	WG926517
Bromomethane	ND		0.00500	1	11/16/2016 22:55	WG926517
Carbon disulfide	ND		0.00100	1	11/16/2016 22:55	WG926517
Carbon tetrachloride	ND		0.00100	1	11/16/2016 22:55	WG926517
Chlorobenzene	ND		0.00100	1	11/16/2016 22:55	WG926517
Chlorodibromomethane	ND		0.00100	1	11/16/2016 22:55	WG926517
Chloroethane	ND		0.00500	1	11/16/2016 22:55	WG926517
Chloroform	ND		0.00500	1	11/16/2016 22:55	WG926517
Chloromethane	ND		0.00250	1	11/16/2016 22:55	WG926517
Dibromomethane	ND		0.00100	1	11/16/2016 22:55	WG926517
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	11/16/2016 22:55	WG926517
1,2-Dibromoethane	ND		0.00100	1	11/16/2016 22:55	WG926517
1,2-Dichlorobenzene	ND		0.00100	1	11/16/2016 22:55	WG926517
1,4-Dichlorobenzene	ND		0.00100	1	11/16/2016 22:55	WG926517
trans-1,4-Dichloro-2-butene	ND		0.00250	1	11/16/2016 22:55	WG926517
1,1-Dichloroethane	ND		0.00100	1	11/16/2016 22:55	WG926517
1,2-Dichloroethane	ND		0.00100	1	11/16/2016 22:55	WG926517
1,1-Dichloroethene	ND		0.00100	1	11/16/2016 22:55	WG926517
cis-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 22:55	WG926517
trans-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 22:55	WG926517
1,2-Dichloropropane	ND		0.00100	1	11/16/2016 22:55	WG926517
cis-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 22:55	WG926517
trans-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 22:55	WG926517
Ethylbenzene	ND		0.00100	1	11/16/2016 22:55	WG926517
2-Hexanone	ND		0.0100	1	11/16/2016 22:55	WG926517
Iodomethane	ND		0.0100	1	11/16/2016 22:55	WG926517
2-Butanone (MEK)	ND		0.0100	1	11/16/2016 22:55	WG926517
Methylene Chloride	ND		0.00500	1	11/16/2016 22:55	WG926517
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	11/16/2016 22:55	WG926517
Styrene	ND		0.00100	1	11/16/2016 22:55	WG926517
1,1,1,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 22:55	WG926517
1,1,2,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 22:55	WG926517
Tetrachloroethene	ND		0.00100	1	11/16/2016 22:55	WG926517
Toluene	ND		0.00500	1	11/16/2016 22:55	WG926517
1,1,1-Trichloroethane	ND		0.00100	1	11/16/2016 22:55	WG926517
1,1,2-Trichloroethane	ND		0.00100	1	11/16/2016 22:55	WG926517
Trichloroethene	ND		0.00100	1	11/16/2016 22:55	WG926517
Trichlorofluoromethane	ND	J3	0.00500	1	11/16/2016 22:55	WG926517
1,2,3-Trichloropropane	ND		0.00250	1	11/16/2016 22:55	WG926517
Vinyl acetate	ND		0.0100	1	11/16/2016 22:55	WG926517
Vinyl chloride	ND		0.00100	1	11/16/2016 22:55	WG926517
Xylenes, Total	ND		0.00300	1	11/16/2016 22:55	WG926517
(S) Toluene-d8	*104*		*90.0-115*		*11/16/2016 22:55*	WG926517
(S) Dibromofluoromethane	*101*		*79.0-121*		*11/16/2016 22:55*	WG926517
(S) α,α,α-Trifluorotoluene	*102*		*90.4-116*		*11/16/2016 22:55*	WG926517
(S) 4-Bromofluorobenzene	*103*		*80.1-120*		*11/16/2016 22:55*	WG926517

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	11/14/2016 18:30	WG926143

EDB / DBCP by Method 8011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	11/14/2016 18:30	WG926143

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	11/15/2016 08:12	WG926340

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.250	1	11/16/2016 13:22	WG926779

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	11/11/2016 20:34	WG925886

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	11/11/2016 20:20	WG925823
Chloride	6.61		1.00	1	11/11/2016 20:20	WG925823
Fluoride	ND		0.100	1	11/11/2016 20:20	WG925823
Nitrate	0.464		0.100	1	11/11/2016 20:20	WG925823
Sulfate	ND		5.00	1	11/11/2016 20:20	WG925823

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/14/2016 13:21	WG925917

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	11/17/2016 15:23	WG926439
Antimony	ND		0.00200	1	11/17/2016 15:23	WG926439
Arsenic	ND		0.00200	1	11/17/2016 15:23	WG926439
Barium	0.00738		0.00500	1	11/17/2016 15:23	WG926439
Beryllium	ND		0.00200	1	11/17/2016 15:23	WG926439
Boron	0.0297		0.0200	1	11/17/2016 15:23	WG926439
Cadmium	ND		0.00100	1	11/17/2016 15:23	WG926439
Calcium	3.81		1.00	1	11/17/2016 15:23	WG926439
Chromium	ND		0.00200	1	11/17/2016 15:23	WG926439
Copper	ND		0.00500	1	11/17/2016 15:23	WG926439
Cobalt	ND		0.00200	1	11/17/2016 15:23	WG926439
Iron	ND		0.100	1	11/17/2016 15:23	WG926439
Lead	ND		0.00200	1	11/17/2016 15:23	WG926439
Magnesium	2.48		1.00	1	11/17/2016 15:23	WG926439
Manganese	0.0223		0.00500	1	11/17/2016 15:23	WG926439
Nickel	ND		0.00200	1	11/17/2016 15:23	WG926439
Potassium	ND		1.00	1	11/17/2016 15:23	WG926439
Selenium	ND		0.00200	1	11/17/2016 15:23	WG926439
Silver	ND		0.00200	1	11/17/2016 15:23	WG926439
Sodium	3.87		1.00	1	11/17/2016 15:23	WG926439
Thallium	ND		0.00200	1	11/17/2016 15:23	WG926439
Vanadium	ND		0.00500	1	11/17/2016 15:23	WG926439
Zinc	ND		0.0250	1	11/17/2016 15:23	WG926439

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J3 J4	0.0500	1	11/16/2016 23:18	WG926517
Acrylonitrile	ND		0.0100	1	11/16/2016 23:18	WG926517
Benzene	ND		0.00100	1	11/16/2016 23:18	WG926517
Bromochloromethane	ND		0.00100	1	11/16/2016 23:18	WG926517
Bromodichloromethane	ND		0.00100	1	11/16/2016 23:18	WG926517
Bromoform	ND		0.00100	1	11/16/2016 23:18	WG926517
Bromomethane	ND		0.00500	1	11/16/2016 23:18	WG926517
Carbon disulfide	ND		0.00100	1	11/16/2016 23:18	WG926517
Carbon tetrachloride	ND		0.00100	1	11/16/2016 23:18	WG926517
Chlorobenzene	ND		0.00100	1	11/16/2016 23:18	WG926517
Chlorodibromomethane	ND		0.00100	1	11/16/2016 23:18	WG926517
Chloroethane	ND		0.00500	1	11/16/2016 23:18	WG926517
Chloroform	ND		0.00500	1	11/16/2016 23:18	WG926517
Chloromethane	ND		0.00250	1	11/16/2016 23:18	WG926517
Dibromomethane	ND		0.00100	1	11/16/2016 23:18	WG926517
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	11/16/2016 23:18	WG926517
1,2-Dibromoethane	ND		0.00100	1	11/16/2016 23:18	WG926517
1,2-Dichlorobenzene	ND		0.00100	1	11/16/2016 23:18	WG926517
1,4-Dichlorobenzene	ND		0.00100	1	11/16/2016 23:18	WG926517
trans-1,4-Dichloro-2-butene	ND		0.00250	1	11/16/2016 23:18	WG926517
1,1-Dichloroethane	ND		0.00100	1	11/16/2016 23:18	WG926517
1,2-Dichloroethane	ND		0.00100	1	11/16/2016 23:18	WG926517
1,1-Dichloroethene	ND		0.00100	1	11/16/2016 23:18	WG926517
cis-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 23:18	WG926517
trans-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 23:18	WG926517
1,2-Dichloropropane	ND		0.00100	1	11/16/2016 23:18	WG926517
cis-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 23:18	WG926517
trans-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 23:18	WG926517
Ethylbenzene	ND		0.00100	1	11/16/2016 23:18	WG926517
2-Hexanone	ND		0.0100	1	11/16/2016 23:18	WG926517
Iodomethane	ND		0.0100	1	11/16/2016 23:18	WG926517
2-Butanone (MEK)	ND		0.0100	1	11/16/2016 23:18	WG926517
Methylene Chloride	ND		0.00500	1	11/16/2016 23:18	WG926517
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	11/16/2016 23:18	WG926517
Styrene	ND		0.00100	1	11/16/2016 23:18	WG926517
1,1,1,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 23:18	WG926517
1,1,2,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 23:18	WG926517
Tetrachloroethene	ND		0.00100	1	11/16/2016 23:18	WG926517
Toluene	ND		0.00500	1	11/16/2016 23:18	WG926517
1,1,1-Trichloroethane	ND		0.00100	1	11/16/2016 23:18	WG926517
1,1,2-Trichloroethane	ND		0.00100	1	11/16/2016 23:18	WG926517
Trichloroethene	ND		0.00100	1	11/16/2016 23:18	WG926517
Trichlorofluoromethane	ND	J3	0.00500	1	11/16/2016 23:18	WG926517
1,2,3-Trichloropropane	ND		0.00250	1	11/16/2016 23:18	WG926517
Vinyl acetate	ND		0.0100	1	11/16/2016 23:18	WG926517
Vinyl chloride	ND		0.00100	1	11/16/2016 23:18	WG926517
Xylenes, Total	ND		0.00300	1	11/16/2016 23:18	WG926517
(S) Toluene-d8	*102*		*90.0-115*		*11/16/2016 23:18*	WG926517
(S) Dibromofluoromethane	*92.3*		*79.0-121*		*11/16/2016 23:18*	WG926517
(S) α,α,α-Trifluorotoluene	*99.8*		*90.4-116*		*11/16/2016 23:18*	WG926517
(S) 4-Bromofluorobenzene	*97.3*		*80.1-120*		*11/16/2016 23:18*	WG926517

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	11/14/2016 18:41	WG926143

EDB / DBCP by Method 8011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	11/14/2016 18:41	WG926143

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	28.7		20.0	1	11/15/2016 09:04	WG926340

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.250	1	11/16/2016 13:25	WG926779

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	11/11/2016 20:35	WG925886

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	11/11/2016 20:35	WG925823
Chloride	28.6		1.00	1	11/11/2016 20:35	WG925823
Fluoride	ND		0.100	1	11/11/2016 20:35	WG925823
Nitrate	0.935		0.100	1	11/11/2016 20:35	WG925823
Sulfate	ND		5.00	1	11/11/2016 20:35	WG925823

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	11/14/2016 13:48	WG925917

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.229		0.100	1	11/17/2016 16:09	WG926439
Antimony	ND		0.00200	1	11/17/2016 16:09	WG926439
Arsenic	ND		0.00200	1	11/17/2016 16:09	WG926439
Barium	0.0188		0.00500	1	11/17/2016 16:09	WG926439
Beryllium	ND		0.00200	1	11/17/2016 16:09	WG926439
Boron	0.0302		0.0200	1	11/17/2016 16:09	WG926439
Cadmium	ND		0.00100	1	11/17/2016 16:09	WG926439
Calcium	9.55		1.00	1	11/17/2016 16:09	WG926439
Chromium	ND		0.00200	1	11/17/2016 16:09	WG926439
Copper	ND		0.00500	1	11/17/2016 16:09	WG926439
Cobalt	0.00201		0.00200	1	11/17/2016 16:09	WG926439
Iron	0.687		0.100	1	11/17/2016 16:09	WG926439
Lead	ND		0.00200	1	11/17/2016 16:09	WG926439
Magnesium	4.95		1.00	1	11/17/2016 16:09	WG926439
Manganese	0.0504		0.00500	1	11/17/2016 16:09	WG926439
Nickel	0.00348		0.00200	1	11/17/2016 16:09	WG926439
Potassium	ND		1.00	1	11/17/2016 16:09	WG926439
Selenium	ND		0.00200	1	11/17/2016 16:09	WG926439
Silver	ND		0.00200	1	11/17/2016 16:09	WG926439
Sodium	10.3		1.00	1	11/17/2016 16:09	WG926439
Thallium	ND		0.00200	1	11/17/2016 16:09	WG926439
Vanadium	ND		0.00500	1	11/17/2016 16:09	WG926439
Zinc	ND		0.0250	1	11/17/2016 16:09	WG926439

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J3 J4	0.0500	1	11/16/2016 23:42	WG926517
Acrylonitrile	ND		0.0100	1	11/16/2016 23:42	WG926517
Benzene	ND		0.00100	1	11/16/2016 23:42	WG926517
Bromochloromethane	ND		0.00100	1	11/16/2016 23:42	WG926517
Bromodichloromethane	ND		0.00100	1	11/16/2016 23:42	WG926517
Bromoform	ND		0.00100	1	11/16/2016 23:42	WG926517
Bromomethane	ND		0.00500	1	11/16/2016 23:42	WG926517
Carbon disulfide	ND		0.00100	1	11/16/2016 23:42	WG926517
Carbon tetrachloride	ND		0.00100	1	11/16/2016 23:42	WG926517
Chlorobenzene	ND		0.00100	1	11/16/2016 23:42	WG926517
Chlorodibromomethane	ND		0.00100	1	11/16/2016 23:42	WG926517
Chloroethane	ND		0.00500	1	11/16/2016 23:42	WG926517
Chloroform	ND		0.00500	1	11/16/2016 23:42	WG926517
Chloromethane	ND		0.00250	1	11/16/2016 23:42	WG926517
Dibromomethane	ND		0.00100	1	11/16/2016 23:42	WG926517
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	11/16/2016 23:42	WG926517
1,2-Dibromoethane	ND		0.00100	1	11/16/2016 23:42	WG926517
1,2-Dichlorobenzene	ND		0.00100	1	11/16/2016 23:42	WG926517
1,4-Dichlorobenzene	ND		0.00100	1	11/16/2016 23:42	WG926517
trans-1,4-Dichloro-2-butene	ND		0.00250	1	11/16/2016 23:42	WG926517
1,1-Dichloroethane	ND		0.00100	1	11/16/2016 23:42	WG926517
1,2-Dichloroethane	ND		0.00100	1	11/16/2016 23:42	WG926517
1,1-Dichloroethene	ND		0.00100	1	11/16/2016 23:42	WG926517
cis-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 23:42	WG926517
trans-1,2-Dichloroethene	ND		0.00100	1	11/16/2016 23:42	WG926517
1,2-Dichloropropane	ND		0.00100	1	11/16/2016 23:42	WG926517
cis-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 23:42	WG926517
trans-1,3-Dichloropropene	ND		0.00100	1	11/16/2016 23:42	WG926517
Ethylbenzene	ND		0.00100	1	11/16/2016 23:42	WG926517
2-Hexanone	ND		0.0100	1	11/16/2016 23:42	WG926517
Iodomethane	ND		0.0100	1	11/16/2016 23:42	WG926517
2-Butanone (MEK)	ND		0.0100	1	11/16/2016 23:42	WG926517
Methylene Chloride	ND		0.00500	1	11/16/2016 23:42	WG926517
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	11/16/2016 23:42	WG926517
Styrene	ND		0.00100	1	11/16/2016 23:42	WG926517
1,1,1,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 23:42	WG926517
1,1,2,2-Tetrachloroethane	ND		0.00100	1	11/16/2016 23:42	WG926517
Tetrachloroethene	ND		0.00100	1	11/16/2016 23:42	WG926517
Toluene	ND		0.00500	1	11/16/2016 23:42	WG926517
1,1,1-Trichloroethane	ND		0.00100	1	11/16/2016 23:42	WG926517
1,1,2-Trichloroethane	ND		0.00100	1	11/16/2016 23:42	WG926517
Trichloroethene	ND		0.00100	1	11/16/2016 23:42	WG926517
Trichlorofluoromethane	ND	J3	0.00500	1	11/16/2016 23:42	WG926517
1,2,3-Trichloropropane	ND		0.00250	1	11/16/2016 23:42	WG926517
Vinyl acetate	ND		0.0100	1	11/16/2016 23:42	WG926517
Vinyl chloride	ND		0.00100	1	11/16/2016 23:42	WG926517
Xylenes, Total	ND		0.00300	1	11/16/2016 23:42	WG926517
(S) Toluene-d8	*105*		*90.0-115*		*11/16/2016 23:42*	WG926517
(S) Dibromofluoromethane	*106*		*79.0-121*		*11/16/2016 23:42*	WG926517
(S) a,a,a-Trifluorotoluene	*98.7*		*90.4-116*		*11/16/2016 23:42*	WG926517
(S) 4-Bromofluorobenzene	*93.7*		*80.1-120*		*11/16/2016 23:42*	WG926517

