

**FIRST QUARTER 2019 GROUNDWATER
ASSESSMENT MONITORING REPORT
MARCH 2019 MONITORING EVENT**

**FORMER ENVIRONMENTAL WASTE SOLUTIONS
CAMDEN CLASS II LANDFILL**

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

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THE TENNESSEE DEPARTMENT OF ENVIRONMENT AND
CONSERVATION**

**FORMER ENVIRONMENTAL WASTE SOLUTIONS
CAMDEN CLASS II LANDFILL**

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EXECUTIVE SUMMARY

This report documents the first quarter 2019 assessment-monitoring event, which was performed at the former Environmental Waste Solutions, LLC (EWS) Camden Class II Landfill on March 5, 2019.

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. The observed chloride concentration at MW-3 during this March 2019 event (13.9 mg/l) was lower in concentration than the previous 22 groundwater events at MW-3 since May 19, 2009 when the reported chloride concentration at MW-3 was 10.0 mg/l.

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.

The First Quarter 2019 sampling event at the facility included the following sampling activities:

Groundwater samples were collected by CEC on March 5, 2019 from MW-1, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3. Leachate samples were collected by CEC on March 4, 2019 from the "Aluminum Processing Waste Cell (APWC)" and "Industrial Waste Cell (IWC)" locations. On March 7, 2019, 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).

Pace Analytical (Pace), formerly ESC Lab Sciences, was the laboratory sub-contracted to perform the chemical analyses. Laboratory reports for the 1st quarter 2019 groundwater analyses were prepared by Pace and reported to CEC on March 13, 2019. Laboratory reports from the 1st quarter 2019 stream (surface water and sediment) analysis were prepared by Pace and reported to CEC on March 18, 2019. Laboratory reports from the 1st quarter 2019 leachate analysis were prepared by Pace and reported to CEC on March 21, 2019.

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 during this assessment monitoring event are summarized in the following paragraphs.

Total cadmium was detected above the MCL (0.005 mg/l) at MW-3 during the March 5, 2019 monitoring event (total cadmium at MW-3 = 0.0117 mg/l). Total cadmium was also detected above the MCL in the duplicate sample collected at MW-3 during the March 5, 2019 monitoring event (total cadmium at MW-3 duplicate sample = 0.0113 mg/l). The cadmium detections at MW-3 during this event were the only cadmium detections 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 when considering all current and past data for cadmium at MW-3. However, the total cadmium concentration reported at MW-3 during the March 5, 2019 sampling event (total cadmium at MW-3=0.0117 mg/l) was considerably lower in concentration than the previous 4th quarter 2018 event (total cadmium at MW-3=0.144 mg/l), the 3rd quarter 2018 event on September 12, 2018 (total cadmium at MW-3=0.297 mg/l), and the 3rd quarter 2018 re-sample event on September 27, 2018 (total cadmium at MW-3=0.204 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 the concentrations of total cadmium, calcium, magnesium, manganese, nickel, potassium, zinc, chloride, fluoride, and sulfate at MW-3 decreased in concentration during this first quarter 2019 monitoring event compared to the previous fourth quarter 2018 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 March 7, 2019 monitoring event. In addition, total cadmium was not detected above the laboratory PQL of 0.500 mg/kg in the sediment samples collected from nearby Charlie Creek and Cane Creek during the March 7, 2019 monitoring event.

Eight SSIs were identified over background during this event. In addition to the total cadmium in MW-3, SSIs included chloride (MW-3, MW-5, TMW-1, TMW-2, and TMW-3), zinc (MW-3), and sulfate (MW-3). The chloride, zinc, and sulfate detections observed in the site monitoring wells were all below their associated MCLs or 2DWS.

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
micro-mhos•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:

$$\textit{Established Top of Casing Elevation} - \textit{Depth to Water} = \textit{Groundwater Elevation}$$

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-one (21) feet below the top of casing at the up-gradient monitor well MW-1 to approximately ten (10) feet below the top of casing at monitor well MW-4. The potentiometric gradient calculated from groundwater elevation data collected on March 5, 2019 is approximately 1.27%.

The potentiometric gradient is calculated according to the following formula:

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

$$\frac{(395.86') - (371.63')}{1,910'} * 100 = 1.27\%$$

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 (airline 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 March 5, 2019 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 ($\text{Na}_2\text{S}_2\text{O}_3$); 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 (HNO₃); 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 March 4, 2019, 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 March 21, 2019. 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-3. 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-3 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 March 13, 2019. Laboratory analytical testing of the field blank presented in the analytical report revealed that none of the tested constituents were above the PQL. Most of the results for the duplicate sample collected from MW-3 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.

For instance, the groundwater analytical report from the March 2019 event indicated that the same analyte was found in the associated laboratory blank for the detected concentrations of total Hardness (MW-1, TMW-1, TMW-2), Alkalinity (MW-4), copper (MW-3, TMW-3), and dissolved lead (Duplicate at MW-3, TMW-3) and are indicated as laboratory qualifier “B”. In addition, the IWC-L leachate sample indicated multiple inorganic constituent analysis failed the method required serial dilution test and/or subsequent post-spike criteria which indicated matrix interference as laboratory qualifier “O1”; or the sample concentrations were too high to evaluate accurate spike recoveries as indicated by laboratory qualifier “V”. 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 March 2019 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 first quarter 2019 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

First quarter groundwater samples were collected by CEC on March 5, 2019. Pace performed the groundwater analysis and reported the results on March 13, 2019. First quarter leachate samples were collected by CEC on March 4, 2019 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 March 21, 2019. First quarter stream (surface water and sediment) samples were collected from the Cane Creek and Charlie Creek by CEC on March 7, 2019, and Pace reported the results on March 18, 2019.

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 March 7, 2019 are presented in Table 2b – 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 March 5, 2019 monitoring event (total cadmium at MW-3 = 0.0117 mg/l). In addition, total cadmium was detected above the MCL in the duplicate sample collected from MW-3 during the March 5, 2019 monitoring event (total cadmium at duplicate MW-3=0.0113 mg/l). A summary of cadmium concentrations (total cadmium and dissolved cadmium) and turbidity values observed at MW-3 during each sampling event since May 9, 2016 is referenced in the table below:

MW-3 Summary of Cadmium Concentrations and Turbidity Measurements			
Date	Total Cadmium (mg/l)	Cadmium, Dissolved (mg/l)	Turbidity (NTU)
3/5/2019	0.0117	0.0133	6.27
12/4/2018	0.144	0.139	4.77
9/27/2018	0.204	0.204	1.05
9/12/2018	0.297	0.320	1.12
6/19/2018	0.0312	0.0292	4.90
3/22/2018	0.00671	0.00637	24.3
12/14/2017	0.00659	0.00733	23.0
9/28/2017	0.00926	0.0102	18.9
8/8/2017	0.0113	NA	16.6
6/8/2017	0.0286	NA	34.8
11/10/2016	0.00177	NA	64.5
5/9/2016	<0.001	NA	8.39

As demonstrated in the summary table above, the total cadmium concentrations at MW-3 and the duplicate sample collected at MW-3 during this March 5, 2019 monitoring event were lower and appear to be decreasing in concentration compared to previous monitoring events. In addition, the turbidity result for MW-3 on March 5, 2019 (6.27 NTUs) was within the recommended goal of 10 NTUs, and is consistent with recent monitoring events. Also, the sampling results from the March 5, 2019 groundwater event and the previous seven sampling events 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 at a level above the laboratory PQL, but at a level below the MCL (<0.005 mg/l), in MW-3 during the 4th quarter 2016 sampling event completed on November 10, 2016. Total cadmium was first detected above the MCL of 0.005 mg/l at MW-3 during the June 8, 2017 event. 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 any other monitoring wells at the site including monitoring wells TMW-1, TMW-2, and TMW-3, which are down-gradient from MW-3.

Total Cobalt was detected in up-gradient well MW-1 (0.0395 mg/l) and down-gradient wells MW-3 (0.00317 mg/l), MW-3 duplicate (0.00326 mg/l), and MW-5 (0.00243 mg/l) during this March 2019 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 cobalt detection at upgradient MW-1 was above the RSL for cobalt concentrations during this March 2019 event. However, the reported cobalt concentrations in downgradient MW-3 (and the MW-3 duplicate) and MW-5 were below the RSL for cobalt concentrations during this March 2019 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 similar concentrations during previous events. For this site, 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 (0.00479 mg/l), MW-3 duplicate (0.00499 mg/l), MW-4 (0.00218 mg/l), MW-5 (0.0158 mg/l), TMW-1 (0.00213 mg/l), and TMW-3 (0.00203 mg/l), and were not above the MCL of 0.1 mg/l for chromium concentrations.

Total Copper was detected in down-gradient MW-3 (0.0074 mg/l) and TMW-3 (0.00558 mg/l), and were not above the MCL of 1.3 mg/l for copper concentrations. As indicated by the laboratory qualifier “B” in the analytical report, total copper was found in the associated laboratory blank for MW-3 and TMW-3. Therefore, the copper concentrations reported at MW-3 and TMW-3 during this event may have been falsely reported at higher concentrations than the actual concentrations.

Total Mercury was detected in up-gradient well MW-1 (total mercury = 0.000922 mg/l) during this March 2019 monitoring event, which was below the MCL of 0.002 mg/l for mercury concentrations and lower in concentration than the previous December 2018 event (total mercury

= 0.00101 mg/l) at MW-1. Total Mercury was not detected above the laboratory PQL (0.000200 mg/l) at any of the down-gradient wells during this March 2019 event. During the 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 in future monitoring events.

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

Laboratory analytical results for the groundwater samples collected in March of 2019 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 that 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 TMW-1, TMW-2, TMW-3, and the duplicate sample collected at MW-3, iron in down-gradient wells MW-5, TMW-1, TMW-2, and TMW-3, manganese in down-gradient wells MW-3, the duplicate sample collected at MW-3, and MW-5. Chloride, sulfate, and nickel 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 TMW-1 (0.340 mg/l), TMW-2 (0.562 mg/l), TMW-3 (0.371 mg/l), and the duplicate sample at MW-3 (0.201 mg/l) during the March 2019 sampling event were above the 2DWS (0.2 mg/L). During the previous December 2018 sampling event, the aluminum concentrations at MW-3 (0.638 mg/l), duplicate sample at MW-3 (0.672 mg/l), TMW-1 (0.315 mg/l), TMW-2 (1.26 mg/l), and TMW-3 (0.276 mg/l) were above the SDWS. However, it should be noted that the previous December 2018 analytical laboratory report identified a “B” qualifier code for the aluminum concentration at MW-3, MW-5, TMW-1, and TMW-3 that indicated that aluminum was found in the associated method blank. Therefore, the aluminum concentrations observed at MW-3, MW-5, TMW-1, and TMW-3 during the December 2018 event may have been falsely reported at higher concentrations than the actual concentrations. In addition, during the September 2018 sampling event, the aluminum concentrations at MW-3 (0.418 mg/l), MW-5 (0.219 mg/l), and TMW-2 (1.29 mg/l) were above the SDWS. Aluminum was not detected above the PQL (0.001 mg/l) at MW-1 and MW-4 during this March 2019 event.

Sampling data suggests that total aluminum concentrations are sensitive to turbidity values, given that the dissolved aluminum concentrations at MW-5, TMW-2, and TMW-3 were less than the laboratory PQL (<0.1 mg/l). The total aluminum detections were likely affected by the turbidity at the time of sampling at TMW-1 (52.6 NTU), TMW-2 (38.2 NTU), and TMW-3 (38.2 NTU), and

is supported by the fact that the dissolved aluminum at TMW-1 (dissolved aluminum=0.156 mg/l) was lower than the total aluminum concentration and below the 2DWS for Aluminum. 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-2 (1.34 NTU) and TMW-3 (0.84 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-1 (11.0 NTU) remained above the recommended 10 NTUs 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** concentrations reported at MW-3 (13.9 mg/l) and MW-5 (81.0 mg/l) during this March 2019 event were below the 2DWS for chloride concentrations (250 mg/l). The reported chloride concentration at MW-3 during this event was considerably lower in concentration compared to the previous December 2018 event (65 mg/l) and September 2018 event (222 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. In addition, the chloride concentration at MW-3 during this event was lower in concentration than the previous twenty-two monitoring events since July 16, 2010. Although the chloride concentrations reported at MW-5 have remained below the 2DWS for chloride concentrations, the chloride concentrations at MW-5 appear to be increasing slightly since November 2016 based on the time-series graphs. The observed increase in chloride concentrations at MW-5 during this event is noted, and chloride concentrations at MW-3 and MW-5 will continue to be evaluated.

Total Iron was detected above the 2DWS (0.3 mg/l) in up-gradient well MW-1 (5.14 mg/l) and down-gradient wells MW-5 (0.741 mg/l), TMW-1 (1.36 mg/l), TMW-2 (0.886 mg/l), and TMW-3 (1.18 mg/l) during the March 2019 monitoring event. The reported total iron concentrations at each of the groundwater monitoring wells 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 (0.629 mg/l) and down-gradient wells MW-3 (0.375 mg/l) and MW-5 (0.151 mg/l) during the March 2019 monitoring event. The presence of total manganese in the local groundwater is considered to be naturally occurring, originating from deposits in the soil overburden.

Total Nickel was detected in up-gradient well MW-1 (0.00638 mg/l) and down-gradient wells MW-3 (0.0162 mg/l) and MW-5 (0.009932 mg/l) during the March 5, 2019 sampling event, and were **not** 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). 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. The observed total nickel concentration at MW-3 during this event was lower in concentration compared to the previous December 2018 monitoring event (total nickel at MW-3=0.0714 mg/l) and September 2018 monitoring event (total nickel at MW-3=0.126 mg/l).

The **Sulfate** concentration reported at MW-3 during this sampling event was 85.8 mg/l, which was **below** the 2DWS for sulfate (250 mg/l). The observed sulfate concentration during this event was considerably lower in concentration than the previous December 2018 event (324 mg/l) and the previous September 2018 event (484 mg/l), which was the first time the Sulfate concentration at MW-3 was above the 2DWS. Prior to September 2018, 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/l) 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-5 (6.12 mg/l), which was just above the laboratory PQL of 5.00 mg/l during this March 2019 event, which was well below the 2DWS. Sulfate was not detected above the PQL of 5.00 mg/l 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 total magnesium concentration at MW-3 during this March 2019 event was 7.83 mg/l, and was considerably lower in concentration than the previous December 2018 event (36.4 mg/l) and previous September 2018 event (64 mg/l). Before the September 2018 event, 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 from November 2015 to June 2018.

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 March 7, 2019 monitoring event. In addition, total cadmium was not detected above the laboratory PQL of 0.500 mg/kg in the sediment samples collected from nearby Charlie Creek and Cane Creek during this March 7, 2019 monitoring event.

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. Four QC qualifier codes (B, J4, O1, and V) were indicated during the laboratory analysis of samples collected in March 2019. One QC qualifier

codes (B) was indicated during the laboratory analysis of groundwater samples. Three QC qualifier codes (B, O1, and V) were indicated during the laboratory analysis of leachate samples. Two QC qualifier code (B and J4) 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 may be evaluated using parametric prediction limit (PPL) analysis. Inter-well and intra-well (intra-well utilized for upgradient MW-1) statistical methods were appropriately utilized to determine statistically significant increases in constituent concentrations.

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. Intra-well PPL and non-parametric statistical methods were appropriately utilized to determine statistically significant increases in water quality data in up-gradient monitoring well MW-1. The arsenic and cobalt data at MW-1 were normally distributed using the Shapiro-Wilks test for normality. In addition, the chloride data at MW-1 was normally distributed when the data were log-transformed with replacement of non-detects to half the corresponding detection limit. Therefore, intra-well PPL analysis was performed for the arsenic and cobalt data sets that passed normality testing. Intra-well PPL analysis was also performed for the chloride data set that passed normality testing as log-transformed data. However, all other data sets (barium, nickel, and

mercury data) for MW-1 were not normally distributed, and were evaluated using intra-well non-parametric statistical methods.

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. 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. All other data sets (aluminum, barium, total cadmium, chromium, cobalt, copper, fluoride, nickel, 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 analysis was 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 analysis was conducted for 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 as a confirmation test for any parameter that 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 cadmium at MW-3, chloride at MW-3, MW-5, TMW-1, TMW-2, and TMW-3, sulfate at MW-3, and zinc at MW-3. Trend analyses revealed a statistically significant upward trend in total cadmium, chloride, fluoride, sulfate, and zinc concentrations reported at MW-3. In addition, trend analyses revealed a statistically significant upward trend in total barium, chloride, chromium, nickel, and sulfate concentrations was reported at MW-5; and a statistically significant upward trend in chloride concentrations was reported at TMW-1 and TMW-3.

Trend analyses revealed a statistically significant downward trend in aluminum, chromium and cobalt at MW-3 with no distinct statistically significant trends with total barium and nickel concentrations reported at MW-3. In addition, trend analysis revealed a downward trend in total barium and chromium concentrations at MW-4. No other statistically significant upward or downward trends in data were identified using the Mann-Kendall trend analyses.

Based on the review of the time-series graphs, it appears that the concentrations of total barium, total cadmium, calcium, chloride, cobalt, fluoride, magnesium, manganese, nickel, potassium, zinc, and sulfate at MW-3 decreased in concentration during this 1st quarter 2019 monitoring event compared to the previous two monitoring events (fourth quarter 2018 monitoring event and the third quarter 2018 event). During the 3rd quarter 2018 monitoring event, these constituent concentrations (total cadmium, calcium, magnesium, manganese, nickel, potassium, zinc, chloride, fluoride, and sulfate) at MW-3 increased in concentration compared to previous groundwater events. In addition, the conductivity measured in millivolts (mV) observed at MW-3 during this March 2019 event was lower than the previous two monitoring events.

Trend analysis did not reveal a trend in the barium data at MW-3 using the Mann-Kendall trend analysis during this event, and did not produce a SSI over background using the Shewart-CUSUM control chart at MW-3. Further, the reported barium concentration at MW-3 during this event (0.032 mg/l) was less than the twenty-two consecutive sample results collected at MW-3 from July 16, 2010 to December 4, 2018. Total barium also remains below the MCL for the primary drinking water standard for barium of 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 March 5, 2019 (0.0117 mg/l and 0.0113 mg/l in duplicate sample) were lower in concentration than the previous December 4, 2018 (0.144 mg/l and 0.137 mg/l in duplicate sample) event.

The chloride concentrations observed at MW-3 (13.9 mg/l), MW-5 (81.0 mg/l), TMW-1 (16.4 mg/l), TMW-2 (19.3 mg/l), and TMW-3 (55.9 mg/l) produced a 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 and TMW-2, the data do 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, TMW-1, and TMW-3 indicated an upward trend in chloride concentrations using the Mann-Kendall trend analyses at the 95% confidence level.

The chromium concentrations observed at MW-3 (0.00479 mg/l), MW-4 (0.00218 mg/l), MW-5 (0.0158 mg/l), TMW-1 (0.00213 mg/l), and TMW-3 (0.00203 mg/l) were less than the MCL (0.1 mg/l), and did not produce a SSI in reported concentrations during this event.

The fluoride concentration at MW-3 (Fluoride at MW-3=0.163 mg/l) was less than the MCL (4.0 mg/l) and did not produce a SSI over background during this event. When considering all data accumulated from MW-3 since January 21, 2009, a statistically significant upward trend in fluoride concentrations at MW-3 was indicated using the Mann-Kendall trend analysis at the 95% confidence level. However, the reported fluoride concentration at MW-3 during this event was less than the previous December 2018 event (Fluoride at MW-3=0.4 mg/l) and September 2018 event (Fluoride at MW-3=0.543 mg/l). The Fluoride detection at MW-3 in September 2018 was higher than the previous ten sampling events prior to the September 2018 event.

A 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 during this sampling event was 85.8 mg/l, and was considerably lower in concentration than the previous December 2018 event (324 mg/l) and the previous September 2018 event (484 mg/l). The sulfate concentrations observed at MW-3 had remained below the 2DWS during all previous monitoring events prior to September 2018. Sulfate was also detected in MW-5 (6.12 mg/l) during this March 2019 event, which was well below the 2DWS of 250 mg/l. Sulfate was not detected above the PQL in any of the other monitoring wells across the site.

A SSI in reported total zinc concentrations at MW-3 was identified during this sampling event, and the statistical trend analysis for total zinc at MW-3 during this March 2019 event (total zinc at MW-3=0.0994 mg/l) confirmed an increasing trend having statistical significance. However, the zinc concentration reported during this event was less than the previous three monitoring events in December 2018 (total zinc at MW-3= 1.34 mg/l), initial September 12, 2018 event (total zinc at MW-3= 1.68 mg/l), and the subsequent re-sample event on September 27, 2018 (total zinc =1.58 mg/l). The September 12, 2018 event was the highest zinc concentration reported at MW-3 since April 19, 2008. 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 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 appear to be decreasing in concentration since September 2018, and are still below the 2DWS of 5 mg/l.

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 first quarter assessment-monitoring event of 2019 are summarized as follows:

- SSIs over background identified for the current monitoring event include total cadmium at MW-3, chloride at MW-3, MW-5, TMW-1, TMW-2, and TMW-3, sulfate at MW-3, and zinc at MW-3. Trend analyses revealed a statistically significant upward trend in total barium, total cadmium, chloride, copper, sulfate, and zinc concentrations reported at MW-3; a statistically significant upward trend in barium, chromium, nickel, and sulfate concentrations reported at MW-5; and a statistically significant upward trend in chloride concentrations reported at MW-5, TMW-1, and TMW-3.
- The total and dissolved cadmium concentrations at MW-3 during this event were above the MCL. In addition, 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. During the previous two monitoring events in December 2018 and September 2018, cadmium concentrations were considerably higher in MW-3 than the concentration detected in the current, March 2019 event. The higher concentrations of cadmium in September 2018 may have been attributable to the closure construction activities in and around the storm water pond located immediately adjacent to MW-3 at that time. As construction activities in these areas have decreased, the cadmium levels observed in MW-3 have considerably decreased over a short period of 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.
- 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. During the previous events in September 2018 and December 2018, the observed sulfate concentrations at MW-3 had been above the 2DWS for sulfate (250 mg/l). However, the sulfate concentration reported at MW-3 during this sampling event was 85.8 mg/l, which was below the 2DWS for sulfate (250 mg/l). Sulfate was also detected in MW-5 (6.12 mg/l) during this March 2019 event, which was well below the 2DWS. Sulfate has not consistently been detected above the PQL (5 mg/l) at any of the other permanent monitoring wells or temporary monitoring wells across the site. Although the sulfate concentration at MW-3 was below the 2DWS during this event, the observed sulfate concentration during this event is relatively higher compared to most sampling events prior to September 2018. Therefore, MW-3 will be closely monitored for increasing trends in sulfate concentrations 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, potassium, zinc, chloride, fluoride,

and sulfate at MW-3 decreased in concentration during this first quarter 2019 monitoring event compared to the previous fourth quarter 2018 monitoring event. Further, these observed constituent concentrations during the previous fourth quarter 2018 monitoring event were lower than the third quarter 2018 monitoring event. During the third quarter 2018 event, the same, above-referenced constituents at MW-3 increased in concentration compared to previous groundwater events. Specifically, the observed cadmium, calcium, fluoride, magnesium, manganese, nickel, and zinc concentrations reported at MW-3 during the September 2018 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 the previous third quarter 2018 monitoring event was higher than previous monitoring events since the April 2016 monitoring event. However, the conductivity measurement during this event and the previous fourth quarter 2018 event were considerably lower than the previous third quarter 2018 monitoring event.

- The chloride concentrations at MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3 are still well below the 250 mg/l 2DWS. Further, the observed chloride concentration at MW-3 during this event (13.9 mg/l) was lower in concentration than the previous 22 groundwater events at MW-3 after May 19, 2009 when the reported chloride concentration at MW-3 was 10.0 mg/l.
- Trend analyses revealed a statistically significant downward trend in aluminum, chromium, and cobalt concentrations reported at MW-3, and no distinct statistically significant trend in barium, copper, and nickel concentrations were reported at MW-3. When considering all chloride data to date from MW-4, and TMW-2, the data do not show an upward or downward trend in chloride concentrations using the Mann-Kendall trend analysis at the 95% confidence level. In addition, trend analysis revealed a downward trend in total barium and chromium concentrations at MW-4. No other statistically significant upward or downward trends in data were identified for this event.
- 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 March 7, 2019 monitoring event. In addition, total cadmium was not detected above the laboratory PQL of 0.500 mg/kg in the sediment samples collected from nearby Charlie Creek and Cane Creek during this March 7, 2019 monitoring event.
- No constituents were detected above regulatory limits at any of the stream samples. Sediment samples do not have an MCL and surface water is compared to general water quality criteria.

The second quarter 2019 assessment-monitoring event is tentatively scheduled for June 2019 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. In addition, 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 2018, and no new wells or springs were identified within the approved search radius for the site during the December 2018 update. The next annual water use survey update for the former EWS Class II Landfill is scheduled to be completed in December 2019.

7.0 RECOMMENDATIONS

The following recommendations are presented in an effort to ensure 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



LEGEND

- MW1** 394.62 GROUND WATER MONITORING WELL
GROUND WATER ELEVATION (FMSL)
- TMW-1** 375.46 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

NOTE:

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

$$i = \frac{395.86' \text{ (MW-1)} - 371.63' \text{ (MW-4)}}{1,910'} = 0.0127 \text{ ft/ft}$$

GROUNDWATER CONDITIONS

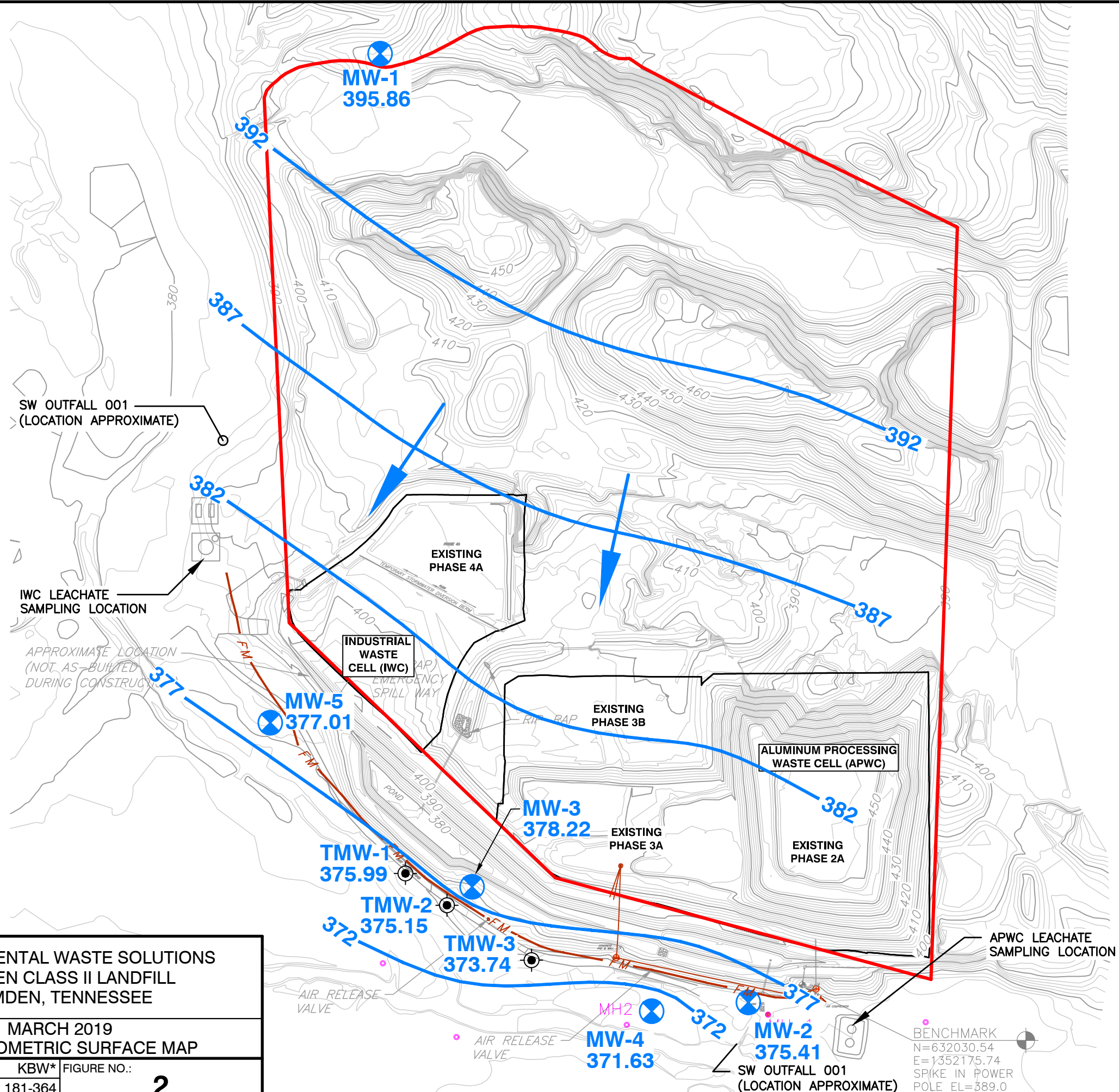
THE WATER LEVELS PRESENTED HEREIN ARE APPLICABLE TO THE LOCATION AND TIME OF MEASUREMENT. WATER LEVELS MAY FLUCTUATE THROUGH TIME.

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



*HAND SIGNATURE ON FILE



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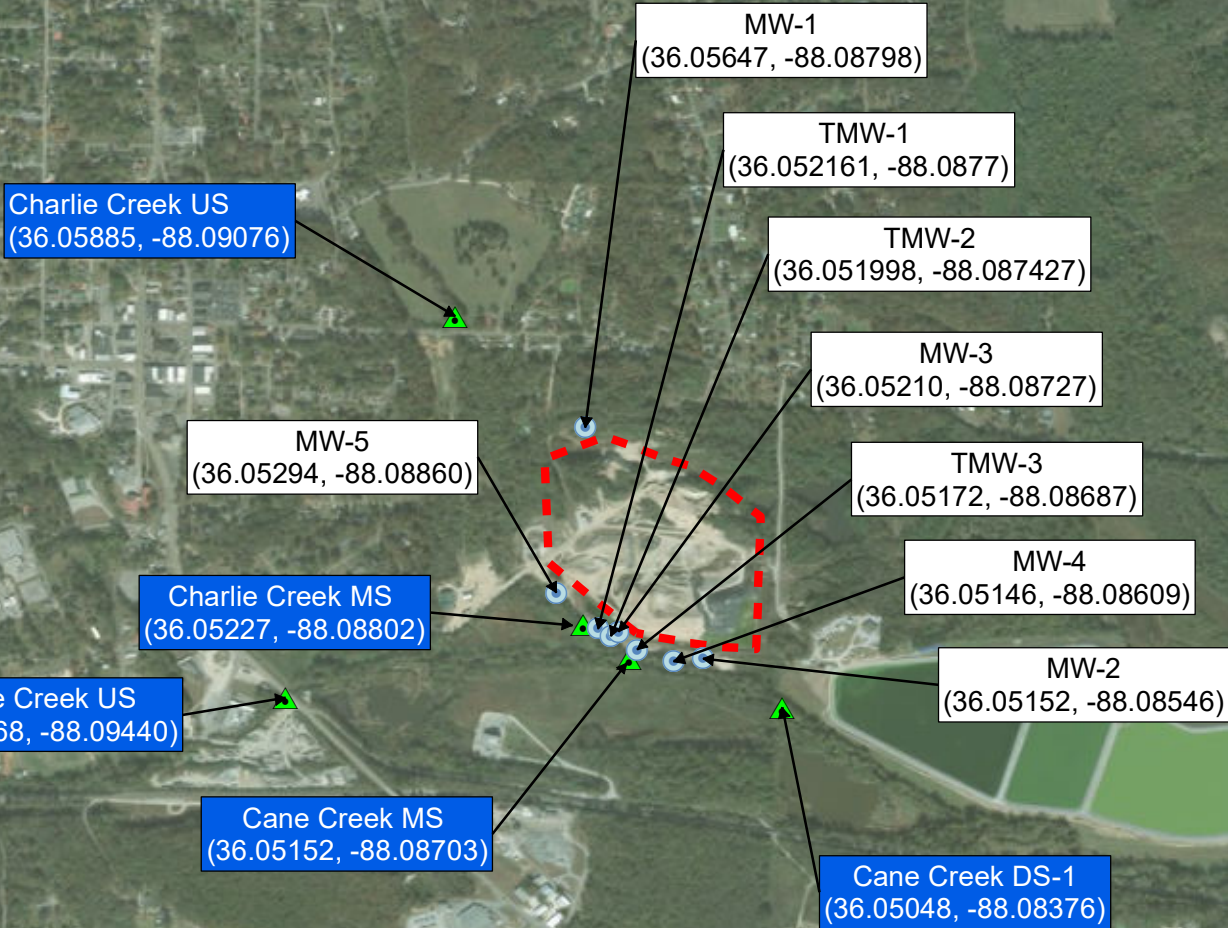
ENVIRONMENTAL WASTE SOLUTIONS
CAMDEN CLASS II LANDFILL
CAMDEN, TENNESSEE

MARCH 2019
POTENTIOMETRIC SURFACE MAP

DRAWN BY:	CDS	CHECKED BY:	PC	APPROVED BY:	KBW*	FIGURE NO.:	2
DATE:	APRIL 2019	DWG SCALE:	1"=200'	PROJECT NO.:	181-364		

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

P:\2018\181-364\CADD\DWG\181-364_GROUNDWATER MAP MARCH 2019.DWG FIG 2 (2) JLS:(PCAMPBELL - 5/7/2019) - LP: 5/7/2019_3:59:01_PM



LEGEND

- Groundwater Wells
- Sediment and Surface Water Sample Station
- Approximate Fill Limit

REFERENCE
 ESRI WORLD IMAGERY / ARCGIS MAP SERVICE:
[HTTP://GOTO.ARCGISONLINE.COM/MAPS/WORLD_IMAGERY](http://GOTO.ARCGISONLINE.COM/MAPS/WORLD_IMAGERY),
 ACCESSED 6/7/2019, IMAGERY DATE: 2016.

I:\SVR-NASHI\P\2018\181-364-GIS\Maps\181-364 Figure 3 Map for Former EWS Landfill GW Report.mxd (6/7/2019 3:54:01 PM)



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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* <small>* Hand signature on file</small>	FIGURE NO: 3
DATE: JUNE 2019	SCALE: 1" = 1,500'	PROJECT NO: 181-364	

Table 1
Former Environmental Waste Solutions Camden Class II Landfill
Field Parameters and Potentiometric Data - March 2019

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	3/5/2019	10:35	416.47	385.97	0.17	1.7	20.61	395.86	13.1	94.2	5.48	1.71	120.9	5.27
MW-2*	3/5/2019	12:55	380.35	367.70	0.17	1.3	4.94	375.41	10.0	362.2	6.17	0.62	135.8	NS
MW-3	3/5/2019	13:35	392.90	365.10	0.17	2.2	14.68	378.22	9.0	198	5.01	7.22	151.6	6.27
MW-4	3/5/2019	12:35	381.47	358.37	0.17	2.3	9.84	371.63	12.8	54.3	5.76	3.26	128.9	2.14
MW-5	3/5/2019	11:40	385.25	351.40	0.17	4.3	8.24	377.01	13.9	285.6	5.26	0.92	149.2	34.4
TMW-1	3/5/2019	11:45	381.19	348.99	0.085	1.1	5.20	375.99	12.1	82.7	5.50	3.89	264.5	52.6
TMW-2	3/5/2019	13:15	384.27	356.77	0.085	0.8	9.12	375.15	12.7	82.1	5.56	5.33	330.5	36.0
TMW-3	3/5/2019	15:00	381.37	353.37	0.085	0.9	7.63	373.74	12.2	207.0	5.19	1.03	331.5	38.2
Charlie Creek US	3/7/2019	10:10	NA	NA	NA	NA	NA	NA	3.9	53.3	6.27	11.71	166.4	5.57
Cane Creek US	3/7/2019	10:00	NA	NA	NA	NA	NA	NA	3.8	97.7	6.47	11.87	112.0	9.09
Charlie Creek MS	3/7/2019	9:10	NA	NA	NA	NA	NA	NA	3.8	71.0	6.49	11.63	139.6	7.19
Cane Creek MS	3/7/2019	9:00	NA	NA	NA	NA	NA	NA	3.8	92.0	6.51	11.63	104.8	7.55
Cane Creek DS-1	3/7/2019	8:30	NA	NA	NA	NA	NA	NA	3.7	95.0	6.28	11.88	126.2	8.22
Leachate (IWC-L)	3/4/2019	14:55	NA	NA	NA	NA	NA	NA	6.30	119,120	5.06	3.80	197.2	15.9
Leachate (APWC-L)	3/4/2019	14:45	NA	NA	NA	NA	NA	NA	43.3	133,499	9.10	0.17	80.6	2.53

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 March 5, 2019.

* - 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 - March 2019

	MW-1		MW-3		Duplicate (MW-3)		MW-4		MW-5		TMW-1		TMW-2		TMW-3	Field Blank	Leachate IWC-L		Leachate-APWC-L	
	3/5/2019		3/5/2019		3/5/2019		3/5/2019		3/5/2019		3/5/2019		3/5/2019		3/5/2019	3/5/2019	3/4/2019		3/4/2019	
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)	
Hardness	-	34.1	B 98.5		100		<30.0		101		34.4	B	31.5	B	80.1	<30.0	2,680	B	165	B
Alkalinity	-	53.9	<20.0		<20.0		24.5	B	<20.0		<20.0		<20.0		<20.0	<20.0	<20.0		8,770	
Ammonia Nitrogen	-	<0.100	<0.100		<0.100		<0.100		<0.100		<0.100		<0.100		<0.100	<0.100	71.3		5,210	
COD	-	<10.0	<10.0		11.7		<10.0		<10.0		<10.0		<10.0		<10.0	<10.0	210		8,660	
Boron	-	<0.200	<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200	<0.200	<0.200		10.4	
Boron, Dissolved	-	<0.200	<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200	NS	<0.200		10.9	
Bromide	-	<1.00	<5.00		<5.00		<1.00		<1.00		<1.00		<1.00		<1.00	<1.00	1.64		116	
Chloride	250 ²	2.11	13.9		13.9		6.99		81.0		16.4		19.3		55.9	<1.00	4,160		120,000	
Fluoride	2 ²	<0.100	0.163		0.127		<0.100		<0.100		<0.100		<0.100		<0.100	<0.100	0.437		20.2	
Nitrate	10	<0.100	1.18		1.36		0.619		1.38		1.78		0.964		4.83	<0.100	<0.100		92.6	
Sulfate	250 ²	<5.00	85.8		83.8		<5.00		6.12		<5.00		<5.00		<5.00	<5.00	<500		1,200	
Aluminum	0.2 ²	<0.100	0.192		0.201		<0.100		0.168		0.340		0.562		0.371	<0.100	15.1		<10.0	
Aluminum, Dissolved	0.2 ²	<0.100	0.175		0.179		<0.100		<0.100		0.156		<0.100		<0.100	<0.100	6.5	O1	<10.0	
Antimony	0.006	<0.00200	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200	<0.00200	<0.00200		<0.200	
Antimony, Dissolved	-	<0.00200	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200	<0.00200	<0.00200		0.0536	
Arsenic	0.01	0.0045	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200	<0.00200	0.0129		<0.200	
Arsenic, Dissolved	0.01	0.0074	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200	NS	<0.0200	O1	<0.200	
Barium	-	0.0184	0.0320		0.0313		0.00623		0.0452		0.0186		0.0270		0.0407	<0.00500	0.132		0.905	
Barium, Dissolved	-	0.0227	0.0347		0.0368		0.00724		0.0449		0.0177		0.0260		0.0433	NS	0.140	O1	1.23	
Beryllium	0.004	<0.00200	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200	<0.00200	0.00304		<0.200	
Total Cadmium	0.005	<0.00100	0.0117		0.0113		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100	<0.00100	6.22		<0.100	
Cadmium, Dissolved	0.005	<0.00100	0.013		0.0131		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100	NS	6.56	O1 V	0.10	
Calcium	-	8.35	18.7		19.0		3.80		15.5		8.16		7.18		17.2	<1.00	752		<100	
Calcium, Dissolved	-	9.11	22.7		22.4		4.62		17.7		9.3		8.31		19.9	NS	790	O1 V	<100	
Chromium	0.1	<0.00200	0.00479		0.00499		0.00218		0.0158		0.00213		<0.00200		0.00203	<0.00200	0.0169		<0.200	
Chromium, Dissolved	0.1	<0.00200	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200	NS	<0.0200		<0.200	
Cobalt	0.006 ³	0.0395	0.00317		0.00326		<0.00200		0.00243		<0.00200		<0.00200		<0.00200	<0.00200	0.0477		<0.200	
Cobalt, Dissolved	0.006 ³	0.0491	0.00345		0.0036		<0.00200		0.00275		<0.00200		<0.00200		<0.00200	NS	0.053	O1	<0.200	
Copper	1.3	<0.00500	0.0074	B	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		0.00558	B	<0.00500		0.465	143
Copper, Dissolved	1.3	0.0149	0.00814		<0.00500		<0.00500		0.00591		0.00562		<0.00500		0.00634	NS	0.413	O1	147.00	
Iron	0.3 ²	5.14	0.218		0.205		0.116		0.741		1.36		0.886		1.18	<0.100	21.5		<10.0	
Iron, Dissolved	0.3 ²	7.47	<0.100		<0.100		<0.100		<0.100		0.231		<0.100		<0.100	NS	20.8	O1 V	<10.0	
Lead	0.015	<0.00200	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200	<0.00200	0.0258		<0.200	
Lead, Dissolved	0.015	0.00204	B <0.00200		0.00224	B	<0.00200		<0.00200		<0.00200		<0.00200		0.002	B	0.0249	B O1	<0.200	
Magnesium	-	2.38	7.83		8.04		2.33		10.9		2.54		2.62		5.79	<1.00	89.9		<100	
Magnesium, Dissolved	-	2.68	9.10		9.25		2.65		12.5		2.96		3.04		6.70		97.2	O1	<100	
Manganese	0.05 ²	0.629	0.375		0.378		0.0159		0.151		0.0965		0.0151		0.0195	<0.00500	11.9		<0.500	
Manganese, Dissolved	0.05 ²	0.794	0.42		0.424		0.0168		0.168		0.0943		<0.00500		0.0136		12.4	O1 V	<0.500	
Nickel	0.10 ¹	0.00638	0.0162		0.0158		<0.00200		0.00932		<0.00200		<0.00200		<0.00200	<0.00200	0.0587		1.89	
Nickel, Dissolved	0.10 ¹	0.00714	0.0175		0.0181		<0.00200		0.00921		<0.00200		<0.00200		<0.00200		0.065	O1	2.54	

Table 2a
Former EWS Camden Class II Landfill IDL 03-0212 (Terminated)
Groundwater and Leachate Analytical Data - March 2019

	MW-1	MW-3	Duplicate (MW-3)	MW-4	MW-5	TMW-1	TMW-2	TMW-3	Field Blank	Leachate IWC-L	Leachate-APWC-L	
	3/5/2019	3/5/2019	3/5/2019	3/5/2019	3/5/2019	3/5/2019	3/5/2019	3/5/2019	3/5/2019	3/4/2019	3/4/2019	
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)	
Potassium	-	1.06	3.4	3.39	<1.00	1.31	<1.00	<1.00	1.59	<1.00	595	30,800
Potassium, Dissolved	-	1.21	3.89	3.88	<1.00	1.45	1.01	<1.00	1.75		669	O1 41,700
Selenium	0.05	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	0.0162	<0.200
Selenium, Dissolved	0.05	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	NS	0.0584	O1 0.277
Silver	0.10 ²	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200		<0.00200	<0.200
Sodium	-	4.14	6.22	6.38	3.10	18.8	3.71	3.38	10.6	<1.00	1,080	48,600
Sodium, Dissolved	-	4.37	6.76	6.70	3.50	19.8	3.88	3.81	11.7		1,130	O1 V 48,100
Thallium	0.002	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	<0.00200	0.00231	<0.200
Vanadium	-	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.500
Zinc	5 ²	<0.0250	0.0994	0.10	<0.0250	<0.0250	<0.0250	<0.0250	<0.0250	<0.0250	63.1	21.9
Zinc, Dissolved	5 ²	<0.0250	0.114	0.117	<0.0250	<0.0250	<0.0250	<0.0250	<0.0250		64.0	28.6
Mercury	0.002	0.000922	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	0.000389
Mercury, Dissolved	0.002	0.000361	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200	<0.000200		<0.000200	<0.00200
Acetone	-	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	0.0991	0.357
Bromodichloromethane	-	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	0.0037	<0.00100
Chloroform		<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	0.0155	<0.00500
2-Butanone (MEK)	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.011	0.0122
Toluene	1.0	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.00100	<0.00100
4-Methyl-2-Pentanone (MIBK)	-	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.0383	0.0117
Ethylene Dibromide (EDB)	0.00005	<0.0000100	<0.0000100	<0.0000100	<0.0000100	<0.0000100	<0.0000100	<0.0000100	<0.0000100	<0.0000100	<0.0000100	<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.

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

V- The sample concentration is too high to evaluate accurate spike recoveries.

Table 2b
Former EWS Camden Class II Landfill IDL 03-0212 (Terminated)
Stream and Sediment Analytical Data - March 2019

Parameter	Stream Samples (Water)						Sediment Samples (Solids)								
	Charlie Creek US		Charlie Creek MS		Cane Creek US		Cane Creek MS		Cane Creek US		Cane Creek MS		Cane Creek DS-1		
	3/7/2019		3/7/2019		3/7/2019		3/7/2019		3/7/2019		3/7/2019		3/7/2019		
Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/l)		Value (mg/kg)		Value (mg/kg)		Value (mg/kg)	
Total Hardness	<30.0		39.4	B	50.9	B	50.1	B	49.7	B	NA		NA		NA
Ammonia (as N)	<0.100		<0.100		<0.100		<0.100		<0.100		NA		NA		NA
Boron	<0.200		<0.200		<0.200		<0.200		<0.200		<10.0		<10.0		<10.0
Bromide	<1.00		<1.00		<1.00		<1.00		<1.00		<10.0		<10.0		<10.0
Chloride	5.10		8.92		7.30		7.12		8.98		<10.0		30.8		<10.0
Fluoride	<0.100		<0.100		<0.100		<0.100		<0.100		<1.00		1.07		<1.00
Aluminum	0.248		0.243		0.213		0.171		0.196		811	J5	1,260		644
Aluminum (Dissolved-LF)	<0.100		<0.100		<0.100		<0.100		<0.100		NA		NA		NA
Antimony	<0.00200	J4	<0.00200	J4	<0.00200	J4	<0.00200	J4	<0.00200	J4	<2.00		<2.00		<2.00
Arsenic	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<2.00		<2.00		<2.00
Arsenic (Dissolved-LF)	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NA		NA		NA
Barium	0.0308		0.0345		0.0355		0.0351		0.0367		6.13		11.8		7.45
Barium (Dissolved-LF)	0.0297		0.033		0.0365		0.0354		0.0375		NA		NA		NA
Beryllium	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.200		<0.200		<0.200
Total Cadmium	<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.500		<0.500		<0.500
Cadmium (Dissolved-LF)	<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		NA		NA		NA
Calcium	8.88		12.0		13.8		13.9		14.1		160		169		450
Calcium (Dissolved-LF)	9.26		12.6		14.4		14.6		14.5		NA		NA		NA
Chromium	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		2.61		3.63		6.19
Cobalt	<0.00200		<0.00200		0.00241		<0.00200		<0.00200		<1.00		1.16		1.21
Cobalt (Dissolved-LF)	<0.00200		<0.00200		0.0023		<0.00200		<0.00200		NA		NA		NA
Copper	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<2.00		<2.00		<2.00
Iron	0.385		0.457		1.09		0.891		0.862		1,890	J5	2,820		2,740
Iron (Dissolved-LF)	0.16		0.132	B	0.129	B	0.174		0.164		NA		NA		NA
Lead	<0.00200		<0.00200		<0.00200		0.00388		<0.00200		1.43		1.94		7.02
Lead (Dissolved-LF)	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NA		NA		NA
Magnesium	1.98		2.67		4.29		4.03		3.94		<100	O1	104		112
Magnesium (Dissolved-LF)	2.01		2.77		4.51		4.26		4.04		NA		NA		NA
Manganese	0.103		0.185		0.53		0.464		0.447		50.8		102		39.1
Manganese (Dissolved-LF)	0.113		0.192		0.553		0.487		0.459		NA		NA		NA
Nickel	<0.00200		<0.00200		0.00317		0.00311		0.00251		<2.00		<2.00		<2.00
Nickel, (Dissolved-LF)	0.00237	B	<0.00200		0.00419	B	0.00402	B	0.00288	B	NA		NA		NA
Potassium	<1.00		1.23		1.48		1.45		1.63		108		146		<100
Potassium (Dissolved-LF)	<1.00		1.25		1.51		1.49		1.86		NA		NA		NA
Selenium	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<2.00		<2.00		<2.00
Silver	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<1.00		<1.00		<1.00
Sodium	4.53		5.39		6.14		5.81		6.44		<100		<100		<100
Sodium (Dissolved-LF)	4.47		5.25		5.95		5.71		6.14		NA		NA		NA
Thallium	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<2.00		<2.00		<2.00
Vanadium	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		4.01	B	5.06	B	5.09
Zinc	<0.0250		<0.0250		<0.0250		<0.0250		<0.0250		<5.00		7.16		9.0
Mercury	<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<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

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

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

Table 3
Intra-Well and Inter-Well Statistical Summary
Environmental Waste Solutions Camden Class II Landfill IDL 03-0212 (Terminated)
Inorganic Analytical Data - March 2019

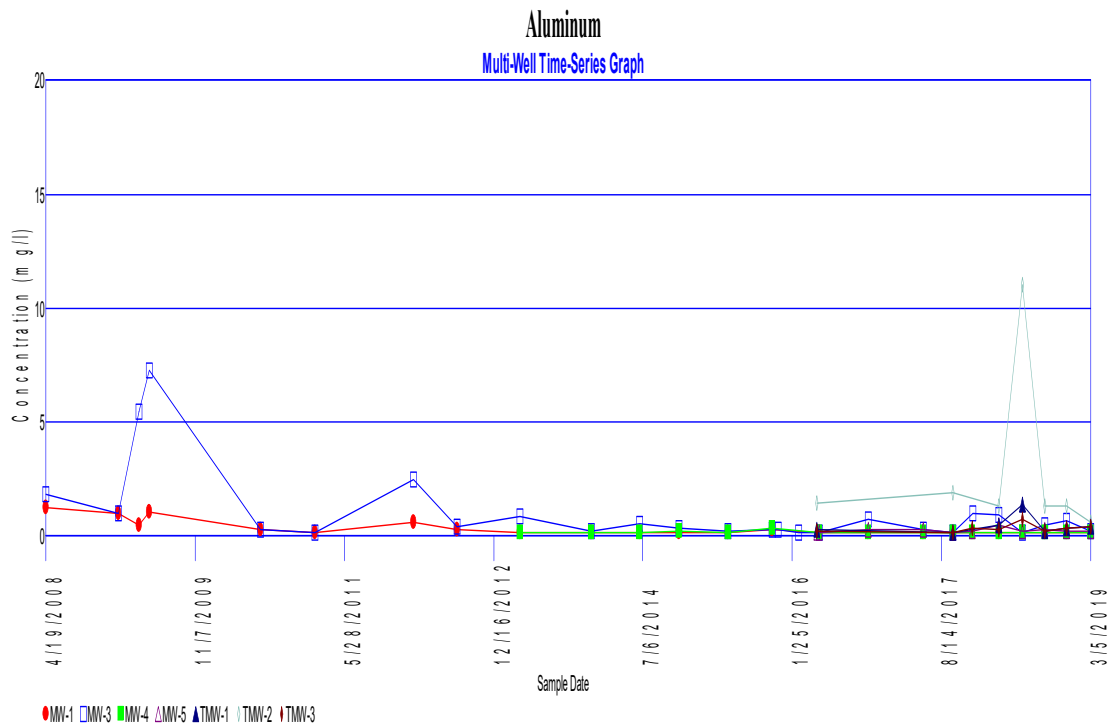
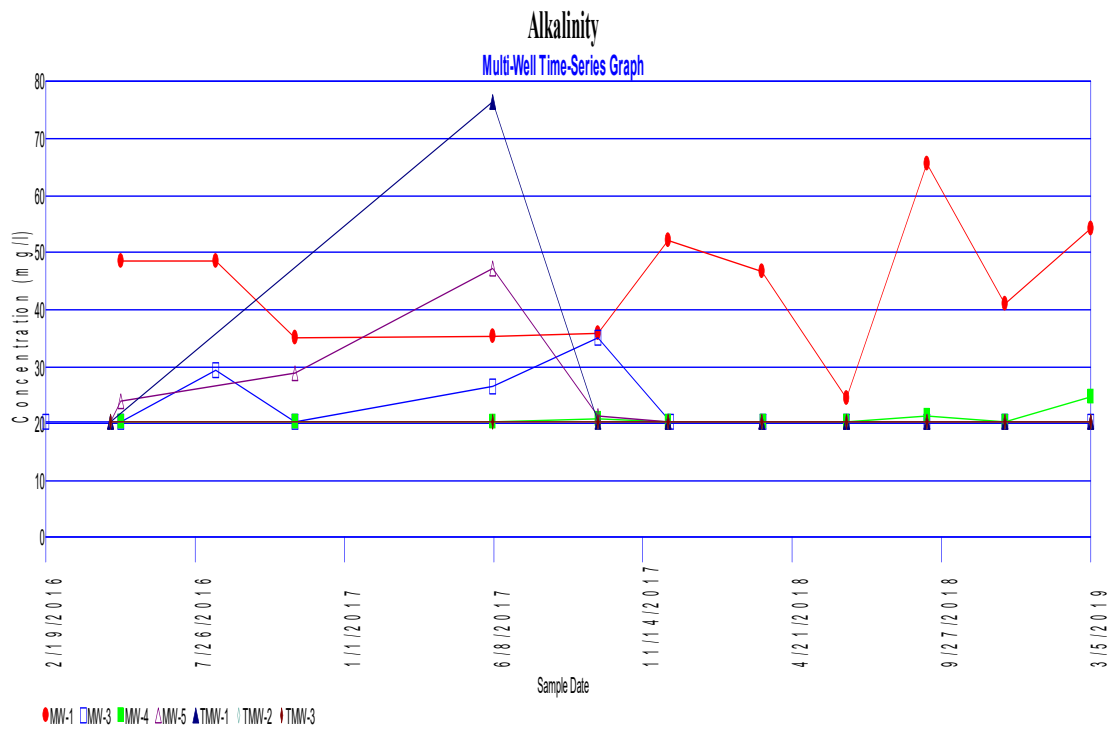
Intra-Well Statistical Summary (Upgradient Background Well MW-1)								
Constituent	Well	% Non Detects	Normality	Intra-well NPPL	Intra-well PPL	Shewhart-Cusum	Wilcoxon Rank Sum	SSI
Arsenic	MW-1	0.00	parametric	--	Pass	--	--	No
Barium	MW-1	0.00	non-parametric	Pass	--	Pass	--	No
Chloride	MW-1	0.00	log-normal	--	Pass*	--	--	No
Cobalt	MW-1	0.00	parametric	--	Pass	--	--	No
Nickel	MW-1	45.83	non-parametric	Pass	--	Pass	--	No
Mercury	MW-1	37.50	non-parametric	Pass	--	Pass	--	No

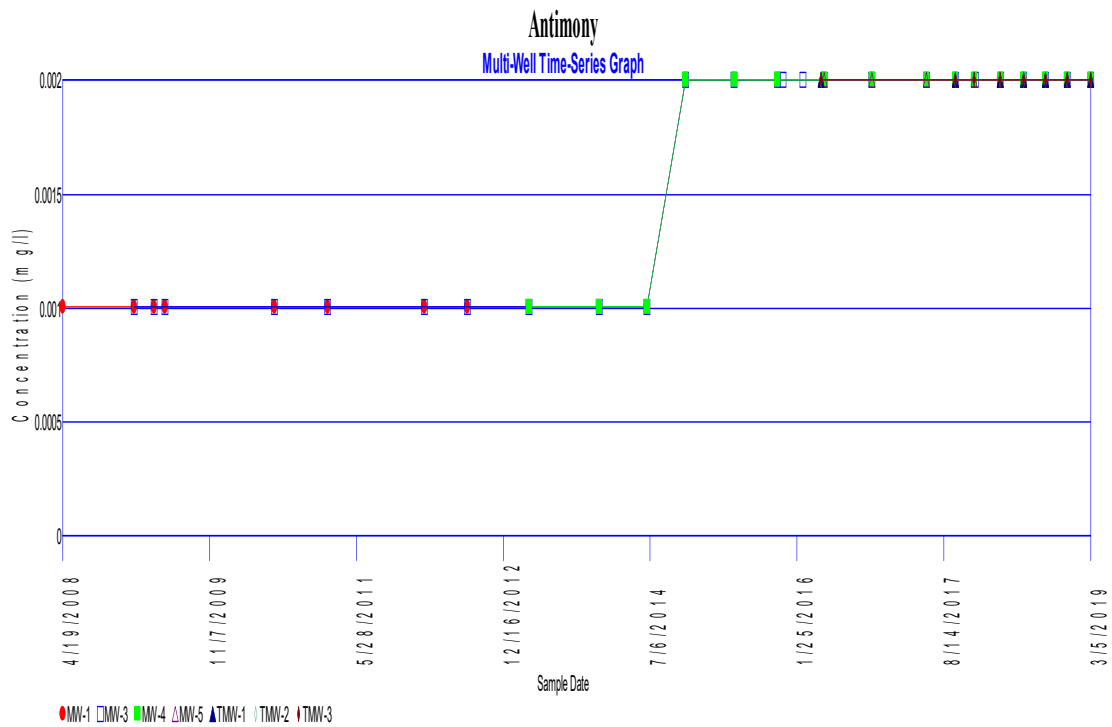
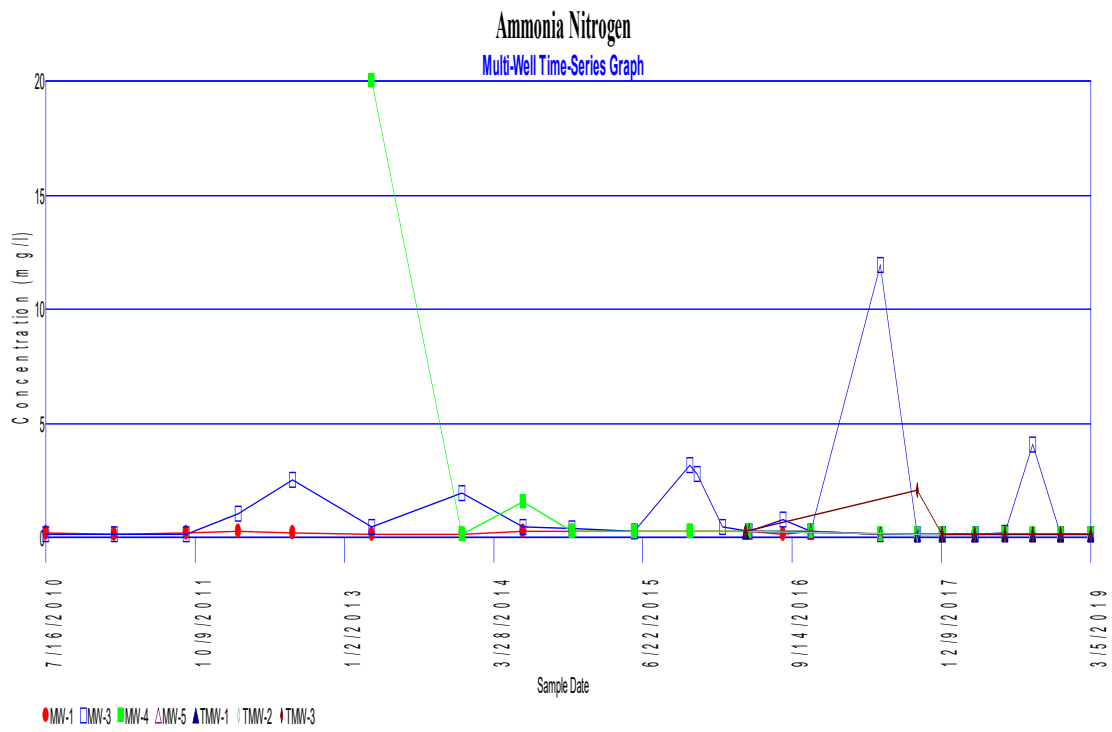
Inter-Well Statistical Summary (Downgradient Compliance Wells)									
Constituent	Well	Total % Non Detects	Normality	Inter-well NPPL	Inter-well PPL	Shewhart-Cusum	Wilcoxon Rank Sum	SSI	Mann-Kendall Trend Analysis
Aluminum	MW-3	36.36	non-parametric	--	--	Pass	--	No	Downward Trend
	MW-5		non-parametric	--	--	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
Barium	MW-3	0.00	non-parametric	--	--	Pass	--	No	No Trend
	MW-4		non-parametric	--	--	Pass	--	No	Downward Trend
	MW-5		non-parametric	--	--	Pass	--	No	Upward 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	88.89	non-parametric	Fail	--	--	Fail	Yes	Upward Trend
Chloride	MW-3	0.00	log-normal	--	Fail	--	--	Yes	Upward Trend
	MW-4		log-normal	--	Pass	--	--	No	No Trend
	MW-5		log-normal	--	Fail	--	--	Yes	Upward Trend
	TMW-1		log-normal	--	Fail	--	--	Yes	Upward Trend
	TMW-2		log-normal	--	Fail	--	--	Yes	No Trend
	TMW-3		log-normal	--	Fail	--	--	Yes	Upward Trend
Chromium	MW-3	74.75	non-parametric	Pass	--	--	--	No	Downward Trend
	MW-4		non-parametric	Pass	--	--	--	No	Downward Trend
	MW-5		non-parametric	Pass	--	--	--	No	Upward 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
Cobalt	MW-3	57.58	non-parametric	Pass	--	--	--	No	Downward Trend
	MW-5		non-parametric	Pass	--	--	--	No	No Trend
Copper	MW-3	82.65	non-parametric	Pass	--	--	--	No	Upward Trend
	TMW-3		non-parametric	Pass	--	--	--	No	No Trend
Fluoride	MW-3	85.71	non-parametric	Pass	--	--	--	No	Upward Trend
Nickel	MW-3	62.38	non-parametric	Pass	--	--	--	No	No Trend
	MW-5		non-parametric	Pass	--	--	--	No	Upward Trend
Zinc	MW-3	63.37	non-parametric	Fail	--	--	Fail	Yes	Upward Trend
Sulfate	MW-3	62.38	non-parametric	Fail	--	--	Fail	Yes	Upward Trend
	MW-5		non-parametric	Pass	--	--	--	No	Upward Trend

