SEMI-ANNUAL GROUNDWATER MONITORING REPORT

ENVIRONMENTAL WASTE SOLUTIONS
CAMDEN CLASS II LANDFILL
TDSWM PERMIT NUMBER IDL 03-0212
CAMDEN, TENNESSEE

Prepared For:

ENVIRONMENTAL WASTE SOLUTIONS CLASS II LANDFILL
200 OMAR CIRCLE
CAMDEN, TN 38320

Prepared By:

CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
NASHVILLE, TN

CEC Project 142-059

JUNE 2014

SEMI-ANNUAL GROUNDWATER MONITORING REPORT
June 2014

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

Prepared by:
Civil & Environmental Consultants, Inc.
325 Seaboard Lane, Suite 170
Franklin, Tennessee 37067
CEC Project No. 142-059
August 22, 2014

Michael Johnson, P.G.
Project Manager II

Philip Campbell
Assistant Project Manager

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APPENDICES

EXECUTIVE SUMMARY

This report documents the first semi-annual monitoring event of 2014 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 following table presents the wells that were used to develop this report.

Upgradient Monitoring Points	Downgradient Monitoring Points
MW-1	MW-3, MW-4

Groundwater samples were collected by Civil & Environmental Consultants, Inc. (CEC) on June 26, 2014. ESC Lab Sciences performed the analysis and reported the results on July 10, 2014. All monitoring wells were sampled during the event, with the exception of MW-2, which was recently replaced by MW-4. MW-2 has subsequently been removed from the monitoring network because the well routinely yielded insufficient volume of water for sampling purposes. MW-2 remains in place, and will continue to be monitored for field parameters and water level data. The collected groundwater samples were analyzed for Appendix I inorganics, Bromide, Chloride, Nitrate, Sulfate, Ammonia (NH3), 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 groundwater constituents.

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

SSIs over background identified for the current monitoring event include zinc at MW-4 and chloride at MW-3 and MW-4. The chloride concentrations are consistent with historical data and remain well below the secondary drinking water standard for chloride concentrations. The zinc concentration at MW-4 was 0.062 mg/L, well below the secondary drinking water standard of 5 mg/L. Additionally, MW-4 has been sampled only three times, therefore there is insufficient data to support a trend in groundwater concentrations at MW-4 at this time.

The next semi-annual monitoring event is tentatively scheduled for October, 2014.

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 accepts household waste
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 Operated Treatment Works
ppm – parts per million*
PQL – Practical Quantitation Limit
QC – Quality Control
SNL – Sanitary Landfill
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

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 can be located on the Camden, Tennessee USGS quadrangle at north latitude 36° 3' 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 Figure 1- Site location Map. The landfill footprint can be viewed in 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 and 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, 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 southwest. Comparisons of the water bearing zone elevations to static groundwater elevations for both indicate an unconfined aquifer.

2.2 MONITOR WELL INTEGRITY & STATIC WATER LEVELS

The groundwater monitoring network for the Class II Landfill consists of monitor wells MW-1, MW-3, and MW-4. Monitor well MW-1 serves as an up-gradient monitoring point while monitor wells MW-3 and MW-4 serve as down-gradient monitoring points.

The integrity of each monitor 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 monitor well. Once the watertight seal is removed from the top of each monitor well's casing, the well is allowed to de-pressurize. A decontaminated electronic probe is slowly lowered into the monitor 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 monitor 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 this data, the electronic water level probe is removed from the monitor 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. Groundwater elevations are listed in **Table 1 - Field Parameters & Potentiometric Data, Appendix A**.

2.3 GROUNDWATER FLOW DIRECTION

Groundwater flow at the landfill appears to flow in a southwesterly direction towards Charlie Creek. Groundwater flow in the vicinity of the Class II Landfill appears to flow from a topographic high north of the landfill generally south towards monitor wells MW-3 and MW-4 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-two (22) feet below ground surface at the up-gradient monitor well MW-1

to approximately ten (10) feet below ground surface at monitor well MW-4. The groundwater potentiometric data interpreted from the 1999 and 2006 hydrogeolgical 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 June 26, 2014 is approximately 1.19 %.

The potentiometric gradient is calculated according to the following formula:

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

$$\frac{(393.25 \text{ at MW-1}) - (370.61 \text{at MW-4})}{1{,}900'} * 100 = 1.19\%$$

The above calculation assumes a perpendicular gradient between the potentiometric contours drawn between MW-1 to MW-4. 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 either landfill have not been determined at this time.

3.0 GROUNDWATER SAMPLING PROCEDURES

3.1 INSTRUMENTATION

Depth to groundwater measurements are collected using a Solinst® electronic water level indicator, model # 122. A YSI 556 Multi-parameter probe is used to record pH, specific conductance, temperature, dissolved oxygen and ORP during groundwater sampling events at the landfill. A LaMotte model 2020 turbidity meter or equivalent is used to collect turbidity readings. Each instrument is either checked against known standards or calibrated as per manufacturers' specifications prior to the commencement of sampling activities.

3.2 PURGING AND COLLECTION OF FIELD PARAMETER VALUES

Groundwater shall be purged using either a decontaminated down-well pump using new tubing or using new tubing connected to a peristaltic pump or in the case of a pump malfunction, a new disposable bailer. The total volume of groundwater residing in each monitor well is calculated by subtracting the depth to water from the total depth of each well. This linear distance is next multiplied by 0.163 gallons per foot in a 2 inch (I.D.) monitor well. When purging using a disposable polyethylene bailer, the bailer with sufficient nylon twine is slowly lowered into the water column. The bailer is allowed to completely submerse into the water column prior to extracting the bailer from the monitor well. The initial amount of purged groundwater is collected in a clean, high-density polyethylene (HDPE) reservoir where it is observed for Temperature, pH, specific conductance, dissolved oxygen, oxidation-reduction potential (ORP) and turbidity. These values are noted in the site specific field book as V_0 and then the collected groundwater is discarded onto the ground, away from the monitor well.

Bailers and tubing used for purging activities shall be constructed of either polyethylene or Teflon. Bailers shall be factory decontaminated and sealed as to allow no environmental contaminants to interact with the bailer. New nylon twine shall be fixed to each bailer via a tied knot.

The collected groundwater will be decanted into a flow-through cell where it will be observed for pH, specific conductance, temperature, and turbidity. These values will be noted in the site specific field book as V_0 and then the collected groundwater will be poured onto the ground, down-gradient from the monitor well.

Groundwater shall be purged from the monitor well for a specific period of time that allows for a new volume of water to have passed into the flow-through cell. Once this volume of water has been purged, the field chemistry parameters will again be observed and recorded in the field book as V_1. This procedure for purging groundwater continues for an additional well volume, if sufficient groundwater is available. After the second purged well volume has been observed for field parameter values, the values are checked against values for V_1. If the pH and specific conductance values for each volume purged vary no more than 10% from V_1 to V_2 and the temperature has stabilized to within one degree Celsius, preparations are made to collect a groundwater sample for submittal to an analytical laboratory. If the field parameters have not stabilized, the purging procedure shall continue until either one of the following conditions are met:

1. Field stabilization occurs,
2. Well is purged dry, or
3. Three well volumes have been purged.

If the monitor well is purged dry, then the recharging groundwater shall be collected within twenty-four hours.

Field parameter values are presented in Table 1 – Groundwater Field Data, 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 are collected from monitor wells once field parameter data indicates that stagnant water has been purged from the well. Groundwater is placed in laboratory supplied

sample vessels in the following order if analyzed: Appendix I inorganics – one (1), five-hundred (500) ml preserved with nitric (HNO3) acid; Bromide, Chloride, Nitrate, Sulfate – one (1), two-hundred fifty (250) ml unpreserved HDPE jar; Ammonia – one (1), two-hundred fifty (250) ml HDPE jar preserved with sulfuric (H2SO4) acid.

3.4 QUALITY ASSURANCE & QUALITY CONTROL

Field blanks were collected for each sample collection event performed to date at the EWS Class II Landfill. CEC collected a field blank next to monitoring well MW-3. The field blanks were collected by pouring deionized water into a duplicate set of sample bottles. Thereby, allowing any airborne contaminants a chance to enter the field blank sample. Laboratory analytical testing of the field blanks did not reveal the presence of any of the EWS Class II Landfill site specific target compounds.

In addition, a duplicate sample was collected from MW-4 for laboratory quality control purposes. The reported values for the duplicate sample are similar to the original MW-4 sample.

3.5 SAMPLE CHAIN-OF-CUSTODY

A sample Chain-of-Custody (COC) traveled along with each sample kit from ESC to EWS and finally back to ESC for the sampling events. The CEC SOP 07-01-01 for maintaining sample Chain of Custody may be found in **Appendix D**.

4.0 LABORATORY ANALYTICAL PROCEDURES

4.1 ANALYTICAL METHODS

All laboratory analyses for June 2014 monitoring event were completed by Environmental Science Corporation in Mt. Juliet, Tennessee. The analytical methods chosen for this monitoring event are the most appropriate procedures as directed 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 (if necessary) were as follows:

Method 6010b	Inductively Coupled Plasma (ICP) – Atomic Emission Spectrometry
Method 6020	ICP – Mass Spectrometry
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 (Fluoride)
Method 350.1	Ammonia Nitrogen

4.2 LABORATORY ANALYTICAL RESULTS

Laboratory reports from the analysis of groundwater samples collected from the EWS Camden Class II Landfill during the semi-annual monitoring event were prepared by ESC and reported to CEC on July 10, 2014. Copies of the laboratory reports are located in **Appendix C – Laboratory Analytical Reports**. Constituent values from all laboratory analysis along with applicable maximum contaminant levels (MCLs) are presented in **Table 2 – Analytical Results, 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. One QC qualifier code was indicated during the laboratory analysis of groundwater samples during this monitoring event and can be viewed along with the **Laboratory Analytical Reports, 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 analysis 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. Data determined to be normally distributed were evaluated using parametric prediction interval analysis. Data that was 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 to the concentrations observed at the up-gradient monitoring location during this monitoring event. For the Class II Landfill, monitor well MW-1 was considered as background. Intra-well analysis was also utilized at MW-1 to compare the concentrations observed during the current groundwater sampling event to the established background data set.

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 and Trend Analysis**.

5.2 RESULTS

Review of the statistical analysis performed on the available data indicated that there were two statistically significant increases (SSI's) over background data. The SSI's over background data were limited to Barium (MW-3), and Chloride (MW-3 and MW-4). The Barium and Chloride detections observed at MW-3 and MW-4 are well below their associated MCL's.

Trend analysis utilizing the limited data available from the monitoring events showed no distinct trends for the site monitoring wells.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Representative groundwater samples were collected from monitor wells MW-1, MW-3 and MW-4. The groundwater samples were analyzed for Appendix I list of parameters, bromide, chloride, nitrate, sulfate, ammonia (NH3), and a short list of ions.

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

Laboratory analytical results for the groundwater samples collected from the facility monitor wells for the EWS Class II Landfill indicated that one compound was detected at concentrations that exceeded the EPA maximum contaminant levels (MCL); specifically, the concentration of Arsenic in MW-1.

Arsenic was detected in MW-1 at a concentration of (0.063 mg/l). The MCL for arsenic is (0.01 mg/l). Arsenic has been detected at concentrations exceeding the primary drinking water MCL prior to the disposal of waste in the landfill. More specifically, 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. Additionally, ESC indicated that the arsenic concentration at MW-1 "failed the method required serial dilution test and/or subsequent post-spike criteria, which indicate matrix interference".

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

Laboratory analytical results for the groundwater samples collected in June of 2014 from the EWS Class II Landfill groundwater monitor well network indicated that two of the site specific groundwater monitor list of compounds was detected at concentrations which exceeded the

Tennessee Public Water Supply Secondary Drinking Water Standards (2DW). Those parameters included Iron and Manganese in upgradient well MW-1, Iron and Manganese in MW-3, and Manganese in MW-4.

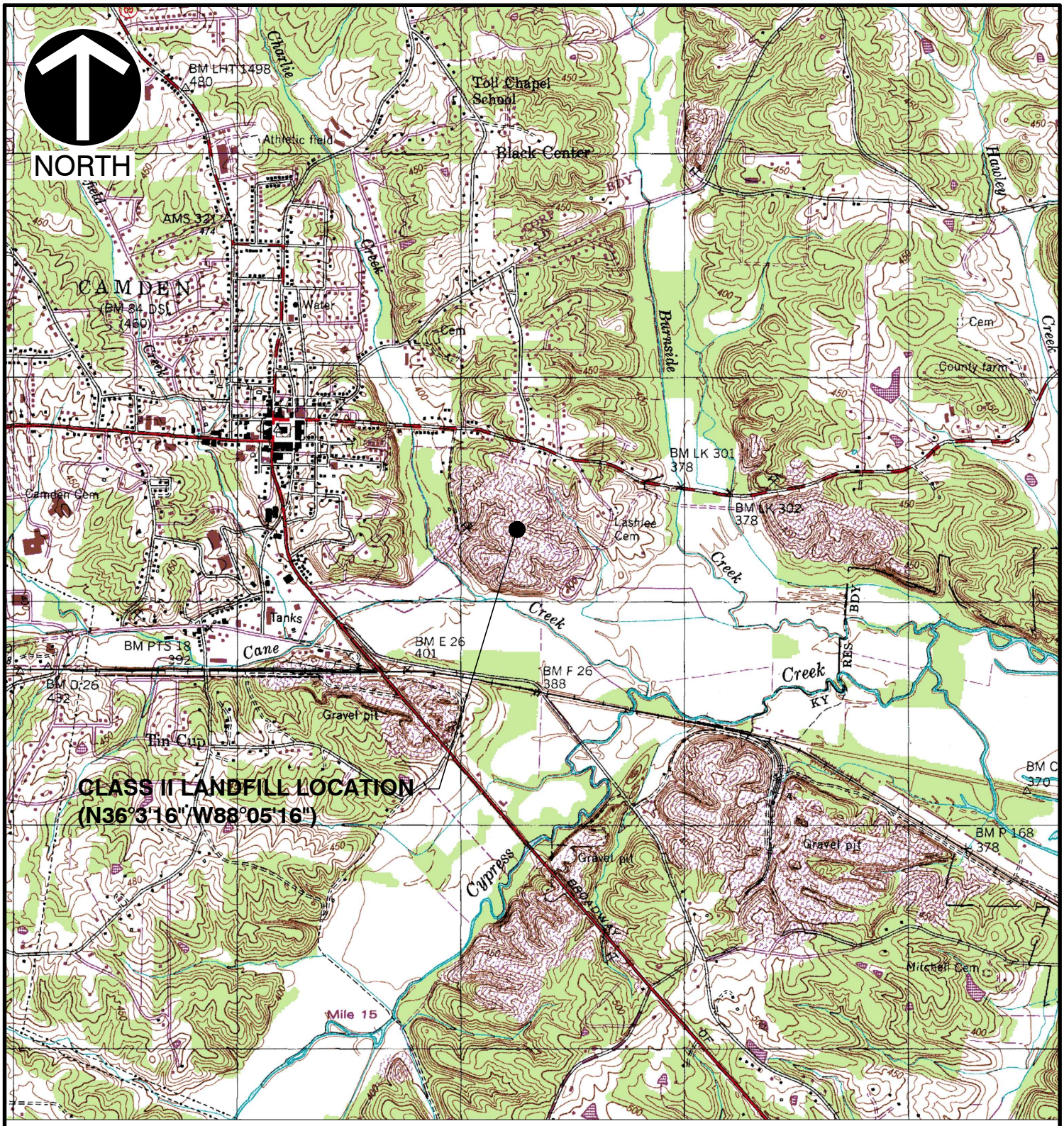
Iron was detected at a concentration of 26 mg/L in MW-1 and 1.6 mg/L in MW-3 prior to the placement of waste. Therefore, the concentration in the groundwater samples taken during the June 2014 sample event of 18 mg/L in MW-1 and 0.44 mg/L in MW-3 are not considered the result of a new offsite source.

Manganese has been consistently detected in upgradient well MW-1 and has the highest reported concentration observed during the current monitoring event. The manganese detections observed in site monitoring wells are considered a natural variation in local groundwater.

The next semi-annual monitoring event is tentatively scheduled for October, 2014.

APPENDIX A

MAPS AND TABLES



REFERENCE

1. U.S.G.S. 7.5' TOPOGRAPHIC MAP, CAMDEN QUADRANGLE, TENN. DATED: 1950, PHOTOREVISED: 1984.

* HAND SIGNATURE ON FILE

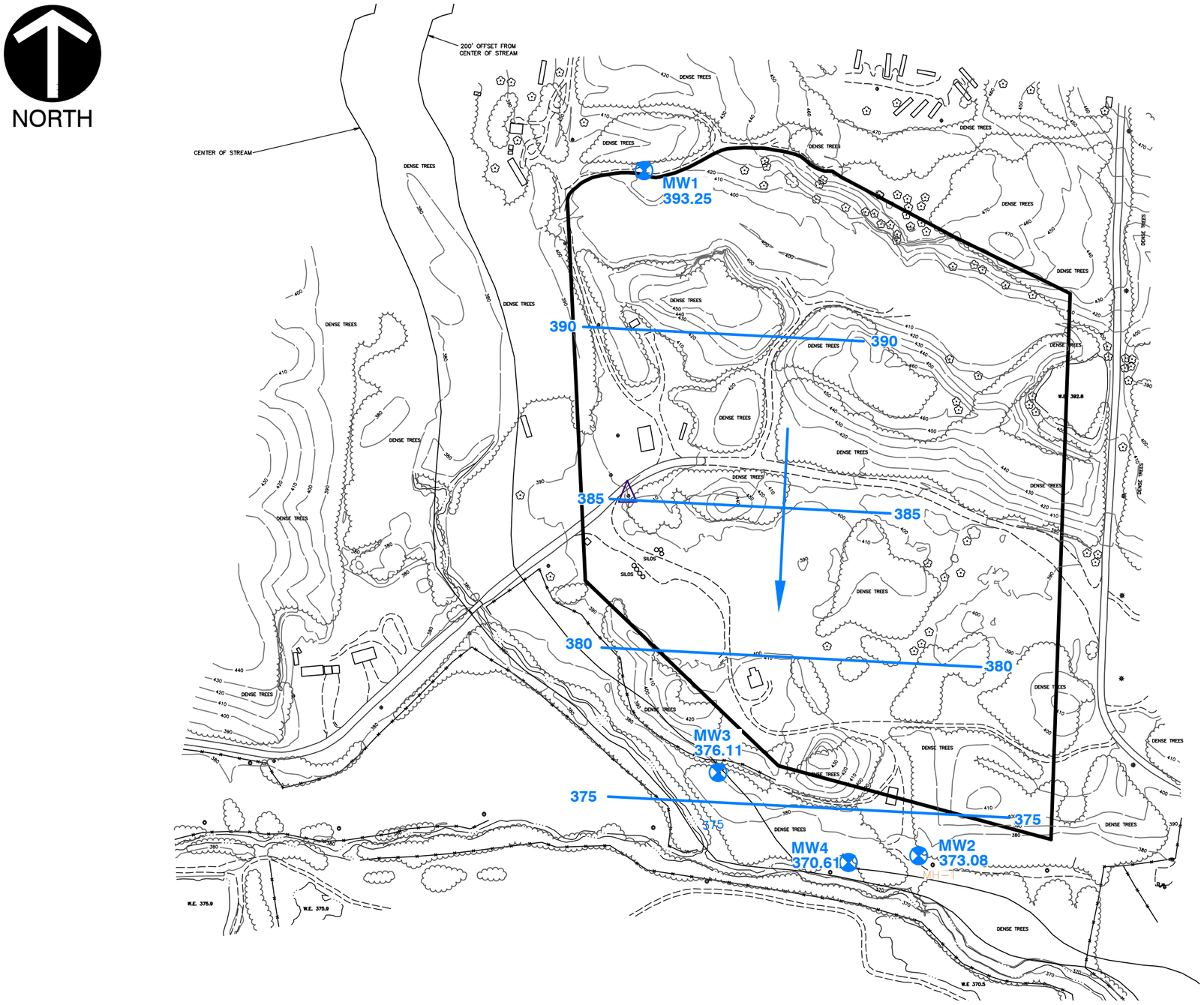
Civil & Environmental Consultants, Inc.
325 Seaboard Lane, Suite 170 - Franklin, TN 37067
615-333-7797 · 800-763-2326
www.cecinc.com

ENVIRONMENTAL WASTE SOLUTIONS
CLASS II CAMDEN LANDFILL
CAMDEN, TENNESSEE

SITE LOCATION MAP

DRAWN BY:	KLU	CHECKED BY:	PC	APPROVED BY:	*EH	FIGURE NO.:	1
DATE:	AUGUST 14, 2014	DWG SCALE:	1"=2000'	PROJECT NO:	142-059		

P:\2014\142-059\-CADD\Dwg\142-059 SITE LOCATION MAP.dwg{LAYOUT1} LS:(8/14/2014 - kunderwood) - LP: 8/14/2014 1:43 PM



LEGEND

- MW1 / 393.25 — GROUND WATER MONITORING WELL / GROUND WATER ELEVATION (FMSL)
- 390 — POTENTIOMETRIC SURFACE CONTOUR (FMSL)
- GROUND WATER FLOW DIRECTION
- MH1 — MANHOLE
- APPROXIMATE FILL LIMITS

NOTE:

Hydraulic gradient calculation between points MW–1 and MW–4

$$i = \frac{393.25' - 370.61'}{1{,}900'} = 0.0119 \text{ ft/ft}$$

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 THIS 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.

SCALE IN FEET

0 300' 600'

Civil & Environmental Consultants, Inc.
405 Duke Drive, Suite 270 - Franklin, TN 37067
615-333-7797 · 800-763-2326
www.cecinc.com

ENVIRONMENTAL WASTE SOLUTIONS
CAMDEN CLASS II LANDFILL
CAMDEN, TENNESSEE

JUNE 2014
POTENTIOMETRIC SURFACE MAP

DRAWN BY:	PC	CHECKED BY:	MJ	APPROVED BY:	EH
DATE:	JUNE 2014	DWG SCALE:	1"=300'	PROJECT NO:	101-301

FIGURE NO.: 2

P:\2014\142-059\-DRAFT DOCUMENTS\JUNE 2014 GW REPORT\101-301 GROUNDWATER MAP JUNE 2014.DWG[LAYOUT1]LS:(PCAMPBELL - 8/18/2014) - LP: 8/18/2014_1:49:26_PM

Table 1

Environmental Waste Solutions Camden Class II Landfill IDL 03-0212

Field Parameters and Potentiometric Data - June 26, 2014

Monitoring Well/ Piezometric Well	Date	Sample Time	Top of Casing Elevation Feet MSL	Sample Method	Bottom of Well Elevation Feet	Well Diameter Feet	Well Volume Gallons	Depth to Water Feet	Potentiometric Surface Feet MSL	Temperature Degrees C	Conductivity micromhos/cm	pH SU	Dissolved Oxygen mg/l	Oxidation Reduction Potential Millivolts	Turbidity NTU
MW-1	6/26/2014	12:30	415.36	Bailer	382.26	0.17	1.9	22.11	393.25	15.7	96.0	5.08	0.41	34.2	14.9
MW-2	6/26/2014	NS	380.15	NS	367.70	0.17	0.9	7.07	373.08	20.9	225.2	5.91	4.76	160	NS
MW-3	6/26/2014	12:27	392.49	Bailer	369.66	0.17	1.1	16.38	376.11	16.9	160.9	5.57	0.86	205.7	25.8
MW-4	6/26/2014	13:35	381.50	Bailer	369.39	0.17	0.2	10.89	370.61	15.0	165.1	5.37	0.39	249.4	7.88

NS= Not Sampled, Only water level and field parameters collected at MW-2. MW-2 removed from monitoring network

Table 2
Environmental Waste Solutions Camden Class II Landfill IDL 03-0212
Analytical Data - June 26, 2014

		MW-1		MW-3		MW-4	
		6/26/2014		6/26/2014		6/26/2014	
Parameter	MCL (mg/l)	Value (mg/l)	Qual	Value (mg/l)	Qual	Value (mg/l)	Qual
Bromide		<1.0		<1.0		<1.0	
Chloride	250 [2]	**2.9**		**29**		**31**	
Nitrate	10	<0.10		**1.4**		**2.2**	
Sulfate	250 [2]	<5.0		**9.7**		<5.0	
Ammonia Nitrogen	-	<0.25		**0.41**		**1.5**	
Antimony	0.006	<0.0010		<0.0010		<0.0010	
Arsenic	0.01	**0.063**	O1	0.0012		<0.0010	
Beryllium	0.004	<0.0010		<0.0010		<0.0010	
Cadmium	0.005	<0.00050		<0.00050		<0.00050	
Copper	1.3	<0.0020		0.0073		<0.0020	
Lead	0.015	<0.0010		**0.0021**		<0.0010	
Selenium	0.05	<0.0010		<0.0010		<0.0010	
Thallium	0.002	<0.0010		<0.0010		<0.0010	
Zinc	5 [2]	**<0.010**		0.023		**0.062**	
Mercury	0.002	<0.00020		<0.00020		<0.00020	
Aluminum	0.2 [2]	<0.10		**0.5**		<0.10	
Barium	2	**0.018**		**0.079**		**0.04**	
Boron	-	<0.20		<0.20		<0.20	
Calcium	-	**3.3**		**8.6**		**7.9**	
Chromium	0.1	<0.010		<0.010		<0.010	
Cobalt	-	**0.036**		<0.010		<0.010	
Iron	0.3 [2]	**18**		**0.44**		<0.10	
Magnesium	-	**3.3**		**3.2**		**5.2**	
Manganese	0.05 [2]	**0.98**		**0.12**		**0.83**	
Nickel	-	<0.020		<0.020		<0.020	
Potassium	-	**<1.0**		**6.6**		**3.6**	
Silver	0.10 [2]	<0.010		<0.010		<0.010	
Sodium	-	**2.9**		**14**		**16**	
Vanadium	-	<0.010		<0.010		<0.010	

Notes:

MCL: Maximum Contaminant Level Enforceable National Primary Drinking Water Standards

2: Non-Enforceable National Secondary Drinking Water Standard

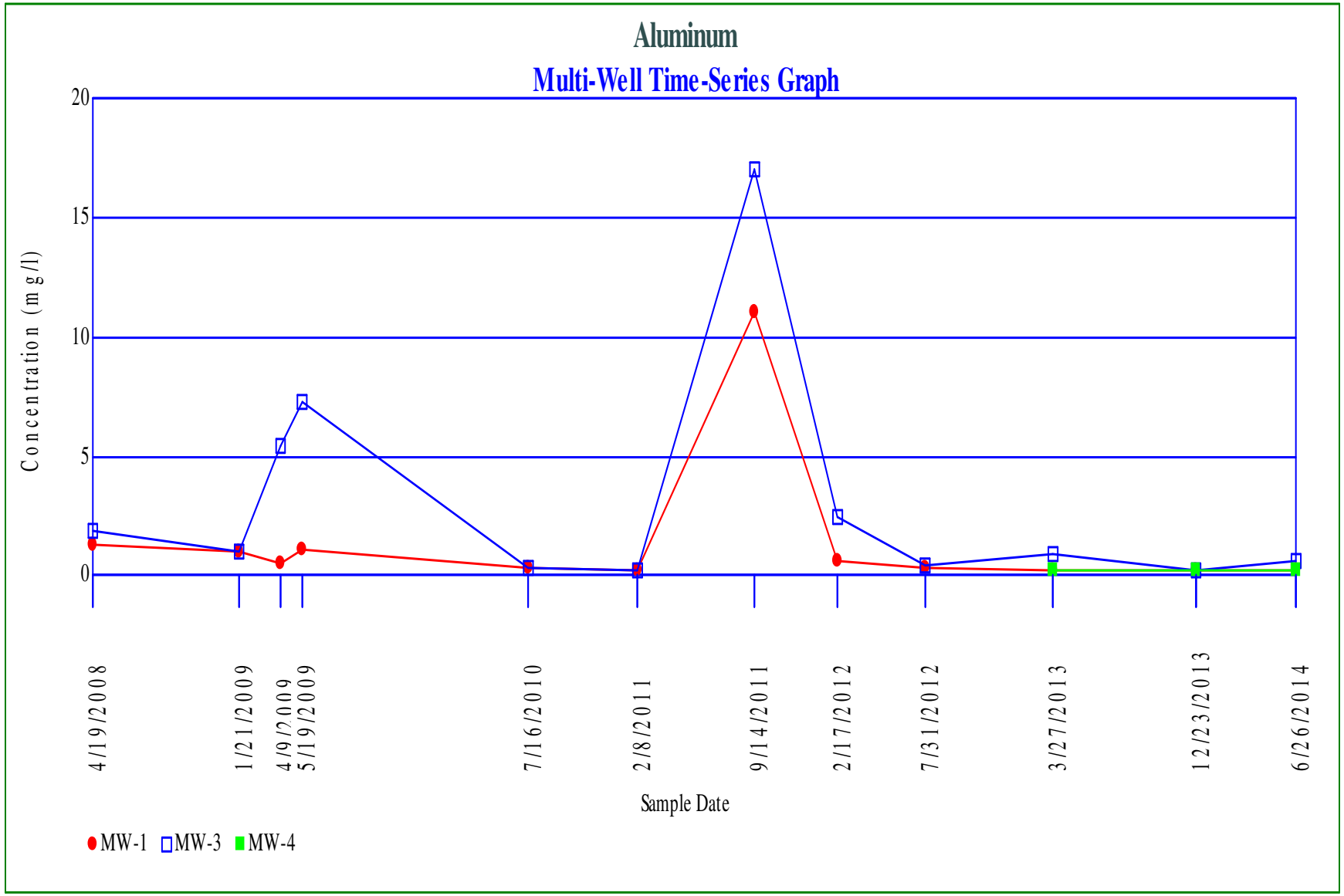
Bold text indicates laboratory analytical detections above the practical quantitation level

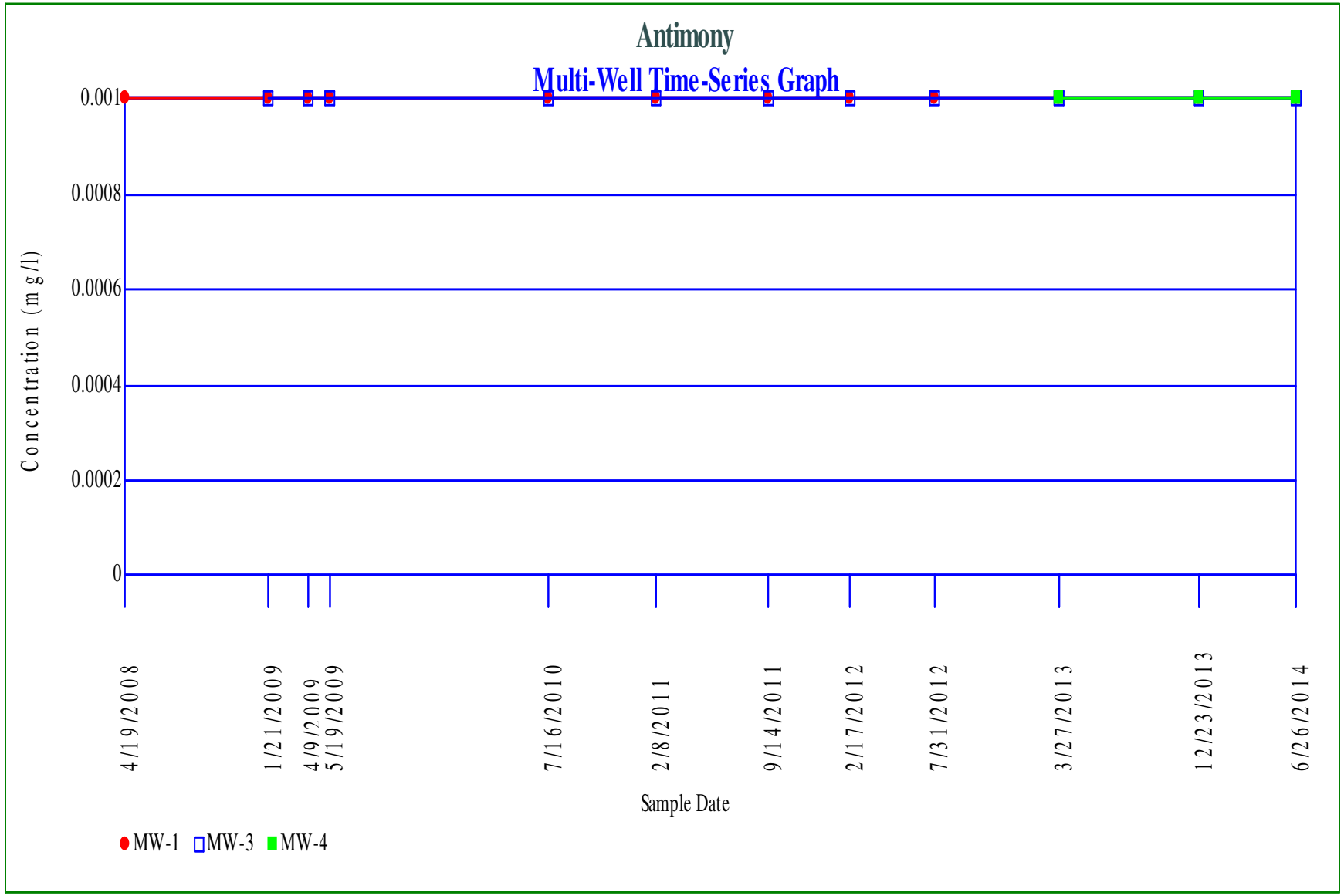
Greyed text indicates detection above respective MCL