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	11/14/2016 18:52	WG926143

EDB / DBCP by Method 8011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	11/14/2016 18:52	WG926143

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	22.5	B	20.0	1	11/15/2016 09:24	WG926340

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.250	1	11/16/2016 13:26	WG926779

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	11/14/2016 15:20	WG926294

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	11/11/2016 20:50	WG925823
Chloride	29.9		1.00	1	11/11/2016 20:50	WG925823
Fluoride	ND		0.100	1	11/11/2016 20:50	WG925823
Nitrate	0.890		0.100	1	11/11/2016 20:50	WG925823
Sulfate	ND		5.00	1	11/11/2016 20:50	WG925823

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	11/14/2016 13:51	WG925917

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.363		0.100	1	11/17/2016 16:13	WG926439
Antimony	ND		0.00200	1	11/17/2016 16:13	WG926439
Arsenic	ND		0.00200	1	11/17/2016 16:13	WG926439
Barium	0.0240		0.00500	1	11/17/2016 16:13	WG926439
Beryllium	ND		0.00200	1	11/17/2016 16:13	WG926439
Boron	0.0251		0.0200	1	11/17/2016 16:13	WG926439
Cadmium	ND		0.00100	1	11/17/2016 16:13	WG926439
Calcium	9.65		1.00	1	11/17/2016 16:13	WG926439
Chromium	ND		0.00200	1	11/17/2016 16:13	WG926439
Copper	ND		0.00500	1	11/17/2016 16:13	WG926439
Cobalt	0.00213		0.00200	1	11/17/2016 16:13	WG926439
Iron	1.24		0.100	1	11/17/2016 16:13	WG926439
Lead	ND		0.00200	1	11/17/2016 16:13	WG926439
Magnesium	4.92		1.00	1	11/17/2016 16:13	WG926439
Manganese	0.0511		0.00500	1	11/17/2016 16:13	WG926439
Nickel	0.00364		0.00200	1	11/17/2016 16:13	WG926439
Potassium	ND		1.00	1	11/17/2016 16:13	WG926439
Selenium	ND		0.00200	1	11/17/2016 16:13	WG926439
Silver	ND		0.00200	1	11/17/2016 16:13	WG926439
Sodium	10.0		1.00	1	11/17/2016 16:13	WG926439
Thallium	ND		0.00200	1	11/17/2016 16:13	WG926439
Vanadium	ND		0.00500	1	11/17/2016 16:13	WG926439
Zinc	ND		0.0250	1	11/17/2016 16:13	WG926439

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J3 J4	0.0500	1	11/17/2016 00:05	WG926517
Acrylonitrile	ND		0.0100	1	11/17/2016 00:05	WG926517
Benzene	ND		0.00100	1	11/17/2016 00:05	WG926517
Bromochloromethane	ND		0.00100	1	11/17/2016 00:05	WG926517
Bromodichloromethane	ND		0.00100	1	11/17/2016 00:05	WG926517
Bromoform	ND		0.00100	1	11/17/2016 00:05	WG926517
Bromomethane	ND		0.00500	1	11/17/2016 00:05	WG926517
Carbon disulfide	ND		0.00100	1	11/17/2016 00:05	WG926517
Carbon tetrachloride	ND		0.00100	1	11/17/2016 00:05	WG926517
Chlorobenzene	ND		0.00100	1	11/17/2016 00:05	WG926517
Chlorodibromomethane	ND		0.00100	1	11/17/2016 00:05	WG926517
Chloroethane	ND		0.00500	1	11/17/2016 00:05	WG926517
Chloroform	ND		0.00500	1	11/17/2016 00:05	WG926517
Chloromethane	ND		0.00250	1	11/17/2016 00:05	WG926517
Dibromomethane	ND		0.00100	1	11/17/2016 00:05	WG926517
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	11/17/2016 00:05	WG926517
1,2-Dibromoethane	ND		0.00100	1	11/17/2016 00:05	WG926517
1,2-Dichlorobenzene	ND		0.00100	1	11/17/2016 00:05	WG926517
1,4-Dichlorobenzene	ND		0.00100	1	11/17/2016 00:05	WG926517
trans-1,4-Dichloro-2-butene	ND		0.00250	1	11/17/2016 00:05	WG926517
1,1-Dichloroethane	ND		0.00100	1	11/17/2016 00:05	WG926517
1,2-Dichloroethane	ND		0.00100	1	11/17/2016 00:05	WG926517
1,1-Dichloroethene	ND		0.00100	1	11/17/2016 00:05	WG926517
cis-1,2-Dichloroethene	ND		0.00100	1	11/17/2016 00:05	WG926517
trans-1,2-Dichloroethene	ND		0.00100	1	11/17/2016 00:05	WG926517
1,2-Dichloropropane	ND		0.00100	1	11/17/2016 00:05	WG926517
cis-1,3-Dichloropropene	ND		0.00100	1	11/17/2016 00:05	WG926517
trans-1,3-Dichloropropene	ND		0.00100	1	11/17/2016 00:05	WG926517
Ethylbenzene	ND		0.00100	1	11/17/2016 00:05	WG926517
2-Hexanone	ND		0.0100	1	11/17/2016 00:05	WG926517
Iodomethane	ND		0.0100	1	11/17/2016 00:05	WG926517
2-Butanone (MEK)	ND		0.0100	1	11/17/2016 00:05	WG926517
Methylene Chloride	ND		0.00500	1	11/17/2016 00:05	WG926517
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	11/17/2016 00:05	WG926517
Styrene	ND		0.00100	1	11/17/2016 00:05	WG926517
1,1,1,2-Tetrachloroethane	ND		0.00100	1	11/17/2016 00:05	WG926517
1,1,2,2-Tetrachloroethane	ND		0.00100	1	11/17/2016 00:05	WG926517
Tetrachloroethene	ND		0.00100	1	11/17/2016 00:05	WG926517
Toluene	ND		0.00500	1	11/17/2016 00:05	WG926517
1,1,1-Trichloroethane	ND		0.00100	1	11/17/2016 00:05	WG926517
1,1,2-Trichloroethane	ND		0.00100	1	11/17/2016 00:05	WG926517
Trichloroethene	ND		0.00100	1	11/17/2016 00:05	WG926517
Trichlorofluoromethane	ND	J3	0.00500	1	11/17/2016 00:05	WG926517
1,2,3-Trichloropropane	ND		0.00250	1	11/17/2016 00:05	WG926517
Vinyl acetate	ND		0.0100	1	11/17/2016 00:05	WG926517
Vinyl chloride	ND		0.00100	1	11/17/2016 00:05	WG926517
Xylenes, Total	ND		0.00300	1	11/17/2016 00:05	WG926517
(S) Toluene-d8	*102*		*90.0-115*		*11/17/2016 00:05*	WG926517
(S) Dibromofluoromethane	*106*		*79.0-121*		*11/17/2016 00:05*	WG926517
(S) a,a,a-Trifluorotoluene	*100*		*90.4-116*		*11/17/2016 00:05*	WG926517
(S) 4-Bromofluorobenzene	*98.9*		*80.1-120*		*11/17/2016 00:05*	WG926517

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	11/14/2016 19:03	WG926143

EDB / DBCP by Method 8011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	11/14/2016 19:03	WG926143

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	7.37		1.00	1	11/20/2016 10:07	WG928330

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	15.3		1.00	1	11/16/2016 03:57	WG926357

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Chloride	42.1		1.00	1	11/16/2016 04:12	WG926357

Method Blank (MB)

(MB) R3178027-1 11/14/16 15:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity	3.10	J	2.71	20.0

L872045-01 Original Sample (OS) • Duplicate (DUP)

(OS) L872045-01 11/14/16 16:10 • (DUP) R3178027-2 11/14/16 16:31

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	389	397	1	2.00		20

L872045-02 Original Sample (OS) • Duplicate (DUP)

(OS) L872045-02 11/14/16 18:22 • (DUP) R3178027-4 11/14/16 18:30

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	399	405	1	2.00		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178027-3 11/14/16 17:16 • (LCSD) R3178027-5 11/14/16 18:37

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Alkalinity	100	95.1	114	95.0	114	85.0-115			19.0	20

Method Blank (MB)

(MB) R3178333-1 11/15/16 08:02

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Alkalinity	2.76	J	2.71	20.0

L872094-06 Original Sample (OS) • Duplicate (DUP)

(OS) L872094-06 11/15/16 08:12 • (DUP) R3178333-3 11/15/16 08:19

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Alkalinity	ND	ND	1	0.000	J	20

L872084-01 Original Sample (OS) • Duplicate (DUP)

(OS) L872084-01 11/15/16 12:37 • (DUP) R3178333-8 11/15/16 13:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Alkalinity	12200	12000	1	1.00		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178333-4 11/15/16 09:11 • (LCSD) R3178333-7 11/15/16 11:45

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Alkalinity	100	96.6	96.9	97.0	97.0	85.0-115			0.000	20

Method Blank (MB)

(MB) R3177559-1 11/11/16 20:29

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
COD	U		3.00	10.0

L872044-01 Original Sample (OS) • Duplicate (DUP)

(OS) L872044-01 11/11/16 20:31 • (DUP) R3177559-4 11/11/16 20:31

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
COD	82.9	79.4	1	4.00		20

L872094-06 Original Sample (OS) • Duplicate (DUP)

(OS) L872094-06 11/11/16 20:34 • (DUP) R3177559-7 11/11/16 20:34

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
COD	ND	ND	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3177559-2 11/11/16 20:30 • (LCSD) R3177559-3 11/11/16 20:30

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
COD	242	239	241	99.0	99.0	90.0-110			1.00	20

L872053-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872053-07 11/11/16 20:32 • (MS) R3177559-5 11/11/16 20:32 • (MSD) R3177559-6 11/11/16 20:32

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
COD	400	ND	420	406	105	102	1	80.0-120			3.00	20

Method Blank (MB)

(MB) R3177904-1 11/14/16 15:18

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
COD	U		3.00	10.0

L872126-01 Original Sample (OS) • Duplicate (DUP)

(OS) L872126-01 11/14/16 15:20 • (DUP) R3177904-4 11/14/16 15:20

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
COD	ND	ND	1	0.000		20

L872127-01 Original Sample (OS) • Duplicate (DUP)

(OS) L872127-01 11/14/16 15:23 • (DUP) R3177904-7 11/14/16 15:23

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
COD	20.8	13.2	1	44.0	P1	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3177904-2 11/14/16 15:19 • (LCSD) R3177904-3 11/14/16 15:19

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
COD	242	238	243	98.0	100	90.0-110			2.00	20

L872126-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872126-03 11/14/16 15:20 • (MS) R3177904-5 11/14/16 15:21 • (MSD) R3177904-6 11/14/16 15:21

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
COD	400	ND	409	406	102	101	1	80.0-120			1.00	20

Method Blank (MB)

(MB) R3177592-1 11/11/16 13:53

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Bromide	U		0.079	1.00
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Nitrate	U		0.0227	0.100
Sulfate	U		0.0774	5.00

L872058-03 Original Sample (OS) • Duplicate (DUP)

(OS) L872058-03 11/11/16 16:07 • (DUP) R3177592-4 11/11/16 16:52

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	U	0.000	1	0		15
Chloride	3.37	3.37	1	0		15
Fluoride	0.148	0.153	1	3		15
Nitrate	U	0.000	1	0		15
Sulfate	10.9	11.0	1	1		15

L872094-08 Original Sample (OS) • Duplicate (DUP)

(OS) L872094-08 11/11/16 20:50 • (DUP) R3177592-8 11/11/16 21:05

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.000	1	0		15
Chloride	29.9	29.8	1	0		15
Fluoride	ND	0.0132	1	2	J	15
Nitrate	0.890	0.884	1	1		15
Sulfate	ND	2.51	1	0	J	15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3177592-2 11/11/16 14:08 • (LCSD) R3177592-3 11/11/16 14:22

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromide	40.0	39.9	40.0	100	100	80-120			0	15
Chloride	40.0	39.4	39.5	98	99	80-120			0	15
Fluoride	8.00	7.89	7.97	99	100	80-120			1	15
Nitrate	8.00	8.09	8.11	101	101	80-120			0	15
Sulfate	40.0	39.8	39.9	100	100	80-120			0	15

L872058-04 Original Sample (OS) • Matrix Spike (MS)

(OS) L872058-04 11/11/16 17:07 • (MS) R3177592-5 11/11/16 17:21

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	U	48.9	98	1	80-120	
Chloride	50.0	3.36	54.4	102	1	80-120	
Fluoride	5.00	0.151	5.24	102	1	80-120	
Nitrate	5.00	U	4.94	99	1	80-120	
Sulfate	50.0	11.2	62.2	102	1	80-120	

L872058-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872058-02 11/11/16 19:36 • (MS) R3177592-6 11/11/16 19:51 • (MSD) R3177592-7 11/11/16 20:05

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	U	48.9	49.5	98	99	1	80-120			1	15
Chloride	50.0	14.8	65.5	65.5	101	102	1	80-120			0	15
Fluoride	5.00	0.271	5.34	5.45	101	104	1	80-120			2	15
Nitrate	5.00	2.81	7.80	7.93	100	102	1	80-120			2	15
Sulfate	50.0	24.2	74.5	74.5	101	101	1	80-120			0	15

Method Blank (MB)

