THIRD QUARTER 2018 GROUNDWATER ASSESSMENT MONITORING REPORT SEPTEMBER 2018 MONITORING EVENT

FORMER ENVIRONMENTAL WASTE SOLUTIONS CAMDEN CLASS II LANDFILL

TDSWM PERMIT NUMBER IDL 03-0212 (TERMINATED) 200 OMAR CIRCLE CAMDEN, TN 38320

Prepared for:
THE TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

FORMER ENVIRONMENTAL WASTE SOLUTIONS CAMDEN CLASS II LANDFILL

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CEC PROJECT 181-364

DECEMBER 2018

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EXECUTIVE SUMMARY

This report documents the third quarter 2018 assessment-monitoring event, which was performed at the former Environmental Waste Solutions, LLC (EWS) Camden Class II Landfill on September 12, 2018. In addition, this report documents the re-sample event completed at the former EWS Camden Class II Landfill at MW-3 on September 27, 2018.

The former 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), and was formerly registered with the Tennessee Division of Solid Waste Management (DSWM) with permit number IDL 03-0212, and previously received secondary aluminum smelter waste for disposal including aluminum dross, salt cakes, and other industrial wastes. The IDL 03-0212 permit was terminated in July 2017.

Beginning in 2008, the site entered into the Groundwater Detection-Monitoring Program, and groundwater samples were collected from site monitoring wells on a semi-annual basis. EWS entered the Assessment Monitoring Program because of chloride concentrations reported above the 250 mg/l EPA secondary drinking water standard (2DWS) at monitoring well MW-3 during the November 2015 semi-annual detection-monitoring event. As a result, additional groundwater quality assessment activities were completed which included the installation of a new permanent groundwater monitoring well (MW-5), the installation of three (3) temporary monitoring wells (TMW-1, TMW-2, TMW-3), and completion of a private water-use survey. In addition, the semi-annual detection monitoring frequency was increased from semi-annual to quarterly assessment monitoring.

Quarterly assessment monitoring activities have been performed since the November 2015 monitoring event in general accordance with the site's Groundwater Quality Assessment Plan (GWQAP) dated March 14, 2016. During the second quarter 2017 assessment-monitoring event, total cadmium was detected above the maximum contaminant level (MCL) at MW-3, which was the first MCL exceedance for total cadmium concentrations at any well location on site. As a result, enhancements have been made to the sampling and analytical program for the site. Additional quarterly sampling activities have been added to the sampling and analytical program for the site, which includes the addition of stream and sediment sampling in nearby Charlie Creek and Cane Creek and quarterly leachate sampling. In addition, the annual storm water sample collected for Sector L National Pollutant Discharge Elimination System (NPDES) compliance now includes the analysis of total cadmium.

The Third Quarter 2018 sampling event at the facility included the following sampling activities:

Groundwater samples were collected by CEC on September 12, 2018 from MW-1, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3. Leachate samples were collected by Civil & Environmental Consultants, Inc. (CEC) on September 12, 2018 from the "Aluminum Processing

Waste Cell (APWC)" and "Industrial Waste Cell (IWC)" locations. On September 20, 2018, surface water and sediment samples were collected from Cane Creek and Charlie Creek by CEC. The stream (surface water and sediment) sample locations included Charlie Creek Upstream (US), Charlie Creek Midstream (MS), Cane Creek US, Cane Creek MS, and Cane Creek Downstream (DS-1). In addition, CEC collected a groundwater sample from MW-3 during a re-sample event on September 27, 2018. Also, the stream (surface water and sediment) sample locations were re-sampled on October 29, 2018.

Pace Analytical (Pace), formerly ESC Lab Sciences, was the laboratory sub-contracted to perform the chemical analyses. Laboratory reports for the 3rd quarter 2018 groundwater and leachate analysis were prepared by Pace and reported to CEC on September 21, 2018. Laboratory reports from the initial 3rd quarter 2018 stream (surface water and sediment) analysis were prepared by Pace and reported to CEC on September 24, 2018. The laboratory report for the groundwater re-sample event at MW-3 was prepared by Pace and reported to CEC on October 3, 2018. The laboratory report for the stream (surface water and sediment) re-sample event was prepared by Pace and reported to CEC on November 2, 2018.

The reported concentrations of chemicals detected in the groundwater monitoring wells and temporary monitoring wells were reviewed and compared against their respective U.S. EPA Maximum Contaminant Levels (MCLs) and U.S. National Secondary Drinking Water Standards (2DWS). Stream (surface water) samples were reviewed and compared to the upstream sampling results and the General Water Quality Criteria established in TDEC Rule Chapter 0400-40.03 of the Rules of the Tennessee Department of Environment and Conservation. Statistical analysis methods were used to identify whether there were any statistically significant increases (SSIs) in any site monitoring wells over background concentrations for the analyzed water quality parameters. Statistical analysis methods were not used to identify any SSIs for the stream (surface water) samples, since the sample size is very limited at this time. The results of the analyses are summarized in the following paragraphs.

Total arsenic was detected above the MCL (0.01 mg/l) at up-gradient MW-1 during the September 12, 2018 monitoring event (total arsenic at MW-1=0.0184 mg/l) and was the only arsenic detection above the MCL at any of the groundwater monitoring well locations. The presence of total arsenic in the local groundwater near up-gradient monitoring well MW-1 may be attributable to naturally occurring deposits in the soil overburden since there is no immediate development up-gradient of MW-1 and there were no detections of total arsenic in any of the downgradient monitoring wells.

Total cadmium was detected above the MCL (0.005 mg/l) at MW-3 during the September 12, 2018 monitoring event (total cadmium at MW-3 = 0.297 mg/l) and was the only cadmium detection above the MCL at any of the groundwater monitoring locations. The statistical trend analysis for total cadmium at MW-3 does confirm an increasing trend having statistical significance. The reported total cadmium concentration during this event was higher than the previous June 9, 2018 monitoring event where total cadmium at MW-3 = 0.0312 mg/l. A re-sample event was completed

at MW-3 on September 27, 2018. The September 27, 2018 re-sample event revealed total cadmium at MW-3=0.204 mg/l and total cadmium at MW-3 duplicate sample=0.206 mg/l. Total cadmium was first detected above the MCL at MW-3 during the June 8, 2017 event (total cadmium at MW-3 = 0.0286 mg/l).

Although there have been elevated concentrations of total cadmium in MW-3, the extent of cadmium in the groundwater at the site appears to be limited to the area around MW-3 as there have been no detections of cadmium above the Practical Quantitative Limit (PQL) of 0.001 mg/l, as of this date, from groundwater samples extracted from temporary monitoring wells TMW-2 and TMW-3 that are immediately down-gradient of MW-3.

The time-series graphs indicated that total cadmium, calcium, magnesium, manganese, nickel, zinc, chloride, fluoride, and sulfate concentrations at MW-3 increased in concentration during this third quarter 2018 assessment monitoring event.

Total cadmium was not detected above the laboratory PQL of 0.001 mg/l in the surface water samples collected from nearby Charlie Creek and Cane Creek during the September 20, 2018 monitoring event or during the October 29, 2018 re-sample event. Total cadmium was detected in the sediment sample collected from Charlie Creek MS (total cadmium = 3.27 mg/kg) during the initial September 20, 2018 sampling event, which was the only reported cadmium detection above the laboratory PQL of 0.500 mg/kg. However, total cadmium was not detected above the laboratory PQL of 0.500 mg/kg in the sediment at Charlie Creek MS during the October 29, 2018 re-sample event.

Six SSIs were identified over background during this event. In addition to the total cadmium in MW-3, SSIs included barium (MW-3), chloride (MW-3, MW-5, TMW-1, TMW-2, and TMW-3), fluoride (MW-3), zinc (MW-3), and sulfate (MW-3). The barium, chloride, fluoride, and zinc detections observed in the site monitoring wells were all below their associated MCLs or 2DWS. However, the sulfate detection observed in MW-3 (484 mg/l) was above the 2DWS (250 mg/l).

Glossary of Terms

Appendix I	Refers to the required regulatory sample list of groundwater parameters
CEC	Civil & Environmental Consultants, Inc.
Class I Landfill	Municipal Solid Waste Landfill
Class II Landfill	Industrial Waste Landfill
Class IV Landfill	Construction/Demolition Waste Landfill
Class III/IV Landfill	Landscaping and Construction/Demolition Waste Landfill
DML	Construction Demolition Landfill
US EPA	United States Environmental Protection Agency
Pace	Pace Analytical
EWS	Environmental Waste Solutions
GW	Groundwater
HDPE	High Density Polyethylene
HI	Hydrogeologic Investigation
MCL	Maximum Contaminant Level
microomhos•cm-1	micro-Siemens per centimeter
mg/l	milligrams per Liter
MW	Monitor Well
NPPL	Non-parametric prediction limit analysis
ORP	Oxidation Reduction Potential
POTW	Publically Owned Treatment Works
ppm	parts per million*
PQL	Practical Quantitation Limit
QC	Quality Control
2DWS	Secondary Drinking Water Standard (EPA)
SESD	Science and Ecosystem Support Division
SNL	Sanitary Landfill
SSI	Statistically Significant Increase
TDEC	Tennessee Department of Environment and Conservation
TDOG	Tennessee Division of Geology
TDSWM	Tennessee Division of Solid Waste Management
TOC	Top of Casing
VOC	Volatile Organic Compound

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

1.0 INTRODUCTION

1.1 SITE LOCATION

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

1.2 CURRENT ACTIVITIES

The former EWS Camden Class II landfill is not currently operating (i.e., the permit has been terminated, and TDEC is in the process of achieving certified final closure of the site with construction activities currently underway). The final closure activities being implemented at the facility are intended to protect the environment and human health. Final closure activities currently underway include leachate treatment, leachate hauling and disposal, storm water management activities, and landfill cap construction.

2.0 AQUIFER CHARACTERISTICS

2.1 GEOLOGIC AND AQUIFER CHARACTERISTICS

The extensive reworking of the site because of the excavation of chert for local road and fill projects has 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 mottling's of very light-gray and yellowish-gray (surfaces stained pale to dark yellowish-orange), bedded and blocky (beds 2 to 8 inches thick), dense, conchoidal fracture, contains pods of white to light gray tripolitic clay, locally stained yellow and brown, and fossiliferous. Locally, especially near the top, fragments of chert are cemented into large masses and beds of breccia by dark-brown to moderate-red limonite.

Groundwater potentiometric data collected from the uppermost water-bearing zone across the entire landfill site footprint during the 1999 and 2006 hydrogeological investigations indicated that groundwater flow in the uppermost aquifer is generally to the south. Comparisons of the water bearing zone elevations to static groundwater elevations indicate an unconfined aquifer.

2.2 MONITOR WELL INTEGRITY & STATIC WATER LEVELS

The groundwater-monitoring network for the former EWS Class II Landfill currently consists of monitoring wells MW-1, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3. Due to insufficient groundwater volumes for sampling, MW-2 has been removed from the regular sampling network and replaced by MW-4. MW-2 is still intact and is used for potentiometric surface measurements and field parameter testing. Monitoring well MW-1 serves as an up-gradient monitoring point, while monitoring wells MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3 serve as down-gradient monitoring points. The temporary wells (TMW-1, TMW-2, and TMW-3) were installed with the purpose of delineating the areal extent of groundwater contamination and providing additional potentiometric interpretation. The installation of these temporary wells were in response to elevated chloride concentrations at MW-3, which were first detected during the November 2015 sampling event. In addition to providing potentiometric information for the site, these temporary wells yield groundwater samples for water-quality analyses.

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

Up-gradient Monitoring Points	Down-gradient Monitoring Points
MW-1	MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3

Before purging and sampling activities began, depth to water (DTW) measurements were collected at each of the above-referenced monitoring wells using an electronic water level indicator such as the Solinst® model #122 electronic water-level indicator. DTW measurements were also collected from MW-2 for potentiometric interpretation. DTW measurements were collected in the following order from first to last: MW-1, MW-5, TMW-1, TMW-2, TMW-3, MW-4, MW-2, and finally MW-3.

The integrity of each monitoring well was checked during each sampling event prior to groundwater collection. The physical condition of each wellhead was observed and noted along with the condition of all locking mechanisms for each monitoring well. Once the watertight seal was removed from the top of each monitoring well's casing, the well was allowed to equilibrate to atmospheric conditions. The water-level indicator was decontaminated in accordance with the United States Environmental Protection Agency-Science and Ecosystem Support Division (USEPA SESD) procedures for field water-level measurements in between wells and a new pair of clean nitrile gloves were donned at each monitoring location while collecting DTW measurements. The decontaminated electronic water-level indicator was slowly lowered into the well to establish the distance between the top of casing and the elevation of free groundwater. The electronic probe was capable of determining this distance to within one-hundredth of one foot (0.01 foot). The distance was written in the site-specific field book or field data sheet as DTW. Upon collection of these data, the electronic water-level indicator was removed from the monitoring well and decontaminated.

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 the current Tennessee State Plan Coordinate System. The top of casing elevations for all site-monitoring wells (MW-1, MW-2, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3) were updated by a licensed land surveyor on May 12, 2016. Groundwater elevations are listed in Appendix A – Table 1 – Field Parameters & Potentiometric Data and reflect the most recent survey.

2.3 GROUNDWATER FLOW DIRECTION

Groundwater at the landfill appears to generally flow in a southern direction towards Charlie Creek and Cane Creek. Groundwater flow in the vicinity of the former EWS Class II Landfill generally flows from a topographic high north of the landfill towards monitoring wells MW-2, MW-3, MW-4, and MW-5 and temporary monitoring wells TMW-1, TMW-2, and TMW-3, which are all down-gradient of the waste cells.

2.4 POTENTIOMETRIC GRADIENT

The potentiometric surface of the unconfined aquifer occurring beneath the former EWS Class II landfill occurs at approximately twenty-two (22) feet below the top of casing at the up-gradient monitor well MW-1 to approximately ten (11) feet below the top of casing at monitor well MW-4. The potentiometric gradient calculated from groundwater elevation data collected on September 12, 2018 is approximately 1.22%.

The potentiometric gradient is calculated according to the following formula:

$$\frac{\text{Highest GW. Elev. (MW-1) } \_ \text{ – Lowest GW. Elev. (MW-4)}}{\text{Horizontal Distance between the Wells}} * 100 = \text{Pot. Grad.}$$

$$\frac{(393.06') - (369.82)}{1{,}910'} * 100 = 1.22\%$$

The above calculation assumes a perpendicular gradient between the potentiometric elevations from MW-1 and 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 uppermost aquifer occurring beneath the landfill have not been determined at this time.

3.0 GROUNDWATER SAMPLING PROCEDURES

3.1 INSTRUMENTATION

Before purging and sampling activities began, DTW measurements were collected at each of the monitoring wells. A YSI Professional Plus® multi-parameter instrument (YSI) was used to record pH, conductivity, temperature, dissolved oxygen (DO), and oxidation-reduction potential (ORP) during groundwater sampling events at the landfill. A Hach® model 2100Q turbidity meter was used to collect turbidity readings. Each instrument was either checked against known standards or calibrated per manufacturers' specifications prior to the commencement of sampling activities.

3.2 GROUNDWATER PURGING AND COLLECTION OF FIELD PARAMETER VALUES

On November 29, 2017, dedicated submersible bladder pumps (low-flow bladder pumps) were installed in each of the groundwater monitoring wells (MW-1, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3). During the December 11, 2017 sampling event, monitoring personnel for the former EWS Class II Landfill began utilizing low-flow protocols as described within the USEPA's Issue Paper EPA/540/S-95/504: Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures, April 1996. The low-flow protocols have continued to be utilized by monitoring personnel during each quarterly groundwater assessment monitoring event since December 11, 2017. Additionally, groundwater-sampling activities were completed during this sampling event in accordance with the USEPA SESD sampling procedure -SESDPROC-301-R4 titled "Groundwater Sampling", effective April 26, 2017.

Each dedicated submersible bladder pump is of stainless steel construction, and each is equipped with a Teflon™ bladder and dedicated Teflon™-lined bonded twin polyethylene tubing (air-line and water discharge line). The low-flow bladder pumps were operated by using a special control box, which controls the pressure and frequency of the pumping action and was used to adjust the flow rate of the water. The flow rate used was adjusted to minimize stress (drawdown), prevent damage to monitoring well components, and to minimize the risk of introducing sediments into the monitoring well through the well's gravel pack. Water pumped was withdrawn directly from the formation with little mixing of casing water or disturbance to the sampling zone. The initial amount of purged groundwater was collected in a clean, high density polyethylene (HDPE) flow-through cell while measuring temperature, pH, conductivity, DO, and ORP. A turbidity meter was used to collect turbidity readings during low-flow purging activities.

The start time of purging, the parameter measurements at intervals during purging, estimated pumped volumes, depths to water for low-flow sampling, and any notes of unusual conditions were recorded during purging activities. Field parameter measurements (temperature, pH, conductivity, DO, ORP, and turbidity) were collected periodically until proper field stabilization goals had been met, which are defined by the USEPA SESD as: "for at least three consecutive measurements, the pH remains constant within 0.1 Standard Unit (SU), conductivity varies no more than 5 percent, and the turbidity has either stabilized or is below 10 Nephelometric Turbidity

Units (NTUs)". Other parameters such as DO were also measured as a purge-adequacy parameter. Normal goals for DO are 0.2 mg/l or 10% saturation, whichever is greater. Temperature and ORP were measured during purging to obtain measurements of record for these parameters for each sampling event.

During the September 12, 2018 monitoring event, a peristaltic pump was utilized during purging activities in the temporary monitoring wells (TMW-1, TMW-2, and TMW-3). According to the USEPA SESD groundwater sampling procedures, peristaltic pumps can be utilized as an alternative and acceptable method for low-flow or multiple volume purging and sampling activities.

Peristaltic pumps require three separate pieces of tubing in order to function: (1) a section of Teflon® tubing which is lowered into the well, (2) a small section of flexible Masterflex® silicone tubing which is installed into the peristaltic pump head, and (3) a small section of Teflon® tubing which connects the pump head to the flow-through cell. The first section of tubing was deployed to the approximate mid-screen within the well (approximately 4 feet above the bottom of the well casing) and cut above the ground surface. The free end of the first section of tubing was connected to the flexible Masterflex® silicone tubing situated in the peristaltic pump head. Finally, the third section of tubing (second section of Teflon® tubing) connected the Masterflex® silicone tubing at the pump head to the flow-through cell for collection of field chemistry parameter measurements. In order to prevent the transfer of residuals between sampling locations, all three sections of tubing were replaced between each well. After replacement of all sections of tubing, the peristaltic pump was turned on, and a suitable (slow) pumping rate was achieved to maintain a minimal and stable drawdown level. Field parameters were collected from the initial amount of water that was purged and measurements were collected periodically until the parameters had stabilized as described above.

With respect to groundwater chemistry, an adequate purge is achieved when the pH and conductivity have stabilized and the turbidity either has stabilized or is below 10 NTUs. If the field parameters were not stable, the purging procedures continued until one of the following adequate purge conditions were met:

1. Field stabilization occurred
2. Well was purged dry. For wells with slow recovery, attempts were made to avoid purging to dryness by slowing the purge rate. In some situations, even with slow purge rates, the well may be pumped dry. This situation generally indicates that an adequate purge had been achieved and the well was sampled following sufficient recovery (enough volume to allow filling of all sample containers).
3. A minimum of three well volumes were purged.

Field chemistry parameters were collected periodically at the temporary wells until field parameter measurements had stabilized, and at least three well volumes were removed from each temporary monitoring well. The purge water from down-gradient monitoring wells MW-3, MW-4, MW-5,

TMW-1, TMW-2, and TMW-3 were containerized and discarded into the on-site leachate collection system storage tank.

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

3.3 GROUNDWATER SAMPLE COLLECTION & PRESERVATION

Groundwater samples were collected from monitoring wells when field parameter data indicated that stagnant water had been purged from the well and replaced by groundwater from the adjacent formation that is representative of actual aquifer conditions. Groundwater was placed in the laboratory supplied sample vessels in the following order: Appendix I organics – three (3) forty (40) mL amber glass containers preserved with hydrochloric acid (HCl); Appendix I organics EDB and DBCP– three (3) forty (40) mL clear glass containers preserved with sodium thiosulfate ($Na_2S_2O_3$); total metals (Appendix I metals, Al, Ca, Fe, K, Mg, Mn, Na, and Boron) – one (1) five-hundred (500) ml HDPE container preserved with nitric acid (HNO_3); alkalinity, bromide, chloride, nitrate, and sulfate – one (1) two-hundred fifty (250) ml unpreserved HDPE container; COD & ammonia – one (1) two-hundred fifty (250) ml HDPE jar preserved with sulfuric acid (H_2SO_4). In addition to total metals analysis, dissolved metals samples were collected for analysis (dissolved Appendix I metals, Al, Ca, Fe, K, Mg, Na, and Boron) at each location. Each dissolved metals sample was collected by field filtering the groundwater using a new disposable 0.45-micron filter and placing the filtered groundwater into one (1) five-hundred (500) ml HDPE container preserved with HNO_3. As soon as samples were collected in their respective containers, samples were preserved accordingly and placed on ice in a sample cooler.

As described in the previous section, a peristaltic pump was used to purge temporary monitoring wells TMW-1, TMW-2, and TMW-3. Samples for organic analysis cannot be exposed to the flexible peristaltic pump-head tubing, due to the risk of contaminant sorption and/or the risk of the dissolution of organic compounds to the sample. Therefore, the sample containers for the more turbidity-sensitive analysis were filled first (metals), and samples for organic analysis were collected using a clean Teflon® bailer at each temporary monitoring well.

3.4 STREAM (SURFACE WATER AND SEDIMENT) SAMPLE COLLECTION AND PRESERVATION

The stream surface water sampling activities were completed in accordance with the USEPA SESD sampling procedure -SESDPROC-201-R4 titled “Surface Water Sampling”. The stream sediment sampling activities were completed in accordance with the USEPA SESD sampling procedure -SESDPROC-200-R3 titled “Sediment Sampling”. Surface water and sediment samples were collected from the stream, beginning at the furthest downstream sampling location, moving upstream, and ending with the furthest designated upstream sampling location. Stream (surface water and sediment) sample locations included the following:

- Charlie Creek US: Charlie creek upstream north side of SR-191 within Right-of-Way (ROW)
- Cane Creek US: Cane creek upstream side of S Forrest Ave. within ROW
- Charlie Creek MS: South of landfill footprint, before confluence
- Cane Creek MS: South of landfill footprint, after confluence
- Cane Creek DS-1: Stream location at landfill property boundary, before Camden WWTP.

The laboratory results for all stream (surface water and sediment) sample locations are summarized in Table 2b – Stream and Sediment Analytical Data in Appendix A. The stream (surface water and sediment) sample locations are shown on Figure 3 - "Groundwater and Stream Sample Locations" located in Appendix A.

3.4.1 Stream Sampling

The surface water samples were collected prior to the collection of the sediment samples at approximately the same dedicated sampling locations in the stream. CEC sampling personnel faced upstream and collected the sample without disturbing the bottom sediments. The surface water samples were collected directly in laboratory-supplied sample vessels for the analysis of: total metals (Appendix I metals, Al, Ca, Fe, K, Mg, Mn, Na, and Boron) – one (1) five-hundred (500) ml HDPE container preserved with nitric acid (HNO_3); total hardness, bromide, chloride, and fluoride – one (1) two-hundred fifty (250) ml unpreserved HDPE container; dissolved metals (Appendix I metals, Al, Ca, Fe, K, Mg, Mn, Na, and Boron) - one (1) five-hundred (500) ml unpreserved HDPE container, which was submitted to the laboratory for filtering prior to analysis for dissolved metals. The CEC sampler added the laboratory-supplied preservative to the appropriate sample vessels directly after sample collection (except for the metals samples designated for lab filtering).

3.4.2 Sediment Sampling

The sediment sampling method was accomplished by wading into the surface water body and, while facing upstream (into the current), removing the upper surface layer of sediment using a stainless steel scoop or spoon along the bottom of the surface water body in the upstream direction. Excess water was carefully drained from the scoop or spoon so as to minimize the loss of fine-grained particles associated with the sampled substrate. Aliquots of the collected sample were placed in a glass pan and homogenized according to the quartering method described in the USEPA SESD sampling procedures.

After the sediment aliquots were homogenized, the samples were placed into appropriate lab-supplied sample containers using the alternative shoveling method, and the caps were tightly secured. The alternate shoveling method is accomplished by placing separate scoops of the homogenized sediments in each container in sequence and repeating until all containers are full or

the sample has been exhausted. The threads on each container and lid were cleaned to ensure a tight seal when closed. The sediment samples were collected in their respective sample containers for the analysis of: total metals (Appendix I metals, Al, Ca, Fe, K, Mg, Mn, Na, and Boron), bromide, chloride, and fluoride. All sediment samples collected from the stream were analyzed for the same list of parameters as the surface water samples, with the exception of total hardness and dissolved metals.

Equipment used to collect field samples was cleaned and decontaminated in accordance with the USEPA SESD - Field Equipment Cleaning and Decontamination procedures.

3.5 LEACHATE SAMPLING PROCEDURES

Leachate samples were collected by CEC on September 12, 2018, from the "Aluminum Processing Waste Cell (APWC)" and "Industrial Waste Cell (IWC)" locations. The APWC leachate sample was collected from the leachate collection system associated with the aluminum processing waste cell and was collected directly from the associated leachate collection hose before the leachate entered the APWC leachate collection tanks. The IWC leachate sample was collected from the leachate collection system associated with the industrial waste cell and was collected directly from the associated leachate collection hose within the secondary containment area before the leachate entered the IWC leachate collection tank. Laboratory reports from the leachate analysis were prepared by Pace and reported to CEC on September 21, 2018. The approximate APWC and IWC leachate sample locations are shown on Figure 2 - Potentiometric Surface Map located in Appendix A.

3.6 QUALITY ASSURANCE AND QUALITY CONTROL

3.6.1 Field Quality Assurance and Quality Control

Field Quality Assurance and Quality Control (QA/QC) samples were collected as part of the groundwater-sampling program. Quality assurance (with internal laboratory quality controls) addresses the accuracy and repeatability of analytical results after analysis in the laboratory. Quality control addresses methods to preserve the integrity of samples in the field and during shipping to the laboratory. Quality control may be accomplished by incorporating trip blanks, field blanks, field duplicates, and equipment (rinsate) blanks into the analytical program.

A field blank and a duplicate sample were collected during this groundwater monitoring event. CEC collected a field blank next to monitoring well TMW-3 and a duplicate sample was collected from MW-4. The field blank was collected by pouring deionized water into a set of sample bottles provided by the laboratory, thereby allowing any airborne contaminants a chance to enter the field blank sample. The duplicate sample was collected by taking separate samples from within MW-4 at the same time. In addition, a laboratory supplied trip blank for VOC analysis was prepared and placed in a cooler, which was present during groundwater sampling activities. Upon the collection of the final groundwater sample, the trip blank was placed in a sample cooler and delivered to Pace for VOC analysis. No VOCs were detected above the laboratory PQL in the trip blank sample.

Pace reported the groundwater laboratory analytical results to CEC on September 21, 2018. Laboratory analytical testing of the field blank presented in the analytical report revealed that none of the tested constituents were above the PQL. The results for the duplicate sample collected from MW-4 were similar to the original MW-4 sample results. A duplicate sample was also collected from MW-3 during the re-sample event on September 27, 2018. The results of the duplicate sample collected from MW-3 during the re-sample event were similar to the original MW-3 sample results.

3.6.2 Laboratory Quality Assurance and Quality Control

In order to demonstrate that a laboratory is producing data of adequate precision, accuracy and sensitivity, it is necessary to assess all laboratory procedures at all stages from sampling to reporting. The laboratory completed specific control and assessment procedures designed to monitor, quantitatively, the accuracy and precision of specific assays. Laboratory Internal Quality Assurance (IQA) refers to the full range of practices employed to ensure that laboratory results are reliable. Internal Laboratory Quality Control (IQC) consists of the operational techniques used by the laboratory staff for continuous assessment of the quality of the results of individual analytical procedures. The specific quality-control procedures utilized by the analytical laboratory are summarized in the following table:

Quality Criteria Category	Quality Control Laboratory Methods
Precision	Laboratory duplicates at a frequency of one per matrix spike, one per laboratory control sample, and one per method blank.
Bias	Matrix spikes, laboratory control samples, method blanks at a frequency of one sample per standard batch.
Representative and Comparable Data	Adherence to standard analytical procedures, analytical methods, units of measurement, and detection limits.

The internal laboratory IQA and IQC results are included in the laboratory analytical reports located in Appendix C - Laboratory Analytical Reports & Field Information Logs.

3.7 SAMPLE CHAIN-OF-CUSTODY

A sample Chain-of-Custody (COC) traveled with the sample kit from Pace to the former EWS Class II Landfill site and back to Pace for the September 2018 sampling event. The CEC SOP 07-01-01 for maintaining sample Chain of Custody may is presented in Appendix D – CEC Standard Operating Procedures.

4.0 LABORATORY ANALYTICAL PROCEDURES

4.1 ANALYTICAL METHODS

All laboratory analyses for the third quarter 2018 groundwater assessment-monitoring event were completed by Pace Analytical. The analytical methods chosen for these monitoring events were in full compliance with the procedures required by the DSWM and the USEPA'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 and leachate samples** were as follows:

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

The SW-846 methods used for the analysis of **stream surface water samples** were as follows:

Method 6010b	Inductively Coupled Plasma (ICP) – Atomic Emission Spectrometry (Boron only)
Method 6020	ICP – Mass Spectrometry (metals & dissolved metals)
Method 130.1	Total Hardness
Method 7470A	Mercury in Liquid Waste – Manual Cold Vapor Technique
Method 9056A	Determination of Inorganic Anions by Ion Chromatography (Bromide, Chloride, Fluoride)

The SW-846 methods used for the analysis of **stream sediment samples** were as follows:

Method 6010b	Inductively Coupled Plasma (ICP) – Atomic Emission Spectrometry
Method 7470A	Mercury in Liquid Waste – Manual Cold Vapor Technique
Method 9056A	Determination of Inorganic Anions by Ion Chromatography (Bromide, Chloride, Fluoride)

4.2 LABORATORY ANALYTICAL RESULTS

Third quarter groundwater samples were collected by CEC on September 12, 2018. Pace performed the groundwater analysis and reported the results on September 21, 2018. Third quarter leachate samples were collected by CEC on September 12, 2018 from the "Aluminum Processing Waste Cell (APWC)" and "Industrial Waste Cell (IWC)" leachate sample locations. Pace performed the leachate analysis and reported the results on September 21, 2018. Third quarter stream (surface water and sediment) samples were collected from the Cane Creek and Charlie Creek by CEC on September 20, 2018, and Pace reported the results on September 24, 2018. Due to an elevated cadmium detection at MW-3 and a first time Selenium detection (below MCL) at MW-3 reported by Pace on September 21, 2018, CEC collected a groundwater sample from MW-3 during a re-sample event on September 27, 2018. The laboratory report for the groundwater re-sample event at MW-3 was prepared by Pace and reported to CEC on October 3, 2018. The Selenium detection at MW-3 was not confirmed during the resampling event (See section 4.2.1). Also, the stream (surface water and sediment) sample locations were re-sampled on October 29, 2018 due to detections of total cadmium at Charlie Creek MS, Cane Creek US, and Cane Creek DS-1.The laboratory report for the stream (surface water and sediment) re-sample event was prepared by Pace and reported to CEC on November 2, 2018.

Constituent values from all inorganic laboratory analyses for groundwater and leachate samples, along with applicable MCLs or 2DWSs, are presented in Table 2a – Groundwater and Leachate Analytical Data in Appendix A. Constituent values from all inorganic laboratory analyses for stream and sediment samples collected on September 20, 2018 are presented in Table 2b – Stream and Sediment Analytical Data in Appendix A. Constituent values from all inorganic laboratory analyses for stream and sediment samples collected during the re-sample event on October 29, 2018 are presented in Table 2c – Stream and Sediment Analytical Data in Appendix A. Copies of the laboratory reports are located in Appendix C – Laboratory Analytical Reports.

4.2.1 EWS Groundwater Quality Relative to the EPA Primary Drinking Water Standards

Total Cadmium was detected above the MCL (0.005 mg/l) at MW-3 during the September 12, 2018 monitoring event (total cadmium at MW-3 = 0.297 mg/l). The total cadmium concentration at MW-3 during the September 12, 2018 event was higher in concentration than the previous June 19, 2018 monitoring event (total cadmium at MW-3 = 0.0312 mg/l), the March 22, 2018 monitoring event (total cadmium at MW-3 = 0.00671 mg/l), and the December 14, 2017 monitoring event (total cadmium at MW-3=0.00659 mg/l). The elevated total cadmium detection at MW-3 was confirmed during the September 27, 2018 re-sample event at MW-3 (total cadmium at MW-3=0.204 mg/l and total cadmium at MW-3 duplicate sample=0.206 mg/l).The turbidity results for MW-3 on September 12, 2018 (1.12 NTUs), September 27, 2018 (1.05 NTUs), and June 18, 2018 (4.92 NTUs) events were within the recommended goal of 10 NTUs. The turbidity results for MW-3 on March 22, 2018 (24.3 NTUs), December 14, 2017 (23 NTUs), and September 28, 2017 (18.9 NTUs) at the time of sample collection were slightly above the recommended goal of 10 NTUs. The sampling results from the initial September 12, 2018 groundwater event and the September 27, 2018 re-sample event at MW-3 and the previous four sampling events (June 18,

2018, March 22, 2018, December 14, 2017 and September 28, 2017) revealed that the dissolved cadmium results in the field-filtered samples collected at MW-3 were above the MCL and similar to the total cadmium results. Total cadmium was first detected above the laboratory PQL in MW-3 during the 4th quarter 2016 sampling event completed on November 10, 2016 (total cadmium at MW-3=0.00177 mg/l), which was below the MCL. Total cadmium was first detected above the MCL at MW-3 during the June 8, 2017 event (total cadmium at MW-3 = 0.0286 mg/l). Although there have been elevated detections of total cadmium in MW-3, there have been no detections, as of this date, from groundwater samples extracted from temporary monitoring wells TMW-2 and TMW-3 that are immediately down-gradient of MW-3. Regardless, the elevated total cadmium detections at MW-3 during this event and the subsequent re-sample event remain a cause for concern.

Total Cobalt was detected in up-gradient well MW-1 (0.0198 mg/l) and down-gradient wells MW-3 (0.00825 mg/l), and MW-5 (0.00204 mg/l) during this September 2018 event. Cobalt does not have an MCL; however, TDEC-DSWM uses the EPA regional screening level (RSL) of 0.006 mg/l as the groundwater protection standard for this constituent. The reported detection at MW-3 was above the RSL during this September 2018 event. Cobalt has historically been detected at concentrations that exceed the RSL at MW-1 prior to the disposal of waste in the landfill, and total Cobalt was detected in MW-1 at a similar concentrations during the previous March 2018 event (total cobalt at MW-1= 0.0425 mg/l) and December 2017 event (total cobalt at MW-1=0.0411 mg/l). The presence of cobalt in the local groundwater is considered to be naturally occurring, originating from deposits in the soil overburden, since there is no immediate development up-gradient of MW-1.

Total Chromium was detected in MW-3 (0.0102 mg/l), MW-5 (0.00283 mg/l), and TMW-2 (0.00303 mg/l), and were not above the MCL of 0.1 mg/l for chromium concentrations.

Total Mercury was **not** detected above the MCL (0.002 mg/l) in up-gradient well MW-1 (total mercury = 0.000244 mg/l) during this September 2018 monitoring event. During the previous June 2018 event, total mercury was detected above the MCL at MW-1 (total mercury=0.00319 mg/l), which was the first time the total mercury concentration has exceeded the MCL at MW-1. Total mercury has previously been detected above the laboratory PQL (0.0002 mg/l) at up-gradient well MW-1 at concentrations ranging from 0.00024 mg/l (February 2011) to 0.000858 mg/l (May 2016). Although total mercury has been previously detected above the PQL at up-gradient MW-1, total mercury has not been detected above the laboratory PQL in any of the down-gradient monitoring wells since monitoring began at the site in 2008. The presence of mercury in the local groundwater near up-gradient monitoring well MW-1 may be attributable to naturally occurring deposits in the soil overburden since there is no immediate development up-gradient of MW-1. The observed concentrations of mercury at MW-1 will continue to be monitored carefully in future monitoring events.

Total Selenium was **not** detected above the MCL (0.05 mg/l) in down-gradient well MW-3 (total selenium at MW-3 = 0.00249 mg/l) during this September 2018 event. Although total selenium at

MW-3 was not above the MCL, this was the first time selenium was detected at MW-3 since sampling began in 2008. Therefore, a re-sample was completed on September 27, 2018. Selenium was not detected above the laboratory PQL (<0.002 mg/l) at MW-3 in the re-sample event, including the duplicate sample collected at MW-3 during the re-sample event. Therefore, the total selenium concentration observed during the initial event was not confirmed through re-sampling.

4.2.2 EWS Groundwater Quality Relative to the National Secondary Drinking Water Standards

Laboratory analytical results for the groundwater samples collected in September of 2018 from the former EWS Class II Landfill groundwater monitoring well network indicated that five of the site-specific groundwater-monitoring list of compounds were detected at concentrations which exceeded the National Secondary Drinking Water Standards (2DWS). Those parameters include iron and manganese in up-gradient well MW-1, aluminum in down-gradient wells MW-3, MW-5, and TMW-1, iron in down-gradient well TMW-2, manganese in down-gradient wells MW-3 and MW-5, nickel in down-gradient well MW-3, and sulfate in down-gradient well MW-3. Chloride detections were below the 2DWS during this event. The observed concentrations at monitoring wells at the site for the constituents given below are discussed relative to the 2DWS.

Total Aluminum concentrations observed in MW-3 (0.418 mg/l), MW-5 (0.219 mg/l), and TMW-2 (1.29 mg/l) during the September 2018 sampling event were above the 2DWS (0.2 mg/L). During the previous June 2018 sampling event, the aluminum concentrations at TMW-1 (1.35 mg/l), TMW-2 (11.0 mg/l), and TMW-3 (0.696 mg/l) were above the 2DWS. Also, during the March 2018 sampling event, the aluminum concentrations at MW-3 (0.846 mg/l), MW-5 (0.432 mg/l), TMW-1 (0.442 mg/l), TMW-2 (1.28 mg/l), and TMW-3 (0.236 mg/l) were above the 2DWS (0.2 mg/l). Aluminum was not detected above the PQL (0.001 mg/l) at MW-1 and MW-4 during this September 2018 event. It should be noted that the analytical laboratory report identified a "B" qualifier code for the aluminum concentration at MW-5 and TMW-1, which indicated that aluminum was found in the associated method blank. Therefore, the aluminum concentrations observed at MW-5 and TMW-1 during this event may have been falsely reported at higher concentrations than the actual concentrations.

Sampling data suggests that total aluminum concentrations are sensitive to turbidity values, given that the dissolved aluminum concentrations at MW-5, TMW-1, and TMW-3 were less than the laboratory PQL (<0.1 mg/l). The total aluminum detection at TMW-2 was also likely affected by the turbidity at the time of sampling (turbidity at TMW-2=112 NTU), and is supported by the fact that the dissolved aluminum at TMW-2 (dissolved aluminum=0.19 mg/l) was below the 2DWS and lower in concentration than the total aluminum concentration. Each dissolved metals sample was field-filtered using a 0.45 micron filter before sample collection, and the turbidity in the field-filtered samples at TMW-1 (4.50 NTU) and TMW-3 (5.10 NTU) were below the recommended 10 NTUs. It should also be noted that although each sample was field-filtered using a 0.45-micron filter before sample collection, the turbidity at TMW-2 (29.7 NTU) remained elevated after field filtering, indicating that very small (<0.45 micron) colloidal clay particles were able to pass through the filter and remain in the water column.

The **Chloride** concentration reported at MW-3 was 222 mg/l during this September 2018 event, which was below the 2DWS for chloride concentrations (250 mg/l). Since the second semi-annual monitoring event in November 2015 (458 mg/l) and the supplemental re-sampling event (360 mg/l) in December 2015, chloride concentrations at MW-3 have remained below the 250 mg/l 2DWS for chloride concentrations. However, this reported chloride concentration at MW-3 during this September 2018 event was higher in concentration than the previous seven quarterly groundwater monitoring events. The observed increase in chloride concentrations at MW-3 during this event is worth noting, and chloride concentrations will continue to be monitored closely.

Total Iron was detected above the 2DWS (0.3 mg/l) in up-gradient well MW-1 (6.39 mg/l) and down-gradient well TMW-2 (2.17 mg/l) during the September 2018 monitoring event. The reported total iron concentrations at MW-1 and TMW-2 were less than the highest concentrations observed prior to placement of waste and do not exhibit a trend via time-series graphs. The presence of iron in the local groundwater is considered to be naturally occurring, originating from deposits in the soil overburden, and iron has consistently been detected above the 2DWS in MW-1.

Total Manganese has been consistently detected at concentrations above the 2DWS (0.05 mg/l) in up-gradient well MW-1. Manganese detections were observed above the 2DWS (0.05 mg/l) in up-gradient MW-1 (0.537 mg/l) and down-gradient site monitoring wells MW-3 (2.63 mg/l) and MW-5 (0.0861 mg/l) during this September 2018 sampling event. The presence of total manganese in the local groundwater is considered to be naturally occurring, originating from deposits in the soil overburden. However, the observed total Manganese concentration at MW-3 during this event was higher in concentration compared to previous total manganese concentrations at MW-3 since 2010.

Total Nickel was detected above the MCL value obtained from the Tennessee Division of Water Resources (TN DWR) Public Water Systems chapter rule 0400-45-01-.06 (0.10 mg/l) at MW-3 during the September 12, 2018 sampling event (total nickel at MW-3 = 0.126 mg/l). In addition, total nickel was detected at MW-3 (total nickel = 0.134 mg/l) during the subsequent re-sample event at MW-3. Total nickel has been detected at concentrations above the TN DWR Public Water Systems MCL (0.1 mg/l) in up-gradient well MW-1 during previous events on April 9, 2009 (total nickel at MW-1= 0.2 mg/l) and May 19, 2009 (total nickel at MW-1=0.17 mg/l). Therefore, the presence of total nickel in the local groundwater is considered to be naturally occurring, originating from deposits in the soil overburden. However, the observed total Nickel concentrations at MW-3 during this event and the subsequent re-sample event were higher in concentration compared to previous total nickel concentrations at MW-3 during the previous June 2018 monitoring event (total nickel at MW-3= 0.00376 mg/l). In addition, the total nickel concentrations observed during this event and the subsequent re-sample event are higher in concentration than all previous sampling events since 2008. The observed increase in nickel concentrations at MW-3 during this event is worth noting, and nickel concentrations will continue to be monitored closely during future monitoring events.

The **Sulfate** concentration reported at MW-3 during this sampling event was 484 mg/l, which was above the 2DWS for sulfate (250 mg/l). This was the first time the Sulfate concentration at MW-3 was above the 2DWS. The sulfate concentration at MW-3 had remained below the 2DWS during previous events in June 2018 (30.1 mg/l), December 2017 (46.2 mg/l), September 2017 (46.2 mg/l), and June 2017 (93.7 mg/) monitoring events. For further comparisons, the detected sulfate concentration at MW-3 in November 2016 was 34 mg/l, 95.7 mg/l in August 2016, and 105 mg/l in March 2017. Prior to August 2016, the reported sulfate concentrations at MW-3 ranged from <5 mg/l to 29.1 mg/l. Sulfate was also detected in MW-1 (12.3 mg/l), and MW-5 (5.73 mg/l), which were well below the 2DWS. Sulfate was not detected above the PQL in any of the other monitoring wells across the site.

Total Magnesium does not currently have an established MCL, 2DWS, EPA RSL, or an approved alternate groundwater protection standard (GWPS). The highest total magnesium concentration observed at MW-3 was 31.9 mg/l during the November 2015 monitoring event, and total magnesium concentrations remained below 31.9 mg/l at MW-3 in recent groundwater events since November 2015. However, the total magnesium concentration at MW-3 during this event (total magnesium at MW-3=64.0 mg/l) was higher compared to previous groundwater events at MW-3.

4.3 SURFACE WATER AND SEDIMENT ANALYTICAL RESULTS

Total cadmium was not detected above the laboratory PQL of 0.001 mg/l in the surface water samples collected from nearby Charlie Creek and Cane Creek during the September 20, 2018 monitoring event or during the October 29, 2018 re-sample event. Total cadmium was detected in the sediment sample collected from Charlie Creek MS at a relatively low concentration (total cadmium = 3.27 mg/kg) during the initial September 20, 2018 sampling event, which was the only reported cadmium detection above the laboratory PQL of 0.500 mg/kg. However, total cadmium was not detected above the laboratory PQL of 0.500 mg/kg in the sediment at Charlie Creek MS during the October 29, 2018 re-sample event. Therefore, the initial reported cadmium detection was not confirmed through re-sample and no firm conclusions can be made at this time concerning the total cadmium detection reported at Charlie Creek MS during the initial September 20, 2018 sampling event. However, stream (surface water and sediment) sampling will continue to be monitored closely for the presence of total cadmium during future quarterly events.

4.4 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. Pace complies with this directive and reports all qualifiers along with explanations of QC qualifier codes. Three QC qualifier codes (B, J3 and J4) were indicated during the laboratory analysis of samples collected in September 2018. Two QC qualifier codes (B and J4) were indicated during the laboratory analysis of groundwater samples. Two QC qualifier codes (B and J4) were indicated during the laboratory analysis of leachate samples. Two QC qualifier code (B and J3) were indicated during the laboratory analysis of stream and sediment samples.

Specific information concerning each laboratory QC qualifier code are described in the Laboratory Analytical Reports in Appendix C.

5.0 STATISTICAL ANALYSIS

5.1 APPLICABLE METHODS

The Rules of the Tennessee Department of Environment and Conservation, Division of Solid Waste Management Chapter 1200-1-7-.04 state, in part, that each landfill must conduct and report statistical analyses as part of the evaluation of groundwater monitoring data. Statistical analyses of the sampling data was performed on monitoring wells MW-1, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3.

The solid waste rules require groundwater sample results and associated statistical methods used to determine the statistical background of a groundwater detection/assessment monitoring program be "protective of human health and the environment". Furthermore, the rules require that the results be "representative" of the background groundwater quality of the geologic formation(s) being monitored. Various influences may affect the representativeness of sample results, which include possible errors in sampling. As previously discussed, reported total metals concentrations are likely affected by elevated turbidity values and would not be representative of the natural groundwater conditions. Before statistical evaluations were completed, the turbidity values which were collected during historical groundwater sampling events were evaluated for elevated turbidity values (>150 NTU). If the turbidity value at the time of sample collection at any given location was greater than 150 NTUs, the total metals concentrations for each sample location would not be representative of natural groundwater conditions. As a result, the corresponding data were removed from the background data set for statistical evaluations.

After the non-representative background sample data was removed, the distribution of the data was evaluated for normality. The test for normality was conducted using the Shapiro-Wilks method if N <50 or Shapiro-Francia method if N>50. The normality test was performed for both raw and log-transformed data, with replacement of non-detects to half of the corresponding laboratory PQL. Data determined to be normally distributed were evaluated using parametric prediction limit (PPL) analysis. The chloride data set for the monitoring wells were normally distributed when the data were log-transformed with replacement of non-detects to half of the corresponding detection limit. Therefore, inter-well parametric prediction limit analysis was performed for the chloride data set that passed normality testing as log-transformed data. All other data sets were not normally distributed, and were evaluated using non-parametric statistical methods. Intra-well PPL and non-parametric statistical methods were appropriately utilized to determine statistically significant trends in data in up-gradient monitoring well MW-1. Inter-well and intra-well (intra-well utilized for upgradient MW-1) PPL analysis and non-parametric statistical methods were appropriately utilized to determine statistically significant trends in data.

Inter-well analyses compared the concentrations observed at the down-gradient monitoring locations (MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3) to the concentrations observed at the up-gradient monitoring location (MW-1) during this monitoring event. Intra-well analyses was utilized only at MW-1 to compare the concentrations observed during the current groundwater-sampling event to the established background data set for MW-1 concentrations.

Arsenic, chloride, and cobalt data at up-gradient well MW-1 were normally distributed and were evaluated using PPL intra-well analysis. Chloride data from all up-gradient and down-gradient monitoring wells were normally distributed when the data were log-transformed and non-detects were replaced by half of the corresponding PQL. Therefore, the chloride data at MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3 were evaluated using PPL inter-well analysis. Barium, nickel, and mercury data at MW-1 were not normally distributed and were evaluated using intra-well non-parametric statistical methods. Aluminum, barium, total cadmium, chromium, cobalt, fluoride, nickel, selenium, zinc, and sulfate data at all up-gradient and down-gradient monitoring wells were not normally distributed and were evaluated using non-parametric statistical methods.

The percentage of inter-well non-detects for each parameter determined the primary statistical method utilized. If the percentage of non-detects in the samples was less than 50%, Shewart-CUSUM control charts were utilized. If more than 50% non-detects existed for the given parameter, non-parametric inter-well prediction limit analyses were conducted on the data. For this site, based on the high amount of left-censored data (>50% of non-detects), non-parametric inter-well prediction limit analyses were conducted for most of the data from up-gradient well MW-1 compared to down-gradient monitoring wells (MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3). Additional statistical procedures performed included Mann-Kendall trend analyses and the non-parametric Wilcoxon Rank Sum group comparisons (with non-detects set to the highest reporting limit for the given constituent analyzed). The Wilcoxon Rank Sum non-parametric inter-well analysis was conducted for any parameter which failed the above mentioned statistical analysis methods for final determination of a statistical increase.

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

5.2 STATISTICAL RESULTS

No statistically significant increases (SSIs) in reported constituent concentrations were identified in up-gradient well MW-1 using intra-well non-parametric prediction limit analysis.

SSIs over background identified for the current monitoring event include total barium at MW-3, total cadmium at MW-3, chloride at MW-3, MW-5, TMW-1, TMW-2, and TMW-3, fluoride at MW-3, sulfate at MW-3, and zinc at MW-3. Trend analyses revealed a statistically significant upward trend in total barium, total cadmium, chloride, fluoride, sulfate, and zinc concentrations reported at MW-3; and a statistically significant upward trend in chloride concentrations reported at MW-5 and TMW-1.

Trend analyses revealed a statistically significant downward trend in aluminum, cobalt, concentrations reported at MW-3, and no distinct statistically significant trend in chromium and nickel concentrations reported at MW-3. Also, trend analysis revealed a downward trend in total

barium concentrations at MW-4, and no distinct statistically significant trend in chloride detections at MW-4, TMW-2, and TMW-3.

Based on the review of the time-series graphs, it appears that the concentrations of total cadmium, calcium, magnesium, manganese, nickel, zinc, chloride, fluoride, and sulfate at MW-3 had increased in concentration during this third quarter 2018 assessment monitoring event compared to previous groundwater events at MW-3. In addition, the conductivity measured in millivolts (MV) observed at MW-3 during this event were higher than the previous monitoring events since the April 2016 monitoring event. The observed cadmium, calcium, fluoride, magnesium, manganese, nickel, and zinc concentrations reported at MW-3 during this event were the highest reported concentrations of these constituents since April 19, 2008, when monitoring began at MW-3.

The total barium concentration at MW-3 was 0.147 mg/l during this sampling event and was slightly higher than the previous June 2018 event (0.135 mg/l) and the previous March 2018 sample event (0.102 mg/l). However, the reported barium concentration at MW-3 remains less than the six consecutive sample results collected at MW-3 from May 28, 2015 to November 10, 2016. Total barium also remains below the MCL for the primary drinking water standard for barium (2 mg/l).

The statistical trend analysis for total cadmium at MW-3 does confirm an increasing trend having statistical significance when considering all current and past data for cadmium at MW-3. The total cadmium concentrations reported at MW-3 during this sampling event on September 12, 2018 (0.297 mg/l) and the subsequent re-sample event on September 27, 2018 (0.204 mg/l and 0.206 mg/l in duplicate sample) were higher in concentration compared to previous events.

The chloride concentrations observed at MW-3 (222 mg/l), MW-5 (57.1 mg/l), TMW-1 (12.8 mg/l), TMW-2 (15.1 mg/l), and TMW-3 (47.1 mg/l) produced an SSI over background during this event. The chloride detections at MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3 are consistent with previous data and are below the 2DWS for chloride concentrations (250 mg/l). When considering all chloride data to date from MW-4, TMW-2, and TMW-3, the data did not show an upward or downward trend in chloride concentrations using the Mann-Kendall trend analysis at the 95% confidence level. However, the chloride concentrations observed at MW-3, MW-5, and TMW-1 indicated an upward trend in chloride concentrations using the Mann-Kendall trend analyses at the 95% confidence level. Although the chloride concentration at MW-3 was less than the 2DWS during this event, the chloride concentration at MW-3 was higher in concentration than the previous nine sampling events since February 19, 2016, and should continue to be monitored closely.

The chromium concentrations observed at MW-3 (0.0102 mg/l), MW-5 (0.00283 mg/l), and TMW-2 (0.00303 mg/l) were less than the MCL (0.1 mg/l), and did not indicate a SSI in reported concentrations during this event.

Similar to the total cadmium and zinc trend analysis, the statistical trend analysis for total fluoride at MW-3 during this September 2018 event (Fluoride=0.543 mg/l) confirmed an increasing trend having statistical significance. In addition, this reported fluoride concentration during this event was higher than the previous ten sampling events since January 21, 2009.

An SSI in reported sulfate concentrations at MW-3 was identified during this sampling event. In addition, when considering all data accumulated from MW-3 since May 19, 2009, a statistically significant upward trend in sulfate concentrations at MW-3 was indicated using the Mann-Kendall trend analysis at the 95% confidence level. The sulfate concentration reported at MW-3 during this sampling event was 484 mg/l, which was above the 2DWS for sulfate concentrations (250 mg/l) and the highest reported sulfate concentration at MW-3 to date. This event was the first time the sulfate concentration exceeded the 2DWS at MW-3.

The statistical trend analysis for total zinc at MW-3 during this September 2018 event (total zinc at MW-3= 1.68 mg/l) confirmed an increasing trend having statistical significance, and was the highest reported zinc concentration reported at MW-3 to date (since April 19, 2008). The elevated zinc concentration at MW-3 was confirmed during the September 27, 2018 re-sample event where zinc was detected at a similar concentration in MW-3 (total zinc =1.58 mg/l) and the duplicate MW-3 sample (total zinc = 1.57 mg/l). Total zinc was first detected above the laboratory PQL (<0.025 mg/l) at MW-3 during the June 2017 groundwater event (total zinc=0.0769 mg/l) and was also detected during the September 2017 event (total zinc= 0.0439 mg/l), December 2017 event (total zinc = 0.159 mg/l), and March 2018 event (total zinc = 0.0499 mg/l). Before June 2017, zinc had remained below the current laboratory PQL of 0.025 mg/l since July of 2010. Although zinc levels at MW-3 are above the PQL, the levels are still below the 2DWS of 5 mg/l. However, the observed increase in zinc concentrations reported at MW-3 are worth noting and should continue to be monitored closely.

A summary of intra-well and inter-well statistical analysis is presented in Table 3 – Intra-Well and Inter-Well Statistical Summary in Appendix A.

6.0 CONCLUSIONS

The results of the third quarter assessment-monitoring event of 2018 are summarized as follows:

- SSIs over background identified for the current monitoring event included total cadmium at MW-3, chloride at MW-3, MW-5, TMW-1, TMW-2, and TMW-3, fluoride at MW-3, sulfate at MW-3, and zinc at MW-3. Also, trend analyses revealed a statistically significant upward trend in total barium, total cadmium, chloride, fluoride, sulfate, and zinc concentrations reported at MW-3; and a statistically significant upward trend in chloride concentrations reported at MW-5 and TMW-1.
- The total and dissolved cadmium concentrations at MW-3 during this event were above the MCL during this event. Also, statistical trend analysis for total cadmium at MW-3 does confirm an increasing trend having statistical significance when analyzing the data using the Mann-Kendall trend analysis method. Based on current data, the impacted area appears to be limited to the MW-3 location, since there have been no cadmium detections from groundwater samples obtained from temporary monitoring wells TMW-2 and TMW-3 that are immediately down-gradient of MW-3. The increase in the cadmium concentration observed at MW-3 during this monitoring event may be attributed to on-going closure activities in and around the storm water pond located immediately adjacent to MW-3. If this is the case, it is expected that, as closure activities are completed at the landfills, the elevated cadmium levels detected in MW-3 will decrease over time. However, the detections of total cadmium and dissolved cadmium at MW-3 remain at levels above the MCL, and the accompanying statistically significant trend analysis for cadmium in MW-3 remains an area of concern.
- The sulfate concentration reported at MW-3 (484 mg/l) was above the 250 mg/l 2DWS for sulfate concentration, and was the first time sulfate exceeded the 2DWS. In addition, a SSI was identified for the reported sulfate concentration at MW-3 and the sulfate concentration at MW-3 exhibited a statistically significant increasing trend. The highest sulfate concentration observed at MW-3 prior to this event was 95.7 mg/l, and was reported during the August 18, 2016 monitoring event. Sulfate has not consistently been detected above the PQL (5 mg/l) at any of the other permanent monitoring wells or temporary monitoring wells. However, the sulfate concentration above the 2DWS during this event is an area of concern, and the sulfate concentration at MW-3 will be closely monitored during the next monitoring event.
- Based on the review of the time-series graphs, it appears that the concentrations of total cadmium, calcium, magnesium, manganese, nickel, zinc, chloride, fluoride, and sulfate concentrations at MW-3 increased in concentration during this third quarter 2018 assessment monitoring event compared to previous groundwater events at MW-3. Specifically, the observed cadmium, calcium, fluoride, magnesium, manganese, nickel, and zinc concentrations reported at MW-3 during this event were the highest reported concentrations of these constituents since April 19, 2008, when monitoring began at MW-3. In addition, the conductivity measured in millivolts (mV) observed at MW-3

during this event was higher than the previous monitoring events since the April 2016 monitoring event.

- The increase in constituent concentrations observed at MW-3 during this monitoring event further support the possibility that the observed increases in concentrations may be caused by on-going closure activities in and around the storm water pond located immediately adjacent to MW-3. It is expected that as closure activities are completed at the landfills, the elevated constituent concentrations detected in MW-3 will decrease over time. However, the observed increase in constituent concentrations primarily at MW-3, remains an area of concern.
- The chloride concentrations at MW-4, MW-5, TMW-1, TMW-2, and TMW-3 are still well below the 250 mg/l 2DWS.
- Trend analyses revealed a statistically significant downward trend in aluminum, cobalt, concentrations reported at MW-3, and no distinct statistically significant trend in chromium and nickel concentrations reported at MW-3. When considering all chloride data to date from MW-4, TMW-2, and TMW-3, the data did not show an upward or downward trend in chloride concentrations using the Mann-Kendall trend analysis at the 95% confidence level. Also, trend analysis revealed a downward trend in total barium concentrations at MW-4, and no distinct statistically significant trend in chloride detections at MW-4, TMW-2, and TMW-3.
- No VOCs were detected above their respective laboratory PQL in any of the groundwater monitoring wells or stream samples during the monitoring event.
- Total cadmium was not detected above the laboratory PQL of 0.001 mg/l in the surface water samples collected from nearby Charlie Creek and Cane Creek during the September 20, 2018 monitoring event or during the October 29, 2018 re-sample event. Total cadmium was detected in the sediment sample collected from Charlie Creek MS at a relatively low concentration during the initial September 20, 2018 sampling event, which was the only reported cadmium detection above the laboratory PQL. However, total cadmium was not detected in the sediment at Charlie Creek MS during the October 29, 2018 re-sample event. Therefore, the initial reported cadmium detection was not confirmed through re-sample and no firm conclusions can be made at this time concerning the total cadmium detection reported at Charlie Creek MS during the initial September 20, 2018 sampling event. However, stream (surface water and sediment) sampling will continue to be monitored closely for the presence of total cadmium during future quarterly events.
- No constituents were detected above regulatory limits at any of the stream (surface water and sediment) samples. Sediment samples do not have an MCL and surface water is compared to general water quality criteria.

The fourth quarter 2018 assessment monitoring event is tentatively scheduled for December 2018 and will consist of collecting groundwater samples from up-gradient well MW-1 and down-gradient wells MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3. Also, surface water and sediment samples will be collected from selected locations along Charlie Creek and Cane Creek. Leachate samples will be collected from the APWC and IWC.

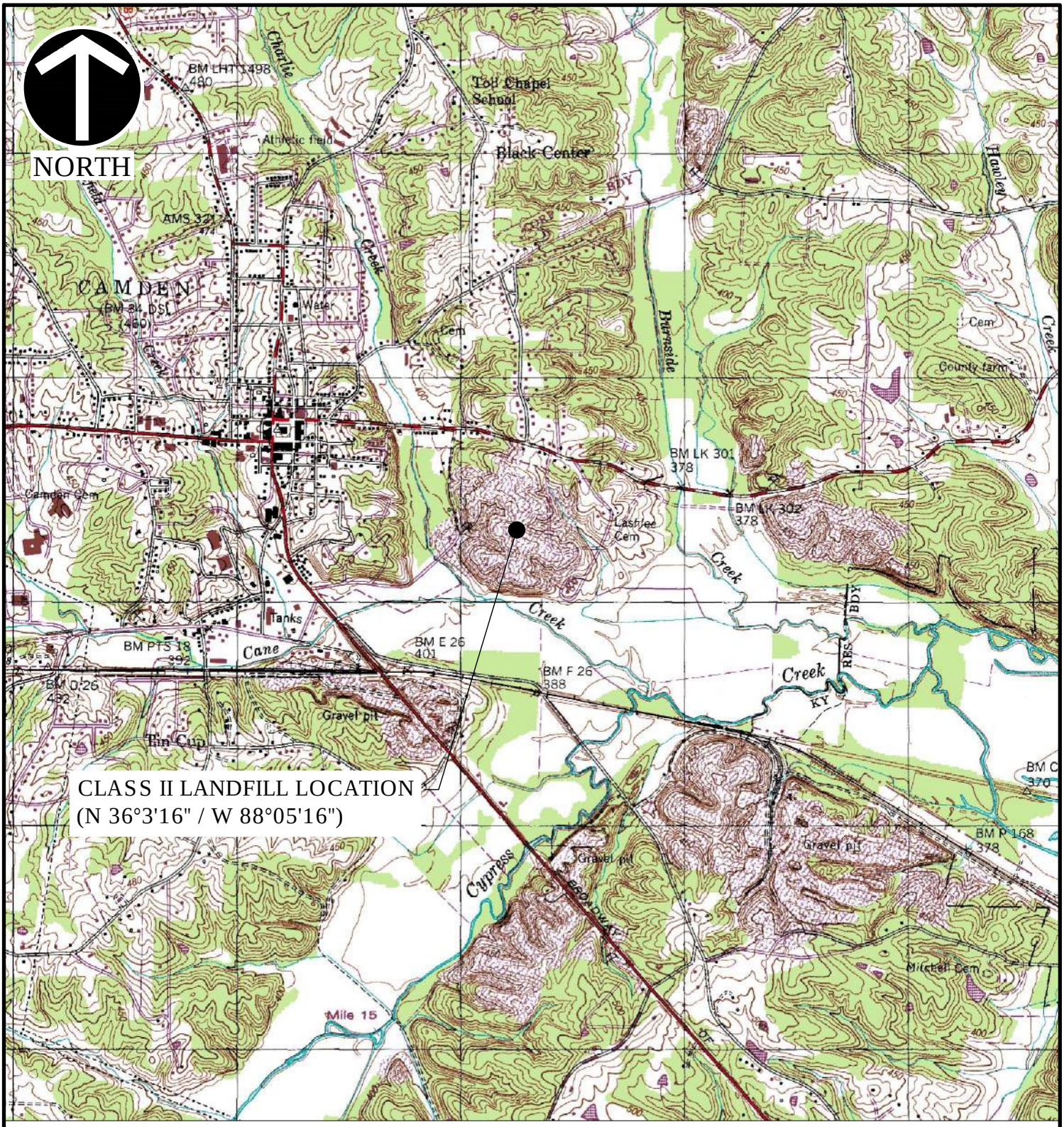
Since the former EWS Class II Landfill site remains in assessment monitoring, a private water use survey update is required annually. The previous annual water use survey for the former EWS Class II Landfill site was completed in December 2017. Therefore, an updated annual water use survey will be completed in December 2018.

7.0 RECOMMENDATIONS

The following recommendations are presented in an effort to insure the continuance of securing representative groundwater samples and to obtain analytical results with a high-degree of accuracy and precision (i.e., repeatability).

1. It is recommended that all permanent monitoring wells on the site continue to be monitored quarterly. In addition, quarterly groundwater samples will continue to be collected from temporary monitoring wells down-gradient from MW-3. Surface water samples and sediment samples will continue to be collected at selected locations along Charlie Creek and Cane Creek and analyzed for total and dissolved metals during future quarterly assessment monitoring activities.
2. It is recommended that the chosen analytical laboratory (Pace) continue to analyze for total and dissolved metal constituents, using methods that will produce the lowest reporting limit. In addition to providing results for dissolved metals in the case where certain groundwater samples have turbidities that are above 10 NTUs, having a growing database of dissolved metal constituents is essential, if there is a future need for groundwater geochemical modeling.
3. It is recommended that total metals sample data will continue to be removed from the background data set for statistical evaluations, if elevated turbidity values (>150 NTU) are observed during sample collection.

APPENDIX A
MAPS & TABLES



REFERENCE

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

SCALE IN FEET

0 2000' 4000'

* HAND SIGNATURE ON FILE

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FORMER EWS SITE
CLASS II CAMDEN LANDFILL
CAMDEN, TENNESSEE

SITE LOCATION MAP

DRAWN BY:	KLU	CHECKED BY:	PC	APPROVED BY:	KBW*	FIGURE NO.:	1
DATE:	NOVEMBER 2018	DWG SCALE:	1" = 2000'	PROJECT NO:	181-364		

P:\2018\181-364\-CADD\Dwg\181-364_ SITE LOCATION MAP.dwg[LAYOUT1] LS:(12/3/2018 - pcampbell) - LP: 12/3/2018 10:28 AM

NORTH

LEGEND

- MW1 394.73 — GROUND WATER MONITORING WELL GROUND WATER ELEVATION (FMSL)
- TMW-1 373.94 — TEMPORARY GROUND WATER MONITORING WELL GROUND WATER ELEVATION (FMSL)
- 390 — POTENTIOMETRIC SURFACE CONTOUR (FMSL)
- GROUND WATER FLOW DIRECTION
- MH1 — MANHOLE
- APPROXIMATE FILL LIMITS
- FM — LEACHATE FORCE MAIN

MW-1
393.06

SW OUTFALL 001
(LOCATION APPROXIMATE)

IWC LEACHATE
SAMPLING LOCATION

APPROXIMATE LOCATION
(NOT AS-BUILTED
DURING CONSTRUCTION)

EXISTING
PHASE 4A

INDUSTRIAL
WASTE
CELL (IWC)

EMERGENCY
SPILL WAY

RIP RAP

EXISTING
PHASE 3B

ALUMINUM PROCESSING
WASTE CELL (APWC)

EXISTING
PHASE 3A

EXISTING
PHASE 2A

POND

MW-5
374.78

MW-3
375.02

TMW-1
373.48

TMW-2
372.68

TMW-3
371.33

MW-2
373.73

MW-4
369.82

MH1

MH2

AIR RELEASE
VALVE

AIR RELEASE
VALVE

APWC LEACHATE
SAMPLING LOCATION

SW OUTFALL 001
(LOCATION APPROXIMATE)

BENCHMARK
N=632030.54
E=1352175.74
SPIKE IN POWER
POLE EL=389.0

NOTE:

Hydraulic gradient calculation between MW-1 and MW-4 locations.

$$i = \frac{393.06' \text{ (MW-1)} - 369.82' \text{ (MW-4)}}{1{,}910'} = 0.0122 \text{ ft/ft}$$

GROUNDWATER CONDITIONS

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

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

SCALE IN FEET

0 200 400

*HAND SIGNATURE ON FILE

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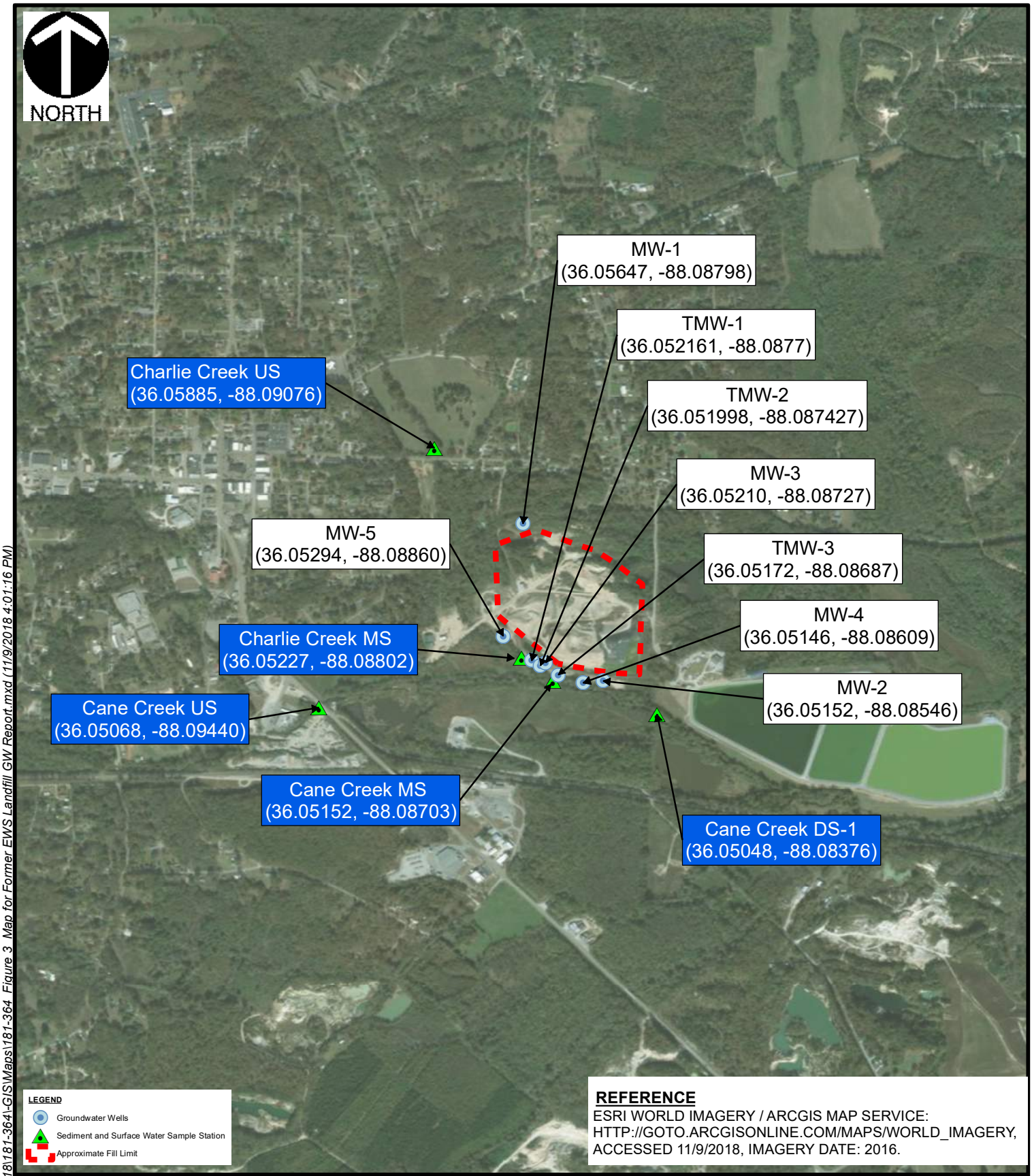
ENVIRONMENTAL WASTE SOLUTIONS
CAMDEN CLASS II LANDFILL
CAMDEN, TENNESSEE

SEPTEMBER 2018
POTENTIOMETRIC SURFACE MAP

DRAWN BY:	CDS	CHECKED BY:	PC	APPROVED BY:	KBW*	FIGURE NO.:
DATE:	OCTOBER 2018	DWG SCALE:	1" = 200'	PROJECT NO:	181-364	2



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FORMER EWS SITE
CLASS II CAMDEN LANDFILL
CAMDEN, BENTON COUNTY, TN

GROUNDWATER AND STREAM SAMPLE LOCATIONS

DRAWN BY:	CDS	CHECKED BY:	PJC	APPROVED BY:	KBW* * Hand signature on file	FIGURE NO:	3
DATE:	NOVEMBER 2018	SCALE:	1 " = 1,500 '	PROJECT NO:	181-364		

\\SVR-NASH \\svr-nash\projects\2018\181-364\-GIS\Maps\181-364_Figure 3_Map for Former EWS Landfill GW Report.mxd (11/9/2018 4:01:16 PM)

Table 1

Former Environmental Waste Solutions Camden Class II Landfill

Field Parameters and Potentiometric Data - September 2018

Monitoring Well/ Sample Location	Date	Sample Time	Top of Casing Elevation[1] (Feet MSL)	Bottom of Well Elevation (Feet)	Well Diameter (Feet)	Well Volume Gallons	Depth to Water (Feet)[2]	Potentiometric Surface (Feet MSL)	Temperature (˚C)	Conductivity (micromhos/cm)	pH (SU)	Dissolved Oxygen (mg/l)	Oxidation Reduction Potential (Millivolts)	Turbidity (NTU)
MW-1	9/12/2018	11:20	416.47	385.97	0.17	1.2	23.41	393.06	16.4	83.4	4.80	0.49	78.9	4.86
MW-2*	9/12/2018	13:57	380.35	367.70	0.17	1.0	6.62	373.73	23.2	603	5.71	4.44	116.3	2.98
MW-3	9/12/2018	15:40	392.90	365.10	0.17	1.7	17.88	375.02	21.1	1,475	5.39	0.62	127.1	1.12
MW-3 (re-sample)	9/27/2018	12:15	392.90	365.10	0.17	3.3	8.29	384.61	22.6	1,152	4.72	0.39	303.7	1.05
MW-4	9/12/2018	13:25	381.47	358.37	0.17	1.9	11.65	369.82	17.0	56.4	5.50	3.14	100.2	2.94
MW-5	9/12/2018	12:35	385.25	351.40	0.17	4.0	10.47	374.78	17.5	210.1	5.09	1.07	98.6	8.96
TMW-1	9/12/2018	12:30	381.19	348.99	0.085	1.0	7.71	373.48	18.7	76.9	5.76	4.77	242.7	39.8
TMW-2	9/12/2018	14:30	384.27	356.77	0.085	0.7	11.59	372.68	18.7	73.0	5.80	5.79	262.2	112
TMW-3	9/12/2018	15:50	381.37	353.37	0.085	0.8	10.04	371.33	17.8	180.3	5.41	1.72	259.9	8.81
Charlie Creek US	9/20/2018	11:00	NA	NA	NA	NA	NA	NA	23.1	120.4	6.04	6.17	149.7	2.67
Cane Creek US	9/20/2018	10:30	NA	NA	NA	NA	NA	NA	25.3	246.2	6.73	8.06	151.8	5.89
Charlie Creek MS	9/20/2018	10:00	NA	NA	NA	NA	NA	NA	23.2	149.4	6.13	5.74	155.0	5.88
Cane Creek MS	9/20/2018	9:30	NA	NA	NA	NA	NA	NA	23.2	175.9	6.10	3.94	161.5	3.72
Cane Creek DS-1	9/20/2018	9:02	NA	NA	NA	NA	NA	NA	23.1	206.5	5.94	3.50	162.5	4.82
Leachate (IWC-L)	9/12/2018	14:45	NA	NA	NA	NA	NA	NA	24.3	110,130	4.17	2.40	270.1	8.01
Leachate (APWC-L)	9/12/2018	14:20	NA	NA	NA	NA	NA	NA	55.9	409,253	9.19	0.26	141.8	9.18

[1] Top of Casing Elevations from survey by Civil & Environmental Consultants, Inc. on May 12, 2016.

[2] Depth to water measurements collected by Civil & Environmental Consultants, Inc. on September 12, 2018.

* - MW-2 has been removed from monitoring network. Only water level and field parameters collected at MW-2.

NS= Not Sampled

NA= Not Applicable.

Table 2a
Former EWS Camden Class II Landfill IDL 03-0212 (Terminated)
Groundwater and Leachate Analytical Data - September 2018

		MW-1		MW-3		MW-3 (re-sample)		Duplicate (MW-3 re-sample)		MW-4		Duplicate (MW-4)		MW-5		TMW-1		TMW-2		TMW-3		Field Blank		Leachate IWC-L		Leachate-APWC-L	
		9/12/2018		9/12/2018		9/27/2018		9/27/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018	
Parameter	**MCL/GWPS (mg/l)**	**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**	
Hardness	-	<30.0		**640**		NS		NS		<30.0		<30.0		**71.2**		<30.0		<30.0		**73.0**		<30.0		**28,400**		**685**	
Alkalinity	-	**65.4**		<20.0		NS		NS		**21.2**		<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		**6,530**	
Ammonia Nitrogen	-	<0.100		**4.05**		NS		NS		<0.100		<0.100		<0.100		<0.100		<0.100		<0.100		<0.100		**873**		**6,120**	
COD	-	<10.0		22.0		NS		NS		<10.0		<10.0		<10.0		<10.0		<10.0		<10.0		<10.0		**6,990**		**18,900**	
Boron	-	<0.200		<0.200		NS		NS		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<1.00		**8.94**	
Boron, Dissolved	-	<0.200		<0.200		NS		NS		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<1.00		**9.40**	
Bromide	-	<1.00		<1.00		NS		NS		<1.00		<1.00		<1.00		<1.00		<1.00		<1.00		<1.00		**34.3**		**61.5**	
Chloride	250 [2]	**4.94**		**222**		NS		NS		**7.44**		**7.04**		**57.1**		**12.8**		**15.1**		**47.1**		<1.00		**68,300**		**109,000**	
Fluoride	2 [2]	<0.100		**0.543**		NS		NS		<0.100		<0.100		<0.100		<0.100		<0.100		<0.100		<0.100		**14.2**		**12.0**	
Nitrate	10	<0.100		**5.70**		NS		NS		**0.677**		**0.654**		**1.01**		**1.76**		**0.865**		**4.13**		<0.100		<0.100		**30.7**	
Sulfate	250 [2]	**12.3**		**484**		NS		NS		<5.00		<5.00		**5.73**		<5.00		<5.00		<5.00		<5.00		**2,650**		**610**	
Aluminum	0.2 [2]	<0.100		**0.418**		NS		NS		<0.100		<0.100		**0.219**	B	**0.158**	B	**1.29**		**0.164**		<0.100		**160**		<5.00	
Aluminum, Dissolved	0.2 [2]	<0.100		**0.422**		NS		NS		<0.100		<0.100		<0.100		<0.100		**0.19**		<0.100		NA		**165**		<5.00	
Antimony	0.006	<0.00200	J4	<0.00200	J4	NS		NS		<0.00200	J4	<0.00200		<0.00200	J4	<0.00200	J4	<0.00200		<0.00200		<0.00200		<0.200		<0.200	
Arsenic	0.01	**0.0184**		<0.00200		NS		NS		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		**0.187**		<0.100	
Arsenic, Dissolved	0.01	**0.0220**		<0.00200		NS		NS		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NA		**0.295**		<0.100	
Barium	-	**0.0186**		**0.147**		**0.0780**		**0.0800**		**0.0073**		**0.00765**		**0.0308**		**0.00974**		**0.0357**		**0.0339**		<0.00500		**1.30**		**1.28**	
Barium, Dissolved	-	**0.0172**		**0.156**		**0.0769**		**0.0781**		**0.00755**		**0.008**		**0.0285**		**0.00763**		**0.0270**		**0.0338**		NA		**1.33**		**1.34**	
Beryllium	0.004	<0.00200		<0.00200		NS				<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.100		<0.100	
Total Cadmium	0.005	<0.00100		**0.297**		**0.204**		**0.206**		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		**199**		**0.0933**	
Cadmium, Dissolved	0.005	<0.00100		**0.320**		**0.221**		**0.222**		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		NA		**227**		**0.144**	
Calcium	-	**3.15**		**140**		NS		NS		**4.33**		**4.40**		**12.5**		**8.41**		**7.66**		**17.1**		<1.00		**6,750**		**262**	
Calcium, Dissolved	-	**3.46**		**145**		NS		NS		**4.78**		**4.50**		**12.7**		**8.48**		**7.44**		**17.7**		NA		**6,910**		**282**	
Chromium	0.1	<0.00200		**0.0102**		NS		NS		<0.00200		<0.00200		**0.00283**		<0.00200		**0.00303**		<0.00200		<0.00200		<0.100		<0.100	
Chromium, Dissolved	0.1	<0.00200		**0.014**		NS		NS		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NA		<0.100		<0.100	
Cobalt	0.006 [3]	**0.0198**		**0.00825**		NS		NS		<0.00200		<0.00200		**0.00204**		<0.00200		<0.00200		<0.00200		<0.00200		**1.2**		<0.100	
Cobalt, Dissolved	0.006 [3]	**0.0217**		**0.00865**		NS		NS		<0.00200		<0.00200		**0.00211**		<0.00200		<0.00200		<0.00200		NA		**1.27**		<0.100	
Copper	1.3	<0.00500		<0.00500		NS		NS		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		**19.2**		**5.43**	
Copper, Dissolved	1.3	<0.00500		**0.0061**		NS		NS		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		NA		**20.5**		**6.08**	
Iron	0.3 [2]	**10.3**		<0.100		NS		NS		<0.100		**0.115**		**0.224**	**B**	**0.294**		**2.17**		**0.177**		<0.100		**292**		<5.00	
Iron, Dissolved	0.3 [2]	**11.1**		<0.100		NS		NS		<0.100		<0.100		<0.100		<0.100		**0.192**		<0.100		NA		**269**		<5.00	
Lead	0.015	<0.00200		<0.00200		NS		NS		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		**0.307**		<0.100	
Lead, Dissolved	0.015	0.00203	B	0.00316	B	NS		NS		<0.00200		0.00203	B	<0.00200		<0.00200		**0.00259**	B	<0.00200		NA		**0.323**	B	<0.100	
Magnesium	-	**2.45**		**64.0**		NS		NS		**2.52**		**2.61**		**8.23**		**2.28**		**2.71**		**5.38**		<1.00		**1,610**		<50.0	
Magnesium, Dissolved	-	**2.58**		**65.2**		NS		NS		**2.65**		**2.65**		**8.6**		**2.46**		**2.64**		**5.6**		NA		**1,720**		<50.0	
Manganese	0.05 [2]	**0.537**		**2.63**		NS		NS		**0.0185**		**0.0183**		**0.0861**		**0.0112**		**0.0336**		**0.0112**		<0.00500		**330**		<0.250	
Manganese, Dissolved	0.05 [2]	**0.576**		**2.69**		NS		NS		**0.0169**		**0.0174**		**0.0847**		0.00811		**0.00596**		**0.00934**		NA		**339**		<0.250	
Nickel	0.10 [1]	**0.00839**		**0.126**		**0.134**		**0.134**		<0.00200		<0.00200		**0.00671**		<0.00200		<0.00200		<0.00200		<0.00200		**1.11**		**0.123**	

Table 2a
Former EWS Camden Class II Landfill IDL 03-0212 (Terminated)
Groundwater and Leachate Analytical Data - September 2018

		MW-1		MW-3		MW-3 (re-sample)		Duplicate (MW-3 re-sample)		MW-4		Duplicate (MW-4)		MW-5		TMW-1		TMW-2		TMW-3		Field Blank		Leachate IWC-L		Leachate-APWC-L	
		9/12/2018		9/12/2018		9/27/2018		9/27/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018		9/12/2018	
Parameter	**MCL/GWPS (mg/l)**	**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**	
Nickel, Dissolved	0.10 [1]	**0.00936**		**0.134**		**0.138**		**0.139**		<0.00200		<0.00200		**0.00724**		<0.00200		<0.00200		<0.00200		NA		**1.14**		**0.124**	
Potassium	-	**1.33**	B	**33.2**		NS		NS		<1.00		<1.00		**1.64**	B	**1.22**	B	**2.55**		**1.62**		<1.00		**7,680**		**35,600**	
Potassium, Dissolved	-	**3.11**		**35.7**		NS		NS		<1.00		<1.00		**1.33**		<1.00		**1.02**		**1.70**		NA		**7,770**		**38,300**	
Selenium	0.05	<0.00200		**0.00249**		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		**0.171**		<0.100	
Selenium, Dissolved	0.05	<0.00200		**0.00302**		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NA		**0.504**		<0.100	
Silver	0.10 [2]	<0.00200		<0.00200		NS		NS		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.100		<0.100	
Sodium	-	**5.23**		**57.3**		NS		NS		**3.60**		**3.70**		**16.0**		**3.33**		**3.69**		**9.67**		<1.00		**13,500**		**59,100**	
Sodium, Dissolved	-	**5.63**		**60.4**		NS		NS		**3.93**		**3.92**		**16.7**		**3.27**		**3.79**		**10.0**		NA		**14,300**		**65,800**	
Thallium	0.002	<0.00200		<0.00200		NS		NS		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.100		<0.100	
Vanadium	-	<0.00500		<0.00500		NS		NS		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.250		<0.250	
Zinc	5 [2]	<0.0250		**1.68**		**1.58**		**1.57**		<0.0250		<0.0250		<0.0250		<0.0250		<0.0250		<0.0250		<0.0250		**1,950**		**8.56**	
Zinc, Dissolved	5 [2]	<0.0250		**1.74**		**1.65**		**1.65**		<0.0250		<0.0250		**0.0271**		<0.0250		<0.0250		<0.0250		NA		**2,380**		**8.69**	
Mercury	0.002	**0.000244**	B	<0.000200		NS		NS		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		**0.000608**	B	<0.00200	
Mercury, Dissolved	0.002	<0.000200		<0.000200		NS		NS		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		NA		**0.000611**	B	<0.00200	
Acetone	-	<0.0500	J4	<0.0500	J4	NS		NS		<0.0500	J4	<0.0500	J4	<0.0500	J4	<0.0500	J4	<0.0500	J4	<0.0500	J4	<0.0500	J4	<1.00		**0.29**	
Carbon Disulfide	-	<0.00100		<0.00100		NS		NS		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		**0.00117**		<0.00500	
Chloromethane	-	<0.00250		<0.00250		NS		NS		<0.00250		<0.00250		<0.00250		<0.00250		<0.00250		<0.00250		<0.00250		**0.00429**		<0.0125	
2-Butanone (MEK)	-	<0.0100		<0.0100		NS		NS		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		**0.174**		<0.0500	
4-Methyl-2-Pentanone (MIBK)	-	<0.0100		<0.0100		NS		NS		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		**0.0251**		<0.0500	
Ethylene Dibromide (EDB)	0.00005	<0.0000100		<0.0000100		NS		NS		<0.0000100		<0.0000100		<0.0000100		<0.0000100		<0.0000100		<0.0000100		<0.0000100		**0.000103**		<0.0000100	

Notes:
MCL: Maximum Contaminant Level Enforceable National Primary Drinking Water Standards
GWPS: Groundwater Protection Standard
[1] - MCL value obtained from TN Division of Water Supply rule 1200-5-.06(1)(b)11
[2] - MCL value obtained from TN Division of Water Supply rule 1200-5-1-.12(1)(n). (EPA Secondary Drinking Water Standard)
[3] - GWPS value is referenced from EPA Regional Screening Level for Cobalt
NS- Not Sampled for analysis.
NA-Not Analyzed by the Laboratory.
Bold text indicates laboratory analytical detections above the practical quantitation level
Dark gray shaded text indicates detection above respective MCL/GWPS
Light gray shaded text indicates detection above respective Non-Enforceable National Secondary Drinking Water Standard.
B-The same analyte is found in the associated blank.
T8-Sample(s) received past/too close to holding time expiration.
P1-Reported value not applicable for sample concentrations less than 5 times the reporting limit.
Q-Samples was prepared and/or analyzed past recommended holding time. Concentrations should be considered minimum values.

Table 2b
Former EWS Camden Class II Landfill IDL 03-0212 (Terminated)
Stream and Sediment Analytical Data - September 2018

	Stream Samples (Water)										Sediment Samples (Solids)									
	Charlie Creek US		Charlie Creek MS		Cane Creek US		Cane Creek MS		Cane Creek DS-1		Charlie Creek US		Charlie Creek MS		Cane Creek US		Cane Creek MS		Cane Creek DS-1	
	9/26/2018		9/26/2018		9/26/2018		9/26/2018		9/26/2018		9/26/2018		9/26/2018		9/26/2018		9/26/2018		9/26/2018	
Parameter	**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/kg)**		**Value (mg/kg)**		**Value (mg/kg)**		**Value (mg/kg)**		**Value (mg/kg)**	
Total Hardness	**39.9**	B	**54.1**	B	**102**		**79.1**		**83.9**		NA		NA		NA		NA		NA	
Ammonia (as N)	<0.100		<0.100		<0.100		<0.100		**0.14**		NA		NA		NA		NA		NA	
Boron	<0.2		<0.2		<0.2		<0.2		<0.2		<10		<10		<10		<10		<10	
Bromide	<1		<1		<1		<1		<1		<10.0		<10.0		<10.0		<10.0		<10.0	
Chloride	**9.31**		**11.1**		**14.6**		**11.8**		**17.0**		<10.0		<10.0		<10.0		**26.4**	B	<10.0	
Fluoride	**0.101**		**0.135**		**0.212**		**0.179**		**0.187**		**1.13**		**2.42**		**1.21**		**1.43**		**1.25**	
Aluminum	<0.100		<0.100		<0.100		<0.100		<0.100		**1,210**		**3,230**		**993**		**1,880**		**481**	
Aluminum (Dissolved-LF)	<0.100		<0.100		<0.100		<0.100		<0.100		NA		NA		NA		NA		NA	
Antimony	<0.002		<0.002		<0.002		<0.002		<0.002		<1.00		<1.00		<1.00		<1.00		<1.00	
Arsenic	<0.00200		<0.00200		**0.00229**		<0.00200		<0.00200		**1.25**		**2.03**		<1.00		**2.20**		<1.00	
Arsenic (Dissolved-LF)	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NA		NA		NA		NA		NA	
Barium	**0.0276**		**0.0348**		**0.0409**		**0.0334**		**0.0423**		**16.2**		**29.5**		**12.9**		**16.8**		**9.8**	
Barium (Dissolved-LF)	**0.0275**	B	**0.0327**	B	**0.0348**	B	**0.033**	B	**0.0397**		NA		NA		NA		NA		NA	
Beryllium	<0.002		<0.002		<0.002		<0.002		<0.002		<0.200		**0.338**		<0.200		<0.200		<0.200	
Total Cadmium	<0.001		<0.001		<0.001		<0.001		<0.001		<0.500		**3.27**		<0.500		<0.500		<0.500	
Cadmium (Dissolved-LF)	<0.001		<0.001		<0.001		<0.001		<0.001		NA		NA		NA		NA		NA	
Calcium	**13.8**		**17.3**		**29.2**		**23.2**		**23**		**625**		**641**		**156**		**1740**		<100	
Calcium (Dissolved-LF)	**13.5**		**17.1**		**28.3**		**23.4**		**23.1**		NA		NA		NA		NA		NA	
Chromium	<0.002		<0.002		<0.002		<0.002		<0.002		**4.65**		**7.27**		**2.97**		**7.84**		**2.13**	
Cobalt	<0.002		<0.002		<0.002		<0.002		<0.002		**1.69**		**2.14**		**1.12**		**1.87**		<1.00	
Cobalt (Dissolved-LF)	<0.002		<0.002		<0.002		<0.002		<0.002		NA		NA		NA		NA		NA	
Copper	<0.05		<0.005		<0.005		<0.005		<0.005		**1.19**		**7.05**		<1.00		**6.69**		<1.00	
Copper, (Dissolved-LF)	<0.005		<0.005		<0.005		<0.005		<0.005		NA		NA		NA		NA		NA	
Iron	**0.386**		**0.538**		**1.09**		**0.606**		**0.83**		**4,140**		**5,900**		**2,660**		**4,930**		**1,860**	
Iron (Dissolved-LF)	**0.183**		**0.18**		**0.261**		**0.308**		**0.318**		NA		NA		NA		NA		NA	
Lead	<0.002		<0.002		<0.002		<0.002		<0.002		**4.37**		**7.76**		**3.74**		**9.12**		**1.86**	
Magnesium	**2.28**		**2.99**		**5.61**		**4.54**		**4.77**		**137**		**444**		<100		**373**		<100	
Magnesium (Dissolved-LF)	**2.27**		**2.96**		**5.58**		**4.57**		**4.73**		NA		NA		NA		NA		NA	
Manganese	**0.111**		**0.292**		**0.646**		**0.318**		**0.345**		**187**		**265**		**299**		**246**		**27.2**	
Manganese (Dissolved-LF)	**0.094**		**0.261**		**0.320**		**0.241**		**0.203**		NA		NA		NA		NA		NA	
Nickel	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<2.00		**3.02**		<2.00		**2.41**		<2.00	
Nickel, (Dissolved-LF)	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NA		NA		NA		NA		NA	
Potassium	**1.60**		**1.94**		**3.07**		**2.67**		**3.38**		**185**	B	**587**	B	**135**	B	**425**	B	**147**	
Potassium (Dissolved-LF)	**1.53**		**1.87**		**3.01**		**2.69**		**3.26**		NA		NA		NA		NA		NA	
Selenium	<0.002		<0.002		<0.002		<0.002		<0.002		<2.00		<2.00		<2.00		<2.00		<2.00	
Silver	<0.002		<0.002		<0.002		<0.002		<0.002		<0.500		<0.500		<0.500		<0.500		<0.500	
Sodium	**6.45**		**6.70**		**10.1**		**7.91**		**10.2**		<100		<100		<100		<100		<100	
Sodium (Dissolved-LF)	**6.64**		**6.91**		**10.2**		**8.05**		**10.2**		NA		NA		NA		NA		NA	
Thallium	<0.002		<0.002		<0.002		<0.002		<0.002		<1.00		<1.00		<1.00		<1.00		<1.00	
Vanadium	<0.005		<0.005		<0.005		<0.005		<0.005		**6.35**		**12.4**		**3.94**	B	**8.41**		**2.90**	B
Zinc	<0.025		<0.025		<0.025		<0.025		<0.025		**9.29**		**48.8**		**9.40**		**52.5**		**7.28**	
Mercury	<0.0002		<0.0002		<0.0002		<0.0002		<0.0002		<0.0200		<0.0200		<0.0200		<0.0200		<0.0200	

Notes:

Bold text indicates laboratory analytical detections above the laboratory practical quantitation level (PQL)

NA: Not Analyzed

(Dissolved-LF): Dissolved metals samples were filtered in the laboratory. Samples were placed into unpreserved sample containers in the field.