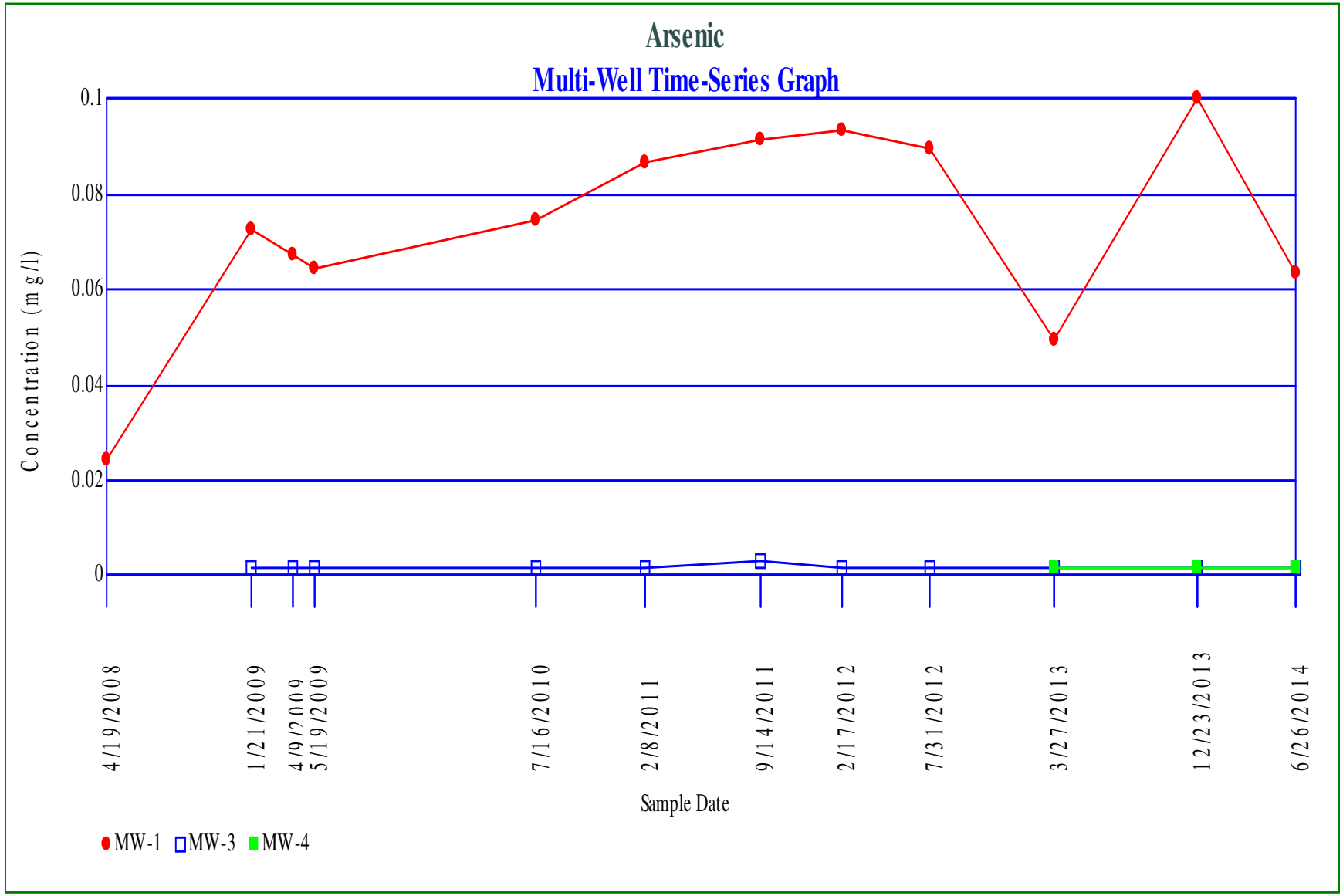
O1: (ESC) The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

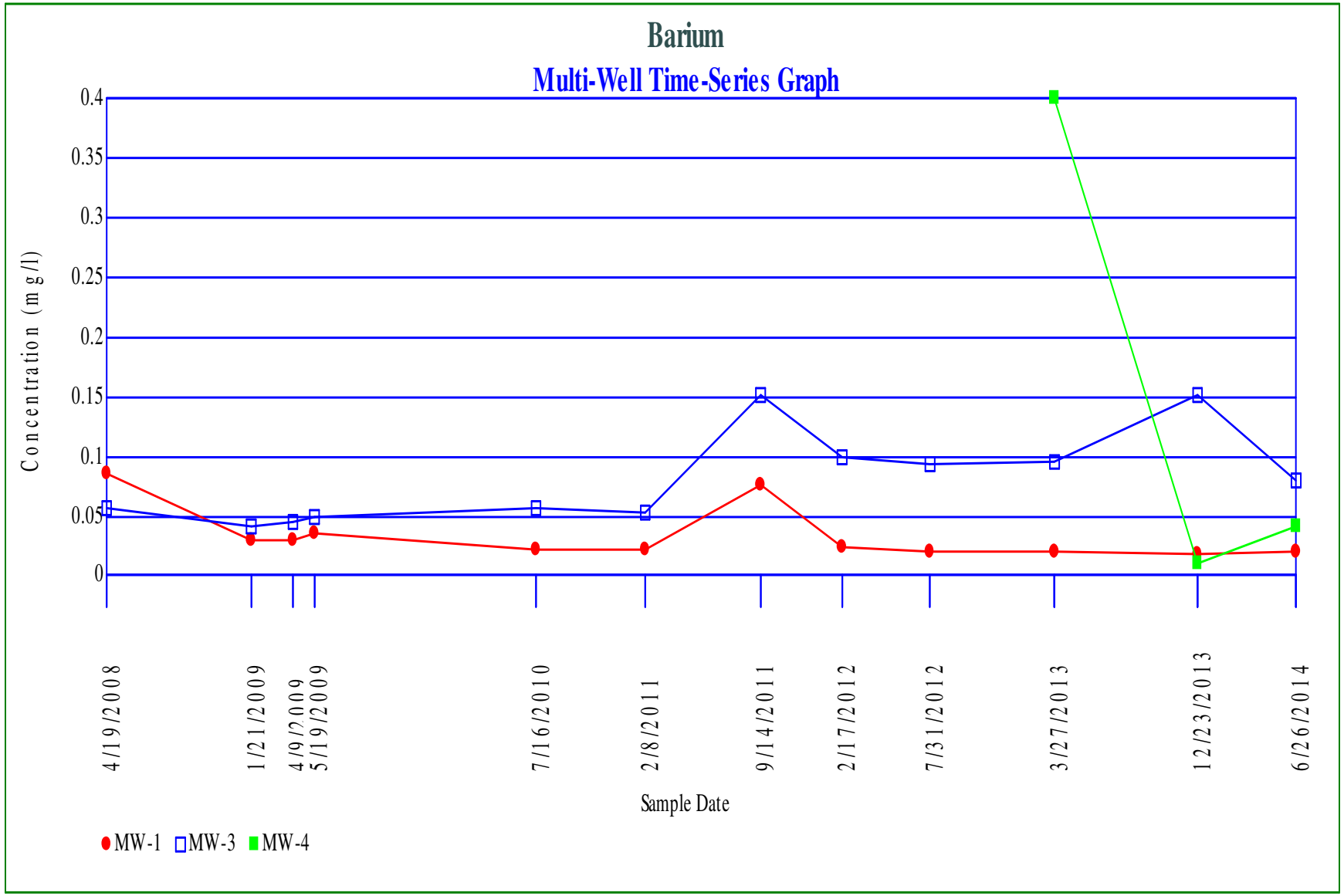
APPENDIX B

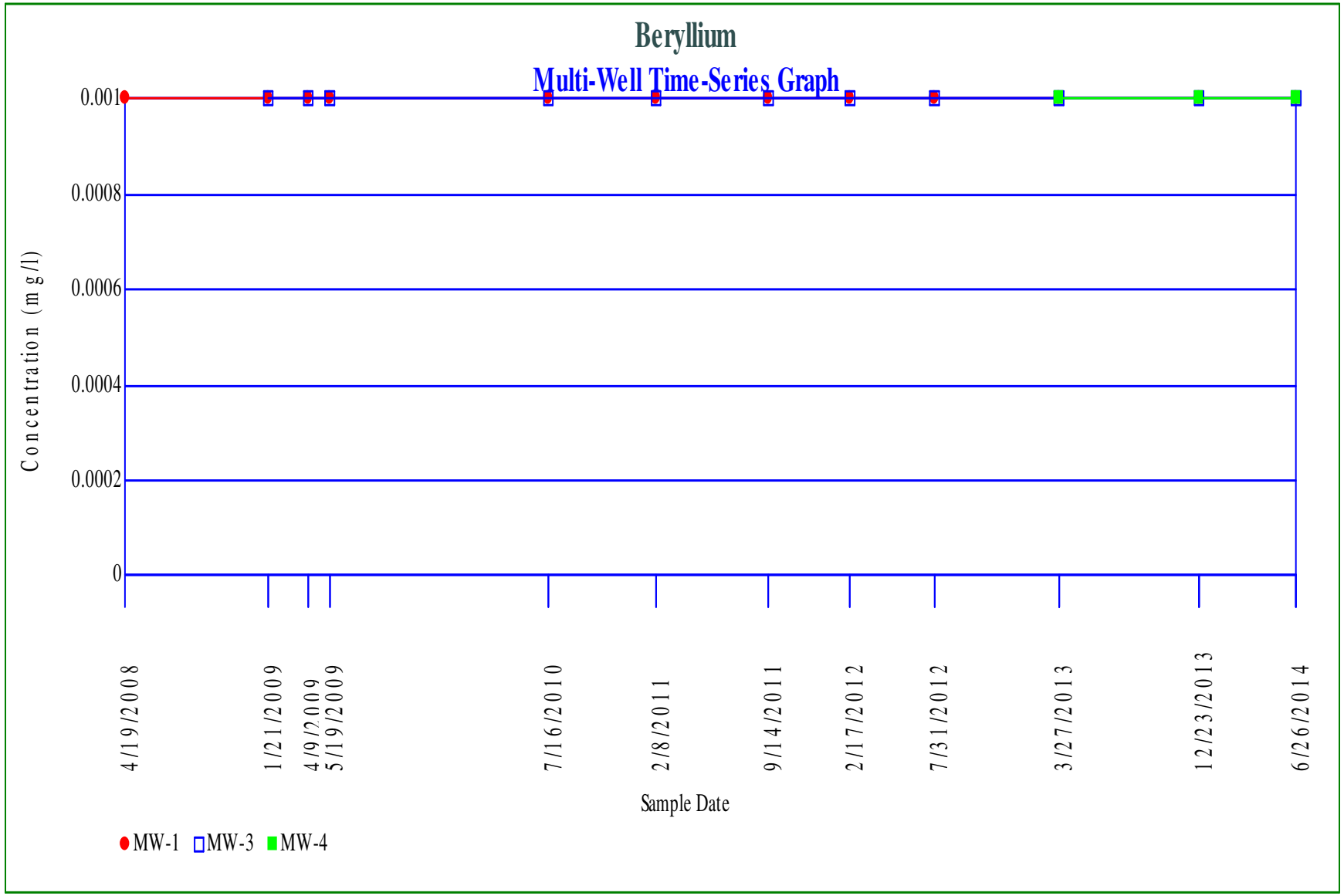
STATISTICAL EVALUATIONS & TIME SERIES PLOTS

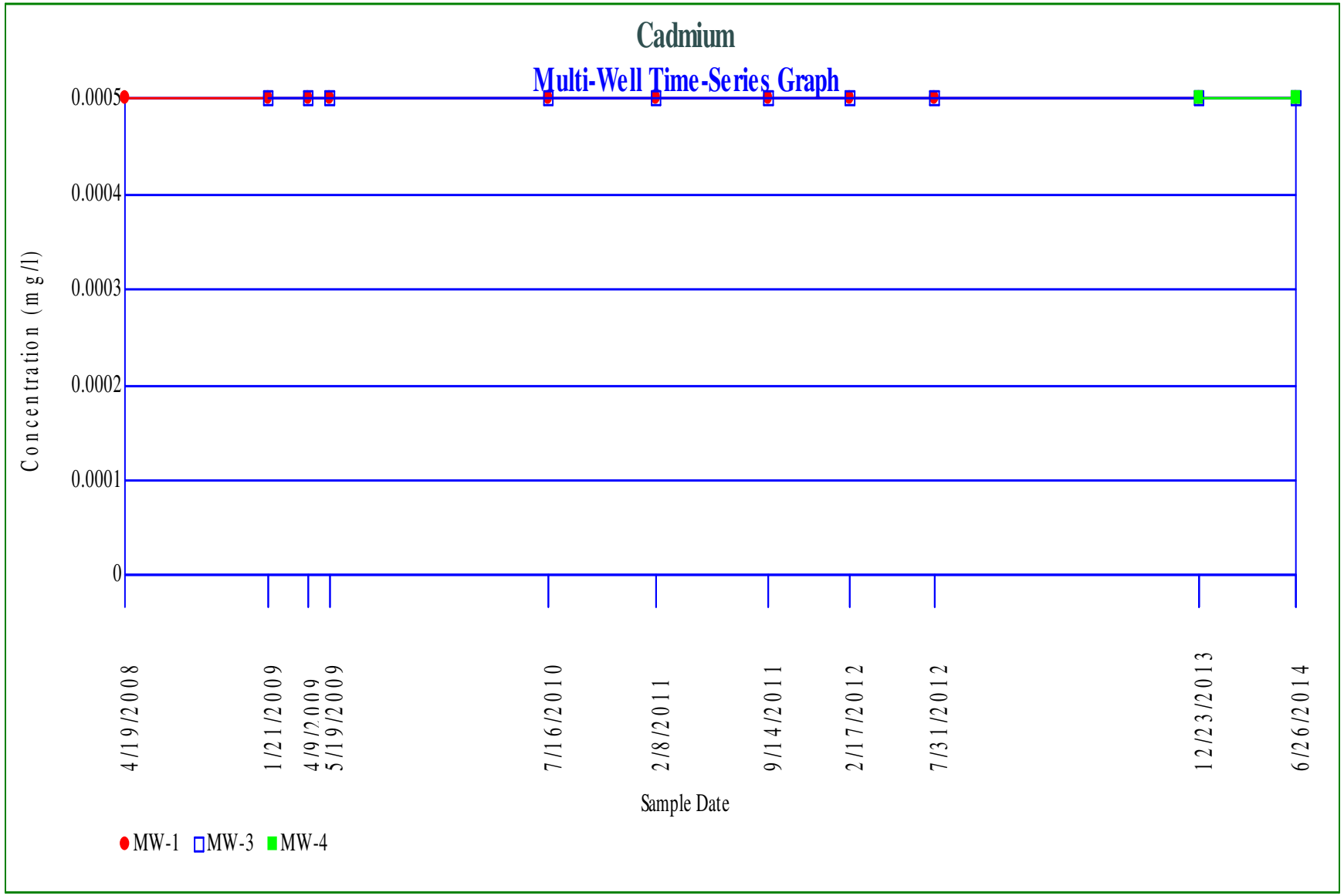

Aluminum
Multi-Well Time-Series Graph
Concentration (mg/l)
20
15
10
5
0
4/19/2008
1/21/2009
4/9/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Sample Date
MW-1
MW-3
MW-4

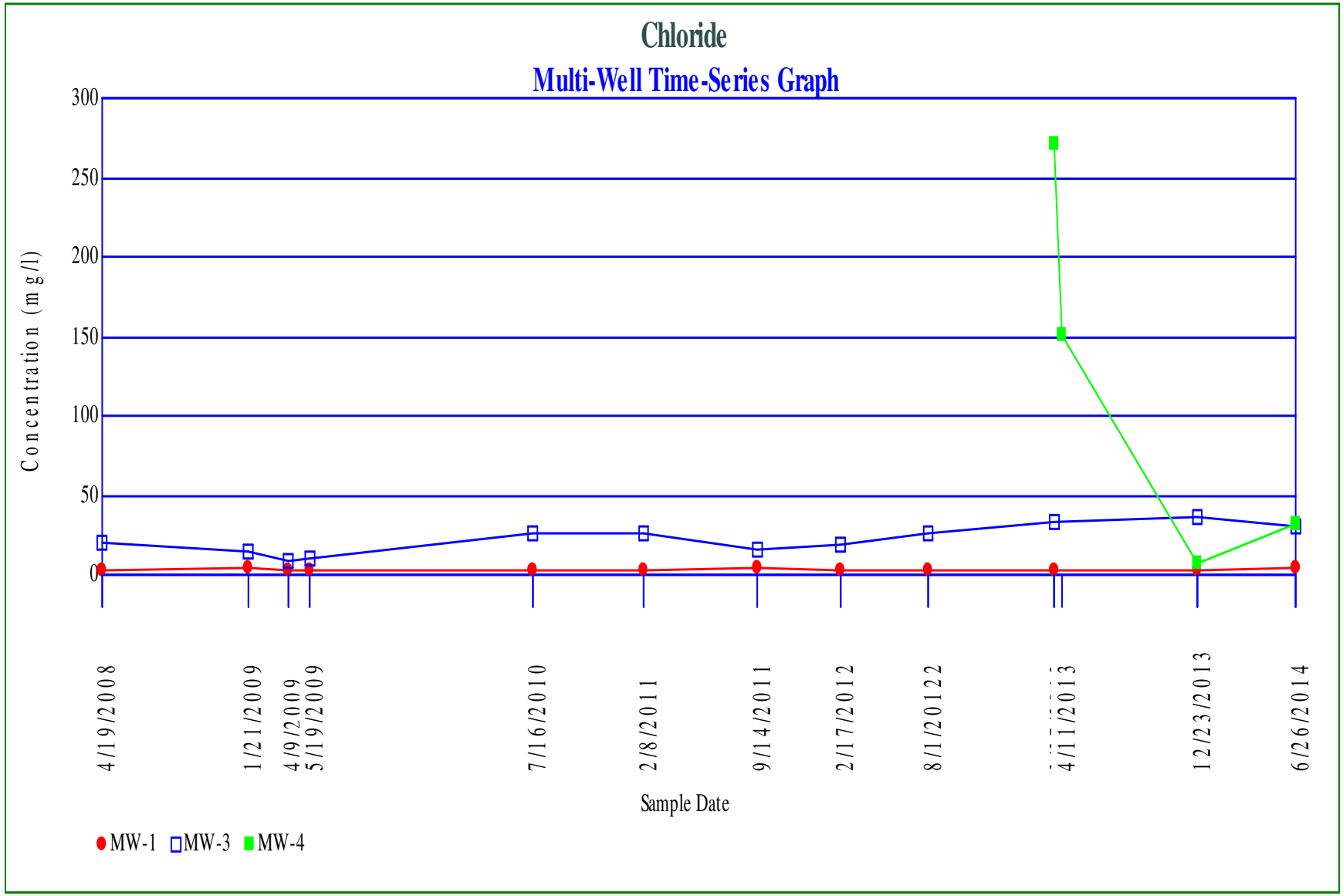

Antimony
Multi-Well Time-Series Graph
0.001
0.0008
0.0006
0.0004
0.0002
0
Concentration (mg/l)
4/19/2008
1/21/2009
4/9/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Sample Date
MW-1
MW-3
MW-4


Arsenic
Multi-Well Time-Series Graph
Concentration (mg/l)
0.1
0.08
0.06
0.04
0.02
0
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
Sample Date
MW-1
MW-3
MW-4

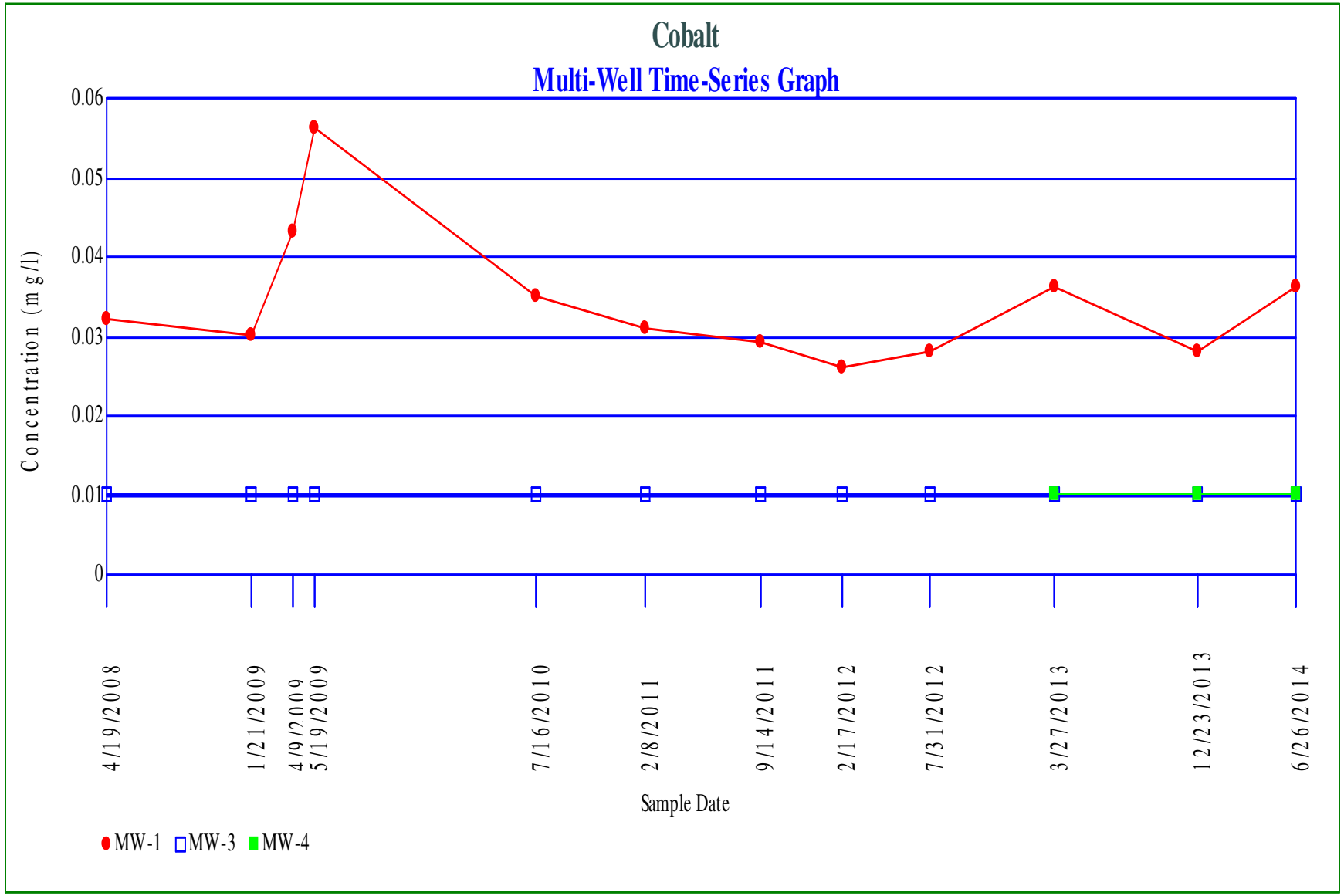

Barium
Multi-Well Time-Series Graph
Concentration (mg/l)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
4/19/2008
1/21/2009
4/9/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Sample Date
MW-1
MW-3
MW-4

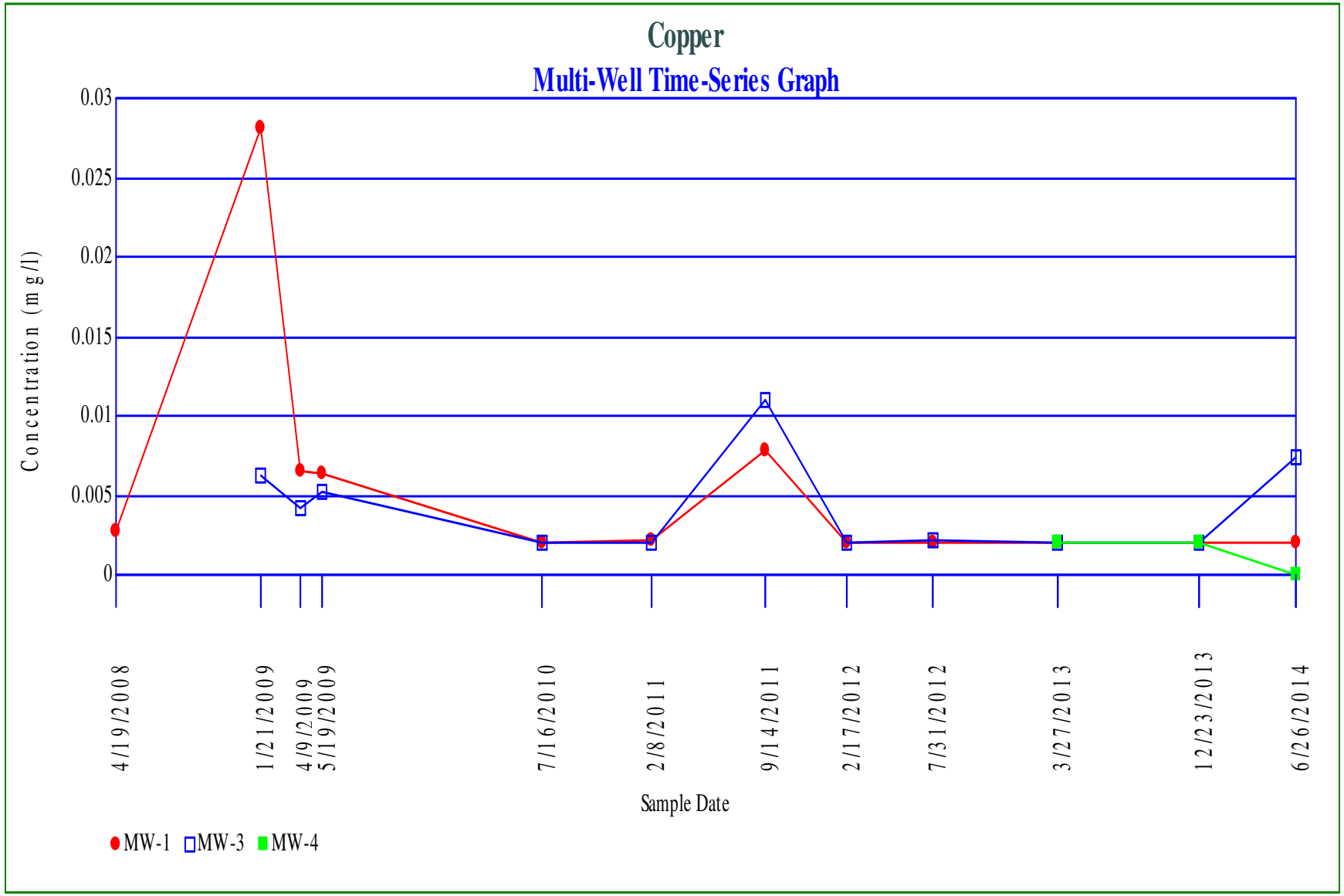

Beryllium
Multi-Well Time-Series Graph
0.001
0.0008
0.0006
0.0004
0.0002
0
Concentration (mg/l)
4/19/2008
1/21/2009
4/9/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Sample Date
MW-1
MW-3
MW-4


Cadmium
Multi-Well Time-Series Graph
0.0005
0.0004
0.0003
0.0002
0.0001
0
Concentration (mg/l)
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
12/23/2013
6/26/2014
Sample Date
MW-1
MW-3
MW-4

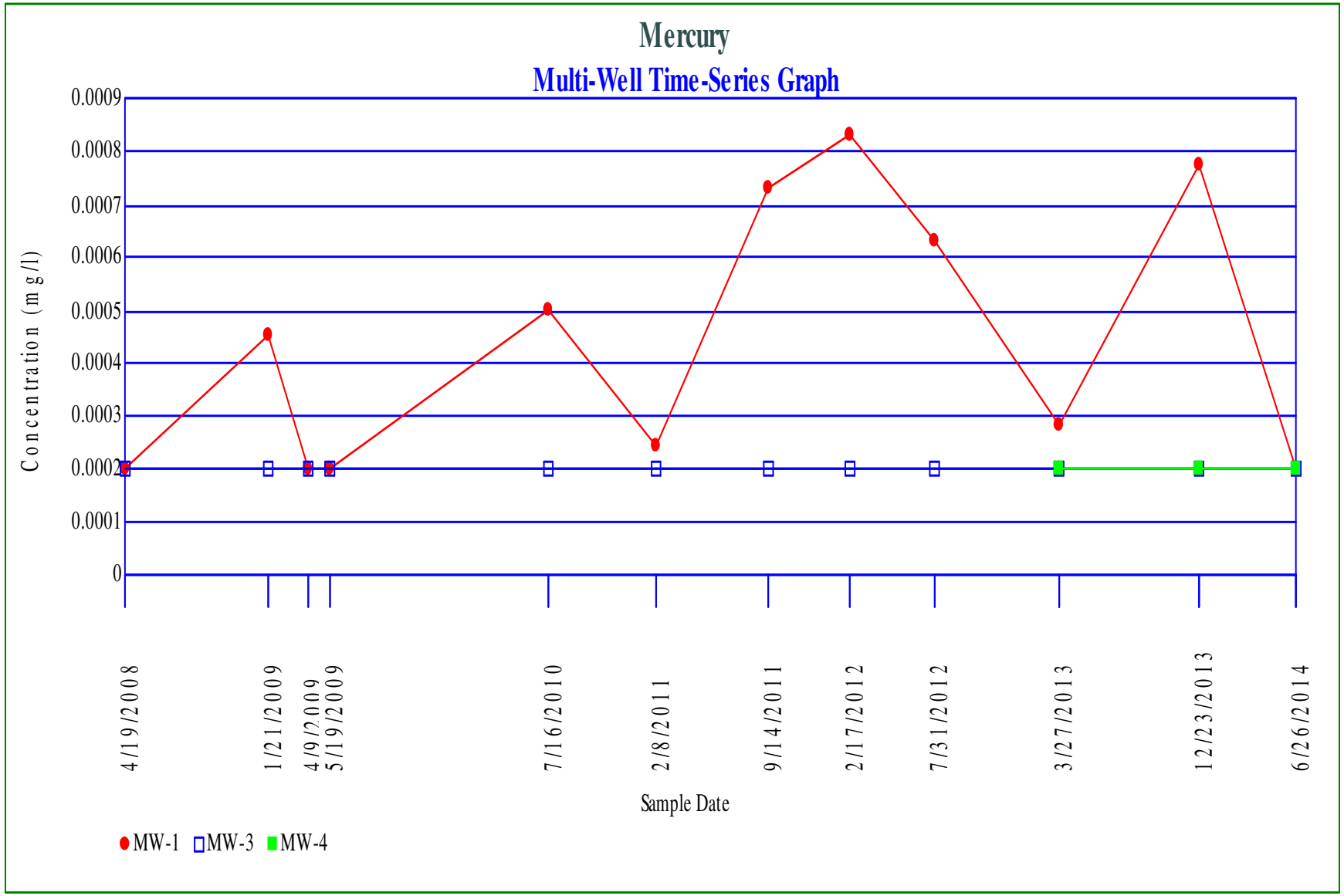

Chloride
Multi-Well Time-Series Graph
300
250
200
150
100
50
0
Concentration (mg/l)
4/19/2008
1/21/2009
4/9/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
8/1/20122
4/11/2013
12/23/2013
6/26/2014
Sample Date
MW-1
MW-3
MW-4