(MB) R3178465-1 11/15/16 21:59

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00

L872024-01 Original Sample (OS) • Duplicate (DUP)

(OS) L872024-01 11/15/16 23:58 • (DUP) R3178465-4 11/16/16 00:13

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	88.2	87.2	1	1		15

L872094-11 Original Sample (OS) • Duplicate (DUP)

(OS) L872094-11 11/16/16 04:12 • (DUP) R3178465-6 11/16/16 04:27

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	42.1	42.1	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178465-2 11/15/16 22:14 • (LCSD) R3178465-3 11/15/16 22:29

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Chloride	40.0	39.6	39.6	99	99	80-120			0	15

L872060-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L872060-01 11/16/16 02:28 • (MS) R3178465-5 11/16/16 02:43

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
Chloride	50.0	20.2	66.2	92	1	80-120	

L872126-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872126-01 11/16/16 07:36 • (MS) R3178465-7 11/16/16 07:51 • (MSD) R3178465-8 11/16/16 08:06

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Chloride	50.0	4.02	55.2	55.2	102	102	1	80-120			0	15

Method Blank (MB)

(MB) R3179405-1 11/19/16 21:27

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Chloride	U		0.0519	1.00

L873912-01 Original Sample (OS) • Duplicate (DUP)

(OS) L873912-01 11/19/16 22:41 • (DUP) R3179405-4 11/19/16 22:56

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Chloride	64.3	64.2	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3179405-2 11/19/16 21:42 • (LCSD) R3179405-3 11/19/16 21:57

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Chloride	40.0	39.6	39.7	99	99	80-120			0	15

L873912-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L873912-02 11/19/16 23:11 • (MS) R3179405-5 11/19/16 23:26

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
Chloride	50.0	55.6	106	101	1	80-120	E

Method Blank (MB)

(MB) R3177883-1 11/14/16 13:13

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.000049	0.000200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3177883-2 11/14/16 13:16 • (LCSD) R3177883-3 11/14/16 13:18

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury	0.00300	0.00323	0.00306	108	102	80-120			5	20

L872094-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872094-06 11/14/16 13:21 • (MS) R3177883-4 11/14/16 13:33 • (MSD) R3177883-5 11/14/16 13:36

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.00300	ND	0.00332	0.00320	111	107	1	75-125			4	20

Method Blank (MB)

(MB) R3178965-1 11/17/16 14:52

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.00509		0.005	0.100
Antimony	U		0.000754	0.00200
Arsenic	U		0.00025	0.00200
Barium	U		0.00036	0.00500
Beryllium	U		0.00012	0.00200
Boron	U		0.0015	0.0200
Cadmium	U		0.00016	0.00100
Calcium	U		0.046	1.00
Chromium	U		0.00054	0.00200
Copper	U		0.00052	0.00500
Cobalt	U		0.00026	0.00200
Iron	U		0.015	0.100
Lead	U		0.00024	0.00200
Magnesium	U		0.1	1.00
Manganese	U		0.00025	0.00500
Nickel	U		0.00035	0.00200
Potassium	U		0.037	1.00
Selenium	U		0.00038	0.00200
Silver	U		0.00031	0.00200
Sodium	U		0.11	1.00
Thallium	U		0.00019	0.00200
Vanadium	0.000248	J	0.00018	0.00500
Zinc	U		0.00256	0.0250

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178965-2 11/17/16 14:55 • (LCSD) R3178965-3 11/17/16 14:59

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	4.92	4.87	98	97	80-120			1	20
Antimony	0.0579	0.0503	0.0498	87	86	80-120			1	20
Arsenic	0.0500	0.0486	0.0492	97	98	80-120			1	20
Barium	0.0500	0.0483	0.0487	97	97	80-120			1	20
Beryllium	0.0500	0.0499	0.0492	100	98	80-120			2	20
Boron	0.0500	0.0495	0.0497	99	99	80-120			0	20
Cadmium	0.0500	0.0499	0.0505	100	101	80-120			1	20
Calcium	5.00	5.01	4.90	100	98	80-120			2	20
Chromium	0.0500	0.0499	0.0507	100	101	80-120			2	20
Copper	0.0500	0.0535	0.0541	107	108	80-120			1	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178965-2 11/17/16 14:55 • (LCSD) R3178965-3 11/17/16 14:59

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Cobalt	0.0500	0.0516	0.0527	103	105	80-120			2	20
Iron	5.00	4.98	5.07	100	101	80-120			2	20
Lead	0.0500	0.0496	0.0495	99	99	80-120			0	20
Magnesium	5.00	5.01	5.03	100	101	80-120			0	20
Manganese	0.0500	0.0488	0.0492	98	98	80-120			1	20
Nickel	0.0500	0.0516	0.0522	103	104	80-120			1	20
Potassium	5.00	4.77	4.77	95	95	80-120			0	20
Selenium	0.0500	0.0491	0.0479	98	96	80-120			2	20
Silver	0.0500	0.0503	0.0503	101	101	80-120			0	20
Sodium	5.00	5.05	5.05	101	101	80-120			0	20
Thallium	0.0500	0.0472	0.0470	94	94	80-120			0	20
Vanadium	0.0500	0.0492	0.0498	98	100	80-120			1	20
Zinc	0.0500	0.0506	0.0500	101	100	80-120			1	20

L872094-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872094-01 11/17/16 15:02 • (MS) R3178965-5 11/17/16 15:09 • (MSD) R3178965-6 11/17/16 15:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	ND	4.79	4.77	95	95	1	75-125			0	20
Antimony	0.0579	ND	0.0489	0.0489	84	84	1	75-125			0	20
Arsenic	0.0500	ND	0.0478	0.0478	96	96	1	75-125			0	20
Barium	0.0500	ND	0.0481	0.0477	96	95	1	75-125			1	20
Beryllium	0.0500	ND	0.0474	0.0470	95	94	1	75-125			1	20
Boron	0.0500	0.0314	0.0766	0.0787	90	95	1	75-125			3	20
Cadmium	0.0500	ND	0.0502	0.0509	100	102	1	75-125			1	20
Calcium	5.00	ND	4.91	4.99	98	100	1	75-125			2	20
Chromium	0.0500	ND	0.0492	0.0495	98	99	1	75-125			1	20
Copper	0.0500	0.275	0.0525	0.0528	0	0	1	75-125	V	V	1	20
Cobalt	0.0500	ND	0.0511	0.0514	102	103	1	75-125			1	20
Potassium	5.00	ND	4.78	4.73	96	95	1	75-125			1	20
Iron	5.00	ND	4.85	4.93	97	99	1	75-125			2	20
Lead	0.0500	0.00717	0.0494	0.0488	84	83	1	75-125			1	20
Magnesium	5.00	ND	5.00	5.04	100	101	1	75-125			1	20
Manganese	0.0500	ND	0.0484	0.0480	96	95	1	75-125			1	20
Nickel	0.0500	ND	0.0502	0.0513	100	103	1	75-125			2	20
Selenium	0.0500	ND	0.0489	0.0491	98	98	1	75-125			0	20
Silver	0.0500	ND	0.0492	0.0500	98	100	1	75-125			2	20
Sodium	5.00	ND	5.07	5.09	98	99	1	75-125			0	20

L872094-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872094-01 11/17/16 15:02 • (MS) R3178965-5 11/17/16 15:09 • (MSD) R3178965-6 11/17/16 15:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Thallium	0.0500	ND	0.0466	0.0471	93	94	1	75-125			1	20
Vanadium	0.0500	ND	0.0482	0.0486	96	97	1	75-125			1	20
Zinc	0.0500	0.228	0.0480	0.0502	0	0	1	75-125	V	V	4	20

Method Blank (MB)

(MB) R3178567-3 11/16/16 15:48

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromochloromethane	U		0.000520	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
Carbon disulfide	U		0.000275	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
trans-1,4-Dichloro-2-butene	U		0.000866	0.00250
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100
trans-1,3-Dichloropropene	U		0.000419	0.00100
Ethylbenzene	U		0.000384	0.00100
2-Hexanone	U		0.00382	0.0100
Iodomethane	U		0.00171	0.0100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000780	0.00500
1,1,1-Trichloroethane	U		0.000319	0.00100

Method Blank (MB)

(MB) R3178567-3 11/16/16 15:48

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
Vinyl acetate	U		0.00163	0.0100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*102*			*90.0-115*
(S) Dibromofluoromethane	*103*			*79.0-121*
(S) α,α,α-Trifluorotoluene	*98.2*			*90.4-116*
(S) 4-Bromofluorobenzene	*88.6*			*80.1-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178567-1 11/16/16 13:15 • (LCSD) R3178567-2 11/16/16 14:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.351	0.282	281	226	28.7-175	J4	J3 J4	21.6	20.9
Acrylonitrile	0.125	0.152	0.139	122	112	58.2-145			8.79	20
Benzene	0.0250	0.0285	0.0255	114	102	73.0-122			11.3	20
Bromodichloromethane	0.0250	0.0259	0.0230	104	92.0	75.5-121			12.1	20
Bromochloromethane	0.0250	0.0273	0.0254	109	102	78.9-123			7.23	20
Bromoform	0.0250	0.0243	0.0235	97.3	94.0	71.5-131			3.43	20
Bromomethane	0.0250	0.0208	0.0181	83.4	72.4	22.4-187			14.1	20
Carbon disulfide	0.0250	0.0285	0.0268	114	107	53.0-134			5.94	20
Carbon tetrachloride	0.0250	0.0263	0.0239	105	95.5	70.9-129			9.79	20
Chlorobenzene	0.0250	0.0260	0.0265	104	106	79.7-122			1.86	20
Chlorodibromomethane	0.0250	0.0266	0.0260	106	104	78.2-124			1.95	20
Chloroethane	0.0250	0.0189	0.0171	75.7	68.2	41.2-153			10.4	20
Chloroform	0.0250	0.0278	0.0250	111	100	73.2-125			10.5	20
Chloromethane	0.0250	0.0242	0.0226	96.6	90.6	55.8-134			6.44	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0260	0.0228	104	91.1	64.8-131			13.1	20
1,2-Dibromoethane	0.0250	0.0225	0.0232	89.9	92.8	79.8-122			3.17	20
Dibromomethane	0.0250	0.0261	0.0245	104	97.9	79.5-118			6.27	20
1,2-Dichlorobenzene	0.0250	0.0265	0.0233	106	93.1	84.7-118			12.9	20
1,4-Dichlorobenzene	0.0250	0.0244	0.0219	97.7	87.7	82.2-114			10.8	20
trans-1,4-Dichloro-2-butene	0.0250	0.0203	0.0233	81.2	93.1	58.3-129			13.7	20
1,1-Dichloroethane	0.0250	0.0292	0.0260	117	104	71.7-127			11.5	20
1,2-Dichloroethane	0.0250	0.0272	0.0252	109	101	65.3-126			7.65	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178567-1 11/16/16 13:15 • (LCSD) R3178567-2 11/16/16 14:25

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,1-Dichloroethene	0.0250	0.0289	0.0262	116	105	59.9-137			9.96	20
cis-1,2-Dichloroethene	0.0250	0.0283	0.0257	113	103	77.3-122			9.46	20
trans-1,2-Dichloroethene	0.0250	0.0283	0.0256	113	103	72.6-125			9.72	20
1,2-Dichloropropane	0.0250	0.0276	0.0245	111	98.1	77.4-125			11.9	20
cis-1,3-Dichloropropene	0.0250	0.0268	0.0237	107	94.8	77.7-124			12.3	20
trans-1,3-Dichloropropene	0.0250	0.0245	0.0224	98.0	89.5	73.5-127			9.04	20
Ethylbenzene	0.0250	0.0254	0.0255	101	102	80.9-121			0.630	20
2-Hexanone	0.125	0.129	0.122	103	97.7	59.4-151			5.49	20
Iodomethane	0.125	0.136	0.131	109	105	64.6-137			4.01	20
2-Butanone (MEK)	0.125	0.165	0.148	132	118	46.4-155			10.9	20
Methylene Chloride	0.0250	0.0277	0.0250	111	100	69.5-120			10.3	20
4-Methyl-2-pentanone (MIBK)	0.125	0.121	0.111	96.7	89.0	63.3-138			8.33	20
Styrene	0.0250	0.0257	0.0264	103	106	79.9-124			2.96	20
1,1,1,2-Tetrachloroethane	0.0250	0.0257	0.0261	103	104	78.5-125			1.57	20
1,1,2,2-Tetrachloroethane	0.0250	0.0251	0.0266	101	106	79.3-123			5.62	20
Tetrachloroethene	0.0250	0.0239	0.0254	95.6	101	73.5-130			5.93	20
Toluene	0.0250	0.0250	0.0224	99.9	89.6	77.9-116			10.8	20
1,1,1-Trichloroethane	0.0250	0.0270	0.0244	108	97.5	71.1-129			10.2	20
1,1,2-Trichloroethane	0.0250	0.0257	0.0235	103	93.9	81.6-120			9.06	20
Trichloroethene	0.0250	0.0273	0.0240	109	96.1	79.5-121			12.8	20
Trichlorofluoromethane	0.0250	0.0291	0.0233	116	93.2	49.1-157		J3	22.2	20
1,2,3-Trichloropropane	0.0250	0.0238	0.0254	95.1	102	74.9-124			6.66	20
Vinyl acetate	0.125	0.127	0.139	102	111	41.7-159			9.02	20
Vinyl chloride	0.0250	0.0228	0.0210	91.2	83.9	61.5-134			8.30	20
Xylenes, Total	0.0750	0.0750	0.0710	100	94.7	79.2-122			5.53	20
(S) Toluene-d8				*101*	*97.8*	*90.0-115*				
(S) Dibromofluoromethane				*107*	*106*	*79.0-121*				
(S) a,a,a-Trifluorotoluene				*96.1*	*97.0*	*90.4-116*				
(S) 4-Bromofluorobenzene				*92.7*	*107*	*80.1-120*				

Method Blank (MB)

(MB) R3178220-1 11/14/16 17:13

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ethylene Dibromide	U		0.00000240	0.0000100
1,2-Dibromo-3-Chloropropane	U		0.00000430	0.0000200

L872451-08 Original Sample (OS) • Duplicate (DUP)

(OS) L872451-08 11/14/16 17:57 • (DUP) R3178220-3 11/14/16 17:46

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ethylene Dibromide	0.000189	0.000182	1	3.59		20
1,2-Dibromo-3-Chloropropane	ND	0.000	1	0.000		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178220-4 11/14/16 19:36 • (LCSD) R3178220-5 11/14/16 21:37

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethylene Dibromide	0.000250	0.000209	0.000219	83.6	87.5	60.0-140			4.50	20
1,2-Dibromo-3-Chloropropane	0.000250	0.000191	0.000198	76.2	79.4	60.0-140			4.01	20

L872451-09 Original Sample (OS) • Matrix Spike (MS)

(OS) L872451-09 11/14/16 17:35 • (MS) R3178220-2 11/14/16 17:24

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ethylene Dibromide	0.000100	ND	0.0000955	95.5	1	60.0-140	
1,2-Dibromo-3-Chloropropane	0.000100	ND	0.0000770	77.0	1	60.0-140	

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	The sample concentration is too high to evaluate accurate spike recoveries.

