FOURTH QUARTER 2018 GROUNDWATER ASSESSMENT MONITORING REPORT DECEMBER 2018 MONITORING EVENT

FORMER ENVIRONMENTAL WASTE SOLUTIONS CAMDEN CLASS II LANDFILL

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

Prepared for:
THE TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION

FORMER ENVIRONMENTAL WASTE SOLUTIONS CAMDEN CLASS II LANDFILL

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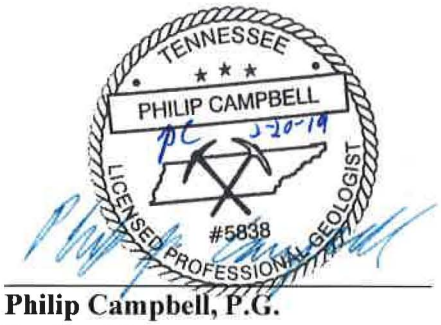

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EXECUTIVE SUMMARY

This report documents the fourth quarter 2018 assessment-monitoring event, which was performed at the former Environmental Waste Solutions, LLC (EWS) Camden Class II Landfill on December 4, 2018.

The former EWS Camden Class II Landfill is located in Benton County at 200 Omar Circle, Camden, Tennessee (latitude 36°03'16" N/longitude -88°05'16" W), and was formerly registered with the Tennessee Division of Solid Waste Management (DSWM) with permit number IDL 03-0212, and previously received secondary aluminum smelter waste for disposal including aluminum dross, salt cakes, and other industrial wastes. The IDL 03-0212 permit was terminated in July 2017.

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

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

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

Groundwater samples were collected by CEC on December 4, 2018 from MW-1, MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-3. Leachate samples were collected by CEC on December 4, 2018 from the "Aluminum Processing Waste Cell (APWC)" and "Industrial Waste Cell (IWC)" locations. On December 12, 2018, surface water and sediment samples were collected from Cane Creek and Charlie Creek by CEC. The stream (surface water and sediment) sample locations included Charlie Creek Upstream (US), Charlie Creek Midstream (MS), Cane Creek US, Cane Creek MS, and Cane Creek Downstream (DS-1).

Pace Analytical (Pace), formerly ESC Lab Sciences, was the laboratory sub-contracted to perform the chemical analyses. Laboratory reports for the 4th quarter 2018 groundwater and leachate analysis were prepared by Pace and reported to CEC on December 14, 2018. Laboratory reports from the 4th quarter 2018 stream (surface water and sediment) analysis were prepared by Pace and reported to CEC on December 21, 2018.

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

Total arsenic was detected above the MCL (0.01 mg/l) at up-gradient MW-1 during the December 4, 2018 monitoring event (total arsenic at MW-1=0.0254 mg/l) and was the only arsenic detection above the MCL at any of the groundwater monitoring well locations. The presence of total arsenic in the local groundwater near up-gradient monitoring well MW-1 may be attributable to naturally occurring deposits in the soil overburden, since there is no immediate development up-gradient of MW-1 and there were no detections of total arsenic in any of the down-gradient monitoring wells.

Total cadmium was detected above the MCL (0.005 mg/l) at MW-3 during the December 4, 2018 monitoring event (total cadmium at MW-3 = 0.144 mg/l). Total cadmium was also detected above the MCL in the duplicate sample collected at MW-3 during the December 4, 2018 monitoring event (total cadmium at MW-3 duplicate sample = 0.137 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 December 4, 2018 sampling event (total cadmium at MW-3=0.144 mg/l) was lower in concentration than the previous 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 fourth quarter 2018 monitoring event compared to the previous third 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 December 12, 2018 monitoring event. Total cadmium was detected in the sediment sample collected from Cane Creek MS at a relatively low concentration during the December 2018 event (total cadmium=0.566 mg/kg), which was the only reported cadmium detection above the laboratory PQL of 0.500 mg/kg during this event. The relatively low cadmium concentration observed in the sediment sample collected at Cane Creek MS may be from naturally occurring cadmium levels found in the sediments.

Five 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), fluoride (MW-3), zinc (MW-3), and sulfate (MW-3). The chloride, fluoride, and zinc detections observed in the site monitoring wells were all below their associated MCLs or 2DWS. However, the sulfate detection observed in MW-3 (324 mg/l) was above the 2DWS (250 mg/l).

Glossary of Terms

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

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

1.0 INTRODUCTION

1.1 SITE LOCATION

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

1.2 CURRENT ACTIVITIES

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

2.0 AQUIFER CHARACTERISTICS

2.1 GEOLOGIC AND AQUIFER CHARACTERISTICS

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

2.1.1 Camden and Harriman Formations

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

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

2.2 MONITOR WELL INTEGRITY & STATIC WATER LEVELS

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

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

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

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

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

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

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

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

2.3 GROUNDWATER FLOW DIRECTION

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

2.4 POTENTIOMETRIC GRADIENT

The potentiometric surface of the unconfined aquifer occurring beneath the former EWS Class II Landfill occurs at approximately twenty-two (22) feet below the top of casing at the up-gradient monitor well MW-1 to approximately ten (11) feet below the top of casing at monitor well MW-4. The potentiometric gradient calculated from groundwater elevation data collected on December 4, 2018 is approximately 1.26%.

The potentiometric gradient is calculated according to the following formula:

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

$$\frac{(394.62') - (370.60')}{1{,}910'} * 100 = 1.26\%$$

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 December 4, 2018 monitoring event, a peristaltic pump was utilized during purging activities in the temporary monitoring wells (TMW-1, TMW-2, and TMW-3). According to the USEPA SESD groundwater sampling procedures, peristaltic pumps can be utilized as an alternative and acceptable method for low-flow or multiple volume purging and sampling activities.

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

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

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

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

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

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

3.3 GROUNDWATER SAMPLE COLLECTION & PRESERVATION

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

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

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

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

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

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

3.4.1 Stream Sampling

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

3.4.2 Sediment Sampling

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

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

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

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

3.5 LEACHATE SAMPLING PROCEDURES

Leachate samples were collected by CEC on December 4, 2018, from the "Aluminum Processing Waste Cell (APWC)" and "Industrial Waste Cell (IWC)" locations. The APWC leachate sample was collected from the leachate collection system associated with the aluminum processing waste cell and was collected directly from the associated leachate collection hose before the leachate entered the APWC leachate collection tanks. The IWC leachate sample was collected from the leachate collection system associated with the industrial waste cell and was collected directly from the associated leachate collection hose within the secondary containment area before the leachate entered the IWC leachate collection tank. Laboratory reports from the leachate analysis were prepared by Pace and reported to CEC on December 4, 2018. The approximate APWC and IWC leachate sample locations are shown on Figure 2 - Potentiometric Surface Map located in Appendix A.

3.6 QUALITY ASSURANCE AND QUALITY CONTROL

3.6.1 Field Quality Assurance and Quality Control

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

A field blank and a duplicate sample were collected during this groundwater-monitoring event. CEC collected a field blank next to monitoring well TMW-3 and a duplicate sample was collected from MW-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 December 14, 2018. 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, with the exception of total Hardness and Chemical Oxygen Demand (COD). Concentrations of total hardness (417 mg/l) and COD (14.8 mg/l) were reported in MW-3. However, the laboratory report indicated that total hardness (PQL=30.0 mg/l) and COD (PQL=10.0 mg/l) were not detected above their respective PQL in the duplicate sample collected from MW-3. On January 29, 2019, CEC contacted Pace Analytical concerning the differences in the reported total Hardness and COD detections. Pace Analytical indicated that the COD was likely reporting within the statistical variation of the test for results just above the PQL. Pace Analytical also indicated that the original MW-3 sample was re-analyzed for total Hardness, and the re-analysis resulted in a concentration similar to the original MW-3 analysis (417 mg/l), confirming the total Hardness reported result at MW-3. The total Hardness concentration reported below the PQL in the duplicate sample at MW-3 may have been mislabeled by the laboratory.

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 December 2018 event indicated that the same analyte was found in the associated laboratory blank for the detected concentrations of total Hardness (TMW-1), aluminum (MW-3, MW-5, TMW-1, TMW-2, TMW-3), dissolved chromium

(MW-3), dissolved iron (MW-4), and dissolved sodium (MW-1, MW-4, TMW-1, TMW-2) and are indicated as laboratory qualifier "B"; the detected nitrate concentration at TMW-3 indicated the associated batch IQC was outside the established quality control range for precision. 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 December 2018 sampling event. The CEC SOP 07-01-01 for maintaining sample Chain of Custody may is presented in Appendix D – CEC Standard Operating Procedures.

4.0 LABORATORY ANALYTICAL PROCEDURES

4.1 ANALYTICAL METHODS

All laboratory analyses for the fourth quarter 2018 groundwater assessment-monitoring event were completed by Pace Analytical. The analytical methods chosen for these monitoring events were in full compliance with the procedures required by the DSWM and the USEPA's publication SW-846, entitled Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (3rd Edition).

The SW-846 methods used for the analysis of **groundwater and leachate samples** were as follows:

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

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

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

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

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

4.2 LABORATORY ANALYTICAL RESULTS

Fourth quarter groundwater samples were collected by CEC on December 4, 2018. Pace performed the groundwater analysis and reported the results on December 14, 2018. Fourth quarter leachate samples were collected by CEC on December 4, 2018 from the "Aluminum Processing Waste Cell (APWC)" and "Industrial Waste Cell (IWC)" leachate sample locations. Pace performed the leachate analysis and reported the results on December 14, 2018. Fourth quarter stream (surface water and sediment) samples were collected from the Cane Creek and Charlie Creek by CEC on December 12, 2018, and Pace reported the results on December 21, 2018.

Constituent values from all inorganic laboratory analyses for groundwater and leachate samples, along with applicable MCLs or 2DWSs, are presented in Table 2a – Groundwater and Leachate Analytical Data in Appendix A. Constituent values from all inorganic laboratory analyses for stream and sediment samples collected on December 12, 2018 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 December 4, 2018 monitoring event (total cadmium at MW-3 = 0.144 mg/l). In addition, total cadmium was detected above the MCL in the duplicate sample collected from MW-3 during the December 4, 2018 monitoring event (total cadmium at duplicate MW-3=0.137 mg/l). The total cadmium concentrations at MW-3 and the duplicate sample collected at MW-3 during this December 4, 2018 monitoring event were lower and appear to be decreasing in concentration compared to the previous September 12, 2018 event and the September 27, 2018 confirmatory re-sample event at MW-3. Although the total cadmium concentrations at MW-3 appear to be decreasing since the September 12, 2018 event, the total cadmium concentration at MW-3 during this event remains higher than the June 19, 2018 monitoring event, the March 22, 2018 monitoring event, and the December 14, 2017 monitoring event. The turbidity results for MW-3 on December 4, 2018 (4.77 NTUs), September 12, 2018 (1.12 NTUs), September 27, 2018 (1.05 NTUs), and June 18, 2018 (4.92 NTUs) events were within the recommended goal of 10 NTUs. The turbidity results for MW-3 on March 22, 2018 (24.3 NTUs), December 14, 2017 (23 NTUs), and September 28, 2017 (18.9 NTUs) at the time of sample collection were slightly above the recommended goal of 10 NTUs. The sampling results from the December 4, 2018 groundwater event and the previous six sampling events (from September 28, 2017 to September 27, 2018) 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, in MW-3 during the 4th quarter 2016 sampling event completed on November 10, 2016. Total cadmium was first detected above the MCL 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. Regardless, the elevated total cadmium detections at MW-3 during this event remain a cause for concern.

Total Cobalt was detected in up-gradient well MW-1 (0.0284 mg/l) and down-gradient wells MW-3 (0.0219 mg/l), MW-3 duplicate (0.0211 mg/l), and MW-5 (0.00264 mg/l) during this December 2018 event. Cobalt does not have an MCL; however, TDEC-DSWM uses the EPA regional screening level (RSL) of 0.006 mg/l as the groundwater protection standard for this constituent. The reported cobalt detections at upgradient MW-1 and downgradient MW-3 (and the MW-3 duplicate) were above the RSL for cobalt concentrations during this December 2018 event. Cobalt has historically been detected at concentrations that exceed the RSL at MW-1 prior to the disposal of waste in the landfill, and total cobalt was detected in MW-1 at similar concentrations during the previous March 2018 event and December 2017 event. 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 (0.00356 mg/l), MW-3 duplicate (0.00325 mg/l), MW-4 (0.00269 mg/l), MW-5 (0.00885 mg/l), TMW-1 (0.00224 mg/l), TMW-2 (0.00259 mg/l), and TMW-3 (0.00211 mg/l), and were not above the MCL of 0.1 mg/l for chromium concentrations.

Total Copper was detected in up-gradient well MW-1 (0.00715 mg/l) and down-gradient MW-3 (0.0082 mg/l), and were not above the MCL of 1.3 mg/l for copper concentrations.

Total Mercury was detected in up-gradient well MW-1 (total mercury = 0.00101 mg/l) during this December 2018 monitoring event, which was below the MCL of 0.002 mg/l for mercury concentrations. 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 December of 2018 from the former EWS Class II Landfill groundwater monitoring well network indicated that five of the site-specific groundwater-monitoring list of compounds were detected at concentrations 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 MW-3, TMW-1, TMW-2, and TMW-3, iron in down-gradient wells MW-3, MW-4, MW-5, TMW-1, TMW-2, and TMW-

3, manganese in down-gradient wells MW-3 and MW-5, and sulfate in down-gradient well MW-3. Chloride 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 MW-3 (0.638 mg/l), TMW-1 (0.315 mg/l), TMW-2 (1.26 mg/l), and TMW-3 (0.276 mg/l) during the December 2018 sampling event were above the 2DWS (0.2 mg/L). During the previous 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. In addition, during the June 2018 sampling event, the aluminum concentrations at TMW-1 (1.35 mg/l), TMW-2 (11.0 mg/l), and TMW-3 (0.696 mg/l) were above the 2DWS. Aluminum was not detected above the PQL (0.001 mg/l) at MW-1 and MW-4 during this December 2018 event. It should be noted that the 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 this event may have been falsely reported at higher concentrations than the actual concentrations.

Sampling data suggests that total aluminum concentrations are sensitive to turbidity values, given that the dissolved aluminum concentrations at MW-5 and TMW-1 were less than the laboratory PQL (<0.1 mg/l). The total aluminum detection at TMW-2 was also likely affected by the turbidity at the time of sampling (turbidity at TMW-2=63.2 NTU), and is supported by the fact that the dissolved aluminum at TMW-2 (dissolved aluminum=0.731 mg/l) was lower in concentration than the total aluminum concentration. Each dissolved metals sample was field-filtered using a 0.45 micron filter before sample collection, and the turbidity in the field-filtered samples at TMW-1 (0.56 NTU) and TMW-3 (1.39 NTU) were below the recommended 10 NTUs. It should also be noted that although each sample was field-filtered using a 0.45-micron filter before sample collection, the turbidity at TMW-2 (34.1 NTU) remained elevated after field filtering, indicating that very small (<0.45 micron) colloidal clay particles were able to pass through the filter and remain in the water column.

The **Chloride** concentrations reported at MW-3 (65.0 mg/l) and MW-5 (72.5 mg/l) during this December 2018 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 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 thirteen monitoring events since November 21, 2014. 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 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 (6.39 mg/l) and down-gradient wells MW-3(0.356 mg/l), MW-4 (0.358 mg/l), MW-5 (0.896 mg/l), TMW-1 (0.769 mg/l), TMW-2 (1.67 mg/l), and TMW-3 (1.17 mg/l) during the December 2018 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 (0.667 mg/l) and down-gradient wells MW-3 (2.38 mg/l) and MW-5 (0.139mg/l) during the December 2018 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 (0.00744 mg/l) and down-gradient wells MW-3 (0.0714 mg/l) and MW-5 (0.00902 mg/l) during the December 4, 2018 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 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 324 mg/l, which was above the 2DWS for sulfate (250 mg/l). The observed Sulfate concentration at MW-3 during this event was lower in concentration than 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/) 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 (5.93 mg/l) was just above the laboratory PQL of 5.00 mg/l during this December 2018 event, which was well below the 2DWS. Sulfate was not detected above the PQL in any of the other monitoring wells across the site.

Total Magnesium does not currently have an established MCL, 2DWS, EPA RSL, or an approved alternate groundwater protection standard (GWPS). The total magnesium concentration at MW-3 during this December 2018 event was 36.4 mg/l, and was lower in concentration than the previous September 2018 event. 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 December 4, 2018 monitoring event. Total cadmium was detected in the sediment sample collected from Cane Creek MS at a relatively low concentration during the December 2018 event (total cadmium=0.566 mg/kg), which was the only reported cadmium detection above the laboratory PQL of 0.500 mg/kg during this event. Total cadmium was detected at Charlie Creek MS at a concentration of 3.27 mg/kg during the previous initial September 20, 2018 sampling event, which was the only reported cadmium detection above the laboratory PQL of 0.500 mg/kg. However, total cadmium was not detected above the laboratory PQL of 0.500 mg/kg in the sediment at Charlie Creek MS during the October 29, 2018 re-sample event. No firm conclusions can be made at this time concerning the relatively low total cadmium detections reported at Cane Creek MS during this event or Charlie Creek MS during the previous initial September 20, 2018 sampling event. In 2001, the University of Tennessee Department of Geology prepared a report that was published by the Tennessee Department of Environment and Conservation-Division of Geology titled *Hazardous Trace Elements in Tennessee Soils and Other Regolith* which stated "uncontaminated, uncultivated soils generally contain from <0.1 ppm for soils derived from igneous rocks to 11 ppm cadmium for soils derived from sedimentary rocks" (Kopp, 2001). Furthermore, according to Kopp, 2001, "a statistical summary prepared by the Tennessee Division of Superfund (DSF) in 1996 reported a cadmium concentration range of <0.1 ppm to 13 ppm for 149 [soil] samples analyzed throughout Tennessee", and the "DSF study concluded that the naturally occurring background level of cadmium in Tennessee was 1.0 ppm". Therefore, the relatively low cadmium concentrations observed in the sediment samples may be from naturally occurring cadmium levels found in the sediments. While the Kopp, 2001 document shows that cadmium is naturally occurring in Tennessee soils and sediments, stream (surface water and sediment) sampling will continue to be monitored and evaluated for the presence of total cadmium during future quarterly events.

4.4 QUALITY CONTROL QUALIFIER CODES

The EPA Contract Laboratory Program states that sample and result qualifiers should be utilized as part of a total quality-control process. Pace complies with this directive and reports all qualifiers along with explanations of QC qualifier codes. Five QC qualifier codes (B, J3, J4, J6 and P1) were indicated during the laboratory analysis of samples collected in December 2018. Two QC qualifier codes (B and J3) were indicated during the laboratory analysis of groundwater samples. One QC qualifier code (B) was indicated during the laboratory analysis of leachate samples. Four QC

qualifier code (B, J4, J6, and P1) 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 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 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, chloride, 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, fluoride at MW-3, sulfate at MW-3, and zinc at MW-3. Trend analyses revealed a statistically significant upward trend in total barium, total cadmium, chloride, fluoride, sulfate, and zinc concentrations reported at MW-3; a statistically significant upward trend in chloride concentrations was reported at MW-5 and TMW-1; and a statistically significant upward trend in sulfate concentrations was reported at MW-5.

Trend analyses revealed a statistically significant downward trend in chromium and cobalt at MW-3 with no distinct statistically significant trends with aluminum, copper, 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 cadmium, calcium, magnesium, manganese, nickel, potassium, zinc, chloride, fluoride, and sulfate at MW-3 decreased in concentration during this fourth quarter 2018 monitoring event compared to the previous third quarter 2018 monitoring event. During the previous third quarter 2018 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 the previous third quarter 2018 monitoring event was higher than previous monitoring events since the April 2016 monitoring event. However, the conductivity measurements during this event were lower than the previous third quarter 2018 monitoring event.