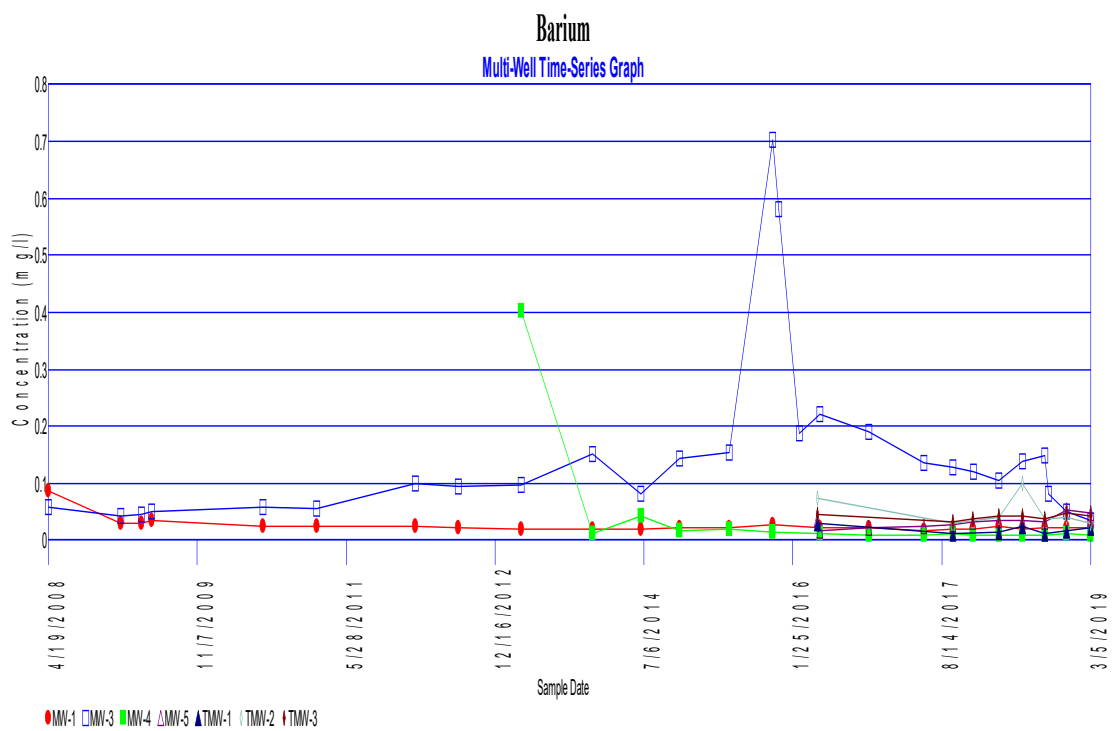
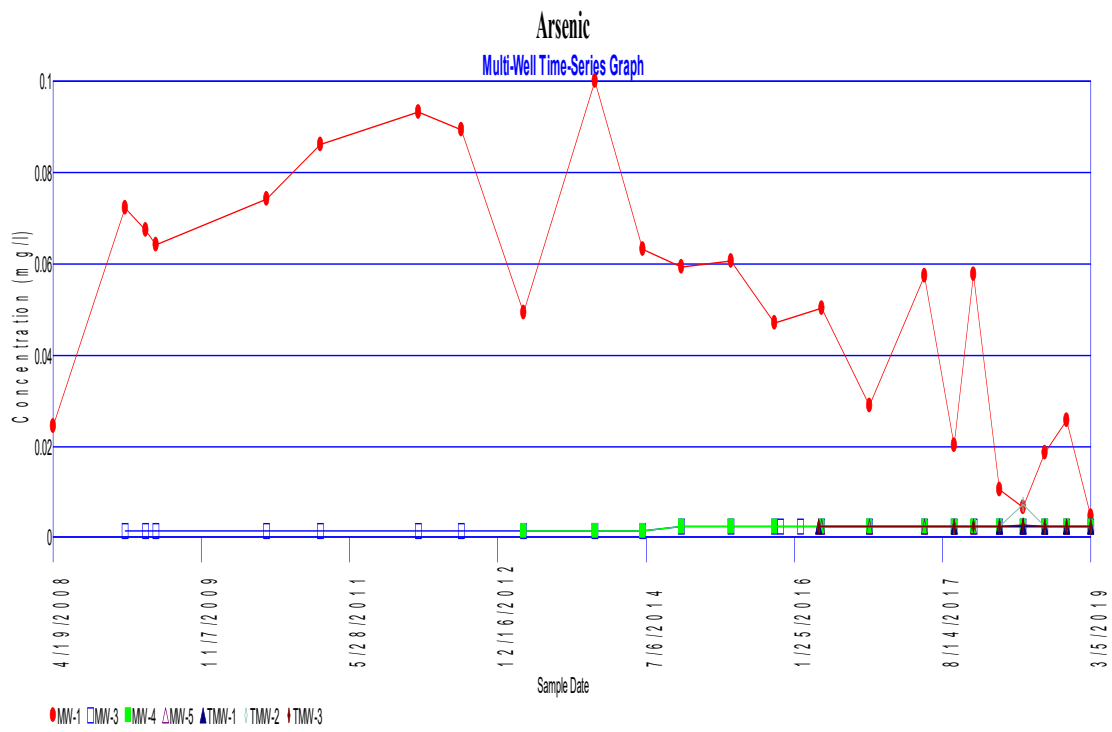
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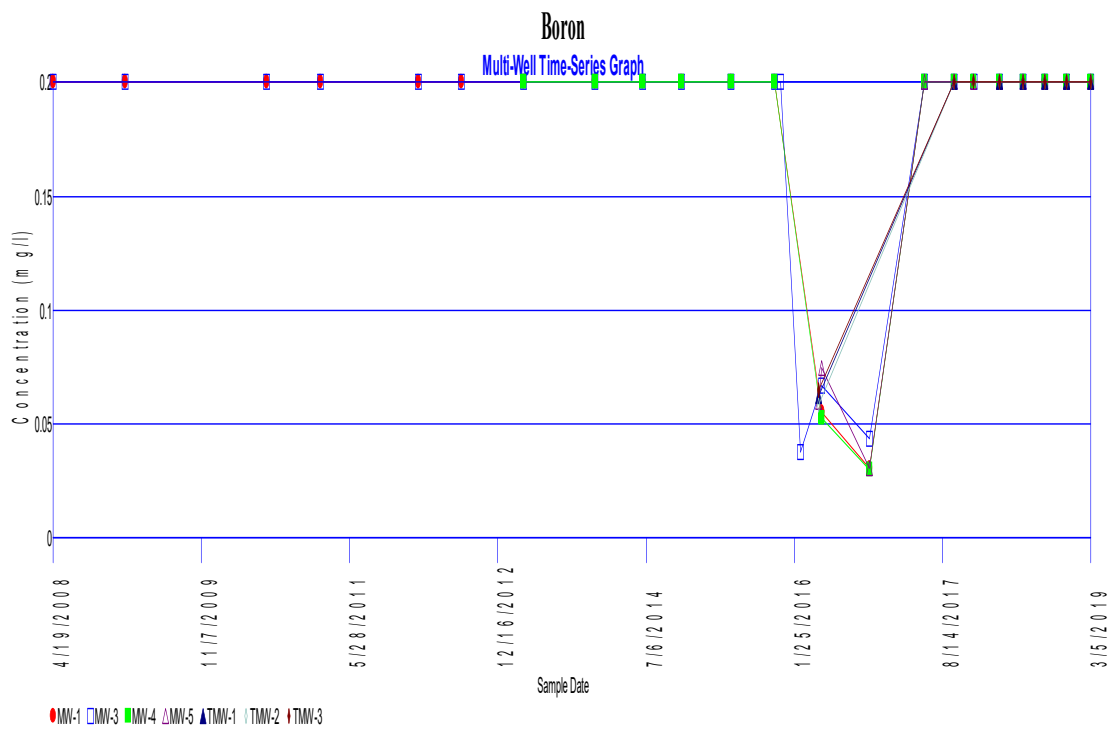
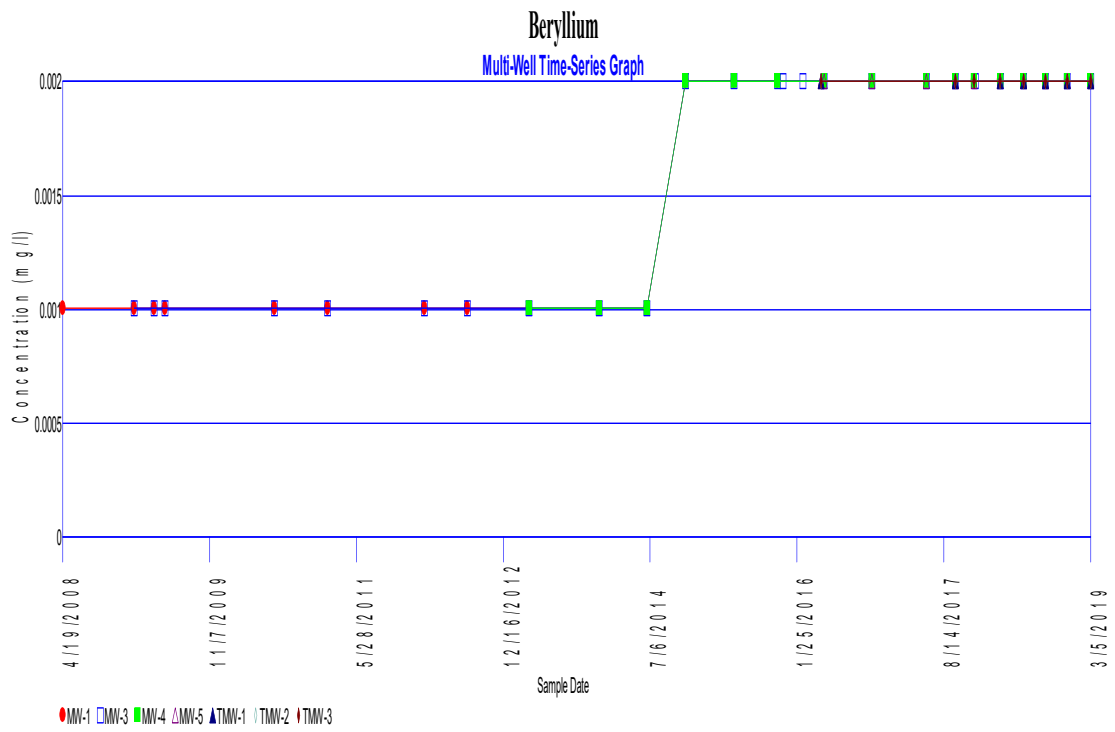
* 99% Parametric Confidence level was used for Chloride when the data was log-transformed at 1/2 the detection limit.

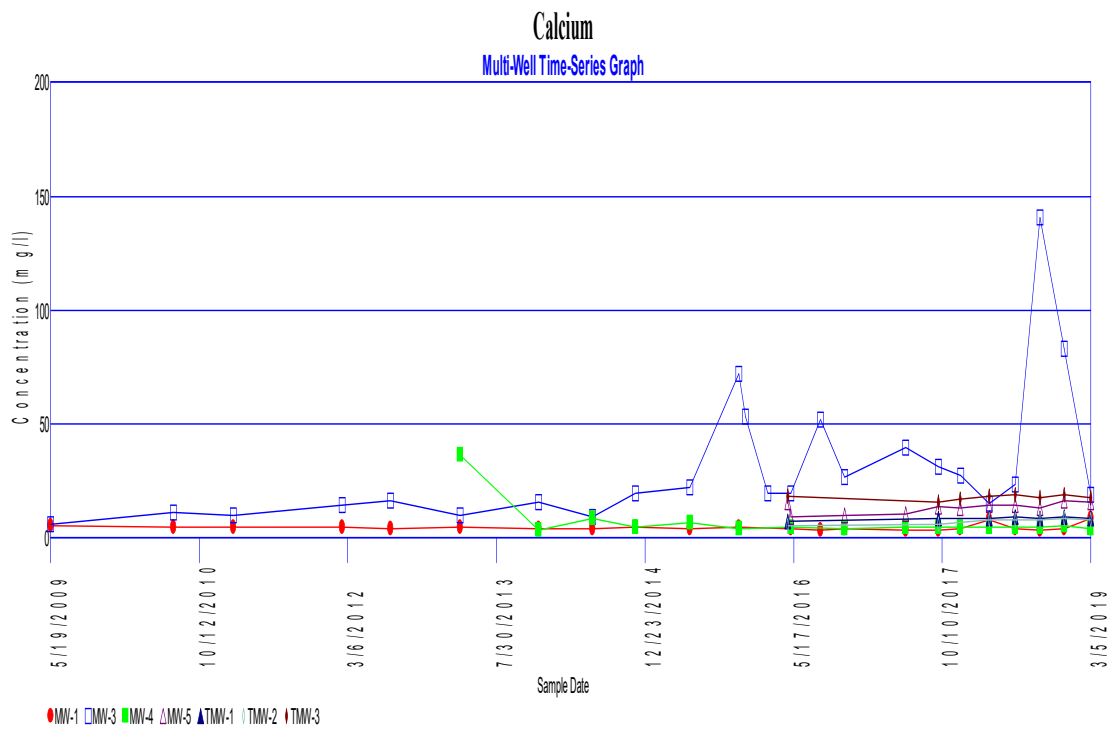
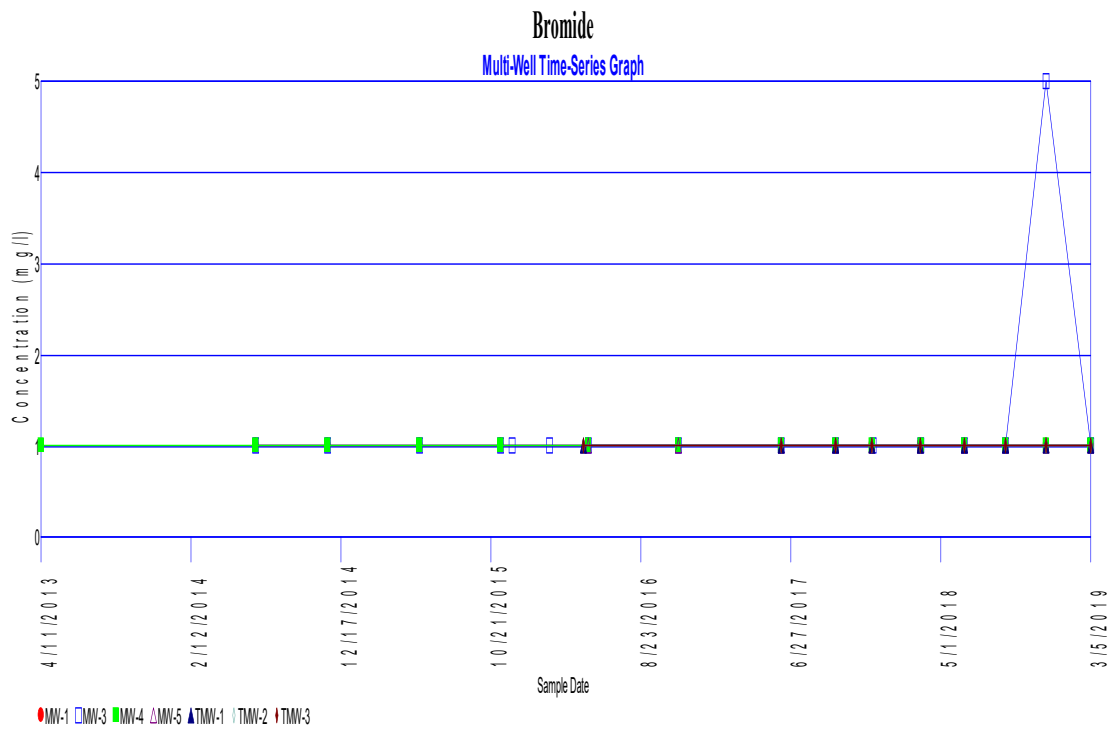
APPENDIX B
STATISTICAL EVALUATIONS & TIME SERIES PLOTS

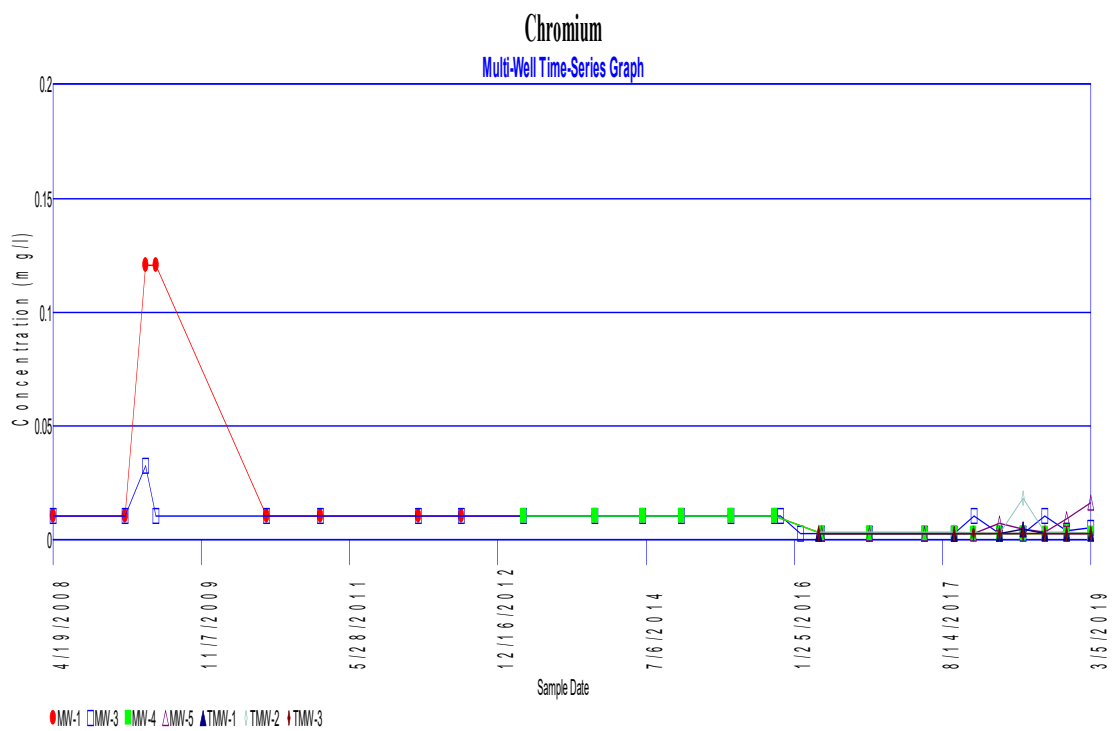
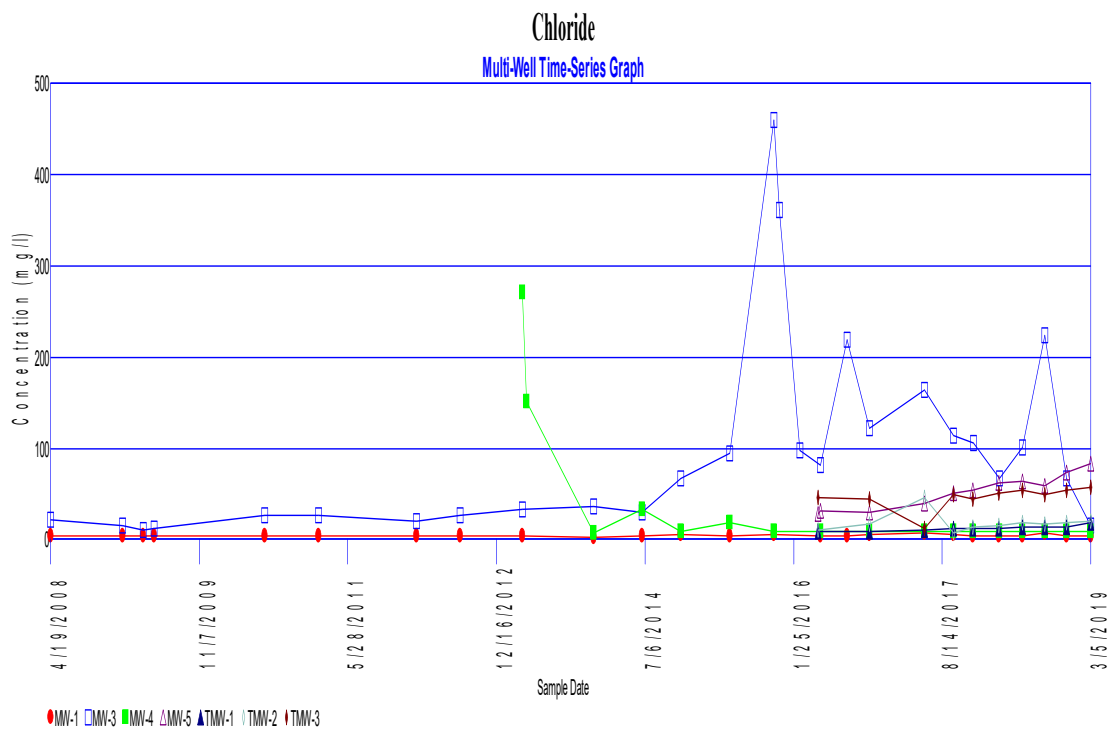


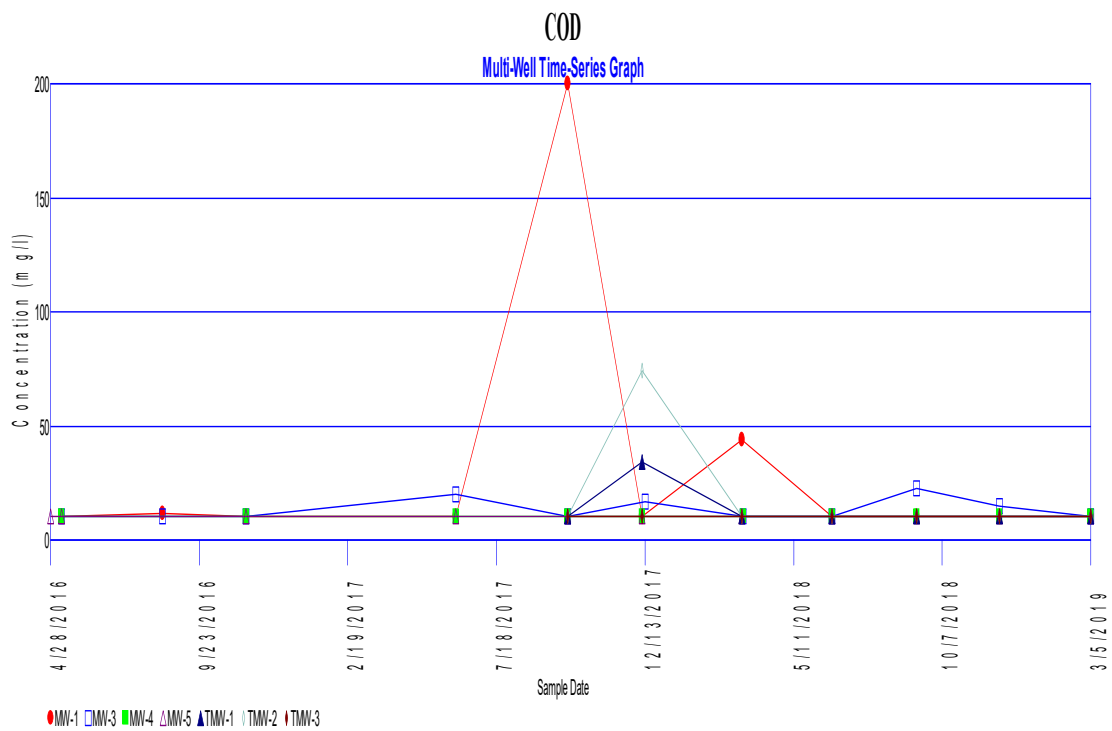
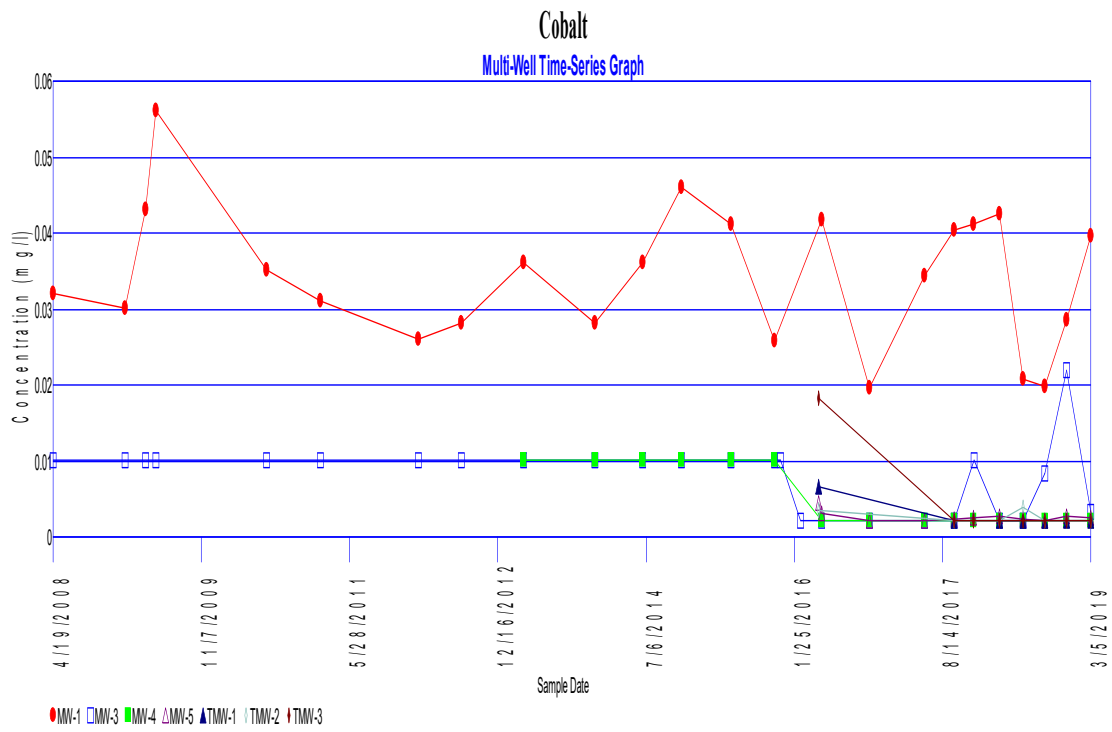


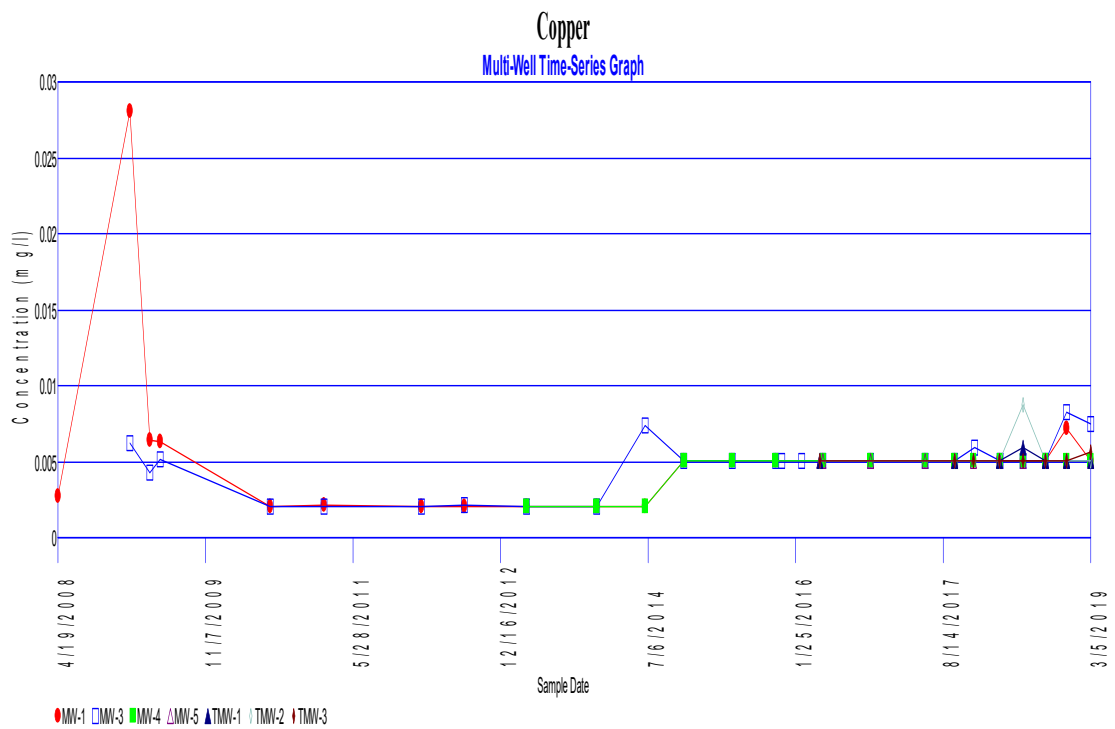
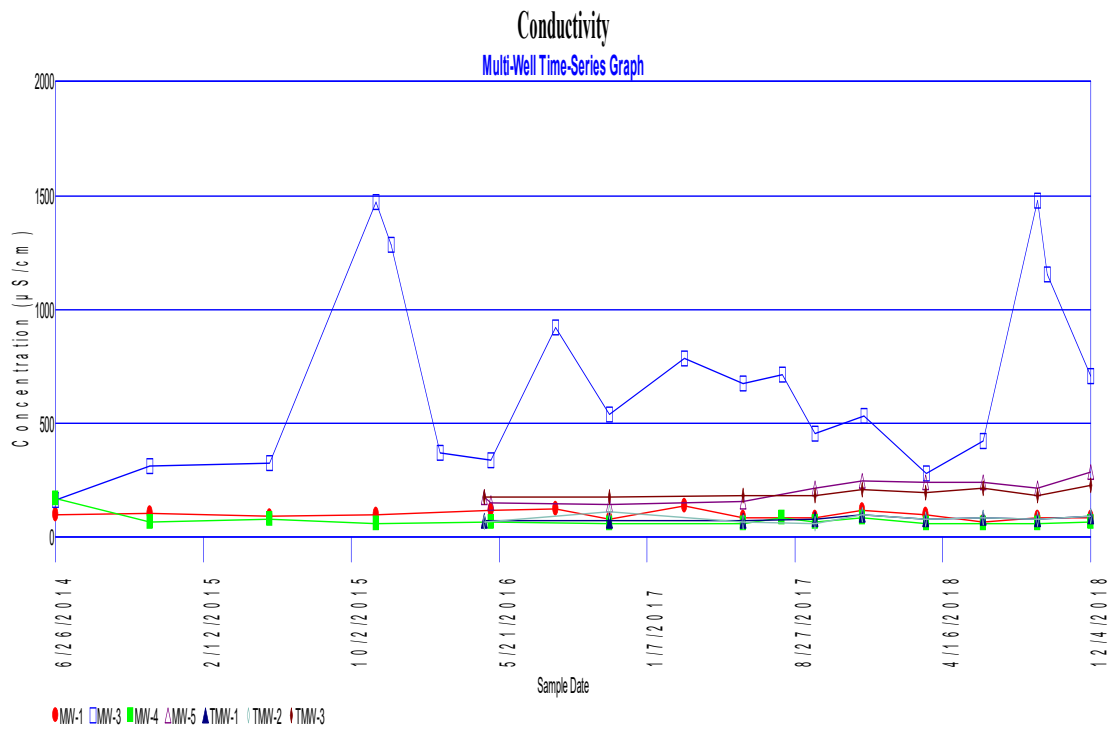




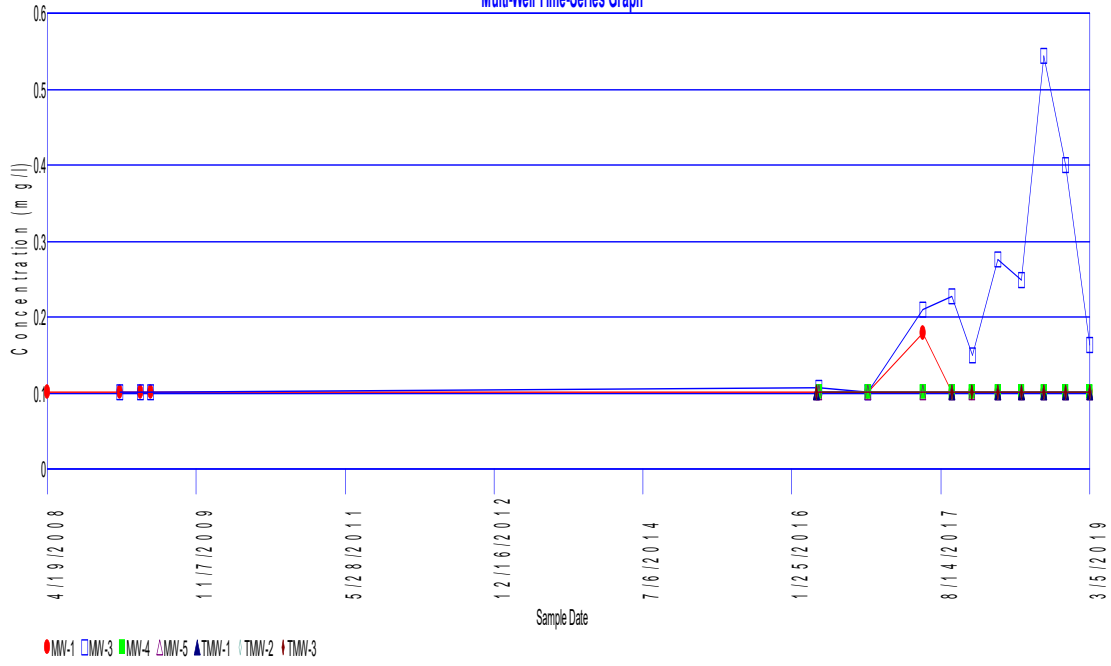




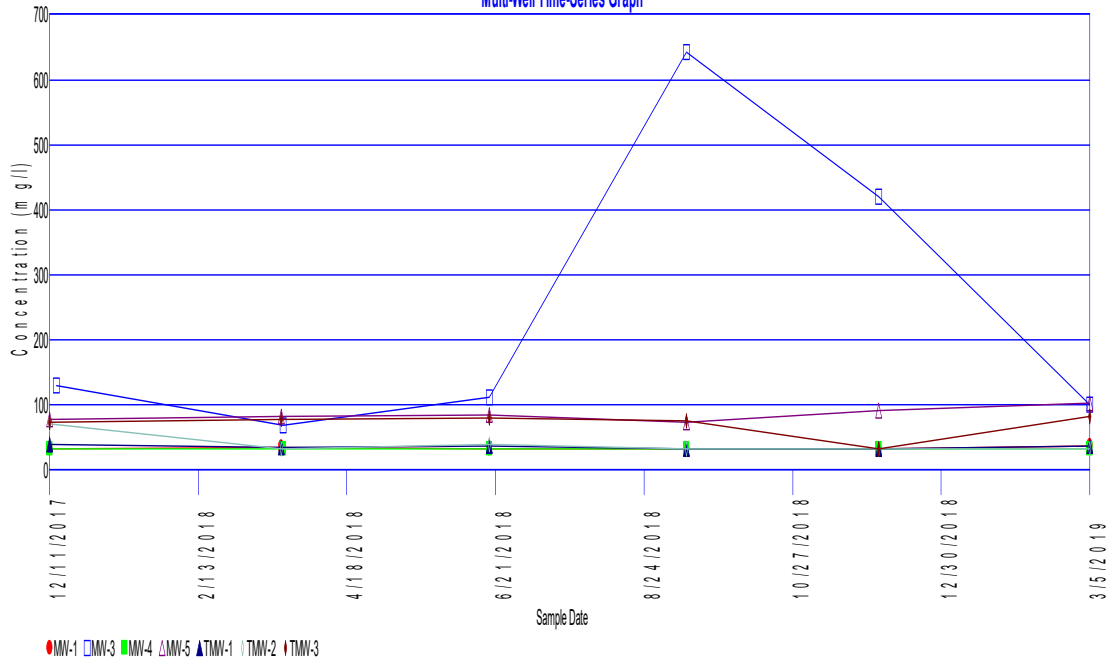




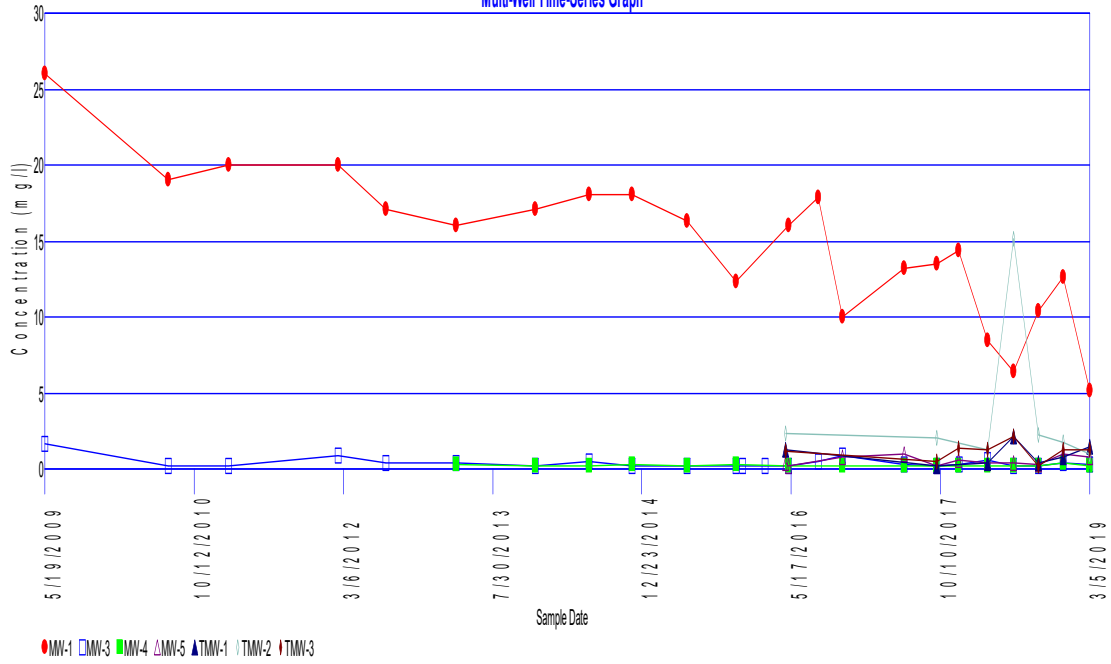
Fluoride Multi-Well Time-Series Graph



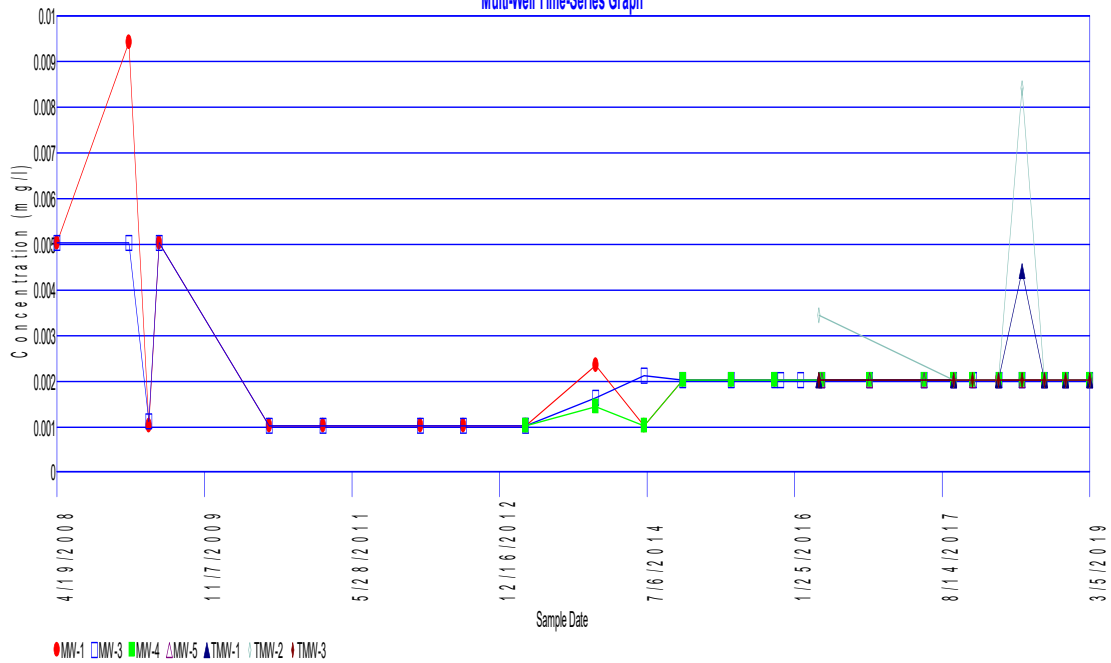
Hardness Multi-Well Time-Series Graph



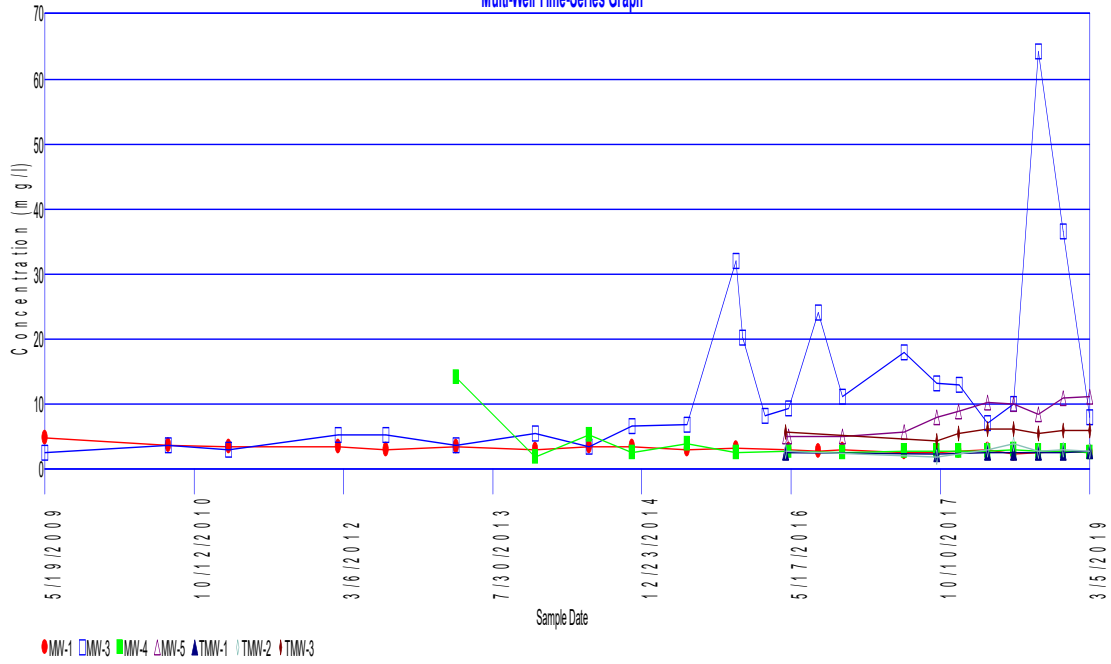
Iron Multi-Well Time-Series Graph



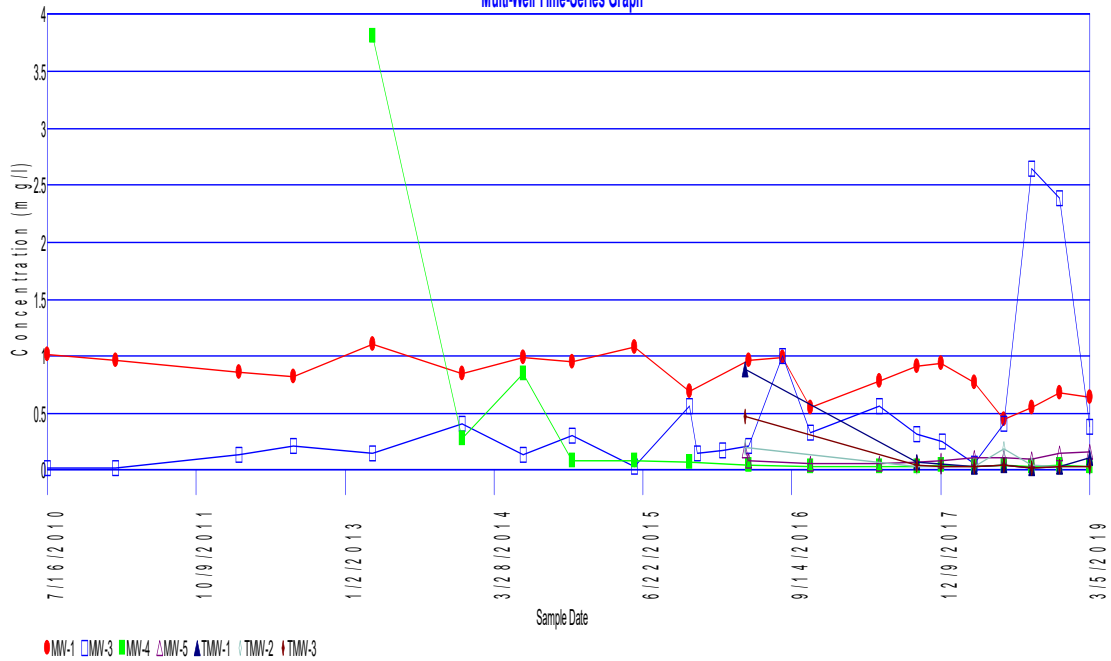
Lead Multi-Well Time-Series Graph



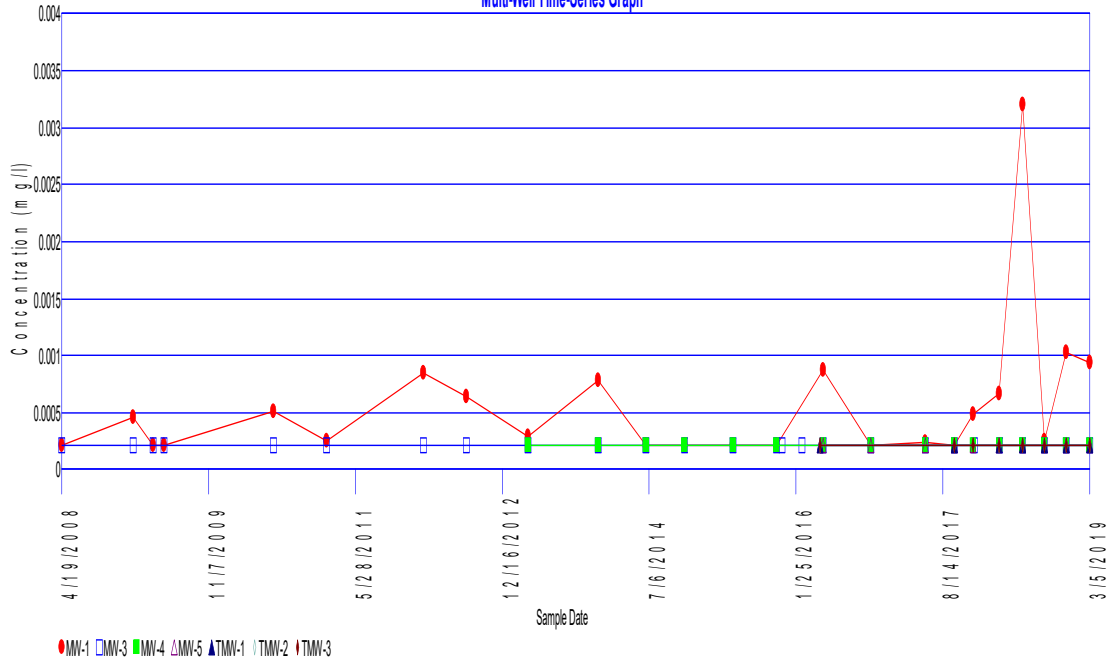
Magnesium Multi-Well Time-Series Graph



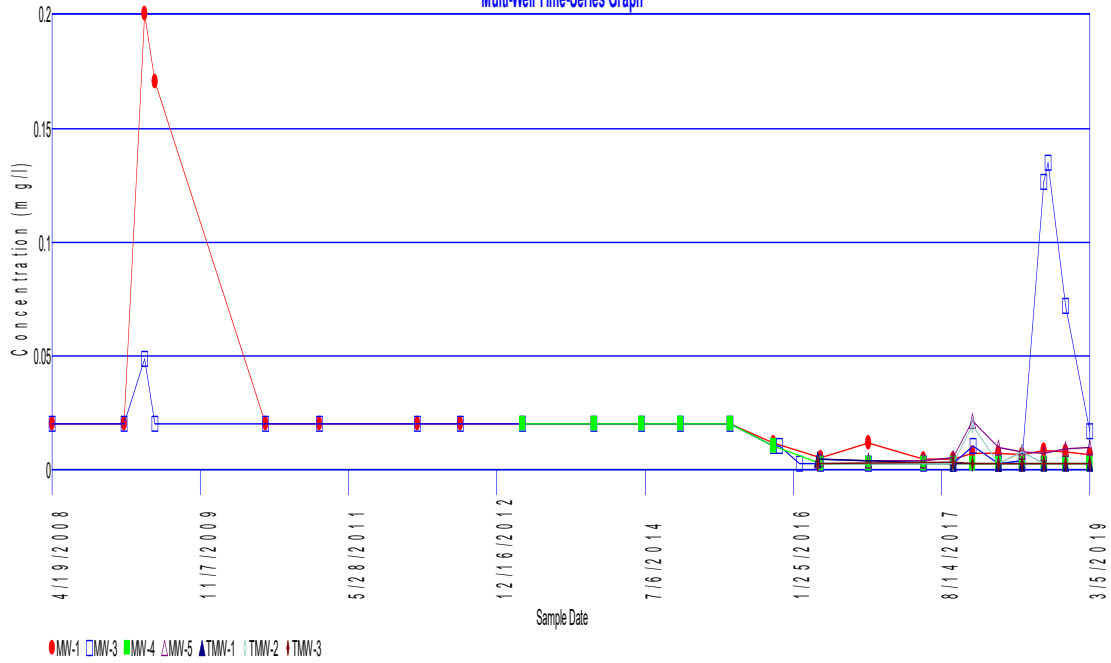
Manganese Multi-Well Time-Series Graph

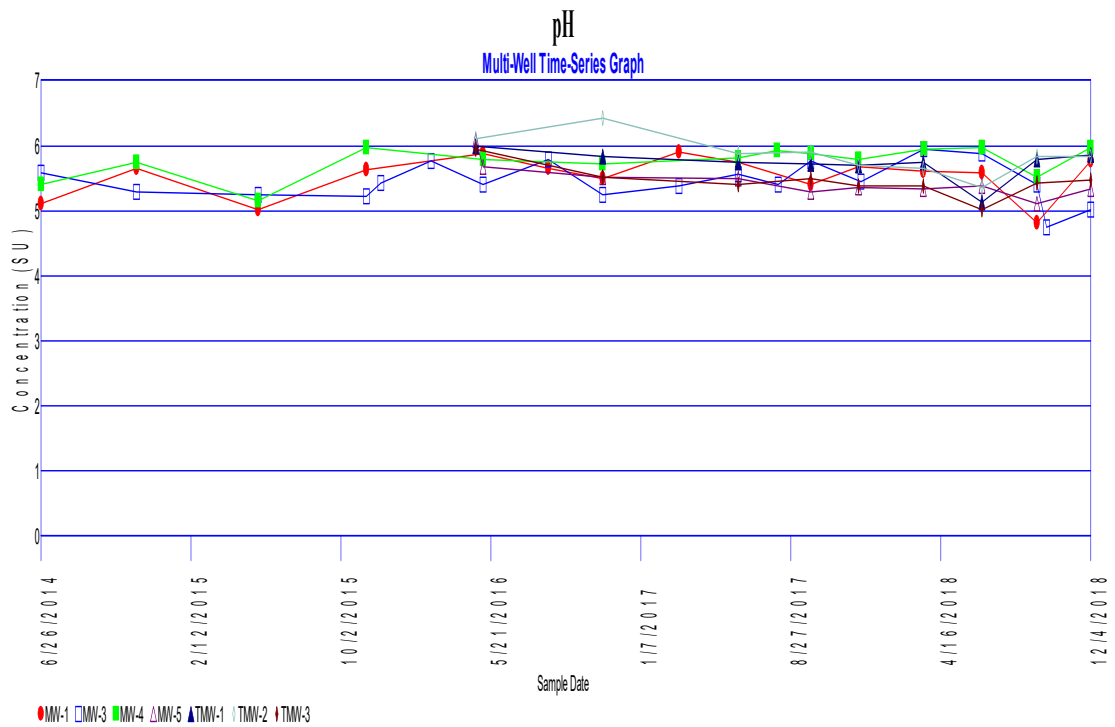
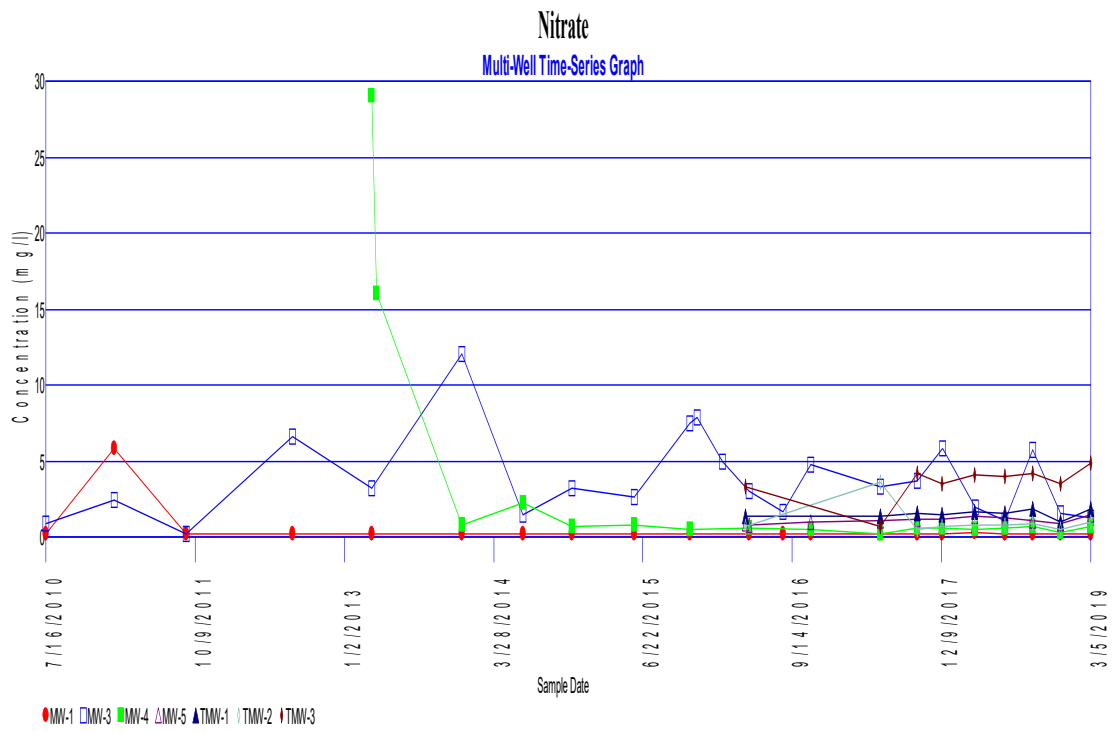


Mercury Multi-Well Time-Series Graph

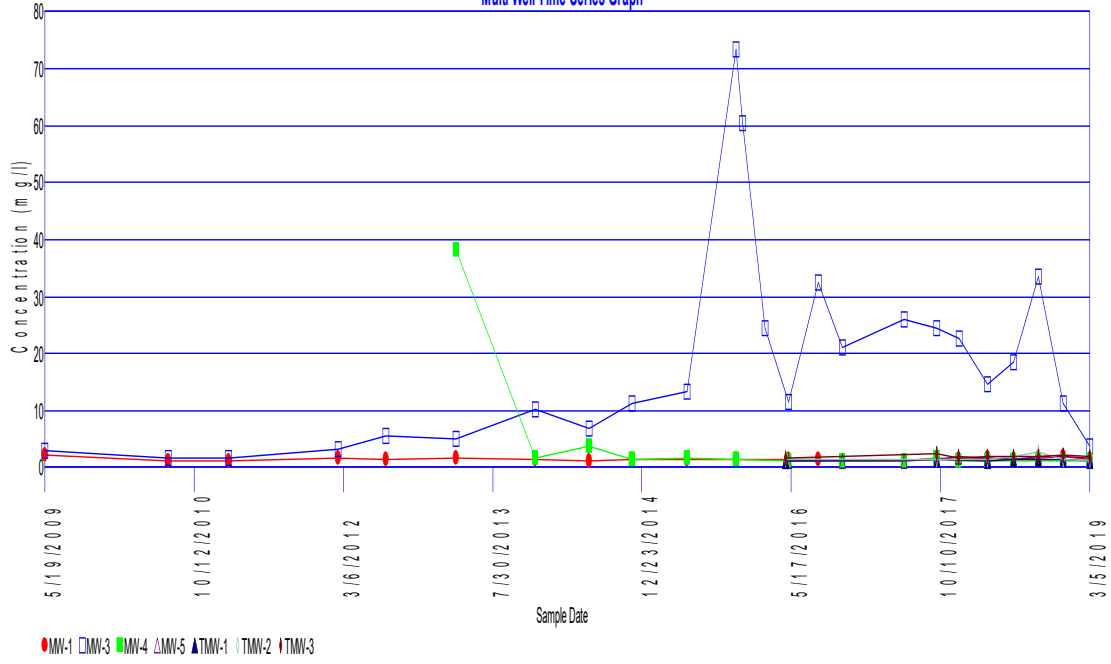


Nickel Multi-Well Time-Series Graph

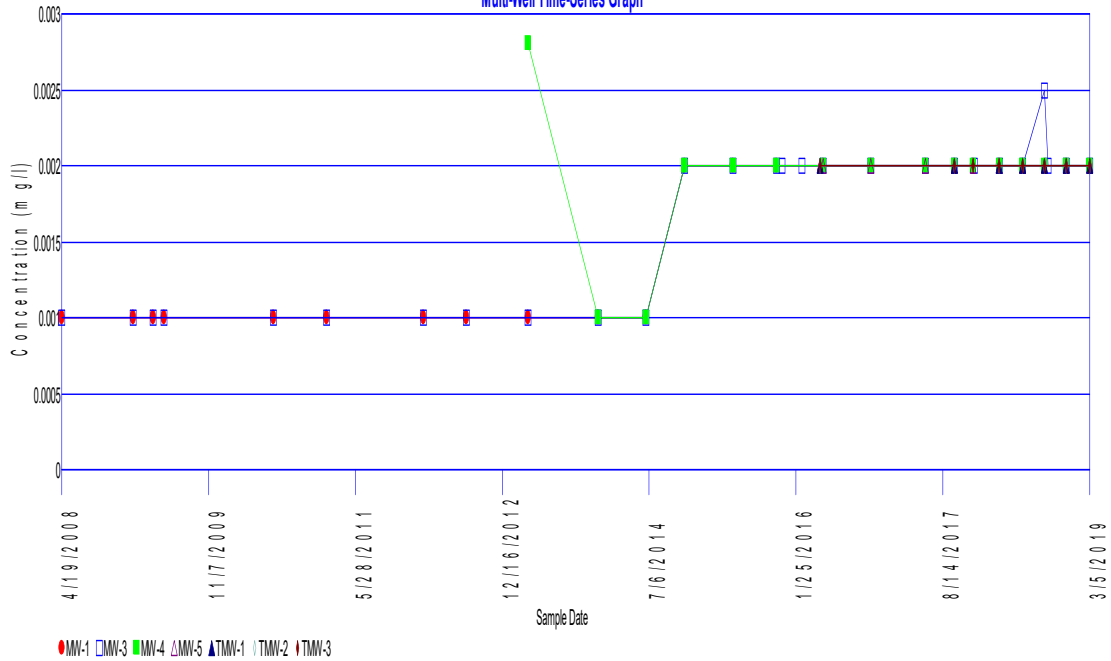


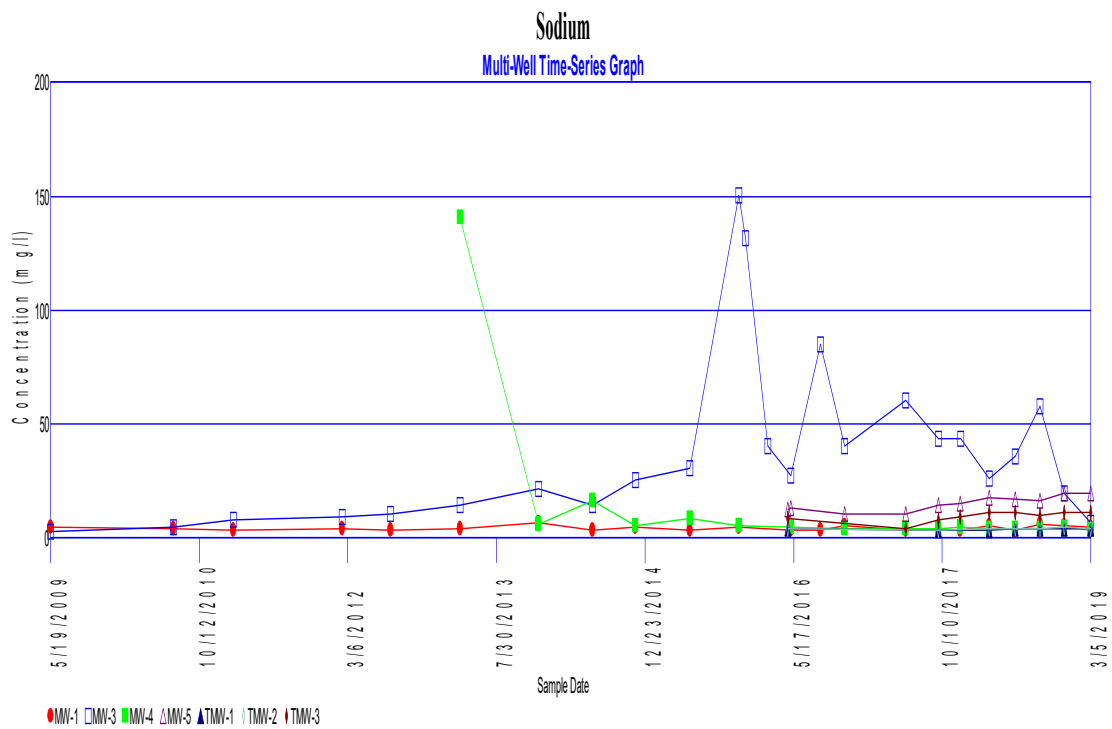
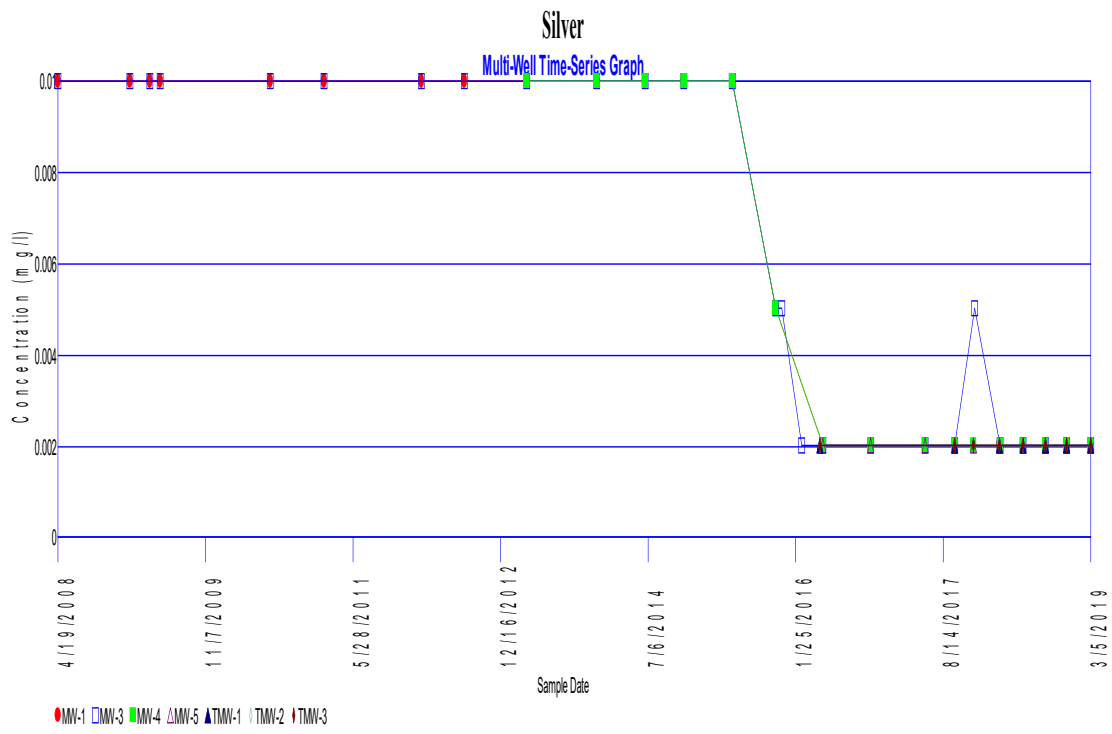