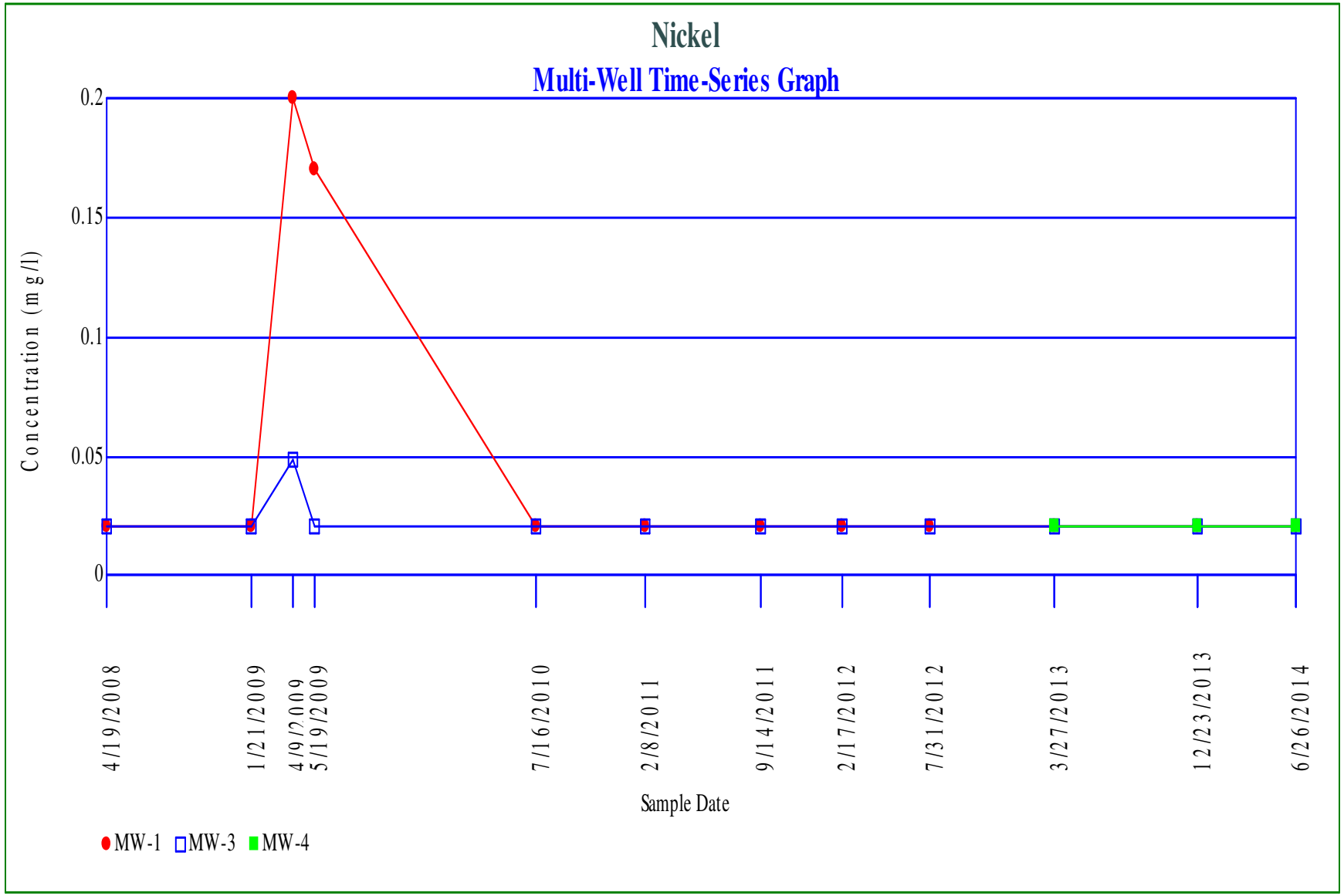

Chromium
Multi-Well Time-Series Graph
0.2
0.15
0.1
0.05
0
Concentration (mg/l)
4/19/2008
1/21/2009
4/9/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Sample Date
MW-1
MW-3
MW-4

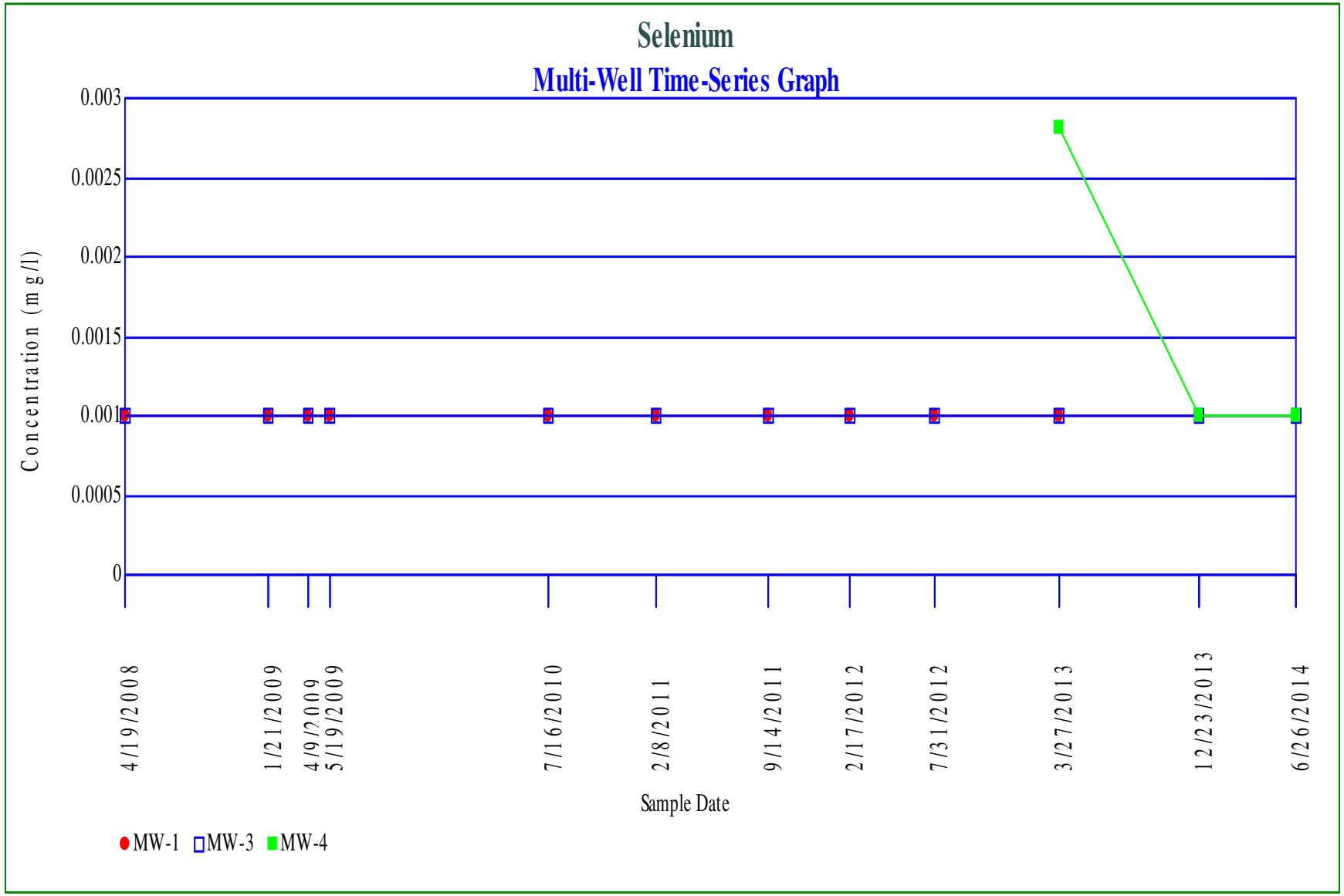

Cobalt
Multi-Well Time-Series Graph
0.06
0.05
0.04
0.03
0.02
0.01
0
Concentration (mg/l)
4/19/2008
1/21/2009
4/9/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Sample Date
MW-1
MW-3
MW-4

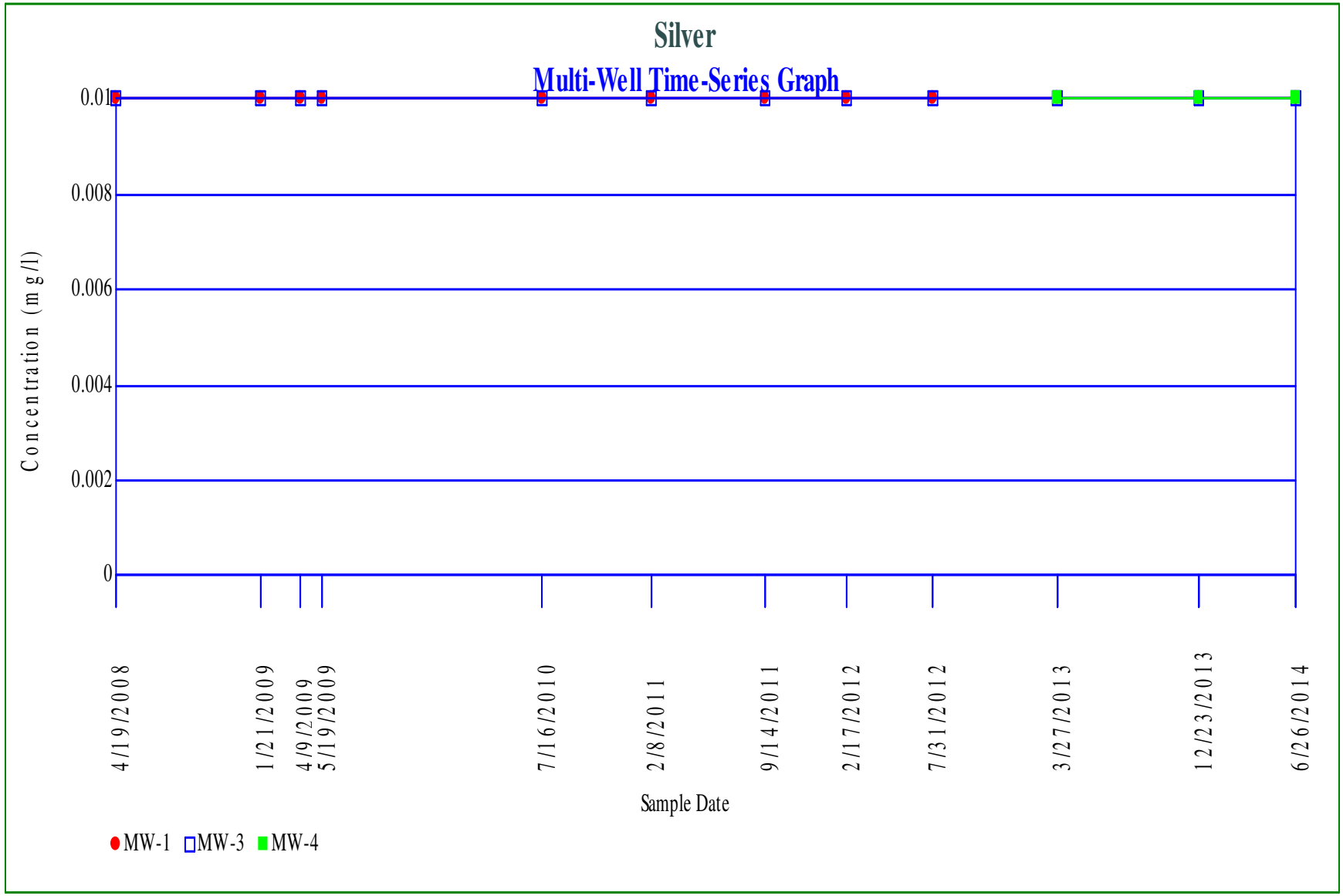

Copper
Multi-Well Time-Series Graph
Concentration (mg/l)
0.03
0.025
0.02
0.015
0.01
0.005
0
4/19/2008
1/21/2009
4/9/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Sample Date
MW-1
MW-3
MW-4

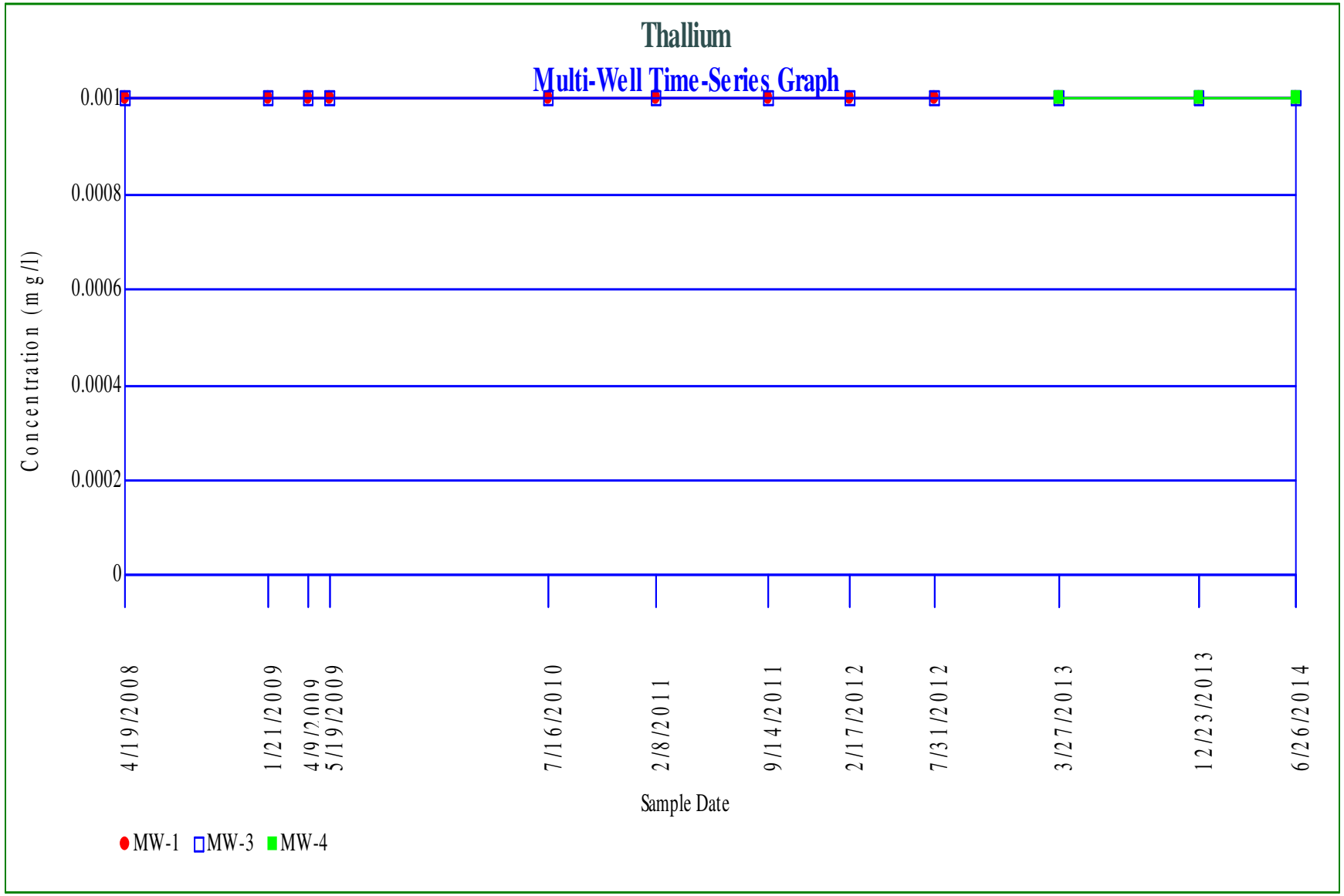

Lead
Multi-Well Time-Series Graph
Concentration (mg/l)
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
4/19/2008
1/21/2009
4/9/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Sample Date
MW-1
MW-3
MW-4

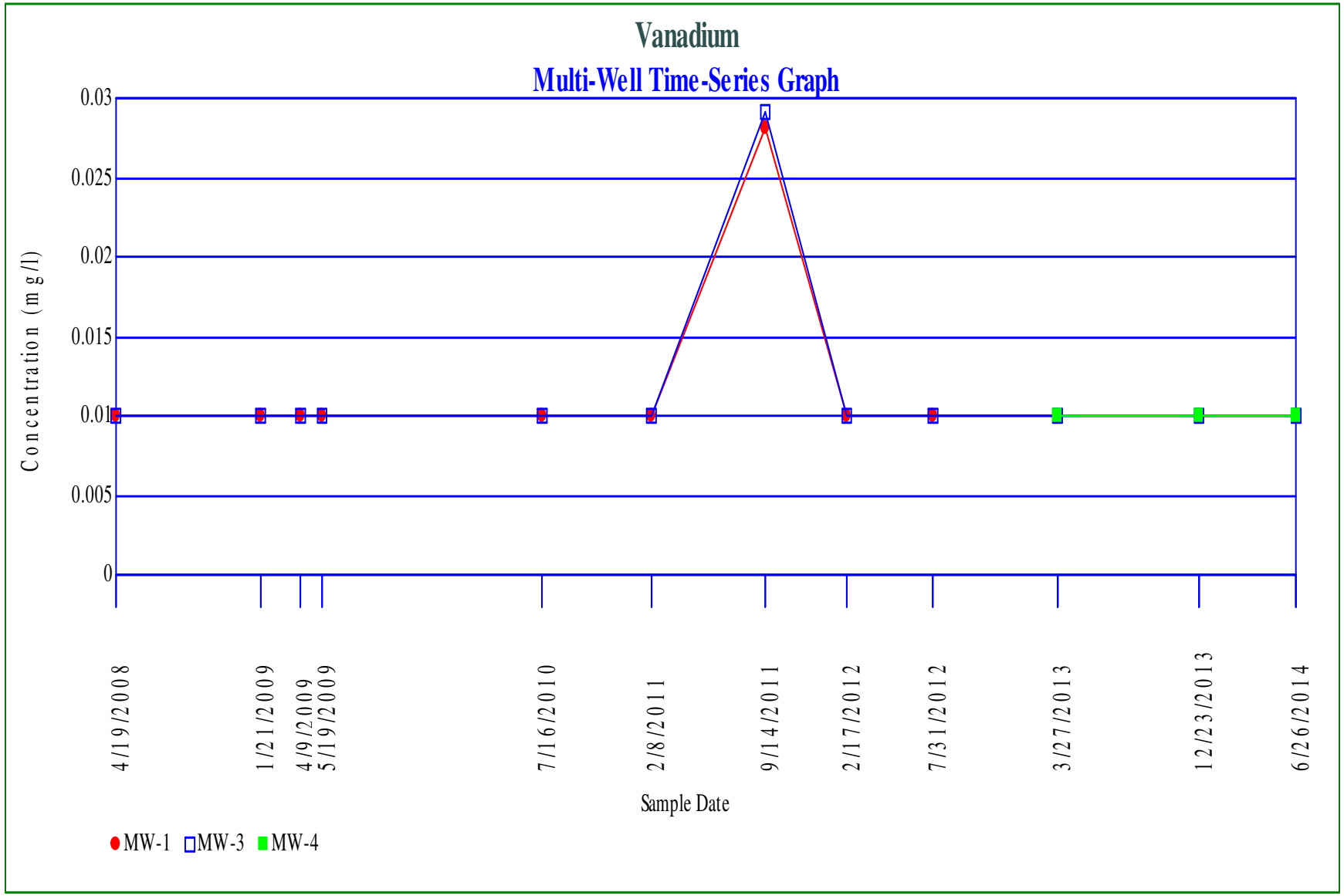

Mercury
Multi-Well Time-Series Graph
0.0009
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
Concentration (mg/l)
4/19/2008
1/21/2009
4/9/2009
5/19/2009
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Sample Date
MW-1
MW-3
MW-4


Nickel
Multi-Well Time-Series Graph
Concentration (mg/l)
0.2
0.15
0.1
0.05
0
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
Sample Date
MW-1
MW-3
MW-4


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
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
Sample Date
MW-1
MW-3
MW-4


Silver
Multi-Well Time-Series Graph
0.01
0.008
0.006
0.004
0.002
0
Concentration (mg/l)
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
Sample Date
MW-1
MW-3
MW-4


Thallium
Multi-Well Time-Series Graph
0.001
0.0008
0.0006
0.0004
0.0002
0
Concentration (mg/l)
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
Sample Date
MW-1
MW-3
MW-4


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
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
Sample Date
MW-1
MW-3
MW-4


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
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
Sample Date
MW-1
MW-3
MW-4

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 = 13 for 27 measurements

Sum of b values = 14.7173
Sample Standard Deviation = 3.92836
W Statistic = 0.539831

5% Critical value of 0.923 exceeds 0.539831
Evidence of non-normality at 95% level of significance

1% Critical value of 0.894 exceeds 0.539831
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Arsenic

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 13 for 26 measurements

Sum of b values = 0.169536
Sample Standard Deviation = 0.0390541
W Statistic = 0.753787

5% Critical value of 0.92 exceeds 0.753787
Evidence of non-normality at 95% level of significance

1% Critical value of 0.891 exceeds 0.753787
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 = 13 for 27 measurements

Sum of b values = 0.308799
Sample Standard Deviation = 0.0768786
W Statistic = 0.620535

5% Critical value of 0.923 exceeds 0.620535
Evidence of non-normality at 95% level of significance

1% Critical value of 0.894 exceeds 0.620535
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 = 14 for 28 measurements

Sum of b values = 195.722
Sample Standard Deviation = 55.47
W Statistic = 0.461105

5% Critical value of 0.924 exceeds 0.461105
Evidence of non-normality at 95% level of significance

1% Critical value of 0.896 exceeds 0.461105
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 = 13 for 27 measurements

Sum of b values = 0.0599917
Sample Standard Deviation = 0.0133837
W Statistic = 0.772785

5% Critical value of 0.923 exceeds 0.772785
Evidence of non-normality at 95% level of significance

1% Critical value of 0.894 exceeds 0.772785
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Copper

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 13 for 26 measurements

Sum of b values = 0.0202797
Sample Standard Deviation = 0.00543651
W Statistic = 0.556601

5% Critical value of 0.92 exceeds 0.556601
Evidence of non-normality at 95% level of significance

1% Critical value of 0.891 exceeds 0.556601
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Lead

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 13 for 27 measurements

Sum of b values = 0.00988381
Sample Standard Deviation = 0.00230646
W Statistic = 0.706289

5% Critical value of 0.923 exceeds 0.706289
Evidence of non-normality at 95% level of significance

1% Critical value of 0.894 exceeds 0.706289
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Zinc

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

K = 13 for 27 measurements

Sum of b values = 0.265772
Sample Standard Deviation = 0.101064
W Statistic = 0.265983

5% Critical value of 0.923 exceeds 0.265983
Evidence of non-normality at 95% level of significance

1% Critical value of 0.894 exceeds 0.265983
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 = 13 for 27 measurements

Sum of b values = 8.78411
Sample Standard Deviation = 1.79402
W Statistic = 0.922077

5% Critical value of 0.923 exceeds 0.922077
Evidence of non-normality at 95% level of significance

1% Critical value of 0.894 is less than 0.922077
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Arsenic

All Locations

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 13 for 26 measurements

Sum of b values = 10.338
Sample Standard Deviation = 2.42541
W Statistic = 0.726709

5% Critical value of 0.92 exceeds 0.726709
Evidence of non-normality at 95% level of significance

1% Critical value of 0.891 exceeds 0.726709
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 = 13 for 27 measurements

Sum of b values = 4.22219
Sample Standard Deviation = 0.840761
W Statistic = 0.969966

5% Critical value of 0.923 is less than 0.969966
Data is normally distributed at 95% level of significance

1% Critical value of 0.894 is less than 0.969966
Data is normally distributed 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 = 14 for 28 measurements

Sum of b values = 6.93564
Sample Standard Deviation = 1.4041
W Statistic = 0.903684

5% Critical value of 0.924 exceeds 0.903684
Evidence of non-normality at 95% level of significance

1% Critical value of 0.896 is less than 0.903684
Data is normally distributed 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 = 13 for 27 measurements

Sum of b values = 4.16793
Sample Standard Deviation = 0.971638
W Statistic = 0.707715

5% Critical value of 0.923 exceeds 0.707715
Evidence of non-normality at 95% level of significance

1% Critical value of 0.894 exceeds 0.707715
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Copper

All Locations

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 13 for 26 measurements

Sum of b values = 6.5152
Sample Standard Deviation = 1.5502
W Statistic = 0.706545

5% Critical value of 0.92 exceeds 0.706545
Evidence of non-normality at 95% level of significance

1% Critical value of 0.891 exceeds 0.706545
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Lead

All Locations

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 13 for 27 measurements

Sum of b values = 4.25331
Sample Standard Deviation = 0.925121
W Statistic = 0.812988

5% Critical value of 0.923 exceeds 0.812988
Evidence of non-normality at 95% level of significance

1% Critical value of 0.894 exceeds 0.812988
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Zinc

All Locations

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

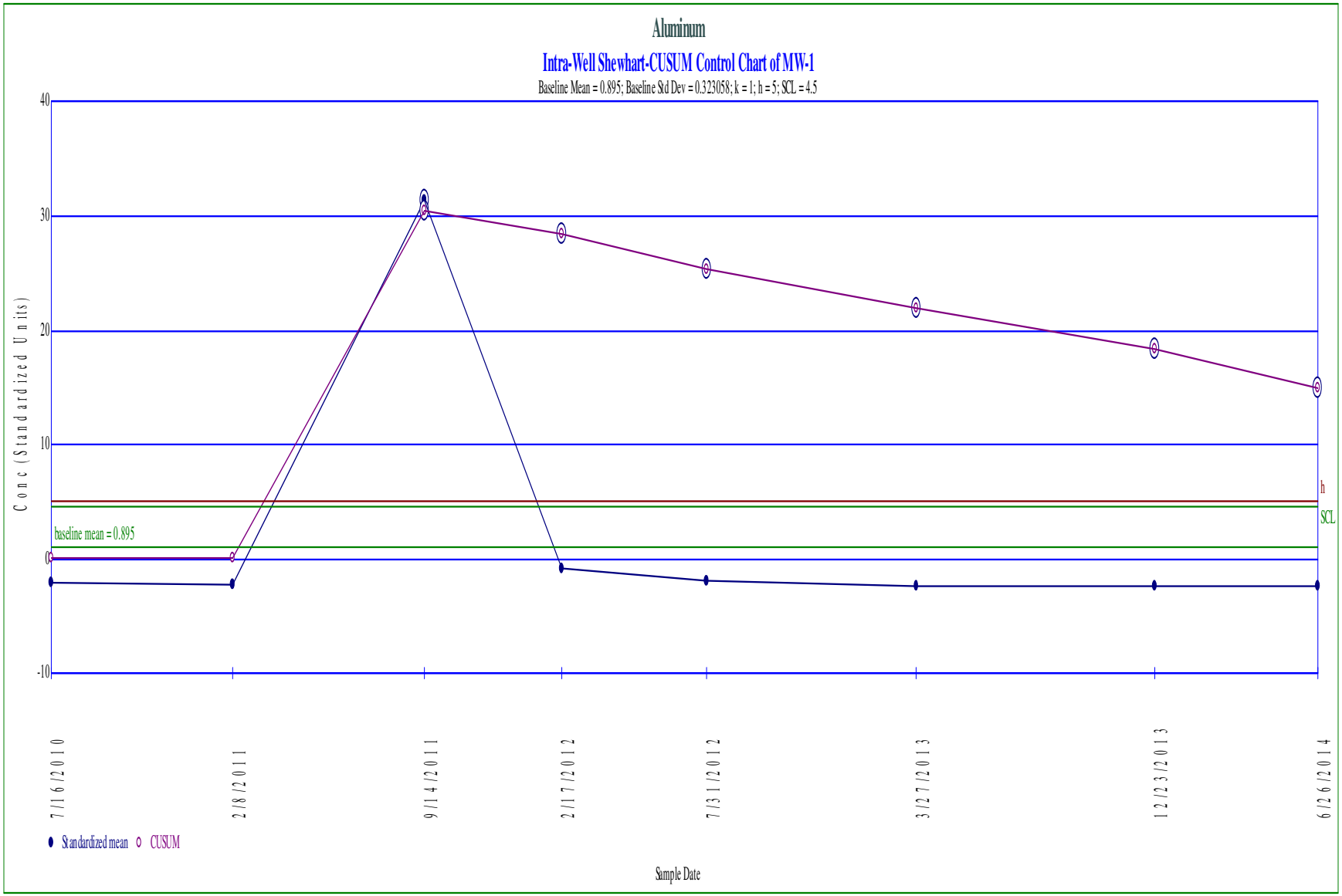
Non-Detects Replaced with 1/2 DL

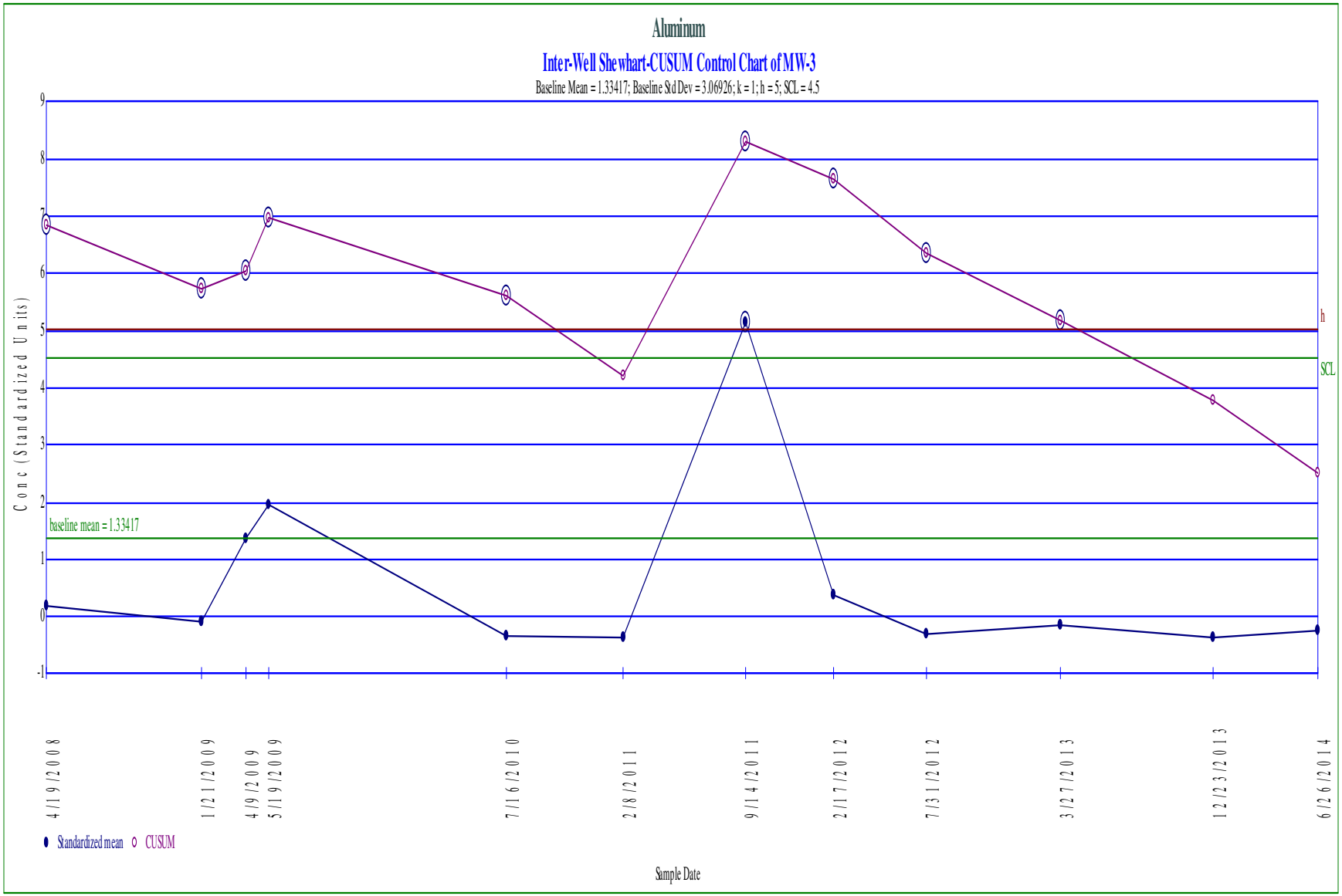
K = 13 for 27 measurements

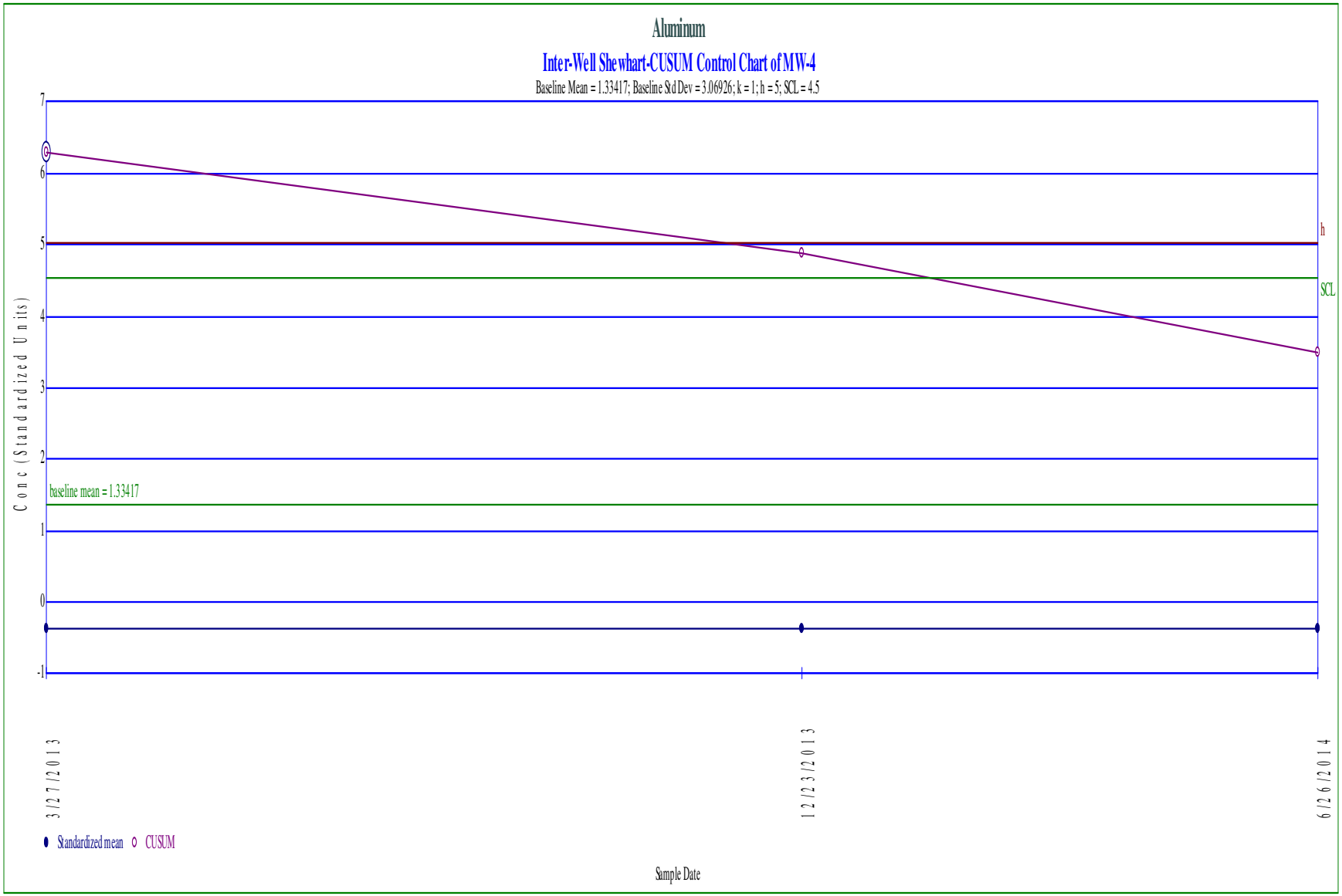
Sum of b values = 4.34207
Sample Standard Deviation = 0.944238
W Statistic = 0.813313