B-The same analyte is found in the associated blank

Table 2c
Former EWS Camden Class II Landfill IDL 03-0212 (Terminated)
Stream and Sediment Analytical Data - October 2018

	Stream Samples (Water)										Sediment Samples (Solids)					
	Charlie Creek US		Charlie Creek MS		Cane Creek US		Cane Creek MS		Cane Creek DS-1		Charlie Creek US		Charlie Creek MS		Cane Creek US	Cane Creek MS	Cane Creek DS-1	
	10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018		10/29/2018	10/29/2018	10/29/2018	
Parameter	Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/kg)		Value (mg/kg)		Value (mg/kg)	Value (mg/kg)	Value (mg/kg)	
Total Hardness	NS		NS		NS		NS		NS		NA		NA		NA	NA	NA	
Ammonia (as N)	NS		NS		NS		NS		NS		NA		NA		NA	NA	NA	
Boron	<0.200		<0.200		<0.200		<0.200		<0.200		<10		<10		<10	<10	<10	
Bromide	NS		NS		NS		NS		NS		NS		NS		NS	NS	NS	
Chloride	NS		NS		NS		NS		NS		NS		NS		NS	NS	NS	
Fluoride	NS		NS		NS		NS		NS		NS		NS		NS	NS	NS	
Aluminum	<0.100		<0.100		<0.100		0.121		0.242		**519**		**849**		**821**	**1,500**	**676**	
Aluminum (Dissolved-LF)	<0.100		<0.100		<0.100		<0.100		<0.100		NA		NA		NA	NA	NA	
Antimony	<0.00200	J4	<0.00200	J4	<0.00200	J4	<0.00200	J4	<0.00200	J4	<1.00		<1.00		<1.00	<1.00	<1.00	
Arsenic	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<1.00		<1.00		<1.00	**1.72**	<1.00	
Arsenic (Dissolved-LF)	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NA		NA		NA	NA	NA	
Barium	**0.0355**		**0.0397**		**0.0411**		**0.0418**		**0.0437**		**5.78**		**6.06**		**9.53**	**12.4**	**5.76**	
Barium (Dissolved-LF)	**0.0365**		**0.0394**		**0.0408**		**0.0386**		**0.0404**		NA		NA		NA	NA	NA	
Beryllium	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.200		<0.200		<0.200	<0.200	<0.200	
Total Cadmium	<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.500		<0.500		<0.500	<0.500	<0.500	
Cadmium (Dissolved-LF)	<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		NA		NA		NA	NA	NA	
Calcium	**14.4**		**16.8**		**23.5**		**19.9**		**20.6**		<100		**119**		**418**	**203**	<100	
Calcium (Dissolved-LF)	**14.3**		**16.8**		**23.7**		**20.1**		**20.7**		NA		NA		NA	NA	NA	
Chromium	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		**2.51**		**3.11**		**3.77**	**4.94**	**2.75**	
Cobalt	<0.002		<0.002		<0.002		<0.002		<0.002		<1.00		<1.00		<1.00	**1.61**	<1.00	
Cobalt (Dissolved-LF)	<0.002		<0.002		<0.002		<0.002		<0.002		NA		NA		NA	NA	NA	
Copper	<0.00500		<0.00500		**0.0141**		<0.00500		<0.00500		<1.00		<1.00		<1.00	**1.36**	<1.00	
Copper, (Dissolved-LF)	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		NA		NA		NA	NA	NA	
Iron	**0.321**		**0.416**		**0.738**		**0.497**		**0.903**		**1,910**		**2,270**		**3,020**	**4,180**	**2,180**	
Iron (Dissolved-LF)	**<0.100**		**<0.100**		**0.104**		**<0.100**		**<0.100**		NA		NA		NA	NA	NA	
Lead	<0.002		<0.002		<0.002		<0.002		<0.002		**1.08**		**1.7**		**3.9**	**3.48**	**1.55**	
Magnesium	**2.6**		**3.09**		**5.35**		**4.53**		**4.78**		<100		<100		**142**	**129**	<100	
Magnesium (Dissolved-LF)	**2.69**		**3.17**		**5.40**		**4.59**		**4.92**		NA		NA		NA	NA	NA	
Manganese	**0.145**		**0.337**		**0.381**		**0.34**		**0.38**		**51.6**		**47.4**		**77.3**	**168**	**39.3**	
Manganese (Dissolved-LF)	**0.119**		**0.32**		**0.233**		**0.239**		**0.25**		NA		NA		NA	NA	NA	
Nickel	0.00211		<0.00200		0.00237		0.0022		0.00219		<2.00		<2.00		<2.00	<2.00	<2.00	
Nickel, (Dissolved-LF)	0.00227		<0.00200		0.00232		0.00212		0.00202		NA		NA		NA	NA	NA	
Potassium	**1.93**	B	**2.53**	**B**	**3.72**		**2.49**	B	**2.79**	B	<100		**126**		**124**	**210**	<100	
Potassium (Dissolved-LF)	**1.90**		**2.01**		**4.26**		**3.14**		**2.74**		NA		NA		NA	NA	NA	
Selenium	<0.002		<0.002		<0.002		<0.002		<0.002		<2.00		<2.00		<2.00	<2.00	<2.00	
Silver	<0.002		<0.002		<0.002		<0.002		<0.002		<0.500		<0.500		<0.500	<0.500	<0.500	
Sodium	**6.53**		**6.98**		**9.35**		**8.56**		**9.57**		<100		<100		<100	<100	<100	
Sodium (Dissolved-LF)	**6.88**		**6.92**		**9.05**		**8.41**		**9.10**		NA		NA		NA	NA	NA	
Thallium	<0.002		<0.002		<0.002		<0.002		<0.002		<1.00		<1.00		<1.00	<1.00	<1.00	
Vanadium	<0.005		<0.005		<0.005		<0.005		<0.005		**3.65**		**3.92**		**4.45**	**7.23**	**3.47**	B
Zinc	<0.025		<0.025		<0.025		<0.025		<0.025		<5.00		**5.69**	B	**10.7**	**14.1**	**7.34**	
Mercury	<0.0002		<0.0002		<0.0002		<0.0002		<0.0002		<0.0200		<0.0200		<0.0200	<0.0200	<0.0200	

Notes:
Bold text indicates laboratory analytical detections above the laboratory practical quantitation level (PQL)
NA: Not Analyzed
NS: Not Sampled
(Dissolved-LF): Dissolved metals samples were filtered in the laboratory. Samples were placed into unpreserved sample containers in the field.
B-The same analyte is found in the associated blank
J4-The associated batch QC was outside the established quality control range for accuracy.

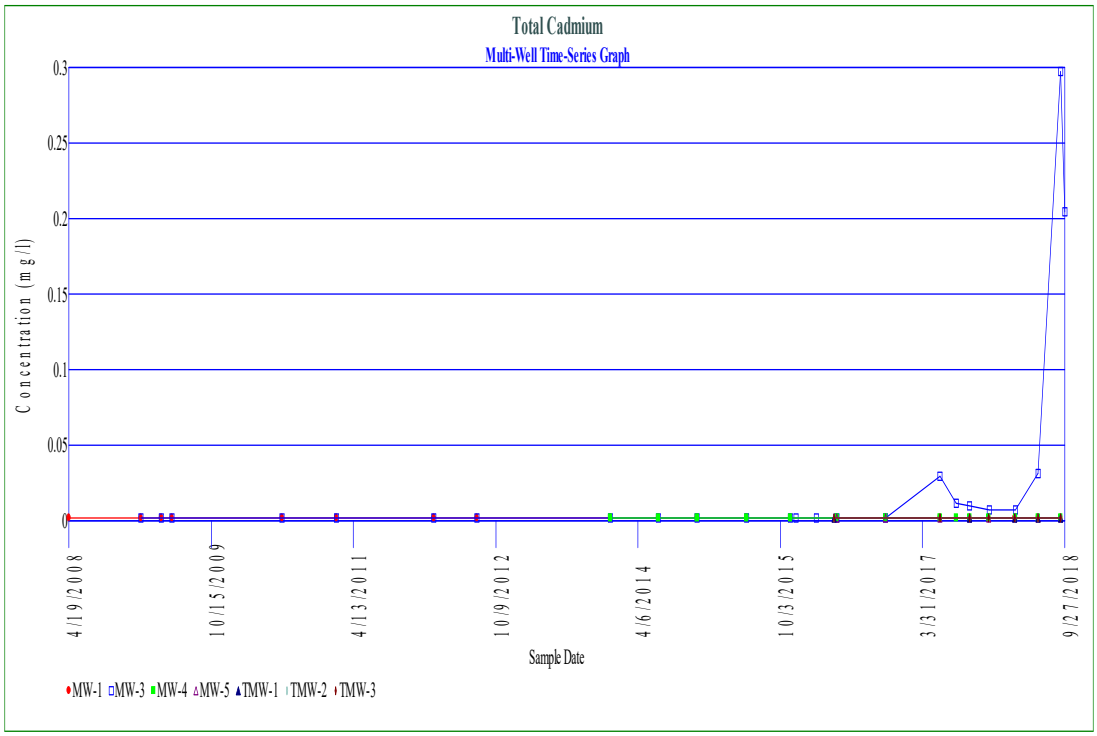
Table 3
Intra-Well and Inter-Well Statistical Summary
Environmental Waste Solutions Camden Class II Landfill IDL 03-0212 (Terminated)
Inorganic Analytical Data - September 2018

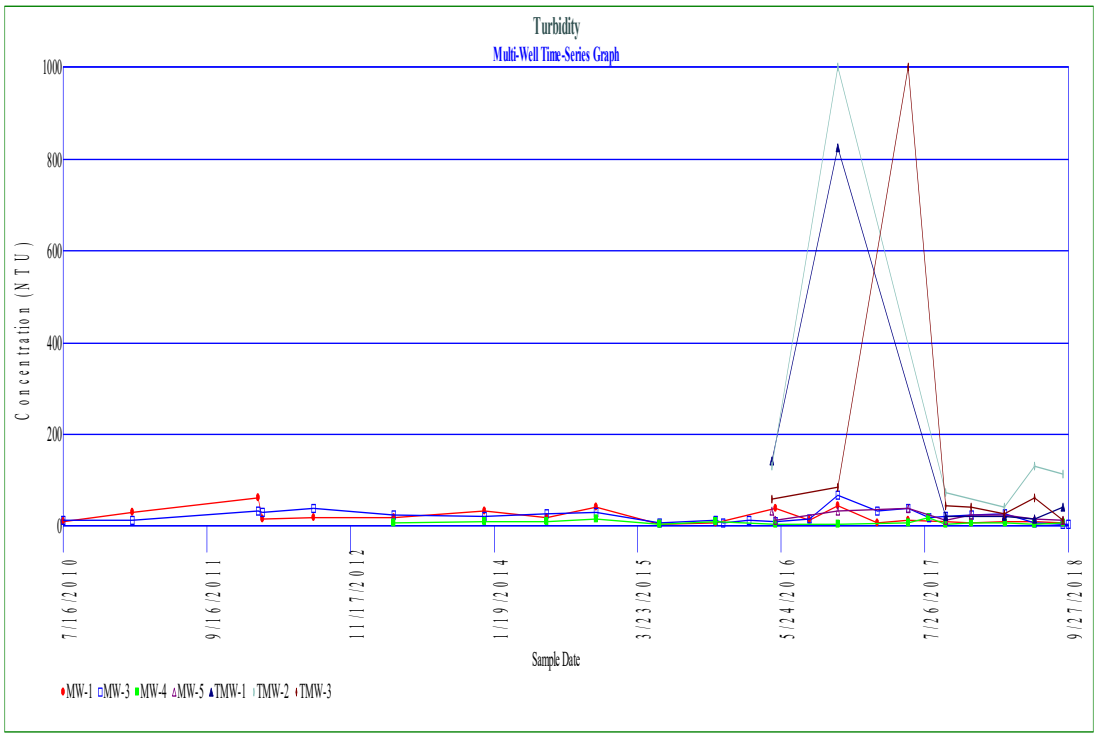
Intra-Well Statistical Summary (Upgradient Background Well MW-1)								
Constituent	Well	% Non Detects	Normality	Intra-well NPPL	Intra-well PPL	Shewhart-Cusum	Wilcoxon Rank Sum	SSI
Arsenic	MW-1	0.00	parametric	--	Pass	--	--	No
Barium	MW-1	0.00	non-parametric	--	--	Pass	--	No
Chloride	MW-1	0.00	log-normal	--	Pass*	--	--	No
Cobalt	MW-1	0.00	parametric	--	Pass	--	--	No
Nickel	MW-1	50.00	non-parametric	Pass	--	Pass	--	No
Mercury	MW-1	40.91	non-parametric	Pass	--	Pass	--	No

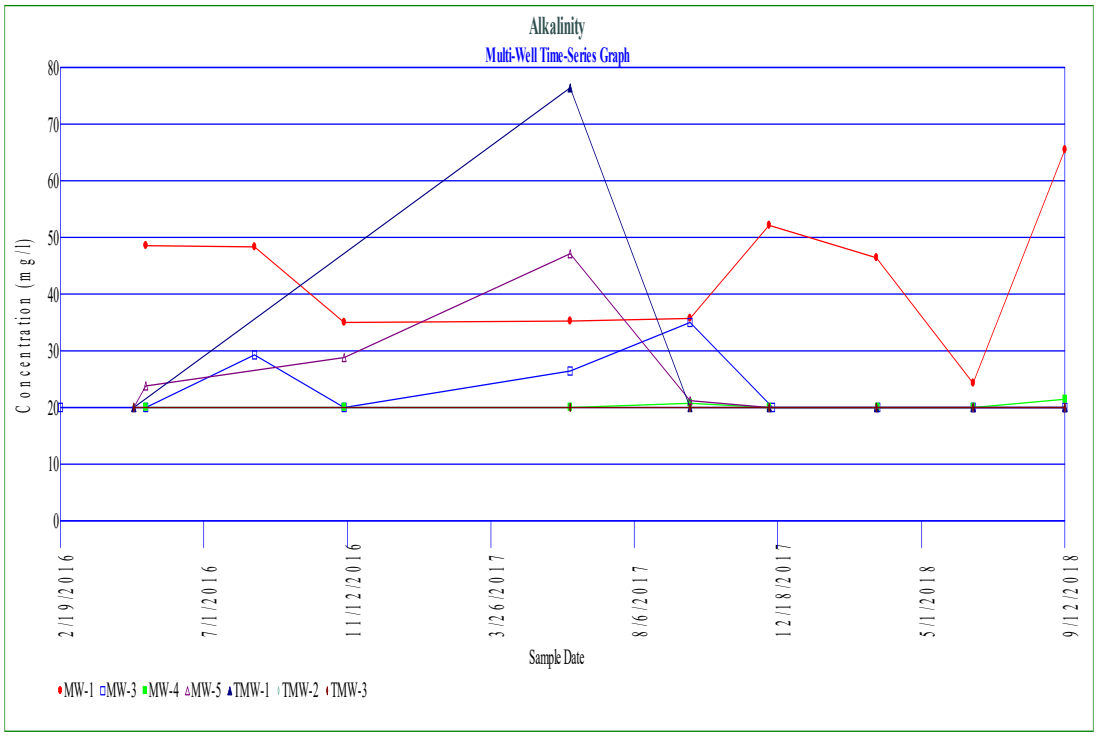
Inter-Well Statistical Summary (Downgradient Compliance Wells)									
Constituent	Well	Total % Non Detects	Normality	Inter-well NPPL	Inter-well PPL	Shewhart-Cusum	Wilcoxon Rank Sum	SSI	Mann-Kendall Trend Analysis
Aluminum	MW-3	37.65	non-parametric	--	--	Pass	--	No	**Downward Trend**
	MW-5		non-parametric	--	--	Pass	--	No	No Trend
	TMW-1		non-parametric	--	--	Pass	--	No	No Trend
	TMW-2		non-parametric	--	--	Pass	--	Yes	No Trend
	TMW-3		non-parametric	--	--	Pass	--	No	No Trend
Barium	MW-3	0	non-parametric	--	--	Pass	**Fail**	**Yes**	**Upward Trend**
	MW-4		non-parametric	--	--	Pass	--	No	**Downward Trend**
	MW-5		non-parametric	--	--	Pass	--	No	No Trend
	TMW-1		non-parametric	--	--	Pass	--	No	No Trend
	TMW-2		non-parametric	--	--	Pass	--	No	No Trend
	TMW-3		non-parametric	--	--	Pass	--	No	No Trend
Total Cadmium	MW-3	89.41	non-parametric	**Fail**	--	--	**Fail**	**Yes**	**Upward Trend**
Chloride	MW-3	0	log-normal	--	**Fail**	--	**Fail**	**Yes**	**Upward Trend**
	MW-4		log-normal	--	Pass*	--	--	No	No Trend
	MW-5		log-normal	--	**Fail**	--	**Fail**	**Yes**	**Upward Trend**
	TMW-1		log-normal	--	**Fail**	--	**Fail**	**Yes**	**Upward Trend**
	TMW-2		log-normal	--	**Fail**	--	**Fail**	**Yes**	No Trend
	TMW-3		log-normal	--	**Fail**	--	**Fail**	**Yes**	No Trend
Chromium	MW-3	83.53	non-parametric	Pass	--	--	--	No	No Trend
	MW-5		non-parametric	Pass	--	--	--	No	No Trend
	TMW-2		non-parametric	Pass	--	--	--	No	No Trend
Cobalt	MW-3	57.65	non-parametric	Pass	--	--	--	No	**Downward Trend**
	MW-5		non-parametric	Pass	--	--	--	No	No Trend
Fluoride	MW-3	85.71	non-parametric	**Fail**	--	--	**Fail**	**Yes**	**Upward Trend**
Nickel	MW-3	63.95	non-parametric	Pass	--	--	--	No	No Trend
	MW-5		non-parametric	Pass	--	--	--	No	No Trend
Selenium	MW-3	97.67	non-parametric	Pass	--	--	--	No	No Trend
Zinc	MW-3	59.77	non-parametric	**Fail**	--	--	**Fail**	**Yes**	**Upward Trend**
Sulfate	MW-3	60.92	non-parametric	**Fail**	--	--	**Fail**	**Yes**	**Upward Trend**
	MW-5		non-parametric	Pass	--	--	--	No	No Trend

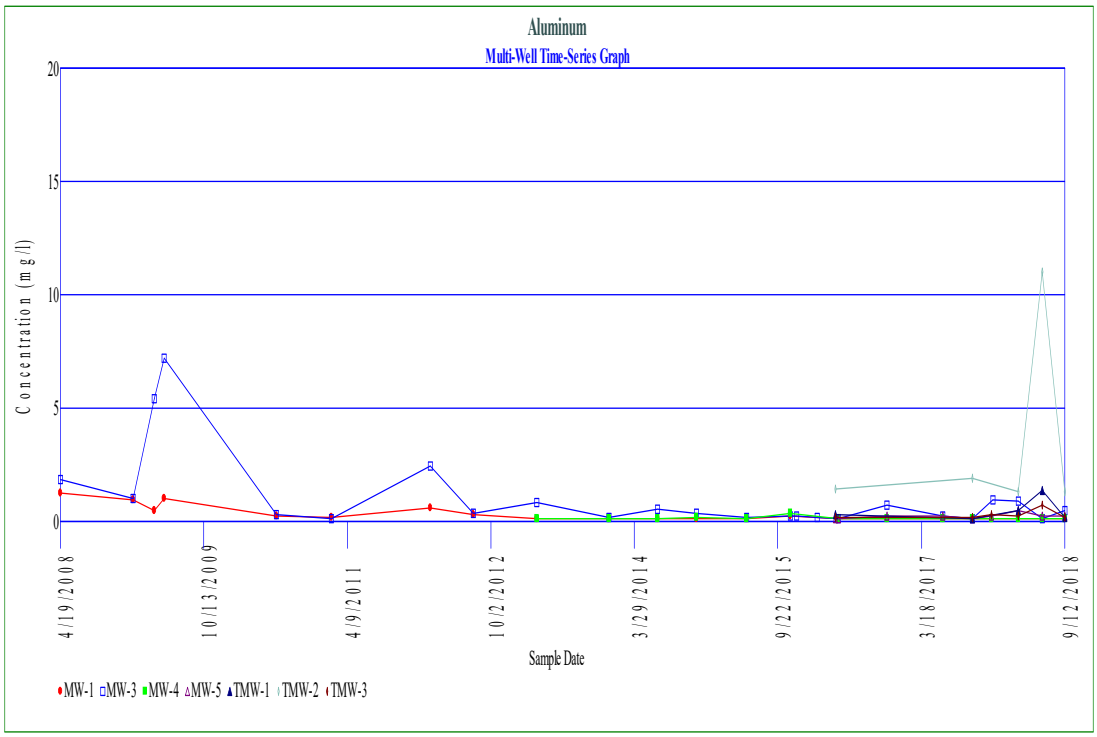
Notes:
* 99% Parametric Confidence level was used for Chloride when the data was log-transformed at 1/2 the detection limit.

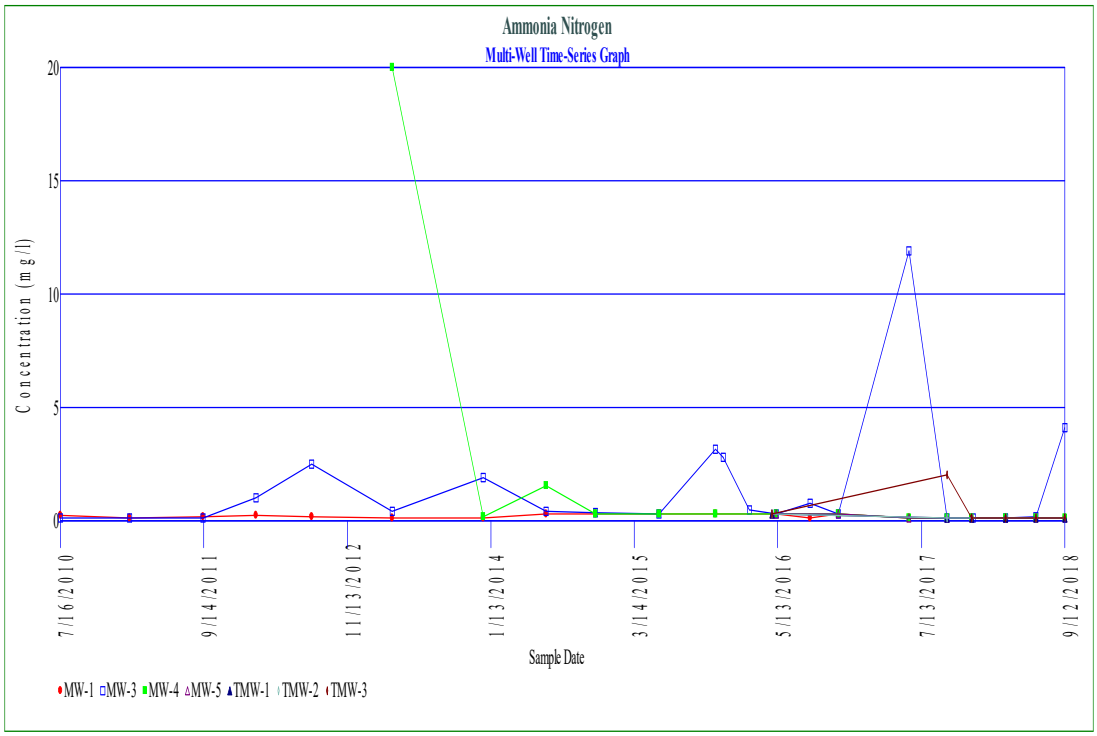
APPENDIX B
STATISTICAL EVALUATIONS & TIME SERIES PLOTS

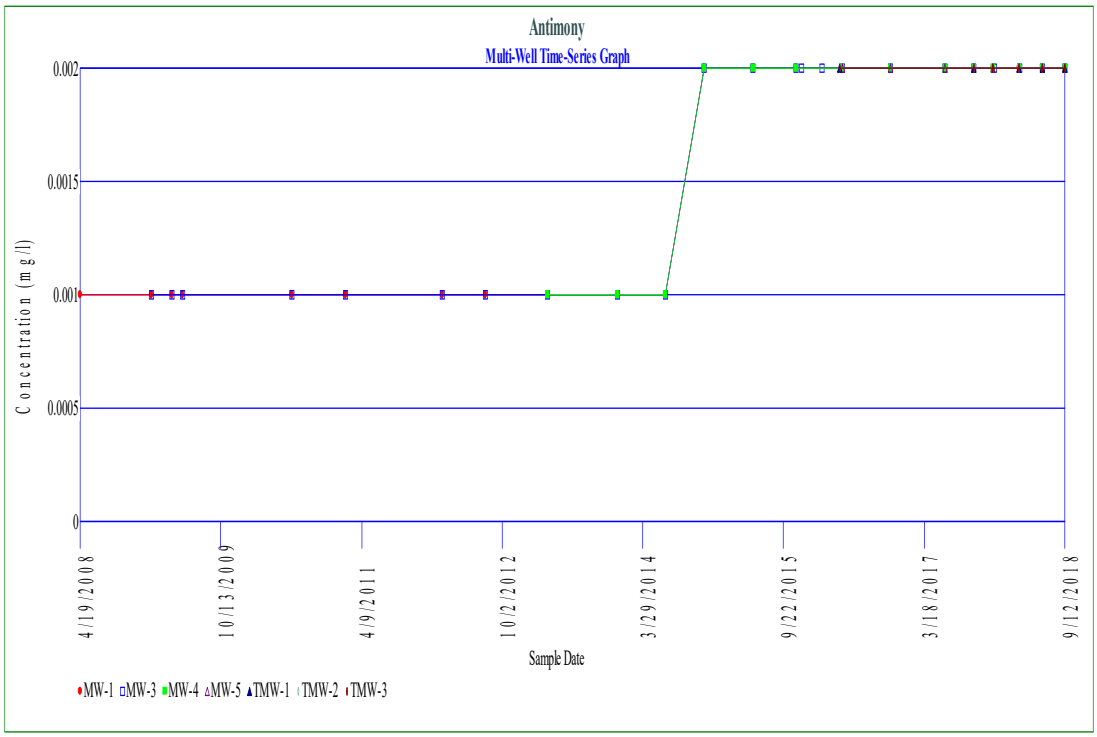

Total Cadmium
Multi-Well Time-Series Graph
0.3
0.25
0.2
0.15
0.1
0.05
0
Concentration (mg/l)
4/19/2008
10/15/2009
4/13/2011
10/9/2012
4/6/2014
10/3/2015
3/31/2017
9/27/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

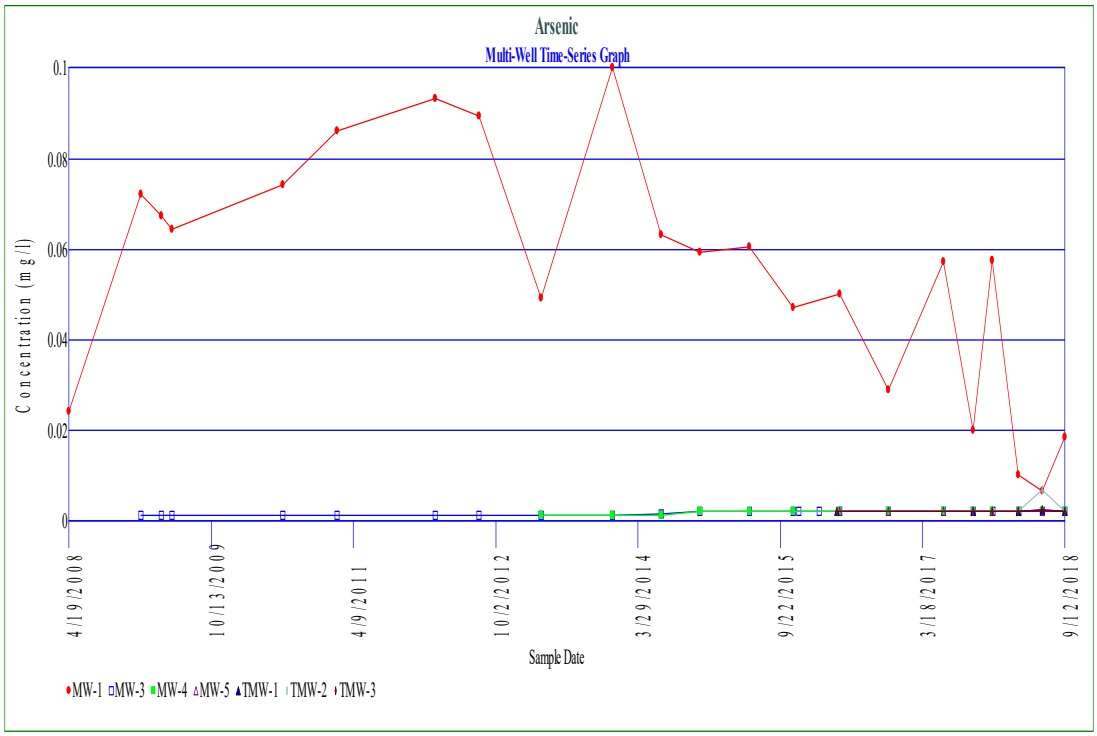

Turbidity
Multi-Well Time-Series Graph
1000
800
600
400
200
0
Concentration (NTU)
7/16/2010
9/16/2011
11/17/2012
1/19/2014
3/23/2015
5/24/2016
7/26/2017
9/27/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

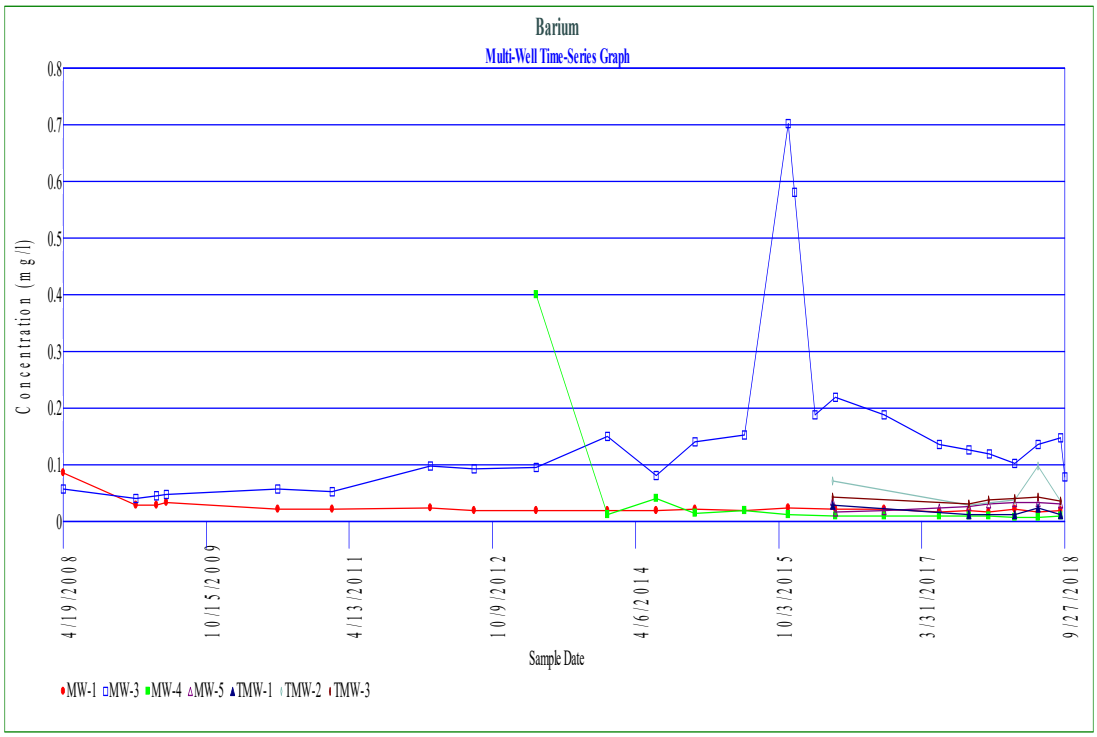

Alkalinity
Multi-Well Time-Series Graph
Concentration (mg/l)
80
70
60
50
40
30
20
10
0
2/19/2016
7/1/2016
11/12/2016
3/26/2017
8/6/2017
12/18/2017
5/1/2018
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

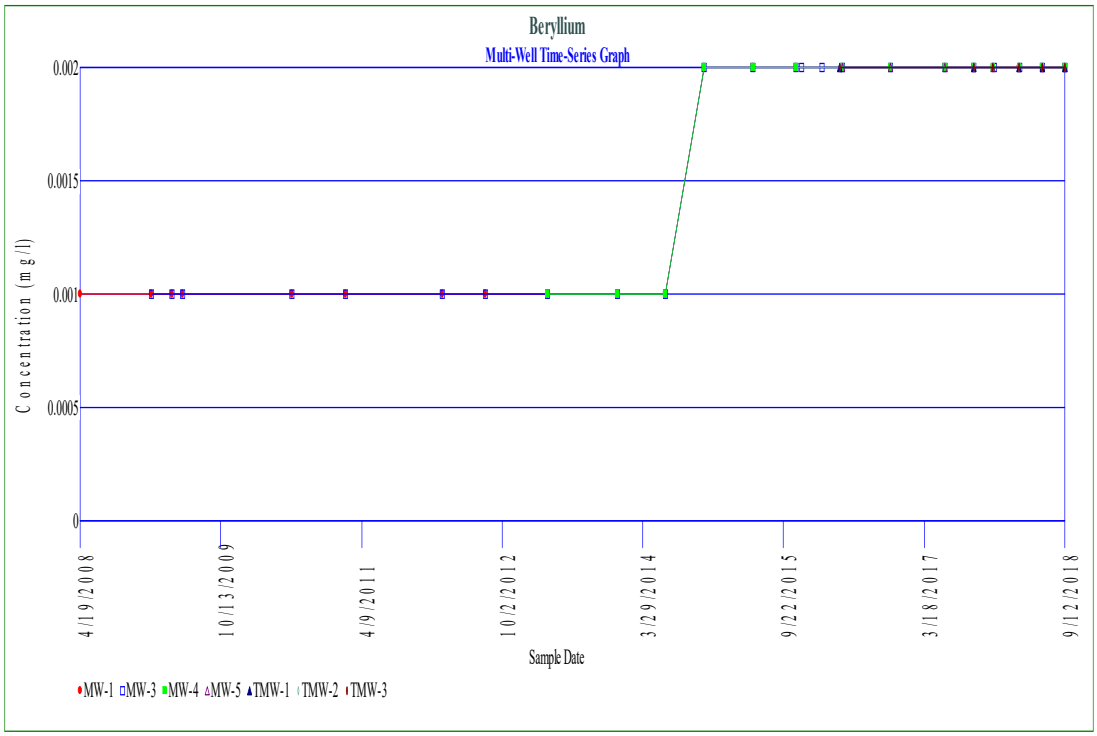

Aluminum
Multi-Well Time-Series Graph
Concentration (mg/l)
20
15
10
5
0
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

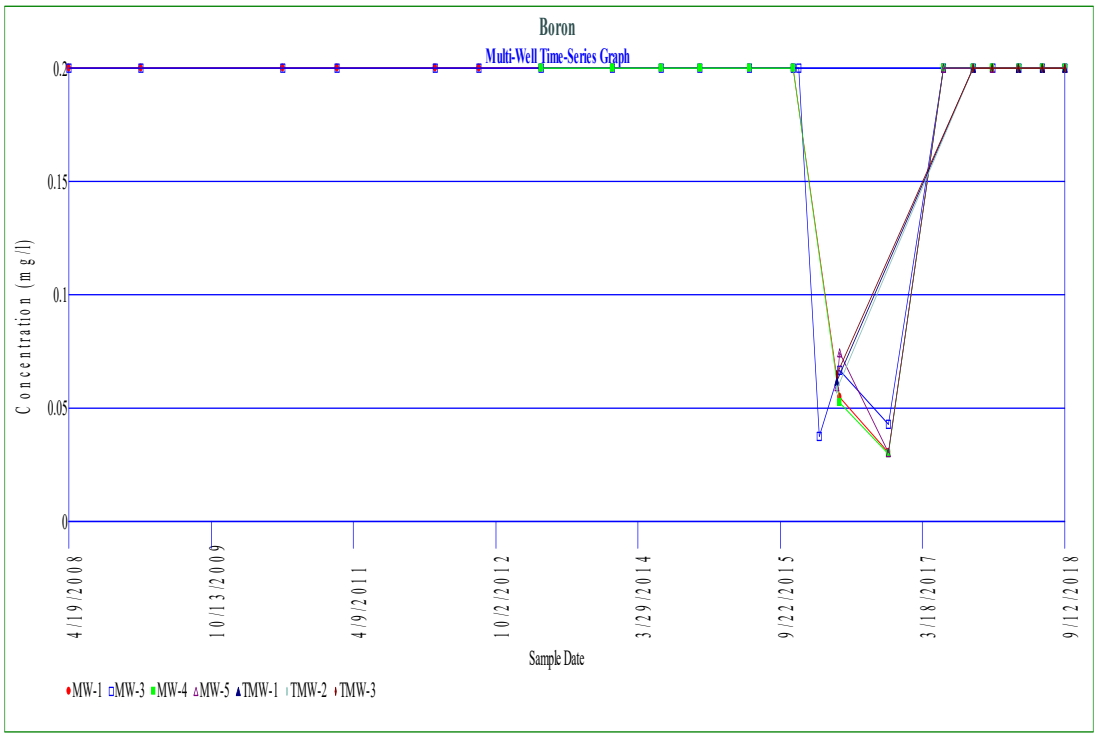

Ammonia Nitrogen
Multi-Well Time-Series Graph
20
15
10
5
0
Concentration (mg/l)
7/16/2010
9/14/2011
11/13/2012
1/13/2014
3/14/2015
5/13/2016
7/13/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

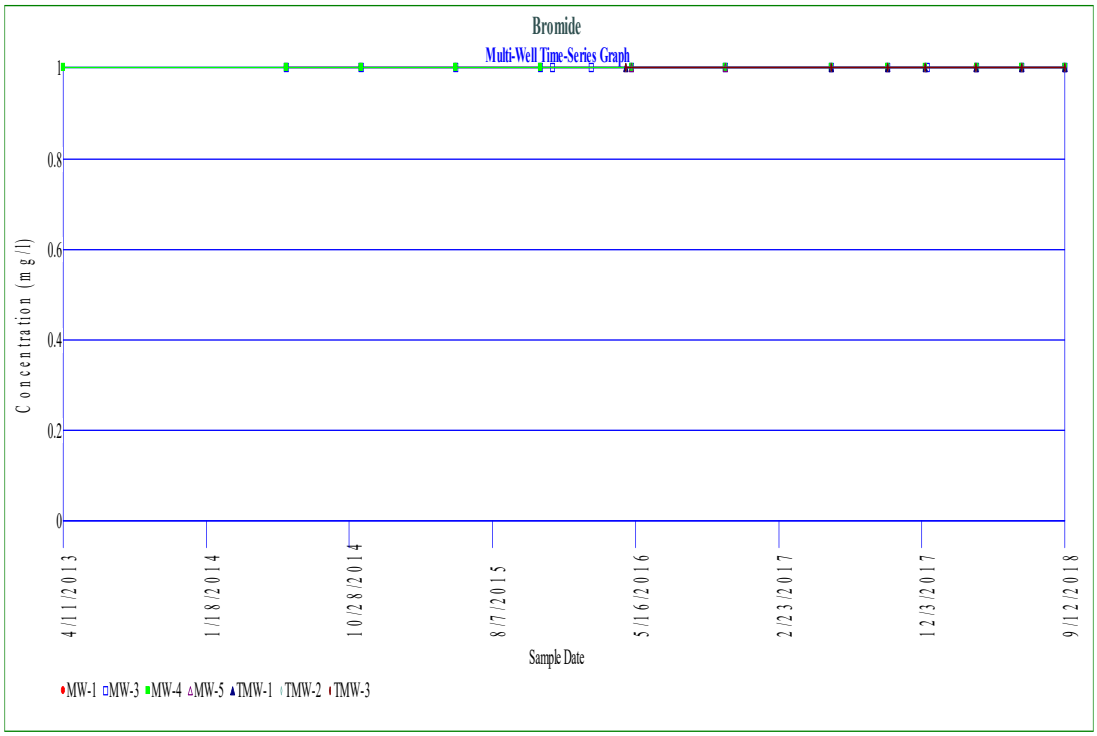

Antimony
Multi-Well Time-Series Graph
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

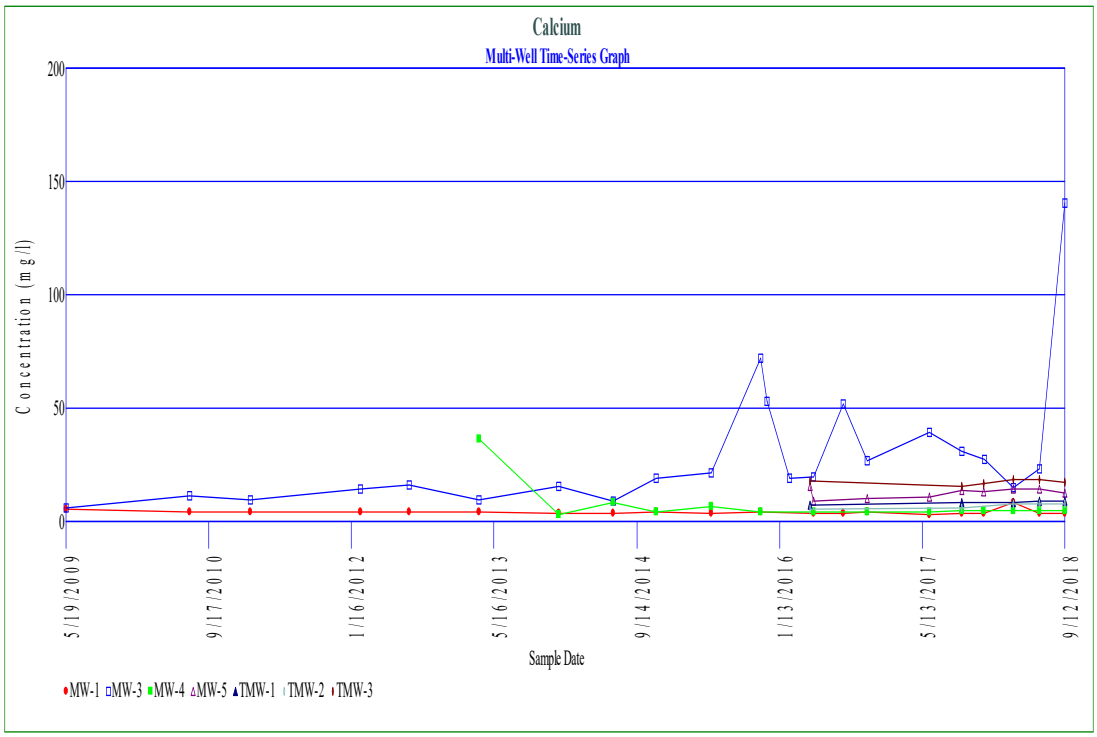

Arsenic
Multi-Well Time-Series Graph
0.1
0.08
0.06
0.04
0.02
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

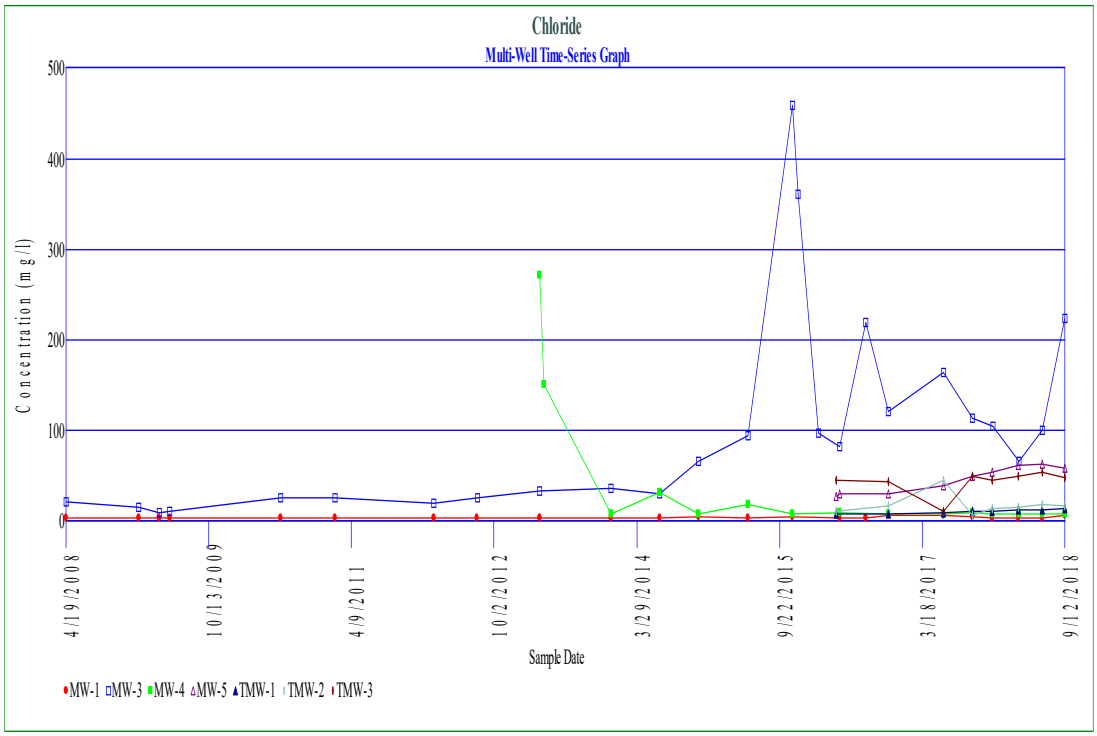

Barium
Multi-Well Time-Series Graph
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Concentration (mg/l)
4/19/2008
10/15/2009
4/13/2011
10/9/2012
4/6/2014
10/3/2015
3/31/2017
9/27/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

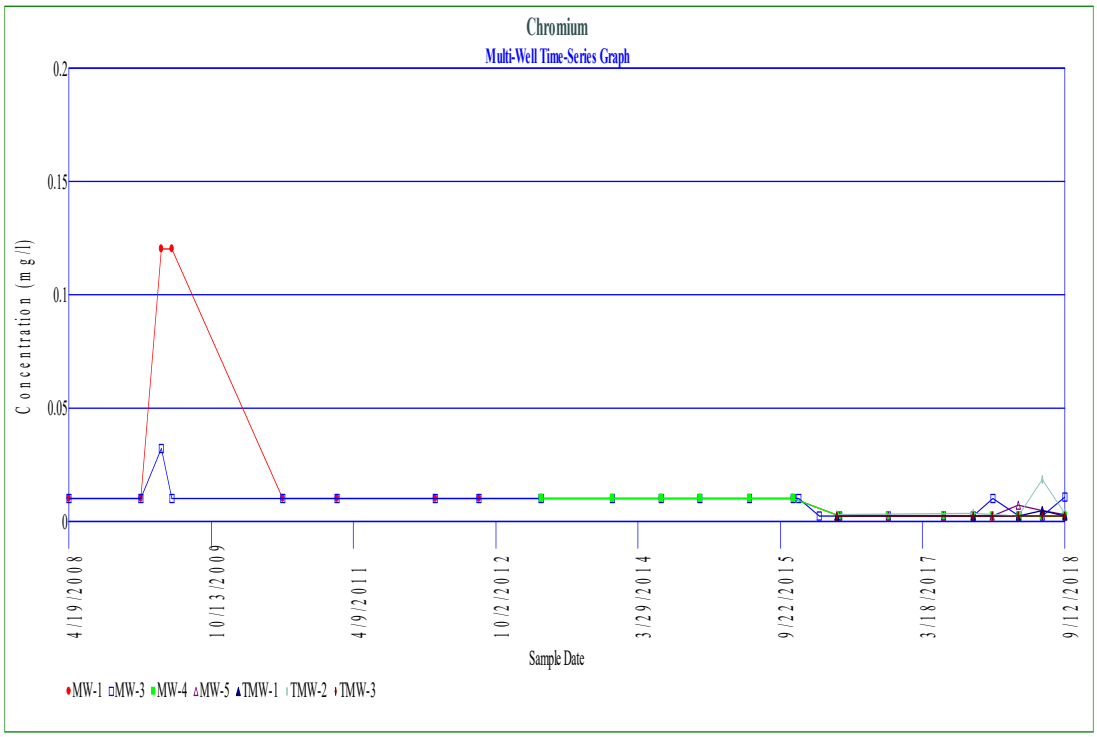

Beryllium
Multi-Well Time-Series Graph
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

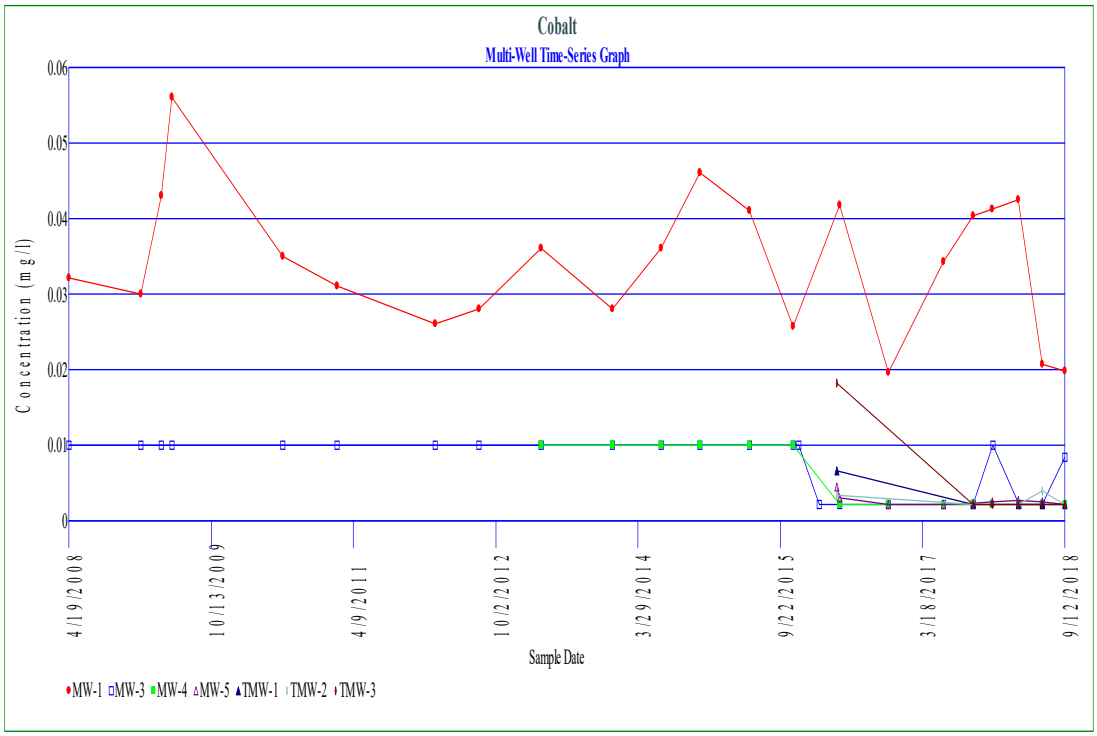

Boron
Multi-Well Time-Series Graph
0.2
0.15
0.1
0.05
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

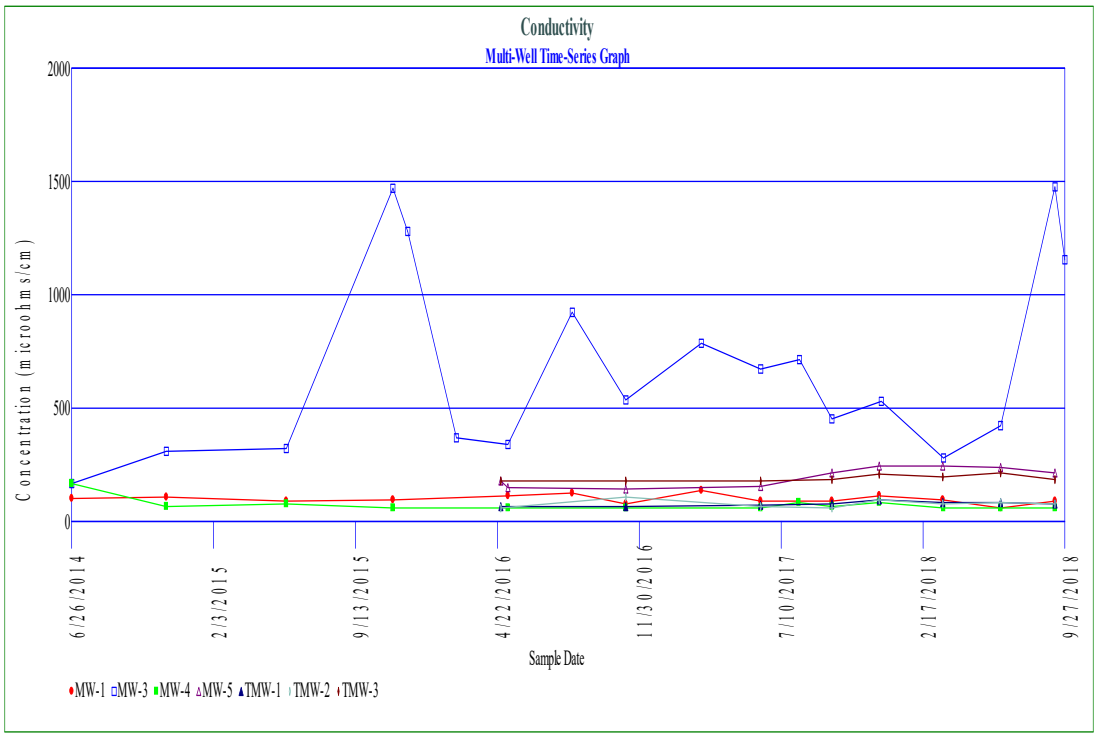

Bromide
Multi-Well Time-Series Graph
Concentration (mg/l)
1
0.8
0.6
0.4
0.2
0
4/11/2013
1/18/2014
10/28/2014
8/7/2015
5/16/2016
2/23/2017
12/3/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

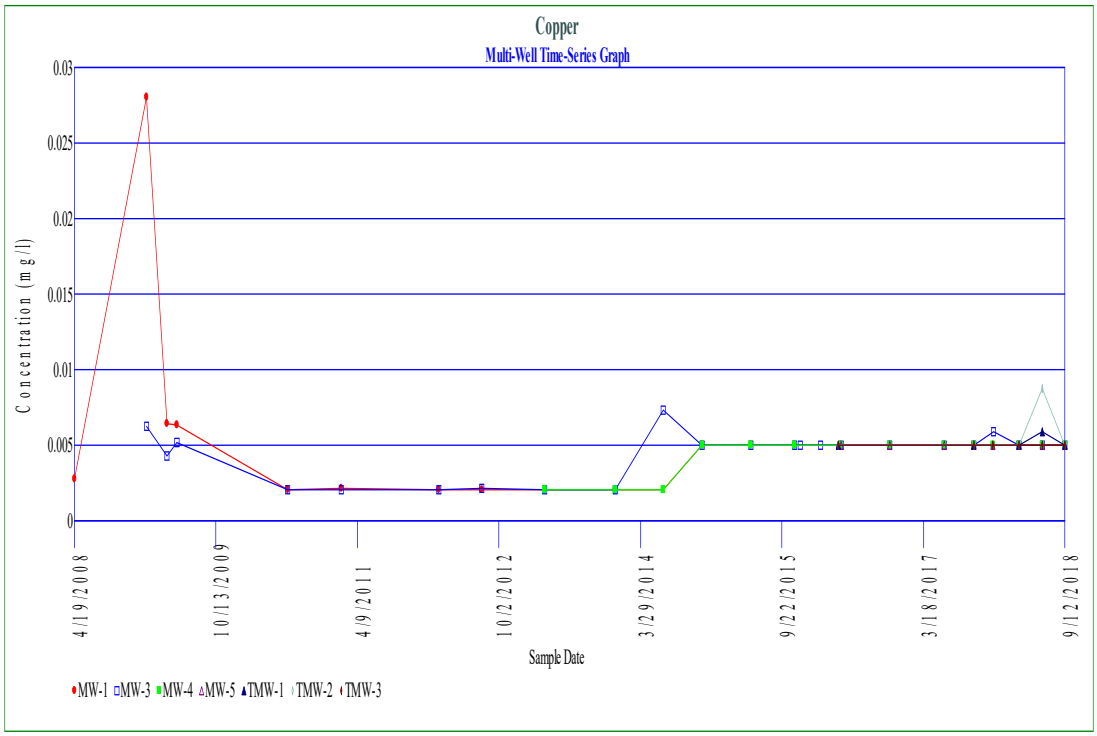

Calcium
Multi-Well Time-Series Graph
Concentration (mg/l)
200
150
100
50
0
5/19/2009
9/17/2010
1/16/2012
5/16/2013
9/14/2014
1/13/2016
5/13/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

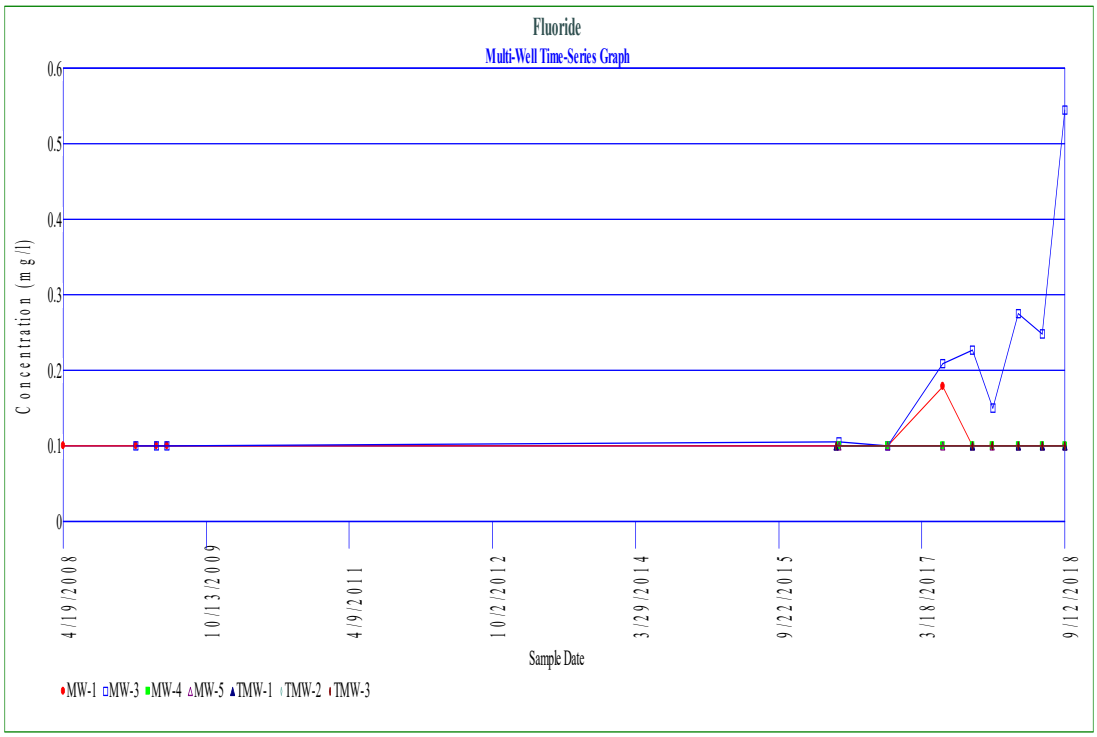

Chloride
Multi-Well Time-Series Graph
500
400
300
200
100
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

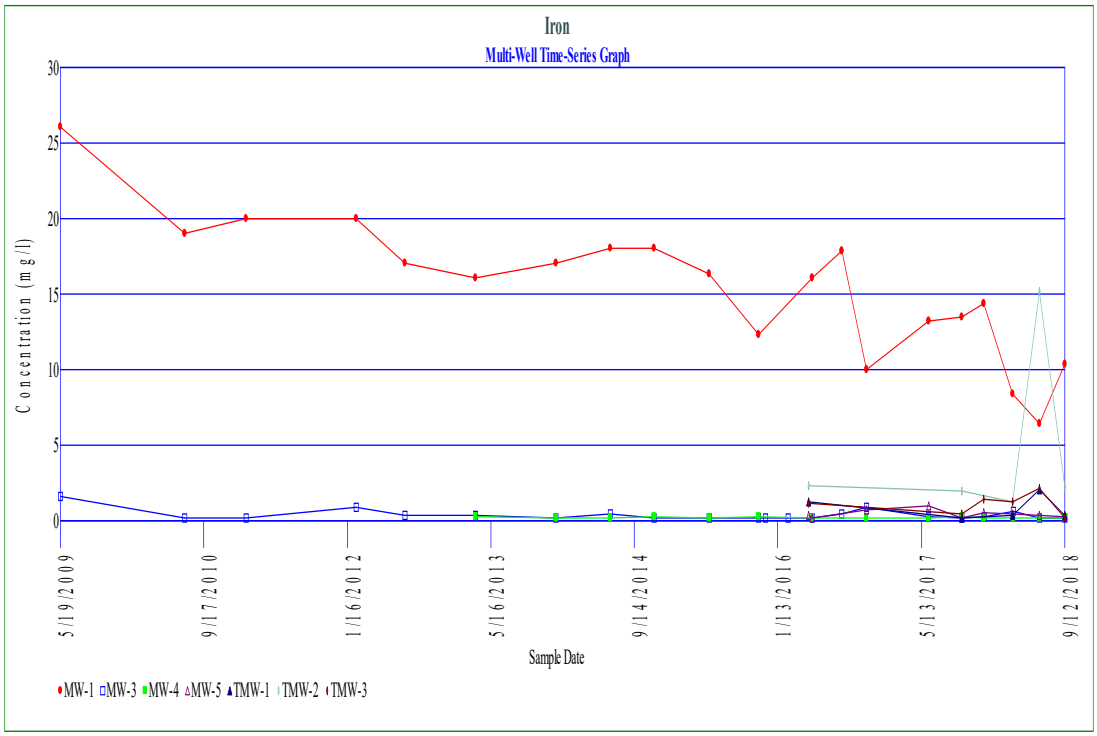

Chromium
Multi-Well Time-Series Graph
0.2
0.15
0.1
0.05
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

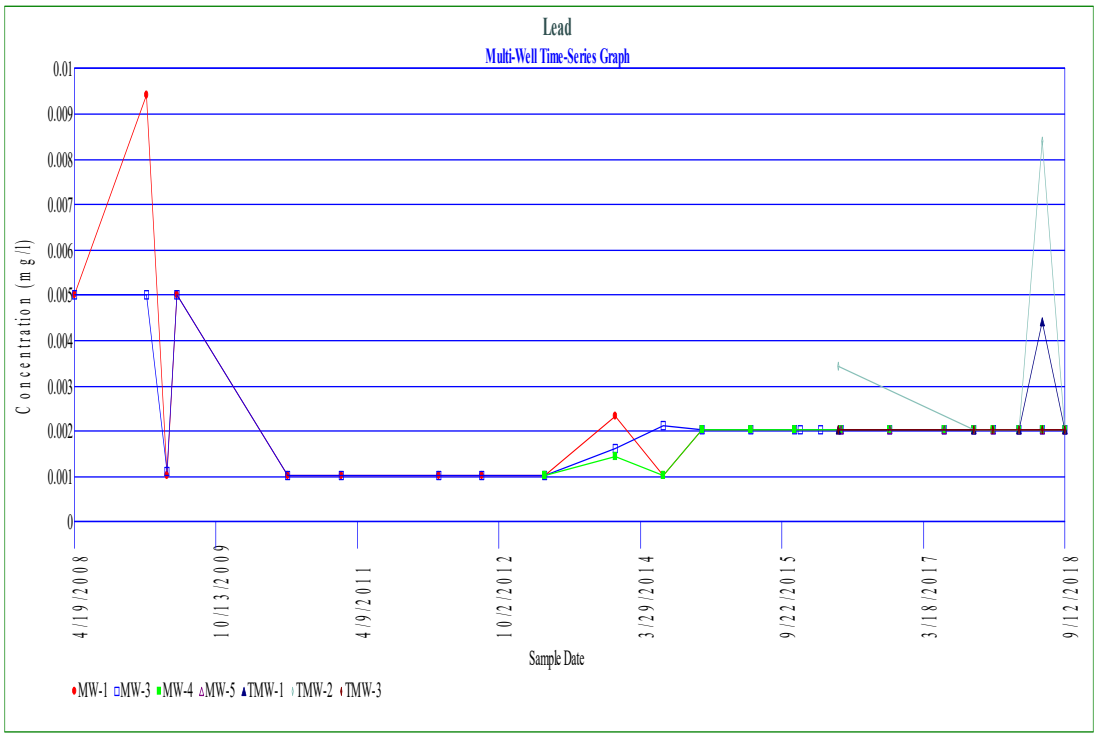

Cobalt
Multi-Well Time-Series Graph
0.06
0.05
0.04
0.03
0.02
0.01
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

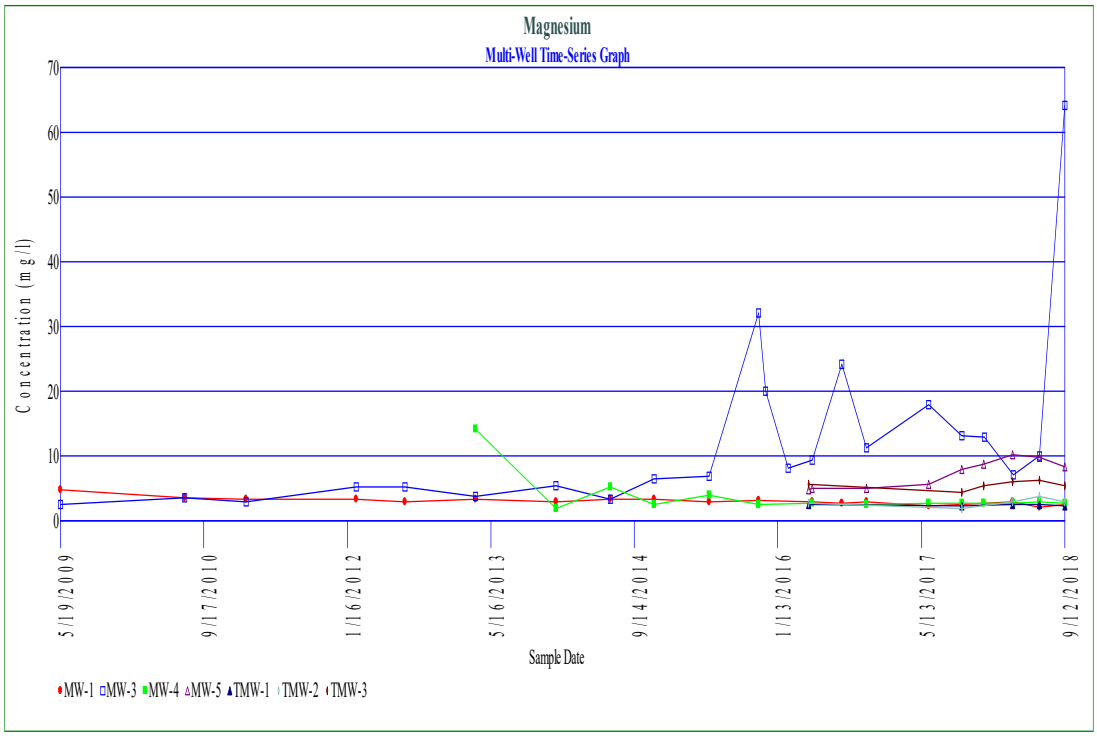

Conductivity
Multi-Well Time-Series Graph
2000
1500
1000
500
0
Concentration (microohms/cm)
6/26/2014
2/3/2015
9/13/2015
4/22/2016
11/30/2016
7/10/2017
2/17/2018
9/27/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

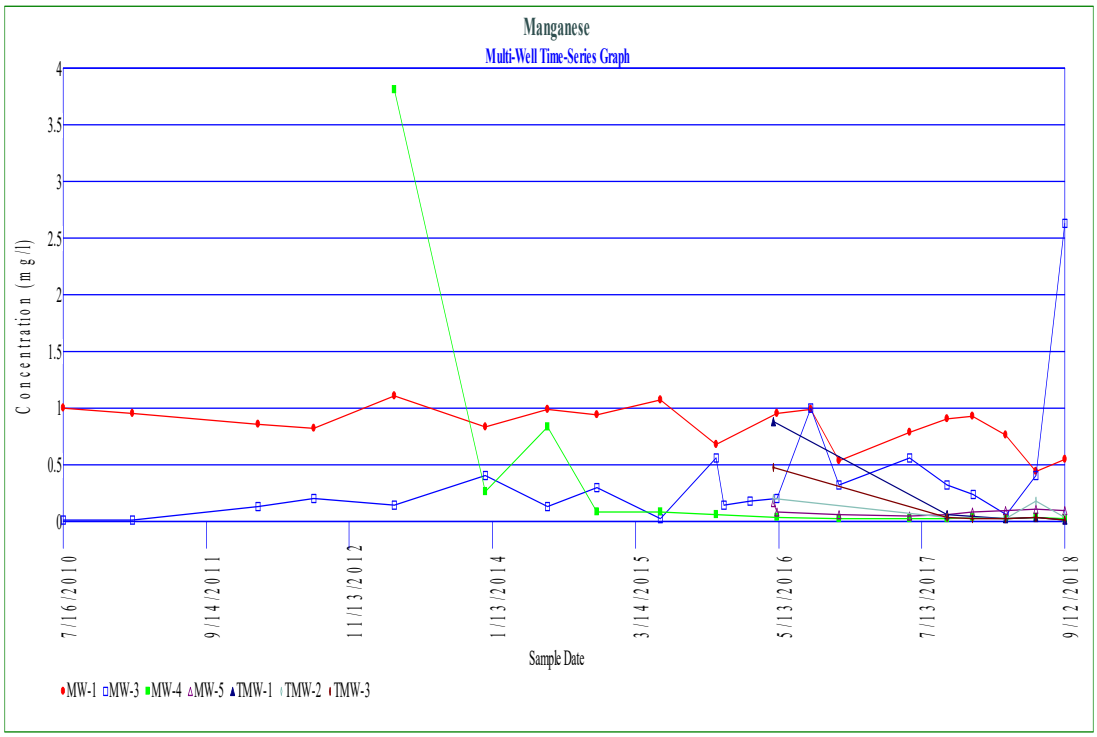

Copper
Multi-Well Time-Series Graph
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

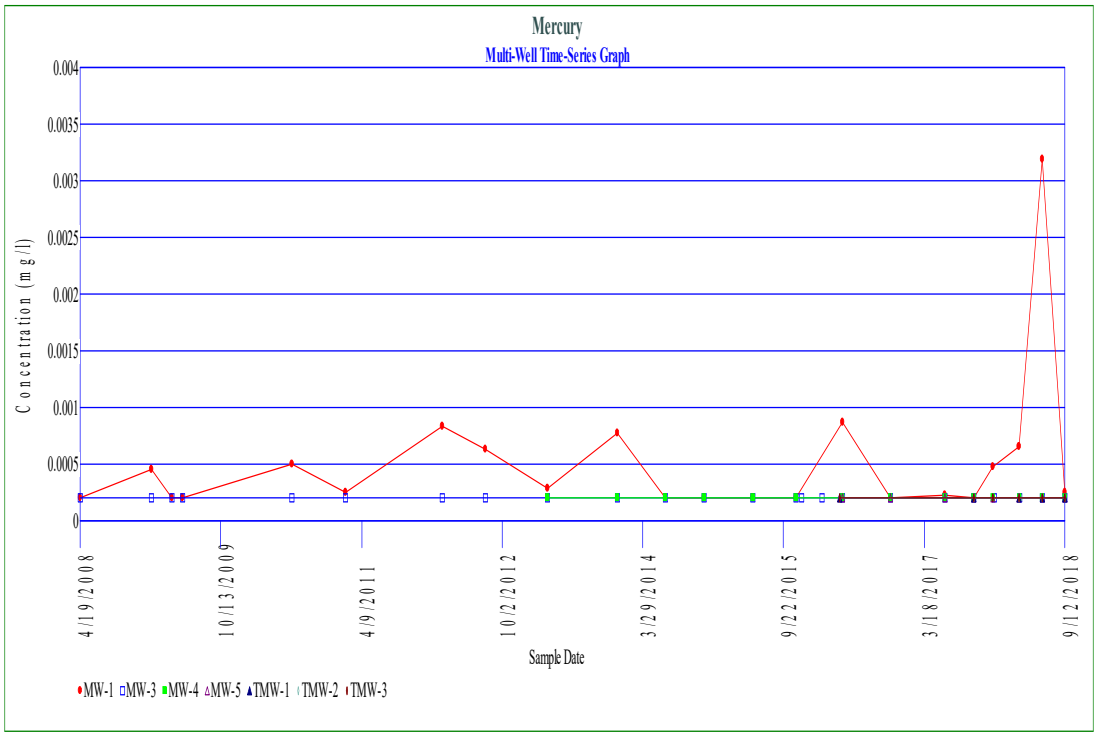

Fluoride
Multi-Well Time-Series Graph
0.6
0.5
0.4
0.3
0.2
0.1
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

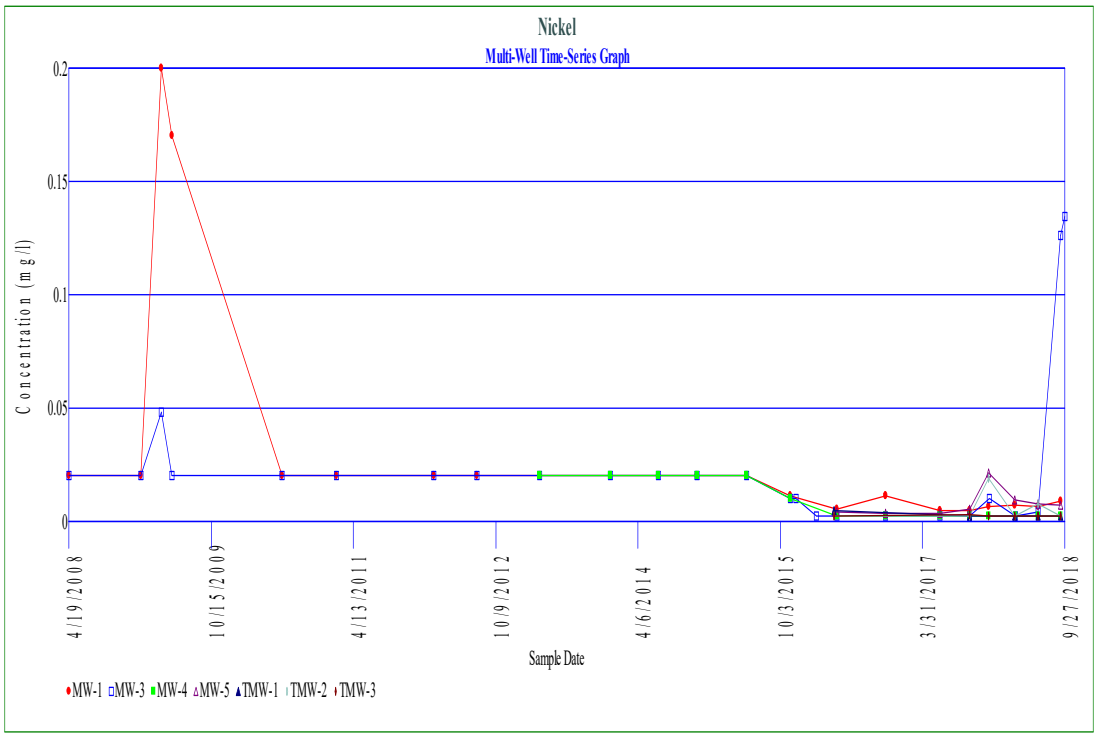

Iron
Multi-Well Time-Series Graph
Concentration (mg/l)
30
25
20
15
10
5
0
5/19/2009
9/17/2010
1/16/2012
5/16/2013
9/14/2014
1/13/2016
5/13/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

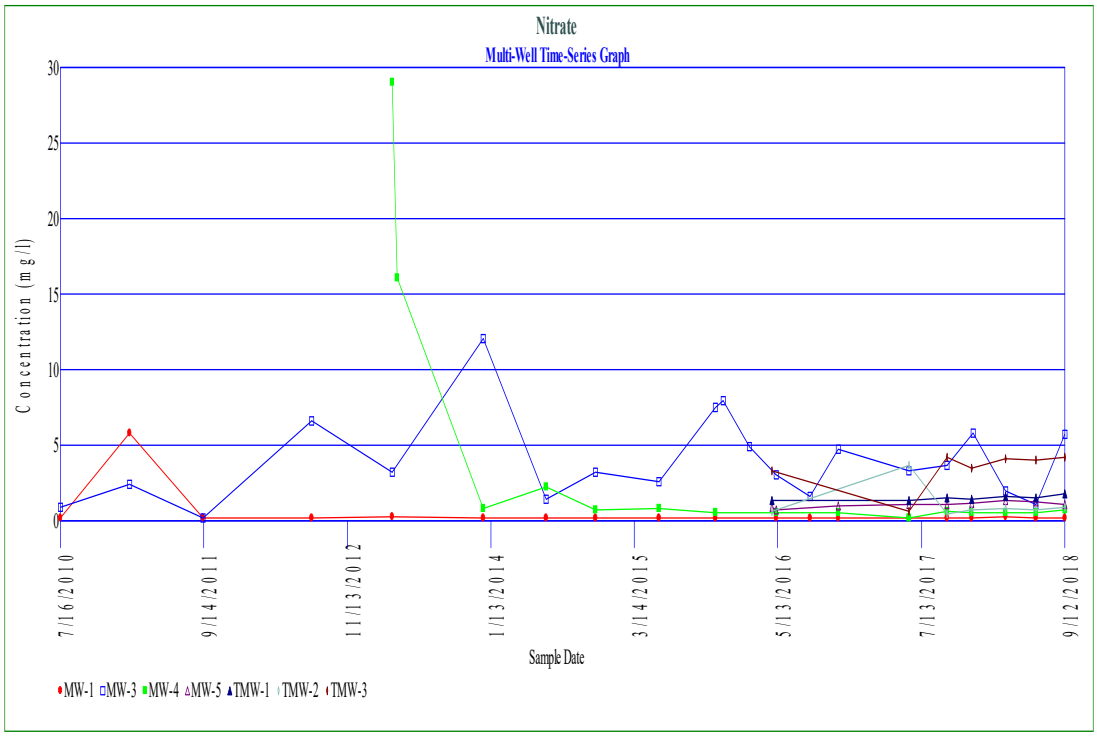

Lead
Multi-Well Time-Series Graph
Concentration (mg/l)
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

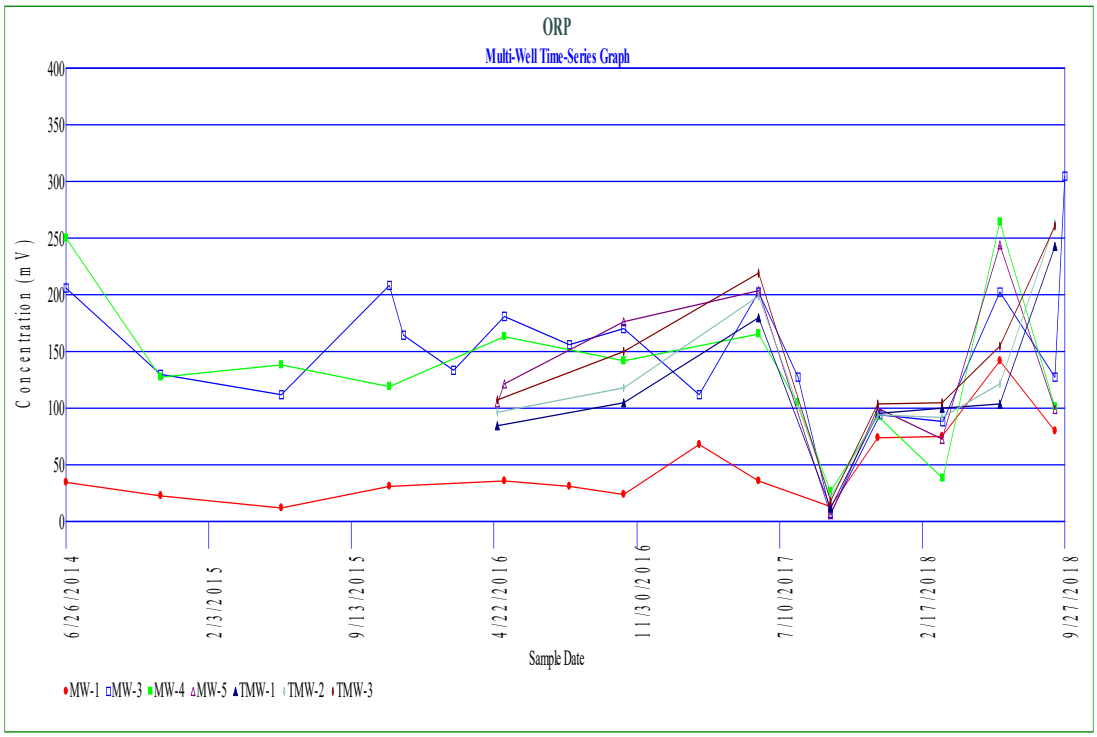

Magnesium
Multi-Well Time-Series Graph
Concentration (mg/l)
70
60
50
40
30
20
10
0
5/19/2009
9/17/2010
1/16/2012
5/16/2013
9/14/2014
1/13/2016
5/13/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

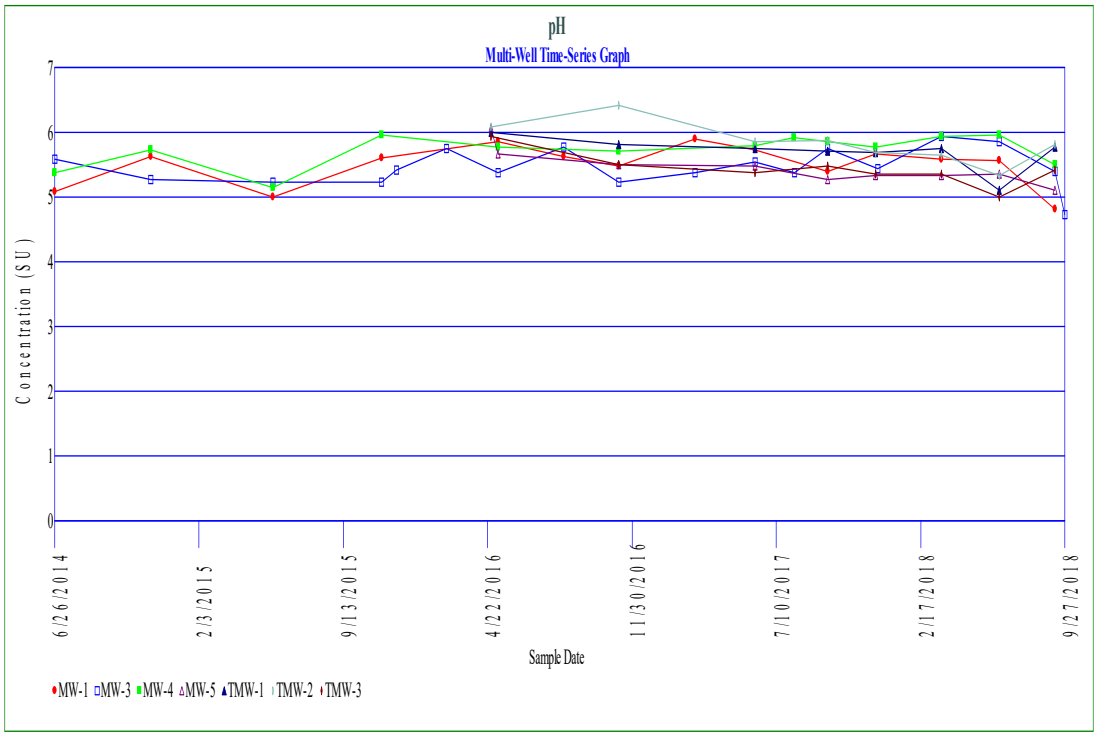

Manganese
Multi-Well Time-Series Graph
Concentration (mg/l)
4
3.5
3
2.5
2
1.5
1
0.5
0
7/16/2010
9/14/2011
11/13/2012
1/13/2014
3/14/2015
5/13/2016
7/13/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

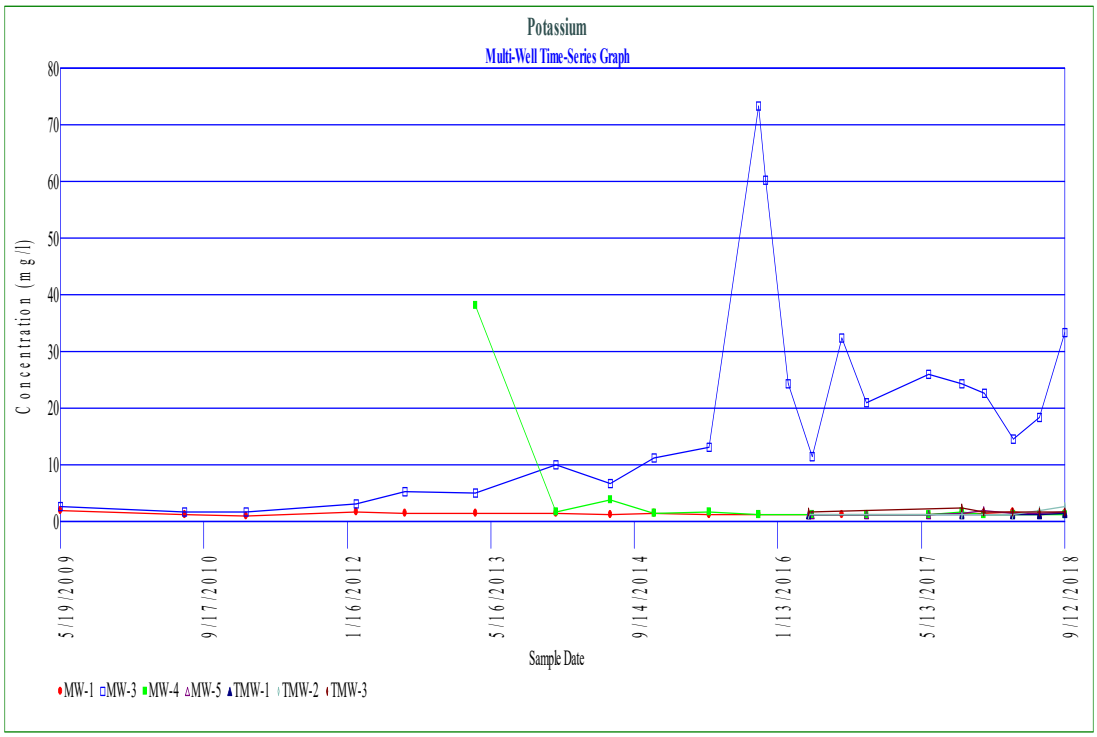

Mercury
Multi-Well Time-Series Graph
0.004
0.0035
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

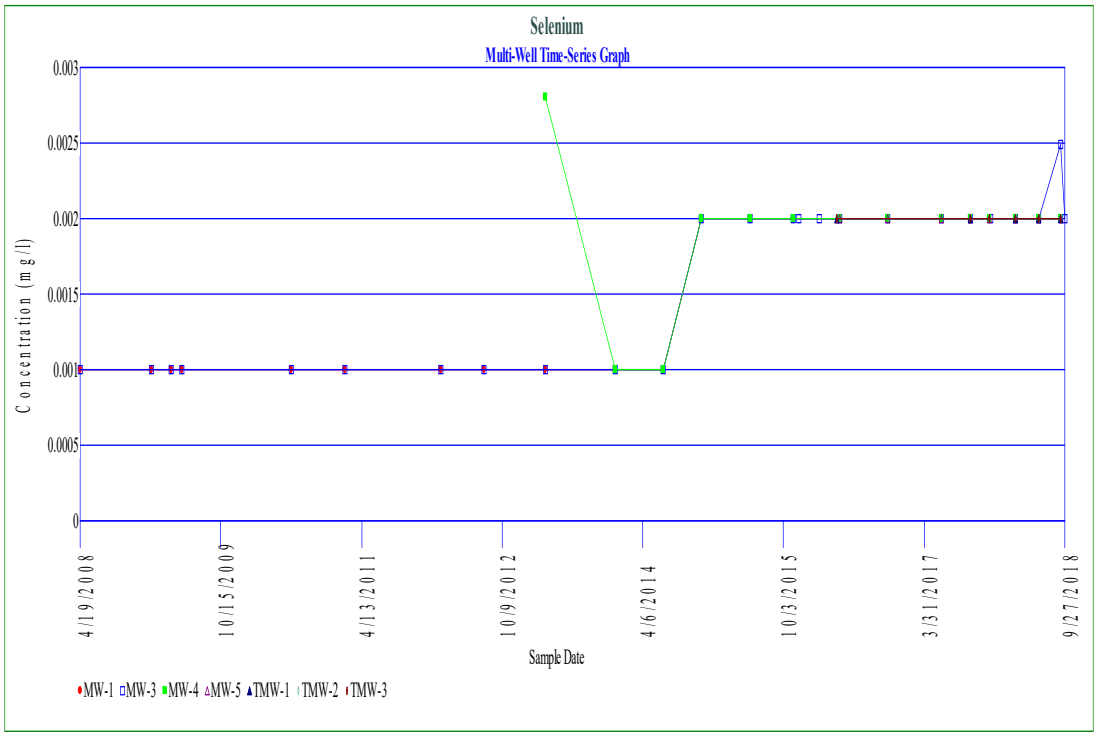

Nickel
Multi-Well Time-Series Graph
0.2
0.15
0.1
0.05
0
Concentration (mg/l)
4/19/2008
10/15/2009
4/13/2011
10/9/2012
4/6/2014
10/3/2015
3/31/2017
9/27/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

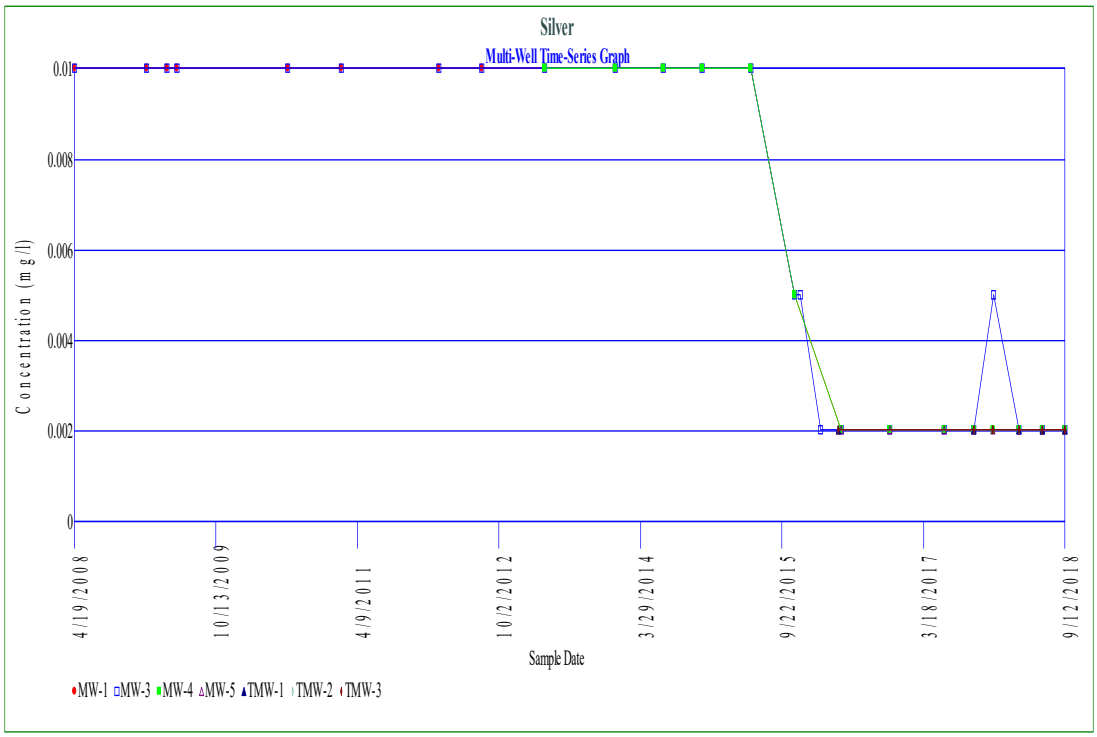

Nitrate
Multi-Well Time-Series Graph
Concentration (mg/l)
30
25
20
15
10
5
0
7/16/2010
9/14/2011
11/13/2012
1/13/2014
3/14/2015
5/13/2016
7/13/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

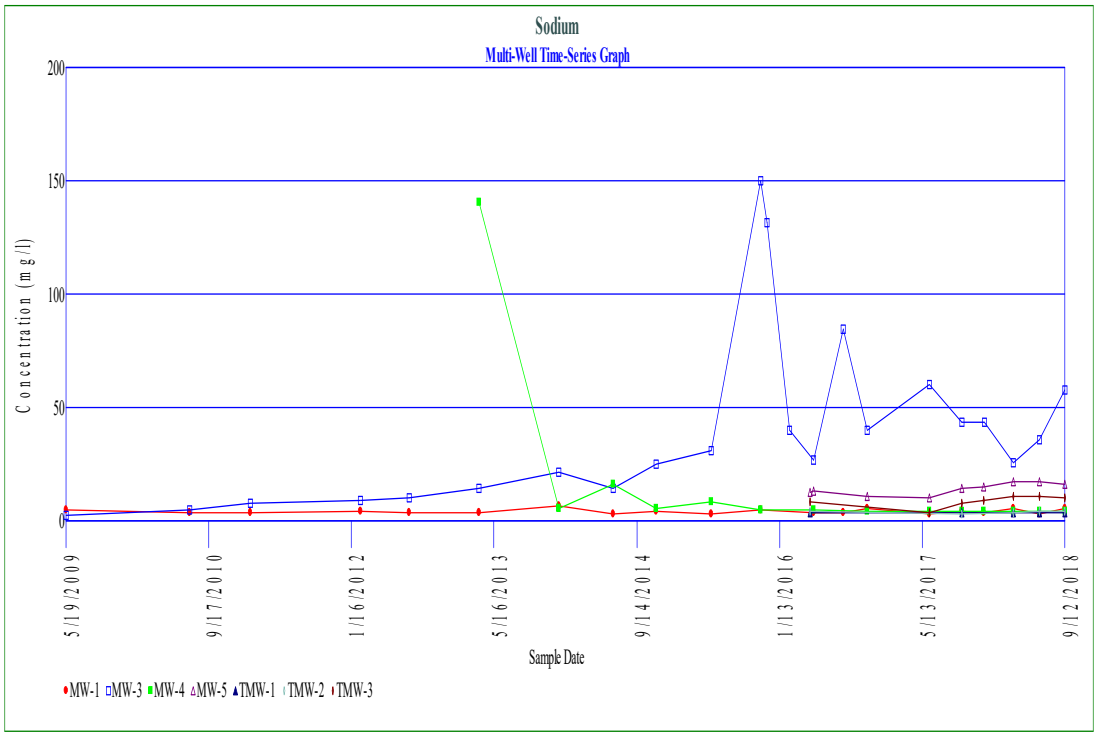

ORP
Multi-Well Time-Series Graph
Concentration (mV)
400
350
300
250
200
150
100
50
0
6/26/2014
2/3/2015
9/13/2015
4/22/2016
11/30/2016
7/10/2017
2/17/2018
9/27/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