Potassium Multi-Well Time-Series Graph

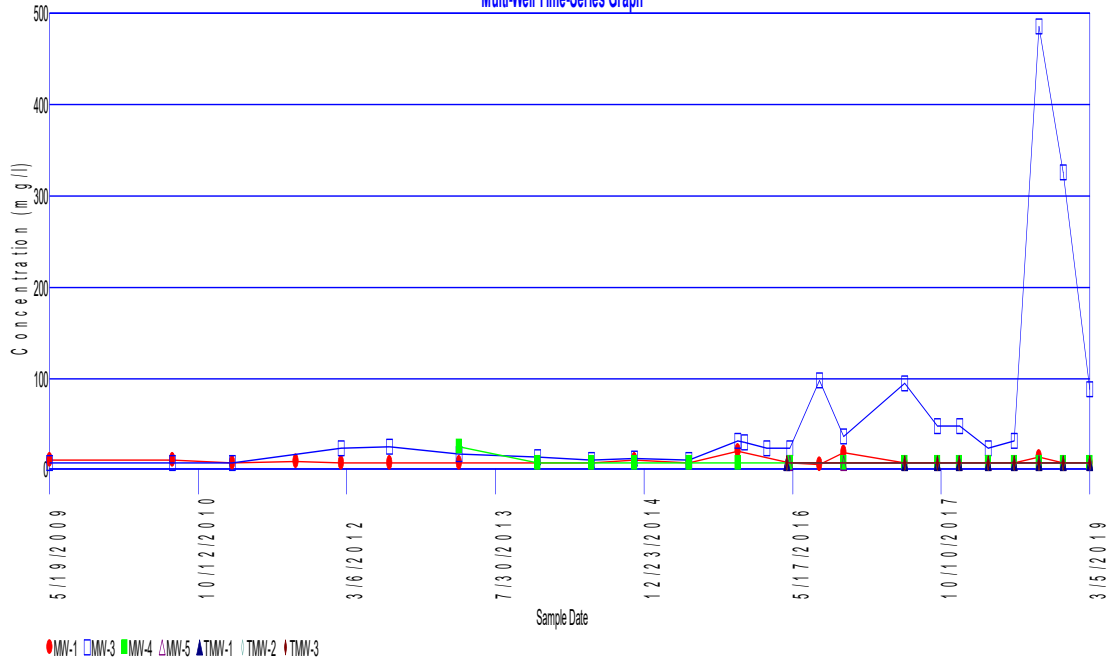


Selenium Multi-Well Time-Series Graph

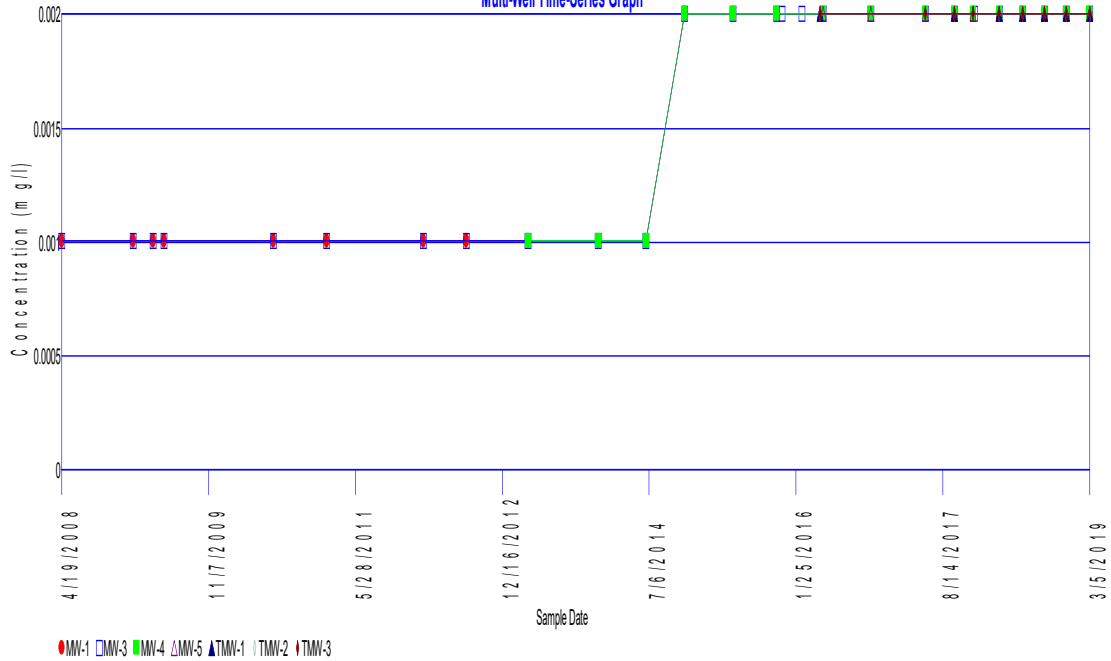




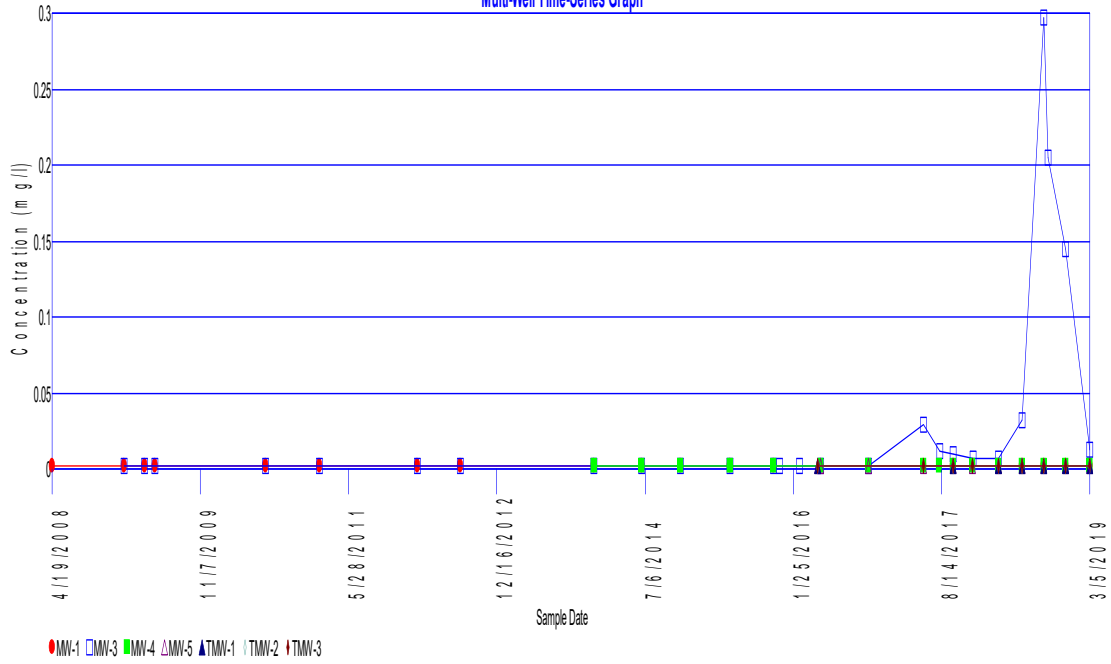
Sulfate Multi-Well Time-Series Graph



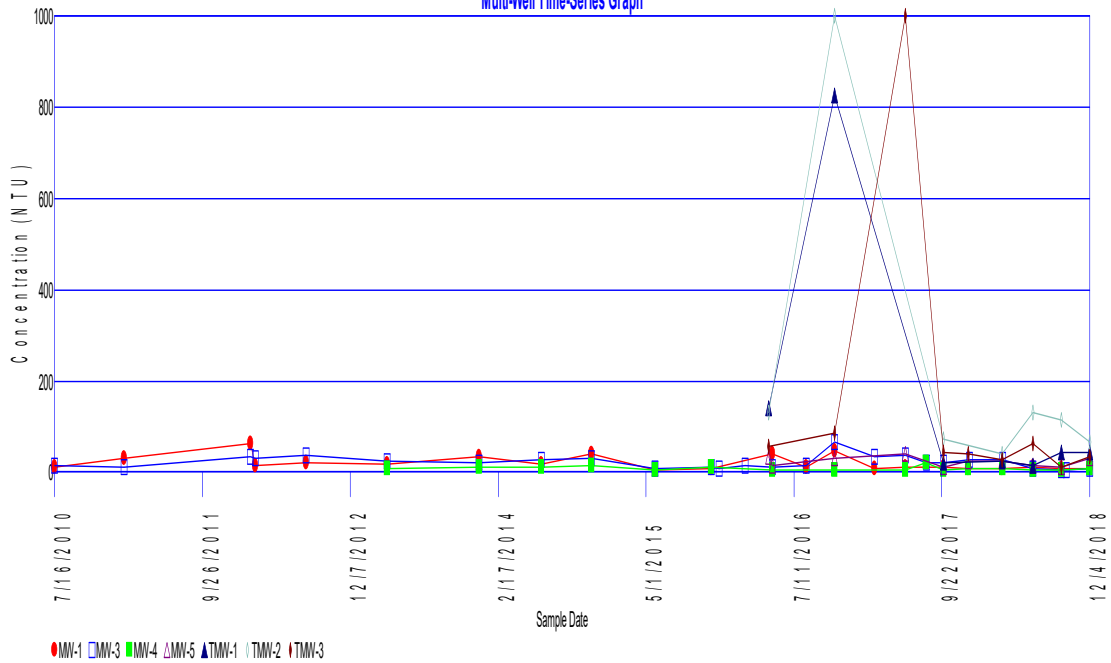
Thallium Multi-Well Time-Series Graph



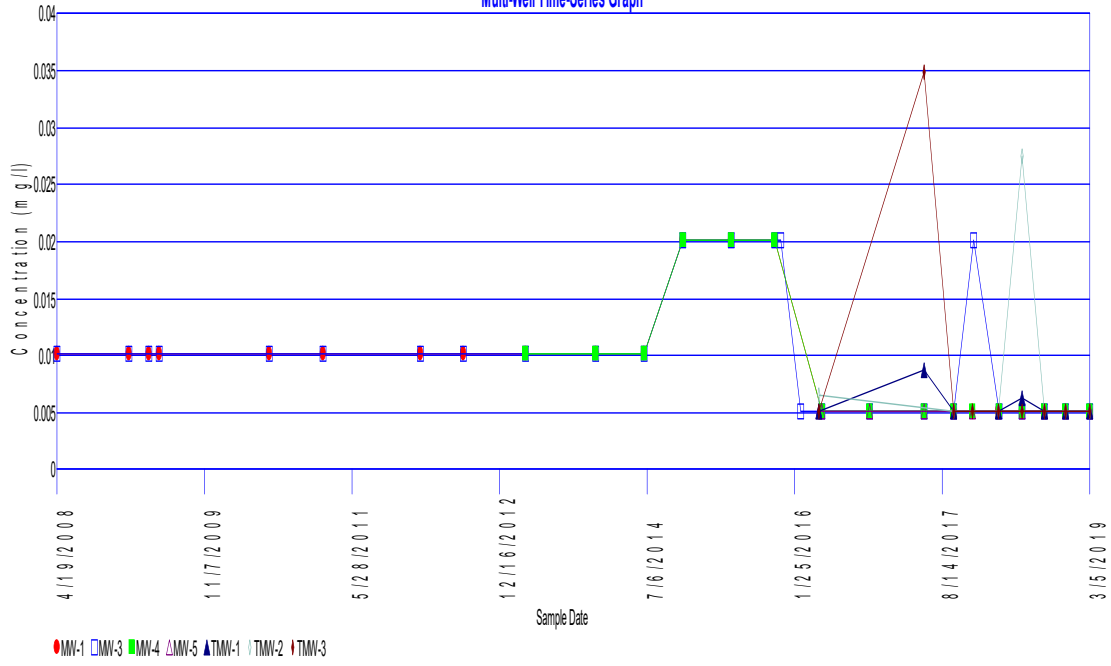
Total Cadmium Multi-Well Time-Series Graph



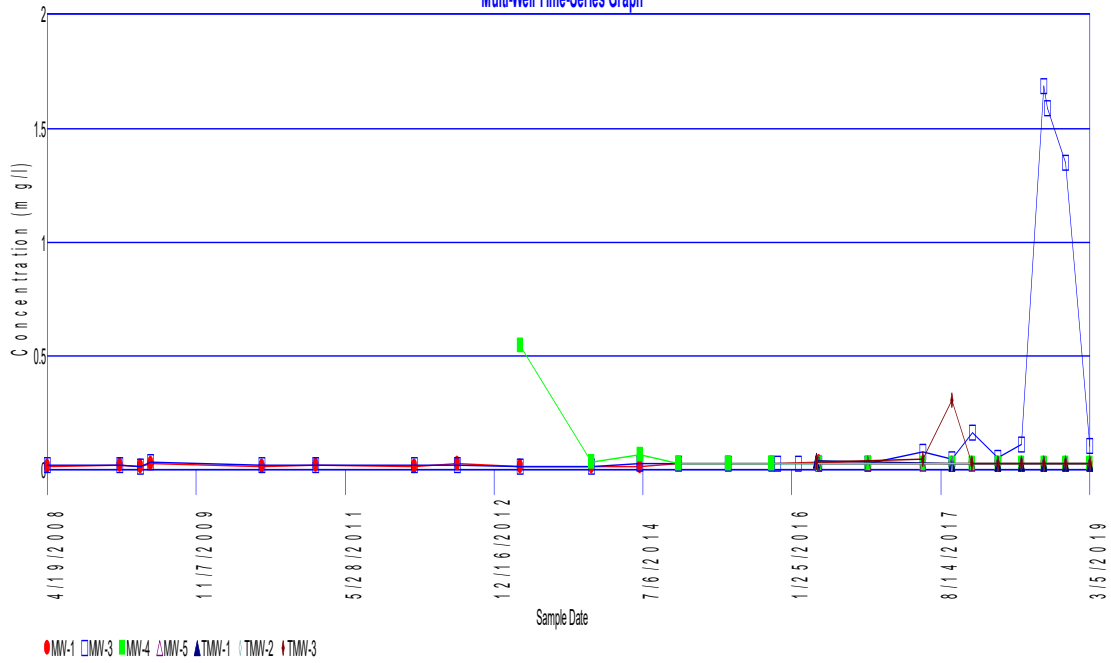
Turbidity Multi-Well Time-Series Graph



Vanadium Multi-Well Time-Series Graph



Zinc Multi-Well Time-Series Graph



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 = 12 for 24 measurements

Sum of b values = 0.132301
Sample Standard Deviation = 0.0282644
W Statistic = 0.952618

5% Critical value of 0.916 is less than 0.952618
Data is normally distributed at 95% level of significance

1% Critical value of 0.884 is less than 0.952618
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 = 12 for 24 measurements

Sum of b values = 0.0443278
Sample Standard Deviation = 0.0136142
W Statistic = 0.460933

5% Critical value of 0.916 exceeds 0.460933
Evidence of non-normality at 95% level of significance

1% Critical value of 0.884 exceeds 0.460933
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 = 12 for 24 measurements

Sum of b values = 1.38011
Sample Standard Deviation = 0.345214
W Statistic = 0.694902

5% Critical value of 0.916 exceeds 0.694902
Evidence of non-normality at 95% level of significance

1% Critical value of 0.884 exceeds 0.694902
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 = 12 for 25 measurements

Sum of b values = 5.00158
Sample Standard Deviation = 1.10795
W Statistic = 0.849104

5% Critical value of 0.918 exceeds 0.849104
Evidence of non-normality at 95% level of significance

1% Critical value of 0.888 exceeds 0.849104
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 = 12 for 25 measurements

Sum of b values = 1.67961
Sample Standard Deviation = 0.356345
W Statistic = 0.925689

5% Critical value of 0.918 is less than 0.925689
Data is normally distributed at 95% level of significance

1% Critical value of 0.888 is less than 0.925689
Data is normally distributed 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 = 12 for 24 measurements

Sum of b values = 0.0425507
Sample Standard Deviation = 0.00902057
W Statistic = 0.967428

5% Critical value of 0.916 is less than 0.967428
Data is normally distributed at 95% level of significance

1% Critical value of 0.884 is less than 0.967428
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 Detection Limit

K = 12 for 24 measurements

Sum of b values = 0.155059
Sample Standard Deviation = 0.0490448
W Statistic = 0.434593

5% Critical value of 0.916 exceeds 0.434593
Evidence of non-normality at 95% level of significance

1% Critical value of 0.884 exceeds 0.434593
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Nickel

Location: MW-1

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

K = 12 for 24 measurements

Sum of b values = 3.42831
Sample Standard Deviation = 0.92505
W Statistic = 0.597176

5% Critical value of 0.916 exceeds 0.597176
Evidence of non-normality at 95% level of significance

1% Critical value of 0.884 exceeds 0.597176
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 = 12 for 24 measurements

Sum of b values = 0.00226251
Sample Standard Deviation = 0.000627219
W Statistic = 0.565734

5% Critical value of 0.916 exceeds 0.565734
Evidence of non-normality at 95% level of significance

1% Critical value of 0.884 exceeds 0.565734
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 = 12 for 24 measurements

Sum of b values = 4.59372
Sample Standard Deviation = 1.02543
W Statistic = 0.872555

5% Critical value of 0.916 exceeds 0.872555
Evidence of non-normality at 95% level of significance

1% Critical value of 0.884 exceeds 0.872555
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 = 12 for 24 measurements

Sum of b values = 4.59372

Sample Standard Deviation = 1.02543

W Statistic = 0.872555

5% Critical value of 0.916 exceeds 0.872555

Evidence of non-normality at 95% level of significance

1% Critical value of 0.884 exceeds 0.872555

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 99% 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
	9/12/2018	0.0184
	12/4/2018	0.0254

From 23 baseline samples

Baseline mean = 0.0530609

Baseline std Dev = 0.0270634

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 = 23 (background observations) - 1

$t(0.99, 22) = 2.50832$

Date	Samples	Mean	Interval	Significant
3/5/2019	1	0.00449	[0, 0.122405]	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 99% 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
	9/12/2018	0.0198
	12/4/2018	0.0284

From 23 baseline samples

Baseline mean = 0.0339957

Baseline std Dev = 0.00915148

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 = 23 (background observations) - 1

$t(0.99, 22) = 2.50832$

Date	Samples	Mean	Interval	Significant
3/5/2019	1	0.0395	[0, 0.0574442]	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
	9/12/2018	1.59737
	12/4/2018	0.512824

From 24 baseline samples
Baseline mean = 0.968237
Baseline std Dev = 0.361184

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 = 24 (background observations) - 1
 $t(0.99, 23) = 2.49987$

Date	Samples	Mean	Interval	Significant
3/5/2019	1	0.746688	[0, 1.88977]	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Barium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 0%

Future Samples (k) = 1

Recent Dates = 1

Baseline Measurements (n) = 23

Maximum Baseline Concentration = 0.084

Confidence Level = 95.8%

False Positive Rate = 4.2%

Baseline MeasuremDate	Value
4/19/2008	0.084
1/21/2009	0.028
4/9/2009	0.028
5/19/2009	0.033
7/16/2010	0.021
2/8/2011	0.021
2/17/2012	0.022
7/31/2012	0.019
3/27/2013	0.018
12/23/2013	0.017
6/26/2014	0.018
11/21/2014	0.02
5/28/2015	0.0188
11/11/2015	0.0237
5/9/2016	0.02
11/10/2016	0.0207
6/8/2017	0.0146
9/28/2017	0.0175
12/11/2017	0.0166
3/21/2018	0.0212
6/19/2018	0.0163
9/12/2018	0.0186
12/4/2018	0.0199

Date	Count	Mean	Significant
3/5/2019	1	0.0184	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 = 47.8261%

Future Samples (k) = 1

Recent Dates = 1

Baseline Measurements (n) = 23

Maximum Baseline Concentration = 0.2

Confidence Level = 95.8%

False Positive Rate = 4.2%

Baseline MeasuremDate	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
12/4/2018	0.00744

Date	Count	Mean	Significant
3/5/2019	1	0.00638	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 = 39.1304%

Future Samples (k) = 1

Recent Dates = 1

Baseline Measurements (n) = 23

Maximum Baseline Concentration = 0.00319

Confidence Level = 95.8%

False Positive Rate = 4.2%

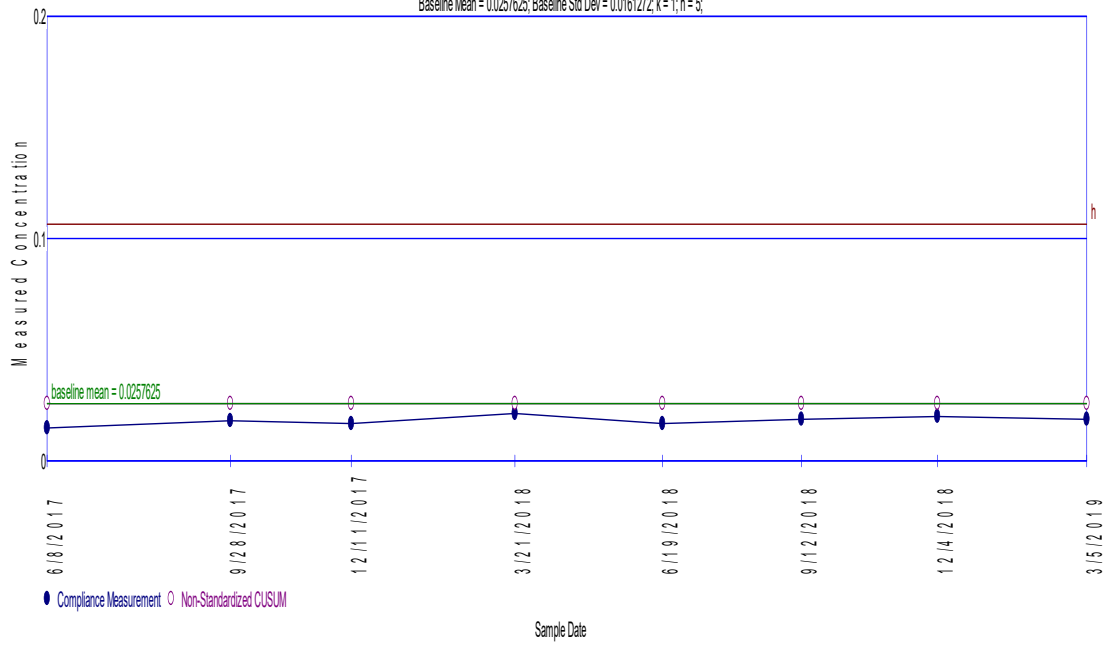
Baseline MeasuremDate	Value
4/19/2008	ND<0.0002
1/21/2009	0.00045
4/9/2009	ND<0.0002
5/19/2009	ND<0.0002
7/16/2010	0.0005
2/8/2011	0.00024
2/17/2012	0.00083
7/31/2012	0.00063
3/27/2013	0.00028
12/23/2013	0.00077
6/26/2014	ND<0.0002
11/21/2014	ND<0.0002
5/28/2015	ND<0.0002
11/11/2015	ND<0.0002
5/9/2016	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
9/12/2018	0.000244
12/4/2018	0.00101

Date	Count	Mean	Significant
3/5/2019	1	0.000922	FALSE

Barium

Intra-Well Shewhart-CUSUM Control Chart (Unified Guidance) of MW-1

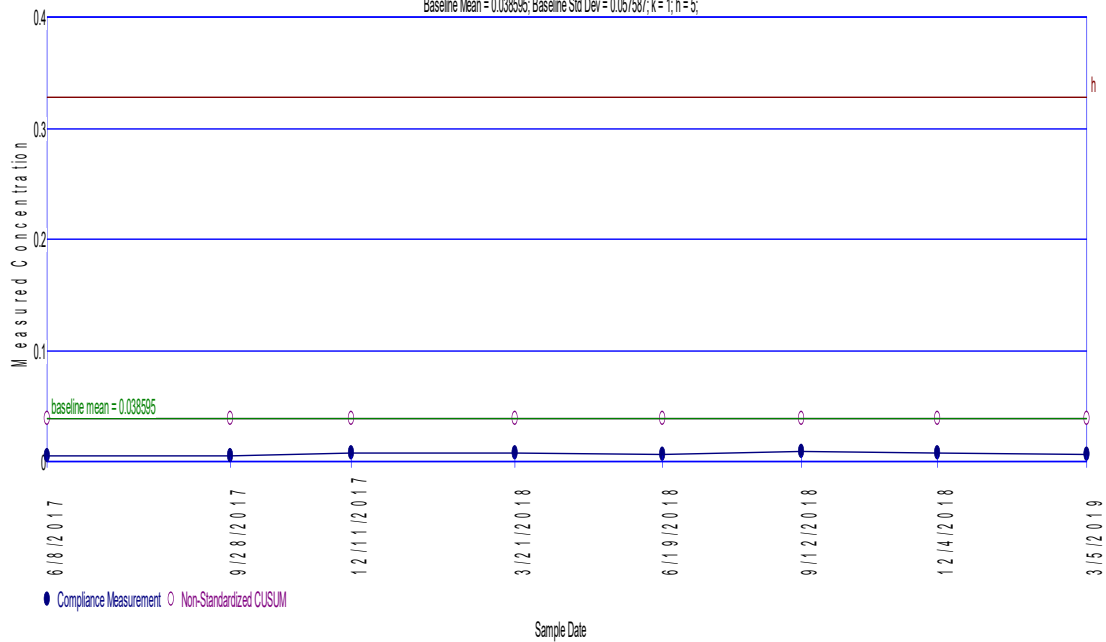
Baseline Mean = 0.0257625; Baseline Std Dev = 0.0161272; k = 1; h = 5;



Nickel

Intra-Well Shewhart-CUSUM Control Chart (Unified Guidance) of MW-1

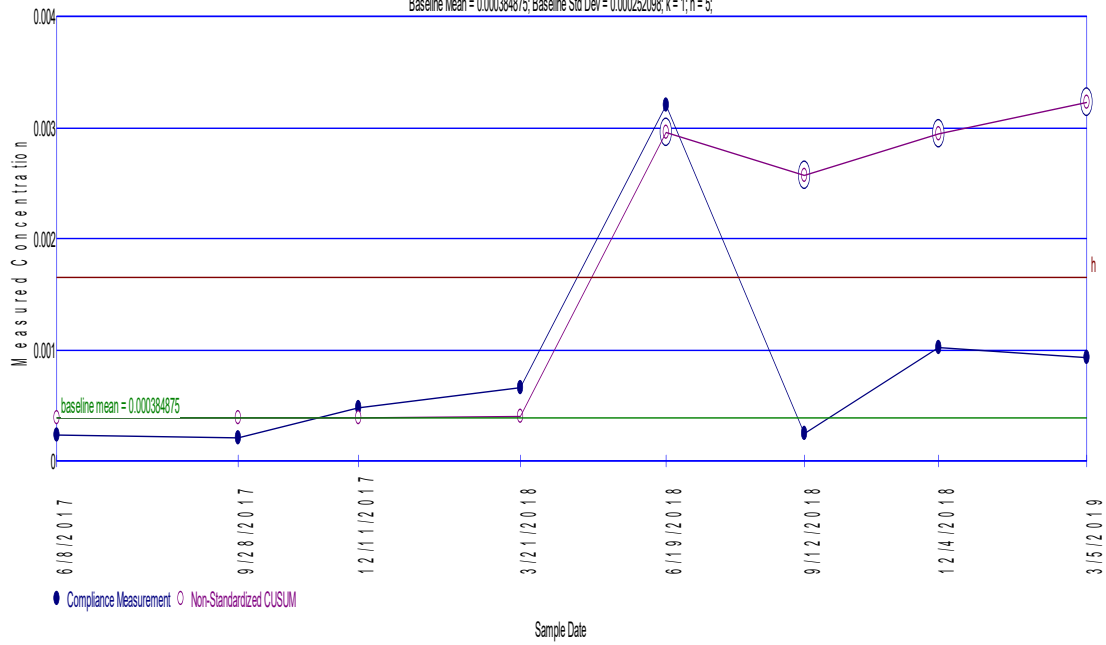
Baseline Mean = 0.038595; Baseline Std Dev = 0.0675807; k = 1; h = 5;



Mercury

Intra-Well Shewhart-CUSUM Control Chart (Unified Guidance) of MW-1

Baseline Mean = 0.000384875; Baseline Std Dev = 0.000252086; k = 1; h = 5;



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 = 99

Data Set Standard Deviation = 1.42546
Numerator = 6129.47
Denominator = 18181.4
W Statistic = 0.337129 = 6129.47 / 18181.4

5% Critical value of 0.976 exceeds 0.337129
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.337129
Evidence of non-normality at 99% level of significance

Page 1

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 = 100

Data Set Standard Deviation = 0.101378
Numerator = 44.5553
Denominator = 94.7611
W Statistic = 0.470186 = 44.5553 / 94.7611

5% Critical value of 0.976 exceeds 0.470186
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.470186
Evidence of non-normality at 99% level of significance

Page 2

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 = 99

Data Set Standard Deviation = 0.0385652
Numerator = 2.34679
Denominator = 13.3078
W Statistic = 0.176347 = 2.34679 / 13.3078

5% Critical value of 0.976 exceeds 0.176347
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.176347
Evidence of non-normality at 99% level of significance

Page 3

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 = 110

Data Set Standard Deviation = 69.4864
Numerator = 2.94273e+007
Denominator = 5.37939e+007
W Statistic = 0.547038 = 2.94273e+007 / 5.37939e+007

5% Critical value of 0.976 exceeds 0.547038
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.547038
Evidence of non-normality at 99% level of significance

Page 4

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 = 99

Data Set Standard Deviation = 0.016872

Numerator = 0.718362

Denominator = 2.54713

W Statistic = 0.282028 = 0.718362 / 2.54713

5% Critical value of 0.976 exceeds 0.282028
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.282028
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 = 99

Data Set Standard Deviation = 0.0138118

Numerator = 1.28453

Denominator = 1.70694

W Statistic = 0.752533 = 1.28453 / 1.70694

5% Critical value of 0.976 exceeds 0.752533
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.752533
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Copper

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Number of Measurements = 98

Data Set Standard Deviation = 0.00273073

Numerator = 0.0254209

Denominator = 0.0656317

W Statistic = 0.387326 = 0.0254209 / 0.0656317

5% Critical value of 0.976 exceeds 0.387326
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.387326
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 = 70

Data Set Standard Deviation = 0.0708705

Numerator = 7.05655

Denominator = 21.8912

W Statistic = 0.322347 = 7.05655 / 21.8912

5% Critical value of 0.967 exceeds 0.322347
Evidence of non-normality at 95% level of significance

1% Critical value of 0.953 exceeds 0.322347
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 = 101

Data Set Standard Deviation = 0.0312481
Numerator = 3.79463
Denominator = 9.17844
W Statistic = 0.413429 = 3.79463 / 9.17844

5% Critical value of 0.976 exceeds 0.413429
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.413429
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 = 101

Data Set Standard Deviation = 0.263835
Numerator = 143.988
Denominator = 654.313
W Statistic = 0.22006 = 143.988 / 654.313

5% Critical value of 0.976 exceeds 0.22006
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.22006
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 = 99

Data Set Standard Deviation = 1.31735
Numerator = 13959.4
Denominator = 15528.1
W Statistic = 0.898979 = 13959.4 / 15528.1

5% Critical value of 0.976 exceeds 0.898979
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.898979
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 = 100

Data Set Standard Deviation = 1.00177
Numerator = 8894.55
Denominator = 9252.88
W Statistic = 0.961273 = 8894.55 / 9252.88

5% Critical value of 0.976 exceeds 0.961273
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.961273
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 = 99

Data Set Standard Deviation = 1.309
Numerator = 5442.86
Denominator = 15331.9
W Statistic = 0.355002 = 5442.86 / 15331.9

5% Critical value of 0.976 exceeds 0.355002
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.355002
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 = 110

Data Set Standard Deviation = 1.39061
Numerator = 21111.5
Denominator = 21544.8
W Statistic = 0.979889 = 21111.5 / 21544.8

5% Critical value of 0.976 is less than 0.979889
Data is normally distributed at 95% level of significance

1% Critical value of 0.967 is less than 0.979889
Data is normally distributed 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 = 99

Data Set Standard Deviation = 1.00896
Numerator = 7206.45
Denominator = 9108.83
W Statistic = 0.79115 = 7206.45 / 9108.83

5% Critical value of 0.976 exceeds 0.79115
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.79115
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 = 99

Data Set Standard Deviation = 1.3768
Numerator = 14659.6
Denominator = 16961.4
W Statistic = 0.864291 = 14659.6 / 16961.4

5% Critical value of 0.976 exceeds 0.864291
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.864291
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Copper

All Locations

Normality Test of Parameter Concentrations

Natural Logarithm Transformation

Non-Detects Replaced with 1/2 DL

Total Number of Measurements = 98

Data Set Standard Deviation = 0.550962

Numerator = 1933.24

Denominator = 2671.76

W Statistic = 0.723584 = 1933.24 / 2671.76

5% Critical value of 0.976 exceeds 0.723584
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.723584
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 = 70

Data Set Standard Deviation = 0.555887

Numerator = 577.042

Denominator = 1346.83

W Statistic = 0.428446 = 577.042 / 1346.83

5% Critical value of 0.967 exceeds 0.428446
Evidence of non-normality at 95% level of significance

1% Critical value of 0.953 exceeds 0.428446
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 = 101

Data Set Standard Deviation = 1.28555

Numerator = 13434.3

Denominator = 15534.6

W Statistic = 0.864796 = 13434.3 / 15534.6

5% Critical value of 0.976 exceeds 0.864796
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.864796
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 = 101

Data Set Standard Deviation = 1.07286

Numerator = 6407.14

Denominator = 10819.5

W Statistic = 0.592183 = 6407.14 / 10819.5

5% Critical value of 0.976 exceeds 0.592183
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.592183
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 = 101

Data Set Standard Deviation = 1.18015

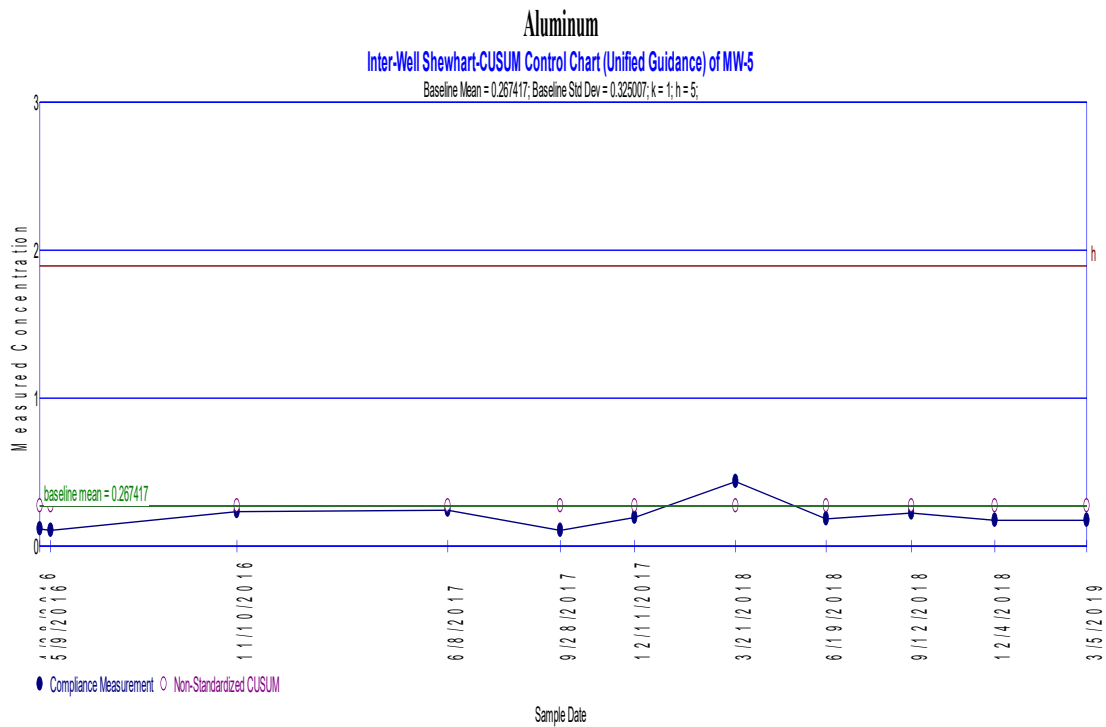
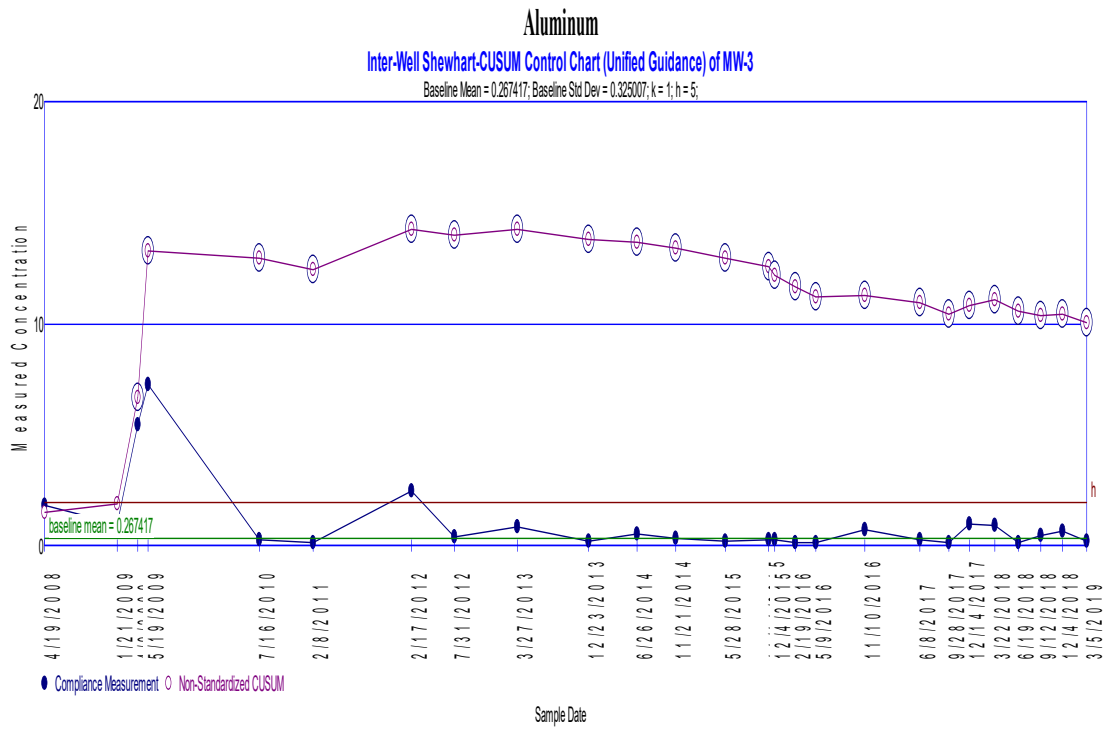
Numerator = 8995.81

Denominator = 13091.6

W Statistic = $0.687143 = 8995.81 / 13091.6$

5% Critical value of 0.976 exceeds 0.687143
Evidence of non-normality at 95% level of significance

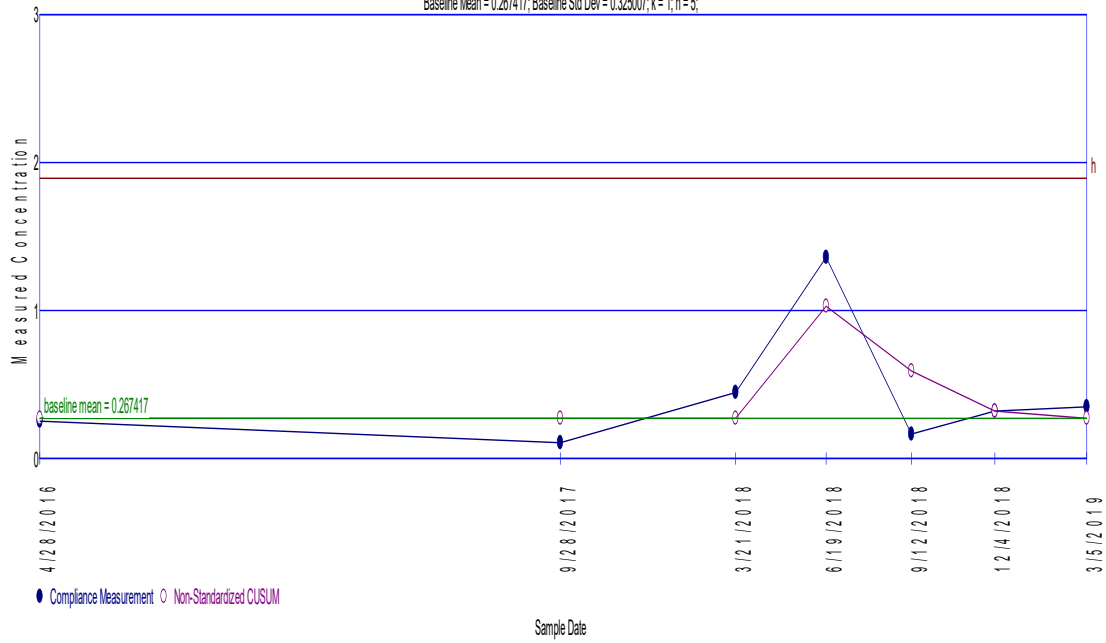
1% Critical value of 0.967 exceeds 0.687143
Evidence of non-normality at 99% level of significance



Aluminum

Inter-Well Shewhart-CUSUM Control Chart (Unified Guidance) of TMW-1

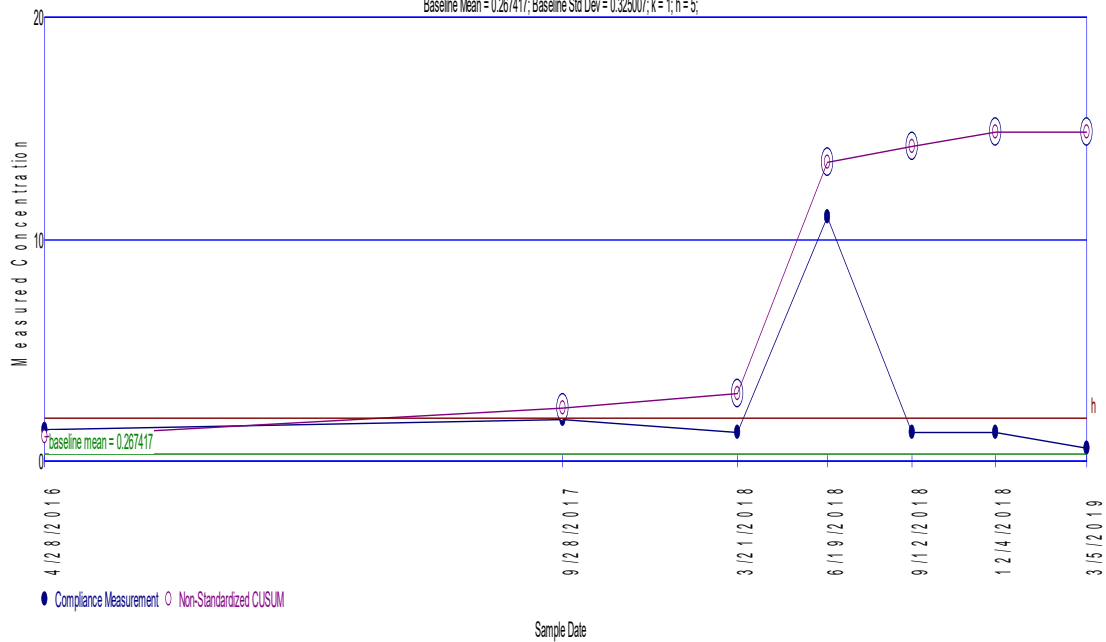
Baseline Mean = 0.267417; Baseline Std Dev = 0.325007; k = 1; h = 5;



Aluminum

Inter-Well Shewhart-CUSUM Control Chart (Unified Guidance) of TMW-2

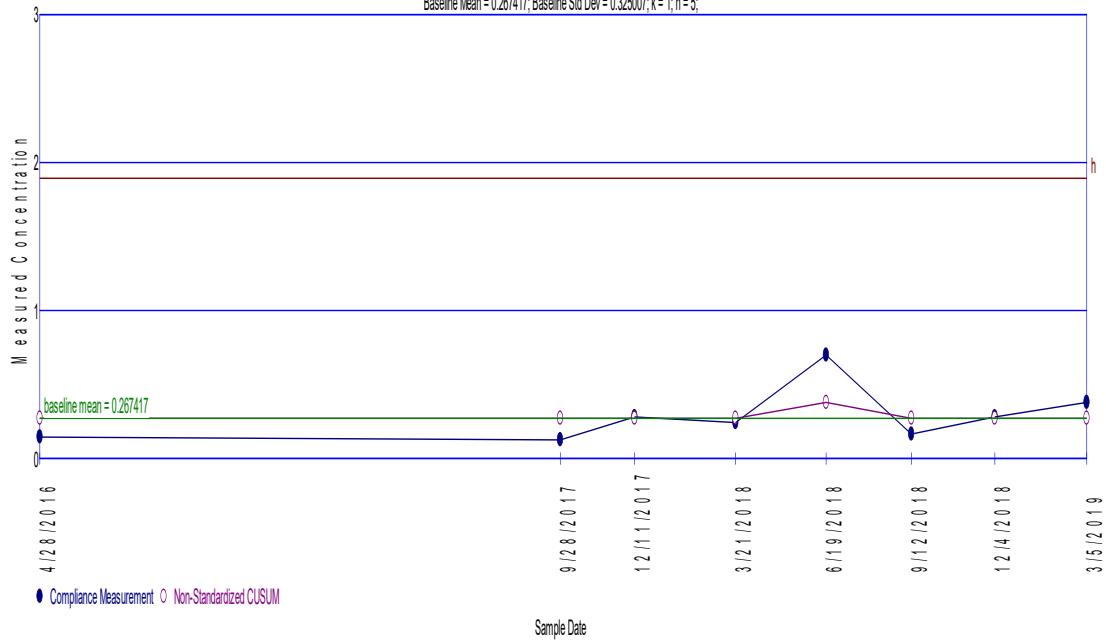
Baseline Mean = 0.267417; Baseline Std Dev = 0.325007; k = 1; h = 5;



Aluminum

Inter-Well Shewhart-CUSUM Control Chart (Unified Guidance) of TMW-3

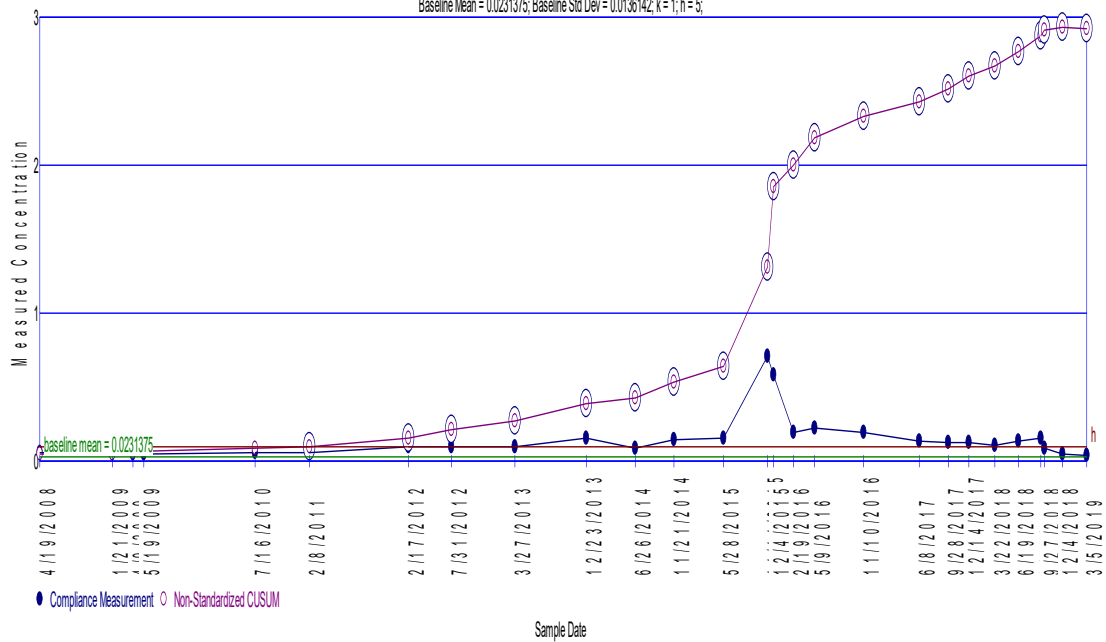
Baseline Mean = 0.267417; Baseline Std Dev = 0.325007; k = 1; h = 5;

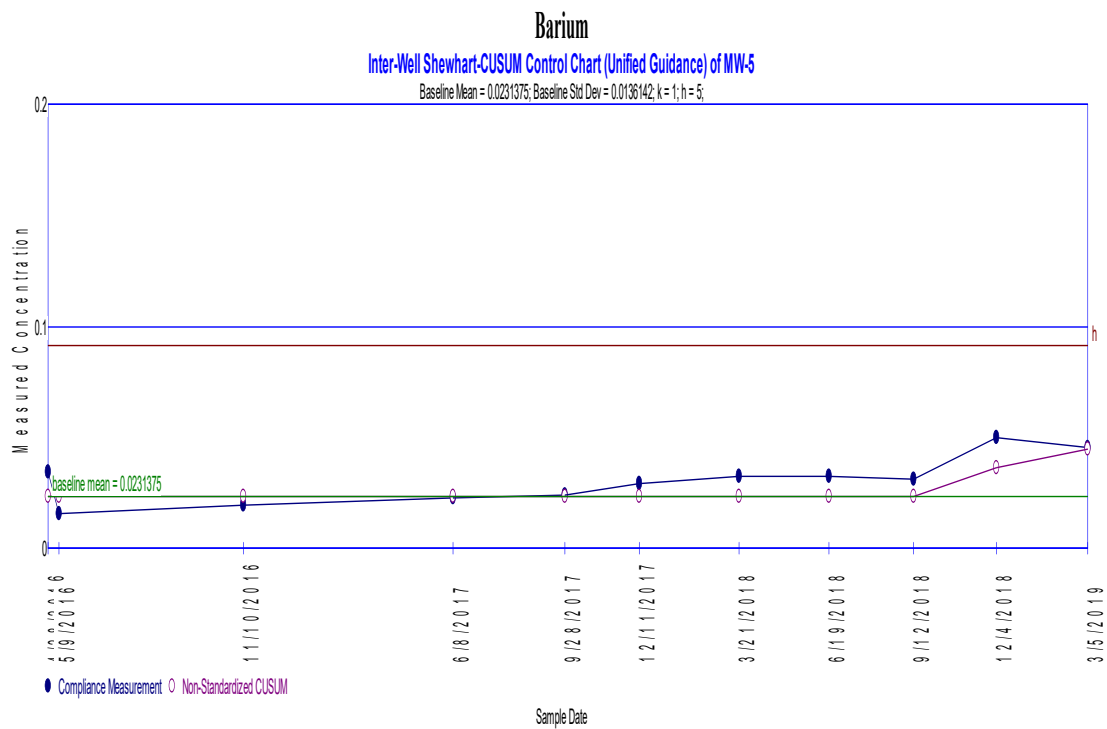
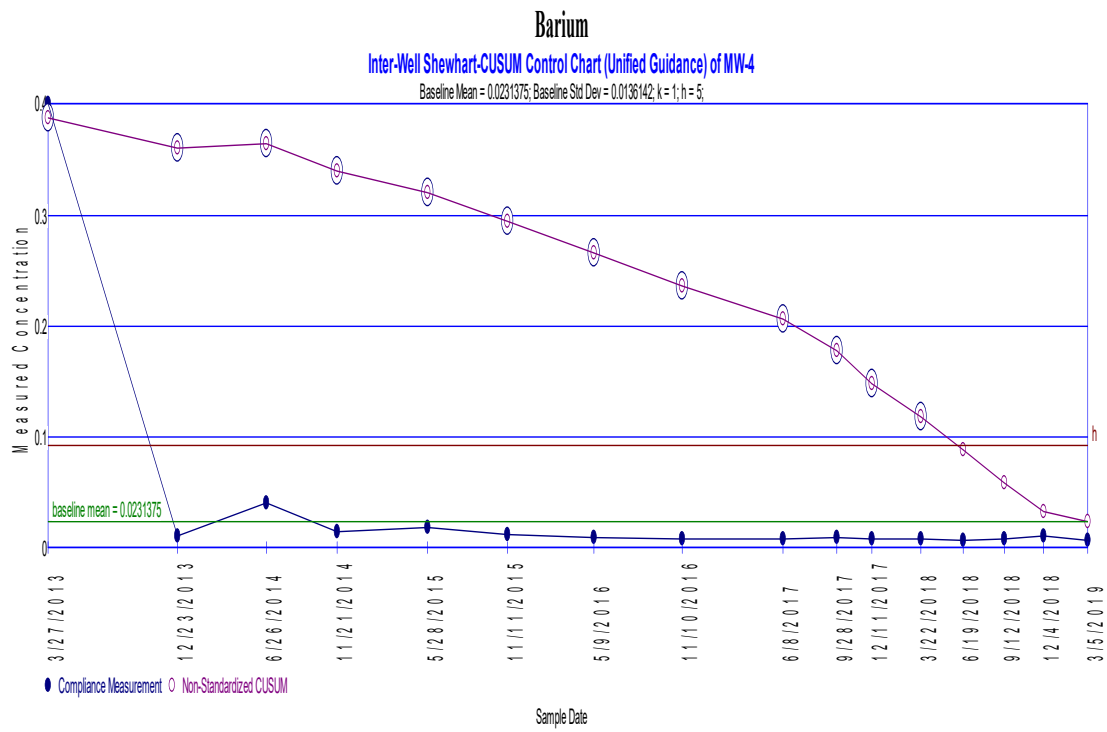


Barium

Inter-Well Shewhart-CUSUM Control Chart (Unified Guidance) of MW-3

Baseline Mean = 0.0231375; Baseline Std Dev = 0.0136142; k = 1; h = 5;

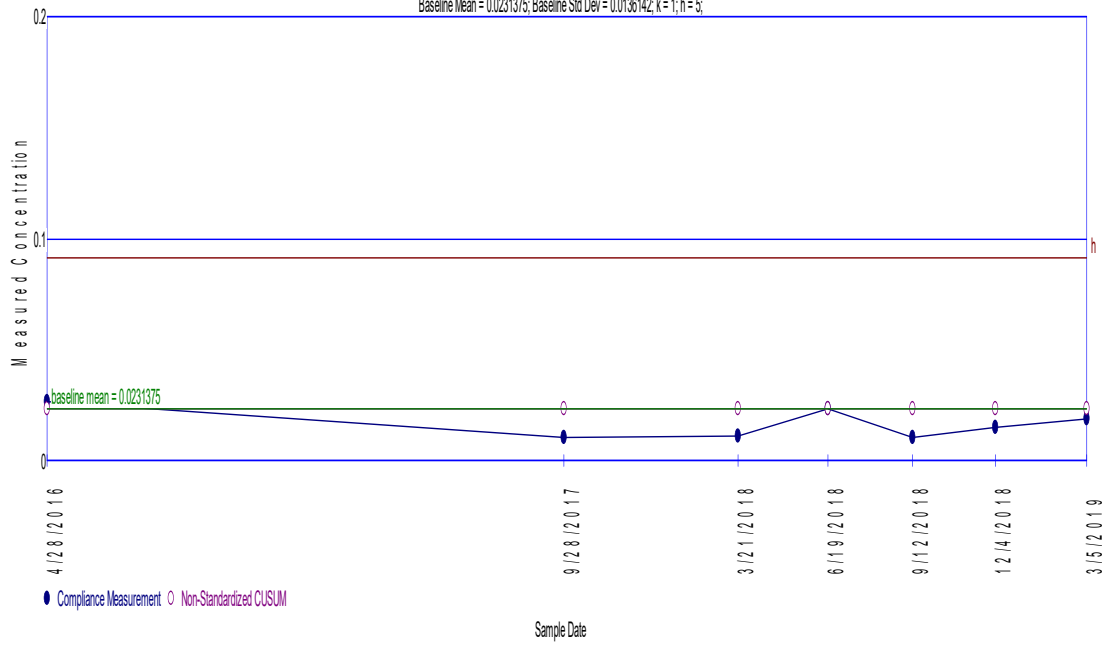




Barium

Inter-Well Shewhart-CUSUM Control Chart (Unified Guidance) of TMW-1

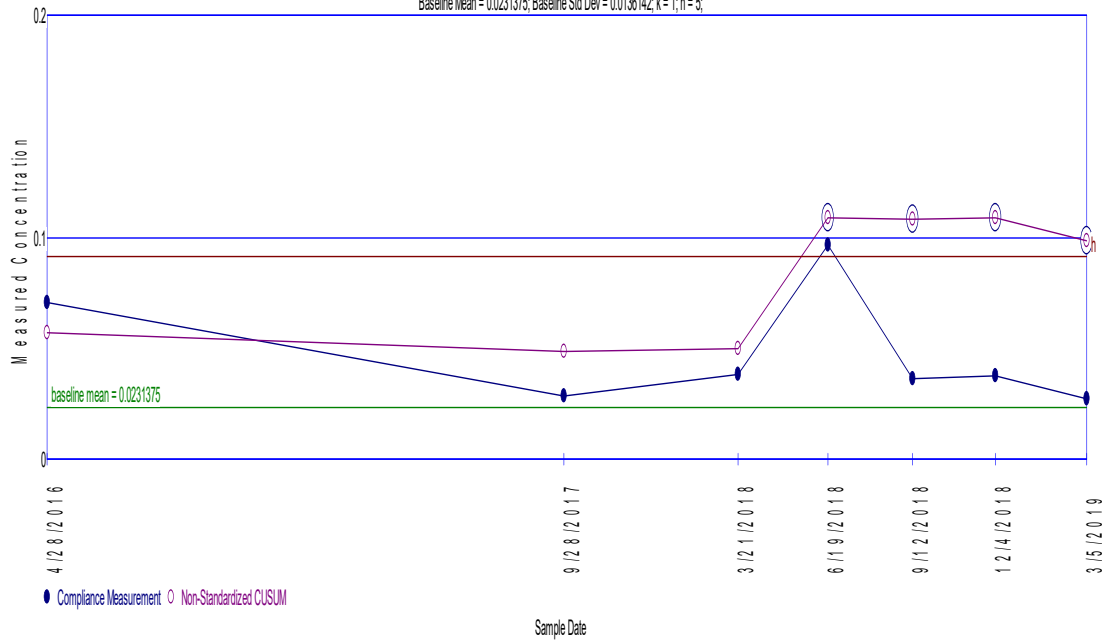
Baseline Mean = 0.0231375; Baseline Std Dev = 0.0136142; k = 1; h = 5;