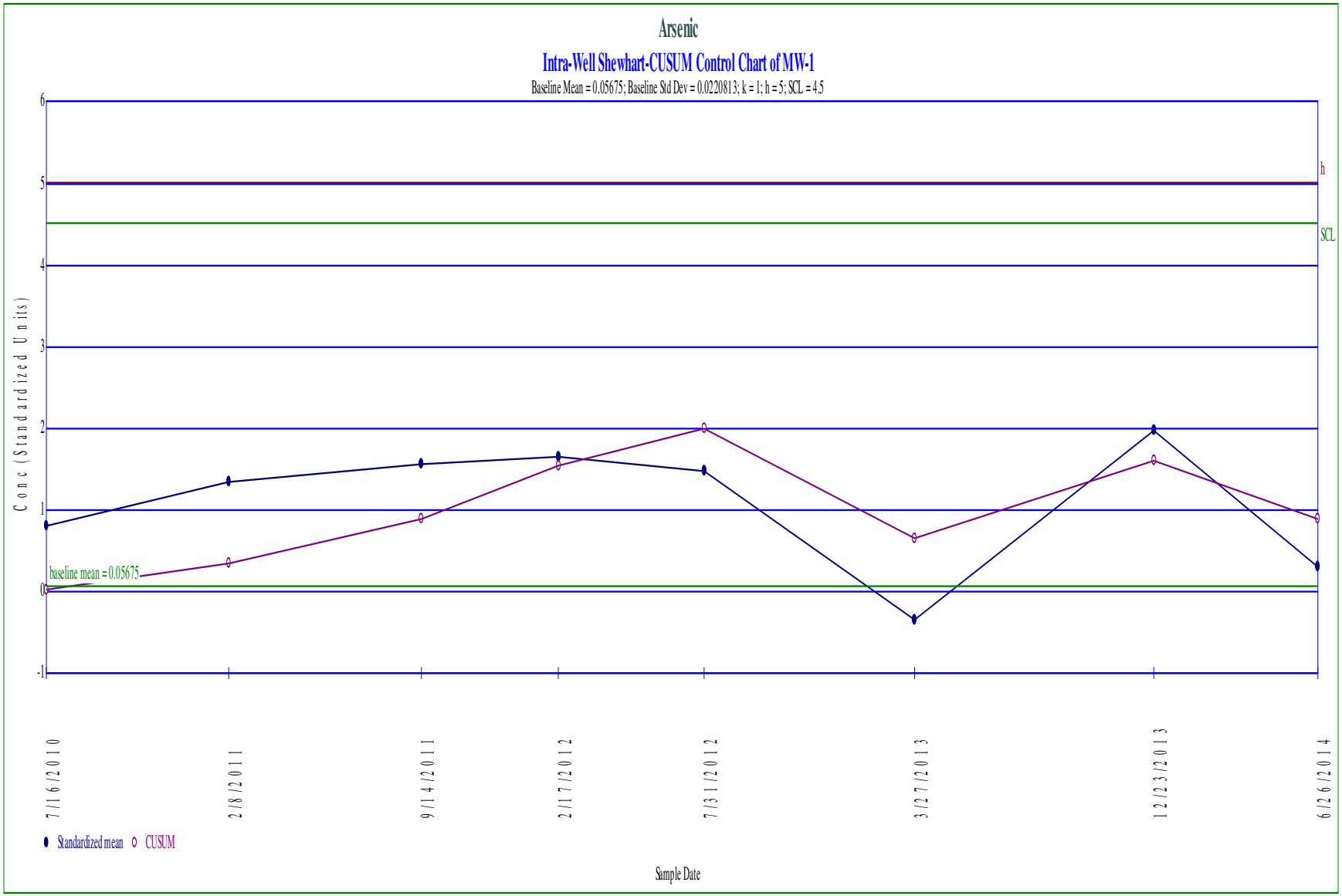
5% Critical value of 0.923 exceeds 0.813313
Evidence of non-normality at 95% level of significance

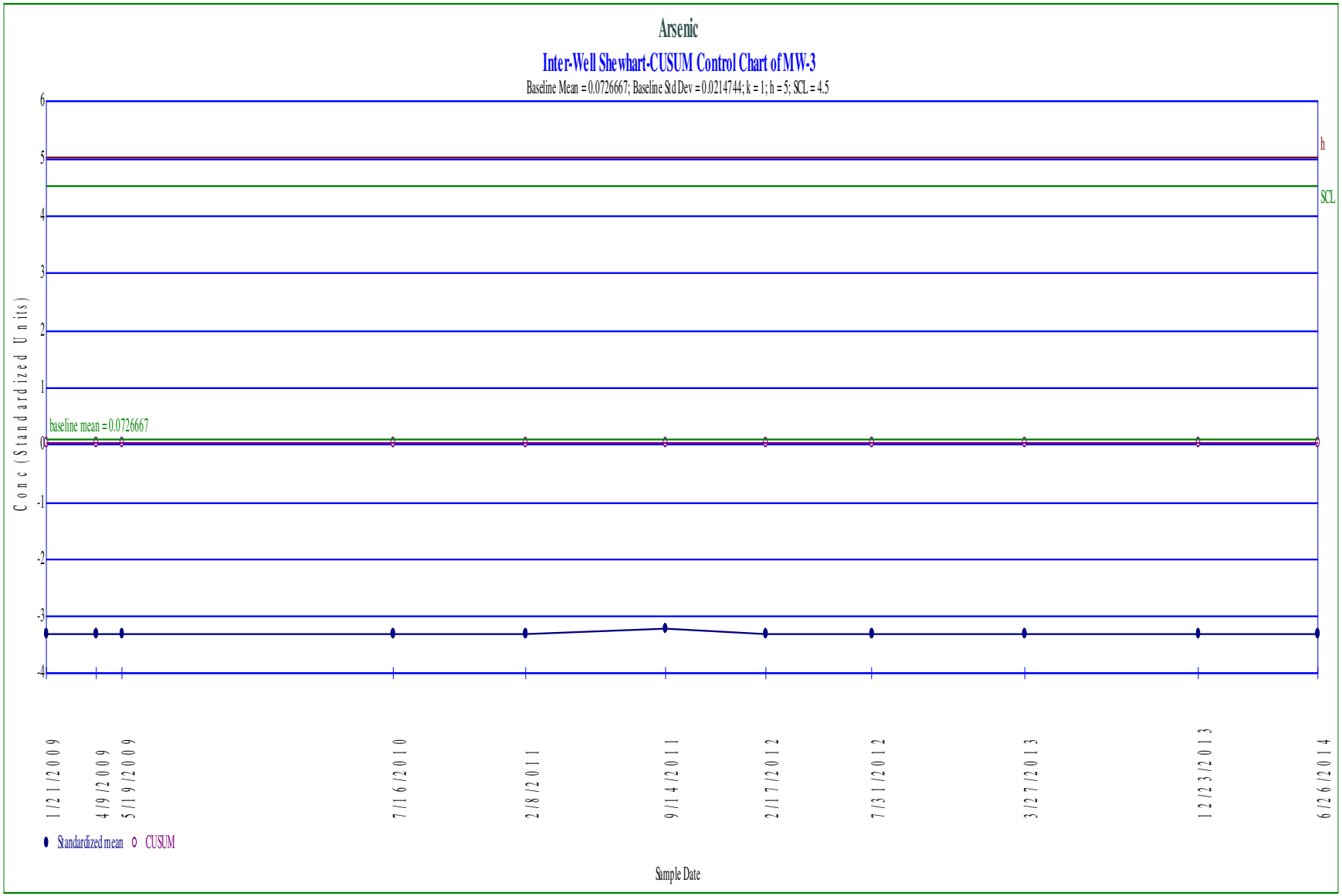
1% Critical value of 0.894 exceeds 0.813313
Evidence of non-normality at 99% level of significance

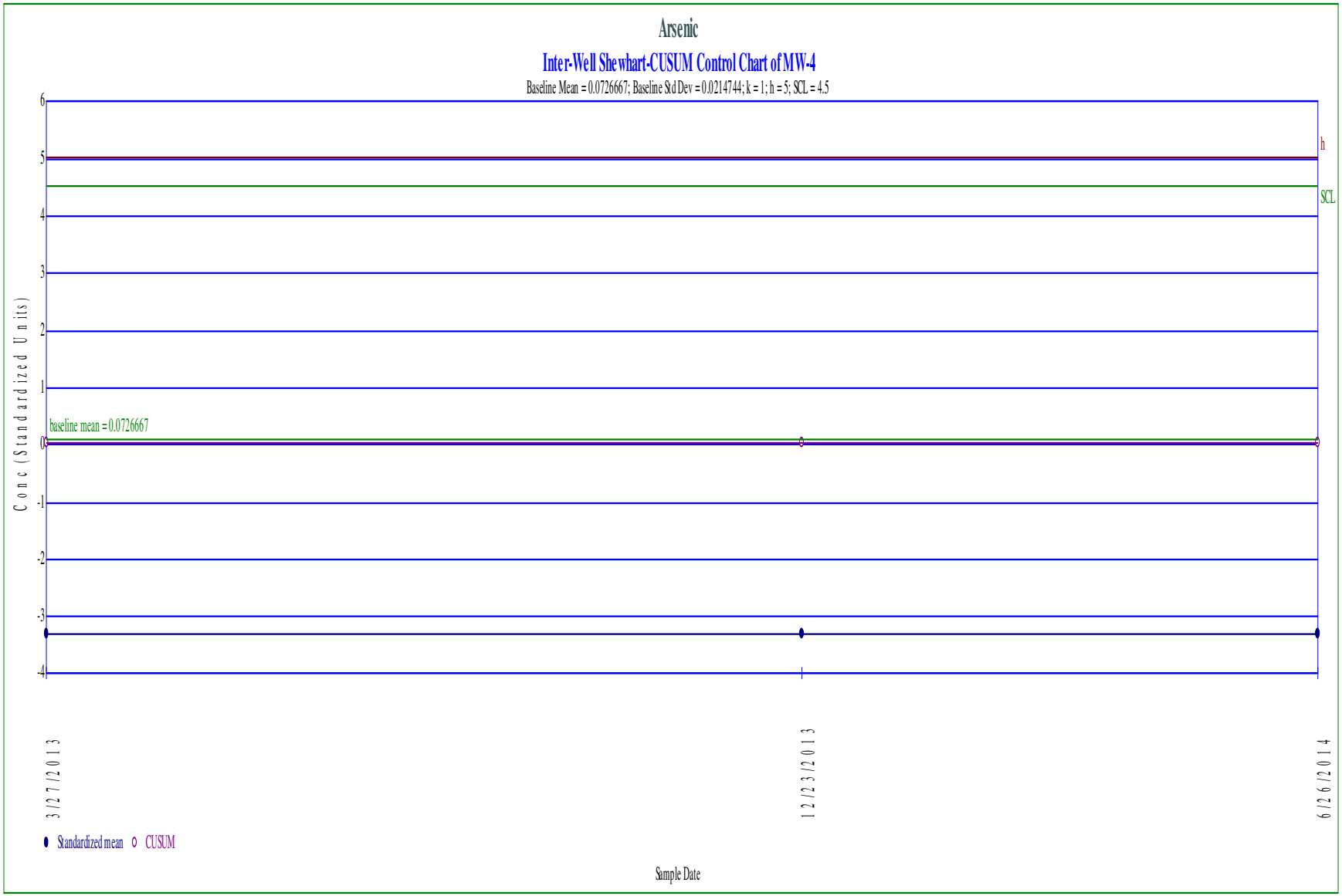

Aluminum
Intra-Well Shewhart-CUSUM Control Chart of MW-1
Baseline Mean = 0.895; Baseline Std Dev = 0.323058; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
40
30
20
10
0
-10
h
SCL
baseline mean = 0.895
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Standardized mean
CUSUM
Sample Date


Aluminum
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 1.33417; Baseline Std Dev = 3.06926; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
9
8
7
6
5
4
3
2
1
0
-1
h
SCL
baseline mean = 1.33417
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
Standardized mean
CUSUM
Sample Date


Aluminum
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 1.33417; Baseline Std Dev = 3.06926; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
7
6
5
4
3
2
1
0
-1
h
SCL
baseline mean = 1.33417
3/27/2013
12/23/2013
6/26/2014
Standardized mean
CUSUM
Sample Date


Arsenic
Intra-Well Shewhart-CUSUM Control Chart of MW-1
Baseline Mean = 0.05675; Baseline Std Dev = 0.0220813; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
h
SCL
baseline mean = 0.05675
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Standardized mean
CUSUM
Sample Date


Arsenic
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 0.0726667; Baseline Std Dev = 0.0214744; k = 1; h = 5; SCL = 4.5
h
SCL
baseline mean = 0.0726667
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
-2
-3
-4
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
12/3/2013
6/26/2014
Standardized mean
CUSUM
Sample Date


Arsenic
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 0.0726667; Baseline Std Dev = 0.0214744; k = 1; h = 5; SCL = 4.5
h
SCL
baseline mean = 0.0726667
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
-2
-3
-4
3/27/2013
12/3/2013
6/26/2014
Standardized mean
CUSUM
Sample Date

Parametric Prediction Interval Analysis
Inter-Well Comparison
Parameter: Barium
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

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

Background Samples = 12
Background Mean = -3.6049
Background Std Dev = 0.537806

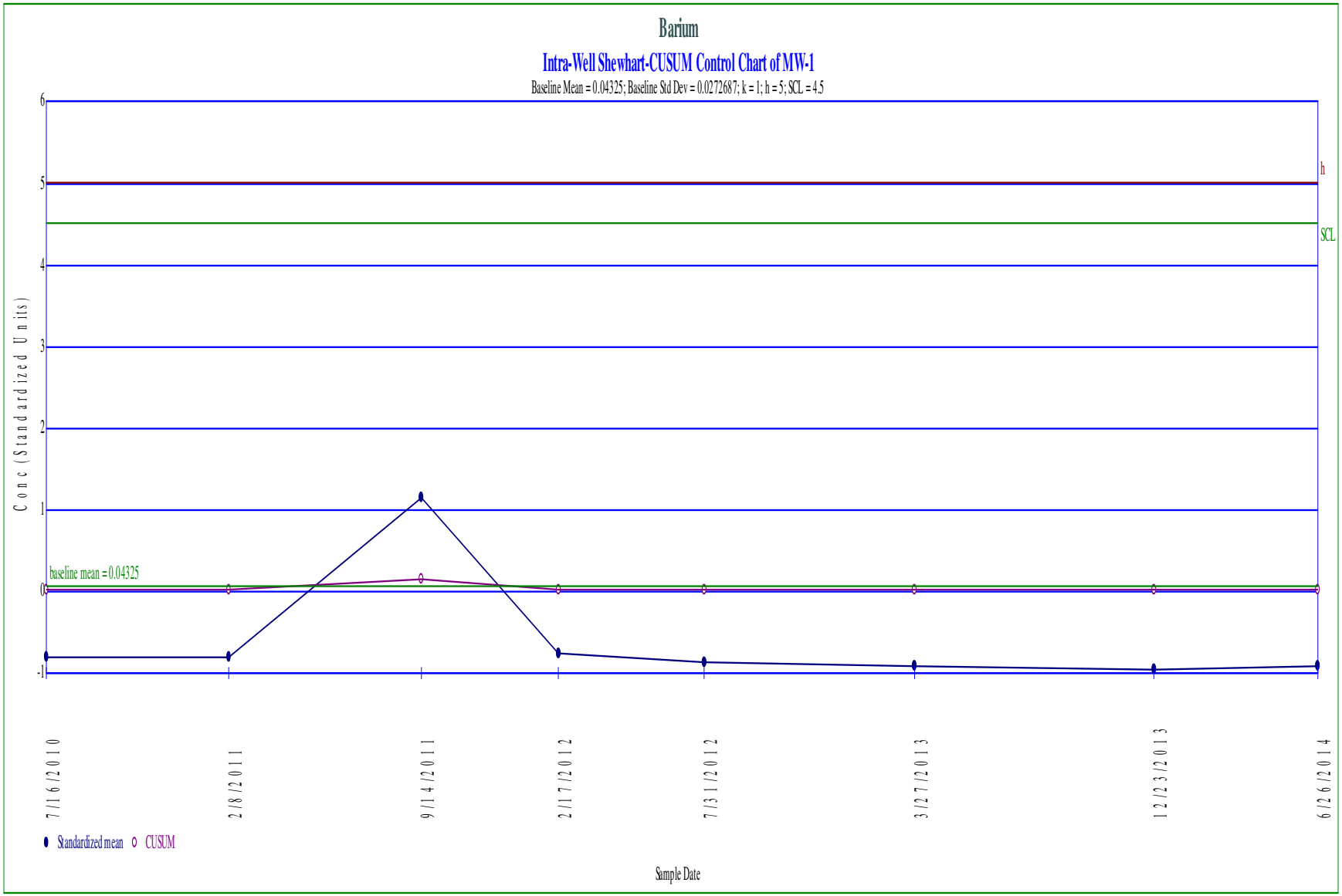
Number of comparisons = 2
Future Samples (k) = 2
Actual confidence level is 1.0 - (0.05/2) = 97.5 %
t is Percentile of Student's T-Test (0.95/2) = 0.975
Degrees of Freedom = 12 (background observations) - 1
t(0.975, 12) = 2.20099

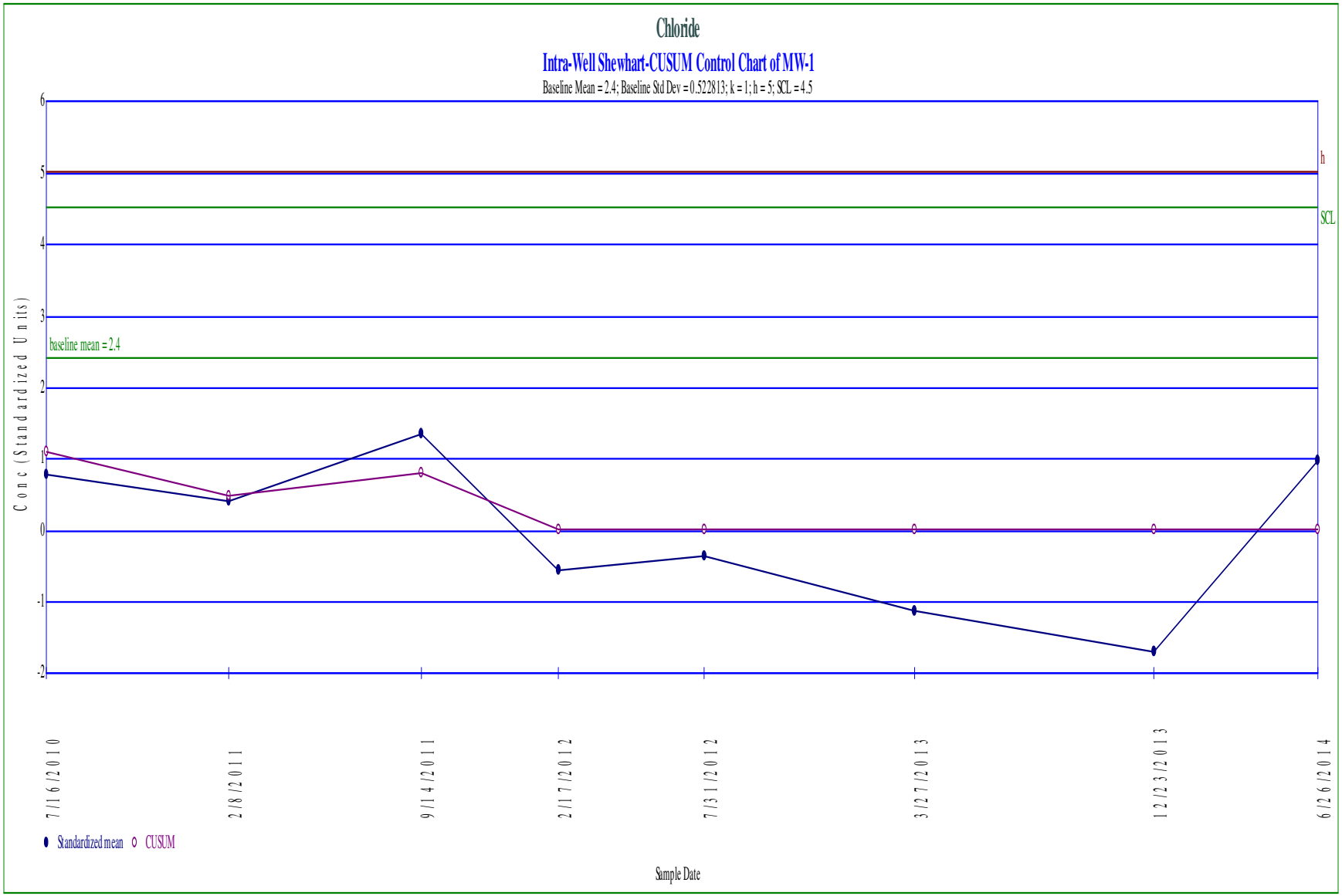
Well MW-3

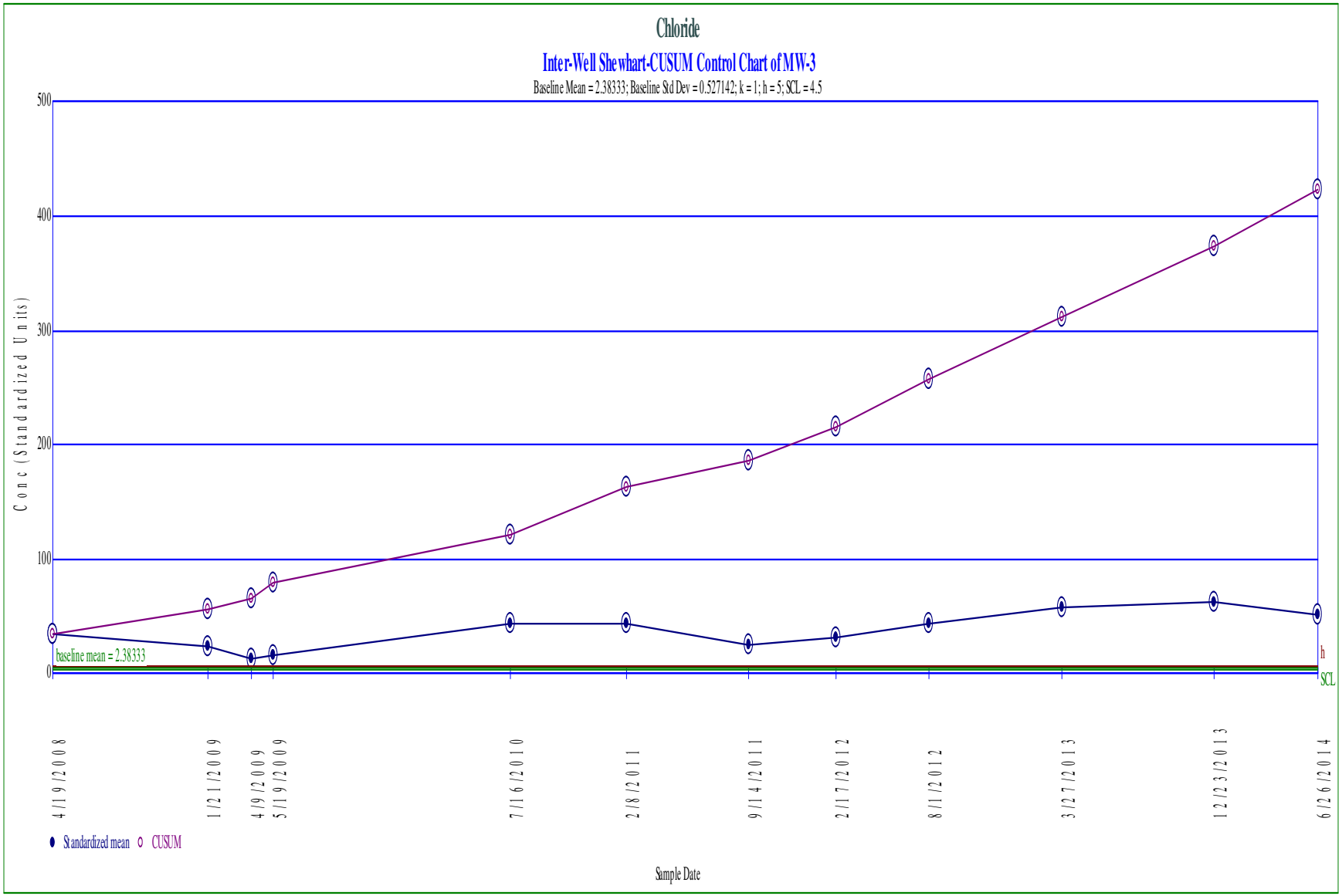
Date	Samples	Mean	Interval	Significant
6/26/2014	1	-2.53831	[0, -2.37286]	FALSE

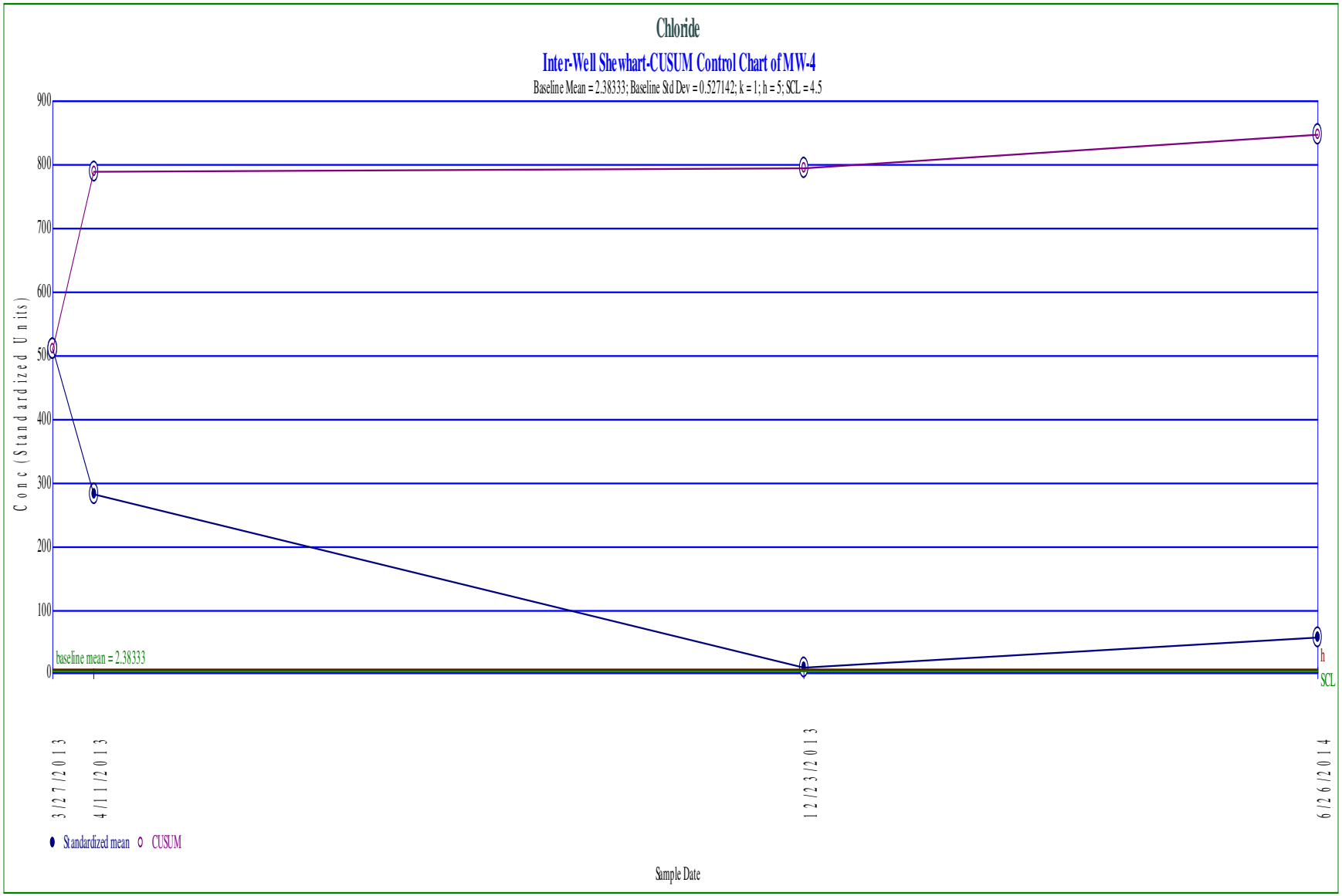
Well MW-4

Date	Samples	Mean	Interval	Significant
6/26/2014	1	-3.21888	[0, -2.37286]	FALSE


Barium
Intra-Well Shewhart-CUSUM Control Chart of MW-1
Baseline Mean = 0.04325; Baseline Std Dev = 0.0272687; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
h
SCL
baseline mean = 0.04325
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Standardized mean
CUSUM
Sample Date


Chloride
Intra-Well Shewhart-CUSUM Control Chart of MW-1
Baseline Mean = 2.4; Baseline Std Dev = 0.522813; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
-2
h
SCL
baseline mean = 2.4
7/16/2010
2/8/2011
9/14/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
Standardized mean
CUSUM
Sample Date


Chloride
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 2.38333; Baseline Std Dev = 0.527142; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
500
400
300
200
100
0
baseline mean = 2.38333
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
8/1/2012
3/27/2013
12/23/2013
6/26/2014
Standardized mean
CUSUM
Sample Date


Chloride
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 2.38333; Baseline Std Dev = 0.527142; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
900
800
700
600
500
400
300
200
100
0
baseline mean = 2.38333
h
SCL
3/27/2013
4/11/2013
12/23/2013
6/26/2014
Standardized mean
CUSUM
Sample Date

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 2

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	2	4
	1/21/2009	2.9	10
	4/9/2009	1.9	3
	5/19/2009	2.8	8
	7/16/2010	2.8	9
	2/8/2011	2.6	7
	9/14/2011	3.1	12
	2/17/2012	2.1	5
	7/31/2012	2.2	6
	3/27/2013	1.8	2
	12/23/2013	1.5	1
	6/26/2014	2.9	11
MW-3	4/19/2008	20	18
	1/21/2009	14	15
	4/9/2009	8.2	13
	5/19/2009	10	14
	7/16/2010	25	19
	2/8/2011	25	20
	9/14/2011	15	16
	2/17/2012	18	17
	8/1/2012	25	21
	3/27/2013	32	23
	12/23/2013	35	24
	6/26/2014	29	22

The Wilcoxon Statistic is 144

The Expected value is is 72

The Standard Deviation is 17.3205

The Z Score is 4.12805

The Standard Deviation adjusted for ties is 17.3205

The Z Score adjusted for ties is 4.12805

4.12805 > 2.326 indicating statistical significance at 1% level

4.12805 > 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 2

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	2	4
	1/21/2009	2.9	10
	4/9/2009	1.9	3
	5/19/2009	2.8	8
	7/16/2010	2.8	9
	2/8/2011	2.6	7
	9/14/2011	3.1	12
	2/17/2012	2.1	5
	7/31/2012	2.2	6
	3/27/2013	1.8	2
	12/23/2013	1.5	1
	6/26/2014	2.9	11
MW-4	3/27/2013	270	16
	4/11/2013	150	15
	12/23/2013	6.4	13
	6/26/2014	31	14

The Wilcoxon Statistic is 48
The Expected value is is 24
The Standard Deviation is 8.24621
The Z Score is 2.84979
The Standard Deviation adjusted for ties is 8.24621
The Z Score adjusted for ties is 2.84979

2.84979 > 2.326 indicating statistical significance at 1% level

2.84979 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 55.5556%
Number of comparisons = 2
Future Samples (k) = 2
Recent Dates = 1
Background Measurements (n) = 12
Maximum Background Value = 0.056
Confidence Level = 85.7%
False Positive Rate = 14.3%

Location	Date	Count	Mean	Significant
MW-3	6/26/2014	1	0.01	FALSE
MW-4	6/26/2014	1	0.01	FALSE

Parametric Prediction Interval Analysis
Intra-Well Comparison for MW-1
Parameter: Cobalt
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

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

Baseline Samples	Date	Result
	4/19/2008	-3.44202
	1/21/2009	-3.50656
	4/9/2009	-3.14656
	5/19/2009	-2.8824
	7/16/2010	-3.35241
	2/8/2011	-3.47377
	9/14/2011	-3.54046
	2/17/2012	-3.64966
	7/31/2012	-3.57555
	3/27/2013	-3.32424
	12/23/2013	-3.57555