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**
***** Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660	Nevada	TN-03-2002-34
Alaska	UST-080	New Hampshire	2975
Arizona	AZ0612	New Jersey–NELAP	TN002
Arkansas	88-0469	New Mexico	TN00003
California	01157CA	New York	11742
Colorado	TN00003	North Carolina	Env375
Conneticut	PH-0197	North Carolina [1]	DW21704
Florida	E87487	North Carolina [2]	41
Georgia	NELAP	North Dakota	R-140
Georgia [1]	923	Ohio–VAP	CL0069
Idaho	TN00003	Oklahoma	9915
Illinois	200008	Oregon	TN200002
Indiana	C-TN-01	Pennsylvania	68-02979
Iowa	364	Rhode Island	221
Kansas	E-10277	South Carolina	84004
Kentucky [1]	90010	South Dakota	n/a
Kentucky [2]	16	Tennessee [1 4]	2006
Louisiana	AI30792	Texas	T 104704245-07-TX
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	6157585858
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	109
Minnesota	047-999-395	Washington	C1915
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA
Nebraska	NE-OS-15-05		

Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**

Civil & Environmental Consultants - TN

325 Seaboard Lane, Suite 170
Franklin, TN 37067

Billing Information & Quote Number:
Dr. Kevin Wolfe
325 Seaboard Lane, Suite 170
Franklin, TN 37067

Report to: **Philip Campbell**

Email To: mjohnson@cecinc.com, pcampbell@cecinc.com

Project Description: **EWS Landfill**

City/State Collected:

Phone: **615-333-7797**
Fax: **615-333-7751**

Client Project # **142-059**

Lab Project # **CEC-142-059**

Collected by (print): Philip Campbell

Site/Facility ID #

P.O. #

Collected by (signature): Philip Campbell

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	ALK 60mlAmb-NoPres, or 500ml Plastic-NoPres	Br, Cl, F, NO3, SO4 250mlHDPE-NoPres (2-125mL bottles)	COD 250mlHDPE-H2SO4 <2	Metals 250mlHDPE-HNO3 App. I + Extras* <2 or 500mL-HNO3	NH3 125mlHDPE-H2SO4 <2 (250mL)	SV8011 40mlClr-NaThio	V8260AP1 40mlAmb-HCl	V8260AP1 40mlAmb-HCl-Blk	Chloride			
~~LEACHATE~~		GW	~~—~~	~~11-10-16~~		~~10~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~				
FIELD BLANK	Grab	GW	—		16:30 KD	10	X	X	X	X	X	X	X				01
TRIP BLANK	—	GW	—		—	1								X			02
MW-1	Grab		—		15:15	11	X	X	X	X	X	X	X				03
MW-3			—		16:15	11	X	X	X	X	X	X	X				04
MW-4			—		12:16	11	X	X	X	X	X	X	X				15
MW-5			—		14:00	11	X	X	X	X	X	X	X				06
Duplicate			—		—	11	X	X	X	X	X	X	X				07
TMW-1			—		10:45	1									X		08
TMW-2	Grab	GW			15:00	1									X		09
TMW-3	Grab	GW			15:45	1									X		10

* Matrix: **SS** - Soil **GW** - Groundwater **WW** - WasteWater **DW** - Drinking Water **OT** - Other ___

Remarks: * App I metals + Al, Ca, Fe, K, Mg, Mn, Na, Boron

pH ___ Temp ___
Flow ___ Other ___

Chain of Custody Page 1 of 1

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 372694
A164
Acctnum: CEC
Template: T111756
Prelogin: P575481
TSR: 350 - Jimmy Hunt
PB: KD 11-2-16
Shipped Via: Courier

Rem./Contaminant | Sample # (lab only)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Philip Campbell	11-11-16	10:36	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ___
Temp: 3.1 °C Bottles Received: 69
Date: 11-11-16 Time: 1036

Hold #
Condition: a (lab use only)
COC Seal Intact: ___Y ___N ___NA
pH Checked: 22 NCF:

ESC
LAB SCIENCES
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Cooler Receipt Form

Client: CEC		SDG#	872694
Cooler Received/Opened On: 11/11/16	Temperature Upon Receipt:		3.1 °c
Received By: Nikki Farmer			
Signature:			

Receipt Check List	Yes	No	N/A
Were custody seals on outside of cooler and intact?			✓
Were custody papers properly filled out?	✓		
Did all bottles arrive in good condition?	✓		
Were correct bottles used for the analyses requested?	✓		
Was sufficient amount of sample sent in each bottle?	✓		
Were all applicable sample containers correctly preserved and checked for preservation? (Any not in accepted range noted on COC)	✓		
If applicable, was an observable VOA headspace present?		✓	
Non Conformance Generated. (If yes see attached NCF)			

ANALYTICAL REPORT

November 23, 2016

Civil & Environmental Consultants - TN

Sample Delivery Group:	L872084
Samples Received:	11/11/2016
Project Number:	142-059
Description:	EWS Camden Class 2 Landfill
Site:	CAMDEN, TN
Report To:	Philip Campbell 325 Seaboard Lane, Suite 170 Franklin, TN 37067

Entire Report Reviewed By:

Jimmy Hunt
Technical Service Representative

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

LEACHATE-SMELTER CELL L872084-01 GW

Collected by: Philip Campbell
Collected date/time: 11/10/16 14:30
Received date/time: 11/11/16 10:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG926261	10	11/14/16 10:37	11/15/16 10:08	NJB
Metals (ICPMS) by Method 6020	WG926023	180	11/14/16 08:50	11/15/16 14:49	JDG
Metals (ICPMS) by Method 6020	WG926023	90	11/14/16 08:50	11/15/16 14:29	JDG
Metals (ICPMS) by Method 6020	WG926023	90	11/14/16 08:50	11/15/16 22:36	VSS
Volatile Organic Compounds (GC/MS) by Method 8260B	WG926518	1	11/22/16 09:40	11/22/16 09:40	DWR
Wet Chemistry by Method 2320 B-2011	WG926340	1	11/15/16 12:37	11/15/16 12:37	AMC
Wet Chemistry by Method 350.1	WG927642	1000	11/18/16 09:45	11/18/16 09:45	DR
Wet Chemistry by Method 9056A	WG927124	10000	11/16/16 12:15	11/16/16 12:15	SAM

All MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jimmy Hunt
Technical Service Representative

Sample Handling and Receiving

The following analysis were performed from an unpreserved, insufficiently or inadequately preserved sample.

ESC Sample ID	Project Sample ID	Method
L872084-01	LEACHATE-SMELTER CELL	6020, 7470A

The following samples were prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.

ESC Sample ID	Project Sample ID	Method
L872084-01	LEACHATE-SMELTER CELL	9056A

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Alkalinity	12200		2.71	20.0	1	11/15/2016 12:37	WG926340

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Ammonia Nitrogen	8180		38.0	250	1000	11/18/2016 09:45	WG927642

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Bromide	U		790	10000	10000	11/16/2016 12:15	WG927124
Chloride	41100		519	10000	10000	11/16/2016 12:15	WG927124
Fluoride	U		99.0	1000	10000	11/16/2016 12:15	WG927124
Nitrate	U		227	1000	10000	11/16/2016 12:15	WG927124
Sulfate	7790	J	774	50000	10000	11/16/2016 12:15	WG927124

Sample Narrative:

9056A L872084-01 WG927124: Reporting at high dilution due to large chloride hit

Mercury by Method 7470A

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Mercury	U		0.000490	0.00200	10	11/15/2016 10:08	WG926261

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Aluminum	U		0.450	9.00	90	11/15/2016 14:29	WG926023
Antimony	0.0697	J	0.0679	0.180	90	11/15/2016 14:29	WG926023
Arsenic	U		0.0225	0.180	90	11/15/2016 14:29	WG926023
Barium	1.73		0.0324	0.450	90	11/15/2016 14:29	WG926023
Beryllium	U		0.0108	0.180	90	11/15/2016 14:29	WG926023
Boron	11.2		0.135	1.80	90	11/15/2016 14:29	WG926023
Cadmium	0.410		0.0144	0.0900	90	11/15/2016 14:29	WG926023
Calcium	61.2	J	4.14	90.0	90	11/15/2016 14:29	WG926023
Chromium	U		0.0486	0.180	90	11/15/2016 14:29	WG926023
Copper	8.78		0.0468	0.450	90	11/15/2016 14:29	WG926023
Cobalt	0.0987	J	0.0234	0.180	90	11/15/2016 14:29	WG926023
Iron	U		1.35	9.00	90	11/15/2016 14:29	WG926023
Lead	U		0.0216	0.180	90	11/15/2016 14:29	WG926023
Magnesium	U		9.00	90.0	90	11/15/2016 14:29	WG926023
Manganese	0.0524	J	0.0225	0.450	90	11/15/2016 14:29	WG926023
Nickel	0.624		0.0315	0.180	90	11/15/2016 14:29	WG926023
Potassium	55700		3.33	90.0	90	11/15/2016 14:29	WG926023
Selenium	U		0.0342	0.180	90	11/15/2016 14:29	WG926023
Silver	U		0.0279	0.180	90	11/15/2016 14:29	WG926023
Sodium	94800		19.8	180	180	11/15/2016 14:49	WG926023
Thallium	U		0.0171	0.180	90	11/15/2016 14:29	WG926023
Vanadium	0.0896	J	0.0162	0.450	90	11/15/2016 14:29	WG926023
Zinc	64.3		0.230	2.25	90	11/15/2016 22:36	WG926023

Volatile Organic Compounds (GC/MS) by Method 8260B

Analyte	Result	Qualifier	MDL	RDL	Dilution	Analysis	Batch
	mg/l		mg/l	mg/l		date / time	
Acetone	0.871		0.0100	0.0500	1	11/22/2016 09:40	WG926518
Acrylonitrile	U		0.00187	0.0100	1	11/22/2016 09:40	WG926518
Benzene	U		0.000331	0.00100	1	11/22/2016 09:40	WG926518
Bromochloromethane	U		0.000520	0.00100	1	11/22/2016 09:40	WG926518
Bromodichloromethane	U		0.000380	0.00100	1	11/22/2016 09:40	WG926518
Bromoform	U		0.000469	0.00100	1	11/22/2016 09:40	WG926518
Bromomethane	0.00108	J	0.000866	0.00500	1	11/22/2016 09:40	WG926518
Carbon disulfide	U		0.000275	0.00100	1	11/22/2016 09:40	WG926518
Carbon tetrachloride	U		0.000379	0.00100	1	11/22/2016 09:40	WG926518
Chlorobenzene	U		0.000348	0.00100	1	11/22/2016 09:40	WG926518
Chlorodibromomethane	U		0.000327	0.00100	1	11/22/2016 09:40	WG926518
Chloroethane	U		0.000453	0.00500	1	11/22/2016 09:40	WG926518
Chloroform	U		0.000324	0.00500	1	11/22/2016 09:40	WG926518
Chloromethane	0.000834	J	0.000276	0.00250	1	11/22/2016 09:40	WG926518
Dibromomethane	U		0.000346	0.00100	1	11/22/2016 09:40	WG926518
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500	1	11/22/2016 09:40	WG926518
1,2-Dibromoethane	U		0.000381	0.00100	1	11/22/2016 09:40	WG926518
1,2-Dichlorobenzene	U		0.000349	0.00100	1	11/22/2016 09:40	WG926518
1,4-Dichlorobenzene	U		0.000274	0.00100	1	11/22/2016 09:40	WG926518
trans-1,4-Dichloro-2-butene	U		0.000866	0.00250	1	11/22/2016 09:40	WG926518
1,1-Dichloroethane	U		0.000259	0.00100	1	11/22/2016 09:40	WG926518
1,2-Dichloroethane	U		0.000361	0.00100	1	11/22/2016 09:40	WG926518
1,1-Dichloroethene	U		0.000398	0.00100	1	11/22/2016 09:40	WG926518
cis-1,2-Dichloroethene	U		0.000260	0.00100	1	11/22/2016 09:40	WG926518
trans-1,2-Dichloroethene	U		0.000396	0.00100	1	11/22/2016 09:40	WG926518
1,2-Dichloropropane	U		0.000306	0.00100	1	11/22/2016 09:40	WG926518
cis-1,3-Dichloropropene	U		0.000418	0.00100	1	11/22/2016 09:40	WG926518
trans-1,3-Dichloropropene	U		0.000419	0.00100	1	11/22/2016 09:40	WG926518
Ethylbenzene	U		0.000384	0.00100	1	11/22/2016 09:40	WG926518
2-Hexanone	U		0.00382	0.0100	1	11/22/2016 09:40	WG926518
Iodomethane	0.00414	J J4	0.00171	0.0100	1	11/22/2016 09:40	WG926518
2-Butanone (MEK)	0.0491		0.00393	0.0100	1	11/22/2016 09:40	WG926518
Methylene Chloride	U		0.00100	0.00500	1	11/22/2016 09:40	WG926518
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100	1	11/22/2016 09:40	WG926518
Styrene	U		0.000307	0.00100	1	11/22/2016 09:40	WG926518
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100	1	11/22/2016 09:40	WG926518
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100	1	11/22/2016 09:40	WG926518
Tetrachloroethene	U		0.000372	0.00100	1	11/22/2016 09:40	WG926518
Toluene	U		0.000780	0.00500	1	11/22/2016 09:40	WG926518
1,1,1-Trichloroethane	U		0.000319	0.00100	1	11/22/2016 09:40	WG926518
1,1,2-Trichloroethane	U		0.000383	0.00100	1	11/22/2016 09:40	WG926518
Trichloroethene	U		0.000398	0.00100	1	11/22/2016 09:40	WG926518
Trichlorofluoromethane	U		0.00120	0.00500	1	11/22/2016 09:40	WG926518
1,2,3-Trichloropropane	U		0.000807	0.00250	1	11/22/2016 09:40	WG926518
Vinyl acetate	U		0.00163	0.0100	1	11/22/2016 09:40	WG926518
Vinyl chloride	U		0.000259	0.00100	1	11/22/2016 09:40	WG926518
Xylenes, Total	U		0.00106	0.00300	1	11/22/2016 09:40	WG926518
(S) Toluene-d8	*97.6*			*90.0-115*		*11/22/2016 09:40*	WG926518
(S) Dibromofluoromethane	*108*			*79.0-121*		*11/22/2016 09:40*	WG926518
(S) α,α,α-Trifluorotoluene	*87.3*	J2		*90.4-116*		*11/22/2016 09:40*	WG926518
(S) 4-Bromofluorobenzene	*91.7*			*80.1-120*		*11/22/2016 09:40*	WG926518

Method Blank (MB)

(MB) R3178333-1 11/15/16 08:02

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Alkalinity	2.76	J	2.71	20.0

L872094-06 Original Sample (OS) • Duplicate (DUP)

(OS) L872094-06 11/15/16 08:12 • (DUP) R3178333-3 11/15/16 08:19

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Alkalinity	ND	ND	1	0.000	J	20

L872084-01 Original Sample (OS) • Duplicate (DUP)

(OS) L872084-01 11/15/16 12:37 • (DUP) R3178333-8 11/15/16 13:00

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Alkalinity	12200	12000	1	1.00		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178333-4 11/15/16 09:11 • (LCSD) R3178333-7 11/15/16 11:45