Barium

Inter-Well Shewhart-CUSUM Control Chart (Unified Guidance) of TMW-2

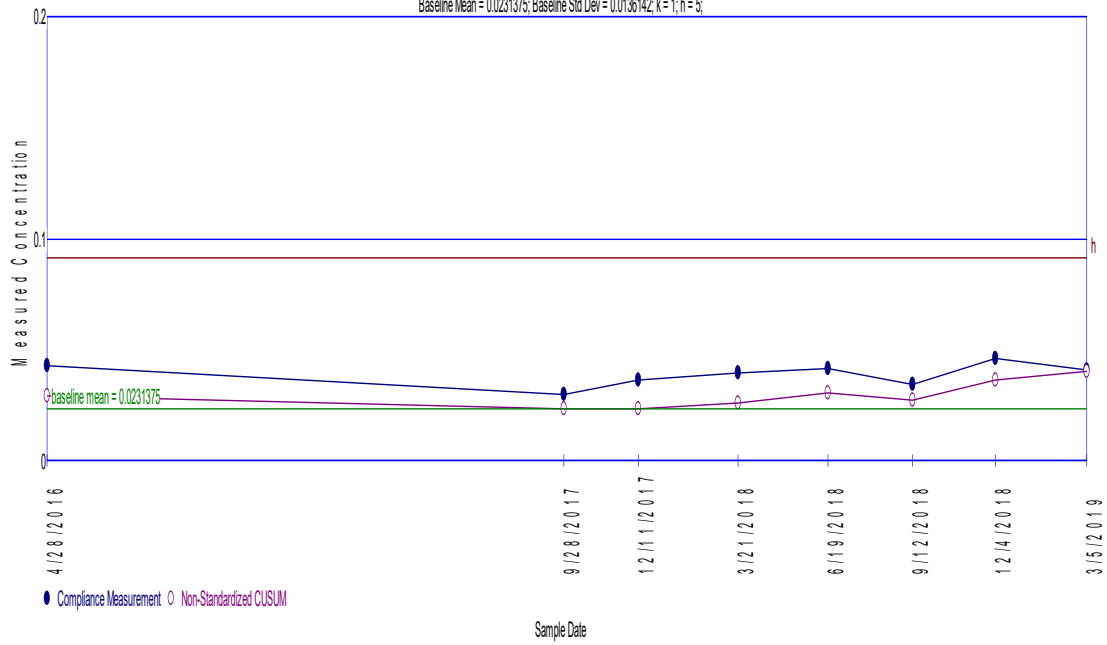
Baseline Mean = 0.0231375; Baseline Std Dev = 0.0136142; k = 1; h = 5;



Barium

Inter-Well Shewhart-CUSUM Control Chart (Unified Guidance) of TMW-3

Baseline Mean = 0.0231375; Baseline Std Dev = 0.0136142; k = 1; h = 5;



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 = 25
Background Mean = 0.959375
Background Std Dev = 0.356345

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 = 25 (background observations) - 1
 $t(0.998333, 24) = 3.35514$

Well MW-3

Date	Samples	Mean	Interval	Significant
3/5/2019	1	2.63189	[0, 2.17864]	TRUE

Well MW-4

Date	Samples	Mean	Interval	Significant
3/5/2019	1	1.94448	[0, 2.17864]	FALSE

Well MW-5

Date	Samples	Mean	Interval	Significant
3/5/2019	1	4.39445	[0, 2.17864]	TRUE

Well TMW-1

Date	Samples	Mean	Interval	Significant
3/5/2019	1	2.79728	[0, 2.17864]	TRUE

Well TMW-2

Date	Samples	Mean	Interval	Significant
3/5/2019	1	2.96011	[0, 2.17864]	TRUE

Well TMW-3

Date	Samples	Mean	Interval	Significant
3/5/2019	1	4.02356	[0, 2.17864]	TRUE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Total Cadmium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 88.8889%

Number of comparisons = 6

Future Samples (k) = 6

Recent Dates = 1

Background Measurements (n) = 23

Maximum Background Value = 0.001

Confidence Level = 79.3%

False Positive Rate = 20.7%

Location	Date	Count	Mean	Significant
MW-3	3/5/2019	1	0.0117	TRUE
MW-4	3/5/2019	1	0.001	FALSE
MW-5	3/5/2019	1	0.001	FALSE
TMW-1	3/5/2019	1	0.001	FALSE
TMW-2	3/5/2019	1	0.001	FALSE
TMW-3	3/5/2019	1	0.001	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Chromium

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 74.7475%

Number of comparisons = 6

Future Samples (k) = 6

Recent Dates = 1

Background Measurements (n) = 24

Maximum Background Value = 0.12

Confidence Level = 80%

False Positive Rate = 20%

Location	Date	Count	Mean	Significant
MW-3	3/5/2019	1	0.00479	FALSE
MW-4	3/5/2019	1	0.00218	FALSE
MW-5	3/5/2019	1	0.0158	FALSE
TMW-1	3/5/2019	1	0.00213	FALSE
TMW-2	3/5/2019	1	0.002	FALSE
TMW-3	3/5/2019	1	0.00203	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Cobalt

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 57.5758%

Number of comparisons = 6

Future Samples (k) = 6

Recent Dates = 1

Background Measurements (n) = 24

Maximum Background Value = 0.056

Confidence Level = 80%

False Positive Rate = 20%

Location	Date	Count	Mean	Significant
MW-3	3/5/2019	1	0.00317	FALSE
MW-4	3/5/2019	1	0.002	FALSE
MW-5	3/5/2019	1	0.00243	FALSE
TMW-1	3/5/2019	1	0.002	FALSE
TMW-2	3/5/2019	1	0.002	FALSE
TMW-3	3/5/2019	1	0.002	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Copper

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 82.6531%

Number of comparisons = 6

Future Samples (k) = 6

Recent Dates = 1

Background Measurements (n) = 24

Maximum Background Value = 0.028

Confidence Level = 80%

False Positive Rate = 20%

Location	Date	Count	Mean	Significant
MW-3	3/5/2019	1	0.0074	FALSE
MW-4	3/5/2019	1	0.005	FALSE
MW-5	3/5/2019	1	0.005	FALSE
TMW-1	3/5/2019	1	0.005	FALSE
TMW-2	3/5/2019	1	0.005	FALSE
TMW-3	3/5/2019	1	0.00558	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) = 14

Maximum Background Value = 0.178

Confidence Level = 70%

False Positive Rate = 30%

Location	Date	Count	Mean	Significant
MW-3	3/5/2019	1	0.163	FALSE
MW-4	3/5/2019	1	0.1	FALSE
MW-5	3/5/2019	1	0.1	FALSE
TMW-1	3/5/2019	1	0.1	FALSE
TMW-2	3/5/2019	1	0.1	FALSE
TMW-3	3/5/2019	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 = 62.3762%

Number of comparisons = 6

Future Samples (k) = 6

Recent Dates = 1

Background Measurements (n) = 24

Maximum Background Value = 0.2

Confidence Level = 80%

False Positive Rate = 20%

Location	Date	Count	Mean	Significant
MW-3	3/5/2019	1	0.0162	FALSE
MW-4	3/5/2019	1	0.002	FALSE
MW-5	3/5/2019	1	0.00932	FALSE
TMW-1	3/5/2019	1	0.002	FALSE
TMW-2	3/5/2019	1	0.002	FALSE
TMW-3	3/5/2019	1	0.002	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Zinc

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 63.3663%

Number of comparisons = 6

Future Samples (k) = 6

Recent Dates = 1

Background Measurements (n) = 24

Maximum Background Value = 0.0281

Confidence Level = 80%

False Positive Rate = 20%

Location	Date	Count	Mean	Significant
MW-3	3/5/2019	1	0.0994	TRUE
MW-4	3/5/2019	1	0.025	FALSE
MW-5	3/5/2019	1	0.025	FALSE
TMW-1	3/5/2019	1	0.025	FALSE
TMW-2	3/5/2019	1	0.025	FALSE
TMW-3	3/5/2019	1	0.025	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Sulfate

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 62.3762%

Number of comparisons = 6

Future Samples (k) = 6

Recent Dates = 1

Background Measurements (n) = 23

Maximum Background Value = 18.8

Confidence Level = 79.3%

False Positive Rate = 20.7%

Location	Date	Count	Mean	Significant
MW-3	3/5/2019	1	85.8	TRUE
MW-4	3/5/2019	1	5	FALSE
MW-5	3/5/2019	1	6.12	FALSE
TMW-1	3/5/2019	1	5	FALSE
TMW-2	3/5/2019	1	5	FALSE
TMW-3	3/5/2019	1	5	FALSE

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 38
Non detect rank is 19.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	ND<0.001	19.5
	1/21/2009	ND<0.001	19.5
	4/9/2009	ND<0.001	19.5
	5/19/2009	ND<0.001	19.5
	7/16/2010	ND<0.001	19.5
	2/8/2011	ND<0.001	19.5
	2/17/2012	ND<0.001	19.5
	7/31/2012	ND<0.001	19.5
	12/23/2013	ND<0.001	19.5
	6/26/2014	ND<0.001	19.5
	11/21/2014	ND<0.001	19.5
	5/28/2015	ND<0.001	19.5
	11/11/2015	ND<0.001	19.5
	5/9/2016	ND<0.001	19.5
	11/10/2016	ND<0.001	19.5
	6/8/2017	ND<0.001	19.5
	9/28/2017	ND<0.001	19.5
	12/11/2017	ND<0.001	19.5
	3/21/2018	ND<0.001	19.5
	6/19/2018	ND<0.001	19.5
9/12/2018	ND<0.001	19.5	
12/4/2018	ND<0.001	19.5	
3/5/2019	ND<0.001	19.5	
MW-3	1/21/2009	ND<0.001	19.5
	4/9/2009	ND<0.001	19.5
	5/19/2009	ND<0.001	19.5
	7/16/2010	ND<0.001	19.5
	2/8/2011	ND<0.001	19.5
	2/17/2012	ND<0.001	19.5
	7/31/2012	ND<0.001	19.5
	12/23/2013	ND<0.001	19.5
	6/26/2014	ND<0.001	19.5
	11/21/2014	ND<0.001	19.5
	5/28/2015	ND<0.001	19.5
	11/11/2015	ND<0.001	19.5
	12/4/2015	ND<0.001	19.5
	2/19/2016	ND<0.001	19.5
	5/9/2016	ND<0.001	19.5
	11/10/2016	0.00177	39
	6/8/2017	0.0286	45
	8/8/2017	0.0113	43
	9/28/2017	0.00926	42
	12/14/2017	0.00659	40
3/22/2018	0.00671	41	
6/19/2018	0.0312	46	

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9/12/2018	0.297	49
9/27/2018	0.204	48
12/4/2018	0.144	47
3/5/2019	0.0117	44

The Wilcoxon Statistic is 425.5

The Expected value is 299

The Standard Deviation is 49.9166

The Z Score is 2.52421

The Standard Deviation adjusted for ties is 38.4673

The Z Score adjusted for ties is 3.45515

2.52421 > 2.326 indicating statistical significance at 1% level

3.45515 > 2.326 indicating statistical significance at 1% level when adjusted for ties

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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 24
Non detect rank is 12.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.011	25
	1/21/2009	0.015	32
	4/9/2009	0.011	26
	5/19/2009	0.021	38
	7/16/2010	0.011	27
	2/8/2011	0.016	35
	2/17/2012	ND<0.01	12.5
	7/31/2012	0.023	39
	3/27/2013	0.012	29
	12/23/2013	ND<0.01	12.5
	6/26/2014	ND<0.01	12.5
	11/21/2014	ND<0.025	12.5
	5/28/2015	ND<0.025	12.5
	11/11/2015	ND<0.025	12.5
	5/9/2016	0.0281	41
	11/10/2016	ND<0.025	12.5
	6/8/2017	ND<0.025	12.5
	9/28/2017	ND<0.025	12.5
	12/11/2017	ND<0.025	12.5
	3/21/2018	ND<0.025	12.5
6/19/2018	ND<0.025	12.5	
9/12/2018	ND<0.025	12.5	
12/4/2018	ND<0.025	12.5	
3/5/2019	ND<0.025	12.5	
MW-3	4/19/2008	0.017	37
	1/21/2009	0.015	33
	4/9/2009	0.011	28
	5/19/2009	0.031	42
	7/16/2010	0.015	34
	2/8/2011	0.013	30
	2/17/2012	0.014	31
	7/31/2012	0.016	36
	3/27/2013	ND<0.01	12.5
	12/23/2013	ND<0.01	12.5
	6/26/2014	0.023	40
	11/21/2014	ND<0.025	12.5
	5/28/2015	ND<0.025	12.5
	11/11/2015	ND<0.025	12.5
	12/4/2015	ND<0.025	12.5
	2/19/2016	ND<0.025	12.5
	5/9/2016	ND<0.025	12.5
	11/10/2016	ND<0.025	12.5
	6/8/2017	0.0769	45
	9/28/2017	0.0439	43
12/14/2017	0.159	48	

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3/22/2018	0.0499	44
6/19/2018	0.109	47
9/12/2018	1.68	51
9/27/2018	1.58	50
12/4/2018	1.34	49
3/5/2019	0.0994	46

The Wilcoxon Statistic is 468.5

The Expected value is 324

The Standard Deviation is 52.9906

The Z Score is 2.71746

The Standard Deviation adjusted for ties is 50.1574

The Z Score adjusted for ties is 2.87096

2.71746 > 2.326 indicating statistical significance at 1% level

2.87096 > 2.326 indicating statistical significance at 1% level when adjusted for ties

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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 14
Non detect rank is 7.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	5/19/2009	8.9	21
	7/16/2010	9.4	24
	2/8/2011	5.8	18
	9/14/2011	6.6	20
	2/17/2012	ND<5	7.5
	7/31/2012	ND<5	7.5
	3/27/2013	5.1	16
	12/23/2013	6.1	19
	6/26/2014	ND<5	7.5
	11/21/2014	9.1	23
	5/28/2015	ND<5	7.5
	11/11/2015	18.8	31
	5/9/2016	ND<5	7.5
	8/18/2016	3.51	15
	11/10/2016	16.5	30
	6/8/2017	ND<5	7.5
	9/28/2017	ND<5	7.5
	12/11/2017	ND<5	7.5
	3/21/2018	ND<5	7.5
	6/19/2018	ND<5	7.5
9/12/2018	12.3	28	
12/4/2018	ND<5	7.5	
3/5/2019	ND<5	7.5	
MW-3	5/19/2009	ND<5	7.5
	7/16/2010	5.1	17
	2/8/2011	ND<5	7.5
	2/17/2012	22	32
	7/31/2012	23	36
	3/27/2013	16	29
	12/23/2013	12	27
	6/26/2014	9.7	25
	11/21/2014	11	26
	5/28/2015	9.09	22
	11/11/2015	29.3	38
	12/4/2015	29.1	37
	2/19/2016	22.2	33
	5/9/2016	22.3	34
	8/18/2016	95.7	45
	11/10/2016	34	40
	6/8/2017	93.7	44
	9/28/2017	46.2	41
	12/14/2017	46.2	42
	3/22/2018	22.3	35
6/19/2018	30.1	39	
9/12/2018	484	47	

12/4/2018	324	46
3/5/2019	85.8	43

The Wilcoxon Statistic is 493
The Expected value is 276
The Standard Deviation is 46.9894
The Z Score is 4.60743
The Standard Deviation adjusted for ties is 46.3672
The Z Score adjusted for ties is 4.66925
The Z Score adjusted for ties is 4.66925
4.60743 > 2.326 indicating statistical significance at 1% level
4.66925 > 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 = 115 - 206 = -91

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
7/18/2010	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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 84
B = 0
C = 6
D = 0
E = 8
F = 0

a = 37050
b = 140400
c = 1300

Group Variance = 2053.67

Z-Score = -1.98599

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

-1.98599 < -1.65463 indicating a downward trend

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Mann-Kendall Trend Analysis

Parameter: Aluminum

Location: MW-5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 28 - 26 = 2

Tied Group	Value	Members
1	0.1	2

Time Period Observations

4/28/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

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

a = 2970
b = 8910
c = 220

Group Variance = 164

Z-Score = 0.0780869

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

$|0.0780869| < 1.97737$ indicating no evidence of a trend

Page 2

Mann-Kendall Trend Analysis

Parameter: Aluminum

Location: TMW-1

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 13 - 8 = 5

Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining S >= |5| is 0.562

0.562 >= 0.025 indicating no evidence of a trend

Page 3

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 - 16 = -11

Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining S >= |-11| is 0.136

0.136 >= 0.025 indicating no evidence of a trend

Page 4

Mann-Kendall Trend Analysis

Parameter: Aluminum

Location: TMW-3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 21 - 7 = 14

Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining S >= |14| is 0.108

0.108 >= 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 = 211 - 140 = 71

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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 41418

b = 157950

c = 1404

Group Variance = 2301

Z-Score = 1.45928

Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

|1.45928| <= 1.97737 indicating no evidence of a 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 = 21 - 99 = -78

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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 8880

b = 30240

c = 480

Group Variance = 493.333

Z-Score = -3.46673

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

-3.46673 < -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 = 43 - 12 = 31

Tied Group Value	Members
------------------	---------

Time Period	Observations
-------------	--------------

4/28/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 0

B = 0

C = 0

D = 0

E = 0

F = 0

a = 2970

b = 8910

c = 220

Group Variance = 165

Z-Score = 2.3355

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

2.3355 > 1.65463 indicating an upward 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 = 10 - 11 = -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

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Mann-Kendall Trend Analysis

Parameter: Barium

Location: TMW-2

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 7 - 14 = -7

Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining S >= |-7| is 0.382

0.382 >= 0.025 indicating no evidence of a trend

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Mann-Kendall Trend Analysis

Parameter: Barium

Location: TMW-3

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

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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 = 203 - 17 = 186

Tied GrouValue	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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 7350

B = 0

C = 2730

D = 0

E = 210

F = 0

a = 37050

b = 140400

c = 1300

Group Variance = 1650

Z-Score = 4.55439

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

4.55439 > 1.65463 indicating an upward trend

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Mann-Kendall Trend Analysis

Parameter: Chloride

Location: MW-3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 255 - 92 = 163

Tied GrouValue	Members
----------------	---------

1	25	3
2	65	2

Time Period	Observations
-------------	--------------

4/19/2008	1
1/21/2009	1
4/9/2009	1
5/19/2009	1
7/18/2010	1
2/8/2011	1
2/17/2012	1
8/1/2012	1
3/27/2013	1
12/23/2013	1
6/28/2014	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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 84
B = 0
C = 6
D = 0
E = 8
F = 0
a = 41418
b = 157950
c = 1404
Group Variance = 2296.33
Z-Score = 3.38063
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.38063 > 1.65463 indicating an upward trend

Page 13

Mann-Kendall Trend Analysis

Parameter: Chloride

Location: MW-5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 52 - 3 = 49

Tied GrouValue	Members
----------------	---------

Time Period	Observations
-------------	--------------

4/28/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 2970
b = 8910
c = 220
Group Variance = 165
Z-Score = 3.73679
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.73679 > 1.65463 indicating an upward trend

Page 14

Mann-Kendall Trend Analysis

Parameter: Chloride

Location: MW-4

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 53 - 83 = -30

Tied GrouValue	Members
----------------	---------

Time Period	Observations
-------------	--------------

3/27/2013	1
4/11/2013	1
12/23/2013	1
6/28/2014	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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 10608
b = 36720
c = 544
Group Variance = 589.333
Z-Score = -1.19459
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
| -1.19459 | <= 1.97737 indicating no evidence of a trend

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Mann-Kendall Trend Analysis

Parameter: Chloride

Location: MW-5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 52 - 3 = 49

Tied GrouValue	Members
----------------	---------

Time Period	Observations
-------------	--------------

4/28/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 2970
b = 8910
c = 220
Group Variance = 165
Z-Score = 3.73679
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.73679 > 1.65463 indicating an upward trend

Page 16

Mann-Kendall Trend Analysis

Parameter: Chloride

Location: TMW-1

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 43 - 2 = 41
Comparing at 95% confidence level (upward trend)
Probability of obtaining S \geq 41 is 1.5e-005
S > 0 and 1.5e-005 < 0.05 indicating an upward trend

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Mann-Kendall Trend Analysis

Parameter: Chloride

Location: TMW-2

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 31 - 14 = 17
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S \geq |17| is 0.156
0.156 \geq 0.025 indicating no evidence of a trend

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Mann-Kendall Trend Analysis

Parameter: Chloride

Location: TMW-3

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 36 - 9 = 27
Comparing at 95% confidence level (upward trend)
Probability of obtaining S \geq 27 is 0.0083
S > 0 and 0.0083 < 0.05 indicating an upward trend

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Mann-Kendall Trend Analysis

Parameter: Chromium

Location: MW-3

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 44 - 155 = -111

Tied Group	Value	Members
1	0.01	15
2	0.002	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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 8148
B = 0
C = 2940
D = 0
E = 252
F = 0
a = 37050
b = 140400
c = 1300
Group Variance = 1605.67
Z-Score = -2.74514
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-2.74514 < -1.65463 indicating a downward trend

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Mann-Kendall Trend Analysis

Parameter: Chromium

Location: MW-4

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 16 - 61 = -45

Tied Group	Value	Members
1	0.01	6
2	0.002	8

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
9/29/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 1686
B = 0
C = 456
D = 0
E = 86
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 399.667
Z-Score = -2.20092
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-2.20092 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Chromium

Location: TMW-1

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 11 - 4 = 7

Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |7| is 0.382
0.382 >= 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 = 8 - 13 = -5
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |-5| is 0.562
0.562 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chromium

Location: TMW-3

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 15 - 3 = 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: Cobalt

Location: MW-3

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 45 - 145 = -100

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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 9390
B = 0
C = 3480
D = 0
E = 270
F = 0
a = 37050
b = 140400
c = 1300
Group Variance = 1536.67
Z-Score = -2.52549
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-2.52549 < -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 = 25 - 29 = -4

Tied Group	Value	Members
1	0.00264	2

Time Period	Observations
4/28/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 18
B = 0
C = 0
D = 0
E = 2
F = 0
a = 2970
b = 8910
c = 220
Group Variance = 164
Z-Score = -0.234261
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
 $| -0.234261 | <= 1.97737$ indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Copper

Location: MW-3

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 160 - 64 = 96

Tied Group	Value	Members
1	0.002	5
2	0.005	12

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
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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 4128
B = 0
C = 1380
D = 0
E = 152
F = 0
a = 33000
b = 124200
c = 1200
Group Variance = 1604
Z-Score = 2.37204
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.37204 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Copper

Location: TMW-3

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 7 - 0 = 7

Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)

Probability of obtaining S >= |7| is 0.473

0.473 >= 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 = 61 - 11 = 50

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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 156
 B = 0
 C = 24
 D = 0
 E = 12
 F = 0
 a = 4836
 b = 15444
 c = 312
 Group Variance = 260
 Z-Score = 3.03885
 Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.03885 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Nickel

Location: MW-3

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 97 - 179 = -82

Tied Group	Value	Members
1	0.02	12
2	0.01	3
3	0.002	4

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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 4050
 B = 0
 C = 1350
 D = 0
 E = 150
 F = 0
 a = 41418
 b = 157950
 c = 1404
 Group Variance = 2076
 Z-Score = -1.77775
 Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)

$|-1.77775| \leq 1.97737$ indicating no evidence of a 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 = 41 - 14 = 27

Tied Group	Value	Members
1		

Time Period	Observations
4/28/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 0
 B = 0
 C = 0
 D = 0
 E = 0
 F = 0
 a = 2970
 b = 8910
 c = 220
 Group Variance = 165
 Z-Score = 2.0241
 Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.0241 > 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 = 277 - 51 = 226

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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 834
 B = 0
 C = 210
 D = 0
 E = 46
 F = 0
 a = 41418
 b = 157950
 c = 1404
 Group Variance = 2254.67
 Z-Score = 4.73851
 Comparison Level at 95% confidence level = 1.65463 (upward trend)

4.73851 > 1.65463 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 = 222 - 51 = 171

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
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 54
 B = 0
 C = 0
 D = 0
 E = 6
 F = 0
 a = 29256
 b = 109296
 c = 1104
 Group Variance = 1622.33
 Z-Score = 4.22065
 Comparison Level at 95% confidence level = 1.65463 (upward trend)
 4.22065 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Sulfate

Location: MW-5

Original Data (Not Transformed)

Non-Detects Replaced with Detection Limit

95% Confidence Level

S Statistic = 33 - 1 = 32

Tied Group	Value	Members
1	5	7

Time Period	Observations
4/26/2016	1
5/9/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/11/2017	1
3/21/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1
3/5/2019	1

There are 0 time periods with multiple data

A = 798
 B = 0
 C = 210
 D = 0
 E = 42
 F = 0
 a = 2970
 b = 8910
 c = 220
 Group Variance = 120.667
 Z-Score = 2.82207
 Comparison Level at 95% confidence level = 1.65463 (upward trend)
 2.82207 > 1.65463 indicating an upward trend

APPENDIX C
LABORATORY ANALYTICAL REPORTS &
FIELD INFORMATION LOGS

March 13, 2019

Civil & Environmental Consultants - TN

Sample Delivery Group: L1075820
Samples Received: 03/06/2019
Project Number: 181-364
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:



Jason Romer
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.



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SAMPLE SUMMARY



MW-1 L1075820-01 GW

Collected by
PC / AB Collected date/time
03/05/19 10:35 Received date/time
03/06/19 10:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1248517	1	03/12/19 12:10	03/12/19 12:10	JER	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1248244	1	03/12/19 16:30	03/12/19 16:30	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1248433	1	03/13/19 08:34	03/13/19 08:34	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1247115	1	03/10/19 11:00	03/10/19 13:50	BAM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1245891	1	03/06/19 20:54	03/06/19 20:54	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1245996	1	03/06/19 19:15	03/07/19 09:18	ABL	Mt. Juliet, TN
Mercury by Method 7470A	WG1245998	1	03/06/19 19:15	03/07/19 10:53	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246101	1	03/07/19 07:43	03/07/19 11:25	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246644	1	03/07/19 13:36	03/08/19 10:24	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1245989	1	03/07/19 09:43	03/08/19 14:48	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/10/19 20:02	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/11/19 15:07	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1246403	1	03/07/19 11:56	03/07/19 11:56	TJJ	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1246401	1	03/07/19 08:38	03/07/19 13:06	HMH	Mt. Juliet, TN

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Gl

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Al

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Sc

MW-3 L1075820-02 GW

Collected by
PC / AB Collected date/time
03/05/19 13:35 Received date/time
03/06/19 10:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1248517	1	03/12/19 12:11	03/12/19 12:11	JER	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1248244	1	03/12/19 16:36	03/12/19 16:36	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1248433	1	03/13/19 08:36	03/13/19 08:36	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1247115	1	03/10/19 11:00	03/10/19 13:50	BAM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1245891	1	03/06/19 21:26	03/06/19 21:26	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1245996	1	03/06/19 19:15	03/07/19 09:21	ABL	Mt. Juliet, TN
Mercury by Method 7470A	WG1245998	1	03/06/19 19:15	03/07/19 11:01	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246101	1	03/07/19 07:43	03/07/19 11:28	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246644	1	03/07/19 13:36	03/08/19 10:27	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1245989	1	03/07/19 09:43	03/08/19 14:53	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/10/19 20:07	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/11/19 15:12	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1246403	1	03/07/19 12:15	03/07/19 12:15	TJJ	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1246401	1	03/07/19 08:38	03/07/19 13:43	HMH	Mt. Juliet, TN

MW-4 L1075820-03 GW

Collected by
PC / AB Collected date/time
03/05/19 12:35 Received date/time
03/06/19 10:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1248517	1	03/12/19 12:12	03/12/19 12:12	JER	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1248244	1	03/12/19 16:44	03/12/19 16:44	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1248433	1	03/13/19 08:38	03/13/19 08:38	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1247115	1	03/10/19 11:00	03/10/19 13:50	BAM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1245891	1	03/06/19 21:42	03/06/19 21:42	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1245996	1	03/06/19 19:15	03/07/19 09:23	ABL	Mt. Juliet, TN
Mercury by Method 7470A	WG1245998	1	03/06/19 19:15	03/07/19 11:08	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246101	1	03/07/19 07:43	03/07/19 11:39	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246644	1	03/07/19 13:36	03/08/19 10:29	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1245989	1	03/07/19 09:43	03/08/19 14:57	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/10/19 20:11	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/11/19 15:16	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1246403	1	03/07/19 12:36	03/07/19 12:36	TJJ	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1246401	1	03/07/19 08:38	03/07/19 13:56	HMH	Mt. Juliet, TN

SAMPLE SUMMARY

MW-5 L1075820-04 GW

Collected by
PC / AB Collected date/time
03/05/19 11:40 Received date/time
03/06/19 10:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1248517	1	03/12/19 12:13	03/12/19 12:13	JER	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1248244	1	03/12/19 16:50	03/12/19 16:50	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1248433	1	03/13/19 08:39	03/13/19 08:39	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1247115	1	03/10/19 11:00	03/10/19 13:51	BAM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1245891	1	03/06/19 21:58	03/06/19 21:58	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1245996	1	03/06/19 19:15	03/07/19 09:25	ABL	Mt. Juliet, TN
Mercury by Method 7470A	WG1245998	1	03/06/19 19:15	03/07/19 11:10	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246101	1	03/07/19 07:43	03/07/19 11:42	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246644	1	03/07/19 13:36	03/08/19 10:37	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1245989	1	03/07/19 09:43	03/08/19 15:02	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/10/19 20:41	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/11/19 15:35	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1246403	1	03/07/19 12:55	03/07/19 12:55	TJJ	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1246401	1	03/07/19 08:38	03/07/19 14:08	HMH	Mt. Juliet, TN

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Gl

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Sc

TMW-1 L1075820-05 GW

Collected by
PC / AB Collected date/time
03/05/19 11:45 Received date/time
03/06/19 10:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1248517	1	03/12/19 12:14	03/12/19 12:14	JER	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1248244	1	03/12/19 16:56	03/12/19 16:56	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1248433	1	03/13/19 08:41	03/13/19 08:41	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1247115	1	03/10/19 11:00	03/10/19 13:51	BAM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1245891	1	03/06/19 22:29	03/06/19 22:29	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1245996	1	03/06/19 19:15	03/07/19 09:28	ABL	Mt. Juliet, TN
Mercury by Method 7470A	WG1245998	1	03/06/19 19:15	03/07/19 11:13	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246101	1	03/07/19 07:43	03/07/19 11:45	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246644	1	03/07/19 13:36	03/08/19 10:40	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1245989	1	03/07/19 09:43	03/08/19 15:06	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/10/19 20:46	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/11/19 15:40	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1246403	1	03/07/19 13:15	03/07/19 13:15	TJJ	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1246401	1	03/07/19 08:38	03/07/19 14:20	HMH	Mt. Juliet, TN

TMW-2 L1075820-06 GW

Collected by
PC / AB Collected date/time
03/05/19 13:15 Received date/time
03/06/19 10:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1248517	1	03/12/19 12:16	03/12/19 12:16	JER	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1248244	1	03/12/19 17:13	03/12/19 17:13	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1248433	1	03/13/19 08:42	03/13/19 08:42	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1247115	1	03/10/19 11:00	03/10/19 13:51	BAM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1245891	1	03/06/19 22:45	03/06/19 22:45	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1245996	1	03/06/19 19:15	03/07/19 09:30	ABL	Mt. Juliet, TN
Mercury by Method 7470A	WG1245998	1	03/06/19 19:15	03/07/19 11:15	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246101	1	03/07/19 07:43	03/07/19 11:48	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246644	1	03/07/19 13:36	03/08/19 10:42	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1245989	1	03/07/19 09:43	03/08/19 15:11	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/10/19 20:50	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/11/19 15:44	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1246403	1	03/07/19 13:36	03/07/19 13:36	TJJ	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1246401	1	03/07/19 08:38	03/07/19 14:32	HMH	Mt. Juliet, TN

SAMPLE SUMMARY

TMW-3 L1075820-07 GW

Collected by
PC / AB Collected date/time
03/05/19 15:00 Received date/time
03/06/19 10:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1248517	1	03/12/19 12:17	03/12/19 12:17	JER	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1248244	1	03/12/19 17:20	03/12/19 17:20	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1248433	1	03/13/19 08:44	03/13/19 08:44	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1247115	1	03/10/19 11:00	03/10/19 13:51	BAM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1245891	1	03/06/19 23:01	03/06/19 23:01	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1245996	1	03/06/19 19:15	03/07/19 09:38	ABL	Mt. Juliet, TN
Mercury by Method 7470A	WG1245998	1	03/06/19 19:15	03/07/19 11:18	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246101	1	03/07/19 07:43	03/07/19 11:50	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246644	1	03/07/19 13:36	03/08/19 10:45	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1245989	1	03/07/19 09:43	03/08/19 15:15	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/10/19 20:55	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/11/19 15:49	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1246403	1	03/07/19 13:56	03/07/19 13:56	TJJ	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1246401	1	03/07/19 08:38	03/07/19 14:45	HMH	Mt. Juliet, TN

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DUPLICATE L1075820-08 GW

Collected by
PC / AB Collected date/time
03/05/19 00:00 Received date/time
03/06/19 10:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1248517	1	03/12/19 12:18	03/12/19 12:18	JER	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1248244	1	03/12/19 17:27	03/12/19 17:27	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1248433	1	03/13/19 08:45	03/13/19 08:45	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1247115	1	03/10/19 11:00	03/10/19 13:51	BAM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1245973	1	03/06/19 15:30	03/06/19 15:30	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1245996	1	03/06/19 19:15	03/07/19 09:40	ABL	Mt. Juliet, TN
Mercury by Method 7470A	WG1245998	1	03/06/19 19:15	03/07/19 11:20	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246101	1	03/07/19 07:43	03/07/19 11:53	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246644	1	03/07/19 13:36	03/08/19 10:48	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1245989	1	03/07/19 09:43	03/08/19 15:20	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/10/19 21:00	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/11/19 15:53	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1246403	1	03/07/19 14:16	03/07/19 14:16	TJJ	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1246401	1	03/07/19 08:38	03/07/19 14:57	HMH	Mt. Juliet, TN

FIELD BLANK L1075820-09 GW

Collected by
PC / AB Collected date/time
03/05/19 14:20 Received date/time
03/06/19 10:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1248517	1	03/12/19 12:19	03/12/19 12:19	JER	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1248244	1	03/12/19 17:33	03/12/19 17:33	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1248433	1	03/13/19 08:49	03/13/19 08:49	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1247951	1	03/10/19 11:00	03/10/19 14:20	BAM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1245973	1	03/06/19 16:14	03/06/19 16:14	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1245996	1	03/06/19 19:15	03/07/19 09:43	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1246101	1	03/07/19 07:43	03/07/19 11:56	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1245989	1	03/07/19 10:23	03/08/19 15:25	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/10/19 21:04	LD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1246973	1	03/09/19 09:33	03/11/19 15:58	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1246403	1	03/07/19 14:36	03/07/19 14:36	TJJ	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1246401	1	03/07/19 08:38	03/07/19 15:09	HMH	Mt. Juliet, TN

SAMPLE SUMMARY



TRIP BLANK L1075820-10 GW

Collected by: PC / AB
 Collected date/time: 03/05/19 00:00
 Received date/time: 03/06/19 10:30

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1246403	1	03/07/19 11:36	03/07/19 11:36	TJJ	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



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.

Jason Romer
Project Manager

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Sr
- ⁶ Qc
- ⁷ Gl
- ⁸ Al
- ⁹ Sc



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	34.1	B	30.0	1	03/12/2019 12:10	WG1248517

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	53.9		20.0	1	03/12/2019 16:30	WG1248244

3 Ss

4 Cn

Sample Narrative:

L1075820-01 WG1248244: Endpoint pH 4.5

5 Sr

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/13/2019 08:34	WG1248433

6 Qc

7 Gl

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	03/10/2019 13:50	WG1247115

8 Al

9 Sc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/06/2019 20:54	WG1245891
Chloride	2.11		1.00	1	03/06/2019 20:54	WG1245891
Fluoride	ND		0.100	1	03/06/2019 20:54	WG1245891
Nitrate	ND		0.100	1	03/06/2019 20:54	WG1245891
Sulfate	ND		5.00	1	03/06/2019 20:54	WG1245891

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	0.000922		0.000200	1	03/07/2019 09:18	WG1245996
Mercury,Dissolved	0.000361		0.000200	1	03/07/2019 10:53	WG1245998

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/07/2019 11:25	WG1246101
Boron,Dissolved	ND		0.200	1	03/08/2019 10:24	WG1246644

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	03/10/2019 20:02	WG1246973
Aluminum,Dissolved	ND		0.100	1	03/08/2019 14:48	WG1245989
Antimony	ND		0.00200	1	03/11/2019 15:07	WG1246973
Antimony,Dissolved	ND		0.00200	1	03/08/2019 14:48	WG1245989
Arsenic	0.00449		0.00200	1	03/10/2019 20:02	WG1246973
Arsenic,Dissolved	0.00739		0.00200	1	03/08/2019 14:48	WG1245989
Barium	0.0184		0.00500	1	03/10/2019 20:02	WG1246973
Barium,Dissolved	0.0227		0.00500	1	03/08/2019 14:48	WG1245989



Collected date/time: 03/05/19 10:35

L1075820

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	03/10/2019 20:02	WG1246973
Beryllium,Dissolved	ND		0.00200	1	03/08/2019 14:48	WG1245989
Cadmium	ND		0.00100	1	03/10/2019 20:02	WG1246973
Cadmium,Dissolved	ND		0.00100	1	03/08/2019 14:48	WG1245989
Calcium	8.35		1.00	1	03/10/2019 20:02	WG1246973
Calcium,Dissolved	9.11		1.00	1	03/08/2019 14:48	WG1245989
Chromium	ND		0.00200	1	03/10/2019 20:02	WG1246973
Chromium,Dissolved	ND		0.00200	1	03/08/2019 14:48	WG1245989
Cobalt	0.0395		0.00200	1	03/10/2019 20:02	WG1246973
Cobalt,Dissolved	0.0491		0.00200	1	03/08/2019 14:48	WG1245989
Copper	ND		0.00500	1	03/10/2019 20:02	WG1246973
Copper,Dissolved	0.0149		0.00500	1	03/08/2019 14:48	WG1245989
Iron	5.14		0.100	1	03/10/2019 20:02	WG1246973
Iron,Dissolved	7.47		0.100	1	03/08/2019 14:48	WG1245989
Lead	ND		0.00200	1	03/10/2019 20:02	WG1246973
Lead,Dissolved	0.00204	B	0.00200	1	03/08/2019 14:48	WG1245989
Magnesium	2.38		1.00	1	03/10/2019 20:02	WG1246973
Magnesium,Dissolved	2.68		1.00	1	03/08/2019 14:48	WG1245989
Manganese	0.629		0.00500	1	03/10/2019 20:02	WG1246973
Manganese,Dissolved	0.794		0.00500	1	03/08/2019 14:48	WG1245989
Nickel	0.00638		0.00200	1	03/10/2019 20:02	WG1246973
Nickel,Dissolved	0.00714		0.00200	1	03/08/2019 14:48	WG1245989
Potassium	1.06		1.00	1	03/10/2019 20:02	WG1246973
Potassium,Dissolved	1.21		1.00	1	03/08/2019 14:48	WG1245989
Selenium	ND		0.00200	1	03/11/2019 15:07	WG1246973
Selenium,Dissolved	ND		0.00200	1	03/08/2019 14:48	WG1245989
Silver	ND		0.00200	1	03/11/2019 15:07	WG1246973
Silver,Dissolved	ND		0.00200	1	03/08/2019 14:48	WG1245989
Sodium	4.14		1.00	1	03/10/2019 20:02	WG1246973
Sodium,Dissolved	4.37		1.00	1	03/08/2019 14:48	WG1245989
Thallium	ND		0.00200	1	03/10/2019 20:02	WG1246973
Thallium,Dissolved	ND		0.00200	1	03/08/2019 14:48	WG1245989
Vanadium	ND		0.00500	1	03/10/2019 20:02	WG1246973
Vanadium,Dissolved	ND		0.00500	1	03/08/2019 14:48	WG1245989
Zinc	ND		0.0250	1	03/10/2019 20:02	WG1246973
Zinc,Dissolved	ND		0.0250	1	03/08/2019 14:48	WG1245989

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
Acetone	ND		0.0500	1	03/07/2019 11:56	WG1246403
Acrylonitrile	ND		0.0100	1	03/07/2019 11:56	WG1246403
Benzene	ND		0.00100	1	03/07/2019 11:56	WG1246403
Bromochloromethane	ND		0.00100	1	03/07/2019 11:56	WG1246403
Bromodichloromethane	ND		0.00100	1	03/07/2019 11:56	WG1246403
Bromoform	ND		0.00100	1	03/07/2019 11:56	WG1246403
Bromomethane	ND		0.00500	1	03/07/2019 11:56	WG1246403
Carbon disulfide	ND		0.00100	1	03/07/2019 11:56	WG1246403
Carbon tetrachloride	ND		0.00100	1	03/07/2019 11:56	WG1246403
Chlorobenzene	ND		0.00100	1	03/07/2019 11:56	WG1246403
Chlorodibromomethane	ND		0.00100	1	03/07/2019 11:56	WG1246403
Chloroethane	ND		0.00500	1	03/07/2019 11:56	WG1246403
Chloroform	ND		0.00500	1	03/07/2019 11:56	WG1246403
Chloromethane	ND		0.00250	1	03/07/2019 11:56	WG1246403
Dibromomethane	ND		0.00100	1	03/07/2019 11:56	WG1246403
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/07/2019 11:56	WG1246403



Collected date/time: 03/05/19 10:35

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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	03/07/2019 11:56	WG1246403
1,2-Dichlorobenzene	ND		0.00100	1	03/07/2019 11:56	WG1246403
1,4-Dichlorobenzene	ND		0.00100	1	03/07/2019 11:56	WG1246403
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/07/2019 11:56	WG1246403
1,1-Dichloroethane	ND		0.00100	1	03/07/2019 11:56	WG1246403
1,2-Dichloroethane	ND		0.00100	1	03/07/2019 11:56	WG1246403
1,1-Dichloroethene	ND		0.00100	1	03/07/2019 11:56	WG1246403
cis-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 11:56	WG1246403
trans-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 11:56	WG1246403
1,2-Dichloropropane	ND		0.00100	1	03/07/2019 11:56	WG1246403
cis-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 11:56	WG1246403
trans-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 11:56	WG1246403
Ethylbenzene	ND		0.00100	1	03/07/2019 11:56	WG1246403
2-Hexanone	ND		0.0100	1	03/07/2019 11:56	WG1246403
Iodomethane	ND		0.0100	1	03/07/2019 11:56	WG1246403
2-Butanone (MEK)	ND		0.0100	1	03/07/2019 11:56	WG1246403
Methylene Chloride	ND		0.00500	1	03/07/2019 11:56	WG1246403
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/07/2019 11:56	WG1246403
Styrene	ND		0.00100	1	03/07/2019 11:56	WG1246403
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 11:56	WG1246403
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 11:56	WG1246403
Tetrachloroethene	ND		0.00100	1	03/07/2019 11:56	WG1246403
Toluene	ND		0.00100	1	03/07/2019 11:56	WG1246403
1,1,1-Trichloroethane	ND		0.00100	1	03/07/2019 11:56	WG1246403
1,1,2-Trichloroethane	ND		0.00100	1	03/07/2019 11:56	WG1246403
Trichloroethene	ND		0.00100	1	03/07/2019 11:56	WG1246403
Trichlorofluoromethane	ND		0.00500	1	03/07/2019 11:56	WG1246403
1,2,3-Trichloropropane	ND		0.00250	1	03/07/2019 11:56	WG1246403
Vinyl acetate	ND		0.0100	1	03/07/2019 11:56	WG1246403
Vinyl chloride	ND		0.00100	1	03/07/2019 11:56	WG1246403
Xylenes, Total	ND		0.00300	1	03/07/2019 11:56	WG1246403
(S) Toluene-d8	106		80.0-120		03/07/2019 11:56	WG1246403
(S) a,a,a-Trifluorotoluene	102		80.0-120		03/07/2019 11:56	WG1246403
(S) 4-Bromofluorobenzene	103		77.0-126		03/07/2019 11:56	WG1246403
(S) 1,2-Dichloroethane-d4	108		70.0-130		03/07/2019 11:56	WG1246403

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	03/07/2019 13:06	WG1246401
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/07/2019 13:06	WG1246401



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	98.5		30.0	1	03/12/2019 12:11	WG1248517

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/12/2019 16:36	WG1248244

3 Ss

4 Cn

Sample Narrative:

L1075820-02 WG1248244: Endpoint pH 4.5

5 Sr

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/13/2019 08:36	WG1248433

6 Qc

7 Gl

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	03/10/2019 13:50	WG1247115

8 Al

9 Sc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/06/2019 21:26	WG1245891
Chloride	13.9		1.00	1	03/06/2019 21:26	WG1245891
Fluoride	0.163		0.100	1	03/06/2019 21:26	WG1245891
Nitrate	1.18		0.100	1	03/06/2019 21:26	WG1245891
Sulfate	85.8		5.00	1	03/06/2019 21:26	WG1245891

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/07/2019 09:21	WG1245996
Mercury,Dissolved	ND		0.000200	1	03/07/2019 11:01	WG1245998

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/07/2019 11:28	WG1246101
Boron,Dissolved	ND		0.200	1	03/08/2019 10:27	WG1246644

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	0.192		0.100	1	03/10/2019 20:07	WG1246973
Aluminum,Dissolved	0.175		0.100	1	03/08/2019 14:53	WG1245989
Antimony	ND		0.00200	1	03/11/2019 15:12	WG1246973
Antimony,Dissolved	ND		0.00200	1	03/08/2019 14:53	WG1245989
Arsenic	ND		0.00200	1	03/10/2019 20:07	WG1246973
Arsenic,Dissolved	ND		0.00200	1	03/08/2019 14:53	WG1245989
Barium	0.0320		0.00500	1	03/10/2019 20:07	WG1246973
Barium,Dissolved	0.0347		0.00500	1	03/08/2019 14:53	WG1245989



Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	03/10/2019 20:07	WG1246973
Beryllium,Dissolved	ND		0.00200	1	03/08/2019 14:53	WG1245989
Cadmium	0.0117		0.00100	1	03/10/2019 20:07	WG1246973
Cadmium,Dissolved	0.0133		0.00100	1	03/08/2019 14:53	WG1245989
Calcium	18.7		1.00	1	03/10/2019 20:07	WG1246973
Calcium,Dissolved	22.7		1.00	1	03/08/2019 14:53	WG1245989
Chromium	0.00479		0.00200	1	03/10/2019 20:07	WG1246973
Chromium,Dissolved	ND		0.00200	1	03/08/2019 14:53	WG1245989
Cobalt	0.00317		0.00200	1	03/10/2019 20:07	WG1246973
Cobalt,Dissolved	0.00345		0.00200	1	03/08/2019 14:53	WG1245989
Copper	0.00740	B	0.00500	1	03/10/2019 20:07	WG1246973
Copper,Dissolved	0.00814		0.00500	1	03/08/2019 14:53	WG1245989
Iron	0.218		0.100	1	03/10/2019 20:07	WG1246973
Iron,Dissolved	ND		0.100	1	03/08/2019 14:53	WG1245989
Lead	ND		0.00200	1	03/10/2019 20:07	WG1246973
Lead,Dissolved	ND		0.00200	1	03/08/2019 14:53	WG1245989
Magnesium	7.83		1.00	1	03/10/2019 20:07	WG1246973
Magnesium,Dissolved	9.10		1.00	1	03/08/2019 14:53	WG1245989
Manganese	0.375		0.00500	1	03/10/2019 20:07	WG1246973
Manganese,Dissolved	0.420		0.00500	1	03/08/2019 14:53	WG1245989
Nickel	0.0162		0.00200	1	03/10/2019 20:07	WG1246973
Nickel,Dissolved	0.0175		0.00200	1	03/08/2019 14:53	WG1245989
Potassium	3.37		1.00	1	03/10/2019 20:07	WG1246973
Potassium,Dissolved	3.89		1.00	1	03/08/2019 14:53	WG1245989
Selenium	ND		0.00200	1	03/11/2019 15:12	WG1246973
Selenium,Dissolved	ND		0.00200	1	03/08/2019 14:53	WG1245989
Silver	ND		0.00200	1	03/11/2019 15:12	WG1246973
Silver,Dissolved	ND		0.00200	1	03/08/2019 14:53	WG1245989
Sodium	6.22		1.00	1	03/10/2019 20:07	WG1246973
Sodium,Dissolved	6.76		1.00	1	03/08/2019 14:53	WG1245989
Thallium	ND		0.00200	1	03/10/2019 20:07	WG1246973
Thallium,Dissolved	ND		0.00200	1	03/08/2019 14:53	WG1245989
Vanadium	ND		0.00500	1	03/10/2019 20:07	WG1246973
Vanadium,Dissolved	ND		0.00500	1	03/08/2019 14:53	WG1245989
Zinc	0.0994		0.0250	1	03/10/2019 20:07	WG1246973
Zinc,Dissolved	0.114		0.0250	1	03/08/2019 14:53	WG1245989

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
Acetone	ND		0.0500	1	03/07/2019 12:15	WG1246403
Acrylonitrile	ND		0.0100	1	03/07/2019 12:15	WG1246403
Benzene	ND		0.00100	1	03/07/2019 12:15	WG1246403
Bromochloromethane	ND		0.00100	1	03/07/2019 12:15	WG1246403
Bromodichloromethane	ND		0.00100	1	03/07/2019 12:15	WG1246403
Bromoform	ND		0.00100	1	03/07/2019 12:15	WG1246403
Bromomethane	ND		0.00500	1	03/07/2019 12:15	WG1246403
Carbon disulfide	ND		0.00100	1	03/07/2019 12:15	WG1246403
Carbon tetrachloride	ND		0.00100	1	03/07/2019 12:15	WG1246403
Chlorobenzene	ND		0.00100	1	03/07/2019 12:15	WG1246403
Chlorodibromomethane	ND		0.00100	1	03/07/2019 12:15	WG1246403
Chloroethane	ND		0.00500	1	03/07/2019 12:15	WG1246403
Chloroform	ND		0.00500	1	03/07/2019 12:15	WG1246403
Chloromethane	ND		0.00250	1	03/07/2019 12:15	WG1246403
Dibromomethane	ND		0.00100	1	03/07/2019 12:15	WG1246403
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/07/2019 12:15	WG1246403



Collected date/time: 03/05/19 13:35

L1075820

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	03/07/2019 12:15	WG1246403
1,2-Dichlorobenzene	ND		0.00100	1	03/07/2019 12:15	WG1246403
1,4-Dichlorobenzene	ND		0.00100	1	03/07/2019 12:15	WG1246403
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/07/2019 12:15	WG1246403
1,1-Dichloroethane	ND		0.00100	1	03/07/2019 12:15	WG1246403
1,2-Dichloroethane	ND		0.00100	1	03/07/2019 12:15	WG1246403
1,1-Dichloroethene	ND		0.00100	1	03/07/2019 12:15	WG1246403
cis-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 12:15	WG1246403
trans-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 12:15	WG1246403
1,2-Dichloropropane	ND		0.00100	1	03/07/2019 12:15	WG1246403
cis-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 12:15	WG1246403
trans-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 12:15	WG1246403
Ethylbenzene	ND		0.00100	1	03/07/2019 12:15	WG1246403
2-Hexanone	ND		0.0100	1	03/07/2019 12:15	WG1246403
Iodomethane	ND		0.0100	1	03/07/2019 12:15	WG1246403
2-Butanone (MEK)	ND		0.0100	1	03/07/2019 12:15	WG1246403
Methylene Chloride	ND		0.00500	1	03/07/2019 12:15	WG1246403
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/07/2019 12:15	WG1246403
Styrene	ND		0.00100	1	03/07/2019 12:15	WG1246403
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 12:15	WG1246403
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 12:15	WG1246403
Tetrachloroethene	ND		0.00100	1	03/07/2019 12:15	WG1246403
Toluene	ND		0.00100	1	03/07/2019 12:15	WG1246403
1,1,1-Trichloroethane	ND		0.00100	1	03/07/2019 12:15	WG1246403
1,1,2-Trichloroethane	ND		0.00100	1	03/07/2019 12:15	WG1246403
Trichloroethene	ND		0.00100	1	03/07/2019 12:15	WG1246403
Trichlorofluoromethane	ND		0.00500	1	03/07/2019 12:15	WG1246403
1,2,3-Trichloropropane	ND		0.00250	1	03/07/2019 12:15	WG1246403
Vinyl acetate	ND		0.0100	1	03/07/2019 12:15	WG1246403
Vinyl chloride	ND		0.00100	1	03/07/2019 12:15	WG1246403
Xylenes, Total	ND		0.00300	1	03/07/2019 12:15	WG1246403
(S) Toluene-d8	106		80.0-120		03/07/2019 12:15	WG1246403
(S) o,o,a-Trifluorotoluene	103		80.0-120		03/07/2019 12:15	WG1246403
(S) 4-Bromofluorobenzene	103		77.0-126		03/07/2019 12:15	WG1246403
(S) 1,2-Dichloroethane-d4	106		70.0-130		03/07/2019 12:15	WG1246403

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	03/07/2019 13:43	WG1246401
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/07/2019 13:43	WG1246401



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	ND		30.0	1	03/12/2019 12:12	WG1248517

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	24.5	B	20.0	1	03/12/2019 16:44	WG1248244

3 Ss

4 Cn

Sample Narrative:

L1075820-03 WG1248244: Endpoint pH 4.5

5 Sr

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/13/2019 08:38	WG1248433

6 Qc

7 Gl

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	03/10/2019 13:50	WG1247115

8 Al

9 Sc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/06/2019 21:42	WG1245891
Chloride	6.99		1.00	1	03/06/2019 21:42	WG1245891
Fluoride	ND		0.100	1	03/06/2019 21:42	WG1245891
Nitrate	0.619		0.100	1	03/06/2019 21:42	WG1245891
Sulfate	ND		5.00	1	03/06/2019 21:42	WG1245891

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/07/2019 09:23	WG1245996
Mercury,Dissolved	ND		0.000200	1	03/07/2019 11:08	WG1245998

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/07/2019 11:39	WG1246101
Boron,Dissolved	ND		0.200	1	03/08/2019 10:29	WG1246644

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	03/10/2019 20:11	WG1246973
Aluminum,Dissolved	ND		0.100	1	03/08/2019 14:57	WG1245989
Antimony	ND		0.00200	1	03/11/2019 15:16	WG1246973
Antimony,Dissolved	ND		0.00200	1	03/08/2019 14:57	WG1245989
Arsenic	ND		0.00200	1	03/10/2019 20:11	WG1246973
Arsenic,Dissolved	ND		0.00200	1	03/08/2019 14:57	WG1245989
Barium	0.00623		0.00500	1	03/10/2019 20:11	WG1246973
Barium,Dissolved	0.00724		0.00500	1	03/08/2019 14:57	WG1245989



Collected date/time: 03/05/19 12:35

L1075820

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	03/10/2019 20:11	WG1246973
Beryllium,Dissolved	ND		0.00200	1	03/08/2019 14:57	WG1245989
Cadmium	ND		0.00100	1	03/10/2019 20:11	WG1246973
Cadmium,Dissolved	ND		0.00100	1	03/08/2019 14:57	WG1245989
Calcium	3.80		1.00	1	03/10/2019 20:11	WG1246973
Calcium,Dissolved	4.62		1.00	1	03/08/2019 14:57	WG1245989
Chromium	0.00218		0.00200	1	03/10/2019 20:11	WG1246973
Chromium,Dissolved	ND		0.00200	1	03/08/2019 14:57	WG1245989
Cobalt	ND		0.00200	1	03/10/2019 20:11	WG1246973
Cobalt,Dissolved	ND		0.00200	1	03/08/2019 14:57	WG1245989
Copper	ND		0.00500	1	03/10/2019 20:11	WG1246973
Copper,Dissolved	ND		0.00500	1	03/08/2019 14:57	WG1245989
Iron	0.116		0.100	1	03/10/2019 20:11	WG1246973
Iron,Dissolved	ND		0.100	1	03/08/2019 14:57	WG1245989
Lead	ND		0.00200	1	03/10/2019 20:11	WG1246973
Lead,Dissolved	ND		0.00200	1	03/08/2019 14:57	WG1245989
Magnesium	2.33		1.00	1	03/10/2019 20:11	WG1246973
Magnesium,Dissolved	2.65		1.00	1	03/08/2019 14:57	WG1245989
Manganese	0.0159		0.00500	1	03/10/2019 20:11	WG1246973
Manganese,Dissolved	0.0168		0.00500	1	03/08/2019 14:57	WG1245989
Nickel	ND		0.00200	1	03/10/2019 20:11	WG1246973
Nickel,Dissolved	ND		0.00200	1	03/08/2019 14:57	WG1245989
Potassium	ND		1.00	1	03/10/2019 20:11	WG1246973
Potassium,Dissolved	ND		1.00	1	03/08/2019 14:57	WG1245989
Selenium	ND		0.00200	1	03/11/2019 15:16	WG1246973
Selenium,Dissolved	ND		0.00200	1	03/08/2019 14:57	WG1245989
Silver	ND		0.00200	1	03/11/2019 15:16	WG1246973
Silver,Dissolved	ND		0.00200	1	03/08/2019 14:57	WG1245989
Sodium	3.10		1.00	1	03/10/2019 20:11	WG1246973
Sodium,Dissolved	3.50		1.00	1	03/08/2019 14:57	WG1245989
Thallium	ND		0.00200	1	03/10/2019 20:11	WG1246973
Thallium,Dissolved	ND		0.00200	1	03/08/2019 14:57	WG1245989
Vanadium	ND		0.00500	1	03/10/2019 20:11	WG1246973
Vanadium,Dissolved	ND		0.00500	1	03/08/2019 14:57	WG1245989
Zinc	ND		0.0250	1	03/10/2019 20:11	WG1246973
Zinc,Dissolved	ND		0.0250	1	03/08/2019 14:57	WG1245989

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
Acetone	ND		0.0500	1	03/07/2019 12:36	WG1246403
Acrylonitrile	ND		0.0100	1	03/07/2019 12:36	WG1246403
Benzene	ND		0.00100	1	03/07/2019 12:36	WG1246403
Bromochloromethane	ND		0.00100	1	03/07/2019 12:36	WG1246403
Bromodichloromethane	ND		0.00100	1	03/07/2019 12:36	WG1246403
Bromoform	ND		0.00100	1	03/07/2019 12:36	WG1246403
Bromomethane	ND		0.00500	1	03/07/2019 12:36	WG1246403
Carbon disulfide	ND		0.00100	1	03/07/2019 12:36	WG1246403
Carbon tetrachloride	ND		0.00100	1	03/07/2019 12:36	WG1246403
Chlorobenzene	ND		0.00100	1	03/07/2019 12:36	WG1246403
Chlorodibromomethane	ND		0.00100	1	03/07/2019 12:36	WG1246403
Chloroethane	ND		0.00500	1	03/07/2019 12:36	WG1246403
Chloroform	ND		0.00500	1	03/07/2019 12:36	WG1246403
Chloromethane	ND		0.00250	1	03/07/2019 12:36	WG1246403
Dibromomethane	ND		0.00100	1	03/07/2019 12:36	WG1246403
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/07/2019 12:36	WG1246403



Collected date/time: 03/05/19 12:35

L1075820

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	03/07/2019 12:36	WG1246403
1,2-Dichlorobenzene	ND		0.00100	1	03/07/2019 12:36	WG1246403
1,4-Dichlorobenzene	ND		0.00100	1	03/07/2019 12:36	WG1246403
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/07/2019 12:36	WG1246403
1,1-Dichloroethane	ND		0.00100	1	03/07/2019 12:36	WG1246403
1,2-Dichloroethane	ND		0.00100	1	03/07/2019 12:36	WG1246403
1,1-Dichloroethene	ND		0.00100	1	03/07/2019 12:36	WG1246403
cis-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 12:36	WG1246403
trans-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 12:36	WG1246403
1,2-Dichloropropane	ND		0.00100	1	03/07/2019 12:36	WG1246403
cis-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 12:36	WG1246403
trans-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 12:36	WG1246403
Ethylbenzene	ND		0.00100	1	03/07/2019 12:36	WG1246403
2-Hexanone	ND		0.0100	1	03/07/2019 12:36	WG1246403
Iodomethane	ND		0.0100	1	03/07/2019 12:36	WG1246403
2-Butanone (MEK)	ND		0.0100	1	03/07/2019 12:36	WG1246403
Methylene Chloride	ND		0.00500	1	03/07/2019 12:36	WG1246403
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/07/2019 12:36	WG1246403
Styrene	ND		0.00100	1	03/07/2019 12:36	WG1246403
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 12:36	WG1246403
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 12:36	WG1246403
Tetrachloroethene	ND		0.00100	1	03/07/2019 12:36	WG1246403
Toluene	ND		0.00100	1	03/07/2019 12:36	WG1246403
1,1,1-Trichloroethane	ND		0.00100	1	03/07/2019 12:36	WG1246403
1,1,2-Trichloroethane	ND		0.00100	1	03/07/2019 12:36	WG1246403
Trichloroethene	ND		0.00100	1	03/07/2019 12:36	WG1246403
Trichlorofluoromethane	ND		0.00500	1	03/07/2019 12:36	WG1246403
1,2,3-Trichloropropane	ND		0.00250	1	03/07/2019 12:36	WG1246403
Vinyl acetate	ND		0.0100	1	03/07/2019 12:36	WG1246403
Vinyl chloride	ND		0.00100	1	03/07/2019 12:36	WG1246403
Xylenes, Total	ND		0.00300	1	03/07/2019 12:36	WG1246403
(S) Toluene-d8	106		80.0-120		03/07/2019 12:36	WG1246403
(S) o,o,o-Trifluorotoluene	102		80.0-120		03/07/2019 12:36	WG1246403
(S) 4-Bromofluorobenzene	103		77.0-126		03/07/2019 12:36	WG1246403
(S) 1,2-Dichloroethane-d4	107		70.0-130		03/07/2019 12:36	WG1246403

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	03/07/2019 13:56	WG1246401
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/07/2019 13:56	WG1246401



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	101		30.0	1	03/12/2019 12:13	WG1248517

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/12/2019 16:50	WG1248244

3 Ss

4 Cn

Sample Narrative:

L1075820-04 WG1248244: Endpoint pH 4.5

5 Sr

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/13/2019 08:39	WG1248433

6 Qc

7 Gl

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	03/10/2019 13:51	WG1247115

8 Al

9 Sc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/06/2019 21:58	WG1245891
Chloride	81.0		1.00	1	03/06/2019 21:58	WG1245891
Fluoride	ND		0.100	1	03/06/2019 21:58	WG1245891
Nitrate	1.38		0.100	1	03/06/2019 21:58	WG1245891
Sulfate	6.12		5.00	1	03/06/2019 21:58	WG1245891

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/07/2019 09:25	WG1245996
Mercury,Dissolved	ND		0.000200	1	03/07/2019 11:10	WG1245998

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/07/2019 11:42	WG1246101
Boron,Dissolved	ND		0.200	1	03/08/2019 10:37	WG1246644