From 11 baseline samples
Baseline mean = -3.40629
Baseline std Dev = 0.224046

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 = 11 (background observations) - 1
t(0.95, 11) = 1.81246

Date	Samples	Mean	Interval	Significant
6/26/2014	1	-3.32424	[0, -2.98216]	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Copper

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 45.4545%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 11
Maximum Baseline Concentration = 0.028
Confidence Level = 91.7%
False Positive Rate = 8.3%

Baseline Measurements	Date	Value
	4/19/2008	0.0027
	1/21/2009	0.028
	4/9/2009	0.0064
	5/19/2009	0.0063
	7/16/2010	<0.002
	2/8/2011	0.0021
	9/14/2011	0.0077
	2/17/2012	<0.002
	7/31/2012	<0.002
	3/27/2013	<0.002
	12/23/2013	<0.002

Date	Count	Mean	Significant
6/26/2014	1	0.002	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 72.7273%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 11
Maximum Baseline Concentration = 0.0094
Confidence Level = 91.7%
False Positive Rate = 8.3%

Baseline Measurements	Date	Value
	4/19/2008	<0.005
	1/21/2009	0.0094
	4/9/2009	<0.001
	5/19/2009	<0.005
	7/16/2010	<0.001
	2/8/2011	<0.001
	9/14/2011	0.0038
	2/17/2012	<0.001
	7/31/2012	<0.001
	3/27/2013	<0.001
	12/23/2013	0.0023

Date	Count	Mean	Significant
6/26/2014	1	0.001	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Lead

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 66.6667%
Number of comparisons = 2
Future Samples (k) = 2
Recent Dates = 1
Background Measurements (n) = 12
Maximum Background Value = 0.0094
Confidence Level = 85.7%
False Positive Rate = 14.3%

Location	Date	Count	Mean	Significant
MW-3	6/26/2014	1	0.0021	FALSE
MW-4	6/26/2014	1	0.001	FALSE

Shapiro-Wilks Test of Normality

Parameter: Zinc

Location: MW-1

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 6 for 12 measurements

Sum of b values = 1.75562
Sample Standard Deviation = 0.566671
W Statistic = 0.872584

5% Critical value of 0.859 is less than 0.872584
Data is normally distributed at 95% level of significance

1% Critical value of 0.805 is less than 0.872584
Data is normally distributed at 99% level of significance

Parametric Prediction Interval Analysis
Intra-Well Comparison for MW-1
Parameter: Zinc
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

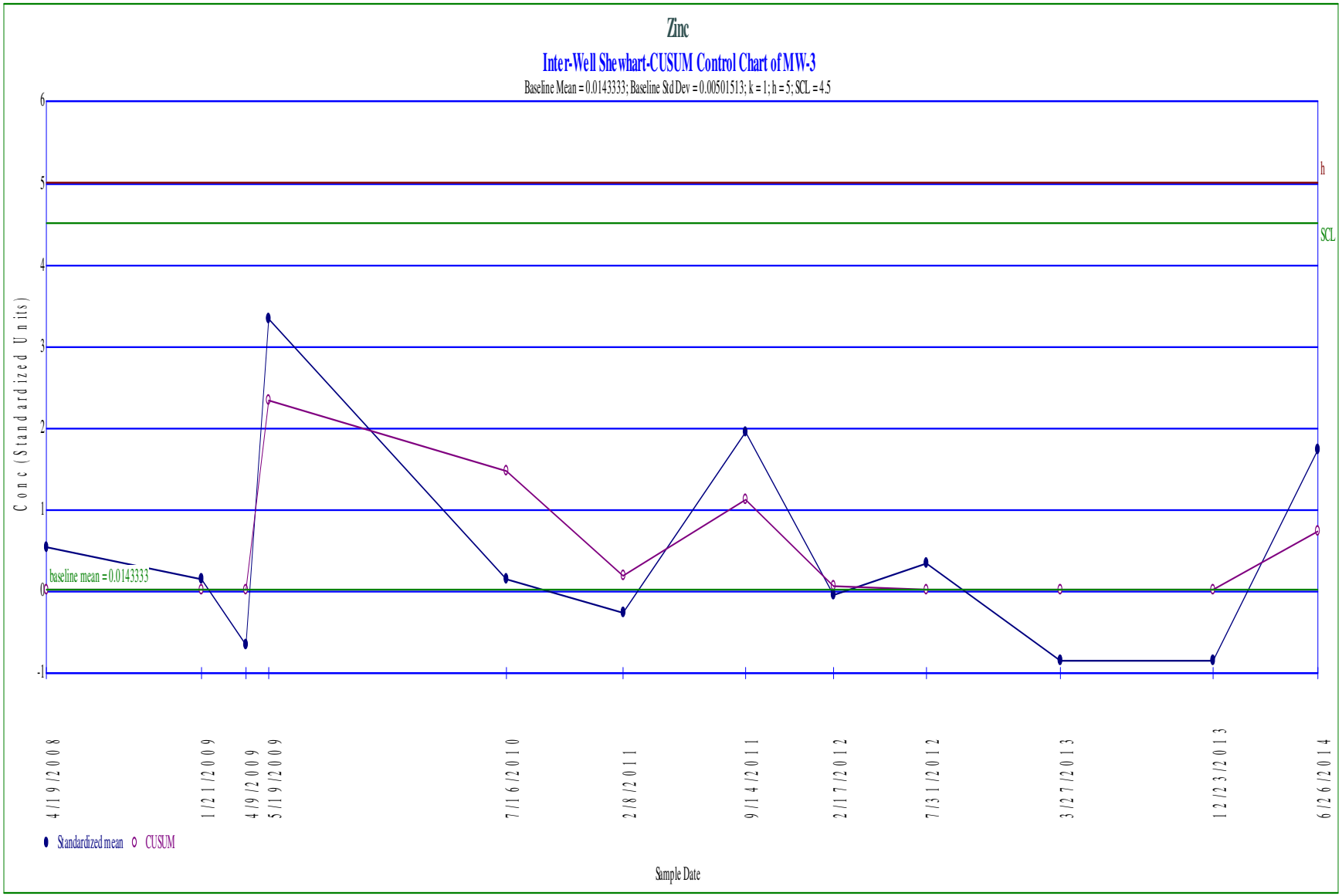
Intra-Well Unified Guid. Formula 95% One-Sided Comparison

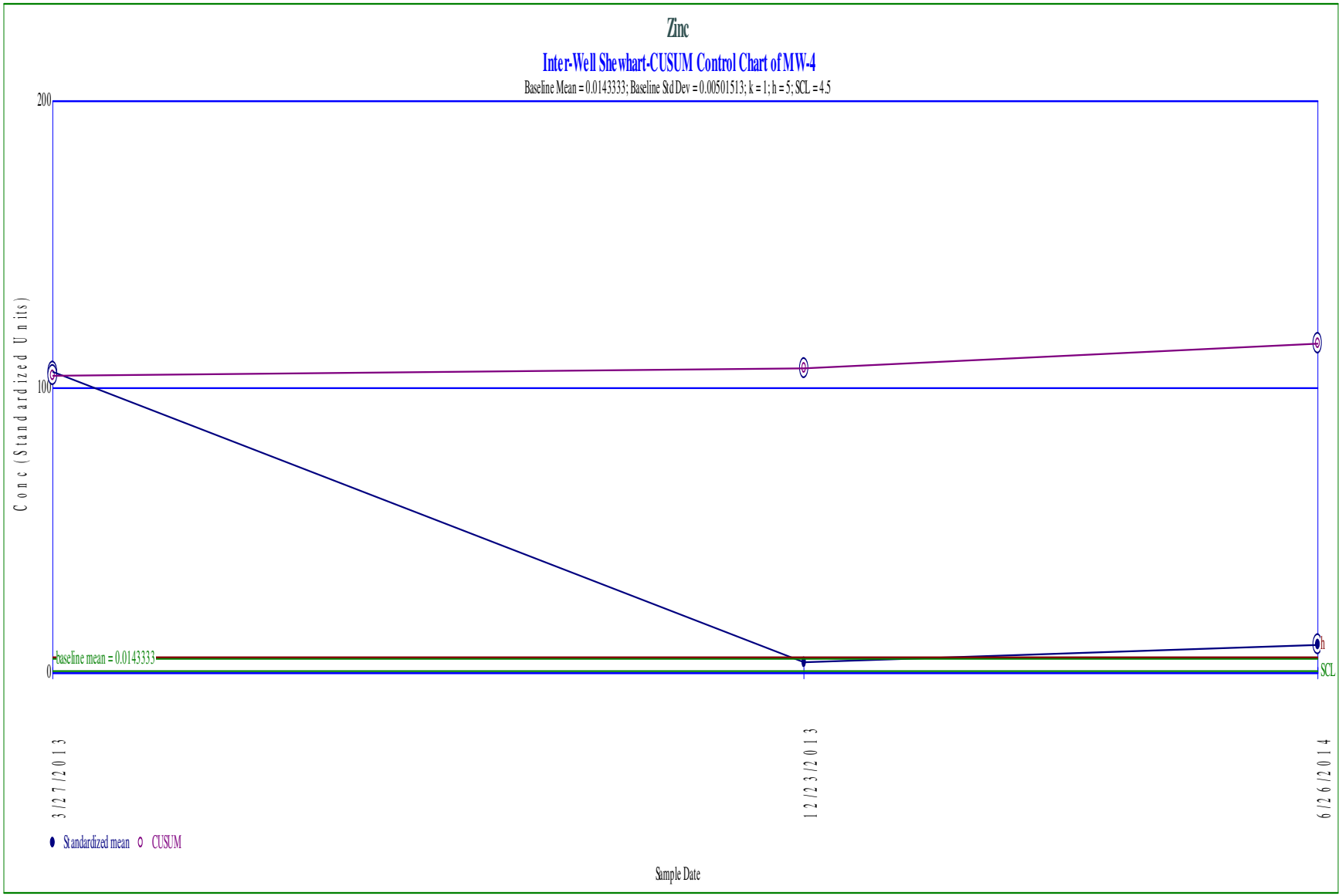
Baseline Samples	Date	Result
	4/19/2008	-4.50986
	1/21/2009	-4.19971
	4/9/2009	-4.50986
	5/19/2009	-3.86323
	7/16/2010	-4.50986
	2/8/2011	-4.13517
	9/14/2011	-3.81671
	2/17/2012	<-5.29832
	7/31/2012	-3.77226
	3/27/2013	-4.42285
	12/23/2013	<-5.29832

From 11 baseline samples
Baseline mean = -4.39419
Baseline std Dev = 0.527538

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 = 11 (background observations) - 1
t(0.95, 11) = 1.81246

Date	Samples	Mean	Interval	Significant
6/26/2014	1	-5.29832	[0, -3.39554]	FALSE


Zinc
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 0.0143333; Baseline Std Dev = 0.00501513; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
h
SCL
baseline mean = 0.0143333
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
Standardized mean
CUSUM
Sample Date


Zinc
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 0.0143333; Baseline Std Dev = 0.00501513; k = 1; h = 5; SCL = 4.5
200
100
0
Conc (Standardized Units)
baseline mean = 0.0143333
SCL
3/27/2013
12/23/2013
6/26/2014
Standardized mean
CUSUM
Sample Date

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Zinc

Location: MW-4

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total non detects is 3
Non detect rank is 2

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.011	4
	1/21/2009	0.015	8
	4/9/2009	0.011	5
	5/19/2009	0.021	10
	7/16/2010	0.011	6
	2/8/2011	0.016	9
	9/14/2011	0.022	11
	2/17/2012	<0.01	2
	7/31/2012	0.023	12
	3/27/2013	0.012	7
	12/23/2013	<0.01	2
	6/26/2014	<0.01	2
MW-4	3/27/2013	0.54	15
	12/23/2013	0.031	13
	6/26/2014	0.062	14

The Wilcoxon Statistic is 36
The Expected value is is 18
The Standard Deviation is 6.9282
The Z Score is 2.52591
The Standard Deviation adjusted for ties is 6.90342
The Z Score adjusted for ties is 2.53498

2.52591 > 2.326 indicating statistical significance at 1% level

2.53498 > 2.326 indicating statistical significance at 1% level when adjusted for ties

APPENDIX C

LABORATORY ANALYTICAL REPORT, FIELD INFORMATION LOGS

12065 Lebanon Rd.
Mt. Juliet, TN 37122
(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

Michael Johnson
Civil & Environmental Consultants - TN
405 Duke Drive, Suite 270
Franklin, TN 37067

Report Summary

Thursday July 10, 2014

Report Number: L707212
Samples Received: 06/27/14
Client Project: 142-059

Description: EWS - Camden

The analytical results in this report are based upon information supplied by you, the client, and are for your exclusive use. If you have any questions regarding this data package, please do not hesitate to call.

Entire Report Reviewed By: Jimmy Hunt

Jimmy Hunt , ESC Representative

Laboratory Certification Numbers

A2LA - 1461-01, AIHA - 100789, AL - 40660, CA - 01157CA, CT - PH-0197, FL - E87487, GA - 923, IN - C-TN-01, KY - 90010, KYUST - 0016, NC - ENV375/DW21704/BIO041, ND - R-140. NJ - TN002, NJ NELAP - TN002, SC - 84004, TN - 2006, VA - 460132, WV - 233, AZ - 0612, MN - 047-999-395, NY - 11742, WI - 998093910, NV - TN000032011-1, TX - T104704245-11-3, OK - 9915, PA - 68-02979, IA Lab #364, EPA - TN002

Accreditation is only applicable to the test methods specified on each scope of accreditation held by ESC Lab Sciences.

Where applicable, sampling conducted by ESC is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

ESC LAB SCIENCES
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Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-01

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : MW-1

Collected By : Philip Campbell
Collection Date : 06/26/14 11:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Bromide	BDL	1.0	mg/l	9056	06/27/14	1
Chloride	2.9	1.0	mg/l	9056	06/27/14	1
Nitrate	BDL	0.10	mg/l	9056	06/27/14	1
Sulfate	BDL	5.0	mg/l	9056	06/27/14	1
Ammonia Nitrogen	BDL	0.25	mg/l	350.1	07/09/14	1
Antimony	BDL	0.0010	mg/l	6020	07/08/14	1
Arsenic	0.063	0.0010	mg/l	6020	07/08/14	1
Beryllium	BDL	0.0010	mg/l	6020	07/08/14	1
Cadmium	BDL	0.00050	mg/l	6020	07/08/14	1
Copper	BDL	0.0020	mg/l	6020	07/08/14	1
Lead	BDL	0.0010	mg/l	6020	07/08/14	1
Selenium	BDL	0.0010	mg/l	6020	07/08/14	1
Thallium	BDL	0.0010	mg/l	6020	07/08/14	1
Zinc	BDL	0.010	mg/l	6020	07/08/14	1
Mercury	BDL	0.00020	mg/l	7470A	06/30/14	1
Aluminum	BDL	0.10	mg/l	6010B	07/07/14	1
Barium	0.018	0.0050	mg/l	6010B	07/06/14	1
Boron	BDL	0.20	mg/l	6010B	07/06/14	1
Calcium	3.3	1.0	mg/l	6010B	07/06/14	1
Chromium	BDL	0.010	mg/l	6010B	07/07/14	1
Cobalt	0.036	0.010	mg/l	6010B	07/06/14	1
Iron	18.	0.10	mg/l	6010B	07/06/14	1
Magnesium	3.3	1.0	mg/l	6010B	07/07/14	1
Manganese	0.98	0.010	mg/l	6010B	07/06/14	1
Nickel	BDL	0.020	mg/l	6010B	07/06/14	1
Potassium	BDL	1.0	mg/l	6010B	07/07/14	1
Silver	BDL	0.010	mg/l	6010B	07/06/14	1
Sodium	2.9	1.0	mg/l	6010B	07/06/14	1
Vanadium	BDL	0.010	mg/l	6010B	07/06/14	1
Volatile Organics						
Acetone	BDL	0.050	mg/l	8260B	07/01/14	1
Acrylonitrile	BDL	0.010	mg/l	8260B	07/01/14	1
Benzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromochloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromodichloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromoform	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromomethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Carbon disulfide	BDL	0.0010	mg/l	8260B	07/01/14	1
Carbon tetrachloride	BDL	0.0010	mg/l	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-01

Date Received : June 27, 2014
Description : EWS - Camden

Site ID :

Sample ID : MW-1

Project # : 142-059

Collected By : Philip Campbell
Collection Date : 06/26/14 11:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Chlorodibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Chloroethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloroform	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloromethane	BDL	0.0025	mg/l	8260B	07/01/14	1
Dibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,4-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,4-Dichloro-2-butene	BDL	0.0025	mg/l	8260B	07/01/14	1
1,1-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloropropane	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
Ethylbenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
2-Hexanone	BDL	0.010	mg/l	8260B	07/01/14	1
Iodomethane	BDL	0.010	mg/l	8260B	07/01/14	1
2-Butanone (MEK)	BDL	0.010	mg/l	8260B	07/01/14	1
Methylene Chloride	BDL	0.0050	mg/l	8260B	07/01/14	1
4-Methyl-2-pentanone (MIBK)	BDL	0.010	mg/l	8260B	07/01/14	1
Styrene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,1,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Tetrachloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Toluene	BDL	0.0050	mg/l	8260B	07/01/14	1
1,1,1-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichlorofluoromethane	BDL	0.0050	mg/l	8260B	07/01/14	1
1,2,3-Trichloropropane	BDL	0.0025	mg/l	8260B	07/01/14	1
Vinyl acetate	BDL	0.010	mg/l	8260B	07/01/14	1
Vinyl chloride	BDL	0.0010	mg/l	8260B	07/01/14	1
Xylenes, Total	BDL	0.0030	mg/l	8260B	07/01/14	1
Surrogate Recovery						
Toluene-d8	96.4		% Rec.	8260B	07/01/14	1
Dibromofluoromethane	103.		% Rec.	8260B	07/01/14	1
a,a,a-Trifluorotoluene	102.		% Rec.	8260B	07/01/14	1
4-Bromofluorobenzene	94.8		% Rec.	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.

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Reported: 07/10/14 09:45 Printed: 07/10/14 09:45

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-02

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : MW-3

Collected By : Philip Campbell
Collection Date : 06/26/14 12:45

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Bromide	BDL	1.0	mg/l	9056	06/27/14	1
Chloride	29.	1.0	mg/l	9056	06/27/14	1
Nitrate	1.4	0.10	mg/l	9056	06/27/14	1
Sulfate	9.7	5.0	mg/l	9056	06/27/14	1
Ammonia Nitrogen	0.41	0.25	mg/l	350.1	07/08/14	1
Antimony	BDL	0.0010	mg/l	6020	07/09/14	1
Arsenic	0.0012	0.0010	mg/l	6020	07/09/14	1
Beryllium	BDL	0.0010	mg/l	6020	07/09/14	1
Cadmium	BDL	0.00050	mg/l	6020	07/09/14	1
Copper	0.0073	0.0020	mg/l	6020	07/09/14	1
Lead	0.0021	0.0010	mg/l	6020	07/09/14	1
Selenium	BDL	0.0010	mg/l	6020	07/09/14	1
Thallium	BDL	0.0010	mg/l	6020	07/09/14	1
Zinc	0.023	0.010	mg/l	6020	07/09/14	1
Mercury	BDL	0.00020	mg/l	7470A	06/30/14	1
Aluminum	0.50	0.10	mg/l	6010B	07/07/14	1
Barium	0.079	0.0050	mg/l	6010B	07/06/14	1
Boron	BDL	0.20	mg/l	6010B	07/06/14	1
Calcium	8.6	1.0	mg/l	6010B	07/06/14	1
Chromium	BDL	0.010	mg/l	6010B	07/07/14	1
Cobalt	BDL	0.010	mg/l	6010B	07/06/14	1
Iron	0.44	0.10	mg/l	6010B	07/06/14	1
Magnesium	3.2	1.0	mg/l	6010B	07/07/14	1
Manganese	0.12	0.010	mg/l	6010B	07/06/14	1
Nickel	BDL	0.020	mg/l	6010B	07/06/14	1
Potassium	6.6	1.0	mg/l	6010B	07/07/14	1
Silver	BDL	0.010	mg/l	6010B	07/06/14	1
Sodium	14.	1.0	mg/l	6010B	07/06/14	1
Vanadium	BDL	0.010	mg/l	6010B	07/06/14	1
Volatile Organics						
Acetone	BDL	0.050	mg/l	8260B	07/01/14	1
Acrylonitrile	BDL	0.010	mg/l	8260B	07/01/14	1
Benzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromochloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromodichloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromoform	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromomethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Carbon disulfide	BDL	0.0010	mg/l	8260B	07/01/14	1
Carbon tetrachloride	BDL	0.0010	mg/l	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-02

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : MW-3

Collected By : Philip Campbell
Collection Date : 06/26/14 12:45

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Chlorodibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Chloroethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloroform	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloromethane	BDL	0.0025	mg/l	8260B	07/01/14	1
Dibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,4-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,4-Dichloro-2-butene	BDL	0.0025	mg/l	8260B	07/01/14	1
1,1-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloropropane	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
Ethylbenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
2-Hexanone	BDL	0.010	mg/l	8260B	07/01/14	1
Iodomethane	BDL	0.010	mg/l	8260B	07/01/14	1
2-Butanone (MEK)	BDL	0.010	mg/l	8260B	07/01/14	1
Methylene Chloride	BDL	0.0050	mg/l	8260B	07/01/14	1
4-Methyl-2-pentanone (MIBK)	BDL	0.010	mg/l	8260B	07/01/14	1
Styrene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,1,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Tetrachloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Toluene	BDL	0.0050	mg/l	8260B	07/01/14	1
1,1,1-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichlorofluoromethane	BDL	0.0050	mg/l	8260B	07/01/14	1
1,2,3-Trichloropropane	BDL	0.0025	mg/l	8260B	07/01/14	1
Vinyl acetate	BDL	0.010	mg/l	8260B	07/01/14	1
Vinyl chloride	BDL	0.0010	mg/l	8260B	07/01/14	1
Xylenes, Total	BDL	0.0030	mg/l	8260B	07/01/14	1
Surrogate Recovery						
Toluene-d8	97.2		% Rec.	8260B	07/01/14	1
Dibromofluoromethane	107.		% Rec.	8260B	07/01/14	1
a,a,a-Trifluorotoluene	101.		% Rec.	8260B	07/01/14	1
4-Bromofluorobenzene	98.0		% Rec.	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-03

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : MW-4

Collected By : Philip Campbell
Collection Date : 06/26/14 12:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Bromide	BDL	1.0	mg/l	9056	06/27/14	1
Chloride	31.	1.0	mg/l	9056	06/27/14	1
Nitrate	2.2	0.10	mg/l	9056	06/27/14	1
Sulfate	BDL	5.0	mg/l	9056	06/27/14	1
Ammonia Nitrogen	1.5	0.25	mg/l	350.1	07/08/14	1
Antimony	BDL	0.0010	mg/l	6020	07/09/14	1
Arsenic	BDL	0.0010	mg/l	6020	07/09/14	1
Beryllium	BDL	0.0010	mg/l	6020	07/09/14	1
Cadmium	BDL	0.00050	mg/l	6020	07/09/14	1
Copper	BDL	0.0020	mg/l	6020	07/09/14	1
Lead	BDL	0.0010	mg/l	6020	07/09/14	1
Selenium	BDL	0.0010	mg/l	6020	07/09/14	1
Thallium	BDL	0.0010	mg/l	6020	07/09/14	1
Zinc	0.062	0.010	mg/l	6020	07/09/14	1
Mercury	BDL	0.00020	mg/l	7470A	06/30/14	1
Aluminum	BDL	0.10	mg/l	6010B	07/07/14	1
Barium	0.040	0.0050	mg/l	6010B	07/06/14	1
Boron	BDL	0.20	mg/l	6010B	07/06/14	1
Calcium	7.9	1.0	mg/l	6010B	07/06/14	1
Chromium	BDL	0.010	mg/l	6010B	07/07/14	1
Cobalt	BDL	0.010	mg/l	6010B	07/06/14	1
Iron	BDL	0.10	mg/l	6010B	07/06/14	1
Magnesium	5.2	1.0	mg/l	6010B	07/07/14	1
Manganese	0.83	0.010	mg/l	6010B	07/06/14	1
Nickel	BDL	0.020	mg/l	6010B	07/06/14	1
Potassium	3.6	1.0	mg/l	6010B	07/07/14	1
Silver	BDL	0.010	mg/l	6010B	07/06/14	1
Sodium	16.	1.0	mg/l	6010B	07/06/14	1
Vanadium	BDL	0.010	mg/l	6010B	07/06/14	1
Volatile Organics						
Acetone	BDL	0.050	mg/l	8260B	07/01/14	1
Acrylonitrile	BDL	0.010	mg/l	8260B	07/01/14	1
Benzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromochloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromodichloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromoform	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromomethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Carbon disulfide	BDL	0.0010	mg/l	8260B	07/01/14	1
Carbon tetrachloride	BDL	0.0010	mg/l	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-03

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : MW-4

Collected By : Philip Campbell
Collection Date : 06/26/14 12:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Chlorodibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Chloroethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloroform	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloromethane	BDL	0.0025	mg/l	8260B	07/01/14	1
Dibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,4-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,4-Dichloro-2-butene	BDL	0.0025	mg/l	8260B	07/01/14	1
1,1-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloropropane	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
Ethylbenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
2-Hexanone	BDL	0.010	mg/l	8260B	07/01/14	1
Iodomethane	BDL	0.010	mg/l	8260B	07/01/14	1
2-Butanone (MEK)	BDL	0.010	mg/l	8260B	07/01/14	1
Methylene Chloride	BDL	0.0050	mg/l	8260B	07/01/14	1
4-Methyl-2-pentanone (MIBK)	BDL	0.010	mg/l	8260B	07/01/14	1
Styrene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,1,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Tetrachloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Toluene	BDL	0.0050	mg/l	8260B	07/01/14	1
1,1,1-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichlorofluoromethane	BDL	0.0050	mg/l	8260B	07/01/14	1
1,2,3-Trichloropropane	BDL	0.0025	mg/l	8260B	07/01/14	1
Vinyl acetate	BDL	0.010	mg/l	8260B	07/01/14	1
Vinyl chloride	BDL	0.0010	mg/l	8260B	07/01/14	1
Xylenes, Total	BDL	0.0030	mg/l	8260B	07/01/14	1
Surrogate Recovery						
Toluene-d8	95.6		% Rec.	8260B	07/01/14	1
Dibromofluoromethane	105.		% Rec.	8260B	07/01/14	1
a,a,a-Trifluorotoluene	102.		% Rec.	8260B	07/01/14	1
4-Bromofluorobenzene	95.6		% Rec.	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-04

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : DUPLICATE

Collected By : Philip Campbell
Collection Date : 06/26/14 00:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Bromide	BDL	1.0	mg/l	9056	06/27/14	1
Chloride	32.	1.0	mg/l	9056	06/27/14	1
Nitrate	2.3	0.10	mg/l	9056	06/27/14	1
Sulfate	BDL	5.0	mg/l	9056	06/27/14	1
Ammonia Nitrogen	1.4	0.25	mg/l	350.1	07/08/14	1
Antimony	BDL	0.0010	mg/l	6020	07/09/14	1
Arsenic	BDL	0.0010	mg/l	6020	07/09/14	1
Beryllium	BDL	0.0010	mg/l	6020	07/09/14	1
Cadmium	BDL	0.00050	mg/l	6020	07/09/14	1
Copper	BDL	0.0020	mg/l	6020	07/09/14	1
Lead	BDL	0.0010	mg/l	6020	07/09/14	1
Selenium	BDL	0.0010	mg/l	6020	07/09/14	1
Thallium	BDL	0.0010	mg/l	6020	07/09/14	1
Zinc	0.069	0.010	mg/l	6020	07/09/14	1
Mercury	BDL	0.00020	mg/l	7470A	06/30/14	1
Aluminum	0.15	0.10	mg/l	6010B	07/07/14	1
Barium	0.043	0.0050	mg/l	6010B	07/06/14	1
Boron	BDL	0.20	mg/l	6010B	07/06/14	1
Calcium	8.2	1.0	mg/l	6010B	07/06/14	1
Chromium	BDL	0.010	mg/l	6010B	07/07/14	1
Cobalt	BDL	0.010	mg/l	6010B	07/06/14	1
Iron	0.10	0.10	mg/l	6010B	07/06/14	1
Magnesium	6.0	1.0	mg/l	6010B	07/07/14	1
Manganese	0.87	0.010	mg/l	6010B	07/06/14	1
Nickel	BDL	0.020	mg/l	6010B	07/06/14	1
Potassium	3.5	1.0	mg/l	6010B	07/07/14	1
Silver	BDL	0.010	mg/l	6010B	07/06/14	1
Sodium	16.	1.0	mg/l	6010B	07/06/14	1
Vanadium	BDL	0.010	mg/l	6010B	07/06/14	1
Volatile Organics						
Acetone	BDL	0.050	mg/l	8260B	07/01/14	1
Acrylonitrile	BDL	0.010	mg/l	8260B	07/01/14	1
Benzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromochloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromodichloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromoform	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromomethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Carbon disulfide	BDL	0.0010	mg/l	8260B	07/01/14	1
Carbon tetrachloride	BDL	0.0010	mg/l	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)

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Tax I.D. 62-0814289

Est. 1970

REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-04

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : DUPLICATE

Collected By : Philip Campbell
Collection Date : 06/26/14 00:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Chlorodibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Chloroethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloroform	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloromethane	BDL	0.0025	mg/l	8260B	07/01/14	1
Dibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,4-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,4-Dichloro-2-butene	BDL	0.0025	mg/l	8260B	07/01/14	1
1,1-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloropropane	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
Ethylbenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
2-Hexanone	BDL	0.010	mg/l	8260B	07/01/14	1
Iodomethane	BDL	0.010	mg/l	8260B	07/01/14	1
2-Butanone (MEK)	BDL	0.010	mg/l	8260B	07/01/14	1
Methylene Chloride	BDL	0.0050	mg/l	8260B	07/01/14	1
4-Methyl-2-pentanone (MIBK)	BDL	0.010	mg/l	8260B	07/01/14	1
Styrene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,1,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Tetrachloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Toluene	BDL	0.0050	mg/l	8260B	07/01/14	1
1,1,1-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichlorofluoromethane	BDL	0.0050	mg/l	8260B	07/01/14	1
1,2,3-Trichloropropane	BDL	0.0025	mg/l	8260B	07/01/14	1
Vinyl acetate	BDL	0.010	mg/l	8260B	07/01/14	1
Vinyl chloride	BDL	0.0010	mg/l	8260B	07/01/14	1
Xylenes, Total	BDL	0.0030	mg/l	8260B	07/01/14	1
Surrogate Recovery						
Toluene-d8	98.6		% Rec.	8260B	07/01/14	1
Dibromofluoromethane	107.		% Rec.	8260B	07/01/14	1
a,a,a-Trifluorotoluene	102.		% Rec.	8260B	07/01/14	1
4-Bromofluorobenzene	97.7		% Rec.	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.

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Reported: 07/10/14 09:45 Printed: 07/10/14 09:45

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-05

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : EQUIPMENT BLANK

Collected By : Philip Campbell
Collection Date : 06/26/14 14:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Bromide	BDL	1.0	mg/l	9056	06/27/14	1
Chloride	3.4	1.0	mg/l	9056	06/27/14	1
Nitrate	BDL	0.10	mg/l	9056	06/27/14	1
Sulfate	BDL	5.0	mg/l	9056	06/27/14	1
Ammonia Nitrogen	BDL	0.25	mg/l	350.1	07/08/14	1
Antimony	BDL	0.0010	mg/l	6020	07/09/14	1
Arsenic	BDL	0.0010	mg/l	6020	07/09/14	1
Beryllium	BDL	0.0010	mg/l	6020	07/09/14	1
Cadmium	BDL	0.00050	mg/l	6020	07/09/14	1
Copper	BDL	0.0020	mg/l	6020	07/09/14	1
Lead	BDL	0.0010	mg/l	6020	07/09/14	1
Selenium	BDL	0.0010	mg/l	6020	07/09/14	1
Thallium	BDL	0.0010	mg/l	6020	07/09/14	1
Zinc	BDL	0.010	mg/l	6020	07/09/14	1
Mercury	BDL	0.00020	mg/l	7470A	06/30/14	1
Aluminum	BDL	0.10	mg/l	6010B	07/07/14	1
Barium	BDL	0.0050	mg/l	6010B	07/06/14	1
Boron	BDL	0.20	mg/l	6010B	07/06/14	1
Calcium	BDL	1.0	mg/l	6010B	07/06/14	1
Chromium	BDL	0.010	mg/l	6010B	07/07/14	1
Cobalt	BDL	0.010	mg/l	6010B	07/06/14	1
Iron	BDL	0.10	mg/l	6010B	07/06/14	1
Magnesium	BDL	1.0	mg/l	6010B	07/07/14	1
Manganese	BDL	0.010	mg/l	6010B	07/06/14	1
Nickel	BDL	0.020	mg/l	6010B	07/06/14	1
Potassium	BDL	1.0	mg/l	6010B	07/07/14	1
Silver	BDL	0.010	mg/l	6010B	07/06/14	1
Sodium	15.	1.0	mg/l	6010B	07/06/14	1
Vanadium	BDL	0.010	mg/l	6010B	07/06/14	1
Volatile Organics						
Acetone	BDL	0.050	mg/l	8260B	07/01/14	1
Acrylonitrile	BDL	0.010	mg/l	8260B	07/01/14	1
Benzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromochloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromodichloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromoform	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromomethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Carbon disulfide	BDL	0.0010	mg/l	8260B	07/01/14	1
Carbon tetrachloride	BDL	0.0010	mg/l	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-05

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : EQUIPMENT BLANK

Collected By : Philip Campbell
Collection Date : 06/26/14 14:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Chlorodibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Chloroethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloroform	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloromethane	BDL	0.0025	mg/l	8260B	07/01/14	1
Dibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,4-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,4-Dichloro-2-butene	BDL	0.0025	mg/l	8260B	07/01/14	1
1,1-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloropropane	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
Ethylbenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
2-Hexanone	BDL	0.010	mg/l	8260B	07/01/14	1
Iodomethane	BDL	0.010	mg/l	8260B	07/01/14	1
2-Butanone (MEK)	BDL	0.010	mg/l	8260B	07/01/14	1
Methylene Chloride	BDL	0.0050	mg/l	8260B	07/01/14	1
4-Methyl-2-pentanone (MIBK)	BDL	0.010	mg/l	8260B	07/01/14	1
Styrene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,1,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Tetrachloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Toluene	BDL	0.0050	mg/l	8260B	07/01/14	1
1,1,1-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichlorofluoromethane	BDL	0.0050	mg/l	8260B	07/01/14	1
1,2,3-Trichloropropane	BDL	0.0025	mg/l	8260B	07/01/14	1
Vinyl acetate	BDL	0.010	mg/l	8260B	07/01/14	1
Vinyl chloride	BDL	0.0010	mg/l	8260B	07/01/14	1
Xylenes, Total	BDL	0.0030	mg/l	8260B	07/01/14	1
Surrogate Recovery						
Toluene-d8	97.3		% Rec.	8260B	07/01/14	1
Dibromofluoromethane	106.		% Rec.	8260B	07/01/14	1
a,a,a-Trifluorotoluene	101.		% Rec.	8260B	07/01/14	1
4-Bromofluorobenzene	97.6		% Rec.	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.