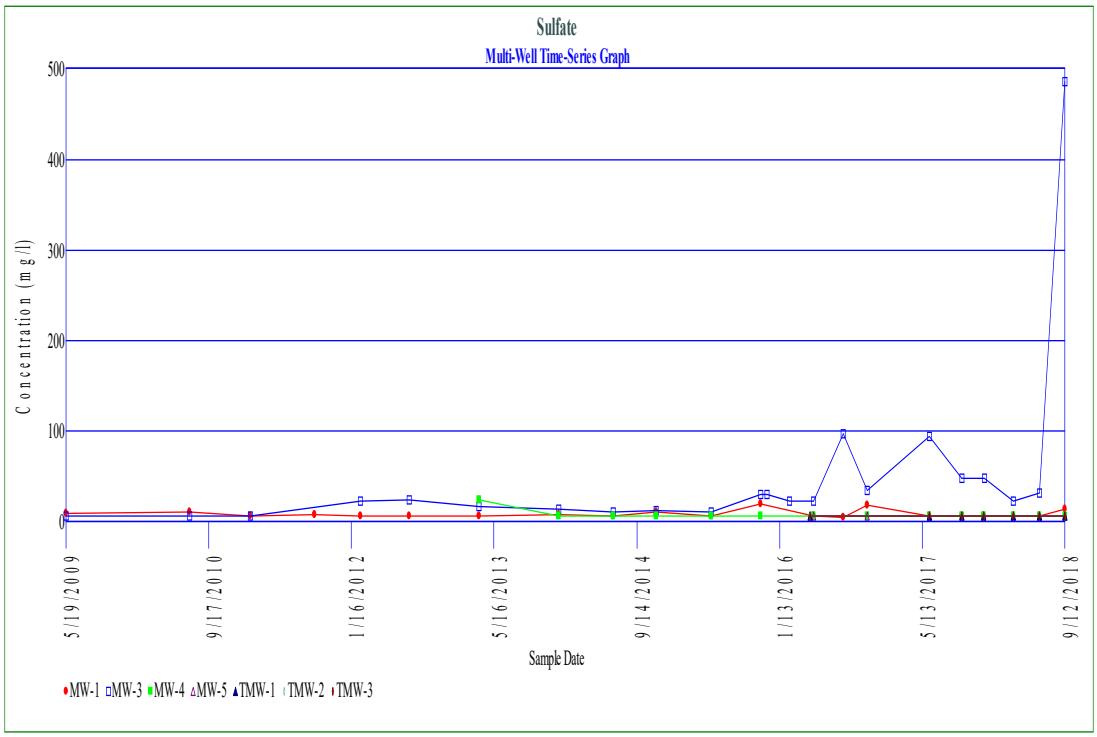

pH
Multi-Well Time-Series Graph
Concentration (SU)
7
6
5
4
3
2
1
0
6/26/2014
2/3/2015
9/13/2015
4/22/2016
11/30/2016
7/10/2017
2/17/2018
9/27/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

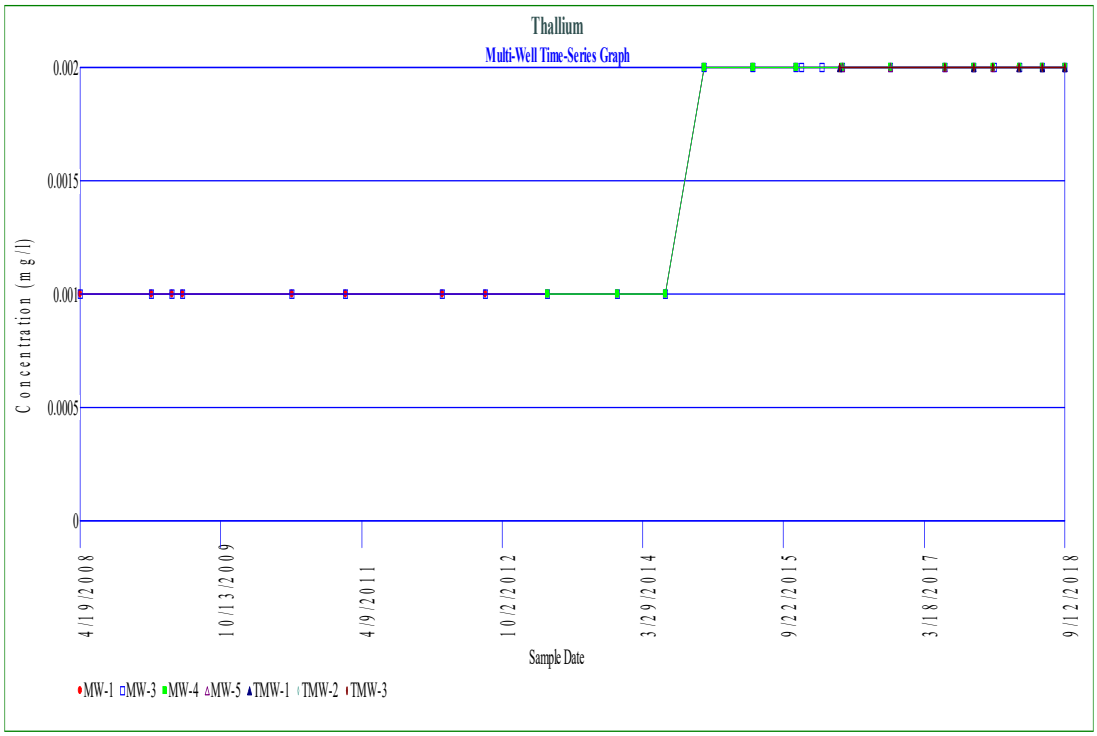

Potassium
Multi-Well Time-Series Graph
Concentration (mg/l)
80
70
60
50
40
30
20
10
0
5/19/2009
9/17/2010
1/16/2012
5/16/2013
9/14/2014
1/13/2016
5/13/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

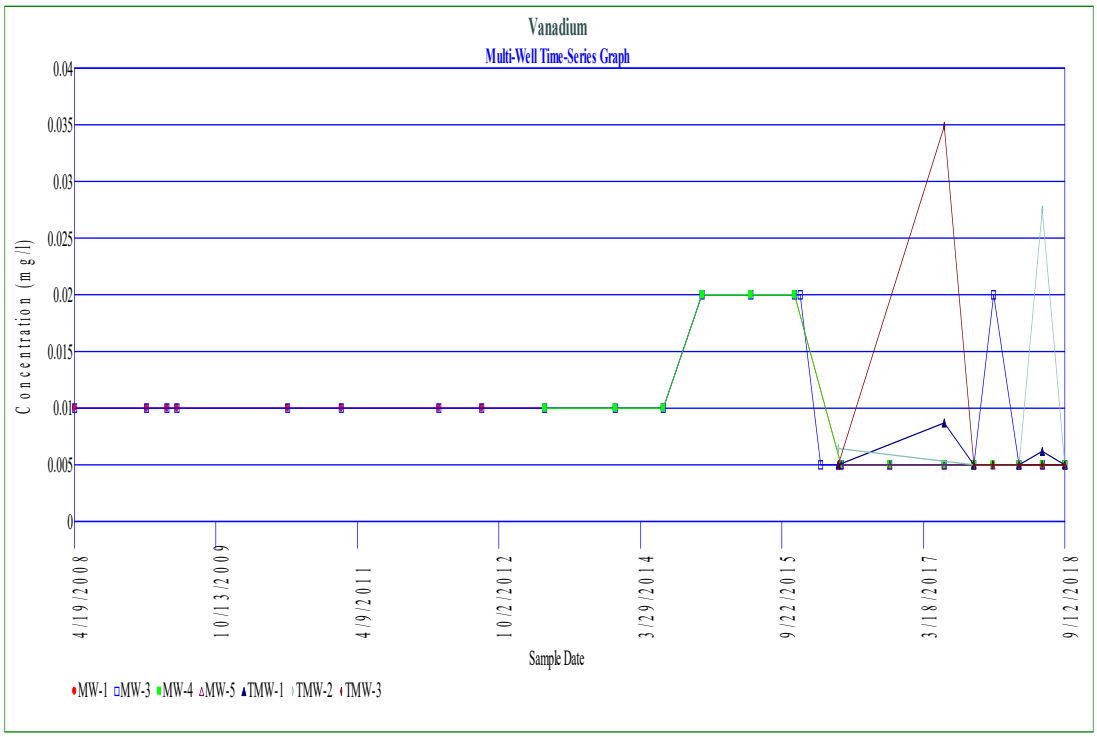

Selenium
Multi-Well Time-Series Graph
0.003
0.0025
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
10/15/2009
4/13/2011
10/9/2012
4/6/2014
10/3/2015
3/31/2017
9/27/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

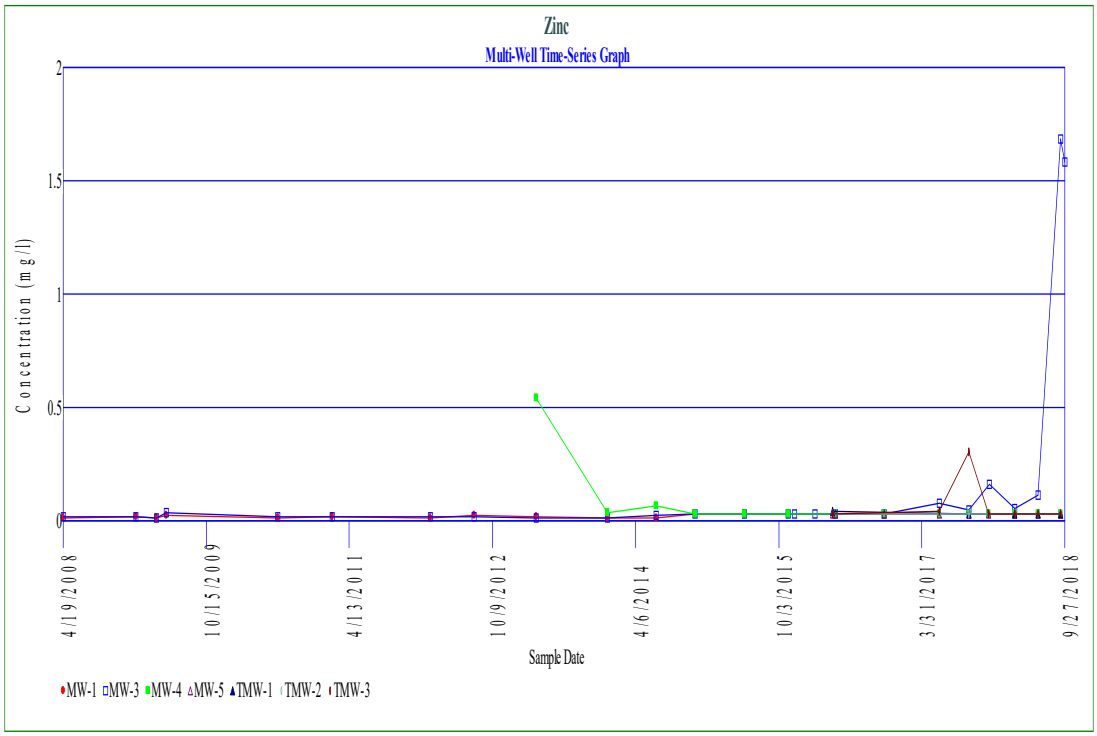

Silver
Multi-Well Time-Series Graph
0.01
0.008
0.006
0.004
0.002
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Sodium
Multi-Well Time-Series Graph
200
150
100
50
0
Concentration (mg/l)
5/19/2009
9/17/2010
1/16/2012
5/16/2013
9/14/2014
1/13/2016
5/13/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Sulfate
Multi-Well Time-Series Graph
500
400
300
200
100
0
Concentration (mg/l)
5/19/2009
9/17/2010
1/16/2012
5/16/2013
9/14/2014
1/13/2016
5/13/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Thallium
Multi-Well Time-Series Graph
0.002
0.0015
0.001
0.0005
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Vanadium
Multi-Well Time-Series Graph
0.04
0.035
0.03
0.025
0.02
0.015
0.01
0.005
0
Concentration (mg/l)
4/19/2008
10/13/2009
4/9/2011
10/2/2012
3/29/2014
9/22/2015
3/18/2017
9/12/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3


Zinc
Multi-Well Time-Series Graph
2
1.5
1
0.5
0
Concentration (mg/l)
4/19/2008
10/15/2009
4/13/2011
10/9/2012
4/6/2014
10/3/2015
3/31/2017
9/27/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

Shapiro-Wilks Test of Normality

Parameter: Arsenic
Location: MW-1
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 22 measurements

Sum of b values = 0.121065
Sample Standard Deviation = 0.0270039
W Statistic = 0.95712

5% Critical value of 0.911 is less than 0.95712
Data is normally distributed at 95% level of significance

1% Critical value of 0.878 is less than 0.95712
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium
Location: MW-1
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 22 measurements

Sum of b values = 0.0448483
Sample Standard Deviation = 0.0141878
W Statistic = 0.475818

5% Critical value of 0.911 exceeds 0.475818
Evidence of non-normality at 95% level of significance

1% Critical value of 0.878 exceeds 0.475818
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Chloride
Location: MW-1
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 23 measurements

Sum of b values = 4.8811
Sample Standard Deviation = 1.12046
W Statistic = 0.862626

5% Critical value of 0.914 exceeds 0.862626
Evidence of non-normality at 95% level of significance

1% Critical value of 0.881 exceeds 0.862626
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Cobalt
Location: MW-1
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 22 measurements

Sum of b values = 0.0418406
Sample Standard Deviation = 0.00928325
W Statistic = 0.967331

5% Critical value of 0.911 is less than 0.967331
Data is normally distributed at 95% level of significance

1% Critical value of 0.878 is less than 0.967331
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Nickel
Location: MW-1
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 22 measurements

Sum of b values = 0.155825
Sample Standard Deviation = 0.0508822
W Statistic = 0.446606

5% Critical value of 0.911 exceeds 0.446606
Evidence of non-normality at 95% level of significance

1% Critical value of 0.878 exceeds 0.446606
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Mercury
Location: MW-1
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 22 measurements

Sum of b values = 0.00208122
Sample Standard Deviation = 0.000642056
W Statistic = 0.500348

5% Critical value of 0.911 exceeds 0.500348
Evidence of non-normality at 95% level of significance

1% Critical value of 0.878 exceeds 0.500348
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium
Location: MW-1
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 11 for 22 measurements

Sum of b values = 1.38843
Sample Standard Deviation = 0.359333
W Statistic = 0.710941

5% Critical value of 0.911 exceeds 0.710941
Evidence of non-normality at 95% level of significance

1% Critical value of 0.878 exceeds 0.710941
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Chloride
Location: MW-1
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 11 for 23 measurements

Sum of b values = 1.6117
Sample Standard Deviation = 0.355734
W Statistic = 0.933032

5% Critical value of 0.914 is less than 0.933032
Data is normally distributed at 95% level of significance

1% Critical value of 0.881 is less than 0.933032
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Nickel
Location: MW-1
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 11 for 22 measurements

Sum of b values = 3.40265
Sample Standard Deviation = 0.95762
W Statistic = 0.601212

5% Critical value of 0.911 exceeds 0.601212
Evidence of non-normality at 95% level of significance

1% Critical value of 0.878 exceeds 0.601212
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Mercury
Location: MW-1
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 11 for 22 measurements

Sum of b values = 4.26603
Sample Standard Deviation = 1.00436
W Statistic = 0.859115

5% Critical value of 0.911 exceeds 0.859115
Evidence of non-normality at 95% level of significance

1% Critical value of 0.878 exceeds 0.859115
Evidence of non-normality at 99% level of significance

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-1
Parameter: Arsenic
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

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

Baseline Samples	Date	Result
	4/19/2008	0.024
	1/21/2009	0.072
	4/9/2009	0.067
	5/19/2009	0.064
	7/16/2010	0.074
	2/8/2011	0.086
	2/17/2012	0.093
	7/31/2012	0.089
	3/27/2013	0.049
	12/23/2013	0.1
	6/26/2014	0.063
	11/21/2014	0.059
	5/28/2015	0.0604
	11/11/2015	0.0469
	5/9/2016	0.05
	11/10/2016	0.0286
	6/8/2017	0.0571
	9/28/2017	0.0199
	12/11/2017	0.0573
	3/21/2018	0.0101
	6/19/2018	0.0063

From 21 baseline samples
Baseline mean = 0.0560286
Baseline std Dev = 0.0264215

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 = 21 (background observations) - 1
t(0.95, 21) = 1.72472

Date	Samples	Mean	Interval	Significant
9/12/2018	1	0.0184	[0, 0.102671]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-1
Parameter: Cobalt
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

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

Baseline Samples	Date	Result
	4/19/2008	0.032
	1/21/2009	0.03
	4/9/2009	0.043
	5/19/2009	0.056
	7/16/2010	0.035
	2/8/2011	0.031
	2/17/2012	0.026
	7/31/2012	0.028
	3/27/2013	0.036
	12/23/2013	0.028
	6/26/2014	0.036
	11/21/2014	0.046
	5/28/2015	0.041
	11/11/2015	0.0257
	5/9/2016	0.0417
	11/10/2016	0.0196
	6/8/2017	0.0342
	9/28/2017	0.0403
	12/11/2017	0.0411
	3/21/2018	0.0425
	6/19/2018	0.0206

From 21 baseline samples
Baseline mean = 0.0349381
Baseline std Dev = 0.00891911

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 = 21 (background observations) - 1
t(0.95, 21) = 1.72472

Date	Samples	Mean	Interval	Significant
9/12/2018	1	0.0198	[0, 0.050683]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-1
Parameter: Chloride
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

Intra-Well Unified Guid. Formula 99% One-Sided Comparison

Baseline Samples	Date	Result
	4/19/2008	0.693147
	1/21/2009	1.06471
	4/9/2009	0.641854
	5/19/2009	1.02962
	7/16/2010	1.02962
	2/8/2011	0.955511
	2/17/2012	0.741937
	7/31/2012	0.788457
	3/27/2013	0.587787
	12/23/2013	0.405465
	6/26/2014	1.06471
	11/21/2014	1.36098
	5/28/2015	0.698135
	11/11/2015	1.37877
	5/9/2016	0.751416
	8/18/2016	0.875469
	11/10/2016	1.52388
	6/8/2017	1.73695
	9/28/2017	1.41342
	12/11/2017	0.837248
	3/21/2018	0.741937
	6/19/2018	0.806476

From 22 baseline samples
Baseline mean = 0.960341
Baseline std Dev = 0.33777

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.01/1) = 99 %
t is Percentile of Student's T-Test (0.99/1) = 0.99
Degrees of Freedom = 22 (background observations) - 1
t(0.99, 21) = 2.51765

Date	Samples	Mean	Interval	Significant
9/12/2018	1	1.59737	[0, 1.82984]	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1
Parameter: Nickel
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 50%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 22
Maximum Baseline Concentration = 0.2
Confidence Level = 95.7%
False Positive Rate = 4.3%

Baseline Measurements	Date	Value
	4/19/2008	ND<0.02
	1/21/2009	ND<0.02
	4/9/2009	0.2
	5/19/2009	0.17
	7/16/2010	ND<0.02
	2/8/2011	ND<0.02
	2/17/2012	ND<0.02
	7/31/2012	ND<0.02
	3/27/2013	ND<0.02
	12/23/2013	ND<0.02
	6/26/2014	ND<0.02
	11/21/2014	ND<0.02
	5/28/2015	ND<0.02
	11/11/2015	0.0112
	5/9/2016	0.00512
	11/10/2016	0.0112
	6/8/2017	0.00418
	9/28/2017	0.00445
	12/11/2017	0.00652
	3/21/2018	0.00658
	6/19/2018	0.00637
	9/12/2018	0.00839

Date	Count	Mean	Significant
9/12/2018	1	0.00839	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1
Parameter: Nickel
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 52.381%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 21
Maximum Baseline Concentration = 0.2
Confidence Level = 95.5%
False Positive Rate = 4.5%

Baseline Measurements	Date	Value
	4/19/2008	ND<0.02
	1/21/2009	ND<0.02
	4/9/2009	0.2
	5/19/2009	0.17
	7/16/2010	ND<0.02
	2/8/2011	ND<0.02
	2/17/2012	ND<0.02
	7/31/2012	ND<0.02
	3/27/2013	ND<0.02
	12/23/2013	ND<0.02
	6/26/2014	ND<0.02
	11/21/2014	ND<0.02
	5/28/2015	ND<0.02
	11/11/2015	0.0112
	5/9/2016	0.00512
	11/10/2016	0.0112
	6/8/2017	0.00418
	9/28/2017	0.00445
	12/11/2017	0.00652
	3/21/2018	0.00658
	6/19/2018	0.00637

Date	Count	Mean	Significant
9/12/2018	1	0.00839	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Mercury

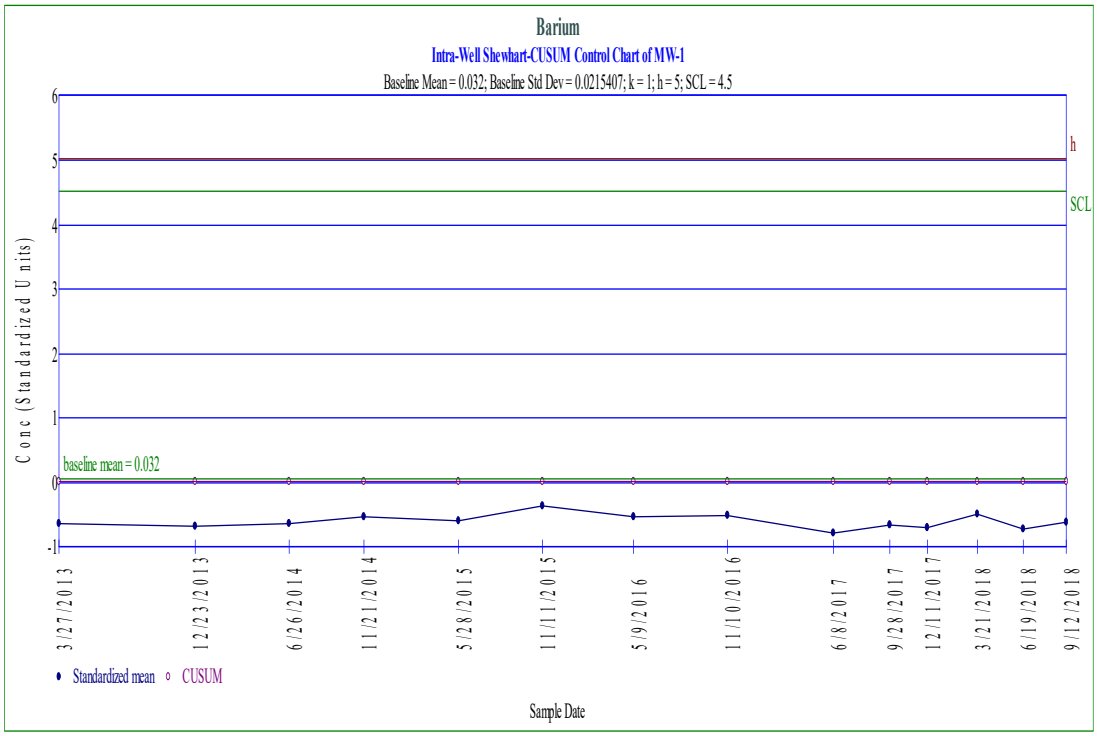
Original Data (Not Transformed)

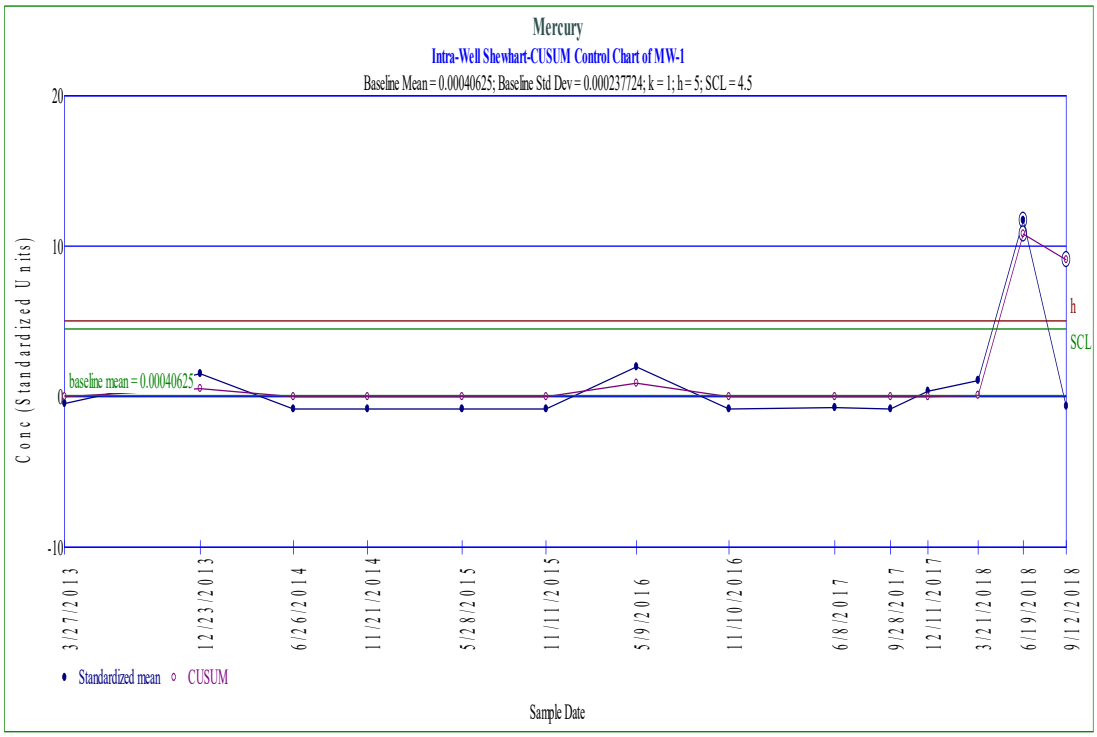
Non-Detects Replaced with Detection Limit

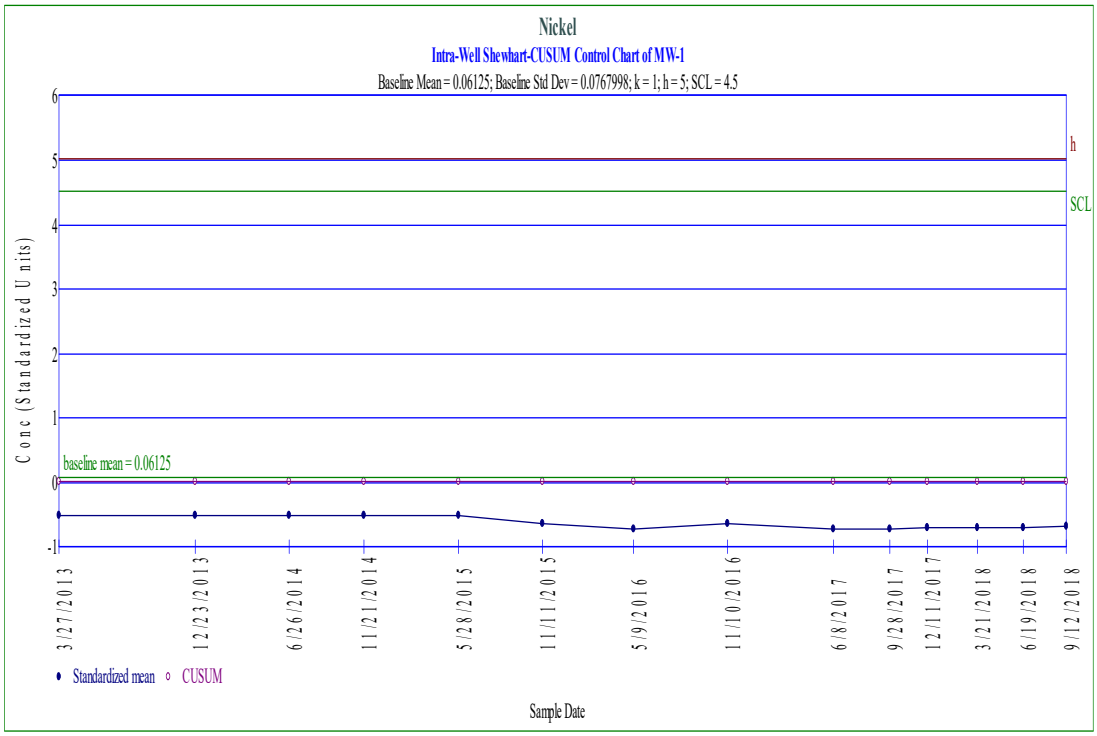
Total Percent Non-Detects = 42.8571%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 21
Maximum Baseline Concentration = 0.00319
Confidence Level = 95.5%
False Positive Rate = 4.5%

Baseline Measurements	Date	Value
	4/19/2008	ND<0.0002
	1/21/2009	0.00045
	4/9/2009	ND<0.0002
	5/19/2009	ND<0.0002
	7/16/2010	0.0005
	2/8/2011	0.00024
	2/17/2012	0.00083
	7/31/2012	0.00063
	3/27/2013	0.00028
	12/23/2013	0.00077
	6/26/2014	ND<0.0002
	11/21/2014	ND<0.0002
	5/28/2015	ND<0.0002
	11/11/2015	ND<0.0002
	5/9/2016	0.000858
	11/10/2016	ND<0.0002
	6/8/2017	0.000222
	9/28/2017	ND<0.0002
	12/11/2017	0.000473
	3/21/2018	0.000651
	6/19/2018	0.00319

Date	Count	Mean	Significant
9/12/2018	1	0.000244	FALSE


Barium
Intra-Well Shewhart-CUSUM Control Chart of MW-1
Baseline Mean = 0.032; Baseline Std Dev = 0.0215407; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
h
SCL
baseline mean = 0.032
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date


Mercury
Intra-Well Shewhart-CUSUM Control Chart of MW-1
Baseline Mean = 0.00040625; Baseline Std Dev = 0.000237724; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
h
SCL
baseline mean = 0.00040625
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date


Nickel
Intra-Well Shewhart-CUSUM Control Chart of MW-1
Baseline Mean = 0.06125; Baseline Std Dev = 0.0767998; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
h
SCL
baseline mean = 0.06125
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

Wilcoxon Non-Parametric Analysis (Intra-Well)

Parameter: Mercury
Location: MW-1
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total non detects is 9
Non detect rank is 5

Wilcoxon Ranks

Group	Date	Conc.	Rank
Baseline Values	4/19/2008	ND<0.0002	5
	1/21/2009	0.00045	14
	4/9/2009	ND<0.0002	5
	5/19/2009	ND<0.0002	5
Comparison Values	7/16/2010	0.0005	16
	2/8/2011	0.00024	11
	2/17/2012	0.00083	20
	7/31/2012	0.00063	17
	3/27/2013	0.00028	13
	12/23/2013	0.00077	19
	6/26/2014	ND<0.0002	5
	11/21/2014	ND<0.0002	5
	5/28/2015	ND<0.0002	5
	11/11/2015	ND<0.0002	5
	5/9/2016	0.000858	21
	11/10/2016	ND<0.0002	5
	6/8/2017	0.000222	10
	9/28/2017	ND<0.0002	5
	12/11/2017	0.000473	15
	3/21/2018	0.000651	18
	6/19/2018	0.00319	22
	9/12/2018	0.000244	12

The Wilcoxon Statistic is 53
The Expected value is is 36
The Standard Deviation is 11.7473
The Z Score is 1.40457
The Standard Deviation adjusted for ties is 11.3424

The Z Score adjusted for ties is 1.45472

1.40457 < 2.326 indicating no statistical significance at 1% level

1.45472 < 2.326 indicating no statistical significance at 1% level when adjusted for ties

Shapiro-Francia Test of Normality

Parameter: Aluminum
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 85

Data Set Standard Deviation = 1.5302
Numerator = 5391.79
Denominator = 15365.7
W Statistic = 0.350898 = 5391.79 / 15365.7

5% Critical value of 0.972 exceeds 0.350898
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.350898
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Aluminum
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
Total Number of Measurements = 85

Data Set Standard Deviation = 1.36081
Numerator = 10809.8
Denominator = 12152.2
W Statistic = 0.889534 = 10809.8 / 12152.2

5% Critical value of 0.972 exceeds 0.889534
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.889534
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Barium
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 86

Data Set Standard Deviation = 0.108382
Numerator = 38.974
Denominator = 79.1457
W Statistic = 0.492434 = 38.974 / 79.1457

5% Critical value of 0.972 exceeds 0.492434
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.492434
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Barium
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
Total Number of Measurements = 86

Data Set Standard Deviation = 1.04442
Numerator = 7056.55
Denominator = 7349.66
W Statistic = 0.960119 = 7056.55 / 7349.66

5% Critical value of 0.972 exceeds 0.960119
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.960119
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Chloride
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 96

Data Set Standard Deviation = 73.5562
Numerator = 2.50513e+007
Denominator = 4.57224e+007
W Statistic = 0.5479 = 2.50513e+007 / 4.57224e+007

5% Critical value of 0.975 exceeds 0.5479
Evidence of non-normality at 95% level of significance

1% Critical value of 0.965 exceeds 0.5479
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Chloride
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
Total Number of Measurements = 96

Data Set Standard Deviation = 1.41497
Numerator = 16531.5
Denominator = 16919.4
W Statistic = 0.977074 = 16531.5 / 16919.4

5% Critical value of 0.975 is less than 0.977074
Data is normally distributed at 95% level of significance

1% Critical value of 0.965 is less than 0.977074
Data is normally distributed at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Chromium
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 85

Data Set Standard Deviation = 0.0180705
Numerator = 0.620013
Denominator = 2.14289
W Statistic = 0.289336 = 0.620013 / 2.14289

5% Critical value of 0.972 exceeds 0.289336
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.289336
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Chromium
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
Total Number of Measurements = 85

Data Set Standard Deviation = 1.04426
Numerator = 5399.34
Denominator = 7156.12
W Statistic = 0.754507 = 5399.34 / 7156.12

5% Critical value of 0.972 exceeds 0.754507
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.754507
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Cobalt
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 85

Data Set Standard Deviation = 0.0139978
Numerator = 0.989941
Denominator = 1.28581
W Statistic = 0.769898 = 0.989941 / 1.28581

5% Critical value of 0.972 exceeds 0.769898
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.769898
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Cobalt
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
Total Number of Measurements = 85

Data Set Standard Deviation = 1.36519
Numerator = 10729.8
Denominator = 12230.5
W Statistic = 0.877301 = 10729.8 / 12230.5

5% Critical value of 0.972 exceeds 0.877301
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.877301
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Fluoride
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 56

Data Set Standard Deviation = 0.0689713
Numerator = 3.9526
Denominator = 12.9777
W Statistic = 0.304568 = 3.9526 / 12.9777

5% Critical value of 0.961 exceeds 0.304568
Evidence of non-normality at 95% level of significance

1% Critical value of 0.944 exceeds 0.304568
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Fluoride
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
Total Number of Measurements = 56

Data Set Standard Deviation = 0.545304
Numerator = 344.915
Denominator = 811.223
W Statistic = 0.425179 = 344.915 / 811.223

5% Critical value of 0.961 exceeds 0.425179
Evidence of non-normality at 95% level of significance

1% Critical value of 0.944 exceeds 0.425179
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Nickel
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 87

Data Set Standard Deviation = 0.0328176
Numerator = 3.01642
Denominator = 7.41171
W Statistic = 0.40698 = 3.01642 / 7.41171

5% Critical value of 0.972 exceeds 0.40698
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.40698
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Nickel
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
Total Number of Measurements = 87

Data Set Standard Deviation = 1.25599
Numerator = 9390.81
Denominator = 10856.2
W Statistic = 0.865021 = 9390.81 / 10856.2

5% Critical value of 0.972 exceeds 0.865021
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.865021
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Selenium
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 86

Data Set Standard Deviation = 0.000471332
Numerator = 0.000951805
Denominator = 0.00149681
W Statistic = 0.635889 = 0.000951805 / 0.00149681

5% Critical value of 0.972 exceeds 0.635889
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.635889
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Selenium
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
Total Number of Measurements = 86

Data Set Standard Deviation = 0.358309
Numerator = 558.189
Denominator = 865.025
W Statistic = 0.645287 = 558.189 / 865.025

5% Critical value of 0.972 exceeds 0.645287
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.645287
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Sulfate
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 87

Data Set Standard Deviation = 53.0373
Numerator = 3.59949e+006
Denominator = 1.93583e+007
W Statistic = 0.18594 = 3.59949e+006 / 1.93583e+007

5% Critical value of 0.972 exceeds 0.18594
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.18594
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Sulfate
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
Total Number of Measurements = 87

Data Set Standard Deviation = 1.12546
Numerator = 6170.93
Denominator = 8716.91
W Statistic = 0.707926 = 6170.93 / 8716.91

5% Critical value of 0.972 exceeds 0.707926
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.707926
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Total Cadmium
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 85

Data Set Standard Deviation = 0.0388339
Numerator = 1.51147
Denominator = 9.89643
W Statistic = 0.152729 = 1.51147 / 9.89643

5% Critical value of 0.972 exceeds 0.152729
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.152729
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Total Cadmium
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
Total Number of Measurements = 85

Data Set Standard Deviation = 1.2477
Numerator = 3463.15
Denominator = 10215.8
W Statistic = 0.338998 = 3463.15 / 10215.8

5% Critical value of 0.972 exceeds 0.338998
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.338998
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Zinc
All Locations
Normality Test of Parameter Concentrations
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 87

Data Set Standard Deviation = 0.249003
Numerator = 84.9114
Denominator = 426.693
W Statistic = 0.198999 = 84.9114 / 426.693

5% Critical value of 0.972 exceeds 0.198999
Evidence of non-normality at 95% level of significance

1% Critical value of 0.961 exceeds 0.198999
Evidence of non-normality at 99% level of significance

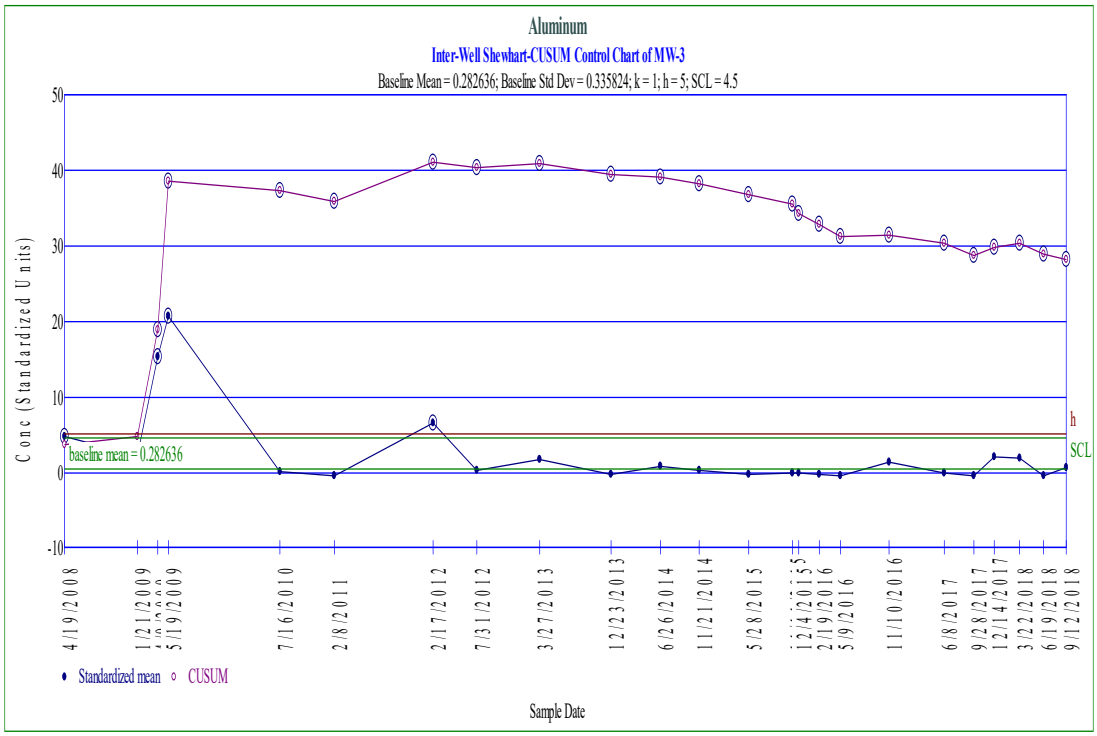
Shapiro-Francia Test of Normality

Parameter: Zinc
All Locations
Normality Test of Parameter Concentrations
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
Total Number of Measurements = 87

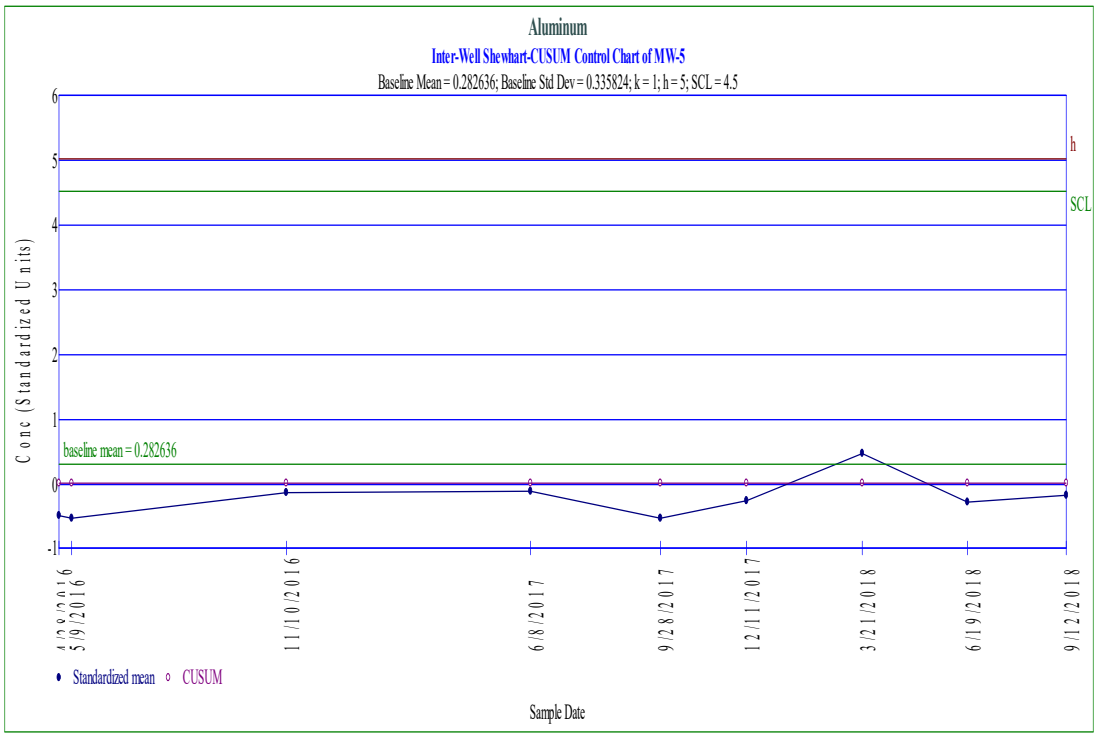
Data Set Standard Deviation = 1.03479
Numerator = 4573.55
Denominator = 7368.98
W Statistic = 0.620649 = 4573.55 / 7368.98

5% Critical value of 0.972 exceeds 0.620649
Evidence of non-normality at 95% level of significance

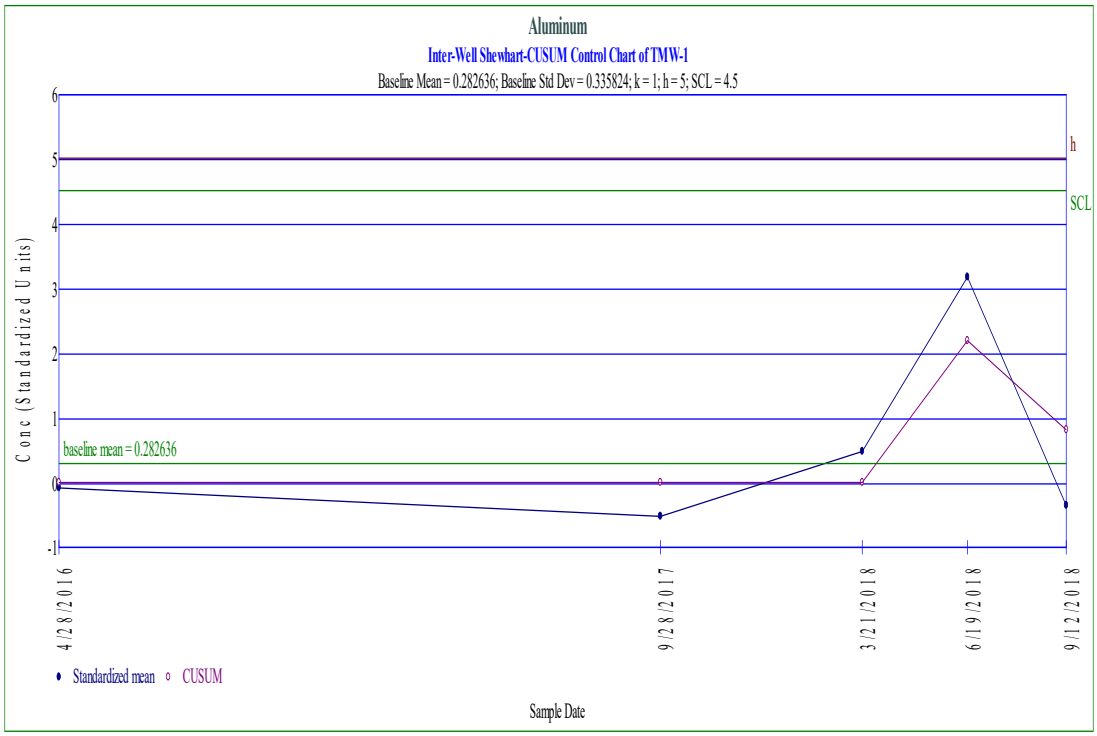
1% Critical value of 0.961 exceeds 0.620649
Evidence of non-normality at 99% level of significance

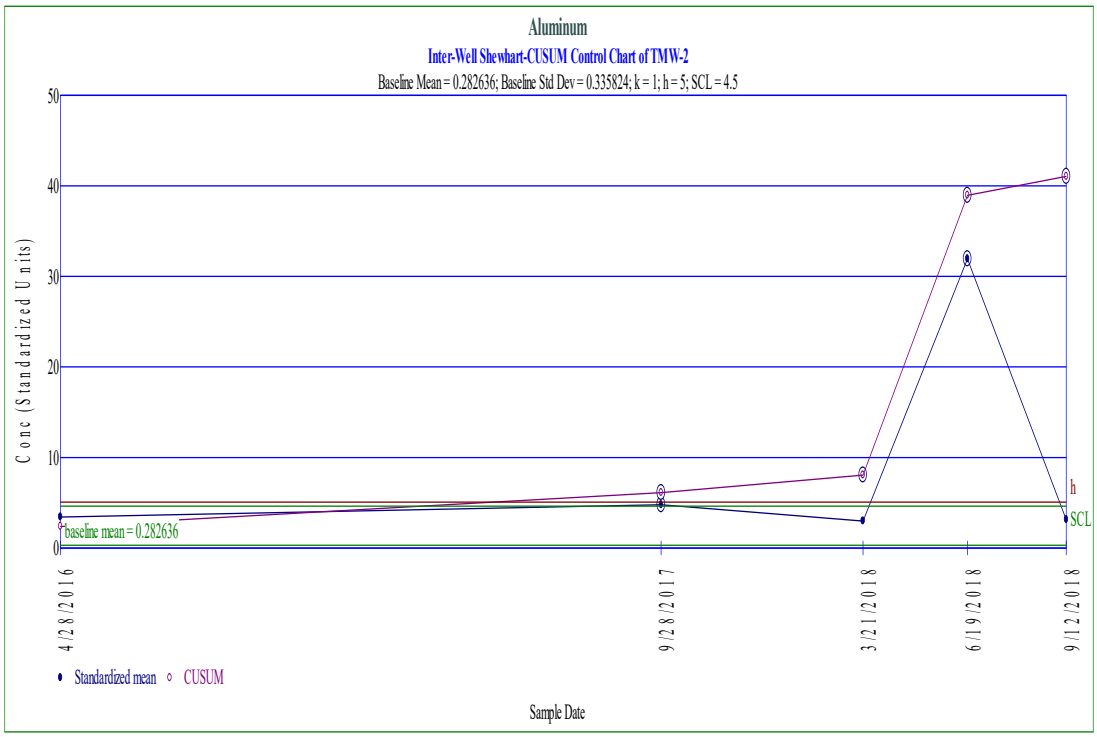

Aluminum
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 0.282636; Baseline Std Dev = 0.335824; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
50
40
30
20
10
0
-10
h
SCL
baseline mean = 0.282636
4/19/2008
7/16/2010
2/8/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
2/19/2016
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/14/2017
3/22/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

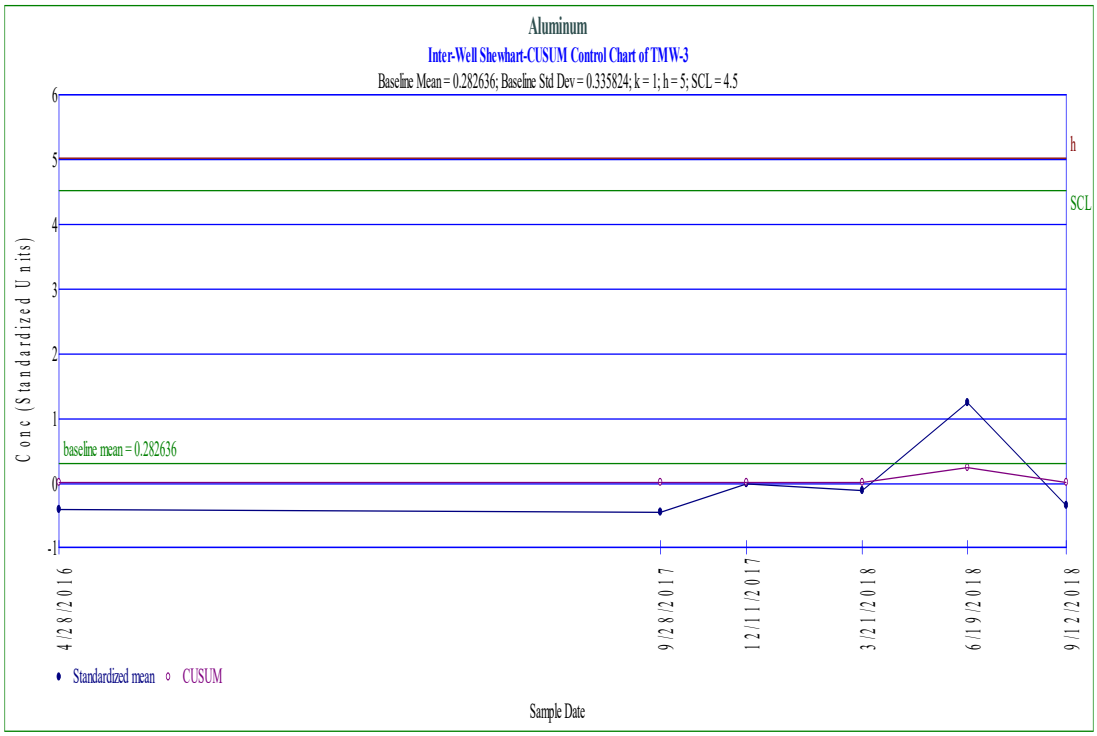
Page 1

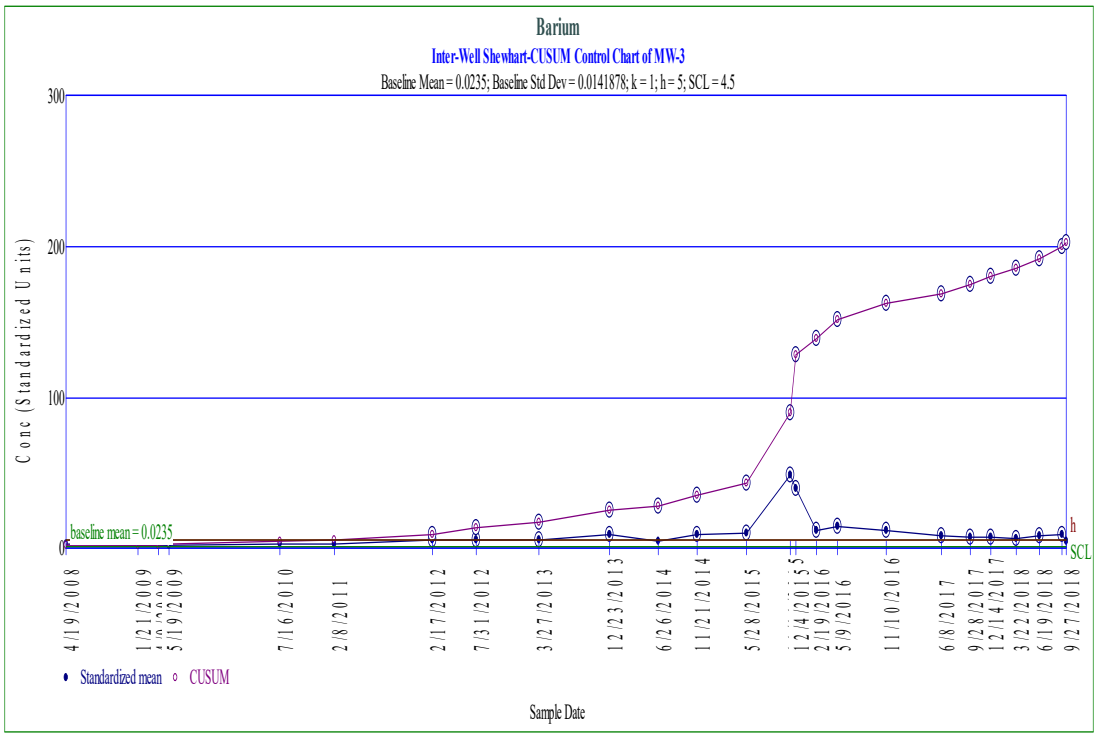

Aluminum
Inter-Well Shewhart-CUSUM Control Chart of MW-5
Baseline Mean = 0.282636; Baseline Std Dev = 0.335824; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
h
SCL
baseline mean = 0.282636
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

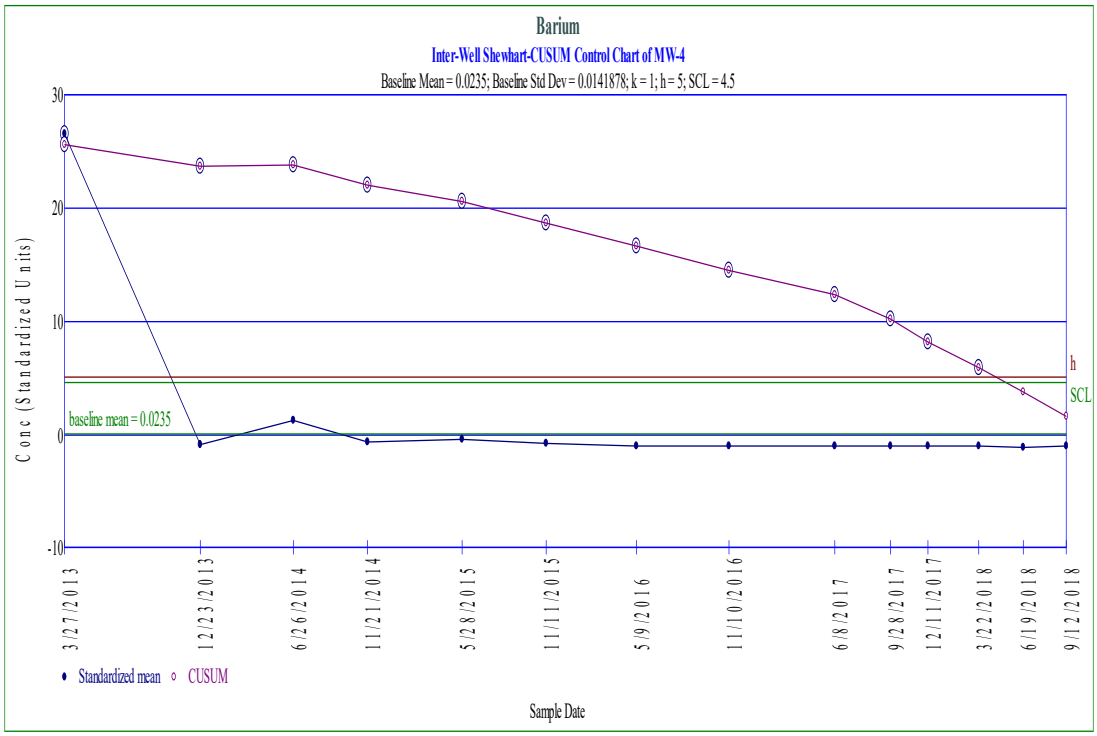
Page 2

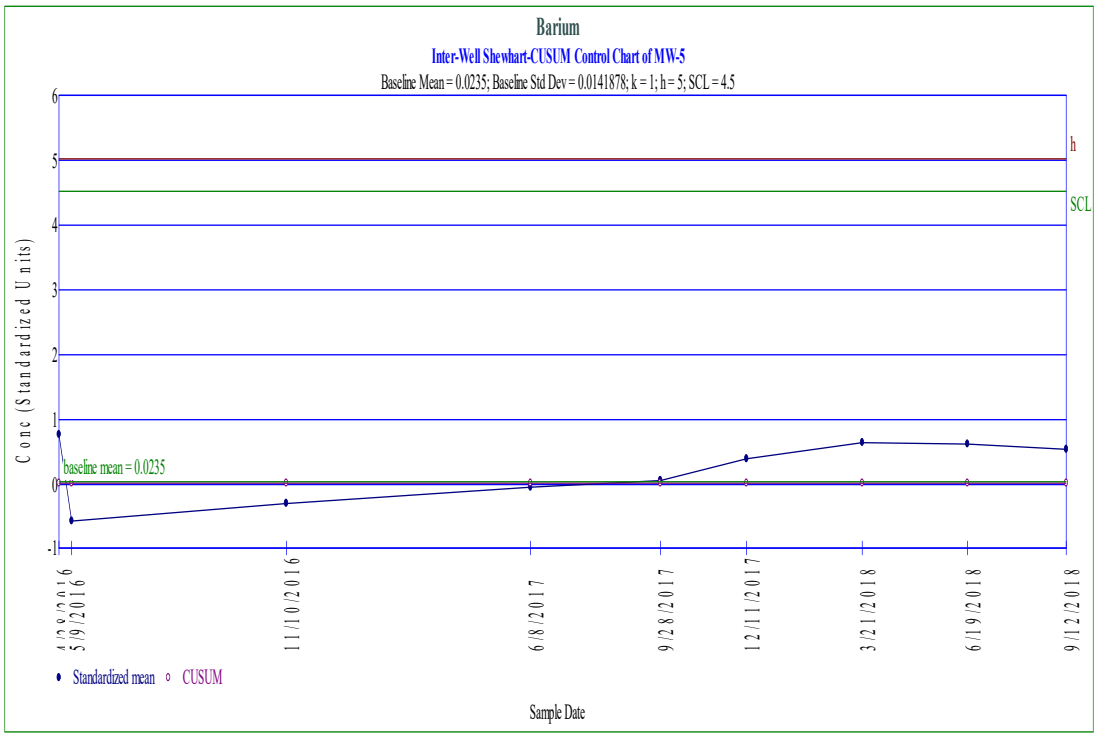

Aluminum
Inter-Well Shewhart-CUSUM Control Chart of TMW-1
Baseline Mean = 0.282636; Baseline Std Dev = 0.335824; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
h
SCL
baseline mean = 0.282636
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

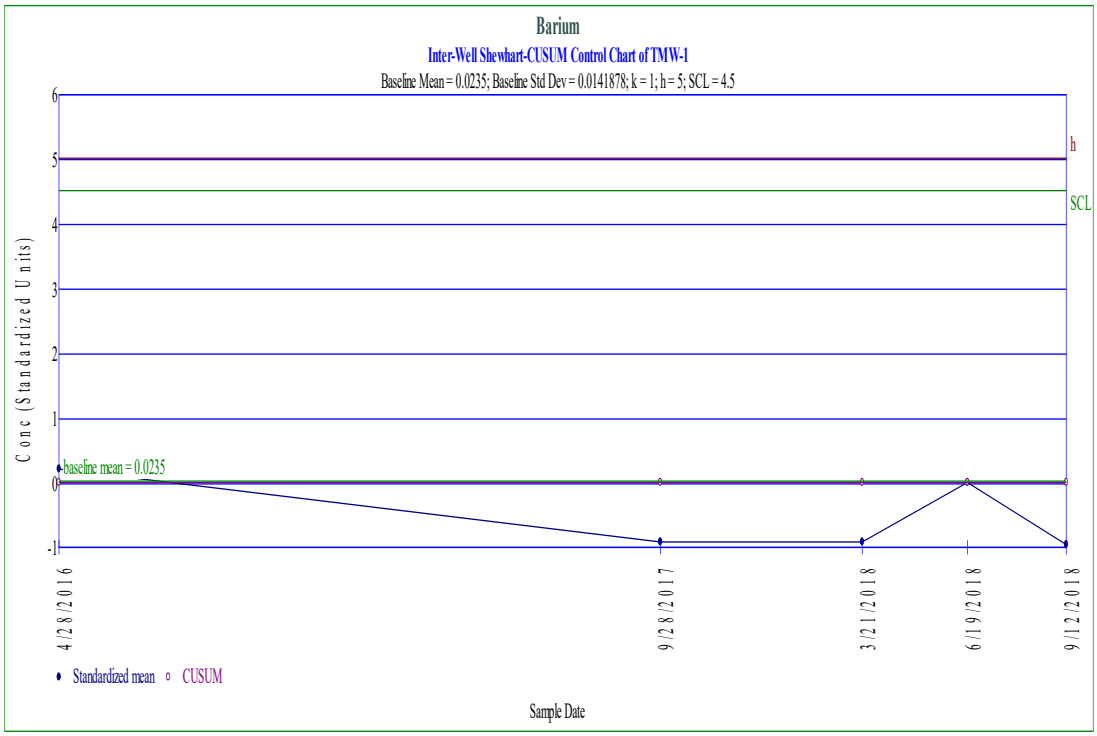

Aluminum
Inter-Well Shewhart-CUSUM Control Chart of TMW-2
Baseline Mean = 0.282636; Baseline Std Dev = 0.335824; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
50
40
30
20
10
0
h
SCL
baseline mean = 0.282636
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

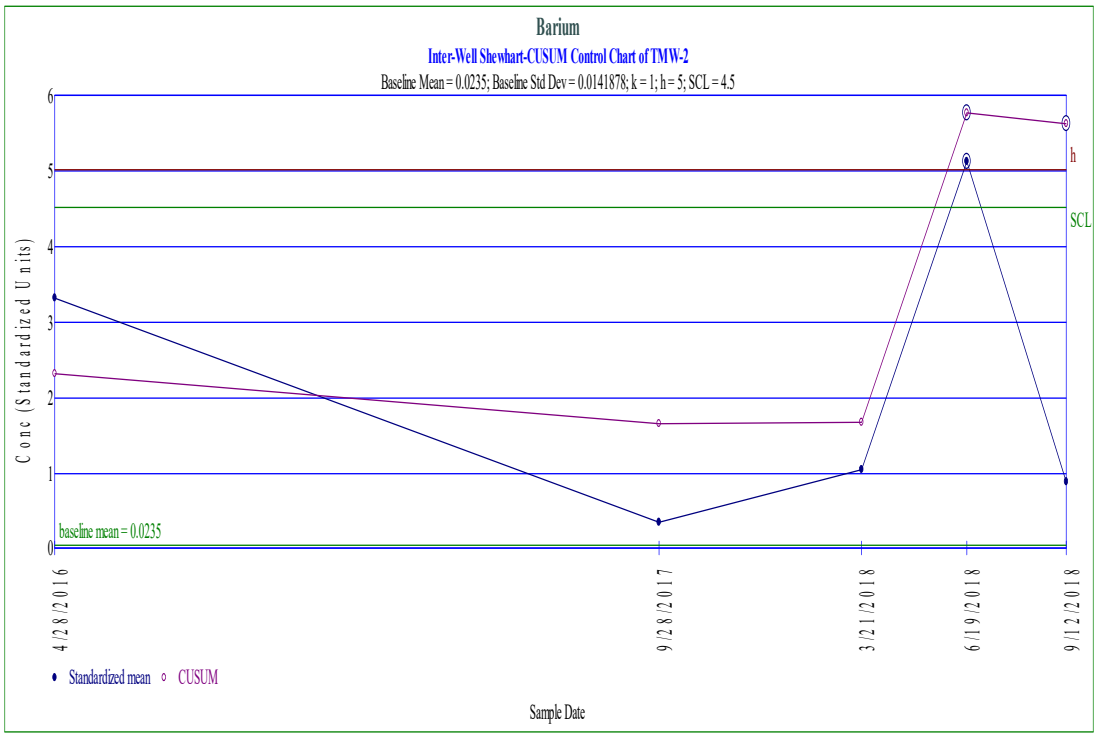

Aluminum
Inter-Well Shewhart-CUSUM Control Chart of TMW-3
Baseline Mean = 0.282636; Baseline Std Dev = 0.335824; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
h
SCL
baseline mean = 0.282636
4/28/2016
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

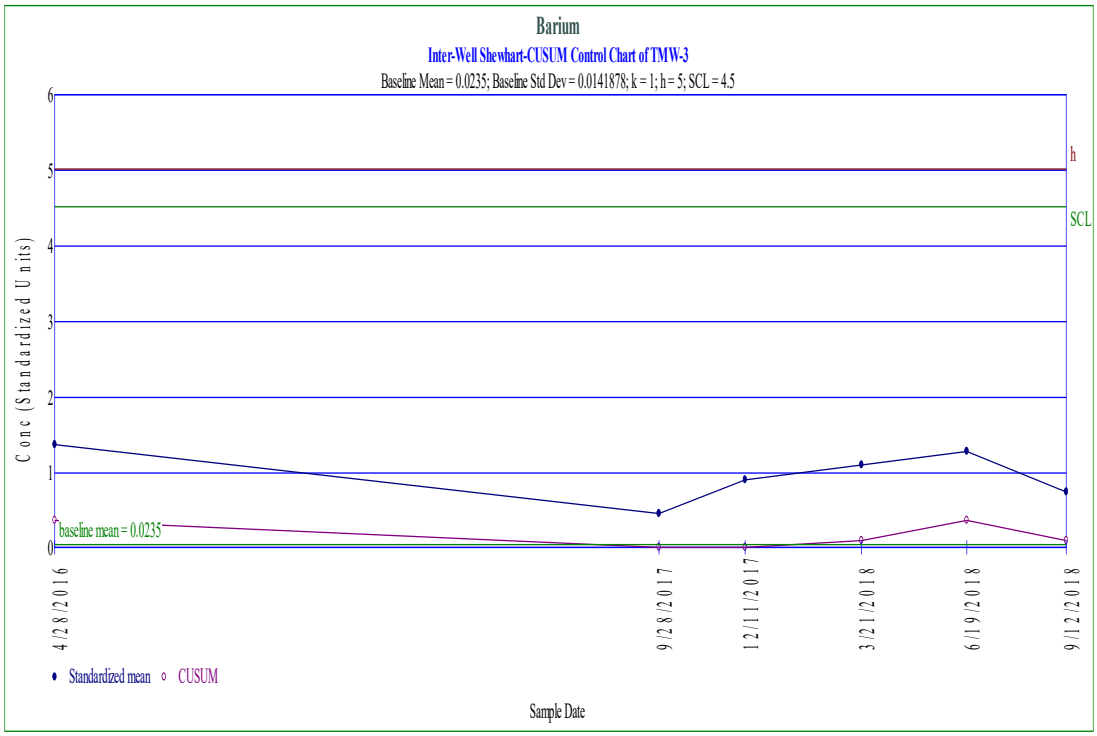

Barium
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 0.0235; Baseline Std Dev = 0.0141878; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
300
200
100
0
h
SCL
baseline mean = 0.0235
4/19/2008
1/21/2009
5/19/2009
7/16/2010
2/8/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
12/4/2015
2/19/2016
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/14/2017
3/22/2018
6/19/2018
9/27/2018
Standardized mean
CUSUM
Sample Date

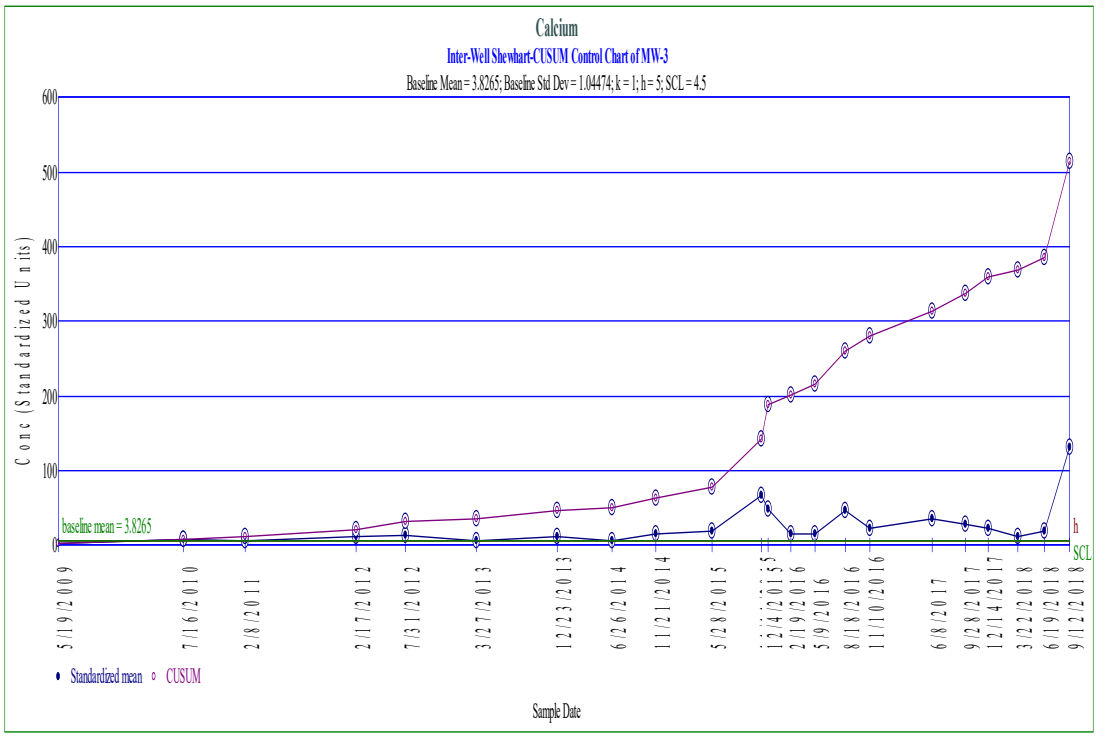

Barium
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 0.0235; Baseline Std Dev = 0.0141878; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
30
20
10
0
-10
h
SCL
baseline mean = 0.0235
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/22/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

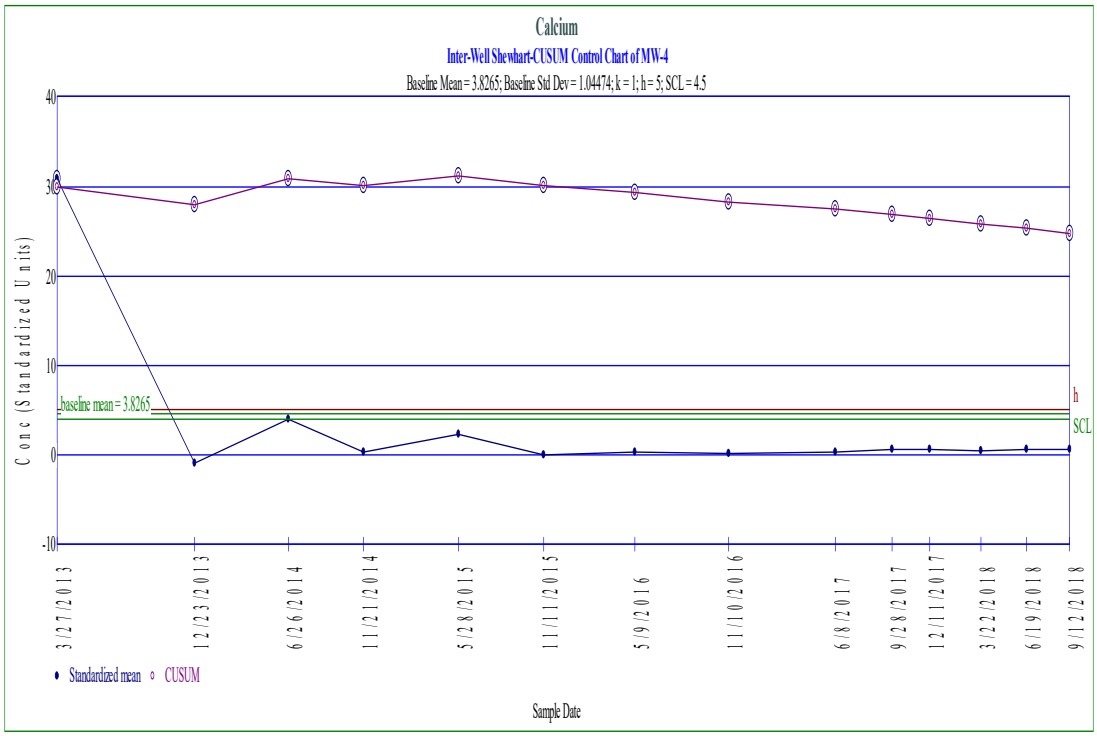

Barium
Inter-Well Shewhart-CUSUM Control Chart of MW-5
Baseline Mean = 0.0235; Baseline Std Dev = 0.0141878; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
h
SCL
baseline mean = 0.0235
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

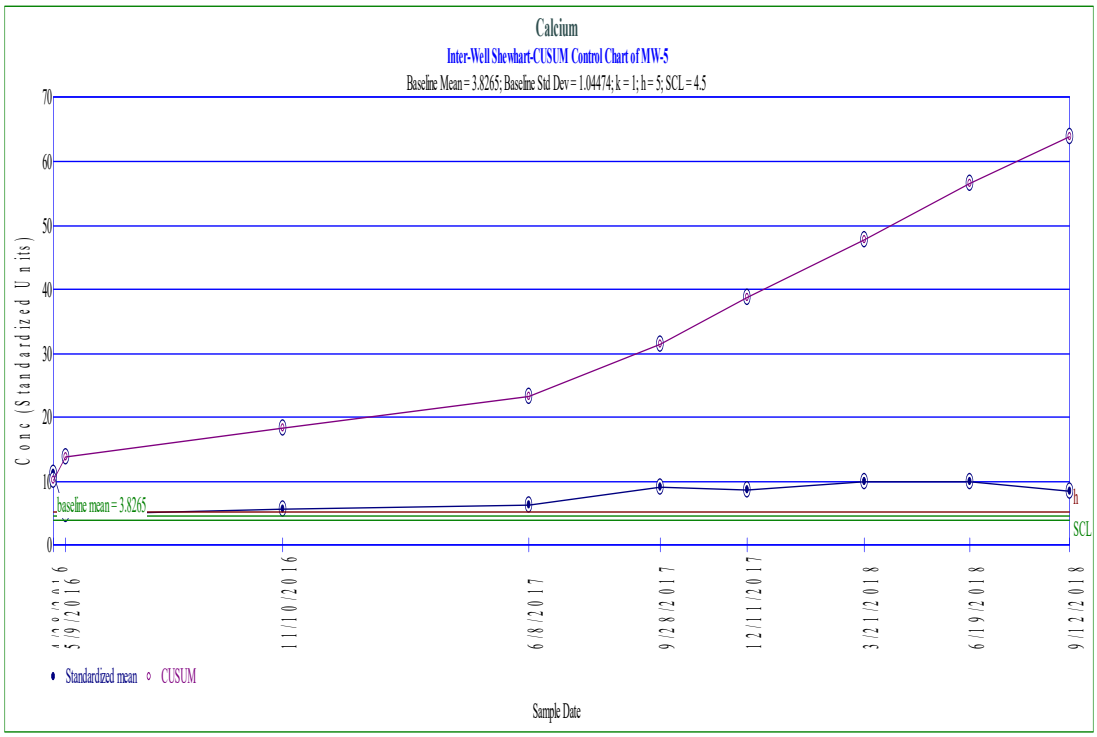

Barium
Inter-Well Shewhart-CUSUM Control Chart of TMW-1
Baseline Mean = 0.0235; Baseline Std Dev = 0.0141878; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
h
SCL
baseline mean = 0.0235
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

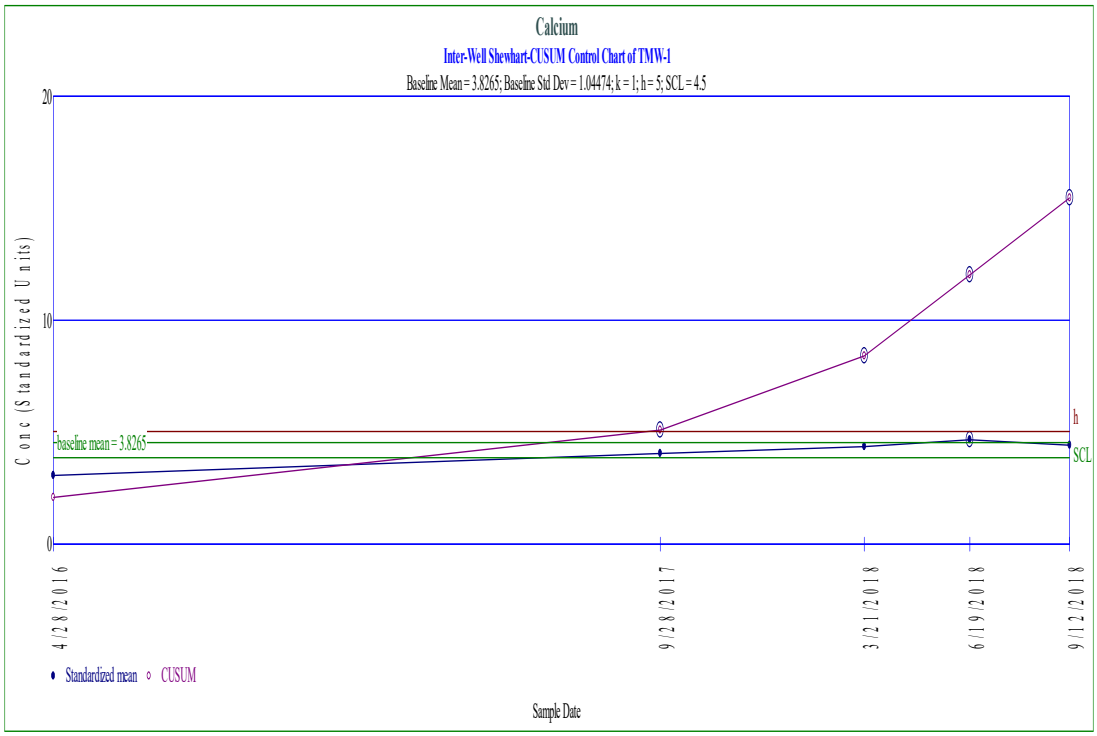

Barium
Inter-Well Shewhart-CUSUM Control Chart of TMW-2
Baseline Mean = 0.0235; Baseline Std Dev = 0.0141878; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
h
SCL
baseline mean = 0.0235
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

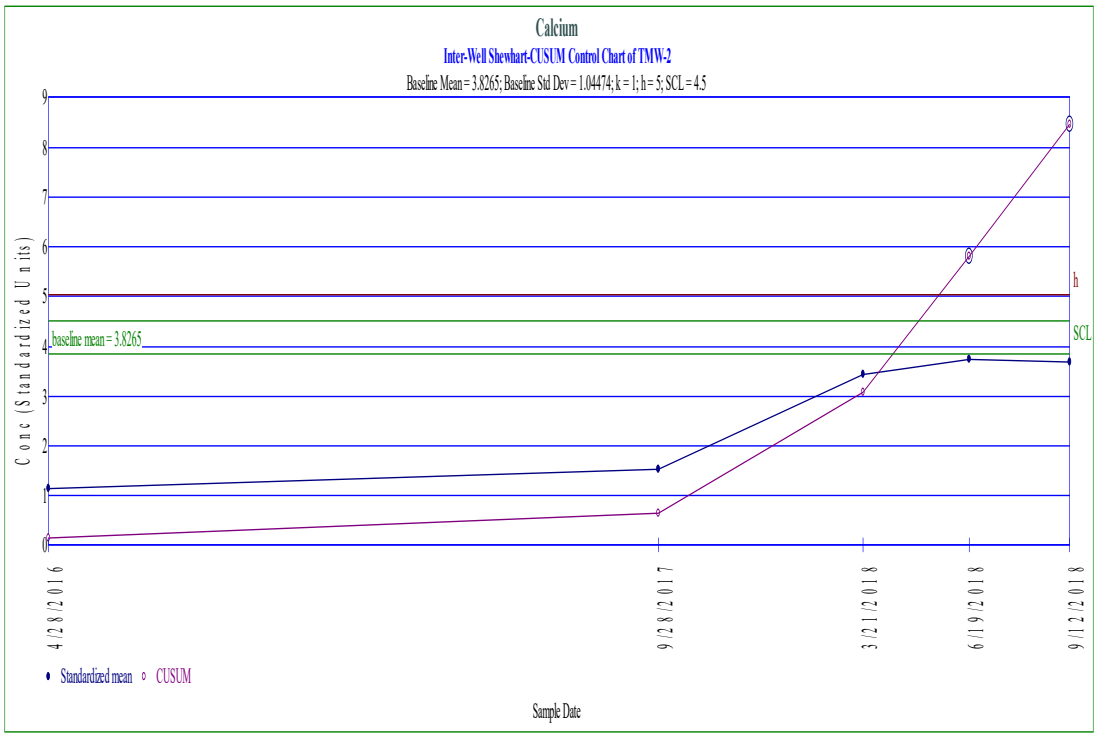

Barium
Inter-Well Shewhart-CUSUM Control Chart of TMW-3
Baseline Mean = 0.0235; Baseline Std Dev = 0.0141878; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
h
SCL
baseline mean = 0.0235
4/28/2016
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

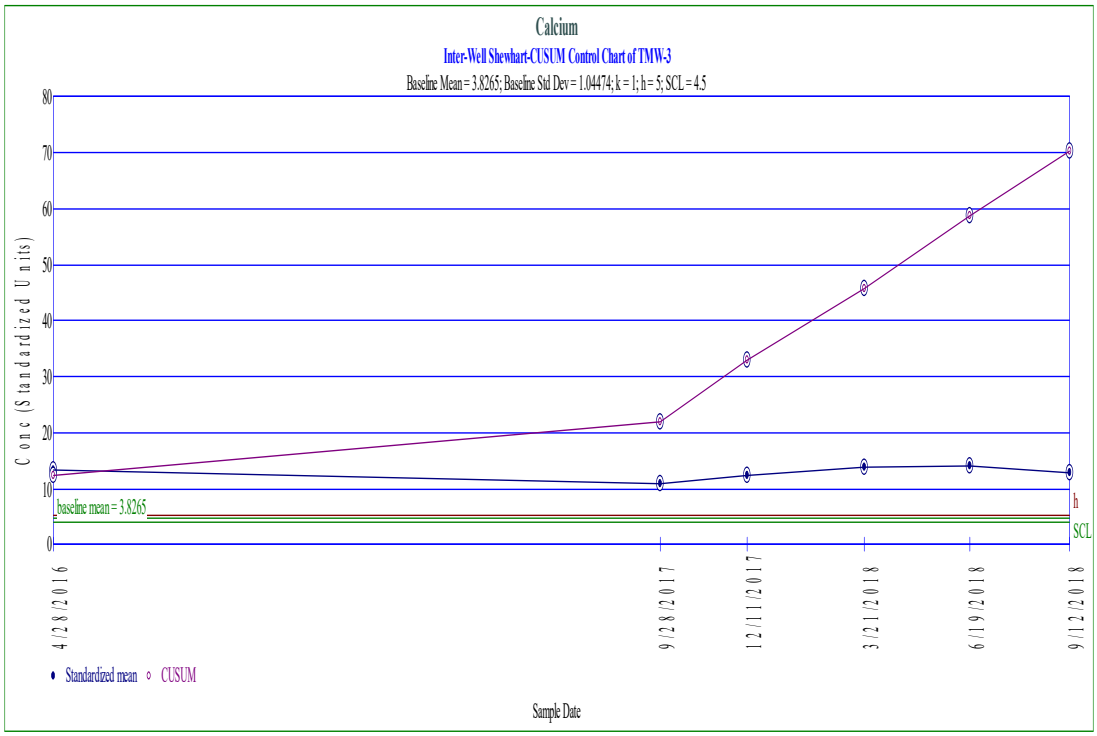

Calcium
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 3.8265; Baseline Std Dev = 1.04474; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
h
SCL
baseline mean = 3.8265
5/19/2009
7/16/2010
2/8/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
12/4/2015
2/19/2016
5/9/2016
8/18/2016
11/10/2016
6/8/2017
9/28/2017
12/14/2017
3/22/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

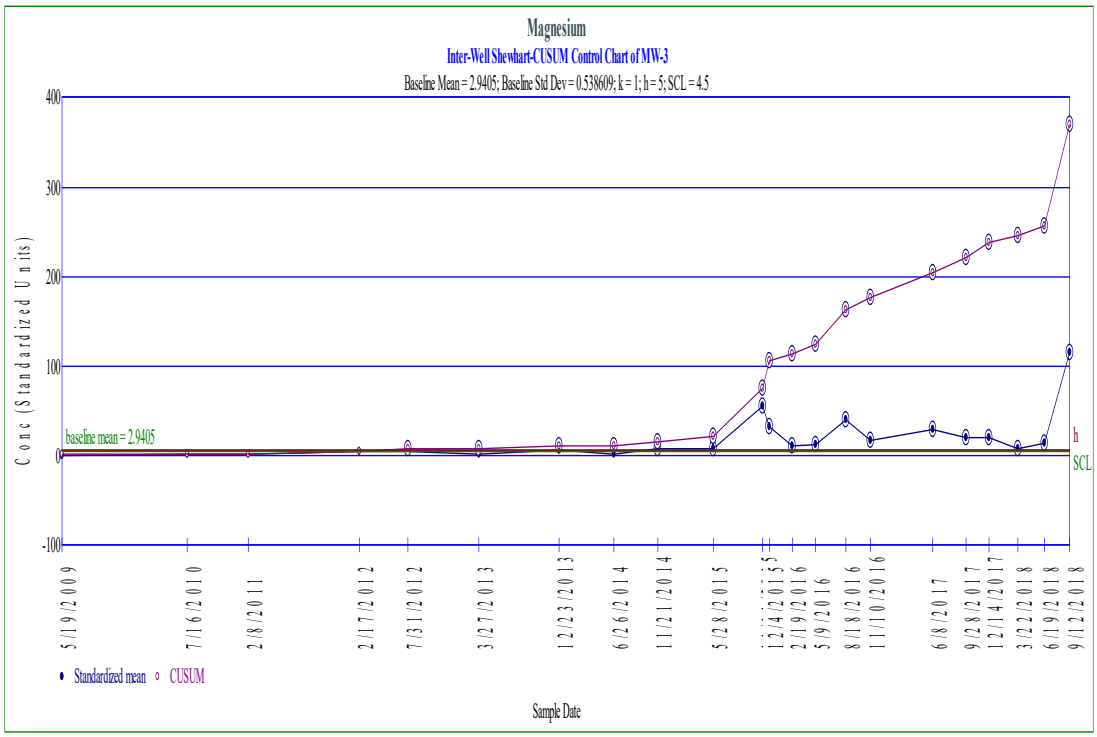

Calcium
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 3.8265; Baseline Std Dev = 1.04474; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
40
30
20
10
0
-10
baseline mean = 3.8265
h
SCL
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/22/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

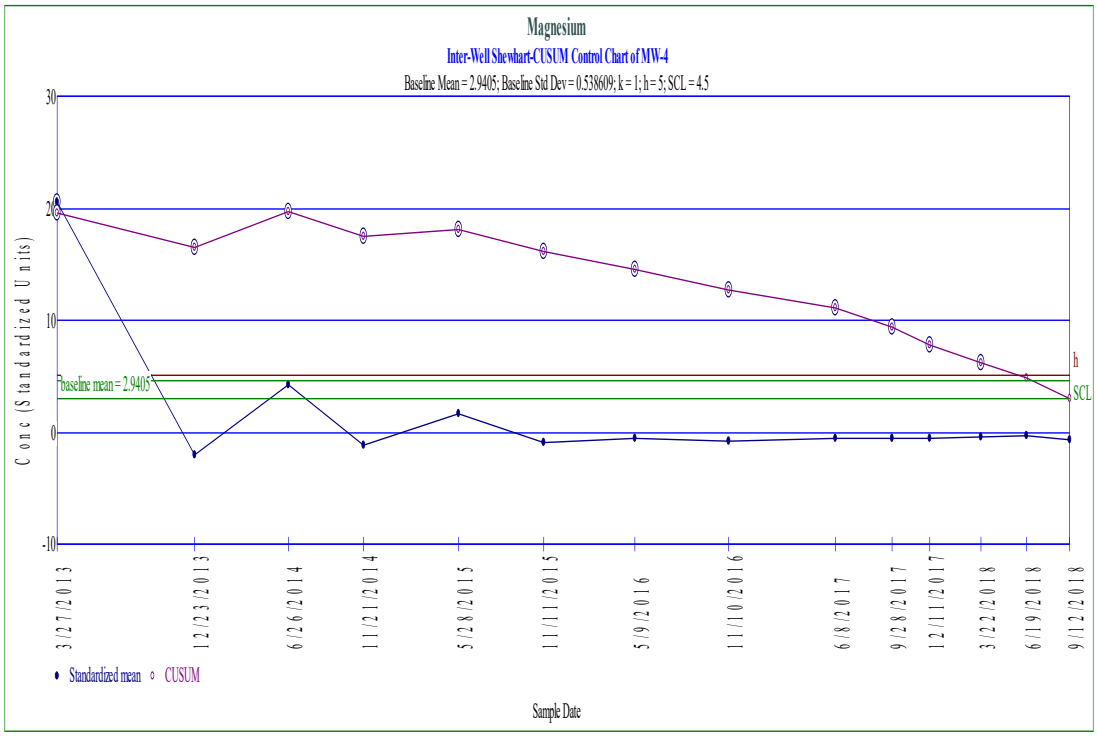

Calcium
Inter-Well Shewhart-CUSUM Control Chart of MW-5
Baseline Mean = 3.8265; Baseline Std Dev = 1.04474; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
70
60
50
40
30
20
10
0
baseline mean = 3.8265
h
SCL
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

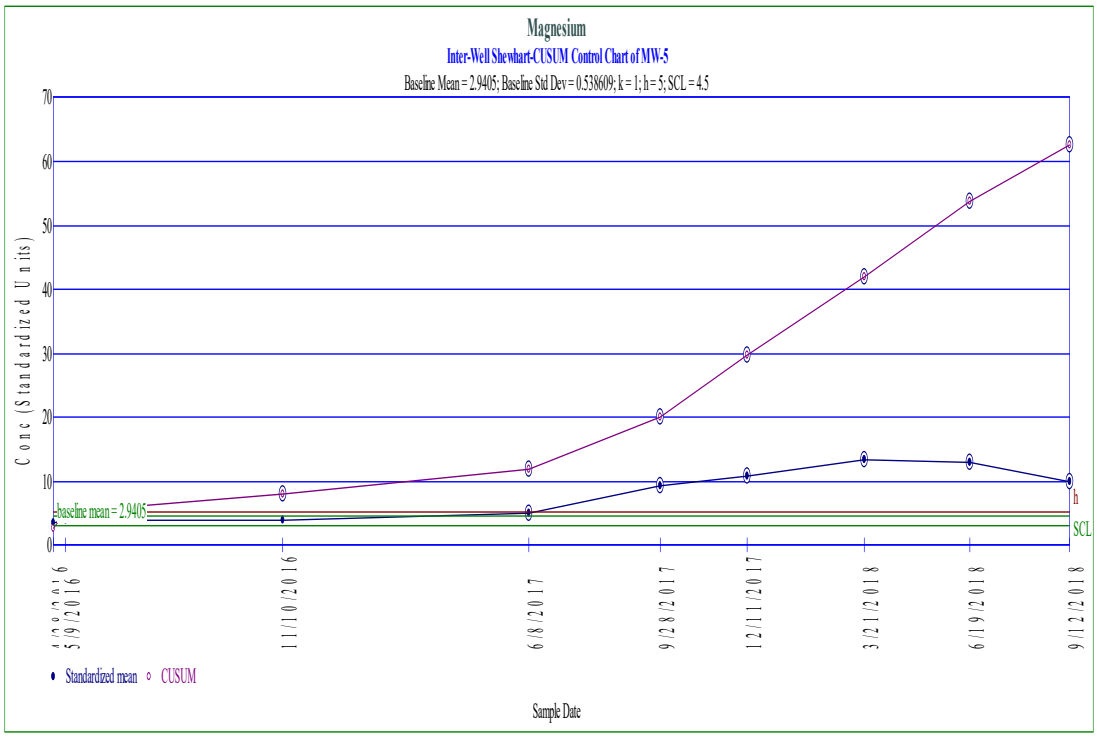

Calcium
Inter-Well Shewhart-CUSUM Control Chart of TMW-1
Baseline Mean = 3.8265; Baseline Std Dev = 1.04474; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
20
10
0
baseline mean = 3.8265
h
SCL
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

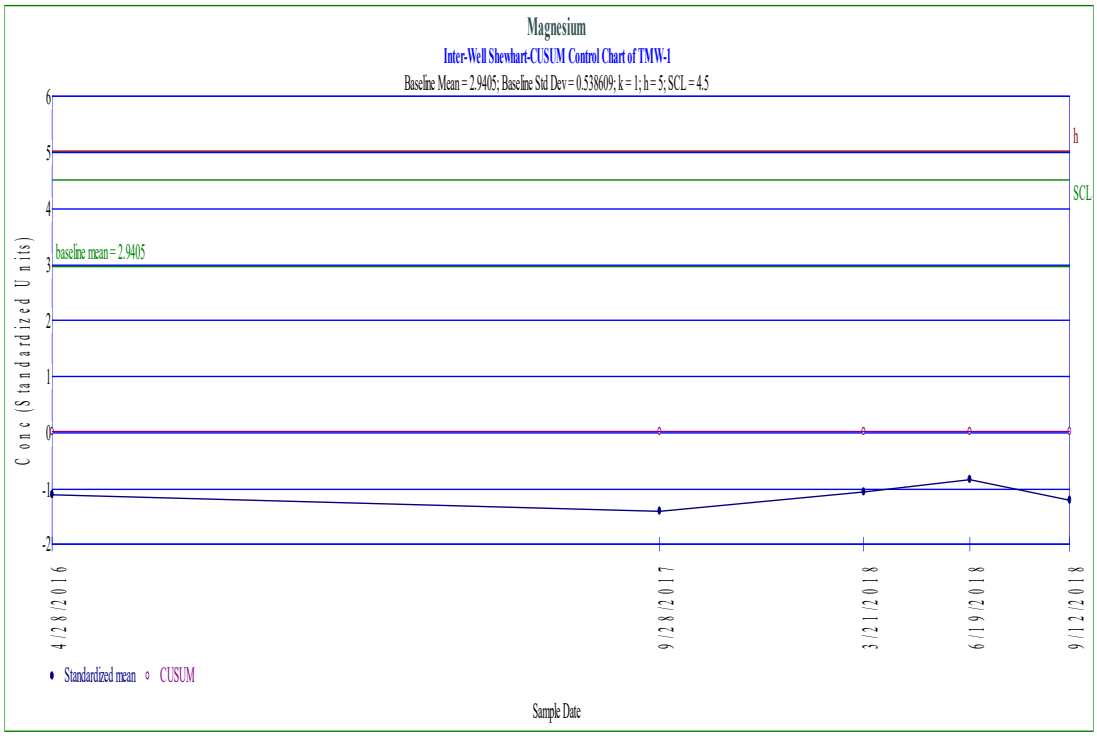

Calcium
Inter-Well Shewhart-CUSUM Control Chart of TMW-2
Baseline Mean = 3.8265; Baseline Std Dev = 1.04474; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
9
8
7
6
5
4
3
2
1
0
h
SCL
baseline mean = 3.8265
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