Trend analysis revealed a statistically significant upward trend in the barium data at MW-3 using the Mann-Kendall trend analysis. However, the total barium concentration at MW-3 (0.0485 mg/l) during this sampling event did not produce a SSI over background using the Shewart-CUSUM control chart at MW-3. The total barium concentration at MW-3 was lower than the previous September 27, 2018 re-sample event (0.078 mg/l) and the initial September 2018 event (0.147 mg/l). Further, the reported barium concentration at MW-3 during this event was less than the twenty-one consecutive sample results collected at MW-3 from July 16, 2010 to September 27, 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 December 4, 2018 (0.144 mg/l and 0.137 mg/l in duplicate sample) were lower in concentration than the previous September 12, 2018 (0.297 mg/l) and the subsequent re-sample event on September 27, 2018 (0.204 mg/l and 0.206 mg/l in duplicate sample).

The chloride concentrations observed at MW-3 (65.0 mg/l), MW-5 (72.5 mg/l), TMW-1 (12.1 mg/l), TMW-2 (16.6 mg/l), and TMW-3 (52.2 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, TMW-2, and TMW-3, 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, and TMW-1 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 (0.00356 mg/l), MW-4 (0.00269 mg/l), MW-5 (0.00884 mg/l), TMW-1 (0.00224 mg/l), TMW-2 (0.00259 mg/l), and TMW-3 (0.00211 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=0.400 mg/l) produced an SSI over background during this event and the statistical trend analysis for total fluoride at MW-3 during this December 2018 event confirmed an increasing trend having statistical significance. However, the reported fluoride concentration at MW-3 during this event was less than the previous September 2018 event (Fluoride at MW-3=0.543 mg/l), which 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 324 mg/l, and was lower in concentration than 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 (5.93 mg/l) during this December 2018 event, which was well below the 2DWS. 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 December 2018 event (total zinc at MW-3=1.34 mg/l) confirmed an increasing trend having statistical significance. However, the zinc concentration reported during this event was less than the initial September 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), which was the highest reported 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 fourth quarter assessment-monitoring event of 2018 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, fluoride at MW-3, sulfate at MW-3, and zinc at MW-3. Trend analyses revealed a statistically significant upward trend in total barium, total cadmium, chloride, fluoride, sulfate, and zinc concentrations reported at MW-3; a statistically significant upward trend in chloride concentrations reported at MW-5 and TMW-1; and a statistically significant upward trend in sulfate concentrations reported at MW-5.
- The total and dissolved cadmium concentrations at MW-3 during this event were above the MCL during this event. 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 September 2018 monitoring event, cadmium concentrations were higher in MW-3 than the concentrations detected in the current, December 2018 event. The higher concentrations in September may be attributable to on-going closure construction activities in and around the storm water pond located immediately adjacent to MW-3 at that time. As construction activities wind down at the site, it is anticipated that the cadmium levels in MW-3 will trend down over time. However, the detections of total cadmium and dissolved cadmium at MW-3 remain at levels above the MCL, and the accompanying statistically significant trend analysis for cadmium in MW-3 remains an area of concern.
- The sulfate concentration reported at MW-3 during this sampling event was 324 mg/l, which was above the 2DWS for sulfate (250 mg/l). In addition, a SSI was identified for the reported sulfate concentration at MW-3 and the sulfate concentration at MW-3 exhibited a statistically significant increasing trend. The observed sulfate concentration at MW-3 during this event was lower in concentration than the previous September 2018 event. Sulfate was also detected in MW-5 (5.93 mg/l) during this December 2018 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. However, the sulfate concentration above the 2DWS during this event at MW-3 is an area of concern. 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 fourth quarter 2018 monitoring event compared to the previous third quarter 2018 monitoring event.

During the previous 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 previous 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 were considerably lower than the previous third quarter 2018 monitoring event.

- The chloride concentrations at MW-4, MW-5, TMW-1, TMW-2, and TMW-3 are still well below the 250 mg/l 2DWS.
- Trend analyses revealed a statistically significant downward trend in chromium and cobalt concentrations reported at MW-3, and no distinct statistically significant trend in aluminum, copper, and nickel concentrations were reported at MW-3. When considering all chloride data to date from MW-4, TMW-2, and TMW-3, 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 December 4, 2018 monitoring event. Total cadmium was detected in the sediment sample collected from Cane Creek MS at a relatively low concentration during the December 2018 event (total cadmium=0.566 mg/kg), which was the only reported cadmium detection above the laboratory PQL of 0.500 mg/kg during this event. During the previous September 20, 2018 event, total cadmium was detected at Charlie Creek MS at a relatively low concentration (total cadmium = 3.27 mg/kg), which was the only reported cadmium detection above the laboratory PQL of 0.500 mg/kg. However, samples taken during the re-sample event on October 29, 2018 did not have any detections for total cadmium above the laboratory PQL of 0.500 mg/kg in the sediment at Charlie Creek MS. No firm conclusions can be made at this time concerning the relatively low total cadmium detections reported at Cane Creek MS during this event, or Charlie Creek MS during the initial September 20, 2018 sampling event. However, previous documentation has shown that cadmium is naturally occurring in Tennessee soils and sediments (see section 4.3 and 8.0 for additional detail regarding naturally occurring cadmium in Tennessee soils and sediments), and the relatively low cadmium concentrations observed in the sediment samples may be from naturally occurring cadmium levels found in the sediments. Although previous documentation has shown

that cadmium is naturally occurring in Tennessee soils and sediments, stream (surface water and sediment) sampling will continue to be monitored and evaluated for the presence of total cadmium during future quarterly events.

- No constituents were detected above regulatory limits at any of the stream (surface water and sediment) samples. Sediment samples do not have an MCL and surface water is compared to general water quality criteria.

The first quarter 2019 assessment-monitoring event is tentatively scheduled for March 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 2017. Therefore, an updated annual water use survey was completed in December 2018. In summary, CEC obtained a current listing of the registered water well data from the DWR for the Camden (20-SE) quadrangle on November 30, 2018 and reviewed it for new drinking water sources within the specified search radius. No new wells or springs were identified within the approved search radius for the site. CEC also conducted a visual (drive-by) search of properties located within the specified search radius to identify any new drinking water wells or springs that may not have been formally reported to TDEC-DWS. The drive-by search was performed on December 4, 2018, in conjunction with the 4th quarter groundwater-sampling event. No new wells or springs were identified during the annual water use survey update completed in December 2018. For recordkeeping purposes, the 2018 annual water use survey update for the site will be submitted in a separate report and will include tables, figures, and other pertinent information.

7.0 RECOMMENDATIONS

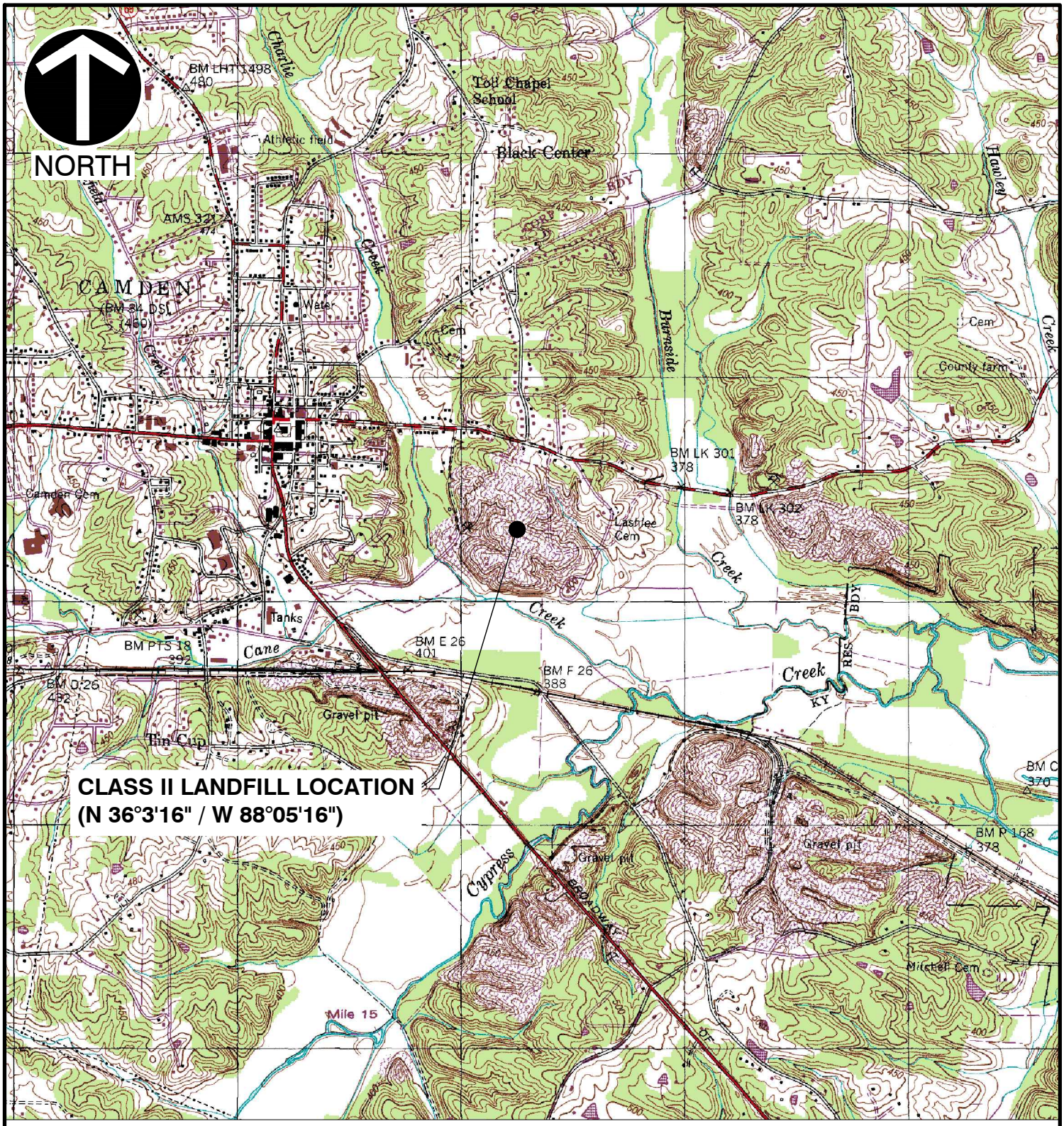
The following recommendations are presented in an effort to ensure the continuance of securing representative groundwater samples and to obtain analytical results with a high-degree of accuracy and precision (i.e., repeatability).

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.

8.0 REFERENCES

Kopp, Otto C. Department of Geological Sciences, University of Tennessee, Knoxville (2001), "*Hazardous Trace Elements in Tennessee Soils and Other Regolith*-Tennessee Department of Environment and Conservation-Division of Geology-Report Investigations No. 49".

APPENDIX A
MAPS & TABLES



REFERENCE

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

SCALE IN FEET

0 2000' 4000'

* HAND SIGNATURE ON FILE

Civil & Environmental Consultants, Inc.

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FORMER EWS SITE
CLASS II CAMDEN LANDFILL
CAMDEN, TENNESSEE

SITE LOCATION MAP

DRAWN BY:	KLU	CHECKED BY:	PC	APPROVED BY:	KBW*	FIGURE NO.:	1
DATE:	JANUARY 2019	DWG SCALE:	1"=2000'	PROJECT NO:	181-364		

P:\2018\181-364\-CADD\Dwg\181-364_ SITE LOCATION MAP.dwg[LAYOUT1] LS:(1/29/2019 - pcampbell) - LP: 2/19/2019 3:52 PM

NORTH

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.

$$i = \frac{394.62' \text{ (MW-1)} - 370.60' \text{ (MW-4)}}{1{,}910'} = 0.0126 \text{ ft/ft}$$

GROUNDWATER CONDITIONS

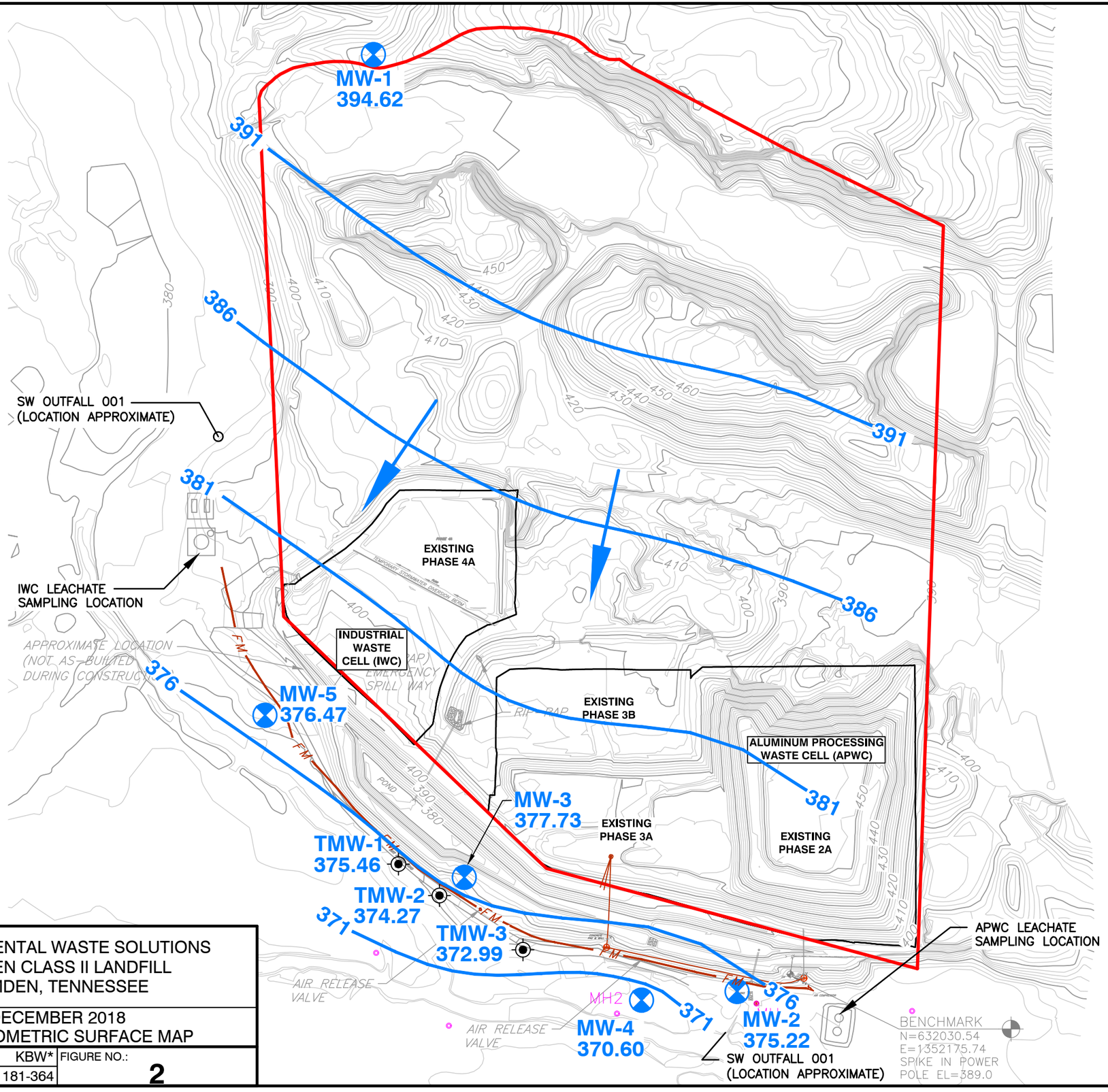
THE WATER LEVELS PRESENTED HEREIN ARE APPLICABLE TO THE LOCATION AND TIME OF MEASUREMENT. WATER LEVELS MAY FLUCTUATE THROUGH TIME.

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

SCALE IN FEET

0 200 400

*HAND SIGNATURE ON FILE



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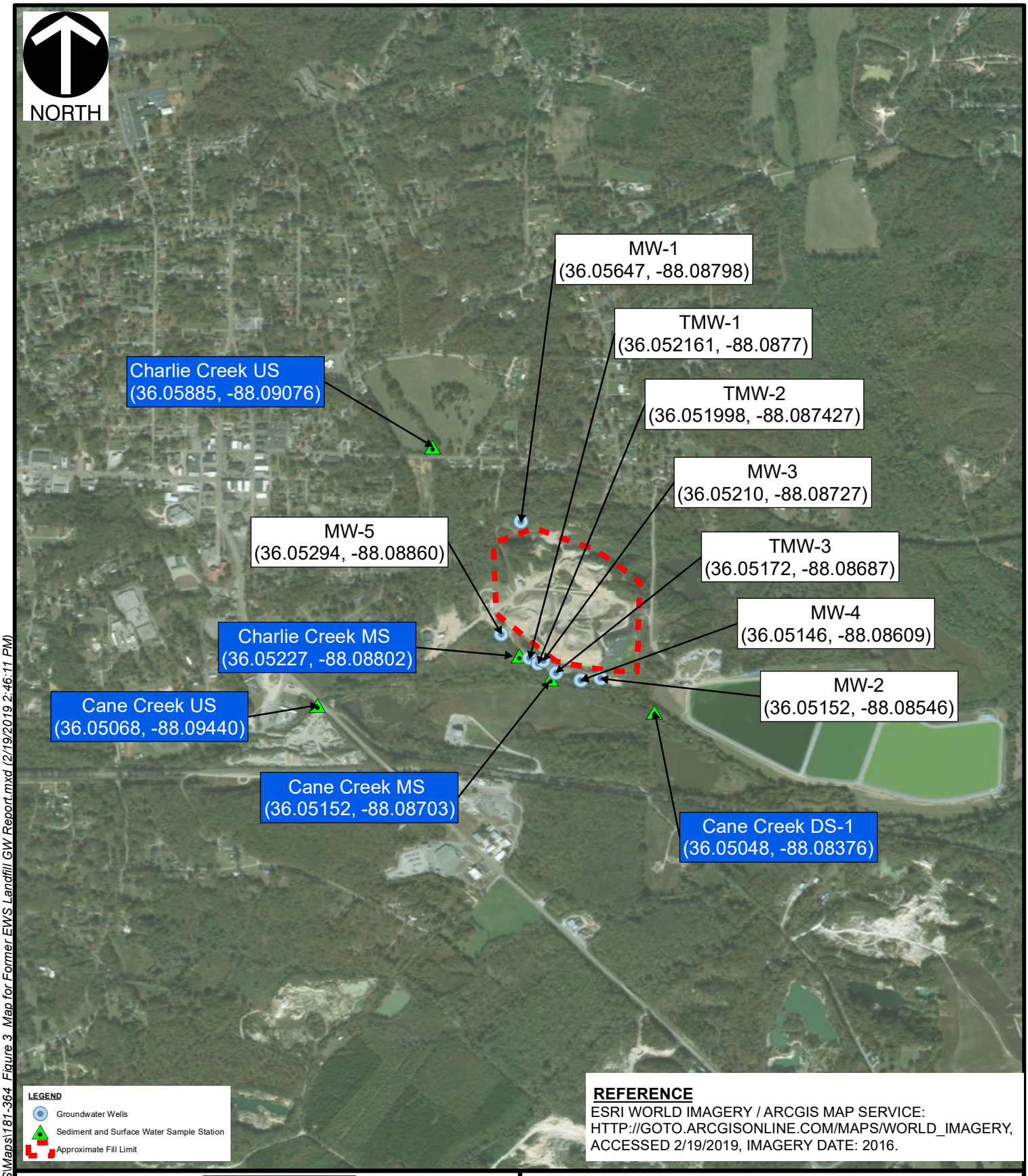
ENVIRONMENTAL WASTE SOLUTIONS
CAMDEN CLASS II LANDFILL
CAMDEN, TENNESSEE