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Reported: 07/10/14 09:45 Printed: 07/10/14 09:45

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-06

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : FIELD BLANK

Collected By : Philip Campbell
Collection Date : 06/26/14 13:50

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Bromide	BDL	1.0	mg/l	9056	06/27/14	1
Chloride	3.5	1.0	mg/l	9056	06/27/14	1
Nitrate	BDL	0.10	mg/l	9056	06/27/14	1
Sulfate	BDL	5.0	mg/l	9056	06/27/14	1
Ammonia Nitrogen	BDL	0.25	mg/l	350.1	07/08/14	1
Antimony	BDL	0.0010	mg/l	6020	07/03/14	1
Arsenic	BDL	0.0010	mg/l	6020	07/03/14	1
Beryllium	BDL	0.0010	mg/l	6020	07/03/14	1
Cadmium	BDL	0.00050	mg/l	6020	07/03/14	1
Copper	BDL	0.0020	mg/l	6020	07/03/14	1
Lead	BDL	0.0010	mg/l	6020	07/03/14	1
Selenium	BDL	0.0010	mg/l	6020	07/03/14	1
Thallium	BDL	0.0010	mg/l	6020	07/03/14	1
Zinc	BDL	0.010	mg/l	6020	07/03/14	1
Mercury	BDL	0.00020	mg/l	7470A	06/30/14	1
Aluminum	BDL	0.10	mg/l	6010B	07/07/14	1
Barium	BDL	0.0050	mg/l	6010B	07/06/14	1
Boron	BDL	0.20	mg/l	6010B	07/06/14	1
Calcium	BDL	1.0	mg/l	6010B	07/06/14	1
Chromium	BDL	0.010	mg/l	6010B	07/07/14	1
Cobalt	BDL	0.010	mg/l	6010B	07/06/14	1
Iron	BDL	0.10	mg/l	6010B	07/06/14	1
Magnesium	BDL	1.0	mg/l	6010B	07/07/14	1
Manganese	BDL	0.010	mg/l	6010B	07/06/14	1
Nickel	BDL	0.020	mg/l	6010B	07/06/14	1
Potassium	BDL	1.0	mg/l	6010B	07/07/14	1
Silver	BDL	0.010	mg/l	6010B	07/06/14	1
Sodium	15.	1.0	mg/l	6010B	07/06/14	1
Vanadium	BDL	0.010	mg/l	6010B	07/06/14	1
Volatile Organics						
Acetone	BDL	0.050	mg/l	8260B	07/01/14	1
Acrylonitrile	BDL	0.010	mg/l	8260B	07/01/14	1
Benzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromochloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromodichloromethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromoform	BDL	0.0010	mg/l	8260B	07/01/14	1
Bromomethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Carbon disulfide	BDL	0.0010	mg/l	8260B	07/01/14	1
Carbon tetrachloride	BDL	0.0010	mg/l	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-06

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : FIELD BLANK

Collected By : Philip Campbell
Collection Date : 06/26/14 13:50

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Chlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
Chlorodibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Chloroethane	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloroform	BDL	0.0050	mg/l	8260B	07/01/14	1
Chloromethane	BDL	0.0025	mg/l	8260B	07/01/14	1
Dibromomethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,4-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,4-Dichloro-2-butene	BDL	0.0025	mg/l	8260B	07/01/14	1
1,1-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,2-Dichloropropane	BDL	0.0010	mg/l	8260B	07/01/14	1
cis-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
trans-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/01/14	1
Ethylbenzene	BDL	0.0010	mg/l	8260B	07/01/14	1
2-Hexanone	BDL	0.010	mg/l	8260B	07/01/14	1
Iodomethane	BDL	0.010	mg/l	8260B	07/01/14	1
2-Butanone (MEK)	BDL	0.010	mg/l	8260B	07/01/14	1
Methylene Chloride	BDL	0.0050	mg/l	8260B	07/01/14	1
4-Methyl-2-pentanone (MIBK)	BDL	0.010	mg/l	8260B	07/01/14	1
Styrene	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,1,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Tetrachloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Toluene	BDL	0.0050	mg/l	8260B	07/01/14	1
1,1,1-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
1,1,2-Trichloroethane	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichloroethene	BDL	0.0010	mg/l	8260B	07/01/14	1
Trichlorofluoromethane	BDL	0.0050	mg/l	8260B	07/01/14	1
1,2,3-Trichloropropane	BDL	0.0025	mg/l	8260B	07/01/14	1
Vinyl acetate	BDL	0.010	mg/l	8260B	07/01/14	1
Vinyl chloride	BDL	0.0010	mg/l	8260B	07/01/14	1
Xylenes, Total	BDL	0.0030	mg/l	8260B	07/01/14	1
Surrogate Recovery						
Toluene-d8	98.5		% Rec.	8260B	07/01/14	1
Dibromofluoromethane	103.		% Rec.	8260B	07/01/14	1
a,a,a-Trifluorotoluene	102.		% Rec.	8260B	07/01/14	1
4-Bromofluorobenzene	95.7		% Rec.	8260B	07/01/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.

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Reported: 07/10/14 09:45 Printed: 07/10/14 09:45

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-07

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : TRIP BLANK

Collected By : Philip Campbell
Collection Date : 06/26/14 00:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Volatile Organics						
Acetone	BDL	0.050	mg/l	8260B	07/02/14	1
Acrylonitrile	BDL	0.010	mg/l	8260B	07/02/14	1
Benzene	BDL	0.0010	mg/l	8260B	07/02/14	1
Bromochloromethane	BDL	0.0010	mg/l	8260B	07/02/14	1
Bromodichloromethane	BDL	0.0010	mg/l	8260B	07/02/14	1
Bromoform	BDL	0.0010	mg/l	8260B	07/02/14	1
Bromomethane	BDL	0.0050	mg/l	8260B	07/02/14	1
Carbon disulfide	BDL	0.0010	mg/l	8260B	07/02/14	1
Carbon tetrachloride	BDL	0.0010	mg/l	8260B	07/02/14	1
Chlorobenzene	BDL	0.0010	mg/l	8260B	07/02/14	1
Chlorodibromomethane	BDL	0.0010	mg/l	8260B	07/02/14	1
Chloroethane	BDL	0.0050	mg/l	8260B	07/02/14	1
Chloroform	BDL	0.0050	mg/l	8260B	07/02/14	1
Chloromethane	BDL	0.0025	mg/l	8260B	07/02/14	1
Dibromomethane	BDL	0.0010	mg/l	8260B	07/02/14	1
1,2-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/02/14	1
1,4-Dichlorobenzene	BDL	0.0010	mg/l	8260B	07/02/14	1
trans-1,4-Dichloro-2-butene	BDL	0.0025	mg/l	8260B	07/02/14	1
1,1-Dichloroethane	BDL	0.0010	mg/l	8260B	07/02/14	1
1,2-Dichloroethane	BDL	0.0010	mg/l	8260B	07/02/14	1
1,1-Dichloroethene	BDL	0.0010	mg/l	8260B	07/02/14	1
cis-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/02/14	1
trans-1,2-Dichloroethene	BDL	0.0010	mg/l	8260B	07/02/14	1
1,2-Dichloropropane	BDL	0.0010	mg/l	8260B	07/02/14	1
cis-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/02/14	1
trans-1,3-Dichloropropene	BDL	0.0010	mg/l	8260B	07/02/14	1
Ethylbenzene	BDL	0.0010	mg/l	8260B	07/02/14	1
2-Hexanone	BDL	0.010	mg/l	8260B	07/02/14	1
Iodomethane	BDL	0.010	mg/l	8260B	07/02/14	1
2-Butanone (MEK)	BDL	0.010	mg/l	8260B	07/02/14	1
Methylene Chloride	BDL	0.0050	mg/l	8260B	07/02/14	1
4-Methyl-2-pentanone (MIBK)	BDL	0.010	mg/l	8260B	07/02/14	1
Styrene	BDL	0.0010	mg/l	8260B	07/02/14	1
1,1,1,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/02/14	1
1,1,2,2-Tetrachloroethane	BDL	0.0010	mg/l	8260B	07/02/14	1
Tetrachloroethene	BDL	0.0010	mg/l	8260B	07/02/14	1
Toluene	BDL	0.0050	mg/l	8260B	07/02/14	1
1,1,1-Trichloroethane	BDL	0.0010	mg/l	8260B	07/02/14	1
1,1,2-Trichloroethane	BDL	0.0010	mg/l	8260B	07/02/14	1
Trichloroethene	BDL	0.0010	mg/l	8260B	07/02/14	1
Trichlorofluoromethane	BDL	0.0050	mg/l	8260B	07/02/14	1
1,2,3-Trichloropropane	BDL	0.0025	mg/l	8260B	07/02/14	1
Vinyl acetate	BDL	0.010	mg/l	8260B	07/02/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)

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REPORT OF ANALYSIS

Michael Johnson
Civil & Environmental Consultants -
405 Duke Drive, Suite 270
Franklin, TN 37067

July 10, 2014

ESC Sample # : L707212-07

Site ID :

Project # : 142-059

Date Received : June 27, 2014
Description : EWS - Camden

Sample ID : TRIP BLANK

Collected By : Philip Campbell
Collection Date : 06/26/14 00:00

Parameter	Result	Det. Limit	Units	Method	Date	Dil.
Vinyl chloride	BDL	0.0010	mg/l	8260B	07/02/14	1
Xylenes, Total	BDL	0.0030	mg/l	8260B	07/02/14	1
Surrogate Recovery						
Toluene-d8	97.9		% Rec.	8260B	07/02/14	1
Dibromofluoromethane	96.9		% Rec.	8260B	07/02/14	1
a,a,a-Trifluorotoluene	99.6		% Rec.	8260B	07/02/14	1
4-Bromofluorobenzene	97.1		% Rec.	8260B	07/02/14	1

BDL - Below Detection Limit
Det. Limit - Practical Quantitation Limit(PQL)
Note:
The reported analytical results relate only to the sample submitted.

.
Reported: 07/10/14 09:45 Printed: 07/10/14 09:45

Attachment A
List of Analytes with QC Qualifiers

Sample Number	Work Group	Sample Type	Analyte	Run ID	Qualifier
L707212-01	WG730490	SAMP	Arsenic	R2958127	O1

Attachment B
Explanation of QC Qualifier Codes

Qualifier	Meaning
O1	(ESC) The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

Qualifier Report Information

ESC utilizes sample and result qualifiers as set forth by the EPA Contract Laboratory Program and as required by most certifying bodies including NELAC. In addition to the EPA qualifiers adopted by ESC, we have implemented ESC qualifiers to provide more information pertaining to our analytical results. Each qualifier is designated in the qualifier explanation as either EPA or ESC. Data qualifiers are intended to provide the ESC client with more detailed information concerning the potential bias of reported data. Because of the wide range of constituents and variety of matrices incorporated by most EPA methods,it is common for some compounds to fall outside of established ranges. These exceptions are evaluated and all reported data is valid and useable "unless qualified as 'R' (Rejected)."

Definitions

Accuracy - The relationship of the observed value of a known sample to the true value of a known sample. Represented by percent recovery and relevant to samples such as: control samples, matrix spike recoveries, surrogate recoveries, etc.

Precision - The agreement between a set of samples or between duplicate samples. Relates to how close together the results are and is represented by Relative Percent Differrence.

Surrogate - Organic compounds that are similar in chemical composition, extraction, and chromotography to analytes of interest. The surrogates are used to determine the probable response of the group of analytes that are chemically related to the surrogate compound. Surrogates are added to the sample and carried through all stages of preparation and analyses.

TIC - Tentatively Identified Compound: Compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates.

Summary of Remarks For Samples Printed
07/10/14 at 09:45:55

TSR Signing Reports: 350
R5 - Desired TAT

Use CDG, SBG, ASG, not CDICP, SBICP, or ASICP on GW; Charge $6 for additional metals when metals list is run.

Sample: L707212-01 Account: CEC Received: 06/27/14 14:10 Due Date: 07/07/14 00:00 RPT Date: 07/10/14 09:45

Sample: L707212-02 Account: CEC Received: 06/27/14 14:10 Due Date: 07/07/14 00:00 RPT Date: 07/10/14 09:45

Sample: L707212-03 Account: CEC Received: 06/27/14 14:10 Due Date: 07/07/14 00:00 RPT Date: 07/10/14 09:45

Sample: L707212-04 Account: CEC Received: 06/27/14 14:10 Due Date: 07/07/14 00:00 RPT Date: 07/10/14 09:45

Sample: L707212-05 Account: CEC Received: 06/27/14 14:10 Due Date: 07/07/14 00:00 RPT Date: 07/10/14 09:45

Sample: L707212-06 Account: CEC Received: 06/27/14 14:10 Due Date: 07/07/14 00:00 RPT Date: 07/10/14 09:45

Sample: L707212-07 Account: CEC Received: 06/27/14 14:10 Due Date: 07/07/14 00:00 RPT Date: 07/10/14 09:45

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Quality Assurance Report
Level II

L707212

July 10, 2014

Laboratory Blank

Analyte	Result	Units	% Rec	Limit	Batch	Date Analyzed
Bromide	< 1	mg/l			WG728982	06/27/14 09:50
Chloride	< 1	mg/l			WG728982	06/27/14 09:50
Nitrate	< .1	mg/l			WG728982	06/27/14 09:50
Sulfate	< 5	mg/l			WG728982	06/27/14 09:50
Mercury	< .0002	mg/l			WG729128	06/30/14 14:37
1,1,1,2-Tetrachloroethane	< .001	mg/l			WG729151	07/01/14 11:22
1,1,1-Trichloroethane	< .001	mg/l			WG729151	07/01/14 11:22
1,1,2,2-Tetrachloroethane	< .001	mg/l			WG729151	07/01/14 11:22
1,1,2-Trichloroethane	< .001	mg/l			WG729151	07/01/14 11:22
1,1-Dichloroethane	< .001	mg/l			WG729151	07/01/14 11:22
1,1-Dichloroethene	< .001	mg/l			WG729151	07/01/14 11:22
1,2,3-Trichloropropane	< .001	mg/l			WG729151	07/01/14 11:22
1,2-Dichlorobenzene	< .001	mg/l			WG729151	07/01/14 11:22
1,2-Dichloroethane	< .001	mg/l			WG729151	07/01/14 11:22
1,2-Dichloropropane	< .001	mg/l			WG729151	07/01/14 11:22
1,4-Dichlorobenzene	< .001	mg/l			WG729151	07/01/14 11:22
2-Butanone (MEK)	< .01	mg/l			WG729151	07/01/14 11:22
2-Hexanone	< .01	mg/l			WG729151	07/01/14 11:22
4-Methyl-2-pentanone (MIBK)	< .01	mg/l			WG729151	07/01/14 11:22
Acetone	< .05	mg/l			WG729151	07/01/14 11:22
Acrylonitrile	< .01	mg/l			WG729151	07/01/14 11:22
Benzene	< .001	mg/l			WG729151	07/01/14 11:22
Bromochloromethane	< .001	mg/l			WG729151	07/01/14 11:22
Bromodichloromethane	< .001	mg/l			WG729151	07/01/14 11:22
Bromoform	< .001	mg/l			WG729151	07/01/14 11:22
Bromomethane	< .005	mg/l			WG729151	07/01/14 11:22
Carbon disulfide	< .001	mg/l			WG729151	07/01/14 11:22
Carbon tetrachloride	< .001	mg/l			WG729151	07/01/14 11:22
Chlorobenzene	< .001	mg/l			WG729151	07/01/14 11:22
Chlorodibromomethane	< .001	mg/l			WG729151	07/01/14 11:22
Chloroethane	< .005	mg/l			WG729151	07/01/14 11:22
Chloroform	< .005	mg/l			WG729151	07/01/14 11:22
Chloromethane	< .0025	mg/l			WG729151	07/01/14 11:22
cis-1,2-Dichloroethene	< .001	mg/l			WG729151	07/01/14 11:22
cis-1,3-Dichloropropene	< .001	mg/l			WG729151	07/01/14 11:22
Dibromomethane	< .001	mg/l			WG729151	07/01/14 11:22
Ethylbenzene	< .001	mg/l			WG729151	07/01/14 11:22
Iodomethane	< .01	mg/l			WG729151	07/01/14 11:22
Methylene Chloride	< .005	mg/l			WG729151	07/01/14 11:22
Styrene	< .001	mg/l			WG729151	07/01/14 11:22
Tetrachloroethene	< .001	mg/l			WG729151	07/01/14 11:22
Toluene	< .005	mg/l			WG729151	07/01/14 11:22
trans-1,2-Dichloroethene	< .001	mg/l			WG729151	07/01/14 11:22
trans-1,3-Dichloropropene	< .001	mg/l			WG729151	07/01/14 11:22
trans-1,4-Dichloro-2-butene	< .0025	mg/l			WG729151	07/01/14 11:22
Trichloroethene	< .001	mg/l			WG729151	07/01/14 11:22
Trichlorofluoromethane	< .005	mg/l			WG729151	07/01/14 11:22
Vinyl acetate	< .01	mg/l			WG729151	07/01/14 11:22
Vinyl chloride	< .001	mg/l			WG729151	07/01/14 11:22
Xylenes, Total	< .003	mg/l			WG729151	07/01/14 11:22
4-Bromofluorobenzene		% Rec.	96.50	71-126	WG729151	07/01/14 11:22
Dibromofluoromethane		% Rec.	104.0	78.3-121	WG729151	07/01/14 11:22
Toluene-d8		% Rec.	99.50	88.5-111	WG729151	07/01/14 11:22
a,a,a-Trifluorotoluene		% Rec.	101.0	85-114	WG729151	07/01/14 11:22

* Performance of this Analyte is outside of established criteria.
For additional information, please see Attachment A 'List of Analytes with QC Qualifiers.'

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Level II

L707212

July 10, 2014

Laboratory Blank

Analyte	Result	Units	% Rec	Limit	Batch	Date Analyzed
1,1,1,2-Tetrachloroethane	< .001	mg/l			WG729185	07/02/14 13:40
1,1,1-Trichloroethane	< .001	mg/l			WG729185	07/02/14 13:40
1,1,2,2-Tetrachloroethane	< .001	mg/l			WG729185	07/02/14 13:40
1,1,2-Trichloroethane	< .001	mg/l			WG729185	07/02/14 13:40
1,1-Dichloroethane	< .001	mg/l			WG729185	07/02/14 13:40
1,1-Dichloroethene	< .001	mg/l			WG729185	07/02/14 13:40
1,2,3-Trichloropropane	< .001	mg/l			WG729185	07/02/14 13:40
1,2-Dichlorobenzene	< .001	mg/l			WG729185	07/02/14 13:40
1,2-Dichloroethane	< .001	mg/l			WG729185	07/02/14 13:40
1,2-Dichloropropane	< .001	mg/l			WG729185	07/02/14 13:40
1,4-Dichlorobenzene	< .001	mg/l			WG729185	07/02/14 13:40
2-Butanone (MEK)	< .01	mg/l			WG729185	07/02/14 13:40
2-Hexanone	< .01	mg/l			WG729185	07/02/14 13:40
4-Methyl-2-pentanone (MIBK)	< .01	mg/l			WG729185	07/02/14 13:40
Acetone	< .05	mg/l			WG729185	07/02/14 13:40
Acrylonitrile	< .01	mg/l			WG729185	07/02/14 13:40
Benzene	< .001	mg/l			WG729185	07/02/14 13:40
Bromochloromethane	< .001	mg/l			WG729185	07/02/14 13:40
Bromodichloromethane	< .001	mg/l			WG729185	07/02/14 13:40
Bromoform	< .001	mg/l			WG729185	07/02/14 13:40
Bromomethane	< .005	mg/l			WG729185	07/02/14 13:40
Carbon disulfide	< .001	mg/l			WG729185	07/02/14 13:40
Carbon tetrachloride	< .001	mg/l			WG729185	07/02/14 13:40
Chlorobenzene	< .001	mg/l			WG729185	07/02/14 13:40
Chlorodibromomethane	< .001	mg/l			WG729185	07/02/14 13:40
Chloroethane	< .005	mg/l			WG729185	07/02/14 13:40
Chloroform	< .005	mg/l			WG729185	07/02/14 13:40
Chloromethane	< .0025	mg/l			WG729185	07/02/14 13:40
cis-1,2-Dichloroethene	< .001	mg/l			WG729185	07/02/14 13:40
cis-1,3-Dichloropropene	< .001	mg/l			WG729185	07/02/14 13:40
Dibromomethane	< .001	mg/l			WG729185	07/02/14 13:40
Ethylbenzene	< .001	mg/l			WG729185	07/02/14 13:40
Iodomethane	< .01	mg/l			WG729185	07/02/14 13:40
Methylene Chloride	< .005	mg/l			WG729185	07/02/14 13:40
Styrene	< .001	mg/l			WG729185	07/02/14 13:40
Tetrachloroethene	< .001	mg/l			WG729185	07/02/14 13:40
Toluene	< .005	mg/l			WG729185	07/02/14 13:40
trans-1,2-Dichloroethene	< .001	mg/l			WG729185	07/02/14 13:40
trans-1,3-Dichloropropene	< .001	mg/l			WG729185	07/02/14 13:40
trans-1,4-Dichloro-2-butene	< .0025	mg/l			WG729185	07/02/14 13:40
Trichloroethene	< .001	mg/l			WG729185	07/02/14 13:40
Trichlorofluoromethane	< .005	mg/l			WG729185	07/02/14 13:40
Vinyl acetate	< .01	mg/l			WG729185	07/02/14 13:40
Vinyl chloride	< .001	mg/l			WG729185	07/02/14 13:40
Xylenes, Total	< .003	mg/l			WG729185	07/02/14 13:40
4-Bromofluorobenzene		% Rec.	92.30	71-126	WG729185	07/02/14 13:40
Dibromofluoromethane		% Rec.	96.70	78.3-121	WG729185	07/02/14 13:40
Toluene-d8		% Rec.	97.40	88.5-111	WG729185	07/02/14 13:40
a,a,a-Trifluorotoluene		% Rec.	98.50	85-114	WG729185	07/02/14 13:40
Antimony	< .001	mg/l			WG729943	07/03/14 12:50
Arsenic	< .001	mg/l			WG729943	07/03/14 12:50
Beryllium	< .001	mg/l			WG729943	07/03/14 12:50
Cadmium	< .0005	mg/l			WG729943	07/03/14 12:50
Copper	< .002	mg/l			WG729943	07/03/14 12:50
Lead	< .001	mg/l			WG729943	07/03/14 12:50
Selenium	< .001	mg/l			WG729943	07/03/14 12:50

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Level II

L707212

July 10, 2014

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Analyte	Result	Units	% Rec	Limit	Batch	Date Analyzed
Thallium	< .001	mg/l			WG729943	07/03/14 12:50
Zinc	< .01	mg/l			WG729943	07/03/14 12:50
Barium	< .005	mg/l			WG729884	07/06/14 07:02
Boron	< .2	mg/l			WG729884	07/06/14 07:02
Calcium	< 1	mg/l			WG729884	07/06/14 07:02
Cobalt	< .01	mg/l			WG729884	07/06/14 07:02
Iron	< .1	mg/l			WG729884	07/06/14 07:02
Manganese	< .01	mg/l			WG729884	07/06/14 07:02
Nickel	< .02	mg/l			WG729884	07/06/14 07:02
Silver	< .01	mg/l			WG729884	07/06/14 07:02
Sodium	< 1	mg/l			WG729884	07/06/14 07:02
Vanadium	< .01	mg/l			WG729884	07/06/14 07:02
Aluminum	< .1	mg/l			WG729884	07/07/14 03:13
Chromium	< .01	mg/l			WG729884	07/07/14 03:13
Magnesium	< 1	mg/l			WG729884	07/07/14 03:13
Potassium	< 1	mg/l			WG729884	07/07/14 03:13
Ammonia Nitrogen	< .25	mg/l			WG729766	07/08/14 07:23
Antimony	< .001	mg/l			WG730490	07/08/14 15:06
Arsenic	< .001	mg/l			WG730490	07/08/14 15:06
Beryllium	< .001	mg/l			WG730490	07/08/14 15:06
Cadmium	< .0005	mg/l			WG730490	07/08/14 15:06
Copper	< .002	mg/l			WG730490	07/08/14 15:06
Lead	< .001	mg/l			WG730490	07/08/14 15:06
Selenium	< .001	mg/l			WG730490	07/08/14 15:06
Thallium	< .001	mg/l			WG730490	07/08/14 15:06
Zinc	< .01	mg/l			WG730490	07/08/14 15:06
Ammonia Nitrogen	< .25	mg/l			WG729768	07/08/14 17:50
Ammonia Nitrogen	< .25	mg/l			WG730155	07/09/14 17:28

Duplicate

Analyte	Units	Result	Duplicate	RPD	Limit	Ref Samp	Batch
Nitrate	mg/l	0.0	0.0	0.0	20	L706830-01	WG728982
Chloride	mg/l	4.70	5.17	10.0	20	L707111-04	WG728982
Nitrate	mg/l	0.230	0.152	41.0*	20	L707111-04	WG728982
Sulfate	mg/l	19.0	17.8	6.00	20	L707111-04	WG728982
Mercury	mg/l	0.0	0.0000349	9.00	20	L707212-05	WG729128
Ammonia Nitrogen	mg/l	0.360	0.410	13.0	20	L707212-02	WG729766
Ammonia Nitrogen	mg/l	0.0	0.0	0.0	20	L707107-01	WG729766
Ammonia Nitrogen	mg/l	0.0	0.0	0.0	20	L707425-02	WG729768
Ammonia Nitrogen	mg/l	0.520	0.530	1.90	20	L707209-02	WG729768

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Quality Assurance Report
Level II

L707212

July 10, 2014

Analyte	Units	Result	Duplicate	RPD	Limit	Ref Samp	Batch
			Duplicate				
Ammonia Nitrogen	mg/l	0.0	0.0	0.0	20	L707808-01	WG730155
Ammonia Nitrogen	mg/l	0.0	0.0	0.0	20	L707212-01	WG730155

Analyte	Units	Known Val	Result	% Rec	Limit	Batch
			Laboratory Control Sample			
Bromide	mg/l	40	40.6	102.	90-110	WG728982
Chloride	mg/l	40	41.0	102.	90-110	WG728982
Nitrate	mg/l	8	8.30	104.	90-110	WG728982
Sulfate	mg/l	40	40.9	102.	90-110	WG728982
Mercury	mg/l	.003	0.00288	96.0	85-115	WG729128
1,1,1,2-Tetrachloroethane	mg/l	.025	0.0258	103.	74.2-124	WG729151
1,1,1-Trichloroethane	mg/l	.025	0.0251	100.	73.2-123	WG729151
1,1,2,2-Tetrachloroethane	mg/l	.025	0.0250	100.	70.7-122	WG729151
1,1,2-Trichloroethane	mg/l	.025	0.0241	96.3	77.7-118	WG729151
1,1-Dichloroethane	mg/l	.025	0.0250	100.	70.7-126	WG729151
1,1-Dichloroethene	mg/l	.025	0.0232	92.8	67.8-129	WG729151
1,2,3-Trichloropropane	mg/l	.025	0.0256	102.	71.8-121	WG729151
1,2-Dichlorobenzene	mg/l	.025	0.0249	99.5	78.4-117	WG729151
1,2-Dichloroethane	mg/l	.025	0.0246	98.3	68.8-124	WG729151
1,2-Dichloropropane	mg/l	.025	0.0257	103.	76.5-119	WG729151
1,4-Dichlorobenzene	mg/l	.025	0.0243	97.1	78.8-115	WG729151
2-Butanone (MEK)	mg/l	.125	0.111	88.5	55-149	WG729151
2-Hexanone	mg/l	.125	0.114	91.6	65.6-144	WG729151
4-Methyl-2-pentanone (MIBK)	mg/l	.125	0.118	94.2	70.5-133	WG729151
Acetone	mg/l	.125	0.108	86.3	35.6-163	WG729151
Acrylonitrile	mg/l	.125	0.119	94.9	55.2-130	WG729151
Benzene	mg/l	.025	0.0243	97.2	74.8-121	WG729151
Bromochloromethane	mg/l	.025	0.0260	104.	77.6-119	WG729151
Bromodichloromethane	mg/l	.025	0.0249	99.5	75.1-116	WG729151
Bromoform	mg/l	.025	0.0255	102.	67.5-130	WG729151
Bromomethane	mg/l	.025	0.0239	95.8	49.9-162	WG729151
Carbon disulfide	mg/l	.025	0.0273	109.	64.6-140	WG729151
Carbon tetrachloride	mg/l	.025	0.0250	99.8	70.2-123	WG729151
Chlorobenzene	mg/l	.025	0.0253	101.	78.1-119	WG729151
Chlorodibromomethane	mg/l	.025	0.0257	103.	74-121	WG729151
Chloroethane	mg/l	.025	0.0221	88.4	61.7-135	WG729151
Chloroform	mg/l	.025	0.0250	100.	76-121	WG729151
Chloromethane	mg/l	.025	0.0258	103.	61.5-129	WG729151
cis-1,2-Dichloroethene	mg/l	.025	0.0254	102.	76-119	WG729151
cis-1,3-Dichloropropene	mg/l	.025	0.0257	103.	78.2-120	WG729151
Dibromomethane	mg/l	.025	0.0252	101.	79.5-118	WG729151
Ethylbenzene	mg/l	.025	0.0251	101.	78.8-122	WG729151
Iodomethane	mg/l	.125	0.128	103.	61-130	WG729151
Methylene Chloride	mg/l	.025	0.0245	98.0	70.3-120	WG729151
Styrene	mg/l	.025	0.0261	104.	80.4-126	WG729151
Tetrachloroethene	mg/l	.025	0.0236	94.5	72.6-126	WG729151
Toluene	mg/l	.025	0.0244	97.5	79.7-116	WG729151
trans-1,2-Dichloroethene	mg/l	.025	0.0250	100.	72.6-121	WG729151
trans-1,3-Dichloropropene	mg/l	.025	0.0267	107.	74.3-123	WG729151
trans-1,4-Dichloro-2-butene	mg/l	.025	0.0232	92.9	65.1-123	WG729151
Trichloroethene	mg/l	.025	0.0256	103.	77.7-118	WG729151
Trichlorofluoromethane	mg/l	.025	0.0229	91.6	63.5-135	WG729151
Vinyl acetate	mg/l	.125	0.109	87.4	65-138	WG729151
Vinyl chloride	mg/l	.025	0.0247	98.9	65.9-128	WG729151

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Mt. Juliet, TN 37122
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Fax (615) 758-5859

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Quality Assurance Report
Level II