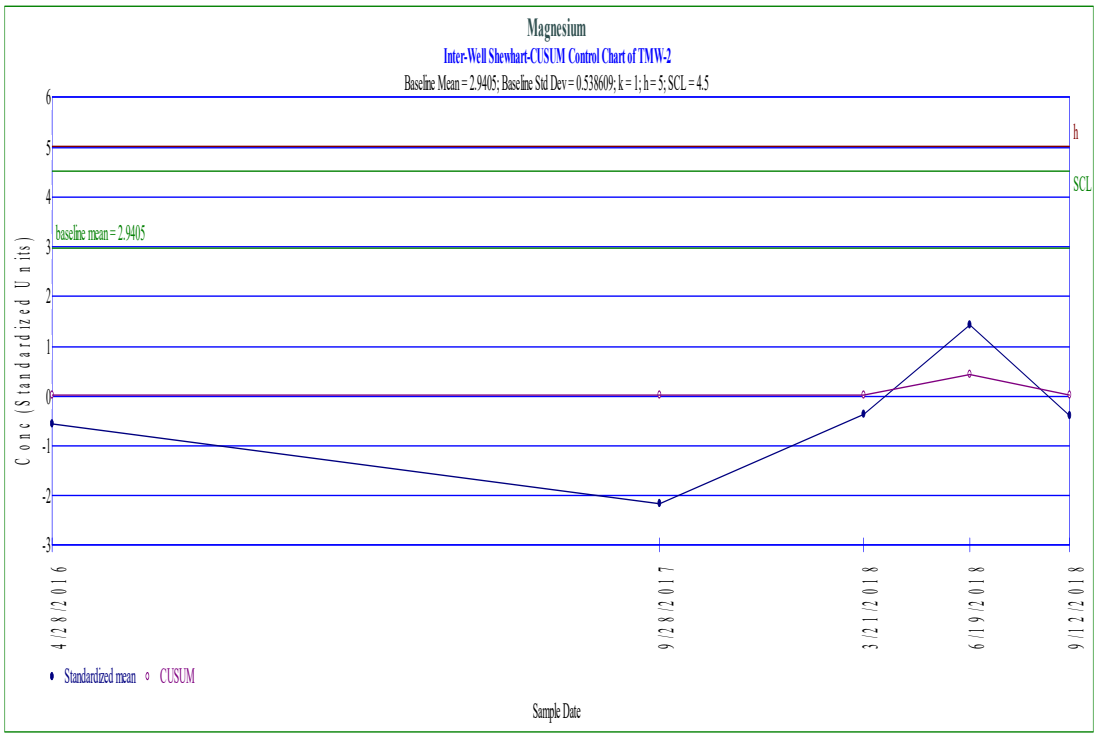

Calcium
Inter-Well Shewhart-CUSUM Control Chart of TMW-3
Baseline Mean = 3.8265; Baseline Std Dev = 1.04474; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
baseline mean = 3.8265
h
SCL
4/28/2016
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

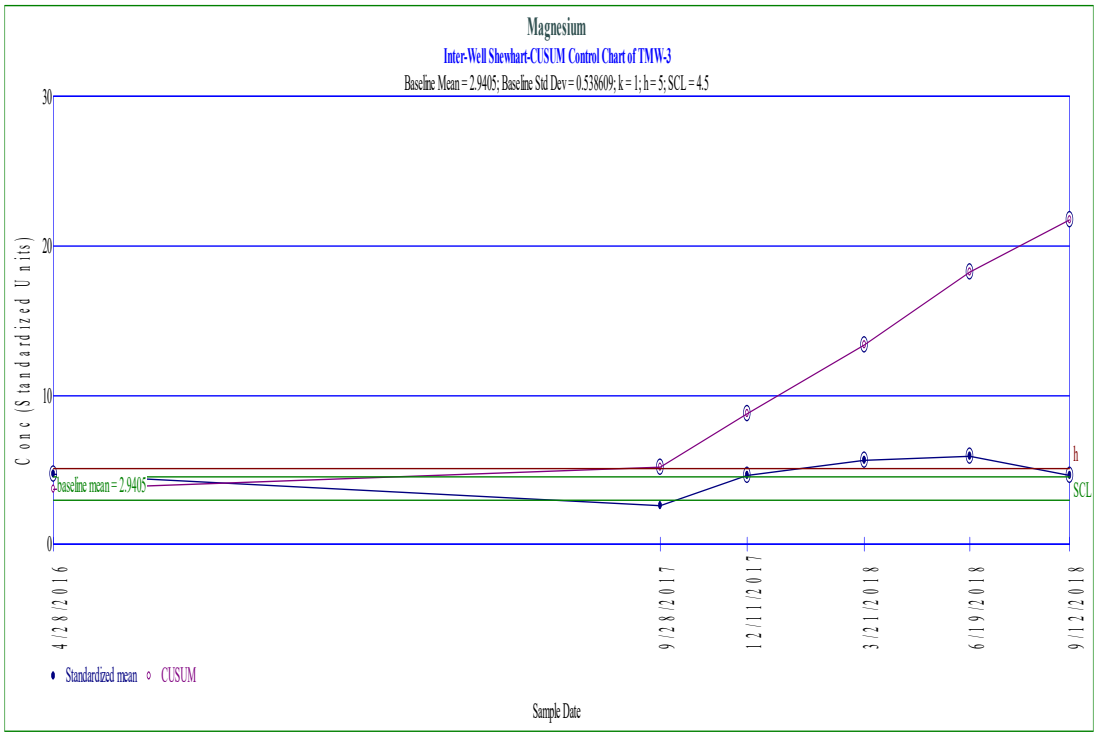

Magnesium
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 2.9405; Baseline Std Dev = 0.538609; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
baseline mean = 2.9405
h
SCL
5/19/2009
7/16/2010
2/8/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
12/4/2015
2/19/2016
5/9/2016
8/18/2016
11/10/2016
6/8/2017
9/28/2017
12/14/2017
3/22/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date


Magnesium
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 2.9405; Baseline Std Dev = 0.538609; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
30
20
10
0
-10
Baseline mean = 2.9405
h
SCL
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/22/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date


Magnesium
Inter-Well Shewhart-CUSUM Control Chart of MW-5
Baseline Mean = 2.9405; Baseline Std Dev = 0.538609; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
70
60
50
40
30
20
10
0
baseline mean = 2.9405
h
SCL
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date


Magnesium
Inter-Well Shewhart-CUSUM Control Chart of TMW-1
Baseline Mean = 2.9405; Baseline Std Dev = 0.538609; k = 1; h = 5; SCL = 4.5
h
SCL
baseline mean = 2.9405
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
-2
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date


Magnesium
Inter-Well Shewhart-CUSUM Control Chart of TMW-2
Baseline Mean = 2.9405; Baseline Std Dev = 0.538609; k = 1; h = 5; SCL = 4.5
h
SCL
baseline mean = 2.9405
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
-2
-3
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date



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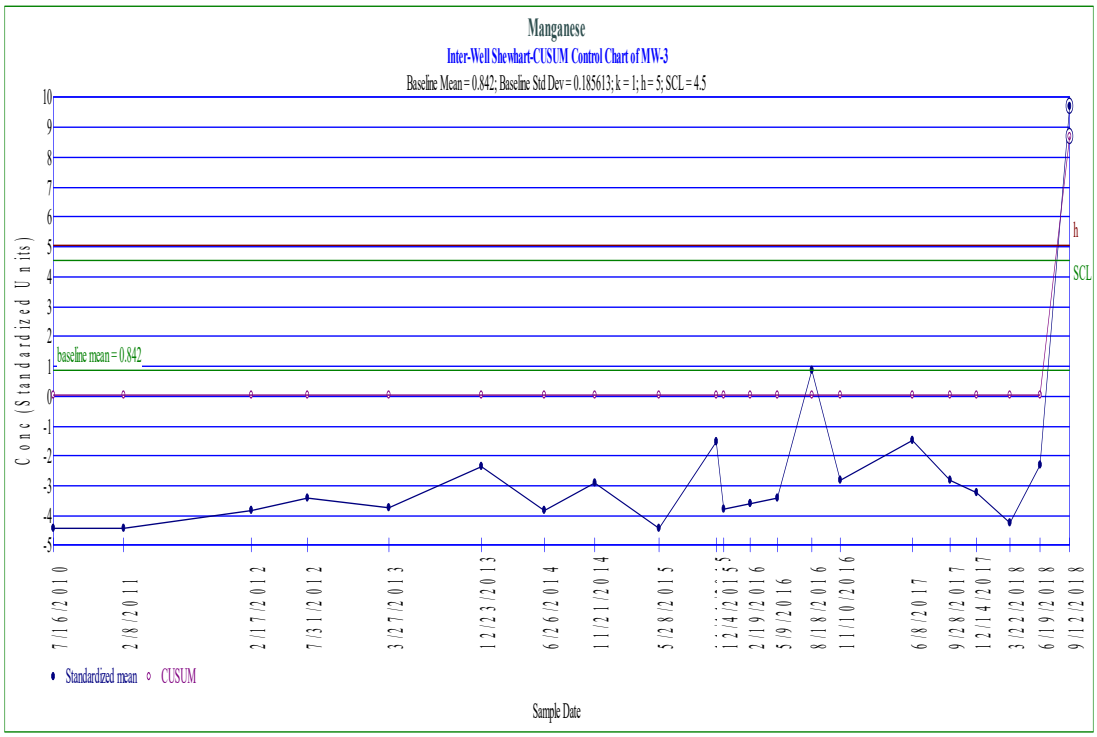

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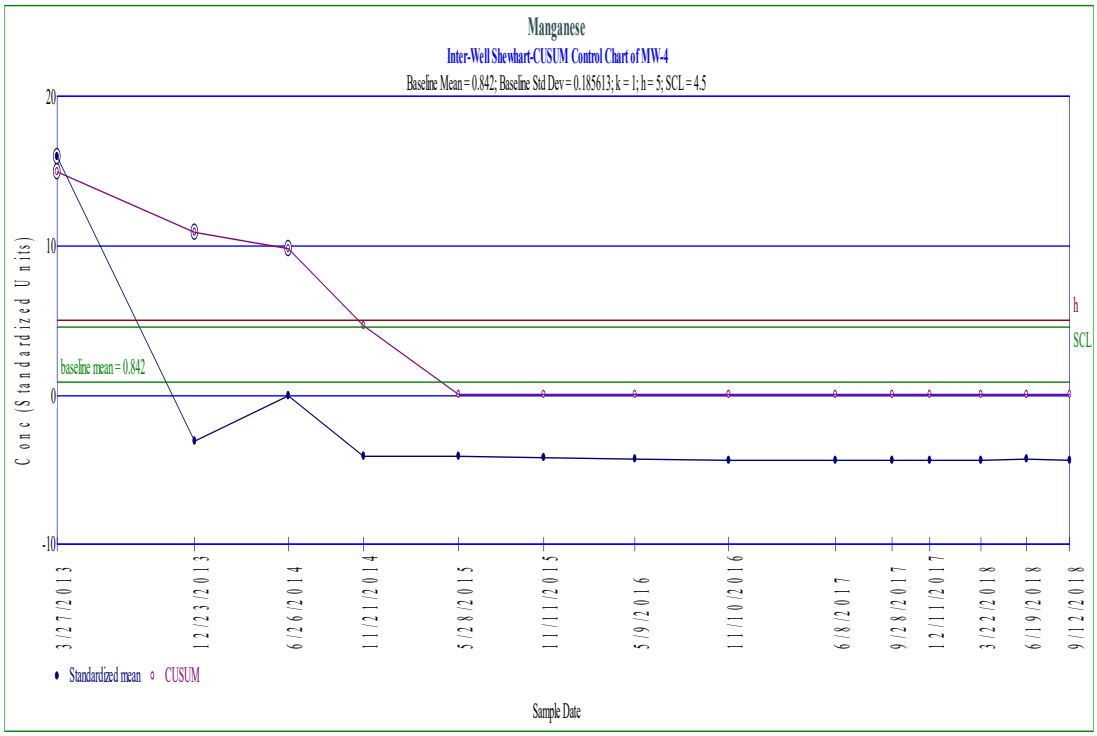
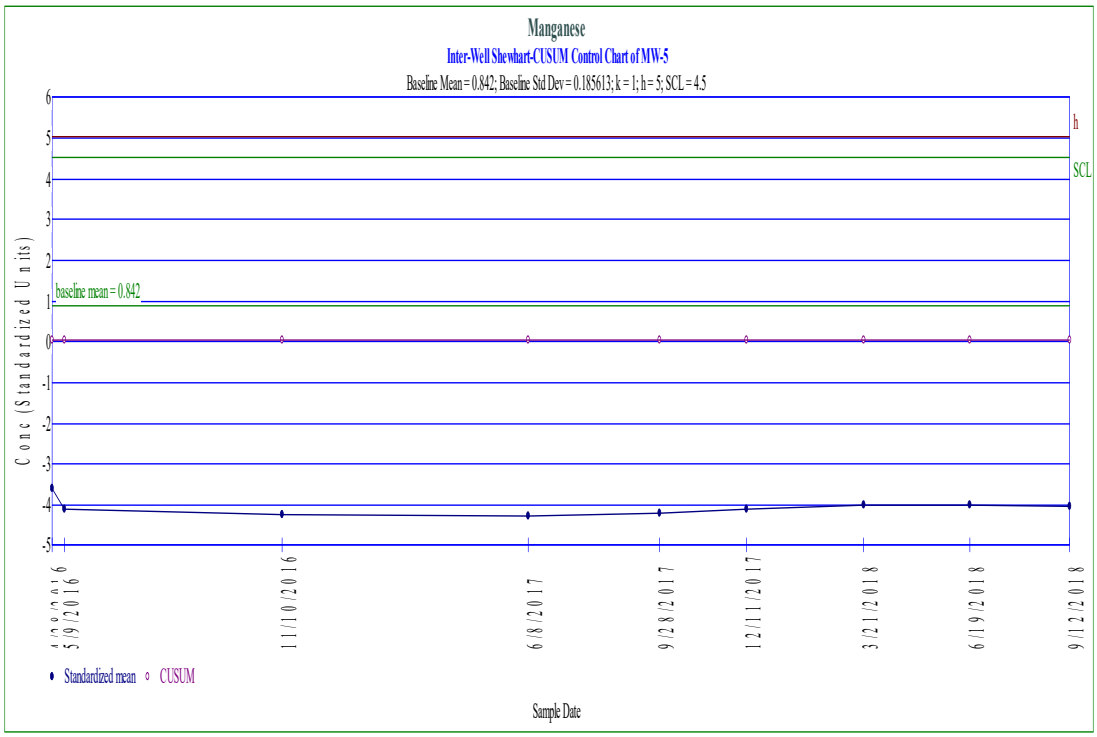
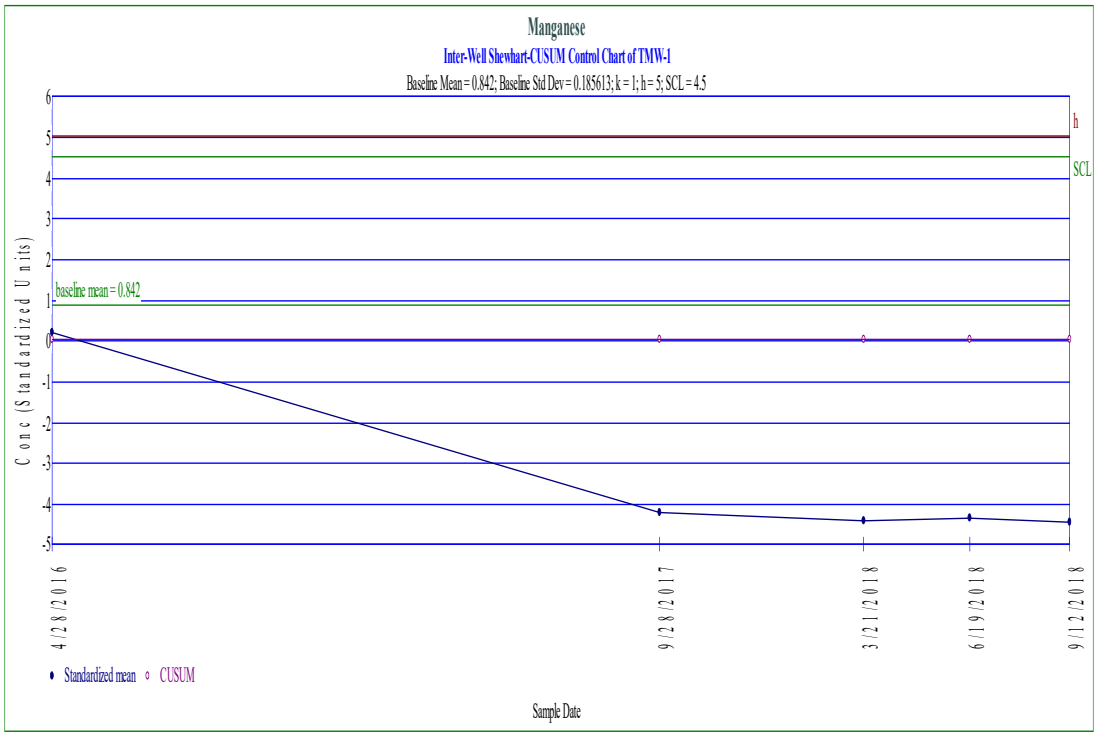
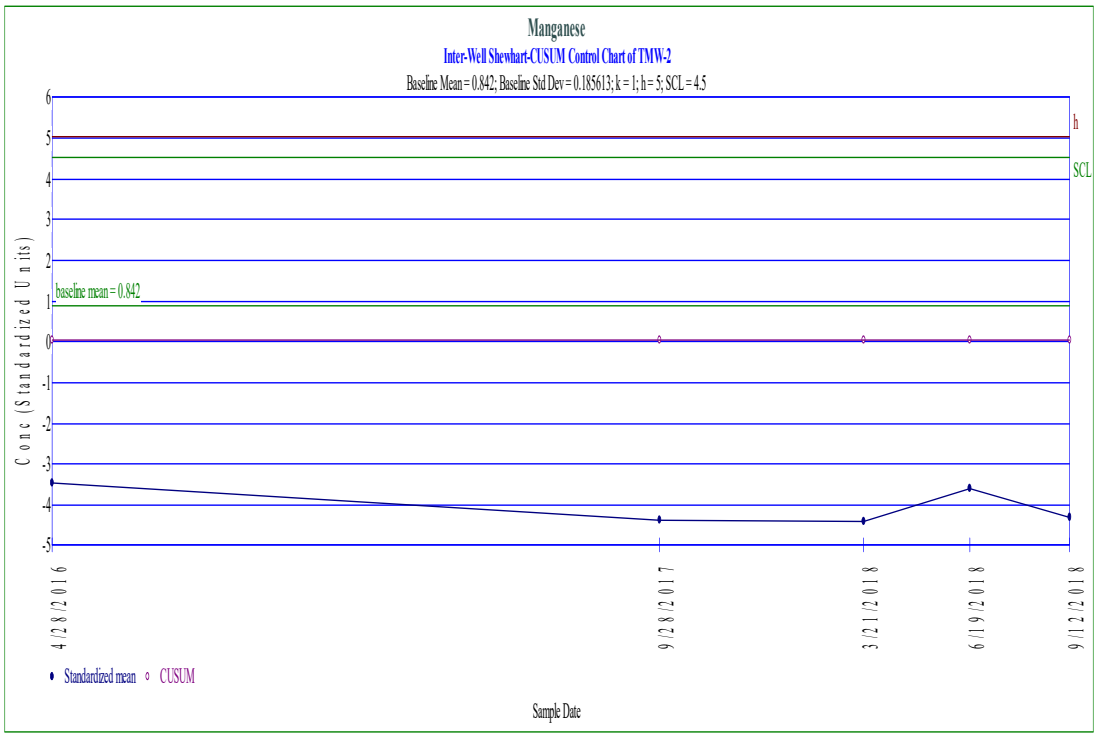
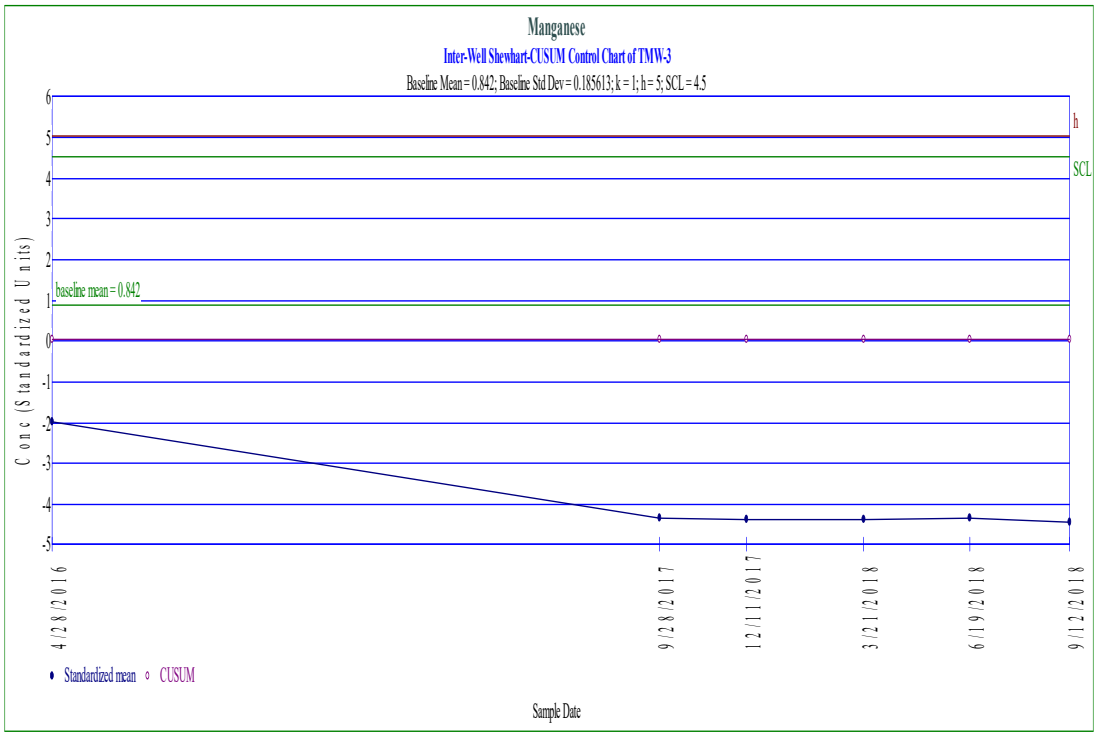
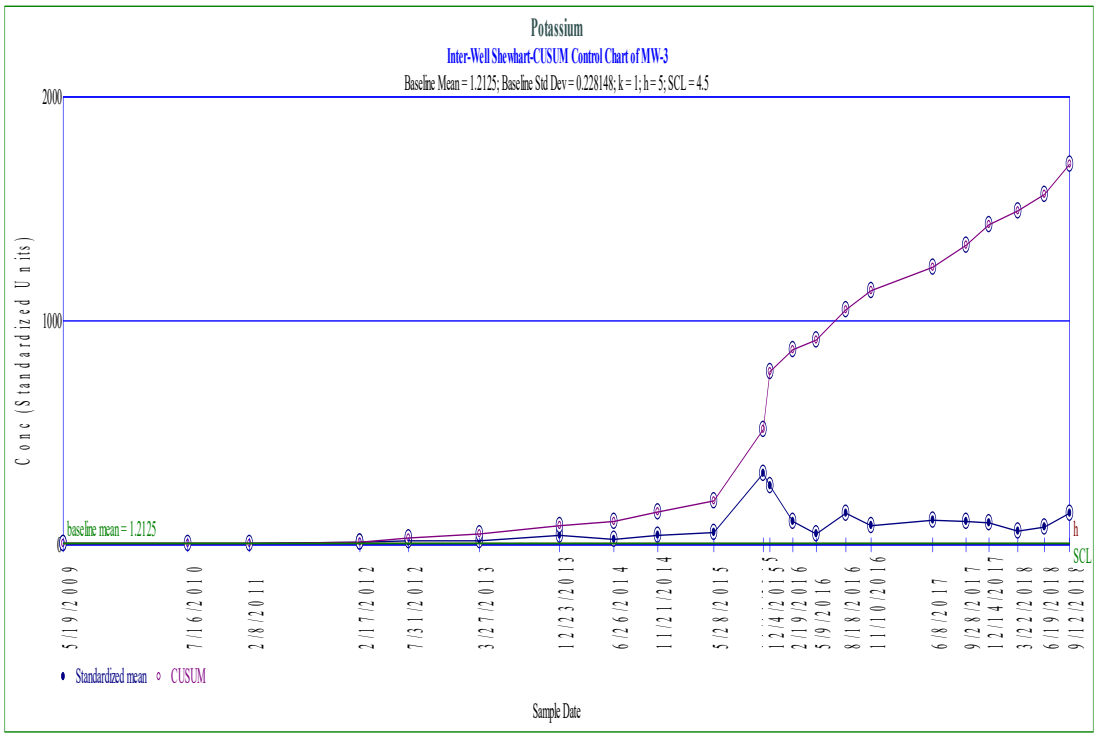

Manganese
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 0.842; Baseline Std Dev = 0.185613; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
20
10
0
-10
h
SCL
baseline mean = 0.842
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/22/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

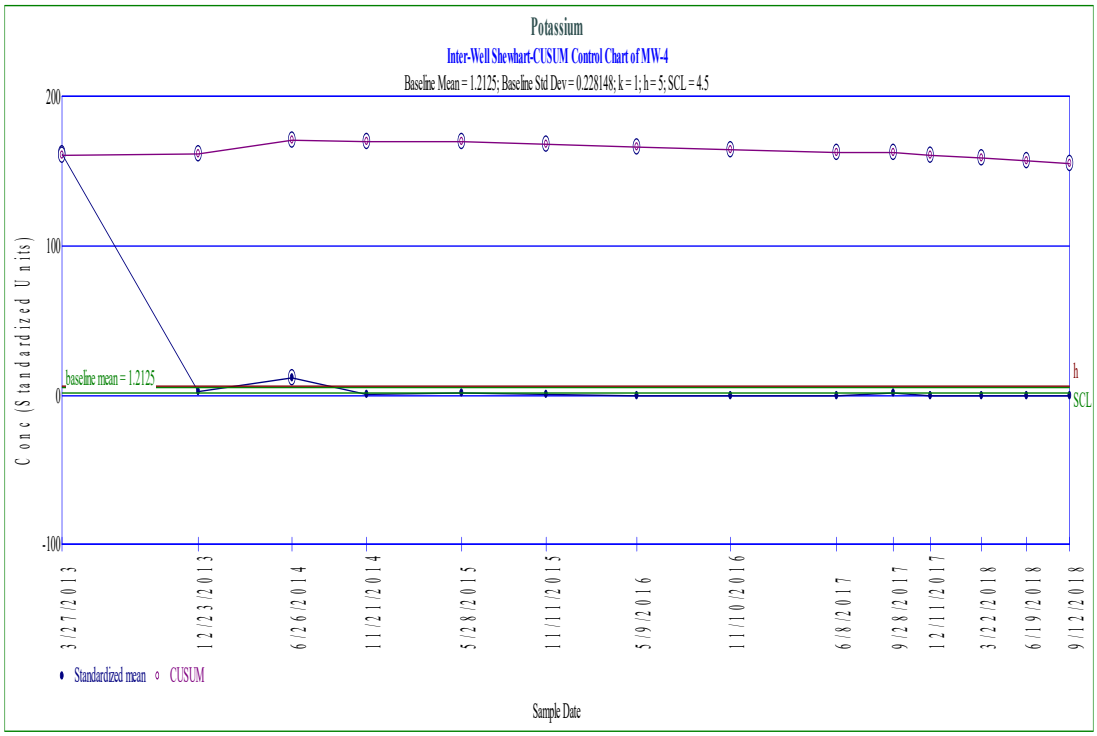

Manganese
Inter-Well Shewhart-CUSUM Control Chart of MW-5
Baseline Mean = 0.842; Baseline Std Dev = 0.185613; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
-2
-3
-4
-5
h
SCL
baseline mean = 0.842
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

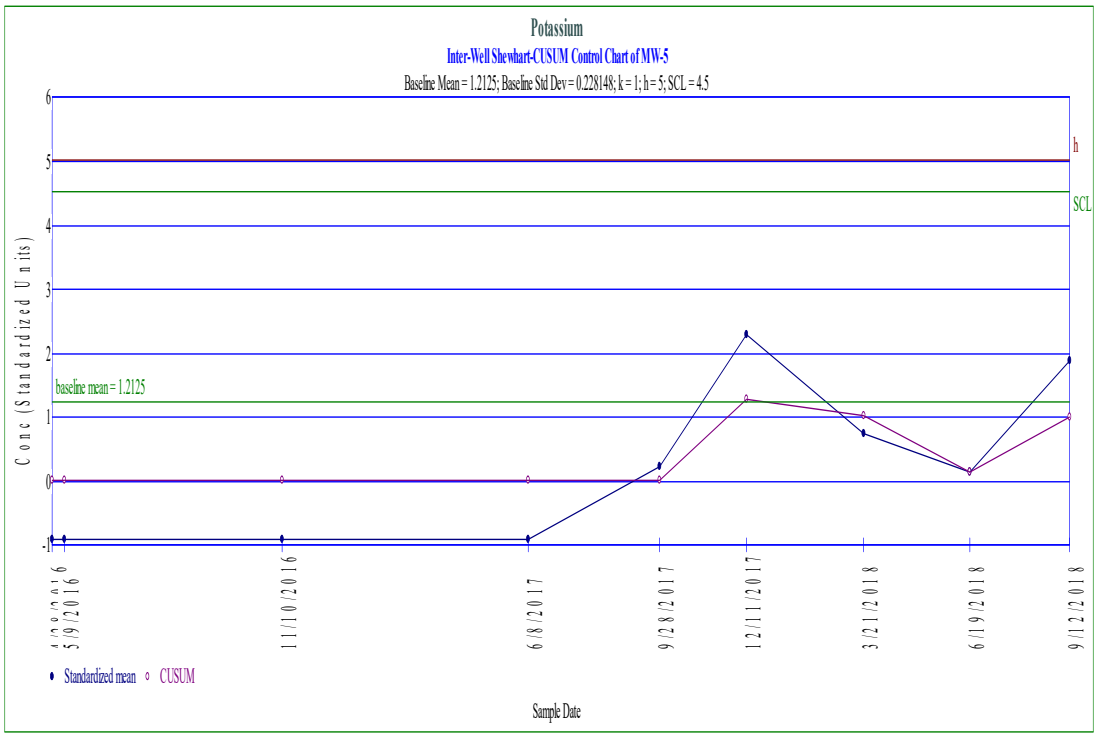

Manganese
Inter-Well Shewhart-CUSUM Control Chart of TMW-1
Baseline Mean = 0.842; Baseline Std Dev = 0.185613; k = 1; h = 5; SCL = 4.5
h
SCL
baseline mean = 0.842
Conc (Standardized Units)
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

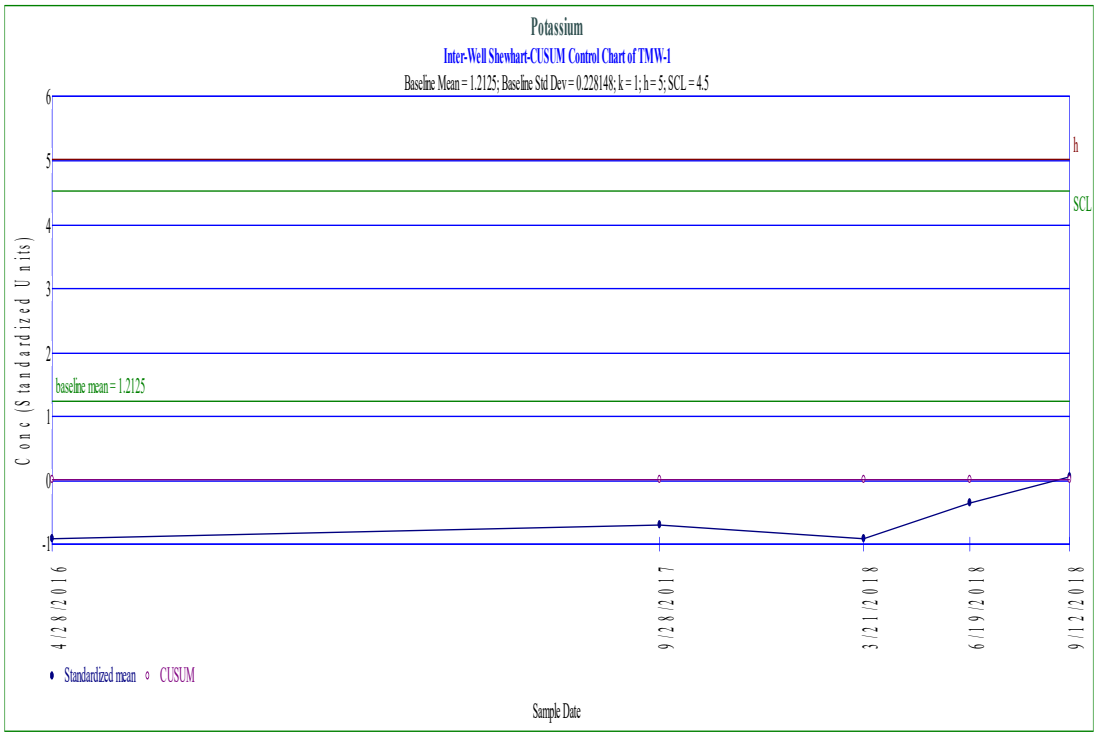

Manganese
Inter-Well Shewhart-CUSUM Control Chart of TMW-2
Baseline Mean = 0.842; Baseline Std Dev = 0.185613; k = 1; h = 5; SCL = 4.5
h
SCL
baseline mean = 0.842
Conc (Standardized Units)
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

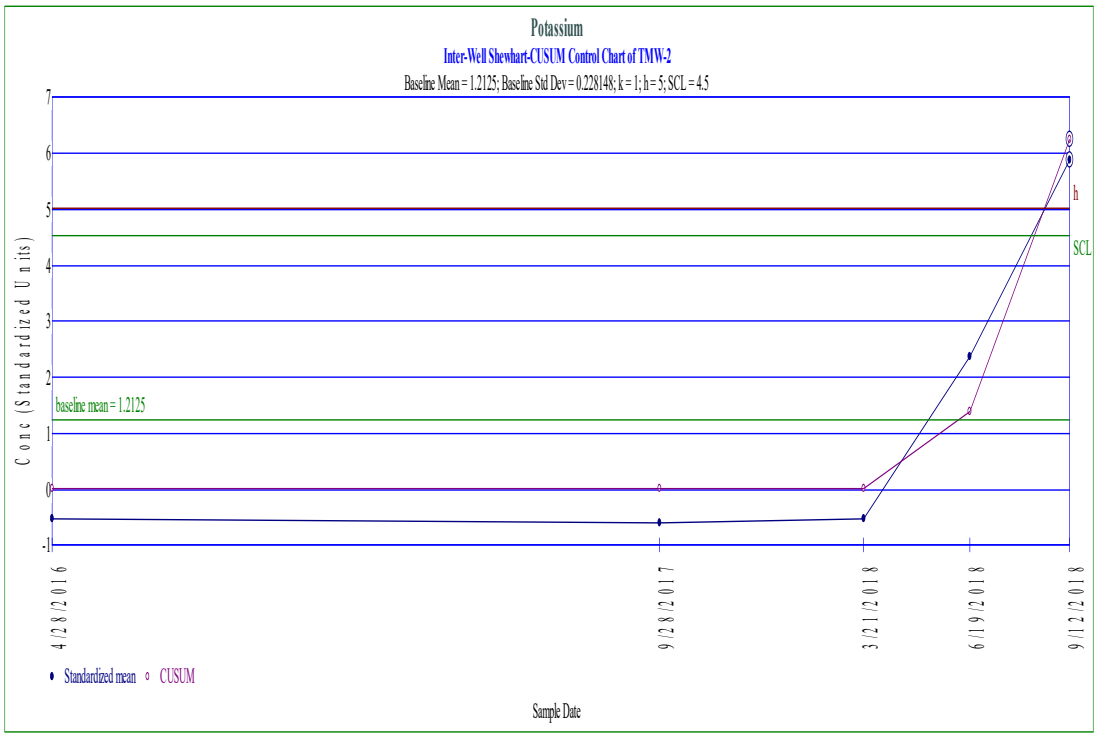

Manganese
Inter-Well Shewhart-CUSUM Control Chart of TMW-3
Baseline Mean = 0.842; Baseline Std Dev = 0.185613; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
baseline mean = 0.842
h
SCL
4/28/2016
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

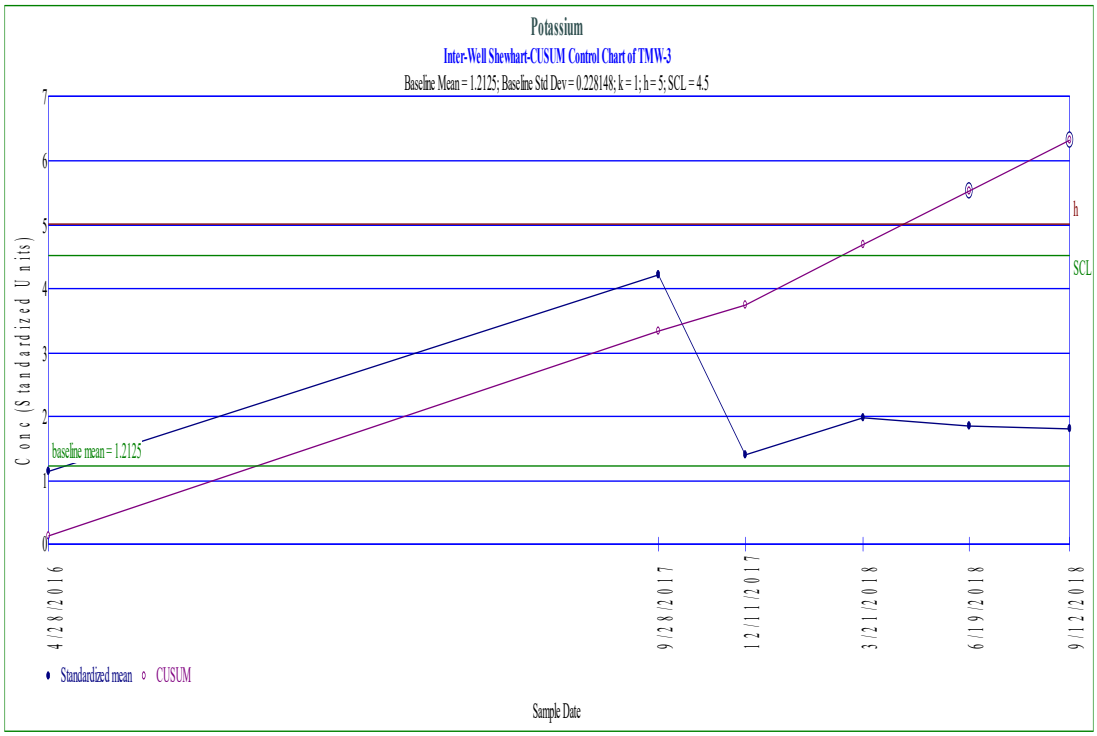

Potassium
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 1.2125; Baseline Std Dev = 0.228148; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
baseline mean = 1.2125
h
SCL
5/19/2009
7/16/2010
2/8/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
12/4/2015
2/19/2016
5/9/2016
8/18/2016
11/10/2016
6/8/2017
9/28/2017
12/14/2017
3/22/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

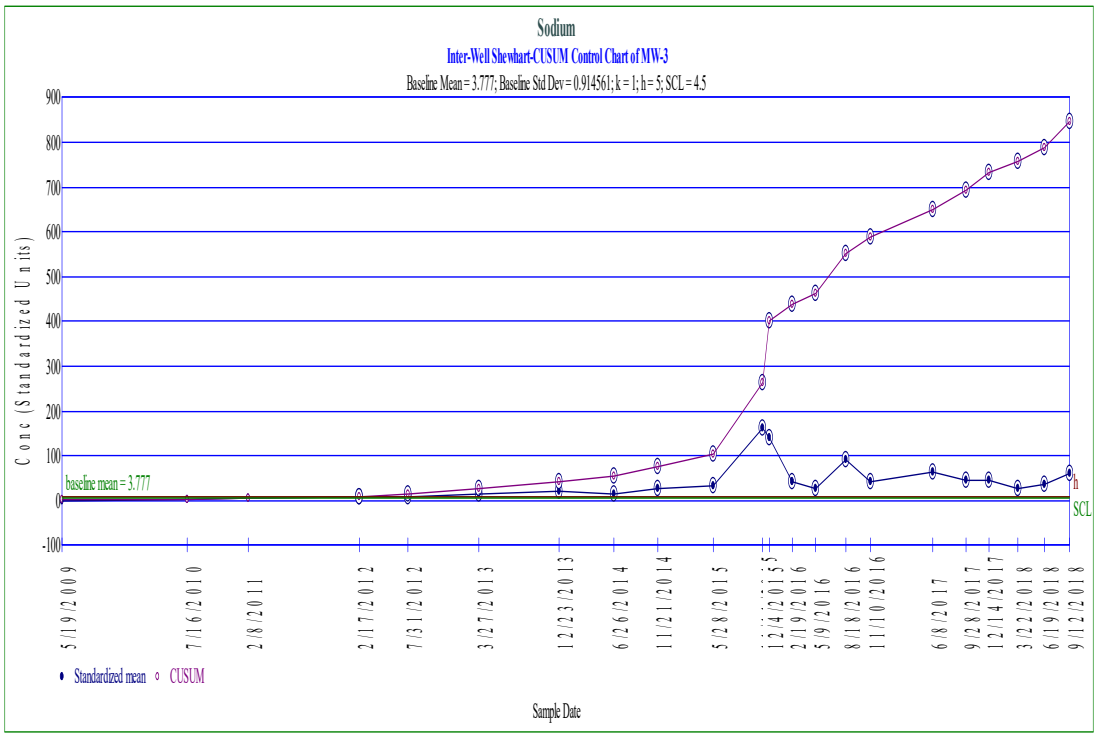

Potassium
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 1.2125; Baseline Std Dev = 0.228148; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
200
100
0
-100
baseline mean = 1.2125
h
SCL
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/22/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

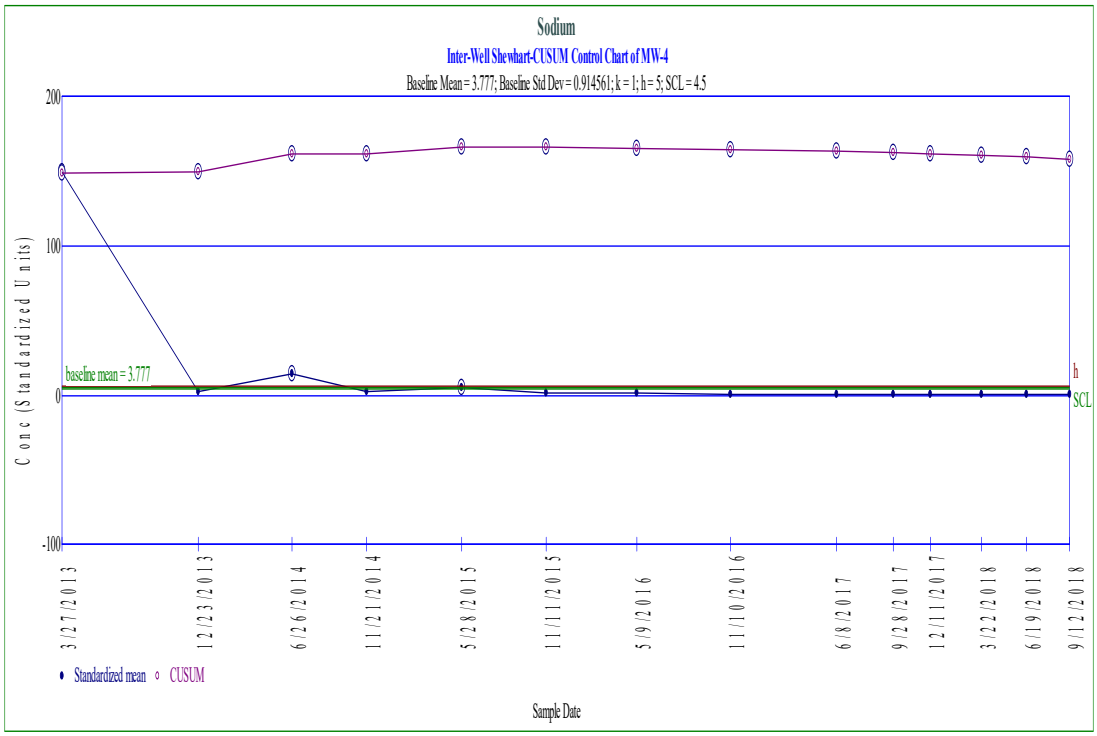

Potassium
Inter-Well Shewhart-CUSUM Control Chart of MW-5
Baseline Mean = 1.2125; Baseline Std Dev = 0.228148; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
h
SCL
baseline mean = 1.2125
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

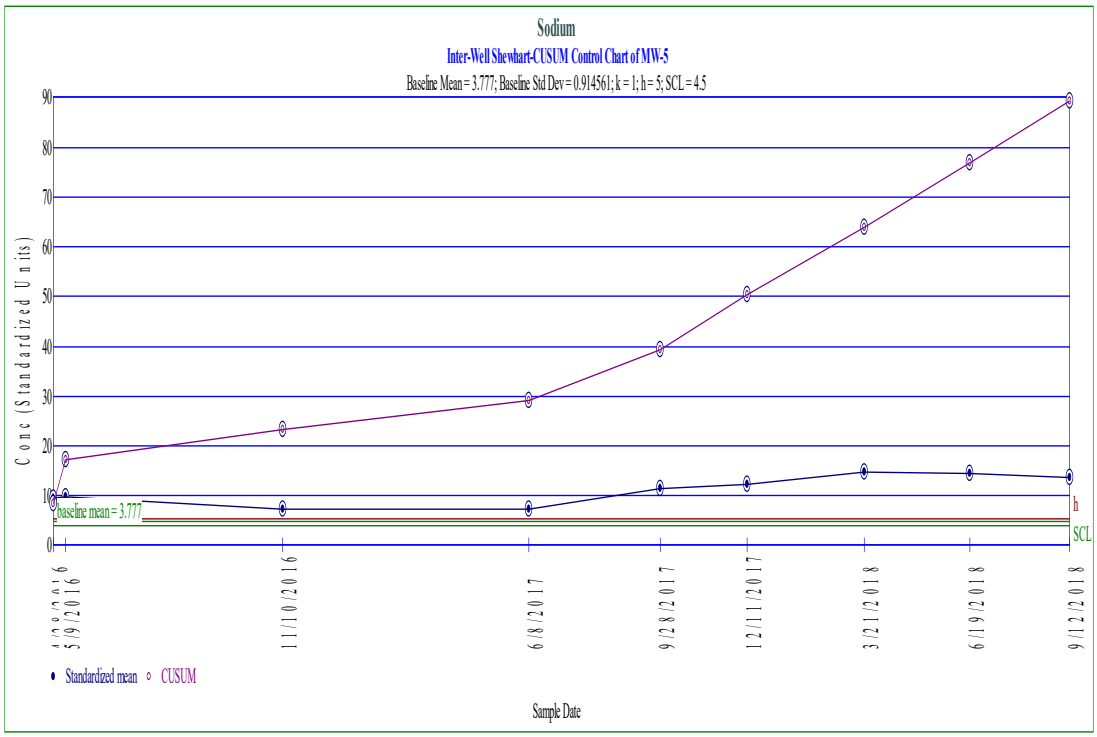

Potassium
Inter-Well Shewhart-CUSUM Control Chart of TMW-1
Baseline Mean = 1.2125; Baseline Std Dev = 0.228148; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
h
SCL
baseline mean = 1.2125
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

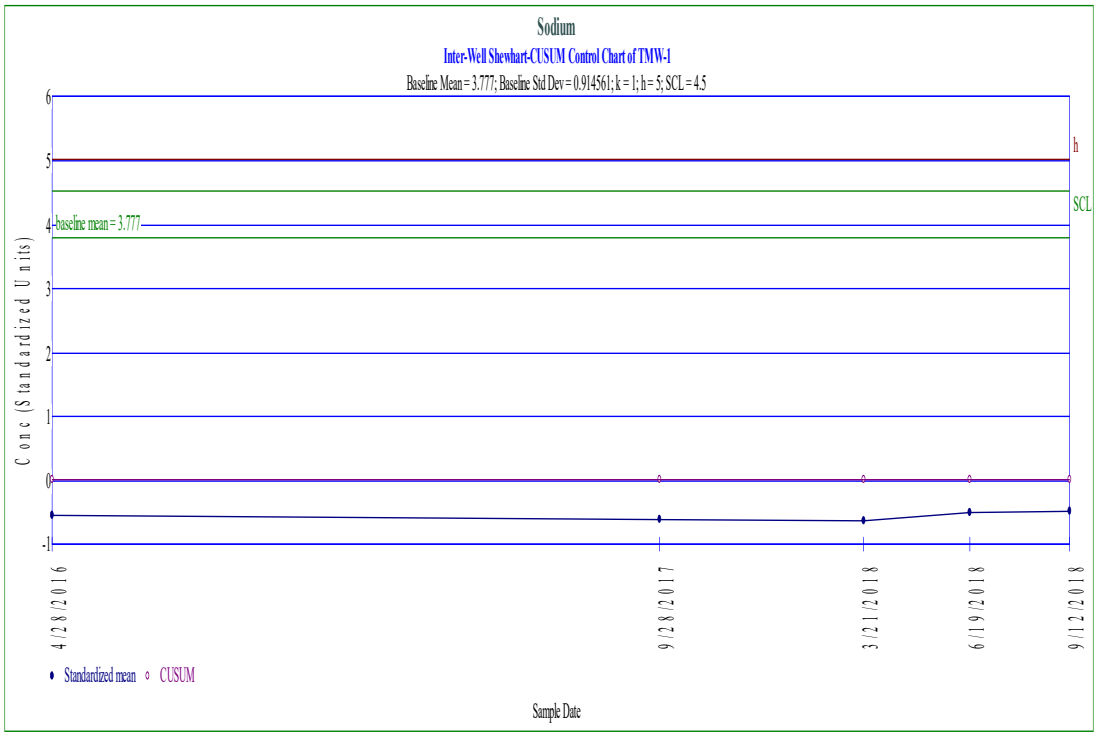

Potassium
Inter-Well Shewhart-CUSUM Control Chart of TMW-2
Baseline Mean = 1.2125; Baseline Std Dev = 0.228148; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
h
SCL
baseline mean = 1.2125
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

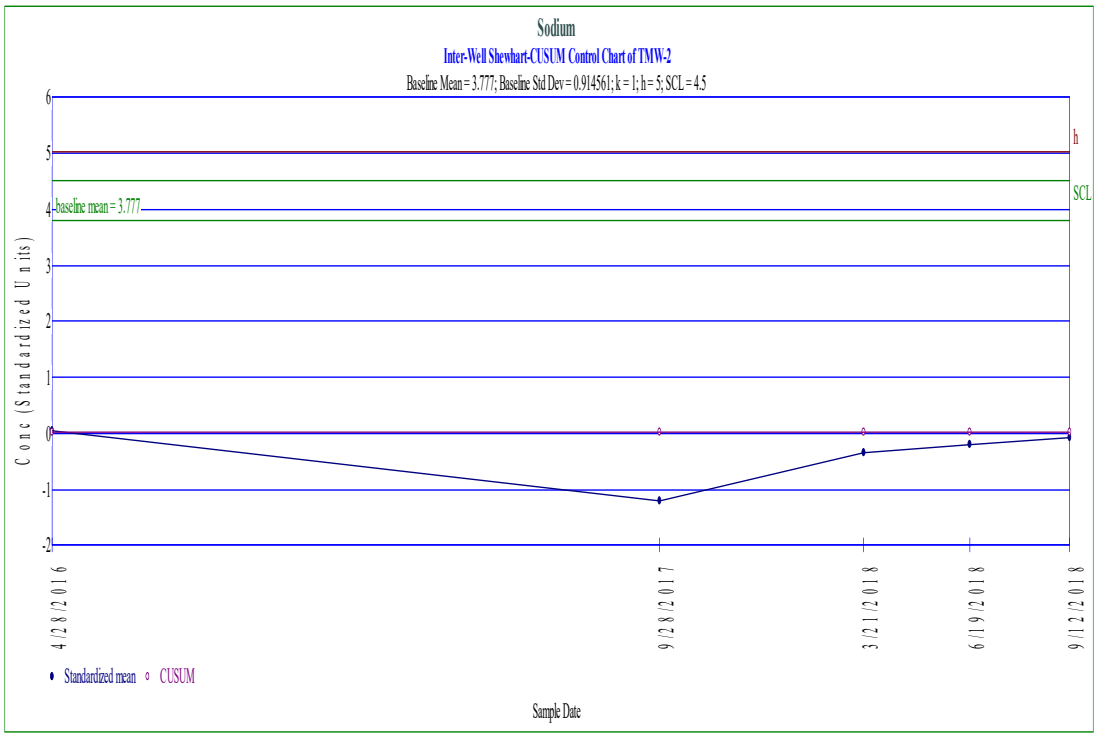

Potassium
Inter-Well Shewhart-CUSUM Control Chart of TMW-3
Baseline Mean = 1.2125; Baseline Std Dev = 0.228148; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
baseline mean = 1.2125
h
SCL
4/28/2016
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

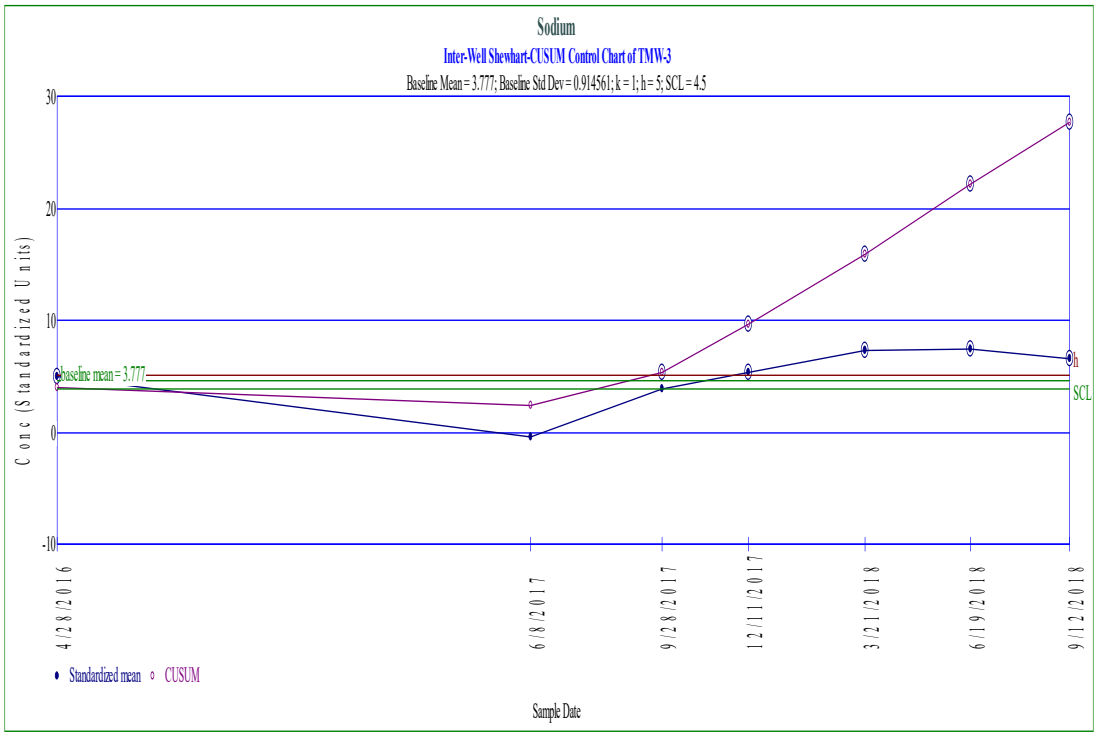

Sodium
Inter-Well Shewhart-CUSUM Control Chart of MW-3
Baseline Mean = 3.777; Baseline Std Dev = 0.914561; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
baseline mean = 3.777
h
SCL
5/19/2009
7/16/2010
2/8/2011
2/17/2012
7/31/2012
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
12/4/2015
2/19/2016
5/9/2016
8/18/2016
11/10/2016
6/8/2017
9/28/2017
12/14/2017
3/22/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date


Sodium
Inter-Well Shewhart-CUSUM Control Chart of MW-4
Baseline Mean = 3.777; Baseline Std Dev = 0.914561; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
200
100
0
-100
baseline mean = 3.777
h
SCL
3/27/2013
12/23/2013
6/26/2014
11/21/2014
5/28/2015
11/11/2015
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/22/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date


Sodium
Inter-Well Shewhart-CUSUM Control Chart of MW-5
Baseline Mean = 3.777; Baseline Std Dev = 0.914561; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
90
80
70
60
50
40
30
20
10
0
baseline mean = 3.777
h
SCL
5/9/2016
11/10/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date


Sodium
Inter-Well Shewhart-CUSUM Control Chart of TMW-1
Baseline Mean = 3.777; Baseline Std Dev = 0.914561; k = 1; h = 5; SCL = 4.5
h
SCL
baseline mean = 3.777
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date


Sodium
Inter-Well Shewhart-CUSUM Control Chart of TMW-2
Baseline Mean = 3.777; Baseline Std Dev = 0.914561; k = 1; h = 5; SCL = 4.5
h
SCL
baseline mean = 3.777
Conc (Standardized Units)
6
5
4
3
2
1
0
-1
-2
4/28/2016
9/28/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date


Sodium
Inter-Well Shewhart-CUSUM Control Chart of TMW-3
Baseline Mean = 3.777; Baseline Std Dev = 0.914561; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
30
20
10
0
-10
Baseline mean = 3.777
h
SCL
4/28/2016
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
Standardized mean
CUSUM
Sample Date

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 83.5294%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 22
Maximum Background Value = 0.12
Confidence Level = 78.6%
False Positive Rate = 21.4%

Location	Date	Count	Mean	Significant
MW-3	9/12/2018	1	0.0102	FALSE
MW-4	9/12/2018	1	0.002	FALSE
MW-5	9/12/2018	1	0.00283	FALSE
TMW-1	9/12/2018	1	0.002	FALSE
TMW-2	9/12/2018	1	0.00303	FALSE
TMW-3	9/12/2018	1	0.002	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 57.6471%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 22
Maximum Background Value = 0.056
Confidence Level = 78.6%
False Positive Rate = 21.4%

Location	Date	Count	Mean	Significant
MW-3	9/12/2018	1	0.00825	FALSE
MW-4	9/12/2018	1	0.002	FALSE
MW-5	9/12/2018	1	0.00204	FALSE
TMW-1	9/12/2018	1	0.002	FALSE
TMW-2	9/12/2018	1	0.002	FALSE
TMW-3	9/12/2018	1	0.002	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison
Parameter: Fluoride
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 85.7143%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 12
Maximum Background Value = 0.178
Confidence Level = 66.7%
False Positive Rate = 33.3%

Location	Date	Count	Mean	Significant
MW-3	**9/12/2018**	**1**	**0.543**	**TRUE**
MW-4	9/12/2018	1	0.1	FALSE
MW-5	9/12/2018	1	0.1	FALSE
TMW-1	9/12/2018	1	0.1	FALSE
TMW-2	9/12/2018	1	0.1	FALSE
TMW-3	9/12/2018	1	0.1	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison
Parameter: Nickel
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 63.2184%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 22
Maximum Background Value = 0.2
Confidence Level = 78.6%
False Positive Rate = 21.4%

Location	Date	Count	Mean	Significant
MW-3	9/27/2018	1	0.134	FALSE
MW-4	9/12/2018	1	0.002	FALSE
MW-5	9/12/2018	1	0.00671	FALSE
TMW-1	9/12/2018	1	0.002	FALSE
TMW-2	9/12/2018	1	0.002	FALSE
TMW-3	9/12/2018	1	0.002	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison
Parameter: Selenium
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 97.6744%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 22
Maximum Background Value = 0.002
Confidence Level = 78.6%
False Positive Rate = 21.4%

Location	Date	Count	Mean	Significant
MW-3	9/27/2018	1	0.002	FALSE
MW-4	9/12/2018	1	0.002	FALSE
MW-5	9/12/2018	1	0.002	FALSE
TMW-1	9/12/2018	1	0.002	FALSE
TMW-2	9/12/2018	1	0.002	FALSE
TMW-3	9/12/2018	1	0.002	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison
Parameter: Sulfate
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 60.9195%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 21
Maximum Background Value = 18.8
Confidence Level = 77.8%
False Positive Rate = 22.2%

Location	Date	Count	Mean	Significant
MW-3	**9/12/2018**	**1**	**484**	**TRUE**
MW-4	9/12/2018	1	5	FALSE
MW-5	9/12/2018	1	5.73	FALSE
TMW-1	9/12/2018	1	5	FALSE
TMW-2	9/12/2018	1	5	FALSE
TMW-3	9/12/2018	1	5	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison
Parameter: Total Cadmium
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 89.4118%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 21
Maximum Background Value = 0.001
Confidence Level = 77.8%
False Positive Rate = 22.2%

Location	Date	Count	Mean	Significant
MW-3	**9/27/2018**	**1**	**0.204**	**TRUE**
MW-4	9/12/2018	1	0.001	FALSE
MW-5	9/12/2018	1	0.001	FALSE
TMW-1	9/12/2018	1	0.001	FALSE
TMW-2	9/12/2018	1	0.001	FALSE
TMW-3	9/12/2018	1	0.001	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison
Parameter: Zinc
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 59.7701%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 22
Maximum Background Value = 0.0281
Confidence Level = 78.6%
False Positive Rate = 21.4%

Location	Date	Count	Mean	Significant
MW-3	**9/27/2018**	**1**	**1.58**	**TRUE**
MW-4	9/12/2018	1	0.025	FALSE
MW-5	9/12/2018	1	0.025	FALSE
TMW-1	9/12/2018	1	0.025	FALSE
TMW-2	9/12/2018	1	0.025	FALSE
TMW-3	9/12/2018	1	0.025	FALSE

Parametric Prediction Interval Analysis

Inter-Well Comparison
Parameter: Chloride
Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL

Inter-Well Unified Guid. Formula 99% One-Sided Comparison

Background Samples = 23
Background Mean = 0.988037
Background Std Dev = 0.355734

Number of comparisons = 6
Future Samples (k) = 6
Actual confidence level is 1.0 - (0.01/6) = 99.8333 %
t is Percentile of Student's T-Test (0.99/6) = 0.998333
Degrees of Freedom = 23 (background observations) - 1
t(0.998333, 22) = 3.39061

Well MW-3

Date	Samples	Mean	Interval	Significant
9/12/2018	**1**	**5.40268**	**[0, 2.22013]**	**TRUE**

Well MW-4

Date	Samples	Mean	Interval	Significant
9/12/2018	1	2.00687	[0, 2.22013]	FALSE

Well MW-5

Date	Samples	Mean	Interval	Significant
9/12/2018	**1**	**4.0448**	**[0, 2.22013]**	**TRUE**

Well TMW-1

Date	Samples	Mean	Interval	Significant
9/12/2018	**1**	**2.54945**	**[0, 2.22013]**	**TRUE**

Well TMW-2

Date	Samples	Mean	Interval	Significant
9/12/2018	**1**	**2.71469**	**[0, 2.22013]**	**TRUE**

Well TMW-3

Date	Samples	Mean	Interval	Significant
9/12/2018	1	3.85227	[0, 2.22013]	TRUE

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 0
Non detect rank is 7

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.084	30
	1/21/2009	0.028	19
	4/9/2009	0.028	20
	5/19/2009	0.033	21
	7/16/2010	0.021	14
	2/8/2011	0.021	15
	2/17/2012	0.022	17
	7/31/2012	0.019	10
	3/27/2013	0.018	6
	12/23/2013	0.017	4
	6/26/2014	0.018	7
	11/21/2014	0.02	11
	5/28/2015	0.0188	9
	11/11/2015	0.0237	18
	5/9/2016	0.02	12
	11/10/2016	0.0207	13
	6/8/2017	0.0146	1
	9/28/2017	0.0175	5
	12/11/2017	0.0166	3
	3/21/2018	0.0212	16
	6/19/2018	0.0163	2
	9/12/2018	0.0186	8
MW-3	4/19/2008	0.056	27
	1/21/2009	0.039	22
	4/9/2009	0.043	23
	5/19/2009	0.047	24
	7/16/2010	0.055	26
	2/8/2011	0.052	25
	2/17/2012	0.097	33
	7/31/2012	0.091	31

3/27/2013	0.094	32
12/23/2013	0.15	41
6/26/2014	0.079	29
11/21/2014	0.14	39
5/28/2015	0.152	42
11/11/2015	0.701	47
12/4/2015	0.579	46
2/19/2016	0.186	43
5/9/2016	0.218	45
11/10/2016	0.188	44
6/8/2017	0.134	37
9/28/2017	0.125	36
12/14/2017	0.119	35
3/22/2018	0.102	34
6/19/2018	0.135	38
9/12/2018	0.147	40
9/27/2018	0.078	28

The Wilcoxon Statistic is 542
The Expected value is is 275
The Standard Deviation is 46.9042
The Z Score is 5.6818
The Standard Deviation adjusted for ties is 46.9042
The Z Score adjusted for ties is 5.6818
5.6818 > 2.326 indicating statistical significance at 1% level
5.6818 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 0
Non detect rank is 7

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.084	35
	1/21/2009	0.028	31
	4/9/2009	0.028	32
	5/19/2009	0.033	33
	7/16/2010	0.021	26
	2/8/2011	0.021	27
	2/17/2012	0.022	29
	7/31/2012	0.019	22
	3/27/2013	0.018	18
	12/23/2013	0.017	16
	6/26/2014	0.018	19
	11/21/2014	0.02	23
	5/28/2015	0.0188	21
	11/11/2015	0.0237	30
	5/9/2016	0.02	24
	11/10/2016	0.0207	25
	6/8/2017	0.0146	12
	9/28/2017	0.0175	17
	12/11/2017	0.0166	14
	3/21/2018	0.0212	28
	6/19/2018	0.0163	13
	9/12/2018	0.0186	20
MW-4	3/27/2013	0.4	36
	12/23/2013	0.0096	9
	6/26/2014	0.04	34
	11/21/2014	0.013	11
	5/28/2015	0.0169	15
	11/11/2015	0.0105	10
	5/9/2016	0.00821	8
	11/10/2016	0.00738	4

6/8/2017	0.00749	5
9/28/2017	0.00788	7
12/11/2017	0.00769	6
3/22/2018	0.00701	2
6/19/2018	0.00646	1
9/12/2018	0.0073	3

The Wilcoxon Statistic is 46
The Expected value is is 154
The Standard Deviation is 30.8167
The Z Score is -3.52082
The Standard Deviation adjusted for ties is 30.8167
The Z Score adjusted for ties is -3.52082
-3.52082 < 2.326 indicating no statistical significance at 1% level
-3.52082 < 2.326 indicating no statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Barium
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total non detects is 0
Non detect rank is 7

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.084	31
	1/21/2009	0.028	23
	4/9/2009	0.028	24
	5/19/2009	0.033	29
	7/16/2010	0.021	16
	2/8/2011	0.021	17
	2/17/2012	0.022	19
	7/31/2012	0.019	12
	3/27/2013	0.018	7
	12/23/2013	0.017	5
	6/26/2014	0.018	8
	11/21/2014	0.02	13
	5/28/2015	0.0188	10
	11/11/2015	0.0237	21
	5/9/2016	0.02	14
	11/10/2016	0.0207	15
	6/8/2017	0.0146	1
	9/28/2017	0.0175	6
	12/11/2017	0.0166	4
	3/21/2018	0.0212	18
	6/19/2018	0.0163	3
	9/12/2018	0.0186	9
MW-5	4/28/2016	0.0342	30
	5/9/2016	0.015	2
	11/10/2016	0.0188	11
	6/8/2017	0.0224	20
	9/28/2017	0.0239	22
	12/11/2017	0.0286	25
	3/21/2018	0.0323	28
	6/19/2018	0.032	27

	9/12/2018	0.0308	26

The Wilcoxon Statistic is 146
The Expected value is is 99
The Standard Deviation is 22.9783
The Z Score is 2.02365
The Standard Deviation adjusted for ties is 22.9783
The Z Score adjusted for ties is 2.02365
2.02365 < 2.326 indicating no statistical significance at 1% level
2.02365 < 2.326 indicating no statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Barium
Location: TMW-1
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total non detects is 0
Non detect rank is 7

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.084	27
	1/21/2009	0.028	24
	4/9/2009	0.028	25
	5/19/2009	0.033	26
	7/16/2010	0.021	17
	2/8/2011	0.021	18
	2/17/2012	0.022	20
	7/31/2012	0.019	13
	3/27/2013	0.018	9
	12/23/2013	0.017	7
	6/26/2014	0.018	10
	11/21/2014	0.02	14
	5/28/2015	0.0188	12
	11/11/2015	0.0237	22
	5/9/2016	0.02	15
	11/10/2016	0.0207	16
	6/8/2017	0.0146	4
	9/28/2017	0.0175	8
	12/11/2017	0.0166	6
	3/21/2018	0.0212	19
	6/19/2018	0.0163	5
	9/12/2018	0.0186	11
TMW-1	4/28/2016	0.0264	23
	9/28/2017	0.0103	2
	3/21/2018	0.0104	3
	6/19/2018	0.0233	21
	9/12/2018	0.00974	1

The Wilcoxon Statistic is 35

The Expected value is is 55
The Standard Deviation is 16.0208
The Z Score is -1.27958
The Standard Deviation adjusted for ties is 16.0208
The Z Score adjusted for ties is -1.27958
-1.27958 < 2.326 indicating no statistical significance at 1% level
-1.27958 < 2.326 indicating no statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Barium
Location: TMW-2
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total non detects is 0
Non detect rank is 7

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.084	26
	1/21/2009	0.028	19
	4/9/2009	0.028	20
	5/19/2009	0.033	22
	7/16/2010	0.021	14
	2/8/2011	0.021	15
	2/17/2012	0.022	17
	7/31/2012	0.019	10
	3/27/2013	0.018	6
	12/23/2013	0.017	4
	6/26/2014	0.018	7
	11/21/2014	0.02	11
	5/28/2015	0.0188	9
	11/11/2015	0.0237	18
	5/9/2016	0.02	12
	11/10/2016	0.0207	13
	6/8/2017	0.0146	1
	9/28/2017	0.0175	5
	12/11/2017	0.0166	3
	3/21/2018	0.0212	16
	6/19/2018	0.0163	2
	9/12/2018	0.0186	8
TMW-2	4/28/2016	0.0703	25
	9/28/2017	0.0282	21
	3/21/2018	0.038	24
	6/19/2018	0.096	27
	9/12/2018	0.0357	23

The Wilcoxon Statistic is 105

The Expected value is is 55
The Standard Deviation is 16.0208
The Z Score is 3.08973
The Standard Deviation adjusted for ties is 16.0208
The Z Score adjusted for ties is 3.08973
3.08973 > 2.326 indicating statistical significance at 1% level
3.08973 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 0
Non detect rank is 7

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.084	28
	1/21/2009	0.028	19
	4/9/2009	0.028	20
	5/19/2009	0.033	22
	7/16/2010	0.021	14
	2/8/2011	0.021	15
	2/17/2012	0.022	17
	7/31/2012	0.019	10
	3/27/2013	0.018	6
	12/23/2013	0.017	4
	6/26/2014	0.018	7
	11/21/2014	0.02	11
	5/28/2015	0.0188	9
	11/11/2015	0.0237	18
	5/9/2016	0.02	12
	11/10/2016	0.0207	13
	6/8/2017	0.0146	1
	9/28/2017	0.0175	5
	12/11/2017	0.0166	3
	3/21/2018	0.0212	16
	6/19/2018	0.0163	2
	9/12/2018	0.0186	8
TMW-3	4/28/2016	0.0426	27
	9/28/2017	0.0296	21
	12/11/2017	0.0361	24
	3/21/2018	0.0389	25
	6/19/2018	0.0414	26
	9/12/2018	0.0339	23

The Wilcoxon Statistic is 125
The Expected value is is 66
The Standard Deviation is 17.8606
The Z Score is 3.27537
The Standard Deviation adjusted for ties is 17.8606
The Z Score adjusted for ties is 3.27537
3.27537 > 2.326 indicating statistical significance at 1% level
3.27537 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 0
Non detect rank is 0

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	5/19/2009	4.9	19
	7/16/2010	4	14
	2/8/2011	4	15
	2/17/2012	4.1	18
	7/31/2012	3.6	11
	3/27/2013	4	16
	12/23/2013	3.5	10
	6/26/2014	3.3	5
	11/21/2014	4	17
	5/28/2015	3.44	8
	11/11/2015	3.99	13
	5/9/2016	3.45	9
	8/18/2016	3.09	2
	11/10/2016	3.72	12
	6/8/2017	2.73	1
	9/28/2017	3.18	4
	12/11/2017	3.31	6
	3/21/2018	7.76	21
	6/19/2018	3.31	7
	9/12/2018	3.15	3
MW-3	5/19/2009	5.7	20
	7/16/2010	11	25
	2/8/2011	9.3	23
	2/17/2012	14	26
	7/31/2012	16	29
	3/27/2013	9.4	24
	12/23/2013	15	28
	6/26/2014	8.6	22
	11/21/2014	19	31
	5/28/2015	21.4	33

11/11/2015	71.6	41
12/4/2015	52.6	40
2/19/2016	18.9	30
5/9/2016	19.1	32
8/18/2016	51.5	39
11/10/2016	26.3	35
6/8/2017	38.9	38
9/28/2017	30.9	37
12/14/2017	26.9	36
3/22/2018	14.5	27
6/19/2018	22.7	34
9/12/2018	140	42

The Wilcoxon Statistic is 439
The Expected value is is 220
The Standard Deviation is 39.7073
The Z Score is 5.50277
The Standard Deviation adjusted for ties is 39.7073
The Z Score adjusted for ties is 5.50277
5.50277 > 2.326 indicating statistical significance at 1% level
5.50277 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Calcium
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total non detects is 0
Non detect rank is 0

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	5/19/2009	4.9	19
	7/16/2010	4	14
	2/8/2011	4	15
	2/17/2012	4.1	18
	7/31/2012	3.6	11
	3/27/2013	4	16
	12/23/2013	3.5	10
	6/26/2014	3.3	5
	11/21/2014	4	17
	5/28/2015	3.44	8
	11/11/2015	3.99	13
	5/9/2016	3.45	9
	8/18/2016	3.09	2
	11/10/2016	3.72	12
	6/8/2017	2.73	1
	9/28/2017	3.18	4
	12/11/2017	3.31	6
	3/21/2018	7.76	20
	6/19/2018	3.31	7
	9/12/2018	3.15	3
MW-5	4/28/2016	15.3	29
	5/9/2016	8.64	21
	11/10/2016	9.55	22
	6/8/2017	10.2	23
	9/28/2017	13.2	26
	12/11/2017	12.7	25
	3/21/2018	14.1	27
	6/19/2018	14.1	28
	9/12/2018	12.5	24

The Wilcoxon Statistic is 180
The Expected value is is 90
The Standard Deviation is 21.2132
The Z Score is 4.21907
The Standard Deviation adjusted for ties is 21.2132
The Z Score adjusted for ties is 4.21907
4.21907 > 2.326 indicating statistical significance at 1% level
4.21907 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 0
Non detect rank is 0

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	5/19/2009	4.9	19
	7/16/2010	4	14
	2/8/2011	4	15
	2/17/2012	4.1	18
	7/31/2012	3.6	11
	3/27/2013	4	16
	12/23/2013	3.5	10
	6/26/2014	3.3	5
	11/21/2014	4	17
	5/28/2015	3.44	8
	11/11/2015	3.99	13
	5/9/2016	3.45	9
	8/18/2016	3.09	2
	11/10/2016	3.72	12
	6/8/2017	2.73	1
	9/28/2017	3.18	4
	12/11/2017	3.31	6
	3/21/2018	7.76	20
	6/19/2018	3.31	7
	9/12/2018	3.15	3
TMW-3	4/28/2016	17.5	24
	9/28/2017	14.9	21
	12/11/2017	16.5	22
	3/21/2018	18.1	25
	6/19/2018	18.4	26
	9/12/2018	17.1	23

The Wilcoxon Statistic is 120
The Expected value is is 60

The Standard Deviation is 16.4317
The Z Score is 3.62105
The Standard Deviation adjusted for ties is 16.4317
The Z Score adjusted for ties is 3.62105
3.62105 > 2.326 indicating statistical significance at 1% level
3.62105 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 0
Non detect rank is 21.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	2	4
	1/21/2009	2.9	16
	4/9/2009	1.9	3
	5/19/2009	2.8	14
	7/16/2010	2.8	15
	2/8/2011	2.6	13
	2/17/2012	2.1	6
	7/31/2012	2.2	9
	3/27/2013	1.8	2
	12/23/2013	1.5	1
	6/26/2014	2.9	17
	11/21/2014	3.9	18
	5/28/2015	2.01	5
	11/11/2015	3.97	19
	5/9/2016	2.12	8
	8/18/2016	2.4	12
	11/10/2016	4.59	21
	6/8/2017	5.68	23
	9/28/2017	4.11	20
	12/11/2017	2.31	11
	3/21/2018	2.1	7
	6/19/2018	2.24	10
	9/12/2018	4.94	22
MW-3	4/19/2008	20	28
	1/21/2009	14	26
	4/9/2009	8.2	24
	5/19/2009	10	25
	7/16/2010	25	29
	2/8/2011	25	30
	2/17/2012	18	27

8/1/2012	25	31
3/27/2013	32	33
12/23/2013	35	34
6/26/2014	29	32
11/21/2014	65	35
5/28/2015	92.8	38
11/11/2015	458	48
12/4/2015	360	47
2/19/2016	96.1	39
5/9/2016	80.7	37
8/18/2016	218	45
11/10/2016	120	43
6/8/2017	163	44
9/28/2017	112	42
12/14/2017	104	41
3/22/2018	65.2	36
6/19/2018	99	40
9/12/2018	222	46

The Wilcoxon Statistic is 575
The Expected value is is 287.5
The Standard Deviation is 48.4553
The Z Score is 5.92298
The Standard Deviation adjusted for ties is 48.4553
The Z Score adjusted for ties is 5.92298
5.92298 > 2.326 indicating statistical significance at 1% level
5.92298 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Chloride
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total non detects is 0
Non detect rank is 21.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	2	4
	1/21/2009	2.9	16
	4/9/2009	1.9	3
	5/19/2009	2.8	14
	7/16/2010	2.8	15
	2/8/2011	2.6	13
	2/17/2012	2.1	6
	7/31/2012	2.2	9
	3/27/2013	1.8	2
	12/23/2013	1.5	1
	6/26/2014	2.9	17
	11/21/2014	3.9	18
	5/28/2015	2.01	5
	11/11/2015	3.97	19
	5/9/2016	2.12	8
	8/18/2016	2.4	12
	11/10/2016	4.59	21
	6/8/2017	5.68	23
	9/28/2017	4.11	20
	12/11/2017	2.31	11
	3/21/2018	2.1	7
	6/19/2018	2.24	10
	9/12/2018	4.94	22
MW-5	4/28/2016	26.6	24
	5/9/2016	29.4	26
	11/10/2016	28.6	25
	6/8/2017	38.4	27
	9/28/2017	48.7	28
	12/11/2017	52.5	29
	3/21/2018	60.9	31

6/19/2018	62.2	32
9/12/2018	57.1	30

The Wilcoxon Statistic is 207
The Expected value is is 103.5
The Standard Deviation is 23.859
The Z Score is 4.31704
The Standard Deviation adjusted for ties is 23.859
The Z Score adjusted for ties is 4.31704
4.31704 > 2.326 indicating statistical significance at 1% level
4.31704 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Chloride
Location: TMW-1
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total non detects is 0
Non detect rank is 21.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	2	4
	1/21/2009	2.9	16
	4/9/2009	1.9	3
	5/19/2009	2.8	14
	7/16/2010	2.8	15
	2/8/2011	2.6	13
	2/17/2012	2.1	6
	7/31/2012	2.2	9
	3/27/2013	1.8	2
	12/23/2013	1.5	1
	6/26/2014	2.9	17
	11/21/2014	3.9	18
	5/28/2015	2.01	5
	11/11/2015	3.97	19
	5/9/2016	2.12	8
	8/18/2016	2.4	12
	11/10/2016	4.59	21
	6/8/2017	5.68	23
	9/28/2017	4.11	20
	12/11/2017	2.31	11
	3/21/2018	2.1	7
	6/19/2018	2.24	10
	9/12/2018	4.94	22
TMW-1	4/28/2016	6.89	24
	11/10/2016	7.37	25
	6/8/2017	8.82	26
	9/28/2017	10.4	28
	12/11/2017	9.92	27
	3/21/2018	11.2	29
	6/19/2018	11.7	30

9/12/2018	12.8	31

The Wilcoxon Statistic is 184
The Expected value is is 92
The Standard Deviation is 22.151
The Z Score is 4.13074
The Standard Deviation adjusted for ties is 22.151
The Z Score adjusted for ties is 4.13074
4.13074 > 2.326 indicating statistical significance at 1% level
4.13074 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Chloride
Location: TMW-2
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total non detects is 0
Non detect rank is 21.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	2	4
	1/21/2009	2.9	16
	4/9/2009	1.9	3
	5/19/2009	2.8	14
	7/16/2010	2.8	15
	2/8/2011	2.6	13
	2/17/2012	2.1	6
	7/31/2012	2.2	9
	3/27/2013	1.8	2
	12/23/2013	1.5	1
	6/26/2014	2.9	17
	11/21/2014	3.9	18
	5/28/2015	2.01	5
	11/11/2015	3.97	19
	5/9/2016	2.12	8
	8/18/2016	2.4	12
	11/10/2016	4.59	21
	6/8/2017	5.68	24
	9/28/2017	4.11	20
	12/11/2017	2.31	11
	3/21/2018	2.1	7
	6/19/2018	2.24	10
	9/12/2018	4.94	22
TMW-2	4/28/2016	9.28	25
	11/10/2016	15.3	29
	6/8/2017	44.5	31
	9/28/2017	5.45	23
	12/11/2017	12.4	26
	3/21/2018	14.5	27
	6/19/2018	16.8	30

9/12/2018 15.1 28

The Wilcoxon Statistic is 183
The Expected value is is 92
The Standard Deviation is 22.151
The Z Score is 4.08559
The Standard Deviation adjusted for ties is 22.151
The Z Score adjusted for ties is 4.08559
4.08559 > 2.326 indicating statistical significance at 1% level
4.08559 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 0
Non detect rank is 21.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	2	4
	1/21/2009	2.9	16
	4/9/2009	1.9	3
	5/19/2009	2.8	14
	7/16/2010	2.8	15
	2/8/2011	2.6	13
	2/17/2012	2.1	6
	7/31/2012	2.2	9
	3/27/2013	1.8	2
	12/23/2013	1.5	1
	6/26/2014	2.9	17
	11/21/2014	3.9	18
	5/28/2015	2.01	5
	11/11/2015	3.97	19
	5/9/2016	2.12	8
	8/18/2016	2.4	12
	11/10/2016	4.59	21
	6/8/2017	5.68	23
	9/28/2017	4.11	20
	12/11/2017	2.31	11
	3/21/2018	2.1	7
	6/19/2018	2.24	10
	9/12/2018	4.94	22
TMW-3	4/28/2016	43.7	27
	11/10/2016	42.1	25
	6/8/2017	10.3	24
	9/28/2017	48.5	29
	12/11/2017	43.6	26
	3/21/2018	48.7	30
	6/19/2018	53.2	31

9/12/2018 47.1 28

The Wilcoxon Statistic is 184
The Expected value is is 92
The Standard Deviation is 22.151
The Z Score is 4.13074
The Standard Deviation adjusted for ties is 22.151
The Z Score adjusted for ties is 4.13074
4.13074 > 2.326 indicating statistical significance at 1% level
4.13074 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 15
Non detect rank is 8

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	ND<0.1	8
	1/21/2009	ND<0.1	8
	4/9/2009	ND<0.1	8
	5/19/2009	ND<0.1	8
	5/9/2016	ND<0.1	8
	11/10/2016	ND<0.1	8
	6/8/2017	0.178	18
	9/28/2017	ND<0.1	8
	12/11/2017	ND<0.1	8
	3/21/2018	ND<0.1	8
	6/19/2018	ND<0.1	8
	9/12/2018	ND<0.1	8
MW-3	1/21/2009	ND<0.1	8
	4/9/2009	ND<0.1	8
	5/19/2009	ND<0.1	8
	5/9/2016	0.105	16
	11/10/2016	ND<0.1	8
	6/8/2017	0.208	19
	9/28/2017	0.226	20
	12/14/2017	0.149	17
	3/22/2018	0.274	22
	6/19/2018	0.248	21
	9/12/2018	0.543	23

The Wilcoxon Statistic is 104
The Expected value is is 66
The Standard Deviation is 16.2481
The Z Score is 2.30797
The Standard Deviation adjusted for ties is 13.8187

The Z Score adjusted for ties is 2.71371
2.30797 < 2.326 indicating no statistical significance at 1% level
2.71371 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 0
Non detect rank is 0

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	5/19/2009	4.6	25
	7/16/2010	3.5	23
	2/8/2011	3.3	20
	2/17/2012	3.2	16
	7/31/2012	2.9	14
	3/27/2013	3.2	17
	12/23/2013	2.8	11
	6/26/2014	3.3	21
	11/21/2014	3.2	18
	5/28/2015	2.76	8
	11/11/2015	3.07	15
	5/9/2016	2.78	9
	8/18/2016	2.61	6
	11/10/2016	2.86	13
	6/8/2017	2.27	2
	9/28/2017	2.47	5
	12/11/2017	2.69	7
	3/21/2018	2.79	10
	6/19/2018	2.06	1
	9/12/2018	2.45	4
MW-3	5/19/2009	2.4	3
	7/16/2010	3.4	22
	2/8/2011	2.8	12
	2/17/2012	5.2	26
	7/31/2012	5.2	27
	3/27/2013	3.6	24
	12/23/2013	5.3	28
	6/26/2014	3.2	19
	11/21/2014	6.4	29
	5/28/2015	6.71	30

11/11/2015	31.9	41
12/4/2015	20	39
2/19/2016	8.08	32
5/9/2016	9.2	33
8/18/2016	24	40
11/10/2016	11.1	35
6/8/2017	17.8	38
9/28/2017	13	37
12/14/2017	12.8	36
3/22/2018	6.88	31
6/19/2018	9.92	34
9/12/2018	64	42

The Wilcoxon Statistic is 405
The Expected value is is 220
The Standard Deviation is 39.7073
The Z Score is 4.64651
The Standard Deviation adjusted for ties is 39.7073
The Z Score adjusted for ties is 4.64651
4.64651 > 2.326 indicating statistical significance at 1% level
4.64651 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Magnesium
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total non detects is 0
Non detect rank is 0

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	5/19/2009	4.6	20
	7/16/2010	3.5	19
	2/8/2011	3.3	17
	2/17/2012	3.2	14
	7/31/2012	2.9	12
	3/27/2013	3.2	15
	12/23/2013	2.8	10
	6/26/2014	3.3	18
	11/21/2014	3.2	16
	5/28/2015	2.76	7
	11/11/2015	3.07	13
	5/9/2016	2.78	8
	8/18/2016	2.61	5
	11/10/2016	2.86	11
	6/8/2017	2.27	2
	9/28/2017	2.47	4
	12/11/2017	2.69	6
	3/21/2018	2.79	9
	6/19/2018	2.06	1
	9/12/2018	2.45	3
MW-5	4/28/2016	4.77	21
	5/9/2016	4.94	22
	11/10/2016	4.95	23
	6/8/2017	5.58	24
	9/28/2017	7.9	25
	12/11/2017	8.62	27
	3/21/2018	10.1	29
	6/19/2018	9.78	28
	9/12/2018	8.23	26

The Wilcoxon Statistic is 180
The Expected value is is 90
The Standard Deviation is 21.2132
The Z Score is 4.21907
The Standard Deviation adjusted for ties is 21.2132
The Z Score adjusted for ties is 4.21907
4.21907 > 2.326 indicating statistical significance at 1% level
4.21907 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 0
Non detect rank is 0

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	5/19/2009	4.6	21
	7/16/2010	3.5	19
	2/8/2011	3.3	17
	2/17/2012	3.2	14
	7/31/2012	2.9	12
	3/27/2013	3.2	15
	12/23/2013	2.8	10
	6/26/2014	3.3	18
	11/21/2014	3.2	16
	5/28/2015	2.76	7
	11/11/2015	3.07	13
	5/9/2016	2.78	8
	8/18/2016	2.61	5
	11/10/2016	2.86	11
	6/8/2017	2.27	2
	9/28/2017	2.47	4
	12/11/2017	2.69	6
	3/21/2018	2.79	9
	6/19/2018	2.06	1
	9/12/2018	2.45	3
TMW-3	4/28/2016	5.44	24
	9/28/2017	4.28	20
	12/11/2017	5.41	23
	3/21/2018	5.95	25
	6/19/2018	6.08	26
	9/12/2018	5.38	22

The Wilcoxon Statistic is 119
The Expected value is is 60

The Standard Deviation is 16.4317
The Z Score is 3.5602
The Standard Deviation adjusted for ties is 16.4317
The Z Score adjusted for ties is 3.5602
3.5602 > 2.326 indicating statistical significance at 1% level
3.5602 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 2
Non detect rank is 1.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	7/16/2010	1	37
	2/8/2011	0.95	32
	2/17/2012	0.85	28
	7/31/2012	0.81	26
	3/27/2013	1.1	39
	12/23/2013	0.83	27
	6/26/2014	0.98	35
	11/21/2014	0.94	31
	5/28/2015	1.07	38
	11/11/2015	0.678	23
	5/9/2016	0.952	33
	8/18/2016	0.977	34
	11/10/2016	0.535	19
	6/8/2017	0.776	25
	9/28/2017	0.904	29
	12/11/2017	0.921	30
	3/21/2018	0.757	24
	6/19/2018	0.431	18
	9/12/2018	0.537	20
MW-3	7/16/2010	ND<0.01	1.5
	2/8/2011	ND<0.01	1.5
	2/17/2012	0.12	5
	7/31/2012	0.2	10
	3/27/2013	0.14	8
	12/23/2013	0.4	16
	6/26/2014	0.12	6
	11/21/2014	0.29	13
	5/28/2015	0.0136	3
	11/11/2015	0.549	21
	12/4/2015	0.133	7

2/19/2016	0.168	9
5/9/2016	0.201	11
8/18/2016	0.996	36
11/10/2016	0.311	15
6/8/2017	0.555	22
9/28/2017	0.31	14
12/14/2017	0.234	12
3/22/2018	0.0496	4
6/19/2018	0.401	17
9/12/2018	2.63	40

The Wilcoxon Statistic is 41
The Expected value is is 199.5
The Standard Deviation is 36.9222
The Z Score is -4.30635
The Standard Deviation adjusted for ties is 36.9205
The Z Score adjusted for ties is -4.30655
-4.30635 < 2.326 indicating no statistical significance at 1% level
-4.30655 < 2.326 indicating no statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Potassium
Location: MW-3
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	5/19/2009	1.9	22
	7/16/2010	1	5
	2/8/2011	0.94	4
	2/17/2012	1.5	19
	7/31/2012	1.2	11
	3/27/2013	1.4	17
	12/23/2013	1.2	12
	6/26/2014	ND<1	2
	11/21/2014	1.2	13
	5/28/2015	1.1	7
	11/11/2015	1.16	10
	5/9/2016	1.12	8
	8/18/2016	1.05	6
	11/10/2016	ND<1	2
	6/8/2017	ND<1	2
	9/28/2017	1.37	16
	12/11/2017	1.22	14
	3/21/2018	1.43	18
	6/19/2018	1.13	9
	9/12/2018	1.33	15
MW-3	5/19/2009	2.6	23
	7/16/2010	1.5	20
	2/8/2011	1.5	21
	2/17/2012	2.9	24
	7/31/2012	5.2	26
	3/27/2013	4.8	25
	12/23/2013	10	28
	6/26/2014	6.6	27
	11/21/2014	11	29
	5/28/2015	13	31

11/11/2015	73.1	42
12/4/2015	60.2	41
2/19/2016	24.1	36
5/9/2016	11.3	30
8/18/2016	32.3	39
11/10/2016	20.8	34
6/8/2017	25.8	38
9/28/2017	24.1	37
12/14/2017	22.5	35
3/22/2018	14.4	32
6/19/2018	18.3	33
9/12/2018	33.2	40

The Wilcoxon Statistic is 438
The Expected value is is 220
The Standard Deviation is 39.7073
The Z Score is 5.47759
The Standard Deviation adjusted for ties is 39.7008
The Z Score adjusted for ties is 5.47848
5.47759 > 2.326 indicating statistical significance at 1% level
5.47848 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Potassium
Location: TMW-2
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	5/19/2009	1.9	24
	7/16/2010	1	5
	2/8/2011	0.94	4
	2/17/2012	1.5	22
	7/31/2012	1.2	14
	3/27/2013	1.4	20
	12/23/2013	1.2	15
	6/26/2014	ND<1	2
	11/21/2014	1.2	16
	5/28/2015	1.1	10
	11/11/2015	1.16	13
	5/9/2016	1.12	11
	8/18/2016	1.05	6
	11/10/2016	ND<1	2
	6/8/2017	ND<1	2
	9/28/2017	1.37	19
	12/11/2017	1.22	17
	3/21/2018	1.43	21
	6/19/2018	1.13	12
	9/12/2018	1.33	18
TMW-2	4/28/2016	1.09	8
	9/28/2017	1.07	7
	3/21/2018	1.09	9
	6/19/2018	1.75	23
	9/12/2018	2.55	25

The Wilcoxon Statistic is 57
The Expected value is is 50
The Standard Deviation is 14.7196