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	0.168		0.100	1	03/10/2019 20:41	WG1246973
Aluminum,Dissolved	ND		0.100	1	03/08/2019 15:02	WG1245989
Antimony	ND		0.00200	1	03/11/2019 15:35	WG1246973
Antimony,Dissolved	ND		0.00200	1	03/08/2019 15:02	WG1245989
Arsenic	ND		0.00200	1	03/10/2019 20:41	WG1246973
Arsenic,Dissolved	ND		0.00200	1	03/08/2019 15:02	WG1245989
Barium	0.0452		0.00500	1	03/10/2019 20:41	WG1246973
Barium,Dissolved	0.0449		0.00500	1	03/08/2019 15:02	WG1245989



Collected date/time: 03/05/19 11:40

L1075820

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	03/10/2019 20:41	WG1246973
Beryllium,Dissolved	ND		0.00200	1	03/08/2019 15:02	WG1245989
Cadmium	ND		0.00100	1	03/10/2019 20:41	WG1246973
Cadmium,Dissolved	ND		0.00100	1	03/08/2019 15:02	WG1245989
Calcium	15.5		1.00	1	03/10/2019 20:41	WG1246973
Calcium,Dissolved	17.7		1.00	1	03/08/2019 15:02	WG1245989
Chromium	0.0158		0.00200	1	03/10/2019 20:41	WG1246973
Chromium,Dissolved	ND		0.00200	1	03/08/2019 15:02	WG1245989
Cobalt	0.00243		0.00200	1	03/10/2019 20:41	WG1246973
Cobalt,Dissolved	0.00275		0.00200	1	03/08/2019 15:02	WG1245989
Copper	ND		0.00500	1	03/10/2019 20:41	WG1246973
Copper,Dissolved	0.00591		0.00500	1	03/08/2019 15:02	WG1245989
Iron	0.741		0.100	1	03/10/2019 20:41	WG1246973
Iron,Dissolved	ND		0.100	1	03/08/2019 15:02	WG1245989
Lead	ND		0.00200	1	03/10/2019 20:41	WG1246973
Lead,Dissolved	ND		0.00200	1	03/08/2019 15:02	WG1245989
Magnesium	10.9		1.00	1	03/10/2019 20:41	WG1246973
Magnesium,Dissolved	12.5		1.00	1	03/08/2019 15:02	WG1245989
Manganese	0.151		0.00500	1	03/10/2019 20:41	WG1246973
Manganese,Dissolved	0.168		0.00500	1	03/08/2019 15:02	WG1245989
Nickel	0.00932		0.00200	1	03/10/2019 20:41	WG1246973
Nickel,Dissolved	0.00921		0.00200	1	03/08/2019 15:02	WG1245989
Potassium	1.31		1.00	1	03/10/2019 20:41	WG1246973
Potassium,Dissolved	1.45		1.00	1	03/08/2019 15:02	WG1245989
Selenium	ND		0.00200	1	03/11/2019 15:35	WG1246973
Selenium,Dissolved	ND		0.00200	1	03/08/2019 15:02	WG1245989
Silver	ND		0.00200	1	03/11/2019 15:35	WG1246973
Silver,Dissolved	ND		0.00200	1	03/08/2019 15:02	WG1245989
Sodium	18.8		1.00	1	03/10/2019 20:41	WG1246973
Sodium,Dissolved	19.8		1.00	1	03/08/2019 15:02	WG1245989
Thallium	ND		0.00200	1	03/10/2019 20:41	WG1246973
Thallium,Dissolved	ND		0.00200	1	03/08/2019 15:02	WG1245989
Vanadium	ND		0.00500	1	03/10/2019 20:41	WG1246973
Vanadium,Dissolved	ND		0.00500	1	03/08/2019 15:02	WG1245989
Zinc	ND		0.0250	1	03/10/2019 20:41	WG1246973
Zinc,Dissolved	ND		0.0250	1	03/08/2019 15:02	WG1245989

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
Acetone	ND		0.0500	1	03/07/2019 12:55	WG1246403
Acrylonitrile	ND		0.0100	1	03/07/2019 12:55	WG1246403
Benzene	ND		0.00100	1	03/07/2019 12:55	WG1246403
Bromochloromethane	ND		0.00100	1	03/07/2019 12:55	WG1246403
Bromodichloromethane	ND		0.00100	1	03/07/2019 12:55	WG1246403
Bromoform	ND		0.00100	1	03/07/2019 12:55	WG1246403
Bromomethane	ND		0.00500	1	03/07/2019 12:55	WG1246403
Carbon disulfide	ND		0.00100	1	03/07/2019 12:55	WG1246403
Carbon tetrachloride	ND		0.00100	1	03/07/2019 12:55	WG1246403
Chlorobenzene	ND		0.00100	1	03/07/2019 12:55	WG1246403
Chlorodibromomethane	ND		0.00100	1	03/07/2019 12:55	WG1246403
Chloroethane	ND		0.00500	1	03/07/2019 12:55	WG1246403
Chloroform	ND		0.00500	1	03/07/2019 12:55	WG1246403
Chloromethane	ND		0.00250	1	03/07/2019 12:55	WG1246403
Dibromomethane	ND		0.00100	1	03/07/2019 12:55	WG1246403
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/07/2019 12:55	WG1246403



Collected date/time: 03/05/19 11:40

L1075820

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	03/07/2019 12:55	WG1246403
1,2-Dichlorobenzene	ND		0.00100	1	03/07/2019 12:55	WG1246403
1,4-Dichlorobenzene	ND		0.00100	1	03/07/2019 12:55	WG1246403
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/07/2019 12:55	WG1246403
1,1-Dichloroethane	ND		0.00100	1	03/07/2019 12:55	WG1246403
1,2-Dichloroethane	ND		0.00100	1	03/07/2019 12:55	WG1246403
1,1-Dichloroethene	ND		0.00100	1	03/07/2019 12:55	WG1246403
cis-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 12:55	WG1246403
trans-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 12:55	WG1246403
1,2-Dichloropropane	ND		0.00100	1	03/07/2019 12:55	WG1246403
cis-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 12:55	WG1246403
trans-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 12:55	WG1246403
Ethylbenzene	ND		0.00100	1	03/07/2019 12:55	WG1246403
2-Hexanone	ND		0.0100	1	03/07/2019 12:55	WG1246403
Iodomethane	ND		0.0100	1	03/07/2019 12:55	WG1246403
2-Butanone (MEK)	ND		0.0100	1	03/07/2019 12:55	WG1246403
Methylene Chloride	ND		0.00500	1	03/07/2019 12:55	WG1246403
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/07/2019 12:55	WG1246403
Styrene	ND		0.00100	1	03/07/2019 12:55	WG1246403
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 12:55	WG1246403
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 12:55	WG1246403
Tetrachloroethene	ND		0.00100	1	03/07/2019 12:55	WG1246403
Toluene	ND		0.00100	1	03/07/2019 12:55	WG1246403
1,1,1-Trichloroethane	ND		0.00100	1	03/07/2019 12:55	WG1246403
1,1,2-Trichloroethane	ND		0.00100	1	03/07/2019 12:55	WG1246403
Trichloroethene	ND		0.00100	1	03/07/2019 12:55	WG1246403
Trichlorofluoromethane	ND		0.00500	1	03/07/2019 12:55	WG1246403
1,2,3-Trichloropropane	ND		0.00250	1	03/07/2019 12:55	WG1246403
Vinyl acetate	ND		0.0100	1	03/07/2019 12:55	WG1246403
Vinyl chloride	ND		0.00100	1	03/07/2019 12:55	WG1246403
Xylenes, Total	ND		0.00300	1	03/07/2019 12:55	WG1246403
(S) Toluene-d8	107		80.0-120		03/07/2019 12:55	WG1246403
(S) o,o,a-Trifluorotoluene	101		80.0-120		03/07/2019 12:55	WG1246403
(S) 4-Bromofluorobenzene	104		77.0-126		03/07/2019 12:55	WG1246403
(S) 1,2-Dichloroethane-d4	105		70.0-130		03/07/2019 12:55	WG1246403

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	03/07/2019 14:08	WG1246401
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/07/2019 14:08	WG1246401



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	34.4	B	30.0	1	03/12/2019 12:14	WG1248517

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/12/2019 16:56	WG1248244

3 Ss

4 Cn

Sample Narrative:

L1075820-05 WG1248244: Endpoint pH 4.5

5 Sr

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/13/2019 08:41	WG1248433

6 Qc

7 Gl

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	03/10/2019 13:51	WG1247115

8 Al

9 Sc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/06/2019 22:29	WG1245891
Chloride	16.4		1.00	1	03/06/2019 22:29	WG1245891
Fluoride	ND		0.100	1	03/06/2019 22:29	WG1245891
Nitrate	1.78		0.100	1	03/06/2019 22:29	WG1245891
Sulfate	ND		5.00	1	03/06/2019 22:29	WG1245891

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/07/2019 09:28	WG1245996
Mercury,Dissolved	ND		0.000200	1	03/07/2019 11:13	WG1245998

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/07/2019 11:45	WG1246101
Boron,Dissolved	ND		0.200	1	03/08/2019 10:40	WG1246644

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	0.340		0.100	1	03/10/2019 20:46	WG1246973
Aluminum,Dissolved	0.156		0.100	1	03/08/2019 15:06	WG1245989
Antimony	ND		0.00200	1	03/11/2019 15:40	WG1246973
Antimony,Dissolved	ND		0.00200	1	03/08/2019 15:06	WG1245989
Arsenic	ND		0.00200	1	03/10/2019 20:46	WG1246973
Arsenic,Dissolved	ND		0.00200	1	03/08/2019 15:06	WG1245989
Barium	0.0186		0.00500	1	03/10/2019 20:46	WG1246973
Barium,Dissolved	0.0177		0.00500	1	03/08/2019 15:06	WG1245989



Collected date/time: 03/05/19 11:45

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Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	03/10/2019 20:46	WG1246973
Beryllium,Dissolved	ND		0.00200	1	03/08/2019 15:06	WG1245989
Cadmium	ND		0.00100	1	03/10/2019 20:46	WG1246973
Cadmium,Dissolved	ND		0.00100	1	03/08/2019 15:06	WG1245989
Calcium	8.16		1.00	1	03/10/2019 20:46	WG1246973
Calcium,Dissolved	9.30		1.00	1	03/08/2019 15:06	WG1245989
Chromium	0.00213		0.00200	1	03/10/2019 20:46	WG1246973
Chromium,Dissolved	ND		0.00200	1	03/08/2019 15:06	WG1245989
Cobalt	ND		0.00200	1	03/10/2019 20:46	WG1246973
Cobalt,Dissolved	ND		0.00200	1	03/08/2019 15:06	WG1245989
Copper	ND		0.00500	1	03/10/2019 20:46	WG1246973
Copper,Dissolved	0.00562		0.00500	1	03/08/2019 15:06	WG1245989
Iron	1.36		0.100	1	03/10/2019 20:46	WG1246973
Iron,Dissolved	0.231		0.100	1	03/08/2019 15:06	WG1245989
Lead	ND		0.00200	1	03/10/2019 20:46	WG1246973
Lead,Dissolved	ND		0.00200	1	03/08/2019 15:06	WG1245989
Magnesium	2.54		1.00	1	03/10/2019 20:46	WG1246973
Magnesium,Dissolved	2.96		1.00	1	03/08/2019 15:06	WG1245989
Manganese	0.0965		0.00500	1	03/10/2019 20:46	WG1246973
Manganese,Dissolved	0.0943		0.00500	1	03/08/2019 15:06	WG1245989
Nickel	ND		0.00200	1	03/10/2019 20:46	WG1246973
Nickel,Dissolved	ND		0.00200	1	03/08/2019 15:06	WG1245989
Potassium	ND		1.00	1	03/10/2019 20:46	WG1246973
Potassium,Dissolved	1.01		1.00	1	03/08/2019 15:06	WG1245989
Selenium	ND		0.00200	1	03/11/2019 15:40	WG1246973
Selenium,Dissolved	ND		0.00200	1	03/08/2019 15:06	WG1245989
Silver	ND		0.00200	1	03/11/2019 15:40	WG1246973
Silver,Dissolved	ND		0.00200	1	03/08/2019 15:06	WG1245989
Sodium	3.71		1.00	1	03/10/2019 20:46	WG1246973
Sodium,Dissolved	3.88		1.00	1	03/08/2019 15:06	WG1245989
Thallium	ND		0.00200	1	03/10/2019 20:46	WG1246973
Thallium,Dissolved	ND		0.00200	1	03/08/2019 15:06	WG1245989
Vanadium	ND		0.00500	1	03/10/2019 20:46	WG1246973
Vanadium,Dissolved	ND		0.00500	1	03/08/2019 15:06	WG1245989
Zinc	ND		0.0250	1	03/10/2019 20:46	WG1246973
Zinc,Dissolved	ND		0.0250	1	03/08/2019 15:06	WG1245989

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
Acetone	ND		0.0500	1	03/07/2019 13:15	WG1246403
Acrylonitrile	ND		0.0100	1	03/07/2019 13:15	WG1246403
Benzene	ND		0.00100	1	03/07/2019 13:15	WG1246403
Bromochloromethane	ND		0.00100	1	03/07/2019 13:15	WG1246403
Bromodichloromethane	ND		0.00100	1	03/07/2019 13:15	WG1246403
Bromoform	ND		0.00100	1	03/07/2019 13:15	WG1246403
Bromomethane	ND		0.00500	1	03/07/2019 13:15	WG1246403
Carbon disulfide	ND		0.00100	1	03/07/2019 13:15	WG1246403
Carbon tetrachloride	ND		0.00100	1	03/07/2019 13:15	WG1246403
Chlorobenzene	ND		0.00100	1	03/07/2019 13:15	WG1246403
Chlorodibromomethane	ND		0.00100	1	03/07/2019 13:15	WG1246403
Chloroethane	ND		0.00500	1	03/07/2019 13:15	WG1246403
Chloroform	ND		0.00500	1	03/07/2019 13:15	WG1246403
Chloromethane	ND		0.00250	1	03/07/2019 13:15	WG1246403
Dibromomethane	ND		0.00100	1	03/07/2019 13:15	WG1246403
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/07/2019 13:15	WG1246403



Collected date/time: 03/05/19 11:45

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
1,2-Dibromoethane	ND		0.00100	1	03/07/2019 13:15	WG1246403
1,2-Dichlorobenzene	ND		0.00100	1	03/07/2019 13:15	WG1246403
1,4-Dichlorobenzene	ND		0.00100	1	03/07/2019 13:15	WG1246403
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/07/2019 13:15	WG1246403
1,1-Dichloroethane	ND		0.00100	1	03/07/2019 13:15	WG1246403
1,2-Dichloroethane	ND		0.00100	1	03/07/2019 13:15	WG1246403
1,1-Dichloroethene	ND		0.00100	1	03/07/2019 13:15	WG1246403
cis-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 13:15	WG1246403
trans-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 13:15	WG1246403
1,2-Dichloropropane	ND		0.00100	1	03/07/2019 13:15	WG1246403
cis-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 13:15	WG1246403
trans-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 13:15	WG1246403
Ethylbenzene	ND		0.00100	1	03/07/2019 13:15	WG1246403
2-Hexanone	ND		0.0100	1	03/07/2019 13:15	WG1246403
Iodomethane	ND		0.0100	1	03/07/2019 13:15	WG1246403
2-Butanone (MEK)	ND		0.0100	1	03/07/2019 13:15	WG1246403
Methylene Chloride	ND		0.00500	1	03/07/2019 13:15	WG1246403
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/07/2019 13:15	WG1246403
Styrene	ND		0.00100	1	03/07/2019 13:15	WG1246403
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 13:15	WG1246403
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 13:15	WG1246403
Tetrachloroethene	ND		0.00100	1	03/07/2019 13:15	WG1246403
Toluene	ND		0.00100	1	03/07/2019 13:15	WG1246403
1,1,1-Trichloroethane	ND		0.00100	1	03/07/2019 13:15	WG1246403
1,1,2-Trichloroethane	ND		0.00100	1	03/07/2019 13:15	WG1246403
Trichloroethene	ND		0.00100	1	03/07/2019 13:15	WG1246403
Trichlorofluoromethane	ND		0.00500	1	03/07/2019 13:15	WG1246403
1,2,3-Trichloropropane	ND		0.00250	1	03/07/2019 13:15	WG1246403
Vinyl acetate	ND		0.0100	1	03/07/2019 13:15	WG1246403
Vinyl chloride	ND		0.00100	1	03/07/2019 13:15	WG1246403
Xylenes, Total	ND		0.00300	1	03/07/2019 13:15	WG1246403
(S) Toluene-d8	104		80.0-120		03/07/2019 13:15	WG1246403
(S) o,o,a-Trifluorotoluene	101		80.0-120		03/07/2019 13:15	WG1246403
(S) 4-Bromofluorobenzene	101		77.0-126		03/07/2019 13:15	WG1246403
(S) 1,2-Dichloroethane-d4	107		70.0-130		03/07/2019 13:15	WG1246403

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

EDB / DBCP by Method 8011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ethylene Dibromide	ND		0.0000100	1	03/07/2019 14:20	WG1246401
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/07/2019 14:20	WG1246401



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	31.5	B	30.0	1	03/12/2019 12:16	WG1248517

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/12/2019 17:13	WG1248244

3 Ss

4 Cn

Sample Narrative:

L1075820-06 WG1248244: Endpoint pH 4.5

5 Sr

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/13/2019 08:42	WG1248433

6 Qc

7 Gl

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	03/10/2019 13:51	WG1247115

8 Al

9 Sc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/06/2019 22:45	WG1245891
Chloride	19.3		1.00	1	03/06/2019 22:45	WG1245891
Fluoride	ND		0.100	1	03/06/2019 22:45	WG1245891
Nitrate	0.964		0.100	1	03/06/2019 22:45	WG1245891
Sulfate	ND		5.00	1	03/06/2019 22:45	WG1245891

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/07/2019 09:30	WG1245996
Mercury,Dissolved	ND		0.000200	1	03/07/2019 11:15	WG1245998

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/07/2019 11:48	WG1246101
Boron,Dissolved	ND		0.200	1	03/08/2019 10:42	WG1246644

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	0.562		0.100	1	03/10/2019 20:50	WG1246973
Aluminum,Dissolved	ND		0.100	1	03/08/2019 15:11	WG1245989
Antimony	ND		0.00200	1	03/11/2019 15:44	WG1246973
Antimony,Dissolved	ND		0.00200	1	03/08/2019 15:11	WG1245989
Arsenic	ND		0.00200	1	03/10/2019 20:50	WG1246973
Arsenic,Dissolved	ND		0.00200	1	03/08/2019 15:11	WG1245989
Barium	0.0270		0.00500	1	03/10/2019 20:50	WG1246973
Barium,Dissolved	0.0260		0.00500	1	03/08/2019 15:11	WG1245989



Collected date/time: 03/05/19 13:15

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Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	03/10/2019 20:50	WG1246973
Beryllium,Dissolved	ND		0.00200	1	03/08/2019 15:11	WG1245989
Cadmium	ND		0.00100	1	03/10/2019 20:50	WG1246973
Cadmium,Dissolved	ND		0.00100	1	03/08/2019 15:11	WG1245989
Calcium	7.18		1.00	1	03/10/2019 20:50	WG1246973
Calcium,Dissolved	8.31		1.00	1	03/08/2019 15:11	WG1245989
Chromium	ND		0.00200	1	03/10/2019 20:50	WG1246973
Chromium,Dissolved	ND		0.00200	1	03/08/2019 15:11	WG1245989
Cobalt	ND		0.00200	1	03/10/2019 20:50	WG1246973
Cobalt,Dissolved	ND		0.00200	1	03/08/2019 15:11	WG1245989
Copper	ND		0.00500	1	03/10/2019 20:50	WG1246973
Copper,Dissolved	ND		0.00500	1	03/08/2019 15:11	WG1245989
Iron	0.886		0.100	1	03/10/2019 20:50	WG1246973
Iron,Dissolved	ND		0.100	1	03/08/2019 15:11	WG1245989
Lead	ND		0.00200	1	03/10/2019 20:50	WG1246973
Lead,Dissolved	ND		0.00200	1	03/08/2019 15:11	WG1245989
Magnesium	2.62		1.00	1	03/10/2019 20:50	WG1246973
Magnesium,Dissolved	3.04		1.00	1	03/08/2019 15:11	WG1245989
Manganese	0.0151		0.00500	1	03/10/2019 20:50	WG1246973
Manganese,Dissolved	ND		0.00500	1	03/08/2019 15:11	WG1245989
Nickel	ND		0.00200	1	03/10/2019 20:50	WG1246973
Nickel,Dissolved	ND		0.00200	1	03/08/2019 15:11	WG1245989
Potassium	ND		1.00	1	03/10/2019 20:50	WG1246973
Potassium,Dissolved	ND		1.00	1	03/08/2019 15:11	WG1245989
Selenium	ND		0.00200	1	03/11/2019 15:44	WG1246973
Selenium,Dissolved	ND		0.00200	1	03/08/2019 15:11	WG1245989
Silver	ND		0.00200	1	03/11/2019 15:44	WG1246973
Silver,Dissolved	ND		0.00200	1	03/08/2019 15:11	WG1245989
Sodium	3.38		1.00	1	03/10/2019 20:50	WG1246973
Sodium,Dissolved	3.81		1.00	1	03/08/2019 15:11	WG1245989
Thallium	ND		0.00200	1	03/10/2019 20:50	WG1246973
Thallium,Dissolved	ND		0.00200	1	03/08/2019 15:11	WG1245989
Vanadium	ND		0.00500	1	03/10/2019 20:50	WG1246973
Vanadium,Dissolved	ND		0.00500	1	03/08/2019 15:11	WG1245989
Zinc	ND		0.0250	1	03/10/2019 20:50	WG1246973
Zinc,Dissolved	ND		0.0250	1	03/08/2019 15:11	WG1245989

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
Acetone	ND		0.0500	1	03/07/2019 13:36	WG1246403
Acrylonitrile	ND		0.0100	1	03/07/2019 13:36	WG1246403
Benzene	ND		0.00100	1	03/07/2019 13:36	WG1246403
Bromochloromethane	ND		0.00100	1	03/07/2019 13:36	WG1246403
Bromodichloromethane	ND		0.00100	1	03/07/2019 13:36	WG1246403
Bromoform	ND		0.00100	1	03/07/2019 13:36	WG1246403
Bromomethane	ND		0.00500	1	03/07/2019 13:36	WG1246403
Carbon disulfide	ND		0.00100	1	03/07/2019 13:36	WG1246403
Carbon tetrachloride	ND		0.00100	1	03/07/2019 13:36	WG1246403
Chlorobenzene	ND		0.00100	1	03/07/2019 13:36	WG1246403
Chlorodibromomethane	ND		0.00100	1	03/07/2019 13:36	WG1246403
Chloroethane	ND		0.00500	1	03/07/2019 13:36	WG1246403
Chloroform	ND		0.00500	1	03/07/2019 13:36	WG1246403
Chloromethane	ND		0.00250	1	03/07/2019 13:36	WG1246403
Dibromomethane	ND		0.00100	1	03/07/2019 13:36	WG1246403
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/07/2019 13:36	WG1246403



Collected date/time: 03/05/19 13:15

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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	03/07/2019 13:36	WG1246403
1,2-Dichlorobenzene	ND		0.00100	1	03/07/2019 13:36	WG1246403
1,4-Dichlorobenzene	ND		0.00100	1	03/07/2019 13:36	WG1246403
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/07/2019 13:36	WG1246403
1,1-Dichloroethane	ND		0.00100	1	03/07/2019 13:36	WG1246403
1,2-Dichloroethane	ND		0.00100	1	03/07/2019 13:36	WG1246403
1,1-Dichloroethene	ND		0.00100	1	03/07/2019 13:36	WG1246403
cis-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 13:36	WG1246403
trans-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 13:36	WG1246403
1,2-Dichloropropane	ND		0.00100	1	03/07/2019 13:36	WG1246403
cis-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 13:36	WG1246403
trans-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 13:36	WG1246403
Ethylbenzene	ND		0.00100	1	03/07/2019 13:36	WG1246403
2-Hexanone	ND		0.0100	1	03/07/2019 13:36	WG1246403
Iodomethane	ND		0.0100	1	03/07/2019 13:36	WG1246403
2-Butanone (MEK)	ND		0.0100	1	03/07/2019 13:36	WG1246403
Methylene Chloride	ND		0.00500	1	03/07/2019 13:36	WG1246403
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/07/2019 13:36	WG1246403
Styrene	ND		0.00100	1	03/07/2019 13:36	WG1246403
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 13:36	WG1246403
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 13:36	WG1246403
Tetrachloroethene	ND		0.00100	1	03/07/2019 13:36	WG1246403
Toluene	ND		0.00100	1	03/07/2019 13:36	WG1246403
1,1,1-Trichloroethane	ND		0.00100	1	03/07/2019 13:36	WG1246403
1,1,2-Trichloroethane	ND		0.00100	1	03/07/2019 13:36	WG1246403
Trichloroethene	ND		0.00100	1	03/07/2019 13:36	WG1246403
Trichlorofluoromethane	ND		0.00500	1	03/07/2019 13:36	WG1246403
1,2,3-Trichloropropane	ND		0.00250	1	03/07/2019 13:36	WG1246403
Vinyl acetate	ND		0.0100	1	03/07/2019 13:36	WG1246403
Vinyl chloride	ND		0.00100	1	03/07/2019 13:36	WG1246403
Xylenes, Total	ND		0.00300	1	03/07/2019 13:36	WG1246403
(S) Toluene-d8	104		80.0-120		03/07/2019 13:36	WG1246403
(S) a,a,a-Trifluorotoluene	101		80.0-120		03/07/2019 13:36	WG1246403
(S) 4-Bromofluorobenzene	103		77.0-126		03/07/2019 13:36	WG1246403
(S) 1,2-Dichloroethane-d4	107		70.0-130		03/07/2019 13:36	WG1246403

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EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	03/07/2019 14:32	WG1246401
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/07/2019 14:32	WG1246401



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	80.1		30.0	1	03/12/2019 12:17	WG1248517

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/12/2019 17:20	WG1248244

3 Ss

4 Cn

Sample Narrative:

L1075820-07 WG1248244: Endpoint pH 4.5

5 Sr

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/13/2019 08:44	WG1248433

6 Qc

7 Gl

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	03/10/2019 13:51	WG1247115

8 Al

9 Sc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/06/2019 23:01	WG1245891
Chloride	55.9		1.00	1	03/06/2019 23:01	WG1245891
Fluoride	ND		0.100	1	03/06/2019 23:01	WG1245891
Nitrate	4.83		0.100	1	03/06/2019 23:01	WG1245891
Sulfate	ND		5.00	1	03/06/2019 23:01	WG1245891

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/07/2019 09:38	WG1245996
Mercury,Dissolved	ND		0.000200	1	03/07/2019 11:18	WG1245998

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/07/2019 11:50	WG1246101
Boron,Dissolved	ND		0.200	1	03/08/2019 10:45	WG1246644

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	0.371		0.100	1	03/10/2019 20:55	WG1246973
Aluminum,Dissolved	ND		0.100	1	03/08/2019 15:15	WG1245989
Antimony	ND		0.00200	1	03/11/2019 15:49	WG1246973
Antimony,Dissolved	ND		0.00200	1	03/08/2019 15:15	WG1245989
Arsenic	ND		0.00200	1	03/10/2019 20:55	WG1246973
Arsenic,Dissolved	ND		0.00200	1	03/08/2019 15:15	WG1245989
Barium	0.0407		0.00500	1	03/10/2019 20:55	WG1246973
Barium,Dissolved	0.0433		0.00500	1	03/08/2019 15:15	WG1245989



Collected date/time: 03/05/19 15:00

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Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	03/10/2019 20:55	WG1246973
Beryllium,Dissolved	ND		0.00200	1	03/08/2019 15:15	WG1245989
Cadmium	ND		0.00100	1	03/10/2019 20:55	WG1246973
Cadmium,Dissolved	ND		0.00100	1	03/08/2019 15:15	WG1245989
Calcium	17.2		1.00	1	03/10/2019 20:55	WG1246973
Calcium,Dissolved	19.9		1.00	1	03/08/2019 15:15	WG1245989
Chromium	0.00203		0.00200	1	03/10/2019 20:55	WG1246973
Chromium,Dissolved	ND		0.00200	1	03/08/2019 15:15	WG1245989
Cobalt	ND		0.00200	1	03/10/2019 20:55	WG1246973
Cobalt,Dissolved	ND		0.00200	1	03/08/2019 15:15	WG1245989
Copper	0.00558	B	0.00500	1	03/10/2019 20:55	WG1246973
Copper,Dissolved	0.00634		0.00500	1	03/08/2019 15:15	WG1245989
Iron	1.18		0.100	1	03/10/2019 20:55	WG1246973
Iron,Dissolved	ND		0.100	1	03/08/2019 15:15	WG1245989
Lead	ND		0.00200	1	03/10/2019 20:55	WG1246973
Lead,Dissolved	0.00200	B	0.00200	1	03/08/2019 15:15	WG1245989
Magnesium	5.79		1.00	1	03/10/2019 20:55	WG1246973
Magnesium,Dissolved	6.70		1.00	1	03/08/2019 15:15	WG1245989
Manganese	0.0195		0.00500	1	03/10/2019 20:55	WG1246973
Manganese,Dissolved	0.0136		0.00500	1	03/08/2019 15:15	WG1245989
Nickel	ND		0.00200	1	03/10/2019 20:55	WG1246973
Nickel,Dissolved	ND		0.00200	1	03/08/2019 15:15	WG1245989
Potassium	1.59		1.00	1	03/10/2019 20:55	WG1246973
Potassium,Dissolved	1.75		1.00	1	03/08/2019 15:15	WG1245989
Selenium	ND		0.00200	1	03/11/2019 15:49	WG1246973
Selenium,Dissolved	ND		0.00200	1	03/08/2019 15:15	WG1245989
Silver	ND		0.00200	1	03/11/2019 15:49	WG1246973
Silver,Dissolved	ND		0.00200	1	03/08/2019 15:15	WG1245989
Sodium	10.6		1.00	1	03/10/2019 20:55	WG1246973
Sodium,Dissolved	11.7		1.00	1	03/08/2019 15:15	WG1245989
Thallium	ND		0.00200	1	03/10/2019 20:55	WG1246973
Thallium,Dissolved	ND		0.00200	1	03/08/2019 15:15	WG1245989
Vanadium	ND		0.00500	1	03/10/2019 20:55	WG1246973
Vanadium,Dissolved	ND		0.00500	1	03/08/2019 15:15	WG1245989
Zinc	ND		0.0250	1	03/10/2019 20:55	WG1246973
Zinc,Dissolved	ND		0.0250	1	03/08/2019 15:15	WG1245989

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	03/07/2019 13:56	WG1246403
Acrylonitrile	ND		0.0100	1	03/07/2019 13:56	WG1246403
Benzene	ND		0.00100	1	03/07/2019 13:56	WG1246403
Bromochloromethane	ND		0.00100	1	03/07/2019 13:56	WG1246403
Bromodichloromethane	ND		0.00100	1	03/07/2019 13:56	WG1246403
Bromoform	ND		0.00100	1	03/07/2019 13:56	WG1246403
Bromomethane	ND		0.00500	1	03/07/2019 13:56	WG1246403
Carbon disulfide	ND		0.00100	1	03/07/2019 13:56	WG1246403
Carbon tetrachloride	ND		0.00100	1	03/07/2019 13:56	WG1246403
Chlorobenzene	ND		0.00100	1	03/07/2019 13:56	WG1246403
Chlorodibromomethane	ND		0.00100	1	03/07/2019 13:56	WG1246403
Chloroethane	ND		0.00500	1	03/07/2019 13:56	WG1246403
Chloroform	ND		0.00500	1	03/07/2019 13:56	WG1246403
Chloromethane	ND		0.00250	1	03/07/2019 13:56	WG1246403
Dibromomethane	ND		0.00100	1	03/07/2019 13:56	WG1246403
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/07/2019 13:56	WG1246403



Collected date/time: 03/05/19 15:00

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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	03/07/2019 13:56	WG1246403
1,2-Dichlorobenzene	ND		0.00100	1	03/07/2019 13:56	WG1246403
1,4-Dichlorobenzene	ND		0.00100	1	03/07/2019 13:56	WG1246403
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/07/2019 13:56	WG1246403
1,1-Dichloroethane	ND		0.00100	1	03/07/2019 13:56	WG1246403
1,2-Dichloroethane	ND		0.00100	1	03/07/2019 13:56	WG1246403
1,1-Dichloroethene	ND		0.00100	1	03/07/2019 13:56	WG1246403
cis-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 13:56	WG1246403
trans-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 13:56	WG1246403
1,2-Dichloropropane	ND		0.00100	1	03/07/2019 13:56	WG1246403
cis-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 13:56	WG1246403
trans-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 13:56	WG1246403
Ethylbenzene	ND		0.00100	1	03/07/2019 13:56	WG1246403
2-Hexanone	ND		0.0100	1	03/07/2019 13:56	WG1246403
Iodomethane	ND		0.0100	1	03/07/2019 13:56	WG1246403
2-Butanone (MEK)	ND		0.0100	1	03/07/2019 13:56	WG1246403
Methylene Chloride	ND		0.00500	1	03/07/2019 13:56	WG1246403
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/07/2019 13:56	WG1246403
Styrene	ND		0.00100	1	03/07/2019 13:56	WG1246403
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 13:56	WG1246403
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 13:56	WG1246403
Tetrachloroethene	ND		0.00100	1	03/07/2019 13:56	WG1246403
Toluene	ND		0.00100	1	03/07/2019 13:56	WG1246403
1,1,1-Trichloroethane	ND		0.00100	1	03/07/2019 13:56	WG1246403
1,1,2-Trichloroethane	ND		0.00100	1	03/07/2019 13:56	WG1246403
Trichloroethene	ND		0.00100	1	03/07/2019 13:56	WG1246403
Trichlorofluoromethane	ND		0.00500	1	03/07/2019 13:56	WG1246403
1,2,3-Trichloropropane	ND		0.00250	1	03/07/2019 13:56	WG1246403
Vinyl acetate	ND		0.0100	1	03/07/2019 13:56	WG1246403
Vinyl chloride	ND		0.00100	1	03/07/2019 13:56	WG1246403
Xylenes, Total	ND		0.00300	1	03/07/2019 13:56	WG1246403
(S) Toluene-d8	105		80.0-120		03/07/2019 13:56	WG1246403
(S) o,o,a-Trifluorotoluene	101		80.0-120		03/07/2019 13:56	WG1246403
(S) 4-Bromofluorobenzene	102		77.0-126		03/07/2019 13:56	WG1246403
(S) 1,2-Dichloroethane-d4	104		70.0-130		03/07/2019 13:56	WG1246403

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EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	03/07/2019 14:45	WG1246401
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/07/2019 14:45	WG1246401



Collected date/time: 03/05/19 00:00

L1075820

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	100		30.0	1	03/12/2019 12:18	WG1248517

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/12/2019 17:27	WG1248244

3 Ss

4 Cn

Sample Narrative:

L1075820-08 WG1248244: Endpoint pH 4.5

5 Sr

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/13/2019 08:45	WG1248433

6 Qc

7 Gl

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
COD	11.7		10.0	1	03/10/2019 13:51	WG1247115

8 Al

9 Sc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/06/2019 15:30	WG1245973
Chloride	13.9		1.00	1	03/06/2019 15:30	WG1245973
Fluoride	0.127		0.100	1	03/06/2019 15:30	WG1245973
Nitrate	1.36		0.100	1	03/06/2019 15:30	WG1245973
Sulfate	83.8		5.00	1	03/06/2019 15:30	WG1245973

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/07/2019 09:40	WG1245996
Mercury,Dissolved	ND		0.000200	1	03/07/2019 11:20	WG1245998

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/07/2019 11:53	WG1246101
Boron,Dissolved	ND		0.200	1	03/08/2019 10:48	WG1246644

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	0.201		0.100	1	03/10/2019 21:00	WG1246973
Aluminum,Dissolved	0.179		0.100	1	03/08/2019 15:20	WG1245989
Antimony	ND		0.00200	1	03/11/2019 15:53	WG1246973
Antimony,Dissolved	ND		0.00200	1	03/08/2019 15:20	WG1245989
Arsenic	ND		0.00200	1	03/10/2019 21:00	WG1246973
Arsenic,Dissolved	ND		0.00200	1	03/08/2019 15:20	WG1245989
Barium	0.0313		0.00500	1	03/10/2019 21:00	WG1246973
Barium,Dissolved	0.0368		0.00500	1	03/08/2019 15:20	WG1245989



Collected date/time: 03/05/19 00:00

L1075820

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	03/10/2019 21:00	WG1246973
Beryllium,Dissolved	ND		0.00200	1	03/08/2019 15:20	WG1245989
Cadmium	0.0113		0.00100	1	03/10/2019 21:00	WG1246973
Cadmium,Dissolved	0.0131		0.00100	1	03/08/2019 15:20	WG1245989
Calcium	19.0		1.00	1	03/10/2019 21:00	WG1246973
Calcium,Dissolved	22.4		1.00	1	03/08/2019 15:20	WG1245989
Chromium	0.00499		0.00200	1	03/10/2019 21:00	WG1246973
Chromium,Dissolved	ND		0.00200	1	03/08/2019 15:20	WG1245989
Cobalt	0.00326		0.00200	1	03/10/2019 21:00	WG1246973
Cobalt,Dissolved	0.00358		0.00200	1	03/08/2019 15:20	WG1245989
Copper	ND		0.00500	1	03/10/2019 21:00	WG1246973
Copper,Dissolved	ND		0.00500	1	03/08/2019 15:20	WG1245989
Iron	0.205		0.100	1	03/10/2019 21:00	WG1246973
Iron,Dissolved	ND		0.100	1	03/08/2019 15:20	WG1245989
Lead	ND		0.00200	1	03/10/2019 21:00	WG1246973
Lead,Dissolved	0.00224	B	0.00200	1	03/08/2019 15:20	WG1245989
Magnesium	8.04		1.00	1	03/10/2019 21:00	WG1246973
Magnesium,Dissolved	9.25		1.00	1	03/08/2019 15:20	WG1245989
Manganese	0.378		0.00500	1	03/10/2019 21:00	WG1246973
Manganese,Dissolved	0.424		0.00500	1	03/08/2019 15:20	WG1245989
Nickel	0.0158		0.00200	1	03/10/2019 21:00	WG1246973
Nickel,Dissolved	0.0181		0.00200	1	03/08/2019 15:20	WG1245989
Potassium	3.39		1.00	1	03/10/2019 21:00	WG1246973
Potassium,Dissolved	3.88		1.00	1	03/08/2019 15:20	WG1245989
Selenium	ND		0.00200	1	03/11/2019 15:53	WG1246973
Selenium,Dissolved	ND		0.00200	1	03/08/2019 15:20	WG1245989
Silver	ND		0.00200	1	03/11/2019 15:53	WG1246973
Silver,Dissolved	ND		0.00200	1	03/08/2019 15:20	WG1245989
Sodium	6.38		1.00	1	03/10/2019 21:00	WG1246973
Sodium,Dissolved	6.70		1.00	1	03/08/2019 15:20	WG1245989
Thallium	ND		0.00200	1	03/10/2019 21:00	WG1246973
Thallium,Dissolved	ND		0.00200	1	03/08/2019 15:20	WG1245989
Vanadium	ND		0.00500	1	03/10/2019 21:00	WG1246973
Vanadium,Dissolved	ND		0.00500	1	03/08/2019 15:20	WG1245989
Zinc	0.101		0.0250	1	03/10/2019 21:00	WG1246973
Zinc,Dissolved	0.117		0.0250	1	03/08/2019 15:20	WG1245989

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
Acetone	ND		0.0500	1	03/07/2019 14:16	WG1246403
Acrylonitrile	ND		0.0100	1	03/07/2019 14:16	WG1246403
Benzene	ND		0.00100	1	03/07/2019 14:16	WG1246403
Bromochloromethane	ND		0.00100	1	03/07/2019 14:16	WG1246403
Bromodichloromethane	ND		0.00100	1	03/07/2019 14:16	WG1246403
Bromoform	ND		0.00100	1	03/07/2019 14:16	WG1246403
Bromomethane	ND		0.00500	1	03/07/2019 14:16	WG1246403
Carbon disulfide	ND		0.00100	1	03/07/2019 14:16	WG1246403
Carbon tetrachloride	ND		0.00100	1	03/07/2019 14:16	WG1246403
Chlorobenzene	ND		0.00100	1	03/07/2019 14:16	WG1246403
Chlorodibromomethane	ND		0.00100	1	03/07/2019 14:16	WG1246403
Chloroethane	ND		0.00500	1	03/07/2019 14:16	WG1246403
Chloroform	ND		0.00500	1	03/07/2019 14:16	WG1246403
Chloromethane	ND		0.00250	1	03/07/2019 14:16	WG1246403
Dibromomethane	ND		0.00100	1	03/07/2019 14:16	WG1246403
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/07/2019 14:16	WG1246403



Collected date/time: 03/05/19 00:00

L1075820

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	03/07/2019 14:16	WG1246403
1,2-Dichlorobenzene	ND		0.00100	1	03/07/2019 14:16	WG1246403
1,4-Dichlorobenzene	ND		0.00100	1	03/07/2019 14:16	WG1246403
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/07/2019 14:16	WG1246403
1,1-Dichloroethane	ND		0.00100	1	03/07/2019 14:16	WG1246403
1,2-Dichloroethane	ND		0.00100	1	03/07/2019 14:16	WG1246403
1,1-Dichloroethene	ND		0.00100	1	03/07/2019 14:16	WG1246403
cis-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 14:16	WG1246403
trans-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 14:16	WG1246403
1,2-Dichloropropane	ND		0.00100	1	03/07/2019 14:16	WG1246403
cis-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 14:16	WG1246403
trans-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 14:16	WG1246403
Ethylbenzene	ND		0.00100	1	03/07/2019 14:16	WG1246403
2-Hexanone	ND		0.0100	1	03/07/2019 14:16	WG1246403
Iodomethane	ND		0.0100	1	03/07/2019 14:16	WG1246403
2-Butanone (MEK)	ND		0.0100	1	03/07/2019 14:16	WG1246403
Methylene Chloride	ND		0.00500	1	03/07/2019 14:16	WG1246403
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/07/2019 14:16	WG1246403
Styrene	ND		0.00100	1	03/07/2019 14:16	WG1246403
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 14:16	WG1246403
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 14:16	WG1246403
Tetrachloroethene	ND		0.00100	1	03/07/2019 14:16	WG1246403
Toluene	ND		0.00100	1	03/07/2019 14:16	WG1246403
1,1,1-Trichloroethane	ND		0.00100	1	03/07/2019 14:16	WG1246403
1,1,2-Trichloroethane	ND		0.00100	1	03/07/2019 14:16	WG1246403
Trichloroethene	ND		0.00100	1	03/07/2019 14:16	WG1246403
Trichlorofluoromethane	ND		0.00500	1	03/07/2019 14:16	WG1246403
1,2,3-Trichloropropane	ND		0.00250	1	03/07/2019 14:16	WG1246403
Vinyl acetate	ND		0.0100	1	03/07/2019 14:16	WG1246403
Vinyl chloride	ND		0.00100	1	03/07/2019 14:16	WG1246403
Xylenes, Total	ND		0.00300	1	03/07/2019 14:16	WG1246403
(S) Toluene-d8	104		80.0-120		03/07/2019 14:16	WG1246403
(S) a,a,a-Trifluorotoluene	100		80.0-120		03/07/2019 14:16	WG1246403
(S) 4-Bromofluorobenzene	101		77.0-126		03/07/2019 14:16	WG1246403
(S) 1,2-Dichloroethane-d4	103		70.0-130		03/07/2019 14:16	WG1246403

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	03/07/2019 14:57	WG1246401
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/07/2019 14:57	WG1246401



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	ND		30.0	1	03/12/2019 12:19	WG1248517

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/12/2019 17:33	WG1248244

3 Ss

4 Cn

Sample Narrative:

L1075820-09 WG1248244: Endpoint pH 4.5

5 Sr

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/13/2019 08:49	WG1248433

6 Qc

7 Gl

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	03/10/2019 14:20	WG1247951

8 Al

9 Sc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/06/2019 16:14	WG1245973
Chloride	ND		1.00	1	03/06/2019 16:14	WG1245973
Fluoride	ND		0.100	1	03/06/2019 16:14	WG1245973
Nitrate	ND		0.100	1	03/06/2019 16:14	WG1245973
Sulfate	ND		5.00	1	03/06/2019 16:14	WG1245973

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/07/2019 09:43	WG1245996

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/07/2019 11:56	WG1246101

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	03/10/2019 21:04	WG1246973
Aluminum,Dissolved	ND		0.100	1	03/08/2019 15:25	WG1245989
Antimony	ND		0.00200	1	03/11/2019 15:58	WG1246973
Arsenic	ND		0.00200	1	03/10/2019 21:04	WG1246973
Barium	ND		0.00500	1	03/10/2019 21:04	WG1246973
Beryllium	ND		0.00200	1	03/10/2019 21:04	WG1246973
Cadmium	ND		0.00100	1	03/10/2019 21:04	WG1246973
Calcium	ND		1.00	1	03/10/2019 21:04	WG1246973
Chromium	ND		0.00200	1	03/10/2019 21:04	WG1246973
Cobalt	ND		0.00200	1	03/10/2019 21:04	WG1246973



Collected date/time: 03/05/19 14:20

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Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Copper	ND		0.00500	1	03/10/2019 21:04	WG1246973
Iron	ND		0.100	1	03/10/2019 21:04	WG1246973
Lead	ND		0.00200	1	03/10/2019 21:04	WG1246973
Magnesium	ND		1.00	1	03/10/2019 21:04	WG1246973
Manganese	ND		0.00500	1	03/10/2019 21:04	WG1246973
Nickel	ND		0.00200	1	03/10/2019 21:04	WG1246973
Potassium	ND		1.00	1	03/10/2019 21:04	WG1246973
Selenium	ND		0.00200	1	03/11/2019 15:58	WG1246973
Silver	ND		0.00200	1	03/11/2019 15:58	WG1246973
Sodium	ND		1.00	1	03/10/2019 21:04	WG1246973
Thallium	ND		0.00200	1	03/10/2019 21:04	WG1246973
Vanadium	ND		0.00500	1	03/10/2019 21:04	WG1246973
Zinc	ND		0.0250	1	03/10/2019 21:04	WG1246973

- 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	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Acetone	ND		0.0500	1	03/07/2019 14:36	WG1246403
Acrylonitrile	ND		0.0100	1	03/07/2019 14:36	WG1246403
Benzene	ND		0.00100	1	03/07/2019 14:36	WG1246403
Bromochloromethane	ND		0.00100	1	03/07/2019 14:36	WG1246403
Bromodichloromethane	ND		0.00100	1	03/07/2019 14:36	WG1246403
Bromoform	ND		0.00100	1	03/07/2019 14:36	WG1246403
Bromomethane	ND		0.00500	1	03/07/2019 14:36	WG1246403
Carbon disulfide	ND		0.00100	1	03/07/2019 14:36	WG1246403
Carbon tetrachloride	ND		0.00100	1	03/07/2019 14:36	WG1246403
Chlorobenzene	ND		0.00100	1	03/07/2019 14:36	WG1246403
Chlorodibromomethane	ND		0.00100	1	03/07/2019 14:36	WG1246403
Chloroethane	ND		0.00500	1	03/07/2019 14:36	WG1246403
Chloroform	ND		0.00500	1	03/07/2019 14:36	WG1246403
Chloromethane	ND		0.00250	1	03/07/2019 14:36	WG1246403
Dibromomethane	ND		0.00100	1	03/07/2019 14:36	WG1246403
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/07/2019 14:36	WG1246403
1,2-Dibromoethane	ND		0.00100	1	03/07/2019 14:36	WG1246403
1,2-Dichlorobenzene	ND		0.00100	1	03/07/2019 14:36	WG1246403
1,4-Dichlorobenzene	ND		0.00100	1	03/07/2019 14:36	WG1246403
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/07/2019 14:36	WG1246403
1,1-Dichloroethane	ND		0.00100	1	03/07/2019 14:36	WG1246403
1,2-Dichloroethane	ND		0.00100	1	03/07/2019 14:36	WG1246403
1,1-Dichloroethene	ND		0.00100	1	03/07/2019 14:36	WG1246403
cis-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 14:36	WG1246403
trans-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 14:36	WG1246403
1,2-Dichloropropane	ND		0.00100	1	03/07/2019 14:36	WG1246403
cis-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 14:36	WG1246403
trans-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 14:36	WG1246403
Ethylbenzene	ND		0.00100	1	03/07/2019 14:36	WG1246403
2-Hexanone	ND		0.0100	1	03/07/2019 14:36	WG1246403
Iodomethane	ND		0.0100	1	03/07/2019 14:36	WG1246403
2-Butanone (MEK)	ND		0.0100	1	03/07/2019 14:36	WG1246403
Methylene Chloride	ND		0.00500	1	03/07/2019 14:36	WG1246403
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/07/2019 14:36	WG1246403
Styrene	ND		0.00100	1	03/07/2019 14:36	WG1246403
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 14:36	WG1246403
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 14:36	WG1246403
Tetrachloroethene	ND		0.00100	1	03/07/2019 14:36	WG1246403
Toluene	ND		0.00100	1	03/07/2019 14:36	WG1246403



Collected date/time: 03/05/19 14:20

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,1,1-Trichloroethane	ND		0.00100	1	03/07/2019 14:36	WG1246403
1,1,2-Trichloroethane	ND		0.00100	1	03/07/2019 14:36	WG1246403
Trichloroethene	ND		0.00100	1	03/07/2019 14:36	WG1246403
Trichlorofluoromethane	ND		0.00500	1	03/07/2019 14:36	WG1246403
1,2,3-Trichloropropane	ND		0.00250	1	03/07/2019 14:36	WG1246403
Vinyl acetate	ND		0.0100	1	03/07/2019 14:36	WG1246403
Vinyl chloride	ND		0.00100	1	03/07/2019 14:36	WG1246403
Xylenes, Total	ND		0.00300	1	03/07/2019 14:36	WG1246403
(S) Toluene-d8	104		80.0-120		03/07/2019 14:36	WG1246403
(S) a,a,a-Trifluorotoluene	102		80.0-120		03/07/2019 14:36	WG1246403
(S) 4-Bromofluorobenzene	102		77.0-126		03/07/2019 14:36	WG1246403
(S) 1,2-Dichloroethane-d4	107		70.0-130		03/07/2019 14:36	WG1246403

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	03/07/2019 15:09	WG1246401
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/07/2019 15:09	WG1246401



Collected date/time: 03/05/19 00:00

L1075820

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

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Acetone	ND		0.0500	1	03/07/2019 11:36	WG1246403
Acrylonitrile	ND		0.0100	1	03/07/2019 11:36	WG1246403
Benzene	ND		0.00100	1	03/07/2019 11:36	WG1246403
Bromochloromethane	ND		0.00100	1	03/07/2019 11:36	WG1246403
Bromodichloromethane	ND		0.00100	1	03/07/2019 11:36	WG1246403
Bromoform	ND		0.00100	1	03/07/2019 11:36	WG1246403
Bromomethane	ND		0.00500	1	03/07/2019 11:36	WG1246403
Carbon disulfide	ND		0.00100	1	03/07/2019 11:36	WG1246403
Carbon tetrachloride	ND		0.00100	1	03/07/2019 11:36	WG1246403
Chlorobenzene	ND		0.00100	1	03/07/2019 11:36	WG1246403
Chlorodibromomethane	ND		0.00100	1	03/07/2019 11:36	WG1246403
Chloroethane	ND		0.00500	1	03/07/2019 11:36	WG1246403
Chloroform	ND		0.00500	1	03/07/2019 11:36	WG1246403
Chloromethane	ND		0.00250	1	03/07/2019 11:36	WG1246403
Dibromomethane	ND		0.00100	1	03/07/2019 11:36	WG1246403
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/07/2019 11:36	WG1246403
1,2-Dibromoethane	ND		0.00100	1	03/07/2019 11:36	WG1246403
1,2-Dichlorobenzene	ND		0.00100	1	03/07/2019 11:36	WG1246403
1,4-Dichlorobenzene	ND		0.00100	1	03/07/2019 11:36	WG1246403
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/07/2019 11:36	WG1246403
1,1-Dichloroethane	ND		0.00100	1	03/07/2019 11:36	WG1246403
1,2-Dichloroethane	ND		0.00100	1	03/07/2019 11:36	WG1246403
1,1-Dichloroethene	ND		0.00100	1	03/07/2019 11:36	WG1246403
cis-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 11:36	WG1246403
trans-1,2-Dichloroethene	ND		0.00100	1	03/07/2019 11:36	WG1246403
1,2-Dichloropropane	ND		0.00100	1	03/07/2019 11:36	WG1246403
cis-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 11:36	WG1246403
trans-1,3-Dichloropropene	ND		0.00100	1	03/07/2019 11:36	WG1246403
Ethylbenzene	ND		0.00100	1	03/07/2019 11:36	WG1246403
2-Hexanone	ND		0.0100	1	03/07/2019 11:36	WG1246403
Iodomethane	ND		0.0100	1	03/07/2019 11:36	WG1246403
2-Butanone (MEK)	ND		0.0100	1	03/07/2019 11:36	WG1246403
Methylene Chloride	ND		0.00500	1	03/07/2019 11:36	WG1246403
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/07/2019 11:36	WG1246403
Styrene	ND		0.00100	1	03/07/2019 11:36	WG1246403
1,1,1-Tetrachloroethane	ND		0.00100	1	03/07/2019 11:36	WG1246403
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/07/2019 11:36	WG1246403
Tetrachloroethene	ND		0.00100	1	03/07/2019 11:36	WG1246403
Toluene	ND		0.00100	1	03/07/2019 11:36	WG1246403
1,1,1-Trichloroethane	ND		0.00100	1	03/07/2019 11:36	WG1246403
1,1,2-Trichloroethane	ND		0.00100	1	03/07/2019 11:36	WG1246403
Trichloroethene	ND		0.00100	1	03/07/2019 11:36	WG1246403
Trichlorofluoromethane	ND		0.00500	1	03/07/2019 11:36	WG1246403
1,2,3-Trichloropropane	ND		0.00250	1	03/07/2019 11:36	WG1246403
Vinyl acetate	ND		0.0100	1	03/07/2019 11:36	WG1246403
Vinyl chloride	ND		0.00100	1	03/07/2019 11:36	WG1246403
Xylenes, Total	ND		0.00300	1	03/07/2019 11:36	WG1246403
(S) Toluene-d8	105		80.0-120		03/07/2019 11:36	WG1246403
(S) a, a, a-Trifluorotoluene	104		80.0-120		03/07/2019 11:36	WG1246403
(S) 4-Bromofluorobenzene	102		77.0-126		03/07/2019 11:36	WG1246403
(S) 1,2-Dichloroethane-d4	104		70.0-130		03/07/2019 11:36	WG1246403

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3390781-1 03/12/19 11:56

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Hardness (colorimetric) as CaCO3	6.36	J	1.43	30.0

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1074061-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1074061-02 03/12/19 12:23 • (DUP) R3390781-6 03/12/19 12:24

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Hardness (colorimetric) as CaCO3	286	285	5	0.350		20

L1076122-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1076122-01 03/12/19 12:41 • (DUP) R3390781-7 03/12/19 12:41

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Hardness (colorimetric) as CaCO3	263	282	5	6.80		20

Laboratory Control Sample (LCS)

(LCS) R3390781-2 03/12/19 11:57

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Hardness (colorimetric) as CaCO3	150	157	105	85.0-115	

L1074061-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1074061-03 03/12/19 12:00 • (MS) R3390781-3 03/12/19 12:00 • (MSD) R3390781-4 03/12/19 12:01

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Hardness (colorimetric) as CaCO3	150	242	272	271	20.0	19.3	1	80.0-120	E J6	E J6	0.368	20



Method Blank (MB)

(MB) R3390952-1 03/12/19 15:45

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Alkalinity	3.34	J	2.71	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1075742-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1075742-01 03/12/19 16:08 • (DUP) R3390952-3 03/12/19 16:17

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Alkalinity	96.6	101	1	4.18		20

Sample Narrative:

OS: Endpoint pH 4.5 headspace

DUP: Endpoint pH 4.5

L1075966-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1075966-02 03/12/19 17:52 • (DUP) R3390952-6 03/12/19 18:01

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Alkalinity	19.1	12.7	1	40.2	J P1	20

Sample Narrative:

OS: Endpoint pH 4.5 headspace

DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3390952-5 03/12/19 17:03

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Alkalinity	100	105	105	85.0-115	

Sample Narrative:

LCS: Endpoint pH 4.5

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3391068-1 03/13/19 08:14

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Ammonia Nitrogen	U		0.0317	0.100

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1075727-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1075727-02 03/13/19 08:17 • (DUP) R3391068-3 03/13/19 08:18

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Ammonia Nitrogen	ND	0.000	1	0.000		10

L1075820-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1075820-08 03/13/19 08:45 • (DUP) R3391068-5 03/13/19 08:47

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Ammonia Nitrogen	ND	0.000	1	0.000		10

Laboratory Control Sample (LCS)

(LCS) R3391068-2 03/13/19 08:15

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Ammonia Nitrogen	7.50	7.02	93.6	90.0-110	

L1075734-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1075734-02 03/13/19 08:25 • (MS) R3391068-4 03/13/19 08:26

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Ammonia Nitrogen	5.00	ND	4.97	99.4	1	90.0-110	

L1075933-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075933-01 03/13/19 09:01 • (MS) R3391068-6 03/13/19 09:03 • (MSD) R3391068-7 03/13/19 09:04

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Ammonia Nitrogen	5.00	0.876	5.66	5.63	95.8	95.0	1	90.0-110			0.691	10



Method Blank (MB)

(MB) R3390247-1 03/10/19 13:48

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
COD	U		3.00	10.0

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1075719-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1075719-01 03/10/19 13:48 • (DUP) R3390247-3 03/10/19 13:48

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
COD	457	458	1	0.286		20

L1076408-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1076408-01 03/10/19 13:52 • (DUP) R3390247-6 03/10/19 13:52

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
COD	135	136	1	0.709		20

Laboratory Control Sample (LCS)

(LCS) R3390247-2 03/10/19 13:48

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
COD	222	218	98.2	90.0-110	

L1075820-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075820-02 03/10/19 13:50 • (MS) R3390247-4 03/10/19 13:50 • (MSD) R3390247-5 03/10/19 13:50

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
COD	400	ND	405	403	101	101	1	80.0-120			0.419	20



Method Blank (MB)

(MB) R3390256-1 03/10/19 14:19

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
COD	U		3.00	10.0

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1075820-09 Original Sample (OS) • Duplicate (DUP)

(OS) L1075820-09 03/10/19 14:20 • (DUP) R3390256-3 03/10/19 14:20

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
COD	ND	0.000	1	0.000		20

L1076233-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1076233-01 03/10/19 14:23 • (DUP) R3390256-6 03/10/19 14:23

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
COD	309	306	1	0.771		20

Laboratory Control Sample (LCS)

(LCS) R3390256-2 03/10/19 14:19

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
COD	222	223	100	90.0-110	

L1075933-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075933-01 03/10/19 14:21 • (MS) R3390256-4 03/10/19 14:21 • (MSD) R3390256-5 03/10/19 14:21

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
COD	400	70.8	488	488	104	104	1	80.0-120			0.109	20



Method Blank (MB)

(MB) R3389347-1 03/06/19 09:33

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

L1075702-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1075702-01 03/06/19 12:06 • (DUP) R3389347-3 03/06/19 12:21

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Bromide	ND	0.000	1	0.000		15
Chloride	5.81	5.83	1	0.469		15
Fluoride	ND	0.0629	1	0.000		15
Nitrate	1.52	1.51	1	0.231		15
Sulfate	ND	2.95	1	0.000		15

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1075779-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1075779-07 03/06/19 18:15 • (DUP) R3389347-6 03/06/19 18:31

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Bromide	0.398	0.434	1	8.65	U	15
Chloride	65.7	65.7	1	0.0425		15
Fluoride	4.71	4.72	1	0.233		15
Nitrate	2.52	2.58	1	2.33		15

L1075779-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1075779-07 03/07/19 00:11 • (DUP) R3389347-9 03/07/19 00:27

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Sulfate	178	179	5	0.443		15



Laboratory Control Sample (LCS)

(LCS) R3389347-2 03/06/19 09:49

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
Bromide	40.0	39.9	99.7	80.0-120	
Chloride	40.0	39.3	98.3	80.0-120	
Fluoride	8.00	7.88	98.5	80.0-120	
Nitrate	8.00	8.02	100	80.0-120	
Sulfate	40.0	40.2	100	80.0-120	

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

L1075759-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075759-08 03/06/19 13:09 • (MS) R3389347-4 03/06/19 13:25 • (MSD) R3389347-5 03/06/19 13:40

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Bromide	50.0	U	47.4	47.9	94.8	95.8	1	80.0-120			0.991	15
Chloride	50.0	8.34	56.4	55.7	96.1	94.7	1	80.0-120			1.31	15
Fluoride	5.00	0.0198	4.93	4.63	98.2	92.3	1	80.0-120			6.14	15
Nitrate	5.00	1.46	6.23	6.27	95.5	96.2	1	80.0-120			0.584	15
Sulfate	50.0	0.285	49.1	49.3	97.7	98.0	1	80.0-120			0.284	15

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1075779-07 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075779-07 03/06/19 18:15 • (MS) R3389347-7 03/06/19 18:47 • (MSD) R3389347-8 03/06/19 19:03

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Bromide	50.0	0.398	47.1	47.5	93.3	94.1	1	80.0-120			0.859	15
Chloride	50.0	65.7	112	113	93.0	94.5	1	80.0-120	<u>E</u>	<u>E</u>	0.703	15
Fluoride	5.00	4.71	9.31	9.40	92.0	94.0	1	80.0-120			1.04	15
Nitrate	5.00	2.52	7.37	7.47	96.9	99.1	1	80.0-120			1.44	15
Sulfate	50.0	177	217	218	79.0	80.4	1	80.0-120	<u>E J6</u>	<u>E</u>	0.308	15



Method Blank (MB)

(MB) R3389324-1 03/06/19 08:57

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	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	0.342	J	0.0774	5.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

L1075820-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1075820-08 03/06/19 15:30 • (DUP) R3389324-3 03/06/19 15:41

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Bromide	ND	0.000	1	0.000		15
Chloride	13.9	14.0	1	0.610		15
Fluoride	0.127	0.127	1	0.315		15
Nitrate	1.36	1.38	1	1.53		15
Sulfate	83.8	84.3	1	0.595		15

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Laboratory Control Sample (LCS)

(LCS) R3389324-2 03/06/19 09:08

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Bromide	40.0	40.9	102	80.0-120	
Chloride	40.0	40.8	102	80.0-120	
Fluoride	8.00	8.36	104	80.0-120	
Nitrate	8.00	8.13	102	80.0-120	
Sulfate	40.0	41.6	104	80.0-120	