L707212

July 10, 2014

Analyte	Units	Laboratory Control Sample Known Val	Result	% Rec	Limit	Batch
Xylenes, Total	mg/l	.075	0.0770	103.	78.7-121	WG729151
4-Bromofluorobenzene				98.10	71-126	WG729151
Dibromofluoromethane				101.0	78.3-121	WG729151
Toluene-d8				98.90	88.5-111	WG729151
a,a,a-Trifluorotoluene				102.0	85-114	WG729151
1,1,1,2-Tetrachloroethane	mg/l	.025	0.0244	97.6	74.2-124	WG729185
1,1,1-Trichloroethane	mg/l	.025	0.0220	87.9	73.2-123	WG729185
1,1,2,2-Tetrachloroethane	mg/l	.025	0.0276	110.	70.7-122	WG729185
1,1,2-Trichloroethane	mg/l	.025	0.0260	104.	77.7-118	WG729185
1,1-Dichloroethane	mg/l	.025	0.0225	90.2	70.7-126	WG729185
1,1-Dichloroethene	mg/l	.025	0.0185	74.0	67.8-129	WG729185
1,2,3-Trichloropropane	mg/l	.025	0.0265	106.	71.8-121	WG729185
1,2-Dichlorobenzene	mg/l	.025	0.0258	103.	78.4-117	WG729185
1,2-Dichloroethane	mg/l	.025	0.0205	82.0	68.8-124	WG729185
1,2-Dichloropropane	mg/l	.025	0.0227	91.0	76.5-119	WG729185
1,4-Dichlorobenzene	mg/l	.025	0.0244	97.4	78.8-115	WG729185
2-Butanone (MEK)	mg/l	.125	0.0956	76.5	55-149	WG729185
2-Hexanone	mg/l	.125	0.120	96.1	65.6-144	WG729185
4-Methyl-2-pentanone (MIBK)	mg/l	.125	0.121	96.8	70.5-133	WG729185
Acetone	mg/l	.125	0.0922	73.8	35.6-163	WG729185
Acrylonitrile	mg/l	.125	0.112	89.4	55.2-130	WG729185
Benzene	mg/l	.025	0.0226	90.4	74.8-121	WG729185
Bromochloromethane	mg/l	.025	0.0240	96.1	77.6-119	WG729185
Bromodichloromethane	mg/l	.025	0.0231	92.2	75.1-116	WG729185
Bromoform	mg/l	.025	0.0279	112.	67.5-130	WG729185
Bromomethane	mg/l	.025	0.0180	72.2	49.9-162	WG729185
Carbon disulfide	mg/l	.025	0.0177	70.8	64.6-140	WG729185
Carbon tetrachloride	mg/l	.025	0.0248	99.3	70.2-123	WG729185
Chlorobenzene	mg/l	.025	0.0252	101.	78.1-119	WG729185
Chlorodibromomethane	mg/l	.025	0.0258	103.	74-121	WG729185
Chloroethane	mg/l	.025	0.0169	67.7	61.7-135	WG729185
Chloroform	mg/l	.025	0.0229	91.5	76-121	WG729185
Chloromethane	mg/l	.025	0.0185	74.0	61.5-129	WG729185
cis-1,2-Dichloroethene	mg/l	.025	0.0240	96.1	76-119	WG729185
cis-1,3-Dichloropropene	mg/l	.025	0.0244	97.5	78.2-120	WG729185
Dibromomethane	mg/l	.025	0.0249	99.5	79.5-118	WG729185
Ethylbenzene	mg/l	.025	0.0246	98.4	78.8-122	WG729185
Iodomethane	mg/l	.125	0.109	86.9	61-130	WG729185
Methylene Chloride	mg/l	.025	0.0227	90.7	70.3-120	WG729185
Styrene	mg/l	.025	0.0245	98.0	80.4-126	WG729185
Tetrachloroethene	mg/l	.025	0.0243	97.2	72.6-126	WG729185
Toluene	mg/l	.025	0.0235	94.1	79.7-116	WG729185
trans-1,2-Dichloroethene	mg/l	.025	0.0233	93.2	72.6-121	WG729185
trans-1,3-Dichloropropene	mg/l	.025	0.0253	101.	74.3-123	WG729185
trans-1,4-Dichloro-2-butene	mg/l	.025	0.0222	88.6	65.1-123	WG729185
Trichloroethene	mg/l	.025	0.0241	96.3	77.7-118	WG729185
Trichlorofluoromethane	mg/l	.025	0.0204	81.5	63.5-135	WG729185
Vinyl acetate	mg/l	.125	0.104	83.5	65-138	WG729185
Vinyl chloride	mg/l	.025	0.0174	69.7	65.9-128	WG729185
Xylenes, Total	mg/l	.075	0.0739	98.5	78.7-121	WG729185
4-Bromofluorobenzene				96.00	71-126	WG729185
Dibromofluoromethane				95.80	78.3-121	WG729185
Toluene-d8				98.10	88.5-111	WG729185
a,a,a-Trifluorotoluene				99.20	85-114	WG729185
Antimony	mg/l	.05	0.0556	111.	85-115	WG729943

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Quality Assurance Report
Level II

L707212

July 10, 2014

Laboratory Control Sample

Analyte	Units	Known Val	Result	% Rec	Limit	Batch
Arsenic	mg/l	.05	0.0518	104.	85-115	WG729943
Beryllium	mg/l	.05	0.0543	109.	85-115	WG729943
Cadmium	mg/l	.05	0.0547	109.	85-115	WG729943
Copper	mg/l	.05	0.0527	105.	85-115	WG729943
Lead	mg/l	.05	0.0539	108.	85-115	WG729943
Selenium	mg/l	.05	0.0494	99.0	85-115	WG729943
Thallium	mg/l	.05	0.0540	108.	85-115	WG729943
Zinc	mg/l	.05	0.0532	106.	85-115	WG729943
Barium	mg/l	1	1.06	106.	80-120	WG729884
Boron	mg/l	1	1.01	101.	80-120	WG729884
Calcium	mg/l	10	10.3	103.	80-120	WG729884
Cobalt	mg/l	1	1.10	110.	80-120	WG729884
Iron	mg/l	1	1.04	104.	80-120	WG729884
Manganese	mg/l	1	1.06	106.	80-120	WG729884
Nickel	mg/l	1	0.997	100.	80-120	WG729884
Silver	mg/l	1	1.04	104.	80-120	WG729884
Sodium	mg/l	10	10.2	102.	80-120	WG729884
Vanadium	mg/l	1	1.05	105.	80-120	WG729884
Aluminum	mg/l	1	1.11	111.	80-120	WG729884
Chromium	mg/l	1	1.05	105.	80-120	WG729884
Magnesium	mg/l	10	11.4	114.	80-120	WG729884
Potassium	mg/l	10	9.28	93.0	80-120	WG729884
Ammonia Nitrogen	mg/l	7.5	7.70	103.	90-110	WG729766
Antimony	mg/l	.05	0.0569	114.	85-115	WG730490
Arsenic	mg/l	.05	0.0483	97.0	85-115	WG730490
Beryllium	mg/l	.05	0.0531	106.	85-115	WG730490
Cadmium	mg/l	.05	0.0550	110.	85-115	WG730490
Copper	mg/l	.05	0.0550	110.	85-115	WG730490
Lead	mg/l	.05	0.0550	110.	85-115	WG730490
Selenium	mg/l	.05	0.0499	100.	85-115	WG730490
Thallium	mg/l	.05	0.0538	108.	85-115	WG730490
Zinc	mg/l	.05	0.0548	110.	85-115	WG730490
Ammonia Nitrogen	mg/l	7.5	7.92	106.	90-110	WG729768
Ammonia Nitrogen	mg/l	7.5	7.80	104.	90-110	WG730155

Laboratory Control Sample Duplicate

Analyte	Units	Result	Ref	%Rec	Limit	RPD	Limit	Batch
Bromide	mg/l	40.5	40.6	101.	90-110	0.0	20	WG728982
Chloride	mg/l	40.9	41.0	102.	90-110	0.0	20	WG728982
Nitrate	mg/l	8.27	8.30	103.	90-110	0.0	20	WG728982
Sulfate	mg/l	40.8	40.9	102.	90-110	0.0	20	WG728982
1,1,1,2-Tetrachloroethane	mg/l	0.0251	0.0258	100.	74.2-124	2.95	20	WG729151
1,1,1-Trichloroethane	mg/l	0.0255	0.0251	102.	73.2-123	1.89	20	WG729151
1,1,2,2-Tetrachloroethane	mg/l	0.0252	0.0250	101.	70.7-122	0.650	20	WG729151
1,1,2-Trichloroethane	mg/l	0.0245	0.0241	98.0	77.7-118	1.83	20	WG729151
1,1-Dichloroethane	mg/l	0.0261	0.0250	104.	70.7-126	4.20	20	WG729151

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Quality Assurance Report
Level II

L707212

July 10, 2014

Analyte	Units	Laboratory Control Sample Result	Ref	%Rec	Limit	Duplicate RPD	Limit	Batch
1,1-Dichloroethene	mg/l	0.0233	0.0232	93.0	67.8-129	0.420	20	WG729151
1,2,3-Trichloropropane	mg/l	0.0253	0.0256	101.	71.8-121	1.08	20	WG729151
1,2-Dichlorobenzene	mg/l	0.0251	0.0249	100.	78.4-117	0.730	20	WG729151
1,2-Dichloroethane	mg/l	0.0261	0.0246	104.	68.8-124	5.94	20	WG729151
1,2-Dichloropropane	mg/l	0.0265	0.0257	106.	76.5-119	3.02	20	WG729151
1,4-Dichlorobenzene	mg/l	0.0241	0.0243	96.0	78.8-115	0.770	20	WG729151
2-Butanone (MEK)	mg/l	0.120	0.111	96.0	55-149	8.49	20	WG729151
2-Hexanone	mg/l	0.119	0.114	95.0	65.6-144	3.71	20	WG729151
4-Methyl-2-pentanone (MIBK)	mg/l	0.125	0.118	100.	70.5-133	5.79	20	WG729151
Acetone	mg/l	0.115	0.108	92.0	35.6-163	6.72	23.9	WG729151
Acrylonitrile	mg/l	0.128	0.119	102.	55.2-130	7.52	20	WG729151
Benzene	mg/l	0.0254	0.0243	102.	74.8-121	4.43	20	WG729151
Bromochloromethane	mg/l	0.0278	0.0260	111.	77.6-119	6.79	20	WG729151
Bromodichloromethane	mg/l	0.0257	0.0249	103.	75.1-116	3.36	20	WG729151
Bromoform	mg/l	0.0256	0.0255	102.	67.5-130	0.250	20	WG729151
Bromomethane	mg/l	0.0245	0.0239	98.0	49.9-162	2.41	20	WG729151
Carbon disulfide	mg/l	0.0246	0.0273	98.0	64.6-140	10.3	20	WG729151
Carbon tetrachloride	mg/l	0.0252	0.0250	101.	70.2-123	0.850	20	WG729151
Chlorobenzene	mg/l	0.0250	0.0253	100.	78.1-119	1.51	20	WG729151
Chlorodibromomethane	mg/l	0.0258	0.0257	103.	74-121	0.600	20	WG729151
Chloroethane	mg/l	0.0231	0.0221	92.0	61.7-135	4.29	20	WG729151
Chloroform	mg/l	0.0257	0.0250	103.	76-121	2.79	20	WG729151
Chloromethane	mg/l	0.0263	0.0258	105.	61.5-129	1.95	20	WG729151
cis-1,2-Dichloroethene	mg/l	0.0263	0.0254	105.	76-119	3.50	20	WG729151
cis-1,3-Dichloropropene	mg/l	0.0265	0.0257	106.	78.2-120	2.82	20	WG729151
Dibromomethane	mg/l	0.0261	0.0252	104.	79.5-118	3.40	20	WG729151
Ethylbenzene	mg/l	0.0249	0.0251	100.	78.8-122	0.960	20	WG729151
Iodomethane	mg/l	0.133	0.128	106.	61-130	3.50	20	WG729151
Methylene Chloride	mg/l	0.0253	0.0245	101.	70.3-120	3.14	20	WG729151
Styrene	mg/l	0.0258	0.0261	103.	80.4-126	1.07	20	WG729151
Tetrachloroethene	mg/l	0.0234	0.0236	94.0	72.6-126	0.920	20	WG729151
Toluene	mg/l	0.0247	0.0244	99.0	79.7-116	1.21	20	WG729151
trans-1,2-Dichloroethene	mg/l	0.0258	0.0250	103.	72.6-121	2.84	20	WG729151
trans-1,3-Dichloropropene	mg/l	0.0276	0.0267	110.	74.3-123	3.17	20	WG729151
trans-1,4-Dichloro-2-butene	mg/l	0.0248	0.0232	99.0	65.1-123	6.53	20	WG729151
Trichloroethene	mg/l	0.0259	0.0256	104.	77.7-118	1.05	20	WG729151
Trichlorofluoromethane	mg/l	0.0229	0.0229	91.0	63.5-135	0.220	20	WG729151
Vinyl acetate	mg/l	0.118	0.109	94.0	65-138	7.44	20	WG729151
Vinyl chloride	mg/l	0.0253	0.0247	101.	65.9-128	2.30	20	WG729151
Xylenes, Total	mg/l	0.0755	0.0770	101.	78.7-121	2.00	20	WG729151
4-Bromofluorobenzene				98.40	71-126			WG729151
Dibromofluoromethane				99.10	78.3-121			WG729151
Toluene-d8				98.90	88.5-111			WG729151
a,a,a-Trifluorotoluene				103.0	85-114			WG729151
1,1,1,2-Tetrachloroethane	mg/l	0.0251	0.0244	100.	74.2-124	3.02	20	WG729185
1,1,1-Trichloroethane	mg/l	0.0226	0.0220	90.0	73.2-123	2.80	20	WG729185
1,1,2,2-Tetrachloroethane	mg/l	0.0292	0.0276	117.	70.7-122	5.91	20	WG729185
1,1,2-Trichloroethane	mg/l	0.0259	0.0260	104.	77.7-118	0.210	20	WG729185
1,1-Dichloroethane	mg/l	0.0229	0.0225	92.0	70.7-126	1.47	20	WG729185
1,1-Dichloroethene	mg/l	0.0187	0.0185	75.0	67.8-129	0.830	20	WG729185
1,2,3-Trichloropropane	mg/l	0.0276	0.0265	110.	71.8-121	4.09	20	WG729185
1,2-Dichlorobenzene	mg/l	0.0260	0.0258	104.	78.4-117	0.960	20	WG729185
1,2-Dichloroethane	mg/l	0.0211	0.0205	84.0	68.8-124	3.09	20	WG729185
1,2-Dichloropropane	mg/l	0.0225	0.0227	90.0	76.5-119	1.06	20	WG729185
1,4-Dichlorobenzene	mg/l	0.0243	0.0244	97.0	78.8-115	0.0900	20	WG729185
2-Butanone (MEK)	mg/l	0.103	0.0956	82.0	55-149	7.61	20	WG729185
2-Hexanone	mg/l	0.132	0.120	105.	65.6-144	9.09	20	WG729185

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July 10, 2014

Analyte	Units	Laboratory Control Sample Result	Ref	%Rec	Limit	Duplicate RPD	Limit	Batch
4-Methyl-2-pentanone (MIBK)	mg/l	0.130	0.121	104.	70.5-133	7.33	20	WG729185
Acetone	mg/l	0.0977	0.0922	78.0	35.6-163	5.79	23.9	WG729185
Acrylonitrile	mg/l	0.119	0.112	96.0	55.2-130	6.65	20	WG729185
Benzene	mg/l	0.0230	0.0226	92.0	74.8-121	1.80	20	WG729185
Bromochloromethane	mg/l	0.0247	0.0240	99.0	77.6-119	2.78	20	WG729185
Bromodichloromethane	mg/l	0.0237	0.0231	95.0	75.1-116	2.68	20	WG729185
Bromoform	mg/l	0.0281	0.0279	112.	67.5-130	0.740	20	WG729185
Bromomethane	mg/l	0.0192	0.0180	77.0	49.9-162	6.05	20	WG729185
Carbon disulfide	mg/l	0.0177	0.0177	71.0	64.6-140	0.0100	20	WG729185
Carbon tetrachloride	mg/l	0.0249	0.0248	100.	70.2-123	0.280	20	WG729185
Chlorobenzene	mg/l	0.0251	0.0252	100.	78.1-119	0.220	20	WG729185
Chlorodibromomethane	mg/l	0.0260	0.0258	104.	74-121	0.580	20	WG729185
Chloroethane	mg/l	0.0176	0.0169	70.0	61.7-135	3.86	20	WG729185
Chloroform	mg/l	0.0236	0.0229	94.0	76-121	2.99	20	WG729185
Chloromethane	mg/l	0.0188	0.0185	75.0	61.5-129	1.66	20	WG729185
cis-1,2-Dichloroethene	mg/l	0.0244	0.0240	98.0	76-119	1.50	20	WG729185
cis-1,3-Dichloropropene	mg/l	0.0242	0.0244	97.0	78.2-120	0.570	20	WG729185
Dibromomethane	mg/l	0.0258	0.0249	103.	79.5-118	3.50	20	WG729185
Ethylbenzene	mg/l	0.0246	0.0246	98.0	78.8-122	0.140	20	WG729185
Iodomethane	mg/l	0.112	0.109	90.0	61-130	3.41	20	WG729185
Methylene Chloride	mg/l	0.0235	0.0227	94.0	70.3-120	3.70	20	WG729185
Styrene	mg/l	0.0254	0.0245	102.	80.4-126	3.67	20	WG729185
Tetrachloroethene	mg/l	0.0243	0.0243	97.0	72.6-126	0.0800	20	WG729185
Toluene	mg/l	0.0236	0.0235	94.0	79.7-116	0.220	20	WG729185
trans-1,2-Dichloroethene	mg/l	0.0237	0.0233	95.0	72.6-121	1.60	20	WG729185
trans-1,3-Dichloropropene	mg/l	0.0252	0.0253	101.	74.3-123	0.490	20	WG729185
trans-1,4-Dichloro-2-butene	mg/l	0.0239	0.0222	96.0	65.1-123	7.67	20	WG729185
Trichloroethene	mg/l	0.0247	0.0241	99.0	77.7-118	2.56	20	WG729185
Trichlorofluoromethane	mg/l	0.0215	0.0204	86.0	63.5-135	5.50	20	WG729185
Vinyl acetate	mg/l	0.107	0.104	86.0	65-138	2.81	20	WG729185
Vinyl chloride	mg/l	0.0178	0.0174	71.0	65.9-128	2.26	20	WG729185
Xylenes, Total	mg/l	0.0751	0.0739	100.	78.7-121	1.64	20	WG729185
4-Bromofluorobenzene				97.80	71-126			WG729185
Dibromofluoromethane				96.30	78.3-121			WG729185
Toluene-d8				97.90	88.5-111			WG729185
a,a,a-Trifluorotoluene				99.70	85-114			WG729185
Antimony	mg/l	0.0540	0.0556	108.	85-115	3.00	20	WG729943
Arsenic	mg/l	0.0527	0.0518	105.	85-115	2.00	20	WG729943
Beryllium	mg/l	0.0517	0.0543	103.	85-115	5.00	20	WG729943
Cadmium	mg/l	0.0521	0.0547	104.	85-115	5.00	20	WG729943
Copper	mg/l	0.0519	0.0527	104.	85-115	2.00	20	WG729943
Lead	mg/l	0.0521	0.0539	104.	85-115	3.00	20	WG729943
Selenium	mg/l	0.0496	0.0494	99.0	85-115	1.00	20	WG729943
Thallium	mg/l	0.0535	0.0540	107.	85-115	1.00	20	WG729943
Zinc	mg/l	0.0515	0.0532	103.	85-115	3.00	20	WG729943
Barium	mg/l	1.07	1.06	107.	80-120	2.00	20	WG729884
Boron	mg/l	1.04	1.01	104.	80-120	3.00	20	WG729884
Calcium	mg/l	10.5	10.3	105.	80-120	2.00	20	WG729884
Cobalt	mg/l	1.12	1.10	112.	80-120	2.00	20	WG729884
Iron	mg/l	1.07	1.04	107.	80-120	2.00	20	WG729884
Manganese	mg/l	1.07	1.06	107.	80-120	1.00	20	WG729884
Nickel	mg/l	1.04	0.997	104.	80-120	4.00	20	WG729884
Silver	mg/l	1.05	1.04	105.	80-120	2.00	20	WG729884
Sodium	mg/l	10.3	10.2	103.	80-120	1.00	20	WG729884
Vanadium	mg/l	1.07	1.05	107.	80-120	2.00	20	WG729884

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(615) 758-5858
1-800-767-5859
Fax (615) 758-5859

Tax I.D. 62-0814289

Est. 1970

Civil & Environmental Consultants - TN
Michael Johnson
405 Duke Drive, Suite 270
Franklin, TN 37067

Quality Assurance Report
Level II

L707212

July 10, 2014

		Laboratory Control Sample Duplicate						
Analyte	Units	Result	Ref	%Rec	Limit	RPD	Limit	Batch
Aluminum	mg/l	1.09	1.11	109.	80-120	2.00	20	WG729884
Chromium	mg/l	1.08	1.05	108.	80-120	3.00	20	WG729884
Magnesium	mg/l	11.4	11.4	114.	80-120	0.0	20	WG729884
Potassium	mg/l	9.31	9.28	93.0	80-120	0.0	20	WG729884
Ammonia Nitrogen	mg/l	7.57	7.70	101.	90-110	1.70	20	WG729766
Antimony	mg/l	0.0564	0.0569	113.	85-115	1.00	20	WG730490
Arsenic	mg/l	0.0496	0.0483	99.0	85-115	3.00	20	WG730490
Beryllium	mg/l	0.0538	0.0531	108.	85-115	1.00	20	WG730490
Cadmium	mg/l	0.0553	0.0550	110.	85-115	0.0	20	WG730490
Copper	mg/l	0.0549	0.0550	110.	85-115	0.0	20	WG730490
Lead	mg/l	0.0559	0.0550	112.	85-115	2.00	20	WG730490
Selenium	mg/l	0.0525	0.0499	105.	85-115	5.00	20	WG730490
Thallium	mg/l	0.0537	0.0538	107.	85-115	0.0	20	WG730490
Zinc	mg/l	0.0553	0.0548	110.	85-115	1.00	20	WG730490
Ammonia Nitrogen	mg/l	7.35	7.92	98.0	90-110	7.47	20	WG729768
Ammonia Nitrogen	mg/l	7.75	7.80	103.	90-110	0.643	20	WG730155

		Matrix Spike						
Analyte	Units	MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Nitrate	mg/l	5.10	0.0	5	100.	80-120	L706830-01	WG728982
Mercury	mg/l	0.00288	0.0000349	.003	95.0	80-120	L707212-05	WG729128
1,1,1,2-Tetrachloroethane	mg/l	0.0229	0.0	.025	92.0	64-128	L707327-05	WG729151
1,1,1-Trichloroethane	mg/l	0.0212	0.0	.025	85.0	58.7-134	L707327-05	WG729151
1,1,2,2-Tetrachloroethane	mg/l	0.0246	0.0	.025	98.0	56-132	L707327-05	WG729151
1,1,2-Trichloroethane	mg/l	0.0225	0.0	.025	90.0	66.3-125	L707327-05	WG729151
1,1-Dichloroethane	mg/l	0.0219	0.0	.025	87.0	58.5-132	L707327-05	WG729151
1,1-Dichloroethene	mg/l	0.0180	0.0	.025	72.0	51.1-140	L707327-05	WG729151
1,2,3-Trichloropropane	mg/l	0.0243	0.0	.025	97.0	61.4-128	L707327-05	WG729151
1,2-Dichlorobenzene	mg/l	0.0203	0.0	.025	81.0	68.2-123	L707327-05	WG729151
1,2-Dichloroethane	mg/l	0.0223	0.0	.025	89.0	60-126	L707327-05	WG729151
1,2-Dichloropropane	mg/l	0.0230	0.0	.025	92.0	64.2-123	L707327-05	WG729151
1,4-Dichlorobenzene	mg/l	0.0178	0.0	.025	71.0	68.6-123	L707327-05	WG729151
2-Butanone (MEK)	mg/l	0.110	0.0	.125	88.0	22.4-138	L707327-05	WG729151
2-Hexanone	mg/l	0.116	0.0	.125	92.0	43.3-137	L707327-05	WG729151
4-Methyl-2-pentanone (MIBK)	mg/l	0.119	0.0	.125	95.0	60.8-140	L707327-05	WG729151
Acetone	mg/l	0.116	0.00976	.125	85.0	10-130	L707327-05	WG729151
Acrylonitrile	mg/l	0.119	0.0	.125	95.0	49.4-133	L707327-05	WG729151
Benzene	mg/l	0.0203	0.0	.025	81.0	54.3-133	L707327-05	WG729151
Bromochloromethane	mg/l	0.0232	0.0	.025	93.0	66.5-122	L707327-05	WG729151
Bromodichloromethane	mg/l	0.0229	0.0	.025	92.0	63.9-121	L707327-05	WG729151
Bromoform	mg/l	0.0245	0.0	.025	98.0	59.5-134	L707327-05	WG729151
Bromomethane	mg/l	0.0172	0.0	.025	69.0	41.7-155	L707327-05	WG729151
Carbon disulfide	mg/l	0.0161	0.0	.025	64.0	43.3-149	L707327-05	WG729151
Carbon tetrachloride	mg/l	0.0200	0.0	.025	80.0	55.7-134	L707327-05	WG729151
Chlorobenzene	mg/l	0.0214	0.0	.025	86.0	67-125	L707327-05	WG729151
Chlorodibromomethane	mg/l	0.0239	0.0	.025	96.0	64.3-125	L707327-05	WG729151

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Quality Assurance Report
Level II

July 10, 2014

L707212

Analyte	Units	Matrix Spike MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Chloroethane	mg/l	0.0177	0.0	.025	71.0	51.5-136	L707327-05	WG729151
Chloroform	mg/l	0.0223	0.0	.025	89.0	63-129	L707327-05	WG729151
Chloromethane	mg/l	0.0174	0.0	.025	70.0	42.4-135	L707327-05	WG729151
cis-1,2-Dichloroethene	mg/l	0.0222	0.0	.025	89.0	59.2-129	L707327-05	WG729151
cis-1,3-Dichloropropene	mg/l	0.0206	0.0	.025	82.0	66.4-125	L707327-05	WG729151
Dibromomethane	mg/l	0.0231	0.0	.025	92.0	68.2-124	L707327-05	WG729151
Ethylbenzene	mg/l	0.0208	0.0	.025	83.0	61.4-133	L707327-05	WG729151
Iodomethane	mg/l	0.102	0.0	.125	82.0	49.7-132	L707327-05	WG729151
Methylene Chloride	mg/l	0.0211	0.0	.025	84.0	58.1-122	L707327-05	WG729151
Styrene	mg/l	0.0219	0.0	.025	88.0	66.8-133	L707327-05	WG729151
Tetrachloroethene	mg/l	0.0172	0.0	.025	69.0	53-139	L707327-05	WG729151
Toluene	mg/l	0.0199	0.0	.025	79.0	61.4-130	L707327-05	WG729151
trans-1,2-Dichloroethene	mg/l	0.0198	0.0	.025	79.0	56.5-129	L707327-05	WG729151
trans-1,3-Dichloropropene	mg/l	0.0230	0.0	.025	92.0	64.1-128	L707327-05	WG729151
trans-1,4-Dichloro-2-butene	mg/l	0.0188	0.0	.025	75.0	57.1-130	L707327-05	WG729151
Trichloroethene	mg/l	0.0202	0.0	.025	81.0	44.1-149	L707327-05	WG729151
Trichlorofluoromethane	mg/l	0.0164	0.0	.025	66.0	49.6-145	L707327-05	WG729151
Vinyl acetate	mg/l	0.0936	0.0	.125	75.0	56.1-149	L707327-05	WG729151
Vinyl chloride	mg/l	0.0176	0.0	.025	70.0	47.8-137	L707327-05	WG729151
Xylenes, Total	mg/l	0.0616	0.0	.075	82.0	63.3-131	L707327-05	WG729151
4-Bromofluorobenzene					103.0	71-126		WG729151
Dibromofluoromethane					102.0	78.3-121		WG729151
Toluene-d8					99.60	88.5-111		WG729151
a,a,a-Trifluorotoluene					102.0	85-114		WG729151
1,1,1,2-Tetrachloroethane	mg/l	0.0244	0.0	.025	98.0	64-128	L707336-02	WG729185
1,1,1-Trichloroethane	mg/l	0.0223	0.0	.025	89.0	58.7-134	L707336-02	WG729185
1,1,2,2-Tetrachloroethane	mg/l	0.0269	0.0	.025	110.	56-132	L707336-02	WG729185
1,1,2-Trichloroethane	mg/l	0.0255	0.0	.025	100.	66.3-125	L707336-02	WG729185
1,1-Dichloroethane	mg/l	0.0219	0.0	.025	87.0	58.5-132	L707336-02	WG729185
1,1-Dichloroethene	mg/l	0.0180	0.0	.025	72.0	51.1-140	L707336-02	WG729185
1,2,3-Trichloropropane	mg/l	0.0259	0.0	.025	100.	61.4-128	L707336-02	WG729185
1,2-Dichlorobenzene	mg/l	0.0246	0.0	.025	98.0	68.2-123	L707336-02	WG729185
1,2-Dichloroethane	mg/l	0.0205	0.0	.025	82.0	60-126	L707336-02	WG729185
1,2-Dichloropropane	mg/l	0.0223	0.00103	.025	85.0	64.2-123	L707336-02	WG729185
1,4-Dichlorobenzene	mg/l	0.0238	0.0	.025	95.0	68.6-123	L707336-02	WG729185
2-Butanone (MEK)	mg/l	0.0971	0.0	.125	78.0	22.4-138	L707336-02	WG729185
2-Hexanone	mg/l	0.121	0.0	.125	97.0	43.3-137	L707336-02	WG729185
4-Methyl-2-pentanone (MIBK)	mg/l	0.120	0.0	.125	96.0	60.8-140	L707336-02	WG729185
Acetone	mg/l	0.0912	0.00134	.125	72.0	10-130	L707336-02	WG729185
Acrylonitrile	mg/l	0.116	0.0	.125	93.0	49.4-133	L707336-02	WG729185
Benzene	mg/l	0.0224	0.0	.025	90.0	54.3-133	L707336-02	WG729185
Bromochloromethane	mg/l	0.0237	0.0	.025	95.0	66.5-122	L707336-02	WG729185
Bromodichloromethane	mg/l	0.0230	0.0	.025	92.0	63.9-121	L707336-02	WG729185
Bromoform	mg/l	0.0270	0.0	.025	110.	59.5-134	L707336-02	WG729185
Bromomethane	mg/l	0.0184	0.0	.025	74.0	41.7-155	L707336-02	WG729185
Carbon disulfide	mg/l	0.0167	0.0	.025	67.0	43.3-149	L707336-02	WG729185
Carbon tetrachloride	mg/l	0.0248	0.0	.025	99.0	55.7-134	L707336-02	WG729185
Chlorobenzene	mg/l	0.0248	0.0	.025	99.0	67-125	L707336-02	WG729185
Chlorodibromomethane	mg/l	0.0257	0.0	.025	100.	64.3-125	L707336-02	WG729185
Chloroethane	mg/l	0.0174	0.0	.025	70.0	51.5-136	L707336-02	WG729185
Chloroform	mg/l	0.0227	0.0	.025	91.0	63-129	L707336-02	WG729185
Chloromethane	mg/l	0.0184	0.0	.025	74.0	42.4-135	L707336-02	WG729185
cis-1,2-Dichloroethene	mg/l	0.0236	0.0	.025	94.0	59.2-129	L707336-02	WG729185
cis-1,3-Dichloropropene	mg/l	0.0243	0.0	.025	97.0	66.4-125	L707336-02	WG729185
Dibromomethane	mg/l	0.0247	0.0	.025	99.0	68.2-124	L707336-02	WG729185
Ethylbenzene	mg/l	0.0242	0.0	.025	97.0	61.4-133	L707336-02	WG729185
Iodomethane	mg/l	0.109	0.0	.125	87.0	49.7-132	L707336-02	WG729185

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Michael Johnson
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Quality Assurance Report
Level II

L707212

July 10, 2014

Analyte	Units	Matrix Spike MS Res	Ref Res	TV	% Rec	Limit	Ref Samp	Batch
Methylene Chloride	mg/l	0.0220	0.0	.025	88.0	58.1-122	L707336-02	WG729185
Styrene	mg/l	0.0244	0.0	.025	98.0	66.8-133	L707336-02	WG729185
Tetrachloroethene	mg/l	0.0247	0.0	.025	99.0	53-139	L707336-02	WG729185
Toluene	mg/l	0.0231	0.0	.025	92.0	61.4-130	L707336-02	WG729185
trans-1,2-Dichloroethene	mg/l	0.0225	0.0	.025	90.0	56.5-129	L707336-02	WG729185
trans-1,3-Dichloropropene	mg/l	0.0256	0.0	.025	100.	64.1-128	L707336-02	WG729185
trans-1,4-Dichloro-2-butene	mg/l	0.0222	0.0	.025	89.0	57.1-130	L707336-02	WG729185
Trichloroethene	mg/l	0.0236	0.0	.025	94.0	44.1-149	L707336-02	WG729185
Trichlorofluoromethane	mg/l	0.0209	0.0	.025	84.0	49.6-145	L707336-02	WG729185
Vinyl acetate	mg/l	0.104	0.0	.125	83.0	56.1-149	L707336-02	WG729185
Vinyl chloride	mg/l	0.0175	0.0	.025	70.0	47.8-137	L707336-02	WG729185
Xylenes, Total	mg/l	0.0733	0.0	.075	98.0	63.3-131	L707336-02	WG729185
4-Bromofluorobenzene					95.60	71-126		WG729185
Dibromofluoromethane					95.60	78.3-121		WG729185
Toluene-d8					98.30	88.5-111		WG729185
a,a,a-Trifluorotoluene					98.20	85-114		WG729185
Antimony	mg/l	0.0554	0.000560	.05	110.	75-125	L707212-06	WG729943
Arsenic	mg/l	0.0569	0.000200	.05	110.	75-125	L707212-06	WG729943
Beryllium	mg/l	0.0539	0.000190	.05	110.	75-125	L707212-06	WG729943
Cadmium	mg/l	0.0554	0.0000500	.05	110.	75-125	L707212-06	WG729943
Copper	mg/l	0.0539	0.000690	.05	110.	75-125	L707212-06	WG729943
Lead	mg/l	0.0549	0.000390	.05	110.	75-125	L707212-06	WG729943
Selenium	mg/l	0.0527	-0.000050	.05	100.	75-125	L707212-06	WG729943
Thallium	mg/l	0.0551	0.0000300	.05	110.	75-125	L707212-06	WG729943
Zinc	mg/l	0.0527	0.000940	.05	100.	75-125	L707212-06	WG729943
Ammonia Nitrogen	mg/l	8.38	0.0	10	84.0*	90-110	L707125-02	WG729766
Antimony	mg/l	0.0562	-0.000070	.05	110.	75-125	L707212-01	WG730490
Arsenic	mg/l	0.110	0.0633	.05	94.0	75-125	L707212-01	WG730490
Beryllium	mg/l	0.0526	-0.000320	.05	100.	75-125	L707212-01	WG730490
Cadmium	mg/l	0.0548	-0.000090	.05	110.	75-125	L707212-01	WG730490
Copper	mg/l	0.0482	0.000360	.05	96.0	75-125	L707212-01	WG730490
Lead	mg/l	0.0545	-0.000080	.05	110.	75-125	L707212-01	WG730490
Selenium	mg/l	0.0479	-0.000560	.05	96.0	75-125	L707212-01	WG730490
Thallium	mg/l	0.0534	0.000240	.05	110.	75-125	L707212-01	WG730490
Zinc	mg/l	0.0567	0.00758	.05	98.0	75-125	L707212-01	WG730490
Ammonia Nitrogen	mg/l	9.59	0.0	10	96.0	90-110	L707414-03	WG729768
Ammonia Nitrogen	mg/l	8.29	0.0	10	83.0*	90-110	L707425-06	WG730155