The Z Score is 0.441588
The Standard Deviation adjusted for ties is 14.7083
The Z Score adjusted for ties is 0.441928
0.441588 < 2.326 indicating no statistical significance at 1% level
0.441928 < 2.326 indicating no statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Sodium
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	5/19/2009	4.5	18
	7/16/2010	3.5	11
	2/8/2011	3	6
	2/17/2012	3.8	13
	7/31/2012	3	7
	3/27/2013	3.5	12
	12/23/2013	6	22
	6/26/2014	2.9	3
	11/21/2014	4	15
	5/28/2015	2.95	5
	11/11/2015	4.25	16
	5/9/2016	3.09	8
	8/18/2016	3.14	9
	11/10/2016	4.94	20
	6/8/2017	2.93	4
	9/28/2017	3.84	14
	12/11/2017	3.23	10
	3/21/2018	4.86	19
	6/19/2018	2.88	2
	9/12/2018	5.23	21
MW-3	5/19/2009	2	1
	7/16/2010	4.3	17
	2/8/2011	7.2	23
	2/17/2012	8.7	24
	7/31/2012	9.8	25
	3/27/2013	14	26
	12/23/2013	21	28
	6/26/2014	14	27
	11/21/2014	25	29
	5/28/2015	30.4	32

11/11/2015	150	42
12/4/2015	131	41
2/19/2016	39.7	34
5/9/2016	26.7	31
8/18/2016	84.2	40
11/10/2016	39.7	35
6/8/2017	60.1	39
9/28/2017	43.3	37
12/14/2017	42.9	36
3/22/2018	25.4	30
6/19/2018	35.3	33
9/12/2018	57.3	38

The Wilcoxon Statistic is 415
The Expected value is is 220
The Standard Deviation is 39.7073
The Z Score is 4.89835
The Standard Deviation adjusted for ties is 39.7073
The Z Score adjusted for ties is 4.89835
4.89835 > 2.326 indicating statistical significance at 1% level
4.89835 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Sodium
Location: MW-5
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	5/19/2009	4.5	16
	7/16/2010	3.5	10
	2/8/2011	3	5
	2/17/2012	3.8	12
	7/31/2012	3	6
	3/27/2013	3.5	11
	12/23/2013	6	20
	6/26/2014	2.9	2
	11/21/2014	4	14
	5/28/2015	2.95	4
	11/11/2015	4.25	15
	5/9/2016	3.09	7
	8/18/2016	3.14	8
	11/10/2016	4.94	18
	6/8/2017	2.93	3
	9/28/2017	3.84	13
	12/11/2017	3.23	9
	3/21/2018	4.86	17
	6/19/2018	2.88	1
	9/12/2018	5.23	19
MW-5	4/28/2016	12.2	23
	5/9/2016	12.6	24
	11/10/2016	10.3	22
	6/8/2017	10.1	21
	9/28/2017	14	25
	12/11/2017	14.8	26
	3/21/2018	17	29
	6/19/2018	16.7	28
	9/12/2018	16	27

The Wilcoxon Statistic is 180
The Expected value is is 90
The Standard Deviation is 21.2132
The Z Score is 4.21907
The Standard Deviation adjusted for ties is 21.2132
The Z Score adjusted for ties is 4.21907
4.21907 > 2.326 indicating statistical significance at 1% level
4.21907 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Sodium
Location: TMW-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	5/19/2009	4.5	17
	7/16/2010	3.5	11
	2/8/2011	3	5
	2/17/2012	3.8	13
	7/31/2012	3	6
	3/27/2013	3.5	12
	12/23/2013	6	21
	6/26/2014	2.9	2
	11/21/2014	4	15
	5/28/2015	2.95	4
	11/11/2015	4.25	16
	5/9/2016	3.09	7
	8/18/2016	3.14	8
	11/10/2016	4.94	19
	6/8/2017	2.93	3
	9/28/2017	3.84	14
	12/11/2017	3.23	9
	3/21/2018	4.86	18
	6/19/2018	2.88	1
	9/12/2018	5.23	20
TMW-3	4/28/2016	8.26	23
	6/8/2017	3.31	10
	9/28/2017	7.31	22
	12/11/2017	8.61	24
	3/21/2018	10.4	26
	6/19/2018	10.5	27
	9/12/2018	9.67	25

The Wilcoxon Statistic is 129

The Expected value is is 70
The Standard Deviation is 18.0739
The Z Score is 3.23671
The Standard Deviation adjusted for ties is 18.0739
The Z Score adjusted for ties is 3.23671
3.23671 > 2.326 indicating statistical significance at 1% level
3.23671 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 12
Non detect rank is 6.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	5/19/2009	8.9	19
	7/16/2010	9.4	22
	2/8/2011	5.8	16
	9/14/2011	6.6	18
	2/17/2012	ND<5	6.5
	7/31/2012	ND<5	6.5
	3/27/2013	5.1	14
	12/23/2013	6.1	17
	6/26/2014	ND<5	6.5
	11/21/2014	9.1	21
	5/28/2015	ND<5	6.5
	11/11/2015	18.8	29
	5/9/2016	ND<5	6.5
	8/18/2016	3.51	13
	11/10/2016	16.5	28
	6/8/2017	ND<5	6.5
	9/28/2017	ND<5	6.5
	12/11/2017	ND<5	6.5
	3/21/2018	ND<5	6.5
	6/19/2018	ND<5	6.5
	9/12/2018	12.3	26
MW-3	5/19/2009	ND<5	6.5
	7/16/2010	5.1	15
	2/8/2011	ND<5	6.5
	2/17/2012	22	30
	7/31/2012	23	34
	3/27/2013	16	27
	12/23/2013	12	25
	6/26/2014	9.7	23
	11/21/2014	11	24

5/28/2015	9.09	20
11/11/2015	29.3	36
12/4/2015	29.1	35
2/19/2016	22.2	31
5/9/2016	22.3	32
8/18/2016	95.7	42
11/10/2016	34	38
6/8/2017	93.7	41
9/28/2017	46.2	39
12/14/2017	46.2	40
3/22/2018	22.3	33
6/19/2018	30.1	37
9/12/2018	484	43

The Wilcoxon Statistic is 405
The Expected value is is 231
The Standard Deviation is 41.1582
The Z Score is 4.21544
The Standard Deviation adjusted for ties is 40.7114
The Z Score adjusted for ties is 4.2617
4.21544 > 2.326 indicating statistical significance at 1% level
4.2617 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 36
Non detect rank is 18.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	ND<0.001	18.5
	1/21/2009	ND<0.001	18.5
	4/9/2009	ND<0.001	18.5
	5/19/2009	ND<0.001	18.5
	7/16/2010	ND<0.001	18.5
	2/8/2011	ND<0.001	18.5
	2/17/2012	ND<0.001	18.5
	7/31/2012	ND<0.001	18.5
	12/23/2013	ND<0.001	18.5
	6/26/2014	ND<0.001	18.5
	11/21/2014	ND<0.001	18.5
	5/28/2015	ND<0.001	18.5
	11/11/2015	ND<0.001	18.5
	5/9/2016	ND<0.001	18.5
	11/10/2016	ND<0.001	18.5
	6/8/2017	ND<0.001	18.5
	9/28/2017	ND<0.001	18.5
	12/11/2017	ND<0.001	18.5
	3/21/2018	ND<0.001	18.5
	6/19/2018	ND<0.001	18.5
	9/12/2018	ND<0.001	18.5
MW-3	1/21/2009	ND<0.001	18.5
	4/9/2009	ND<0.001	18.5
	5/19/2009	ND<0.001	18.5
	7/16/2010	ND<0.001	18.5
	2/8/2011	ND<0.001	18.5
	2/17/2012	ND<0.001	18.5
	7/31/2012	ND<0.001	18.5
	12/23/2013	ND<0.001	18.5
	6/26/2014	ND<0.001	18.5

11/21/2014	ND<0.001	18.5
5/28/2015	ND<0.001	18.5
11/11/2015	ND<0.001	18.5
12/4/2015	ND<0.001	18.5
2/19/2016	ND<0.001	18.5
5/9/2016	ND<0.001	18.5
11/10/2016	0.00177	37
6/8/2017	0.0286	42
8/8/2017	0.0113	41
9/28/2017	0.00926	40
12/14/2017	0.00659	38
3/22/2018	0.00671	39
6/19/2018	0.0312	43
9/12/2018	0.297	45
9/27/2018	0.204	44

The Wilcoxon Statistic is 346.5
The Expected value is is 252
The Standard Deviation is 43.9545
The Z Score is 2.13857
The Standard Deviation adjusted for ties is 30.7098
The Z Score adjusted for ties is 3.06091
2.13857 < 2.326 indicating no statistical significance at 1% level
3.06091 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

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

Total non detects is 22
Non detect rank is 11.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.011	23
	1/21/2009	0.015	30
	4/9/2009	0.011	24
	5/19/2009	0.021	36
	7/16/2010	0.011	25
	2/8/2011	0.016	33
	2/17/2012	ND<0.01	11.5
	7/31/2012	0.023	37
	3/27/2013	0.012	27
	12/23/2013	ND<0.01	11.5
	6/26/2014	ND<0.01	11.5
	11/21/2014	ND<0.025	11.5
	5/28/2015	ND<0.025	11.5
	11/11/2015	ND<0.025	11.5
	5/9/2016	0.0281	39
	11/10/2016	ND<0.025	11.5
	6/8/2017	ND<0.025	11.5
	9/28/2017	ND<0.025	11.5
	12/11/2017	ND<0.025	11.5
	3/21/2018	ND<0.025	11.5
	6/19/2018	ND<0.025	11.5
	9/12/2018	ND<0.025	11.5
MW-3	4/19/2008	0.017	35
	1/21/2009	0.015	31
	4/9/2009	0.011	26
	5/19/2009	0.031	40
	7/16/2010	0.015	32
	2/8/2011	0.013	28
	2/17/2012	0.014	29
	7/31/2012	0.016	34

3/27/2013	ND<0.01	11.5
12/23/2013	ND<0.01	11.5
6/26/2014	0.023	38
11/21/2014	ND<0.025	11.5
5/28/2015	ND<0.025	11.5
11/11/2015	ND<0.025	11.5
12/4/2015	ND<0.025	11.5
2/19/2016	ND<0.025	11.5
5/9/2016	ND<0.025	11.5
11/10/2016	ND<0.025	11.5
6/8/2017	0.0769	43
9/28/2017	0.0439	41
12/14/2017	0.159	45
3/22/2018	0.0499	42
6/19/2018	0.109	44
9/12/2018	1.68	47
9/27/2018	1.58	46

The Wilcoxon Statistic is 379.5
The Expected value is is 275
The Standard Deviation is 46.9042
The Z Score is 2.21729
The Standard Deviation adjusted for ties is 44.438
The Z Score adjusted for ties is 2.34034
2.21729 < 2.326 indicating no statistical significance at 1% level
2.34034 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 93 - 179 = -86

Tied Group	Value	Members
1	0.1	3
2	0.2	2

Time Period	Observations
4/19/2008	1
1/21/2009	1
4/9/2009	1
5/19/2009	1
7/16/2010	1
2/8/2011	1
2/17/2012	1
7/31/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 84
B = 0

C = 6
D = 0
E = 8
F = 0
a = 29256
b = 109296
c = 1104
Group Variance = 1620.67
Z-Score = -2.11141
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-2.11141 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 8 - 17 = -9

Tied Group	Value	Members
1	0.1	12

Time Period	Observations
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 3828
B = 0
C = 1320
D = 0
E = 132
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 121
Z-Score = -0.727273
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.727273| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Aluminum
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 22 - 13 = 9
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |9| is 0.417
0.417 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Aluminum
Location: TMW-1
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 6 - 4 = 2
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |2| is 0.816
0.816 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Aluminum
Location: TMW-2
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 5 - 5 = 0
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |0| is 1.184
1.184 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 10 - 5 = 5
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |5| is 0.47
0.47 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 208 - 92 = 116

Tied Group	Value	Members

Time Period	Observations
4/19/2008	1
1/21/2009	1
4/9/2009	1
5/19/2009	1
7/16/2010	1
2/8/2011	1
2/17/2012	1
7/31/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
9/27/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0

D = 0
E = 0
F = 0
a = 33000
b = 124200
c = 1200
Group Variance = 1833.33
Z-Score = 2.68582
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.68582 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 12 - 79 = -67

Tied Group	Value	Members

Time Period	Observations
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = -3.61316
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-3.61316 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Barium
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 25 - 11 = 14
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |14| is 0.18
0.18 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Barium
Location: TMW-1
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 3 - 7 = -4
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |-4| is 0.484
0.484 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Barium
Location: TMW-2
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 5 - 5 = 0
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |0| is 1.184
1.184 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 7 - 8 = -1
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |-1| is 1
1 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 175 - 56 = 119

Tied Group	Value	Members

Time Period	Observations
5/19/2009	1
7/16/2010	1
2/8/2011	1
2/17/2012	1
7/31/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
8/18/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0

a = 22638
b = 83160
c = 924
Group Variance = 1257.67
Z-Score = 3.32736
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.32736 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 48 - 42 = 6

Tied Group	Value	Members
1	4.33	2

Time Period	Observations
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 332.667
Z-Score = 0.274136
Comparison Level at 95% confidence level = 1.65463 (upward trend)
0.274136 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Calcium
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 22 - 13 = 9
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |9| is 0.417
0.417 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Calcium
Location: TMW-1
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 9 - 1 = 8
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |8| is 0.084
0.084 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Calcium
Location: TMW-2
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 9 - 1 = 8
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |8| is 0.084
0.084 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 10 - 5 = 5
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |5| is 0.47
0.47 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 242 - 55 = 187

Tied Group	Value	Members
1	25	3

Time Period	Observations
4/19/2008	1
1/21/2009	1
4/9/2009	1
5/19/2009	1
7/16/2010	1
2/8/2011	1
2/17/2012	1
8/1/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
8/18/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 66
B = 0

C = 6
D = 0
E = 6
F = 0
a = 33000
b = 124200
c = 1200
Group Variance = 1829.67
Z-Score = 4.34837
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.34837 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 38 - 67 = -29

Tied Group	Value	Members

Time Period	Observations
3/27/2013	1
4/11/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 7350
b = 24570
c = 420
Group Variance = 408.333
Z-Score = -1.38564
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-1.38564| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 33 - 3 = 30
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 30 is 0.00043
S > 0 and 0.00043 < 0.05 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: TMW-1
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 27 - 1 = 26
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 26 is 0.00019
S > 0 and 0.00019 < 0.05 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: TMW-2
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 17 - 11 = 6
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |6| is 0.548
0.548 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 20 - 8 = 12
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |12| is 0.178
0.178 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chromium
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 18 - 3 = 15
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |15| is 0.15
0.15 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chromium
Location: TMW-2
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 7 - 3 = 4
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |4| is 0.484
0.484 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 14 - 127 = -113

Tied Group	Value	Members
1	0.01	16
2	0.002	6

Time Period	Observations
4/19/2008	1
1/21/2009	1
4/9/2009	1
5/19/2009	1
7/16/2010	1
2/8/2011	1
2/17/2012	1
7/31/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 9390
B = 0

C = 3480
D = 0
E = 270
F = 0
a = 29256
b = 109296
c = 1104
Group Variance = 1103.67
Z-Score = -3.37131
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-3.37131 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Cobalt
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 14 - 22 = -8
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |-8| is 0.476
0.476 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 45 - 4 = 41

Tied Group	Value	Members
1	0.1	4

Time Period	Observations
1/21/2009	1
4/9/2009	1
5/19/2009	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 156
B = 0
C = 24
D = 0
E = 12
F = 0
a = 2970
b = 8910
c = 220
Group Variance = 156.333
Z-Score = 3.19915
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.19915 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 185 - 45 = 140

Tied Group	Value	Members
1	5.2	2

Time Period	Observations
5/19/2009	1
7/16/2010	1
2/8/2011	1
2/17/2012	1
7/31/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
8/18/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2

F = 0
a = 22638
b = 83160
c = 924
Group Variance = 1256.67
Z-Score = 3.92107
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.92107 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 48 - 43 = 5

Tied Group	Value	Members

Time Period	Observations
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = 0.21898
Comparison Level at 95% confidence level = 1.65463 (upward trend)
0.21898 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Magnesium
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 32 - 4 = 28
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 28 is 0.0012
S > 0 and 0.0012 < 0.05 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Magnesium
Location: TMW-1
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 6 - 4 = 2
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 2 is 0.408
S < 0 or 0.408 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Magnesium
Location: TMW-2
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 7 - 3 = 4
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 4 is 0.242
S < 0 or 0.242 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 9 - 6 = 3
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 3 is 0.36
S < 0 or 0.36 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 151 - 57 = 94

Tied Group	Value	Members
1	0.01	2
2	0.12	2

Time Period	Observations
7/16/2010	1
2/8/2011	1
2/17/2012	1
7/31/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
8/18/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 36
B = 0
C = 0
D = 0
E = 4

F = 0
a = 19740
b = 71820
c = 840
Group Variance = 1094.67
Z-Score = 2.81088
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.81088 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 15 - 76 = -61

Tied Group	Value	Members

Time Period	Observations
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 333.667
Z-Score = -3.28469
Comparison Level at 95% confidence level = 1.65463 (upward trend)
-3.28469 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Manganese
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 22 - 14 = 8
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 8 is 0.238
S < 0 or 0.238 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Manganese
Location: TMW-1
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 1 - 9 = -8
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= -8 is 0.042
S < 0 or 0.042 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Manganese
Location: TMW-2
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 4 - 6 = -2
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= -2 is 0.408
S < 0 or 0.408 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 3 - 12 = -9
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= -9 is 0.068
S < 0 or 0.068 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Nickel
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 25 - 11 = 14
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |14| is 0.18
0.18 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 181 - 48 = 133

Tied Group	Value	Members
1	1.5	2
2	24.1	2

Time Period	Observations
5/19/2009	1
7/16/2010	1
2/8/2011	1
2/17/2012	1
7/31/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
8/18/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 36
B = 0
C = 0
D = 0

E = 4
F = 0
a = 22638
b = 83160
c = 924
Group Variance = 1255.67
Z-Score = 3.72509
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.72509 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 8 - 62 = -54

Tied Group	Value	Members
1	1	7

Time Period	Observations
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 798
B = 0
C = 210
D = 0
E = 42
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 289.333
Z-Score = -3.11585
Comparison Level at 95% confidence level = 1.65463 (upward trend)
-3.11585 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Potassium
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 25 - 5 = 20
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 20 is 0.022
S > 0 and 0.022 < 0.05 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Potassium
Location: TMW-1
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 8 - 1 = 7
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 7 is 0.0795
S < 0 or 0.0795 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Potassium
Location: TMW-2
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 8 - 1 = 7
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 7 is 0.0795
S < 0 or 0.0795 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 8 - 7 = 1
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 1 is 0.5
S < 0 or 0.5 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Selenium
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 0 - 0 = 0
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |0| is 1.08
1.08 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 182 - 47 = 135

Tied Group	Value	Members
1	14	2
2	39.7	2

Time Period	Observations
5/19/2009	1
7/16/2010	1
2/8/2011	1
2/17/2012	1
7/31/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
8/18/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 36
B = 0
C = 0
D = 0

E = 4
F = 0
a = 22638
b = 83160
c = 924
Group Variance = 1255.67
Z-Score = 3.78153
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.78153 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 11 - 79 = -68

Tied Group	Value	Members
1	3.77	2

Time Period	Observations
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 6006
b = 19656
c = 364
Group Variance = 332.667
Z-Score = -3.67342
Comparison Level at 95% confidence level = 1.65463 (upward trend)
-3.67342 <= 1.65463 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Sodium
Location: MW-5
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 28 - 8 = 20
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 20 is 0.022
S > 0 and 0.022 < 0.05 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Sodium
Location: TMW-1
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 7 - 3 = 4
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 4 is 0.242
S < 0 or 0.242 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

Parameter: Sodium
Location: TMW-2
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 6 - 4 = 2
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 2 is 0.408
S < 0 or 0.408 >= 0.05 indicating no evidence of an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 17 - 4 = 13
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 13 is 0.035
S > 0 and 0.035 < 0.05 indicating an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 182 - 46 = 136

Tied Group	Value	Members
1	5	2
2	22.3	2
3	46.2	2

Time Period	Observations
5/19/2009	1
7/16/2010	1
2/8/2011	1
2/17/2012	1
7/31/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
8/18/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1

There are 0 time periods with multiple data

A = 54
B = 0
C = 0

D = 0
E = 6
F = 0
a = 22638
b = 83160
c = 924
Group Variance = 1254.67
Z-Score = 3.81127
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.81127 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 161 - 10 = 151

Tied Group	Value	Members
1	0.001	15

Time Period	Observations
1/21/2009	1
4/9/2009	1
5/19/2009	1
7/16/2010	1
2/8/2011	1
2/17/2012	1
7/31/2012	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
8/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
9/27/2018	1

There are 0 time periods with multiple data

A = 7350
B = 0
C = 2730

D = 0
E = 210
F = 0
a = 29256
b = 109296
c = 1104
Group Variance = 1217
Z-Score = 4.29978
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.29978 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

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

95% Confidence Level

S Statistic = 233 - 44 = 189

Tied Group	Value	Members
1	0.015	2
2	0.01	2
3	0.025	7

Time Period	Observations
4/19/2008	1
1/21/2009	1
4/9/2009	1
5/19/2009	1
7/16/2010	1
2/8/2011	1
2/17/2012	1
7/31/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
9/27/2018	1

There are 0 time periods with multiple data

A = 834
B = 0
C = 210
D = 0
E = 46
F = 0
a = 33000
b = 124200
c = 1200
Group Variance = 1787
Z-Score = 4.44729
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.44729 > 1.65463 indicating an upward trend

APPENDIX C
LABORATORY ANALYTICAL REPORTS & FIELD INFORMATION LOGS

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

September 21, 2018

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1025453
Samples Received:	09/13/2018
Project Number:	171-873
Description:	EWS Camden Class 2 Landfill
Site:	CAMDEN, TN
Report To:	Philip Campbell 325 Seaboard Lane, Suite 170 Franklin, TN 37067

Entire Report Reviewed By:

Chris McCord
Project Manager

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

MW-1 L1025453-01 GW

Collected by	Collected date/time	Received date/time
Philip Campbell	09/12/18 11:20	09/13/18 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1167289	1	09/17/18 13:15	09/17/18 13:15	KK
Wet Chemistry by Method 2320 B-2011	WG1167701	1	09/19/18 21:03	09/19/18 21:03	GB
Wet Chemistry by Method 350.1	WG1166372	1	09/18/18 13:19	09/18/18 13:19	JER
Wet Chemistry by Method 410.4	WG1167017	1	09/16/18 08:35	09/16/18 11:54	TH
Wet Chemistry by Method 9056A	WG1165641	1	09/13/18 22:26	09/13/18 22:26	ELN
Mercury by Method 7470A	WG1166098	1	09/17/18 13:34	09/18/18 13:44	TCT
Mercury by Method 7470A	WG1166101	1	09/17/18 13:34	09/18/18 12:48	TCT
Metals (ICP) by Method 6010B	WG1166217	1	09/18/18 11:39	09/18/18 18:00	ST
Metals (ICP) by Method 6010B	WG1166248	1	09/18/18 13:36	09/18/18 19:49	ST
Metals (ICPMS) by Method 6020	WG1165892	1	09/14/18 09:41	09/14/18 19:02	JPD
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/17/18 23:12	LAT
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/18/18 13:00	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	1	09/14/18 02:34	09/14/18 02:34	RAS
EDB / DBCP by Method 8011	WG1167194	1	09/17/18 12:12	09/18/18 00:15	KLM

MW-3 L1025453-02 GW

Collected by	Collected date/time	Received date/time
Philip Campbell	09/12/18 15:40	09/13/18 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1167289	10	09/17/18 13:22	09/17/18 13:22	KK
Wet Chemistry by Method 2320 B-2011	WG1167701	1	09/19/18 21:10	09/19/18 21:10	GB
Wet Chemistry by Method 350.1	WG1166372	1	09/18/18 13:20	09/18/18 13:20	JER
Wet Chemistry by Method 410.4	WG1167017	1	09/16/18 08:35	09/16/18 11:54	TH
Wet Chemistry by Method 9056A	WG1165641	1	09/13/18 22:44	09/13/18 22:44	ELN
Wet Chemistry by Method 9056A	WG1165641	5	09/13/18 23:02	09/13/18 23:02	ELN
Mercury by Method 7470A	WG1166098	1	09/17/18 13:34	09/18/18 13:56	TCT
Mercury by Method 7470A	WG1166101	1	09/17/18 13:34	09/18/18 13:00	TCT
Metals (ICP) by Method 6010B	WG1166217	1	09/18/18 11:39	09/18/18 18:08	ST
Metals (ICP) by Method 6010B	WG1166248	1	09/18/18 13:36	09/18/18 19:52	ST
Metals (ICPMS) by Method 6020	WG1165892	1	09/14/18 09:41	09/14/18 19:06	JPD
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/17/18 23:16	LAT
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/18/18 13:04	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	1	09/14/18 02:54	09/14/18 02:54	RAS
EDB / DBCP by Method 8011	WG1167194	1	09/17/18 12:12	09/18/18 00:27	KLM

MW-4 L1025453-03 GW

Collected by	Collected date/time	Received date/time
Philip Campbell	09/12/18 13:25	09/13/18 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1167289	1	09/17/18 13:17	09/17/18 13:17	KK
Wet Chemistry by Method 2320 B-2011	WG1167701	1	09/19/18 21:16	09/19/18 21:16	GB
Wet Chemistry by Method 350.1	WG1166372	1	09/18/18 13:22	09/18/18 13:22	JER
Wet Chemistry by Method 410.4	WG1167017	1	09/16/18 08:35	09/16/18 11:54	TH
Wet Chemistry by Method 9056A	WG1165641	1	09/13/18 23:20	09/13/18 23:20	ELN
Mercury by Method 7470A	WG1166098	1	09/17/18 13:34	09/18/18 13:58	TCT
Mercury by Method 7470A	WG1166101	1	09/17/18 13:34	09/18/18 13:02	TCT
Metals (ICP) by Method 6010B	WG1166217	1	09/18/18 11:39	09/18/18 18:11	ST
Metals (ICP) by Method 6010B	WG1166248	1	09/18/18 13:36	09/18/18 19:55	ST
Metals (ICPMS) by Method 6020	WG1165892	1	09/14/18 09:41	09/14/18 19:11	JPD
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/17/18 23:21	LAT
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/18/18 13:08	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	1	09/14/18 03:15	09/14/18 03:15	RAS
EDB / DBCP by Method 8011	WG1167194	1	09/17/18 12:12	09/18/18 00:38	KLM

MW-5 L1025453-04 GW

Collected by	Collected date/time	Received date/time
Philip Campbell	09/12/18 12:35	09/13/18 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1167289	1	09/17/18 13:18	09/17/18 13:18	KK
Wet Chemistry by Method 2320 B-2011	WG1167701	1	09/19/18 21:23	09/19/18 21:23	GB
Wet Chemistry by Method 350.1	WG1166372	1	09/18/18 13:28	09/18/18 13:28	JER
Wet Chemistry by Method 410.4	WG1167017	1	09/16/18 08:35	09/16/18 11:54	TH
Wet Chemistry by Method 9056A	WG1165641	1	09/13/18 23:38	09/13/18 23:38	ELN
Mercury by Method 7470A	WG1166098	1	09/17/18 13:34	09/18/18 14:01	TCT
Mercury by Method 7470A	WG1166101	1	09/17/18 13:34	09/18/18 13:05	TCT
Metals (ICP) by Method 6010B	WG1166217	1	09/18/18 11:39	09/18/18 18:14	ST
Metals (ICP) by Method 6010B	WG1166248	1	09/18/18 13:36	09/18/18 19:58	ST
Metals (ICPMS) by Method 6020	WG1165892	1	09/14/18 09:41	09/14/18 19:16	JPD
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/17/18 23:26	LAT
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/18/18 13:12	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	1	09/14/18 03:35	09/14/18 03:35	RAS
EDB / DBCP by Method 8011	WG1167194	1	09/17/18 12:12	09/18/18 00:50	KLM

TMW-1 L1025453-05 GW

Collected by	Collected date/time	Received date/time
Philip Campbell	09/12/18 12:30	09/13/18 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1167334	1	09/17/18 14:13	09/17/18 14:13	KK
Wet Chemistry by Method 2320 B-2011	WG1167701	1	09/19/18 21:28	09/19/18 21:28	GB
Wet Chemistry by Method 350.1	WG1166372	1	09/18/18 13:30	09/18/18 13:30	JER
Wet Chemistry by Method 410.4	WG1167017	1	09/16/18 08:35	09/16/18 11:55	TH
Wet Chemistry by Method 9056A	WG1165641	1	09/14/18 00:33	09/14/18 00:33	ELN
Mercury by Method 7470A	WG1166098	1	09/17/18 13:34	09/18/18 14:03	TCT
Mercury by Method 7470A	WG1166101	1	09/17/18 13:34	09/18/18 13:12	TCT
Metals (ICP) by Method 6010B	WG1166217	1	09/18/18 11:39	09/18/18 18:17	ST
Metals (ICP) by Method 6010B	WG1166248	1	09/18/18 13:36	09/18/18 20:01	ST
Metals (ICPMS) by Method 6020	WG1165892	1	09/14/18 09:41	09/14/18 19:20	JPD
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/17/18 21:26	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	1	09/14/18 03:56	09/14/18 03:56	RAS
EDB / DBCP by Method 8011	WG1167194	1	09/17/18 12:12	09/18/18 01:01	KLM

TMW-2 L1025453-06 GW

Collected by	Collected date/time	Received date/time
Philip Campbell	09/12/18 14:30	09/13/18 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1167334	1	09/17/18 14:14	09/17/18 14:14	KK
Wet Chemistry by Method 2320 B-2011	WG1167701	1	09/19/18 21:34	09/19/18 21:34	GB
Wet Chemistry by Method 350.1	WG1166372	1	09/18/18 13:31	09/18/18 13:31	JER
Wet Chemistry by Method 410.4	WG1167017	1	09/16/18 08:35	09/16/18 11:55	TH
Wet Chemistry by Method 9056A	WG1165899	1	09/13/18 19:43	09/13/18 19:43	ELN
Mercury by Method 7470A	WG1166098	1	09/17/18 13:34	09/18/18 14:13	TCT
Mercury by Method 7470A	WG1166101	1	09/17/18 13:34	09/18/18 13:14	TCT
Metals (ICP) by Method 6010B	WG1166217	1	09/18/18 11:39	09/18/18 18:19	ST
Metals (ICP) by Method 6010B	WG1166248	1	09/18/18 13:36	09/18/18 20:03	ST
Metals (ICPMS) by Method 6020	WG1166228	1	09/14/18 14:47	09/18/18 00:52	JPD
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/17/18 23:30	LAT
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/18/18 13:16	LAT
Metals (ICPMS) by Method 6020	WG1167668	1	09/19/18 09:03	09/19/18 17:22	LD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	1	09/14/18 04:16	09/14/18 04:16	RAS
EDB / DBCP by Method 8011	WG1167194	1	09/17/18 12:12	09/18/18 01:12	KLM

TMW-3 L1025453-07 GW

Collected by: Philip Campbell
Collected date/time: 09/12/18 15:50
Received date/time: 09/13/18 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1167334	1	09/17/18 14:17	09/17/18 14:17	KK
Wet Chemistry by Method 2320 B-2011	WG1167701	1	09/19/18 21:41	09/19/18 21:41	GB
Wet Chemistry by Method 350.1	WG1166372	1	09/18/18 13:33	09/18/18 13:33	JER
Wet Chemistry by Method 410.4	WG1167017	1	09/16/18 08:35	09/16/18 11:55	TH
Wet Chemistry by Method 9056A	WG1165899	1	09/13/18 20:11	09/13/18 20:11	ELN
Mercury by Method 7470A	WG1166098	1	09/17/18 13:34	09/18/18 14:16	TCT
Mercury by Method 7470A	WG1166101	1	09/17/18 13:34	09/18/18 13:17	TCT
Metals (ICP) by Method 6010B	WG1166217	1	09/18/18 11:39	09/18/18 18:22	ST
Metals (ICP) by Method 6010B	WG1166248	1	09/18/18 13:36	09/18/18 20:12	ST
Metals (ICPMS) by Method 6020	WG1166228	1	09/14/18 14:47	09/18/18 00:57	JPD
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/17/18 23:35	LAT
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/18/18 13:20	LAT
Metals (ICPMS) by Method 6020	WG1167668	1	09/19/18 09:03	09/19/18 17:26	LD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	1	09/14/18 04:36	09/14/18 04:36	RAS
EDB / DBCP by Method 8011	WG1167194	1	09/17/18 12:12	09/18/18 01:24	KLM

DUPLICATE L1025453-08 GW

Collected by: Philip Campbell
Collected date/time: 09/12/18 00:00
Received date/time: 09/13/18 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1167334	1	09/17/18 14:18	09/17/18 14:18	KK
Wet Chemistry by Method 2320 B-2011	WG1167701	1	09/19/18 21:46	09/19/18 21:46	GB
Wet Chemistry by Method 350.1	WG1166372	1	09/18/18 13:34	09/18/18 13:34	JER
Wet Chemistry by Method 410.4	WG1167017	1	09/16/18 08:35	09/16/18 11:56	TH
Wet Chemistry by Method 9056A	WG1165899	1	09/13/18 20:38	09/13/18 20:38	ELN
Mercury by Method 7470A	WG1166098	1	09/17/18 13:34	09/18/18 14:18	TCT
Mercury by Method 7470A	WG1166101	1	09/17/18 13:34	09/18/18 13:19	TCT
Metals (ICP) by Method 6010B	WG1166217	1	09/18/18 11:39	09/18/18 18:25	ST
Metals (ICP) by Method 6010B	WG1166248	1	09/18/18 13:36	09/18/18 20:15	ST
Metals (ICPMS) by Method 6020	WG1166228	1	09/14/18 14:47	09/18/18 01:02	JPD
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/17/18 23:40	LAT
Metals (ICPMS) by Method 6020	WG1166252	1	09/15/18 11:42	09/18/18 13:24	LAT
Metals (ICPMS) by Method 6020	WG1167668	1	09/19/18 09:03	09/19/18 17:31	LD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	1	09/14/18 04:57	09/14/18 04:57	RAS
EDB / DBCP by Method 8011	WG1167194	1.02	09/17/18 12:12	09/18/18 01:35	KLM

FIELD BLANK L1025453-09 GW

Collected by: Philip Campbell
Collected date/time: 09/12/18 15:15
Received date/time: 09/13/18 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1167334	1	09/17/18 14:19	09/17/18 14:19	KK
Wet Chemistry by Method 2320 B-2011	WG1167701	1	09/19/18 21:52	09/19/18 21:52	GB
Wet Chemistry by Method 350.1	WG1166372	1	09/18/18 13:36	09/18/18 13:36	JER
Wet Chemistry by Method 410.4	WG1167017	1	09/16/18 08:35	09/16/18 11:56	TH
Wet Chemistry by Method 9056A	WG1165899	1	09/13/18 21:06	09/13/18 21:06	ELN
Mercury by Method 7470A	WG1166098	1	09/17/18 13:34	09/18/18 14:21	TCT
Metals (ICP) by Method 6010B	WG1166217	1	09/18/18 11:39	09/18/18 18:28	ST
Metals (ICPMS) by Method 6020	WG1166228	1	09/14/18 14:47	09/18/18 01:16	JPD
Metals (ICPMS) by Method 6020	WG1167668	1	09/19/18 09:03	09/19/18 17:44	LD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	1	09/14/18 05:17	09/14/18 05:17	RAS
EDB / DBCP by Method 8011	WG1167194	1.01	09/17/18 12:12	09/18/18 01:58	KLM

TRIP BLANK L1025453-10 GW

Collected by	Collected date/time	Received date/time
Philip Campbell	09/12/18 00:00	09/13/18 15:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	1	09/13/18 22:50	09/13/18 22:50	RAS

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

Chris McCord
Project Manager

Sample Handling and Receiving

No extra volume received to perform Matrix Spike samples.

Lab Sample ID	Project Sample ID	Method
L1025453-01	MW-1	8260B
L1025453-02	MW-3	8260B
L1025453-03	MW-4	8260B
L1025453-04	MW-5	8260B
L1025453-05	TMW-1	8260B
L1025453-06	TMW-2	8260B
L1025453-07	TMW-3	8260B
L1025453-08	DUPLICATE	8260B
L1025453-09	FIELD BLANK	8260B
L1025453-10	TRIP BLANK	8260B

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	ND		30.0	1	09/17/2018 13:15	WG1167289

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	65.4		20.0	1	09/19/2018 21:03	WG1167701

Sample Narrative:
L1025453-01 WG1167701: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	09/18/2018 13:19	WG1166372

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	09/16/2018 11:54	WG1167017

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	09/13/2018 22:26	WG1165641
Chloride	4.94		1.00	1	09/13/2018 22:26	WG1165641
Fluoride	ND		0.100	1	09/13/2018 22:26	WG1165641
Nitrate	ND		0.100	1	09/13/2018 22:26	WG1165641
Sulfate	12.3		5.00	1	09/13/2018 22:26	WG1165641

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	0.000244	B	0.000200	1	09/18/2018 13:44	WG1166098
Mercury,Dissolved	ND		0.000200	1	09/18/2018 12:48	WG1166101

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	09/18/2018 18:00	WG1166217
Boron,Dissolved	ND		0.200	1	09/18/2018 19:49	WG1166248

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	09/14/2018 19:02	WG1165892
Aluminum,Dissolved	ND		0.100	1	09/17/2018 23:12	WG1166252
Antimony	ND	J4	0.00200	1	09/14/2018 19:02	WG1165892
Antimony,Dissolved	ND	J4	0.00200	1	09/18/2018 13:00	WG1166252
Arsenic	0.0184		0.00200	1	09/14/2018 19:02	WG1165892
Arsenic,Dissolved	0.0220		0.00200	1	09/17/2018 23:12	WG1166252
Barium	0.0186		0.00500	1	09/14/2018 19:02	WG1165892
Barium,Dissolved	0.0172		0.00500	1	09/17/2018 23:12	WG1166252

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	09/14/2018 19:02	WG1165892
Beryllium,Dissolved	ND		0.00200	1	09/17/2018 23:12	WG1166252
Cadmium	ND		0.00100	1	09/14/2018 19:02	WG1165892
Cadmium,Dissolved	ND		0.00100	1	09/18/2018 13:00	WG1166252
Calcium	3.15		1.00	1	09/14/2018 19:02	WG1165892
Calcium,Dissolved	3.46		1.00	1	09/17/2018 23:12	WG1166252
Chromium	ND		0.00200	1	09/14/2018 19:02	WG1165892
Chromium,Dissolved	ND		0.00200	1	09/17/2018 23:12	WG1166252
Cobalt	0.0198		0.00200	1	09/14/2018 19:02	WG1165892
Cobalt,Dissolved	0.0217		0.00200	1	09/18/2018 13:00	WG1166252
Copper	ND		0.00500	1	09/14/2018 19:02	WG1165892
Copper,Dissolved	ND		0.00500	1	09/17/2018 23:12	WG1166252
Iron	10.3		0.100	1	09/14/2018 19:02	WG1165892
Iron,Dissolved	11.1		0.100	1	09/17/2018 23:12	WG1166252
Lead	ND		0.00200	1	09/14/2018 19:02	WG1165892
Lead,Dissolved	0.00203	B	0.00200	1	09/17/2018 23:12	WG1166252
Magnesium	2.45		1.00	1	09/14/2018 19:02	WG1165892
Magnesium,Dissolved	2.58		1.00	1	09/18/2018 13:00	WG1166252
Manganese	0.537		0.00500	1	09/14/2018 19:02	WG1165892
Manganese,Dissolved	0.576		0.00500	1	09/17/2018 23:12	WG1166252
Nickel	0.00839		0.00200	1	09/14/2018 19:02	WG1165892
Nickel,Dissolved	0.00936		0.00200	1	09/18/2018 13:00	WG1166252
Potassium	1.33	B	1.00	1	09/14/2018 19:02	WG1165892
Potassium,Dissolved	3.11		1.00	1	09/17/2018 23:12	WG1166252
Selenium	ND		0.00200	1	09/14/2018 19:02	WG1165892
Selenium,Dissolved	ND		0.00200	1	09/17/2018 23:12	WG1166252
Silver	ND		0.00200	1	09/14/2018 19:02	WG1165892
Silver,Dissolved	ND		0.00200	1	09/17/2018 23:12	WG1166252
Sodium	5.23		1.00	1	09/14/2018 19:02	WG1165892
Sodium,Dissolved	5.63		1.00	1	09/17/2018 23:12	WG1166252
Thallium	ND		0.00200	1	09/14/2018 19:02	WG1165892
Thallium,Dissolved	ND		0.00200	1	09/17/2018 23:12	WG1166252
Vanadium	ND		0.00500	1	09/14/2018 19:02	WG1165892
Vanadium,Dissolved	ND		0.00500	1	09/17/2018 23:12	WG1166252
Zinc	ND		0.0250	1	09/14/2018 19:02	WG1165892
Zinc,Dissolved	ND		0.0250	1	09/18/2018 13:00	WG1166252

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J4	0.0500	1	09/14/2018 02:34	WG1166010
Acrylonitrile	ND		0.0100	1	09/14/2018 02:34	WG1166010
Benzene	ND		0.00100	1	09/14/2018 02:34	WG1166010
Bromochloromethane	ND		0.00100	1	09/14/2018 02:34	WG1166010
Bromodichloromethane	ND		0.00100	1	09/14/2018 02:34	WG1166010
Bromoform	ND	J4	0.00100	1	09/14/2018 02:34	WG1166010
Bromomethane	ND		0.00500	1	09/14/2018 02:34	WG1166010
Carbon disulfide	ND		0.00100	1	09/14/2018 02:34	WG1166010
Carbon tetrachloride	ND		0.00100	1	09/14/2018 02:34	WG1166010
Chlorobenzene	ND		0.00100	1	09/14/2018 02:34	WG1166010
Chlorodibromomethane	ND		0.00100	1	09/14/2018 02:34	WG1166010
Chloroethane	ND		0.00500	1	09/14/2018 02:34	WG1166010
Chloroform	ND		0.00500	1	09/14/2018 02:34	WG1166010
Chloromethane	ND		0.00250	1	09/14/2018 02:34	WG1166010
Dibromomethane	ND		0.00100	1	09/14/2018 02:34	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	09/14/2018 02:34	WG1166010

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dibromoethane	ND		0.00100	1	09/14/2018 02:34	WG1166010
1,2-Dichlorobenzene	ND		0.00100	1	09/14/2018 02:34	WG1166010
1,4-Dichlorobenzene	ND		0.00100	1	09/14/2018 02:34	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.00250	1	09/14/2018 02:34	WG1166010
1,1-Dichloroethane	ND		0.00100	1	09/14/2018 02:34	WG1166010
1,2-Dichloroethane	ND		0.00100	1	09/14/2018 02:34	WG1166010
1,1-Dichloroethene	ND		0.00100	1	09/14/2018 02:34	WG1166010
cis-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 02:34	WG1166010
trans-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 02:34	WG1166010
1,2-Dichloropropane	ND		0.00100	1	09/14/2018 02:34	WG1166010
cis-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 02:34	WG1166010
trans-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 02:34	WG1166010
Ethylbenzene	ND		0.00100	1	09/14/2018 02:34	WG1166010
2-Hexanone	ND		0.0100	1	09/14/2018 02:34	WG1166010
Iodomethane	ND		0.0100	1	09/14/2018 02:34	WG1166010
2-Butanone (MEK)	ND		0.0100	1	09/14/2018 02:34	WG1166010
Methylene Chloride	ND		0.00500	1	09/14/2018 02:34	WG1166010
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	09/14/2018 02:34	WG1166010
Styrene	ND		0.00100	1	09/14/2018 02:34	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 02:34	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 02:34	WG1166010
Tetrachloroethene	ND		0.00100	1	09/14/2018 02:34	WG1166010
Toluene	ND		0.00100	1	09/14/2018 02:34	WG1166010
1,1,1-Trichloroethane	ND		0.00100	1	09/14/2018 02:34	WG1166010
1,1,2-Trichloroethane	ND		0.00100	1	09/14/2018 02:34	WG1166010
Trichloroethene	ND		0.00100	1	09/14/2018 02:34	WG1166010
Trichlorofluoromethane	ND		0.00500	1	09/14/2018 02:34	WG1166010
1,2,3-Trichloropropane	ND		0.00250	1	09/14/2018 02:34	WG1166010
Vinyl acetate	ND		0.0100	1	09/14/2018 02:34	WG1166010
Vinyl chloride	ND		0.00100	1	09/14/2018 02:34	WG1166010
Xylenes, Total	ND		0.00300	1	09/14/2018 02:34	WG1166010
(S) Toluene-d8	*101*		*80.0-120*		*09/14/2018 02:34*	WG1166010
(S) Dibromofluoromethane	*104*		*75.0-120*		*09/14/2018 02:34*	WG1166010
(S) a,a,a-Trifluorotoluene	*106*		*80.0-120*		*09/14/2018 02:34*	WG1166010
(S) 4-Bromofluorobenzene	*87.2*		*77.0-126*		*09/14/2018 02:34*	WG1166010

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	09/18/2018 00:15	WG1167194
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	09/18/2018 00:15	WG1167194

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	640		300	10	09/17/2018 13:22	WG1167289

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	09/19/2018 21:10	WG1167701

Sample Narrative:
L1025453-02 WG1167701: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	4.05		0.100	1	09/18/2018 13:20	WG1166372

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	22.0		10.0	1	09/16/2018 11:54	WG1167017

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	09/13/2018 22:44	WG1165641
Chloride	222		5.00	5	09/13/2018 23:02	WG1165641
Fluoride	0.543		0.100	1	09/13/2018 22:44	WG1165641
Nitrate	5.70		0.100	1	09/13/2018 22:44	WG1165641
Sulfate	484		25.0	5	09/13/2018 23:02	WG1165641

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/18/2018 13:56	WG1166098
Mercury,Dissolved	ND		0.000200	1	09/18/2018 13:00	WG1166101

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	09/18/2018 18:08	WG1166217
Boron,Dissolved	ND		0.200	1	09/18/2018 19:52	WG1166248

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.418		0.100	1	09/14/2018 19:06	WG1165892
Aluminum,Dissolved	0.422		0.100	1	09/17/2018 23:16	WG1166252
Antimony	ND	J4	0.00200	1	09/14/2018 19:06	WG1165892
Antimony,Dissolved	ND	J4	0.00200	1	09/18/2018 13:04	WG1166252
Arsenic	ND		0.00200	1	09/14/2018 19:06	WG1165892
Arsenic,Dissolved	ND		0.00200	1	09/17/2018 23:16	WG1166252
Barium	0.147		0.00500	1	09/14/2018 19:06	WG1165892
Barium,Dissolved	0.156		0.00500	1	09/17/2018 23:16	WG1166252

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	09/14/2018 19:06	WG1165892
Beryllium,Dissolved	ND		0.00200	1	09/17/2018 23:16	WG1166252
Cadmium	0.297		0.00100	1	09/14/2018 19:06	WG1165892
Cadmium,Dissolved	0.320		0.00100	1	09/18/2018 13:04	WG1166252
Calcium	140		1.00	1	09/14/2018 19:06	WG1165892
Calcium,Dissolved	145		1.00	1	09/17/2018 23:16	WG1166252
Chromium	0.0102		0.00200	1	09/14/2018 19:06	WG1165892
Chromium,Dissolved	0.0140		0.00200	1	09/17/2018 23:16	WG1166252
Cobalt	0.00825		0.00200	1	09/14/2018 19:06	WG1165892
Cobalt,Dissolved	0.00865		0.00200	1	09/18/2018 13:04	WG1166252
Copper	ND		0.00500	1	09/14/2018 19:06	WG1165892
Copper,Dissolved	0.00610		0.00500	1	09/17/2018 23:16	WG1166252
Iron	ND		0.100	1	09/14/2018 19:06	WG1165892
Iron,Dissolved	ND		0.100	1	09/17/2018 23:16	WG1166252
Lead	ND		0.00200	1	09/14/2018 19:06	WG1165892
Lead,Dissolved	0.00316	B	0.00200	1	09/18/2018 13:04	WG1166252
Magnesium	64.0		1.00	1	09/14/2018 19:06	WG1165892
Magnesium,Dissolved	65.2		1.00	1	09/18/2018 13:04	WG1166252
Manganese	2.63		0.00500	1	09/14/2018 19:06	WG1165892
Manganese,Dissolved	2.69		0.00500	1	09/17/2018 23:16	WG1166252
Nickel	0.126		0.00200	1	09/14/2018 19:06	WG1165892
Nickel,Dissolved	0.134		0.00200	1	09/18/2018 13:04	WG1166252
Potassium	33.2		1.00	1	09/14/2018 19:06	WG1165892
Potassium,Dissolved	35.7		1.00	1	09/17/2018 23:16	WG1166252
Selenium	0.00249		0.00200	1	09/14/2018 19:06	WG1165892
Selenium,Dissolved	0.00302		0.00200	1	09/17/2018 23:16	WG1166252
Silver	ND		0.00200	1	09/14/2018 19:06	WG1165892
Silver,Dissolved	ND		0.00200	1	09/17/2018 23:16	WG1166252
Sodium	57.3		1.00	1	09/14/2018 19:06	WG1165892
Sodium,Dissolved	60.4		1.00	1	09/17/2018 23:16	WG1166252
Thallium	ND		0.00200	1	09/14/2018 19:06	WG1165892
Thallium,Dissolved	ND		0.00200	1	09/17/2018 23:16	WG1166252
Vanadium	ND		0.00500	1	09/14/2018 19:06	WG1165892
Vanadium,Dissolved	ND		0.00500	1	09/17/2018 23:16	WG1166252
Zinc	1.68		0.0250	1	09/14/2018 19:06	WG1165892
Zinc,Dissolved	1.74		0.0250	1	09/18/2018 13:04	WG1166252

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J4	0.0500	1	09/14/2018 02:54	WG1166010
Acrylonitrile	ND		0.0100	1	09/14/2018 02:54	WG1166010
Benzene	ND		0.00100	1	09/14/2018 02:54	WG1166010
Bromochloromethane	ND		0.00100	1	09/14/2018 02:54	WG1166010
Bromodichloromethane	ND		0.00100	1	09/14/2018 02:54	WG1166010
Bromoform	ND	J4	0.00100	1	09/14/2018 02:54	WG1166010
Bromomethane	ND		0.00500	1	09/14/2018 02:54	WG1166010
Carbon disulfide	ND		0.00100	1	09/14/2018 02:54	WG1166010
Carbon tetrachloride	ND		0.00100	1	09/14/2018 02:54	WG1166010
Chlorobenzene	ND		0.00100	1	09/14/2018 02:54	WG1166010
Chlorodibromomethane	ND		0.00100	1	09/14/2018 02:54	WG1166010
Chloroethane	ND		0.00500	1	09/14/2018 02:54	WG1166010
Chloroform	ND		0.00500	1	09/14/2018 02:54	WG1166010
Chloromethane	ND		0.00250	1	09/14/2018 02:54	WG1166010
Dibromomethane	ND		0.00100	1	09/14/2018 02:54	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	09/14/2018 02:54	WG1166010

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dibromoethane	ND		0.00100	1	09/14/2018 02:54	WG1166010
1,2-Dichlorobenzene	ND		0.00100	1	09/14/2018 02:54	WG1166010
1,4-Dichlorobenzene	ND		0.00100	1	09/14/2018 02:54	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.00250	1	09/14/2018 02:54	WG1166010
1,1-Dichloroethane	ND		0.00100	1	09/14/2018 02:54	WG1166010
1,2-Dichloroethane	ND		0.00100	1	09/14/2018 02:54	WG1166010
1,1-Dichloroethene	ND		0.00100	1	09/14/2018 02:54	WG1166010
cis-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 02:54	WG1166010
trans-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 02:54	WG1166010
1,2-Dichloropropane	ND		0.00100	1	09/14/2018 02:54	WG1166010
cis-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 02:54	WG1166010
trans-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 02:54	WG1166010
Ethylbenzene	ND		0.00100	1	09/14/2018 02:54	WG1166010
2-Hexanone	ND		0.0100	1	09/14/2018 02:54	WG1166010
Iodomethane	ND		0.0100	1	09/14/2018 02:54	WG1166010
2-Butanone (MEK)	ND		0.0100	1	09/14/2018 02:54	WG1166010
Methylene Chloride	ND		0.00500	1	09/14/2018 02:54	WG1166010
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	09/14/2018 02:54	WG1166010
Styrene	ND		0.00100	1	09/14/2018 02:54	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 02:54	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 02:54	WG1166010
Tetrachloroethene	ND		0.00100	1	09/14/2018 02:54	WG1166010
Toluene	ND		0.00100	1	09/14/2018 02:54	WG1166010
1,1,1-Trichloroethane	ND		0.00100	1	09/14/2018 02:54	WG1166010
1,1,2-Trichloroethane	ND		0.00100	1	09/14/2018 02:54	WG1166010
Trichloroethene	ND		0.00100	1	09/14/2018 02:54	WG1166010
Trichlorofluoromethane	ND		0.00500	1	09/14/2018 02:54	WG1166010
1,2,3-Trichloropropane	ND		0.00250	1	09/14/2018 02:54	WG1166010
Vinyl acetate	ND		0.0100	1	09/14/2018 02:54	WG1166010
Vinyl chloride	ND		0.00100	1	09/14/2018 02:54	WG1166010
Xylenes, Total	ND		0.00300	1	09/14/2018 02:54	WG1166010
(S) Toluene-d8	*101*		*80.0-120*		*09/14/2018 02:54*	WG1166010
(S) Dibromofluoromethane	*106*		*75.0-120*		*09/14/2018 02:54*	WG1166010
(S) a,a,a-Trifluorotoluene	*109*		*80.0-120*		*09/14/2018 02:54*	WG1166010
(S) 4-Bromofluorobenzene	*83.1*		*77.0-126*		*09/14/2018 02:54*	WG1166010

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	09/18/2018 00:27	WG1167194
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	09/18/2018 00:27	WG1167194

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	ND		30.0	1	09/17/2018 13:17	WG1167289

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	21.2		20.0	1	09/19/2018 21:16	WG1167701

Sample Narrative:
L1025453-03 WG1167701: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	09/18/2018 13:22	WG1166372

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	09/16/2018 11:54	WG1167017

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	09/13/2018 23:20	WG1165641
Chloride	7.44		1.00	1	09/13/2018 23:20	WG1165641
Fluoride	ND		0.100	1	09/13/2018 23:20	WG1165641
Nitrate	0.677		0.100	1	09/13/2018 23:20	WG1165641
Sulfate	ND		5.00	1	09/13/2018 23:20	WG1165641

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/18/2018 13:58	WG1166098
Mercury,Dissolved	ND		0.000200	1	09/18/2018 13:02	WG1166101

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	09/18/2018 18:11	WG1166217
Boron,Dissolved	ND		0.200	1	09/18/2018 19:55	WG1166248

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	09/14/2018 19:11	WG1165892
Aluminum,Dissolved	ND		0.100	1	09/17/2018 23:21	WG1166252
Antimony	ND	J4	0.00200	1	09/14/2018 19:11	WG1165892
Antimony,Dissolved	ND	J4	0.00200	1	09/18/2018 13:08	WG1166252
Arsenic	ND		0.00200	1	09/14/2018 19:11	WG1165892
Arsenic,Dissolved	ND		0.00200	1	09/17/2018 23:21	WG1166252
Barium	0.00730		0.00500	1	09/14/2018 19:11	WG1165892
Barium,Dissolved	0.00755		0.00500	1	09/17/2018 23:21	WG1166252

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	09/14/2018 19:11	WG1165892
Beryllium,Dissolved	ND		0.00200	1	09/17/2018 23:21	WG1166252
Cadmium	ND		0.00100	1	09/14/2018 19:11	WG1165892
Cadmium,Dissolved	ND		0.00100	1	09/17/2018 23:21	WG1166252
Calcium	4.33		1.00	1	09/14/2018 19:11	WG1165892
Calcium,Dissolved	4.78		1.00	1	09/17/2018 23:21	WG1166252
Chromium	ND		0.00200	1	09/14/2018 19:11	WG1165892
Chromium,Dissolved	ND		0.00200	1	09/17/2018 23:21	WG1166252
Cobalt	ND		0.00200	1	09/14/2018 19:11	WG1165892
Cobalt,Dissolved	ND		0.00200	1	09/17/2018 23:21	WG1166252
Copper	ND		0.00500	1	09/14/2018 19:11	WG1165892
Copper,Dissolved	ND		0.00500	1	09/17/2018 23:21	WG1166252
Iron	ND		0.100	1	09/14/2018 19:11	WG1165892
Iron,Dissolved	ND		0.100	1	09/17/2018 23:21	WG1166252
Lead	ND		0.00200	1	09/14/2018 19:11	WG1165892
Lead,Dissolved	ND		0.00200	1	09/17/2018 23:21	WG1166252
Magnesium	2.52		1.00	1	09/14/2018 19:11	WG1165892
Magnesium,Dissolved	2.65		1.00	1	09/18/2018 13:08	WG1166252
Manganese	0.0185		0.00500	1	09/14/2018 19:11	WG1165892
Manganese,Dissolved	0.0169		0.00500	1	09/17/2018 23:21	WG1166252
Nickel	ND		0.00200	1	09/14/2018 19:11	WG1165892
Nickel,Dissolved	ND		0.00200	1	09/17/2018 23:21	WG1166252
Potassium	ND		1.00	1	09/14/2018 19:11	WG1165892
Potassium,Dissolved	ND		1.00	1	09/17/2018 23:21	WG1166252
Selenium	ND		0.00200	1	09/14/2018 19:11	WG1165892
Selenium,Dissolved	ND		0.00200	1	09/17/2018 23:21	WG1166252
Silver	ND		0.00200	1	09/14/2018 19:11	WG1165892
Silver,Dissolved	ND		0.00200	1	09/17/2018 23:21	WG1166252
Sodium	3.60		1.00	1	09/14/2018 19:11	WG1165892
Sodium,Dissolved	3.93		1.00	1	09/17/2018 23:21	WG1166252
Thallium	ND		0.00200	1	09/14/2018 19:11	WG1165892
Thallium,Dissolved	ND		0.00200	1	09/17/2018 23:21	WG1166252
Vanadium	ND		0.00500	1	09/14/2018 19:11	WG1165892
Vanadium,Dissolved	ND		0.00500	1	09/17/2018 23:21	WG1166252
Zinc	ND		0.0250	1	09/14/2018 19:11	WG1165892
Zinc,Dissolved	ND		0.0250	1	09/17/2018 23:21	WG1166252

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J4	0.0500	1	09/14/2018 03:15	WG1166010
Acrylonitrile	ND		0.0100	1	09/14/2018 03:15	WG1166010
Benzene	ND		0.00100	1	09/14/2018 03:15	WG1166010
Bromochloromethane	ND		0.00100	1	09/14/2018 03:15	WG1166010
Bromodichloromethane	ND		0.00100	1	09/14/2018 03:15	WG1166010
Bromoform	ND	J4	0.00100	1	09/14/2018 03:15	WG1166010
Bromomethane	ND		0.00500	1	09/14/2018 03:15	WG1166010
Carbon disulfide	ND		0.00100	1	09/14/2018 03:15	WG1166010
Carbon tetrachloride	ND		0.00100	1	09/14/2018 03:15	WG1166010
Chlorobenzene	ND		0.00100	1	09/14/2018 03:15	WG1166010
Chlorodibromomethane	ND		0.00100	1	09/14/2018 03:15	WG1166010
Chloroethane	ND		0.00500	1	09/14/2018 03:15	WG1166010
Chloroform	ND		0.00500	1	09/14/2018 03:15	WG1166010
Chloromethane	ND		0.00250	1	09/14/2018 03:15	WG1166010
Dibromomethane	ND		0.00100	1	09/14/2018 03:15	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	09/14/2018 03:15	WG1166010

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dibromoethane	ND		0.00100	1	09/14/2018 03:15	WG1166010
1,2-Dichlorobenzene	ND		0.00100	1	09/14/2018 03:15	WG1166010
1,4-Dichlorobenzene	ND		0.00100	1	09/14/2018 03:15	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.00250	1	09/14/2018 03:15	WG1166010
1,1-Dichloroethane	ND		0.00100	1	09/14/2018 03:15	WG1166010
1,2-Dichloroethane	ND		0.00100	1	09/14/2018 03:15	WG1166010
1,1-Dichloroethene	ND		0.00100	1	09/14/2018 03:15	WG1166010
cis-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 03:15	WG1166010
trans-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 03:15	WG1166010
1,2-Dichloropropane	ND		0.00100	1	09/14/2018 03:15	WG1166010
cis-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 03:15	WG1166010
trans-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 03:15	WG1166010
Ethylbenzene	ND		0.00100	1	09/14/2018 03:15	WG1166010
2-Hexanone	ND		0.0100	1	09/14/2018 03:15	WG1166010
Iodomethane	ND		0.0100	1	09/14/2018 03:15	WG1166010
2-Butanone (MEK)	ND		0.0100	1	09/14/2018 03:15	WG1166010
Methylene Chloride	ND		0.00500	1	09/14/2018 03:15	WG1166010
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	09/14/2018 03:15	WG1166010
Styrene	ND		0.00100	1	09/14/2018 03:15	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 03:15	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 03:15	WG1166010
Tetrachloroethene	ND		0.00100	1	09/14/2018 03:15	WG1166010
Toluene	ND		0.00100	1	09/14/2018 03:15	WG1166010
1,1,1-Trichloroethane	ND		0.00100	1	09/14/2018 03:15	WG1166010
1,1,2-Trichloroethane	ND		0.00100	1	09/14/2018 03:15	WG1166010
Trichloroethene	ND		0.00100	1	09/14/2018 03:15	WG1166010
Trichlorofluoromethane	ND		0.00500	1	09/14/2018 03:15	WG1166010
1,2,3-Trichloropropane	ND		0.00250	1	09/14/2018 03:15	WG1166010
Vinyl acetate	ND		0.0100	1	09/14/2018 03:15	WG1166010
Vinyl chloride	ND		0.00100	1	09/14/2018 03:15	WG1166010
Xylenes, Total	ND		0.00300	1	09/14/2018 03:15	WG1166010
(S) Toluene-d8	*101*		*80.0-120*		*09/14/2018 03:15*	WG1166010
(S) Dibromofluoromethane	*102*		*75.0-120*		*09/14/2018 03:15*	WG1166010
(S) a,a,a-Trifluorotoluene	*105*		*80.0-120*		*09/14/2018 03:15*	WG1166010
(S) 4-Bromofluorobenzene	*83.9*		*77.0-126*		*09/14/2018 03:15*	WG1166010

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	09/18/2018 00:38	WG1167194
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	09/18/2018 00:38	WG1167194

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	71.2		30.0	1	09/17/2018 13:18	WG1167289

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	09/19/2018 21:23	WG1167701

Sample Narrative:
L1025453-04 WG1167701: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	09/18/2018 13:28	WG1166372

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	09/16/2018 11:54	WG1167017

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	09/13/2018 23:38	WG1165641
Chloride	57.1		1.00	1	09/13/2018 23:38	WG1165641
Fluoride	ND		0.100	1	09/13/2018 23:38	WG1165641
Nitrate	1.01		0.100	1	09/13/2018 23:38	WG1165641
Sulfate	5.73		5.00	1	09/13/2018 23:38	WG1165641

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/18/2018 14:01	WG1166098
Mercury,Dissolved	ND		0.000200	1	09/18/2018 13:05	WG1166101

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	09/18/2018 18:14	WG1166217
Boron,Dissolved	ND		0.200	1	09/18/2018 19:58	WG1166248

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.219	B	0.100	1	09/14/2018 19:16	WG1165892
Aluminum,Dissolved	ND		0.100	1	09/17/2018 23:26	WG1166252
Antimony	ND	J4	0.00200	1	09/14/2018 19:16	WG1165892
Antimony,Dissolved	ND	J4	0.00200	1	09/18/2018 13:12	WG1166252
Arsenic	ND		0.00200	1	09/14/2018 19:16	WG1165892
Arsenic,Dissolved	ND		0.00200	1	09/17/2018 23:26	WG1166252
Barium	0.0308		0.00500	1	09/14/2018 19:16	WG1165892
Barium,Dissolved	0.0285		0.00500	1	09/17/2018 23:26	WG1166252

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	09/14/2018 19:16	WG1165892
Beryllium,Dissolved	ND		0.00200	1	09/17/2018 23:26	WG1166252
Cadmium	ND		0.00100	1	09/14/2018 19:16	WG1165892
Cadmium,Dissolved	ND		0.00100	1	09/17/2018 23:26	WG1166252
Calcium	12.5		1.00	1	09/14/2018 19:16	WG1165892
Calcium,Dissolved	12.7		1.00	1	09/17/2018 23:26	WG1166252
Chromium	0.00283		0.00200	1	09/14/2018 19:16	WG1165892
Chromium,Dissolved	ND		0.00200	1	09/17/2018 23:26	WG1166252
Cobalt	0.00204		0.00200	1	09/14/2018 19:16	WG1165892
Cobalt,Dissolved	0.00211		0.00200	1	09/17/2018 23:26	WG1166252
Copper	ND		0.00500	1	09/14/2018 19:16	WG1165892
Copper,Dissolved	ND		0.00500	1	09/17/2018 23:26	WG1166252
Iron	0.224	B	0.100	1	09/14/2018 19:16	WG1165892
Iron,Dissolved	ND		0.100	1	09/17/2018 23:26	WG1166252
Lead	ND		0.00200	1	09/14/2018 19:16	WG1165892
Lead,Dissolved	ND		0.00200	1	09/17/2018 23:26	WG1166252
Magnesium	8.23		1.00	1	09/14/2018 19:16	WG1165892
Magnesium,Dissolved	8.60		1.00	1	09/18/2018 13:12	WG1166252
Manganese	0.0861		0.00500	1	09/14/2018 19:16	WG1165892
Manganese,Dissolved	0.0847		0.00500	1	09/17/2018 23:26	WG1166252
Nickel	0.00671		0.00200	1	09/14/2018 19:16	WG1165892
Nickel,Dissolved	0.00724		0.00200	1	09/18/2018 13:12	WG1166252
Potassium	1.64	B	1.00	1	09/14/2018 19:16	WG1165892
Potassium,Dissolved	1.33		1.00	1	09/17/2018 23:26	WG1166252
Selenium	ND		0.00200	1	09/14/2018 19:16	WG1165892
Selenium,Dissolved	ND		0.00200	1	09/17/2018 23:26	WG1166252
Silver	ND		0.00200	1	09/14/2018 19:16	WG1165892
Silver,Dissolved	ND		0.00200	1	09/17/2018 23:26	WG1166252
Sodium	16.0		1.00	1	09/14/2018 19:16	WG1165892
Sodium,Dissolved	16.7		1.00	1	09/17/2018 23:26	WG1166252
Thallium	ND		0.00200	1	09/14/2018 19:16	WG1165892
Thallium,Dissolved	ND		0.00200	1	09/17/2018 23:26	WG1166252
Vanadium	ND		0.00500	1	09/14/2018 19:16	WG1165892
Vanadium,Dissolved	ND		0.00500	1	09/17/2018 23:26	WG1166252
Zinc	ND		0.0250	1	09/14/2018 19:16	WG1165892
Zinc,Dissolved	0.0271		0.0250	1	09/18/2018 13:12	WG1166252

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J4	0.0500	1	09/14/2018 03:35	WG1166010
Acrylonitrile	ND		0.0100	1	09/14/2018 03:35	WG1166010
Benzene	ND		0.00100	1	09/14/2018 03:35	WG1166010
Bromochloromethane	ND		0.00100	1	09/14/2018 03:35	WG1166010
Bromodichloromethane	ND		0.00100	1	09/14/2018 03:35	WG1166010
Bromoform	ND	J4	0.00100	1	09/14/2018 03:35	WG1166010
Bromomethane	ND		0.00500	1	09/14/2018 03:35	WG1166010
Carbon disulfide	ND		0.00100	1	09/14/2018 03:35	WG1166010
Carbon tetrachloride	ND		0.00100	1	09/14/2018 03:35	WG1166010
Chlorobenzene	ND		0.00100	1	09/14/2018 03:35	WG1166010
Chlorodibromomethane	ND		0.00100	1	09/14/2018 03:35	WG1166010
Chloroethane	ND		0.00500	1	09/14/2018 03:35	WG1166010
Chloroform	ND		0.00500	1	09/14/2018 03:35	WG1166010
Chloromethane	ND		0.00250	1	09/14/2018 03:35	WG1166010
Dibromomethane	ND		0.00100	1	09/14/2018 03:35	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	09/14/2018 03:35	WG1166010

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dibromoethane	ND		0.00100	1	09/14/2018 03:35	WG1166010
1,2-Dichlorobenzene	ND		0.00100	1	09/14/2018 03:35	WG1166010
1,4-Dichlorobenzene	ND		0.00100	1	09/14/2018 03:35	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.00250	1	09/14/2018 03:35	WG1166010
1,1-Dichloroethane	ND		0.00100	1	09/14/2018 03:35	WG1166010
1,2-Dichloroethane	ND		0.00100	1	09/14/2018 03:35	WG1166010
1,1-Dichloroethene	ND		0.00100	1	09/14/2018 03:35	WG1166010
cis-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 03:35	WG1166010
trans-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 03:35	WG1166010
1,2-Dichloropropane	ND		0.00100	1	09/14/2018 03:35	WG1166010
cis-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 03:35	WG1166010
trans-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 03:35	WG1166010
Ethylbenzene	ND		0.00100	1	09/14/2018 03:35	WG1166010
2-Hexanone	ND		0.0100	1	09/14/2018 03:35	WG1166010
Iodomethane	ND		0.0100	1	09/14/2018 03:35	WG1166010
2-Butanone (MEK)	ND		0.0100	1	09/14/2018 03:35	WG1166010
Methylene Chloride	ND		0.00500	1	09/14/2018 03:35	WG1166010
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	09/14/2018 03:35	WG1166010
Styrene	ND		0.00100	1	09/14/2018 03:35	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 03:35	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 03:35	WG1166010
Tetrachloroethene	ND		0.00100	1	09/14/2018 03:35	WG1166010
Toluene	ND		0.00100	1	09/14/2018 03:35	WG1166010
1,1,1-Trichloroethane	ND		0.00100	1	09/14/2018 03:35	WG1166010
1,1,2-Trichloroethane	ND		0.00100	1	09/14/2018 03:35	WG1166010
Trichloroethene	ND		0.00100	1	09/14/2018 03:35	WG1166010
Trichlorofluoromethane	ND		0.00500	1	09/14/2018 03:35	WG1166010
1,2,3-Trichloropropane	ND		0.00250	1	09/14/2018 03:35	WG1166010
Vinyl acetate	ND		0.0100	1	09/14/2018 03:35	WG1166010
Vinyl chloride	ND		0.00100	1	09/14/2018 03:35	WG1166010
Xylenes, Total	ND		0.00300	1	09/14/2018 03:35	WG1166010
(S) Toluene-d8	*100*		*80.0-120*		*09/14/2018 03:35*	WG1166010
(S) Dibromofluoromethane	*103*		*75.0-120*		*09/14/2018 03:35*	WG1166010
(S) a,a,a-Trifluorotoluene	*108*		*80.0-120*		*09/14/2018 03:35*	WG1166010
(S) 4-Bromofluorobenzene	*85.4*		*77.0-126*		*09/14/2018 03:35*	WG1166010

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	09/18/2018 00:50	WG1167194
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	09/18/2018 00:50	WG1167194

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	ND		30.0	1	09/17/2018 14:13	WG1167334

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	09/19/2018 21:28	WG1167701

Sample Narrative:
L1025453-05 WG1167701: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	09/18/2018 13:30	WG1166372

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	09/16/2018 11:55	WG1167017

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	09/14/2018 00:33	WG1165641
Chloride	12.8		1.00	1	09/14/2018 00:33	WG1165641
Fluoride	ND		0.100	1	09/14/2018 00:33	WG1165641
Nitrate	1.76		0.100	1	09/14/2018 00:33	WG1165641
Sulfate	ND		5.00	1	09/14/2018 00:33	WG1165641

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/18/2018 14:03	WG1166098
Mercury,Dissolved	ND		0.000200	1	09/18/2018 13:12	WG1166101

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	09/18/2018 18:17	WG1166217
Boron,Dissolved	ND		0.200	1	09/18/2018 20:01	WG1166248

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.158	B	0.100	1	09/14/2018 19:20	WG1165892
Aluminum,Dissolved	ND		0.100	1	09/17/2018 21:26	WG1166252
Antimony	ND	J4	0.00200	1	09/14/2018 19:20	WG1165892
Antimony,Dissolved	ND	J4	0.00200	1	09/17/2018 21:26	WG1166252
Arsenic	ND		0.00200	1	09/14/2018 19:20	WG1165892
Arsenic,Dissolved	ND		0.00200	1	09/17/2018 21:26	WG1166252
Barium	0.00974		0.00500	1	09/14/2018 19:20	WG1165892
Barium,Dissolved	0.00763		0.00500	1	09/17/2018 21:26	WG1166252

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	09/14/2018 19:20	WG1165892
Beryllium,Dissolved	ND		0.00200	1	09/17/2018 21:26	WG1166252
Cadmium	ND		0.00100	1	09/14/2018 19:20	WG1165892
Cadmium,Dissolved	ND		0.00100	1	09/17/2018 21:26	WG1166252
Calcium	8.41		1.00	1	09/14/2018 19:20	WG1165892
Calcium,Dissolved	8.48		1.00	1	09/17/2018 21:26	WG1166252
Chromium	ND		0.00200	1	09/14/2018 19:20	WG1165892
Chromium,Dissolved	ND		0.00200	1	09/17/2018 21:26	WG1166252
Cobalt	ND		0.00200	1	09/14/2018 19:20	WG1165892
Cobalt,Dissolved	ND		0.00200	1	09/17/2018 21:26	WG1166252
Copper	ND		0.00500	1	09/14/2018 19:20	WG1165892
Copper,Dissolved	ND		0.00500	1	09/17/2018 21:26	WG1166252
Iron	0.294		0.100	1	09/14/2018 19:20	WG1165892
Iron,Dissolved	ND		0.100	1	09/17/2018 21:26	WG1166252
Lead	ND		0.00200	1	09/14/2018 19:20	WG1165892
Lead,Dissolved	ND		0.00200	1	09/17/2018 21:26	WG1166252
Magnesium	2.28		1.00	1	09/14/2018 19:20	WG1165892
Magnesium,Dissolved	2.46		1.00	1	09/17/2018 21:26	WG1166252
Manganese	0.0112		0.00500	1	09/14/2018 19:20	WG1165892
Manganese,Dissolved	0.00811		0.00500	1	09/17/2018 21:26	WG1166252
Nickel	ND		0.00200	1	09/14/2018 19:20	WG1165892
Nickel,Dissolved	ND		0.00200	1	09/17/2018 21:26	WG1166252
Potassium	1.22	B	1.00	1	09/14/2018 19:20	WG1165892
Potassium,Dissolved	ND		1.00	1	09/17/2018 21:26	WG1166252
Selenium	ND		0.00200	1	09/14/2018 19:20	WG1165892
Selenium,Dissolved	ND		0.00200	1	09/17/2018 21:26	WG1166252
Silver	ND		0.00200	1	09/14/2018 19:20	WG1165892
Silver,Dissolved	ND		0.00200	1	09/17/2018 21:26	WG1166252
Sodium	3.33		1.00	1	09/14/2018 19:20	WG1165892
Sodium,Dissolved	3.27		1.00	1	09/17/2018 21:26	WG1166252
Thallium	ND		0.00200	1	09/14/2018 19:20	WG1165892
Thallium,Dissolved	ND		0.00200	1	09/17/2018 21:26	WG1166252
Vanadium	ND		0.00500	1	09/14/2018 19:20	WG1165892
Vanadium,Dissolved	ND		0.00500	1	09/17/2018 21:26	WG1166252
Zinc	ND		0.0250	1	09/14/2018 19:20	WG1165892
Zinc,Dissolved	ND		0.0250	1	09/17/2018 21:26	WG1166252

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J4	0.0500	1	09/14/2018 03:56	WG1166010
Acrylonitrile	ND		0.0100	1	09/14/2018 03:56	WG1166010
Benzene	ND		0.00100	1	09/14/2018 03:56	WG1166010
Bromochloromethane	ND		0.00100	1	09/14/2018 03:56	WG1166010
Bromodichloromethane	ND		0.00100	1	09/14/2018 03:56	WG1166010
Bromoform	ND	J4	0.00100	1	09/14/2018 03:56	WG1166010
Bromomethane	ND		0.00500	1	09/14/2018 03:56	WG1166010
Carbon disulfide	ND		0.00100	1	09/14/2018 03:56	WG1166010
Carbon tetrachloride	ND		0.00100	1	09/14/2018 03:56	WG1166010
Chlorobenzene	ND		0.00100	1	09/14/2018 03:56	WG1166010
Chlorodibromomethane	ND		0.00100	1	09/14/2018 03:56	WG1166010
Chloroethane	ND		0.00500	1	09/14/2018 03:56	WG1166010
Chloroform	ND		0.00500	1	09/14/2018 03:56	WG1166010
Chloromethane	ND		0.00250	1	09/14/2018 03:56	WG1166010
Dibromomethane	ND		0.00100	1	09/14/2018 03:56	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	09/14/2018 03:56	WG1166010

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dibromoethane	ND		0.00100	1	09/14/2018 03:56	WG1166010
1,2-Dichlorobenzene	ND		0.00100	1	09/14/2018 03:56	WG1166010
1,4-Dichlorobenzene	ND		0.00100	1	09/14/2018 03:56	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.00250	1	09/14/2018 03:56	WG1166010
1,1-Dichloroethane	ND		0.00100	1	09/14/2018 03:56	WG1166010
1,2-Dichloroethane	ND		0.00100	1	09/14/2018 03:56	WG1166010
1,1-Dichloroethene	ND		0.00100	1	09/14/2018 03:56	WG1166010
cis-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 03:56	WG1166010
trans-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 03:56	WG1166010
1,2-Dichloropropane	ND		0.00100	1	09/14/2018 03:56	WG1166010
cis-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 03:56	WG1166010
trans-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 03:56	WG1166010
Ethylbenzene	ND		0.00100	1	09/14/2018 03:56	WG1166010
2-Hexanone	ND		0.0100	1	09/14/2018 03:56	WG1166010
Iodomethane	ND		0.0100	1	09/14/2018 03:56	WG1166010
2-Butanone (MEK)	ND		0.0100	1	09/14/2018 03:56	WG1166010
Methylene Chloride	ND		0.00500	1	09/14/2018 03:56	WG1166010
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	09/14/2018 03:56	WG1166010
Styrene	ND		0.00100	1	09/14/2018 03:56	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 03:56	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 03:56	WG1166010
Tetrachloroethene	ND		0.00100	1	09/14/2018 03:56	WG1166010
Toluene	ND		0.00100	1	09/14/2018 03:56	WG1166010
1,1,1-Trichloroethane	ND		0.00100	1	09/14/2018 03:56	WG1166010
1,1,2-Trichloroethane	ND		0.00100	1	09/14/2018 03:56	WG1166010
Trichloroethene	ND		0.00100	1	09/14/2018 03:56	WG1166010
Trichlorofluoromethane	ND		0.00500	1	09/14/2018 03:56	WG1166010
1,2,3-Trichloropropane	ND		0.00250	1	09/14/2018 03:56	WG1166010
Vinyl acetate	ND		0.0100	1	09/14/2018 03:56	WG1166010
Vinyl chloride	ND		0.00100	1	09/14/2018 03:56	WG1166010
Xylenes, Total	ND		0.00300	1	09/14/2018 03:56	WG1166010
(S) Toluene-d8	*98.4*		*80.0-120*		*09/14/2018 03:56*	WG1166010
(S) Dibromofluoromethane	*102*		*75.0-120*		*09/14/2018 03:56*	WG1166010
(S) a,a,a-Trifluorotoluene	*105*		*80.0-120*		*09/14/2018 03:56*	WG1166010
(S) 4-Bromofluorobenzene	*83.5*		*77.0-126*		*09/14/2018 03:56*	WG1166010

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	09/18/2018 01:01	WG1167194
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	09/18/2018 01:01	WG1167194

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	ND		30.0	1	09/17/2018 14:14	WG1167334

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	09/19/2018 21:34	WG1167701

Sample Narrative:
L1025453-06 WG1167701: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	09/18/2018 13:31	WG1166372

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	09/16/2018 11:55	WG1167017

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	09/13/2018 19:43	WG1165899
Chloride	15.1		1.00	1	09/13/2018 19:43	WG1165899
Fluoride	ND		0.100	1	09/13/2018 19:43	WG1165899
Nitrate	0.865		0.100	1	09/13/2018 19:43	WG1165899
Sulfate	ND		5.00	1	09/13/2018 19:43	WG1165899

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/18/2018 14:13	WG1166098
Mercury,Dissolved	ND		0.000200	1	09/18/2018 13:14	WG1166101

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	09/18/2018 18:19	WG1166217
Boron,Dissolved	ND		0.200	1	09/18/2018 20:03	WG1166248

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	1.29		0.100	1	09/18/2018 00:52	WG1166228
Aluminum,Dissolved	0.190		0.100	1	09/17/2018 23:30	WG1166252
Antimony	ND		0.00200	1	09/18/2018 00:52	WG1166228
Antimony,Dissolved	ND	J4	0.00200	1	09/18/2018 13:16	WG1166252
Arsenic	ND		0.00200	1	09/18/2018 00:52	WG1166228
Arsenic,Dissolved	ND		0.00200	1	09/17/2018 23:30	WG1166252
Barium	0.0357		0.00500	1	09/18/2018 00:52	WG1166228
Barium,Dissolved	0.0270		0.00500	1	09/17/2018 23:30	WG1166252

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	09/18/2018 00:52	WG1166228
Beryllium,Dissolved	ND		0.00200	1	09/17/2018 23:30	WG1166252
Cadmium	ND		0.00100	1	09/18/2018 00:52	WG1166228
Cadmium,Dissolved	ND		0.00100	1	09/17/2018 23:30	WG1166252
Calcium	7.66		1.00	1	09/18/2018 00:52	WG1166228
Calcium,Dissolved	7.44		1.00	1	09/17/2018 23:30	WG1166252
Chromium	0.00303		0.00200	1	09/18/2018 00:52	WG1166228
Chromium,Dissolved	ND		0.00200	1	09/17/2018 23:30	WG1166252
Cobalt	ND		0.00200	1	09/18/2018 00:52	WG1166228
Cobalt,Dissolved	ND		0.00200	1	09/17/2018 23:30	WG1166252
Copper	ND		0.00500	1	09/18/2018 00:52	WG1166228
Copper,Dissolved	ND		0.00500	1	09/17/2018 23:30	WG1166252
Iron	2.17		0.100	1	09/18/2018 00:52	WG1166228
Iron,Dissolved	0.192		0.100	1	09/17/2018 23:30	WG1166252
Lead	ND		0.00200	1	09/18/2018 00:52	WG1166228
Lead,Dissolved	0.00259	B	0.00200	1	09/18/2018 13:16	WG1166252
Magnesium	2.71		1.00	1	09/18/2018 00:52	WG1166228
Magnesium,Dissolved	2.64		1.00	1	09/18/2018 13:16	WG1166252
Manganese	0.0336		0.00500	1	09/18/2018 00:52	WG1166228
Manganese,Dissolved	0.00596		0.00500	1	09/17/2018 23:30	WG1166252
Nickel	ND		0.00200	1	09/18/2018 00:52	WG1166228
Nickel,Dissolved	ND		0.00200	1	09/17/2018 23:30	WG1166252
Potassium	2.55		1.00	1	09/19/2018 17:22	WG1167668
Potassium,Dissolved	1.02		1.00	1	09/17/2018 23:30	WG1166252
Selenium	ND		0.00200	1	09/18/2018 00:52	WG1166228
Selenium,Dissolved	ND		0.00200	1	09/17/2018 23:30	WG1166252
Silver	ND		0.00200	1	09/18/2018 00:52	WG1166228
Silver,Dissolved	ND		0.00200	1	09/17/2018 23:30	WG1166252
Sodium	3.69		1.00	1	09/18/2018 00:52	WG1166228
Sodium,Dissolved	3.79		1.00	1	09/17/2018 23:30	WG1166252
Thallium	ND		0.00200	1	09/18/2018 00:52	WG1166228
Thallium,Dissolved	ND		0.00200	1	09/17/2018 23:30	WG1166252
Vanadium	ND		0.00500	1	09/18/2018 00:52	WG1166228
Vanadium,Dissolved	ND		0.00500	1	09/17/2018 23:30	WG1166252
Zinc	ND		0.0250	1	09/18/2018 00:52	WG1166228
Zinc,Dissolved	ND		0.0250	1	09/17/2018 23:30	WG1166252

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J4	0.0500	1	09/14/2018 04:16	WG1166010
Acrylonitrile	ND		0.0100	1	09/14/2018 04:16	WG1166010
Benzene	ND		0.00100	1	09/14/2018 04:16	WG1166010
Bromochloromethane	ND		0.00100	1	09/14/2018 04:16	WG1166010
Bromodichloromethane	ND		0.00100	1	09/14/2018 04:16	WG1166010
Bromoform	ND	J4	0.00100	1	09/14/2018 04:16	WG1166010
Bromomethane	ND		0.00500	1	09/14/2018 04:16	WG1166010
Carbon disulfide	ND		0.00100	1	09/14/2018 04:16	WG1166010
Carbon tetrachloride	ND		0.00100	1	09/14/2018 04:16	WG1166010
Chlorobenzene	ND		0.00100	1	09/14/2018 04:16	WG1166010
Chlorodibromomethane	ND		0.00100	1	09/14/2018 04:16	WG1166010
Chloroethane	ND		0.00500	1	09/14/2018 04:16	WG1166010
Chloroform	ND		0.00500	1	09/14/2018 04:16	WG1166010
Chloromethane	ND		0.00250	1	09/14/2018 04:16	WG1166010
Dibromomethane	ND		0.00100	1	09/14/2018 04:16	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	09/14/2018 04:16	WG1166010

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dibromoethane	ND		0.00100	1	09/14/2018 04:16	WG1166010
1,2-Dichlorobenzene	ND		0.00100	1	09/14/2018 04:16	WG1166010
1,4-Dichlorobenzene	ND		0.00100	1	09/14/2018 04:16	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.00250	1	09/14/2018 04:16	WG1166010
1,1-Dichloroethane	ND		0.00100	1	09/14/2018 04:16	WG1166010
1,2-Dichloroethane	ND		0.00100	1	09/14/2018 04:16	WG1166010
1,1-Dichloroethene	ND		0.00100	1	09/14/2018 04:16	WG1166010
cis-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 04:16	WG1166010
trans-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 04:16	WG1166010
1,2-Dichloropropane	ND		0.00100	1	09/14/2018 04:16	WG1166010
cis-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 04:16	WG1166010
trans-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 04:16	WG1166010
Ethylbenzene	ND		0.00100	1	09/14/2018 04:16	WG1166010
2-Hexanone	ND		0.0100	1	09/14/2018 04:16	WG1166010
Iodomethane	ND		0.0100	1	09/14/2018 04:16	WG1166010
2-Butanone (MEK)	ND		0.0100	1	09/14/2018 04:16	WG1166010
Methylene Chloride	ND		0.00500	1	09/14/2018 04:16	WG1166010
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	09/14/2018 04:16	WG1166010
Styrene	ND		0.00100	1	09/14/2018 04:16	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 04:16	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 04:16	WG1166010
Tetrachloroethene	ND		0.00100	1	09/14/2018 04:16	WG1166010
Toluene	ND		0.00100	1	09/14/2018 04:16	WG1166010
1,1,1-Trichloroethane	ND		0.00100	1	09/14/2018 04:16	WG1166010
1,1,2-Trichloroethane	ND		0.00100	1	09/14/2018 04:16	WG1166010
Trichloroethene	ND		0.00100	1	09/14/2018 04:16	WG1166010
Trichlorofluoromethane	ND		0.00500	1	09/14/2018 04:16	WG1166010
1,2,3-Trichloropropane	ND		0.00250	1	09/14/2018 04:16	WG1166010
Vinyl acetate	ND		0.0100	1	09/14/2018 04:16	WG1166010
Vinyl chloride	ND		0.00100	1	09/14/2018 04:16	WG1166010
Xylenes, Total	ND		0.00300	1	09/14/2018 04:16	WG1166010
(S) Toluene-d8	*100*		*80.0-120*		*09/14/2018 04:16*	WG1166010
(S) Dibromofluoromethane	*104*		*75.0-120*		*09/14/2018 04:16*	WG1166010
(S) a,a,a-Trifluorotoluene	*106*		*80.0-120*		*09/14/2018 04:16*	WG1166010
(S) 4-Bromofluorobenzene	*83.1*		*77.0-126*		*09/14/2018 04:16*	WG1166010

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	09/18/2018 01:12	WG1167194
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	09/18/2018 01:12	WG1167194

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	73.0		30.0	1	09/17/2018 14:17	WG1167334

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	09/19/2018 21:41	WG1167701

Sample Narrative:
L1025453-07 WG1167701: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	09/18/2018 13:33	WG1166372

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	09/16/2018 11:55	WG1167017

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	09/13/2018 20:11	WG1165899
Chloride	47.1		1.00	1	09/13/2018 20:11	WG1165899
Fluoride	ND		0.100	1	09/13/2018 20:11	WG1165899
Nitrate	4.13		0.100	1	09/13/2018 20:11	WG1165899
Sulfate	ND		5.00	1	09/13/2018 20:11	WG1165899

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/18/2018 14:16	WG1166098
Mercury,Dissolved	ND		0.000200	1	09/18/2018 13:17	WG1166101

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	09/18/2018 18:22	WG1166217
Boron,Dissolved	ND		0.200	1	09/18/2018 20:12	WG1166248

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.164		0.100	1	09/18/2018 00:57	WG1166228
Aluminum,Dissolved	ND		0.100	1	09/17/2018 23:35	WG1166252
Antimony	ND		0.00200	1	09/18/2018 00:57	WG1166228
Antimony,Dissolved	ND	J4	0.00200	1	09/18/2018 13:20	WG1166252
Arsenic	ND		0.00200	1	09/18/2018 00:57	WG1166228
Arsenic,Dissolved	ND		0.00200	1	09/17/2018 23:35	WG1166252
Barium	0.0339		0.00500	1	09/18/2018 00:57	WG1166228
Barium,Dissolved	0.0338		0.00500	1	09/17/2018 23:35	WG1166252

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	09/18/2018 00:57	WG1166228
Beryllium,Dissolved	ND		0.00200	1	09/17/2018 23:35	WG1166252
Cadmium	ND		0.00100	1	09/18/2018 00:57	WG1166228
Cadmium,Dissolved	ND		0.00100	1	09/17/2018 23:35	WG1166252
Calcium	17.1		1.00	1	09/18/2018 00:57	WG1166228
Calcium,Dissolved	17.7		1.00	1	09/17/2018 23:35	WG1166252
Chromium	ND		0.00200	1	09/18/2018 00:57	WG1166228
Chromium,Dissolved	ND		0.00200	1	09/17/2018 23:35	WG1166252
Cobalt	ND		0.00200	1	09/18/2018 00:57	WG1166228
Cobalt,Dissolved	ND		0.00200	1	09/17/2018 23:35	WG1166252
Copper	ND		0.00500	1	09/18/2018 00:57	WG1166228
Copper,Dissolved	ND		0.00500	1	09/17/2018 23:35	WG1166252
Iron	0.177		0.100	1	09/18/2018 00:57	WG1166228
Iron,Dissolved	ND		0.100	1	09/17/2018 23:35	WG1166252
Lead	ND		0.00200	1	09/18/2018 00:57	WG1166228
Lead,Dissolved	ND		0.00200	1	09/17/2018 23:35	WG1166252
Magnesium	5.38		1.00	1	09/18/2018 00:57	WG1166228
Magnesium,Dissolved	5.60		1.00	1	09/18/2018 13:20	WG1166252
Manganese	0.0112		0.00500	1	09/18/2018 00:57	WG1166228
Manganese,Dissolved	0.00934		0.00500	1	09/17/2018 23:35	WG1166252
Nickel	ND		0.00200	1	09/18/2018 00:57	WG1166228
Nickel,Dissolved	ND		0.00200	1	09/17/2018 23:35	WG1166252
Potassium	1.62		1.00	1	09/19/2018 17:26	WG1167668
Potassium,Dissolved	1.70		1.00	1	09/17/2018 23:35	WG1166252
Selenium	ND		0.00200	1	09/18/2018 00:57	WG1166228
Selenium,Dissolved	ND		0.00200	1	09/17/2018 23:35	WG1166252
Silver	ND		0.00200	1	09/18/2018 00:57	WG1166228
Silver,Dissolved	ND		0.00200	1	09/17/2018 23:35	WG1166252
Sodium	9.67		1.00	1	09/18/2018 00:57	WG1166228
Sodium,Dissolved	9.99		1.00	1	09/17/2018 23:35	WG1166252
Thallium	ND		0.00200	1	09/18/2018 00:57	WG1166228
Thallium,Dissolved	ND		0.00200	1	09/17/2018 23:35	WG1166252
Vanadium	ND		0.00500	1	09/18/2018 00:57	WG1166228
Vanadium,Dissolved	ND		0.00500	1	09/17/2018 23:35	WG1166252
Zinc	ND		0.0250	1	09/18/2018 00:57	WG1166228
Zinc,Dissolved	ND		0.0250	1	09/17/2018 23:35	WG1166252

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J4	0.0500	1	09/14/2018 04:36	WG1166010
Acrylonitrile	ND		0.0100	1	09/14/2018 04:36	WG1166010
Benzene	ND		0.00100	1	09/14/2018 04:36	WG1166010
Bromochloromethane	ND		0.00100	1	09/14/2018 04:36	WG1166010
Bromodichloromethane	ND		0.00100	1	09/14/2018 04:36	WG1166010
Bromoform	ND	J4	0.00100	1	09/14/2018 04:36	WG1166010
Bromomethane	ND		0.00500	1	09/14/2018 04:36	WG1166010
Carbon disulfide	ND		0.00100	1	09/14/2018 04:36	WG1166010
Carbon tetrachloride	ND		0.00100	1	09/14/2018 04:36	WG1166010
Chlorobenzene	ND		0.00100	1	09/14/2018 04:36	WG1166010
Chlorodibromomethane	ND		0.00100	1	09/14/2018 04:36	WG1166010
Chloroethane	ND		0.00500	1	09/14/2018 04:36	WG1166010
Chloroform	ND		0.00500	1	09/14/2018 04:36	WG1166010
Chloromethane	ND		0.00250	1	09/14/2018 04:36	WG1166010
Dibromomethane	ND		0.00100	1	09/14/2018 04:36	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	09/14/2018 04:36	WG1166010