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Alkalinity	100	96.6	96.9	97.0	97.0	85.0-115			0.000	20

Method Blank (MB)

(MB) R3179165-2 11/18/16 08:45

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Ammonia Nitrogen	U		0.038	0.250

L872961-09 Original Sample (OS) • Duplicate (DUP)

(OS) L872961-09 11/18/16 09:31 • (DUP) R3179165-6 11/18/16 09:32

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Ammonia Nitrogen	ND	0.000	1	0		20

L872094-01 Original Sample (OS) • Duplicate (DUP)

(OS) L872094-01 11/18/16 09:46 • (DUP) R3179165-9 11/18/16 09:48

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Ammonia Nitrogen	ND	0.000	1	200	P1	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3179165-3 11/18/16 08:46 • (LCSD) R3179165-4 11/18/16 08:48

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Ammonia Nitrogen	7.50	7.49	7.48	100	100	90-110			0	20

L872961-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L872961-01 11/18/16 09:12 • (MS) R3179165-5 11/18/16 09:13

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
Ammonia Nitrogen	10.0	ND	10.0	100	1	90-110	

L872961-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872961-10 11/18/16 09:39 • (MS) R3179165-7 11/18/16 09:40 • (MSD) R3179165-8 11/18/16 09:42

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Ammonia Nitrogen	10.0	ND	9.79	9.76	98	98	1	90-110			0	20

Method Blank (MB)

(MB) R3178664-1 11/16/16 10:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Bromide	U		0.079	1.00
Chloride	U		0.0519	1.00
Fluoride	U		0.0099	0.100
Nitrate	U		0.0227	0.100
Sulfate	U		0.0774	5.00

L872956-01 Original Sample (OS) • Duplicate (DUP)

(OS) L872956-01 11/16/16 12:49 • (DUP) R3178664-4 11/16/16 13:04

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.000	1	0		15
Chloride	6.59	6.63	1	1		15
Fluoride	ND	0.000	1	0		15
Nitrate	1.25	1.25	1	0		15
Sulfate	ND	4.74	1	0		15

L872953-02 Original Sample (OS) • Duplicate (DUP)

(OS) L872953-02 11/16/16 18:27 • (DUP) R3178664-6 11/16/16 18:43

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.000	1	0		15
Chloride	4.66	4.74	1	2		15
Fluoride	0.214	0.219	1	2		15
Nitrate	ND	0.000	1	0		15
Sulfate	9.12	9.12	1	0		15

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178664-2 11/16/16 11:14 • (LCSD) R3178664-3 11/16/16 11:29

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromide	40.0	39.3	39.4	98	99	80-120			0	15
Chloride	40.0	39.0	39.1	98	98	80-120			0	15
Fluoride	8.00	7.89	7.86	99	98	80-120			0	15
Nitrate	8.00	8.16	8.19	102	102	80-120			0	15
Sulfate	40.0	39.6	39.7	99	99	80-120			0	15

L872882-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L872882-01 11/16/16 13:19 • (MS) R3178664-5 11/16/16 13:35

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	ND	39.4	79	1	80-120	J6
Nitrate	5.00	ND	4.44	89	1	80-120	
Sulfate	50.0	6.12	74.5	137	1	80-120	J5

L872928-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872928-01 11/16/16 15:53 • (MS) R3178664-7 11/16/16 20:00 • (MSD) R3178664-8 11/16/16 20:15

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	ND	47.5	48.5	95	97	1	80-120			2	15
Chloride	50.0	4.97	55.5	56.1	101	102	1	80-120			1	15
Nitrate	5.00	ND	4.99	5.12	100	102	1	80-120			3	15
Sulfate	50.0	27.3	77.5	77.9	100	101	1	80-120			1	15

Method Blank (MB)

(MB) R3178163-1 11/15/16 09:55

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.000049	0.000200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178163-2 11/15/16 09:57 • (LCSD) R3178163-3 11/15/16 09:59

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury	0.00300	0.00253	0.00245	84	82	80-120			3	20

L872230-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872230-05 11/15/16 10:02 • (MS) R3178163-4 11/15/16 10:04 • (MSD) R3178163-5 11/15/16 10:06

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.00300	ND	0.00246	0.00226	82	75	1	75-125			9	20

Method Blank (MB)

(MB) R3178049-1 11/15/16 01:00

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.0063	J	0.005	0.100
Antimony	U		0.000754	0.00200
Arsenic	U		0.00025	0.00200
Barium	U		0.00036	0.00500
Beryllium	U		0.00012	0.00200
Cadmium	U		0.00016	0.00100
Calcium	U		0.046	1.00
Chromium	U		0.00054	0.00200
Copper	U		0.00052	0.00500
Cobalt	U		0.00026	0.00200
Iron	U		0.015	0.100
Lead	U		0.00024	0.00200
Magnesium	U		0.1	1.00
Manganese	U		0.00025	0.00500
Nickel	U		0.00035	0.00200
Potassium	U		0.037	1.00
Selenium	U		0.00038	0.00200
Silver	U		0.00031	0.00200
Sodium	U		0.11	1.00
Thallium	U		0.00019	0.00200
Vanadium	U		0.00018	0.00500
Zinc	U		0.00256	0.0250

Method Blank (MB)

(MB) R3178135-1 11/15/16 13:27

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0015	0.0200

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178049-2 11/15/16 01:04 • (LCSD) R3178049-3 11/15/16 01:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	4.77	4.75	95	95	80-120			0	20
Antimony	0.0579	0.0498	0.0493	86	85	80-120			1	20
Arsenic	0.0500	0.0476	0.0473	95	95	80-120			1	20
Barium	0.0500	0.0488	0.0491	98	98	80-120			1	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178049-2 11/15/16 01:04 • (LCSD) R3178049-3 11/15/16 01:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Beryllium	0.0500	0.0424	0.0421	85	84	80-120			1	20
Cadmium	0.0500	0.0503	0.0515	101	103	80-120			2	20
Calcium	5.00	4.93	4.90	99	98	80-120			1	20
Chromium	0.0500	0.0489	0.0491	98	98	80-120			0	20
Copper	0.0500	0.0506	0.0508	101	102	80-120			0	20
Cobalt	0.0500	0.0501	0.0502	100	100	80-120			0	20
Iron	5.00	4.86	4.90	97	98	80-120			1	20
Lead	0.0500	0.0483	0.0485	97	97	80-120			0	20
Magnesium	5.00	4.79	4.88	96	98	80-120			2	20
Manganese	0.0500	0.0482	0.0481	96	96	80-120			0	20
Nickel	0.0500	0.0497	0.0502	99	100	80-120			1	20
Potassium	5.00	4.84	4.88	97	98	80-120			1	20
Selenium	0.0500	0.0509	0.0504	102	101	80-120			1	20
Silver	0.0500	0.0501	0.0497	100	99	80-120			1	20
Sodium	5.00	4.87	4.90	97	98	80-120			1	20
Thallium	0.0500	0.0474	0.0472	95	94	80-120			0	20
Vanadium	0.0500	0.0484	0.0485	97	97	80-120			0	20
Zinc	0.0500	0.0490	0.0480	98	96	80-120			2	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3178135-2 11/15/16 13:30 • (LCSD) R3178135-3 11/15/16 13:34

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron	0.0500	0.0461	0.0465	92	93	80-120			1	20

L871916-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L871916-01 11/15/16 01:11 • (MS) R3178049-5 11/15/16 01:18 • (MSD) R3178049-6 11/15/16 01:21

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	ND	4.81	4.77	95	94	1	75-125			1	20
Antimony	0.0579	ND	0.0512	0.0502	88	87	1	75-125			2	20
Arsenic	0.0500	ND	0.0484	0.0480	93	93	1	75-125			1	20
Barium	0.0500	0.0723	0.121	0.122	97	99	1	75-125			1	20
Beryllium	0.0500	ND	0.0430	0.0425	86	85	1	75-125			1	20
Cadmium	0.0500	ND	0.0501	0.0485	100	97	1	75-125			3	20
Calcium	5.00	95.5	101	101	104	113	1	75-125			0	20
Chromium	0.0500	ND	0.0481	0.0477	95	94	1	75-125			1	20

L871916-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L871916-01 11/15/16 01:11 • (MS) R3178049-5 11/15/16 01:18 • (MSD) R3178049-6 11/15/16 01:21

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Copper	0.0500	ND	0.0480	0.0480	95	95	1	75-125			0	20
Cobalt	0.0500	ND	0.0481	0.0481	96	96	1	75-125			0	20
Potassium	5.00	5.00	9.79	9.66	96	93	1	75-125			1	20
Iron	5.00	1.83	6.52	6.51	94	94	1	75-125			0	20
Lead	0.0500	ND	0.0484	0.0475	96	94	1	75-125			2	20
Magnesium	5.00	17.3	22.2	22.2	96	97	1	75-125			0	20
Manganese	0.0500	0.257	0.297	0.301	81	90	1	75-125			2	20
Nickel	0.0500	ND	0.0481	0.0477	94	93	1	75-125			1	20
Selenium	0.0500	ND	0.0517	0.0501	103	100	1	75-125			3	20
Silver	0.0500	ND	0.0489	0.0481	98	96	1	75-125			2	20
Sodium	5.00	235	241	243	119	155	1	75-125		V	1	20
Thallium	0.0500	ND	0.0470	0.0461	94	92	1	75-125			2	20
Vanadium	0.0500	ND	0.0488	0.0484	97	96	1	75-125			1	20
Zinc	0.0500	ND	0.0499	0.0495	92	91	1	75-125			1	20

Method Blank (MB)

(MB) R3179724-3 11/20/16 02:31

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromochloromethane	U		0.000520	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
Carbon disulfide	U		0.000275	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
trans-1,4-Dichloro-2-butene	U		0.000866	0.00250
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100
trans-1,3-Dichloropropene	U		0.000419	0.00100
Ethylbenzene	U		0.000384	0.00100
2-Hexanone	U		0.00382	0.0100
Iodomethane	U		0.00171	0.0100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000780	0.00500
1,1,1-Trichloroethane	U		0.000319	0.00100

Method Blank (MB)

(MB) R3179724-3 11/20/16 02:31

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
Vinyl acetate	U		0.00163	0.0100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*96.9*			*90.0-115*
(S) Dibromofluoromethane	*101*			*79.0-121*
(S) α,α,α-Trifluorotoluene	*92.6*			*90.4-116*
(S) 4-Bromofluorobenzene	*91.0*			*80.1-120*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3179724-1 11/20/16 00:36 • (LCSD) R3179724-2 11/20/16 01:33

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.0953	0.0962	76.2	77.0	28.7-175			0.960	20.9
Acrylonitrile	0.125	0.112	0.107	89.6	85.7	58.2-145			4.46	20
Benzene	0.0250	0.0220	0.0228	88.1	91.3	73.0-122			3.61	20
Bromodichloromethane	0.0250	0.0205	0.0196	82.0	78.5	75.5-121			4.32	20
Bromochloromethane	0.0250	0.0233	0.0222	93.1	88.8	78.9-123			4.75	20
Bromoform	0.0250	0.0229	0.0225	91.8	90.0	71.5-131			2.01	20
Bromomethane	0.0250	0.0119	0.0122	47.7	48.9	22.4-187			2.41	20
Carbon disulfide	0.0250	0.0215	0.0232	86.1	92.8	53.0-134			7.39	20
Carbon tetrachloride	0.0250	0.0186	0.0202	74.3	80.6	70.9-129			8.13	20
Chlorobenzene	0.0250	0.0258	0.0255	103	102	79.7-122			1.00	20
Chlorodibromomethane	0.0250	0.0237	0.0226	95.0	90.4	78.2-124			4.90	20
Chloroethane	0.0250	0.0209	0.0229	83.7	91.4	41.2-153			8.84	20
Chloroform	0.0250	0.0223	0.0228	89.2	91.1	73.2-125			2.08	20
Chloromethane	0.0250	0.0192	0.0212	76.6	84.8	55.8-134			10.2	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0241	0.0228	96.4	91.3	64.8-131			5.40	20
1,2-Dibromoethane	0.0250	0.0249	0.0237	99.7	95.0	79.8-122			4.81	20
Dibromomethane	0.0250	0.0206	0.0199	82.6	79.7	79.5-118			3.58	20
1,2-Dichlorobenzene	0.0250	0.0269	0.0265	107	106	84.7-118			1.37	20
1,4-Dichlorobenzene	0.0250	0.0270	0.0277	108	111	82.2-114			2.34	20
trans-1,4-Dichloro-2-butene	0.0250	0.0154	0.0156	61.6	62.5	58.3-129			1.47	20
1,1-Dichloroethane	0.0250	0.0228	0.0236	91.3	94.6	71.7-127			3.51	20
1,2-Dichloroethane	0.0250	0.0217	0.0210	86.9	83.9	65.3-126			3.41	20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3179724-1 11/20/16 00:36 • (LCSD) R3179724-2 11/20/16 01:33

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,1-Dichloroethene	0.0250	0.0213	0.0226	85.3	90.6	59.9-137			6.02	20
cis-1,2-Dichloroethene	0.0250	0.0223	0.0224	89.1	89.6	77.3-122			0.570	20
trans-1,2-Dichloroethene	0.0250	0.0213	0.0221	85.1	88.5	72.6-125			3.87	20
1,2-Dichloropropane	0.0250	0.0233	0.0233	93.1	93.0	77.4-125			0.0700	20
cis-1,3-Dichloropropene	0.0250	0.0205	0.0197	82.2	78.6	77.7-124			4.36	20
trans-1,3-Dichloropropene	0.0250	0.0206	0.0201	82.4	80.4	73.5-127			2.45	20
Ethylbenzene	0.0250	0.0249	0.0251	99.5	100	80.9-121			0.940	20
2-Hexanone	0.125	0.108	0.107	86.2	85.7	59.4-151			0.580	20
Iodomethane	0.125	0.0743	0.0799	59.5	63.9	64.6-137	J4	J4	7.17	20
2-Butanone (MEK)	0.125	0.103	0.0996	82.5	79.6	46.4-155			3.47	20
Methylene Chloride	0.0250	0.0215	0.0213	85.8	85.4	69.5-120			0.480	20
4-Methyl-2-pentanone (MIBK)	0.125	0.0992	0.0978	79.4	78.3	63.3-138			1.37	20
Styrene	0.0250	0.0253	0.0246	101	98.4	79.9-124			2.62	20
1,1,1,2-Tetrachloroethane	0.0250	0.0244	0.0239	97.5	95.6	78.5-125			1.93	20
1,1,2,2-Tetrachloroethane	0.0250	0.0198	0.0201	79.3	80.4	79.3-123			1.33	20
Tetrachloroethene	0.0250	0.0233	0.0246	93.2	98.6	73.5-130			5.58	20
Toluene	0.0250	0.0218	0.0225	87.0	90.1	77.9-116			3.40	20
1,1,1-Trichloroethane	0.0250	0.0219	0.0229	87.7	91.7	71.1-129			4.45	20
1,1,2-Trichloroethane	0.0250	0.0232	0.0227	92.9	90.7	81.6-120			2.36	20
Trichloroethene	0.0250	0.0258	0.0261	103	104	79.5-121			1.20	20
Trichlorofluoromethane	0.0250	0.0230	0.0248	92.0	99.1	49.1-157			7.47	20
1,2,3-Trichloropropane	0.0250	0.0231	0.0215	92.5	86.0	74.9-124			7.33	20
Vinyl acetate	0.125	0.0529	0.0598	42.3	47.8	41.7-159			12.3	20
Vinyl chloride	0.0250	0.0229	0.0255	91.7	102	61.5-134			10.6	20
Xylenes, Total	0.0750	0.0733	0.0738	97.7	98.4	79.2-122			0.710	20
(S) Toluene-d8				*96.1*	*95.8*	*90.0-115*				
(S) Dibromofluoromethane				*99.1*	*96.6*	*79.0-121*				
(S) a,a,a-Trifluorotoluene				*92.8*	*92.8*	*90.4-116*				
(S) 4-Bromofluorobenzene				*91.8*	*90.8*	*80.1-120*				