L1075820-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075820-08 03/06/19 15:30 • (MS) R3389324-4 03/06/19 15:52 • (MSD) R3389324-5 03/06/19 16:03

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	%	%		%			%	%
Bromide	50.0	ND	48.5	48.5	97.0	96.9	1	80.0-120			0.119	15
Chloride	50.0	13.9	64.3	64.2	101	101	1	80.0-120			0.229	15
Fluoride	5.00	0.127	5.27	5.25	103	103	1	80.0-120			0.312	15
Nitrate	5.00	1.36	6.62	6.60	105	105	1	80.0-120			0.330	15
Sulfate	50.0	83.8	133	133	98.1	97.4	1	80.0-120	E	E	0.256	15



Method Blank (MB)

(MB) R3389535-1 03/07/19 08:39

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Mercury	U		0.0000490	0.000200

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

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

(LCS) R3389535-2 03/07/19 08:42 • (LCSD) R3389535-3 03/07/19 08:44

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Mercury	0.00300	0.00289	0.00298	96.5	99.3	80.0-120			2.86	20

L1075355-23 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075355-23 03/07/19 08:47 • (MS) R3389535-4 03/07/19 08:49 • (MSD) R3389535-5 03/07/19 08:51

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Mercury	0.00300	U	0.00292	0.00296	97.4	98.7	1	75.0-125			1.36	20

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3389560-1 03/07/19 10:46

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	U		0.0000490	0.000200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3389560-2 03/07/19 10:48 • (LCSD) R3389560-3 03/07/19 10:51

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	0.00286	0.00308	95.4	103	80.0-120			7.20	20

L1075820-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075820-01 03/07/19 10:53 • (MS) R3389560-4 03/07/19 10:56 • (MSD) R3389560-5 03/07/19 10:58

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	0.000361	0.00336	0.00321	100	94.8	1	75.0-125			4.77	20

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3389602-1 03/07/19 11:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0126	0.200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3389602-2 03/07/19 11:06 • (LCSD) R3389602-3 03/07/19 11:09

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	1.00	0.995	0.999	99.5	99.9	80.0-120			0.416	20

L1075742-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075742-01 03/07/19 11:12 • (MS) R3389602-5 03/07/19 11:17 • (MSD) R3389602-6 03/07/19 11:19

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 %
Boron	1.00	6.36	7.28	7.32	91.8	95.8	1	75.0-125			0.546	20

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3390006-1 03/08/19 10:05

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	0.0383	↓	0.0126	0.200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3390006-2 03/08/19 10:07 • (LCSD) R3390006-3 03/08/19 10:10

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 %
Boron,Dissolved	1.00	0.982	0.992	98.2	99.2	80.0-120			1.01	20

L1076166-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1076166-01 03/08/19 10:13 • (MS) R3390006-5 03/08/19 10:19 • (MSD) R3390006-6 03/08/19 10:21

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 %
Boron,Dissolved	1.00	14.9	15.7	15.7	81.9	79.0	1	75.0-125			0.184	20

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3390077-1 03/08/19 12:53

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum,Dissolved	U		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	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	0.000405	U	0.000240	0.00200
Magnesium,Dissolved	U		0.100	1.00
Manganese,Dissolved	0.000304	U	0.000250	0.00500
Nickel,Dissolved	U		0.000350	0.00200
Potassium,Dissolved	0.0404	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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

(LCS) R3390077-2 03/08/19 12:58 • (LCSD) R3390077-3 03/08/19 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 %
Aluminum,Dissolved	0.500	0.545	0.531	109	106	80.0-120			2.74	20
Antimony,Dissolved	0.0500	0.0526	0.0529	105	106	80.0-120			0.553	20
Arsenic,Dissolved	0.0500	0.0480	0.0508	96.0	102	80.0-120			5.68	20
Barium,Dissolved	0.0500	0.0488	0.0478	97.7	95.6	80.0-120			2.18	20
Beryllium,Dissolved	0.0500	0.0508	0.0492	102	98.4	80.0-120			3.08	20
Cadmium,Dissolved	0.0500	0.0490	0.0496	98.1	99.1	80.0-120			1.08	20
Calcium,Dissolved	5.00	4.96	5.03	99.3	101	80.0-120			1.32	20
Chromium,Dissolved	0.0500	0.0494	0.0512	98.8	102	80.0-120			3.70	20
Copper,Dissolved	0.0500	0.0505	0.0514	101	103	80.0-120			1.78	20
Cobalt,Dissolved	0.0500	0.0491	0.0507	98.2	101	80.0-120			3.16	20
Iron,Dissolved	0.500	0.523	0.528	105	106	80.0-120			0.877	20



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

(LCS) R3390077-2 03/08/19 12:58 • (LCSD) R3390077-3 03/08/19 13:03

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Lead,Dissolved	0.0500	0.0497	0.0502	99.4	100	80.0-120			1.04	20
Magnesium,Dissolved	5.00	4.97	5.01	99.4	100	80.0-120			0.866	20
Manganese,Dissolved	0.0500	0.0493	0.0514	98.6	103	80.0-120			4.27	20
Nickel,Dissolved	0.0500	0.0487	0.0509	97.4	102	80.0-120			4.34	20
Potassium,Dissolved	5.00	4.99	5.01	99.8	100	80.0-120			0.411	20
Selenium,Dissolved	0.0500	0.0511	0.0498	102	99.6	80.0-120			2.59	20
Silver,Dissolved	0.0500	0.0518	0.0523	104	105	80.0-120			1.06	20
Sodium,Dissolved	5.00	5.10	5.12	102	102	80.0-120			0.345	20
Thallium,Dissolved	0.0500	0.0493	0.0495	98.6	99.0	80.0-120			0.399	20
Vanadium,Dissolved	0.0500	0.0495	0.0512	99.0	102	80.0-120			3.43	20
Zinc,Dissolved	0.0500	0.0486	0.0491	97.1	98.3	80.0-120			1.20	20

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1074997-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1074997-01 03/08/19 13:07 • (MS) R3390077-5 03/08/19 13:16 • (MSD) R3390077-6 03/08/19 13:21

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Aluminum,Dissolved	0.500	0.257	0.735	0.761	95.6	101	1	75.0-125			3.49	20
Antimony,Dissolved	0.0500	0.00123	0.0523	0.0540	102	105	1	75.0-125			3.06	20
Arsenic,Dissolved	0.0500	U	0.0485	0.0489	97.0	97.8	1	75.0-125			0.760	20
Barium,Dissolved	0.0500	0.0639	0.110	0.112	92.7	95.6	1	75.0-125			1.34	20
Beryllium,Dissolved	0.0500	0.00161	0.0508	0.0510	98.4	98.8	1	75.0-125			0.399	20
Cadmium,Dissolved	0.0500	U	0.0486	0.0496	97.3	99.2	1	75.0-125			1.95	20
Calcium,Dissolved	5.00	2.48	7.71	7.59	105	102	1	75.0-125			1.51	20
Chromium,Dissolved	0.0500	U	0.0493	0.0493	98.6	98.6	1	75.0-125			0.0127	20
Copper,Dissolved	0.0500	0.00247	0.0520	0.0520	99.2	99.1	1	75.0-125			0.0887	20
Cobalt,Dissolved	0.0500	0.00414	0.0533	0.0535	98.4	98.8	1	75.0-125			0.374	20
Potassium,Dissolved	5.00	1.03	5.94	5.88	98.2	97.0	1	75.0-125			1.02	20
Iron,Dissolved	0.500	0.0157	0.497	0.517	96.2	100	1	75.0-125			3.93	20
Lead,Dissolved	0.0500	0.000614	0.0498	0.0500	98.3	98.7	1	75.0-125			0.336	20
Magnesium,Dissolved	5.00	1.85	6.79	6.83	98.9	99.6	1	75.0-125			0.496	20
Manganese,Dissolved	0.0500	0.0130	0.0626	0.0607	99.1	95.3	1	75.0-125			3.02	20
Nickel,Dissolved	0.0500	0.0101	0.0604	0.0603	101	100	1	75.0-125			0.183	20
Selenium,Dissolved	0.0500	U	0.0517	0.0508	103	102	1	75.0-125			1.68	20
Silver,Dissolved	0.0500	U	0.0517	0.0528	103	106	1	75.0-125			2.08	20
Sodium,Dissolved	5.00	3.65	8.58	8.42	98.6	95.6	1	75.0-125			1.80	20
Thallium,Dissolved	0.0500	U	0.0496	0.0490	99.2	98.0	1	75.0-125			1.24	20
Vanadium,Dissolved	0.0500	U	0.0492	0.0500	98.5	100	1	75.0-125			1.56	20
Zinc,Dissolved	0.0500	0.0599	0.109	0.108	98.0	95.4	1	75.0-125			1.20	20



Method Blank (MB)

(MB) R3390285-1 03/10/19 19:30

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.00766	U	0.00515	0.100
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	0.000758	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	U		0.0370	1.00
Sodium	U		0.110	1.00
Thallium	U		0.000190	0.00200
Vanadium	U		0.000180	0.00500
Zinc	U		0.00256	0.0250

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

Method Blank (MB)

(MB) R3390599-1 03/11/19 14:35

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	U		0.000754	0.00200
Selenium	U		0.000380	0.00200
Silver	U		0.000310	0.00200

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

(LCS) R3390285-2 03/10/19 19:35 • (LCSD) R3390285-3 03/10/19 19:39

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 %
Aluminum	0.500	0.443	0.461	88.6	92.2	80.0-120			4.02	20
Arsenic	0.0500	0.0428	0.0443	85.7	88.6	80.0-120			3.32	20
Barium	0.0500	0.0418	0.0427	83.7	85.4	80.0-120			2.07	20
Beryllium	0.0500	0.0435	0.0429	87.0	85.9	80.0-120			1.31	20
Cadmium	0.0500	0.0429	0.0424	85.7	84.9	80.0-120			0.980	20



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

(LCS) R3390285-2 03/10/19 19:35 • (LCSD) R3390285-3 03/10/19 19:39

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 %
Calcium	5.00	4.29	4.21	85.7	84.2	80.0-120			1.82	20
Chromium	0.0500	0.0435	0.0453	87.0	90.6	80.0-120			4.10	20
Copper	0.0500	0.0449	0.0486	89.7	97.2	80.0-120			7.97	20
Cobalt	0.0500	0.0428	0.0446	85.6	89.1	80.0-120			4.11	20
Iron	0.500	0.431	0.445	86.2	89.0	80.0-120			3.24	20
Lead	0.0500	0.0421	0.0430	84.1	86.0	80.0-120			2.20	20
Magnesium	5.00	4.31	4.34	86.2	86.8	80.0-120			0.663	20
Manganese	0.0500	0.0430	0.0445	86.0	89.0	80.0-120			3.42	20
Nickel	0.0500	0.0439	0.0445	87.8	89.0	80.0-120			1.38	20
Potassium	5.00	4.26	4.31	85.2	86.3	80.0-120			1.24	20
Sodium	5.00	4.36	4.43	87.3	88.5	80.0-120			1.39	20
Thallium	0.0500	0.0424	0.0422	84.9	84.5	80.0-120			0.496	20
Vanadium	0.0500	0.0428	0.0436	85.6	87.2	80.0-120			1.78	20
Zinc	0.0500	0.0449	0.0446	89.8	89.1	80.0-120			0.713	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

(LCS) R3390599-2 03/11/19 14:40 • (LCSD) R3390599-3 03/11/19 14:44

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	0.0551	0.0557	110	111	80.0-120			1.00	20
Selenium	0.0500	0.0494	0.0477	98.7	95.4	80.0-120			3.41	20
Silver	0.0500	0.0511	0.0503	102	101	80.0-120			1.45	20

L1076309-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1076309-10 03/10/19 19:44 • (MS) R3390285-5 03/10/19 19:53 • (MSD) R3390285-6 03/10/19 19:58

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	0.500	2.08	2.49	2.45	81.7	72.9	1	75.0-125		V	1.77	20
Arsenic	0.0500	0.00231	0.0445	0.0448	84.4	85.0	1	75.0-125			0.721	20
Barium	0.0500	0.0480	0.0912	0.0927	86.4	89.3	1	75.0-125			1.61	20
Beryllium	0.0500	0.00457	0.0479	0.0482	86.7	87.3	1	75.0-125			0.649	20
Cadmium	0.0500	0.000343	0.0441	0.0437	87.6	86.7	1	75.0-125			1.07	20
Calcium	5.00	29.1	33.3	32.7	83.7	70.6	1	75.0-125		V	1.98	20
Chromium	0.0500	0.000790	0.0433	0.0439	84.9	86.2	1	75.0-125			1.52	20
Copper	0.0500	0.00535	0.0438	0.0469	77.0	83.2	1	75.0-125			6.80	20
Cobalt	0.0500	0.0177	0.0607	0.0616	85.9	87.8	1	75.0-125			1.58	20
Potassium	5.00	3.37	7.73	7.67	87.2	86.0	1	75.0-125			0.807	20



L1076309-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1076309-10 03/10/19 19:44 • (MS) R3390285-5 03/10/19 19:53 • (MSD) R3390285-6 03/10/19 19:58

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 %
Iron	0.500	2.57	2.97	3.02	81.3	89.4	1	75.0-125			1.37	20
Lead	0.0500	0.00146	0.0444	0.0455	85.8	88.1	1	75.0-125			2.47	20
Magnesium	5.00	17.5	22.2	21.7	94.8	83.8	1	75.0-125			2.52	20
Manganese	0.0500	0.384	0.424	0.432	80.3	96.5	1	75.0-125			1.90	20
Nickel	0.0500	0.0166	0.0603	0.0617	87.5	90.4	1	75.0-125			2.36	20
Sodium	5.00	50.9	55.3	54.5	88.7	71.9	1	75.0-125		V	1.53	20
Thallium	0.0500	0.000297	0.0427	0.0427	84.8	84.8	1	75.0-125			0.0226	20
Vanadium	0.0500	0.00170	0.0443	0.0445	85.1	85.5	1	75.0-125			0.438	20
Zinc	0.0500	0.0477	0.0921	0.0927	88.6	90.0	1	75.0-125			0.744	20

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

L1076309-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1076309-10 03/11/19 14:49 • (MS) R3390599-5 03/11/19 14:58 • (MSD) R3390599-6 03/11/19 15:03

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	U	0.0551	0.0550	110	110	1	75.0-125			0.243	20
Selenium	0.0500	0.000838	0.0509	0.0528	100	104	1	75.0-125			3.69	20
Silver	0.0500	U	0.0508	0.0509	102	102	1	75.0-125			0.257	20

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3390160-3 03/07/19 10:01

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

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3390160-3 03/07/19 10:01

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	106			80.0-120
(S) a,a,a-Trifluorotoluene	103			80.0-120
(S) 4-Bromofluorobenzene	103			77.0-126
(S) 1,2-Dichloroethane-d4	105			70.0-130

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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

(LCS) R3390160-1 03/07/19 09:00 • (LCSD) R3390160-2 03/07/19 09:21

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 %
Acetone	0.125	0.162	0.171	130	137	19.0-160			5.07	27
Acrylonitrile	0.125	0.133	0.132	106	106	55.0-149			0.308	20
Benzene	0.0250	0.0232	0.0233	92.9	93.2	70.0-123			0.334	20
Bromodichloromethane	0.0250	0.0224	0.0224	89.4	89.5	75.0-120			0.0906	20
Bromochloromethane	0.0250	0.0222	0.0225	89.0	89.9	76.0-122			1.08	20
Bromoform	0.0250	0.0244	0.0250	97.7	100	68.0-132			2.25	20
Bromomethane	0.0250	0.0232	0.0237	92.7	94.9	10.0-160			2.29	25
Carbon disulfide	0.0250	0.0266	0.0234	106	93.8	61.0-128			12.5	20
Carbon tetrachloride	0.0250	0.0239	0.0242	95.4	96.9	68.0-126			1.50	20
Chlorobenzene	0.0250	0.0226	0.0228	90.3	91.4	80.0-121			1.21	20
Chlorodibromomethane	0.0250	0.0235	0.0237	93.8	94.7	77.0-125			0.861	20
Chloroethane	0.0250	0.0235	0.0241	94.2	96.4	47.0-150			2.39	20
Chloroform	0.0250	0.0218	0.0220	87.4	87.9	73.0-120			0.555	20
Chloromethane	0.0250	0.0250	0.0252	100	101	41.0-142			0.788	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0258	0.0260	103	104	58.0-134			0.567	20
1,2-Dibromoethane	0.0250	0.0228	0.0228	91.3	91.2	80.0-122			0.0922	20
Dibromomethane	0.0250	0.0227	0.0230	90.7	91.8	80.0-120			1.25	20
1,2-Dichlorobenzene	0.0250	0.0232	0.0236	92.9	94.6	79.0-121			1.84	20
1,4-Dichlorobenzene	0.0250	0.0225	0.0228	90.2	91.4	79.0-120			1.28	20
trans-1,4-Dichloro-2-butene	0.0250	0.0213	0.0213	85.0	85.4	33.0-144			0.423	20
1,1-Dichloroethane	0.0250	0.0229	0.0230	91.4	92.1	70.0-126			0.748	20
1,2-Dichloroethane	0.0250	0.0219	0.0224	87.6	89.7	70.0-128			2.39	20



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

(LCS) R3390160-1 03/07/19 09:00 • (LCSD) R3390160-2 03/07/19 09:21

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 %
1,1-Dichloroethene	0.0250	0.0278	0.0231	111	92.6	71.0-124			18.2	20
cis-1,2-Dichloroethene	0.0250	0.0224	0.0223	89.6	89.2	73.0-120			0.453	20
trans-1,2-Dichloroethene	0.0250	0.0229	0.0231	91.7	92.4	73.0-120			0.773	20
1,2-Dichloropropane	0.0250	0.0234	0.0236	93.4	94.5	77.0-125			1.16	20
cis-1,3-Dichloropropene	0.0250	0.0223	0.0227	89.1	91.0	80.0-123			2.07	20
trans-1,3-Dichloropropene	0.0250	0.0232	0.0236	92.9	94.6	78.0-124			1.74	20
Ethylbenzene	0.0250	0.0229	0.0233	91.8	93.4	79.0-123			1.73	20
2-Hexanone	0.125	0.126	0.126	101	100	67.0-149			0.643	20
Iodomethane	0.125	0.119	0.119	95.4	95.5	33.0-147			0.167	26
2-Butanone (MEK)	0.125	0.135	0.137	108	109	44.0-160			1.24	20
Methylene Chloride	0.0250	0.0235	0.0232	93.9	92.6	67.0-120			1.42	20
4-Methyl-2-pentanone (MIBK)	0.125	0.127	0.126	102	101	68.0-142			0.922	20
Styrene	0.0250	0.0242	0.0247	96.7	99.0	73.0-130			2.32	20
1,1,1,2-Tetrachloroethane	0.0250	0.0229	0.0233	91.7	93.3	75.0-125			1.73	20
1,1,2,2-Tetrachloroethane	0.0250	0.0224	0.0227	89.7	90.7	65.0-130			1.08	20
Tetrachloroethene	0.0250	0.0229	0.0233	91.5	93.1	72.0-132			1.77	20
Toluene	0.0250	0.0239	0.0242	95.4	96.6	79.0-120			1.28	20
1,1,1-Trichloroethane	0.0250	0.0237	0.0238	94.9	95.2	73.0-124			0.307	20
1,1,2-Trichloroethane	0.0250	0.0220	0.0221	87.9	88.4	80.0-120			0.570	20
Trichloroethene	0.0250	0.0230	0.0230	91.9	92.2	78.0-124			0.346	20
Trichlorofluoromethane	0.0250	0.0266	0.0262	106	105	59.0-147			1.49	20
1,2,3-Trichloropropane	0.0250	0.0217	0.0218	86.7	87.0	73.0-130			0.345	20
Vinyl acetate	0.125	0.133	0.134	106	107	11.0-160			0.372	20
Vinyl chloride	0.0250	0.0228	0.0230	91.3	91.9	67.0-131			0.653	20
Xylenes, Total	0.0750	0.0698	0.0704	93.1	93.9	79.0-123			0.856	20
(S) Toluene-d8				103	103	80.0-120				
(S) a,a,a-Trifluorotoluene				102	103	80.0-120				
(S) 4-Bromofluorobenzene				101	102	77.0-126				
(S) 1,2-Dichloroethane-d4				112	104	70.0-130				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3389719-1 03/07/19 12:42

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Ethylene Dibromide	U		0.0000240	0.0000100
1,2-Dibromo-3-Chloropropane	U		0.0000430	0.0000200

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1075670-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1075670-04 03/07/19 13:31 • (DUP) R3389719-3 03/07/19 13:19

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

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

(LCS) R3389719-4 03/07/19 15:34 • (LCSD) R3389719-5 03/07/19 15:46

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	%	%	%			%	%
Ethylene Dibromide	0.000250	0.000231	0.000235	92.4	94.0	60.0-140			1.72	20
1,2-Dibromo-3-Chloropropane	0.000250	0.000255	0.000263	102	105	60.0-140			3.09	20

L1075820-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1075820-01 03/07/19 13:06 • (MS) R3389719-2 03/07/19 12:54

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
Ethylene Dibromide	0.000100	ND	0.000110	110	1	64.0-159	
1,2-Dibromo-3-Chloropropane	0.000100	ND	0.000106	106	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.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
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.

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

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.
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	LA000356
Kentucky ^{1,6}	90010	South Carolina	84004
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1,4}	2006
Louisiana ¹	LA180010	Texas	T104704245-18-15
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.



1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Civil & Environmental Consultants - TN

325 Seaboard Lane, Suite 170

Report to:
Philip Campbell

Project Description: **EWS Camden Class 2 Landfill**

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

Collected by (print):
Philip Campbell / Adrian Daugh

Collected by (signature):
Philip Campbell

Immediately Packed on Ice N Y

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

Email To: **pcampbell@cecinc.com;**
kclayton@cecinc.com

City/State Collected:

Lab Project #
CEC-EWS CAMDEN LF

P.O. #

Quote #
Date Results Needed

Rush? (Lab MUST Be Notified)
 Same Day Five Day
 Next Day 5 Day (Rad Only)
 Two Day 10 Day (Rad Only)
 Three Day

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page 1 of 2



L# **L1075820**

E187

Acctnum: **CEC**
Template: **T133579**
Prelogin: **P695699**
TSR: **526 - Chris McCord**
PB: **TB 2-26-19**
Shipped Via: **Courier**

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	**WetChem** 250mlHDPE-NoPres	ALK 100ml Amb-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-Bik	Remarks	Sample # (lab only)
MW-1	Grab	GW	-	3-5-19	1035	15	X	X	X	X	X	X	X			-01
MW-3		GW	-		1335	11	X	X	X	X	X	X	X			-02
MW-4		GW	-		1235	11	X	X	X	X	X	X	X			-03
MW-5		GW	-		1140	11	X	X	X	X	X	X	X			-04
TMW-1		GW	-		11:45	11	X	X	X	X	X	X	X			-05
TMW-2		GW	-		13:15	11	X	X	X	X	X	X	X			-06
TMW-3		GW	-		15:00	11	X	X	X	X	X	X	X			-07
DUPLICATE		GW	-		-	11	X	X	X	X	X	X	X			-08
FIELD BLANK	✓	GW	-	↓	1420	10	X	X	X		X	X	X			-09
EQUIPMENT BLANK		GW	-			10	X	X	X		X	X	X			

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other

Remarks: **WetChem** = *NITRATE*, CHLORIDE, BROMIDE, SULFATE, FLUORIDE, ALK Tot/Diss Metals=M6020AP1+Al,Ca,Fe,K,Mg,Mn,Na,B(6010/7470).

Samples returned via:
 UPS FedEx Courier

Tracking # **care**

pH _____ Temp _____
Flow _____ Other _____

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: N
Bottles arrive intact: N
Correct bottles used: N
Sufficient volume sent: N
If Applicable
VOA Zero Headspace: N
Preservation Correct/Checked: N

Relinquished by: (Signature)
MMourey

Date: **2-6-19** Time: **9:36**

Received by: (Signature)
J. Fisher

Trip Blank Received: Yes No
(HCL) MeOH TBR

Relinquished by: (Signature)
J. Fisher

Date: **2-6-19** Time: **10:30**

Received by: (Signature)
Robert

Temp: **0.4+/-0.5°C** Bottles Received: **98**

If preservation required by Login: Date/Time

Relinquished by: (Signature)

Date: Time:

Received for lab by: (Signature)

Date: **3/6/19** Time: **10:30**

Hold: Condition: **NCF / OK**

March 18, 2019

Civil & Environmental Consultants - TN

Sample Delivery Group: L1077065
Samples Received: 03/08/2019
Project Number: 181-364
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.



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CHARLIE CREEK MS L1077065-07	18	
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SAMPLE SUMMARY



CHARLIE CREEK US L1077065-01 GW

Collected by
JW/CD Collected date/time
03/07/19 10:10 Received date/time
03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1249381	1	03/14/19 15:23	03/14/19 15:23	JER	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1249101	1	03/14/19 17:19	03/14/19 17:19	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1247922	1	03/13/19 00:15	03/13/19 00:15	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1247928	1	03/11/19 11:02	03/11/19 21:48	TCT	Mt. Juliet, TN
Mercury by Method 7470A	WG1247931	1	03/11/19 11:07	03/11/19 19:14	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1247700	1	03/12/19 10:57	03/13/19 11:09	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1247712	1	03/12/19 13:22	03/14/19 18:48	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	1	03/12/19 10:50	03/14/19 23:11	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	1	03/12/19 10:50	03/15/19 11:26	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247729	1	03/12/19 13:19	03/14/19 23:18	RDS	Mt. Juliet, TN

1
Cp

2
Tc

3
Ss

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Cn

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Sr

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Qc

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Gl

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Al

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Sc

CHARLIE CREEK MS L1077065-02 GW

Collected by
JW/CD Collected date/time
03/07/19 09:10 Received date/time
03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1249381	1	03/14/19 15:25	03/14/19 15:25	JER	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1249101	1	03/14/19 17:21	03/14/19 17:21	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1248500	1	03/12/19 18:24	03/12/19 18:24	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1247928	1	03/11/19 11:02	03/11/19 21:50	TCT	Mt. Juliet, TN
Mercury by Method 7470A	WG1247931	1	03/11/19 11:07	03/11/19 19:33	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1247700	1	03/12/19 10:57	03/13/19 11:12	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1247712	1	03/12/19 13:22	03/14/19 18:51	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	1	03/12/19 10:50	03/14/19 23:16	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	1	03/12/19 10:50	03/15/19 11:30	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247729	1	03/12/19 13:19	03/14/19 23:32	LAT	Mt. Juliet, TN

CANE CREEK US L1077065-03 GW

Collected by
JW/CD Collected date/time
03/07/19 10:00 Received date/time
03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1249381	1	03/14/19 15:26	03/14/19 15:26	JER	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1249101	1	03/14/19 17:23	03/14/19 17:23	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1248500	1	03/12/19 18:42	03/12/19 18:42	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1247928	1	03/11/19 11:02	03/11/19 21:53	TCT	Mt. Juliet, TN
Mercury by Method 7470A	WG1247931	1	03/11/19 11:07	03/11/19 19:36	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1247700	1	03/12/19 10:57	03/13/19 11:15	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1247712	1	03/12/19 13:22	03/14/19 18:53	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	1	03/12/19 10:50	03/14/19 23:20	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	1	03/12/19 10:50	03/15/19 11:34	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247729	1	03/12/19 13:19	03/14/19 23:37	LAT	Mt. Juliet, TN

CANE CREEK MS L1077065-04 GW

Collected by
JW/CD Collected date/time
03/07/19 09:00 Received date/time
03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1249381	1	03/14/19 15:26	03/14/19 15:26	JER	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1249101	1	03/14/19 17:24	03/14/19 17:24	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1248500	1	03/12/19 19:00	03/12/19 19:00	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1247928	1	03/11/19 11:02	03/11/19 21:55	TCT	Mt. Juliet, TN
Mercury by Method 7470A	WG1247931	1	03/11/19 11:07	03/11/19 19:38	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1247700	1	03/12/19 10:57	03/13/19 11:18	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1247712	1	03/12/19 13:22	03/14/19 18:56	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	1	03/12/19 10:50	03/14/19 23:25	LAT	Mt. Juliet, TN

SAMPLE SUMMARY



CANE CREEK MS L1077065-04 GW

Collected by JW/CD Collected date/time 03/07/19 09:00 Received date/time 03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020A	WG1247703	1	03/12/19 10:50	03/15/19 11:37	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247729	1	03/12/19 13:19	03/14/19 23:41	LAT	Mt. Juliet, TN

1
Cp

2
Tc

3
Ss

4
Cn

5
Sr

6
Qc

7
Gl

8
Al

9
Sc

CANE CREEK DS-1 L1077065-05 GW

Collected by JW/CD Collected date/time 03/07/19 08:30 Received date/time 03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1249381	1	03/14/19 15:27	03/14/19 15:27	JER	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1249101	1	03/14/19 17:26	03/14/19 17:26	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1248500	1	03/12/19 19:17	03/12/19 19:17	ELN	Mt. Juliet, TN
Mercury by Method 7470A	WG1247928	1	03/11/19 11:02	03/11/19 22:03	TCT	Mt. Juliet, TN
Mercury by Method 7470A	WG1247931	1	03/11/19 11:07	03/11/19 19:41	TCT	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1247700	1	03/12/19 10:57	03/13/19 11:20	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1247712	1	03/12/19 13:22	03/14/19 19:04	CCE	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	1	03/12/19 10:50	03/14/19 23:30	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	1	03/12/19 10:50	03/15/19 11:41	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247729	1	03/12/19 13:19	03/14/19 23:46	LAT	Mt. Juliet, TN

CHARLIE CREEK US L1077065-06 Solid

Collected by JW/CD Collected date/time 03/07/19 10:10 Received date/time 03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1248113	1	03/13/19 14:45	03/13/19 17:12	ELN	Mt. Juliet, TN
Mercury by Method 7471B	WG1248358	1	03/11/19 18:15	03/12/19 11:36	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1248292	1	03/12/19 05:45	03/12/19 19:24	TRB	Mt. Juliet, TN

CHARLIE CREEK MS L1077065-07 Solid

Collected by JW/CD Collected date/time 03/07/19 09:10 Received date/time 03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1248113	1	03/13/19 14:45	03/13/19 17:44	ELN	Mt. Juliet, TN
Mercury by Method 7471B	WG1248358	1	03/11/19 18:15	03/12/19 11:39	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1248292	1	03/12/19 05:45	03/12/19 20:01	TRB	Mt. Juliet, TN

CANE CREEK US L1077065-08 Solid

Collected by JW/CD Collected date/time 03/07/19 10:00 Received date/time 03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1248113	1	03/13/19 14:45	03/13/19 18:00	ELN	Mt. Juliet, TN
Mercury by Method 7471B	WG1248358	1	03/11/19 18:15	03/12/19 11:42	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1248292	1	03/12/19 05:45	03/12/19 20:04	TRB	Mt. Juliet, TN

CANE CREEK MS L1077065-09 Solid

Collected by JW/CD Collected date/time 03/07/19 09:00 Received date/time 03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1248113	1	03/13/19 14:45	03/13/19 18:16	ELN	Mt. Juliet, TN
Mercury by Method 7471B	WG1248358	1	03/11/19 18:15	03/12/19 11:44	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1248292	1	03/12/19 05:45	03/12/19 20:06	TRB	Mt. Juliet, TN

SAMPLE SUMMARY



CANE CREEK DS-1 L1077065-10 Solid

Collected by JW/CD Collected date/time 03/07/19 08:30 Received date/time 03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1248113	1	03/13/19 14:45	03/13/19 18:32	ELN	Mt. Juliet, TN
Mercury by Method 7471B	WG1248358	1	03/11/19 18:15	03/12/19 11:47	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1248292	1	03/12/19 05:45	03/12/19 20:09	TRB	Mt. Juliet, TN

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



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

- ¹ Cp
- ² Tc
- ³ Ss
- ⁴ Cn
- ⁵ Sr
- ⁶ Qc
- ⁷ Gl
- ⁸ Al
- ⁹ Sc



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	ND		30.0	1	03/14/2019 15:23	WG1249381

1 Cp

2 Tc

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/14/2019 17:19	WG1249101

3 Ss

4 Cn

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/13/2019 00:15	WG1247922
Chloride	5.10		1.00	1	03/13/2019 00:15	WG1247922
Fluoride	ND		0.100	1	03/13/2019 00:15	WG1247922

5 Sr

6 Qc

7 Gl

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/11/2019 21:48	WG1247928
Mercury,Dissolved	ND		0.000200	1	03/11/2019 19:14	WG1247931

8 Al

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/14/2019 18:48	WG1247712
Boron,Dissolved	ND		0.200	1	03/13/2019 11:09	WG1247700

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	0.248		0.100	1	03/14/2019 23:18	WG1247729
Aluminum,Dissolved	ND		0.100	1	03/15/2019 11:26	WG1247703
Antimony	ND	J4	0.00200	1	03/14/2019 23:18	WG1247729
Antimony,Dissolved	ND		0.00200	1	03/14/2019 23:11	WG1247703
Arsenic	ND		0.00200	1	03/14/2019 23:18	WG1247729
Arsenic,Dissolved	ND		0.00200	1	03/15/2019 11:26	WG1247703
Barium	0.0308		0.00500	1	03/14/2019 23:18	WG1247729
Barium,Dissolved	0.0297		0.00500	1	03/15/2019 11:26	WG1247703
Beryllium	ND		0.00200	1	03/14/2019 23:18	WG1247729
Beryllium,Dissolved	ND		0.00200	1	03/15/2019 11:26	WG1247703
Cadmium	ND		0.00100	1	03/14/2019 23:18	WG1247729
Cadmium,Dissolved	ND		0.00100	1	03/15/2019 11:26	WG1247703
Calcium	8.88		1.00	1	03/14/2019 23:18	WG1247729
Calcium,Dissolved	9.26		1.00	1	03/15/2019 11:26	WG1247703
Chromium	ND		0.00200	1	03/14/2019 23:18	WG1247729
Chromium,Dissolved	ND		0.00200	1	03/15/2019 11:26	WG1247703
Cobalt	ND		0.00200	1	03/14/2019 23:18	WG1247729
Cobalt,Dissolved	ND		0.00200	1	03/15/2019 11:26	WG1247703
Copper	ND		0.00500	1	03/14/2019 23:18	WG1247729
Copper,Dissolved	ND		0.00500	1	03/15/2019 11:26	WG1247703
Iron	0.385		0.100	1	03/14/2019 23:18	WG1247729
Iron,Dissolved	0.160		0.100	1	03/15/2019 11:26	WG1247703
Lead	ND		0.00200	1	03/14/2019 23:18	WG1247729
Lead,Dissolved	ND		0.00200	1	03/15/2019 11:26	WG1247703



Collected date/time: 03/07/19 10:10

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Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	1.98		1.00	1	03/14/2019 23:18	WG1247729
Magnesium,Dissolved	2.01		1.00	1	03/15/2019 11:26	WG1247703
Manganese	0.103		0.00500	1	03/14/2019 23:18	WG1247729
Manganese,Dissolved	0.113		0.00500	1	03/15/2019 11:26	WG1247703
Nickel	ND		0.00200	1	03/14/2019 23:18	WG1247729
Nickel,Dissolved	0.00237	B	0.00200	1	03/15/2019 11:26	WG1247703
Potassium	ND		1.00	1	03/14/2019 23:18	WG1247729
Potassium,Dissolved	ND		1.00	1	03/15/2019 11:26	WG1247703
Selenium	ND		0.00200	1	03/14/2019 23:18	WG1247729
Selenium,Dissolved	ND		0.00200	1	03/15/2019 11:26	WG1247703
Silver	ND		0.00200	1	03/14/2019 23:18	WG1247729
Silver,Dissolved	ND		0.00200	1	03/15/2019 11:26	WG1247703
Sodium	4.53		1.00	1	03/14/2019 23:18	WG1247729
Sodium,Dissolved	4.47		1.00	1	03/14/2019 23:11	WG1247703
Thallium	ND		0.00200	1	03/14/2019 23:18	WG1247729
Thallium,Dissolved	ND		0.00200	1	03/15/2019 11:26	WG1247703
Vanadium	ND		0.00500	1	03/14/2019 23:18	WG1247729
Vanadium,Dissolved	ND		0.00500	1	03/15/2019 11:26	WG1247703
Zinc	ND		0.0250	1	03/14/2019 23:18	WG1247729
Zinc,Dissolved	ND		0.0250	1	03/15/2019 11:26	WG1247703

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	39.4	B	30.0	1	03/14/2019 15:25	WG1249381

1 Cp

2 Tc

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/14/2019 17:21	WG1249101

3 Ss

4 Cn

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/12/2019 18:24	WG1248500
Chloride	8.92		1.00	1	03/12/2019 18:24	WG1248500
Fluoride	ND		0.100	1	03/12/2019 18:24	WG1248500

5 Sr

6 Qc

7 Gl

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/11/2019 21:50	WG1247928
Mercury,Dissolved	ND		0.000200	1	03/11/2019 19:33	WG1247931

8 Al

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/14/2019 18:51	WG1247712
Boron,Dissolved	ND		0.200	1	03/13/2019 11:12	WG1247700

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	0.243		0.100	1	03/14/2019 23:32	WG1247729
Aluminum,Dissolved	ND		0.100	1	03/15/2019 11:30	WG1247703
Antimony	ND	J4	0.00200	1	03/14/2019 23:32	WG1247729
Antimony,Dissolved	ND		0.00200	1	03/14/2019 23:16	WG1247703
Arsenic	ND		0.00200	1	03/14/2019 23:32	WG1247729
Arsenic,Dissolved	ND		0.00200	1	03/15/2019 11:30	WG1247703
Barium	0.0345		0.00500	1	03/14/2019 23:32	WG1247729
Barium,Dissolved	0.0330		0.00500	1	03/15/2019 11:30	WG1247703
Beryllium	ND		0.00200	1	03/14/2019 23:32	WG1247729
Beryllium,Dissolved	ND		0.00200	1	03/15/2019 11:30	WG1247703
Cadmium	ND		0.00100	1	03/14/2019 23:32	WG1247729
Cadmium,Dissolved	ND		0.00100	1	03/15/2019 11:30	WG1247703
Calcium	12.0		1.00	1	03/14/2019 23:32	WG1247729
Calcium,Dissolved	12.6		1.00	1	03/15/2019 11:30	WG1247703
Chromium	ND		0.00200	1	03/14/2019 23:32	WG1247729
Chromium,Dissolved	ND		0.00200	1	03/15/2019 11:30	WG1247703
Cobalt	ND		0.00200	1	03/14/2019 23:32	WG1247729
Cobalt,Dissolved	ND		0.00200	1	03/15/2019 11:30	WG1247703
Copper	ND		0.00500	1	03/14/2019 23:32	WG1247729
Copper,Dissolved	ND		0.00500	1	03/15/2019 11:30	WG1247703
Iron	0.457		0.100	1	03/14/2019 23:32	WG1247729
Iron,Dissolved	0.132	B	0.100	1	03/15/2019 11:30	WG1247703
Lead	ND		0.00200	1	03/14/2019 23:32	WG1247729
Lead,Dissolved	ND		0.00200	1	03/15/2019 11:30	WG1247703



Collected date/time: 03/07/19 09:10

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Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	2.67		1.00	1	03/14/2019 23:32	WG1247729
Magnesium,Dissolved	2.77		1.00	1	03/15/2019 11:30	WG1247703
Manganese	0.185		0.00500	1	03/14/2019 23:32	WG1247729
Manganese,Dissolved	0.192		0.00500	1	03/15/2019 11:30	WG1247703
Nickel	ND		0.00200	1	03/14/2019 23:32	WG1247729
Nickel,Dissolved	ND		0.00200	1	03/15/2019 11:30	WG1247703
Potassium	1.23		1.00	1	03/14/2019 23:32	WG1247729
Potassium,Dissolved	1.25		1.00	1	03/15/2019 11:30	WG1247703
Selenium	ND		0.00200	1	03/14/2019 23:32	WG1247729
Selenium,Dissolved	ND		0.00200	1	03/15/2019 11:30	WG1247703
Silver	ND		0.00200	1	03/14/2019 23:32	WG1247729
Silver,Dissolved	ND		0.00200	1	03/15/2019 11:30	WG1247703
Sodium	5.39		1.00	1	03/14/2019 23:32	WG1247729
Sodium,Dissolved	5.25		1.00	1	03/14/2019 23:16	WG1247703
Thallium	ND		0.00200	1	03/14/2019 23:32	WG1247729
Thallium,Dissolved	ND		0.00200	1	03/15/2019 11:30	WG1247703
Vanadium	ND		0.00500	1	03/14/2019 23:32	WG1247729
Vanadium,Dissolved	ND		0.00500	1	03/15/2019 11:30	WG1247703
Zinc	ND		0.0250	1	03/14/2019 23:32	WG1247729
Zinc,Dissolved	ND		0.0250	1	03/15/2019 11:30	WG1247703

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	50.9	B	30.0	1	03/14/2019 15:26	WG1249381

1 Cp

2 Tc

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/14/2019 17:23	WG1249101

3 Ss

4 Cn

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/12/2019 18:42	WG1248500
Chloride	7.30		1.00	1	03/12/2019 18:42	WG1248500
Fluoride	ND		0.100	1	03/12/2019 18:42	WG1248500

5 Sr

6 Qc

7 Gl

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/11/2019 21:53	WG1247928
Mercury,Dissolved	ND		0.000200	1	03/11/2019 19:36	WG1247931

8 Al

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/14/2019 18:53	WG1247712
Boron,Dissolved	ND		0.200	1	03/13/2019 11:15	WG1247700

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	0.213		0.100	1	03/14/2019 23:37	WG1247729
Aluminum,Dissolved	ND		0.100	1	03/15/2019 11:34	WG1247703
Antimony	ND	J4	0.00200	1	03/14/2019 23:37	WG1247729
Antimony,Dissolved	ND		0.00200	1	03/14/2019 23:20	WG1247703
Arsenic	ND		0.00200	1	03/14/2019 23:37	WG1247729
Arsenic,Dissolved	ND		0.00200	1	03/15/2019 11:34	WG1247703
Barium	0.0355		0.00500	1	03/14/2019 23:37	WG1247729
Barium,Dissolved	0.0365		0.00500	1	03/15/2019 11:34	WG1247703
Beryllium	ND		0.00200	1	03/14/2019 23:37	WG1247729
Beryllium,Dissolved	ND		0.00200	1	03/15/2019 11:34	WG1247703
Cadmium	ND		0.00100	1	03/14/2019 23:37	WG1247729
Cadmium,Dissolved	ND		0.00100	1	03/15/2019 11:34	WG1247703
Calcium	13.8		1.00	1	03/14/2019 23:37	WG1247729
Calcium,Dissolved	14.4		1.00	1	03/15/2019 11:34	WG1247703
Chromium	ND		0.00200	1	03/14/2019 23:37	WG1247729
Chromium,Dissolved	0.00232	B	0.00200	1	03/15/2019 11:34	WG1247703
Cobalt	0.00241		0.00200	1	03/14/2019 23:37	WG1247729
Cobalt,Dissolved	0.00230		0.00200	1	03/15/2019 11:34	WG1247703
Copper	ND		0.00500	1	03/14/2019 23:37	WG1247729
Copper,Dissolved	0.00662	B	0.00500	1	03/15/2019 11:34	WG1247703
Iron	1.09		0.100	1	03/14/2019 23:37	WG1247729
Iron,Dissolved	0.129	B	0.100	1	03/15/2019 11:34	WG1247703
Lead	ND		0.00200	1	03/14/2019 23:37	WG1247729
Lead,Dissolved	ND		0.00200	1	03/15/2019 11:34	WG1247703



Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	4.29		1.00	1	03/14/2019 23:37	WG1247729
Magnesium,Dissolved	4.51		1.00	1	03/15/2019 11:34	WG1247703
Manganese	0.530		0.00500	1	03/14/2019 23:37	WG1247729
Manganese,Dissolved	0.553		0.00500	1	03/15/2019 11:34	WG1247703
Nickel	0.00317		0.00200	1	03/14/2019 23:37	WG1247729
Nickel,Dissolved	0.00419	B	0.00200	1	03/15/2019 11:34	WG1247703
Potassium	1.48		1.00	1	03/14/2019 23:37	WG1247729
Potassium,Dissolved	1.51		1.00	1	03/15/2019 11:34	WG1247703
Selenium	ND		0.00200	1	03/14/2019 23:37	WG1247729
Selenium,Dissolved	ND		0.00200	1	03/15/2019 11:34	WG1247703
Silver	ND		0.00200	1	03/14/2019 23:37	WG1247729
Silver,Dissolved	ND		0.00200	1	03/15/2019 11:34	WG1247703
Sodium	6.14		1.00	1	03/14/2019 23:37	WG1247729
Sodium,Dissolved	5.95		1.00	1	03/14/2019 23:20	WG1247703
Thallium	ND		0.00200	1	03/14/2019 23:37	WG1247729
Thallium,Dissolved	ND		0.00200	1	03/15/2019 11:34	WG1247703
Vanadium	ND		0.00500	1	03/14/2019 23:37	WG1247729
Vanadium,Dissolved	ND		0.00500	1	03/15/2019 11:34	WG1247703
Zinc	ND		0.0250	1	03/14/2019 23:37	WG1247729
Zinc,Dissolved	ND		0.0250	1	03/15/2019 11:34	WG1247703

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	50.1	B	30.0	1	03/14/2019 15:26	WG1249381

1 Cp

2 Tc

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/14/2019 17:24	WG1249101

3 Ss

4 Cn

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/12/2019 19:00	WG1248500
Chloride	7.12		1.00	1	03/12/2019 19:00	WG1248500
Fluoride	ND		0.100	1	03/12/2019 19:00	WG1248500

5 Sr

6 Qc

7 Gl

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/11/2019 21:55	WG1247928
Mercury,Dissolved	ND		0.000200	1	03/11/2019 19:38	WG1247931

8 Al

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/14/2019 18:56	WG1247712
Boron,Dissolved	ND		0.200	1	03/13/2019 11:18	WG1247700

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	0.171		0.100	1	03/14/2019 23:41	WG1247729
Aluminum,Dissolved	ND		0.100	1	03/15/2019 11:37	WG1247703
Antimony	ND	J4	0.00200	1	03/14/2019 23:41	WG1247729
Antimony,Dissolved	ND		0.00200	1	03/14/2019 23:25	WG1247703
Arsenic	ND		0.00200	1	03/14/2019 23:41	WG1247729
Arsenic,Dissolved	ND		0.00200	1	03/15/2019 11:37	WG1247703
Barium	0.0351		0.00500	1	03/14/2019 23:41	WG1247729
Barium,Dissolved	0.0354		0.00500	1	03/15/2019 11:37	WG1247703
Beryllium	ND		0.00200	1	03/14/2019 23:41	WG1247729
Beryllium,Dissolved	ND		0.00200	1	03/15/2019 11:37	WG1247703
Cadmium	ND		0.00100	1	03/14/2019 23:41	WG1247729
Cadmium,Dissolved	ND		0.00100	1	03/15/2019 11:37	WG1247703
Calcium	13.9		1.00	1	03/14/2019 23:41	WG1247729
Calcium,Dissolved	14.6		1.00	1	03/15/2019 11:37	WG1247703
Chromium	ND		0.00200	1	03/14/2019 23:41	WG1247729
Chromium,Dissolved	0.00292	B	0.00200	1	03/15/2019 11:37	WG1247703
Cobalt	ND		0.00200	1	03/14/2019 23:41	WG1247729
Cobalt,Dissolved	ND		0.00200	1	03/15/2019 11:37	WG1247703
Copper	ND		0.00500	1	03/14/2019 23:41	WG1247729
Copper,Dissolved	ND		0.00500	1	03/15/2019 11:37	WG1247703
Iron	0.891		0.100	1	03/14/2019 23:41	WG1247729
Iron,Dissolved	0.174		0.100	1	03/15/2019 11:37	WG1247703
Lead	0.00388		0.00200	1	03/14/2019 23:41	WG1247729
Lead,Dissolved	ND		0.00200	1	03/15/2019 11:37	WG1247703



Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	4.03		1.00	1	03/14/2019 23:41	WG1247729
Magnesium,Dissolved	4.26		1.00	1	03/15/2019 11:37	WG1247703
Manganese	0.464		0.00500	1	03/14/2019 23:41	WG1247729
Manganese,Dissolved	0.487		0.00500	1	03/15/2019 11:37	WG1247703
Nickel	0.00311		0.00200	1	03/14/2019 23:41	WG1247729
Nickel,Dissolved	0.00402	B	0.00200	1	03/15/2019 11:37	WG1247703
Potassium	1.45		1.00	1	03/14/2019 23:41	WG1247729
Potassium,Dissolved	1.49		1.00	1	03/15/2019 11:37	WG1247703
Selenium	ND		0.00200	1	03/14/2019 23:41	WG1247729
Selenium,Dissolved	ND		0.00200	1	03/15/2019 11:37	WG1247703
Silver	ND		0.00200	1	03/14/2019 23:41	WG1247729
Silver,Dissolved	ND		0.00200	1	03/15/2019 11:37	WG1247703
Sodium	5.81		1.00	1	03/14/2019 23:41	WG1247729
Sodium,Dissolved	5.71		1.00	1	03/14/2019 23:25	WG1247703
Thallium	ND		0.00200	1	03/14/2019 23:41	WG1247729
Thallium,Dissolved	ND		0.00200	1	03/15/2019 11:37	WG1247703
Vanadium	ND		0.00500	1	03/14/2019 23:41	WG1247729
Vanadium,Dissolved	ND		0.00500	1	03/15/2019 11:37	WG1247703
Zinc	ND		0.0250	1	03/14/2019 23:41	WG1247729
Zinc,Dissolved	ND		0.0250	1	03/15/2019 11:37	WG1247703

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	49.7	<u>B</u>	30.0	1	03/14/2019 15:27	WG1249381

1 Cp

2 Tc

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	03/14/2019 17:26	WG1249101

3 Ss

4 Cn

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	03/12/2019 19:17	WG1248500
Chloride	8.98		1.00	1	03/12/2019 19:17	WG1248500
Fluoride	ND		0.100	1	03/12/2019 19:17	WG1248500

5 Sr

6 Qc

7 Gl

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/11/2019 22:03	WG1247928
Mercury,Dissolved	ND		0.000200	1	03/11/2019 19:41	WG1247931

8 Al

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/14/2019 19:04	WG1247712
Boron,Dissolved	ND		0.200	1	03/13/2019 11:20	WG1247700

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	0.196		0.100	1	03/14/2019 23:46	WG1247729
Aluminum,Dissolved	ND		0.100	1	03/15/2019 11:41	WG1247703
Antimony	ND	<u>J4</u>	0.00200	1	03/14/2019 23:46	WG1247729
Antimony,Dissolved	ND		0.00200	1	03/14/2019 23:30	WG1247703
Arsenic	ND		0.00200	1	03/14/2019 23:46	WG1247729
Arsenic,Dissolved	ND		0.00200	1	03/15/2019 11:41	WG1247703
Barium	0.0367		0.00500	1	03/14/2019 23:46	WG1247729
Barium,Dissolved	0.0375		0.00500	1	03/15/2019 11:41	WG1247703
Beryllium	ND		0.00200	1	03/14/2019 23:46	WG1247729
Beryllium,Dissolved	ND		0.00200	1	03/15/2019 11:41	WG1247703
Cadmium	ND		0.00100	1	03/14/2019 23:46	WG1247729
Cadmium,Dissolved	ND		0.00100	1	03/15/2019 11:41	WG1247703
Calcium	14.1		1.00	1	03/14/2019 23:46	WG1247729
Calcium,Dissolved	14.5		1.00	1	03/15/2019 11:41	WG1247703
Chromium	ND		0.00200	1	03/14/2019 23:46	WG1247729
Chromium,Dissolved	ND		0.00200	1	03/15/2019 11:41	WG1247703
Cobalt	ND		0.00200	1	03/14/2019 23:46	WG1247729
Cobalt,Dissolved	ND		0.00200	1	03/15/2019 11:41	WG1247703
Copper	ND		0.00500	1	03/14/2019 23:46	WG1247729
Copper,Dissolved	ND		0.00500	1	03/15/2019 11:41	WG1247703
Iron	0.862		0.100	1	03/14/2019 23:46	WG1247729
Iron,Dissolved	0.164		0.100	1	03/15/2019 11:41	WG1247703
Lead	ND		0.00200	1	03/14/2019 23:46	WG1247729
Lead,Dissolved	ND		0.00200	1	03/15/2019 11:41	WG1247703



Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	3.94		1.00	1	03/14/2019 23:46	WG1247729
Magnesium,Dissolved	4.04		1.00	1	03/15/2019 11:41	WG1247703
Manganese	0.447		0.00500	1	03/14/2019 23:46	WG1247729
Manganese,Dissolved	0.459		0.00500	1	03/15/2019 11:41	WG1247703
Nickel	0.00251		0.00200	1	03/14/2019 23:46	WG1247729
Nickel,Dissolved	0.00288	<u>B</u>	0.00200	1	03/15/2019 11:41	WG1247703
Potassium	1.63		1.00	1	03/14/2019 23:46	WG1247729
Potassium,Dissolved	1.86		1.00	1	03/15/2019 11:41	WG1247703
Selenium	ND		0.00200	1	03/14/2019 23:46	WG1247729
Selenium,Dissolved	ND		0.00200	1	03/15/2019 11:41	WG1247703
Silver	ND		0.00200	1	03/14/2019 23:46	WG1247729
Silver,Dissolved	ND		0.00200	1	03/15/2019 11:41	WG1247703
Sodium	6.44		1.00	1	03/14/2019 23:46	WG1247729
Sodium,Dissolved	6.14		1.00	1	03/14/2019 23:30	WG1247703
Thallium	ND		0.00200	1	03/14/2019 23:46	WG1247729
Thallium,Dissolved	ND		0.00200	1	03/15/2019 11:41	WG1247703
Vanadium	ND		0.00500	1	03/14/2019 23:46	WG1247729
Vanadium,Dissolved	ND		0.00500	1	03/15/2019 11:41	WG1247703
Zinc	ND		0.0250	1	03/14/2019 23:46	WG1247729
Zinc,Dissolved	ND		0.0250	1	03/15/2019 11:41	WG1247703

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	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Bromide	ND		10.0	1	03/13/2019 17:12	WG1248113
Chloride	ND		10.0	1	03/13/2019 17:12	WG1248113
Fluoride	ND		1.00	1	03/13/2019 17:12	WG1248113

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

Mercury by Method 7471B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Mercury	ND		0.0200	1	03/12/2019 11:36	WG1248358

6 Qc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Aluminum	811	J5	10.0	1	03/12/2019 19:24	WG1248292
Antimony	ND		2.00	1	03/12/2019 19:24	WG1248292
Arsenic	ND		2.00	1	03/12/2019 19:24	WG1248292
Barium	6.13		0.500	1	03/12/2019 19:24	WG1248292
Beryllium	ND		0.200	1	03/12/2019 19:24	WG1248292
Boron	ND		10.0	1	03/12/2019 19:24	WG1248292
Cadmium	ND		0.500	1	03/12/2019 19:24	WG1248292
Calcium	160		100	1	03/12/2019 19:24	WG1248292
Chromium	2.61		1.00	1	03/12/2019 19:24	WG1248292
Cobalt	ND		1.00	1	03/12/2019 19:24	WG1248292
Copper	ND		2.00	1	03/12/2019 19:24	WG1248292
Iron	1890	J5	10.0	1	03/12/2019 19:24	WG1248292
Lead	1.43		0.500	1	03/12/2019 19:24	WG1248292
Magnesium	ND	O1	100	1	03/12/2019 19:24	WG1248292
Manganese	50.8		1.00	1	03/12/2019 19:24	WG1248292
Nickel	ND		2.00	1	03/12/2019 19:24	WG1248292
Potassium	108		100	1	03/12/2019 19:24	WG1248292
Selenium	ND		2.00	1	03/12/2019 19:24	WG1248292
Silver	ND		1.00	1	03/12/2019 19:24	WG1248292
Sodium	ND		100	1	03/12/2019 19:24	WG1248292
Thallium	ND		2.00	1	03/12/2019 19:24	WG1248292
Vanadium	4.01	B	2.00	1	03/12/2019 19:24	WG1248292
Zinc	ND		5.00	1	03/12/2019 19:24	WG1248292

7 Gl

8 Al

9 Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Bromide	ND		10.0	1	03/13/2019 17:44	WG1248113
Chloride	30.8		10.0	1	03/13/2019 17:44	WG1248113
Fluoride	1.07		1.00	1	03/13/2019 17:44	WG1248113

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

Mercury by Method 7471B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Mercury	ND		0.0200	1	03/12/2019 11:39	WG1248358

6 Qc

7 Gl

8 Al

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Aluminum	1260		10.0	1	03/12/2019 20:01	WG1248292
Antimony	ND		2.00	1	03/12/2019 20:01	WG1248292
Arsenic	ND		2.00	1	03/12/2019 20:01	WG1248292
Barium	11.8		0.500	1	03/12/2019 20:01	WG1248292
Beryllium	ND		0.200	1	03/12/2019 20:01	WG1248292
Boron	ND		10.0	1	03/12/2019 20:01	WG1248292
Cadmium	ND		0.500	1	03/12/2019 20:01	WG1248292
Calcium	169		100	1	03/12/2019 20:01	WG1248292
Chromium	3.63		1.00	1	03/12/2019 20:01	WG1248292
Cobalt	1.16		1.00	1	03/12/2019 20:01	WG1248292
Copper	ND		2.00	1	03/12/2019 20:01	WG1248292
Iron	2820		10.0	1	03/12/2019 20:01	WG1248292
Lead	1.94		0.500	1	03/12/2019 20:01	WG1248292
Magnesium	104		100	1	03/12/2019 20:01	WG1248292
Manganese	102		1.00	1	03/12/2019 20:01	WG1248292
Nickel	ND		2.00	1	03/12/2019 20:01	WG1248292
Potassium	146		100	1	03/12/2019 20:01	WG1248292
Selenium	ND		2.00	1	03/12/2019 20:01	WG1248292
Silver	ND		1.00	1	03/12/2019 20:01	WG1248292
Sodium	ND		100	1	03/12/2019 20:01	WG1248292
Thallium	ND		2.00	1	03/12/2019 20:01	WG1248292
Vanadium	5.06	B	2.00	1	03/12/2019 20:01	WG1248292
Zinc	7.16		5.00	1	03/12/2019 20:01	WG1248292



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Bromide	ND		10.0	1	03/13/2019 18:00	WG1248113
Chloride	ND		10.0	1	03/13/2019 18:00	WG1248113
Fluoride	ND		1.00	1	03/13/2019 18:00	WG1248113

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

Mercury by Method 7471B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Mercury	ND		0.0200	1	03/12/2019 11:42	WG1248358

6 Qc

7 Gl

8 Al

9 Sc

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Aluminum	644		10.0	1	03/12/2019 20:04	WG1248292
Antimony	ND		2.00	1	03/12/2019 20:04	WG1248292
Arsenic	ND		2.00	1	03/12/2019 20:04	WG1248292
Barium	7.45		0.500	1	03/12/2019 20:04	WG1248292
Beryllium	ND		0.200	1	03/12/2019 20:04	WG1248292
Boron	ND		10.0	1	03/12/2019 20:04	WG1248292
Cadmium	ND		0.500	1	03/12/2019 20:04	WG1248292
Calcium	450		100	1	03/12/2019 20:04	WG1248292
Chromium	6.19		1.00	1	03/12/2019 20:04	WG1248292
Cobalt	ND		1.00	1	03/12/2019 20:04	WG1248292
Copper	ND		2.00	1	03/12/2019 20:04	WG1248292
Iron	2740		10.0	1	03/12/2019 20:04	WG1248292
Lead	7.02		0.500	1	03/12/2019 20:04	WG1248292
Magnesium	ND		100	1	03/12/2019 20:04	WG1248292
Manganese	39.1		1.00	1	03/12/2019 20:04	WG1248292
Nickel	ND		2.00	1	03/12/2019 20:04	WG1248292
Potassium	ND		100	1	03/12/2019 20:04	WG1248292
Selenium	ND		2.00	1	03/12/2019 20:04	WG1248292
Silver	ND		1.00	1	03/12/2019 20:04	WG1248292
Sodium	ND		100	1	03/12/2019 20:04	WG1248292
Thallium	ND		2.00	1	03/12/2019 20:04	WG1248292
Vanadium	5.09	B	2.00	1	03/12/2019 20:04	WG1248292
Zinc	9.01		5.00	1	03/12/2019 20:04	WG1248292



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Bromide	ND		10.0	1	03/13/2019 18:16	WG1248113
Chloride	ND		10.0	1	03/13/2019 18:16	WG1248113
Fluoride	ND		1.00	1	03/13/2019 18:16	WG1248113

1 Cp

2 Tc

3 Ss

Mercury by Method 7471B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Mercury	ND		0.0200	1	03/12/2019 11:44	WG1248358

4 Cn

5 Sr

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Aluminum	1160		10.0	1	03/12/2019 20:06	WG1248292
Antimony	ND		2.00	1	03/12/2019 20:06	WG1248292
Arsenic	ND		2.00	1	03/12/2019 20:06	WG1248292
Barium	8.79		0.500	1	03/12/2019 20:06	WG1248292
Beryllium	ND		0.200	1	03/12/2019 20:06	WG1248292
Boron	ND		10.0	1	03/12/2019 20:06	WG1248292
Cadmium	ND		0.500	1	03/12/2019 20:06	WG1248292
Calcium	164		100	1	03/12/2019 20:06	WG1248292
Chromium	4.27		1.00	1	03/12/2019 20:06	WG1248292
Cobalt	1.21		1.00	1	03/12/2019 20:06	WG1248292
Copper	ND		2.00	1	03/12/2019 20:06	WG1248292
Iron	3220		10.0	1	03/12/2019 20:06	WG1248292
Lead	2.14		0.500	1	03/12/2019 20:06	WG1248292
Magnesium	112		100	1	03/12/2019 20:06	WG1248292
Manganese	106		1.00	1	03/12/2019 20:06	WG1248292
Nickel	ND		2.00	1	03/12/2019 20:06	WG1248292
Potassium	166		100	1	03/12/2019 20:06	WG1248292
Selenium	ND		2.00	1	03/12/2019 20:06	WG1248292
Silver	ND		1.00	1	03/12/2019 20:06	WG1248292
Sodium	ND		100	1	03/12/2019 20:06	WG1248292
Thallium	ND		2.00	1	03/12/2019 20:06	WG1248292
Vanadium	5.93		2.00	1	03/12/2019 20:06	WG1248292
Zinc	9.38		5.00	1	03/12/2019 20:06	WG1248292