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dibromoethane	ND		0.00100	1	09/14/2018 04:36	WG1166010
1,2-Dichlorobenzene	ND		0.00100	1	09/14/2018 04:36	WG1166010
1,4-Dichlorobenzene	ND		0.00100	1	09/14/2018 04:36	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.00250	1	09/14/2018 04:36	WG1166010
1,1-Dichloroethane	ND		0.00100	1	09/14/2018 04:36	WG1166010
1,2-Dichloroethane	ND		0.00100	1	09/14/2018 04:36	WG1166010
1,1-Dichloroethene	ND		0.00100	1	09/14/2018 04:36	WG1166010
cis-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 04:36	WG1166010
trans-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 04:36	WG1166010
1,2-Dichloropropane	ND		0.00100	1	09/14/2018 04:36	WG1166010
cis-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 04:36	WG1166010
trans-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 04:36	WG1166010
Ethylbenzene	ND		0.00100	1	09/14/2018 04:36	WG1166010
2-Hexanone	ND		0.0100	1	09/14/2018 04:36	WG1166010
Iodomethane	ND		0.0100	1	09/14/2018 04:36	WG1166010
2-Butanone (MEK)	ND		0.0100	1	09/14/2018 04:36	WG1166010
Methylene Chloride	ND		0.00500	1	09/14/2018 04:36	WG1166010
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	09/14/2018 04:36	WG1166010
Styrene	ND		0.00100	1	09/14/2018 04:36	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 04:36	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 04:36	WG1166010
Tetrachloroethene	ND		0.00100	1	09/14/2018 04:36	WG1166010
Toluene	ND		0.00100	1	09/14/2018 04:36	WG1166010
1,1,1-Trichloroethane	ND		0.00100	1	09/14/2018 04:36	WG1166010
1,1,2-Trichloroethane	ND		0.00100	1	09/14/2018 04:36	WG1166010
Trichloroethene	ND		0.00100	1	09/14/2018 04:36	WG1166010
Trichlorofluoromethane	ND		0.00500	1	09/14/2018 04:36	WG1166010
1,2,3-Trichloropropane	ND		0.00250	1	09/14/2018 04:36	WG1166010
Vinyl acetate	ND		0.0100	1	09/14/2018 04:36	WG1166010
Vinyl chloride	ND		0.00100	1	09/14/2018 04:36	WG1166010
Xylenes, Total	ND		0.00300	1	09/14/2018 04:36	WG1166010
(S) Toluene-d8	*98.3*		*80.0-120*		*09/14/2018 04:36*	WG1166010
(S) Dibromofluoromethane	*107*		*75.0-120*		*09/14/2018 04:36*	WG1166010
(S) a,a,a-Trifluorotoluene	*107*		*80.0-120*		*09/14/2018 04:36*	WG1166010
(S) 4-Bromofluorobenzene	*81.4*		*77.0-126*		*09/14/2018 04:36*	WG1166010

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	09/18/2018 01:24	WG1167194
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	09/18/2018 01:24	WG1167194

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	ND		30.0	1	09/17/2018 14:18	WG1167334

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	09/19/2018 21:46	WG1167701

Sample Narrative:
L1025453-08 WG1167701: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	09/18/2018 13:34	WG1166372

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	09/16/2018 11:56	WG1167017

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	09/13/2018 20:38	WG1165899
Chloride	7.04		1.00	1	09/13/2018 20:38	WG1165899
Fluoride	ND		0.100	1	09/13/2018 20:38	WG1165899
Nitrate	0.654		0.100	1	09/13/2018 20:38	WG1165899
Sulfate	ND		5.00	1	09/13/2018 20:38	WG1165899

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	09/18/2018 14:18	WG1166098
Mercury,Dissolved	ND		0.000200	1	09/18/2018 13:19	WG1166101

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	09/18/2018 18:25	WG1166217
Boron,Dissolved	ND		0.200	1	09/18/2018 20:15	WG1166248

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	09/18/2018 01:02	WG1166228
Aluminum,Dissolved	ND		0.100	1	09/17/2018 23:40	WG1166252
Antimony	ND		0.00200	1	09/18/2018 01:02	WG1166228
Antimony,Dissolved	ND	J4	0.00200	1	09/18/2018 13:24	WG1166252
Arsenic	ND		0.00200	1	09/18/2018 01:02	WG1166228
Arsenic,Dissolved	ND		0.00200	1	09/17/2018 23:40	WG1166252
Barium	0.00765		0.00500	1	09/18/2018 01:02	WG1166228
Barium,Dissolved	0.00800		0.00500	1	09/17/2018 23:40	WG1166252

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	09/18/2018 01:02	WG1166228
Beryllium,Dissolved	ND		0.00200	1	09/17/2018 23:40	WG1166252
Cadmium	ND		0.00100	1	09/18/2018 01:02	WG1166228
Cadmium,Dissolved	ND		0.00100	1	09/18/2018 13:24	WG1166252
Calcium	4.40		1.00	1	09/18/2018 01:02	WG1166228
Calcium,Dissolved	4.50		1.00	1	09/17/2018 23:40	WG1166252
Chromium	ND		0.00200	1	09/18/2018 01:02	WG1166228
Chromium,Dissolved	ND		0.00200	1	09/17/2018 23:40	WG1166252
Cobalt	ND		0.00200	1	09/18/2018 01:02	WG1166228
Cobalt,Dissolved	ND		0.00200	1	09/17/2018 23:40	WG1166252
Copper	ND		0.00500	1	09/18/2018 01:02	WG1166228
Copper,Dissolved	ND		0.00500	1	09/17/2018 23:40	WG1166252
Iron	0.115		0.100	1	09/18/2018 01:02	WG1166228
Iron,Dissolved	ND		0.100	1	09/17/2018 23:40	WG1166252
Lead	ND		0.00200	1	09/18/2018 01:02	WG1166228
Lead,Dissolved	0.00203	B	0.00200	1	09/17/2018 23:40	WG1166252
Magnesium	2.61		1.00	1	09/18/2018 01:02	WG1166228
Magnesium,Dissolved	2.65		1.00	1	09/18/2018 13:24	WG1166252
Manganese	0.0183		0.00500	1	09/18/2018 01:02	WG1166228
Manganese,Dissolved	0.0174		0.00500	1	09/17/2018 23:40	WG1166252
Nickel	ND		0.00200	1	09/18/2018 01:02	WG1166228
Nickel,Dissolved	ND		0.00200	1	09/18/2018 13:24	WG1166252
Potassium	ND		1.00	1	09/19/2018 17:31	WG1167668
Potassium,Dissolved	ND		1.00	1	09/17/2018 23:40	WG1166252
Selenium	ND		0.00200	1	09/18/2018 01:02	WG1166228
Selenium,Dissolved	ND		0.00200	1	09/17/2018 23:40	WG1166252
Silver	ND		0.00200	1	09/18/2018 01:02	WG1166228
Silver,Dissolved	ND		0.00200	1	09/17/2018 23:40	WG1166252
Sodium	3.70		1.00	1	09/18/2018 01:02	WG1166228
Sodium,Dissolved	3.92		1.00	1	09/17/2018 23:40	WG1166252
Thallium	ND		0.00200	1	09/18/2018 01:02	WG1166228
Thallium,Dissolved	ND		0.00200	1	09/17/2018 23:40	WG1166252
Vanadium	ND		0.00500	1	09/18/2018 01:02	WG1166228
Vanadium,Dissolved	ND		0.00500	1	09/17/2018 23:40	WG1166252
Zinc	ND		0.0250	1	09/18/2018 01:02	WG1166228
Zinc,Dissolved	ND		0.0250	1	09/18/2018 13:24	WG1166252

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J4	0.0500	1	09/14/2018 04:57	WG1166010
Acrylonitrile	ND		0.0100	1	09/14/2018 04:57	WG1166010
Benzene	ND		0.00100	1	09/14/2018 04:57	WG1166010
Bromochloromethane	ND		0.00100	1	09/14/2018 04:57	WG1166010
Bromodichloromethane	ND		0.00100	1	09/14/2018 04:57	WG1166010
Bromoform	ND	J4	0.00100	1	09/14/2018 04:57	WG1166010
Bromomethane	ND		0.00500	1	09/14/2018 04:57	WG1166010
Carbon disulfide	ND		0.00100	1	09/14/2018 04:57	WG1166010
Carbon tetrachloride	ND		0.00100	1	09/14/2018 04:57	WG1166010
Chlorobenzene	ND		0.00100	1	09/14/2018 04:57	WG1166010
Chlorodibromomethane	ND		0.00100	1	09/14/2018 04:57	WG1166010
Chloroethane	ND		0.00500	1	09/14/2018 04:57	WG1166010
Chloroform	ND		0.00500	1	09/14/2018 04:57	WG1166010
Chloromethane	ND		0.00250	1	09/14/2018 04:57	WG1166010
Dibromomethane	ND		0.00100	1	09/14/2018 04:57	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	09/14/2018 04:57	WG1166010

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dibromoethane	ND		0.00100	1	09/14/2018 04:57	WG1166010
1,2-Dichlorobenzene	ND		0.00100	1	09/14/2018 04:57	WG1166010
1,4-Dichlorobenzene	ND		0.00100	1	09/14/2018 04:57	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.00250	1	09/14/2018 04:57	WG1166010
1,1-Dichloroethane	ND		0.00100	1	09/14/2018 04:57	WG1166010
1,2-Dichloroethane	ND		0.00100	1	09/14/2018 04:57	WG1166010
1,1-Dichloroethene	ND		0.00100	1	09/14/2018 04:57	WG1166010
cis-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 04:57	WG1166010
trans-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 04:57	WG1166010
1,2-Dichloropropane	ND		0.00100	1	09/14/2018 04:57	WG1166010
cis-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 04:57	WG1166010
trans-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 04:57	WG1166010
Ethylbenzene	ND		0.00100	1	09/14/2018 04:57	WG1166010
2-Hexanone	ND		0.0100	1	09/14/2018 04:57	WG1166010
Iodomethane	ND		0.0100	1	09/14/2018 04:57	WG1166010
2-Butanone (MEK)	ND		0.0100	1	09/14/2018 04:57	WG1166010
Methylene Chloride	ND		0.00500	1	09/14/2018 04:57	WG1166010
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	09/14/2018 04:57	WG1166010
Styrene	ND		0.00100	1	09/14/2018 04:57	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 04:57	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 04:57	WG1166010
Tetrachloroethene	ND		0.00100	1	09/14/2018 04:57	WG1166010
Toluene	ND		0.00100	1	09/14/2018 04:57	WG1166010
1,1,1-Trichloroethane	ND		0.00100	1	09/14/2018 04:57	WG1166010
1,1,2-Trichloroethane	ND		0.00100	1	09/14/2018 04:57	WG1166010
Trichloroethene	ND		0.00100	1	09/14/2018 04:57	WG1166010
Trichlorofluoromethane	ND		0.00500	1	09/14/2018 04:57	WG1166010
1,2,3-Trichloropropane	ND		0.00250	1	09/14/2018 04:57	WG1166010
Vinyl acetate	ND		0.0100	1	09/14/2018 04:57	WG1166010
Vinyl chloride	ND		0.00100	1	09/14/2018 04:57	WG1166010
Xylenes, Total	ND		0.00300	1	09/14/2018 04:57	WG1166010
(S) Toluene-d8	*100*		*80.0-120*		*09/14/2018 04:57*	WG1166010
(S) Dibromofluoromethane	*105*		*75.0-120*		*09/14/2018 04:57*	WG1166010
(S) a,a,a-Trifluorotoluene	*105*		*80.0-120*		*09/14/2018 04:57*	WG1166010
(S) 4-Bromofluorobenzene	*82.1*		*77.0-126*		*09/14/2018 04:57*	WG1166010

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000102	1.02	09/18/2018 01:35	WG1167194
1,2-Dibromo-3-Chloropropane	ND		0.0000204	1.02	09/18/2018 01:35	WG1167194

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	ND		30.0	1	09/17/2018 14:19	WG1167334

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	09/19/2018 21:52	WG1167701

Sample Narrative:

L1025453-09 WG1167701: Endpoint pH 4.5

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	09/18/2018 13:36	WG1166372

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	09/16/2018 11:56	WG1167017

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	09/13/2018 21:06	WG1165899
Chloride	ND		1.00	1	09/13/2018 21:06	WG1165899
Fluoride	ND		0.100	1	09/13/2018 21:06	WG1165899
Nitrate	ND		0.100	1	09/13/2018 21:06	WG1165899
Sulfate	ND		5.00	1	09/13/2018 21:06	WG1165899

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	09/18/2018 14:21	WG1166098

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	09/18/2018 18:28	WG1166217

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	09/18/2018 01:16	WG1166228
Antimony	ND		0.00200	1	09/18/2018 01:16	WG1166228
Arsenic	ND		0.00200	1	09/18/2018 01:16	WG1166228
Barium	ND		0.00500	1	09/18/2018 01:16	WG1166228
Beryllium	ND		0.00200	1	09/18/2018 01:16	WG1166228
Cadmium	ND		0.00100	1	09/18/2018 01:16	WG1166228
Calcium	ND		1.00	1	09/18/2018 01:16	WG1166228
Chromium	ND		0.00200	1	09/18/2018 01:16	WG1166228
Cobalt	ND		0.00200	1	09/18/2018 01:16	WG1166228
Copper	ND		0.00500	1	09/18/2018 01:16	WG1166228

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	ND		0.100	1	09/18/2018 01:16	WG1166228
Lead	ND		0.00200	1	09/18/2018 01:16	WG1166228
Magnesium	ND		1.00	1	09/18/2018 01:16	WG1166228
Manganese	ND		0.00500	1	09/18/2018 01:16	WG1166228
Nickel	ND		0.00200	1	09/18/2018 01:16	WG1166228
Potassium	ND		1.00	1	09/19/2018 17:44	WG1167668
Selenium	ND		0.00200	1	09/18/2018 01:16	WG1166228
Silver	ND		0.00200	1	09/18/2018 01:16	WG1166228
Sodium	ND		1.00	1	09/18/2018 01:16	WG1166228
Thallium	ND		0.00200	1	09/18/2018 01:16	WG1166228
Vanadium	ND		0.00500	1	09/18/2018 01:16	WG1166228
Zinc	ND		0.0250	1	09/18/2018 01:16	WG1166228

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J4	0.0500	1	09/14/2018 05:17	WG1166010
Acrylonitrile	ND		0.0100	1	09/14/2018 05:17	WG1166010
Benzene	ND		0.00100	1	09/14/2018 05:17	WG1166010
Bromochloromethane	ND		0.00100	1	09/14/2018 05:17	WG1166010
Bromodichloromethane	ND		0.00100	1	09/14/2018 05:17	WG1166010
Bromoform	ND	J4	0.00100	1	09/14/2018 05:17	WG1166010
Bromomethane	ND		0.00500	1	09/14/2018 05:17	WG1166010
Carbon disulfide	ND		0.00100	1	09/14/2018 05:17	WG1166010
Carbon tetrachloride	ND		0.00100	1	09/14/2018 05:17	WG1166010
Chlorobenzene	ND		0.00100	1	09/14/2018 05:17	WG1166010
Chlorodibromomethane	ND		0.00100	1	09/14/2018 05:17	WG1166010
Chloroethane	ND		0.00500	1	09/14/2018 05:17	WG1166010
Chloroform	ND		0.00500	1	09/14/2018 05:17	WG1166010
Chloromethane	ND		0.00250	1	09/14/2018 05:17	WG1166010
Dibromomethane	ND		0.00100	1	09/14/2018 05:17	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	09/14/2018 05:17	WG1166010
1,2-Dibromoethane	ND		0.00100	1	09/14/2018 05:17	WG1166010
1,2-Dichlorobenzene	ND		0.00100	1	09/14/2018 05:17	WG1166010
1,4-Dichlorobenzene	ND		0.00100	1	09/14/2018 05:17	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.00250	1	09/14/2018 05:17	WG1166010
1,1-Dichloroethane	ND		0.00100	1	09/14/2018 05:17	WG1166010
1,2-Dichloroethane	ND		0.00100	1	09/14/2018 05:17	WG1166010
1,1-Dichloroethene	ND		0.00100	1	09/14/2018 05:17	WG1166010
cis-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 05:17	WG1166010
trans-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 05:17	WG1166010
1,2-Dichloropropane	ND		0.00100	1	09/14/2018 05:17	WG1166010
cis-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 05:17	WG1166010
trans-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 05:17	WG1166010
Ethylbenzene	ND		0.00100	1	09/14/2018 05:17	WG1166010
2-Hexanone	ND		0.0100	1	09/14/2018 05:17	WG1166010
Iodomethane	ND		0.0100	1	09/14/2018 05:17	WG1166010
2-Butanone (MEK)	ND		0.0100	1	09/14/2018 05:17	WG1166010
Methylene Chloride	ND		0.00500	1	09/14/2018 05:17	WG1166010
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	09/14/2018 05:17	WG1166010
Styrene	ND		0.00100	1	09/14/2018 05:17	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 05:17	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 05:17	WG1166010
Tetrachloroethene	ND		0.00100	1	09/14/2018 05:17	WG1166010
Toluene	ND		0.00100	1	09/14/2018 05:17	WG1166010
1,1,1-Trichloroethane	ND		0.00100	1	09/14/2018 05:17	WG1166010

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,1,2-Trichloroethane	ND		0.00100	1	09/14/2018 05:17	WG1166010
Trichloroethene	ND		0.00100	1	09/14/2018 05:17	WG1166010
Trichlorofluoromethane	ND		0.00500	1	09/14/2018 05:17	WG1166010
1,2,3-Trichloropropane	ND		0.00250	1	09/14/2018 05:17	WG1166010
Vinyl acetate	ND		0.0100	1	09/14/2018 05:17	WG1166010
Vinyl chloride	ND		0.00100	1	09/14/2018 05:17	WG1166010
Xylenes, Total	ND		0.00300	1	09/14/2018 05:17	WG1166010
(S) Toluene-d8	*99.5*		*80.0-120*		*09/14/2018 05:17*	WG1166010
(S) Dibromofluoromethane	*105*		*75.0-120*		*09/14/2018 05:17*	WG1166010
(S) a,a,a-Trifluorotoluene	*107*		*80.0-120*		*09/14/2018 05:17*	WG1166010
(S) 4-Bromofluorobenzene	*82.5*		*77.0-126*		*09/14/2018 05:17*	WG1166010

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000101	1.01	09/18/2018 01:58	WG1167194
1,2-Dibromo-3-Chloropropane	ND		0.0000202	1.01	09/18/2018 01:58	WG1167194

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND	J4	0.0500	1	09/13/2018 22:50	WG1166010
Acrylonitrile	ND		0.0100	1	09/13/2018 22:50	WG1166010
Benzene	ND		0.00100	1	09/13/2018 22:50	WG1166010
Bromochloromethane	ND		0.00100	1	09/13/2018 22:50	WG1166010
Bromodichloromethane	ND		0.00100	1	09/13/2018 22:50	WG1166010
Bromoform	ND	J4	0.00100	1	09/13/2018 22:50	WG1166010
Bromomethane	ND		0.00500	1	09/13/2018 22:50	WG1166010
Carbon disulfide	ND		0.00100	1	09/13/2018 22:50	WG1166010
Carbon tetrachloride	ND		0.00100	1	09/13/2018 22:50	WG1166010
Chlorobenzene	ND		0.00100	1	09/13/2018 22:50	WG1166010
Chlorodibromomethane	ND		0.00100	1	09/13/2018 22:50	WG1166010
Chloroethane	ND		0.00500	1	09/13/2018 22:50	WG1166010
Chloroform	ND		0.00500	1	09/13/2018 22:50	WG1166010
Chloromethane	ND		0.00250	1	09/13/2018 22:50	WG1166010
Dibromomethane	ND		0.00100	1	09/13/2018 22:50	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	09/13/2018 22:50	WG1166010
1,2-Dibromoethane	ND		0.00100	1	09/13/2018 22:50	WG1166010
1,2-Dichlorobenzene	ND		0.00100	1	09/13/2018 22:50	WG1166010
1,4-Dichlorobenzene	ND		0.00100	1	09/13/2018 22:50	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.00250	1	09/13/2018 22:50	WG1166010
1,1-Dichloroethane	ND		0.00100	1	09/13/2018 22:50	WG1166010
1,2-Dichloroethane	ND		0.00100	1	09/13/2018 22:50	WG1166010
1,1-Dichloroethene	ND		0.00100	1	09/13/2018 22:50	WG1166010
cis-1,2-Dichloroethene	ND		0.00100	1	09/13/2018 22:50	WG1166010
trans-1,2-Dichloroethene	ND		0.00100	1	09/13/2018 22:50	WG1166010
1,2-Dichloropropane	ND		0.00100	1	09/13/2018 22:50	WG1166010
cis-1,3-Dichloropropene	ND		0.00100	1	09/13/2018 22:50	WG1166010
trans-1,3-Dichloropropene	ND		0.00100	1	09/13/2018 22:50	WG1166010
Ethylbenzene	ND		0.00100	1	09/13/2018 22:50	WG1166010
2-Hexanone	ND		0.0100	1	09/13/2018 22:50	WG1166010
Iodomethane	ND		0.0100	1	09/13/2018 22:50	WG1166010
2-Butanone (MEK)	ND		0.0100	1	09/13/2018 22:50	WG1166010
Methylene Chloride	ND		0.00500	1	09/13/2018 22:50	WG1166010
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	09/13/2018 22:50	WG1166010
Styrene	ND		0.00100	1	09/13/2018 22:50	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00100	1	09/13/2018 22:50	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00100	1	09/13/2018 22:50	WG1166010
Tetrachloroethene	ND		0.00100	1	09/13/2018 22:50	WG1166010
Toluene	ND		0.00100	1	09/13/2018 22:50	WG1166010
1,1,1-Trichloroethane	ND		0.00100	1	09/13/2018 22:50	WG1166010
1,1,2-Trichloroethane	ND		0.00100	1	09/13/2018 22:50	WG1166010
Trichloroethene	ND		0.00100	1	09/13/2018 22:50	WG1166010
Trichlorofluoromethane	ND		0.00500	1	09/13/2018 22:50	WG1166010
1,2,3-Trichloropropane	ND		0.00250	1	09/13/2018 22:50	WG1166010
Vinyl acetate	ND		0.0100	1	09/13/2018 22:50	WG1166010
Vinyl chloride	ND		0.00100	1	09/13/2018 22:50	WG1166010
Xylenes, Total	ND		0.00300	1	09/13/2018 22:50	WG1166010
(S) Toluene-d8	*100*		*80.0-120*		*09/13/2018 22:50*	WG1166010
(S) Dibromofluoromethane	*109*		*75.0-120*		*09/13/2018 22:50*	WG1166010
(S) a,a,a-Trifluorotoluene	*109*		*80.0-120*		*09/13/2018 22:50*	WG1166010
(S) 4-Bromofluorobenzene	*82.7*		*77.0-126*		*09/13/2018 22:50*	WG1166010

Method Blank (MB)

(MB) R3342480-1 09/17/18 12:54

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hardness (colorimetric) as CaCO3	U		1.43	30.0

L1024473-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1024473-03 09/17/18 13:05 • (DUP) R3342480-4 09/17/18 13:06

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	142	143	1	0.702		20

L1024507-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1024507-03 09/17/18 13:12 • (DUP) R3342480-7 09/17/18 13:14

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	146	148	1	1.36		20

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

(LCS) R3342480-2 09/17/18 12:55 • (LCSD) R3342480-3 09/17/18 12:56

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hardness (colorimetric) as CaCO3	150	155	153	103	102	85.0-115			1.30	20

L1024492-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1024492-03 09/17/18 13:09 • (MS) R3342480-5 09/17/18 13:10 • (MSD) R3342480-6 09/17/18 13:11

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Hardness (colorimetric) as CaCO3	150	120	219	219	66.0	66.0	1	80.0-120	E J6	E J6	0.000	20

Method Blank (MB)

(MB) R3342513-1 09/17/18 14:07

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hardness (colorimetric) as CaCO3	1.94	J	1.43	30.0

L1025756-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1025756-01 09/17/18 14:28 • (DUP) R3342513-7 09/17/18 14:29

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	137	135	1	1.47		20

L1024395-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1024395-03 09/17/18 14:33 • (DUP) R3342513-8 09/17/18 14:34

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	207	210	5	1.68		20

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

(LCS) R3342513-2 09/17/18 14:08 • (LCSD) R3342513-3 09/17/18 14:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hardness (colorimetric) as CaCO3	150	160	160	107	107	85.0-115			0.000	20

L1025649-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025649-02 09/17/18 14:20 • (MS) R3342513-5 09/17/18 14:21 • (MSD) R3342513-6 09/17/18 14:22

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Hardness (colorimetric) as CaCO3	150	63.8	199	199	90.1	90.1	1	80.0-120			0.000	20

Method Blank (MB)

(MB) R3343501-1 09/19/18 19:42

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

Sample Narrative:
BLANK: Endpoint pH 4.5

L1025359-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1025359-02 09/19/18 19:49 • (DUP) R3343501-3 09/19/18 19:55

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	ND	5.91	1	0.000		20

Sample Narrative:
OS: Endpoint pH 4.5
DUP: Endpoint pH 4.5

L1025780-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1025780-06 09/19/18 22:16 • (DUP) R3343501-7 09/19/18 22:22

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	2.76	0.000	1	200	P1	20

Sample Narrative:
OS: Endpoint pH 4.5
DUP: Endpoint pH 4.5

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

(LCS) R3343501-5 09/19/18 20:46 • (LCSD) R3343501-6 09/19/18 21:59

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Alkalinity	100	97.5	99.5	97.5	99.5	85.0-115			2.06	20

Sample Narrative:
LCS: Endpoint pH 4.5
LCSD: Endpoint pH 4.5

Method Blank (MB)

(MB) R3342841-1 09/18/18 13:07

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ammonia Nitrogen	U		0.0317	0.100

L1025269-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1025269-01 09/18/18 13:12 • (DUP) R3342841-4 09/18/18 13:14

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	ND	0.000	1	0.000		10

L1025694-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1025694-01 09/18/18 13:53 • (DUP) R3342841-6 09/18/18 13:55

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	ND	0.000	1	0.000		10

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

(LCS) R3342841-2 09/18/18 13:09 • (LCSD) R3342841-3 09/18/18 13:11

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	7.50	7.67	7.58	102	101	90.0-110			1.13	10

L1025269-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1025269-02 09/18/18 13:15 • (MS) R3342841-5 09/18/18 13:17

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ammonia Nitrogen	5.00	0.465	5.32	97.0	1	90.0-110	

L1025694-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025694-02 09/18/18 13:57 • (MS) R3342841-7 09/18/18 13:58 • (MSD) R3342841-8 09/18/18 14:00

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	5.00	ND	4.72	4.73	94.5	94.7	1	90.0-110			0.212	10

Method Blank (MB)

(MB) R3342299-1 09/16/18 11:53

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

L1025453-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1025453-03 09/16/18 11:54 • (DUP) R3342299-4 09/16/18 11:54

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

L1025609-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1025609-03 09/16/18 11:58 • (DUP) R3342299-7 09/16/18 11:58

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	24.5	25.4	1	3.61		20

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

(LCS) R3342299-2 09/16/18 11:53 • (LCSD) R3342299-3 09/16/18 11:53

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
COD	242	226	224	93.2	92.5	90.0-110			0.797	20

L1025468-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025468-01 09/16/18 11:56 • (MS) R3342299-5 09/16/18 11:57 • (MSD) R3342299-6 09/16/18 11:57

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
COD	400	26.8	396	397	92.4	92.5	1	80.0-120			0.113	20

Method Blank (MB)

(MB) R3342072-1 09/13/18 12:24

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Bromide	U		0.0790	1.00
Chloride	0.158	J	0.0519	1.00
Fluoride	U		0.00990	0.100
Nitrate	U		0.0227	0.100
Sulfate	0.115	J	0.0774	5.00

L1025351-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1025351-07 09/13/18 14:41 • (DUP) R3342072-4 09/13/18 14:59

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.434	1	0.000		15
Chloride	64.7	64.6	1	0.0922		15
Fluoride	0.370	0.370	1	0.000		15
Nitrate	0.897	0.895	1	0.268		15

L1025431-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1025431-01 09/13/18 18:37 • (DUP) R3342072-7 09/13/18 19:06

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	1.16	1.17	1	0.712		15
Chloride	79.6	80.1	1	0.539		15
Fluoride	0.566	0.567	1	0.212		15
Nitrate	ND	0.000	1	0.000		15
Sulfate	47.9	48.2	1	0.456		15

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

(LCS) R3342072-2 09/13/18 12:42 • (LCSD) R3342072-3 09/13/18 13:00

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromide	40.0	39.9	39.9	99.7	99.8	80.0-120			0.108	15
Chloride	40.0	39.9	40.0	99.8	99.9	80.0-120			0.147	15
Fluoride	8.00	8.04	8.04	100	101	80.0-120			0.0846	15
Nitrate	8.00	8.07	8.08	101	101	80.0-120			0.116	15
Sulfate	40.0	40.2	40.2	100	100	80.0-120			0.0237	15

L1025351-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025351-07 09/13/18 14:41 • (MS) R3342072-5 09/13/18 15:17 • (MSD) R3342072-6 09/13/18 15:35

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	ND	51.9	52.2	103	103	1	80.0-120			0.541	15
Chloride	50.0	64.7	116	116	102	102	1	80.0-120	E	E	0.0611	15
Fluoride	5.00	0.370	5.69	5.72	106	107	1	80.0-120			0.549	15
Nitrate	5.00	0.897	6.14	6.18	105	106	1	80.0-120			0.760	15
Sulfate	50.0	131	178	178	93.8	94.6	1	80.0-120	E	E	0.224	15

L1025431-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1025431-01 09/13/18 18:37 • (MS) R3342072-8 09/13/18 19:24

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	1.16	49.8	97.3	1	80.0-120	
Chloride	50.0	79.6	128	96.9	1	80.0-120	E
Fluoride	5.00	0.566	5.78	104	1	80.0-120	
Nitrate	5.00	ND	5.01	100	1	80.0-120	
Sulfate	50.0	47.9	97.0	98.2	1	80.0-120	

Method Blank (MB)

(MB) R3341905-1 09/13/18 09:40

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Bromide	U		0.0790	1.00
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Nitrate	U		0.0227	0.100
Sulfate	U		0.0774	5.00

L1023898-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1023898-07 09/13/18 17:38 • (DUP) R3341905-4 09/13/18 17:51

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	U	0.000	1	0.000		15
Chloride	2580	2580	1	0.269	E	15
Fluoride	0.183	0.193	1	5.38		15
Nitrate	U	0.000	1	0.000		15

L1023898-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1023898-07 09/13/18 18:33 • (DUP) R3341905-7 09/13/18 19:15

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	184	173	5	6.08		15

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

(LCS) R3341905-2 09/13/18 09:54 • (LCSD) R3341905-3 09/13/18 10:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromide	40.0	40.1	40.1	100	100	80.0-120			0.0414	15
Chloride	40.0	39.2	39.3	98.1	98.3	80.0-120			0.209	15
Fluoride	8.00	8.05	8.07	101	101	80.0-120			0.254	15
Nitrate	8.00	8.26	8.27	103	103	80.0-120			0.172	15
Sulfate	40.0	39.6	39.7	99.0	99.2	80.0-120			0.133	15

L1023898-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1023898-07 09/13/18 17:38 • (MS) R3341905-5 09/13/18 18:05 • (MSD) R3341905-6 09/13/18 18:19

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	U	41.2	39.4	82.4	78.7	1	80.0-120		J6	4.62	15
Chloride	50.0	2580	2500	2510	0.000	0.000	1	80.0-120	E V	E V	0.393	15
Fluoride	5.00	0.183	5.27	5.26	102	101	1	80.0-120			0.198	15
Nitrate	5.00	U	4.17	4.25	83.5	85.1	1	80.0-120			1.91	15
Sulfate	50.0	185	216	215	62.3	61.7	1	80.0-120	E J6	E J6	0.136	15

Method Blank (MB)

(MB) R3342873-1 09/18/18 13:32

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	0.0000803	J	0.0000490	0.000200

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

(LCS) R3342873-2 09/18/18 13:34 • (LCSD) R3342873-3 09/18/18 13:41

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	0.00319	0.00325	106	108	80.0-120			1.71	20

L1025453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025453-01 09/18/18 13:44 • (MS) R3342873-4 09/18/18 13:46 • (MSD) R3342873-5 09/18/18 13:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	0.000244	0.00313	0.00334	96.3	103	1	75.0-125			6.41	20

Method Blank (MB)

(MB) R3342871-1 09/18/18 12:33

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	0.0000763	J	0.0000490	0.000200

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

(LCS) R3342871-2 09/18/18 12:43 • (LCSD) R3342871-3 09/18/18 12:45

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	0.00314	0.00300	105	100	80.0-120			4.60	20

L1025453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025453-01 09/18/18 12:48 • (MS) R3342871-4 09/18/18 12:50 • (MSD) R3342871-5 09/18/18 12:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	ND	0.00317	0.00283	101	89.5	1	75.0-125			11.3	20

Method Blank (MB)

(MB) R3342986-1 09/18/18 17:34

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0126	0.200

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

(LCS) R3342986-2 09/18/18 17:36 • (LCSD) R3342986-3 09/18/18 17:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron	1.00	0.993	0.970	99.3	97.0	80.0-120			2.27	20

L1025529-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025529-01 09/18/18 17:42 • (MS) R3342986-5 09/18/18 17:47 • (MSD) R3342986-6 09/18/18 17:50

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron	1.00	0.224	1.21	1.23	98.3	101	1	75.0-125			1.87	20

Method Blank (MB)

(MB) R3342985-1 09/18/18 19:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	U		0.0126	0.200

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

(LCS) R3342985-2 09/18/18 19:07 • (LCSD) R3342985-3 09/18/18 19:09

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	1.00	0.974	0.961	97.4	96.1	80.0-120			1.29	20

L1025754-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025754-02 09/18/18 19:12 • (MS) R3342985-5 09/18/18 19:18 • (MSD) R3342985-6 09/18/18 19:20

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	1.00	ND	1.05	1.04	98.9	98.3	1	75.0-125			0.610	20

Method Blank (MB)

(MB) R3342023-1 09/14/18 11:38

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.0277	J	0.00515	0.100
Antimony	U		0.000754	0.00200
Arsenic	U		0.000250	0.00200
Barium	U		0.000360	0.00500
Beryllium	0.000280	J	0.000120	0.00200
Cadmium	U		0.000160	0.00100
Calcium	U		0.0460	1.00
Chromium	U		0.000540	0.00200
Copper	U		0.000520	0.00500
Cobalt	U		0.000260	0.00200
Iron	0.0243	J	0.0150	0.100
Lead	0.000318	J	0.000240	0.00200
Magnesium	U		0.100	1.00
Manganese	U		0.000250	0.00500
Nickel	U		0.000350	0.00200
Potassium	0.387	J	0.0370	1.00
Selenium	U		0.000380	0.00200
Silver	U		0.000310	0.00200
Sodium	0.130	J	0.110	1.00
Thallium	0.000296	J	0.000190	0.00200
Vanadium	U		0.000180	0.00500
Zinc	U		0.00256	0.0250

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

(LCS) R3342023-2 09/14/18 11:43 • (LCSD) R3342023-3 09/14/18 11:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	4.88	4.91	97.6	98.1	80.0-120			0.542	20
Antimony	0.0500	0.0632	0.0599	126	120	80.0-120	J4		5.36	20
Arsenic	0.0500	0.0506	0.0491	101	98.2	80.0-120			2.93	20
Barium	0.0500	0.0488	0.0481	97.7	96.2	80.0-120			1.51	20
Beryllium	0.0500	0.0497	0.0497	99.5	99.3	80.0-120			0.144	20
Cadmium	0.0500	0.0493	0.0482	98.5	96.4	80.0-120			2.12	20
Calcium	5.00	5.00	4.94	99.9	98.8	80.0-120			1.12	20
Chromium	0.0500	0.0520	0.0509	104	102	80.0-120			2.17	20
Copper	0.0500	0.0516	0.0517	103	103	80.0-120			0.0583	20
Cobalt	0.0500	0.0525	0.0514	105	103	80.0-120			2.00	20
Iron	5.00	5.34	5.37	107	107	80.0-120			0.566	20

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

(LCS) R3342023-2 09/14/18 11:43 • (LCSD) R3342023-3 09/14/18 11:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Lead	0.0500	0.0483	0.0478	96.6	95.6	80.0-120			1.03	20
Magnesium	5.00	4.97	5.00	99.4	100	80.0-120			0.586	20
Manganese	0.0500	0.0505	0.0499	101	99.8	80.0-120			1.10	20
Nickel	0.0500	0.0519	0.0519	104	104	80.0-120			0.0688	20
Potassium	5.00	4.83	4.84	96.7	96.8	80.0-120			0.156	20
Selenium	0.0500	0.0486	0.0472	97.2	94.5	80.0-120			2.87	20
Silver	0.0500	0.0522	0.0501	104	100	80.0-120			4.14	20
Sodium	5.00	5.07	5.04	101	101	80.0-120			0.636	20
Thallium	0.0500	0.0492	0.0490	98.4	98.0	80.0-120			0.334	20
Vanadium	0.0500	0.0502	0.0497	100	99.3	80.0-120			1.13	20
Zinc	0.0500	0.0531	0.0529	106	106	80.0-120			0.411	20

L1025405-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025405-01 09/14/18 11:52 • (MS) R3342023-5 09/14/18 12:01 • (MSD) R3342023-6 09/14/18 12:06

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	0.0328	4.88	4.96	96.9	98.5	1	75.0-125			1.66	20
Antimony	0.0500	U	0.0639	0.0604	128	121	1	75.0-125	J5		5.66	20
Arsenic	0.0500	0.00474	0.0543	0.0549	99.1	100	1	75.0-125			1.12	20
Barium	0.0500	0.264	0.323	0.308	117	87.7	1	75.0-125			4.64	20
Beryllium	0.0500	0.000209	0.0494	0.0501	98.3	99.7	1	75.0-125			1.46	20
Cadmium	0.0500	U	0.0496	0.0482	99.2	96.4	1	75.0-125			2.80	20
Calcium	5.00	92.8	96.3	94.4	69.8	31.0	1	75.0-125	V	V	2.03	20
Chromium	0.0500	0.000636	0.0495	0.0499	97.8	98.5	1	75.0-125			0.650	20
Copper	0.0500	0.00149	0.0506	0.0509	98.1	98.9	1	75.0-125			0.767	20
Cobalt	0.0500	U	0.0501	0.0502	100	100	1	75.0-125			0.108	20
Potassium	5.00	2.23	6.93	7.01	94.0	95.6	1	75.0-125			1.10	20
Iron	5.00	0.0346	5.11	5.28	101	105	1	75.0-125			3.38	20
Lead	0.0500	0.000424	0.0474	0.0479	93.9	94.9	1	75.0-125			1.03	20
Magnesium	5.00	3.60	8.44	8.44	96.7	96.7	1	75.0-125			0.0385	20
Manganese	0.0500	U	0.0478	0.0492	95.6	98.5	1	75.0-125			3.00	20
Nickel	0.0500	U	0.0499	0.0499	99.7	99.8	1	75.0-125			0.0406	20
Selenium	0.0500	0.00128	0.0513	0.0490	100	95.4	1	75.0-125			4.60	20
Silver	0.0500	U	0.0525	0.0505	105	101	1	75.0-125			4.04	20
Sodium	5.00	48.1	52.5	51.9	87.5	76.3	1	75.0-125			1.07	20
Thallium	0.0500	0.000262	0.0482	0.0494	95.9	98.3	1	75.0-125			2.45	20
Vanadium	0.0500	0.0151	0.0638	0.0637	97.4	97.3	1	75.0-125			0.126	20
Zinc	0.0500	0.0415	0.0898	0.0910	96.5	99.0	1	75.0-125			1.41	20

Method Blank (MB)

(MB) R3342671-1 09/18/18 00:20

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.00792	J	0.00515	0.100
Antimony	U		0.000754	0.00200
Arsenic	U		0.000250	0.00200
Barium	U		0.000360	0.00500
Beryllium	U		0.000120	0.00200
Cadmium	U		0.000160	0.00100
Calcium	U		0.0460	1.00
Chromium	U		0.000540	0.00200
Copper	U		0.000520	0.00500
Cobalt	U		0.000260	0.00200
Iron	U		0.0150	0.100
Lead	0.000644	J	0.000240	0.00200
Magnesium	U		0.100	1.00
Manganese	0.000356	J	0.000250	0.00500
Nickel	U		0.000350	0.00200
Selenium	U		0.000380	0.00200
Silver	U		0.000310	0.00200
Sodium	U		0.110	1.00
Thallium	U		0.000190	0.00200
Vanadium	U		0.000180	0.00500
Zinc	U		0.00256	0.0250

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

(LCS) R3342671-2 09/18/18 00:24 • (LCSD) R3342671-3 09/18/18 00:29

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	4.78	4.78	95.6	95.7	80.0-120			0.0295	20
Antimony	0.0500	0.0567	0.0545	113	109	80.0-120			3.87	20
Arsenic	0.0500	0.0488	0.0488	97.7	97.7	80.0-120			0.0176	20
Barium	0.0500	0.0476	0.0456	95.2	91.1	80.0-120			4.41	20
Beryllium	0.0500	0.0473	0.0466	94.6	93.2	80.0-120			1.55	20
Cadmium	0.0500	0.0479	0.0484	95.7	96.7	80.0-120			1.03	20
Calcium	5.00	4.85	4.90	97.1	98.1	80.0-120			1.02	20
Chromium	0.0500	0.0498	0.0500	99.6	100	80.0-120			0.386	20
Copper	0.0500	0.0509	0.0510	102	102	80.0-120			0.179	20
Cobalt	0.0500	0.0509	0.0510	102	102	80.0-120			0.240	20
Iron	5.00	4.86	4.87	97.2	97.4	80.0-120			0.205	20
Lead	0.0500	0.0474	0.0475	94.8	95.1	80.0-120			0.257	20

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

(LCS) R3342671-2 09/18/18 00:24 • (LCSD) R3342671-3 09/18/18 00:29

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Magnesium	5.00	4.83	4.80	96.5	96.0	80.0-120			0.502	20
Manganese	0.0500	0.0487	0.0484	97.3	96.7	80.0-120			0.644	20
Nickel	0.0500	0.0496	0.0505	99.1	101	80.0-120			1.95	20
Selenium	0.0500	0.0447	0.0472	89.3	94.4	80.0-120			5.58	20
Silver	0.0500	0.0486	0.0488	97.2	97.6	80.0-120			0.402	20
Sodium	5.00	5.22	4.97	104	99.5	80.0-120			4.75	20
Thallium	0.0500	0.0476	0.0477	95.1	95.5	80.0-120			0.395	20
Vanadium	0.0500	0.0494	0.0493	98.9	98.6	80.0-120			0.296	20
Zinc	0.0500	0.0484	0.0498	96.7	99.5	80.0-120			2.85	20

L1025698-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025698-02 09/18/18 00:34 • (MS) R3342671-5 09/18/18 00:43 • (MSD) R3342671-6 09/18/18 00:48

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	ND	4.73	4.81	94.0	95.5	1	75.0-125			1.61	20
Antimony	0.0500	ND	0.0574	0.0559	115	112	1	75.0-125			2.51	20
Arsenic	0.0500	ND	0.0481	0.0488	92.8	94.2	1	75.0-125			1.43	20
Barium	0.0500	0.684	0.717	0.714	67.2	61.3	1	75.0-125	V	V	0.409	20
Beryllium	0.0500	ND	0.0475	0.0471	94.9	94.2	1	75.0-125			0.741	20
Cadmium	0.0500	ND	0.0482	0.0492	96.4	98.4	1	75.0-125			2.06	20
Calcium	5.00	123	127	128	86.4	97.9	1	75.0-125			0.451	20
Chromium	0.0500	ND	0.0473	0.0475	94.7	95.0	1	75.0-125			0.346	20
Copper	0.0500	ND	0.0487	0.0484	97.4	96.8	1	75.0-125			0.587	20
Cobalt	0.0500	ND	0.0484	0.0494	96.8	98.8	1	75.0-125			2.05	20
Iron	5.00	14.3	18.7	18.7	87.9	88.3	1	75.0-125			0.127	20
Lead	0.0500	ND	0.0483	0.0484	95.0	95.2	1	75.0-125			0.210	20
Magnesium	5.00	32.0	36.8	36.8	95.4	95.6	1	75.0-125			0.0207	20
Manganese	0.0500	1.71	1.71	1.73	7.53	49.9	1	75.0-125	V	V	1.23	20
Nickel	0.0500	ND	0.0485	0.0481	96.9	96.3	1	75.0-125			0.628	20
Selenium	0.0500	ND	0.0498	0.0480	99.6	96.0	1	75.0-125			3.65	20
Silver	0.0500	ND	0.0490	0.0494	98.0	98.7	1	75.0-125			0.777	20
Sodium	5.00	23.6	28.2	28.5	93.8	99.7	1	75.0-125			1.05	20
Thallium	0.0500	ND	0.0475	0.0480	95.0	96.0	1	75.0-125			1.05	20
Vanadium	0.0500	ND	0.0470	0.0475	93.5	94.5	1	75.0-125			1.07	20
Zinc	0.0500	ND	0.0474	0.0547	94.8	109	1	75.0-125			14.3	20

Method Blank (MB)

(MB) R3342673-1 09/17/18 21:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum,Dissolved	0.00759	J	0.00515	0.100
Antimony,Dissolved	U		0.000754	0.00200
Arsenic,Dissolved	U		0.000250	0.00200
Barium,Dissolved	U		0.000360	0.00500
Beryllium,Dissolved	U		0.000120	0.00200
Cadmium,Dissolved	U		0.000160	0.00100
Calcium,Dissolved	0.0470	J	0.0460	1.00
Chromium,Dissolved	U		0.000540	0.00200
Copper,Dissolved	U		0.000520	0.00500
Cobalt,Dissolved	U		0.000260	0.00200
Iron,Dissolved	U		0.0150	0.100
Lead,Dissolved	0.00842		0.000240	0.00200
Magnesium,Dissolved	U		0.100	1.00
Manganese,Dissolved	0.000276	J	0.000250	0.00500
Nickel,Dissolved	U		0.000350	0.00200
Potassium,Dissolved	0.0400	J	0.0370	1.00
Selenium,Dissolved	U		0.000380	0.00200
Silver,Dissolved	U		0.000310	0.00200
Sodium,Dissolved	U		0.110	1.00
Thallium,Dissolved	U		0.000190	0.00200
Vanadium,Dissolved	U		0.000180	0.00500
Zinc,Dissolved	U		0.00256	0.0250

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

(LCS) R3342673-2 09/17/18 21:17 • (LCSD) R3342673-3 09/17/18 21:21

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	5.00	5.07	4.96	101	99.1	80.0-120			2.33	20
Antimony,Dissolved	0.0500	0.0620	0.0627	124	125	80.0-120	J4	J4	1.23	20
Arsenic,Dissolved	0.0500	0.0527	0.0515	105	103	80.0-120			2.30	20
Barium,Dissolved	0.0500	0.0479	0.0501	95.7	100	80.0-120			4.59	20
Beryllium,Dissolved	0.0500	0.0501	0.0502	100	100	80.0-120			0.213	20
Cadmium,Dissolved	0.0500	0.0534	0.0553	107	111	80.0-120			3.55	20
Calcium,Dissolved	5.00	5.14	4.99	103	99.7	80.0-120			3.05	20
Chromium,Dissolved	0.0500	0.0514	0.0518	103	104	80.0-120			0.811	20
Copper,Dissolved	0.0500	0.0518	0.0522	104	104	80.0-120			0.767	20
Cobalt,Dissolved	0.0500	0.0547	0.0547	109	109	80.0-120			0.0375	20
Iron,Dissolved	5.00	5.17	5.16	103	103	80.0-120			0.320	20

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

(LCS) R3342673-2 09/17/18 21:17 • (LCSD) R3342673-3 09/17/18 21:21

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Lead,Dissolved	0.0500	0.0507	0.0508	101	102	80.0-120			0.226	20
Magnesium,Dissolved	5.00	5.35	5.18	107	104	80.0-120			3.22	20
Manganese,Dissolved	0.0500	0.0504	0.0504	101	101	80.0-120			0.0220	20
Nickel,Dissolved	0.0500	0.0553	0.0550	111	110	80.0-120			0.556	20
Potassium,Dissolved	5.00	4.94	4.98	98.8	99.6	80.0-120			0.748	20
Selenium,Dissolved	0.0500	0.0508	0.0548	102	110	80.0-120			7.63	20
Silver,Dissolved	0.0500	0.0526	0.0528	105	106	80.0-120			0.321	20
Sodium,Dissolved	5.00	5.27	5.19	105	104	80.0-120			1.46	20
Thallium,Dissolved	0.0500	0.0502	0.0506	100	101	80.0-120			0.776	20
Vanadium,Dissolved	0.0500	0.0512	0.0516	102	103	80.0-120			0.691	20
Zinc,Dissolved	0.0500	0.0527	0.0526	105	105	80.0-120			0.271	20

L1025453-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025453-05 09/17/18 21:26 • (MS) R3342673-5 09/17/18 21:35 • (MSD) R3342673-6 09/17/18 21:40

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	5.00	ND	4.88	4.95	96.9	98.2	1	75.0-125			1.34	20
Arsenic,Dissolved	0.0500	ND	0.0509	0.0515	99.4	101	1	75.0-125			1.22	20
Barium,Dissolved	0.0500	0.00763	0.0556	0.0583	95.9	101	1	75.0-125			4.86	20
Beryllium,Dissolved	0.0500	ND	0.0480	0.0488	96.0	97.6	1	75.0-125			1.69	20
Cadmium,Dissolved	0.0500	ND	0.0528	0.0534	106	107	1	75.0-125			1.09	20
Calcium,Dissolved	5.00	8.48	13.5	13.8	101	105	1	75.0-125			1.48	20
Chromium,Dissolved	0.0500	ND	0.0499	0.0511	98.6	101	1	75.0-125			2.35	20
Copper,Dissolved	0.0500	ND	0.0499	0.0518	95.7	99.5	1	75.0-125			3.69	20
Cobalt,Dissolved	0.0500	ND	0.0523	0.0540	105	108	1	75.0-125			3.20	20
Potassium,Dissolved	5.00	ND	5.88	5.72	99.9	96.7	1	75.0-125			2.77	20
Iron,Dissolved	5.00	ND	4.93	5.09	98.4	101	1	75.0-125			3.08	20
Magnesium,Dissolved	5.00	2.46	7.50	7.55	101	102	1	75.0-125			0.705	20
Manganese,Dissolved	0.0500	0.00811	0.0559	0.0561	95.6	95.9	1	75.0-125			0.239	20
Nickel,Dissolved	0.0500	ND	0.0526	0.0545	104	108	1	75.0-125			3.47	20
Selenium,Dissolved	0.0500	ND	0.0502	0.0513	100	103	1	75.0-125			2.15	20
Silver,Dissolved	0.0500	ND	0.0514	0.0521	103	104	1	75.0-125			1.22	20
Sodium,Dissolved	5.00	3.27	8.41	8.35	103	102	1	75.0-125			0.691	20
Thallium,Dissolved	0.0500	ND	0.0477	0.0483	95.4	96.6	1	75.0-125			1.33	20
Vanadium,Dissolved	0.0500	ND	0.0493	0.0508	98.2	101	1	75.0-125			2.94	20
Zinc,Dissolved	0.0500	ND	0.0519	0.0547	95.7	101	1	75.0-125			5.36	20

Method Blank (MB)

(MB) R3343356-1 09/19/18 16:51

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Potassium	0.0986	J	0.0370	1.00

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

(LCS) R3343356-2 09/19/18 16:55 • (LCSD) R3343356-3 09/19/18 17:00

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Potassium	5.00	4.98	5.00	99.7	100	80.0-120			0.313	20

L1026070-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1026070-01 09/19/18 17:04 • (MS) R3343356-5 09/19/18 17:13 • (MSD) R3343356-6 09/19/18 17:17

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Potassium	5.00	3.32	8.10	8.11	95.5	95.8	1	75.0-125			0.167	20

Method Blank (MB)

(MB) R3342065-3 09/13/18 21:36

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromochloromethane	U		0.000520	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
Carbon disulfide	U		0.000275	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
trans-1,4-Dichloro-2-butene	U		0.000866	0.00250
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100
trans-1,3-Dichloropropene	U		0.000419	0.00100
Ethylbenzene	U		0.000384	0.00100
2-Hexanone	U		0.00382	0.0100
Iodomethane	U		0.00171	0.0100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000412	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100

Method Blank (MB)

(MB) R3342065-3 09/13/18 21:36

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
Vinyl acetate	U		0.00163	0.0100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*101*			*80.0-120*
(S) Dibromofluoromethane	*104*			*75.0-120*
(S) a,a,a-Trifluorotoluene	*106*			*80.0-120*
(S) 4-Bromofluorobenzene	*84.3*			*77.0-126*

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

(LCS) R3342065-1 09/13/18 20:34 • (LCSD) R3342065-2 09/13/18 20:55

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.230	0.218	184	174	19.0-160	J4	J4	5.21	27
Acrylonitrile	0.125	0.141	0.154	113	123	55.0-149			8.46	20
Benzene	0.0250	0.0262	0.0269	105	108	70.0-123			2.70	20
Bromodichloromethane	0.0250	0.0258	0.0273	103	109	75.0-120			5.74	20
Bromochloromethane	0.0250	0.0261	0.0270	105	108	76.0-122			3.27	20
Bromoform	0.0250	0.0151	0.0164	60.2	65.5	68.0-132	J4	J4	8.34	20
Bromomethane	0.0250	0.0343	0.0343	137	137	10.0-160			0.0759	25
Carbon disulfide	0.0250	0.0251	0.0262	100	105	61.0-128			4.41	20
Carbon tetrachloride	0.0250	0.0250	0.0261	100	104	68.0-126			4.21	20
Chlorobenzene	0.0250	0.0238	0.0255	95.3	102	80.0-121			6.62	20
Chlorodibromomethane	0.0250	0.0232	0.0246	92.7	98.5	77.0-125			6.00	20
Chloroethane	0.0250	0.0233	0.0274	93.4	110	47.0-150			16.1	20
Chloroform	0.0250	0.0269	0.0273	108	109	73.0-120			1.39	20
Chloromethane	0.0250	0.0262	0.0265	105	106	41.0-142			1.20	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0242	0.0257	96.9	103	58.0-134			5.90	20
1,2-Dibromoethane	0.0250	0.0241	0.0256	96.4	103	80.0-122			6.11	20
Dibromomethane	0.0250	0.0253	0.0265	101	106	80.0-120			4.40	20
1,2-Dichlorobenzene	0.0250	0.0249	0.0264	99.5	106	79.0-121			6.12	20
1,4-Dichlorobenzene	0.0250	0.0235	0.0250	94.1	100	79.0-120			6.26	20
trans-1,4-Dichloro-2-butene	0.0250	0.0211	0.0247	84.2	98.9	33.0-144			16.0	20
1,1-Dichloroethane	0.0250	0.0277	0.0287	111	115	70.0-126			3.83	20
1,2-Dichloroethane	0.0250	0.0280	0.0282	112	113	70.0-128			0.843	20

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

(LCS) R3342065-1 09/13/18 20:34 • (LCSD) R3342065-2 09/13/18 20:55

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,1-Dichloroethene	0.0250	0.0263	0.0272	105	109	71.0-124			3.29	20
cis-1,2-Dichloroethene	0.0250	0.0255	0.0267	102	107	73.0-120			4.94	20
trans-1,2-Dichloroethene	0.0250	0.0263	0.0274	105	110	73.0-120			3.92	20
1,2-Dichloropropane	0.0250	0.0260	0.0281	104	112	77.0-125			7.71	20
cis-1,3-Dichloropropene	0.0250	0.0249	0.0264	99.6	106	80.0-123			5.86	20
trans-1,3-Dichloropropene	0.0250	0.0250	0.0270	99.9	108	78.0-124			7.60	20
Ethylbenzene	0.0250	0.0241	0.0263	96.6	105	79.0-123			8.38	20
2-Hexanone	0.125	0.135	0.136	108	109	67.0-149			0.689	20
Iodomethane	0.125	0.124	0.129	99.5	103	33.0-147			3.56	26
2-Butanone (MEK)	0.125	0.139	0.131	111	105	44.0-160			6.24	20
Methylene Chloride	0.0250	0.0274	0.0276	110	111	67.0-120			0.964	20
4-Methyl-2-pentanone (MIBK)	0.125	0.136	0.137	108	109	68.0-142			0.727	20
Styrene	0.0250	0.0200	0.0217	79.8	86.7	73.0-130			8.28	20
1,1,1,2-Tetrachloroethane	0.0250	0.0240	0.0261	96.0	104	75.0-125			8.24	20
1,1,2,2-Tetrachloroethane	0.0250	0.0217	0.0233	86.7	93.0	65.0-130			7.06	20
Tetrachloroethene	0.0250	0.0230	0.0239	92.1	95.5	72.0-132			3.69	20
Toluene	0.0250	0.0234	0.0247	93.7	99.0	79.0-120			5.51	20
1,1,1-Trichloroethane	0.0250	0.0271	0.0280	109	112	73.0-124			2.99	20
1,1,2-Trichloroethane	0.0250	0.0240	0.0247	95.8	98.6	80.0-120			2.87	20
Trichloroethene	0.0250	0.0242	0.0262	97.0	105	78.0-124			7.78	20
Trichlorofluoromethane	0.0250	0.0252	0.0254	101	102	59.0-147			0.958	20
1,2,3-Trichloropropane	0.0250	0.0218	0.0232	87.2	92.6	73.0-130			6.06	20
Vinyl acetate	0.125	0.160	0.160	128	128	11.0-160			0.0177	20
Vinyl chloride	0.0250	0.0231	0.0236	92.2	94.4	67.0-131			2.34	20
Xylenes, Total	0.0750	0.0746	0.0790	99.5	105	79.0-123			5.73	20
(S) Toluene-d8				*98.8*	*98.4*	*80.0-120*				
(S) Dibromofluoromethane				*107*	*104*	*75.0-120*				
(S) a,a,a-Trifluorotoluene				*103*	*103*	*80.0-120*				
(S) 4-Bromofluorobenzene				*87.1*	*88.2*	*77.0-126*				

Method Blank (MB)

(MB) R3342930-1 09/17/18 23:17

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

L1025443-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1025443-01 09/18/18 00:04 • (DUP) R3342930-3 09/17/18 23:53

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ethylene Dibromide	0.000103	0.000104	1	0.966		20
1,2-Dibromo-3-Chloropropane	ND	0.000	1	0.000		20

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

(LCS) R3342930-4 09/18/18 01:46 • (LCSD) R3342930-5 09/18/18 03:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethylene Dibromide	0.000250	0.000230	0.000224	92.0	89.6	60.0-140			2.64	20
1,2-Dibromo-3-Chloropropane	0.000250	0.000253	0.000236	101	94.4	60.0-140			6.95	20

L1025443-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1025443-02 09/17/18 23:41 • (MS) R3342930-2 09/17/18 23:29

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ethylene Dibromide	0.0000863	ND	0.0000802	92.9	1	64.0-159	
1,2-Dibromo-3-Chloropropane	0.0000863	ND	0.0000874	101	1	72.0-148	

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	The sample concentration is too high to evaluate accurate spike recoveries.

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

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

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

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

A001

ALL SHADED AREAS are for LAB USE ONLY

Company: **Civil & Environmental Consultants - TN**

Address: **325 Seaboard Lane, Suite 170 Franklin, TN 37067**

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

Report To: **Philip Campbell**

Email To: **pcampbell@cecinc.com; kclayton@cecinc.com**

Copy To:

Site Collection Info/Address:

Customer Project Name/Number: **EWS Camden Class 2 Landfill 171-873**

State: / County/City: Time Zone Collected: PT MT CT ET

Phone: **615-333-7797**
Email:

Site/Facility ID #: **CAMDEN, TN**

Compliance Monitoring? [ ] Yes [ ] No

Collected by (print): Philip Campbell / Adria Baugh

Purchase Order #:
Quote #:

DW PWS ID #:
DW Location Code:

Collected by (signature): [signature]

Turnaround Date Required:

Immediately Packed on Ice: [ ] Yes [ ] No

Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive ______ [ ] Hold ______

Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)

Field Filtered (if applicable): [ ] Yes [ ] No
Analysis: ______

Container Preservative Type **

Lab Project Manager: 526 - Chris McCord

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ______

Lab Profile/Line: **CEC-EWS CAMDEN LF**

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N NA (NA circled)
Custody Signatures Present	Y N NA (NA circled)
Collector Signature Present	Y N NA (Y circled)
Bottles Intact	Y N NA (Y circled)
Correct Bottles	Y N NA (Y circled)
Sufficient Volume	Y N NA (Y circled)
Samples Received on Ice	Y N NA (Y circled)
VOA - Headspace Acceptable	Y N NA (Y circled)
USDA Regulated Soils	Y N NA (NA circled)
Samples in Holding Time	Y N NA (Y circled)
Residual Chlorine Present	Y N NA (NA circled)
Cl Strips:	
Sample pH Acceptable	Y N NA (NA circled)
pH Strips:	
Sulfide Present	Y N NA (NA circled)
Lead Acetate Strips:	

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected Date	Collected Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	**WetChem** 250mlHDPE-NoPres	ALK 60mlAmb-NoPres	COD,NH3 250mlHDPE-H2SO4	Diss. Metals-FF 250mlHDPE-HNO3	SV8011 40mlClr-NaThio	Total Metals,HARD 250mlHDPE-HNO3	V8260AP1 40mlAmb-HCl	V8260AP1-Trip Blank 40mlAmb-HCl-Blk			LAB USE ONLY: Lab Sample # / Comments
																			L1025453
MW-1	GW	Grab	9-11-18	1120				11	X	X	X	X	X	X	X				-01
MW-3	GW	↓	↓	1540				11	X	X	X	X	X	X	X				-02
MW-4	GW			1325				11	X	X	X	X	X	X	X				-03
MW-5	GW			1235				11	X	X	X	X	X	X	X				-04
TMW-1	GW			1230				11	X	X	X	X	X	X	X				-05
TMW-2	GW			1430				11	X	X	X	X	X	X	X				-06
TMW-3	GW			1550				11	X	X	X	X	X	X	X				-07
DUPLICATE	GW			—				11	X	X	X	X	X	X	X				-08
FIELD BLANK	GW			1515				11	X	X	X	~~X~~	X	X	X				No Diss. Metals on Field Blank -09
~~EQUIPMENT BLANK~~	~~GW~~							~~11~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~				

Customer Remarks / Special Conditions / Possible Hazards:
WetChem = *NITRATE*,CHLORIDE,BROMIDE,S ,FLUORIDE,ALKTot/Diss Metals=M6020AP1: Al Ca Fe

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA (NA circled)

SHORT HOLDS PRESENT (<72 hours): Y N N/A (N/A circled)

LAB Tracking #: N/A

Samples received via: FEDEX UPS Client Courier (circled) Pace Courier

LAB Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 7 15
Cooler 1 Temp Upon Receipt: 0.7 oC
Cooler 1 Therm Corr. Factor: -0.3 oC
Cooler 1 Corrected Temp: 0.4 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
[signature]	9-13-18/900	[signature] PACE	9/13/18 09:45
[signature] /PACE	9/13/18 13:00	[signature]	9/13/18 1500

MTJL LAB USE ONLY
Table #
Acctnum: CEC
Template: T133579
Prelogin: P671626
PM: 526 - Chris McCord
PB: 9-6-18 [initials]

Trip Blank Received: Y (circled) N NA
3 HCL (circled) MeOH TSP 3 Other (circled)

NonConformance(s) YES / NO (NO circled)

Page ___ of ___

CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical®

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

ALL SHADED AREAS are for LAB USE ONLY

Company: **Civil & Environmental Consultants - TN**	Billing Information: **Dr. Kevin Wolfe, 325 Seaboard Lane, Suite 170, Franklin, TN 37067**
Address: **325 Seaboard Lane, Suite 170 Franklin, TN 37067**	
Report To: **Philip Campbell**	Email To: **pcampbell@cecinc.com; kclayton@cecinc.com**
Copy To:	Site Collection Info/Address:
Customer Project Name/Number: **EWS Camden Class 2 Landfill 171-873**	State: / County/City: Time Zone Collected: PT MT CT ET
Phone: **615-333-7797** Email:	Site/Facility ID #: **CAMDEN, TN**
Collected by (print): Phil Campbell/Adrian Bagby	Purchase Order #: Quote #:
Collected by (signature):	Turnaround Date Required:
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive [ ] Hold	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)
	Compliance Monitoring? [ ] Yes [ ] No
	DW PWS ID #: DW Location Code:
	Immediately Packed on Ice: [ ] Yes [ ] No
	Field Filtered (if applicable): [ ] Yes [ ] No Analysis:

Container Preservative Type **

Lab Project Manager: **526 - Chris McCord**

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Analyses

Lab Profile/Line: **CEC-EWS CAMDEN LF**

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	**WetChem** 250mlHDPE-NoPres	ALK 60mlAmb-NoPres	COD,NH3 250mlHDPE-H2SO4	Diss. Metals-FF 250mlHDPE-HNO3	SV8011 40mlClr-NaThio	Total Metals,HARD 250mlHDPE-HNO3	V8260AP1 40mlAmb-HCl	V8260AP1-Trip Blank 40mlAmb-HCl-Blk			Lab Sample # / Comments
TRIP BLANK	GW	—	—	—				1								X			L1025453 -10

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N	NA
Custody Signatures Present	Y N	NA
Collector Signature Present	Y N	NA
Bottles Intact	Y N	NA
Correct Bottles	Y N	NA
Sufficient Volume	Y N	NA
Samples Received on Ice	Y N	NA
VOA - Headspace Acceptable	Y N	NA
USDA Regulated Soils	Y N	NA
Samples in Holding Time	Y N	NA
Residual Chlorine Present	Y N	
Cl Strips:		
Sample pH Acceptable	Y N	
pH Strips:		
Sulfide Present	Y N	
Lead Acetate Strips:		

LAB USE ONLY:

Customer Remarks / Special Conditions / Possible Hazards:

WetChem = *NITRATE*,CHLORIDE,BROMIDE,SULFATE,FLUORIDE,ALKTot/Diss

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

LAB Tracking #: N/A

Samples received via: FEDEX UPS Client Courier Pace Courier

LAB Sample Temperature Info:

Temp Blank Received: Y N NA

Therm ID#: 7 IR

Cooler 1 Temp Upon Receipt 0.7 oC

Cooler 1 Therm Corr. Factor -0.3 oC

Cooler 1 Corrected Temp 0.4 oC

Comments:

Trip Blank Received: Y N NA

HCL MeOH TSP Other

NonConformance(s): YES / NO

Page ____ of ____

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Phil Campbell	9-13-18/900	Bob Shaffer PACE	9/13/18 09:45
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Bob Shaffer/PACE	9/13/18 15:00	[signature]	9/13/18 1500

MTJL LAB USE ONLY

Table #

Acctnum: CEC

Template: T133579

Prelogin: P671626

PM: 526 - Chris McCord

PB: 9-6-18

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

November 06, 2018

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1038975
Samples Received:	09/28/2018
Project Number:	181-364
Description:	Former EWS Groundwater Sampling

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

Entire Report Reviewed By:

Chris McCord
Project Manager

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

TABLE OF CONTENTS

MW-3 L1038975-01 GW

			Collected by	Collected date/time	Received date/time
				09/27/18 12:15	09/28/18 13:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1188832	1	11/01/18 10:36	11/01/18 16:56	LD
Metals (ICPMS) by Method 6020	WG1189556	1	11/01/18 13:43	11/02/18 13:29	LAT

DUPLICATE L1038975-02 GW

			Collected by	Collected date/time	Received date/time
				09/27/18 00:00	09/28/18 13:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1188832	1	11/01/18 10:36	11/01/18 17:00	LD
Metals (ICPMS) by Method 6020	WG1189556	1	11/01/18 13:43	11/02/18 13:33	LAT

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

Chris McCord
Project Manager

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0780		0.00500	1	11/02/2018 13:29	WG1189556
Barium,Dissolved	0.0769		0.00500	1	11/01/2018 16:56	WG1188832
Cadmium	0.204		0.00100	1	11/02/2018 13:29	WG1189556
Cadmium,Dissolved	0.221		0.00100	1	11/01/2018 16:56	WG1188832
Nickel	0.134		0.00200	1	11/02/2018 13:29	WG1189556
Nickel,Dissolved	0.138		0.00200	1	11/01/2018 16:56	WG1188832
Selenium	ND		0.00200	1	11/02/2018 13:29	WG1189556
Selenium,Dissolved	ND		0.00200	1	11/01/2018 16:56	WG1188832
Zinc	1.58		0.0250	1	11/02/2018 13:29	WG1189556
Zinc,Dissolved	1.65		0.0250	1	11/01/2018 16:56	WG1188832

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Barium	0.0800		0.00500	1	11/02/2018 13:33	WG1189556
Barium,Dissolved	0.0781		0.00500	1	11/01/2018 17:00	WG1188832
Cadmium	0.206		0.00100	1	11/02/2018 13:33	WG1189556
Cadmium,Dissolved	0.222		0.00100	1	11/01/2018 17:00	WG1188832
Nickel	0.134		0.00200	1	11/02/2018 13:33	WG1189556
Nickel,Dissolved	0.139		0.00200	1	11/01/2018 17:00	WG1188832
Selenium	ND		0.00200	1	11/02/2018 13:33	WG1189556
Selenium,Dissolved	ND		0.00200	1	11/01/2018 17:00	WG1188832
Zinc	1.57		0.0250	1	11/02/2018 13:33	WG1189556
Zinc,Dissolved	1.65		0.0250	1	11/01/2018 17:00	WG1188832

Method Blank (MB)

(MB) R3356114-1 11/01/18 15:19

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Barium,Dissolved	0.000447	J	0.000360	0.00500
Cadmium,Dissolved	U		0.000160	0.00100
Nickel,Dissolved	U		0.000350	0.00200
Selenium,Dissolved	U		0.000380	0.00200
Zinc,Dissolved	U		0.00256	0.0250

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

(LCS) R3356114-2 11/01/18 15:23 • (LCSD) R3356114-3 11/01/18 15:27

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Barium,Dissolved	0.0500	0.0481	0.0468	96.3	93.6	80.0-120			2.83	20
Cadmium,Dissolved	0.0500	0.0477	0.0532	95.3	106	80.0-120			10.9	20
Nickel,Dissolved	0.0500	0.0524	0.0528	105	106	80.0-120			0.837	20
Selenium,Dissolved	0.0500	0.0537	0.0524	107	105	80.0-120			2.53	20
Zinc,Dissolved	0.0500	0.0531	0.0531	106	106	80.0-120			0.0210	20

L1038802-18 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1038802-18 11/01/18 15:31 • (MS) R3356114-5 11/01/18 15:39 • (MSD) R3356114-6 11/01/18 15:43

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Barium,Dissolved	0.0500	0.129	0.176	0.178	93.6	96.9	1	75.0-125			0.937	20
Cadmium,Dissolved	0.0500	ND	0.0520	0.0513	104	103	1	75.0-125			1.39	20
Nickel,Dissolved	0.0500	ND	0.0511	0.0503	101	99.5	1	75.0-125			1.55	20
Selenium,Dissolved	0.0500	ND	0.0525	0.0542	105	108	1	75.0-125			3.13	20
Zinc,Dissolved	0.0500	ND	0.0531	0.0541	98.8	101	1	75.0-125			1.91	20

Method Blank (MB)

(MB) R3356172-1 11/01/18 18:36

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Nickel	U		0.000350	0.00200
Selenium	U		0.000380	0.00200
Zinc	U		0.00256	0.0250

Method Blank (MB)

(MB) R3356432-1 11/02/18 12:54

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Barium	U		0.000360	0.00500
Cadmium	U		0.000160	0.00100

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

(LCS) R3356172-2 11/01/18 18:41 • (LCSD) R3356172-3 11/01/18 18:46

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Nickel	0.0500	0.0526	0.0534	105	107	80.0-120			1.51	20
Selenium	0.0500	0.0507	0.0520	101	104	80.0-120			2.51	20
Zinc	0.0500	0.0529	0.0542	106	108	80.0-120			2.35	20

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

(LCS) R3356432-2 11/02/18 12:59 • (LCSD) R3356432-3 11/02/18 13:03

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Barium	0.0500	0.0473	0.0460	94.6	92.1	80.0-120			2.67	20
Cadmium	0.0500	0.0489	0.0493	97.9	98.7	80.0-120			0.807	20

L1039533-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039533-03 11/01/18 18:50 • (MS) R3356172-5 11/01/18 18:59 • (MSD) R3356172-6 11/01/18 19:04

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Nickel	0.0500	0.00315	0.0457	0.0437	85.2	81.1	1	75.0-125			4.57	20
Zinc	0.0500	ND	0.0580	0.0553	98.0	92.7	1	75.0-125			4.69	20

L1039533-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039533-03 11/02/18 13:07 • (MS) R3356432-5 11/02/18 13:16 • (MSD) R3356432-6 11/02/18 13:20

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Barium	0.0100	0.0285	0.0782	0.0806	99.3	104	5	75.0-125			3.08	20
Cadmium	0.0100	ND	0.0483	0.0493	94.1	96.0	5	75.0-125			1.95	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.

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

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

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

A028

L1038975
L1029877 N 09/29/18

CHAIN-OF-CUSTODY / Analytical Request Document

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

Pace Analytical
www.pacelabs.com

Page: 1 of 1

Section A Required Client Information:

Company:	Civil & Environmental Consultants, Inc.
Address:	325 Seaboard Lane, Ste. 170
	Franklin, TN 37067
Email To:	Pcampbell@cecinc.com
Phone: 615-333-7797	Fax:
Requested Due Date/TAT:	~~5-Day~~

Section B Required Project Information:

Report To:	Philip Campbell
Copy To:	Philip Campbell
Purchase Order No.:	
Project Name:	Putnam County Landfill: Dry Creek Seep
Project Number:	615-333-7797

Section C Invoice Information:

Attention:	
Company Name:	
Address:	
Pace Quote Reference:	
Pace Project Manager:	
Pace Profile #:	

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER _____

Site Location STATE: _____

Section D Required Client Information

Matrix Codes (MATRIX / CODE): Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Tissue TS; Other OT

ITEM #	SAMPLE ID (A-Z, 0-9 / -) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED: COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test ↓ Y/N	Requested Analysis Filtered (Y/N): Y	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	MW-3	WT				9-27-18	1215					2						Cadmium, Cadmium (dissolved-FF)			~~01~~ -01
2	Duplicate	WT				9-27-18	-					2									~~02~~ 02
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS
*Dissolved Metals - Field Filtered and preservative added	Philip for Campbell - CEC	9-28-18	9:30	Wayne Shull	9/28/18	1200	
-5 Day TAT	Wayne Shull pace	9/28/18	1345	K Cornell	9/28/18	1345	1.7 °C

SAMPLER NAME AND SIGNATURE: Philip for Campbell

SAMPLE CONDITIONS: °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

Andy Vann

From: Chris McCord
Sent: Monday, October 29, 2018 12:46 PM
To: Login; Sample Storage
Subject: L1029877 *CEC* relog

Please relog L1029877-01 and -02 for CDG, CDDG, SEG, and SEDG. Log as R5 due 11/5.

Thanks,

Christopher McCord
Project Manager
Pace Analytical National Center for Testing & Innovation
12065 Lebanon Road | Mt. Juliet, TN 37122
615.773.3281 | Cell 615.504.3183
cmccord@pacenational.com | www.pacenational.com

ESC Lab Sciences is now Pace Analytical National Center for Testing & Innovation! Please make note of my new email address and website.

From: Campbell, Philip [mailto:pcampbell@cecinc.com]
Sent: Monday, October 29, 2018 12:41 PM
To: Chris McCord
Cc: Wolfe, Kevin
Subject: RE: Former EWS MW-3 analysis

Yes,

Please do both cadmium and selenium via 6020. Thanks!

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

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National Center for Testing & Innovation

ANALYTICAL REPORT

September 21, 2018

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1025443
Samples Received:	09/13/2018
Project Number:	171-873
Description:	EWS Camden Class 2 Landfill
Site:	CAMDEN, TN
Report To:	Philip Campbell 325 Seaboard Lane, Suite 170 Franklin, TN 37067

Entire Report Reviewed By:

Chris McCord
Project Manager

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

TABLE OF CONTENTS

IWC-L L1025443-01 GW

Collected by	Collected date/time	Received date/time
Philip Cambell	09/12/18 14:45	09/13/18 13:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1165935	500	09/13/18 19:21	09/13/18 19:21	JER
Wet Chemistry by Method 2320 B-2011	WG1167701	1	09/19/18 20:39	09/19/18 20:39	GB
Wet Chemistry by Method 350.1	WG1165920	100	09/18/18 12:01	09/18/18 12:01	JER
Wet Chemistry by Method 410.4	WG1167016	25	09/16/18 08:36	09/16/18 11:48	TH
Wet Chemistry by Method 9056A	WG1165641	1	09/14/18 02:04	09/14/18 02:04	ELN
Wet Chemistry by Method 9056A	WG1165641	10	09/14/18 10:29	09/14/18 10:29	ELN
Wet Chemistry by Method 9056A	WG1165641	1000	09/14/18 00:51	09/14/18 00:51	ELN
Wet Chemistry by Method 9056A	WG1166657	100	09/18/18 09:21	09/18/18 09:21	ELN
Mercury by Method 7470A	WG1166098	1	09/17/18 13:34	09/18/18 13:54	TCT
Mercury by Method 7470A	WG1166101	1	09/17/18 13:34	09/18/18 12:57	TCT
Metals (ICP) by Method 6010B	WG1166217	5	09/18/18 11:39	09/19/18 01:48	TRB
Metals (ICP) by Method 6010B	WG1166248	5	09/18/18 13:36	09/19/18 01:00	ST
Metals (ICPMS) by Method 6020	WG1165892	50	09/14/18 09:41	09/14/18 18:43	JPD
Metals (ICPMS) by Method 6020	WG1165892	500	09/14/18 09:41	09/15/18 11:53	JPD
Metals (ICPMS) by Method 6020	WG1166252	50	09/15/18 11:42	09/17/18 23:02	LAT
Metals (ICPMS) by Method 6020	WG1166252	500	09/15/18 11:42	09/18/18 16:21	JDG
Metals (ICPMS) by Method 6020	WG1167507	100	09/18/18 09:11	09/19/18 12:19	LAT
Metals (ICPMS) by Method 6020	WG1167516	50	09/19/18 09:25	09/19/18 19:52	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	1	09/14/18 01:53	09/14/18 01:53	RAS
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166451	20	09/14/18 18:21	09/14/18 18:21	BMB
EDB / DBCP by Method 8011	WG1167194	1	09/17/18 12:12	09/18/18 00:04	KLM

APWC-L L1025443-02 GW

Collected by	Collected date/time	Received date/time
Philip Cambell	09/12/18 14:20	09/13/18 13:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1165935	5	09/13/18 19:53	09/13/18 19:53	JER
Wet Chemistry by Method 2320 B-2011	WG1167701	10	09/20/18 11:30	09/20/18 11:30	GB
Wet Chemistry by Method 350.1	WG1165920	1000	09/18/18 12:27	09/18/18 12:27	JER
Wet Chemistry by Method 410.4	WG1167170	20	09/17/18 18:42	09/17/18 21:42	MZ
Wet Chemistry by Method 9056A	WG1165641	1	09/14/18 02:22	09/14/18 02:22	ELN
Wet Chemistry by Method 9056A	WG1165641	10	09/14/18 10:47	09/14/18 10:47	ELN
Wet Chemistry by Method 9056A	WG1165641	2000	09/14/18 01:09	09/14/18 01:09	ELN
Mercury by Method 7470A	WG1168107	10	09/19/18 10:28	09/20/18 08:27	TCT
Mercury by Method 7470A	WG1168235	10	09/19/18 13:55	09/20/18 08:05	TCT
Metals (ICP) by Method 6010B	WG1166217	20	09/18/18 11:39	09/19/18 01:50	TRB
Metals (ICP) by Method 6010B	WG1166248	1	09/18/18 13:36	09/18/18 19:47	ST
Metals (ICPMS) by Method 6020	WG1165892	100	09/14/18 09:41	09/14/18 18:57	JPD
Metals (ICPMS) by Method 6020	WG1165892	50	09/14/18 09:41	09/14/18 18:53	JPD
Metals (ICPMS) by Method 6020	WG1166252	100	09/15/18 11:42	09/18/18 00:23	LAT
Metals (ICPMS) by Method 6020	WG1166252	50	09/15/18 11:42	09/17/18 23:07	LAT
Metals (ICPMS) by Method 6020	WG1166252	500	09/15/18 11:42	09/18/18 16:27	JDG
Metals (ICPMS) by Method 6020	WG1167507	100	09/18/18 09:11	09/19/18 12:24	LAT
Metals (ICPMS) by Method 6020	WG1167516	50	09/19/18 09:25	09/19/18 19:56	LAT
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166010	5	09/14/18 02:13	09/14/18 02:13	RAS
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1166451	5	09/14/18 18:40	09/14/18 18:40	BMB
EDB / DBCP by Method 8011	WG1167194	1	09/17/18 12:12	09/17/18 23:41	KLM

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

Chris McCord
Project Manager

Sample Handling and Receiving

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

Lab Sample ID	Project Sample ID	Method
L1025443-01	IWC-L	130.1
L1025443-02	APWC-L	130.1, 6020, 6010B, 7470A

No extra volume received to perform Matrix Spike samples.

Lab Sample ID	Project Sample ID	Method
L1025443-01	IWC-L	8260B
L1025443-02	APWC-L	8260B

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	28400		15000	500	09/13/2018 19:21	WG1165935

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	09/19/2018 20:39	WG1167701

Sample Narrative:

L1025443-01 WG1167701: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	873		10.0	100	09/18/2018 12:01	WG1165920

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	6990		250	25	09/16/2018 11:48	WG1167016

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	34.3		10.0	10	09/14/2018 10:29	WG1165641
Chloride	68300		1000	1000	09/14/2018 00:51	WG1165641
Fluoride	14.2		1.00	10	09/14/2018 10:29	WG1165641
Nitrate	ND		0.100	1	09/14/2018 02:04	WG1165641
Sulfate	2650		500	100	09/18/2018 09:21	WG1166657

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	0.000608	B	0.000200	1	09/18/2018 13:54	WG1166098
Mercury,Dissolved	0.000611	B	0.000200	1	09/18/2018 12:57	WG1166101

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		1.00	5	09/19/2018 01:48	WG1166217
Boron,Dissolved	ND		1.00	5	09/19/2018 01:00	WG1166248

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	160		5.00	50	09/14/2018 18:43	WG1165892
Aluminum,Dissolved	165		5.00	50	09/17/2018 23:02	WG1166252
Antimony	ND		0.200	100	09/19/2018 12:19	WG1167507
Antimony,Dissolved	ND		0.100	50	09/19/2018 19:52	WG1167516
Arsenic	0.187		0.100	50	09/14/2018 18:43	WG1165892
Arsenic,Dissolved	0.295		0.100	50	09/17/2018 23:02	WG1166252
Barium	1.30		0.250	50	09/14/2018 18:43	WG1165892
Barium,Dissolved	1.33		0.250	50	09/17/2018 23:02	WG1166252

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.100	50	09/14/2018 18:43	WG1165892
Beryllium,Dissolved	ND		0.100	50	09/17/2018 23:02	WG1166252
Cadmium	199		0.0500	50	09/14/2018 18:43	WG1165892
Cadmium,Dissolved	227		0.500	500	09/18/2018 16:21	WG1166252
Calcium	6750		50.0	50	09/14/2018 18:43	WG1165892
Calcium,Dissolved	6910		50.0	50	09/17/2018 23:02	WG1166252
Chromium	ND		0.100	50	09/14/2018 18:43	WG1165892
Chromium,Dissolved	ND		0.100	50	09/17/2018 23:02	WG1166252
Cobalt	1.20		0.100	50	09/14/2018 18:43	WG1165892
Cobalt,Dissolved	1.27		0.100	50	09/17/2018 23:02	WG1166252
Copper	19.2		0.250	50	09/14/2018 18:43	WG1165892
Copper,Dissolved	20.5		0.250	50	09/17/2018 23:02	WG1166252
Iron	292		5.00	50	09/14/2018 18:43	WG1165892
Iron,Dissolved	269		5.00	50	09/17/2018 23:02	WG1166252
Lead	0.307		0.100	50	09/14/2018 18:43	WG1165892
Lead,Dissolved	0.323	B	0.100	50	09/17/2018 23:02	WG1166252
Magnesium	1610		50.0	50	09/14/2018 18:43	WG1165892
Magnesium,Dissolved	1720		50.0	50	09/17/2018 23:02	WG1166252
Manganese	330		0.250	50	09/14/2018 18:43	WG1165892
Manganese,Dissolved	339		0.250	50	09/17/2018 23:02	WG1166252
Nickel	1.11		0.100	50	09/14/2018 18:43	WG1165892
Nickel,Dissolved	1.14		0.100	50	09/17/2018 23:02	WG1166252
Potassium	7680		50.0	50	09/14/2018 18:43	WG1165892
Potassium,Dissolved	7770		50.0	50	09/17/2018 23:02	WG1166252
Selenium	0.171		0.100	50	09/14/2018 18:43	WG1165892
Selenium,Dissolved	0.504		0.100	50	09/17/2018 23:02	WG1166252
Silver	ND		0.100	50	09/14/2018 18:43	WG1165892
Silver,Dissolved	ND		0.100	50	09/17/2018 23:02	WG1166252
Sodium	13500		50.0	50	09/14/2018 18:43	WG1165892
Sodium,Dissolved	14300		50.0	50	09/17/2018 23:02	WG1166252
Thallium	ND		0.100	50	09/14/2018 18:43	WG1165892
Thallium,Dissolved	ND		0.100	50	09/17/2018 23:02	WG1166252
Vanadium	ND		0.250	50	09/14/2018 18:43	WG1165892
Vanadium,Dissolved	ND		0.250	50	09/17/2018 23:02	WG1166252
Zinc	1950		12.5	500	09/15/2018 11:53	WG1165892
Zinc,Dissolved	2380		12.5	500	09/18/2018 16:21	WG1166252

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		1.00	20	09/14/2018 18:21	WG1166451
Acrylonitrile	ND		0.0100	1	09/14/2018 01:53	WG1166010
Benzene	ND		0.00100	1	09/14/2018 01:53	WG1166010
Bromochloromethane	ND		0.00100	1	09/14/2018 01:53	WG1166010
Bromodichloromethane	ND		0.00100	1	09/14/2018 01:53	WG1166010
Bromoform	ND	J4	0.00100	1	09/14/2018 01:53	WG1166010
Bromomethane	ND		0.00500	1	09/14/2018 01:53	WG1166010
Carbon disulfide	0.00117		0.00100	1	09/14/2018 01:53	WG1166010
Carbon tetrachloride	ND		0.00100	1	09/14/2018 01:53	WG1166010
Chlorobenzene	ND		0.00100	1	09/14/2018 01:53	WG1166010
Chlorodibromomethane	ND		0.00100	1	09/14/2018 01:53	WG1166010
Chloroethane	ND		0.00500	1	09/14/2018 01:53	WG1166010
Chloroform	ND		0.00500	1	09/14/2018 01:53	WG1166010
Chloromethane	0.00429		0.00250	1	09/14/2018 01:53	WG1166010
Dibromomethane	ND		0.00100	1	09/14/2018 01:53	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	09/14/2018 01:53	WG1166010

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dibromoethane	ND		0.00100	1	09/14/2018 01:53	WG1166010
1,2-Dichlorobenzene	ND		0.00100	1	09/14/2018 01:53	WG1166010
1,4-Dichlorobenzene	ND		0.00100	1	09/14/2018 01:53	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.00250	1	09/14/2018 01:53	WG1166010
1,1-Dichloroethane	ND		0.00100	1	09/14/2018 01:53	WG1166010
1,2-Dichloroethane	ND		0.00100	1	09/14/2018 01:53	WG1166010
1,1-Dichloroethene	ND		0.00100	1	09/14/2018 01:53	WG1166010
cis-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 01:53	WG1166010
trans-1,2-Dichloroethene	ND		0.00100	1	09/14/2018 01:53	WG1166010
1,2-Dichloropropane	ND		0.00100	1	09/14/2018 01:53	WG1166010
cis-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 01:53	WG1166010
trans-1,3-Dichloropropene	ND		0.00100	1	09/14/2018 01:53	WG1166010
Ethylbenzene	ND		0.00100	1	09/14/2018 01:53	WG1166010
2-Hexanone	ND		0.0100	1	09/14/2018 01:53	WG1166010
Iodomethane	ND		0.0100	1	09/14/2018 01:53	WG1166010
2-Butanone (MEK)	0.174		0.0100	1	09/14/2018 01:53	WG1166010
Methylene Chloride	ND		0.00500	1	09/14/2018 01:53	WG1166010
4-Methyl-2-pentanone (MIBK)	0.0251		0.0100	1	09/14/2018 01:53	WG1166010
Styrene	ND		0.00100	1	09/14/2018 01:53	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 01:53	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00100	1	09/14/2018 01:53	WG1166010
Tetrachloroethene	ND		0.00100	1	09/14/2018 01:53	WG1166010
Toluene	ND		0.00100	1	09/14/2018 01:53	WG1166010
1,1,1-Trichloroethane	ND		0.00100	1	09/14/2018 01:53	WG1166010
1,1,2-Trichloroethane	ND		0.00100	1	09/14/2018 01:53	WG1166010
Trichloroethene	ND		0.00100	1	09/14/2018 01:53	WG1166010
Trichlorofluoromethane	ND		0.00500	1	09/14/2018 01:53	WG1166010
1,2,3-Trichloropropane	ND		0.00250	1	09/14/2018 01:53	WG1166010
Vinyl acetate	ND		0.0100	1	09/14/2018 01:53	WG1166010
Vinyl chloride	ND		0.00100	1	09/14/2018 01:53	WG1166010
Xylenes, Total	ND		0.00300	1	09/14/2018 01:53	WG1166010
(S) Toluene-d8	*97.5*		*80.0-120*		*09/14/2018 01:53*	WG1166010
(S) Toluene-d8	*106*		*80.0-120*		*09/14/2018 18:21*	WG1166451
(S) Dibromofluoromethane	*111*		*75.0-120*		*09/14/2018 01:53*	WG1166010
(S) Dibromofluoromethane	*107*		*75.0-120*		*09/14/2018 18:21*	WG1166451
(S) a,a,a-Trifluorotoluene	*104*		*80.0-120*		*09/14/2018 01:53*	WG1166010
(S) a,a,a-Trifluorotoluene	*111*		*80.0-120*		*09/14/2018 18:21*	WG1166451
(S) 4-Bromofluorobenzene	*86.7*		*77.0-126*		*09/14/2018 01:53*	WG1166010
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*09/14/2018 18:21*	WG1166451

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	0.000103		0.0000100	1	09/18/2018 00:04	WG1167194
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	09/18/2018 00:04	WG1167194

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	685		150	5	09/13/2018 19:53	WG1165935

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	6530		200	10	09/20/2018 11:30	WG1167701

Sample Narrative:

L1025443-02 WG1167701: Endpoint pH 4.5 HEADSPACE

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	6120		100	1000	09/18/2018 12:27	WG1165920

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	18900		200	20	09/17/2018 21:42	WG1167170

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	61.5		1.00	1	09/14/2018 02:22	WG1165641
Chloride	109000		2000	2000	09/14/2018 01:09	WG1165641
Fluoride	12.0		1.00	10	09/14/2018 10:47	WG1165641
Nitrate	30.7		1.00	10	09/14/2018 10:47	WG1165641
Sulfate	610		50.0	10	09/14/2018 10:47	WG1165641

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.00200	10	09/20/2018 08:27	WG1168107
Mercury,Dissolved	ND		0.00200	10	09/20/2018 08:05	WG1168235

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	8.94		4.00	20	09/19/2018 01:50	WG1166217
Boron,Dissolved	9.40		0.200	1	09/18/2018 19:47	WG1166248

Metals (ICPMS) by Method 6020

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		5.00	50	09/14/2018 18:53	WG1165892
Aluminum,Dissolved	ND		5.00	50	09/17/2018 23:07	WG1166252
Antimony	ND		0.200	100	09/19/2018 12:24	WG1167507
Antimony,Dissolved	ND		0.100	50	09/19/2018 19:56	WG1167516
Arsenic	ND		0.100	50	09/14/2018 18:53	WG1165892
Arsenic,Dissolved	ND		0.100	50	09/17/2018 23:07	WG1166252
Barium	1.28		0.250	50	09/14/2018 18:53	WG1165892
Barium,Dissolved	1.34		0.250	50	09/17/2018 23:07	WG1166252

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.100	50	09/14/2018 18:53	WG1165892
Beryllium,Dissolved	ND		0.100	50	09/17/2018 23:07	WG1166252
Cadmium	0.0933		0.0500	50	09/14/2018 18:53	WG1165892
Cadmium,Dissolved	0.144		0.0500	50	09/17/2018 23:07	WG1166252
Calcium	262		50.0	50	09/14/2018 18:53	WG1165892
Calcium,Dissolved	282		50.0	50	09/17/2018 23:07	WG1166252
Chromium	ND		0.100	50	09/14/2018 18:53	WG1165892
Chromium,Dissolved	ND		0.100	50	09/17/2018 23:07	WG1166252
Cobalt	ND		0.100	50	09/14/2018 18:53	WG1165892
Cobalt,Dissolved	ND		0.100	50	09/17/2018 23:07	WG1166252
Copper	5.43		0.250	50	09/14/2018 18:53	WG1165892
Copper,Dissolved	6.08		0.250	50	09/17/2018 23:07	WG1166252
Iron	ND		5.00	50	09/14/2018 18:53	WG1165892
Iron,Dissolved	ND		5.00	50	09/17/2018 23:07	WG1166252
Lead	ND		0.100	50	09/14/2018 18:53	WG1165892
Lead,Dissolved	ND		0.100	50	09/17/2018 23:07	WG1166252
Magnesium	ND		50.0	50	09/14/2018 18:53	WG1165892
Magnesium,Dissolved	ND		50.0	50	09/17/2018 23:07	WG1166252
Manganese	ND		0.250	50	09/14/2018 18:53	WG1165892
Manganese,Dissolved	ND		0.250	50	09/17/2018 23:07	WG1166252
Nickel	0.123		0.100	50	09/14/2018 18:53	WG1165892
Nickel,Dissolved	0.124		0.100	50	09/17/2018 23:07	WG1166252
Potassium	35600		50.0	50	09/14/2018 18:53	WG1165892
Potassium,Dissolved	38300		100	100	09/18/2018 00:23	WG1166252
Selenium	ND		0.100	50	09/14/2018 18:53	WG1165892
Selenium,Dissolved	ND		0.100	50	09/17/2018 23:07	WG1166252
Silver	ND		0.100	50	09/14/2018 18:53	WG1165892
Silver,Dissolved	ND		0.100	50	09/17/2018 23:07	WG1166252
Sodium	59100		100	100	09/14/2018 18:57	WG1165892
Sodium,Dissolved	65800		500	500	09/18/2018 16:27	WG1166252
Thallium	ND		0.100	50	09/14/2018 18:53	WG1165892
Thallium,Dissolved	ND		0.100	50	09/17/2018 23:07	WG1166252
Vanadium	ND		0.250	50	09/14/2018 18:53	WG1165892
Vanadium,Dissolved	ND		0.250	50	09/17/2018 23:07	WG1166252
Zinc	8.56		1.25	50	09/14/2018 18:53	WG1165892
Zinc,Dissolved	8.69		1.25	50	09/17/2018 23:07	WG1166252

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	0.290		0.250	5	09/14/2018 18:40	WG1166451
Acrylonitrile	ND		0.0500	5	09/14/2018 02:13	WG1166010
Benzene	ND		0.00500	5	09/14/2018 02:13	WG1166010
Bromochloromethane	ND		0.00500	5	09/14/2018 02:13	WG1166010
Bromodichloromethane	ND		0.00500	5	09/14/2018 02:13	WG1166010
Bromoform	ND	J4	0.00500	5	09/14/2018 02:13	WG1166010
Bromomethane	ND		0.0250	5	09/14/2018 02:13	WG1166010
Carbon disulfide	ND		0.00500	5	09/14/2018 02:13	WG1166010
Carbon tetrachloride	ND		0.00500	5	09/14/2018 02:13	WG1166010
Chlorobenzene	ND		0.00500	5	09/14/2018 02:13	WG1166010
Chlorodibromomethane	ND		0.00500	5	09/14/2018 02:13	WG1166010
Chloroethane	ND		0.0250	5	09/14/2018 02:13	WG1166010
Chloroform	ND		0.0250	5	09/14/2018 02:13	WG1166010
Chloromethane	ND		0.0125	5	09/14/2018 02:13	WG1166010
Dibromomethane	ND		0.00500	5	09/14/2018 02:13	WG1166010
1,2-Dibromo-3-Chloropropane	ND		0.0250	5	09/14/2018 02:13	WG1166010

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dibromoethane	ND		0.00500	5	09/14/2018 02:13	WG1166010
1,2-Dichlorobenzene	ND		0.00500	5	09/14/2018 02:13	WG1166010
1,4-Dichlorobenzene	ND		0.00500	5	09/14/2018 02:13	WG1166010
trans-1,4-Dichloro-2-butene	ND		0.0125	5	09/14/2018 02:13	WG1166010
1,1-Dichloroethane	ND		0.00500	5	09/14/2018 02:13	WG1166010
1,2-Dichloroethane	ND		0.00500	5	09/14/2018 02:13	WG1166010
1,1-Dichloroethene	ND		0.00500	5	09/14/2018 02:13	WG1166010
cis-1,2-Dichloroethene	ND		0.00500	5	09/14/2018 02:13	WG1166010
trans-1,2-Dichloroethene	ND		0.00500	5	09/14/2018 02:13	WG1166010
1,2-Dichloropropane	ND		0.00500	5	09/14/2018 02:13	WG1166010
cis-1,3-Dichloropropene	ND		0.00500	5	09/14/2018 02:13	WG1166010
trans-1,3-Dichloropropene	ND		0.00500	5	09/14/2018 02:13	WG1166010
Ethylbenzene	ND		0.00500	5	09/14/2018 02:13	WG1166010
2-Hexanone	ND		0.0500	5	09/14/2018 02:13	WG1166010
Iodomethane	ND		0.0500	5	09/14/2018 02:13	WG1166010
2-Butanone (MEK)	ND		0.0500	5	09/14/2018 02:13	WG1166010
Methylene Chloride	ND		0.0250	5	09/14/2018 02:13	WG1166010
4-Methyl-2-pentanone (MIBK)	ND		0.0500	5	09/14/2018 02:13	WG1166010
Styrene	ND		0.00500	5	09/14/2018 02:13	WG1166010
1,1,1,2-Tetrachloroethane	ND		0.00500	5	09/14/2018 02:13	WG1166010
1,1,2,2-Tetrachloroethane	ND		0.00500	5	09/14/2018 02:13	WG1166010
Tetrachloroethene	ND		0.00500	5	09/14/2018 02:13	WG1166010
Toluene	ND		0.00500	5	09/14/2018 02:13	WG1166010
1,1,1-Trichloroethane	ND		0.00500	5	09/14/2018 02:13	WG1166010
1,1,2-Trichloroethane	ND		0.00500	5	09/14/2018 02:13	WG1166010
Trichloroethene	ND		0.00500	5	09/14/2018 02:13	WG1166010
Trichlorofluoromethane	ND		0.0250	5	09/14/2018 02:13	WG1166010
1,2,3-Trichloropropane	ND		0.0125	5	09/14/2018 02:13	WG1166010
Vinyl acetate	ND		0.0500	5	09/14/2018 02:13	WG1166010
Vinyl chloride	ND		0.00500	5	09/14/2018 02:13	WG1166010
Xylenes, Total	ND		0.0150	5	09/14/2018 02:13	WG1166010
(S) Toluene-d8	*98.9*		*80.0-120*		*09/14/2018 02:13*	WG1166010
(S) Toluene-d8	*105*		*80.0-120*		*09/14/2018 18:40*	WG1166451
(S) Dibromofluoromethane	*98.5*		*75.0-120*		*09/14/2018 02:13*	WG1166010
(S) Dibromofluoromethane	*106*		*75.0-120*		*09/14/2018 18:40*	WG1166451
(S) a,a,a-Trifluorotoluene	*109*		*80.0-120*		*09/14/2018 02:13*	WG1166010
(S) a,a,a-Trifluorotoluene	*115*		*80.0-120*		*09/14/2018 18:40*	WG1166451
(S) 4-Bromofluorobenzene	*83.1*		*77.0-126*		*09/14/2018 02:13*	WG1166010
(S) 4-Bromofluorobenzene	*108*		*77.0-126*		*09/14/2018 18:40*	WG1166451

Sample Narrative:

L1025443-02 WG1166010: Dilution due to soil in vial.