L872020-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872020-02 11/20/16 03:47 • (MS) R3179724-4 11/20/16 02:50 • (MSD) R3179724-5 11/20/16 03:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	ND	564	621	90.3	99.3	5000	25.0-156			9.49	21.5
Acrylonitrile	0.125	ND	623	672	99.7	107	5000	55.9-161			7.54	20
Benzene	0.0250	ND	126	136	101	109	5000	58.6-133			7.63	20
Bromodichloromethane	0.0250	ND	112	120	89.7	96.1	5000	69.2-127			6.81	20

L872020-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872020-02 11/20/16 03:47 • (MS) R3179724-4 11/20/16 02:50 • (MSD) R3179724-5 11/20/16 03:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromochloromethane	0.0250	ND	121	132	96.8	105	5000	74.4-128			8.56	20
Bromoform	0.0250	ND	130	140	104	112	5000	66.3-140			7.83	20
Bromomethane	0.0250	ND	67.4	82.1	53.9	65.6	5000	16.6-183			19.6	20.5
Carbon disulfide	0.0250	ND	127	144	101	115	5000	34.9-138			12.9	20
Carbon tetrachloride	0.0250	ND	111	124	89.0	99.2	5000	60.6-139			10.8	20
Chlorobenzene	0.0250	ND	146	159	117	127	5000	70.1-130			8.22	20
Chlorodibromomethane	0.0250	ND	134	147	107	118	5000	71.6-132			9.36	20
Chloroethane	0.0250	ND	120	130	96.1	104	5000	33.3-155			8.14	20
Chloroform	0.0250	ND	126	136	100	109	5000	66.1-133			8.07	20
Chloromethane	0.0250	ND	111	123	87.2	96.7	5000	40.7-139			10.2	20
1,2-Dibromo-3-Chloropropane	0.0250	ND	131	144	105	115	5000	63.9-142			9.10	20.2
1,2-Dibromoethane	0.0250	ND	135	148	108	118	5000	73.8-131			8.82	20
Dibromomethane	0.0250	ND	115	124	92.2	99.3	5000	72.8-127			7.47	20
1,2-Dichlorobenzene	0.0250	ND	147	161	118	129	5000	77.4-127		J5	8.92	20
1,4-Dichlorobenzene	0.0250	ND	146	162	117	130	5000	74.4-123		J5	10.6	20
trans-1,4-Dichloro-2-butene	0.0250	ND	81.2	90.7	65.0	72.6	5000	57.6-136			11.1	20
1,1-Dichloroethane	0.0250	ND	131	142	105	113	5000	64.0-134			7.80	20
1,2-Dichloroethane	0.0250	ND	122	131	97.2	105	5000	60.7-132			7.50	20
1,1-Dichloroethene	0.0250	ND	128	142	102	113	5000	48.8-144			10.1	20
cis-1,2-Dichloroethene	0.0250	ND	124	135	98.9	108	5000	60.6-136			8.85	20
trans-1,2-Dichloroethene	0.0250	ND	121	135	96.4	108	5000	61.0-132			11.4	20
1,2-Dichloropropane	0.0250	5.06	131	139	101	107	5000	69.7-130			5.45	20
cis-1,3-Dichloropropene	0.0250	ND	109	120	87.3	96.0	5000	71.1-129			9.56	20
trans-1,3-Dichloropropene	0.0250	ND	106	118	83.2	92.8	5000	66.3-136			10.7	20
Ethylbenzene	0.0250	ND	141	153	113	122	5000	62.7-136			7.95	20
2-Hexanone	0.125	ND	608	674	97.2	108	5000	59.4-154			10.4	20.1
Iodomethane	0.125	ND	445	521	71.2	83.3	5000	55.2-140			15.6	20
2-Butanone (MEK)	0.125	ND	575	622	92.0	99.6	5000	45.0-156			7.90	20.8
Methylene Chloride	0.0250	ND	120	130	96.3	104	5000	61.5-125			7.91	20
4-Methyl-2-pentanone (MIBK)	0.125	ND	545	583	87.1	93.3	5000	60.7-150			6.83	20
Styrene	0.0250	ND	143	153	115	122	5000	68.2-133			6.30	20
1,1,1,2-Tetrachloroethane	0.0250	ND	137	147	109	117	5000	70.5-132			6.91	20
1,1,2,2-Tetrachloroethane	0.0250	ND	106	117	84.5	93.8	5000	64.9-145			10.4	20
Tetrachloroethene	0.0250	ND	133	146	106	117	5000	57.4-141			9.20	20
Toluene	0.0250	ND	123	134	98.2	107	5000	67.8-124			8.67	20
1,1,1-Trichloroethane	0.0250	ND	129	141	103	113	5000	58.7-134			8.90	20
1,1,2-Trichloroethane	0.0250	ND	127	139	102	111	5000	74.1-130			9.02	20
Trichloroethene	0.0250	ND	146	159	117	128	5000	48.9-148			8.62	20
Trichlorofluoromethane	0.0250	ND	137	150	110	120	5000	39.9-165			9.28	20
1,2,3-Trichloropropane	0.0250	ND	127	134	102	107	5000	71.5-134			5.07	20

L872020-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L872020-02 11/20/16 03:47 • (MS) R3179724-4 11/20/16 02:50 • (MSD) R3179724-5 11/20/16 03:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Vinyl acetate	0.125	ND	194	230	31.0	36.7	5000	42.8-181	J6	J6	16.9	20
Vinyl chloride	0.0250	ND	138	149	110	119	5000	44.3-143			7.90	20
Xylenes, Total	0.0750	ND	411	446	110	119	5000	65.6-133			8.04	20
(S) Toluene-d8					*96.5*	*95.4*		*90.0-115*				
(S) Dibromofluoromethane					*99.3*	*99.0*		*79.0-121*				
(S) a,a,a-Trifluorotoluene					*91.2*	*91.4*		*90.4-116*				
(S) 4-Bromofluorobenzene					*92.4*	*91.0*		*80.1-120*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J2	Surrogate recovery limits have been exceeded; values are outside lower control limits.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	The sample concentration is too high to evaluate accurate spike recoveries.

ESC Lab Sciences is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our "one location" design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be **YOUR LAB OF CHOICE.**
***** Not all certifications held by the laboratory are applicable to the results reported in the attached report.

State Accreditations

Alabama	40660
Alaska	UST-080
Arizona	AZ0612
Arkansas	88-0469
California	01157CA
Colorado	TN00003
Conneticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1]	90010
Kentucky [2]	16
Louisiana	AI30792
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086
Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico	TN00003
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [2]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	221
South Carolina	84004
South Dakota	n/a
Tennessee [1 4]	2006
Texas	T 104704245-07-TX
Texas [5]	LAB0152
Utah	6157585858
Vermont	VT2006
Virginia	109
Washington	C1915
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	S-67674
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [n/a] Accreditation not applicable

Our Locations

ESC Lab Sciences has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. **ESC Lab Sciences performs all testing at our central laboratory.**

Civil & Environmental Consultants - TN

325 Seaboard Lane, Suite 170
Franklin, TN 37067

Billing Information:
Dr. Kevin Wolfe
325 Seaboard Lane, Suite 170
Franklin, TN 37067

Report to: Philip Campbell

Email To: pcampbell@cecinc.com

Project Description: EWS Camden Class 2 Landfill

City/State Collected:

Phone: 615-333-7797
Fax: 615-333-7751

Client Project # 142-059

Lab Project # CEC-EWS CAMDEN LF

Collected by (print): Philip Campbell

Site/Facility ID # CAMDEN, TN

P.O. #

Collected by (signature): Philip Campbell

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Bromide,Cl, NO3, SO4 250mlHDPE-NoPres Filtered	Dissolved Metals-500mlHDPE-NoPres	NH3 250mlHDPE-H2SO4 <2	Total Metals 500mlHDPE-HNO3 App I + extras	V8260AP1 40mlAmb-HCl	X ALK 60 mL Amb.-No Pres				Rem./Contaminant	Sample # (lab only)
LEACHATE – Smelter cell	Grab	GW		11-10-16	14:30	~~5~~ 10	X	X	X	X	X	X					01

Analysis / Container / Preservative

Chain of Custody Page 1 of 1

ESC LABORATORY SCIENCES
YOUR LAB OF CHOICE
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 872 084
A163
Acctnum: CEC
Template: T107234
Prelogin: P530614
TSR: 350 - Jimmy Hunt
PB: 11-9-16
Shipped Via: Courier

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ___

Remarks: App I metals + Al, Ca, Fe, K, Mg, Mn, Na, Boron
~~** Hold Run Br, Cl, F, NO3, SO4 ; Hold OTHER for TC~~

pH ___ Temp ___
Flow ___ Other ___

Hold #

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Philip Campbell	11-11-16	10:30	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ ___
Temp: 2.9 °C Bottles Received: 10 + TB
Date: 11.11.16 Time: 1039

Condition: (lab use only) OK
COC Seal Intact: ___Y ___N ___NA
pH Checked: NCF:

ESC
L·A·B S·C·I·E·N·C·E·S
YOUR LAB OF CHOICE

Cooler Receipt Form

Client: CEC		SDG#	872684
Cooler Received/Opened On: 11/11/16	Temperature Upon Receipt:		2.9 °c
Received By: Nikki Farmer			
Signature:			

Receipt Check List	Yes	No	N/A
Were custody seals on outside of cooler and intact?			✓
Were custody papers properly filled out?	✓		
Did all bottles arrive in good condition?	✓		
Were correct bottles used for the analyses requested?	✓		
Was sufficient amount of sample sent in each bottle?	✓		
Were all applicable sample containers correctly preserved and checked for preservation? (Any not in accepted range noted on COC)	✓		
If applicable, was an observable VOA headspace present?		✓	
Non Conformance Generated. (If yes see attached NCF)			

L872084

Jimmy Hunt

From: Campbell, Philip <pcampbell@cecinc.com>
Sent: Friday, November 11, 2016 2:17 PM
To: Jimmy Hunt
Subject: RE: EWS Camden Class 2 Landfill

Just do the 8260 analysis and disregard 8011, thanks.

Philip

Philip J. Campbell / Assistant Project Manager
Civil & Environmental Consultants, Inc.
325 Seaboard Lane · Suite 170 · Franklin, TN 37067
Toll-Free: (800) 763-2326 · Direct: (615) 577-9354 · Fax: (615) 333-7751
Mobile: (865) 742-2526 · http://www.cecinc.com
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---

From: Jimmy Hunt [mailto:JHunt@esclabsciences.com]
Sent: Friday, November 11, 2016 2:16 PM
To: Campbell, Philip
Subject: RE: EWS Camden Class 2 Landfill

Philip,
For this sample it would cost $20 extra since you are already running the other AP1 analyses. How do you want to proceed?

Thanks,

Jimmy Hunt
Technical Service Representative
Phone: 615-773-9668
Toll Free: 1-800-767-5859 ext:9668
Email: jhunt@esclabsciences.com

From: Campbell, Philip [mailto:pcampbell@cecinc.com]
Sent: Friday, November 11, 2016 2:11 PM
To: Jimmy Hunt
Subject: RE: EWS Camden Class 2 Landfill

Jimmy,

Does the 8011 cost any extra? I think I may just use the 8260 App 1 VOCs for the leachate for those 2 parameters.

Philip J. Campbell / Assistant Project Manager

Civil & Environmental Consultants, Inc.
325 Seaboard Lane · Suite 170 · Franklin, TN 37067
Toll-Free: (800) 763-2326 · Direct: (615) 577-9354 · Fax: (615) 333-7751
Mobile: (865) 742-2526 · http://www.cecinc.com
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From: Jimmy Hunt [mailto:JHunt@esclabsciences.com]
Sent: Friday, November 11, 2016 1:12 PM
To: Campbell, Philip
Subject: EWS Camden Class 2 Landfill

Philip,

We received the attached sample today. Our login staff tells me that there were 8011 vials included, but 8011 is not listed on the COC. Do you want us to run 8011 on this sample?

Thanks,

Jimmy Hunt
Technical Service Representative
Phone: 615-773-9668
Toll Free: 1-800-767-5859 ext:9668
Email: jhunt@esclabsciences.com

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GROUNDWATER MONITORING FIELD INFORMATION LOG

Civil & Environmental Consultants, Inc. 325 Seaboard Lane, Ste. 170 Franklin, Tennessee 37067 - 800-763-2326 - www.cecinc.com

SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-1
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	clear, 50's
DATE & TIME	11-10-16 / 9:30	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	30.50	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	23.87	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	6.63	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	≈ 3.5	**EQUIPMENT BLANK COLLECTED?**	NA

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	9:50	0	15.9	4.52	55.0	5.93	203.5	145
1.0	10:00	10	15.9	5.15	43.6	5.93	175.0	108
2.0	10:10	20	16.1	5.44	77.5	5.84	11.4	55.0
2.25	10:18	28	16.0	5.48	74.6	5.88	4.4	60.4
2.25 -	Dry - stop purge, remove tubing, come back for sample							

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.25	15:15	28	16.0	5.48	73.8	5.87	23.2	42.7

Sample Charateristics (Odor, Color)	~~clear~~ lt. orange, no odor	**Preservatives Used**	See COC
Number of Containers	11	**Sampler Signature**	Philip Campbell

WELL DATA

Number of Baffles	4	**Well Cap Dedicated/In Place?**	yes/yes
Well Clear of Weeds/Accessible?	yes/yes	**Fittings/Well Head Condition**	good/good
Pad/Casing Quality	good/good	**Lock Condition**	good.