DECEMBER 2018
POTENTIOMETRIC SURFACE MAP

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

P:\2018\181-364\-CADD\DWG\181-364_ GROUNDWATER MAP DECEMBER 2018.DWG(FIG 2 (2)LS:(PCAMPBELL - 1/29/2019) - LP: 2/7/2019_2:37:11_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* * Hand signature on file	FIGURE NO:	3
DATE:	FEBRUARY 2019	SCALE:	1 " = 1,500 '	PROJECT NO:	181-364		

\\SVR-NASH\ P:\2018\181-364\-GIS\Maps\181-364 Figure 3 Map for Former EWS Landfill GW Report.mxd (2/19/2019 2:46:11 PM)

Table 1

Former Environmental Waste Solutions Camden Class II Landfill

Field Parameters and Potentiometric Data - December 2018

Monitoring Well/ Sample Location	Date	Sample Time	Top of Casing Elevation[1] (Feet MSL)	Bottom of Well Elevation (Feet)	Well Diameter (Feet)	Well Volume Gallons	Depth to Water (Feet)[2]	Potentiometric Surface (Feet MSL)	Temperature (˚C)	Conductivity (micromhos/cm)	pH (SU)	Dissolved Oxygen (mg/l)	Oxidation Reduction Potential (Millivolts)	Turbidity (NTU)
MW-1	12/4/2018	10:50	416.47	385.97	0.17	1.5	21.85	394.62	15.0	80.4	5.75	0.56	97.9	6.44
MW-2*	12/4/2018	13:02	380.35	367.70	0.17	1.3	5.13	375.22	14.1	325.2	6.19	1.52	125.9	4.08
MW-3	12/4/2018	12:45	392.90	365.10	0.17	2.1	15.17	377.73	11.1	704	5.00	1.23	131.2	4.77
MW-4	12/4/2018	12:35	381.47	358.37	0.17	2.1	10.87	370.60	14.4	62.1	5.95	2.68	110.7	4.52
MW-5	12/4/2018	11:40	385.25	351.40	0.17	4.3	8.78	376.47	15.0	279.2	5.31	0.72	122.5	26.8
TMW-1	12/4/2018	11:25	381.19	348.99	0.085	1.1	5.73	375.46	15.1	85.3	5.83	4.71	237.9	39.4
TMW-2	12/4/2018	13:00	384.27	356.77	0.085	0.7	10.00	374.27	15.3	89.0	5.80	5.15	252.1	63.2
TMW-3	12/4/2018	15:15	381.37	353.37	0.085	0.8	8.38	372.99	15.2	221.0	5.44	1.42	267.9	31.7
Charlie Creek US	12/4/2018	10:35	NA	NA	NA	NA	NA	NA	5.7	64.6	7.07	NS	88.3	6.94
Cane Creek US	12/4/2018	10:15	NA	NA	NA	NA	NA	NA	5.0	115.2	7.06	NS	90.5	7.50
Charlie Creek MS	12/4/2018	9:30	NA	NA	NA	NA	NA	NA	5.3	78.1	7.12	NS	88.8	5.80
Cane Creek MS	12/4/2018	9:10	NA	NA	NA	NA	NA	NA	4.9	107.0	7.07	NS	91.9	7.32
Cane Creek DS-1	12/4/2018	8:45	NA	NA	NA	NA	NA	NA	4.8	109.8	7.10	NS	90.3	7.34
Leachate (IWC-L)	12/4/2018	14:55	NA	NA	NA	NA	NA	NA	13.7	121,423	4.22	3.64	293.5	14.3
Leachate (APWC-L)	12/4/2018	14:45	NA	NA	NA	NA	NA	NA	6.3	132,073	9.99	0.83	150.3	16.4

[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 December 04, 2018.

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

NS= Not Sampled

NA= Not Applicable.

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

		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	
		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018	
Parameter	**MCL/GWPS (mg/l)**	**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**	
Hardness	-	<30.0		**417**		<30.0		<30.0		**89.4**		**30.0**	B	<30.0		<30.0		<30.0		**38,700**		**251**	B
Alkalinity	-	**40.8**		<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		<20.0		**4,760**	
Ammonia Nitrogen	-	<0.100		<0.100		<0.100		<0.100		<0.100		<0.100		<0.100		<0.100		<0.100		**1,270**		**4,100**	
COD	-	<10.0		**14.8**		<10.0		<10.0		<10.0		<10.0		<10.0		<10.0		<10.0		**6,730**		**4,490**	
Boron	-	<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<2.00		**5.48**	
Boron, Dissolved	-	<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		<0.200		NS		NS		NS	
Bromide	-	<1.00		<5.00		<5.00		<1.00		<1.00		<1.00		<1.00		<1.00		<1.00		**<100**		**82.1**	
Chloride	250 [2]	**1.67**		**65.0**		**66.8**		**6.97**		**72.5**		**12.1**		**16.6**		**52.2**		<1.00		**82,500**		**79,800**	
Fluoride	2 [2]	<0.100		**0.400**		**0.404**		<0.100		<0.100		<0.100		<0.100		<0.100		<0.100		**85.8**		**11.5**	
Nitrate	10	<0.100		**1.49**		**1.32**		**0.236**		**0.87**		**0.905**		**0.399**		**3.46**	J3	<0.100		<0.100		**31.9**	
Sulfate	250 [2]	<5.00		**324**		**325**		<5.00		**5.93**		<5.00		<5.00		<5.00		<5.00		**1,320**		**736**	
Aluminum	0.2 [2]	<0.100		**0.638**	B	**0.672**		<0.100		**0.174**	B	**0.315**	B	**1.26**		**0.276**	B	<0.100		**161**		<10.0	
Aluminum, Dissolved	0.2 [2]	<0.100		**0.621**		**0.588**		<0.100		<0.100		<0.100		**0.731**		**0.142**	B	NS		NS		NS	
Antimony	0.006	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.0200		<0.200	
Arsenic	0.01	**0.0254**		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		**0.217**		<0.200	
Arsenic, Dissolved	0.01	**0.0271**		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS		NS		NS	
Barium	-	**0.0199**		**0.0485**		**0.0465**		**0.0101**		**0.0494**		**0.0145**		**0.0373**		**0.0457**		<0.00500		**2.46**		**0.924**	
Barium, Dissolved	-	**0.0181**		**0.0463**		**0.0447**		**0.00732**		**0.0372**		**0.00692**		**0.0281**		**0.0356**		NS		NS		NS	
Beryllium	0.004	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		**0.0334**		<0.200	
Total Cadmium	0.005	<0.00100		**0.144**		**0.137**		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		**67.3**		<0.100	
Cadmium, Dissolved	0.005	<0.00100		**0.139**		**0.133**		<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		NS		NS		NS	
Calcium	-	**3.75**		**82.7**		**79.6**		**4.76**		**15.7**		**8.95**		**8.06**		**18.7**		<1.00		**9,820**		<100	
Calcium, Dissolved	-	**3.09**		**78.5**		**75.2**		**4.48**		**14.6**		**8.09**		**7.03**		**17.0**		NS		NS		NS	
Chromium	0.1	<0.00200		**0.00356**		**0.00325**		**0.00269**		**0.00884**		**0.00224**		**0.00259**		**0.00211**		<0.00200		<0.400		<0.200	
Chromium, Dissolved	0.1	<0.00200		**0.00222**	B	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS		NS		NS	
Cobalt	0.006 [3]	**0.0284**		**0.0219**		**0.0211**		<0.00200		**0.00264**		<0.00200		<0.00200		<0.00200		<0.00200		**0.474**		<0.200	
Cobalt, Dissolved	0.006 [3]	**0.0283**		**0.0224**		**0.0210**		<0.00200		**0.00235**		<0.00200		<0.00200		<0.00200		NS		NS		NS	
Copper	1.3	**0.00715**		**0.0082**		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		**5.55**		**13.9**	
Copper, Dissolved	1.3	<0.00500		<0.00500		<0.00500		<0.00500		0.00507		<0.00500		<0.00500		<0.00500		NS		NS		NS	
Iron	0.3 [2]	**12.6**		**0.356**		**0.393**		**0.358**		**0.896**		**0.769**		**1.67**		**1.17**		<0.100		**339**		<10.0	
Iron, Dissolved	0.3 [2]	**12.4**		**0.382**		**0.256**	B	<0.100		<0.100		<0.100		**0.817**		<0.100		NS		NS		NS	
Lead	0.015	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		**0.294**		<0.200	
Lead, Dissolved	0.015	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS					
Magnesium	-	**2.51**		**36.4**		**35.2**		**2.59**		**10.80**		**2.35**		**2.88**		**5.86**		<1.00		**1,070**		<100	
Magnesium, Dissolved	-	**2.33**		**34.6**		**33.3**		**2.51**		**10.0**		**2.10**		**2.58**		**5.36**		NS		NS		NS	

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

		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	
		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018		12/4/2018	
Parameter	**MCL/GWPS (mg/l)**	**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**	
Manganese	0.05 [2]	**0.667**		**2.38**		**2.25**		**0.0290**		**0.139**		**0.0136**		**0.0255**		**0.0211**		<0.00500		**132**		<0.500	
Manganese, Dissolved	0.05 [2]	**0.625**		**2.25**		**2.17**		**0.0297**		**0.126**		<0.00500		**0.0123**		**0.0109**		NS		NS		NS	
Nickel	0.10 [1]	**0.00744**		**0.0714**		**0.0699**		<0.00200		**0.00902**		<0.00200		<0.00200		<0.00200		<0.00200		**0.505**		<0.200	
Nickel, Dissolved	0.10 [1]	**0.00687**		**0.0713**		**0.0663**		<0.00200		**0.00747**		<0.00200		<0.00200		<0.00200		NS		NS		NS	
Potassium	-	**1.81**		**11.0**		**10.2**		<1.00		**1.60**		**1.11**		**1.19**		**1.88**		<1.00		**10,900**		**23,000**	
Potassium, Dissolved	-	**1.11**		**9.57**		**9.20**		<1.00		**1.33**		<1.00		**1.01**		**1.52**		NS		NS		NS	
Selenium	0.05	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		**0.431**		<0.200	
Selenium, Dissolved	0.05	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NS		NS		NS	
Silver	0.10 [2]	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.0200		<0.200	
Sodium	-	**4.58**		**18.9**		**17.4**		**4.09**		**19.1**		**3.65**		**4.09**		**11.0**		<1.00		**16,700**		**30,700**	
Sodium, Dissolved	-	**2.73**	B	**17.1**		**16.5**		**3.76**	B	**18.0**		**2.87**	B	**3.76**	B	**9.79**		NS		NS		NS	
Thallium	0.002	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		0.0231		<0.200	
Vanadium	-	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<0.0500		<0.500	
Zinc	5 [2]	<0.0250		**1.34**		**1.40**		<0.0250		<0.0250		<0.0250		<0.0250		<0.0250		<0.0250		**659**		**2.58**	
Zinc, Dissolved	5 [2]	<0.0250		**1.30**		**1.24**		<0.0250		<0.0250		<0.0250		<0.0250		<0.0250		NS		NS		NS	
Mercury	0.002	**0.00101**		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		**0.000804**		<0.000200	
Mercury, Dissolved	0.002	**0.00115**		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		NS		NS		NS	
Acetone	-	<0.0500		<0.0500		<0.0500		<0.0500		<0.0500		<0.0500		<0.0500		<0.0500		<0.0500		**1.58**		**0.702**	
2-Butanone (MEK)	-	<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		**0.267**		**0.0671**	
Toluene	1.0	<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		<0.0100		**0.00534**		<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		**0.000144**		<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.

J3-The associated batch QC was outside the established quality control range for precision.

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

	Stream Samples (Water)										Sediment Samples (Solids)									
	Charlie Creek US		Charlie Creek MS		Cane Creek US		Cane Creek MS		Cane Creek DS-1		Charlie Creek US		Charlie Creek MS		Cane Creek US		Cane Creek MS		Cane Creek DS-1	
	12/12/2018		12/12/2018		12/12/2018		12/12/2018		12/12/2018		12/12/2018		12/12/2018		12/12/2018		12/12/2018		12/12/2018	
Parameter	**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/l)**		**Value (mg/kg)**		**Value (mg/kg)**		**Value (mg/kg)**		**Value (mg/kg)**		**Value (mg/kg)**	
Total Hardness	**30.5**		**39.7**		**65.4**		**64.9**		**62.1**		NA		NA		NA		NA		NA	
Ammonia (as N)	<0.100		<0.100		<0.100		<0.100		<0.100	J6	NA		NA		NA		NA		NA	
Boron	<0.200		<0.200		<0.200		<0.200		<0.200		<10		<10		<10		<10		<10	
Bromide	<1.00		<1.00		<1.00		<1.00		<1.00		<10.0		<10.0		<10.0		<10.0		<10.0	
Chloride	**12.2**		**15.4**		**14.2**		**15.3**		**16.4**		<10.0	P1	**24.7**		<10.0		**11.5**		<10.0	
Fluoride	**0.169**		**0.205**		**0.235**		**0.210**		**0.197**		<1.00	P1	<1.00		<1.00		<1.00		<1.00	
Aluminum	**0.186**		**0.121**		**0.224**		**0.176**		**0.191**		**804**		**567**		**809**		**1,100**		**853**	
Aluminum (Dissolved-LF)	<0.100		<0.100		<0.100		<0.100		<0.100		NA		NA		NA		NA		NA	
Antimony	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<2.00		<2.00		<2.00		<2.00		<2.00	
Arsenic	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<2.00		<2.00		<2.00		<2.00		<2.00	
Arsenic (Dissolved-LF)	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		NA		NA		NA		NA		NA	
Barium	**0.0352**		**0.0384**		**0.0385**		**0.0384**		**0.0411**		**11.0**		**7.71**		**26.0**		**11.2**		**8.98**	
Barium (Dissolved-LF)	**0.0347**		**0.0392**		**0.0371**		**0.0378**		**0.0394**		NA		NA		NA		NA		NA	
Beryllium	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<0.200		<0.200		<0.200		<0.200		<0.200	
Total Cadmium	<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		<0.500		<0.500		<0.500		**0.566**		<0.500	
Cadmium (Dissolved-LF)	<0.00100		<0.00100		<0.00100		<0.00100		<0.00100		NA		NA		NA		NA		NA	
Calcium	**10.5**		**13.2**		**17.5**		**16.9**		**16.8**		<100		<100		**1410**		**174**		**111**	
Calcium (Dissolved-LF)	**9.79**		**12.2**		**16.1**		**15.6**		**15.9**		NA		NA		NA		NA		NA	
Chromium	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		**5.57**		**2.62**		**4.40**		**4.18**		**4.11**	
Cobalt	<0.00200		<0.00200		**0.00388**		**0.00297**		**0.00298**		**1.37**		<1.00		**1.62**		**1.35**		**1.10**	
Cobalt (Dissolved-LF)	<0.00200		<0.00200		**0.00272**		<0.00200		<0.00200		NA		NA		NA		NA		NA	
Copper	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		<2.00		<2.00		<2.00		<2.00		<2.00	
Copper, (Dissolved-LF)	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		NA		NA		NA		NA		NA	
Iron	**0.576**		**0.599**		**1.43**		**1.11**		**1.18**		**3,530**		**2,160**		**3,590**		**3,100**		**3,720**	
Iron (Dissolved-LF)	**0.206**		**0.211**		**0.262**		**0.228**		**0.278**		NA		NA		NA		NA		NA	
Lead	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		**1.79**		**1.00**		**3.71**		**2.72**		**3.06**	
Magnesium	**2.41**		**2.92**		**6.58**		**5.68**		**5.71**		<100		<100		**127**		<100		<100	
Magnesium (Dissolved-LF)	**2.22**		**2.76**		**6.00**		**5.19**		**5.28**		NA		NA		NA		NA		NA	
Manganese	**0.177**		**0.293**		**0.705**		**0.606**		**0.625**		**129**		**142**		**121**		**167**		**127**	
Manganese (Dissolved-LF)	**0.144**		**0.264**		**0.631**		**0.520**		**0.549**		NA		NA		NA		NA		NA	
Nickel	**0.00363**		**0.00354**		**0.00847**		**0.00649**		**0.00645**		<2.00		<2.00		<2.00		<2.00		<2.00	
Nickel, (Dissolved-LF)	**0.00325**		**0.0028**		**0.00663**		**0.00609**		**0.00556**		NA		NA		NA		NA		NA	
Potassium	**1.27**		**1.47**		**1.86**		**1.90**		**2.03**		<100		<100		**117**		**125**		**120**	
Potassium (Dissolved-LF)	**1.37**	B	**1.58**	B	**2.02**		**1.97**	B	**2.11**		NA		NA		NA		NA		NA	
Selenium	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<2.00		<2.00		<2.00		<2.00		<2.00	
Silver	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<1.00		<1.00		<1.00		<1.00		<1.00	
Sodium	**6.02**		**6.72**		**7.95**		**7.57**		**8.01**		<100		<100		<100		<100		<100	
Sodium (Dissolved-LF)	**5.84**		**6.57**		**7.92**		**7.29**		**7.77**		NA		NA		NA		NA		NA	
Thallium	<0.00200		<0.00200		<0.00200		<0.00200		<0.00200		<2.00		<2.00		<2.00		<2.00		<2.00	
Vanadium	<0.00500		<0.00500		<0.00500		<0.00500		<0.00500		**5.49**		**4.00**		**4.52**		**5.32**		**4.97**	B
Zinc	<0.0250		<0.0250		**0.0267**	B	<0.0250		<0.0250		**8.67**		<5.00		**10.3**		**13.9**		**9.98**	
Zinc (Dissolved-LF)	<0.0250		<0.0250		<0.0250		<0.0250		<0.0250		NA		NA		NA		NA		NA	
Mercury	<0.000200		<0.000200		<0.000200		<0.000200		<0.000200		<0.0200		<0.0200		<0.0200		<0.0200		<0.0200	

Notes:
Bold text indicates laboratory analytical detections above the laboratory practical quantitation level (PQL)
NA: Not Analyzed
(Dissolved-LF): Dissolved metals samples were filtered in the laboratory. Samples were placed into unpreserved sample containers in the field.
B-The same analyte is found in the associated blank
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.