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	09/17/2018 23:41	WG1167194
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	09/17/2018 23:41	WG1167194

Method Blank (MB)

(MB) R3341819-1 09/13/18 18:57

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hardness (colorimetric) as CaCO3	U		1.43	30.0

L1024487-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1024487-02 09/13/18 19:00 • (DUP) R3341819-4 09/13/18 19:00

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	82.2	80.4	1	2.21		20

L1025318-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1025318-01 09/13/18 19:17 • (DUP) R3341819-5 09/13/18 19:18

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	123	120	1	2.47		20

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

(LCS) R3341819-2 09/13/18 18:58 • (LCSD) R3341819-3 09/13/18 18:59

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hardness (colorimetric) as CaCO3	150	156	153	104	102	85.0-115			1.94	20

L1025361-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025361-02 09/13/18 19:19 • (MS) R3341819-6 09/13/18 19:20 • (MSD) R3341819-7 09/13/18 19:21

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Hardness (colorimetric) as CaCO3	150	218	261	259	28.7	27.3	1	80.0-120	E J6	E J6	0.769	20

Method Blank (MB)

(MB) R3343501-1 09/19/18 19:42

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

Sample Narrative:
BLANK: Endpoint pH 4.5

L1025359-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1025359-02 09/19/18 19:49 • (DUP) R3343501-3 09/19/18 19:55

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	ND	5.91	1	0.000		20

Sample Narrative:
OS: Endpoint pH 4.5
DUP: Endpoint pH 4.5

L1025780-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1025780-06 09/19/18 22:16 • (DUP) R3343501-7 09/19/18 22:22

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	2.76	0.000	1	200	P1	20

Sample Narrative:
OS: Endpoint pH 4.5
DUP: Endpoint pH 4.5

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

(LCS) R3343501-5 09/19/18 20:46 • (LCSD) R3343501-6 09/19/18 21:59

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Alkalinity	100	97.5	99.5	97.5	99.5	85.0-115			2.06	20

Sample Narrative:
LCS: Endpoint pH 4.5
LCSD: Endpoint pH 4.5

Method Blank (MB)

(MB) R3342754-1 09/18/18 11:17

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Ammonia Nitrogen	U		0.0317	0.100

L1025337-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1025337-01 09/18/18 11:24 • (DUP) R3342754-4 09/18/18 11:26

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Ammonia Nitrogen	2.51	2.54	1	1.47		10

L1025431-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1025431-05 09/18/18 11:58 • (DUP) R3342754-6 09/18/18 11:59

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Ammonia Nitrogen	ND	0.000	1	0.000		10

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

(LCS) R3342754-2 09/18/18 11:18 • (LCSD) R3342754-3 09/18/18 11:20

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Ammonia Nitrogen	7.50	7.72	7.47	103	99.5	90.0-110			3.28	10

L1025468-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025468-01 09/18/18 12:06 • (MS) R3342754-7 09/18/18 12:07 • (MSD) R3342754-8 09/18/18 12:09

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Ammonia Nitrogen	5.00	ND	4.62	4.73	92.4	94.6	1	90.0-110			2.37	10

Method Blank (MB)

(MB) R3342297-1 09/16/18 11:42

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

L1025326-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1025326-03 09/16/18 11:43 • (DUP) R3342297-4 09/16/18 11:44

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	33.4	31.1	1	7.16		20

L1025431-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1025431-05 09/16/18 11:48 • (DUP) R3342297-7 09/16/18 11:48

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	23.0	20.5	1	11.7		20

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

(LCS) R3342297-2 09/16/18 11:42 • (LCSD) R3342297-3 09/16/18 11:42

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
COD	242	222	223	91.6	92.1	90.0-110			0.468	20

L1025400-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025400-01 09/16/18 11:45 • (MS) R3342297-5 09/16/18 11:45 • (MSD) R3342297-6 09/16/18 11:46

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
COD	400	135	535	531	100	99.1	1	80.0-120			0.631	20

Method Blank (MB)

(MB) R3342612-1 09/17/18 21:36

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

L1024393-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1024393-02 09/17/18 21:40 • (DUP) R3342612-4 09/17/18 21:40

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	118	116	1	2.25		20

L1025443-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1025443-02 09/17/18 21:42 • (DUP) R3342612-7 09/17/18 21:43

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	18900	18900	20	0.136		20

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

(LCS) R3342612-2 09/17/18 21:36 • (LCSD) R3342612-3 09/17/18 21:37

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
COD	242	226	225	93.2	93.0	90.0-110			0.209	20

L1025277-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025277-01 09/17/18 21:41 • (MS) R3342612-5 09/17/18 21:41 • (MSD) R3342612-6 09/17/18 21:41

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
COD	400	301	687	685	96.6	96.0	1	80.0-120			0.300	20

Method Blank (MB)

(MB) R3342072-1 09/13/18 12:24

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Bromide	U		0.0790	1.00
Chloride	0.158	J	0.0519	1.00
Fluoride	U		0.00990	0.100
Nitrate	U		0.0227	0.100
Sulfate	0.115	J	0.0774	5.00

L1025351-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1025351-07 09/13/18 14:41 • (DUP) R3342072-4 09/13/18 14:59

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.434	1	0.000		15
Chloride	64.7	64.6	1	0.0922		15
Fluoride	0.370	0.370	1	0.000		15
Nitrate	0.897	0.895	1	0.268		15

L1025431-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1025431-01 09/13/18 18:37 • (DUP) R3342072-7 09/13/18 19:06

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	1.16	1.17	1	0.712		15
Chloride	79.6	80.1	1	0.539		15
Fluoride	0.566	0.567	1	0.212		15
Nitrate	ND	0.000	1	0.000		15
Sulfate	47.9	48.2	1	0.456		15

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

(LCS) R3342072-2 09/13/18 12:42 • (LCSD) R3342072-3 09/13/18 13:00

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromide	40.0	39.9	39.9	99.7	99.8	80.0-120			0.108	15
Chloride	40.0	39.9	40.0	99.8	99.9	80.0-120			0.147	15
Fluoride	8.00	8.04	8.04	100	101	80.0-120			0.0846	15
Nitrate	8.00	8.07	8.08	101	101	80.0-120			0.116	15
Sulfate	40.0	40.2	40.2	100	100	80.0-120			0.0237	15

L1025351-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025351-07 09/13/18 14:41 • (MS) R3342072-5 09/13/18 15:17 • (MSD) R3342072-6 09/13/18 15:35

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	ND	51.9	52.2	103	103	1	80.0-120			0.541	15
Chloride	50.0	64.7	116	116	102	102	1	80.0-120	E	E	0.0611	15
Fluoride	5.00	0.370	5.69	5.72	106	107	1	80.0-120			0.549	15
Nitrate	5.00	0.897	6.14	6.18	105	106	1	80.0-120			0.760	15
Sulfate	50.0	131	178	178	93.8	94.6	1	80.0-120	E	E	0.224	15

L1025431-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1025431-01 09/13/18 18:37 • (MS) R3342072-8 09/13/18 19:24

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	1.16	49.8	97.3	1	80.0-120	
Chloride	50.0	79.6	128	96.9	1	80.0-120	E
Fluoride	5.00	0.566	5.78	104	1	80.0-120	
Nitrate	5.00	ND	5.01	100	1	80.0-120	
Sulfate	50.0	47.9	97.0	98.2	1	80.0-120	

Method Blank (MB)

(MB) R3342689-1 09/17/18 19:35

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Sulfate	U		0.0774	5.00

L1026024-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1026024-04 09/18/18 01:56 • (DUP) R3342689-4 09/18/18 02:12

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	6.56	6.51	1	0.796		15

L1026083-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1026083-09 09/18/18 07:46 • (DUP) R3342689-7 09/18/18 08:02

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Sulfate	U	0.000	1	0.000		15

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

(LCS) R3342689-2 09/17/18 19:51 • (LCSD) R3342689-3 09/17/18 20:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Sulfate	40.0	40.1	40.1	100	100	80.0-120			0.0429	15

L1026024-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1026024-04 09/18/18 01:56 • (MS) R3342689-5 09/18/18 02:59 • (MSD) R3342689-6 09/18/18 03:15

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Sulfate	50.0	6.56	56.7	56.8	100	100	1	80.0-120			0.200	15

L1026083-09 Original Sample (OS) • Matrix Spike (MS)

(OS) L1026083-09 09/18/18 07:46 • (MS) R3342689-8 09/18/18 08:18

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Sulfate	50.0	U	48.2	96.4	1	80.0-120	

Method Blank (MB)

(MB) R3342873-1 09/18/18 13:32

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	0.0000803	J	0.0000490	0.000200

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

(LCS) R3342873-2 09/18/18 13:34 • (LCSD) R3342873-3 09/18/18 13:41

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	0.00319	0.00325	106	108	80.0-120			1.71	20

L1025453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025453-01 09/18/18 13:44 • (MS) R3342873-4 09/18/18 13:46 • (MSD) R3342873-5 09/18/18 13:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	0.000244	0.00313	0.00334	96.3	103	1	75.0-125			6.41	20

Method Blank (MB)

(MB) R3342871-1 09/18/18 12:33

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	0.0000763	J	0.0000490	0.000200

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

(LCS) R3342871-2 09/18/18 12:43 • (LCSD) R3342871-3 09/18/18 12:45

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	0.00314	0.00300	105	100	80.0-120			4.60	20

L1025453-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025453-01 09/18/18 12:48 • (MS) R3342871-4 09/18/18 12:50 • (MSD) R3342871-5 09/18/18 12:52

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	ND	0.00317	0.00283	101	89.5	1	75.0-125			11.3	20

Method Blank (MB)

(MB) R3343447-1 09/20/18 08:08

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.0000490	0.000200

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

(LCS) R3343447-2 09/20/18 08:10 • (LCSD) R3343447-3 09/20/18 08:12

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	0.00318	0.00313	106	104	80.0-120			1.46	20

L1026137-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1026137-01 09/20/18 08:15 • (MS) R3343447-4 09/20/18 08:17 • (MSD) R3343447-5 09/20/18 08:20

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	ND	0.00312	0.00299	104	99.8	1	75.0-125			4.17	20

Method Blank (MB)

(MB) R3343446-1 09/20/18 07:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	U		0.0000490	0.000200

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

(LCS) R3343446-2 09/20/18 08:00 • (LCSD) R3343446-3 09/20/18 08:03

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	0.00300	0.00290	100	96.8	80.0-120			3.43	20

Method Blank (MB)

(MB) R3342986-1 09/18/18 17:34

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0126	0.200

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

(LCS) R3342986-2 09/18/18 17:36 • (LCSD) R3342986-3 09/18/18 17:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron	1.00	0.993	0.970	99.3	97.0	80.0-120			2.27	20

L1025529-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025529-01 09/18/18 17:42 • (MS) R3342986-5 09/18/18 17:47 • (MSD) R3342986-6 09/18/18 17:50

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron	1.00	0.224	1.21	1.23	98.3	101	1	75.0-125			1.87	20

Method Blank (MB)

(MB) R3342985-1 09/18/18 19:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	U		0.0126	0.200

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

(LCS) R3342985-2 09/18/18 19:07 • (LCSD) R3342985-3 09/18/18 19:09

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	1.00	0.974	0.961	97.4	96.1	80.0-120			1.29	20

L1025754-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025754-02 09/18/18 19:12 • (MS) R3342985-5 09/18/18 19:18 • (MSD) R3342985-6 09/18/18 19:20

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	1.00	ND	1.05	1.04	98.9	98.3	1	75.0-125			0.610	20

Method Blank (MB)

(MB) R3342023-1 09/14/18 11:38

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.0277	J	0.00515	0.100
Arsenic	U		0.000250	0.00200
Barium	U		0.000360	0.00500
Beryllium	0.000280	J	0.000120	0.00200
Cadmium	U		0.000160	0.00100
Calcium	U		0.0460	1.00
Chromium	U		0.000540	0.00200
Copper	U		0.000520	0.00500
Cobalt	U		0.000260	0.00200
Iron	0.0243	J	0.0150	0.100
Lead	0.000318	J	0.000240	0.00200
Magnesium	U		0.100	1.00
Manganese	U		0.000250	0.00500
Nickel	U		0.000350	0.00200
Potassium	0.387	J	0.0370	1.00
Selenium	U		0.000380	0.00200
Silver	U		0.000310	0.00200
Sodium	0.130	J	0.110	1.00
Thallium	0.000296	J	0.000190	0.00200
Vanadium	U		0.000180	0.00500
Zinc	U		0.00256	0.0250

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

(LCS) R3342023-2 09/14/18 11:43 • (LCSD) R3342023-3 09/14/18 11:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	4.88	4.91	97.6	98.1	80.0-120			0.542	20
Arsenic	0.0500	0.0506	0.0491	101	98.2	80.0-120			2.93	20
Barium	0.0500	0.0488	0.0481	97.7	96.2	80.0-120			1.51	20
Beryllium	0.0500	0.0497	0.0497	99.5	99.3	80.0-120			0.144	20
Cadmium	0.0500	0.0493	0.0482	98.5	96.4	80.0-120			2.12	20
Calcium	5.00	5.00	4.94	99.9	98.8	80.0-120			1.12	20
Chromium	0.0500	0.0520	0.0509	104	102	80.0-120			2.17	20
Copper	0.0500	0.0516	0.0517	103	103	80.0-120			0.0583	20
Cobalt	0.0500	0.0525	0.0514	105	103	80.0-120			2.00	20
Iron	5.00	5.34	5.37	107	107	80.0-120			0.566	20
Lead	0.0500	0.0483	0.0478	96.6	95.6	80.0-120			1.03	20
Magnesium	5.00	4.97	5.00	99.4	100	80.0-120			0.586	20

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

(LCS) R3342023-2 09/14/18 11:43 • (LCSD) R3342023-3 09/14/18 11:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Manganese	0.0500	0.0505	0.0499	101	99.8	80.0-120			1.10	20
Nickel	0.0500	0.0519	0.0519	104	104	80.0-120			0.0688	20
Potassium	5.00	4.83	4.84	96.7	96.8	80.0-120			0.156	20
Selenium	0.0500	0.0486	0.0472	97.2	94.5	80.0-120			2.87	20
Silver	0.0500	0.0522	0.0501	104	100	80.0-120			4.14	20
Sodium	5.00	5.07	5.04	101	101	80.0-120			0.636	20
Thallium	0.0500	0.0492	0.0490	98.4	98.0	80.0-120			0.334	20
Vanadium	0.0500	0.0502	0.0497	100	99.3	80.0-120			1.13	20
Zinc	0.0500	0.0531	0.0529	106	106	80.0-120			0.411	20

L1025405-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025405-01 09/14/18 11:52 • (MS) R3342023-5 09/14/18 12:01 • (MSD) R3342023-6 09/14/18 12:06

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	0.0328	4.88	4.96	96.9	98.5	1	75.0-125			1.66	20
Arsenic	0.0500	0.00474	0.0543	0.0549	99.1	100	1	75.0-125			1.12	20
Barium	0.0500	0.264	0.323	0.308	117	87.7	1	75.0-125			4.64	20
Beryllium	0.0500	0.000209	0.0494	0.0501	98.3	99.7	1	75.0-125			1.46	20
Cadmium	0.0500	U	0.0496	0.0482	99.2	96.4	1	75.0-125			2.80	20
Calcium	5.00	92.8	96.3	94.4	69.8	31.0	1	75.0-125	V	V	2.03	20
Chromium	0.0500	0.000636	0.0495	0.0499	97.8	98.5	1	75.0-125			0.650	20
Copper	0.0500	0.00149	0.0506	0.0509	98.1	98.9	1	75.0-125			0.767	20
Cobalt	0.0500	U	0.0501	0.0502	100	100	1	75.0-125			0.108	20
Potassium	5.00	2.23	6.93	7.01	94.0	95.6	1	75.0-125			1.10	20
Iron	5.00	0.0346	5.11	5.28	101	105	1	75.0-125			3.38	20
Lead	0.0500	0.000424	0.0474	0.0479	93.9	94.9	1	75.0-125			1.03	20
Magnesium	5.00	3.60	8.44	8.44	96.7	96.7	1	75.0-125			0.0385	20
Manganese	0.0500	U	0.0478	0.0492	95.6	98.5	1	75.0-125			3.00	20
Nickel	0.0500	U	0.0499	0.0499	99.7	99.8	1	75.0-125			0.0406	20
Selenium	0.0500	0.00128	0.0513	0.0490	100	95.4	1	75.0-125			4.60	20
Silver	0.0500	U	0.0525	0.0505	105	101	1	75.0-125			4.04	20
Sodium	5.00	48.1	52.5	51.9	87.5	76.3	1	75.0-125			1.07	20
Thallium	0.0500	0.000262	0.0482	0.0494	95.9	98.3	1	75.0-125			2.45	20
Vanadium	0.0500	0.0151	0.0638	0.0637	97.4	97.3	1	75.0-125			0.126	20
Zinc	0.0500	0.0415	0.0898	0.0910	96.5	99.0	1	75.0-125			1.41	20

Method Blank (MB)

(MB) R3342673-1 09/17/18 21:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum,Dissolved	0.00759	J	0.00515	0.100
Arsenic,Dissolved	U		0.000250	0.00200
Barium,Dissolved	U		0.000360	0.00500
Beryllium,Dissolved	U		0.000120	0.00200
Cadmium,Dissolved	U		0.000160	0.00100
Calcium,Dissolved	0.0470	J	0.0460	1.00
Chromium,Dissolved	U		0.000540	0.00200
Copper,Dissolved	U		0.000520	0.00500
Cobalt,Dissolved	U		0.000260	0.00200
Iron,Dissolved	U		0.0150	0.100
Lead,Dissolved	0.00842		0.000240	0.00200
Magnesium,Dissolved	U		0.100	1.00
Manganese,Dissolved	0.000276	J	0.000250	0.00500
Nickel,Dissolved	U		0.000350	0.00200
Potassium,Dissolved	0.0400	J	0.0370	1.00
Selenium,Dissolved	U		0.000380	0.00200
Silver,Dissolved	U		0.000310	0.00200
Sodium,Dissolved	U		0.110	1.00
Thallium,Dissolved	U		0.000190	0.00200
Vanadium,Dissolved	U		0.000180	0.00500
Zinc,Dissolved	U		0.00256	0.0250

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

(LCS) R3342673-2 09/17/18 21:17 • (LCSD) R3342673-3 09/17/18 21:21

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	5.00	5.07	4.96	101	99.1	80.0-120			2.33	20
Arsenic,Dissolved	0.0500	0.0527	0.0515	105	103	80.0-120			2.30	20
Barium,Dissolved	0.0500	0.0479	0.0501	95.7	100	80.0-120			4.59	20
Beryllium,Dissolved	0.0500	0.0501	0.0502	100	100	80.0-120			0.213	20
Cadmium,Dissolved	0.0500	0.0534	0.0553	107	111	80.0-120			3.55	20
Calcium,Dissolved	5.00	5.14	4.99	103	99.7	80.0-120			3.05	20
Chromium,Dissolved	0.0500	0.0514	0.0518	103	104	80.0-120			0.811	20
Copper,Dissolved	0.0500	0.0518	0.0522	104	104	80.0-120			0.767	20
Cobalt,Dissolved	0.0500	0.0547	0.0547	109	109	80.0-120			0.0375	20
Iron,Dissolved	5.00	5.17	5.16	103	103	80.0-120			0.320	20
Lead,Dissolved	0.0500	0.0507	0.0508	101	102	80.0-120			0.226	20
Magnesium,Dissolved	5.00	5.35	5.18	107	104	80.0-120			3.22	20

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

(LCS) R3342673-2 09/17/18 21:17 • (LCSD) R3342673-3 09/17/18 21:21

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Manganese,Dissolved	0.0500	0.0504	0.0504	101	101	80.0-120			0.0220	20
Nickel,Dissolved	0.0500	0.0553	0.0550	111	110	80.0-120			0.556	20
Potassium,Dissolved	5.00	4.94	4.98	98.8	99.6	80.0-120			0.748	20
Selenium,Dissolved	0.0500	0.0508	0.0548	102	110	80.0-120			7.63	20
Silver,Dissolved	0.0500	0.0526	0.0528	105	106	80.0-120			0.321	20
Sodium,Dissolved	5.00	5.27	5.19	105	104	80.0-120			1.46	20
Thallium,Dissolved	0.0500	0.0502	0.0506	100	101	80.0-120			0.776	20
Vanadium,Dissolved	0.0500	0.0512	0.0516	102	103	80.0-120			0.691	20
Zinc,Dissolved	0.0500	0.0527	0.0526	105	105	80.0-120			0.271	20

L1025453-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025453-05 09/17/18 21:26 • (MS) R3342673-5 09/17/18 21:35 • (MSD) R3342673-6 09/17/18 21:40

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	5.00	ND	4.88	4.95	96.9	98.2	1	75.0-125			1.34	20
Arsenic,Dissolved	0.0500	ND	0.0509	0.0515	99.4	101	1	75.0-125			1.22	20
Barium,Dissolved	0.0500	0.00763	0.0556	0.0583	95.9	101	1	75.0-125			4.86	20
Beryllium,Dissolved	0.0500	ND	0.0480	0.0488	96.0	97.6	1	75.0-125			1.69	20
Cadmium,Dissolved	0.0500	ND	0.0528	0.0534	106	107	1	75.0-125			1.09	20
Calcium,Dissolved	5.00	8.48	13.5	13.8	101	105	1	75.0-125			1.48	20
Chromium,Dissolved	0.0500	ND	0.0499	0.0511	98.6	101	1	75.0-125			2.35	20
Copper,Dissolved	0.0500	ND	0.0499	0.0518	95.7	99.5	1	75.0-125			3.69	20
Cobalt,Dissolved	0.0500	ND	0.0523	0.0540	105	108	1	75.0-125			3.20	20
Potassium,Dissolved	5.00	ND	5.88	5.72	99.9	96.7	1	75.0-125			2.77	20
Iron,Dissolved	5.00	ND	4.93	5.09	98.4	101	1	75.0-125			3.08	20
Magnesium,Dissolved	5.00	2.46	7.50	7.55	101	102	1	75.0-125			0.705	20
Manganese,Dissolved	0.0500	0.00811	0.0559	0.0561	95.6	95.9	1	75.0-125			0.239	20
Nickel,Dissolved	0.0500	ND	0.0526	0.0545	104	108	1	75.0-125			3.47	20
Selenium,Dissolved	0.0500	ND	0.0502	0.0513	100	103	1	75.0-125			2.15	20
Silver,Dissolved	0.0500	ND	0.0514	0.0521	103	104	1	75.0-125			1.22	20
Sodium,Dissolved	5.00	3.27	8.41	8.35	103	102	1	75.0-125			0.691	20
Thallium,Dissolved	0.0500	ND	0.0477	0.0483	95.4	96.6	1	75.0-125			1.33	20
Vanadium,Dissolved	0.0500	ND	0.0493	0.0508	98.2	101	1	75.0-125			2.94	20
Zinc,Dissolved	0.0500	ND	0.0519	0.0547	95.7	101	1	75.0-125			5.36	20

Method Blank (MB)

(MB) R3343151-1 09/19/18 11:36

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	0.00125	J	0.000754	0.00200

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

(LCS) R3343151-2 09/19/18 11:40 • (LCSD) R3343151-3 09/19/18 11:44

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	0.0601	0.0591	120	118	80.0-120			1.68	20

L1026119-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1026119-08 09/19/18 11:49 • (MS) R3343151-5 09/19/18 11:57 • (MSD) R3343151-6 09/19/18 12:02

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	ND	0.0610	0.0591	120	116	1	75.0-125			3.17	20

Method Blank (MB)

(MB) R3343372-1 09/19/18 19:21

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony,Dissolved	U		0.000754	0.00200

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

(LCS) R3343372-2 09/19/18 19:25 • (LCSD) R3343372-3 09/19/18 19:30

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	0.0570	0.0568	114	114	80.0-120			0.379	20

L1025858-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1025858-02 09/19/18 19:34 • (MS) R3343372-5 09/19/18 19:43 • (MSD) R3343372-6 09/19/18 19:47

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony,Dissolved	0.0500	ND	0.0581	0.0591	116	118	1	75.0-125			1.74	20

Method Blank (MB)

(MB) R3342065-3 09/13/18 21:36

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromochloromethane	U		0.000520	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
Carbon disulfide	U		0.000275	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
trans-1,4-Dichloro-2-butene	U		0.000866	0.00250
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100
trans-1,3-Dichloropropene	U		0.000419	0.00100
Ethylbenzene	U		0.000384	0.00100
2-Hexanone	U		0.00382	0.0100
Iodomethane	U		0.00171	0.0100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000412	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100
1,1,2-Trichloroethane	U		0.000383	0.00100

Method Blank (MB)

(MB) R3342065-3 09/13/18 21:36

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
Vinyl acetate	U		0.00163	0.0100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*101*			*80.0-120*
(S) Dibromofluoromethane	*104*			*75.0-120*
(S) a,a,a-Trifluorotoluene	*106*			*80.0-120*
(S) 4-Bromofluorobenzene	*84.3*			*77.0-126*

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

(LCS) R3342065-1 09/13/18 20:34 • (LCSD) R3342065-2 09/13/18 20:55

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acrylonitrile	0.125	0.141	0.154	113	123	55.0-149			8.46	20
Benzene	0.0250	0.0262	0.0269	105	108	70.0-123			2.70	20
Bromodichloromethane	0.0250	0.0258	0.0273	103	109	75.0-120			5.74	20
Bromochloromethane	0.0250	0.0261	0.0270	105	108	76.0-122			3.27	20
Bromoform	0.0250	0.0151	0.0164	60.2	65.5	68.0-132	J4	J4	8.34	20
Bromomethane	0.0250	0.0343	0.0343	137	137	10.0-160			0.0759	25
Carbon disulfide	0.0250	0.0251	0.0262	100	105	61.0-128			4.41	20
Carbon tetrachloride	0.0250	0.0250	0.0261	100	104	68.0-126			4.21	20
Chlorobenzene	0.0250	0.0238	0.0255	95.3	102	80.0-121			6.62	20
Chlorodibromomethane	0.0250	0.0232	0.0246	92.7	98.5	77.0-125			6.00	20
Chloroethane	0.0250	0.0233	0.0274	93.4	110	47.0-150			16.1	20
Chloroform	0.0250	0.0269	0.0273	108	109	73.0-120			1.39	20
Chloromethane	0.0250	0.0262	0.0265	105	106	41.0-142			1.20	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0242	0.0257	96.9	103	58.0-134			5.90	20
1,2-Dibromoethane	0.0250	0.0241	0.0256	96.4	103	80.0-122			6.11	20
Dibromomethane	0.0250	0.0253	0.0265	101	106	80.0-120			4.40	20
1,2-Dichlorobenzene	0.0250	0.0249	0.0264	99.5	106	79.0-121			6.12	20
1,4-Dichlorobenzene	0.0250	0.0235	0.0250	94.1	100	79.0-120			6.26	20
trans-1,4-Dichloro-2-butene	0.0250	0.0211	0.0247	84.2	98.9	33.0-144			16.0	20
1,1-Dichloroethane	0.0250	0.0277	0.0287	111	115	70.0-126			3.83	20
1,2-Dichloroethane	0.0250	0.0280	0.0282	112	113	70.0-128			0.843	20
1,1-Dichloroethene	0.0250	0.0263	0.0272	105	109	71.0-124			3.29	20
cis-1,2-Dichloroethene	0.0250	0.0255	0.0267	102	107	73.0-120			4.94	20

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

(LCS) R3342065-1 09/13/18 20:34 • (LCSD) R3342065-2 09/13/18 20:55

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
trans-1,2-Dichloroethene	0.0250	0.0263	0.0274	105	110	73.0-120			3.92	20
1,2-Dichloropropane	0.0250	0.0260	0.0281	104	112	77.0-125			7.71	20
cis-1,3-Dichloropropene	0.0250	0.0249	0.0264	99.6	106	80.0-123			5.86	20
trans-1,3-Dichloropropene	0.0250	0.0250	0.0270	99.9	108	78.0-124			7.60	20
Ethylbenzene	0.0250	0.0241	0.0263	96.6	105	79.0-123			8.38	20
2-Hexanone	0.125	0.135	0.136	108	109	67.0-149			0.689	20
Iodomethane	0.125	0.124	0.129	99.5	103	33.0-147			3.56	26
2-Butanone (MEK)	0.125	0.139	0.131	111	105	44.0-160			6.24	20
Methylene Chloride	0.0250	0.0274	0.0276	110	111	67.0-120			0.964	20
4-Methyl-2-pentanone (MIBK)	0.125	0.136	0.137	108	109	68.0-142			0.727	20
Styrene	0.0250	0.0200	0.0217	79.8	86.7	73.0-130			8.28	20
1,1,1,2-Tetrachloroethane	0.0250	0.0240	0.0261	96.0	104	75.0-125			8.24	20
1,1,2,2-Tetrachloroethane	0.0250	0.0217	0.0233	86.7	93.0	65.0-130			7.06	20
Tetrachloroethene	0.0250	0.0230	0.0239	92.1	95.5	72.0-132			3.69	20
Toluene	0.0250	0.0234	0.0247	93.7	99.0	79.0-120			5.51	20
1,1,1-Trichloroethane	0.0250	0.0271	0.0280	109	112	73.0-124			2.99	20
1,1,2-Trichloroethane	0.0250	0.0240	0.0247	95.8	98.6	80.0-120			2.87	20
Trichloroethene	0.0250	0.0242	0.0262	97.0	105	78.0-124			7.78	20
Trichlorofluoromethane	0.0250	0.0252	0.0254	101	102	59.0-147			0.958	20
1,2,3-Trichloropropane	0.0250	0.0218	0.0232	87.2	92.6	73.0-130			6.06	20
Vinyl acetate	0.125	0.160	0.160	128	128	11.0-160			0.0177	20
Vinyl chloride	0.0250	0.0231	0.0236	92.2	94.4	67.0-131			2.34	20
Xylenes, Total	0.0750	0.0746	0.0790	99.5	105	79.0-123			5.73	20
(S) Toluene-d8				*98.8*	*98.4*	*80.0-120*				
(S) Dibromofluoromethane				*107*	*104*	*75.0-120*				
(S) a,a,a-Trifluorotoluene				*103*	*103*	*80.0-120*				
(S) 4-Bromofluorobenzene				*87.1*	*88.2*	*77.0-126*				

Method Blank (MB)

(MB) R3342281-3 09/14/18 10:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
(S) Toluene-d8	*100*			*80.0-120*
(S) Dibromofluoromethane	*111*			*75.0-120*
(S) a,a,a-Trifluorotoluene	*107*			*80.0-120*
(S) 4-Bromofluorobenzene	*101*			*77.0-126*

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

(LCS) R3342281-1 09/14/18 09:18 • (LCSD) R3342281-2 09/14/18 09:37

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.135	0.148	108	118	19.0-160			9.00	27
(S) Toluene-d8				*101*	*101*	*80.0-120*				
(S) Dibromofluoromethane				*107*	*106*	*75.0-120*				
(S) a,a,a-Trifluorotoluene				*107*	*103*	*80.0-120*				
(S) 4-Bromofluorobenzene				*98.1*	*100*	*77.0-126*				

Method Blank (MB)

(MB) R3342930-1 09/17/18 23:17

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

L1025443-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1025443-01 09/18/18 00:04 • (DUP) R3342930-3 09/17/18 23:53

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ethylene Dibromide	0.000103	0.000104	1	0.966		20
1,2-Dibromo-3-Chloropropane	ND	0.000	1	0.000		20

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

(LCS) R3342930-4 09/18/18 01:46 • (LCSD) R3342930-5 09/18/18 03:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethylene Dibromide	0.000250	0.000230	0.000224	92.0	89.6	60.0-140			2.64	20
1,2-Dibromo-3-Chloropropane	0.000250	0.000253	0.000236	101	94.4	60.0-140			6.95	20

L1025443-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1025443-02 09/17/18 23:41 • (MS) R3342930-2 09/17/18 23:29

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ethylene Dibromide	0.0000863	ND	0.0000802	92.9	1	64.0-159	
1,2-Dibromo-3-Chloropropane	0.0000863	ND	0.0000874	101	1	72.0-148	

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J4	The associated batch QC was outside the established quality control range for accuracy.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	The sample concentration is too high to evaluate accurate spike recoveries.

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

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

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

CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical®

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

ALL SHADED AREAS are for LAB USE ONLY

Company: **Civil & Environmental Consultants - TN**	Billing Information: **Dr. Kevin Wolfe, 325 Seaboard Lane, Suite 170, Franklin, TN 37067**
Address: **325 Seaboard Lane, Suite 170 Franklin, TN 37067**	
Report To: **Philip Campbell**	Email To: **pcampbell@cecinc.com; kclayton@cecinc.com**
Copy To:	Site Collection Info/Address: State: / County/City: Time Zone Collected: PT MT CT ET
Customer Project Name/Number: **EWS Camden Class 2 Landfill 171-873**	
Phone: **615-333-7797** Email:	Site/Facility ID #: **CAMDEN, TN** — Compliance Monitoring? [ ] Yes [ ] No
Collected by (print):	Purchase Order #: Quote #: — DW PWS ID #: DW Location Code:
Collected by (signature):	Turnaround Date Required: — Immediately Packed on Ice: [ ] Yes [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive _____ [ ] Hold _____	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply) — Field Filtered (if applicable): [ ] Yes [ ] No Analysis: _____

Container Preservative Type **

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Lab Project Manager: **526 - Chris McCord**

Lab Profile/Line: **CEC-EWS CAMDEN LF**

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	**WetChem** 250mlHDPE-NoPres	ALK 60mlAmb-NoPres	COD,NH3 250mlHDPE-H2SO4	Diss.Metals 250mlHDPE-HNO3	SV8011 40mlClr-NaThio	Total Metals,HARD 250mlHDPE-HNO3	V8260AP1 40mlAmb-HCl				Lab Sample # / Comments
IWC-L	GW	Grab	9-12-18	1445				11	X	X	X	X	X	X	X				01
APWC-L	GW	Grab	9-12-18	1430				11	X	X	X	X	X	X	X				02

Analyses

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y	N	NA
Custody Signatures Present	Y	N	NA
Collector Signature Present	Y	N	NA
Bottles Intact	Y	N	NA
Correct Bottles	Y	N	NA
Sufficient Volume	Y	N	NA
Samples Received on Ice	Y	N	NA
VOA - Headspace Acceptable	Y	N	NA
USDA Regulated Soils	Y	N	NA
Samples in Holding Time	Y	N	NA
Residual Chlorine Present	Y	N	NA
Cl Strips: _____			
Sample pH Acceptable	Y	N	
pH Strips: _____			
Sulfide Present	Y	N	NA
Lead Acetate Strips: _____			

LAB USE ONLY: Lab Sample # / Comments: L1025493

Customer Remarks / Special Conditions / Possible Hazards:

WetChem = *NITRATE*,CHLORIDE,BROMIDE,S ,FLUORIDE,ALKTot/Diss Metals=M6020AP1 +

Type of Ice Used: (Wet) Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N (N/A)

SHORT HOLDS PRESENT (<72 hours): Y N (N/A)

LAB Tracking #:

Samples received via: FEDEX UPS Client Courier Pace Courier

B189

LAB Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 7
Cooler 1 Temp Upon Receipt 2.6 oC
Cooler 1 Therm Corr. Factor -0.3 oC
Cooler 1 Corrected Temp 2.3 oC
Comments:
Trip Blank Received: Y (N) NA
HCL MeOH TSP Other
NonConformance(s): YES / (NO)
Page _____ of _____

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
	9-13-18/900		9/14/18 9:4
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
	9/13/18 09:45	PACE	
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
PACE	9/13/18 13:00		9/13/18 1300

Acctnum: CEC
Template: T133582
Prelogin: P671629
PM: 526 - Chris McCord
PB: 9-12-18

* pH unadjusted due to matrix

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

December 05, 2018

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1028046
Samples Received:	09/21/2018
Project Number:	142-059
Description:	EWS Camden Class 2 Landfill
Site:	CAMDEN, TN
Report To:	Philip Campbell 325 Seaboard Lane, Suite 170 Franklin, TN 37067

Entire Report Reviewed By:

Chris McCord
Project Manager

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

CHARLIE CREEK US L1028046-01 Solid

Collected by: CD | Collected date/time: 09/20/18 11:00 | Received date/time: 09/21/18 15:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1169926	1	09/22/18 11:10	09/22/18 21:39	MCG
Mercury by Method 7471A	WG1170178	1	09/23/18 11:19	09/24/18 09:52	EL
Metals (ICP) by Method 6010B	WG1169985	1	09/22/18 11:36	09/23/18 17:22	ST
Metals (ICP) by Method 6010B	WG1169985	1	09/22/18 11:36	09/24/18 03:19	CCE

CHARLIE CREEK MS L1028046-02 Solid

Collected by: CD | Collected date/time: 09/20/18 10:00 | Received date/time: 09/21/18 15:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1169926	1	09/22/18 11:10	09/22/18 21:53	MCG
Mercury by Method 7471A	WG1170178	1	09/23/18 11:19	09/24/18 09:55	EL
Metals (ICP) by Method 6010B	WG1169985	1	09/22/18 11:36	09/23/18 17:24	ST
Metals (ICP) by Method 6010B	WG1169985	1	09/22/18 11:36	09/24/18 03:22	CCE

CANE CREEK US L1028046-03 Solid

Collected by: CD | Collected date/time: 09/20/18 10:30 | Received date/time: 09/21/18 15:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1169926	1	09/22/18 11:10	09/22/18 22:07	MCG
Mercury by Method 7471A	WG1170178	1	09/23/18 11:19	09/24/18 09:57	EL
Metals (ICP) by Method 6010B	WG1169985	1	09/22/18 11:36	09/23/18 17:32	ST
Metals (ICP) by Method 6010B	WG1169985	1	09/22/18 11:36	09/24/18 03:30	CCE

CANE CREEK MS L1028046-04 Solid

Collected by: CD | Collected date/time: 09/20/18 09:30 | Received date/time: 09/21/18 15:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1169926	1	09/22/18 11:10	09/22/18 22:21	MCG
Mercury by Method 7471A	WG1170178	1	09/23/18 11:19	09/24/18 10:00	EL
Metals (ICP) by Method 6010B	WG1169985	1	09/22/18 11:36	09/23/18 17:35	ST
Metals (ICP) by Method 6010B	WG1169985	1	09/22/18 11:36	09/24/18 03:33	CCE

CANE CREEK DS-1 L1028046-05 Solid

Collected by: CD | Collected date/time: 09/20/18 09:02 | Received date/time: 09/21/18 15:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1169926	1	09/22/18 11:10	09/22/18 22:34	MCG
Mercury by Method 7471A	WG1170178	1	09/23/18 11:19	09/24/18 10:03	EL
Metals (ICP) by Method 6010B	WG1169985	1	09/22/18 11:36	09/23/18 17:37	ST
Metals (ICP) by Method 6010B	WG1169985	1	09/22/18 11:36	09/24/18 03:36	CCE

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

Chris McCord
Project Manager

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Bromide	ND		10.0	1	09/22/2018 21:39	WG1169926
Chloride	ND		10.0	1	09/22/2018 21:39	WG1169926
Fluoride	1.13		1.00	1	09/22/2018 21:39	WG1169926

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	09/24/2018 09:52	WG1170178

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	1210		20.0	1	09/23/2018 17:22	WG1169985
Antimony	ND		1.00	1	09/23/2018 17:22	WG1169985
Arsenic	1.25		1.00	1	09/23/2018 17:22	WG1169985
Barium	16.2		0.500	1	09/23/2018 17:22	WG1169985
Beryllium	ND		0.200	1	09/23/2018 17:22	WG1169985
Boron	ND		10.0	1	09/23/2018 17:22	WG1169985
Cadmium	ND		0.500	1	09/23/2018 17:22	WG1169985
Calcium	625		100	1	09/24/2018 03:19	WG1169985
Chromium	4.65		1.00	1	09/23/2018 17:22	WG1169985
Cobalt	1.69		1.00	1	09/23/2018 17:22	WG1169985
Copper	1.19		1.00	1	09/23/2018 17:22	WG1169985
Iron	4140		10.0	1	09/23/2018 17:22	WG1169985
Lead	4.37		0.500	1	09/23/2018 17:22	WG1169985
Magnesium	137		100	1	09/23/2018 17:22	WG1169985
Manganese	187		1.00	1	09/23/2018 17:22	WG1169985
Nickel	ND		2.00	1	09/23/2018 17:22	WG1169985
Potassium	185	B	100	1	09/23/2018 17:22	WG1169985
Selenium	ND		2.00	1	09/23/2018 17:22	WG1169985
Silver	ND		0.500	1	09/23/2018 17:22	WG1169985
Sodium	ND		100	1	09/23/2018 17:22	WG1169985
Thallium	ND		1.00	1	09/23/2018 17:22	WG1169985
Vanadium	6.35		2.00	1	09/23/2018 17:22	WG1169985
Zinc	9.29		5.00	1	09/23/2018 17:22	WG1169985

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Bromide	ND		10.0	1	09/22/2018 21:53	WG1169926
Chloride	ND		10.0	1	09/22/2018 21:53	WG1169926
Fluoride	2.42		1.00	1	09/22/2018 21:53	WG1169926

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	09/24/2018 09:55	WG1170178

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	3230		20.0	1	09/23/2018 17:24	WG1169985
Antimony	ND		1.00	1	09/23/2018 17:24	WG1169985
Arsenic	2.03		1.00	1	09/23/2018 17:24	WG1169985
Barium	29.5		0.500	1	09/23/2018 17:24	WG1169985
Beryllium	0.338		0.200	1	09/23/2018 17:24	WG1169985
Boron	ND		10.0	1	09/23/2018 17:24	WG1169985
Cadmium	3.27		0.500	1	09/23/2018 17:24	WG1169985
Calcium	641		100	1	09/24/2018 03:22	WG1169985
Chromium	7.27		1.00	1	09/23/2018 17:24	WG1169985
Cobalt	2.14		1.00	1	09/23/2018 17:24	WG1169985
Copper	7.05		1.00	1	09/23/2018 17:24	WG1169985
Iron	5900		10.0	1	09/23/2018 17:24	WG1169985
Lead	7.76		0.500	1	09/23/2018 17:24	WG1169985
Magnesium	444		100	1	09/23/2018 17:24	WG1169985
Manganese	265		1.00	1	09/23/2018 17:24	WG1169985
Nickel	3.02		2.00	1	09/23/2018 17:24	WG1169985
Potassium	587	B	100	1	09/23/2018 17:24	WG1169985
Selenium	ND		2.00	1	09/23/2018 17:24	WG1169985
Silver	ND		0.500	1	09/23/2018 17:24	WG1169985
Sodium	ND		100	1	09/23/2018 17:24	WG1169985
Thallium	ND		1.00	1	09/23/2018 17:24	WG1169985
Vanadium	12.4		2.00	1	09/23/2018 17:24	WG1169985
Zinc	48.8		5.00	1	09/23/2018 17:24	WG1169985

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Bromide	ND		10.0	1	09/22/2018 22:07	WG1169926
Chloride	ND		10.0	1	09/22/2018 22:07	WG1169926
Fluoride	1.21		1.00	1	09/22/2018 22:07	WG1169926

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	09/24/2018 09:57	WG1170178

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	993		20.0	1	09/23/2018 17:32	WG1169985
Antimony	ND		1.00	1	09/23/2018 17:32	WG1169985
Arsenic	ND		1.00	1	09/23/2018 17:32	WG1169985
Barium	12.9		0.500	1	09/23/2018 17:32	WG1169985
Beryllium	ND		0.200	1	09/23/2018 17:32	WG1169985
Boron	ND		10.0	1	09/23/2018 17:32	WG1169985
Cadmium	ND		0.500	1	09/23/2018 17:32	WG1169985
Calcium	156		100	1	09/24/2018 03:30	WG1169985
Chromium	2.97		1.00	1	09/23/2018 17:32	WG1169985
Cobalt	1.12		1.00	1	09/23/2018 17:32	WG1169985
Copper	ND		1.00	1	09/23/2018 17:32	WG1169985
Iron	2660		10.0	1	09/23/2018 17:32	WG1169985
Lead	3.74		0.500	1	09/23/2018 17:32	WG1169985
Magnesium	ND		100	1	09/23/2018 17:32	WG1169985
Manganese	299		1.00	1	09/23/2018 17:32	WG1169985
Nickel	ND		2.00	1	09/23/2018 17:32	WG1169985
Potassium	135	B	100	1	09/23/2018 17:32	WG1169985
Selenium	ND		2.00	1	09/23/2018 17:32	WG1169985
Silver	ND		0.500	1	09/23/2018 17:32	WG1169985
Sodium	ND		100	1	09/23/2018 17:32	WG1169985
Thallium	ND		1.00	1	09/23/2018 17:32	WG1169985
Vanadium	3.94	B	2.00	1	09/23/2018 17:32	WG1169985
Zinc	9.40		5.00	1	09/23/2018 17:32	WG1169985

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Bromide	ND		10.0	1	09/22/2018 22:21	WG1169926
Chloride	26.4	B	10.0	1	09/22/2018 22:21	WG1169926
Fluoride	1.43		1.00	1	09/22/2018 22:21	WG1169926

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	09/24/2018 10:00	WG1170178

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	1880		20.0	1	09/23/2018 17:35	WG1169985
Antimony	ND		1.00	1	09/23/2018 17:35	WG1169985
Arsenic	2.20		1.00	1	09/23/2018 17:35	WG1169985
Barium	16.8		0.500	1	09/23/2018 17:35	WG1169985
Beryllium	ND		0.200	1	09/23/2018 17:35	WG1169985
Boron	ND		10.0	1	09/23/2018 17:35	WG1169985
Cadmium	ND		0.500	1	09/23/2018 17:35	WG1169985
Calcium	1740		100	1	09/24/2018 03:33	WG1169985
Chromium	7.84		1.00	1	09/23/2018 17:35	WG1169985
Cobalt	1.87		1.00	1	09/23/2018 17:35	WG1169985
Copper	6.69		1.00	1	09/23/2018 17:35	WG1169985
Iron	4930		10.0	1	09/23/2018 17:35	WG1169985
Lead	9.12		0.500	1	09/23/2018 17:35	WG1169985
Magnesium	373		100	1	09/23/2018 17:35	WG1169985
Manganese	246		1.00	1	09/23/2018 17:35	WG1169985
Nickel	2.41		2.00	1	09/23/2018 17:35	WG1169985
Potassium	425	B	100	1	09/23/2018 17:35	WG1169985
Selenium	ND		2.00	1	09/23/2018 17:35	WG1169985
Silver	ND		0.500	1	09/23/2018 17:35	WG1169985
Sodium	ND		100	1	09/23/2018 17:35	WG1169985
Thallium	ND		1.00	1	09/23/2018 17:35	WG1169985
Vanadium	8.41		2.00	1	09/23/2018 17:35	WG1169985
Zinc	52.5		5.00	1	09/23/2018 17:35	WG1169985

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Bromide	ND		10.0	1	09/22/2018 22:34	WG1169926
Chloride	ND		10.0	1	09/22/2018 22:34	WG1169926
Fluoride	1.25		1.00	1	09/22/2018 22:34	WG1169926

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	09/24/2018 10:03	WG1170178

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	481		20.0	1	09/23/2018 17:37	WG1169985
Antimony	ND		1.00	1	09/23/2018 17:37	WG1169985
Arsenic	ND		1.00	1	09/23/2018 17:37	WG1169985
Barium	9.79		0.500	1	09/23/2018 17:37	WG1169985
Beryllium	ND		0.200	1	09/23/2018 17:37	WG1169985
Boron	ND		10.0	1	09/23/2018 17:37	WG1169985
Cadmium	ND		0.500	1	09/23/2018 17:37	WG1169985
Calcium	ND		100	1	09/24/2018 03:36	WG1169985
Chromium	2.13		1.00	1	09/23/2018 17:37	WG1169985
Cobalt	ND		1.00	1	09/23/2018 17:37	WG1169985
Copper	ND		1.00	1	09/23/2018 17:37	WG1169985
Iron	1860		10.0	1	09/23/2018 17:37	WG1169985
Lead	1.86		0.500	1	09/23/2018 17:37	WG1169985
Magnesium	ND		100	1	09/23/2018 17:37	WG1169985
Manganese	27.2		1.00	1	09/23/2018 17:37	WG1169985
Nickel	ND		2.00	1	09/23/2018 17:37	WG1169985
Potassium	147	B	100	1	09/23/2018 17:37	WG1169985
Selenium	ND		2.00	1	09/23/2018 17:37	WG1169985
Silver	ND		0.500	1	09/23/2018 17:37	WG1169985
Sodium	ND		100	1	09/23/2018 17:37	WG1169985
Thallium	ND		1.00	1	09/23/2018 17:37	WG1169985
Vanadium	2.90	B	2.00	1	09/23/2018 17:37	WG1169985
Zinc	7.28		5.00	1	09/23/2018 17:37	WG1169985

Method Blank (MB)

(MB) R3344428-1 09/22/18 13:55

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Bromide	U		0.133	10.0
Chloride	5.65	J	0.795	10.0
Fluoride	U		0.261	1.00

L1027947-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1027947-01 09/22/18 18:38 • (DUP) R3344428-4 09/22/18 18:52

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.000	1	0.000		15
Chloride	ND	6.36	1	0.000		15
Fluoride	1.26	1.30	1	3.20		15

L1027947-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1027947-03 09/22/18 19:47 • (DUP) R3344428-7 09/22/18 20:29

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.000	1	0.000		15
Chloride	ND	7.02	1	0.000		15
Fluoride	1.85	1.81	1	1.91		15

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

(LCS) R3344428-2 09/22/18 14:09 • (LCSD) R3344428-3 09/22/18 14:23

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromide	200	189	190	94.6	95.2	80.0-120			0.706	15
Chloride	200	199	199	99.3	99.6	80.0-120			0.318	15
Fluoride	20.0	19.7	19.7	98.3	98.6	80.0-120			0.269	15

L1027947-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1027947-02 09/22/18 19:06 • (MS) R3344428-5 09/22/18 19:20 • (MSD) R3344428-6 09/22/18 19:34

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	500	ND	469	466	93.8	93.1	1	80.0-120			0.738	15
Chloride	500	ND	496	497	97.9	98.0	1	80.0-120			0.104	15
Fluoride	50.0	1.44	49.9	50.1	96.8	97.3	1	80.0-120			0.448	15

Method Blank (MB)

(MB) R3344443-1 09/24/18 08:50

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	U		0.00280	0.0200

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

(LCS) R3344443-2 09/24/18 08:53 • (LCSD) R3344443-3 09/24/18 08:56

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.300	0.292	0.276	97.4	92.1	80.0-120			5.53	20

L1027731-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1027731-02 09/24/18 08:58 • (MS) R3344443-4 09/24/18 09:01 • (MSD) R3344443-5 09/24/18 09:03

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.365	0.0318	0.330	0.323	81.7	79.7	1	75.0-125			2.27	20

Method Blank (MB)

(MB) R3344352-1 09/23/18 16:30

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Aluminum	U		3.50	20.0
Antimony	U		0.500	1.00
Arsenic	U		0.460	1.00
Barium	U		0.170	0.500
Beryllium	U		0.0700	0.200
Boron	U		1.26	10.0
Cadmium	U		0.0700	0.200
Chromium	U		0.140	1.00
Cobalt	U		0.230	1.00
Copper	U		0.500	1.00
Iron	U		1.41	10.0
Lead	U		0.190	0.500
Magnesium	U		1.11	100
Manganese	U		0.120	1.00
Nickel	U		0.490	2.00
Potassium	74.4	J	10.2	100
Selenium	U		0.620	2.00
Silver	U		0.120	0.500
Sodium	50.5	J	9.85	100
Thallium	U		0.500	1.00
Vanadium	0.522	J	0.240	2.00
Zinc	U		0.590	5.00

Method Blank (MB)

(MB) R3344367-1 09/24/18 02:50

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Calcium	U		4.63	100

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

(LCS) R3344352-2 09/23/18 16:33 • (LCSD) R3344352-3 09/23/18 16:35

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	1000	1040	1070	104	107	80.0-120			2.98	20
Antimony	100	99.7	102	99.7	102	80.0-120			2.63	20
Arsenic	100	100	102	100	102	80.0-120			2.01	20
Barium	100	103	106	103	106	80.0-120			2.88	20

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

(LCS) R3344352-2 09/23/18 16:33 • (LCSD) R3344352-3 09/23/18 16:35

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Beryllium	100	103	106	103	106	80.0-120			3.05	20
Boron	100	103	106	103	106	80.0-120			3.14	20
Cadmium	100	102	105	102	105	80.0-120			2.97	20
Chromium	100	103	107	103	107	80.0-120			3.24	20
Cobalt	100	104	107	104	107	80.0-120			2.91	20
Copper	100	106	109	106	109	80.0-120			2.29	20
Iron	1000	1030	1070	103	107	80.0-120			3.31	20
Lead	100	102	105	102	105	80.0-120			2.63	20
Magnesium	1000	1020	1050	102	105	80.0-120			2.59	20
Manganese	100	102	105	102	105	80.0-120			2.48	20
Nickel	100	102	105	102	105	80.0-120			2.88	20
Potassium	1000	997	1030	99.7	103	80.0-120			3.07	20
Selenium	100	96.6	100	96.6	100	80.0-120			3.69	20
Silver	20.0	19.8	20.3	99.1	102	80.0-120			2.54	20
Sodium	1000	1050	1080	105	108	80.0-120			2.87	20
Thallium	100	102	104	102	104	80.0-120			2.56	20
Vanadium	100	106	110	106	110	80.0-120			3.75	20
Zinc	100	100	103	100	103	80.0-120			2.63	20

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

(LCS) R3344367-2 09/24/18 03:01 • (LCSD) R3344367-3 09/24/18 03:03

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Calcium	1000	977	1020	97.7	102	80.0-120			4.33	20

L1026664-21 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1026664-21 09/23/18 16:38 • (MS) R3344352-6 09/23/18 16:45 • (MSD) R3344352-7 09/23/18 16:48

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	1000	9230	8470	10100	0.000	82.5	1	75.0-125	V		17.1	20
Antimony	100	ND	79.0	79.3	79.0	79.3	1	75.0-125			0.345	20
Arsenic	100	3.88	101	99.2	97.6	95.3	1	75.0-125			2.22	20
Barium	100	39.5	135	137	95.7	97.6	1	75.0-125			1.40	20
Beryllium	100	0.340	103	101	103	100	1	75.0-125			2.26	20
Boron	100	ND	98.8	96.7	98.8	96.7	1	75.0-125			2.17	20
Cadmium	100	ND	103	101	103	101	1	75.0-125			1.74	20
Chromium	100	10.5	112	112	101	101	1	75.0-125			0.116	20

L1026664-21 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1026664-21 09/23/18 16:38 • (MS) R3344352-6 09/23/18 16:45 • (MSD) R3344352-7 09/23/18 16:48

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Cobalt	100	2.63	108	106	106	104	1	75.0-125			2.06	20
Copper	100	4.34	112	112	107	107	1	75.0-125			0.0450	20
Iron	1000	14400	14500	14300	4.07	0.000	1	75.0-125	V	V	0.985	20
Lead	100	22.2	122	124	100	102	1	75.0-125			1.22	20
Magnesium	1000	516	1440	1450	92.1	93.1	1	75.0-125			0.704	20
Manganese	100	196	273	294	76.9	98.7	1	75.0-125			7.69	20
Nickel	100	3.77	107	106	104	102	1	75.0-125			1.16	20
Potassium	1000	470	1240	1320	76.9	84.9	1	75.0-125			6.30	20
Selenium	100	ND	96.0	93.0	96.0	93.0	1	75.0-125			3.13	20
Silver	20.0	ND	19.8	19.7	99.2	98.3	1	75.0-125			0.894	20
Sodium	1000	201	1180	1150	97.9	94.7	1	75.0-125			2.70	20
Thallium	100	ND	104	101	104	101	1	75.0-125			2.79	20
Vanadium	100	26.4	126	125	99.4	98.3	1	75.0-125			0.936	20
Zinc	100	12.8	114	112	101	99.6	1	75.0-125			1.07	20

L1026664-21 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1026664-21 09/24/18 03:06 • (MS) R3344367-6 09/24/18 03:14 • (MSD) R3344367-7 09/24/18 03:17

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Calcium	1000	529	1370	1240	83.6	71.5	1	75.0-125		J6	9.28	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
V	The sample concentration is too high to evaluate accurate spike recoveries.

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

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

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

CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

ALL SHADED AREAS are for LAB USE ONLY

Company: **Civil & Environmental Consultants - TN**	Billing Information: **Dr. Kevin Wolfe, 325 Seaboard Lane, Suite 170, Franklin, TN 37067**
Address: **325 Seaboard Lane, Suite 170 Franklin, TN 37067**	
Report To: **Philip Campbell**	Email To: **pcampbell@cecinc.com; kclayton@cecinc.com**
Copy To:	Site Collection Info/Address: State: / County/City: Time Zone Collected: PT MT CT ET
Customer Project Name/Number: **EWS Camden Class 2 Landfill 142-059**	
Phone: **615-333-7797** Email:	Site/Facility ID #: **CAMDEN, TN** Compliance Monitoring? [ ] Yes [ ] No
Collected by (print): Chris McCord	Purchase Order #: Quote #: DW PWS ID #: DW Location Code:
Collected by (signature):	Turnaround Date Required: Immediately Packed on Ice: [X] Yes [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive [ ] Hold	Rush: [ ] Same Day [X] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply) Field Filtered (if applicable): [ ] Yes [ ] No Analysis:

Container Preservative Type **

Lab Project Manager: **526 - Chris McCord**

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Lab Profile/Line: **CEC-EWS CAMDEN LF**

Lab Sample Receipt Checklist:

Custody Seals Present/Intact Y N NA
Custody Signatures Present Y N NA
Collector Signature Present Y N NA
Bottles Intact Y N NA
Correct Bottles Y N NA
Sufficient Volume Y N NA
Samples Received on Ice Y N NA
VOA - Headspace Acceptable Y N NA
USDA Regulated Soils Y N NA
Samples in Holding Time Y N NA
Residual Chlorine Present Y N NA
Cl Strips: _____
Sample pH Acceptable Y N NA
pH Strips: _____
Sulfide Present Y N NA
Lead Acetate Strips: _____

LAB USE ONLY:
Lab Sample # / Comments
L1027046

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Bromide, Cl, F 4ozClr-NoPres	Total Metals 2ozClr-NoPres	Analyses	Lab Sample # / Comments
CHARLIE CREEK US	SS	Grab	9/20/18	11:00				2	X	X		01
CHARLIE CREEK MS	SS	Grab	9/20/18	10:00				2	X	X		02
CANE CREEK US	SS	Grab	9/20/18	10:30				2	X	X		03
CANE CREEK MS	SS	Grab	9/20/18	9:30				2	X	X		04
CANE CREEK DS-1	SS	Grab	9/20/18	9:02				2	X	X		05

Customer Remarks / Special Conditions / Possible Hazards:
#Error
#Error

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

LAB Tracking #:

Samples received via: FEDEX UPS Client Courier Pace Courier

A048

LAB Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 11
Cooler 1 Temp Upon Receipt: 1.1 oC
Cooler 1 Therm Corr. Factor: .3 oC
Cooler 1 Corrected Temp 1.4 oC
Comments:
Trip Blank Received: Y (N) NA
HCL MeOH TSP Other

Relinquished by/Company: (Signature) Chris McCord	Date/Time: 9/21/18 1020	Received by/Company: (Signature) Wayne Shull	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature) Wayne Shull	Date/Time: 9/21/18 1555	Received by/Company: (Signature) K Cameron	Date/Time: 9/21/18 1555

Acctnum: CEC
Template: T134050
Prelogin: P671630
PM: 526 - Chris McCord
PB: 9-Lab AR

NonConformance(s): YES / (NO)

Page ____ of ____

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

September 25, 2018

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1028036
Samples Received:	09/21/2018
Project Number:	171-873
Description:	EWS Camden Class 2 Landfill
Site:	CAMDEN, TN
Report To:	Philip Campbell 325 Seaboard Lane, Suite 170 Franklin, TN 37067

Entire Report Reviewed By:

Chris McCord
Project Manager

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

TABLE OF CONTENTS

CHARLIE CREEK US L1028036-01 GW

Collected by	Collected date/time	Received date/time
CD	09/20/18 11:30	09/21/18 15:35

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1170499	1	09/24/18 12:12	09/24/18 12:12	KK
Wet Chemistry by Method 350.1	WG1170543	1	09/24/18 15:23	09/24/18 15:23	JER
Wet Chemistry by Method 9056A	WG1169918	1	09/22/18 09:53	09/22/18 09:53	ELN
Mercury by Method 7470A	WG1169709	1	09/23/18 12:52	09/24/18 09:19	TCT
Mercury by Method 7470A	WG1170193	1	09/23/18 12:18	09/24/18 10:23	TCT
Metals (ICP) by Method 6010B	WG1169960	1	09/23/18 10:40	09/23/18 17:48	CCE
Metals (ICP) by Method 6010B	WG1170318	1	09/23/18 12:53	09/23/18 21:25	CCE
Metals (ICPMS) by Method 6020	WG1169655	1	09/24/18 20:09	09/25/18 01:37	LAT
Metals (ICPMS) by Method 6020	WG1170267	1	09/23/18 10:43	09/23/18 21:03	LD
Metals (ICPMS) by Method 6020	WG1170342	1	09/23/18 13:18	09/24/18 15:09	LAT

CHARLIE CREEK MS L1028036-02 GW

Collected by	Collected date/time	Received date/time
CD	09/20/18 10:00	09/21/18 15:35

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1170499	1	09/24/18 12:13	09/24/18 12:13	KK
Wet Chemistry by Method 350.1	WG1170543	1	09/24/18 15:25	09/24/18 15:25	JER
Wet Chemistry by Method 9056A	WG1169918	1	09/22/18 10:06	09/22/18 10:06	ELN
Mercury by Method 7470A	WG1169709	1	09/23/18 12:52	09/24/18 09:26	TCT
Mercury by Method 7470A	WG1170193	1	09/23/18 12:18	09/24/18 10:26	TCT
Metals (ICP) by Method 6010B	WG1169960	1	09/23/18 10:40	09/23/18 17:50	CCE
Metals (ICP) by Method 6010B	WG1170318	1	09/23/18 12:53	09/23/18 21:36	CCE
Metals (ICPMS) by Method 6020	WG1169655	1	09/24/18 20:09	09/25/18 02:09	LAT
Metals (ICPMS) by Method 6020	WG1170267	1	09/23/18 10:43	09/23/18 21:21	LD
Metals (ICPMS) by Method 6020	WG1170342	1	09/23/18 13:18	09/24/18 15:13	LAT

CANE CREEK US L1028036-03 GW

Collected by	Collected date/time	Received date/time
CD	09/20/18 10:30	09/21/18 15:35

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1170499	1	09/24/18 12:14	09/24/18 12:14	KK
Wet Chemistry by Method 350.1	WG1170543	1	09/24/18 15:26	09/24/18 15:26	JER
Wet Chemistry by Method 9056A	WG1169918	1	09/22/18 11:02	09/22/18 11:02	ELN
Mercury by Method 7470A	WG1169709	1	09/23/18 12:52	09/24/18 09:29	TCT
Mercury by Method 7470A	WG1170193	1	09/23/18 12:18	09/24/18 10:33	JDG
Metals (ICP) by Method 6010B	WG1169960	1	09/23/18 10:40	09/23/18 17:53	CCE
Metals (ICP) by Method 6010B	WG1170318	1	09/23/18 12:53	09/23/18 21:39	CCE
Metals (ICPMS) by Method 6020	WG1169655	1	09/24/18 20:09	09/25/18 02:13	LAT
Metals (ICPMS) by Method 6020	WG1170267	1	09/23/18 10:43	09/23/18 21:25	LD
Metals (ICPMS) by Method 6020	WG1170342	1	09/23/18 13:18	09/24/18 15:18	LAT

CANE CREEK MS L1028036-04 GW

Collected by	Collected date/time	Received date/time
CD	09/20/18 09:30	09/21/18 15:35

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1170499	1	09/24/18 12:15	09/24/18 12:15	KK
Wet Chemistry by Method 350.1	WG1170543	1	09/24/18 15:28	09/24/18 15:28	JER
Wet Chemistry by Method 9056A	WG1169918	1	09/22/18 11:16	09/22/18 11:16	ELN
Mercury by Method 7470A	WG1169709	1	09/23/18 12:52	09/24/18 09:31	TCT
Mercury by Method 7470A	WG1170193	1	09/23/18 12:18	09/24/18 10:36	JDG
Metals (ICP) by Method 6010B	WG1169960	1	09/23/18 10:40	09/23/18 17:56	CCE
Metals (ICP) by Method 6010B	WG1170318	1	09/23/18 12:53	09/23/18 21:42	CCE
Metals (ICPMS) by Method 6020	WG1169655	1	09/24/18 20:09	09/25/18 02:18	LAT

CANE CREEK MS L1028036-04 GW

Collected by	Collected date/time	Received date/time
CD	09/20/18 09:30	09/21/18 15:35

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1170267	1	09/23/18 10:43	09/23/18 21:30	LD
Metals (ICPMS) by Method 6020	WG1170342	1	09/23/18 13:18	09/24/18 15:51	LAT

CANE CREEK DS-1 L1028036-05 GW

Collected by	Collected date/time	Received date/time
CD	09/20/18 09:02	09/21/18 15:35

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1170499	1	09/24/18 12:15	09/24/18 12:15	KK
Wet Chemistry by Method 350.1	WG1170543	1	09/24/18 15:30	09/24/18 15:30	JER
Wet Chemistry by Method 9056A	WG1169918	1	09/22/18 11:58	09/22/18 11:58	ELN
Mercury by Method 7470A	WG1169709	1	09/23/18 12:52	09/24/18 08:35	TCT
Mercury by Method 7470A	WG1170193	1	09/23/18 12:18	09/24/18 10:38	JDG
Metals (ICP) by Method 6010B	WG1169960	1	09/23/18 10:40	09/23/18 18:04	CCE
Metals (ICP) by Method 6010B	WG1170318	1	09/23/18 12:53	09/23/18 21:50	CCE
Metals (ICPMS) by Method 6020	WG1169655	1	09/24/18 20:09	09/25/18 02:23	LAT
Metals (ICPMS) by Method 6020	WG1170267	1	09/23/18 10:43	09/23/18 21:43	LD
Metals (ICPMS) by Method 6020	WG1170342	1	09/23/18 13:18	09/24/18 14:51	LAT

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

Chris McCord
Project Manager

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	39.9	B	30.0	1	09/24/2018 12:12	WG1170499

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	09/24/2018 15:23	WG1170543

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	09/22/2018 09:53	WG1169918
Chloride	9.31		1.00	1	09/22/2018 09:53	WG1169918
Fluoride	0.101		0.100	1	09/22/2018 09:53	WG1169918

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	09/24/2018 09:19	WG1169709
Mercury,Dissolved	ND	J3	0.000200	1	09/24/2018 10:23	WG1170193

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	09/23/2018 17:48	WG1169960
Boron,Dissolved	ND		0.200	1	09/23/2018 21:25	WG1170318

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	09/23/2018 21:03	WG1170267
Aluminum,Dissolved	ND		0.100	1	09/24/2018 15:09	WG1170342
Antimony	ND		0.00200	1	09/23/2018 21:03	WG1170267
Antimony,Dissolved	ND		0.00200	1	09/24/2018 15:09	WG1170342
Arsenic	ND		0.00200	1	09/23/2018 21:03	WG1170267
Arsenic,Dissolved	ND		0.00200	1	09/24/2018 15:09	WG1170342
Barium	0.0276		0.00500	1	09/23/2018 21:03	WG1170267
Barium,Dissolved	0.0275	B	0.00500	1	09/24/2018 15:09	WG1170342
Beryllium	ND		0.00200	1	09/23/2018 21:03	WG1170267
Beryllium,Dissolved	ND		0.00200	1	09/24/2018 15:09	WG1170342
Cadmium	ND		0.00100	1	09/23/2018 21:03	WG1170267
Cadmium,Dissolved	ND		0.00100	1	09/24/2018 15:09	WG1170342
Calcium	13.8		1.00	1	09/23/2018 21:03	WG1170267
Calcium,Dissolved	13.5		1.00	1	09/24/2018 15:09	WG1170342
Chromium	ND		0.00200	1	09/23/2018 21:03	WG1170267
Chromium,Dissolved	ND		0.00200	1	09/24/2018 15:09	WG1170342
Cobalt	ND		0.00200	1	09/23/2018 21:03	WG1170267
Cobalt,Dissolved	ND		0.00200	1	09/24/2018 15:09	WG1170342
Copper	ND		0.00500	1	09/23/2018 21:03	WG1170267
Copper,Dissolved	ND		0.00500	1	09/24/2018 15:09	WG1170342
Iron	0.386		0.100	1	09/23/2018 21:03	WG1170267
Iron,Dissolved	0.183		0.100	1	09/24/2018 15:09	WG1170342
Lead	ND		0.00200	1	09/23/2018 21:03	WG1170267
Lead,Dissolved	ND		0.00200	1	09/24/2018 15:09	WG1170342

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	2.28		1.00	1	09/23/2018 21:03	WG1170267
Magnesium,Dissolved	2.27		1.00	1	09/24/2018 15:09	WG1170342
Manganese	0.111		0.00500	1	09/23/2018 21:03	WG1170267
Manganese,Dissolved	0.0940		0.00500	1	09/24/2018 15:09	WG1170342
Nickel	ND		0.00200	1	09/23/2018 21:03	WG1170267
Nickel,Dissolved	ND		0.00200	1	09/24/2018 15:09	WG1170342
Potassium	1.60		1.00	1	09/23/2018 21:03	WG1170267
Potassium,Dissolved	1.53		1.00	1	09/25/2018 01:37	WG1169655
Selenium	ND		0.00200	1	09/23/2018 21:03	WG1170267
Selenium,Dissolved	ND		0.00200	1	09/24/2018 15:09	WG1170342
Silver	ND		0.00200	1	09/23/2018 21:03	WG1170267
Silver,Dissolved	ND		0.00200	1	09/24/2018 15:09	WG1170342
Sodium	6.45		1.00	1	09/23/2018 21:03	WG1170267
Sodium,Dissolved	6.64		1.00	1	09/24/2018 15:09	WG1170342
Thallium	ND		0.00200	1	09/23/2018 21:03	WG1170267
Thallium,Dissolved	ND		0.00200	1	09/24/2018 15:09	WG1170342
Vanadium	ND		0.00500	1	09/23/2018 21:03	WG1170267
Vanadium,Dissolved	ND		0.00500	1	09/24/2018 15:09	WG1170342
Zinc	ND		0.0250	1	09/23/2018 21:03	WG1170267
Zinc,Dissolved	ND		0.0250	1	09/24/2018 15:09	WG1170342

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	54.1	B	30.0	1	09/24/2018 12:13	WG1170499

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	09/24/2018 15:25	WG1170543

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	09/22/2018 10:06	WG1169918
Chloride	11.1		1.00	1	09/22/2018 10:06	WG1169918
Fluoride	0.135		0.100	1	09/22/2018 10:06	WG1169918

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	09/24/2018 09:26	WG1169709
Mercury,Dissolved	ND	J3	0.000200	1	09/24/2018 10:26	WG1170193

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	09/23/2018 17:50	WG1169960
Boron,Dissolved	ND		0.200	1	09/23/2018 21:36	WG1170318

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	09/23/2018 21:21	WG1170267
Aluminum,Dissolved	ND		0.100	1	09/24/2018 15:13	WG1170342
Antimony	ND		0.00200	1	09/23/2018 21:21	WG1170267
Antimony,Dissolved	ND		0.00200	1	09/24/2018 15:13	WG1170342
Arsenic	ND		0.00200	1	09/23/2018 21:21	WG1170267
Arsenic,Dissolved	ND		0.00200	1	09/24/2018 15:13	WG1170342
Barium	0.0348		0.00500	1	09/23/2018 21:21	WG1170267
Barium,Dissolved	0.0327	B	0.00500	1	09/24/2018 15:13	WG1170342
Beryllium	ND		0.00200	1	09/23/2018 21:21	WG1170267
Beryllium,Dissolved	ND		0.00200	1	09/24/2018 15:13	WG1170342
Cadmium	ND		0.00100	1	09/23/2018 21:21	WG1170267
Cadmium,Dissolved	ND		0.00100	1	09/24/2018 15:13	WG1170342
Calcium	17.3		1.00	1	09/23/2018 21:21	WG1170267
Calcium,Dissolved	17.1		1.00	1	09/24/2018 15:13	WG1170342
Chromium	ND		0.00200	1	09/23/2018 21:21	WG1170267
Chromium,Dissolved	ND		0.00200	1	09/24/2018 15:13	WG1170342
Cobalt	ND		0.00200	1	09/23/2018 21:21	WG1170267
Cobalt,Dissolved	ND		0.00200	1	09/24/2018 15:13	WG1170342
Copper	ND		0.00500	1	09/23/2018 21:21	WG1170267
Copper,Dissolved	ND		0.00500	1	09/24/2018 15:13	WG1170342
Iron	0.538		0.100	1	09/23/2018 21:21	WG1170267
Iron,Dissolved	0.180		0.100	1	09/24/2018 15:13	WG1170342
Lead	ND		0.00200	1	09/23/2018 21:21	WG1170267
Lead,Dissolved	ND		0.00200	1	09/24/2018 15:13	WG1170342

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	2.99		1.00	1	09/23/2018 21:21	WG1170267
Magnesium,Dissolved	2.96		1.00	1	09/24/2018 15:13	WG1170342
Manganese	0.292		0.00500	1	09/23/2018 21:21	WG1170267
Manganese,Dissolved	0.261		0.00500	1	09/24/2018 15:13	WG1170342
Nickel	ND		0.00200	1	09/23/2018 21:21	WG1170267
Nickel,Dissolved	ND		0.00200	1	09/24/2018 15:13	WG1170342
Potassium	1.94		1.00	1	09/23/2018 21:21	WG1170267
Potassium,Dissolved	1.87		1.00	1	09/25/2018 02:09	WG1169655
Selenium	ND		0.00200	1	09/23/2018 21:21	WG1170267
Selenium,Dissolved	ND		0.00200	1	09/24/2018 15:13	WG1170342
Silver	ND		0.00200	1	09/23/2018 21:21	WG1170267
Silver,Dissolved	ND		0.00200	1	09/24/2018 15:13	WG1170342
Sodium	6.70		1.00	1	09/23/2018 21:21	WG1170267
Sodium,Dissolved	6.91		1.00	1	09/24/2018 15:13	WG1170342
Thallium	ND		0.00200	1	09/23/2018 21:21	WG1170267
Thallium,Dissolved	ND		0.00200	1	09/24/2018 15:13	WG1170342
Vanadium	ND		0.00500	1	09/23/2018 21:21	WG1170267
Vanadium,Dissolved	ND		0.00500	1	09/24/2018 15:13	WG1170342
Zinc	ND		0.0250	1	09/23/2018 21:21	WG1170267
Zinc,Dissolved	ND		0.0250	1	09/24/2018 15:13	WG1170342

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	102		30.0	1	09/24/2018 12:14	WG1170499

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	09/24/2018 15:26	WG1170543

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	09/22/2018 11:02	WG1169918
Chloride	14.6		1.00	1	09/22/2018 11:02	WG1169918
Fluoride	0.212		0.100	1	09/22/2018 11:02	WG1169918

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	09/24/2018 09:29	WG1169709
Mercury,Dissolved	ND	J3	0.000200	1	09/24/2018 10:33	WG1170193

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	09/23/2018 17:53	WG1169960
Boron,Dissolved	ND		0.200	1	09/23/2018 21:39	WG1170318

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	09/23/2018 21:25	WG1170267
Aluminum,Dissolved	ND		0.100	1	09/24/2018 15:18	WG1170342
Antimony	ND		0.00200	1	09/23/2018 21:25	WG1170267
Antimony,Dissolved	ND		0.00200	1	09/24/2018 15:18	WG1170342
Arsenic	0.00229		0.00200	1	09/23/2018 21:25	WG1170267
Arsenic,Dissolved	ND		0.00200	1	09/24/2018 15:18	WG1170342
Barium	0.0409		0.00500	1	09/23/2018 21:25	WG1170267
Barium,Dissolved	0.0348	B	0.00500	1	09/24/2018 15:18	WG1170342
Beryllium	ND		0.00200	1	09/23/2018 21:25	WG1170267
Beryllium,Dissolved	ND		0.00200	1	09/24/2018 15:18	WG1170342
Cadmium	ND		0.00100	1	09/23/2018 21:25	WG1170267
Cadmium,Dissolved	ND		0.00100	1	09/24/2018 15:18	WG1170342
Calcium	29.2		1.00	1	09/23/2018 21:25	WG1170267
Calcium,Dissolved	28.3		1.00	1	09/24/2018 15:18	WG1170342
Chromium	ND		0.00200	1	09/23/2018 21:25	WG1170267
Chromium,Dissolved	ND		0.00200	1	09/24/2018 15:18	WG1170342
Cobalt	ND		0.00200	1	09/23/2018 21:25	WG1170267
Cobalt,Dissolved	ND		0.00200	1	09/24/2018 15:18	WG1170342
Copper	ND		0.00500	1	09/23/2018 21:25	WG1170267
Copper,Dissolved	ND		0.00500	1	09/24/2018 15:18	WG1170342
Iron	1.09		0.100	1	09/23/2018 21:25	WG1170267
Iron,Dissolved	0.261		0.100	1	09/24/2018 15:18	WG1170342
Lead	ND		0.00200	1	09/23/2018 21:25	WG1170267
Lead,Dissolved	ND		0.00200	1	09/24/2018 15:18	WG1170342

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	5.61		1.00	1	09/23/2018 21:25	WG1170267
Magnesium,Dissolved	5.58		1.00	1	09/24/2018 15:18	WG1170342
Manganese	0.646		0.00500	1	09/23/2018 21:25	WG1170267
Manganese,Dissolved	0.320		0.00500	1	09/24/2018 15:18	WG1170342
Nickel	ND		0.00200	1	09/23/2018 21:25	WG1170267
Nickel,Dissolved	ND		0.00200	1	09/24/2018 15:18	WG1170342
Potassium	3.07		1.00	1	09/23/2018 21:25	WG1170267
Potassium,Dissolved	3.01		1.00	1	09/25/2018 02:13	WG1169655
Selenium	ND		0.00200	1	09/23/2018 21:25	WG1170267
Selenium,Dissolved	ND		0.00200	1	09/24/2018 15:18	WG1170342
Silver	ND		0.00200	1	09/23/2018 21:25	WG1170267
Silver,Dissolved	ND		0.00200	1	09/24/2018 15:18	WG1170342
Sodium	10.1		1.00	1	09/23/2018 21:25	WG1170267
Sodium,Dissolved	10.2		1.00	1	09/24/2018 15:18	WG1170342
Thallium	ND		0.00200	1	09/23/2018 21:25	WG1170267
Thallium,Dissolved	ND		0.00200	1	09/24/2018 15:18	WG1170342
Vanadium	ND		0.00500	1	09/23/2018 21:25	WG1170267
Vanadium,Dissolved	ND		0.00500	1	09/24/2018 15:18	WG1170342
Zinc	ND		0.0250	1	09/23/2018 21:25	WG1170267
Zinc,Dissolved	ND		0.0250	1	09/24/2018 15:18	WG1170342

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	79.1		30.0	1	09/24/2018 12:15	WG1170499

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	09/24/2018 15:28	WG1170543

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	09/22/2018 11:16	WG1169918
Chloride	11.8		1.00	1	09/22/2018 11:16	WG1169918
Fluoride	0.179		0.100	1	09/22/2018 11:16	WG1169918

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	09/24/2018 09:31	WG1169709
Mercury,Dissolved	ND	J3	0.000200	1	09/24/2018 10:36	WG1170193

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	09/23/2018 17:56	WG1169960
Boron,Dissolved	ND		0.200	1	09/23/2018 21:42	WG1170318

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	09/23/2018 21:30	WG1170267
Aluminum,Dissolved	ND		0.100	1	09/24/2018 15:51	WG1170342
Antimony	ND		0.00200	1	09/23/2018 21:30	WG1170267
Antimony,Dissolved	ND		0.00200	1	09/24/2018 15:51	WG1170342
Arsenic	ND		0.00200	1	09/23/2018 21:30	WG1170267
Arsenic,Dissolved	ND		0.00200	1	09/24/2018 15:51	WG1170342
Barium	0.0334		0.00500	1	09/23/2018 21:30	WG1170267
Barium,Dissolved	0.0330	B	0.00500	1	09/24/2018 15:51	WG1170342
Beryllium	ND		0.00200	1	09/23/2018 21:30	WG1170267
Beryllium,Dissolved	ND		0.00200	1	09/24/2018 15:51	WG1170342
Cadmium	ND		0.00100	1	09/23/2018 21:30	WG1170267
Cadmium,Dissolved	ND		0.00100	1	09/24/2018 15:51	WG1170342
Calcium	23.2		1.00	1	09/23/2018 21:30	WG1170267
Calcium,Dissolved	23.4		1.00	1	09/24/2018 15:51	WG1170342
Chromium	ND		0.00200	1	09/23/2018 21:30	WG1170267
Chromium,Dissolved	ND		0.00200	1	09/24/2018 15:51	WG1170342
Cobalt	ND		0.00200	1	09/23/2018 21:30	WG1170267
Cobalt,Dissolved	ND		0.00200	1	09/24/2018 15:51	WG1170342
Copper	ND		0.00500	1	09/23/2018 21:30	WG1170267
Copper,Dissolved	ND		0.00500	1	09/24/2018 15:51	WG1170342
Iron	0.606		0.100	1	09/23/2018 21:30	WG1170267
Iron,Dissolved	0.308		0.100	1	09/24/2018 15:51	WG1170342
Lead	ND		0.00200	1	09/23/2018 21:30	WG1170267
Lead,Dissolved	ND		0.00200	1	09/24/2018 15:51	WG1170342

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	4.54		1.00	1	09/23/2018 21:30	WG1170267
Magnesium,Dissolved	4.57		1.00	1	09/24/2018 15:51	WG1170342
Manganese	0.318		0.00500	1	09/23/2018 21:30	WG1170267
Manganese,Dissolved	0.241		0.00500	1	09/24/2018 15:51	WG1170342
Nickel	ND		0.00200	1	09/23/2018 21:30	WG1170267
Nickel,Dissolved	ND		0.00200	1	09/24/2018 15:51	WG1170342
Potassium	2.67		1.00	1	09/23/2018 21:30	WG1170267
Potassium,Dissolved	2.69		1.00	1	09/25/2018 02:18	WG1169655
Selenium	ND		0.00200	1	09/23/2018 21:30	WG1170267
Selenium,Dissolved	ND		0.00200	1	09/24/2018 15:51	WG1170342
Silver	ND		0.00200	1	09/23/2018 21:30	WG1170267
Silver,Dissolved	ND		0.00200	1	09/24/2018 15:51	WG1170342
Sodium	7.91		1.00	1	09/23/2018 21:30	WG1170267
Sodium,Dissolved	8.05		1.00	1	09/24/2018 15:51	WG1170342
Thallium	ND		0.00200	1	09/23/2018 21:30	WG1170267
Thallium,Dissolved	ND		0.00200	1	09/24/2018 15:51	WG1170342
Vanadium	ND		0.00500	1	09/23/2018 21:30	WG1170267
Vanadium,Dissolved	ND		0.00500	1	09/24/2018 15:51	WG1170342
Zinc	ND		0.0250	1	09/23/2018 21:30	WG1170267
Zinc,Dissolved	ND		0.0250	1	09/24/2018 15:51	WG1170342

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	83.9		30.0	1	09/24/2018 12:15	WG1170499

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	0.140		0.100	1	09/24/2018 15:30	WG1170543

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	09/22/2018 11:58	WG1169918
Chloride	17.0		1.00	1	09/22/2018 11:58	WG1169918
Fluoride	0.187		0.100	1	09/22/2018 11:58	WG1169918

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	09/24/2018 08:35	WG1169709
Mercury,Dissolved	ND	J3	0.000200	1	09/24/2018 10:38	WG1170193

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	09/23/2018 18:04	WG1169960
Boron,Dissolved	ND		0.200	1	09/23/2018 21:50	WG1170318

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	09/23/2018 21:43	WG1170267
Aluminum,Dissolved	ND		0.100	1	09/24/2018 14:51	WG1170342
Antimony	ND		0.00200	1	09/23/2018 21:43	WG1170267
Antimony,Dissolved	ND		0.00200	1	09/24/2018 14:51	WG1170342
Arsenic	ND		0.00200	1	09/23/2018 21:43	WG1170267
Arsenic,Dissolved	ND		0.00200	1	09/24/2018 14:51	WG1170342
Barium	0.0423		0.00500	1	09/23/2018 21:43	WG1170267
Barium,Dissolved	0.0397		0.00500	1	09/24/2018 14:51	WG1170342
Beryllium	ND		0.00200	1	09/23/2018 21:43	WG1170267
Beryllium,Dissolved	ND		0.00200	1	09/24/2018 14:51	WG1170342
Cadmium	ND		0.00100	1	09/23/2018 21:43	WG1170267
Cadmium,Dissolved	ND		0.00100	1	09/24/2018 14:51	WG1170342
Calcium	23.0		1.00	1	09/23/2018 21:43	WG1170267
Calcium,Dissolved	23.1		1.00	1	09/24/2018 14:51	WG1170342
Chromium	ND		0.00200	1	09/23/2018 21:43	WG1170267
Chromium,Dissolved	ND		0.00200	1	09/24/2018 14:51	WG1170342
Cobalt	ND		0.00200	1	09/23/2018 21:43	WG1170267
Cobalt,Dissolved	ND		0.00200	1	09/24/2018 14:51	WG1170342
Copper	ND		0.00500	1	09/23/2018 21:43	WG1170267
Copper,Dissolved	ND		0.00500	1	09/24/2018 14:51	WG1170342
Iron	0.830		0.100	1	09/23/2018 21:43	WG1170267
Iron,Dissolved	0.318		0.100	1	09/24/2018 14:51	WG1170342
Lead	ND		0.00200	1	09/23/2018 21:43	WG1170267
Lead,Dissolved	ND		0.00200	1	09/24/2018 14:51	WG1170342

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	4.77		1.00	1	09/23/2018 21:43	WG1170267
Magnesium,Dissolved	4.73		1.00	1	09/24/2018 14:51	WG1170342
Manganese	0.345		0.00500	1	09/23/2018 21:43	WG1170267
Manganese,Dissolved	0.203		0.00500	1	09/24/2018 14:51	WG1170342
Nickel	ND		0.00200	1	09/23/2018 21:43	WG1170267
Nickel,Dissolved	ND		0.00200	1	09/24/2018 14:51	WG1170342
Potassium	3.38		1.00	1	09/23/2018 21:43	WG1170267
Potassium,Dissolved	3.26		1.00	1	09/25/2018 02:23	WG1169655
Selenium	ND		0.00200	1	09/23/2018 21:43	WG1170267
Selenium,Dissolved	ND		0.00200	1	09/24/2018 14:51	WG1170342
Silver	ND		0.00200	1	09/23/2018 21:43	WG1170267
Silver,Dissolved	ND		0.00200	1	09/24/2018 14:51	WG1170342
Sodium	10.2		1.00	1	09/23/2018 21:43	WG1170267
Sodium,Dissolved	10.2		1.00	1	09/24/2018 14:51	WG1170342
Thallium	ND		0.00200	1	09/23/2018 21:43	WG1170267
Thallium,Dissolved	ND		0.00200	1	09/24/2018 14:51	WG1170342
Vanadium	ND		0.00500	1	09/23/2018 21:43	WG1170267
Vanadium,Dissolved	ND		0.00500	1	09/24/2018 14:51	WG1170342
Zinc	ND		0.0250	1	09/23/2018 21:43	WG1170267
Zinc,Dissolved	ND		0.0250	1	09/24/2018 14:51	WG1170342

Method Blank (MB)

(MB) R3344474-1 09/24/18 11:52

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hardness (colorimetric) as CaCO3	6.07	J	1.43	30.0

L1026527-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1026527-04 09/24/18 12:24 • (DUP) R3344474-8 09/24/18 12:25

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	299	274	5	8.74		20

L1027250-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1027250-01 09/24/18 12:27 • (DUP) R3344474-9 09/24/18 12:28

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	453	433	5	4.63		20

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

(LCS) R3344474-2 09/24/18 11:53 • (LCSD) R3344474-3 09/24/18 11:54

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Hardness (colorimetric) as CaCO3	150	151	150	101	100	85.0-115			0.664	20

Method Blank (MB)

(MB) R3344569-1 09/24/18 15:03

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ammonia Nitrogen	U		0.0317	0.100

L1027345-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1027345-01 09/24/18 15:07 • (DUP) R3344569-4 09/24/18 15:09

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	7.43	7.38	1	0.743		10

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

(LCS) R3344569-2 09/24/18 15:04 • (LCSD) R3344569-3 09/24/18 15:06

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	7.50	7.48	7.62	99.7	102	90.0-110			1.80	10

L1027366-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1027366-01 09/24/18 15:11 • (MS) R3344569-5 09/24/18 15:12

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ammonia Nitrogen	5.00	9.55	13.8	85.8	1	90.0-110	E J6

Method Blank (MB)

(MB) R3344195-1 09/22/18 07:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Bromide	U		0.0790	1.00
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100

L1028036-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1028036-02 09/22/18 10:06 • (DUP) R3344195-4 09/22/18 10:20

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.000	1	0.000		15
Chloride	11.1	11.1	1	0.0398		15
Fluoride	0.135	0.139	1	3.36		15

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

(LCS) R3344195-2 09/22/18 08:12 • (LCSD) R3344195-3 09/22/18 08:26

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromide	40.0	38.5	38.3	96.2	95.8	80.0-120			0.367	15
Chloride	40.0	39.2	39.2	98.1	98.1	80.0-120			0.0178	15
Fluoride	8.00	7.99	7.99	99.8	99.8	80.0-120			0.00250	15