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-2
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	clear, 60's
DATE & TIME	11-10-16 / 16:00	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	NA, parameters only	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	~~10~~ 12.50	**SAMPLING EQUIPMENT**	YSI 600 pro plus
DEPTH TO WATER (feet)	10.81 ?	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	—
WATER COLUMN (feet)	-2.39	**FIELD BLANK COLLECTED?**	—
PURGE VOLUME (gallons)	0.25	**EQUIPMENT BLANK COLLECTED?**	—

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0.25	—	1	18.4	6.04	176.3	4.89	145.6	235

Sample Charateristics (Odor, Color)	Lt. orange, No odo	**Preservatives Used**	—
Number of Containers	—	**Sampler Signature**	PC

WELL DATA

Number of Baffles	4	**Well Cap Dedicated/In Place?**	yes / yes
Well Clear of Weeds/Accessible?	yes	**Fittings/Well Head Condition**	good
Pad/Casing Quality	good	**Lock Condition**	good

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-3
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Clear, 60's
DATE & TIME	11-16-16 / 10:50	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	27	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	19.99	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	7.01	**FIELD BLANK COLLECTED?**	yes
PURGE VOLUME (gallons)	3.5	**EQUIPMENT BLANK COLLECTED?**	NA

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	10:58	-	18.7	5.46	551	4.77	156.2	63.6
1.25	11:02	4	18.7	5.39	525	4.78	156.1	117
1.75 additions-Bypass S.S. 1.75								
2.00	Dry 11:04							

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.00	16:15	6	18.1	5.12	532	5.04	170.2	64.5
Sample Charateristics (Odor, Color)	~~Light white~~ silty, no odor		**Preservatives Used**			HNO3, HCl, NaThio, H2SO4		
Number of Containers	11		**Sampler Signature**					

WELL DATA

Number of Baffles	4	**Well Cap Dedicated/In Place?**	yes
Well Clear of Weeds/Accessible?	yes	**Fittings/Well Head Condition**	good
Pad/Casing Quality	good	**Lock Condition**	good

11:15 - Michael David on-site

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-4
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Clear, 60's
DATE & TIME	11-10-16 / 11:30	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	23.10	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	11.95	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	11.15	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	6.0	**EQUIPMENT BLANK COLLECTED?**	NA

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	11:39	0	17.5	5.78	57.8	5.28	128.7	54.2
2.0 ~~EVI~~	11:43	4	17.2	5.52	58.1	5.33	145.2	2.10
4.0 ~~3.50 EVI~~	11:47	8	17.3	5.54	57.6	5.32	145.8	1.60
6.0	11:51	12	17.4	5.70	57.5	5.28	140.6	1.18

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
6.0	12:10	12	17.4	5.70	57.5	5.28	140.6	1.18

Sample Charateristics (Odor, Color)	Clear, No odor	**Preservatives Used**	HCl, HNO_3, H_2SO_4, Nonc
Number of Containers	11	**Sampler Signature**	

WELL DATA

Number of Baffles	0	**Well Cap Dedicated/In Place?**	No / yes / yes
Well Clear of Weeds/Accessible?	yes / yes	**Fittings/Well Head Condition**	good / good
Pad/Casing Quality	good / good	**Lock Condition**	good

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-5
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	clear, 60's
DATE & TIME	11-10-16 / 13:15	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	33.85	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	10.15	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (Inches)	2	**DUPLICATE COLLECTED?**	yes
WATER COLUMN (feet)	23.70	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	≈12 . 12.0	**EQUIPMENT BLANK COLLECTED?**	N/A

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	13:20	0	17.0	5.24	166.0	5.48	175.2	29.9
4.0	13:30	10	17.2	5.35	170.0	5.24	173.9	160
8.0	13:45	25	16.7	5.50	141.7	5.61	174.5	559
12.0	13:55	35	16.7	5.53	137.9	5.57	175.4	287

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
12.0	14:00	35	16.7	5.53	137.9	5.57	175.4	28.9

- at metals

Sample Charateristics (Odor, Color)	~~Lt. white fine particles~~ clear, No odor	**Preservatives Used**	
Number of Containers	11	**Sampler Signature**	Philip Campbell

WELL DATA

Number of Baffles	4	**Well Cap Dedicated/In Place?**	yes / yes
Well Clear of Weeds/Accessible?	yes / yes	**Fittings/Well Head Condition**	good / good
Pad/Casing Quality	good / good	**Lock Condition**	good

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	TMW-1
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Clear, 50's
DATE & TIME	11-10-16 / 10:25	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	32.50	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	7.35	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	1	**DUPLICATE COLLECTED?**	NO
WATER COLUMN (feet)	25.15	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	≈1 gal = 1 vol.	**EQUIPMENT BLANK COLLECTED?**	No

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	10:30	0	16.7	5.79	66.0	5.57	103.4	403
1.0	10:33	3	16.6	5.77	66.2	5.61	103.8	OR
2.0	10:36	6	16.4	5.79	65.6	5.70	104.2	OR
3.0	10:39	9	16.4	5.79	65.3	5.71	104.6	823

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
3.0	10:45	9	16.4	5.79	65.3	5.71	104.6	823

Sample Charateristics (Odor, Color)	Lt. orange, No odor	**Preservatives Used**	None
Number of Containers	1	**Sampler Signature**	Phil Campbell

WELL DATA

Number of Baffles	0	**Well Cap Dedicated/In Place?**	—
Well Clear of Weeds/Accessible?	—	**Fittings/Well Head Condition**	—
Pad/Casing Quality	—	**Lock Condition**	—

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	TMW-2
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Clear, 60's
DATE & TIME	11-10-16 / 14:45	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	27.50	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	12.18	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	1"	**DUPLICATE COLLECTED?**	—
WATER COLUMN (feet)	15.32	**FIELD BLANK COLLECTED?**	—
PURGE VOLUME (gallons)	1.5	**EQUIPMENT BLANK COLLECTED?**	—

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	14:50	0	17.0	8.19	103.9	5.45	73.4	285
1.5	14:55	5	16.6	6.37	103.6	5.62	117.3	>1000

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
1.5	15:00	5	16.6	6.37	103.6	5.62	117.3	>1000
Sample Charateristics (Odor, Color)	Lt. orange		**Preservatives Used**			—		
Number of Containers	1		**Sampler Signature**			[signature]		

WELL DATA

Number of Baffles	0	**Well Cap Dedicated/In Place?**	—
Well Clear of Weeds/Accessible?	—	**Fittings/Well Head Condition**	—
Pad/Casing Quality	—	**Lock Condition**	—

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	TMW-3
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Clear,
DATE & TIME	11-10-16 / 15:35	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	28.00	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	19.99	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	1 ~~8.01~~	**DUPLICATE COLLECTED?**	—
WATER COLUMN (feet)	8.01	**FIELD BLANK COLLECTED?**	—
PURGE VOLUME (gallons)	3.0	**EQUIPMENT BLANK COLLECTED?**	—

PURGE INFORMATION

Galions Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	15:35	0	16.9	6.73	196.6	5.49	148.7	>1000
1.0	15:38	3	16.5	5.74	175.5	5.57	146.8	>1000
2.0	15:41	6	16.6	5.54	173.3	5.62	148.3	608
3.0	15:44	9	16.5	5.53	173.5	5.70	149.1	81.6

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
3.0	15:45	9	16.5	5.53	173.5	5.70	149.1	81.6

Sample Charateristics (Odor, Color)	Lt. orange	**Preservatives Used**	None
Number of Containers	1	**Sampler Signature**	Phil J. Campbell

WELL DATA

Number of Baffles	—	**Well Cap Dedicated/In Place?**	—
Well Clear of Weeds/Accessibie?	yes	**Fittings/Weil Head Condition**	—
Pad/Casing Quality	—	**Lock Condition**	—

APPENDIX D
CEC STANDARD OPERATING PROCEDURES

03-02-01 MONITORING WELLS USING CONVENTIONAL PURGING

I. SCOPE AND APPLICABILITY: This procedure is applicable to the sampling of monitoring wells which do not contain free product using conventional purge methodology.

II. PROJECT-SPECIFIC REQUIREMENTS

A. SAMPLE LOCATIONS AND NUMBERING SYSTEM:

B. ANALYTICAL PARAMETERS AND SAMPLE FREQUENCY:

C. FIELD SCREENING AND ANALYSES: *Reference appropriate SOPs.*

D. QUALITY ASSURANCE SAMPLES: *Number and type of blanks and duplicates. Reference SOPs 04-01-01, 04-01-02, and 04-02-01 as appropriate.*

E. FILTRATION:

F. PURGE CRITERION AND DISPOSAL OF PURGE WATER:

G. WELL KEYS: *Indicate whether wells use CEC's standard key*

H. DEDICATED EQUIPMENT: *Indicate whether dedicated pumps or bailers have been installed.*

I. OTHER REQUIREMENTS:

III. METHODOLOGY: Monitoring wells should be sampled progressing from least contaminated to most contaminated to reduce the chances of cross contamination between samples. If a bailer is employed, use new rope for each well.

A. PURGING: Purging is performed to remove static water standing in the well bore, thereby allowing collection of a sample representative of water in the aquifer. Unless otherwise specified in Section II.F., well development may suffice for the purge, so long as the sample is collected immediately following development.

1. Measure the water level from the top of the riser pipe at the pre-marked reference point (SOP 06-01-01).

2. Calculate the purge volume using the data presented in Exhibit 03-02-01 and the criterion presented in Section II.F.

3. Remove the required volume of water using one of the following methods. If the well goes dry, the purge can be considered complete unless otherwise specified in Section II.F. However, attempts should be made to prevent the well from going dry during purging, drying the well disrupts the flow regime and can result in the loss of volatile compounds. Therefore:

≅ If a well is known to have a low yield, it should be purged by bailing.

≅ If a pump is used for purging, adjust the pumping rate to maintain a water column in the well, if possible.

≅ Do not attempt to purge a well to dryness unless it is infeasible to maintain water in the well at a reasonable purge rate.

METHOD A: If the purge criterion is specified on volume of water to be removed:

a. Remove the required volume of water using a submersible pump or bailer. If a pump is used, a check valve must be installed on the pump to prevent pumped water from returning to the well. Begin purging at the top of the water column. Minimize aeration of the water during purging by pumping at a low rate or lowering the bailer gently into the water.

b. Lower the pump or bailer as necessary to continue purging until the well volume criterion is met.

METHOD B: If the purge criteria are specified on stabilization of field analyses:

a. Measure initial water quality by retrieving a sample from the top of the water column using a bailer. Conduct the field analyses specified in Section II.F. Record these results on the Groundwater Monitoring Data Sheet (SOP 07-02-01).

b. Remove one well volume of water by submersible pump or bailer. If a pump is used, a check valve must be installed to prevent water from returning to the well. Begin purging at the top of the water column. Minimize aeration of the water during purging by pumping at a low rate or lowering the bailer gently into the water.

c. After one well volume has been removed, conduct field analyses on the groundwater being discharged. Record results on the Monitoring Sampling Data Sheet.

d. Repeat steps b and c until the purge criteria have been met.

B. SAMPLE COLLECTION: Groundwater samples should be collected immediately after purging , if the well will yield sufficiently. Some low-yielding wells may require time to recover prior to sampling. If the well will not yield a sample immediately after purging, a maximum of 24 hours between purging and sampling is permitted.

1. Collect water from the well by slowly lowering a decontaminated bailer into the water column.

2. Transfer the samples which do not require filtering directly into sample bottles in the following order:

Volatile Organic Compounds
Semi-Volatile Organic Compounds
Pesticides and PCBs
Cations and Anions
Radionuclides
Bacteria.

3. If indicated in Section II.E., filter the required aliquots (SOP 05-03-02 or 05-03-03) and fill those sample bottles.

4. Preserve the samples immediately in accordance with SOP 07-01-02.

5. Conduct field analyses: pH (SOP 05-04-01 or 05-04-04), temperature, specific conductance (SOP 05-04-02), dissolved oxygen (SOP 05-04-03), Eh (SOP 05-04-08), and any other parameters listed in Section II.C.

6. If a dedicated sample bailer was used, return it to the well head. Otherwise, decontaminate the bailer as specified in SOP 01-01-00.

7. Replace the well cap and lock the protective casing.

8. Collect quality-assurance samples specified in Section II.D in accordance with SOP 04-01-01, 04-01-02, and 04-02-01.

9. Decontaminate samples in accordance with SOP 01-01-00.

10. Pack and ship the samples in accordance with SOP 07-01-03. Samples should be shipped on a daily basis and such that holding time requirements (SOP 07-01-02) can be met.

IV. PRECAUTIONS AND COMMON PROBLEMS

A. When using a bailer, do not allow the rope to drag on the ground. If necessary, lay out plastic sheeting to catch the rope.

B. When using a pump, exercise caution to prevent cross-contaminating samples with the hose. Do not sample from the pump discharge for trace organic compounds. Always use a check valve if not using a dedicated hose. Discard hose if there is a question about whether it can be adequately decontaminated.

C. Check the holding times on the analyses to be conducted. The holding time for some parameters is 24 hours. Plan sampling and shipping of these samples accordingly.

D. Preserve samples immediately after collection, including keeping them cool. Do not let samples sit in a hot vehicle until the end of the day.

V. DOCUMENTATION

A. Record information on a Groundwater Monitoring Data Sheet (SOP 07-02-01).

B. Prepare a Trip Report (SOP 07-02-04) and include:

- ≅ Time, date, and method of sample shipment
- ≅ Preservation methods and sample handling
- ≅ Description of purge and sampling methods
- ≅ The Groundwater Monitoring Data Sheet.

VII. REFERENCES

None

04-01-01 FIELD BLANKS

I. SCOPE AND APPLICABILITY

The purpose of a blank in general is to evaluate artificially introduced sources of contamination. Field blanks are part of a continuum of blank types that may be used to monitor for contamination introduced throughout the life span of a sample from collection through to analysis (see Exhibit 1). Examples of field blanks include equipment blanks, lot checks of dedicated sampling equipment, bottle blanks, transfer blanks, decontamination/rinsate source blanks and trip blanks (see 04-01-02).

A. Equipment Blanks are collected to assess the adequacy of decontamination procedures for non-dedicated sampling equipment and may help evaluate whether field conditions, and/or sampling equipment, sample transport, preparation and/or analysis are contributing contaminants to samples. Equipment blanks are typically performed on non-dedicated sampling equipment that requires decontamination between uses. Equipment blanks should not be collected near running machinery which may emit fumes that can contaminate the blanks
.

B. Lot Checks are rinsates of disposable sampling equipment analyzed for the target analytes of interest that are sampled using that equipment. This may include peristolic tubing, sampling scoops or bailers as well as the empty bottles provided by the laboratory if there are concerns with their purity.

C. Transfer Blanks are empty sample containers filled with water in the field to monitor for ambient contamination - they most typically are used for aqueous samples for organics such as volatiles, GRO, and DRO but may also be useful if airborne particulates are of concern for inorganic parameters. The water source should be the same as what will be used for the final rinse of decontaminated field equipment (see 04-04-01).

D. Decontamination/Rinsate Source Blanks are samples created from the source of final rinsate water used in the field. They differ from Transfer Blanks in that they would typically be filled in a "clean" location as opposed to the field to avoid picking up unexpected ambient contamination. This type of blank, while rare, typically is utilized when an unexplained and persistent contaminant has been detected in the equipment blanks and all other potential sources of contamination have been eliminated as the source.

II. PROJECT-SPECIFIC REQUIREMENTS

WATER TYPES TO BE USED FOR BLANKS: Blank water refers to water that is free of any analytes of interest. Common water types include distilled, deionized, HPLC-grade, pesticide grade etc. Depending on the data quality objectives for the project and expected levels of target analytes, the choice of water used for field blanks water may vary. Investigations where trace levels (parts per billion or lower) of contaminant are of interest may require water that meets higher purity standards than soil investigations where target analytes may be in the parts per million range.