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

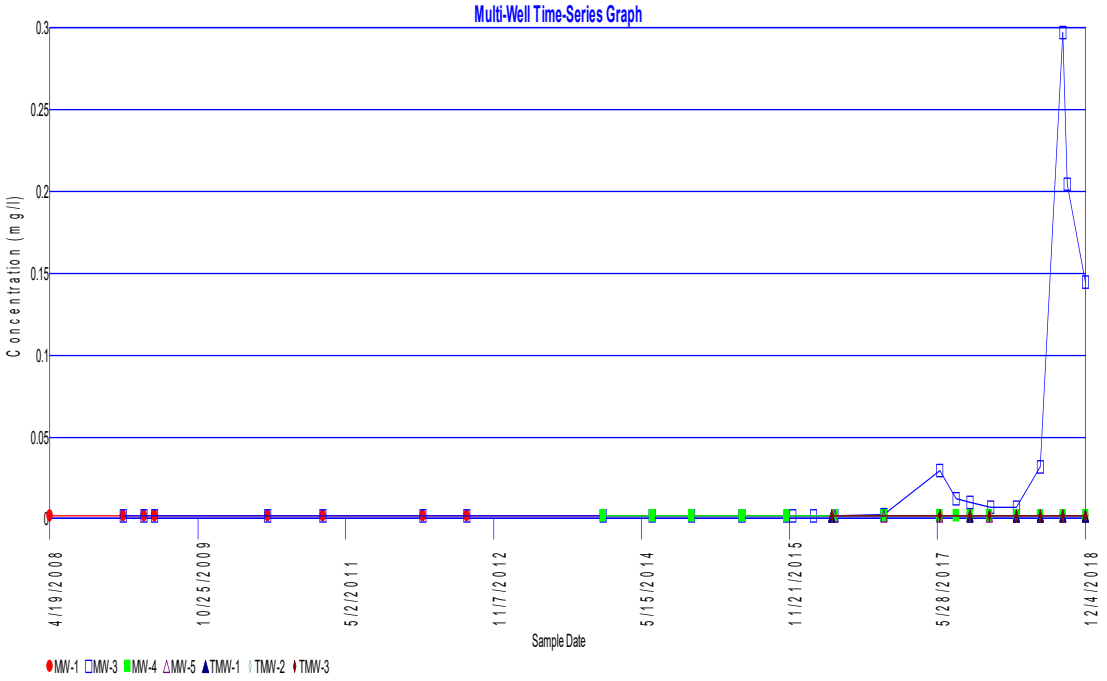
Intra-Well Statistical Summary (Upgradient Background Well MW-1)								
Constituent	Well	% Non Detects	Normality	Intra-well NPPL	Intra-well PPL	Shewhart-Cusum	Wilcoxon Rank Sum	SSI
Arsenic	MW-1	0.00	parametric	--	Pass	--	--	No
Barium	MW-1	0.00	non-parametric	--	--	--	--	No
Chloride	MW-1	0.00	log-normal	--	Pass*	Pass	--	No
Cobalt	MW-1	0.00	parametric	--	Pass	--	--	No
Copper	MW-1	73.91	non-parametric	Pass	--	--	--	No
Nickel	MW-1	47.83	non-parametric	Pass	--	Pass	--	No
Mercury	MW-1	39.13	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	36.96	non-parametric	--	--	Pass	--	No	No 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	**Upward Trend**
	MW-4		non-parametric	--	--	Pass	--	No	**Downward Trend**
	MW-5		non-parametric	--	--	Pass	--	No	No Trend
	TMW-1		non-parametric	--	--	Pass	--	No	No Trend
	TMW-2		non-parametric	--	--	Pass	--	No	No Trend
	TMW-3		non-parametric	--	--	Pass	--	No	No Trend
Total Cadmium	MW-3	89.13	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**	No Trend
Chromium	MW-3	78.26	non-parametric	Pass	--	--	--	No	**Downward Trend**
	MW-4		non-parametric	Pass	--	--	--	No	**Downward Trend**
	MW-5		non-parametric	Pass	--	--	--	No	No Trend
	TMW-1		non-parametric	Pass	--	--	--	No	No Trend
	TMW-2		non-parametric	Pass	--	--	--	No	No Trend
	TMW-3		non-parametric	Pass	--	--	--	No	No Trend
Cobalt	MW-3	57.61	non-parametric	Pass	--	--	--	No	**Downward Trend**
	MW-5		non-parametric	Pass	--	--	--	No	No Trend
Copper	MW-3	83.52	non-parametric	Pass	--	--	--	No	No Trend
Fluoride	MW-3	85.71	non-parametric	**Fail**	--	--	**Fail**	**Yes**	**Upward Trend**
Nickel	MW-3	62.77	non-parametric	Pass	--	--	--	No	No Trend
	MW-5		non-parametric	Pass	--	--	--	No	No Trend
Zinc	MW-3	59.77	non-parametric	**Fail**	--	--	**Fail**	**Yes**	**Upward Trend**
Sulfate	MW-3	61.70	non-parametric	**Fail**	--	--	**Fail**	**Yes**	**Upward Trend**
	MW-5		non-parametric	Pass	--	--	--	No	**Upward Trend**

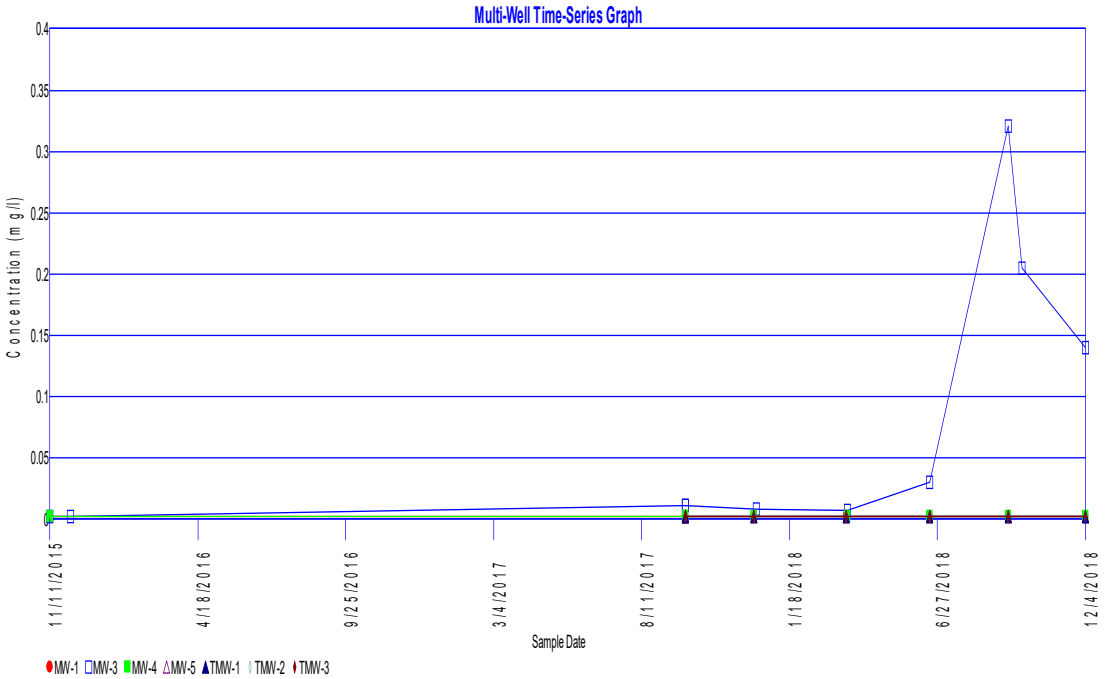
Notes:
* 99% Parametric Confidence level was used for Chloride when the data was log-transformed at 1/2 the detection limit.