L1028036-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1028036-02 09/22/18 10:06 • (MS) R3344195-5 09/22/18 10:34 • (MSD) R3344195-6 09/22/18 10:48

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	ND	47.8	47.6	95.7	95.2	1	80.0-120			0.433	15
Chloride	50.0	11.1	60.8	61.3	99.5	100	1	80.0-120			0.732	15
Fluoride	5.00	0.135	5.16	5.19	100	101	1	80.0-120			0.586	15

Method Blank (MB)

(MB) R3344495-1 09/24/18 08:28

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury	U		0.0000490	0.000200

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

(LCS) R3344495-2 09/24/18 08:30 • (LCSD) R3344495-3 09/24/18 08:33

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury	0.00300	0.00263	0.00280	87.8	93.2	80.0-120			6.04	20

L1028036-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1028036-05 09/24/18 08:35 • (MS) R3344495-4 09/24/18 08:37 • (MSD) R3344495-5 09/24/18 08:40

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury	0.00300	ND	0.00252	0.00303	84.0	101	1	75.0-125			18.2	20

Method Blank (MB)

(MB) R3344496-1 09/24/18 09:33

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury,Dissolved	U		0.0000490	0.000200

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

(LCS) R3344496-2 09/24/18 09:36 • (LCSD) R3344496-6 09/24/18 11:44

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Mercury,Dissolved	0.00300	0.00323	0.00254	108	84.8	80.0-120		J3	23.8	20

L1027149-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1027149-01 09/24/18 09:41 • (MS) R3344496-3 09/24/18 09:43 • (MSD) R3344496-4 09/24/18 09:46

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Mercury,Dissolved	0.00300	ND	0.00233	0.00159	77.5	52.9	1	75.0-125		J3 J6	37.7	20

Method Blank (MB)

(MB) R3344343-1 09/23/18 16:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0126	0.200

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

(LCS) R3344343-2 09/23/18 17:01 • (LCSD) R3344343-3 09/23/18 17:03

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron	1.00	0.998	0.996	99.8	99.6	80.0-120			0.202	20

L1027845-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1027845-01 09/23/18 17:06 • (MS) R3344343-5 09/23/18 17:11 • (MSD) R3344343-6 09/23/18 17:14

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron	1.00	ND	1.01	1.01	99.2	99.0	1	75.0-125			0.223	20

Method Blank (MB)

(MB) R3344357-1 09/23/18 21:17

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Boron,Dissolved	U		0.0126	0.200

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

(LCS) R3344357-2 09/23/18 21:20 • (LCSD) R3344357-3 09/23/18 21:22

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Boron,Dissolved	1.00	0.978	0.987	97.8	98.7	80.0-120			0.847	20

L1028036-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1028036-01 09/23/18 21:25 • (MS) R3344357-5 09/23/18 21:31 • (MSD) R3344357-6 09/23/18 21:33

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Boron,Dissolved	1.00	ND	0.999	0.993	98.1	97.5	1	75.0-125			0.571	20

Method Blank (MB)

(MB) R3344685-1 09/25/18 00:01

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Potassium,Dissolved	0.0441	J	0.0370	1.00

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

(LCS) R3344685-2 09/25/18 00:05 • (LCSD) R3344685-3 09/25/18 00:10

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Potassium,Dissolved	5.00	4.75	4.73	94.9	94.5	80.0-120			0.449	20

L1027572-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1027572-01 09/25/18 00:14 • (MS) R3344685-5 09/25/18 00:24 • (MSD) R3344685-6 09/25/18 00:28

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Potassium,Dissolved	5.00	1.70	6.40	6.33	94.0	92.5	1	75.0-125			1.14	20

Method Blank (MB)

(MB) R3344355-1 09/23/18 20:50

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.00722	J	0.00515	0.100
Antimony	U		0.000754	0.00200
Arsenic	U		0.000250	0.00200
Barium	0.000450	J	0.000360	0.00500
Beryllium	U		0.000120	0.00200
Cadmium	U		0.000160	0.00100
Calcium	0.0484	J	0.0460	1.00
Chromium	0.000601	J	0.000540	0.00200
Copper	U		0.000520	0.00500
Cobalt	U		0.000260	0.00200
Iron	U		0.0150	0.100
Lead	U		0.000240	0.00200
Magnesium	U		0.100	1.00
Manganese	U		0.000250	0.00500
Nickel	U		0.000350	0.00200
Potassium	0.0464	J	0.0370	1.00
Selenium	U		0.000380	0.00200
Silver	U		0.000310	0.00200
Sodium	U		0.110	1.00
Thallium	U		0.000190	0.00200
Vanadium	U		0.000180	0.00500
Zinc	U		0.00256	0.0250

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

(LCS) R3344355-2 09/23/18 20:55 • (LCSD) R3344355-3 09/23/18 20:59

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	4.80	4.79	96.0	95.8	80.0-120			0.202	20
Antimony	0.0500	0.0528	0.0531	106	106	80.0-120			0.707	20
Arsenic	0.0500	0.0498	0.0496	99.6	99.2	80.0-120			0.368	20
Barium	0.0500	0.0481	0.0454	96.1	90.8	80.0-120			5.71	20
Beryllium	0.0500	0.0455	0.0466	90.9	93.3	80.0-120			2.56	20
Cadmium	0.0500	0.0503	0.0508	101	102	80.0-120			1.12	20
Calcium	5.00	4.92	5.07	98.3	101	80.0-120			3.12	20
Chromium	0.0500	0.0511	0.0520	102	104	80.0-120			1.81	20
Copper	0.0500	0.0507	0.0511	101	102	80.0-120			0.881	20
Cobalt	0.0500	0.0525	0.0525	105	105	80.0-120			0.0469	20
Iron	5.00	5.23	5.11	105	102	80.0-120			2.38	20

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

(LCS) R3344355-2 09/23/18 20:55 • (LCSD) R3344355-3 09/23/18 20:59

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Lead	0.0500	0.0492	0.0493	98.4	98.6	80.0-120			0.158	20
Magnesium	5.00	4.96	4.97	99.2	99.3	80.0-120			0.165	20
Manganese	0.0500	0.0504	0.0487	101	97.4	80.0-120			3.51	20
Nickel	0.0500	0.0516	0.0532	103	106	80.0-120			3.03	20
Potassium	5.00	4.86	4.87	97.2	97.5	80.0-120			0.322	20
Selenium	0.0500	0.0533	0.0545	107	109	80.0-120			2.21	20
Silver	0.0500	0.0509	0.0507	102	101	80.0-120			0.475	20
Sodium	5.00	5.01	5.07	100	101	80.0-120			1.26	20
Thallium	0.0500	0.0500	0.0498	100	99.7	80.0-120			0.367	20
Vanadium	0.0500	0.0496	0.0504	99.2	101	80.0-120			1.62	20
Zinc	0.0500	0.0509	0.0507	102	101	80.0-120			0.371	20

L1028036-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1028036-01 09/23/18 21:03 • (MS) R3344355-5 09/23/18 21:12 • (MSD) R3344355-6 09/23/18 21:16

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	ND	4.83	4.90	95.4	96.9	1	75.0-125			1.57	20
Antimony	0.0500	ND	0.0538	0.0533	108	107	1	75.0-125			0.926	20
Arsenic	0.0500	ND	0.0502	0.0500	97.5	97.2	1	75.0-125			0.349	20
Barium	0.0500	0.0276	0.0715	0.0795	87.8	104	1	75.0-125			10.5	20
Beryllium	0.0500	ND	0.0458	0.0454	91.6	90.9	1	75.0-125			0.785	20
Cadmium	0.0500	ND	0.0504	0.0503	101	101	1	75.0-125			0.183	20
Calcium	5.00	13.8	18.7	18.3	98.1	89.6	1	75.0-125			2.28	20
Chromium	0.0500	ND	0.0508	0.0504	100	99.5	1	75.0-125			0.791	20
Copper	0.0500	ND	0.0501	0.0502	98.9	99.2	1	75.0-125			0.242	20
Cobalt	0.0500	ND	0.0517	0.0520	103	104	1	75.0-125			0.557	20
Potassium	5.00	1.60	6.34	6.38	94.8	95.7	1	75.0-125			0.684	20
Iron	5.00	0.386	5.51	5.46	103	101	1	75.0-125			1.00	20
Lead	0.0500	ND	0.0498	0.0498	99.5	99.7	1	75.0-125			0.146	20
Magnesium	5.00	2.28	7.20	7.19	98.4	98.2	1	75.0-125			0.114	20
Manganese	0.0500	0.111	0.160	0.159	97.7	97.4	1	75.0-125			0.115	20
Nickel	0.0500	ND	0.0518	0.0517	102	102	1	75.0-125			0.244	20
Selenium	0.0500	ND	0.0555	0.0558	111	112	1	75.0-125			0.483	20
Silver	0.0500	ND	0.0511	0.0508	102	102	1	75.0-125			0.583	20
Sodium	5.00	6.45	11.4	11.3	97.9	96.8	1	75.0-125			0.496	20
Thallium	0.0500	ND	0.0510	0.0507	102	101	1	75.0-125			0.667	20
Vanadium	0.0500	ND	0.0495	0.0491	98.4	97.7	1	75.0-125			0.761	20
Zinc	0.0500	ND	0.0515	0.0518	103	104	1	75.0-125			0.547	20

Method Blank (MB)

(MB) R3344581-1 09/24/18 14:37

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum,Dissolved	0.0173	J	0.00515	0.100
Antimony,Dissolved	U		0.000754	0.00200
Arsenic,Dissolved	U		0.000250	0.00200
Barium,Dissolved	0.00354	J	0.000360	0.00500
Beryllium,Dissolved	U		0.000120	0.00200
Cadmium,Dissolved	U		0.000160	0.00100
Calcium,Dissolved	U		0.0460	1.00
Chromium,Dissolved	U		0.000540	0.00200
Copper,Dissolved	U		0.000520	0.00500
Cobalt,Dissolved	U		0.000260	0.00200
Iron,Dissolved	U		0.0150	0.100
Lead,Dissolved	U		0.000240	0.00200
Magnesium,Dissolved	U		0.100	1.00
Manganese,Dissolved	U		0.000250	0.00500
Nickel,Dissolved	U		0.000350	0.00200
Selenium,Dissolved	U		0.000380	0.00200
Silver,Dissolved	U		0.000310	0.00200
Sodium,Dissolved	0.416	J	0.110	1.00
Thallium,Dissolved	U		0.000190	0.00200
Vanadium,Dissolved	0.000195	J	0.000180	0.00500
Zinc,Dissolved	U		0.00256	0.0250

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

(LCS) R3344581-2 09/24/18 14:41 • (LCSD) R3344581-3 09/24/18 14:46

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	5.00	4.80	4.85	96.0	96.9	80.0-120			1.00	20
Antimony,Dissolved	0.0500	0.0536	0.0554	107	111	80.0-120			3.41	20
Arsenic,Dissolved	0.0500	0.0501	0.0509	100	102	80.0-120			1.56	20
Barium,Dissolved	0.0500	0.0476	0.0461	95.2	92.1	80.0-120			3.27	20
Beryllium,Dissolved	0.0500	0.0465	0.0478	93.0	95.5	80.0-120			2.66	20
Cadmium,Dissolved	0.0500	0.0496	0.0499	99.1	99.8	80.0-120			0.706	20
Calcium,Dissolved	5.00	4.85	4.89	97.1	97.8	80.0-120			0.709	20
Chromium,Dissolved	0.0500	0.0510	0.0515	102	103	80.0-120			1.04	20
Copper,Dissolved	0.0500	0.0517	0.0520	103	104	80.0-120			0.577	20
Cobalt,Dissolved	0.0500	0.0523	0.0532	105	106	80.0-120			1.69	20
Iron,Dissolved	5.00	5.03	5.07	101	101	80.0-120			0.892	20
Lead,Dissolved	0.0500	0.0494	0.0496	98.8	99.3	80.0-120			0.438	20

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

(LCS) R3344581-2 09/24/18 14:41 • (LCSD) R3344581-3 09/24/18 14:46

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Magnesium,Dissolved	5.00	4.94	5.02	98.8	100	80.0-120			1.63	20
Manganese,Dissolved	0.0500	0.0490	0.0504	98.0	101	80.0-120			2.87	20
Nickel,Dissolved	0.0500	0.0531	0.0531	106	106	80.0-120			0.0675	20
Selenium,Dissolved	0.0500	0.0537	0.0558	107	112	80.0-120			3.91	20
Silver,Dissolved	0.0500	0.0487	0.0494	97.4	98.8	80.0-120			1.42	20
Sodium,Dissolved	5.00	4.98	5.73	99.7	115	80.0-120			13.9	20
Thallium,Dissolved	0.0500	0.0501	0.0506	100	101	80.0-120			1.05	20
Vanadium,Dissolved	0.0500	0.0500	0.0502	100	100	80.0-120			0.342	20
Zinc,Dissolved	0.0500	0.0534	0.0537	107	107	80.0-120			0.551	20

L1028036-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1028036-05 09/24/18 14:51 • (MS) R3344581-5 09/24/18 15:00 • (MSD) R3344581-6 09/24/18 15:04

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	5.00	ND	4.90	4.71	97.8	93.9	1	75.0-125			4.09	20
Antimony,Dissolved	0.0500	ND	0.0563	0.0545	113	109	1	75.0-125			3.28	20
Arsenic,Dissolved	0.0500	ND	0.0492	0.0493	97.3	97.4	1	75.0-125			0.0857	20
Barium,Dissolved	0.0500	0.0397	0.0853	0.0854	91.2	91.4	1	75.0-125			0.0973	20
Beryllium,Dissolved	0.0500	ND	0.0474	0.0468	94.7	93.5	1	75.0-125			1.29	20
Cadmium,Dissolved	0.0500	ND	0.0511	0.0504	102	100	1	75.0-125			1.45	20
Calcium,Dissolved	5.00	23.1	27.7	27.4	93.4	86.4	1	75.0-125			1.27	20
Chromium,Dissolved	0.0500	ND	0.0507	0.0492	101	98.5	1	75.0-125			2.91	20
Copper,Dissolved	0.0500	ND	0.0501	0.0491	100	98.2	1	75.0-125			2.08	20
Cobalt,Dissolved	0.0500	ND	0.0518	0.0510	104	102	1	75.0-125			1.50	20
Iron,Dissolved	5.00	0.318	5.23	5.20	98.3	97.6	1	75.0-125			0.681	20
Lead,Dissolved	0.0500	ND	0.0497	0.0489	99.4	97.7	1	75.0-125			1.65	20
Magnesium,Dissolved	5.00	4.73	9.77	9.58	101	96.9	1	75.0-125			1.92	20
Manganese,Dissolved	0.0500	0.203	0.250	0.250	94.0	93.1	1	75.0-125			0.188	20
Nickel,Dissolved	0.0500	ND	0.0508	0.0516	101	102	1	75.0-125			1.57	20
Selenium,Dissolved	0.0500	ND	0.0584	0.0534	117	107	1	75.0-125			8.95	20
Silver,Dissolved	0.0500	ND	0.0497	0.0485	99.4	96.9	1	75.0-125			2.53	20
Sodium,Dissolved	5.00	10.2	15.4	15.1	103	96.9	1	75.0-125			2.09	20
Thallium,Dissolved	0.0500	ND	0.0505	0.0496	101	99.3	1	75.0-125			1.74	20
Vanadium,Dissolved	0.0500	ND	0.0488	0.0487	97.0	96.9	1	75.0-125			0.0984	20
Zinc,Dissolved	0.0500	ND	0.0543	0.0515	102	96.1	1	75.0-125			5.40	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

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

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

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

CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

ALL SHADED AREAS are for LAB USE ONLY

Company: **Civil & Environmental Consultants - TN**	Billing Information: **Dr. Kevin Wolfe, 325 Seaboard Lane, Suite 170, Franklin, TN 37067**
Address: **325 Seaboard Lane, Suite 170 Franklin, TN 37067**	
Report To: **Philip Campbell**	Email To: **pcampbell@cecinc.com; kclayton@cecinc.com**
Copy To:	Site Collection Info/Address:
Customer Project Name/Number: **EWS Camden Class 2 Landfill 171-873**	State: / County/City: Time Zone Collected: PT MT CT ET
Phone: **615-333-7797** Email:	Site/Facility ID #: **CAMDEN, TN** Compliance Monitoring? [ ] Yes [ ] No
Collected by (print): Cade Duke	Purchase Order #: Quote #: DW PWS ID #: DW Location Code:
Collected by (signature):	Turnaround Date Required: Immediately Packed on Ice: [X] Yes [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive [ ] Hold	Rush: [ ] Same Day [X] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply) Field Filtered (if applicable): [ ] Yes [ ] No Analysis:

Container Preservative Type **: 22 22

Lab Project Manager: **526 - Chris McCord**

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Analyses

Lab Profile/Line: **CEC-EWS CAMDEN LF**

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y	N	NA
Custody Signatures Present	Y	N	NA
Collector Signature Present	Y	N	NA
Bottles Intact	Y	N	NA
Correct Bottles	Y	N	NA
Sufficient Volume	Y	N	NA
Samples Received on Ice	Y	N	NA
VOA - Headspace Acceptable	Y	N	NA
USDA Regulated Soils	Y	N	NA
Samples in Holding Time	Y	N	NA
Residual Chlorine Present	Y	N	NA
Cl Strips:			
Sample pH Acceptable	Y	N	NA
pH Strips:			
Sulfide Present	Y	N	NA
Lead Acetate Strips:			

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Anions(Br,Cl,Fl) 125mlHDPE-NoPres	Diss. Metals-LF 250mlHDPE-NoPres	NH3 125mlHDPE-H2SO4	Total Metals,HARD 250mlHDPE-HNO3	LAB USE ONLY: Lab Sample # / Comments
CHARLIE CREEK US	GW	Grab	9/20/18	11:30				4	X	X	X	X	L1028036
CHARLIE CREEK MS	GW	Grab	9/20/18	10:00				4	X	X	X	X	01
CANE CREEK US	GW	Grab	9/20/18	10:30				4	X	X	X	X	02
CANE CREEK MS	GW	Grab	9/20/18	9:30				4	X	X	X	X	03
CANE CREEK DS-1	GW	Grab	9/20/18	9:02				4	X	X	X	X	04
													05

Customer Remarks / Special Conditions / Possible Hazards:
Tot/Diss.Metals = M6020AP1 + Al,Ca,Fe,K,Mg,Mn,N
#Error

Type of Ice Used: (Wet) Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

LAB Tracking #:

Samples received via: FEDEX UPS Client (Courier) Pace Courier

B200

LAB Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 11
Cooler 1 Temp Upon Receipt 2.6 oC
Cooler 1 Therm Corr. Factor 0.3 oC
Cooler 1 Corrected Temp 2.3 oC
Comments:
Trip Blank Received: ~~Y~~ (N) NA
HCL MeOH TSP Other

	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature) Cade Duke / CEC	9/21/18 1020	Wayne Shull	
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature) Wayne Shull	Date/Time: 9/21/18 1555	Received by/Company: (Signature) Fairss	Date/Time: 9/21/18 1535

Acctnum: CEC
Template: T133580
Prelogin: P671628
PM: 526 - Chris McCord
PB: 9-14-18 DE

NonConformance(s): YES / (NO)

Page ____ of ____

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

December 05, 2018

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1039313
Samples Received:	10/30/2018
Project Number:	171-873
Description:	EWS Camden Class 2 Landfill
Site:	CAMDEN, TN
Report To:	Philip Campbell 325 Seaboard Lane, Suite 170 Franklin, TN 37067

Entire Report Reviewed By:

Chris McCord
Project Manager

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

TABLE OF CONTENTS

CANE CREEK US L1039313-01 GW

Collected by: Caleb Duke | Collected date/time: 10/29/18 09:45 | Received date/time: 10/30/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG1188780	1	10/30/18 20:13	10/31/18 10:23	RDS
Mercury by Method 7470A	WG1188783	1	10/30/18 19:35	10/31/18 09:17	ABL
Metals (ICP) by Method 6010B	WG1188171	1	10/30/18 18:08	10/31/18 02:44	TRB
Metals (ICP) by Method 6010B	WG1188827	1	10/31/18 08:46	10/31/18 14:25	CCE
Metals (ICPMS) by Method 6020	WG1188830	1	10/31/18 08:39	10/31/18 14:55	JPD
Metals (ICPMS) by Method 6020	WG1188832	1	11/01/18 10:36	11/01/18 17:32	LD
Metals (ICPMS) by Method 6020	WG1189556	1	11/01/18 13:43	11/01/18 20:19	LD

CANE CREEK MS L1039313-02 GW

Collected by: Caleb Duke | Collected date/time: 10/29/18 09:15 | Received date/time: 10/30/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG1188780	1	10/30/18 20:13	10/31/18 10:33	RDS
Mercury by Method 7470A	WG1188783	1	10/30/18 19:35	10/31/18 09:20	ABL
Metals (ICP) by Method 6010B	WG1188171	1	10/30/18 18:08	10/31/18 02:47	TRB
Metals (ICP) by Method 6010B	WG1188827	1	10/31/18 08:46	10/31/18 14:28	CCE
Metals (ICPMS) by Method 6020	WG1188830	1	10/31/18 08:39	10/31/18 15:00	JPD
Metals (ICPMS) by Method 6020	WG1188832	1	11/01/18 10:36	11/01/18 17:36	LD
Metals (ICPMS) by Method 6020	WG1189556	1	11/01/18 13:43	11/01/18 20:23	LD

CANE CREEK DS-1 L1039313-03 GW

Collected by: Caleb Duke | Collected date/time: 10/29/18 09:00 | Received date/time: 10/30/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG1188780	1	10/30/18 20:13	10/31/18 10:35	RDS
Mercury by Method 7470A	WG1188783	1	10/30/18 19:35	10/31/18 09:22	ABL
Metals (ICP) by Method 6010B	WG1188171	1	10/30/18 18:08	10/31/18 02:50	TRB
Metals (ICP) by Method 6010B	WG1188827	1	10/31/18 08:46	10/31/18 14:31	CCE
Metals (ICPMS) by Method 6020	WG1188830	1	10/31/18 08:39	10/31/18 15:04	JPD
Metals (ICPMS) by Method 6020	WG1188832	1	11/01/18 10:36	11/01/18 17:40	LD
Metals (ICPMS) by Method 6020	WG1189556	1	11/01/18 13:43	11/01/18 20:28	LD

CHARLIE CREEK MS L1039313-04 GW

Collected by: Caleb Duke | Collected date/time: 10/29/18 09:30 | Received date/time: 10/30/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG1188780	1	10/30/18 20:13	10/31/18 10:38	RDS
Mercury by Method 7470A	WG1188783	1	10/30/18 19:35	10/31/18 09:25	ABL
Metals (ICP) by Method 6010B	WG1188171	1	10/30/18 18:08	10/31/18 02:52	TRB
Metals (ICP) by Method 6010B	WG1188827	1	10/31/18 08:46	10/31/18 14:39	CCE
Metals (ICPMS) by Method 6020	WG1188830	1	10/31/18 08:39	10/31/18 15:09	JPD
Metals (ICPMS) by Method 6020	WG1188832	1	11/01/18 10:36	11/01/18 17:44	LD
Metals (ICPMS) by Method 6020	WG1189556	1	11/01/18 13:43	11/01/18 20:33	LD

CHARLIE CREEK US L1039313-05 GW

Collected by: Caleb Duke | Collected date/time: 10/29/18 10:05 | Received date/time: 10/30/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG1188780	1	10/30/18 20:13	10/31/18 10:40	RDS
Mercury by Method 7470A	WG1188783	1	10/30/18 19:35	10/31/18 09:32	ABL
Metals (ICP) by Method 6010B	WG1188171	1	10/30/18 18:08	10/31/18 02:55	TRB
Metals (ICP) by Method 6010B	WG1188827	1	10/31/18 08:46	10/31/18 14:42	CCE

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

CHARLIE CREEK US L1039313-05 GW

Collected by: Caleb Duke | Collected date/time: 10/29/18 10:05 | Received date/time: 10/30/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICPMS) by Method 6020	WG1188830	1	10/31/18 08:39	10/31/18 15:13	JPD
Metals (ICPMS) by Method 6020	WG1188832	1	11/01/18 10:36	11/01/18 17:48	LD
Metals (ICPMS) by Method 6020	WG1189556	1	11/01/18 13:43	11/01/18 20:37	LD

CANE CREEK US L1039313-06 Solid

Collected by: Caleb Duke | Collected date/time: 10/29/18 09:45 | Received date/time: 10/30/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG1189068	1	10/31/18 11:26	10/31/18 20:30	TCT
Metals (ICP) by Method 6010B	WG1188775	1	10/31/18 12:15	11/01/18 13:03	ST

CANE CREEK MS L1039313-07 Solid

Collected by: Caleb Duke | Collected date/time: 10/29/18 09:15 | Received date/time: 10/30/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG1189068	1	10/31/18 11:26	10/31/18 20:33	TCT
Metals (ICP) by Method 6010B	WG1188775	1	10/31/18 12:15	11/01/18 13:06	ST

CANE CREEK DS-1 L1039313-08 Solid

Collected by: Caleb Duke | Collected date/time: 10/29/18 09:00 | Received date/time: 10/30/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG1189068	1	10/31/18 11:26	10/31/18 20:35	TCT
Metals (ICP) by Method 6010B	WG1188775	1	10/31/18 12:15	11/01/18 13:09	ST

CHARLIE CREEK MS L1039313-09 Solid

Collected by: Caleb Duke | Collected date/time: 10/29/18 09:30 | Received date/time: 10/30/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG1189068	1	10/31/18 11:26	10/31/18 20:38	TCT
Metals (ICP) by Method 6010B	WG1188775	1	10/31/18 12:15	11/01/18 13:11	ST

CHARLIE CREEK US L1039313-10 Solid

Collected by: Caleb Duke | Collected date/time: 10/29/18 10:05 | Received date/time: 10/30/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG1189068	1	10/31/18 11:26	10/31/18 20:40	TCT
Metals (ICP) by Method 6010B	WG1188775	1	10/31/18 12:15	11/01/18 13:14	ST

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

Chris McCord
Project Manager

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/31/2018 10:23	WG1188780
Mercury,Dissolved	ND		0.000200	1	10/31/2018 09:17	WG1188783

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	10/31/2018 14:25	WG1188827
Boron,Dissolved	ND		0.200	1	10/31/2018 02:44	WG1188171

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	10/31/2018 14:55	WG1188830
Aluminum,Dissolved	ND		0.100	1	11/01/2018 17:32	WG1188832
Antimony	ND	J4	0.00200	1	10/31/2018 14:55	WG1188830
Antimony,Dissolved	ND	J4	0.00200	1	11/01/2018 17:32	WG1188832
Arsenic	ND		0.00200	1	10/31/2018 14:55	WG1188830
Arsenic,Dissolved	ND		0.00200	1	11/01/2018 17:32	WG1188832
Barium	0.0411		0.00500	1	10/31/2018 14:55	WG1188830
Barium,Dissolved	0.0408		0.00500	1	11/01/2018 17:32	WG1188832
Beryllium	ND		0.00200	1	10/31/2018 14:55	WG1188830
Beryllium,Dissolved	ND		0.00200	1	11/01/2018 17:32	WG1188832
Cadmium	ND		0.00100	1	10/31/2018 14:55	WG1188830
Cadmium,Dissolved	ND		0.00100	1	11/01/2018 17:32	WG1188832
Calcium	23.5		1.00	1	10/31/2018 14:55	WG1188830
Calcium,Dissolved	23.7		1.00	1	11/01/2018 17:32	WG1188832
Chromium	ND		0.00200	1	10/31/2018 14:55	WG1188830
Chromium,Dissolved	ND		0.00200	1	11/01/2018 17:32	WG1188832
Cobalt	ND		0.00200	1	10/31/2018 14:55	WG1188830
Cobalt,Dissolved	ND		0.00200	1	11/01/2018 17:32	WG1188832
Copper	0.0141		0.00500	1	10/31/2018 14:55	WG1188830
Copper,Dissolved	ND		0.00500	1	11/01/2018 17:32	WG1188832
Iron	0.738		0.100	1	10/31/2018 14:55	WG1188830
Iron,Dissolved	0.104		0.100	1	11/01/2018 17:32	WG1188832
Lead	ND		0.00200	1	10/31/2018 14:55	WG1188830
Lead,Dissolved	ND		0.00200	1	11/01/2018 17:32	WG1188832
Magnesium	5.35		1.00	1	10/31/2018 14:55	WG1188830
Magnesium,Dissolved	5.40		1.00	1	11/01/2018 17:32	WG1188832
Manganese	0.381		0.00500	1	10/31/2018 14:55	WG1188830
Manganese,Dissolved	0.233		0.00500	1	11/01/2018 17:32	WG1188832
Nickel	0.00237		0.00200	1	10/31/2018 14:55	WG1188830
Nickel,Dissolved	0.00232		0.00200	1	11/01/2018 17:32	WG1188832
Potassium	3.72		1.00	1	10/31/2018 14:55	WG1188830
Potassium,Dissolved	4.26		1.00	1	11/01/2018 17:32	WG1188832
Selenium	ND		0.00200	1	10/31/2018 14:55	WG1188830
Selenium,Dissolved	ND		0.00200	1	11/01/2018 17:32	WG1188832
Silver	ND		0.00200	1	10/31/2018 14:55	WG1188830
Silver,Dissolved	ND		0.00200	1	11/01/2018 17:32	WG1188832
Sodium	9.35		1.00	1	11/01/2018 20:19	WG1189556
Sodium,Dissolved	9.05		1.00	1	11/01/2018 17:32	WG1188832
Thallium	ND		0.00200	1	10/31/2018 14:55	WG1188830
Thallium,Dissolved	ND		0.00200	1	11/01/2018 17:32	WG1188832
Vanadium	ND		0.00500	1	10/31/2018 14:55	WG1188830
Vanadium,Dissolved	ND		0.00500	1	11/01/2018 17:32	WG1188832
Zinc	ND		0.0250	1	10/31/2018 14:55	WG1188830

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Zinc,Dissolved	ND		0.0250	1	11/01/2018 17:32	WG1188832

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/31/2018 10:33	WG1188780
Mercury,Dissolved	ND		0.000200	1	10/31/2018 09:20	WG1188783

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	10/31/2018 14:28	WG1188827
Boron,Dissolved	ND		0.200	1	10/31/2018 02:47	WG1188171

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.121		0.100	1	10/31/2018 15:00	WG1188830
Aluminum,Dissolved	ND		0.100	1	11/01/2018 17:36	WG1188832
Antimony	ND	J4	0.00200	1	10/31/2018 15:00	WG1188830
Antimony,Dissolved	ND	J4	0.00200	1	11/01/2018 17:36	WG1188832
Arsenic	ND		0.00200	1	10/31/2018 15:00	WG1188830
Arsenic,Dissolved	ND		0.00200	1	11/01/2018 17:36	WG1188832
Barium	0.0418		0.00500	1	10/31/2018 15:00	WG1188830
Barium,Dissolved	0.0386		0.00500	1	11/01/2018 17:36	WG1188832
Beryllium	ND		0.00200	1	10/31/2018 15:00	WG1188830
Beryllium,Dissolved	ND		0.00200	1	11/01/2018 17:36	WG1188832
Cadmium	ND		0.00100	1	10/31/2018 15:00	WG1188830
Cadmium,Dissolved	ND		0.00100	1	11/01/2018 17:36	WG1188832
Calcium	19.9		1.00	1	10/31/2018 15:00	WG1188830
Calcium,Dissolved	20.1		1.00	1	11/01/2018 17:36	WG1188832
Chromium	ND		0.00200	1	10/31/2018 15:00	WG1188830
Chromium,Dissolved	ND		0.00200	1	11/01/2018 17:36	WG1188832
Cobalt	ND		0.00200	1	10/31/2018 15:00	WG1188830
Cobalt,Dissolved	ND		0.00200	1	11/01/2018 17:36	WG1188832
Copper	ND		0.00500	1	10/31/2018 15:00	WG1188830
Copper,Dissolved	ND		0.00500	1	11/01/2018 17:36	WG1188832
Iron	0.497		0.100	1	10/31/2018 15:00	WG1188830
Iron,Dissolved	ND		0.100	1	11/01/2018 17:36	WG1188832
Lead	ND		0.00200	1	10/31/2018 15:00	WG1188830
Lead,Dissolved	ND		0.00200	1	11/01/2018 17:36	WG1188832
Magnesium	4.53		1.00	1	10/31/2018 15:00	WG1188830
Magnesium,Dissolved	4.59		1.00	1	11/01/2018 17:36	WG1188832
Manganese	0.340		0.00500	1	10/31/2018 15:00	WG1188830
Manganese,Dissolved	0.239		0.00500	1	11/01/2018 17:36	WG1188832
Nickel	0.00220		0.00200	1	10/31/2018 15:00	WG1188830
Nickel,Dissolved	0.00212		0.00200	1	11/01/2018 17:36	WG1188832
Potassium	2.49	B	1.00	1	10/31/2018 15:00	WG1188830
Potassium,Dissolved	3.14		1.00	1	11/01/2018 17:36	WG1188832
Selenium	ND		0.00200	1	10/31/2018 15:00	WG1188830
Selenium,Dissolved	ND		0.00200	1	11/01/2018 17:36	WG1188832
Silver	ND		0.00200	1	10/31/2018 15:00	WG1188830
Silver,Dissolved	ND		0.00200	1	11/01/2018 17:36	WG1188832
Sodium	8.56		1.00	1	11/01/2018 20:23	WG1189556
Sodium,Dissolved	8.41		1.00	1	11/01/2018 17:36	WG1188832
Thallium	ND		0.00200	1	10/31/2018 15:00	WG1188830
Thallium,Dissolved	ND		0.00200	1	11/01/2018 17:36	WG1188832
Vanadium	ND		0.00500	1	10/31/2018 15:00	WG1188830
Vanadium,Dissolved	ND		0.00500	1	11/01/2018 17:36	WG1188832
Zinc	ND		0.0250	1	10/31/2018 15:00	WG1188830

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Zinc,Dissolved	ND		0.0250	1	11/01/2018 17:36	WG1188832

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/31/2018 10:35	WG1188780
Mercury,Dissolved	ND		0.000200	1	10/31/2018 09:22	WG1188783

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	10/31/2018 14:31	WG1188827
Boron,Dissolved	ND		0.200	1	10/31/2018 02:50	WG1188171

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.242		0.100	1	10/31/2018 15:04	WG1188830
Aluminum,Dissolved	ND		0.100	1	11/01/2018 17:40	WG1188832
Antimony	ND	J4	0.00200	1	10/31/2018 15:04	WG1188830
Antimony,Dissolved	ND	J4	0.00200	1	11/01/2018 17:40	WG1188832
Arsenic	ND		0.00200	1	10/31/2018 15:04	WG1188830
Arsenic,Dissolved	ND		0.00200	1	11/01/2018 17:40	WG1188832
Barium	0.0437		0.00500	1	10/31/2018 15:04	WG1188830
Barium,Dissolved	0.0404		0.00500	1	11/01/2018 17:40	WG1188832
Beryllium	ND		0.00200	1	10/31/2018 15:04	WG1188830
Beryllium,Dissolved	ND		0.00200	1	11/01/2018 17:40	WG1188832
Cadmium	ND		0.00100	1	10/31/2018 15:04	WG1188830
Cadmium,Dissolved	ND		0.00100	1	11/01/2018 17:40	WG1188832
Calcium	20.6		1.00	1	10/31/2018 15:04	WG1188830
Calcium,Dissolved	20.7		1.00	1	11/01/2018 17:40	WG1188832
Chromium	ND		0.00200	1	10/31/2018 15:04	WG1188830
Chromium,Dissolved	ND		0.00200	1	11/01/2018 17:40	WG1188832
Cobalt	ND		0.00200	1	10/31/2018 15:04	WG1188830
Cobalt,Dissolved	ND		0.00200	1	11/01/2018 17:40	WG1188832
Copper	ND		0.00500	1	10/31/2018 15:04	WG1188830
Copper,Dissolved	ND		0.00500	1	11/01/2018 17:40	WG1188832
Iron	0.903		0.100	1	10/31/2018 15:04	WG1188830
Iron,Dissolved	ND		0.100	1	11/01/2018 17:40	WG1188832
Lead	ND		0.00200	1	10/31/2018 15:04	WG1188830
Lead,Dissolved	ND		0.00200	1	11/01/2018 17:40	WG1188832
Magnesium	4.78		1.00	1	10/31/2018 15:04	WG1188830
Magnesium,Dissolved	4.92		1.00	1	11/01/2018 17:40	WG1188832
Manganese	0.380		0.00500	1	10/31/2018 15:04	WG1188830
Manganese,Dissolved	0.250		0.00500	1	11/01/2018 17:40	WG1188832
Nickel	0.00219		0.00200	1	10/31/2018 15:04	WG1188830
Nickel,Dissolved	0.00202		0.00200	1	11/01/2018 17:40	WG1188832
Potassium	2.79	B	1.00	1	10/31/2018 15:04	WG1188830
Potassium,Dissolved	2.74		1.00	1	11/01/2018 17:40	WG1188832
Selenium	ND		0.00200	1	10/31/2018 15:04	WG1188830
Selenium,Dissolved	ND		0.00200	1	11/01/2018 17:40	WG1188832
Silver	ND		0.00200	1	10/31/2018 15:04	WG1188830
Silver,Dissolved	ND		0.00200	1	11/01/2018 17:40	WG1188832
Sodium	9.57		1.00	1	11/01/2018 20:28	WG1189556
Sodium,Dissolved	9.10		1.00	1	11/01/2018 17:40	WG1188832
Thallium	ND		0.00200	1	10/31/2018 15:04	WG1188830
Thallium,Dissolved	ND		0.00200	1	11/01/2018 17:40	WG1188832
Vanadium	ND		0.00500	1	10/31/2018 15:04	WG1188830
Vanadium,Dissolved	ND		0.00500	1	11/01/2018 17:40	WG1188832
Zinc	ND		0.0250	1	10/31/2018 15:04	WG1188830

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Zinc,Dissolved	ND		0.0250	1	11/01/2018 17:40	WG1188832

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/31/2018 10:38	WG1188780
Mercury,Dissolved	ND		0.000200	1	10/31/2018 09:25	WG1188783

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	10/31/2018 14:39	WG1188827
Boron,Dissolved	ND		0.200	1	10/31/2018 02:52	WG1188171

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	10/31/2018 15:09	WG1188830
Aluminum,Dissolved	ND		0.100	1	11/01/2018 17:44	WG1188832
Antimony	ND	J4	0.00200	1	10/31/2018 15:09	WG1188830
Antimony,Dissolved	ND	J4	0.00200	1	11/01/2018 17:44	WG1188832
Arsenic	ND		0.00200	1	10/31/2018 15:09	WG1188830
Arsenic,Dissolved	ND		0.00200	1	11/01/2018 17:44	WG1188832
Barium	0.0397		0.00500	1	10/31/2018 15:09	WG1188830
Barium,Dissolved	0.0394		0.00500	1	11/01/2018 17:44	WG1188832
Beryllium	ND		0.00200	1	10/31/2018 15:09	WG1188830
Beryllium,Dissolved	ND		0.00200	1	11/01/2018 17:44	WG1188832
Cadmium	ND		0.00100	1	10/31/2018 15:09	WG1188830
Cadmium,Dissolved	ND		0.00100	1	11/01/2018 17:44	WG1188832
Calcium	16.8		1.00	1	10/31/2018 15:09	WG1188830
Calcium,Dissolved	16.8		1.00	1	11/01/2018 17:44	WG1188832
Chromium	ND		0.00200	1	10/31/2018 15:09	WG1188830
Chromium,Dissolved	ND		0.00200	1	11/01/2018 17:44	WG1188832
Cobalt	ND		0.00200	1	10/31/2018 15:09	WG1188830
Cobalt,Dissolved	ND		0.00200	1	11/01/2018 17:44	WG1188832
Copper	ND		0.00500	1	10/31/2018 15:09	WG1188830
Copper,Dissolved	ND		0.00500	1	11/01/2018 17:44	WG1188832
Iron	0.416		0.100	1	10/31/2018 15:09	WG1188830
Iron,Dissolved	ND		0.100	1	11/01/2018 17:44	WG1188832
Lead	ND		0.00200	1	10/31/2018 15:09	WG1188830
Lead,Dissolved	ND		0.00200	1	11/01/2018 17:44	WG1188832
Magnesium	3.09		1.00	1	10/31/2018 15:09	WG1188830
Magnesium,Dissolved	3.17		1.00	1	11/01/2018 17:44	WG1188832
Manganese	0.337		0.00500	1	10/31/2018 15:09	WG1188830
Manganese,Dissolved	0.320		0.00500	1	11/01/2018 17:44	WG1188832
Nickel	ND		0.00200	1	10/31/2018 15:09	WG1188830
Nickel,Dissolved	ND		0.00200	1	11/01/2018 17:44	WG1188832
Potassium	2.53	B	1.00	1	10/31/2018 15:09	WG1188830
Potassium,Dissolved	2.01		1.00	1	11/01/2018 17:44	WG1188832
Selenium	ND		0.00200	1	10/31/2018 15:09	WG1188830
Selenium,Dissolved	ND		0.00200	1	11/01/2018 17:44	WG1188832
Silver	ND		0.00200	1	10/31/2018 15:09	WG1188830
Silver,Dissolved	ND		0.00200	1	11/01/2018 17:44	WG1188832
Sodium	6.98		1.00	1	11/01/2018 20:33	WG1189556
Sodium,Dissolved	6.92		1.00	1	11/01/2018 17:44	WG1188832
Thallium	ND		0.00200	1	10/31/2018 15:09	WG1188830
Thallium,Dissolved	ND		0.00200	1	11/01/2018 17:44	WG1188832
Vanadium	ND		0.00500	1	10/31/2018 15:09	WG1188830
Vanadium,Dissolved	ND		0.00500	1	11/01/2018 17:44	WG1188832
Zinc	ND		0.0250	1	10/31/2018 15:09	WG1188830

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Zinc,Dissolved	ND		0.0250	1	11/01/2018 17:44	WG1188832

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	10/31/2018 10:40	WG1188780
Mercury,Dissolved	ND		0.000200	1	10/31/2018 09:32	WG1188783

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	10/31/2018 14:42	WG1188827
Boron,Dissolved	ND		0.200	1	10/31/2018 02:55	WG1188171

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	10/31/2018 15:13	WG1188830
Aluminum,Dissolved	ND		0.100	1	11/01/2018 17:48	WG1188832
Antimony	ND	J4	0.00200	1	10/31/2018 15:13	WG1188830
Antimony,Dissolved	ND	J4	0.00200	1	11/01/2018 17:48	WG1188832
Arsenic	ND		0.00200	1	10/31/2018 15:13	WG1188830
Arsenic,Dissolved	ND		0.00200	1	11/01/2018 17:48	WG1188832
Barium	0.0355		0.00500	1	10/31/2018 15:13	WG1188830
Barium,Dissolved	0.0365		0.00500	1	11/01/2018 17:48	WG1188832
Beryllium	ND		0.00200	1	10/31/2018 15:13	WG1188830
Beryllium,Dissolved	ND		0.00200	1	11/01/2018 17:48	WG1188832
Cadmium	ND		0.00100	1	10/31/2018 15:13	WG1188830
Cadmium,Dissolved	ND		0.00100	1	11/01/2018 17:48	WG1188832
Calcium	14.4		1.00	1	10/31/2018 15:13	WG1188830
Calcium,Dissolved	14.3		1.00	1	11/01/2018 17:48	WG1188832
Chromium	ND		0.00200	1	10/31/2018 15:13	WG1188830
Chromium,Dissolved	ND		0.00200	1	11/01/2018 17:48	WG1188832
Cobalt	ND		0.00200	1	10/31/2018 15:13	WG1188830
Cobalt,Dissolved	ND		0.00200	1	11/01/2018 17:48	WG1188832
Copper	ND		0.00500	1	10/31/2018 15:13	WG1188830
Copper,Dissolved	ND		0.00500	1	11/01/2018 17:48	WG1188832
Iron	0.321		0.100	1	10/31/2018 15:13	WG1188830
Iron,Dissolved	ND		0.100	1	11/01/2018 17:48	WG1188832
Lead	ND		0.00200	1	10/31/2018 15:13	WG1188830
Lead,Dissolved	ND		0.00200	1	11/01/2018 17:48	WG1188832
Magnesium	2.60		1.00	1	10/31/2018 15:13	WG1188830
Magnesium,Dissolved	2.69		1.00	1	11/01/2018 17:48	WG1188832
Manganese	0.145		0.00500	1	10/31/2018 15:13	WG1188830
Manganese,Dissolved	0.119		0.00500	1	11/01/2018 17:48	WG1188832
Nickel	0.00211		0.00200	1	10/31/2018 15:13	WG1188830
Nickel,Dissolved	0.00227		0.00200	1	11/01/2018 17:48	WG1188832
Potassium	1.93	B	1.00	1	10/31/2018 15:13	WG1188830
Potassium,Dissolved	1.90		1.00	1	11/01/2018 17:48	WG1188832
Selenium	ND		0.00200	1	10/31/2018 15:13	WG1188830
Selenium,Dissolved	ND		0.00200	1	11/01/2018 17:48	WG1188832
Silver	ND		0.00200	1	10/31/2018 15:13	WG1188830
Silver,Dissolved	ND		0.00200	1	11/01/2018 17:48	WG1188832
Sodium	6.53		1.00	1	11/01/2018 20:37	WG1189556
Sodium,Dissolved	6.88		1.00	1	11/01/2018 17:48	WG1188832
Thallium	ND		0.00200	1	10/31/2018 15:13	WG1188830
Thallium,Dissolved	ND		0.00200	1	11/01/2018 17:48	WG1188832
Vanadium	ND		0.00500	1	10/31/2018 15:13	WG1188830
Vanadium,Dissolved	ND		0.00500	1	11/01/2018 17:48	WG1188832
Zinc	ND		0.0250	1	10/31/2018 15:13	WG1188830

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Zinc,Dissolved	ND		0.0250	1	11/01/2018 17:48	WG1188832

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	10/31/2018 20:30	WG1189068

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	821		20.0	1	11/01/2018 13:03	WG1188775
Antimony	ND		1.00	1	11/01/2018 13:03	WG1188775
Arsenic	ND		1.00	1	11/01/2018 13:03	WG1188775
Barium	9.53		0.500	1	11/01/2018 13:03	WG1188775
Beryllium	ND		0.200	1	11/01/2018 13:03	WG1188775
Boron	ND		10.0	1	11/01/2018 13:03	WG1188775
Cadmium	ND		0.500	1	11/01/2018 13:03	WG1188775
Calcium	418		100	1	11/01/2018 13:03	WG1188775
Chromium	3.77		1.00	1	11/01/2018 13:03	WG1188775
Cobalt	ND		1.00	1	11/01/2018 13:03	WG1188775
Copper	ND		1.00	1	11/01/2018 13:03	WG1188775
Iron	3020		10.0	1	11/01/2018 13:03	WG1188775
Lead	3.90		0.500	1	11/01/2018 13:03	WG1188775
Magnesium	142		100	1	11/01/2018 13:03	WG1188775
Manganese	77.3		1.00	1	11/01/2018 13:03	WG1188775
Nickel	ND		2.00	1	11/01/2018 13:03	WG1188775
Potassium	124		100	1	11/01/2018 13:03	WG1188775
Selenium	ND		2.00	1	11/01/2018 13:03	WG1188775
Silver	ND		0.500	1	11/01/2018 13:03	WG1188775
Sodium	ND		100	1	11/01/2018 13:03	WG1188775
Thallium	ND		1.00	1	11/01/2018 13:03	WG1188775
Vanadium	4.45		2.00	1	11/01/2018 13:03	WG1188775
Zinc	10.7		5.00	1	11/01/2018 13:03	WG1188775

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	10/31/2018 20:33	WG1189068

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	1500		20.0	1	11/01/2018 13:06	WG1188775
Antimony	ND		1.00	1	11/01/2018 13:06	WG1188775
Arsenic	1.72		1.00	1	11/01/2018 13:06	WG1188775
Barium	12.4		0.500	1	11/01/2018 13:06	WG1188775
Beryllium	ND		0.200	1	11/01/2018 13:06	WG1188775
Boron	ND		10.0	1	11/01/2018 13:06	WG1188775
Cadmium	ND		0.500	1	11/01/2018 13:06	WG1188775
Calcium	203		100	1	11/01/2018 13:06	WG1188775
Chromium	4.94		1.00	1	11/01/2018 13:06	WG1188775
Cobalt	1.61		1.00	1	11/01/2018 13:06	WG1188775
Copper	1.36		1.00	1	11/01/2018 13:06	WG1188775
Iron	4180		10.0	1	11/01/2018 13:06	WG1188775
Lead	3.48		0.500	1	11/01/2018 13:06	WG1188775
Magnesium	129		100	1	11/01/2018 13:06	WG1188775
Manganese	168		1.00	1	11/01/2018 13:06	WG1188775
Nickel	ND		2.00	1	11/01/2018 13:06	WG1188775
Potassium	210		100	1	11/01/2018 13:06	WG1188775
Selenium	ND		2.00	1	11/01/2018 13:06	WG1188775
Silver	ND		0.500	1	11/01/2018 13:06	WG1188775
Sodium	ND		100	1	11/01/2018 13:06	WG1188775
Thallium	ND		1.00	1	11/01/2018 13:06	WG1188775
Vanadium	7.23		2.00	1	11/01/2018 13:06	WG1188775
Zinc	14.1		5.00	1	11/01/2018 13:06	WG1188775

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	10/31/2018 20:35	WG1189068

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	676		20.0	1	11/01/2018 13:09	WG1188775
Antimony	ND		1.00	1	11/01/2018 13:09	WG1188775
Arsenic	ND		1.00	1	11/01/2018 13:09	WG1188775
Barium	5.76		0.500	1	11/01/2018 13:09	WG1188775
Beryllium	ND		0.200	1	11/01/2018 13:09	WG1188775
Boron	ND		10.0	1	11/01/2018 13:09	WG1188775
Cadmium	ND		0.500	1	11/01/2018 13:09	WG1188775
Calcium	ND		100	1	11/01/2018 13:09	WG1188775
Chromium	2.75		1.00	1	11/01/2018 13:09	WG1188775
Cobalt	ND		1.00	1	11/01/2018 13:09	WG1188775
Copper	ND		1.00	1	11/01/2018 13:09	WG1188775
Iron	2180		10.0	1	11/01/2018 13:09	WG1188775
Lead	1.55		0.500	1	11/01/2018 13:09	WG1188775
Magnesium	ND		100	1	11/01/2018 13:09	WG1188775
Manganese	39.3		1.00	1	11/01/2018 13:09	WG1188775
Nickel	ND		2.00	1	11/01/2018 13:09	WG1188775
Potassium	ND		100	1	11/01/2018 13:09	WG1188775
Selenium	ND		2.00	1	11/01/2018 13:09	WG1188775
Silver	ND		0.500	1	11/01/2018 13:09	WG1188775
Sodium	ND		100	1	11/01/2018 13:09	WG1188775
Thallium	ND		1.00	1	11/01/2018 13:09	WG1188775
Vanadium	3.47		2.00	1	11/01/2018 13:09	WG1188775
Zinc	7.34		5.00	1	11/01/2018 13:09	WG1188775

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	10/31/2018 20:38	WG1189068

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	849		20.0	1	11/01/2018 13:11	WG1188775
Antimony	ND		1.00	1	11/01/2018 13:11	WG1188775
Arsenic	ND		1.00	1	11/01/2018 13:11	WG1188775
Barium	6.06		0.500	1	11/01/2018 13:11	WG1188775
Beryllium	ND		0.200	1	11/01/2018 13:11	WG1188775
Boron	ND		10.0	1	11/01/2018 13:11	WG1188775
Cadmium	ND		0.500	1	11/01/2018 13:11	WG1188775
Calcium	119		100	1	11/01/2018 13:11	WG1188775
Chromium	3.11		1.00	1	11/01/2018 13:11	WG1188775
Cobalt	ND		1.00	1	11/01/2018 13:11	WG1188775
Copper	ND		1.00	1	11/01/2018 13:11	WG1188775
Iron	2270		10.0	1	11/01/2018 13:11	WG1188775
Lead	1.70		0.500	1	11/01/2018 13:11	WG1188775
Magnesium	ND		100	1	11/01/2018 13:11	WG1188775
Manganese	47.4		1.00	1	11/01/2018 13:11	WG1188775
Nickel	ND		2.00	1	11/01/2018 13:11	WG1188775
Potassium	126		100	1	11/01/2018 13:11	WG1188775
Selenium	ND		2.00	1	11/01/2018 13:11	WG1188775
Silver	ND		0.500	1	11/01/2018 13:11	WG1188775
Sodium	ND		100	1	11/01/2018 13:11	WG1188775
Thallium	ND		1.00	1	11/01/2018 13:11	WG1188775
Vanadium	3.92		2.00	1	11/01/2018 13:11	WG1188775
Zinc	5.69	B	5.00	1	11/01/2018 13:11	WG1188775

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	10/31/2018 20:40	WG1189068

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	519		20.0	1	11/01/2018 13:14	WG1188775
Antimony	ND		1.00	1	11/01/2018 13:14	WG1188775
Arsenic	ND		1.00	1	11/01/2018 13:14	WG1188775
Barium	5.78		0.500	1	11/01/2018 13:14	WG1188775
Beryllium	ND		0.200	1	11/01/2018 13:14	WG1188775
Boron	ND		10.0	1	11/01/2018 13:14	WG1188775
Cadmium	ND		0.500	1	11/01/2018 13:14	WG1188775
Calcium	ND		100	1	11/01/2018 13:14	WG1188775
Chromium	2.51		1.00	1	11/01/2018 13:14	WG1188775
Cobalt	ND		1.00	1	11/01/2018 13:14	WG1188775
Copper	ND		1.00	1	11/01/2018 13:14	WG1188775
Iron	1910		10.0	1	11/01/2018 13:14	WG1188775
Lead	1.08		0.500	1	11/01/2018 13:14	WG1188775
Magnesium	ND		100	1	11/01/2018 13:14	WG1188775
Manganese	51.6		1.00	1	11/01/2018 13:14	WG1188775
Nickel	ND		2.00	1	11/01/2018 13:14	WG1188775
Potassium	ND		100	1	11/01/2018 13:14	WG1188775
Selenium	ND		2.00	1	11/01/2018 13:14	WG1188775
Silver	ND		0.500	1	11/01/2018 13:14	WG1188775
Sodium	ND		100	1	11/01/2018 13:14	WG1188775
Thallium	ND		1.00	1	11/01/2018 13:14	WG1188775
Vanadium	3.65		2.00	1	11/01/2018 13:14	WG1188775
Zinc	ND		5.00	1	11/01/2018 13:14	WG1188775

Method Blank (MB)

(MB) R3355536-1 10/31/18 09:35

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.0000490	0.000200

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

(LCS) R3355536-2 10/31/18 09:37 • (LCSD) R3355536-3 10/31/18 09:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	0.00283	0.00297	94.4	99.0	80.0-120			4.79	20

L1038549-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1038549-07 10/31/18 09:42 • (MS) R3355536-4 10/31/18 09:44 • (MSD) R3355536-5 10/31/18 09:47

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	ND	0.00250	0.00236	83.3	78.6	1	75.0-125			5.82	20

Method Blank (MB)

(MB) R3355535-1 10/31/18 09:03

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	U		0.0000490	0.000200

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

(LCS) R3355535-2 10/31/18 09:05 • (LCSD) R3355535-3 10/31/18 09:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	0.00315	0.00323	105	108	80.0-120			2.73	20

L1039239-21 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039239-21 10/31/18 09:10 • (MS) R3355535-4 10/31/18 09:13 • (MSD) R3355535-5 10/31/18 09:15

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	ND	0.00337	0.00340	112	113	1	75.0-125			1.05	20

Method Blank (MB)

(MB) R3355793-1 10/31/18 19:23

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	U		0.00280	0.0200

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

(LCS) R3355793-2 10/31/18 19:36 • (LCSD) R3355793-3 10/31/18 19:41

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.300	0.248	0.263	82.8	87.8	80.0-120			5.85	20

L1039278-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039278-01 10/31/18 19:44 • (MS) R3355793-4 10/31/18 19:46 • (MSD) R3355793-5 10/31/18 19:56

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.352	0.0106	0.230	0.238	62.3	64.7	1	75.0-125	J6	J6	3.63	20

Method Blank (MB)

(MB) R3355397-1 10/31/18 01:38

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	U		0.0126	0.200

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

(LCS) R3355397-2 10/31/18 01:41 • (LCSD) R3355397-3 10/31/18 01:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	1.00	0.965	0.967	96.5	96.7	80.0-120			0.140	20

L1039094-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039094-02 10/31/18 01:46 • (MS) R3355397-5 10/31/18 01:51 • (MSD) R3355397-6 10/31/18 01:53

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	1.00	ND	1.01	0.999	101	99.9	1	75.0-125			1.01	20

Method Blank (MB)

(MB) R3355662-1 10/31/18 13:34

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0126	0.200

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

(LCS) R3355662-2 10/31/18 13:36 • (LCSD) R3355662-3 10/31/18 13:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron	1.00	1.01	1.01	101	101	80.0-120			0.292	20

L1039085-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039085-03 10/31/18 13:42 • (MS) R3355662-5 10/31/18 13:47 • (MSD) R3355662-6 10/31/18 13:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron	1.00	0.109	1.13	1.13	102	102	1	75.0-125			0.477	20

Method Blank (MB)

(MB) R3356144-1 11/01/18 11:58

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Aluminum	18.2		3.50	20.0
Antimony	U		0.500	1.00
Arsenic	U		0.460	1.00
Barium	U		0.170	0.500
Beryllium	U		0.0700	0.200
Boron	U		1.26	10.0
Cadmium	U		0.0700	0.200
Calcium	7.81	J	4.63	100
Chromium	U		0.140	1.00
Cobalt	U		0.230	1.00
Copper	U		0.500	1.00
Iron	14.8		1.41	10.0
Lead	U		0.190	0.500
Magnesium	7.75	J	1.11	100
Manganese	U		0.120	1.00
Nickel	U		0.490	2.00
Potassium	U		10.2	100
Selenium	U		0.620	2.00
Silver	U		0.120	0.500
Sodium	17.0	J	9.85	100
Thallium	U		0.500	1.00
Vanadium	U		0.240	2.00
Zinc	0.711	J	0.590	5.00

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

(LCS) R3356144-2 11/01/18 12:01 • (LCSD) R3356144-3 11/01/18 12:03

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	1000	1030	1080	103	108	80.0-120			4.62	20
Antimony	100	102	105	102	105	80.0-120			3.24	20
Arsenic	100	97.7	101	97.7	101	80.0-120			3.38	20
Barium	100	103	107	103	107	80.0-120			4.08	20
Beryllium	100	102	106	102	106	80.0-120			3.64	20
Boron	100	102	105	102	105	80.0-120			3.01	20
Cadmium	100	97.7	102	97.7	102	80.0-120			3.89	20
Calcium	1000	1010	1050	101	105	80.0-120			4.15	20
Chromium	100	101	105	101	105	80.0-120			3.80	20
Cobalt	100	103	107	103	107	80.0-120			3.61	20

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

(LCS) R3356144-2 11/01/18 12:01 • (LCSD) R3356144-3 11/01/18 12:03

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Copper	100	100	103	100	103	80.0-120			3.37	20
Iron	1000	1020	1060	102	106	80.0-120			4.04	20
Lead	100	99.4	103	99.4	103	80.0-120			3.35	20
Magnesium	1000	1020	1070	102	107	80.0-120			4.21	20
Manganese	100	99.2	103	99.2	103	80.0-120			4.08	20
Nickel	100	101	105	101	105	80.0-120			3.81	20
Potassium	1000	998	1030	99.8	103	80.0-120			3.12	20
Selenium	100	98.0	101	98.0	101	80.0-120			3.05	20
Silver	20.0	18.3	19.0	91.5	95.2	80.0-120			3.97	20
Sodium	1000	1020	1060	102	106	80.0-120			3.90	20
Thallium	100	96.3	99.7	96.3	99.7	80.0-120			3.45	20
Vanadium	100	101	105	101	105	80.0-120			4.10	20
Zinc	100	99.4	103	99.4	103	80.0-120			3.47	20

L1039394-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039394-01 11/01/18 12:06 • (MS) R3356144-6 11/01/18 12:13 • (MSD) R3356144-7 11/01/18 12:16

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	1000	11.8	1080	1060	107	105	1	75.0-125			2.20	20
Antimony	100	ND	103	99.0	103	99.0	1	75.0-125			3.89	20
Arsenic	100	ND	104	102	104	102	1	75.0-125			2.26	20
Barium	100	ND	108	106	108	106	1	75.0-125			2.27	20
Beryllium	100	ND	107	104	107	104	1	75.0-125			2.60	20
Boron	100	ND	105	101	105	101	1	75.0-125			3.26	20
Cadmium	100	ND	103	101	103	101	1	75.0-125			2.17	20
Calcium	1000	ND	1080	1060	105	102	1	75.0-125			2.22	20
Chromium	100	ND	105	103	105	103	1	75.0-125			1.92	20
Cobalt	100	ND	108	105	108	105	1	75.0-125			2.30	20
Copper	100	19.4	119	118	99.6	98.1	1	75.0-125			1.33	20
Iron	1000	ND	1050	1030	105	103	1	75.0-125			2.09	20
Lead	100	ND	103	101	103	101	1	75.0-125			1.97	20
Magnesium	1000	ND	1060	1040	106	103	1	75.0-125			2.60	20
Manganese	100	ND	103	101	103	101	1	75.0-125			1.70	20
Nickel	100	ND	106	103	106	103	1	75.0-125			2.68	20
Potassium	1000	306	1320	1310	102	101	1	75.0-125			0.508	20
Selenium	100	ND	104	102	104	102	1	75.0-125			1.55	20
Silver	20.0	ND	19.0	18.6	94.9	93.2	1	75.0-125			1.79	20
Sodium	1000	254	1290	1270	103	102	1	75.0-125			0.953	20

L1039394-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039394-01 11/01/18 12:06 • (MS) R3356144-6 11/01/18 12:13 • (MSD) R3356144-7 11/01/18 12:16

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Thallium	100	ND	97.2	95.1	97.2	95.1	1	75.0-125			2.12	20
Vanadium	100	ND	105	103	105	103	1	75.0-125			1.90	20
Zinc	100	ND	103	105	102	104	1	75.0-125			1.97	20

Method Blank (MB)

(MB) R3355654-1 10/31/18 12:34

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	U		0.00515	0.100
Antimony	U		0.000754	0.00200
Arsenic	U		0.000250	0.00200
Barium	U		0.000360	0.00500
Beryllium	U		0.000120	0.00200
Cadmium	U		0.000160	0.00100
Calcium	U		0.0460	1.00
Chromium	U		0.000540	0.00200
Copper	U		0.000520	0.00500
Cobalt	U		0.000260	0.00200
Iron	U		0.0150	0.100
Lead	U		0.000240	0.00200
Magnesium	U		0.100	1.00
Manganese	U		0.000250	0.00500
Nickel	U		0.000350	0.00200
Potassium	0.299	J	0.0370	1.00
Selenium	U		0.000380	0.00200
Silver	U		0.000310	0.00200
Thallium	U		0.000190	0.00200
Vanadium	U		0.000180	0.00500
Zinc	U		0.00256	0.0250

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

(LCS) R3355654-2 10/31/18 12:39 • (LCSD) R3355654-6 10/31/18 13:36

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	4.85	4.90	97.0	98.0	80.0-120			1.00	20
Antimony	0.0500	0.0626	0.0631	125	126	80.0-120	J4	J4	0.810	20
Arsenic	0.0500	0.0497	0.0500	99.4	100	80.0-120			0.654	20
Barium	0.0500	0.0473	0.0471	94.7	94.2	80.0-120			0.522	20
Beryllium	0.0500	0.0490	0.0495	98.1	98.9	80.0-120			0.886	20
Cadmium	0.0500	0.0486	0.0482	97.2	96.4	80.0-120			0.809	20
Calcium	5.00	5.04	5.05	101	101	80.0-120			0.288	20
Chromium	0.0500	0.0508	0.0519	102	104	80.0-120			2.20	20
Copper	0.0500	0.0513	0.0515	103	103	80.0-120			0.497	20
Cobalt	0.0500	0.0525	0.0532	105	106	80.0-120			1.31	20
Iron	5.00	5.07	5.11	101	102	80.0-120			0.943	20
Lead	0.0500	0.0493	0.0496	98.6	99.2	80.0-120			0.604	20

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

(LCS) R3355654-2 10/31/18 12:39 • (LCSD) R3355654-6 10/31/18 13:36

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Magnesium	5.00	4.99	5.04	99.8	101	80.0-120			1.00	20
Manganese	0.0500	0.0490	0.0512	98.0	102	80.0-120			4.42	20
Nickel	0.0500	0.0523	0.0532	105	106	80.0-120			1.70	20
Potassium	5.00	5.31	5.56	106	111	80.0-120			4.67	20
Selenium	0.0500	0.0484	0.0497	96.7	99.5	80.0-120			2.82	20
Silver	0.0500	0.0504	0.0504	101	101	80.0-120			0.0982	20
Thallium	0.0500	0.0489	0.0490	97.8	97.9	80.0-120			0.182	20
Vanadium	0.0500	0.0506	0.0502	101	100	80.0-120			0.872	20
Zinc	0.0500	0.0521	0.0535	104	107	80.0-120			2.55	20

L1039102-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039102-01 10/31/18 12:48 • (MS) R3355654-4 10/31/18 12:57 • (MSD) R3355654-5 10/31/18 13:02

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	0.124	4.95	4.89	96.6	95.2	1	75.0-125			1.34	20
Antimony	0.0500	ND	0.0617	0.0604	123	121	1	75.0-125			2.14	20
Arsenic	0.0500	ND	0.0495	0.0478	97.1	93.7	1	75.0-125			3.43	20
Barium	0.0500	0.180	0.223	0.221	86.7	82.5	1	75.0-125			0.949	20
Beryllium	0.0500	ND	0.0495	0.0481	99.0	96.2	1	75.0-125			2.88	20
Cadmium	0.0500	ND	0.0488	0.0479	97.6	95.7	1	75.0-125			1.93	20
Calcium	5.00	41.5	45.0	44.4	70.5	58.2	1	75.0-125	V	V	1.38	20
Chromium	0.0500	ND	0.0507	0.0498	100	98.5	1	75.0-125			1.70	20
Copper	0.0500	ND	0.0495	0.0479	97.8	94.7	1	75.0-125			3.20	20
Cobalt	0.0500	ND	0.0509	0.0496	102	99.2	1	75.0-125			2.48	20
Potassium	5.00	ND	6.09	5.14	103	83.7	1	75.0-125			17.0	20
Iron	5.00	ND	5.00	4.89	98.7	96.5	1	75.0-125			2.19	20
Lead	0.0500	ND	0.0495	0.0487	98.9	97.3	1	75.0-125			1.63	20
Magnesium	5.00	3.34	8.18	8.12	96.8	95.5	1	75.0-125			0.793	20
Manganese	0.0500	ND	0.0524	0.0518	97.2	95.8	1	75.0-125			1.34	20
Nickel	0.0500	ND	0.0511	0.0496	102	99.3	1	75.0-125			2.97	20
Selenium	0.0500	ND	0.0509	0.0477	102	95.5	1	75.0-125			6.35	20
Silver	0.0500	ND	0.0505	0.0500	101	99.9	1	75.0-125			1.14	20
Thallium	0.0500	ND	0.0484	0.0480	96.8	96.1	1	75.0-125			0.731	20
Vanadium	0.0500	ND	0.0492	0.0482	97.9	96.1	1	75.0-125			1.94	20
Zinc	0.0500	ND	0.0513	0.0502	103	100	1	75.0-125			2.15	20

Method Blank (MB)

(MB) R3356114-1 11/01/18 15:19

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum,Dissolved	0.0127	J	0.00515	0.100
Antimony,Dissolved	U		0.000754	0.00200
Arsenic,Dissolved	U		0.000250	0.00200
Barium,Dissolved	0.000447	J	0.000360	0.00500
Beryllium,Dissolved	U		0.000120	0.00200
Cadmium,Dissolved	U		0.000160	0.00100
Calcium,Dissolved	0.138	J	0.0460	1.00
Chromium,Dissolved	U		0.000540	0.00200
Copper,Dissolved	0.00243	J	0.000520	0.00500
Cobalt,Dissolved	U		0.000260	0.00200
Iron,Dissolved	U		0.0150	0.100
Lead,Dissolved	U		0.000240	0.00200
Magnesium,Dissolved	U		0.100	1.00
Manganese,Dissolved	U		0.000250	0.00500
Nickel,Dissolved	U		0.000350	0.00200
Potassium,Dissolved	U		0.0370	1.00
Selenium,Dissolved	U		0.000380	0.00200
Silver,Dissolved	U		0.000310	0.00200
Sodium,Dissolved	U		0.110	1.00
Thallium,Dissolved	U		0.000190	0.00200
Vanadium,Dissolved	U		0.000180	0.00500
Zinc,Dissolved	U		0.00256	0.0250

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

(LCS) R3356114-2 11/01/18 15:23 • (LCSD) R3356114-3 11/01/18 15:27

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	5.00	4.87	4.91	97.4	98.1	80.0-120			0.796	20
Antimony,Dissolved	0.0500	0.0670	0.0623	134	125	80.0-120	J4	J4	7.25	20
Arsenic,Dissolved	0.0500	0.0501	0.0506	100	101	80.0-120			0.905	20
Barium,Dissolved	0.0500	0.0481	0.0468	96.3	93.6	80.0-120			2.83	20
Beryllium,Dissolved	0.0500	0.0479	0.0482	95.8	96.3	80.0-120			0.503	20
Cadmium,Dissolved	0.0500	0.0477	0.0532	95.3	106	80.0-120			10.9	20
Calcium,Dissolved	5.00	5.10	5.28	102	106	80.0-120			3.56	20
Chromium,Dissolved	0.0500	0.0516	0.0522	103	104	80.0-120			1.23	20
Copper,Dissolved	0.0500	0.0509	0.0519	102	104	80.0-120			1.83	20
Cobalt,Dissolved	0.0500	0.0524	0.0534	105	107	80.0-120			1.83	20
Iron,Dissolved	5.00	5.03	5.11	101	102	80.0-120			1.70	20

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

(LCS) R3356114-2 11/01/18 15:23 • (LCSD) R3356114-3 11/01/18 15:27

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Lead,Dissolved	0.0500	0.0493	0.0498	98.7	99.6	80.0-120			0.912	20
Magnesium,Dissolved	5.00	4.92	4.97	98.5	99.5	80.0-120			1.01	20
Manganese,Dissolved	0.0500	0.0498	0.0513	99.5	103	80.0-120			2.94	20
Nickel,Dissolved	0.0500	0.0524	0.0528	105	106	80.0-120			0.837	20
Potassium,Dissolved	5.00	5.01	5.00	100	99.9	80.0-120			0.310	20
Selenium,Dissolved	0.0500	0.0537	0.0524	107	105	80.0-120			2.53	20
Silver,Dissolved	0.0500	0.0518	0.0527	104	105	80.0-120			1.58	20
Sodium,Dissolved	5.00	5.07	5.03	101	101	80.0-120			0.863	20
Thallium,Dissolved	0.0500	0.0492	0.0500	98.4	100	80.0-120			1.60	20
Vanadium,Dissolved	0.0500	0.0506	0.0509	101	102	80.0-120			0.616	20
Zinc,Dissolved	0.0500	0.0531	0.0531	106	106	80.0-120			0.0210	20

L1038802-18 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1038802-18 11/01/18 15:31 • (MS) R3356114-5 11/01/18 15:39 • (MSD) R3356114-6 11/01/18 15:43

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	5.00	ND	4.82	4.85	96.1	96.8	1	75.0-125			0.720	20
Antimony,Dissolved	0.0500	ND	0.0613	0.0616	123	123	1	75.0-125			0.511	20
Arsenic,Dissolved	0.0500	ND	0.0499	0.0482	99.9	96.4	1	75.0-125			3.54	20
Barium,Dissolved	0.0500	0.129	0.176	0.178	93.6	96.9	1	75.0-125			0.937	20
Beryllium,Dissolved	0.0500	ND	0.0479	0.0473	95.9	94.6	1	75.0-125			1.32	20
Cadmium,Dissolved	0.0500	ND	0.0520	0.0513	104	103	1	75.0-125			1.39	20
Calcium,Dissolved	5.00	103	107	108	81.5	95.6	1	75.0-125			0.660	20
Chromium,Dissolved	0.0500	ND	0.0505	0.0503	101	101	1	75.0-125			0.300	20
Copper,Dissolved	0.0500	ND	0.0535	0.0512	107	102	1	75.0-125			4.49	20
Cobalt,Dissolved	0.0500	ND	0.0508	0.0501	102	100	1	75.0-125			1.41	20
Potassium,Dissolved	5.00	ND	5.67	5.73	98.8	100	1	75.0-125			1.05	20
Iron,Dissolved	5.00	ND	4.95	4.84	99.1	96.7	1	75.0-125			2.39	20
Lead,Dissolved	0.0500	ND	0.0493	0.0487	98.7	97.5	1	75.0-125			1.24	20
Magnesium,Dissolved	5.00	11.0	15.9	15.8	98.3	96.4	1	75.0-125			0.614	20
Manganese,Dissolved	0.0500	0.00992	0.0589	0.0581	97.9	96.3	1	75.0-125			1.33	20
Nickel,Dissolved	0.0500	ND	0.0511	0.0503	101	99.5	1	75.0-125			1.55	20
Selenium,Dissolved	0.0500	ND	0.0525	0.0542	105	108	1	75.0-125			3.13	20
Silver,Dissolved	0.0500	ND	0.0522	0.0517	104	103	1	75.0-125			1.05	20
Sodium,Dissolved	5.00	6.95	11.9	11.9	99.0	99.5	1	75.0-125			0.233	20
Thallium,Dissolved	0.0500	ND	0.0497	0.0489	99.4	97.7	1	75.0-125			1.77	20
Vanadium,Dissolved	0.0500	ND	0.0501	0.0499	100	99.9	1	75.0-125			0.384	20
Zinc,Dissolved	0.0500	ND	0.0531	0.0541	98.8	101	1	75.0-125			1.91	20

Method Blank (MB)

(MB) R3356172-1 11/01/18 18:36

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Sodium	U		0.110	1.00

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

(LCS) R3356172-2 11/01/18 18:41 • (LCSD) R3356172-3 11/01/18 18:46

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Sodium	5.00	5.14	5.31	103	106	80.0-120			3.23	20

L1039533-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1039533-03 11/01/18 20:01 • (MS) R3356172-8 11/01/18 20:10 • (MSD) R3356172-9 11/01/18 20:14

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Sodium	1.00	4060	4060	3780	0.000	0.000	5	75.0-125	V	V	7.13	20

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
J	The identification of the analyte is acceptable; the reported value is an estimate.
J4	The associated batch QC was outside the established quality control range for accuracy.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
V	The sample concentration is too high to evaluate accurate spike recoveries.

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

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

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

Civil & Environmental Consultants - TN

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

Report to: Philip Campbell

Email To: pcampbell@cecinc.com; kclayton@cecinc.com

Project Description: EWS Camden Class 2 Landfill

City/State Collected:

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

Client Project # 171-873

Lab Project # CEC-EWS CAMDEN LF

Collected by (print): Caleb Duke

Site/Facility ID # CAMDEN, TN

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
✓ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed: Nov. 2, 2018

Pres Chk

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Diss. TAL Metals 250mlHDPE-NoPres	M6010TAL 2ozClr-NoPres	Total TAL Metals 250mlHDPE-HNO3	Remarks	Sample # (lab only)
CANE CREEK US	Grab	GW		10/29/18	9:45	2	X		X		-01
CANE CREEK MS	Grab	GW			9:15	2	X		X		02
CANE CREEK DS-1	Grab	GW			9:00	2	X		X		03
CHARLIE CREEK MS	Grab	GW			9:30	2	X		X		04
CHARLIE CREEK US	Grab	GW			10:05	2	X		X		05
CANE CREEK US	Grab	SS			9:45	1		X			06
CANE CREEK MS	Grab	SS			9:15	1		X			07
CANE CREEK DS-1	Grab	SS			9:00	1		X			08
CHARLIE CREEK MS	Grab	SS			9:30	1		X			09
CHARLIE CREEK US	Grab	SS			10:05	1		X			10

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: Tot/Diss. Metals = M6020 API + Al, Ca, Fe, K, Mg, Mn, Na, B (6010/7470)

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier ✓

Tracking #

Chain of Custody Page ___ of ___

Pace Analytical® National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1039313

Table A245

Acctnum: CEC
Template: T142289
Prelogin: P678279
TSR: 526 - Chris McCord
PB:

Shipped Via:

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	10/30/18	7:30 AM	
Relinquished by : (Signature)	10/30/18	09:45	Received by: (Signature)
Relinquished by : (Signature)	10/30/18	15:35	Received for lab by: (Signature)

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: 5.5 °C Bottles Received: 15

Date: 10/30/18 Time: 1540

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

EQUIPMENT CALIBRATION LOG

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

EQUIPMENT CALIBRATION FORM

NAME OF REPRESENTATIVE	A. Baugh
LOCATION	EWS
DATE AND TIME	9/11/18
Equipment and Model # (ex. YSI Pro Plus 556)	YSI Pro plus
Equipment Serial #	YSI #3

pH Calibration

pH buffer Calibration Standard	Buffer solution exp. date	Pre-Cal Reading (S.U.)	ph mV Value	Accepted Range mV	Within Range? (Yes or No)	Post-Cal Reading (S.U.)	Calibrated? (yes/no)
4	8/2019	3.99	158.1	160 to 180	Y	4.00	Y
7	8/2019	6.98	-15.2	+/-50	Y	7.00	Y
10	8/2019	9.79	-165.8	-160 to -180	Y	10.00	Y

Temperature Calibration Check

Cert. Thermometer Value (deg C)	Meter Value (deg C)
—	—

DO Calibration

Actual Barometric Pressure	Barometric Pressure (mm Hg)	D.O. Value (% Saturated)	Unit reading (%)	% DO accepted?
742.6	742.6	100	100	yes

Specific Conductivity Calibration

Conductivity Calibration Standard buffer solution	Buffer solution exp. date	Pre Cal Reading (umhos)	Post Cal Reading (umhos)
1000	1/20	1059	1000

ORP Calibration

ORP Calibration (mV)	Buffer solution exp. date	Pre Cal Reading (mV)	Post Cal Reading (mV)
240	10/20	241.7	240.0

Hach Model 2100P Turbidimeter Calibration

Calibration verification Test performed and passed?	NTU Standard	Within Range? (Yes/No)	Measured Value	Stored?	Final Verification test passed? (Yes/No)
Yes	20				
No	100				
Note: if verification passed, calibration not required	800				

GROUNDWATER MONITORING FIELD INFORMATION LOG

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

SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	MONITORING WELL I.D.	MW-1
LOCATION	Camden, TN	TEMPERATURE & WEATHER	NC, 70's
DATE & TIME	9/12/18	EVENT FREQUENCY	Quarterly
PURGE METHOD	~~Peristaltic Pump~~ Low-Flow	FIELD REPRESENTATIVE	Philip Campbell / L.Baugh
TOTAL WELL DEPTH (feet)	30.50	SAMPLING EQUIPMENT	~~Bailer~~ Bladder pump dedicated
DEPTH TO WATER (feet)	23.41	IS SAMPLE EQUIPMENT DEDICATED?	~~No~~ YES
CASING DIAMETER (inches)	2	DUPLICATE COLLECTED?	No
WATER COLUMN (feet)	7.09	FIELD BLANK COLLECTED?	No
PURGE VOLUME (gallons)	1	EQUIPMENT BLANK COLLECTED?	NA

PURGE INFORMATION

Gallons Purged	Time (00:00)	~~Minutes Purged~~ DTW	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	1052	23.41	17.4	4.39	42.5	5.07	83.5	45.0
.25	1055	23.54	17.1	4.27	38.7	2.55	87.3	68.8
.75	1100	23.69	16.3	4.28	39.8	2.21	90.8	54.9
1.25	1105	23.69	16.4	4.54	66.4	1.10	89.9	20.4
1.75	1110	23.69	16.4	4.67	78.0	.71	79.9	9.52
2.25	1115	23.68	16.4	4.80	83.4	.49	78.9	4.86

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	~~Minutes Purged~~ DTW	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.25	1120	23.68	16.4	4.80	83.4	0.44	78.9	4.86

Sample Charateristics (Odor, Color)	Clear/odorless	Preservatives Used	See COC
Number of Containers	See COC	Sampler Signature	L.Baugh

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-2
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	80s P. cloudy
DATE & TIME	9/12/10 1350	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	NA, parameters only	**FIELD REPRESENTATIVE**	Philip Campbell / A Baugh
TOTAL WELL DEPTH (feet)	10	**SAMPLING EQUIPMENT**	YSI ~~600~~ pro plus
DEPTH TO WATER (feet)	6.62	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	NO
WATER COLUMN (feet)	3.38	**FIELD BLANK COLLECTED?**	NO
PURGE VOLUME (gallons)	—	**EQUIPMENT BLANK COLLECTED?**	NO

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
→	1357	→	23.2	5.71	603	4.44	116.3	2.98

Sample Charateristics (Odor, Color)	N/A	**Preservatives Used**	N/A
Number of Containers	N/A	**Sampler Signature**	A Baugh

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-3
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	80s P.cloudy
DATE & TIME	9/12/18 1510	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	~~Peristaltic Pump~~ Low Flow	**FIELD REPRESENTATIVE**	Philip Campbell / A. Baugh
TOTAL WELL DEPTH (feet)	27	**SAMPLING EQUIPMENT**	~~Bailer~~ Bladder pump
DEPTH TO WATER (feet)	17.88	**IS SAMPLE EQUIPMENT DEDICATED?**	~~No~~ Yes
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	N
WATER COLUMN (feet)	9.12	**FIELD BLANK COLLECTED?**	N
PURGE VOLUME (gallons)	1V = 1.48 3V = 4.46	**EQUIPMENT BLANK COLLECTED?**	N

PURGE INFORMATION

Gallons Purged	Time (00:00)	~~Minutes Purged~~ DTW	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	1512	17.88	19.7	6.33	1734	2.26	135.4	9.13
.5	1517	17.80	19.7	5.86	1428	.83	128.5	2.16
.75	1522	17.80	20.9	5.58	1468	.72	129.1	1.68
1.25	1527	17.81	21.1	5.46	1474	.58	129.6	1.81
1.75	1532	17.81	21.2	5.43	1476	.59	128.8	1.32
2.0	1532	17.81	21.1	5.39	1475	.62	127.1	1.12

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	~~Minutes Purged~~ DTW	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.0	1540	17.81	21.1	5.39	1475	.62	127.1	1.12

Sample Charateristics (Odor, Color)	clear odorless	**Preservatives Used**	See COC
Number of Containers	See COC	**Sampler Signature**	A. Baugh

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-4
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	80s P.cloudy
DATE & TIME	9/12/18 1300	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	23.1	**SAMPLING EQUIPMENT**	~~Bailer~~
DEPTH TO WATER (feet)	Init. DTW = 11.65 / 11.91 DTW during purging	**IS SAMPLE EQUIPMENT DEDICATED?**	~~No~~ Yes
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	Yes
WATER COLUMN (feet)	11.19	**FIELD BLANK COLLECTED?**	NO
PURGE VOLUME (gallons)	2.30	**EQUIPMENT BLANK COLLECTED?**	NO

PURGE INFORMATION

Gallons Purged	Time (00:00)	~~Minutes Purged~~ DTW	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	1302	11.91	18.4	5.90	61.7	5.97	91.2	29.8
.75	1307	12.21	17.1	5.65	58.1	3.26	97.3	137
1.5	1312	12.21	17.0	5.56	57.2	3.32	97.3	19.8
1.85	1317	12.21	17.1	5.52	56.7	3.28	98.0	2.97
2.30	1322	12.21	17.0	5.50	56.4	3.14	100.2	2.94

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.30	1325	12.21	17.0	5.50	56.4	3.14	100.2	2.94

Sample Charateristics (Odor, Color)	Clear/odorless	**Preservatives Used**	See COC
Number of Containers	See COC	**Sampler Signature**	

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-5
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	80s P. cloudy
DATE & TIME	9/12/18 1203	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell / A. Baugh
TOTAL WELL DEPTH (feet)	33.85	**SAMPLING EQUIPMENT**	~~Bailer~~ Bladder Pump
DEPTH TO WATER (feet)	Initial: 10.47 / 10.75 DTW during purge	**IS SAMPLE EQUIPMENT DEDICATED?**	~~No~~ yes
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	NO
WATER COLUMN (feet)	23.1	**FIELD BLANK COLLECTED?**	NO
PURGE VOLUME (gallons)	2.10	**EQUIPMENT BLANK COLLECTED?**	NO

PURGE INFORMATION

Gallons Purged	Time (00:00)	~~Minutes Purged~~ DTW	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	1203	10.75	19.7	5.27	241.1	2.67	99.6	11.5
.25	1206	11.25	17.9	5.16	228.1	.92	92.7	50.4
.75	1211	11.25	12.6	5.10	219.5	.90	93.9	31.9
1.1	1216	11.20	17.6	5.09	215.9	.94	94.8	23.4
1.5	1221	11.25	17.6	5.09	213.8	.96	96.1	18.7
1.75	1226	11.25	17.5	5.09	211.7	1.05	97.5	16.2
2.10	1231	11.25	17.5	5.09	210.1	1.07	98.6	8.96

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.10	1235	11.25	17.5	5.09	210.1	1.07	98.6	8.96

Sample Charaterlstics (Odor, Color)	clear odorless	**Preservatives Used**	See COC
Number of Containers	See COC	**Sampler Signature**	A. Baugh

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	MONITORING WELL I.D.	TMW-1
LOCATION	Camden, TN	TEMPERATURE & WEATHER	PC, 70's
DATE & TIME	9-12-18 / 11:00	EVENT FREQUENCY	Quarterly
PURGE METHOD	Peristaltic Pump	FIELD REPRESENTATIVE	Philip Campbell
TOTAL WELL DEPTH (feet)	32.5	SAMPLING EQUIPMENT	~~Bailer~~ Peristaltic
DEPTH TO WATER (feet)	7.71	IS SAMPLE EQUIPMENT DEDICATED?	No
CASING DIAMETER (inches)	1	DUPLICATE COLLECTED?	No
WATER COLUMN (feet)	24.79	FIELD BLANK COLLECTED?	No
PURGE VOLUME (gallons)	1 vol ≈ 1.01 gallons	EQUIPMENT BLANK COLLECTED?	NA

$0.0055 = \pi r^2$

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU	DTW
0	1110	0	18.8	5.30	256.7	5.57	256.8	726	9.95
0.25	1115	5	18.6	5.37	80.8	5.31	349.6	>1000	10.29
1.0	11:25	15	18.3	5.65	78.0	4.99	238.6	>1000	10.85
1.75	11:35	25	18.7	5.76	76.8	4.81	235.3	>1000	10.35
2.50	11:45	35	18.5	5.75	76.0	4.72	238.3	631	10.38
3.0	11:55	45	18.6	5.75	76.2	4.68	239.2	443	10.36
3.5	12:05	55	18.5	5.76	76.6	4.71	240.5	257	10.34
4.0	12:15	65	18.7	5.76	76.9	4.77	242.7	77.3	10.38

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
4.0	1236	65	18.7	5.76	76.9	4.77	242.7	39.8

– @ meters

NTU = 4.50 after 0.7 filtering

Sample Charateristics (Odor, Color)	Clear to slight orange*	Preservatives Used	see COC
Number of Containers	11	Sampler Signature	Phy Campm

WELL DATA

Number of Baffles	0 (concrete jersey barrier)	Well Cap Dedicated/In Place?	No (Ded. pump removed
Well Clear of Weeds/Accessible?	yes / yes	Fittings/Well Head Condition	OK
Pad/Casing Quality	No pad, PVC casing OK	Lock Condition	OK

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	TMW-2
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	PC, 70's
DATE & TIME	7-12-18/1300	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	27.50	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	11.59	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	1	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	15.91	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	1 vol ≈ 0.75 gallons	**EQUIPMENT BLANK COLLECTED?**	No

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU	
0.0	13:15	-	19.5	5.80	71.9	5.54	247.7	613	
0.5	13:25	10	18.7	5.79	76.1	6.91	251.2	>1000	
1.0	1335	20	18.7	5.78	72.6	5.74	~~253.5~~	>1000	19.25
1.50	1345	30	18.5	5.80	72.9	5.54	255.9	>1000	17.60
2.0	1355	40	18.4	5.73	72.2	5.73	261.8	~~>1000~~ 861	16.85
2.5	1405	50	18.6	5.77	73.1	5.91	260.8	507	16.15
3.0	1415	60	18.8	5.78	73.5	5.76	261.2	361	16.12
3.5	1425	70	18.7	5.80	73.0	5.79	262.2	166	

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU	
3.5	1430	70	18.7	5.80	73.0	5.79	262.2	112	@ metals

Sample Charateristics (Odor, Color)	Lt. orange, No odor	**Preservatives Used**	See COC
Number of Containers	11	**Sampler Signature**	Philip Campbell

NTU = 29.7 after filtering (dissolved)

WELL DATA

Number of Baffles	0 (Jersey Barrier)	**Well Cap Dedicated/In Place?**	Ned. pump removed
Well Clear of Weeds/Accessible?	yes / yes	**Fittings/Well Head Condition**	OK
Pad/Casing Quality	No pad / casing OK	**Lock Condition**	ok

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	TMW-3
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	PC, 70's
DATE & TIME	9-12-18/1445	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	28.00	**SAMPLING EQUIPMENT**	~~Bailer~~ Peristaltic pump
DEPTH TO WATER (feet)	10.04	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	1	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	17.96	**FIELD BLANK COLLECTED?**	yes-1515
PURGE VOLUME (gallons)	1vol ≈ 1 gallon	**EQUIPMENT BLANK COLLECTED?**	NA

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU	DTW
0	14:50	0	18.6	5.32	223.9	1.09	279.5	482	12.19
1.0	1500	10	17.8	5.37	186.1	1.42	272.8	>1000	12.60
2.0	1510	20	18.1	5.42	172.1	2.01	269.7	>1000	11.85
3.0	1520	30	17.8	5.42	177.9	1.70	268.1	181	12.05
4.0	1530	40	17.8	5.41	180.1	1.72	266.0	58.5	12.07
5.0	1541	50	17.6	5.41	179.5	1.74	262.5	36.6	12.10
6.0	1550	60	17.8	5.41	180.3	1.72	259.9	11.3	12.12

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
6.0	1550	60	17.8	5.41	180.3	1.72	259.9	8.81

Sample Charateristics (Odor, Color)	Clear, No odor	**Preservatives Used**	None
Number of Containers	11	**Sampler Signature**	Phil Campbell

@ metals NTU = 5.10 after 6.1 Hr

WELL DATA

Number of Baffles	0 e Jersey Barrier	**Well Cap Dedicated/In Place?**	Ded. pump removed
Well Clear of Weeds/Accessible?	yes/ yes	**Fittings/Well Head Condition**	OK
Pad/Casing Quality	No pad/Casing OK	**Lock Condition**	OK

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	APWC Leachate
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	80s cloudy
DATE & TIME	9/12/18 1415	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Grab	**FIELD REPRESENTATIVE**	L Baugh
TOTAL WELL DEPTH (feet)	NA	**SAMPLING EQUIPMENT**	—
DEPTH TO WATER (feet)	NA	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	NA	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	NA	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	NA	**EQUIPMENT BLANK COLLECTED?**	No

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
-	1420	-	55.9	9.19	409253	.26	141.8	9.18

Sample Charateristics (Odor, Color)	Leachate; strong odor	**Preservatives Used**	See COC
Number of Containers	See COC	**Sampler Signature**	L Baugh

GROUNDWATER MONITORING FIELD INFORMATION LOG

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

SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	IWC Leachate
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	80s P.Cloudy
DATE & TIME	9/12/18 1440	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Grab	**FIELD REPRESENTATIVE**	A.Baugh
TOTAL WELL DEPTH (feet)	NA	**SAMPLING EQUIPMENT**	—
DEPTH TO WATER (feet)	NA	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	NA	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	NA	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	NA	**EQUIPMENT BLANK COLLECTED?**	No

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
-	1445	-	24.3	4.17	110130	2.40	270.1	8.01

Sample Charateristics (Odor, Color)	Leachate	**Preservatives Used**	See COC
Number of Containers	See COC	**Sampler Signature**	A.Baugh

GROUNDWATER MONITORING FIELD INFORMATION LOG

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

SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-3
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Cloudy, wet, 50's
DATE & TIME	9-27-18 / 11:46	**EVENT FREQUENCY**	Quarterly - Re-Sample
PURGE METHOD	Dedicated bladder pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	27	**SAMPLING EQUIPMENT**	Bladder Pump
DEPTH TO WATER (feet)	8.29	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	yes
WATER COLUMN (feet)	18.71	**FIELD BLANK COLLECTED?**	NO
PURGE VOLUME (gallons)	1 vol ≈ 3 gallons	**EQUIPMENT BLANK COLLECTED?**	NO

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU	DTW (ft)
0.0	11:41	0	21.6	4.68	1401	6.47	195.2	112	8.30
0.25	11:45	4	22.6	4.73	1165	3.31	228.6	23.3	8.30
0.50	11:50	9	22.4	4.75	1154	1.33	265.9	6.31	8.30
1.0	11:54	13	22.5	4.76	1156	0.58	283.1	2.46	8.30
1.5	11:58	17	22.5	4.77	1154	0.40	295.2	1.16	8.30
2.0	12:02	21	22.5	4.76	1153	0.47	301.9	1.21	8.30
2.25	12:06	25	22.5	4.72	1152	0.38	302.3	2.43	8.30
2.50	12:10	29	22.6	4.72	1152	0.39	303.7	1.05	

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU	DTW
2.50	12:15	29	22.6	4.72	1152	0.39	303.7	1.05	8.30

Sample Charateristics (Odor, Color)	Clear, No odor	**Preservatives Used**	HNO_3 -
Number of Containers	1	**Sampler Signature**	Phil Campbell

WELL DATA

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

Sed + Surface water Sampling.

EWS 9/20/18

Cane Creek DS 1

Photos 1+2

Time 9:07

ph	5.94
DO	3.5 mg/L
Cond	206.5
ORP	162.5
temp	23.1
Turb	~~[illegible]~~
	4.82

Cane Creek MS

Photos 3+4

Time 9:32

ph	6.1
DO	3.94 mg/L
Cond	175.9
ORP	161.5
temp	23.2
Turb	3.72

Charlie creek MS

Photos 5+6

Time 10:00

ph	6.13
DO	5.74 mg/L
Cond	149.4
ORP	155.0
Temp	23.2
Turb	5.88

EWS 9/20/18 Sed + Surface water Sampling

Cane creek U/S

Photos 7+8 9+10

Time 10:30

ph: 6.23
DO: 8.06
Cond: 248.2 mg/L
orp: 151.8
Temp: 25.3
turb: 5.89

Charlie creek US

Photos 11+12

Time 11:00

ph 6.04
DO 6.17 mg/L
Cond 120.4
orp 149.7
Temp 23.1
turb 2.67

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.