6 Qc

7 Gl

8 Al

9 Sc



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Bromide	ND		10.0	1	03/13/2019 18:32	WG1248113
Chloride	11.7		10.0	1	03/13/2019 18:32	WG1248113
Fluoride	ND		1.00	1	03/13/2019 18:32	WG1248113

1 Cp

2 Tc

3 Ss

Mercury by Method 7471B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Mercury	ND		0.0200	1	03/12/2019 11:47	WG1248358

4 Cn

5 Sr

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
Aluminum	734		10.0	1	03/12/2019 20:09	WG1248292
Antimony	ND		2.00	1	03/12/2019 20:09	WG1248292
Arsenic	ND		2.00	1	03/12/2019 20:09	WG1248292
Barium	6.40		0.500	1	03/12/2019 20:09	WG1248292
Beryllium	ND		0.200	1	03/12/2019 20:09	WG1248292
Boron	ND		10.0	1	03/12/2019 20:09	WG1248292
Cadmium	ND		0.500	1	03/12/2019 20:09	WG1248292
Calcium	ND		100	1	03/12/2019 20:09	WG1248292
Chromium	3.22		1.00	1	03/12/2019 20:09	WG1248292
Cobalt	ND		1.00	1	03/12/2019 20:09	WG1248292
Copper	ND		2.00	1	03/12/2019 20:09	WG1248292
Iron	2240		10.0	1	03/12/2019 20:09	WG1248292
Lead	1.68		0.500	1	03/12/2019 20:09	WG1248292
Magnesium	ND		100	1	03/12/2019 20:09	WG1248292
Manganese	81.7		1.00	1	03/12/2019 20:09	WG1248292
Nickel	ND		2.00	1	03/12/2019 20:09	WG1248292
Potassium	105		100	1	03/12/2019 20:09	WG1248292
Selenium	ND		2.00	1	03/12/2019 20:09	WG1248292
Silver	ND		1.00	1	03/12/2019 20:09	WG1248292
Sodium	ND		100	1	03/12/2019 20:09	WG1248292
Thallium	ND		2.00	1	03/12/2019 20:09	WG1248292
Vanadium	3.53	<u>B</u>	2.00	1	03/12/2019 20:09	WG1248292
Zinc	6.21		5.00	1	03/12/2019 20:09	WG1248292

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3391702-1 03/14/19 15:20

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Hardness (colorimetric) as CaCO3	5.82	<u>J</u>	1.43	30.0

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1077065-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1077065-01 03/14/19 15:23 • (DUP) R3391702-3 03/14/19 15:24

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Hardness (colorimetric) as CaCO3	ND	28.6	1	4.29	<u>J</u>	20

L1077150-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1077150-08 03/14/19 15:44 • (DUP) R3391702-6 03/14/19 15:45

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Hardness (colorimetric) as CaCO3	14.0	13.9	1	0.717	<u>J</u>	20

Laboratory Control Sample (LCS)

(LCS) R3391702-2 03/14/19 15:20

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Hardness (colorimetric) as CaCO3	150	148	98.7	85.0-115	

L1077150-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077150-03 03/14/19 15:36 • (MS) R3391702-4 03/14/19 15:37 • (MSD) R3391702-5 03/14/19 15:40

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Hardness (colorimetric) as CaCO3	150	155	228	233	48.7	52.0	1	80.0-120	<u>E J6</u>	<u>E J6</u>	2.17	20



Method Blank (MB)

(MB) R3391749-1 03/14/19 16:35

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Ammonia Nitrogen	U		0.0317	0.100

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1077005-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1077005-02 03/14/19 16:38 • (DUP) R3391749-3 03/14/19 16:40

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Ammonia Nitrogen	0.637	0.627	1	1.58		10

L1077059-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1077059-01 03/14/19 17:04 • (DUP) R3391749-6 03/14/19 17:05

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Ammonia Nitrogen	0.662	0.663	1	0.151		10

Laboratory Control Sample (LCS)

(LCS) R3391749-2 03/14/19 16:37

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Ammonia Nitrogen	7.50	7.52	100	90.0-110	

L1077005-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077005-03 03/14/19 16:41 • (MS) R3391749-4 03/14/19 16:43 • (MSD) R3391749-5 03/14/19 16:45

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Ammonia Nitrogen	5.00	6.07	11.3	11.2	104	103	1	90.0-110	E	E	0.320	10

L1077059-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1077059-02 03/14/19 17:07 • (MS) R3391749-7 03/14/19 17:08

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Ammonia Nitrogen	5.00	0.809	5.95	103	1	90.0-110	



Method Blank (MB)

(MB) R3391126-1 03/12/19 11:56

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Bromide	U		0.0790	1.00
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1077013-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1077013-05 03/12/19 15:31 • (DUP) R3391126-3 03/12/19 15:46

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Bromide	U	0.000	1	0.000		15
Chloride	3.45	3.47	1	0.396		15
Fluoride	0.0943	0.0927	1	1.71	U	15

L1077013-16 Original Sample (OS) • Duplicate (DUP)

(OS) L1077013-16 03/12/19 20:01 • (DUP) R3391126-6 03/12/19 20:17

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Bromide	0.277	0.280	1	1.04	U	15
Chloride	11.9	12.0	1	0.587		15
Fluoride	0.289	0.289	1	0.138		15

Laboratory Control Sample (LCS)

(LCS) R3391126-2 03/12/19 12:12

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Bromide	40.0	40.9	102	80.0-120	
Chloride	40.0	40.6	102	80.0-120	
Fluoride	8.00	8.02	100	80.0-120	



L1077013-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077013-05 03/12/19 15:31 • (MS) R3391126-4 03/12/19 16:02 • (MSD) R3391126-5 03/12/19 16:18

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	46.6	46.7	93.3	93.5	1	80.0-120			0.191	15
Chloride	50.0	3.45	53.2	53.4	99.5	100	1	80.0-120			0.473	15
Fluoride	5.00	0.0943	5.13	5.16	101	101	1	80.0-120			0.587	15

L1077013-16 Original Sample (OS) • Matrix Spike (MS)

(OS) L1077013-16 03/12/19 20:01 • (MS) R3391126-7 03/12/19 21:04

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	0.277	46.7	92.8	1	80.0-120	
Chloride	50.0	11.9	61.9	100	1	80.0-120	
Fluoride	5.00	0.289	5.37	102	1	80.0-120	

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc



Method Blank (MB)

(MB) R3391020-1 03/12/19 09:58

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Bromide	U		0.0790	1.00
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100

Original Sample (OS) • Duplicate (DUP)

(OS) • (DUP) R3391020-3 03/12/19 15:02

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Bromide	0.000	0.000	1	0.000		15
Chloride	55.9	55.9	1	0.0817		15
Fluoride	0.138	0.138	1	1.30		15

L1077915-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1077915-01 03/12/19 20:29 • (DUP) R3391020-6 03/12/19 20:47

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Bromide	ND	0.000	1	0.000		15
Chloride	19.7	19.8	1	0.279		15
Fluoride	0.266	0.268	1	0.936		15

Laboratory Control Sample (LCS)

(LCS) R3391020-2 03/12/19 10:16

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Bromide	40.0	40.9	102	80.0-120	
Chloride	40.0	40.4	101	80.0-120	
Fluoride	8.00	8.27	103	80.0-120	

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) • (MS) R3391020-4 03/12/19 15:20 • (MSD) R3391020-5 03/12/19 15:38

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	48.4	48.1	48.1	96.7	96.3	1	80.0-120			0.454	15
Chloride	50.0	103	102	102	93.6	92.6	1	80.0-120	E	E	0.482	15
Fluoride	5.00	5.04	5.02	5.02	97.9	97.7	1	80.0-120			0.239	15

L1077915-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1077915-01 03/12/19 20:29 • (MS) R3391020-7 03/12/19 21:05

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	ND	47.0	94.0	1	80.0-120	
Chloride	50.0	19.7	67.9	96.4	1	80.0-120	
Fluoride	5.00	0.266	5.16	97.8	1	80.0-120	

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc



Method Blank (MB)

(MB) R3391415-1 03/13/19 15:59

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Bromide	U		0.133	10.0
Chloride	U		0.795	10.0
Fluoride	U		0.261	1.00

L1077065-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1077065-06 03/13/19 17:12 • (DUP) R3391415-3 03/13/19 17:28

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	6.73	1	4.25	U	15
Fluoride	ND	0.696	1	0.430	U	15

L1077354-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1077354-08 03/13/19 23:54 • (DUP) R3391415-6 03/14/19 00:10

Analyte	Original Result mg/kg	DUP Result mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	U	0.000	1	0.000		15
Chloride	54.0	53.2	1	1.61		15
Fluoride	0.836	0.721	1	14.8	U	15

Laboratory Control Sample (LCS)

(LCS) R3391415-2 03/13/19 16:14

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Bromide	200	211	105	80.0-120	
Chloride	200	217	109	80.0-120	
Fluoride	20.0	21.8	109	80.0-120	

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



L1077347-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077347-03 03/13/19 20:07 • (MS) R3391415-4 03/13/19 20:23 • (MSD) R3391415-5 03/13/19 20:39

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 %
Bromide	513	U	526	503	103	98.1	1	80.0-120			4.43	15
Chloride	513	14.4	542	521	103	98.7	1	80.0-120			4.03	15
Fluoride	51.3	1.53	36.5	35.1	68.3	65.5	1	80.0-120	<u>J6</u>	<u>J6</u>	3.95	15

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc



Method Blank (MB)

(MB) R3390619-1 03/11/19 20:54

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Mercury	U		0.0000490	0.000200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3390619-2 03/11/19 21:01 • (LCSD) R3390619-3 03/11/19 21:04

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Mercury	0.00300	0.00302	0.00300	101	100	80.0-120			0.542	20

L1076862-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1076862-03 03/11/19 21:06 • (MS) R3390619-4 03/11/19 21:09 • (MSD) R3390619-5 03/11/19 21:11

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Mercury	0.00300	ND	0.00297	0.00292	99.1	97.2	1	75.0-125			1.89	20

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3390616-1 03/11/19 19:07

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Mercury,Dissolved	U		0.0000490	0.000200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3390616-2 03/11/19 19:09 • (LCSD) R3390616-3 03/11/19 19:11

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Mercury,Dissolved	0.00300	0.00293	0.00289	97.7	96.5	80.0-120			1.28	20

L1077065-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077065-01 03/11/19 19:14 • (MS) R3390616-4 03/11/19 19:16 • (MSD) R3390616-5 03/11/19 19:19

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Mercury,Dissolved	0.00300	ND	0.00304	0.00304	101	101	1	75.0-125			0.161	20

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3390801-1 03/12/19 10:46

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Mercury	U		0.00280	0.0200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3390801-2 03/12/19 10:48 • (LCSD) R3390801-3 03/12/19 10:51

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Mercury	0.500	0.499	0.561	99.8	112	80.0-120			11.7	20

⁷ Gl

⁸ Al

L1077467-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077467-05 03/12/19 10:53 • (MS) R3390801-4 03/12/19 10:56 • (MSD) R3390801-5 03/12/19 11:06

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Mercury	0.500	0.145	0.690	0.741	109	119	1	75.0-125			7.23	20

⁹ Sc



Method Blank (MB)

(MB) R3391201-1 03/13/19 10:38

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Boron,Dissolved	U		0.0126	0.200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3391201-2 03/13/19 10:40 • (LCSD) R3391201-3 03/13/19 10:43

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Boron,Dissolved	1.00	0.977	0.962	97.7	96.2	80.0-120			1.57	20

L1077333-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077333-04 03/13/19 10:45 • (MS) R3391201-5 03/13/19 10:51 • (MSD) R3391201-6 03/13/19 10:53

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Boron,Dissolved	1.00	0.0301	1.00	1.00	97.1	97.4	1	75.0-125			0.367	20

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3391822-1 03/14/19 18:01

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0126	0.200

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

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

(LCS) R3391822-2 03/14/19 18:03 • (LCSD) R3391822-3 03/14/19 18:06

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 %
Boron	1.00	0.985	0.992	98.5	99.2	80.0-120			0.728	20

L1076830-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1076830-01 03/14/19 18:08 • (MS) R3391822-5 03/14/19 18:13 • (MSD) R3391822-6 03/14/19 18:16

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 %
Boron	1.00	ND	1.02	1.01	96.7	96.2	1	75.0-125			0.478	20

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3391007-1 03/12/19 19:17

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Aluminum	23.8		3.50	10.0
Antimony	U		0.750	2.00
Arsenic	U		0.460	2.00
Barium	0.290	U	0.170	0.500
Beryllium	U		0.0700	0.200
Boron	U		1.26	10.0
Cadmium	U		0.0700	0.500
Calcium	14.1	U	4.63	100
Chromium	U		0.140	1.00
Cobalt	U		0.230	1.00
Copper	U		0.530	2.00
Iron	22.3		1.41	10.0
Lead	U		0.190	0.500
Magnesium	3.85	U	1.11	100
Manganese	0.449	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	1.00
Sodium	22.0	U	9.85	100
Thallium	U		0.650	2.00
Vanadium	0.540	U	0.240	2.00
Zinc	U		0.590	5.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

(LCS) R3391007-2 03/12/19 19:19 • (LCSD) R3391007-3 03/12/19 19:22

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	1020	1030	102	103	80.0-120			0.407	20
Antimony	100	105	105	105	105	80.0-120			0.283	20
Arsenic	100	98.7	99.2	98.7	99.2	80.0-120			0.472	20
Barium	100	105	106	105	106	80.0-120			0.409	20
Beryllium	100	102	103	102	103	80.0-120			0.611	20
Boron	100	99.7	99.4	99.7	99.4	80.0-120			0.318	20
Cadmium	100	101	102	101	102	80.0-120			0.201	20
Calcium	1000	997	1000	99.7	100	80.0-120			0.681	20
Chromium	100	105	105	105	105	80.0-120			0.225	20
Cobalt	100	104	104	104	104	80.0-120			0.590	20



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

(LCS) R3391007-2 03/12/19 19:19 • (LCSD) R3391007-3 03/12/19 19:22

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Copper	100	101	101	101	101	80.0-120			0.0779	20
Iron	1000	977	984	97.7	98.4	80.0-120			0.697	20
Lead	100	101	102	101	102	80.0-120			0.900	20
Magnesium	1000	1020	1030	102	103	80.0-120			0.559	20
Manganese	100	103	103	103	103	80.0-120			0.0863	20
Nickel	100	103	104	103	104	80.0-120			0.677	20
Potassium	1000	954	960	95.4	96.0	80.0-120			0.672	20
Selenium	100	101	102	101	102	80.0-120			1.11	20
Silver	20.0	19.7	19.5	98.6	97.7	80.0-120			0.886	20
Sodium	1000	1050	1060	105	106	80.0-120			0.540	20
Thallium	100	97.8	99.1	97.8	99.1	80.0-120			1.32	20
Vanadium	100	99.9	101	99.9	101	80.0-120			0.643	20
Zinc	100	102	103	102	103	80.0-120			0.565	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1077065-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077065-06 03/12/19 19:24 • (MS) R3391007-6 03/12/19 19:32 • (MSD) R3391007-7 03/12/19 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 %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Aluminum	1000	811	2350	2110	154	130	1	75.0-125	<u>J5</u>	<u>J5</u>	10.7	20
Antimony	100	ND	103	98.5	103	98.5	1	75.0-125			4.91	20
Arsenic	100	ND	104	98.1	104	98.1	1	75.0-125			5.76	20
Barium	100	6.13	116	110	110	104	1	75.0-125			4.97	20
Beryllium	100	ND	106	101	105	101	1	75.0-125			4.47	20
Boron	100	ND	103	98.6	103	98.6	1	75.0-125			4.15	20
Cadmium	100	ND	105	100	105	100	1	75.0-125			4.73	20
Calcium	1000	160	1170	1100	101	94.2	1	75.0-125			6.24	20
Chromium	100	2.61	111	106	108	104	1	75.0-125			4.27	20
Cobalt	100	ND	109	104	109	103	1	75.0-125			4.86	20
Copper	100	ND	106	100	105	99.8	1	75.0-125			4.94	20
Iron	1000	1890	3840	3450	195	156	1	75.0-125	<u>J5</u>	<u>J5</u>	10.7	20
Lead	100	1.43	108	102	106	101	1	75.0-125			5.43	20
Magnesium	1000	ND	1150	1090	108	102	1	75.0-125			5.42	20
Manganese	100	50.8	169	150	118	99.1	1	75.0-125			12.1	20
Nickel	100	ND	109	104	109	103	1	75.0-125			5.13	20
Potassium	1000	108	1120	1070	101	96.0	1	75.0-125			4.61	20
Selenium	100	ND	106	99.6	106	99.6	1	75.0-125			6.02	20
Silver	20.0	ND	20.3	19.2	101	96.2	1	75.0-125			5.39	20
Sodium	1000	ND	1100	1050	107	102	1	75.0-125			4.57	20



L1077065-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077065-06 03/12/19 19:24 • (MS) R3391007-6 03/12/19 19:32 • (MSD) R3391007-7 03/12/19 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 %
Thallium	100	ND	103	97.2	103	97.2	1	75.0-125			5.69	20
Vanadium	100	4.01	108	104	104	99.8	1	75.0-125			4.35	20
Zinc	100	ND	111	106	107	101	1	75.0-125			5.12	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3391853-1 03/14/19 22:11

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Antimony,Dissolved	U		0.000754	0.00200
Sodium,Dissolved	U		0.110	1.00

1 Cp

2 Tc

3 Ss

4 Cn

Method Blank (MB)

(MB) R3391980-1 03/15/19 10:37

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Aluminum,Dissolved	0.00894	J	0.00515	0.100
Arsenic,Dissolved	U		0.000250	0.00200
Barium,Dissolved	0.000679	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	0.00156	J	0.000540	0.00200
Copper,Dissolved	0.00304	J	0.000520	0.00500
Cobalt,Dissolved	U		0.000260	0.00200
Iron,Dissolved	0.0154	J	0.0150	0.100
Lead,Dissolved	0.000860	J	0.000240	0.00200
Magnesium,Dissolved	U		0.100	1.00
Manganese,Dissolved	0.000363	J	0.000250	0.00500
Nickel,Dissolved	0.000637	J	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
Thallium,Dissolved	U		0.000190	0.00200
Vanadium,Dissolved	U		0.000180	0.00500
Zinc,Dissolved	U		0.00256	0.0250

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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

(LCS) R3391853-2 03/14/19 22:16 • (LCSD) R3391853-3 03/14/19 22:21

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	%	%	%			%	%
Antimony,Dissolved	0.0500	0.0514	0.0520	103	104	80.0-120			1.18	20
Sodium,Dissolved	5.00	4.67	4.58	93.3	91.5	80.0-120			1.96	20



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

(LCS) R3391980-2 03/15/19 10:41 • (LCSD) R3391980-3 03/15/19 10:44

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 %
Aluminum,Dissolved	0.500	0.514	0.500	103	100	80.0-120			2.69	20
Arsenic,Dissolved	0.0500	0.0515	0.0514	103	103	80.0-120			0.145	20
Barium,Dissolved	0.0500	0.0508	0.0503	102	101	80.0-120			1.02	20
Beryllium,Dissolved	0.0500	0.0498	0.0484	99.6	96.9	80.0-120			2.70	20
Cadmium,Dissolved	0.0500	0.0511	0.0502	102	100	80.0-120			1.77	20
Calcium,Dissolved	5.00	5.07	5.01	101	100	80.0-120			1.24	20
Chromium,Dissolved	0.0500	0.0535	0.0533	107	107	80.0-120			0.421	20
Copper,Dissolved	0.0500	0.0552	0.0554	110	111	80.0-120			0.328	20
Cobalt,Dissolved	0.0500	0.0521	0.0514	104	103	80.0-120			1.31	20
Iron,Dissolved	0.500	0.534	0.536	107	107	80.0-120			0.395	20
Lead,Dissolved	0.0500	0.0510	0.0503	102	101	80.0-120			1.49	20
Magnesium,Dissolved	5.00	5.10	5.00	102	99.9	80.0-120			2.10	20
Manganese,Dissolved	0.0500	0.0525	0.0516	105	103	80.0-120			1.78	20
Nickel,Dissolved	0.0500	0.0523	0.0526	105	105	80.0-120			0.551	20
Potassium,Dissolved	5.00	5.52	5.13	110	103	80.0-120			7.20	20
Selenium,Dissolved	0.0500	0.0543	0.0525	109	105	80.0-120			3.38	20
Silver,Dissolved	0.0500	0.0512	0.0512	102	102	80.0-120			0.138	20
Thallium,Dissolved	0.0500	0.0498	0.0482	99.6	96.5	80.0-120			3.16	20
Vanadium,Dissolved	0.0500	0.0516	0.0513	103	103	80.0-120			0.626	20
Zinc,Dissolved	0.0500	0.0550	0.0538	110	108	80.0-120			2.37	20

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1077185-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077185-01 03/15/19 10:48 • (MS) R3391980-5 03/15/19 10:56 • (MSD) R3391980-6 03/15/19 10:59

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	0.0500	6.50	6.92	6.92	83.3	83.5	10	75.0-125			0.0153	20
Antimony,Dissolved	0.00500	ND	0.0559	0.0563	112	113	10	75.0-125			0.602	20
Arsenic,Dissolved	0.00500	ND	0.0675	0.0656	103	98.8	10	75.0-125			2.88	20
Barium,Dissolved	0.00500	0.140	0.188	0.186	95.7	92.7	10	75.0-125			0.787	20
Beryllium,Dissolved	0.00500	ND	0.0517	0.0494	98.3	93.7	10	75.0-125			4.54	20
Cadmium,Dissolved	0.00500	6.56	6.56	6.58	0.000	49.2	10	75.0-125	V	V	0.377	20
Calcium,Dissolved	0.500	790	806	802	324	238	10	75.0-125	V	V	0.532	20
Chromium,Dissolved	0.00500	ND	0.0543	0.0551	109	110	10	75.0-125			1.61	20
Copper,Dissolved	0.00500	0.413	0.467	0.476	107	125	10	75.0-125			1.96	20
Cobalt,Dissolved	0.00500	0.0530	0.103	0.101	101	96.1	10	75.0-125			2.38	20
Potassium,Dissolved	0.500	669	674	675	105	119	10	75.0-125			0.106	20
Iron,Dissolved	0.0500	20.8	21.6	21.6	162	161	10	75.0-125	V	V	0.00643	20
Lead,Dissolved	0.00500	0.0249	0.0766	0.0749	103	100	10	75.0-125			2.20	20



L1077185-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077185-01 03/15/19 10:48 • (MS) R3391980-5 03/15/19 10:56 • (MSD) R3391980-6 03/15/19 10:59

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 %
Magnesium,Dissolved	0.500	97.2	102	101	90.5	81.0	10	75.0-125			0.466	20
Manganese,Dissolved	0.00500	12.4	12.6	12.6	436	450	10	75.0-125	√	√	0.0580	20
Nickel,Dissolved	0.00500	0.0645	0.114	0.114	98.8	98.6	10	75.0-125			0.0545	20
Selenium,Dissolved	0.00500	0.0584	0.107	0.116	96.5	115	10	75.0-125			8.52	20
Silver,Dissolved	0.00500	ND	0.0498	0.0503	99.6	101	10	75.0-125			0.971	20
Sodium,Dissolved	0.500	1130	1130	1140	64.1	321	10	75.0-125	√	√	1.13	20
Thallium,Dissolved	0.00500	ND	0.0530	0.0499	101	95.0	10	75.0-125			6.00	20
Vanadium,Dissolved	0.00500	ND	0.0515	0.0499	103	99.9	10	75.0-125			3.14	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3391806-1 03/14/19 21:35

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.00632	U	0.00515	0.100
Antimony	0.00111	U	0.000754	0.00200
Arsenic	0.000468	U	0.000250	0.00200
Barium	U		0.000360	0.00500
Beryllium	0.000150	U	0.000120	0.00200
Cadmium	U		0.000160	0.00100
Calcium	U		0.0460	1.00
Chromium	0.000717	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	0.0802	U	0.0370	1.00
Selenium	U		0.000380	0.00200
Silver	U		0.000310	0.00200
Sodium	U		0.110	1.00
Thallium	0.000304	U	0.000190	0.00200
Vanadium	0.000348	U	0.000180	0.00500
Zinc	U		0.00256	0.0250

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

(LCS) R3391806-2 03/14/19 21:40 • (LCSD) R3391806-3 03/14/19 21:44

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 %
Aluminum	0.500	0.485	0.485	97.0	96.9	80.0-120			0.0757	20
Antimony	0.0500	0.0689	0.0683	138	137	80.0-120	J4	J4	0.965	20
Arsenic	0.0500	0.0501	0.0497	100	99.5	80.0-120			0.664	20
Barium	0.0500	0.0480	0.0486	96.0	97.2	80.0-120			1.18	20
Beryllium	0.0500	0.0485	0.0477	97.0	95.4	80.0-120			1.61	20
Cadmium	0.0500	0.0488	0.0484	97.6	96.8	80.0-120			0.785	20
Calcium	5.00	4.88	4.77	97.7	95.4	80.0-120			2.30	20
Chromium	0.0500	0.0507	0.0498	101	99.6	80.0-120			1.89	20
Copper	0.0500	0.0504	0.0491	101	98.2	80.0-120			2.65	20
Cobalt	0.0500	0.0511	0.0505	102	101	80.0-120			1.19	20
Iron	0.500	0.502	0.495	100	99.1	80.0-120			1.39	20



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

(LCS) R3391806-2 03/14/19 21:40 • (LCSD) R3391806-3 03/14/19 21:44

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Lead	0.0500	0.0480	0.0473	96.0	94.7	80.0-120			1.45	20
Magnesium	5.00	4.88	4.81	97.6	96.3	80.0-120			1.40	20
Manganese	0.0500	0.0511	0.0491	102	98.3	80.0-120			3.92	20
Nickel	0.0500	0.0506	0.0500	101	100	80.0-120			1.31	20
Potassium	5.00	4.94	4.79	98.8	95.9	80.0-120			2.95	20
Selenium	0.0500	0.0509	0.0480	102	96.0	80.0-120			5.89	20
Silver	0.0500	0.0484	0.0488	96.8	97.7	80.0-120			0.853	20
Sodium	5.00	4.94	4.95	98.8	99.0	80.0-120			0.232	20
Thallium	0.0500	0.0486	0.0476	97.2	95.2	80.0-120			2.13	20
Vanadium	0.0500	0.0509	0.0497	102	99.3	80.0-120			2.53	20
Zinc	0.0500	0.0488	0.0477	97.6	95.4	80.0-120			2.31	20

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1077061-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077061-01 03/14/19 21:49 • (MS) R3391806-5 03/14/19 21:58 • (MSD) R3391806-6 03/14/19 22:03

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Aluminum	0.500	ND	0.575	0.584	95.1	97.0	1	75.0-125			1.60	20
Antimony	0.0500	ND	0.0697	0.0680	139	136	1	75.0-125	<u>J5</u>	<u>J5</u>	2.54	20
Arsenic	0.0500	ND	0.0482	0.0490	95.1	96.8	1	75.0-125			1.80	20
Barium	0.0500	0.0443	0.0913	0.0880	94.0	87.4	1	75.0-125			3.67	20
Beryllium	0.0500	ND	0.0480	0.0485	96.1	96.9	1	75.0-125			0.914	20
Cadmium	0.0500	ND	0.0484	0.0492	96.9	98.4	1	75.0-125			1.62	20
Calcium	5.00	19.8	24.2	24.6	87.1	94.4	1	75.0-125			1.49	20
Chromium	0.0500	ND	0.0481	0.0488	96.3	97.6	1	75.0-125			1.40	20
Copper	0.0500	ND	0.0488	0.0489	97.6	97.8	1	75.0-125			0.119	20
Cobalt	0.0500	0.00300	0.0506	0.0522	95.1	98.4	1	75.0-125			3.18	20
Potassium	5.00	ND	5.78	5.82	95.8	96.6	1	75.0-125			0.691	20
Iron	0.500	0.965	1.43	1.45	93.9	96.5	1	75.0-125			0.894	20
Lead	0.0500	ND	0.0482	0.0491	96.5	98.2	1	75.0-125			1.76	20
Magnesium	5.00	6.45	11.1	11.3	93.5	96.3	1	75.0-125			1.27	20
Manganese	0.0500	0.426	0.468	0.468	83.3	83.9	1	75.0-125			0.0682	20
Nickel	0.0500	0.0107	0.0582	0.0597	94.9	97.9	1	75.0-125			2.57	20
Selenium	0.0500	ND	0.0471	0.0477	93.4	94.7	1	75.0-125			1.34	20
Silver	0.0500	ND	0.0478	0.0481	95.6	96.2	1	75.0-125			0.579	20
Sodium	5.00	1.33	6.22	6.24	97.7	98.1	1	75.0-125			0.344	20
Thallium	0.0500	ND	0.0477	0.0487	95.4	97.5	1	75.0-125			2.14	20
Vanadium	0.0500	ND	0.0471	0.0495	93.5	98.4	1	75.0-125			5.08	20
Zinc	0.0500	ND	0.0502	0.0496	94.3	93.2	1	75.0-125			1.14	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.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
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.
O1	The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.
V	The sample concentration is too high to evaluate accurate spike recoveries.

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 GI

8 AI

9 Sc



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	LA000356
Kentucky ^{1,6}	90010	South Carolina	84004
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1,4}	2006
Louisiana ¹	LA180010	Texas	T104704245-18-15
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.



1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

Civil & Environmental Consultants - TN

325 Seaboard Lane, Suite 170

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 #
181-364

Lab Project #
CEC-EWS CAMDEN LF

Collected by (print): *Caleb Decker*
JD Willis

Site/Facility ID #
CAMDEN, TN

P.O. #

Collected by (signature):
Caleb Decker
JD Willis
 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

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs
-----------	-----------	----------	-------	------	------	--------------

CHARLIE CREEK US	6	GW		3-7-17	10:10	4 X
CHARLIE CREEK MS	6	GW		3-7-19	9:10	4 X
CANE CREEK US	6	GW		3-7-17	10:00	4 X
CANE CREEK MS	6	GW		3-7-19	9:00	4 X
CANE CREEK DS-1	6	GW		3-7-19	8:30	4 X
CHARLIE CREEK US	6	SS		3-7-19	10:10	2 X
CHARLIE CREEK MS	6	SS		3-7-19	9:10	2 X
CANE CREEK US	6	SS		3-7-19	10:00	2 X
CANE CREEK MS	6	SS		3-7-19	9:00	2 X
CANE CREEK DS-1	6	SS		3-7-19	8:30	2 X

Analysis / Container / Preservative										Chain of Custody Page ___ of ___		
Pres Chk											Pace Analytical* National Center for Testing & Innovation	
			12		12						12065 Lebanon Rd Mount Juliet, TN 37122 Phone: 615-758-5858 Phone: 800-767-5859 Fax: 615-758-5859	
											L# U077065 B152	
											Acctnum: CEC Template: T133580 Prelogin: P695693 TSR: 526 - Chris McCord PB: T6 2-26-19	
											Shipped Via: Courier	
											Remarks	Sample # (lab only)

* Matrix:
 SS - Soil AIR - Air F - Filter
 GW - Groundwater B - Bioassay
 WW - WasteWater
 DW - Drinking Water
 OT - Other

Remarks: Tot/Diss. Metals = M6020AP1 + Al, Ca, Fe, K, Mg, Mn, Na, B (6010/7470)
 Soil Total Metals = M6010AP1 + Al, Ca, Fe, K, Mg, Mn, Na
 RAD SCREEN: <0.5 mCi/hr

Samples returned via:
 ___ UPS ___ FedEx ___ Courier

Tracking #

Sample Receipt Checklist	
COC Seal Present/Intact:	NP <u> </u> Y <u> </u> N <u> </u>
COC Signed/Accurate:	<u> </u> Y <u> </u> N <u> </u>
Bottles arrive intact:	<u> </u> Y <u> </u> N <u> </u>
Correct bottles used:	<u> </u> Y <u> </u> N <u> </u>
Sufficient volume sent:	<u> </u> Y <u> </u> N <u> </u>
If Applicable	
VOA Zero Headspace:	<u> </u> Y <u> </u> N <u> </u>
Preservation Correct/Checked:	<u> </u> Y <u> </u> N <u> </u>

Relinquished by: (Signature) *Caleb Decker*
 Date: 3-7-19 Time: 1:30

Received by: (Signature) _____
 Trip Blank Received: Yes/No HCL/MeOH TBR

If preservation required by Login: Date/Time

Relinquished by: (Signature) _____
 Date: 3/8/19 Time: 9:05

Received by: (Signature) *Wayne Shull*
 Temp: °C Bottles Received: 2.7±0=2.7 ¹⁰ 30

Hold: _____ Condition: NCF /

Relinquished by: (Signature) *Wayne Shull*
 Date: 3/8/19 Time: 1455

Received for lab by: (Signature) *Willis*
 Date: 3/8/19 Time: 1455

Hold: _____ Condition: NCF /

March 21, 2019

Civil & Environmental Consultants - TN

Sample Delivery Group: L1077185
Samples Received: 03/08/2019
Project Number: 181-364
Description: Former EWS Camden Class 2 Landfill
Site: EWS
Report To: Philip Campbell
325 Seaboard Lane, Suite 170
Franklin, TN 37067

Entire Report Reviewed By:

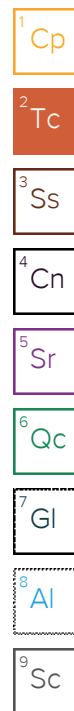


Chris McCord
Project Manager

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.



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SAMPLE SUMMARY

IWC-L L1077185-01 GW

			Collected by	Collected date/time	Received date/time
			Geoff B	03/04/19 12:50	03/09/19 08:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1250128	50	03/15/19 16:37	03/15/19 16:37	JER	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1249932	1	03/15/19 17:23	03/15/19 17:23	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1249722	10	03/14/19 13:29	03/14/19 13:29	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1248440	1	03/12/19 09:00	03/12/19 12:39	BAM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1248934	1	03/17/19 00:26	03/17/19 00:26	ST	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1248934	100	03/17/19 00:42	03/17/19 00:42	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1248526	1	03/13/19 08:14	03/13/19 13:25	ABL	Mt. Juliet, TN
Mercury by Method 7470A	WG1248801	1	03/12/19 17:38	03/13/19 10:03	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1247720	1	03/12/19 13:16	03/13/19 16:41	TRB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1249636	1	03/15/19 08:43	03/15/19 21:10	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	10	03/12/19 10:50	03/15/19 10:48	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	20	03/12/19 10:50	03/15/19 11:53	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1248780	1	03/13/19 08:04	03/13/19 14:03	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1248780	5	03/13/19 08:04	03/13/19 14:09	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1249401	10	03/13/19 17:40	03/15/19 10:06	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1249401	20	03/13/19 17:40	03/15/19 11:45	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1251048	1	03/17/19 19:28	03/18/19 11:49	LAT	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1248721	1	03/12/19 18:53	03/12/19 18:53	BMB	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1248755	1	03/12/19 15:01	03/13/19 00:25	HMH	Mt. Juliet, TN

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

APWC-L L1077185-02 GW

			Collected by	Collected date/time	Received date/time
			Geoff B	03/04/19 11:50	03/09/19 08:50

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG1250128	1	03/15/19 16:29	03/15/19 16:29	JER	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG1249932	100	03/18/19 12:12	03/18/19 12:12	GB	Mt. Juliet, TN
Wet Chemistry by Method 350.1	WG1249722	1000	03/14/19 13:48	03/14/19 13:48	BRJ	Mt. Juliet, TN
Wet Chemistry by Method 410.4	WG1248440	20	03/12/19 09:00	03/12/19 12:40	BAM	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1248934	100	03/17/19 00:57	03/17/19 00:57	ST	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG1248934	5000	03/17/19 01:13	03/17/19 01:13	ST	Mt. Juliet, TN
Mercury by Method 7470A	WG1248526	1	03/13/19 08:14	03/13/19 13:33	ABL	Mt. Juliet, TN
Mercury by Method 7470A	WG1248801	10	03/12/19 17:38	03/13/19 10:10	ABL	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1249629	10	03/14/19 08:32	03/15/19 11:02	CCE	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG1249636	1	03/15/19 08:43	03/15/19 21:14	TRB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	100	03/12/19 10:50	03/15/19 12:08	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1247703	1000	03/12/19 10:50	03/15/19 12:23	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1249401	100	03/13/19 17:40	03/15/19 10:10	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1249401	1000	03/13/19 17:40	03/15/19 12:27	RDS	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1251048	10	03/17/19 19:28	03/18/19 13:30	LAT	Mt. Juliet, TN
Metals (ICPMS) by Method 6020A	WG1251048	100	03/17/19 19:28	03/19/19 21:48	LD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1248986	1	03/13/19 12:17	03/13/19 12:17	ADM	Mt. Juliet, TN
EDB / DBCP by Method 8011	WG1248755	1	03/12/19 15:01	03/13/19 00:37	HMH	Mt. Juliet, TN

IWC-L L1077185-03 GW

			Collected by	Collected date/time	Received date/time
			Caleb Duke	03/07/19 09:10	03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1247235	1	03/09/19 00:57	03/09/19 00:57	MCG	Mt. Juliet, TN

SAMPLE SUMMARY



APWC-L L1077185-04 GW

Collected by: Caleb Duke
 Collected date/time: 03/07/19 08:45
 Received date/time: 03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1247235	100	03/08/19 17:15	03/08/19 17:15	MCG	Mt. Juliet, TN

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc



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

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	2680	B	1500	50	03/15/2019 16:37	WG1250128

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	03/15/2019 17:23	WG1249932

3 Ss

4 Cn

Sample Narrative:

L1077185-01 WG1249932: Endpoint pH 4.5

5 Sr

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	71.3		1.00	10	03/14/2019 13:29	WG1249722

6 Qc

7 Gl

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
COD	210		10.0	1	03/12/2019 12:39	WG1248440

8 Al

9 Sc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	1.64		1.00	1	03/17/2019 00:26	WG1248934
Chloride	4160		100	100	03/17/2019 00:42	WG1248934
Fluoride	0.437		0.100	1	03/17/2019 00:26	WG1248934
Sulfate	ND		500	100	03/17/2019 00:42	WG1248934

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	03/13/2019 13:25	WG1248526
Mercury,Dissolved	ND		0.000200	1	03/13/2019 10:03	WG1248801

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	03/13/2019 16:41	WG1247720
Boron,Dissolved	ND		0.200	1	03/15/2019 21:10	WG1249636

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	15.1		1.00	10	03/15/2019 10:06	WG1249401
Aluminum,Dissolved	6.50	O1	1.00	10	03/15/2019 10:48	WG1247703
Antimony	ND		0.00200	1	03/13/2019 14:03	WG1248780
Antimony,Dissolved	ND		0.00200	1	03/18/2019 11:49	WG1251048
Arsenic	0.0129		0.00200	1	03/13/2019 14:03	WG1248780
Arsenic,Dissolved	ND	O1	0.0200	10	03/15/2019 10:48	WG1247703
Barium	0.132		0.0500	10	03/15/2019 10:06	WG1249401
Barium,Dissolved	0.140	O1	0.0500	10	03/15/2019 10:48	WG1247703
Beryllium	0.00304		0.00200	1	03/13/2019 14:03	WG1248780



Collected date/time: 03/04/19 12:50

L1077185

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch	
Beryllium,Dissolved	ND		0.0200	10	03/15/2019 10:48	WG1247703	¹ Cp
Cadmium	6.22		0.00100	1	03/13/2019 14:03	WG1248780	² Tc
Cadmium,Dissolved	6.56	<u>O1 V</u>	0.0100	10	03/15/2019 10:48	WG1247703	³ Ss
Calcium	752		1.00	1	03/13/2019 14:03	WG1248780	⁴ Cn
Calcium,Dissolved	790	<u>O1 V</u>	10.0	10	03/15/2019 10:48	WG1247703	⁵ Sr
Chromium	0.0169		0.00200	1	03/13/2019 14:03	WG1248780	⁶ Qc
Chromium,Dissolved	ND		0.0200	10	03/15/2019 10:48	WG1247703	⁷ Gl
Cobalt	0.0477		0.00200	1	03/13/2019 14:03	WG1248780	⁸ Al
Cobalt,Dissolved	0.0530	<u>O1</u>	0.0200	10	03/15/2019 10:48	WG1247703	⁹ Sc
Copper	0.465		0.0250	5	03/13/2019 14:09	WG1248780	
Copper,Dissolved	0.413	<u>O1</u>	0.0500	10	03/15/2019 10:48	WG1247703	
Iron	21.5		1.00	10	03/15/2019 10:06	WG1249401	
Iron,Dissolved	20.8	<u>O1 V</u>	1.00	10	03/15/2019 10:48	WG1247703	
Lead	0.0258		0.00200	1	03/13/2019 14:03	WG1248780	
Lead,Dissolved	0.0249	<u>B O1</u>	0.0200	10	03/15/2019 10:48	WG1247703	
Magnesium	89.9		1.00	1	03/13/2019 14:03	WG1248780	
Magnesium,Dissolved	97.2	<u>O1</u>	10.0	10	03/15/2019 10:48	WG1247703	
Manganese	11.9		0.0500	10	03/15/2019 10:06	WG1249401	
Manganese,Dissolved	12.4	<u>O1 V</u>	0.0500	10	03/15/2019 10:48	WG1247703	
Nickel	0.0587		0.00200	1	03/13/2019 14:03	WG1248780	
Nickel,Dissolved	0.0645	<u>O1</u>	0.0200	10	03/15/2019 10:48	WG1247703	
Potassium	595		1.00	1	03/13/2019 14:03	WG1248780	
Potassium,Dissolved	669	<u>O1</u>	10.0	10	03/15/2019 10:48	WG1247703	
Selenium	0.0162		0.00200	1	03/13/2019 14:03	WG1248780	
Selenium,Dissolved	0.0584	<u>O1</u>	0.0200	10	03/15/2019 10:48	WG1247703	
Silver	ND		0.00200	1	03/13/2019 14:03	WG1248780	
Silver,Dissolved	ND		0.0200	10	03/15/2019 10:48	WG1247703	
Sodium	1080		10.0	10	03/15/2019 10:06	WG1249401	
Sodium,Dissolved	1130	<u>O1 V</u>	10.0	10	03/15/2019 10:48	WG1247703	
Thallium	0.00231		0.00200	1	03/13/2019 14:03	WG1248780	
Thallium,Dissolved	ND		0.0200	10	03/15/2019 10:48	WG1247703	
Vanadium	ND		0.00500	1	03/13/2019 14:03	WG1248780	
Vanadium,Dissolved	ND		0.0500	10	03/15/2019 10:48	WG1247703	
Zinc	63.1		0.500	20	03/15/2019 11:45	WG1249401	
Zinc,Dissolved	64.0		0.500	20	03/15/2019 11:53	WG1247703	

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	0.0991		0.0500	1	03/12/2019 18:53	WG1248721
Acrylonitrile	ND		0.0100	1	03/12/2019 18:53	WG1248721
Benzene	ND		0.00100	1	03/12/2019 18:53	WG1248721
Bromochloromethane	ND		0.00100	1	03/12/2019 18:53	WG1248721
Bromodichloromethane	0.00370		0.00100	1	03/12/2019 18:53	WG1248721
Bromoform	ND		0.00100	1	03/12/2019 18:53	WG1248721
Bromomethane	ND		0.00500	1	03/12/2019 18:53	WG1248721
Carbon disulfide	ND		0.00100	1	03/12/2019 18:53	WG1248721
Carbon tetrachloride	ND		0.00100	1	03/12/2019 18:53	WG1248721
Chlorobenzene	ND		0.00100	1	03/12/2019 18:53	WG1248721
Chlorodibromomethane	ND		0.00100	1	03/12/2019 18:53	WG1248721
Chloroethane	ND		0.00500	1	03/12/2019 18:53	WG1248721
Chloroform	0.0155		0.00500	1	03/12/2019 18:53	WG1248721
Chloromethane	ND		0.00250	1	03/12/2019 18:53	WG1248721
Dibromomethane	ND		0.00100	1	03/12/2019 18:53	WG1248721
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/12/2019 18:53	WG1248721
1,2-Dibromoethane	ND		0.00100	1	03/12/2019 18:53	WG1248721



Collected date/time: 03/04/19 12:50

L1077185

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch	
1,2-Dichlorobenzene	ND		0.00100	1	03/12/2019 18:53	WG1248721	¹ Cp
1,4-Dichlorobenzene	ND		0.00100	1	03/12/2019 18:53	WG1248721	² Tc
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/12/2019 18:53	WG1248721	³ Ss
1,1-Dichloroethane	ND		0.00100	1	03/12/2019 18:53	WG1248721	⁴ Cn
1,2-Dichloroethane	ND		0.00100	1	03/12/2019 18:53	WG1248721	⁵ Sr
1,1-Dichloroethene	ND		0.00100	1	03/12/2019 18:53	WG1248721	⁶ Qc
cis-1,2-Dichloroethene	ND		0.00100	1	03/12/2019 18:53	WG1248721	⁷ Gl
trans-1,2-Dichloroethene	ND		0.00100	1	03/12/2019 18:53	WG1248721	⁸ Al
1,2-Dichloropropane	ND		0.00100	1	03/12/2019 18:53	WG1248721	⁹ Sc
cis-1,3-Dichloropropene	ND		0.00100	1	03/12/2019 18:53	WG1248721	
trans-1,3-Dichloropropene	ND		0.00100	1	03/12/2019 18:53	WG1248721	
Ethylbenzene	ND		0.00100	1	03/12/2019 18:53	WG1248721	
2-Hexanone	ND		0.0100	1	03/12/2019 18:53	WG1248721	
Iodomethane	ND		0.0100	1	03/12/2019 18:53	WG1248721	
2-Butanone (MEK)	0.0110		0.0100	1	03/12/2019 18:53	WG1248721	
Methylene Chloride	ND		0.00500	1	03/12/2019 18:53	WG1248721	
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/12/2019 18:53	WG1248721	
Styrene	ND		0.00100	1	03/12/2019 18:53	WG1248721	
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/12/2019 18:53	WG1248721	
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/12/2019 18:53	WG1248721	
Tetrachloroethene	ND		0.00100	1	03/12/2019 18:53	WG1248721	
Toluene	ND		0.00100	1	03/12/2019 18:53	WG1248721	
1,1,1-Trichloroethane	ND		0.00100	1	03/12/2019 18:53	WG1248721	
1,1,2-Trichloroethane	ND		0.00100	1	03/12/2019 18:53	WG1248721	
Trichloroethene	ND		0.00100	1	03/12/2019 18:53	WG1248721	
Trichlorofluoromethane	ND		0.00500	1	03/12/2019 18:53	WG1248721	
1,2,3-Trichloropropane	ND		0.00250	1	03/12/2019 18:53	WG1248721	
Vinyl acetate	ND		0.0100	1	03/12/2019 18:53	WG1248721	
Vinyl chloride	ND		0.00100	1	03/12/2019 18:53	WG1248721	
Xylenes, Total	ND		0.00300	1	03/12/2019 18:53	WG1248721	
(S) Toluene-d8	98.4		80.0-120		03/12/2019 18:53	WG1248721	
(S) o,o,a-Trifluorotoluene	114		80.0-120		03/12/2019 18:53	WG1248721	
(S) 4-Bromofluorobenzene	103		77.0-126		03/12/2019 18:53	WG1248721	
(S) 1,2-Dichloroethane-d4	116		70.0-130		03/12/2019 18:53	WG1248721	

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	03/13/2019 00:25	WG1248755
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/13/2019 00:25	WG1248755



Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	165		30.0	1	03/15/2019 16:29	WG1250128

1 Cp

2 Tc

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Alkalinity	8770		2000	100	03/18/2019 12:12	WG1249932

3 Ss

4 Cn

Sample Narrative:

L1077185-02 WG1249932: Endpoint pH 4.5

5 Sr

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	5210		100	1000	03/14/2019 13:48	WG1249722

6 Qc

7 Gl

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
COD	8660		200	20	03/12/2019 12:40	WG1248440

8 Al

9 Sc

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Bromide	116		100	100	03/17/2019 00:57	WG1248934
Chloride	120000		5000	5000	03/17/2019 01:13	WG1248934
Fluoride	20.2		10.0	100	03/17/2019 00:57	WG1248934
Sulfate	1200		500	100	03/17/2019 00:57	WG1248934

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Mercury	0.000389		0.000200	1	03/13/2019 13:33	WG1248526
Mercury,Dissolved	ND		0.00200	10	03/13/2019 10:10	WG1248801

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Boron	10.4		2.00	10	03/15/2019 11:02	WG1249629
Boron,Dissolved	10.9		0.200	1	03/15/2019 21:14	WG1249636

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Aluminum	ND		10.0	100	03/15/2019 10:10	WG1249401
Aluminum,Dissolved	ND		10.0	100	03/15/2019 12:08	WG1247703
Antimony	ND		0.200	100	03/15/2019 10:10	WG1249401
Antimony,Dissolved	0.0536		0.0200	10	03/18/2019 13:30	WG1251048
Arsenic	ND		0.200	100	03/15/2019 10:10	WG1249401
Arsenic,Dissolved	ND		0.200	100	03/15/2019 12:08	WG1247703
Barium	0.905		0.500	100	03/15/2019 10:10	WG1249401
Barium,Dissolved	1.23		0.500	100	03/15/2019 12:08	WG1247703
Beryllium	ND		0.200	100	03/15/2019 10:10	WG1249401



Collected date/time: 03/04/19 11:50

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Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium,Dissolved	ND		0.200	100	03/15/2019 12:08	WG1247703
Cadmium	ND		0.100	100	03/15/2019 10:10	WG1249401
Cadmium,Dissolved	0.102		0.100	100	03/15/2019 12:08	WG1247703
Calcium	ND		100	100	03/15/2019 10:10	WG1249401
Calcium,Dissolved	ND		100	100	03/15/2019 12:08	WG1247703
Chromium	ND		0.200	100	03/15/2019 10:10	WG1249401
Chromium,Dissolved	ND		0.200	100	03/15/2019 12:08	WG1247703
Cobalt	ND		0.200	100	03/15/2019 10:10	WG1249401
Cobalt,Dissolved	ND		0.200	100	03/15/2019 12:08	WG1247703
Copper	143		5.00	1000	03/15/2019 12:27	WG1249401
Copper,Dissolved	147		5.00	1000	03/15/2019 12:23	WG1247703
Iron	ND		10.0	100	03/15/2019 10:10	WG1249401
Iron,Dissolved	ND		10.0	100	03/15/2019 12:08	WG1247703
Lead	ND		0.200	100	03/15/2019 10:10	WG1249401
Lead,Dissolved	ND		0.200	100	03/15/2019 12:08	WG1247703
Magnesium	ND		100	100	03/15/2019 10:10	WG1249401
Magnesium,Dissolved	ND		100	100	03/15/2019 12:08	WG1247703
Manganese	ND		0.500	100	03/15/2019 10:10	WG1249401
Manganese,Dissolved	ND		0.500	100	03/15/2019 12:08	WG1247703
Nickel	1.89		0.200	100	03/15/2019 10:10	WG1249401
Nickel,Dissolved	2.54		0.200	100	03/15/2019 12:08	WG1247703
Potassium	30800		100	100	03/15/2019 10:10	WG1249401
Potassium,Dissolved	41700		100	100	03/15/2019 12:08	WG1247703
Selenium	ND		0.200	100	03/15/2019 10:10	WG1249401
Selenium,Dissolved	0.277		0.200	100	03/15/2019 12:08	WG1247703
Silver	ND		0.200	100	03/15/2019 10:10	WG1249401
Silver,Dissolved	ND		0.200	100	03/15/2019 12:08	WG1247703
Sodium	48600		100	100	03/15/2019 10:10	WG1249401
Sodium,Dissolved	48100		100	100	03/19/2019 21:48	WG1251048
Thallium	ND		0.200	100	03/15/2019 10:10	WG1249401
Thallium,Dissolved	ND		0.200	100	03/15/2019 12:08	WG1247703
Vanadium	ND		0.500	100	03/15/2019 10:10	WG1249401
Vanadium,Dissolved	ND		0.500	100	03/15/2019 12:08	WG1247703
Zinc	21.9		2.50	100	03/15/2019 10:10	WG1249401
Zinc,Dissolved	28.6		2.50	100	03/15/2019 12:08	WG1247703

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
Acetone	0.357		0.0500	1	03/13/2019 12:17	WG1248986
Acrylonitrile	ND		0.0100	1	03/13/2019 12:17	WG1248986
Benzene	ND		0.00100	1	03/13/2019 12:17	WG1248986
Bromochloromethane	ND		0.00100	1	03/13/2019 12:17	WG1248986
Bromodichloromethane	ND		0.00100	1	03/13/2019 12:17	WG1248986
Bromoform	ND		0.00100	1	03/13/2019 12:17	WG1248986
Bromomethane	ND		0.00500	1	03/13/2019 12:17	WG1248986
Carbon disulfide	ND		0.00100	1	03/13/2019 12:17	WG1248986
Carbon tetrachloride	ND		0.00100	1	03/13/2019 12:17	WG1248986
Chlorobenzene	ND		0.00100	1	03/13/2019 12:17	WG1248986
Chlorodibromomethane	ND		0.00100	1	03/13/2019 12:17	WG1248986
Chloroethane	ND		0.00500	1	03/13/2019 12:17	WG1248986
Chloroform	ND		0.00500	1	03/13/2019 12:17	WG1248986
Chloromethane	ND		0.00250	1	03/13/2019 12:17	WG1248986
Dibromomethane	ND		0.00100	1	03/13/2019 12:17	WG1248986
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	03/13/2019 12:17	WG1248986
1,2-Dibromoethane	ND		0.00100	1	03/13/2019 12:17	WG1248986



Collected date/time: 03/04/19 11:50

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2-Dichlorobenzene	ND		0.00100	1	03/13/2019 12:17	WG1248986
1,4-Dichlorobenzene	ND		0.00100	1	03/13/2019 12:17	WG1248986
trans-1,4-Dichloro-2-butene	ND		0.00250	1	03/13/2019 12:17	WG1248986
1,1-Dichloroethane	ND		0.00100	1	03/13/2019 12:17	WG1248986
1,2-Dichloroethane	ND		0.00100	1	03/13/2019 12:17	WG1248986
1,1-Dichloroethene	ND		0.00100	1	03/13/2019 12:17	WG1248986
cis-1,2-Dichloroethene	ND		0.00100	1	03/13/2019 12:17	WG1248986
trans-1,2-Dichloroethene	ND		0.00100	1	03/13/2019 12:17	WG1248986
1,2-Dichloropropane	ND		0.00100	1	03/13/2019 12:17	WG1248986
cis-1,3-Dichloropropene	ND		0.00100	1	03/13/2019 12:17	WG1248986
trans-1,3-Dichloropropene	ND		0.00100	1	03/13/2019 12:17	WG1248986
Ethylbenzene	ND		0.00100	1	03/13/2019 12:17	WG1248986
2-Hexanone	ND		0.0100	1	03/13/2019 12:17	WG1248986
Iodomethane	ND	<u>J3</u>	0.0100	1	03/13/2019 12:17	WG1248986
2-Butanone (MEK)	0.0122		0.0100	1	03/13/2019 12:17	WG1248986
Methylene Chloride	ND		0.00500	1	03/13/2019 12:17	WG1248986
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	03/13/2019 12:17	WG1248986
Styrene	ND		0.00100	1	03/13/2019 12:17	WG1248986
1,1,1,2-Tetrachloroethane	ND		0.00100	1	03/13/2019 12:17	WG1248986
1,1,2,2-Tetrachloroethane	ND		0.00100	1	03/13/2019 12:17	WG1248986
Tetrachloroethene	ND		0.00100	1	03/13/2019 12:17	WG1248986
Toluene	ND		0.00100	1	03/13/2019 12:17	WG1248986
1,1,1-Trichloroethane	ND		0.00100	1	03/13/2019 12:17	WG1248986
1,1,2-Trichloroethane	ND		0.00100	1	03/13/2019 12:17	WG1248986
Trichloroethene	ND		0.00100	1	03/13/2019 12:17	WG1248986
Trichlorofluoromethane	ND		0.00500	1	03/13/2019 12:17	WG1248986
1,2,3-Trichloropropane	ND		0.00250	1	03/13/2019 12:17	WG1248986
Vinyl acetate	ND		0.0100	1	03/13/2019 12:17	WG1248986
Vinyl chloride	ND		0.00100	1	03/13/2019 12:17	WG1248986
Xylenes, Total	ND		0.00300	1	03/13/2019 12:17	WG1248986
(S) Toluene-d8	104		80.0-120		03/13/2019 12:17	WG1248986
(S) o,o,a-Trifluorotoluene	107		80.0-120		03/13/2019 12:17	WG1248986
(S) 4-Bromofluorobenzene	102		77.0-126		03/13/2019 12:17	WG1248986
(S) 1,2-Dichloroethane-d4	106		70.0-130		03/13/2019 12:17	WG1248986

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	03/13/2019 00:37	WG1248755
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	03/13/2019 00:37	WG1248755



Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis date / time	Batch
Nitrate	ND		0.100	1	03/09/2019 00:57	WG1247235

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	Qualifier	RDL	Dilution	Analysis date / time	Batch
Nitrate	92.6		10.0	100	03/08/2019 17:15	WG1247235

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3392186-1 03/15/19 14:49

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hardness (colorimetric) as CaCO3	5.92	<u>J</u>	1.43	30.0

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1075303-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1075303-03 03/15/19 14:53 • (DUP) R3392186-5 03/15/19 14:54

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	152	153	1	0.656		20

L1077638-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1077638-01 03/15/19 15:12 • (DUP) R3392186-6 03/15/19 15:13

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	71.5	71.7	1	0.279		20

Laboratory Control Sample (LCS)

(LCS) R3392186-2 03/15/19 14:49

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Hardness (colorimetric) as CaCO3	150	155	103	85.0-115	

L1075276-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075276-02 03/15/19 14:50 • (MS) R3392186-3 03/15/19 14:51 • (MSD) R3392186-4 03/15/19 14:52

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 %
Hardness (colorimetric) as CaCO3	150	173	243	243	46.7	46.7	1	80.0-120	<u>E J6</u>	<u>E J6</u>	0.000	20



Method Blank (MB)

(MB) R3392636-1 03/15/19 16:39

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Alkalinity	2.72	↓	2.71	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1078078-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1078078-01 03/15/19 17:04 • (DUP) R3392636-2 03/15/19 17:14

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Alkalinity	217	218	1	0.586		20

Sample Narrative:

OS: Endpoint pH 4.5
DUP: Endpoint pH 4.5

L1077993-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1077993-06 03/15/19 19:52 • (DUP) R3392636-4 03/15/19 19:59

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Alkalinity	477	470	1	1.46		20

Sample Narrative:

OS: Endpoint pH 4.5
DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3392636-3 03/15/19 18:12

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Alkalinity	100	99.7	99.7	85.0-115	

Sample Narrative:

LCS: Endpoint pH 4.5

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3391576-1 03/14/19 12:25

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Ammonia Nitrogen	U		0.0317	0.100

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1075545-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1075545-02 03/14/19 12:28 • (DUP) R3391576-3 03/14/19 12:29

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Ammonia Nitrogen	U	0.000	1	0.000		10

L1077210-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1077210-01 03/14/19 12:58 • (DUP) R3391576-6 03/14/19 12:59

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Ammonia Nitrogen	ND	0.000	1	0.000		10

Laboratory Control Sample (LCS)

(LCS) R3391576-2 03/14/19 12:26

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Ammonia Nitrogen	7.50	7.06	94.2	90.0-110	

L1077113-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077113-06 03/14/19 12:39 • (MS) R3391576-4 03/14/19 12:45 • (MSD) R3391576-5 03/14/19 12:47

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Ammonia Nitrogen	5.00	ND	4.88	4.72	97.6	94.4	1	90.0-110			3.31	10

L1077212-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1077212-01 03/14/19 13:06 • (MS) R3391576-7 03/14/19 13:07

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Ammonia Nitrogen	5.00	0.596	5.70	102	1	90.0-110	



Method Blank (MB)

(MB) R3390778-1 03/12/19 12:36

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
COD	U		3.00	10.0

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1076243-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1076243-01 03/12/19 12:39 • (DUP) R3390778-3 03/12/19 12:39

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
COD	180	182	1	0.935		20

L1077352-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1077352-06 03/12/19 12:44 • (DUP) R3390778-6 03/12/19 12:45

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
COD	19.6	17.6	1	10.7		20

Laboratory Control Sample (LCS)

(LCS) R3390778-2 03/12/19 12:37

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
COD	222	219	98.8	90.0-110	

L1077246-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077246-01 03/12/19 12:42 • (MS) R3390778-4 03/12/19 12:42 • (MSD) R3390778-5 03/12/19 12:42

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
COD	400	ND	417	414	104	103	1	80.0-120			0.799	20



Method Blank (MB)

(MB) R3390105-1 03/08/19 11:17

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Nitrate	U		0.0227	0.100

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1076816-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1076816-10 03/08/19 16:13 • (DUP) R3390105-3 03/08/19 16:28

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Nitrate	0.230	0.235	1	2.28		15

L1076825-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1076825-01 03/08/19 18:47 • (DUP) R3390105-6 03/08/19 19:33

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Nitrate	0.203	0.205	1	0.932		15

Laboratory Control Sample (LCS)

(LCS) R3390105-2 03/08/19 11:32

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Nitrate	8.00	8.05	101	80.0-120	

L1076816-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1076816-10 03/08/19 16:13 • (MS) R3390105-4 03/08/19 16:44 • (MSD) R3390105-5 03/08/19 16:59

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Nitrate	5.00	0.230	5.00	5.01	95.5	95.7	1	80.0-120			0.208	15

L1076825-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1076825-01 03/08/19 18:47 • (MS) R3390105-7 03/08/19 19:49

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Nitrate	5.00	0.203	5.07	97.4	1	80.0-120	



Method Blank (MB)

(MB) R3392509-1 03/16/19 12:14

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Bromide	U		0.0790	1.00
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Sulfate	U		0.0774	5.00

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1077201-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1077201-01 03/16/19 15:41 • (DUP) R3392509-3 03/16/19 15:56

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Bromide	ND	0.000	1	0.000		15
Chloride	22.7	22.7	1	0.00396		15
Fluoride	ND	0.0676	1	9.29	↓	15
Sulfate	17.6	17.6	1	0.0450		15

L1077334-05 Original Sample (OS) • Duplicate (DUP)

(OS) L1077334-05 03/16/19 19:55 • (DUP) R3392509-6 03/16/19 20:11

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Bromide	ND	0.000	1	0.000		15
Chloride	10.3	10.3	1	0.154		15
Fluoride	ND	0.0573	1	0.000		15
Sulfate	29.6	29.8	1	0.609		15