Sources of water suitable for use for field blanks include:

A. **Laboratory supplied water** is laboratory reagent water that is used in the analytical or cleaning processes, as well as for their method blanks. For the best comparability between field blanks and laboratory method or instrument blanks it is recommended that laboratory supplied water be used. This water should be in glass containers if organics analytes are of interest. In addition, this water should be from the laboratory performing the analyses and not left over from a prior investigation or from a different laboratory. This eliminates any variability introduced as a result of different blank water sources. Left over water from a previous project is not recommended for use as a field blank as the possibility exists that the water could have become contaminated during storage.

B. **Store purchased distilled/deionized**: If trace level analyses are not required, the use of commercially prepared distilled/deionized water purchased from a supermarket or home improvement store may be sufficient. As this water typically is available in plastic jugs, it is not an appropriate blank water source when trace level organics are the constituents of interest.

C. **Ultra Pure**: Certified metal-grade, pesticide-grade or HPLC-grade water may be purchased from most chemical supply companies.

III. METHODOLOGY

A. Review the SOP for the medium sampled, the project specific field sampling plan or quality assurance project plan to determine the blank collection frequency required for the project. Due to cost or other considerations, every project may not warrant the use of an equipment blank. Considerations impacting the frequency of equipment blank collection may include expected concentration ranges of the analytes of interest, field conditions (i.e. will sampling activities occur in an area where there are potential background ambient concentrations of target analytes), use of new sampling equipment, newly trained staff, or use of an unknown laboratory. Field blanks may also be collected if unexpected results in field samples are observed.

B. Record the source, date opened and lot number of the water used for the rinsate blanks.

C. Assemble a complete set of decontaminated sampling equipment for the subject sampling effort.

D. Rinse the blank water across the sampling equipment, catching it in a decontaminated stainless-steel bucket or bowl. Handle the water in the same manner as the samples. For example, if samples for metals analysis are to be filtered with a disposable filter, the blank aliquot for metals analysis should be processed through a new disposable filter. Blanks for soil sampling may be run across the split-spoon sampler, trowel, and bucket and/or bowl used for homogenizing.

E. Fill a complete set of sample bottles.

F. Assign the blank a sample id – if it is desirable to obscure the fact that the sample is a blank, use the same format as the other samples in the series, otherwise a simplified sample id such as FB-mmddyy is recommended (where FB could be EB, TRB, LC etc. as appropriate for the blank type).

G. Assign the blank a sample date and time. Laboratory protocols for assigning sampling date/time to improperly labeled samples vary widely and may impact sampling holding times for certain short hold parameters.

H. Include the blanks on the Chain of Custody form along with the other samples.

I. Store, handle, and ship the blanks in the same manner as the samples.

IV. PRECAUTIONS AND COMMON PROBLEMS

A. The selection of stock blank water depends upon the requirements of the project. Analyses for trace contaminants will require a purer blank solution than analyses for major constituents. Stringent analytical requirements will necessitate the use of laboratory-supplied blank water.

B. Include ALL sampling equipment in the rinsing procedure.

V. DOCUMENTATION: Record the following information in the field logbook:

- Source of blank water (include a lot number if available and the type of sample container)
- Time and sequence within the sampling event when the blanks were prepared

- Description of the procedure for preparing the blanks
- Sample numbers assigned to blanks.

Incorporate this information into the Trip Report (SOP 06-02-05).

VI. REFERENCES

EPA, 1986. Test Methods for Evaluating Solid Waste: SW-846; Volume I, Chapter I. Washington, DC.
EPA, 2009. Region III Fact Sheet: Quality Control Tool – Blanks
(http://www.epa.gov/region3/esc/qa/pdf/blanks.pdf)

04-01-02 TRIP BLANKS

I. SCOPE AND APPLICABILITY

A trip blank is a container of laboratory reagent water that is prepared by the laboratory and shipped, unopened, to the field with empty sample containers and then from the field along with the full sample containers. Trip blanks are used to document contamination attributable to shipping and field handling procedures (i.e., diffusion of volatile organics through the septum during daily collection activities, shipment and storage) as well as provide an independent assessment of laboratory introduced contamination. If the trip blank and associated laboratory preparation blanks are free of analytes of interest, it may safely be assumed that reported analytes are actually present in the environmental samples.

II. PROJECT-SPECIFIC REQUIREMENTS

A. Frequency: *Specify the project specific frequency based on the Work Plan.*

B. Other Criteria: A trip blank is used for all classes of volatile organic analyte analyses (VOA), such as TCL volatile organic compounds (VOCs), BTEX, methanol or other purgeable organic compounds. If you are unsure whether a specific analysis is considered a purgeable method, confirm with the laboratory.

1. Trip blanks are also required for soil samples submitted for TPH-gasoline range organics and other purgeable organics analyses (VOAs). These trip blanks should be prepared in the same manner as an aqueous trip blank.
2. If some of the daily samples being collected/shipped together are submitted for typical VOCs (SW846-8260 or EPA 624) while others are submitted for TPH gasoline/diesel range organics (or another purgeable organic method), you will need to include 2 sets of trip blanks and analyze one for each unique (non-overlapping analyte list) method.

C. Other Considerations: Even if the project Work Plan doesn't specifically call for the use of Trip Blanks there are certain situations where the use of a Trip Blank should be evaluated:

1. If an unexpected high field PID reading is encountered during sampling, a trip blank may be warranted to monitor for cross contamination if other samples are included in the shipment.
2. When there is suspicion of the potential of airborne contamination from external sources such as idling vehicles or machinery or operations upwind using VOCs (such as a refinery, spray painting etc.) although such contamination is best monitored for using a transfer blank where the VOA vial is filled in the field with the water used for equipment rinsate blanks.
3. In general, if there is a suspicion of external cross contamination, a trip blank could be submitted to the laboratory to be placed on HOLD. If unexpected results are encountered in the other samples in the shipment, the laboratory can then be requested to analyze the trip blank to determine whether cross contamination has occurred however holding times must be closely monitored in such cases.

III. METHODOLOGY

For those projects where trip blanks are required, appropriate procedures are discussed below:

A. One trip blank should be included with each cooler containing volatile samples. To save on trip blank analysis costs, you may collect all volatile samples during the day in a single cooler and ship them separately from other sample bottles (if necessary to minimize the number of trip blanks required).

B. When ordering bottles from the laboratory for the sampling event, request sufficient trip blanks such that there is at least one trip blank associated with each day of sample collection activities (with a few spares as a contingency if unexpected conditions expand the field activities or a trip blank container breaks).

C. A trip blank is associated with a group of samples that are collected together throughout the day and shipped together. (It is not necessary to maintain the trip blanks with the same set(s) of vials that are shipped from the laboratory, unless there is a concern that these sample containers have potentially been exposed to contamination during shipment, when it is recommended that fresh containers be obtained.)

D. The trip blank should go out to the field in a cooler (with ice) that volatile field samples containers are added to as they are collected during each day's sampling activities. Handle the blank in the same manner as the filled sample vials.

E. Assign the trip blank a sample number identifying its source, consistent with the format used for the sampling event. One suggestion is to include the sample date in the sample number to aid in matching it with the associated field samples in presentation of results in the project report (i.e. TB0401 or TRIP0401 for the trip blank associated with samples collected on 04/01).

F. Assign a date and time to the trip blank on the COC and sample container as if it were a field sample. The time stamp for the trip blank is when the first sample is added to the cooler containing the trip blank. Do not leave this field blank as the laboratory will require a date and time stamp to monitor analysis holding times. Laboratory protocols for assigning this date if left blank can vary considerably.

G. Return the trip blanks to the laboratory with the samples. Include the trip blank information along with the samples on the Chain-of-Custody form (SOP 06-02-02). Analysis is performed for the same suite of volatile organic compounds as the associated samples. (i.e., it is only necessary to request BTEX if associated samples are only analyzed for BTEX). However, if samples with different subsets of volatile constituents are collected and shipped together, select the method that covers all of the constituents. It is not necessary to analyze for both BTEX and TCL VOCs, for example.

IV. PRECAUTIONS AND COMMON PROBLEMS

A. Trip blanks should never be opened in the field.

B. If there are multiple sample teams on the project that are collecting samples separately from each other during the day, a separate trip blank should be assigned to each group which is then shipped separately to the lab.

C. Do not combine groupings of samples with different associated trip blanks into the same cooler for shipping.

D. Do not combine multiple days' worth of VOC samples into a cooler for shipment unless they have been in the same cooler with the trip blank and each other throughout the sampling process.

V. DOCUMENTATION

Describe handling of the trip blanks in the Trip Report (SOP 06-02-05). Include the sample numbers assigned and associated samples (if more than one trip blank is used).

VI. REFERENCES:

EPA, 1986. Test Methods for Evaluating Solid Waste: SW-846; Volume II. Washington, DC

EPA Region III Quality Control Fact Sheet, Field Blanks, http://www.epa.gov/region3/esc/qa/pdf/blanks.pdf

05-03-05 BAILER

I. EQUIPMENT SPECIFICATION: This procedure is applicable to the use of all bottom-fill bailers.

II. INSPECTION AND CALIBRATION

A. DAILY INSPECTION AND CHECKS: Make sure fittings at both ends of the bailer are secure. Assure that the check valve opens and closes freely.

B. CALIBRATION: There is no calibration applicable to this equipment.

C. ROUTINE MAINTENANCE: There is no maintenance applicable to this equipment. Bailers are typically replaced if damaged.

III. USE

A. Select a rope or cable for suspension of the bailer which is appropriate to project requirements. Typically, small gauge nylon rope is used, although stainless-steel cable may be used when samples will be analyzed to very low detection limits. The rope or cable should be new and clean. Do not use materials which have been used on another project, as this may result in cross contamination.

B. Consult the Project Manager to select a bailer composition which is compatible with the anticipated groundwater quality. For most applications, PVC bailers are adequate. Stainless-steel may be used where very low levels of organic compounds are of interest. Teflon bailers are available and may be requested on some projects.

C. Using a strong, non-slipping knot, such as a bowline, tie the rope or cable to the top of the bailer.

D. Lower the bailer into the well. Do not let the bailer free-fall down the well, as the device may shatter or the ball valve may become dislodged upon striking the water or the bottom of the well.

E. Raise the bailer by pulling the rope with a smooth, uniform motion. A jerky motion may open the check valve, resulting in water loss. Check the knot periodically.

Do not allow the bailer rope to drag on the ground. Place plastic sheeting on the ground to keep the rope clean if conditions are muddy, the ground surface is contaminated, or very low levels of contaminants are of interest.

IV. DECONTAMINATION: The equipment should be decontaminated in accordance with SOP 01-01-00.

Typically, the bailer is washed with a potable water and non-phosphate soap solution. The bailer is then rinsed with distilled water and wrapped in plastic or foil until used.

V. TROUBLESHOOTING

A. If the knot should come undone or the rope breaks, the bailer typically can be recovered using a weighted fishing hook tied to monofilament line.

B. When bailing turbid water, it may be necessary to rinse the ball-valve at the bottom of the bailer with distilled water if it clogs.

06-02-02 CHAIN-OF-CUSTODY FORM

I. SCOPE AND APPLICABILITY

A Chain-of-Custody (COC) Form must be completed for each shipment of samples for laboratory analysis. The COC form is the communication record between the project field team and the laboratory login personnel. Accurate and legible completion of the COC form is necessary to insure that samples are analyzed for the correct parameters.

II. PROJECT-SPECIFIC REQUIREMENTS: None.

III. METHODOLOGY

Complete a Chain-of-Custody Form as provided by the laboratory for each shipping container of samples containing the following information (each laboratory will have their own preferred COC form so the location of the information on the form may vary):

- CEC project number and name
- Project Manager or designated CEC contact with their phone number and email
- Date and time of sample collection
- Sample number
- Sample Matrix
- Total number of bottles or jars
- Preservation (this is especially important if the laboratory is expected to preserve the bottles upon receipt)
- Suites of analyses requested, in specific terms. Examples:
  TCL VOCs
  RCRA Metals
  BTEX
  PNAs-SW846 8270/SIM
  Avoid vague descriptors like "VOCs" or "metals." If a project specific analyte list (subset of metals or organic compounds for example) has been set up with the project and is referenced on the COC, include a copy of it with each shipment to the laboratory to ensure that it becomes part of the data report and the sample custody records. It should be possible to determine exactly what sample analyses were requested/required from the COC.
- Requested turnaround time (be specific (i.e. 48 hours, 3 days, etc.,) if not standard)
- Any special notes/requests, for example indicate high PID readings if applicable, request for lower reporting limits – don't assume you will get drinking water limits just because you submit a drinking water sample, this must be requested either in advance or on the COC
- Signature of CEC person relinquishing custody to the laboratory or shipping courier
- Date and time samples were handed over to someone else or placed under custody seals

Signatures of every person who has control of the samples should appear on the Chain-of-Custody Form. If another person, even another CEC employee, takes responsibility for packing or shipping the samples after you have completed the form and before the samples have been sealed, that person should sign as receiving and subsequently relinquishing the samples.

IV. PRECAUTIONS AND COMMON PROBLEMS

- Use of vague terms such as VOCs or Metals may lead to missing parameters. Verify with the laboratory which compounds/metals are part of their standard analyses to ensure that all necessary parameters will be reported.
- Illegible sample names/IDs will lead to the sample login personnel guessing/interpreting what was written which may result in the laboratory report not reflecting the intended sample names/ID. It is often not possible for the laboratory to retroactively edit the report and more importantly the

underlying analysis records to correct sample names/IDs.

- If lower reporting limits are required, this must be communicated to the laboratory on the COC in addition to any prior communication as this may impact how samples are logged in for analysis.

V. DOCUMENTATION

Use the laboratory supplied COC forms (paper or electronic) or equivalent. If three part forms are not used, either make a photocopy, take a photo of or fax the COC before placing it in the cooler. Use of the Chain-of-Custody Form is discussed in SOP 06-01-01 and SOP 06-01-03.

VI. REFERENCES: None.

07-02-01 GROUNDWATER MONITORING DATA SHEET

I. SCOPE AND APPLICABILITY: A Groundwater Monitoring Data Sheet is completed each time water samples are collected to document field data and sampling methodology.

II. PROJECT-SPECIFIC REQUIREMENTS: None.

III. METHODOLOGY: Complete the form (Exhibit 07-02-01) as samples are collected, as follows:

a. Self explanatory
b. CEC project number
c. Names or initials of all members of the sampling team
d. Complete well designation
e. Depth to water level, reported to $\pm$0.01 ft. (Check measurement datum at the top of the column.)
f. Date and time well purging is started
g. Volume of water removed, in gallons
h. Check if well was purged to dryness
i. Indicate method of purging, such as submersible pump or bailer
j. Date and time that the actual sample was withdrawn. If sample bottles were filled at multiple, separate times, these should all be indicated.
k. Self explanatory (Check units for temperature.)
l. Unusual odors or other observations
m. Other atypical information, such as special handling of purge water or field problems

IV. PRECAUTIONS AND COMMON PROBLEMS: All information required by the form must be provided.

V. DOCUMENTATION: Attach the form to the Trip Report (SOP 07-02-04).

VI. REFERENCES: None.