APPENDIX B
STATISTICAL EVALUATIONS & TIME SERIES PLOTS

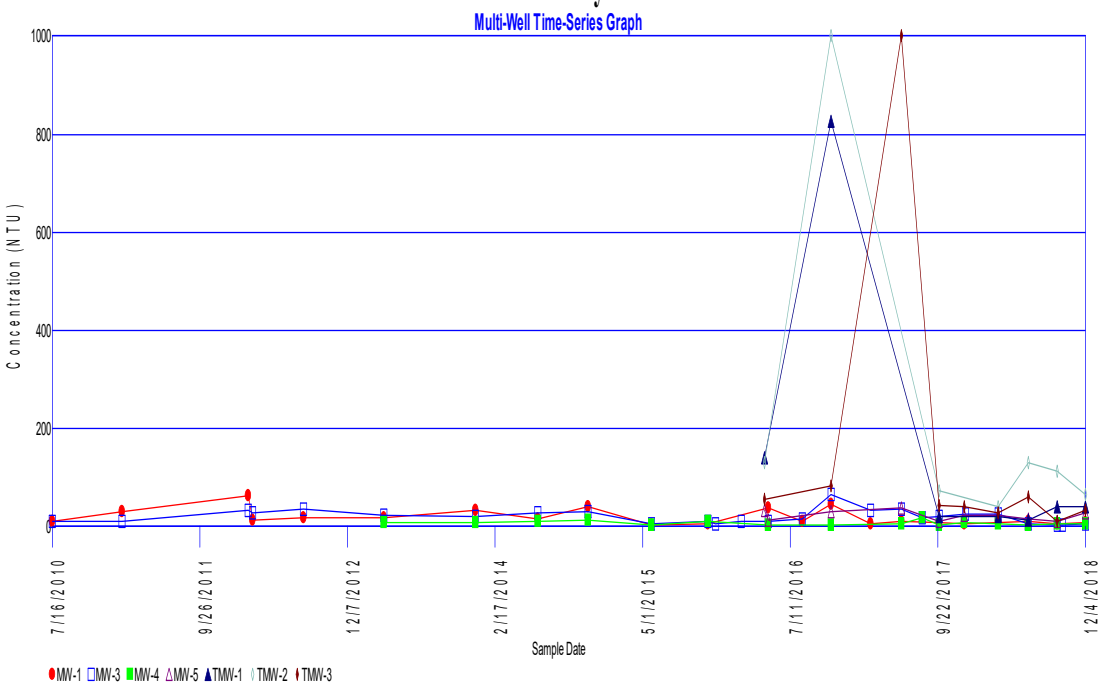
Total Cadmium



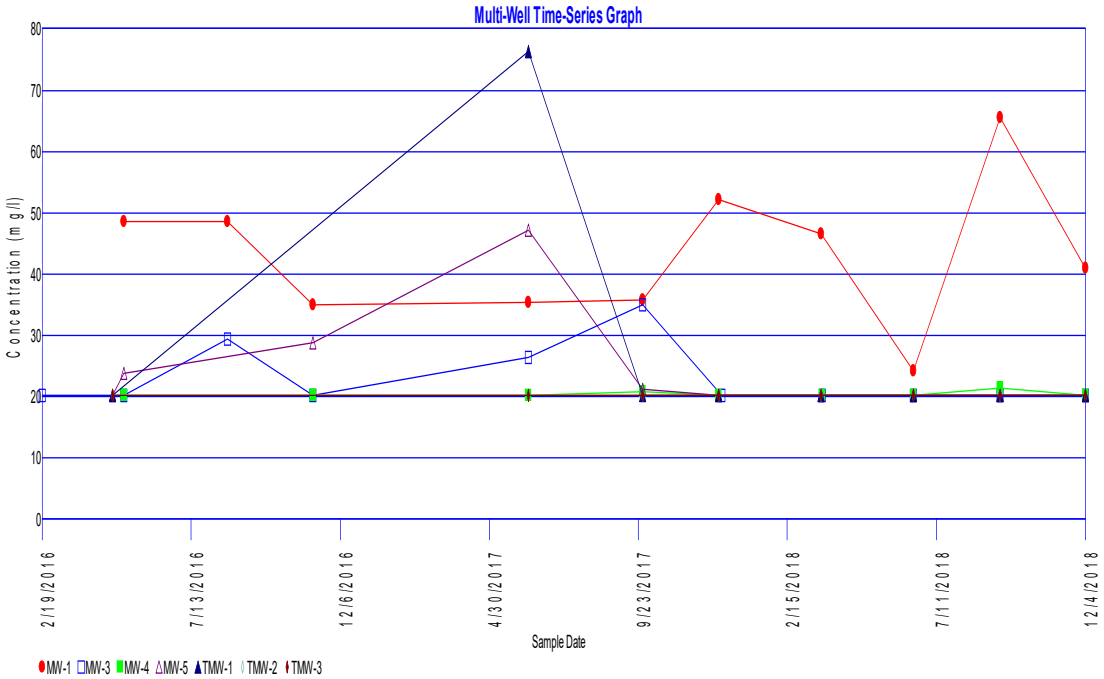
Cadmium,Dissolved



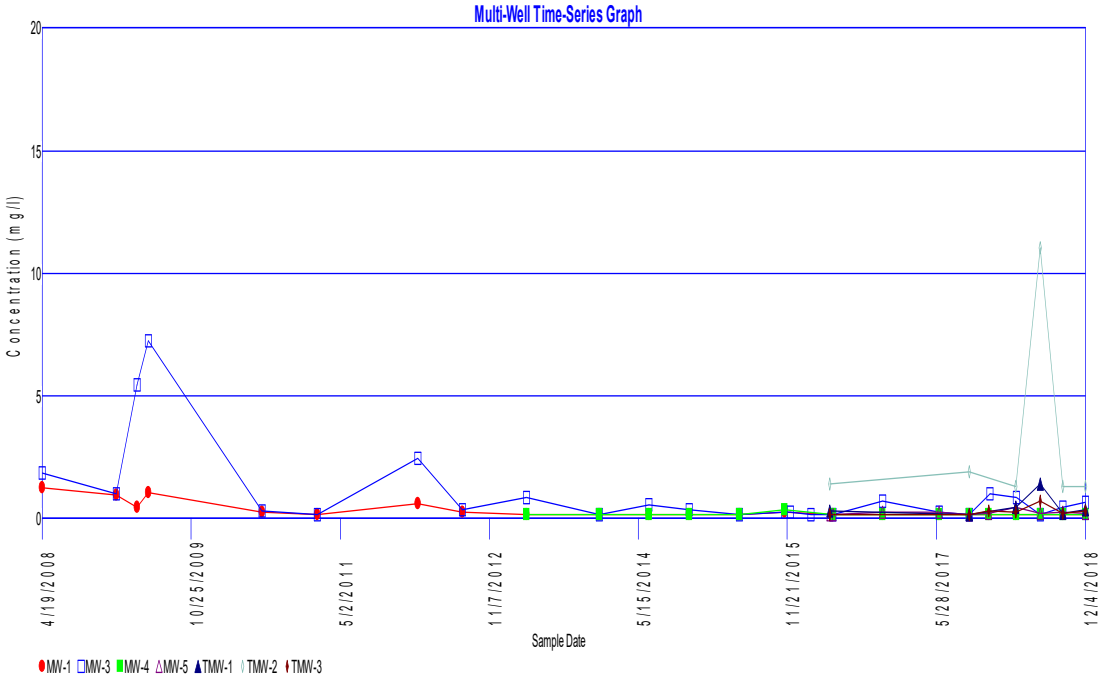
Turbidity



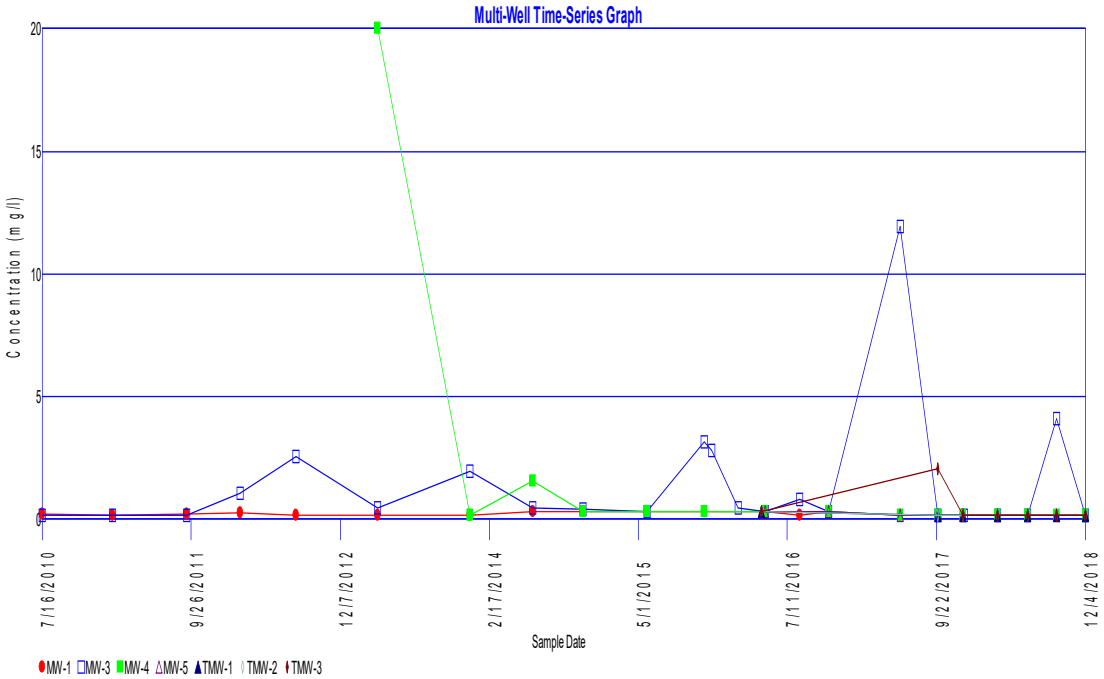
Alkalinity



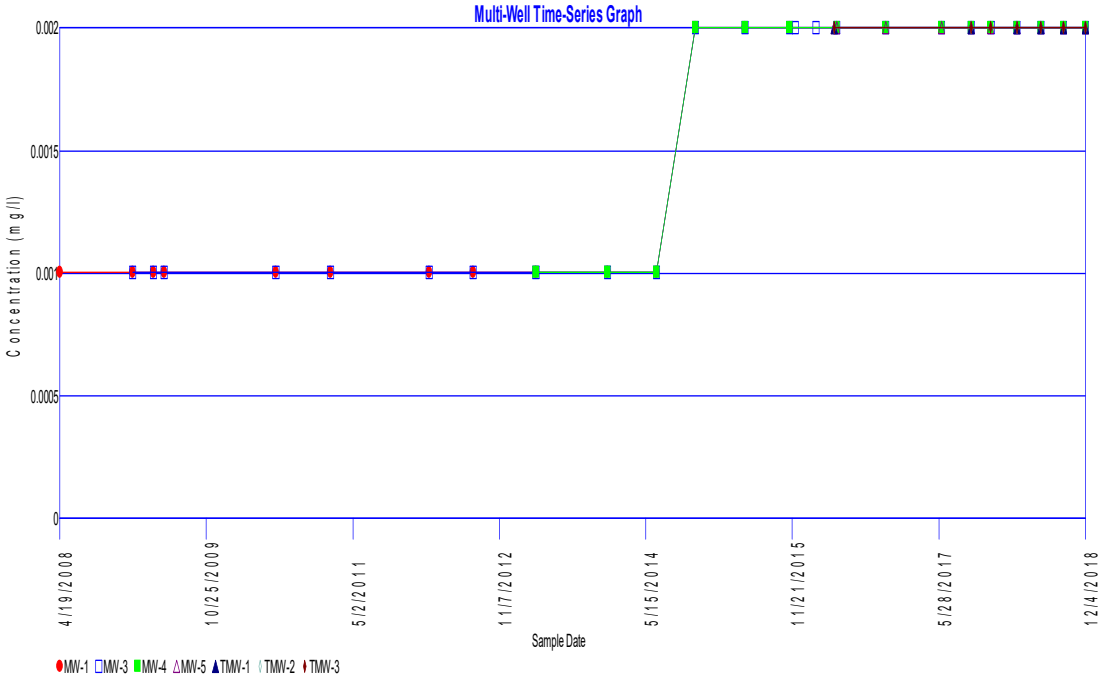
Aluminum



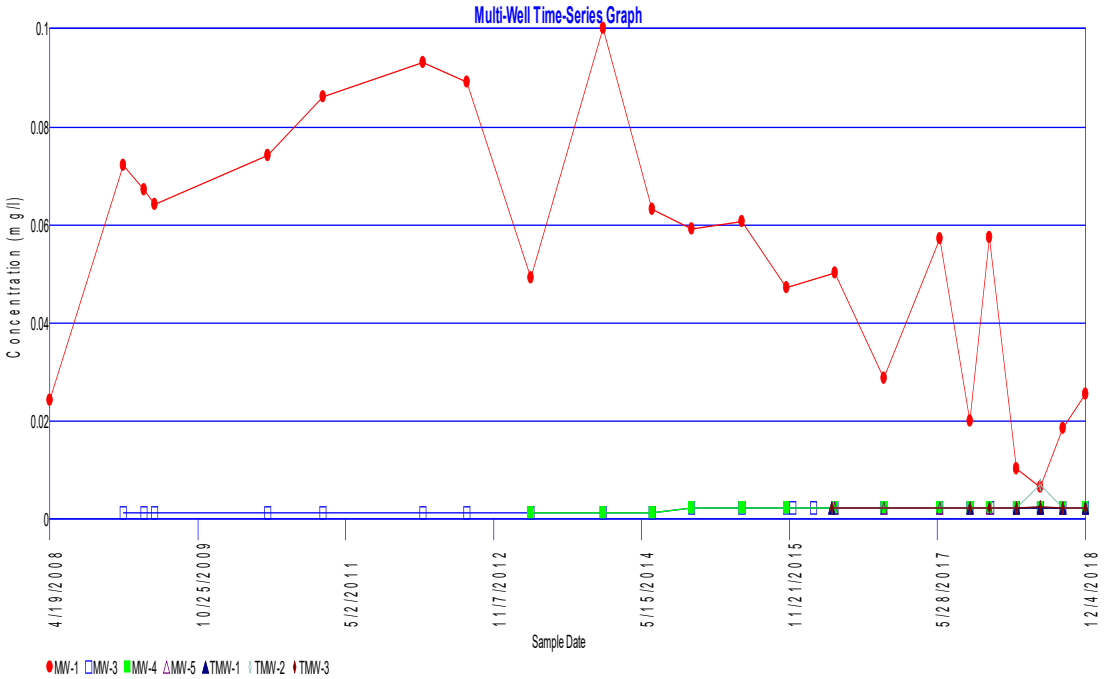
Ammonia Nitrogen



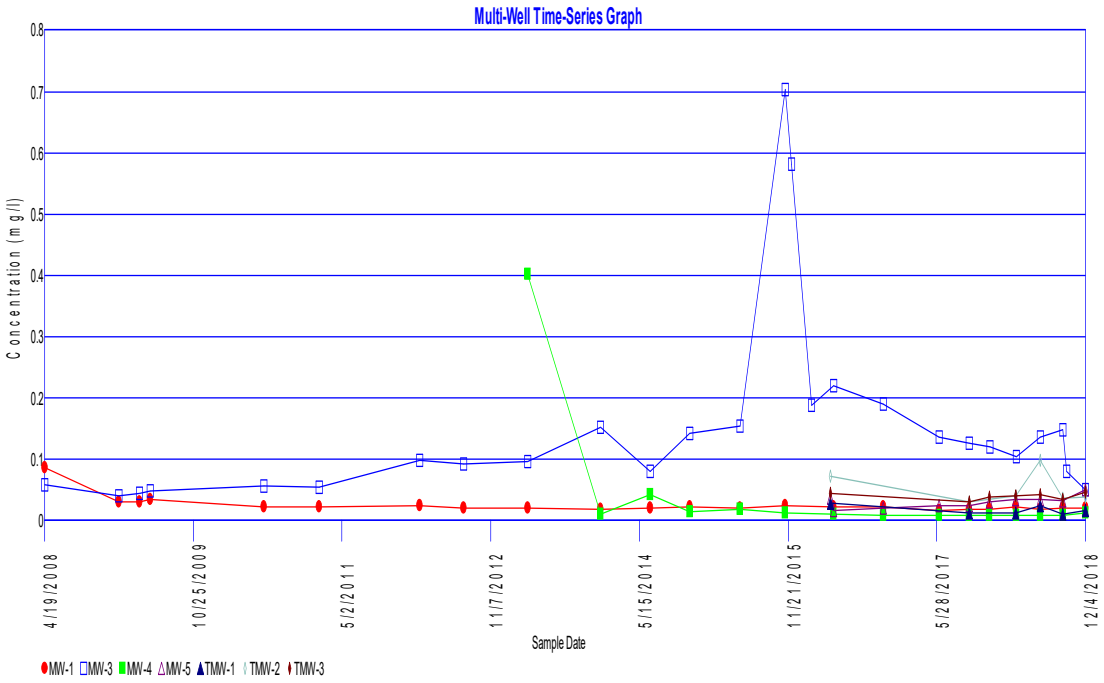
Antimony



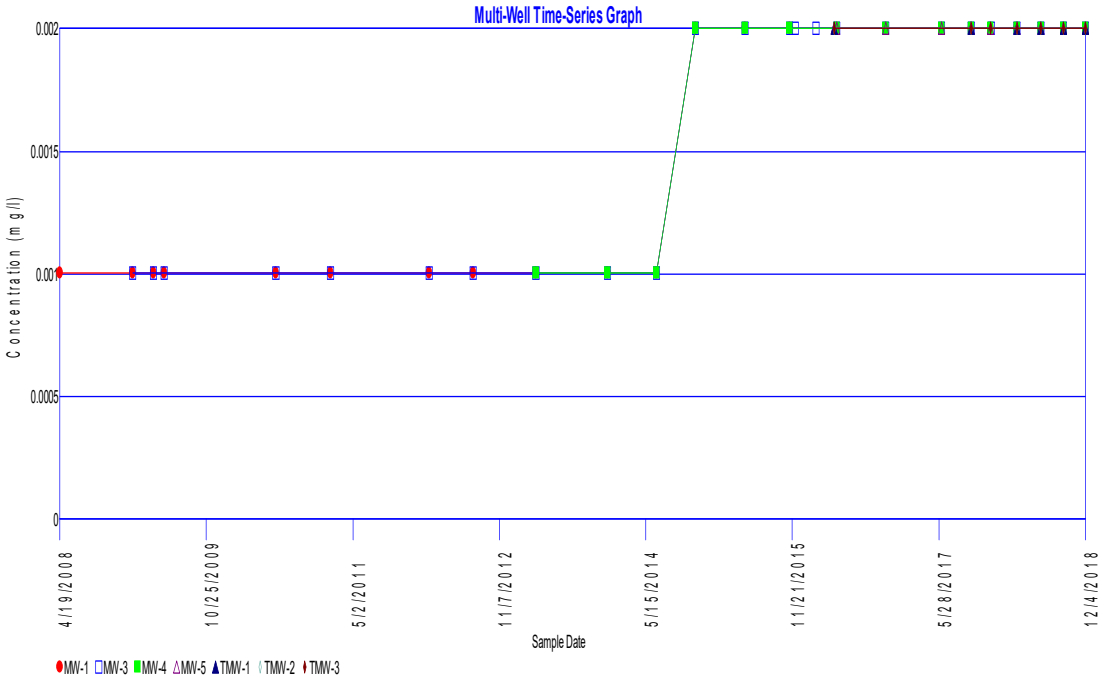
Arsenic



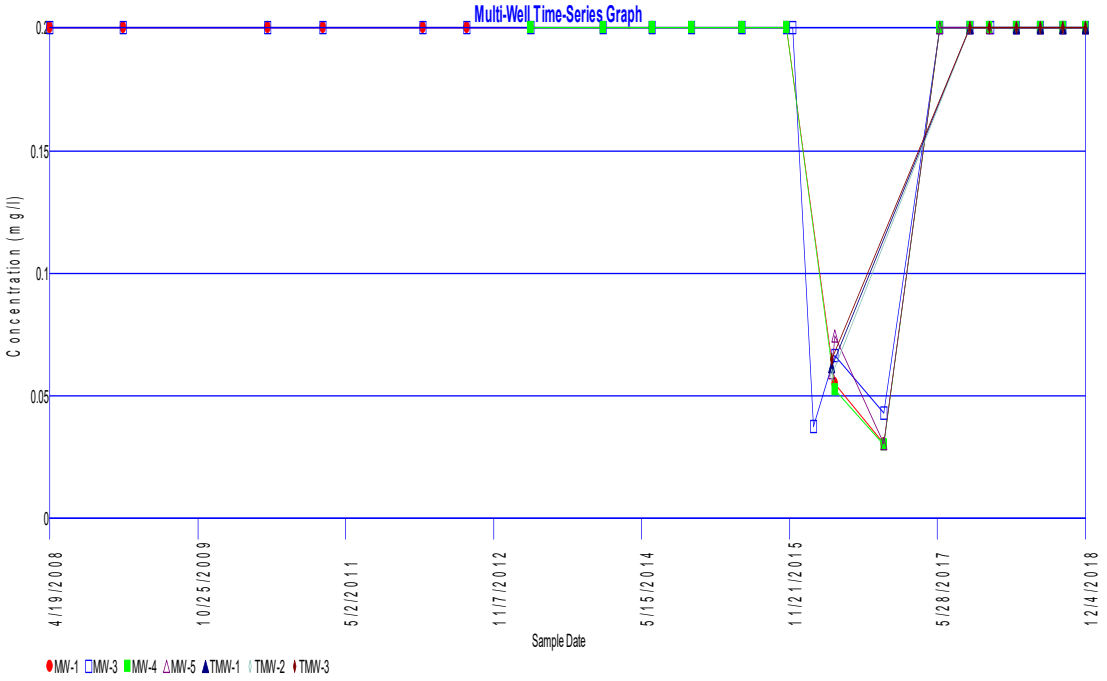
Barium



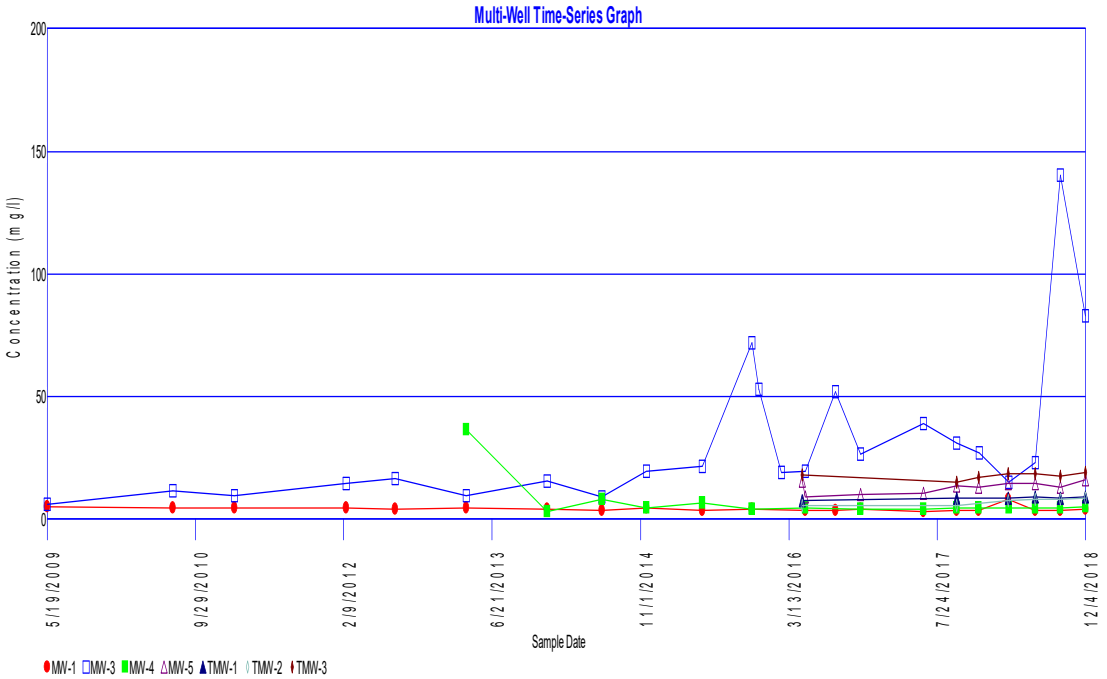
Beryllium



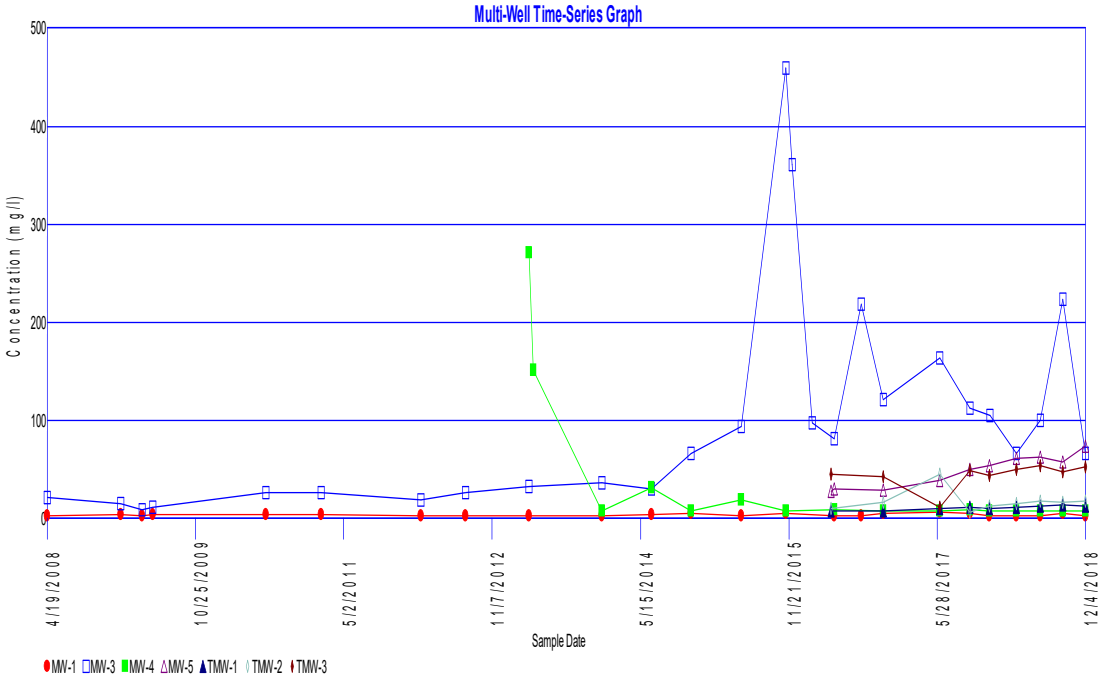
Boron



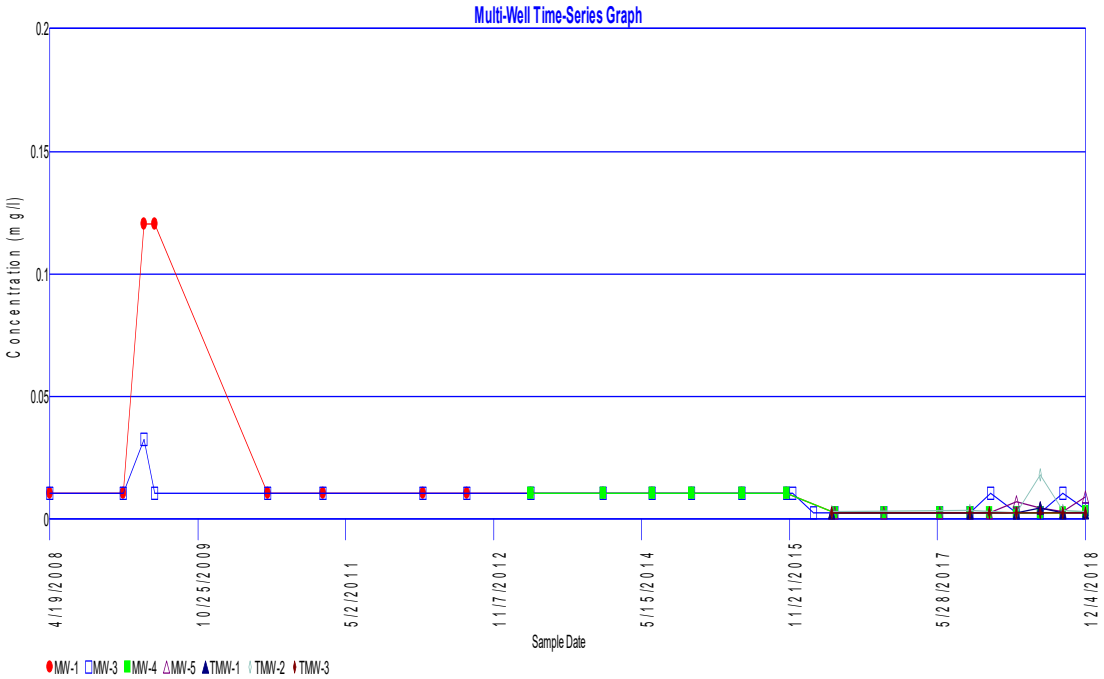
Calcium



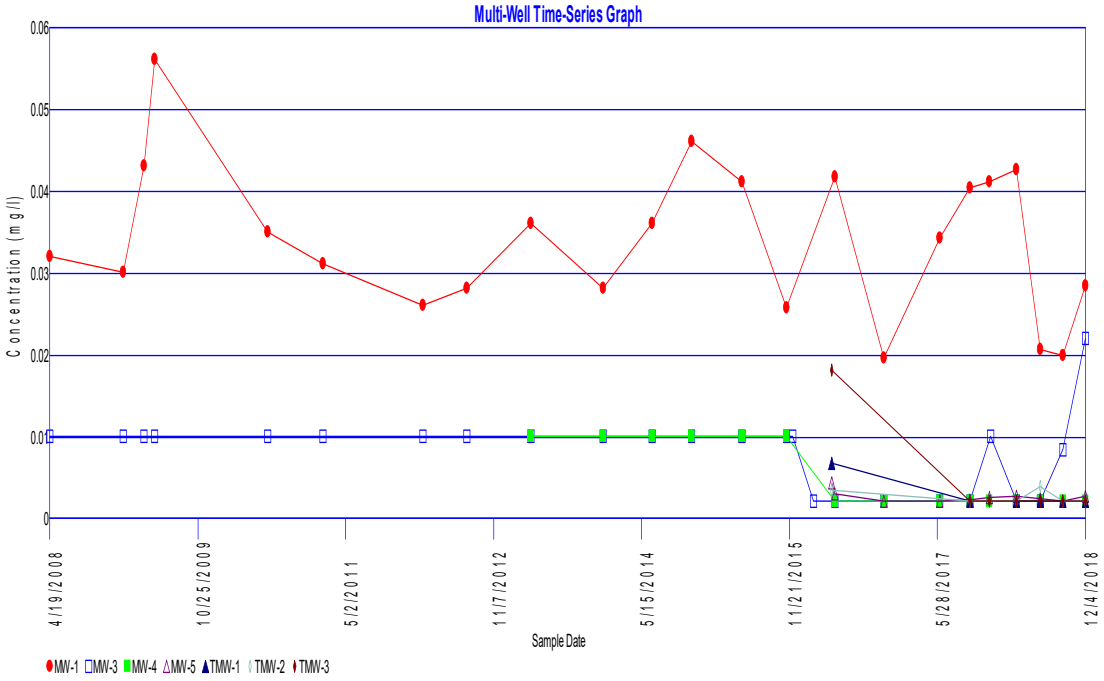
Chloride



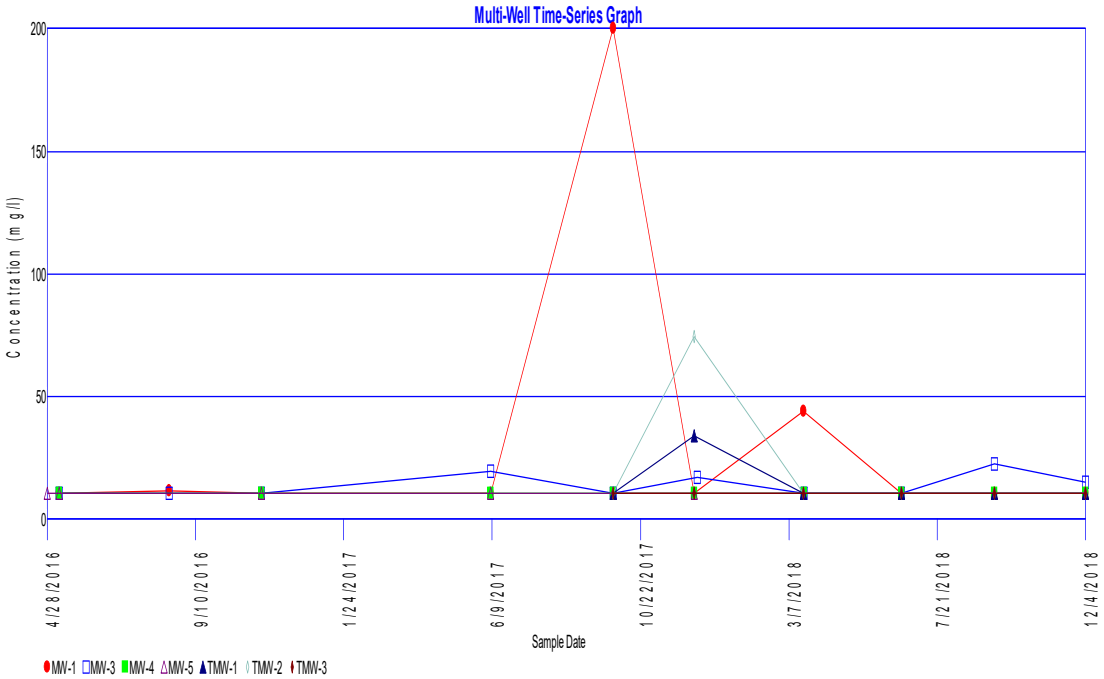
Chromium



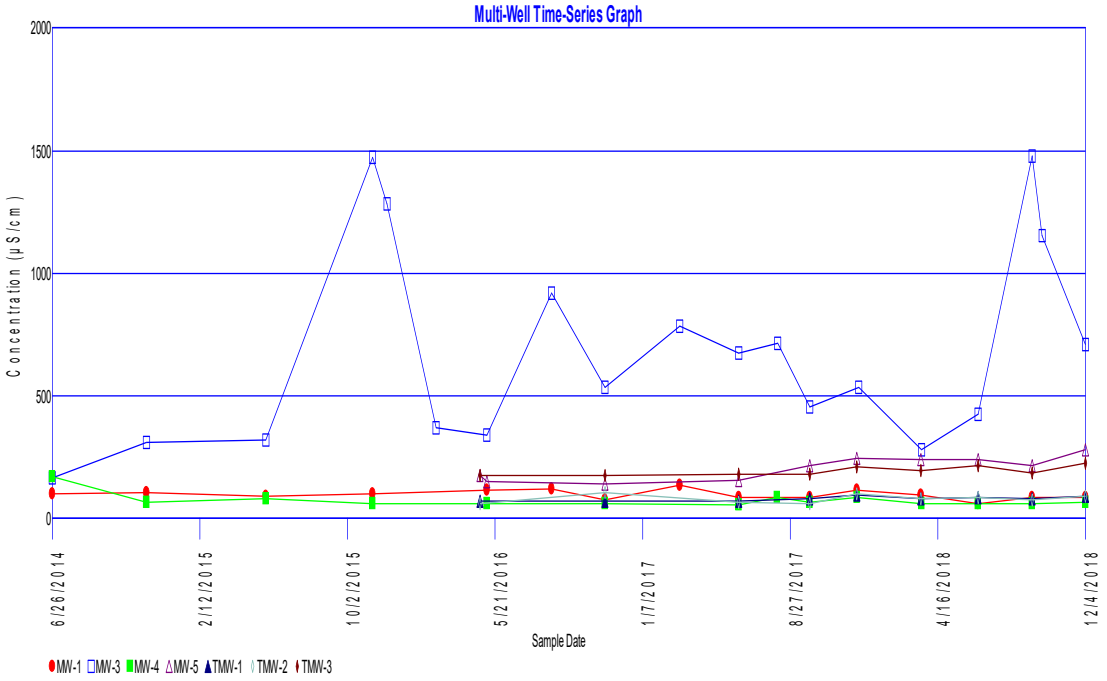
Cobalt


Multi-Well Time-Series Graph