Analyte	Units	Matrix Spike Duplicate MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
Nitrate	mg/l	4.94	5.10	98.8	80-120	3.00	20	L706830-01	WG728982
Mercury	mg/l	0.00295	0.00288	97.1	80-120	2.00	20	L707212-05	WG729128
1,1,1,2-Tetrachloroethane	mg/l	0.0222	0.0229	88.8	64-128	3.19	20	L707327-05	WG729151
1,1,1-Trichloroethane	mg/l	0.0198	0.0212	79.3	58.7-134	6.97	20	L707327-05	WG729151

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Michael Johnson
405 Duke Drive, Suite 270
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Quality Assurance Report
Level II

L707212

July 10, 2014

Analyte	Units	Matrix Spike Duplicate MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
1,1,2,2-Tetrachloroethane	mg/l	0.0227	0.0246	90.9	56-132	7.95	22.2	L707327-05	WG729151
1,1,2-Trichloroethane	mg/l	0.0222	0.0225	89.0	66.3-125	1.26	20	L707327-05	WG729151
1,1-Dichloroethane	mg/l	0.0206	0.0219	82.2	58.5-132	6.08	20	L707327-05	WG729151
1,1-Dichloroethene	mg/l	0.0163	0.0180	65.2	51.1-140	9.70	20.2	L707327-05	WG729151
1,2,3-Trichloropropane	mg/l	0.0242	0.0243	96.8	61.4-128	0.460	22.4	L707327-05	WG729151
1,2-Dichlorobenzene	mg/l	0.0203	0.0203	81.2	68.2-123	0.0200	20	L707327-05	WG729151
1,2-Dichloroethane	mg/l	0.0215	0.0223	86.1	60-126	3.44	20	L707327-05	WG729151
1,2-Dichloropropane	mg/l	0.0220	0.0230	88.2	64.2-123	4.20	20	L707327-05	WG729151
1,4-Dichlorobenzene	mg/l	0.0182	0.0178	72.9	68.6-123	2.42	20	L707327-05	WG729151
2-Butanone (MEK)	mg/l	0.107	0.110	85.3	22.4-138	2.82	27	L707327-05	WG729151
2-Hexanone	mg/l	0.111	0.116	89.0	43.3-137	3.81	25.5	L707327-05	WG729151
4-Methyl-2-pentanone (MIBK)	mg/l	0.114	0.119	91.2	60.8-140	4.41	25.1	L707327-05	WG729151
Acetone	mg/l	0.111	0.116	80.7	10-130	4.72	27.9	L707327-05	WG729151
Acrylonitrile	mg/l	0.114	0.119	91.0	49.4-133	4.47	25.3	L707327-05	WG729151
Benzene	mg/l	0.0195	0.0203	78.1	54.3-133	4.05	20	L707327-05	WG729151
Bromochloromethane	mg/l	0.0223	0.0232	89.0	66.5-122	4.01	20.8	L707327-05	WG729151
Bromodichloromethane	mg/l	0.0218	0.0229	87.0	63.9-121	5.07	20	L707327-05	WG729151
Bromoform	mg/l	0.0234	0.0245	93.6	59.5-134	4.72	20.5	L707327-05	WG729151
Bromomethane	mg/l	0.0158	0.0172	63.0	41.7-155	8.56	21.9	L707327-05	WG729151
Carbon disulfide	mg/l	0.0122	0.0161	48.7	43.3-149	27.8*	20.3	L707327-05	WG729151
Carbon tetrachloride	mg/l	0.0188	0.0200	75.4	55.7-134	6.12	20	L707327-05	WG729151
Chlorobenzene	mg/l	0.0204	0.0214	81.4	67-125	4.89	20	L707327-05	WG729151
Chlorodibromomethane	mg/l	0.0229	0.0239	91.6	64.3-125	4.21	20.8	L707327-05	WG729151
Chloroethane	mg/l	0.0165	0.0177	65.9	51.5-136	7.37	40	L707327-05	WG729151
Chloroform	mg/l	0.0209	0.0223	83.8	63-129	6.47	20	L707327-05	WG729151
Chloromethane	mg/l	0.0165	0.0174	66.0	42.4-135	5.38	20	L707327-05	WG729151
cis-1,2-Dichloroethene	mg/l	0.0204	0.0222	81.5	59.2-129	8.46	20	L707327-05	WG729151
cis-1,3-Dichloropropene	mg/l	0.0203	0.0206	81.0	66.4-125	1.61	20	L707327-05	WG729151
Dibromomethane	mg/l	0.0213	0.0231	85.2	68.2-124	8.13	20	L707327-05	WG729151
Ethylbenzene	mg/l	0.0195	0.0208	78.0	61.4-133	6.32	20	L707327-05	WG729151
Iodomethane	mg/l	0.0975	0.102	78.0	49.7-132	5.01	20	L707327-05	WG729151
Methylene Chloride	mg/l	0.0201	0.0211	80.4	58.1-122	4.69	20	L707327-05	WG729151
Styrene	mg/l	0.0212	0.0219	84.7	66.8-133	3.30	20	L707327-05	WG729151
Tetrachloroethene	mg/l	0.0165	0.0172	66.2	53-139	3.64	20	L707327-05	WG729151
Toluene	mg/l	0.0193	0.0199	77.1	61.4-130	2.92	20	L707327-05	WG729151
trans-1,2-Dichloroethene	mg/l	0.0189	0.0198	75.6	56.5-129	4.52	20	L707327-05	WG729151
trans-1,3-Dichloropropene	mg/l	0.0213	0.0230	85.1	64.1-128	7.78	20	L707327-05	WG729151
trans-1,4-Dichloro-2-butene	mg/l	0.0179	0.0188	71.8	57.1-130	4.54	23.9	L707327-05	WG729151
Trichloroethene	mg/l	0.0194	0.0202	77.4	44.1-149	4.18	20	L707327-05	WG729151
Trichlorofluoromethane	mg/l	0.0150	0.0164	59.9	49.6-145	9.27	21.2	L707327-05	WG729151
Vinyl acetate	mg/l	0.0889	0.0936	71.1	56.1-149	5.13	22.7	L707327-05	WG729151
Vinyl chloride	mg/l	0.0162	0.0176	64.8	47.8-137	8.13	20	L707327-05	WG729151
Xylenes, Total	mg/l	0.0594	0.0616	79.2	63.3-131	3.67	20	L707327-05	WG729151
4-Bromofluorobenzene				97.30	71-126				WG729151
Dibromofluoromethane				98.70	78.3-121				WG729151
Toluene-d8				100.0	88.5-111				WG729151
a,a,a-Trifluorotoluene				101.0	85-114				WG729151
1,1,1,2-Tetrachloroethane	mg/l	0.0253	0.0244	101.	64-128	3.49	20	L707336-02	WG729185
1,1,1-Trichloroethane	mg/l	0.0226	0.0223	90.3	58.7-134	1.16	20	L707336-02	WG729185
1,1,2,2-Tetrachloroethane	mg/l	0.0298	0.0269	119.	56-132	10.2	22.2	L707336-02	WG729185
1,1,2-Trichloroethane	mg/l	0.0270	0.0255	108.	66.3-125	6.05	20	L707336-02	WG729185
1,1-Dichloroethane	mg/l	0.0230	0.0219	92.1	58.5-132	5.21	20	L707336-02	WG729185
1,1-Dichloroethene	mg/l	0.0187	0.0180	74.6	51.1-140	3.50	20.2	L707336-02	WG729185
1,2,3-Trichloropropane	mg/l	0.0287	0.0259	115.	61.4-128	10.1	22.4	L707336-02	WG729185
1,2-Dichlorobenzene	mg/l	0.0256	0.0246	102.	68.2-123	3.96	20	L707336-02	WG729185
1,2-Dichloroethane	mg/l	0.0213	0.0205	85.1	60-126	3.73	20	L707336-02	WG729185
1,2-Dichloropropane	mg/l	0.0231	0.0223	88.1	64.2-123	3.53	20	L707336-02	WG729185

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Quality Assurance Report
Level II

L707212

July 10, 2014

Analyte	Units	Matrix Spike MSD	Duplicate Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
1,4-Dichlorobenzene	mg/l	0.0248	0.0238	99.1	68.6-123	4.18	20	L707336-02	WG729185
2-Butanone (MEK)	mg/l	0.110	0.0971	87.6	22.4-138	12.0	27	L707336-02	WG729185
2-Hexanone	mg/l	0.136	0.121	109.	43.3-137	11.8	25.5	L707336-02	WG729185
4-Methyl-2-pentanone (MIBK)	mg/l	0.136	0.120	109.	60.8-140	13.1	25.1	L707336-02	WG729185
Acetone	mg/l	0.101	0.0912	79.9	10-130	10.5	27.9	L707336-02	WG729185
Acrylonitrile	mg/l	0.128	0.116	102.	49.4-133	9.55	25.3	L707336-02	WG729185
Benzene	mg/l	0.0229	0.0224	91.6	54.3-133	2.32	20	L707336-02	WG729185
Bromochloromethane	mg/l	0.0248	0.0237	99.1	66.5-122	4.40	20.8	L707336-02	WG729185
Bromodichloromethane	mg/l	0.0233	0.0230	93.2	63.9-121	1.42	20	L707336-02	WG729185
Bromoform	mg/l	0.0290	0.0270	116.	59.5-134	7.02	20.5	L707336-02	WG729185
Bromomethane	mg/l	0.0196	0.0184	78.3	41.7-155	6.05	21.9	L707336-02	WG729185
Carbon disulfide	mg/l	0.0172	0.0167	68.9	43.3-149	3.23	20.3	L707336-02	WG729185
Carbon tetrachloride	mg/l	0.0252	0.0248	101.	55.7-134	1.71	20	L707336-02	WG729185
Chlorobenzene	mg/l	0.0256	0.0248	102.	67-125	3.08	20	L707336-02	WG729185
Chlorodibromomethane	mg/l	0.0264	0.0257	106.	64.3-125	2.91	20.8	L707336-02	WG729185
Chloroethane	mg/l	0.0183	0.0174	73.2	51.5-136	4.88	40	L707336-02	WG729185
Chloroform	mg/l	0.0234	0.0227	93.5	63-129	2.99	20	L707336-02	WG729185
Chloromethane	mg/l	0.0192	0.0184	76.8	42.4-135	4.46	20	L707336-02	WG729185
cis-1,2-Dichloroethene	mg/l	0.0247	0.0236	98.6	59.2-129	4.44	20	L707336-02	WG729185
cis-1,3-Dichloropropene	mg/l	0.0244	0.0243	97.8	66.4-125	0.440	20	L707336-02	WG729185
Dibromomethane	mg/l	0.0260	0.0247	104.	68.2-124	5.35	20	L707336-02	WG729185
Ethylbenzene	mg/l	0.0253	0.0242	101.	61.4-133	4.46	20	L707336-02	WG729185
Iodomethane	mg/l	0.111	0.109	88.9	49.7-132	2.36	20	L707336-02	WG729185
Methylene Chloride	mg/l	0.0236	0.0220	94.4	58.1-122	7.19	20	L707336-02	WG729185
Styrene	mg/l	0.0255	0.0244	102.	66.8-133	4.38	20	L707336-02	WG729185
Tetrachloroethene	mg/l	0.0247	0.0247	98.9	53-139	0.140	20	L707336-02	WG729185
Toluene	mg/l	0.0235	0.0231	94.0	61.4-130	1.62	20	L707336-02	WG729185
trans-1,2-Dichloroethene	mg/l	0.0237	0.0225	94.8	56.5-129	5.05	20	L707336-02	WG729185
trans-1,3-Dichloropropene	mg/l	0.0261	0.0256	104.	64.1-128	2.05	20	L707336-02	WG729185
trans-1,4-Dichloro-2-butene	mg/l	0.0251	0.0222	100.	57.1-130	12.1	23.9	L707336-02	WG729185
Trichloroethene	mg/l	0.0245	0.0236	98.1	44.1-149	3.71	20	L707336-02	WG729185
Trichlorofluoromethane	mg/l	0.0221	0.0209	88.5	49.6-145	5.78	21.2	L707336-02	WG729185
Vinyl acetate	mg/l	0.112	0.104	89.8	56.1-149	7.56	22.7	L707336-02	WG729185
Vinyl chloride	mg/l	0.0181	0.0175	72.2	47.8-137	3.04	20	L707336-02	WG729185
Xylenes, Total	mg/l	0.0758	0.0733	101.	63.3-131	3.35	20	L707336-02	WG729185
4-Bromofluorobenzene				97.70	71-126				WG729185
Dibromofluoromethane				96.00	78.3-121				WG729185
Toluene-d8				97.10	88.5-111				WG729185
a,a,a-Trifluorotoluene				99.20	85-114				WG729185
Antimony	mg/l	0.0557	0.0554	110.	75-125	0.0	20	L707212-06	WG729943
Arsenic	mg/l	0.0555	0.0569	111.	75-125	2.00	20	L707212-06	WG729943
Beryllium	mg/l	0.0532	0.0539	106.	75-125	1.00	20	L707212-06	WG729943
Cadmium	mg/l	0.0548	0.0554	110.	75-125	1.00	20	L707212-06	WG729943
Copper	mg/l	0.0527	0.0539	104.	75-125	2.00	20	L707212-06	WG729943
Lead	mg/l	0.0544	0.0549	108.	75-125	1.00	20	L707212-06	WG729943
Selenium	mg/l	0.0533	0.0527	107.	75-125	1.00	20	L707212-06	WG729943
Thallium	mg/l	0.0554	0.0551	111.	75-125	0.0	20	L707212-06	WG729943
Zinc	mg/l	0.0526	0.0527	103.	75-125	0.0	20	L707212-06	WG729943
Ammonia Nitrogen	mg/l	7.75	8.38	77.5*	90-110	7.81	20	L707125-02	WG729766
Antimony	mg/l	0.0569	0.0562	114.	75-125	1.00	20	L707212-01	WG730490
Arsenic	mg/l	0.113	0.110	98.5	75-125	2.00	20	L707212-01	WG730490
Beryllium	mg/l	0.0526	0.0526	106.	75-125	0.0	20	L707212-01	WG730490
Cadmium	mg/l	0.0552	0.0548	110.	75-125	1.00	20	L707212-01	WG730490

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L707212

July 10, 2014

Analyte	Units	MSD	Ref	%Rec	Limit	RPD	Limit	Ref Samp	Batch
Matrix Spike Duplicate									
Copper	mg/l	0.0490	0.0482	97.4	75-125	2.00	20	L707212-01	WG730490
Lead	mg/l	0.0557	0.0545	111.	75-125	2.00	20	L707212-01	WG730490
Selenium	mg/l	0.0490	0.0479	99.2	75-125	2.00	20	L707212-01	WG730490
Thallium	mg/l	0.0543	0.0534	108.	75-125	2.00	20	L707212-01	WG730490
Zinc	mg/l	0.0572	0.0567	99.3	75-125	1.00	20	L707212-01	WG730490
Ammonia Nitrogen	mg/l	10.1	9.59	101.	90-110	5.18	20	L707414-03	WG729768
Ammonia Nitrogen	mg/l	8.82	8.29	88.2*	90-110	6.20	20	L707425-06	WG730155
Post Spike									
Serial Dilution									

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July 10, 2014

Serial Dilution

Batch number /Run number / Sample number cross reference

WG728982: R2951447: L707212-01 02 03 04 05 06
WG729128: R2952973: L707212-01 02 03 04 05 06
WG729151: R2954506: L707212-01 02 03 04 05 06
WG729185: R2954709: L707212-
WG729943: R2955285: L707212-06
WG729884: R2956286 R2956291: L707212-01 02 03 04 05 06
WG729766: R2957409: L707212-02
WG730490: R2958127 R2958585: L707212-01 02 03 04 05
WG729768: R2958466: L707212-03 04 05 06
WG730155: R2958827: L707212-01

* * Calculations are performed prior to rounding of reported values.
* Performance of this Analyte is outside of established criteria.
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July 10, 2014

The data package includes a summary of the analytic results of the quality control samples required by the SW-846 or CWA methods. The quality control samples include a method blank, a laboratory control sample, and the matrix spike/matrix spike duplicate analysis. If a target parameter is outside the method limits, every sample that is effected is flagged with the appropriate qualifier in Appendix B of the analytic report.

Method Blank - an aliquot of reagent water carried through the entire analytic process. The method blank results indicate if any possible contamination exposure during the sample handling, digestion or extraction process, and analysis. Concentrations of target analytes above the reporting limit in the method blank are qualified with the "B" qualifier.

Laboratory Control Sample - is a sample of known concentration that is carried through the digestion/extraction and analysis process. The percent recovery, expressed as a percentage of the theoretical concentration, has statistical control limits indicating that the analytic process is "in control". If a target analyte is outside the control limits for the laboratory control sample or any other control sample, the parameter is flagged with a "J4" qualifier for all effected samples.

Matrix Spike and Matrix Spike Duplicate - is two aliquots of an environmental sample that is spiked with known concentrations of target analytes. The percent recovery of the target analytes also has statistical control limits. If any recoveries that are outside the method control limits, the sample that was selected for matrix spike/matrix spike duplicate analysis is flagged with either a "J5" or a "J6". The relative percent difference (%RPD) between the matrix spike and the matrix spike duplicate recoveries is all calculated. If the RPD is above the method limit, the effected samples are flagged with a "J3" qualifier.

Civil & Environmental Consultants - TN

405 Duke Drive, Suite 270
Franklin, TN 37067

Billing Information:
Dr. Kevin Wolfe
405 Duke Drive, Ste. 270
Franklin, TN 37067

Report to: Michael Johnson

Email To: mjohnson@cecinc.com

Project Description: EWS - Camden

City/State Collected:

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

Client Project # 142-059

Lab Project # CEC-CUSTOM TIRE

Collected by (print): Philip Campbell

Site/Facility ID #

P.O. #

Collected by (signature): Philip A. 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	Br, Cl, NO3, SO4 250mlHDPE-NoPres	Metals 500mlHDPE-HNO3 +2	NH3 250mlHDPE-H2SO4 +2	V8260AP1 40mlAmb-HCl						Rem./Contaminant	Sample # (lab only)
MW-1	Grab	GW	—	6-26-14	1100	5	X	X	X	X							-01
MW-3	Grab	GW	—		1245	5	X	X	X	X							-02
MW-4	Grab	GW	—		1200	5	X	X	X	X							-03
DUPLICATE	Grab	GW	—		—	5	X	X	X	X							-04
EQUIPMENT BLANK	Grab	GW	—		1400	5	X	X	X	X							-05
FIELD BLANK	Grab	GW	—	↓	1350	5	X	X	X	X							-06
Trip Blank	—	W	—	—	—	1				X							-07

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

Remarks:Metals = AP1 + Al, B, Ca, Fe, K, Mg, Mn, Na

pH _____ Temp _____

Flow _____ Other _____

Chain of Custody Page 1 of 1

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

L# L707212

F068

Acctnum: CEC
Template: T75244
Prelogin: P473484
TSR: 350 - Jimmy Hunt
PB: 6-20 KLJ
Shipped Via: Courier

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Phil A. Campbell	6-27-14	1305	Wayne Shull
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)
Wayne Shull	6/27/14	1410	

Samples returned via: ☐ UPS ☐ FedEx ☑ Courier ☐ _____

Temp: 2 °C 2 °C Bottles Received: 31

Date: 6-27-14 Time: 1410

Hold #

Condition: (lab use only) TOI

COC Seal Intact: ___Y ___N ✓NA

pH Checked: <2 NCF:

Cloudy, 80's — Camden - Ews — P Campbell 6-26-14

well	DTW	TD	WC	1 vol	3 vol
mw-2	7.07				
mw-4	10.89	23.10	12.21	2.03	6.10
mw-3	16.38	27.00	10.62	1.85	5.31
mw-1	22.11	30.50	8.39	1.40	4.20

30.50 − 22.11 = 8.39

23.10 − 10.89 = 12.21

27.00 − 16.38 = 10.62

9:30 - looking for mw-3
10:00 wl's complete
10:15 - Set up on mw-1 using peristaltic pump + clean tubing. 1 vol = 1.40 gal.

mw-1

V	Temp	Cond	DO	pH	ORP	Turb	Time
0	16.2	45.7	2.14	4.85	168.9	730	10:36
1	16.0	57.6	1.25	4.17	159.6	142	10:41
2	15.6	80.3	0.51	4.69	74.9	44.4	10:46
3	15.7	96.0	0.41	5.08	34.2	14.9	10:51

Sample - 11:08
*Sampled VOCs via ~~soda straw method~~ PC bailer, PVC cleaned disposable bailer.

Sample times

mw-1	1100
mw-4	1200 = Duplicate
mw-3	1245 - sampled w/ bailer
FB	1350 - @ mw-3
EB	1400 - off per. pump & bailer.

6:30 - Left
8:40 - Arrived on site
14:15 - Leaving site
- used 100' tubing
- 2 bailers + 40' twine

6-26-14 — (cv) — Ews camden — P. Campbell Cloudy, 80's

WC = 12.21, 1 Vol = 2.03 gal, 3 vol = 6.10 gal

mw-4

V	T	Cond	DO	pH	ORP	Turb	Time
0	14.9	153.2	1.19	5.46	238.2	35.1	1136
1	14.9	152.2	0.42	5.14	273.3	10.7	1141
2	14.9	154.3	0.47	5.24	262	3.01	1147
3	15.0	165.1	0.39	5.37	249.4	7.88	1153

12:00 - Sample mw-4
- Duplicate taken here
- Sample VOCs via ~~soda bailer straw method~~ PC
- purged via peristaltic

mw-3 WC = 10.62 | 1 vol ≈ 1.85 | 3 vol ≈ 5.31

V	T	Cond	DO	pH	ORP	Turb	Time
0	15.7	157.5	4.73	5.71	200.6	106	1223
1	16.8	161.6	1.08	5.21	228.2	67.4	1228
2	16.9	161.2	0.52	5.41	217.0	67.6	1233
3	16.9	160.9	0.86	5.57	205.7	71.2	1241

Sample @ 12:45 via bailer Turb = 25.8 @ sample
Purged via peristaltic

mw-2

Purged till dry ≈ 1.5 gal via ~~peristaltic~~ bailer. PC

parameters

T	Cond	DO	pH	ORP	Turb	Time
20.9	225.2	4.76	5.91	160.0	OR	1340

FB - 13:50 - Taken @ mw-3
EB - 14:00 - Taken off peristaltic pumping into bailer.
14:15 - leaving site.

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 EQUIPMENT BLANKS

I. SCOPE AND APPLICABILITY: Equipment blanks are collected to assess the adequacy of decontamination procedures and to determine whether sampling equipment and methods are contributing contaminants to samples.

II. PROJECT-SPECIFIC REQUIREMENTS:

WATER TYPES TO BE USED FOR BLANKS: *[distilled water, deionized water, HPLC-grade water, etc.]*

III. METHODOLOGY

A. Review the SOP for the medium sampled to establish the frequency for collection of blanks.

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

C. Rinse the blank water across the sampling equipment, catching it in a decontaminated stainless-steel bucket. 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.

D. Fill a complete set of sample bottles.

E. Assign the blank a sample number of the same format as the other samples in the series.

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

IV. PRECAUTIONS AND COMMON PROBLEMS

A. The selection of stock solution 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
- ≅ 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 07-02-04).

VI. REFERENCES

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

04-01-02 TRIP BLANKS

I. SCOPE AND APPLICABILITY: Trip blanks are prepared to evaluate whether volatile constituents have migrated into samples from the air on-site, during shipping, or at the laboratory.

II. PROJECT-SPECIFIC REQUIREMENTS:

A. Frequency:

B. Other Criteria:

III. METHODOLOGY

A. When ordering bottles from the laboratory for the sampling event, request that trip blanks be sent also.

B. Keep the supplied blanks with the samples being collected throughout the sampling event. Handle the blanks in the same manner as the filled sample vials.

C. Assign the trip blank a sample number of the format used for the sampling event.

D. Return the trip blanks to the laboratory with the samples. Include the samples on the Chain-of-Custody form (SOP 07-02-02). Analysis is typically performed for volatile organic compounds only.

IV. PRECAUTIONS AND COMMON PROBLEMS: None.

V. DOCUMENTATION: Describe handling on the trip blanks in the Trip Report (SOP 07-02-04). Include the sample numbers assigned.

VI. REFERENCES

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

04-02-01 LIQUID DUPLICATES

I. SCOPE AND APPLICABILITY: Duplicate samples are collected to evaluate the precision involved in the sampling effort. Duplicate samples must be collected to be as similar as possible to the original sample. This procedure is applicable of collection of duplicate samples of all liquids and flowable sludges.

II. PROJECT-SPECIFIC REQUIREMENTS:

NUMBER/FREQUENCY OF DUPLICATE SAMPLING:

DUPLICATE NUMBERING SYSTEM: *[Indicate how sample numbers are to be assigned to duplicates, and whether "blind" numbers should be assigned.]*

III. METHODOLOGY

A. Prepare sample bottles for the target sample and its duplicate.

B. Collect the liquid sample in accordance with the appropriate SOP.

C. When filling sample bottles, fill each type of bottle for the sample and duplicate in sequence. Fill both VOA vials, then both metals bottles, etc. This will assure that the duplicate is as similar to the original sample as possible.

D. Preserve the sample and duplicate identically.

IV. PRECAUTIONS AND COMMON PROBLEMS

A. Failure to fill bottles alternately between the sample and duplicate may result in poor reproducibility between analyses.

B. Samples with free product or multiple phases present special problems. The phase distribution must be the same in both aliquots.

V. DOCUMENTATION: List the sample and duplicate on the Groundwater Monitoring Data Sheet as separate samples, describing the duplicate in the "Comments" column. If a Groundwater Monitoring Data Sheet is not appropriate, incorporate this information into the Trip Report (SOP 07-02-04).

VI. REFERENCES: None.

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.

06-01-01 WATER-LEVEL MEASUREMENT IN MONITORING WELLS

I. SCOPE AND APPLICABILITY: This procedure is applicable to the measurement of water levels in monitoring wells and open boreholes.

II. PROJECT-SPECIFIC REQUIREMENTS

A. REQUIRED READINGS:

B. APPLICABLE METHODS:

III. METHODOLOGY: Water levels should always be recorded to ±0.01 foot. Measurements should be made from a marked point on the inner casing for monitoring wells, and from the ground surface for open boreholes. Equipment should be decontaminated in accordance with SOP 01-01-00 after each measurement. The following methods may be used:

A. CHALKED-TAPE METHOD

1. Check records for historic water levels in the well, if available.

2. Rub the first five feet of a steel surveyor's chain or fiberglass tape with carpenter's chalk.

3. Lower the tape into the well until the end of the tape enters the water.

4. Record the tape footing at the wellhead to within 0.01 feet.

5. Pull the tape out of the well and read the tape footage of the water mark to within 0.01 feet. The difference between the readings is the water level.

B. SOUNDING

1. Attach a small float or hollow-bottom weight or sounder to the end of a tape measure.

2. Lower the sounder into the well and listen for the sound of the weight hitting the water surface.

3. When this is heard, pull the sounder back a few inches and redrop it by 1/4-inch increments until the sound is heard again.

4. Subsequent smaller increments of lowering the sounder will allow water-level measurements to within 0.01 feet.

5. Measure the length from the zero mark on the tape measure to the bottom of the weight. Add this value to all field measurements made with the sounder.

C. ELECTRIC-WATER LEVEL METER (Solinst)

1. Turn the Solinst on by turning the knob clockwise. This knob is also the volume control. Test the Solinst to see if the battery is dead by pushing the button next to the volume knob.If the battery is charged the Solinst will emit an audible tone and the red indicator light will illuminate.
2. Lower the end of the probe into the well or borehole. The probe will cause the unit to emit the tone and illuminate the light when it contacts water.

3. Pull the probe back a few inches and lower the probe in smaller increments until the water level is measured to within 0.01 feet.

4. The water level is read directly from the Solinst tape, and already includes a correction for the length of the probe on the bottom of the tape.

D. INTERFACE PROBE: This is the only reliable method for wells with floating free product.

1. Push the On/Off button to turn unit on. Lower the probe into the liquid. The horn will sound a steady tone and the yellow light will illuminate when the probe contacts an oil product. Slowly raise probe until sound stops, lower until sound is heard again to refine the oil level.

2. Read the tape marking and note as the surface level of product.

3. Slowly lower the probe through the oil product, searching for the oil-water interface. When the probe reaches water the tone will switch from steady to a beeping tone and the red light will illuminate. Slowly move probe up and down to refine the oil/water interface to within 0.01 feet. Read the water level directly from the tape. The length of the probe is already considered.

NOTE: Auto Shutoff Feature: After approximately five minutes of power on, the unit will auto-shut off. A chirping sound will be heard, warning impending shut off. Press

<POWER ON/RENEW> to continue operation. During five minute interval, short "alive" beep is heard.

IV. PRECAUTIONS AND COMMON PROBLEMS:

1. Be sure to allow sufficient time after development, purging or pumping to allow the well to recover to static conditions.

2. Sounding may be difficult with very deep water levels or in noisy conditions because the sound is hard to hear.

3. Measurement of water levels in pumping wells or wells/boreholes with cascading water can be difficult. Installing a narrow PVC access tube inside the well casing can make obtaining accurate readings easier.

4. Free product floating on the water table depresses the natural water level. If a true water level is required, the product of the oil thickness and the oil specific gravity must be added to the oil/water interface elevation.

5. If there is no measurement mark on the well riser, add one in indelible ink.

V. DOCUMENTATION

1. Record water levels in a field notebook or Groundwater Monitoring Data Sheet (SOP 07-02-01). Be sure to record the date and time of the measurement.

2. Data should be incorporated into the Trip Report (SOP 07-02-04). Method of measurement should be reported.

VI. REFERENCES: None

07-01-01 MAINTAINING SAMPLE CHAIN OF CUSTODY

I. SCOPE AND APPLICABILITY: This procedure is to be employed whenever samples are collected for laboratory analysis, and is designed to ensure that sample integrity is maintained. These procedures are necessary to assure that samples are defensible.

II. PROJECT-SPECIFIC REQUIREMENTS: None.

III. METHODOLOGY

A. SAMPLE CUSTODY: The sampling personnel must maintain custody of the samples until they are delivered to the laboratory, at which time the laboratory takes over the custody record. A sample is considered to be in custody if:

- it is in the investigator's actual possession
- it is in view of the investigator
- it has been placed in a secure area
- a signed custody seal has been placed on the sample container such that the seal would be destroyed if the container was opened.

B. CUSTODY RECORD

1. Complete a Chain-of-Custody Form for each shipping container of samples as described in SOP 07-02-02. Place the white copy of the completed form in the shipping container with the samples, as discussed in SOP 07-01-03.

2. Affix a signed custody seal to secure all samples. Seals may be placed across the lids of individual sample bottles, or on each shipping container of samples. If seals are placed on shipping containers, at least two seals must be used, and they must be placed such that the container cannot be opened without breaking the seals.

IV. PRECAUTIONS AND COMMON PROBLEMS

A. It may be necessary to cover custody seals with clear postal tape to prevent them from falling off.

B. Deliver or fax a copy of the custody form to the Project Manager within 24 hours of shipping the samples so that any errors can be corrected before the laboratory begins processing the samples.

V. DOCUMENTATION

A. The pink copy of the Chain-of-Custody Form should be submitted to the Project Manager as soon as possible after the samples are shipped.

B. The Project Manager or a designee must review the form for completeness and correctness. Any errors should be flagged, and the laboratory should be contacted if errors could affect analysis. The reviewer should initial and date the form, then place it in the Project File.

C. Compliance or problems with custody procedures should be documented in the Trip Report (SOP 07-02-04).

VI. REFERENCES

EPA Region IV; 1991. Environmental Compliance Branch, Standard Operating Procedures and Quality Assurance Manual. Athens, Georgia.

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.