Laboratory Control Sample (LCS)

(LCS) R3392509-2 03/16/19 12:30

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	mg/l	mg/l	%	%	
Bromide	40.0	40.5	101	80.0-120	
Chloride	40.0	40.8	102	80.0-120	
Fluoride	8.00	8.45	106	80.0-120	
Sulfate	40.0	41.3	103	80.0-120	



L1077201-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077201-01 03/16/19 15:41 • (MS) R3392509-4 03/16/19 16:12 • (MSD) R3392509-5 03/16/19 16:28

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 %
Bromide	50.0	ND	47.6	47.7	95.1	95.5	1	80.0-120			0.331	15
Chloride	50.0	22.7	71.6	71.9	97.7	98.3	1	80.0-120			0.403	15
Fluoride	5.00	ND	5.10	5.14	101	102	1	80.0-120			0.677	15
Sulfate	50.0	17.6	67.0	67.2	98.9	99.2	1	80.0-120			0.249	15

L1077334-05 Original Sample (OS) • Matrix Spike (MS)

(OS) L1077334-05 03/16/19 19:55 • (MS) R3392509-7 03/16/19 20:27

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	ND	45.9	91.8	1	80.0-120	
Chloride	50.0	10.3	60.3	99.9	1	80.0-120	
Fluoride	5.00	ND	5.09	101	1	80.0-120	
Sulfate	50.0	29.6	78.3	97.4	1	80.0-120	

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3391207-1 03/13/19 13:11

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.0000490	0.000200

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

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

(LCS) R3391207-2 03/13/19 13:13 • (LCSD) R3391207-3 03/13/19 13:16

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	0.00298	0.00286	99.5	95.4	80.0-120			4.18	20

L1077613-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077613-04 03/13/19 13:18 • (MS) R3391207-4 03/13/19 13:20 • (MSD) R3391207-5 03/13/19 13:23

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	0.00281	0.00251	93.6	83.7	1	75.0-125			11.1	20

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3391177-1 03/13/19 09:55

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Mercury,Dissolved	U		0.0000490	0.000200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3391177-2 03/13/19 09:58 • (LCSD) R3391177-3 03/13/19 10:00

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	0.00307	0.00306	102	102	80.0-120			0.466	20

⁷ Gl

⁸ Al

L1077185-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077185-01 03/13/19 10:03 • (MS) R3391177-4 03/13/19 10:05 • (MSD) R3391177-5 03/13/19 10:08

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	0.00331	0.00322	110	107	1	75.0-125			2.56	20

⁹ Sc



Method Blank (MB)

(MB) R3391389-1 03/13/19 15:28

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0126	0.200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3391389-2 03/13/19 15:31 • (LCSD) R3391389-3 03/13/19 15:33

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron	1.00	0.967	0.961	96.7	96.1	80.0-120			0.593	20

L1076816-13 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1076816-13 03/13/19 15:36 • (MS) R3391389-5 03/13/19 15:41 • (MSD) R3391389-6 03/13/19 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 %
Boron	1.00	0.276	1.24	1.29	96.8	101	1	75.0-125			3.28	20

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3391620-1 03/14/19 11:38

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron	U		0.0126	0.200

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

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

(LCS) R3391620-2 03/14/19 11:41 • (LCSD) R3391620-3 03/14/19 11:43

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	1.00	0.989	0.979	98.9	97.9	80.0-120			1.08	20

L1077754-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077754-01 03/14/19 11:46 • (MS) R3391620-5 03/14/19 11:52 • (MSD) R3391620-6 03/14/19 11:54

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	0.170	1.14	1.14	97.4	97.4	1	75.0-125			0.0350	20

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3392213-1 03/15/19 20:52

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	U		0.0126	0.200

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

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

(LCS) R3392213-2 03/15/19 20:55 • (LCSD) R3392213-3 03/15/19 20:57

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	1.00	1.01	100	101	80.0-120			0.747	20

L1078221-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1078221-05 03/15/19 21:00 • (MS) R3392213-5 03/15/19 21:05 • (MSD) R3392213-6 03/15/19 21:08

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	0.0940	1.09	1.07	99.8	97.6	1	75.0-125			2.04	20

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3391853-1 03/14/19 22:11

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Sodium,Dissolved	U		0.110	1.00

¹ Cp

² Tc

³ Ss

⁴ Cn

Method Blank (MB)

(MB) R3391980-1 03/15/19 10:37

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Aluminum,Dissolved	0.00894	J	0.00515	0.100
Arsenic,Dissolved	U		0.000250	0.00200
Barium,Dissolved	0.000679	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	0.00156	J	0.000540	0.00200
Copper,Dissolved	0.00304	J	0.000520	0.00500
Cobalt,Dissolved	U		0.000260	0.00200
Iron,Dissolved	0.0154	J	0.0150	0.100
Lead,Dissolved	0.000860	J	0.000240	0.00200
Magnesium,Dissolved	U		0.100	1.00
Manganese,Dissolved	0.000363	J	0.000250	0.00500
Nickel,Dissolved	0.000637	J	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
Thallium,Dissolved	U		0.000190	0.00200
Vanadium,Dissolved	U		0.000180	0.00500
Zinc,Dissolved	U		0.00256	0.0250

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

(LCS) R3391853-2 03/14/19 22:16 • (LCSD) R3391853-3 03/14/19 22:21

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Sodium,Dissolved	5.00	4.67	4.58	93.3	91.5	80.0-120			1.96	20



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

(LCS) R3391980-2 03/15/19 10:41 • (LCSD) R3391980-3 03/15/19 10:44

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Aluminum,Dissolved	0.500	0.514	0.500	103	100	80.0-120			2.69	20
Arsenic,Dissolved	0.0500	0.0515	0.0514	103	103	80.0-120			0.145	20
Barium,Dissolved	0.0500	0.0508	0.0503	102	101	80.0-120			1.02	20
Beryllium,Dissolved	0.0500	0.0498	0.0484	99.6	96.9	80.0-120			2.70	20
Cadmium,Dissolved	0.0500	0.0511	0.0502	102	100	80.0-120			1.77	20
Calcium,Dissolved	5.00	5.07	5.01	101	100	80.0-120			1.24	20
Chromium,Dissolved	0.0500	0.0535	0.0533	107	107	80.0-120			0.421	20
Copper,Dissolved	0.0500	0.0552	0.0554	110	111	80.0-120			0.328	20
Cobalt,Dissolved	0.0500	0.0521	0.0514	104	103	80.0-120			1.31	20
Iron,Dissolved	0.500	0.534	0.536	107	107	80.0-120			0.395	20
Lead,Dissolved	0.0500	0.0510	0.0503	102	101	80.0-120			1.49	20
Magnesium,Dissolved	5.00	5.10	5.00	102	99.9	80.0-120			2.10	20
Manganese,Dissolved	0.0500	0.0525	0.0516	105	103	80.0-120			1.78	20
Nickel,Dissolved	0.0500	0.0523	0.0526	105	105	80.0-120			0.551	20
Potassium,Dissolved	5.00	5.52	5.13	110	103	80.0-120			7.20	20
Selenium,Dissolved	0.0500	0.0543	0.0525	109	105	80.0-120			3.38	20
Silver,Dissolved	0.0500	0.0512	0.0512	102	102	80.0-120			0.138	20
Thallium,Dissolved	0.0500	0.0498	0.0482	99.6	96.5	80.0-120			3.16	20
Vanadium,Dissolved	0.0500	0.0516	0.0513	103	103	80.0-120			0.626	20
Zinc,Dissolved	0.0500	0.0550	0.0538	110	108	80.0-120			2.37	20

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1077185-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077185-01 03/15/19 10:48 • (MS) R3391980-5 03/15/19 10:56 • (MSD) R3391980-6 03/15/19 10:59

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Aluminum,Dissolved	0.0500	6.50	6.92	6.92	83.3	83.5	10	75.0-125			0.0153	20
Arsenic,Dissolved	0.00500	ND	0.0675	0.0656	103	98.8	10	75.0-125			2.88	20
Barium,Dissolved	0.00500	0.140	0.188	0.186	95.7	92.7	10	75.0-125			0.787	20
Beryllium,Dissolved	0.00500	ND	0.0517	0.0494	98.3	93.7	10	75.0-125			4.54	20
Cadmium,Dissolved	0.00500	6.56	6.56	6.58	0.000	49.2	10	75.0-125	V	V	0.377	20
Calcium,Dissolved	0.500	790	806	802	324	238	10	75.0-125	V	V	0.532	20
Chromium,Dissolved	0.00500	ND	0.0543	0.0551	109	110	10	75.0-125			1.61	20
Copper,Dissolved	0.00500	0.413	0.467	0.476	107	125	10	75.0-125			1.96	20
Cobalt,Dissolved	0.00500	0.0530	0.103	0.101	101	96.1	10	75.0-125			2.38	20
Potassium,Dissolved	0.500	669	674	675	105	119	10	75.0-125			0.106	20
Iron,Dissolved	0.0500	20.8	21.6	21.6	162	161	10	75.0-125	V	V	0.00643	20
Lead,Dissolved	0.00500	0.0249	0.0766	0.0749	103	100	10	75.0-125			2.20	20
Magnesium,Dissolved	0.500	97.2	102	101	90.5	81.0	10	75.0-125			0.466	20



L1077185-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077185-01 03/15/19 10:48 • (MS) R3391980-5 03/15/19 10:56 • (MSD) R3391980-6 03/15/19 10:59

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 %
Manganese,Dissolved	0.00500	12.4	12.6	12.6	436	450	10	75.0-125	√	√	0.0580	20
Nickel,Dissolved	0.00500	0.0645	0.114	0.114	98.8	98.6	10	75.0-125			0.0545	20
Selenium,Dissolved	0.00500	0.0584	0.107	0.116	96.5	115	10	75.0-125			8.52	20
Silver,Dissolved	0.00500	ND	0.0498	0.0503	99.6	101	10	75.0-125			0.971	20
Sodium,Dissolved	0.500	1130	1130	1140	64.1	321	10	75.0-125	√	√	1.13	20
Thallium,Dissolved	0.00500	ND	0.0530	0.0499	101	95.0	10	75.0-125			6.00	20
Vanadium,Dissolved	0.00500	ND	0.0515	0.0499	103	99.9	10	75.0-125			3.14	20

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc



Method Blank (MB)

(MB) R3391241-1 03/13/19 12:44

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	U		0.000754	0.00200
Arsenic	U		0.000250	0.00200
Beryllium	U		0.000120	0.00200
Cadmium	U		0.000160	0.00100
Calcium	0.100	J	0.0460	1.00
Chromium	U		0.000540	0.00200
Copper	U		0.000520	0.00500
Cobalt	U		0.000260	0.00200
Lead	U		0.000240	0.00200
Magnesium	U		0.100	1.00
Nickel	U		0.000350	0.00200
Potassium	U		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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

(LCS) R3391241-2 03/13/19 12:48 • (LCSD) R3391241-7 03/13/19 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 %
Antimony	0.0500	0.0531	0.0519	106	104	80.0-120			2.45	20
Arsenic	0.0500	0.0502	0.0496	100	99.1	80.0-120			1.36	20
Beryllium	0.0500	0.0465	0.0460	92.9	91.9	80.0-120			1.09	20
Cadmium	0.0500	0.0487	0.0489	97.3	97.8	80.0-120			0.522	20
Calcium	5.00	4.82	4.78	96.3	95.6	80.0-120			0.739	20
Chromium	0.0500	0.0498	0.0491	99.7	98.2	80.0-120			1.48	20
Copper	0.0500	0.0498	0.0500	99.5	100	80.0-120			0.483	20
Cobalt	0.0500	0.0505	0.0492	101	98.4	80.0-120			2.70	20
Lead	0.0500	0.0490	0.0487	98.1	97.5	80.0-120			0.621	20
Magnesium	5.00	4.83	4.73	96.6	94.5	80.0-120			2.19	20
Nickel	0.0500	0.0504	0.0495	101	98.9	80.0-120			1.93	20
Potassium	5.00	4.86	4.85	97.3	97.0	80.0-120			0.333	20
Selenium	0.0500	0.0503	0.0486	101	97.2	80.0-120			3.51	20
Silver	0.0500	0.0503	0.0485	101	97.1	80.0-120			3.65	20
Thallium	0.0500	0.0490	0.0480	98.0	96.0	80.0-120			2.03	20
Vanadium	0.0500	0.0496	0.0490	99.3	98.1	80.0-120			1.21	20



L1077329-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077329-01 03/13/19 12:57 • (MS) R3391241-5 03/13/19 13:07 • (MSD) R3391241-6 03/13/19 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 %
Antimony	0.0500	0.00210	0.0534	0.0538	103	103	1	75.0-125			0.845	20
Arsenic	0.0500	ND	0.0495	0.0490	97.8	96.8	1	75.0-125			1.01	20
Beryllium	0.0500	ND	0.0450	0.0451	90.0	90.1	1	75.0-125			0.0912	20
Cadmium	0.0500	ND	0.0480	0.0490	95.0	97.0	1	75.0-125			2.08	20
Calcium	5.00	67.0	72.5	72.1	111	104	1	75.0-125			0.508	20
Chromium	0.0500	0.00243	0.0487	0.0489	92.6	93.0	1	75.0-125			0.416	20
Copper	0.0500	0.0240	0.0682	0.0688	88.4	89.7	1	75.0-125			1.01	20
Cobalt	0.0500	ND	0.0489	0.0488	96.6	96.5	1	75.0-125			0.139	20
Potassium	5.00	3.10	7.96	8.02	97.1	98.4	1	75.0-125			0.793	20
Lead	0.0500	0.0227	0.0718	0.0715	98.2	97.6	1	75.0-125			0.373	20
Magnesium	5.00	15.7	20.7	20.5	98.8	96.0	1	75.0-125			0.680	20
Nickel	0.0500	0.00510	0.0528	0.0525	95.4	94.8	1	75.0-125			0.547	20
Selenium	0.0500	ND	0.0484	0.0493	96.7	98.7	1	75.0-125			1.96	20
Silver	0.0500	ND	0.0488	0.0496	97.7	99.1	1	75.0-125			1.45	20
Thallium	0.0500	ND	0.0493	0.0491	98.6	98.3	1	75.0-125			0.291	20
Vanadium	0.0500	ND	0.0489	0.0490	96.2	96.5	1	75.0-125			0.280	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3391371-1 03/13/19 20:50

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	0.000505	J	0.000250	0.00500
Nickel	U		0.000350	0.00200
Potassium	U		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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

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

(LCS) R3391371-2 03/13/19 20:54 • (LCSD) R3391371-3 03/13/19 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	0.500	0.497	0.471	99.4	94.2	80.0-120			5.35	20
Antimony	0.0500	0.0556	0.0565	111	113	80.0-120			1.59	20
Arsenic	0.0500	0.0475	0.0483	95.1	96.6	80.0-120			1.58	20
Barium	0.0500	0.0492	0.0485	98.4	97.0	80.0-120			1.41	20
Beryllium	0.0500	0.0414	0.0435	82.8	87.0	80.0-120			4.94	20
Cadmium	0.0500	0.0430	0.0437	86.1	87.5	80.0-120			1.65	20
Calcium	5.00	4.81	4.79	96.3	95.8	80.0-120			0.475	20
Chromium	0.0500	0.0489	0.0483	97.8	96.5	80.0-120			1.28	20
Copper	0.0500	0.0478	0.0471	95.7	94.3	80.0-120			1.49	20
Cobalt	0.0500	0.0477	0.0477	95.5	95.4	80.0-120			0.118	20
Iron	0.500	0.475	0.484	95.0	96.7	80.0-120			1.77	20



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

(LCS) R3391371-2 03/13/19 20:54 • (LCSD) R3391371-3 03/13/19 20:59

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	<u>LCS Qualifier</u>	<u>LCSD Qualifier</u>	RPD %	RPD Limits %
Lead	0.0500	0.0455	0.0455	91.0	91.0	80.0-120			0.0753	20
Magnesium	5.00	4.79	4.88	95.7	97.5	80.0-120			1.86	20
Manganese	0.0500	0.0474	0.0478	94.8	95.5	80.0-120			0.802	20
Nickel	0.0500	0.0478	0.0481	95.6	96.1	80.0-120			0.597	20
Potassium	5.00	4.76	4.87	95.2	97.4	80.0-120			2.35	20
Selenium	0.0500	0.0445	0.0465	89.0	93.1	80.0-120			4.51	20
Silver	0.0500	0.0500	0.0506	99.9	101	80.0-120			1.36	20
Sodium	5.00	4.83	4.77	96.6	95.3	80.0-120			1.36	20
Thallium	0.0500	0.0460	0.0460	92.1	92.1	80.0-120			0.0161	20
Vanadium	0.0500	0.0473	0.0485	94.6	97.1	80.0-120			2.56	20
Zinc	0.0500	0.0502	0.0487	100	97.4	80.0-120			2.99	20

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc

L1077349-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1077349-02 03/13/19 21:04 • (MS) R3391371-5 03/13/19 21:13 • (MSD) R3391371-6 03/13/19 21:18

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	<u>MS Qualifier</u>	<u>MSD Qualifier</u>	RPD %	RPD Limits %
Aluminum	0.500	0.0210	0.489	0.488	93.5	93.5	1	75.0-125			0.0681	20
Antimony	0.0500	U	0.0573	0.0572	115	114	1	75.0-125			0.149	20
Arsenic	0.0500	0.00224	0.0504	0.0496	96.3	94.8	1	75.0-125			1.46	20
Barium	0.0500	0.0676	0.116	0.117	97.4	98.1	1	75.0-125			0.311	20
Beryllium	0.0500	U	0.0445	0.0432	89.1	86.4	1	75.0-125			3.07	20
Cadmium	0.0500	U	0.0427	0.0423	85.4	84.6	1	75.0-125			0.922	20
Calcium	5.00	168	172	169	68.8	16.2	1	75.0-125	V	V	1.55	20
Chromium	0.0500	U	0.0478	0.0473	95.7	94.5	1	75.0-125			1.23	20
Copper	0.0500	0.000544	0.0460	0.0450	90.9	88.9	1	75.0-125			2.25	20
Cobalt	0.0500	U	0.0464	0.0459	92.9	91.7	1	75.0-125			1.21	20
Potassium	5.00	1.78	6.71	6.39	98.4	92.2	1	75.0-125			4.76	20
Iron	0.500	7.98	8.35	8.37	73.7	77.9	1	75.0-125	V		0.255	20
Lead	0.0500	U	0.0461	0.0458	92.2	91.6	1	75.0-125			0.696	20
Magnesium	5.00	40.1	45.1	44.7	98.9	92.0	1	75.0-125			0.769	20
Manganese	0.0500	0.825	0.858	0.861	66.0	70.7	1	75.0-125	V	V	0.272	20
Nickel	0.0500	U	0.0461	0.0470	92.3	93.9	1	75.0-125			1.77	20
Selenium	0.0500	U	0.0498	0.0473	99.6	94.6	1	75.0-125			5.12	20
Silver	0.0500	U	0.0505	0.0513	101	103	1	75.0-125			1.55	20
Sodium	5.00	35.8	40.9	41.3	103	111	1	75.0-125			1.01	20
Thallium	0.0500	U	0.0474	0.0467	94.7	93.4	1	75.0-125			1.39	20
Vanadium	0.0500	U	0.0472	0.0462	94.4	92.4	1	75.0-125			2.16	20
Zinc	0.0500	U	0.0494	0.0483	98.7	96.6	1	75.0-125			2.17	20



Method Blank (MB)

(MB) R3392678-1 03/18/19 11:17

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Antimony,Dissolved	U		0.000754	0.00200
Sodium,Dissolved	0.500	<u>J</u>	0.110	1.00

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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

(LCS) R3392678-2 03/18/19 11:22 • (LCSD) R3392678-3 03/18/19 11:27

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	%	%	%			%	%
Antimony,Dissolved	0.0500	0.0563	0.0549	113	110	80.0-120			2.39	20
Sodium,Dissolved	5.00	5.43	5.32	109	106	80.0-120			2.17	20

L1075545-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075545-02 03/18/19 11:31 • (MS) R3392678-5 03/18/19 11:40 • (MSD) R3392678-6 03/18/19 11:45

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	%	%		%			%	%
Antimony,Dissolved	0.0500	0.000839	0.0558	0.0583	110	115	1	75.0-125			4.40	20

L1075545-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1075545-02 03/18/19 17:16 • (MS) R3392678-11 03/18/19 17:26 • (MSD) R3392678-12 03/18/19 17:30

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,Dissolved	5.00	121	130	131	182	204	1	75.0-125	<u>V</u>	<u>V</u>	0.843	20



Method Blank (MB)

(MB) R3390986-4 03/12/19 13:23

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

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3390986-4 03/12/19 13:23

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) a,a,a-Trifluorotoluene	108			80.0-120
(S) 4-Bromofluorobenzene	106			77.0-126
(S) 1,2-Dichloroethane-d4	102			70.0-130

Laboratory Control Sample (LCS)

(LCS) R3390986-1 03/12/19 12:02

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Acetone	0.125	0.113	90.8	19.0-160	
Acrylonitrile	0.125	0.128	103	55.0-149	
Benzene	0.0250	0.0249	99.6	70.0-123	
Bromodichloromethane	0.0250	0.0263	105	75.0-120	
Bromoform	0.0250	0.0229	91.7	68.0-132	
Bromomethane	0.0250	0.0344	138	10.0-160	
Carbon disulfide	0.0250	0.0184	73.5	61.0-128	
Carbon tetrachloride	0.0250	0.0248	99.4	68.0-126	
Chlorobenzene	0.0250	0.0244	97.8	80.0-121	
Chlorodibromomethane	0.0250	0.0239	95.5	77.0-125	
Chloroethane	0.0250	0.0267	107	47.0-150	
Bromochloromethane	0.0250	0.0249	99.8	76.0-122	
Chloroform	0.0250	0.0253	101	73.0-120	
Chloromethane	0.0250	0.0187	75.0	41.0-142	
1,2-Dibromo-3-Chloropropane	0.0250	0.0232	93.0	58.0-134	
1,2-Dibromoethane	0.0250	0.0264	105	80.0-122	
Dibromomethane	0.0250	0.0266	106	80.0-120	
1,2-Dichlorobenzene	0.0250	0.0260	104	79.0-121	
1,4-Dichlorobenzene	0.0250	0.0250	100	79.0-120	
trans-1,4-Dichloro-2-butene	0.0250	0.0230	92.0	33.0-144	
1,1-Dichloroethane	0.0250	0.0252	101	70.0-126	
1,2-Dichloroethane	0.0250	0.0260	104	70.0-128	

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Laboratory Control Sample (LCS)

(LCS) R3390986-1 03/12/19 12:02

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	<u>LCS Qualifier</u>
1,1-Dichloroethene	0.0250	0.0214	85.7	71.0-124	
cis-1,2-Dichloroethene	0.0250	0.0265	106	73.0-120	
trans-1,2-Dichloroethene	0.0250	0.0251	100	73.0-120	
1,2-Dichloropropane	0.0250	0.0271	108	77.0-125	
cis-1,3-Dichloropropene	0.0250	0.0261	105	80.0-123	
trans-1,3-Dichloropropene	0.0250	0.0252	101	78.0-124	
Ethylbenzene	0.0250	0.0255	102	79.0-123	
2-Hexanone	0.125	0.127	101	67.0-149	
Iodomethane	0.125	0.0956	76.5	33.0-147	
2-Butanone (MEK)	0.125	0.127	102	44.0-160	
Methylene Chloride	0.0250	0.0237	94.7	67.0-120	
4-Methyl-2-pentanone (MIBK)	0.125	0.123	98.5	68.0-142	
Styrene	0.0250	0.0257	103	73.0-130	
1,1,1,2-Tetrachloroethane	0.0250	0.0250	99.8	75.0-125	
1,1,2,2-Tetrachloroethane	0.0250	0.0248	99.1	65.0-130	
Tetrachloroethene	0.0250	0.0239	95.8	72.0-132	
Toluene	0.0250	0.0237	94.9	79.0-120	
1,1,1-Trichloroethane	0.0250	0.0250	99.8	73.0-124	
1,1,2-Trichloroethane	0.0250	0.0248	99.2	80.0-120	
Trichloroethene	0.0250	0.0260	104	78.0-124	
Trichlorofluoromethane	0.0250	0.0283	113	59.0-147	
1,2,3-Trichloropropane	0.0250	0.0240	95.9	73.0-130	
Vinyl acetate	0.125	0.129	103	11.0-160	
Vinyl chloride	0.0250	0.0217	86.7	67.0-131	
Xylenes, Total	0.0750	0.0765	102	79.0-123	
(S) Toluene-d8			96.6	80.0-120	
(S) a,a,a-Trifluorotoluene			104	80.0-120	
(S) 4-Bromofluorobenzene			98.9	77.0-126	
(S) 1,2-Dichloroethane-d4			109	70.0-130	

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3391436-5 03/13/19 10:57

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
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethane	U		0.000259	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 Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3391436-5 03/13/19 10:57

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
Xylenes, Total	U		0.00106	0.00300
Vinyl chloride	U		0.000259	0.00100
(S) Toluene-d8	100			80.0-120
(S) a,a,a-Trifluorotoluene	111			80.0-120
(S) 4-Bromofluorobenzene	101			77.0-126
(S) 1,2-Dichloroethane-d4	104			70.0-130

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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

(LCS) R3391436-1 03/13/19 09:16 • (LCSD) R3391436-2 03/13/19 09:36

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 %
Benzene	0.0250	0.0242	0.0247	96.9	98.6	70.0-123			1.78	20
Acetone	0.125	0.0983	0.108	78.7	86.1	19.0-160			9.06	27
Acrylonitrile	0.125	0.125	0.128	99.7	102	55.0-149			2.33	20
Bromodichloromethane	0.0250	0.0278	0.0268	111	107	75.0-120			3.65	20
Bromochloromethane	0.0250	0.0269	0.0243	107	97.3	76.0-122			9.92	20
Bromoform	0.0250	0.0245	0.0246	98.0	98.3	68.0-132			0.351	20
Bromomethane	0.0250	0.0325	0.0321	130	128	10.0-160			1.10	25
Carbon disulfide	0.0250	0.0221	0.0225	88.5	90.2	61.0-128			1.93	20
Carbon tetrachloride	0.0250	0.0282	0.0285	113	114	68.0-126			0.932	20
Chlorobenzene	0.0250	0.0248	0.0256	99.3	102	80.0-121			2.93	20
Chlorodibromomethane	0.0250	0.0260	0.0267	104	107	77.0-125			2.87	20
Chloroethane	0.0250	0.0305	0.0299	122	119	47.0-150			2.20	20
Chloroform	0.0250	0.0261	0.0263	104	105	73.0-120			0.877	20
Chloromethane	0.0250	0.0203	0.0244	81.4	97.4	41.0-142			17.9	20
1,2-Dichloroethane	0.0250	0.0270	0.0266	108	107	70.0-128			1.48	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0236	0.0241	94.5	96.6	58.0-134			2.21	20
1,2-Dibromoethane	0.0250	0.0261	0.0262	104	105	80.0-122			0.483	20
Dibromomethane	0.0250	0.0254	0.0264	102	106	80.0-120			3.96	20
1,2-Dichlorobenzene	0.0250	0.0245	0.0260	98.0	104	79.0-121			5.94	20
1,4-Dichlorobenzene	0.0250	0.0245	0.0253	98.0	101	79.0-120			3.14	20
trans-1,4-Dichloro-2-butene	0.0250	0.0228	0.0234	91.2	93.5	33.0-144			2.46	20
1,1-Dichloroethane	0.0250	0.0257	0.0256	103	103	70.0-126			0.297	20



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

(LCS) R3391436-1 03/13/19 09:16 • (LCSD) R3391436-2 03/13/19 09:36

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 %
Ethylbenzene	0.0250	0.0257	0.0258	103	103	79.0-123			0.396	20
1,1-Dichloroethene	0.0250	0.0243	0.0254	97.1	102	71.0-124			4.50	20
cis-1,2-Dichloroethene	0.0250	0.0260	0.0270	104	108	73.0-120			3.68	20
trans-1,2-Dichloroethene	0.0250	0.0244	0.0256	97.8	102	73.0-120			4.60	20
1,2-Dichloropropane	0.0250	0.0255	0.0256	102	102	77.0-125			0.0299	20
cis-1,3-Dichloropropene	0.0250	0.0262	0.0265	105	106	80.0-123			1.24	20
trans-1,3-Dichloropropene	0.0250	0.0257	0.0262	103	105	78.0-124			1.87	20
2-Hexanone	0.125	0.122	0.127	97.9	102	67.0-149			4.06	20
Iodomethane	0.125	0.0669	0.0944	53.5	75.5	33.0-147		J3	34.0	26
2-Butanone (MEK)	0.125	0.116	0.120	92.7	96.2	44.0-160			3.64	20
Toluene	0.0250	0.0239	0.0240	95.7	96.2	79.0-120			0.543	20
Methylene Chloride	0.0250	0.0234	0.0238	93.7	95.2	67.0-120			1.60	20
4-Methyl-2-pentanone (MIBK)	0.125	0.117	0.121	93.8	97.0	68.0-142			3.31	20
Styrene	0.0250	0.0267	0.0268	107	107	73.0-130			0.397	20
1,1,1,2-Tetrachloroethane	0.0250	0.0261	0.0264	104	106	75.0-125			1.33	20
1,1,2,2-Tetrachloroethane	0.0250	0.0234	0.0239	93.6	95.6	65.0-130			2.21	20
Tetrachloroethene	0.0250	0.0252	0.0265	101	106	72.0-132			4.69	20
Xylenes, Total	0.0750	0.0745	0.0780	99.3	104	79.0-123			4.59	20
1,1,1-Trichloroethane	0.0250	0.0271	0.0276	108	111	73.0-124			1.95	20
1,1,2-Trichloroethane	0.0250	0.0259	0.0260	103	104	80.0-120			0.326	20
Trichloroethene	0.0250	0.0257	0.0260	103	104	78.0-124			1.13	20
Trichlorofluoromethane	0.0250	0.0308	0.0297	123	119	59.0-147			3.53	20
1,2,3-Trichloropropane	0.0250	0.0237	0.0242	94.9	96.7	73.0-130			1.91	20
Vinyl acetate	0.125	0.143	0.140	114	112	11.0-160			1.96	20
Vinyl chloride	0.0250	0.0279	0.0306	112	123	67.0-131			9.40	20
(S) Toluene-d8				100	99.1	80.0-120				
(S) a,a,a-Trifluorotoluene				107	108	80.0-120				
(S) 4-Bromofluorobenzene				107	104	77.0-126				
(S) 1,2-Dichloroethane-d4				112	109	70.0-130				

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



Method Blank (MB)

(MB) R3391081-1 03/12/19 23:24

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Ethylene Dibromide	U		0.0000240	0.0000100
1,2-Dibromo-3-Chloropropane	U		0.0000430	0.0000200

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1077754-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1077754-01 03/13/19 00:13 • (DUP) R3391081-3 03/13/19 00:01

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

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

(LCS) R3391081-4 03/13/19 02:14 • (LCSD) R3391081-5 03/13/19 04:40

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	%	%	%			%	%
Ethylene Dibromide	0.000250	0.000219	0.000227	87.6	90.8	60.0-140			3.59	20
1,2-Dibromo-3-Chloropropane	0.000250	0.000247	0.000258	98.8	103	60.0-140			4.36	20

L1077754-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1077754-02 03/12/19 23:49 • (MS) R3391081-2 03/12/19 23:36

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
	mg/l	mg/l	mg/l	%		%	
Ethylene Dibromide	0.000100	U	0.000106	106	1	64.0-159	
1,2-Dibromo-3-Chloropropane	0.000100	U	0.000107	107	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.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
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.

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Al
- 9 Sc

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

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

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	LA000356
Kentucky ^{1,6}	90010	South Carolina	84004
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1,4}	2006
Louisiana ¹	LA180010	Texas	T104704245-18-15
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

325 Seaboard Lane, Suite 170

Billing Information:

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

Pres
Chk

Analysis / Container / Preservative



12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859



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 #
181-364

Lab Project #
CEC-EWS CAMDEN LF

Collected by (print):
Geoff Bowald

Site/Facility ID #
CAMDEN, TN

P.O. #

Collected by (signature):
Geoff Bowald

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Immediately Packed on Ice N ___ Y

Date Results Needed

No. of Ctrts

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Ctrts	**WetChem** 250miHDPE-NoPres	ALK 100ml Amb-NoPres	COD,NH3 250miHDPE-H2SO4	Diss.Metals 250miHDPE ^{LF} No Pres.	SV8011: 40micir-NaThio	Total Metals, HARD 250miHDPE-HNO3	V8260AP1 40miAmb-HCl			
IWC-L	Grab	GW	-	3-4-19	12:50	11	X	X	X	X	X	X	X			
APWC-L	Grab	GW	-	3-4-19	11:50	11	X	X	X	X	X	X	X			

L# **L1077185**

Table #

Acctnum: **CEC**

Template: **T133582**

Prelogin: **P695694**

TSR: **526 - Chris McCord**

PB: **TB 2-26-19**

Shipped Via: **Courier**

Remarks

Sample # (lab only)

Loc: 490
169505

-01
02

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other

Remarks: ****WetChem** = *NITRATE*, CHLORIDE, BROMIDE, SULFATE, FLUORIDE, ALK Tot/Diss Metals=M6020AP1 + Al, Ca, Fe, K, Mg, Mn, Na, B(6010)**

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
___ UPS ___ FedEx ___ Courier _____

Tracking #

Received by: (Signature)

Trip Blank Received: Yes / No
HCL / MeOH
TBR

Sample Receipt Checklist

COC Seal Present/Intact: 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)

Temp: **5.1 °C**

Bottles Received: **22**

If preservation required by Login: Date/Time

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)
Keith Jeff

Date: **03-05-2019**

Time: **07:00**

Hold:

Condition: **NCF / OK**



COOLER RECEIPT FORM

L1677185

Cooler Received/Opened On 03-05-2019 @ 7:00
Time Samples Removed From Cooler 10:54 Time Samples Placed in Storage 11:12 (2 Hour Window)

- 1. Tracking # MA (last 4 digits, FedEx) Courier: Client
IR Gun ID 31470368 pH Strip Lot HC857466 Chlorine Strip Lot 083018
- 2. Temperature of rep. sample or temp blank when opened: 5.1 Degrees Celsius
- 3. If Item #2 temperature is 0°C or less, was the representative sample or temp blank frozen? YES NO...NA
- 4. Were custody seals on outside of cooler? YES...NO...NA
If yes, how many and where: _____
- 5. Were the seals intact, signed, and dated correctly? YES...NO...NA
- 6. Were custody papers inside cooler? YES...NO...NA

I certify that I opened the cooler and answered questions 1-6 (Initial) AK

- 7. Were custody seals on containers: YES NO and intact YES...NO...NA
Were these signed and dated correctly? YES...NO...NA
- 8. Packing mat'l used? Bubblewrap Plastic bag Peanuts Vermiculite Foam Insert Paper Other None
- 9. Cooling process: Ice Ice-pack Ice (direct contact) Dry ice Other None
- 10. Did all containers arrive in good condition (unbroken)? YES...NO...NA
- 11. Were all container labels complete (#, date, signed, pres., etc)? YES...NO...NA
- 12. Did all container labels and tags agree with custody papers? YES...NO...NA
- 13a. Were VOA vials received? YES...NO...NA
b. Was there any observable headspace present in any VOA vial? YES...NO...NA



- 14. Was there a Trip Blank in this cooler? YES...NO...NA If multiple coolers, sequence # _____

I certify that I unloaded the cooler and answered questions 7-14 (Initial) AK

- 15a. On pres'd bottles, did pH test strips suggest preservation reached the correct pH level? YES...NO...NA
b. Did the bottle labels indicate that the correct preservatives were used? YES...NO...NA
- 16. Was residual chlorine present? YES...NO...NA

I certify that I checked for chlorine and pH as per SOP and answered questions 15-16 (Initial) AK

- 17. Were custody papers properly filled out (ink, signed, etc)? YES...NO...NA
- 18. Did you sign the custody papers in the appropriate place? YES...NO...NA
- 19. Were correct containers used for the analysis requested? YES...NO...NA
- 20. Was sufficient amount of sample sent in each container? YES...NO...NA

I certify that I entered this project into LIMS and answered questions 17-20 (Initial) AK

I certify that I attached a label with the unique LIMS number to each container (Initial) AK

- 21. Were there Non-Conformance issues at login? YES...NO Was a NCM generated? YES...NO...# _____



Login #: L1077185	Client: CEC	Date: 3/6/19	Evaluated by: Jeremy
-------------------	-------------	--------------	----------------------

Non-Conformance (check applicable items)

Sample Integrity		Chain of Custody Clarification	
Parameter(s) past holding time		Login Clarification Needed	If Broken Container:
Temperature not in range		Chain of custody is incomplete	Insufficient packing material around container
Improper container type		Please specify Metals requested.	Insufficient packing material inside cooler
pH not in range.		Please specify TCLP requested.	Improper handling by carrier (FedEx / UPS / Courier)
Insufficient sample volume.		Received additional samples not listed on coc.	Sample was frozen
Sample is biphasic.		Sample ids on containers do not match ids on coc	Container lid not intact
Vials received with headspace.		Trip Blank not received.	If no Chain of Custody:
Broken container		Client did not "X" analysis.	Received by:
Broken container:	x	Chain of Custody is missing	Date/Time:
Sufficient sample remains			Temp./Cont. Rec./pH:
			Carrier:
			Tracking#

Login Comments: Received the following ID's no COC: IWC-L (3/4/19 1250) and APWC-L (3/4/19 1150) P695694/T133582

Client informed by:	Call	x	Email	Voice Mail	Date:3/7/19	Time:06:34
TSR Initials:CM	Client Contact: Philip Campbell					

Login Instructions:

Log per attached COC. Do not log NITRATE. Client recollected the sample.

This E-mail and any attached files are confidential, and may be copyright protected. If you are not the addressee, any dissemination of this communication is strictly prohibited. If you have received this message in error, please contact the sender immediately and delete/destroy all information received.

Civil & Environmental Consultants-TN
325 Seaboard Lane, Suite 170

Billing Information:

Pres Chk

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Face Analytical*
National Center for Testing & Innovation

Report to: Philip Campbell

Email To: pcompbell@cecinc.com

Project Description: Former EWS Camden Class 2 landfill

City/State Collected: Camden, TN
EWS

Phone: 615-333-7797

Client Project #: 181-364

Lab Project #

Collected by (print): Caleb Duke

Site/Facility ID #: EWS

P.O. #

Collected by (signature): *Caleb Duke*

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

Immediately

Packed on Ice N ___ Y X

Nc. of Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Nc. of Cntrs	Nitrate*
IWC-L	Grab	GW	—	3-7-19	9:10		X
APWC-L	Grab	GW	—	3-7-19	8:45		X

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859



LR 11677037
11077185
E003

AV
3/14/19

Acctnum:

Template:

Prelogin:

TSR:

PB:

Shipped Via:

Remarks

Sample # (lab only)

* Matrix: SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other

Remarks: RAD SCREEN: <0.5 mP/yr
Nitrate sample—please include in report with attached COC. Sample was out of hold pH ___ Temp ___
for nitrate, this is the re-sample.

Flow ___ Other ___

Samples returned via:
UPS ___ FedEx ___ Courier ___

Tracking # *Carrier*

Sample Receipt Checklist

COC Seal Present/Intact: 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) *Caleb Duke* Date: 3-8-19 Time: 10:00

Received by: (Signature) *Wagner Shull* Trip Blank Received: Yes/No 0 HCL/MeOH TBR

Temp: °C Bottles Received: 23.5 ± 0.23 2

Relinquished by: (Signature) *Wagner Shull* Date: 3/8/19 Time: 1455

Received (for lab) by: (Signature) *ADW* Date: 3/8/19 Time: 1455

Hold:

Condition: NCF / OK

AB

March 14, 2019

Civil & Environmental Consultants - TN

Sample Delivery Group: L1077037
Samples Received: 03/08/2019
Project Number: 181-364
Description: Former EWS Camden Class 2 Landfill
Site: EWS
Report To: Philip Campbell
325 Seaboard Lane, Suite 170
Franklin, TN 37067

Entire Report Reviewed By:



Jason Romer
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.



Cp: Cover Page	1	¹Cp
Tc: Table of Contents	2	²Tc
Ss: Sample Summary	3	³Ss
Cn: Case Narrative	4	⁴Cn
Sr: Sample Results	5	⁵Sr
IWC-L L1077037-01	5	
APWC-L L1077037-02	6	
Qc: Quality Control Summary	7	⁶Qc
Wet Chemistry by Method 9056A	7	
Gl: Glossary of Terms	8	⁷Gl
Al: Accreditations & Locations	9	⁸Al
Sc: Sample Chain of Custody	10	⁹Sc

SAMPLE SUMMARY



IWC-L L1077037-01 GW

Collected by: Caleb Duke
 Collected date/time: 03/07/19 09:10
 Received date/time: 03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1247235	1	03/09/19 00:57	03/09/19 00:57	ELN	Mt. Juliet, TN

1 Cp

2 Tc

3 Ss

APWC-L L1077037-02 GW

Collected by: Caleb Duke
 Collected date/time: 03/07/19 08:45
 Received date/time: 03/08/19 14:55

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 9056A	WG1247235	100	03/08/19 17:15	03/08/19 17:15	ELN	Mt. Juliet, TN

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



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.

Jason Romer
Project Manager

- 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	Qualifier	RDL	Dilution	Analysis date / time	Batch
Nitrate	ND		0.100	1	03/09/2019 00:57	WG1247235

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	Qualifier	RDL	Dilution	Analysis date / time	Batch
Nitrate	92.6		10.0	100	03/08/2019 17:15	WG1247235

¹ Cp

² Tc

³ Ss

⁴ Cn

⁵ Sr

⁶ Qc

⁷ Gl

⁸ Al

⁹ Sc



Method Blank (MB)

(MB) R3390105-1 03/08/19 11:17

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
Nitrate	U		0.0227	0.100

1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc

L1076816-10 Original Sample (OS) • Duplicate (DUP)

(OS) L1076816-10 03/08/19 16:13 • (DUP) R3390105-3 03/08/19 16:28

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Nitrate	0.230	0.235	1	2.28		15

Laboratory Control Sample (LCS)

(LCS) R3390105-2 03/08/19 11:32

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Nitrate	8.00	8.05	101	80.0-120	

L1076816-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1076816-10 03/08/19 16:13 • (MS) R3390105-4 03/08/19 16:44 • (MSD) R3390105-5 03/08/19 16:59

Analyte	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Nitrate	5.00	0.230	5.00	5.01	95.5	95.7	1	80.0-120			0.208	15

L1076825-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1076825-01 03/08/19 18:47 • (MS) R3390105-7 03/08/19 19:49

Analyte	Spike Amount	Original Result	MS Result	MS Rec.	Dilution	Rec. Limits	MS Qualifier
Nitrate	5.00	0.203	5.07	97.4	1	80.0-120	



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.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
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.

- 1 Cp
- 2 Tc
- 3 Ss
- 4 Cn
- 5 Sr
- 6 Qc
- 7 Gl
- 8 Ai
- 9 Sc

Qualifier Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.



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	LA000356
Kentucky ^{1,6}	90010	South Carolina	84004
Kentucky ²	16	South Dakota	n/a
Louisiana	AI30792	Tennessee ^{1,4}	2006
Louisiana ¹	LA180010	Texas	T104704245-18-15
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.



1 Cp

2 Tc

3 Ss

4 Cn

5 Sr

6 Qc

7 Gl

8 Al

9 Sc



EQUIPMENT CALIBRATION LOG

EQUIPMENT CALIBRATION FORM

NAME OF REPRESENTATIVE	A. Baugh
LOCATION	Korman Eng
DATE AND TIME	3/5/19
Equipment and Model # (ex. YSI Pro Plus 556)	YSI ProPlus
Equipment Serial #	#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	9/22	4.03	128.3	160 to 180	~	4.00	Y
7	3/20	7.00	-38.8	+/-50	Y	7.00	Y
10	12/19	10.08	-210.8	-160 to -180	N	10.08	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?

Specific Conductivity Calibration				ORP Calibration			
Sp. Conductivity Calibration Standard buffer solution	Buffer solution exp. date	Pre Cal Reading (umhos)	Post Cal Reading (umhos)	ORP Calibration (mV)	Buffer solution exp. date	Pre Cal Reading (mV)	Post Cal Reading (mV)
1409	6/2019	1373	1409				

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.ceclinc.com

SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	MONITORING WELL I.D.	MW-1
LOCATION	Camden, TN	TEMPERATURE & WEATHER	Clear, 28°F
DATE & TIME	3/5/19 1000	EVENT FREQUENCY	Quarterly
PURGE METHOD	Peristaltic Pump <i>low-flow</i>	FIELD REPRESENTATIVE	Philip Campbell / A. Baugh
TOTAL WELL DEPTH (feet)	30.5	SAMPLING EQUIPMENT	Baiter Bladder Pump
DEPTH TO WATER (feet)	20.61	IS SAMPLE EQUIPMENT DEDICATED?	No
CASING DIAMETER (inches)	2	DUPLICATE COLLECTED?	N
WATER COLUMN (feet)	9.89	FIELD BLANK COLLECTED?	N
PURGE VOLUME (gallons)	1.8	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	1015	20.61	11.6	4.85	81.3	5.53	158.5	40.7
.5	1019	20.70	12.5	5.18	85.1	4.26	145.7	37.6
.75	1023	20.71	13.4	5.41	87.1	3.64	131.6	21.4
1.0	1027	20.70	13.4	5.40	88.9	2.91	130.2	14.4
1.4	1031	20.70	13.4	5.47	92.1	2.32	124.2	8.60
1.8	1035	20.70	13.1	5.48	94.2	1.71	120.9	5.27

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
1.8	1035	20.70	13.1	5.48	94.2	1.71	120.9	5.27
Sample Characteristics (Odor, Color)		clear / odorless		Preservatives Used		see COC		
Number of Containers		see COC		Sampler Signature		<i>A. Baugh</i>		

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

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

SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	MONITORING WELL I.D.	MW-2
LOCATION	Camden, TN	TEMPERATURE & WEATHER	Clear, odorless
DATE & TIME	3/5/2019 1255	EVENT FREQUENCY	Quarterly
PURGE METHOD	NA, parameters only	FIELD REPRESENTATIVE	Philip Campbell / A. Baugh
TOTAL WELL DEPTH (feet)	10	SAMPLING EQUIPMENT	—
DEPTH TO WATER (feet)	4.94	IS SAMPLE EQUIPMENT DEDICATED?	No
CASING DIAMETER (inches)	2	DUPLICATE COLLECTED?	N
WATER COLUMN (feet)	5.06	FIELD BLANK COLLECTED?	N
PURGE VOLUME (gallons)	—	EQUIPMENT BLANK COLLECTED?	N

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
—	1255	—	10.0	6.17	362.2	162	135.8	1.28
Sample Characteristics (Odor, Color)			Preservatives Used					
Number of Containers			Sampler Signature			A. Baugh		

WELL DATA

Number of Baffles	4	Well Cap Dedicated/In Place?	No
Well Clear of Weeds/Accessible?	Yes	Fittings/Well Head Condition	N/A
Pad/Casing Quality	Fair, covered w/ soil + rock	Lock Condition	good



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	Clear; 28°F
DATE & TIME	3/5/14 1305	EVENT FREQUENCY	Quarterly
PURGE METHOD	Dedicated bladder pump	FIELD REPRESENTATIVE	Philip Campbell
TOTAL WELL DEPTH (feet)	27	SAMPLING EQUIPMENT	Bladder Pump
DEPTH TO WATER (feet)	14.68	IS SAMPLE EQUIPMENT DEDICATED?	No
CASING DIAMETER (Inches)	2	DUPLICATE COLLECTED?	Y/N
WATER COLUMN (feet)	12.32	FIELD BLANK COLLECTED?	N
PURGE VOLUME (gallons)	2.1	EQUIPMENT BLANK COLLECTED?	N

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	1310 1311	14.68	7.9	5.10	491.9	8.14	162.3	215
0.75	1315	14.70	9.2	5.13	212.9	6.64	156.7	138
1.0	1320 1319	14.70	9.0	5.08	205.9	6.64	154.7	22.7
1.4	1323	14.70	9.1	5.03	201.2	6.96	153.5	9.59
1.8	1327	14.70	9.0	5.01	198.1	7.15	152.2	6.23
2.1	1331	14.70	9.0	5.01	197.6	7.22	151.6	6.27

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.1	1335	14.70	9.0	5.01	197.6	7.22	151.6	6.27
Sample Characteristics (Odor, Color)		Clear; odorless		Preservatives Used		see COC		
Number of Containers		see COC		Sampler Signature		A. Bayl		

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

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-4
LOCATION	Camden, TN	TEMPERATURE & WEATHER	Clear, odorless
DATE & TIME	3/5/19 1200	EVENT FREQUENCY	Quarterly
PURGE METHOD	Peristaltic Pump	FIELD REPRESENTATIVE	Philip Campbell
TOTAL WELL DEPTH (feet)	23.1	SAMPLING EQUIPMENT	Bailer
DEPTH TO WATER (feet)	9.84	IS SAMPLE EQUIPMENT DEDICATED?	No
CASING DIAMETER (inches)	2	DUPLICATE COLLECTED?	no
WATER COLUMN (feet)	13.26	FIELD BLANK COLLECTED?	no
PURGE VOLUME (gallons)	2.4	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	1215	9.84	12.8	5.86	54.8	3.46	133.0	39.0
1.0	1219	9.92	12.8	5.81	55.1	3.06	130.2	18.4
1.25	1223	9.92	12.8	5.81	54.3	3.02	128.4	5.81
1.60	1227	9.92	12.9	5.80	54.5	3.00	128.4	4.28
1.9	1231	9.92	12.8	5.76	54.3	3.26	128.9	2.66
2.2	1235	9.92	12.8	5.76	54.3	3.26	128.9	2.14

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
2.4	1235	9.92	12.8	5.76	54.3	3.26	128.9	2.14
Sample Characteristics (Odor, Color)		clear; odorless		Preservatives Used		see coc		
Number of Containers		see coc		Sampler Signature		A. Campbell		

WELL DATA

Number of Baffles	None	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

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-5
LOCATION	Camden, TN	TEMPERATURE & WEATHER	Clear 20
DATE & TIME	3/5/19 1110	EVENT FREQUENCY	Quarterly
PURGE METHOD	Peristaltic Pump	FIELD REPRESENTATIVE	Philip Campbell / A. Baugh
TOTAL WELL DEPTH (feet)	33.85	SAMPLING EQUIPMENT	Bailer
DEPTH TO WATER (feet)	8.24	IS SAMPLE EQUIPMENT DEDICATED?	No
CASING DIAMETER (inches)	2	DUPLICATE COLLECTED?	N
WATER COLUMN (feet)	25.61	FIELD BLANK COLLECTED?	N
PURGE VOLUME (gallons)	1.2	EQUIPMENT BLANK COLLECTED?	N

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	1112	8.21	12.2	5.26	285.2	2.28	160.8	17.2
.25	1116	8.61	12.8	5.19	290.5	1.33	155.3	29.2
.50	1120	8.61	13.0	5.20	293.3	1.08	153.8	32.8
.65	1124	8.71	13.8	5.22	294.0	.97	152.2	33.5
.8	1128	8.70	14.1	5.25	290.3	.98	150.7	36.4
1.0	1132	8.71	13.7	5.26	284.8	.92	149.5	34.8
1.2	1136	8.71	13.9	5.26	285.6	.92	149.2	34.4

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
1.2	1140	8.71	13.9	5.26	285.6	.92	149.2	34.4
Sample Characteristics (Odor, Color)			Slightly Cloudy; no odor			Preservatives Used		
Number of Containers			See Col			Sampler Signature		

WELL DATA

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

0.00544 0.144



GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	MONITORING WELL I.D.	TMW-1
LOCATION	Camden, TN	TEMPERATURE & WEATHER	clear, 28°F
DATE & TIME	3-5-19 / 10:25	EVENT FREQUENCY	Quarterly
PURGE METHOD	Peristaltic Pump	FIELD REPRESENTATIVE	Philip Campbell
TOTAL WELL DEPTH (feet)	32.5	SAMPLING EQUIPMENT	Bailer
DEPTH TO WATER (feet)	5.20	IS SAMPLE EQUIPMENT DEDICATED?	No
CASING DIAMETER (inches)	1"	DUPLICATE COLLECTED?	No
WATER COLUMN (feet)	27.30	FIELD BLANK COLLECTED?	No
PURGE VOLUME (gallons)	1 vol = 1.11 Gallons	EQUIPMENT BLANK COLLECTED?	No

3 vol = 3.33 gallons **PURGE INFORMATION**

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	10:30	0	12.8	5.68	78.6	5.56	180.3	55
0.75	10:40	10	12.4	5.42	82.1	5.03	185.8	>1000
1.25	10:50	20	12.2	5.38	85.8	4.65	190.8	>1000
1.75	11:00	30	12.1	5.45	81.5	4.21	218.4	>1000
2.25	11:10	40	12.2	5.47	83.1	3.98	246.1	397
2.75	11:20	50	12.0	5.48	82.6	3.99	252.2	380
3.33	11:30	60	12.1	5.50	82.7	3.89	264.5	127

DTW
5.85
6.72
7.61
7.45
7.45
7.46
7.47

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
3.33	11:45	60	12.1	5.50	82.7	3.89	264.5	52.6
Sample Characteristics (Odor, Color)		clear / slightly cloudy		Preservatives Used				
Number of Containers		11		Sampler Signature		Philip Campbell		

Net or
F. 1 hr
NTU =
11.0

WELL DATA

Number of Baffles	0 Jersey Barrier	Well Cap Dedicated/In Place?	*twist cap OK / No protective
Well Clear of Weeds/Accessible?	yes/yes	Fittings/Well Head Condition	OK/OK
Pad/Casing Quality	No pad / PVC casing OK	Lock Condition	OK

steel cover



GROUNDWATER MONITORING FIELD INFORMATION LOG

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

SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	MONITORING WELL I.D.	TMW-2
LOCATION	Camden, TN	TEMPERATURE & WEATHER	Clear, sunny, 29°F
DATE & TIME	3-5-14 12:15	EVENT FREQUENCY	Quarterly
PURGE METHOD	Peristaltic Pump / <i>Low Flow & volumes</i>	FIELD REPRESENTATIVE	Philip Campbell
TOTAL WELL DEPTH (feet)	27.50	SAMPLING EQUIPMENT	Bailer peristaltic pump
DEPTH TO WATER (feet)	9.12	IS SAMPLE EQUIPMENT DEDICATED?	No
CASING DIAMETER (inches)	1	DUPLICATE COLLECTED?	No
WATER COLUMN (feet)	18.38	FIELD BLANK COLLECTED?	No
PURGE VOLUME (gallons)	1 vol = 0.75 Gallons 3 vol = 2.25 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
0	12:20	0	11.6	5.55	87.9	6.38	308.2	36.4	11.99
0.75	12:30	10	12.0	5.54	85.3	5.56	310.9	310.0	12.25
1.25	12:40	20	12.6	5.58	82.8	5.69	315.2	52.2	12.95
1.75	12:50	30	12.4	5.54	80.6	5.41	324.8	11.4	13.05
2.25	13:00	40	12.9	5.55	82.2	4.97	327.0	69.5	13.14
2.75	13:10	50	12.7	5.56	82.1	5.33	330.5	56.3	13.14

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU	NTU =
2.75	13:15	50	12.7	5.56	82.1	5.33	330.5	36.0	1.34 after
Sample Characteristics (Odor, Color)			Mostly clear, Lt. haz, No odor			Preservatives Used			
Number of Containers			1			Sampler Signature			Philip Campbell

WELL DATA

Number of Baffles	0 = Jersey Barrier	Well Cap Dedicated/In Place?	Has twist cap, No protective cover.
Well Clear of Weeds/Accessible?	yes/yes	Fittings/Well Head Condition	OK/OK
Pad/Casing Quality	good No Pad / casing OK	Lock Condition	OK



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.	TMW-3
LOCATION	Camden, TN	TEMPERATURE & WEATHER	Clear, Sunny, 29°F
DATE & TIME	3-5-19 / 13:50	EVENT FREQUENCY	Quarterly
PURGE METHOD	Peristaltic Pump - low flow 5 volumes	FIELD REPRESENTATIVE	Philip Campbell
TOTAL WELL DEPTH (feet)	28.00	SAMPLING EQUIPMENT	Bailer - peristaltic pump
DEPTH TO WATER (feet)	7.63	IS SAMPLE EQUIPMENT DEDICATED?	No
CASING DIAMETER (inches)	4	DUPLICATE COLLECTED?	NO
WATER COLUMN (feet)	20.37	FIELD BLANK COLLECTED?	
PURGE VOLUME (gallons)	1 vol ≈ 0.83 gallons 3 vol ≈ 2.50 gallons	EQUIPMENT BLANK COLLECTED?	NA

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0	1355	0	11.3	5.18	229.1	1.87	364.1	653
0.75	1405	10	12.3	5.16	232.2	0.80	340.0	>1000
1.25	1415	20	11.8	5.19	206.3	0.97	334.9	512
1.75	1425	30	12.0	5.15	206.5	0.97	334.8	390
2.25	1435	40	11.9	5.18	205.6	1.04	332.5	235
2.75	1445	50	12.2	5.19	207.0	1.63	331.5	98

DTW
-
8.75
8.75
5.76
8.77
8.77

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
	1500							38.2
Sample Characteristics (Odor, Color)	clear, No odor		Preservatives Used					
Number of Containers	11		Sampler Signature			Philip Campbell		

@ metals
NTU =
0.84
after
filter

WELL DATA

Number of Baffles	0 - Jersey Baffle	Well Cap Dedicated/In Place?	Twist cap OK & in place, No protective casing
Well Clear of Weeds/Accessible?	yes/yes	Fittings/Well Head Condition	OK/OK
Pad/Casing Quality	No pad / PVC casing OK	Lock Condition	OK

see 1
protective
casing



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.	APWC Leachate
LOCATION	Camden, TN	TEMPERATURE & WEATHER	35° CLEAR
DATE & TIME	3/4/19	EVENT FREQUENCY	Quarterly
PURGE METHOD	Grab	FIELD REPRESENTATIVE	G. Boudin
TOTAL WELL DEPTH (feet)	NA	SAMPLING EQUIPMENT	YSI/TURBID
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
5	11:50	10 MIN	13.3	7.1	133499	0.17	80.6	2.53
Sample Characteristics (Odor, Color)	CLEAR/BLUE/INT/ANODIA			Preservatives Used				
Number of Containers	11			Sampler Signature	G. Boudin			



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	35 CLEAR
DATE & TIME	3/4/19 12:50	EVENT FREQUENCY	Quarterly
PURGE METHOD	Grab	FIELD REPRESENTATIVE	G. Brubaker
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
-	12:50	-	6.3	5.06	109/20	100.0	197.2	15.9
Sample Characteristics (Odor, Color)	Leachate		Preservatives Used			3.80		
Number of Containers	SealCOC		Sampler Signature			G. Brubaker		

Civil & Environmental Consultants - TN

325 Seaboard Lane, Suite 170

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

Pres
Chk

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 #
181-364

Lab Project #
CEC-EWS CAMDEN LF

Collected by (print):
Philip Campbell / Adrian Baugh

Site/Facility ID #
CAMDEN, TN

P.O. #

Collected by (signature):
Philip Campbell

Rush? (Lab MUST Be Notified)

Quote #

___ Same Day ___ Five Day
 ___ Next Day ___ 5 Day (Rad Only)
 ___ Two Day ___ 10 Day (Rad Only)
 ___ Three Day

Date Results Needed

Immediately
 Packed on Ice N ___ Y

No.
of
Cntrs

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	**WetChem** 250mlHDPE-NoPres	ALK 100ml Amb-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-Bik
MW-1	Grab	GW	-	3-5-19		11	X	X	X	X	X	X	X	
MW-3		GW	-			11	X	X	X	X	X	X	X	
MW-4		GW	-			11	X	X	X	X	X	X	X	
MW-5		GW	-			11	X	X	X	X	X	X	X	
TMW-1		GW	-		11:45	11	X	X	X	X	X	X	X	
TMW-2		GW	-		12:15	11	X	X	X	X	X	X	X	
TMW-3		GW	-		15:00	11	X	X	X	X	X	X	X	
DUPLICATE		GW	-			11	X	X	X	X	X	X	X	
FIELD BLANK		GW	-			10	X	X	X		X	X	X	
EQUIPMENT-BLANK		GW	-			10	X	X	X		X	X	X	

* Matrix:
 SS - Soil AIR - Air F - Filter
 GW - Groundwater B - Bioassay
 WW - WasteWater
 DW - Drinking Water
 OT - Other

Remarks:**WetChem** = *NITRATE*,CHLORIDE,BROMIDE,SULFATE,FLUORIDE,ALK
 Tot/Diss Metals=M6020AP1+Al,Ca,Fe,K,Mg,Mn,Na,B(6010/7470).

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
 ___ UPS ___ FedEx ___ Courier

Tracking #

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)

Trip Blank Received: Yes / No
 HCL / MeOH
 TBR

Relinquished by: (Signature)

Date:

Time:

Received by: (Signature)

Temp: °C Bottles Received:

If preservation required by Login: Date/Time

Relinquished by: (Signature)

Date:

Time:

Received for lab by: (Signature)

Date: Time:

Hold:

Condition:
 NCF / OK

12065 Lebanon Rd
 Mount Juliet, TN 37122
 Phone: 615-758-5858
 Phone: 800-767-5859
 Fax: 615-758-5859



L #

Table #

Acctnum: **CEC**

Template: **T133579**

Prelogin: **P695699**

TSR: **526 - Chris McCord**

PB:

Shipped Via: **Courier**

Remarks

Sample # (lab only)

GAO
JDW
3-7-19

Sampling
65, SW

EWS

Cane Creek DS-1

photos

8:30

pH 6.28

1+2

DO 11.88

Cond 95.0

ORP 126.2

Temp 3.69

Turb 8.22

Cane Creek MS

photos

9:00

pH 6.51

3+4

DO 11.63

Cond 92.0

ORP 104.8

Temp 3.8°C

Turb 7.55

Charlie Creek MS

photos

9:10

pH 6.49

5+6

DO 11.63

Cond 71.0

ORP 139.6

Temp 3.8°C

Turb 7.19

Cane Creek

Charlie

Cane Creek US

Photos
7+8

10:00

pH	6.47
DO	11.87
Cond	92.7
orp	112.0
Temp	3.8°C
Turb	9.09

Charlize Creek US

Photos

10:10

pH	6.27
DO	11.71
Cond	53.3
orp	166.4
Temp	3.9°C
Turb	9.09 5.57

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 ± 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.