0.06
0.05
0.04
0.03
0.02
0.01
0
Concentration (mg/l)
4/19/2008
10/25/2009
5/2/2011
11/7/2012
5/15/2014
11/21/2015
5/28/2017
12/4/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

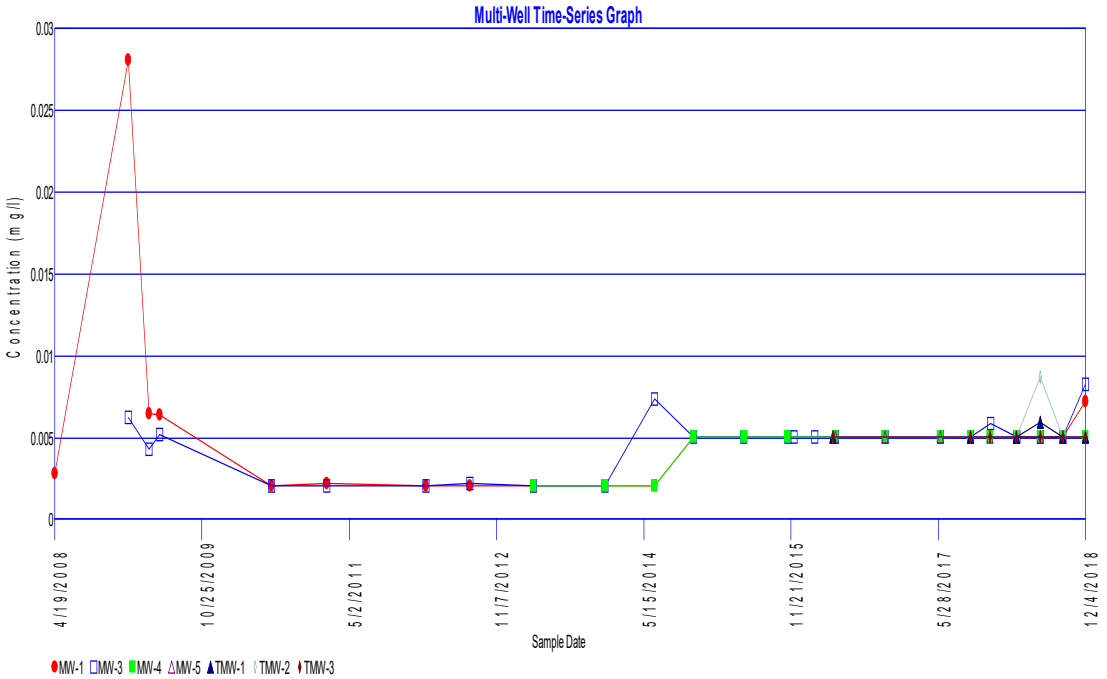
COD


Multi-Well Time-Series Graph
200
150
100
50
0
Concentration (mg/l)
4/28/2016
9/10/2016
1/24/2017
6/9/2017
10/22/2017
3/7/2018
7/21/2018
12/4/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

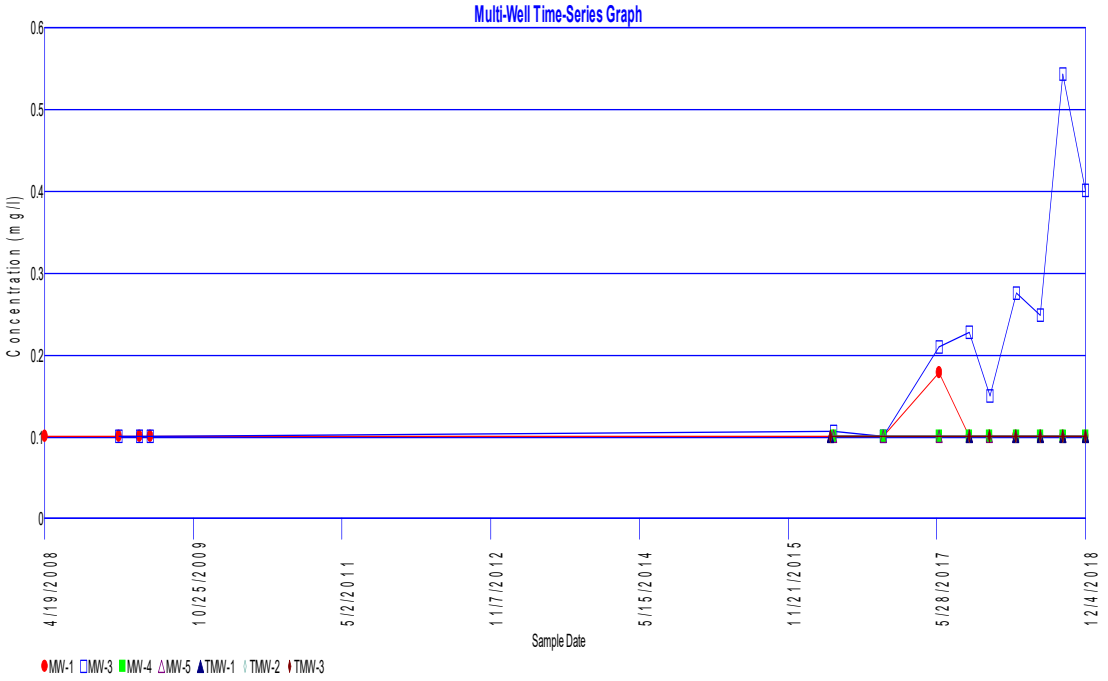
Conductivity



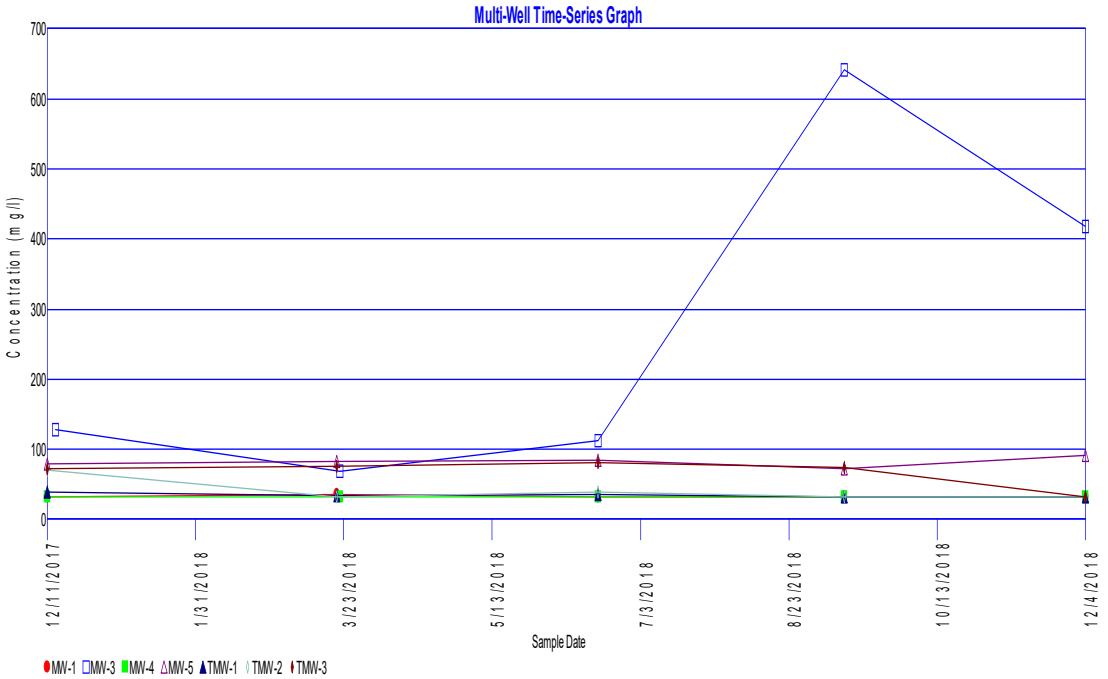
Copper



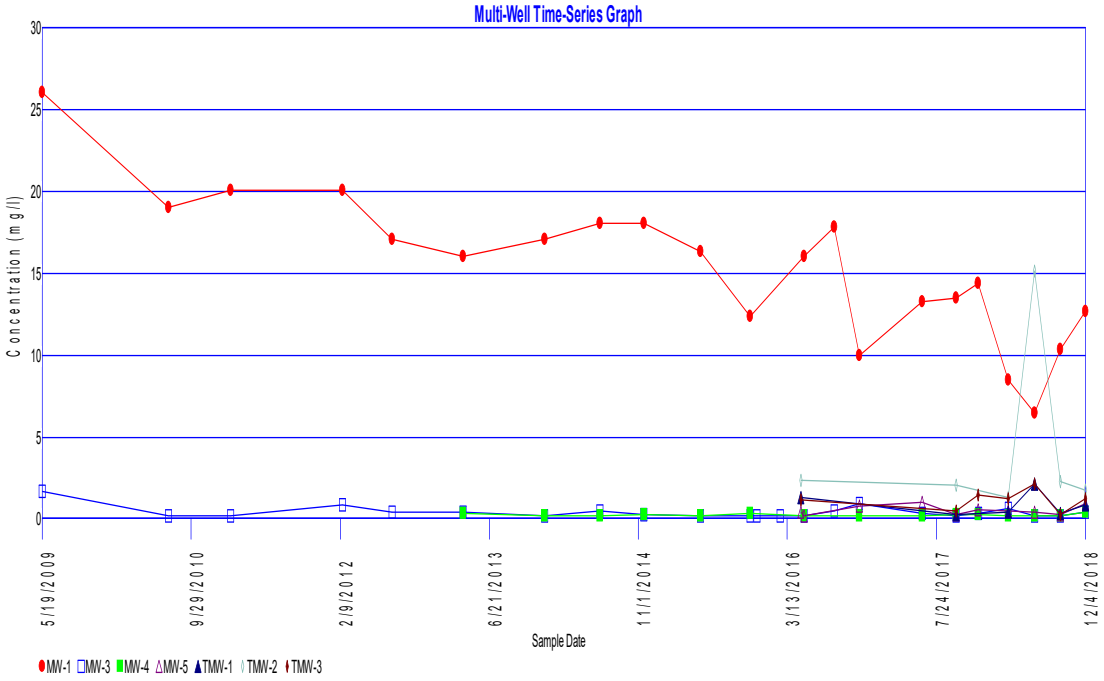
Fluoride



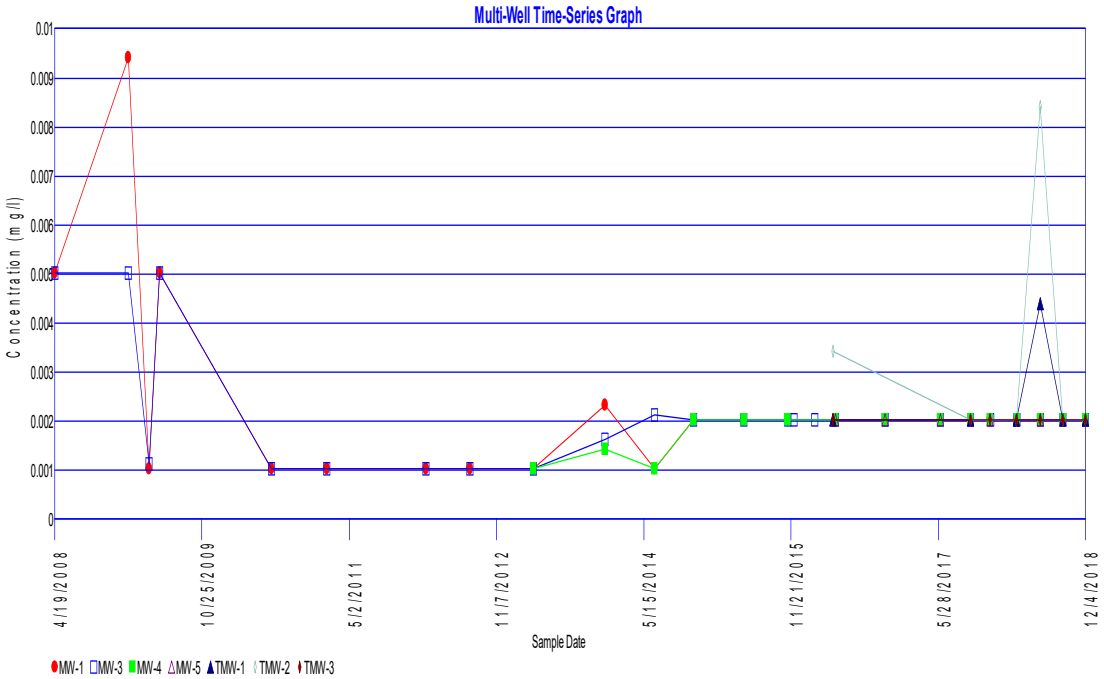
Hardness



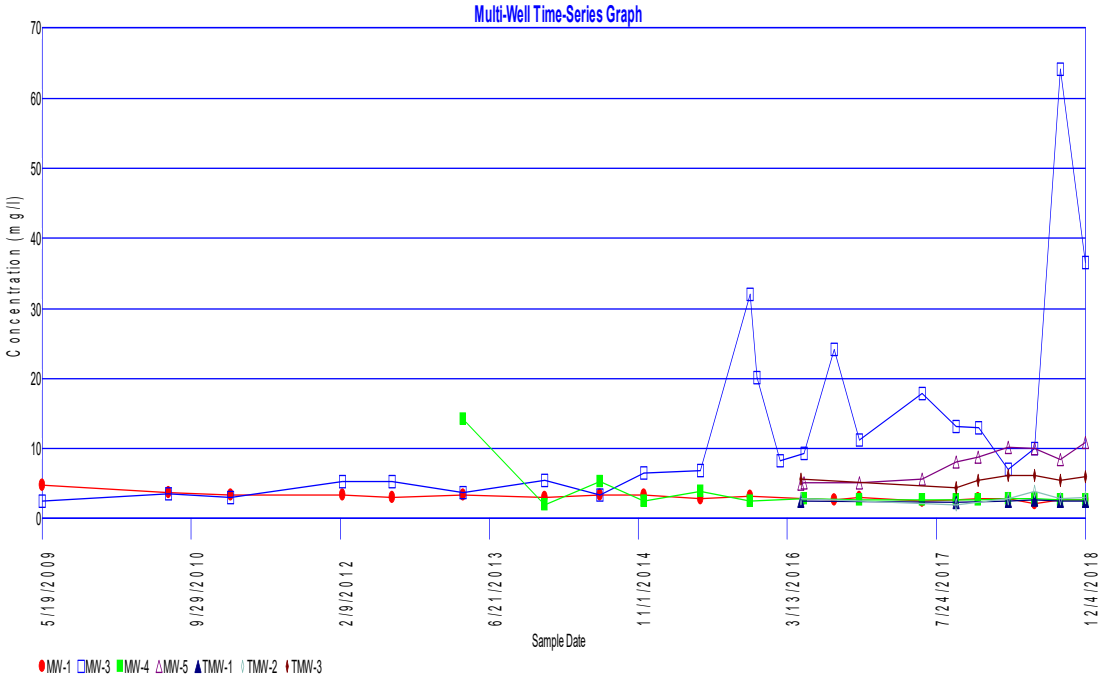
Iron


Multi-Well Time-Series Graph
Concentration (mg/l)
30
25
20
15
10
5
0
5/19/2009
9/29/2010
2/9/2012
6/21/2013
11/1/2014
3/13/2016
7/24/2017
12/4/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

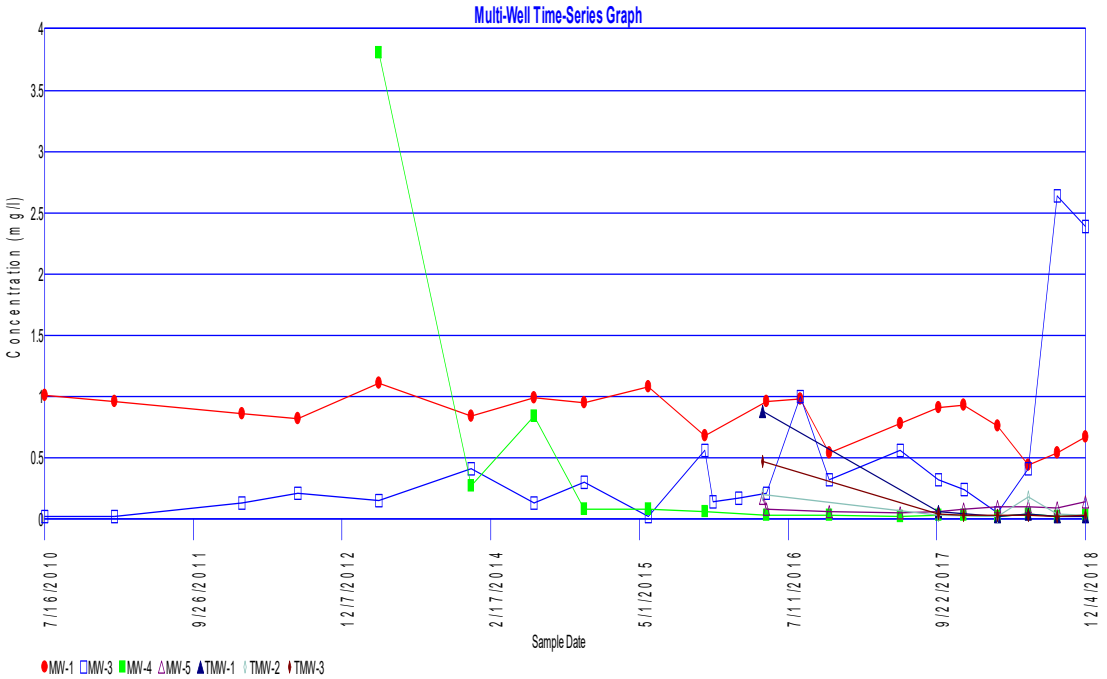
Lead


Multi-Well Time-Series Graph
Concentration (mg/l)
0.01
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
4/19/2008
10/25/2009
5/2/2011
11/7/2012
5/15/2014
11/21/2015
5/28/2017
12/4/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

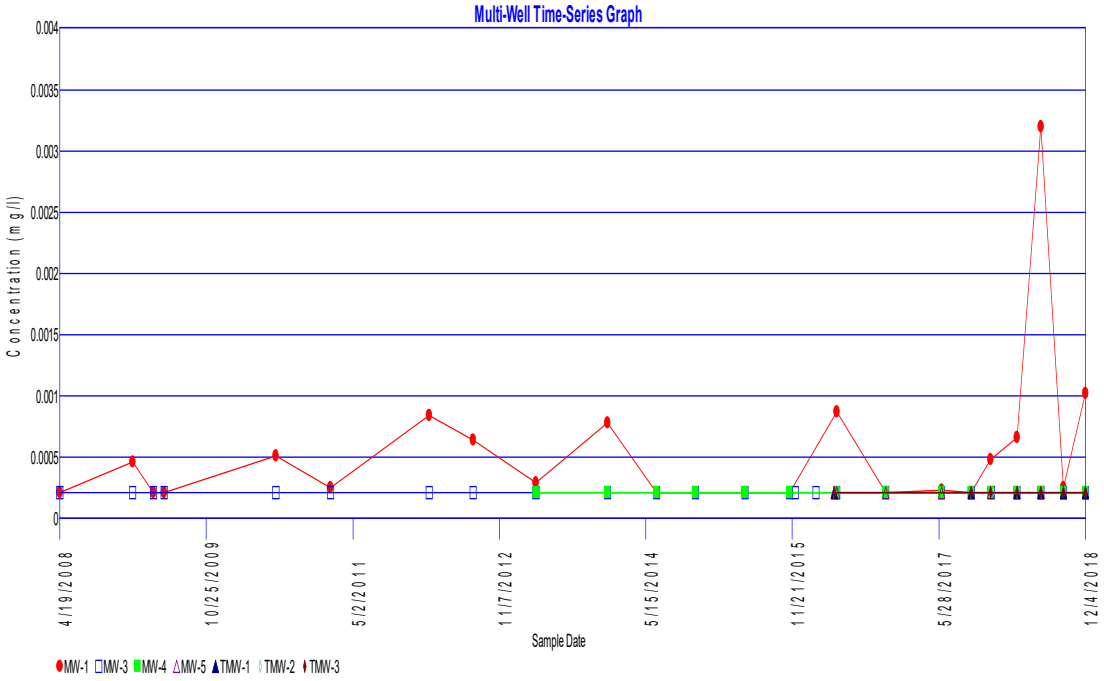
Magnesium



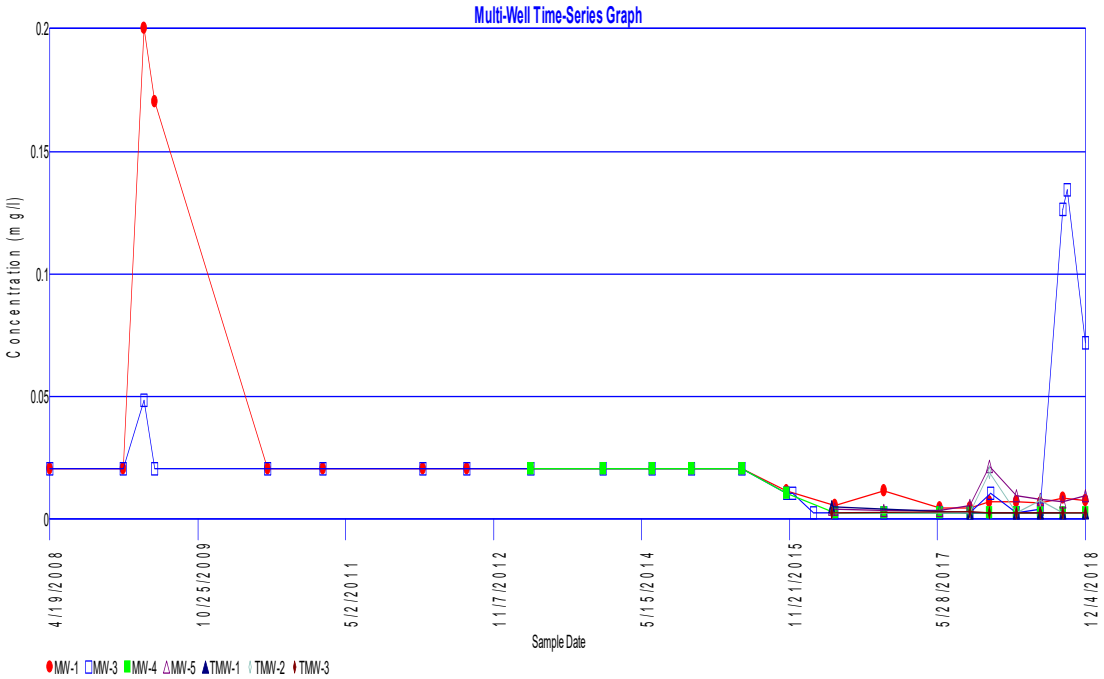
Manganese



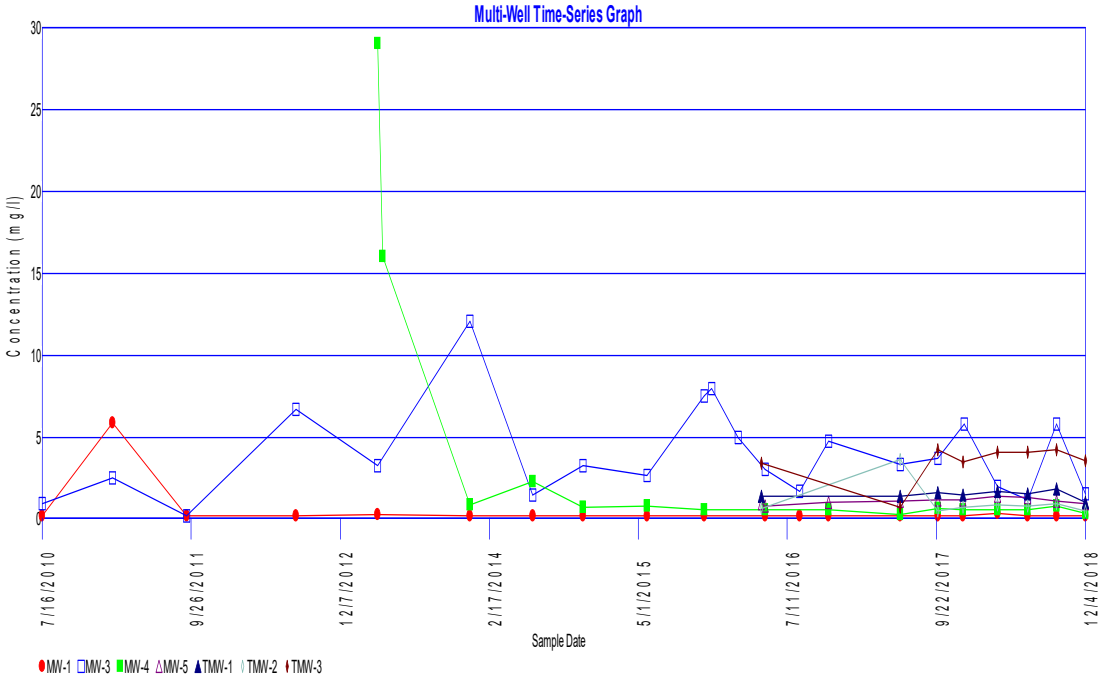
Mercury



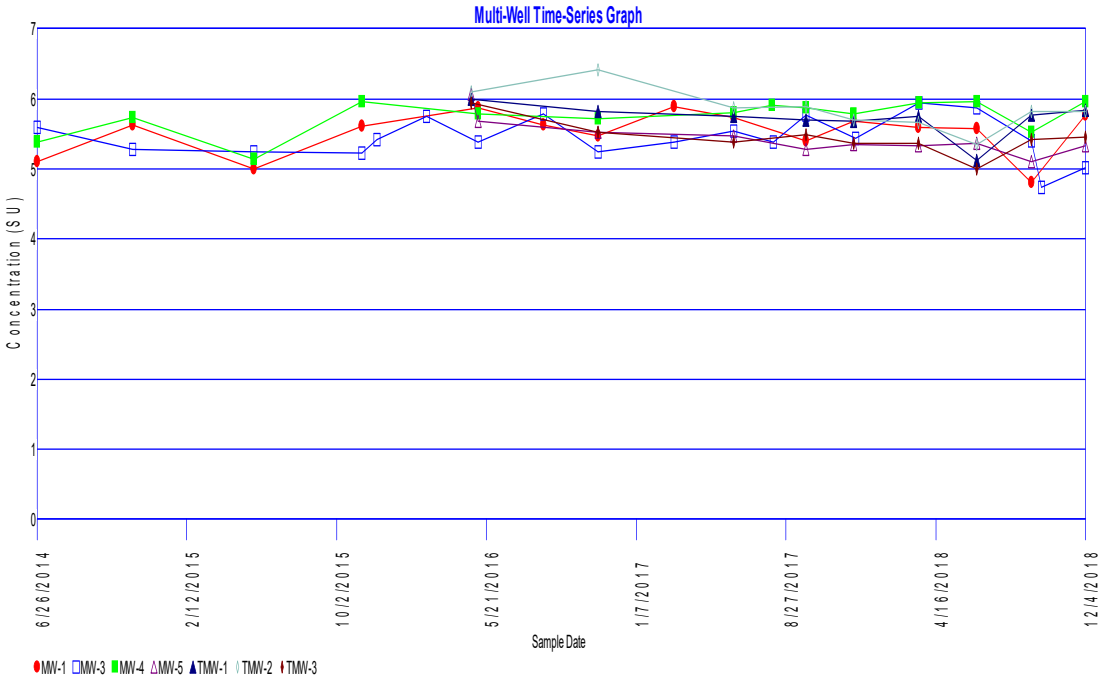
Nickel



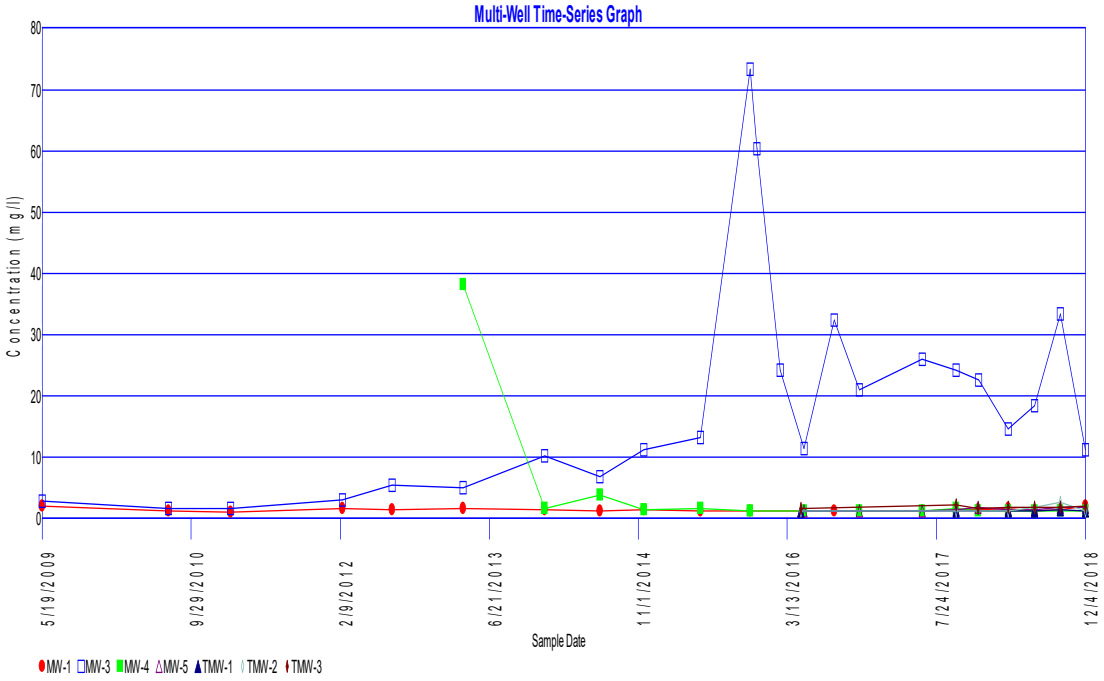
Nitrate


Multi-Well Time-Series Graph
Concentration (mg/l)
30
25
20
15
10
5
0
7/16/2010
9/26/2011
12/7/2012
2/17/2014
5/11/2015
7/11/2016
9/22/2017
12/4/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

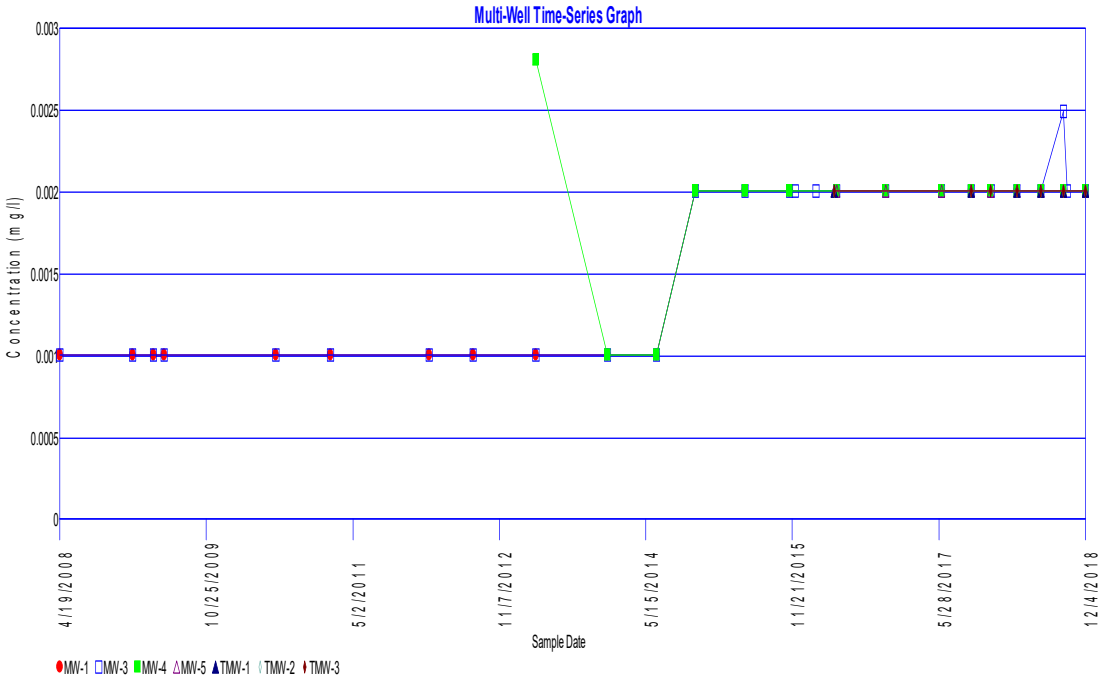
pH


Multi-Well Time-Series Graph
Concentration (SU)
7
6
5
4
3
2
1
0
6/26/2014
2/12/2015
10/2/2015
5/21/2016
1/7/2017
8/27/2017
4/16/2018
12/4/2018
Sample Date
MW-1 MW-3 MW-4 MW-5 TMW-1 TMW-2 TMW-3

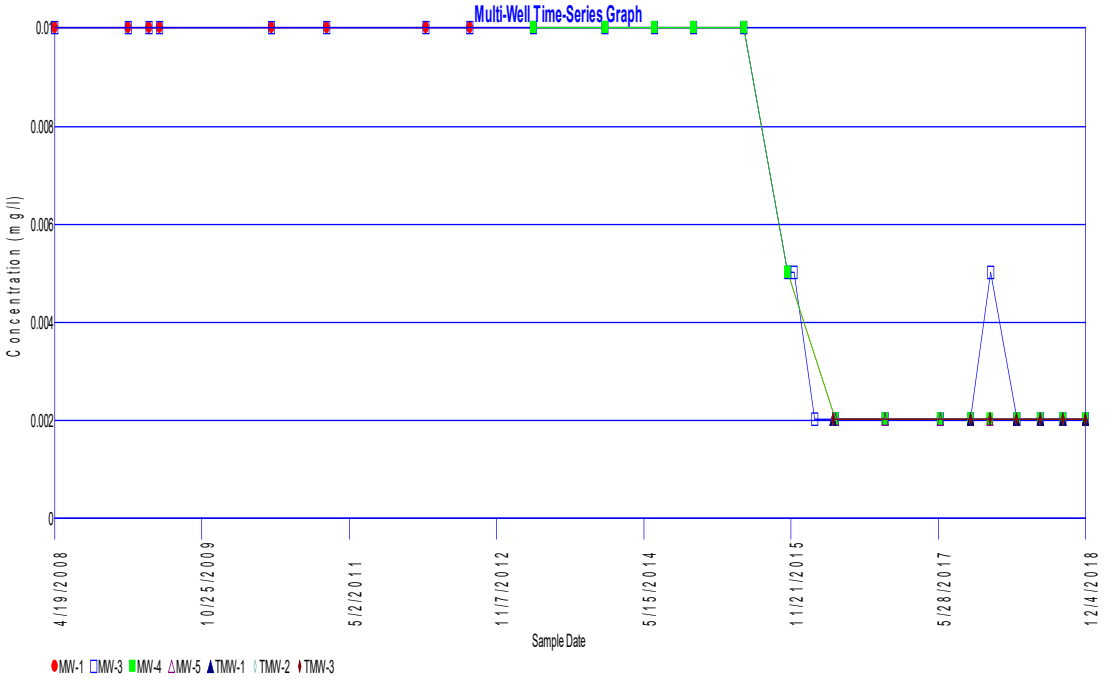
Potassium



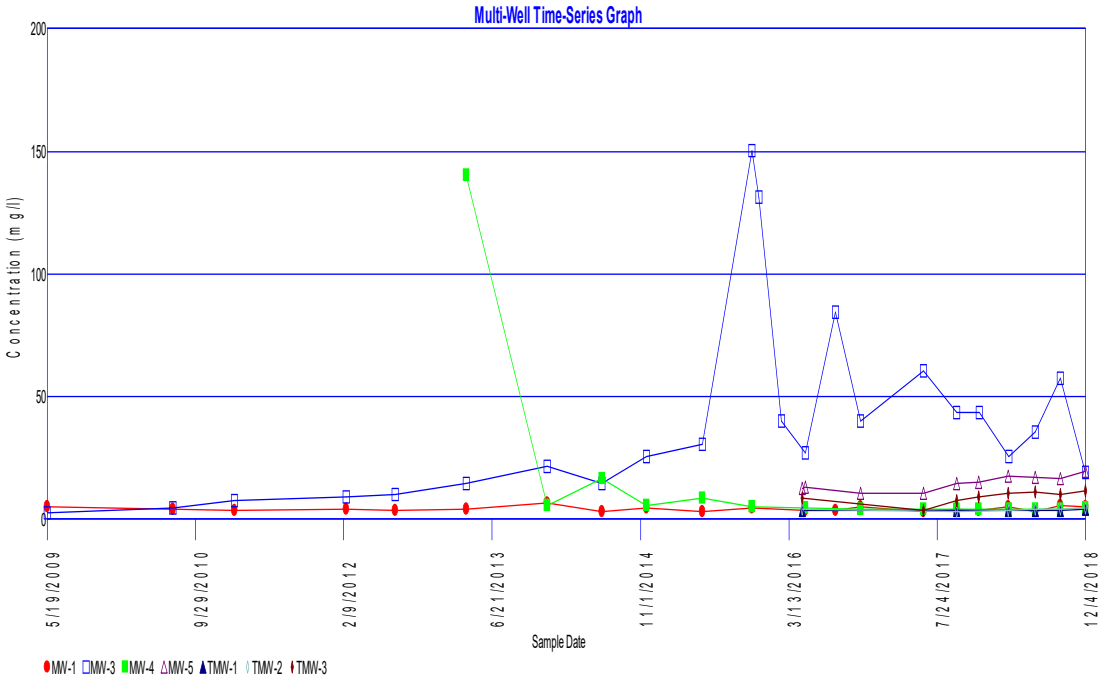
Selenium



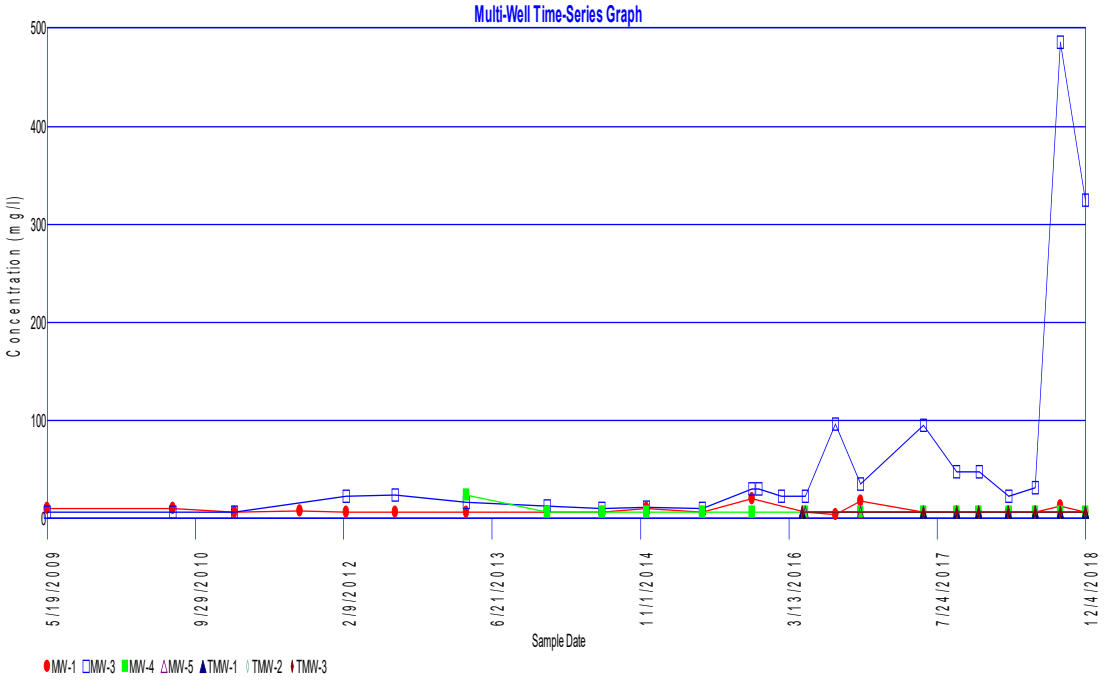
Silver



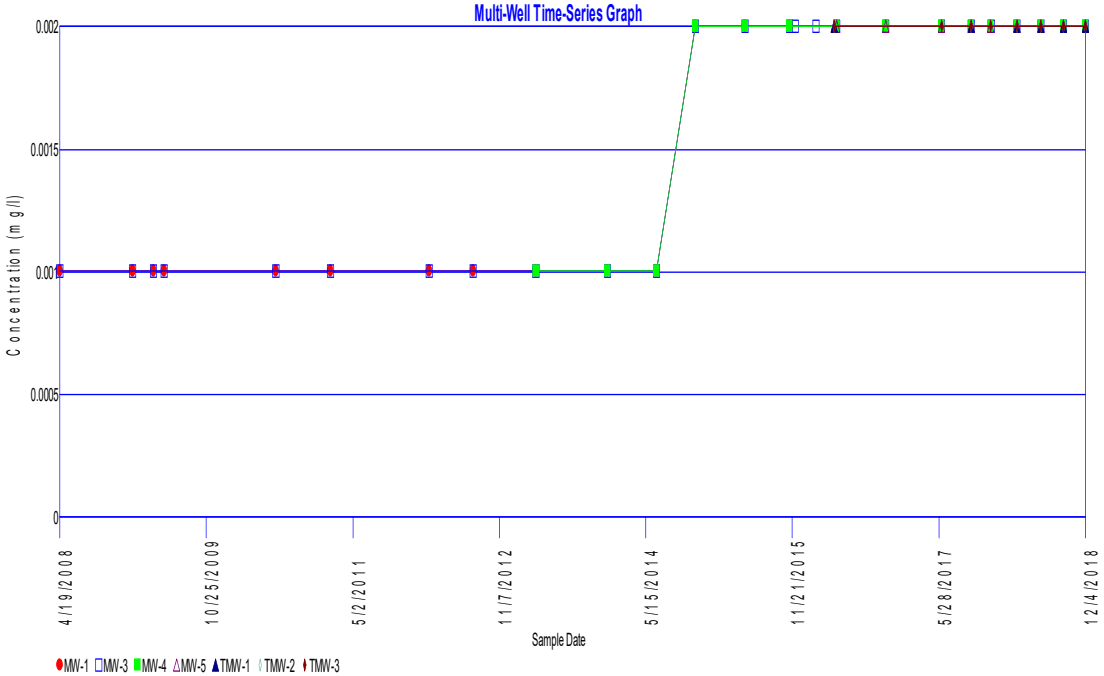
Sodium



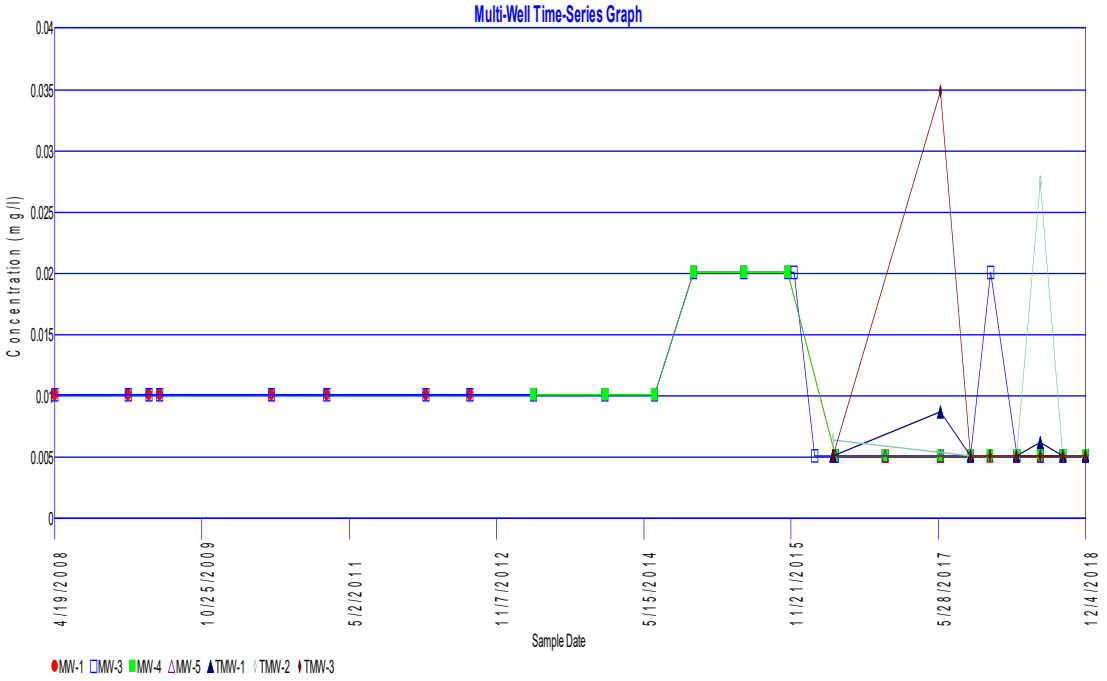
Sulfate



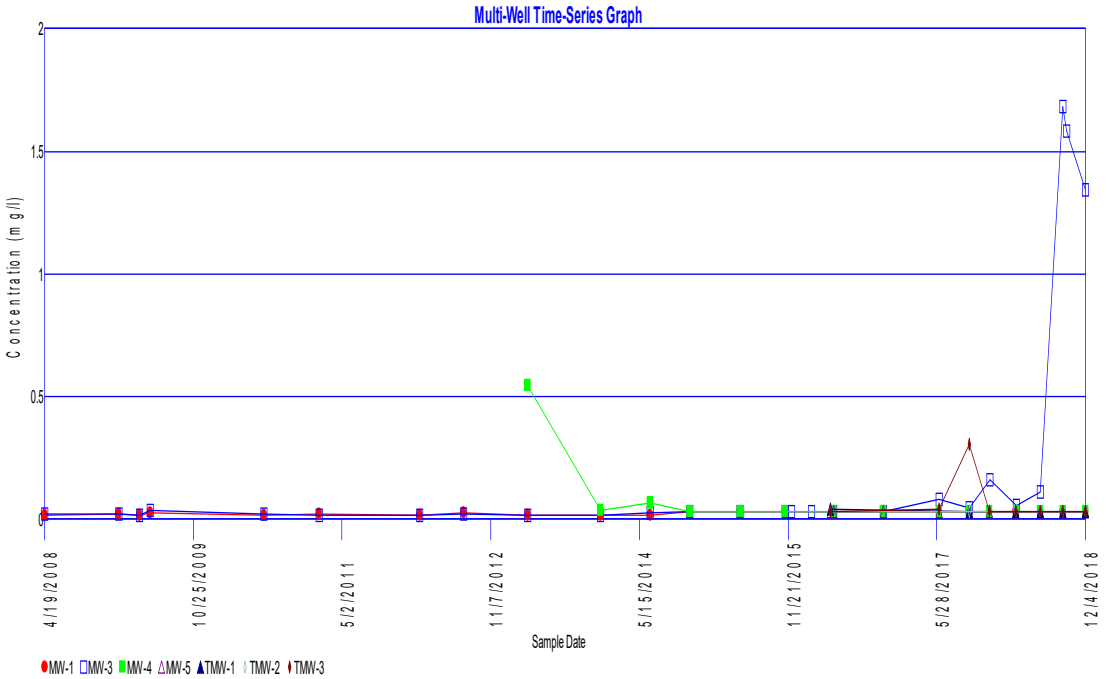
Thallium



Vanadium



Zinc



Shapiro-Wilks Test of Normality

Parameter: Arsenic
Location: MW-1
Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 23 measurements

Sum of b values = 0.124254
Sample Standard Deviation = 0.0270634
W Statistic = 0.958159

5% Critical value of 0.914 is less than 0.958159
Data is normally distributed at 95% level of significance

1% Critical value of 0.881 is less than 0.958159
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium
Location: MW-1
Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 23 measurements

Sum of b values = 0.0445602
Sample Standard Deviation = 0.0138819
W Statistic = 0.46835

5% Critical value of 0.914 exceeds 0.46835
Evidence of non-normality at 95% level of significance

1% Critical value of 0.881 exceeds 0.46835
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 24 measurements

Sum of b values = 4.99565
Sample Standard Deviation = 1.1226
W Statistic = 0.861003

5% Critical value of 0.916 exceeds 0.861003
Evidence of non-normality at 95% level of significance

1% Critical value of 0.884 exceeds 0.861003
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Cobalt
Location: MW-1
Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 23 measurements

Sum of b values = 0.0421986
Sample Standard Deviation = 0.00915148
W Statistic = 0.966477

5% Critical value of 0.914 is less than 0.966477
Data is normally distributed at 95% level of significance

1% Critical value of 0.881 is less than 0.966477
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Copper
Location: MW-1
Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 23 measurements

Sum of b values = 0.0170114
Sample Standard Deviation = 0.00523985
W Statistic = 0.479093

5% Critical value of 0.914 exceeds 0.479093
Evidence of non-normality at 95% level of significance

1% Critical value of 0.881 exceeds 0.479093
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Nickel
Location: MW-1
Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 23 measurements

Sum of b values = 0.155434
Sample Standard Deviation = 0.0499291
W Statistic = 0.440517

5% Critical value of 0.914 exceeds 0.440517
Evidence of non-normality at 95% level of significance

1% Critical value of 0.881 exceeds 0.440517
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Mercury
Location: MW-1
Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
K = 11 for 23 measurements

Sum of b values = 0.00219352
Sample Standard Deviation = 0.000636027
W Statistic = 0.540644

5% Critical value of 0.914 exceeds 0.540644
Evidence of non-normality at 95% level of significance

1% Critical value of 0.881 exceeds 0.540644
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Mercury
Location: MW-1
Normality Test of Parameter Concentrations

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 11 for 23 measurements

Sum of b values = 4.4578
Sample Standard Deviation = 1.01937
W Statistic = 0.86927

5% Critical value of 0.914 exceeds 0.86927
Evidence of non-normality at 95% level of significance

1% Critical value of 0.881 exceeds 0.86927
Evidence of non-normality at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Barium

Location: MW-1

Normality Test of Parameter Concentrations

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 11 for 23 measurements

Sum of b values = 1.38269
Sample Standard Deviation = 0.351475
W Statistic = 0.70346

5% Critical value of 0.914 exceeds 0.70346
Evidence of non-normality at 95% level of significance

1% Critical value of 0.881 exceeds 0.70346
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 24 measurements

Sum of b values = 1.67473
Sample Standard Deviation = 0.361184
W Statistic = 0.934772

5% Critical value of 0.916 is less than 0.934772
Data is normally distributed at 95% level of significance

1% Critical value of 0.884 is less than 0.934772
Data is normally distributed at 99% level of significance

Shapiro-Wilks Test of Normality

Parameter: Copper

Location: MW-1

Normality Test of Parameter Concentrations

Natural Logarithm Transformation
Non-Detects Replaced with 1/2 DL
K = 11 for 23 measurements

Sum of b values = 3.33191
Sample Standard Deviation = 0.790557
W Statistic = 0.807419

5% Critical value of 0.914 exceeds 0.807419
Evidence of non-normality at 95% level of significance

1% Critical value of 0.881 exceeds 0.807419
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 = 11 for 23 measurements

Sum of b values = 3.40736
Sample Standard Deviation = 0.939261
W Statistic = 0.598191

5% Critical value of 0.914 exceeds 0.598191
Evidence of non-normality at 95% level of significance

1% Critical value of 0.881 exceeds 0.598191
Evidence of non-normality at 99% level of significance

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-1

Parameter: Arsenic

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

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

Baseline Samples	Date	Result
	4/19/2008	0.024
	1/21/2009	0.072
	4/9/2009	0.067
	5/19/2009	0.064
	7/16/2010	0.074
	2/8/2011	0.086
	2/17/2012	0.093
	7/31/2012	0.089
	3/27/2013	0.049
	12/23/2013	0.1
	6/26/2014	0.063
	11/21/2014	0.059
	5/28/2015	0.0604
	11/11/2015	0.0469
	5/9/2016	0.05
	11/10/2016	0.0286
	6/8/2017	0.0571
	9/28/2017	0.0199
	12/11/2017	0.0573
	3/21/2018	0.0101
	6/19/2018	0.0063
	9/12/2018	0.0184

From 22 baseline samples
Baseline mean = 0.0543182
Baseline std Dev = 0.0270039

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 22 (background observations) - 1
t(0.95, 22) = 1.72074

Date	Samples	Mean	Interval	Significant
12/4/2018	1	0.0254	[0, 0.101829]	FALSE

Parametric Prediction Interval Analysis

Intra-Well Comparison for MW-1

Parameter: Cobalt

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

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

Baseline Samples	Date	Result
	4/19/2008	0.032
	1/21/2009	0.03
	4/9/2009	0.043
	5/19/2009	0.056
	7/16/2010	0.035
	2/8/2011	0.031
	2/17/2012	0.026
	7/31/2012	0.028
	3/27/2013	0.036
	12/23/2013	0.028
	6/26/2014	0.036
	11/21/2014	0.046
	5/28/2015	0.041
	11/11/2015	0.0257
	5/9/2016	0.0417
	11/10/2016	0.0196
	6/8/2017	0.0342
	9/28/2017	0.0403
	12/11/2017	0.0411
	3/21/2018	0.0425
	6/19/2018	0.0206
	9/12/2018	0.0198

From 22 baseline samples
Baseline mean = 0.03425
Baseline std Dev = 0.00928325

For 1 recent sampling event(s)
Actual confidence level is 1.0 - (0.05/1) = 95 %
t is Percentile of Student's T-Test (0.95/1) = 0.95
Degrees of Freedom = 22 (background observations) - 1
t(0.95, 22) = 1.72074

Date	Samples	Mean	Interval	Significant
12/4/2018	1	0.0284	[0, 0.0505831]	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

From 23 baseline samples
Baseline mean = 0.988037
Baseline std Dev = 0.355734

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
12/4/2018	1	0.512824	[0, 1.89952]	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Copper

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

Total Percent Non-Detects = 77.2727%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 22
Maximum Baseline Concentration = 0.028
Confidence Level = 95.7%
False Positive Rate = 4.3%

Baseline Measurem	Date	Value
	4/19/2008	0.0027
	1/21/2009	0.028
	4/9/2009	0.0064
	5/19/2009	0.0063
	7/16/2010	ND<0.002
	2/8/2011	0.0021
	2/17/2012	ND<0.002
	7/31/2012	ND<0.002
	3/27/2013	ND<0.002
	12/23/2013	ND<0.002
	6/26/2014	ND<0.002
	11/21/2014	ND<0.005
	5/28/2015	ND<0.005
	11/11/2015	ND<0.005
	5/9/2016	ND<0.005
	11/10/2016	ND<0.005
	6/8/2017	ND<0.005
	9/28/2017	ND<0.005
	12/11/2017	ND<0.005
	3/21/2018	ND<0.005
	6/19/2018	ND<0.005
	9/12/2018	ND<0.005

Date	Count	Mean	Significant
12/4/2018	1	0.00715	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Nickel

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

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

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

Date	Count	Mean	Significant
12/4/2018	1	0.00744	FALSE

Non-Parametric Prediction Interval

Intra-Well Comparison for MW-1

Parameter: Mercury

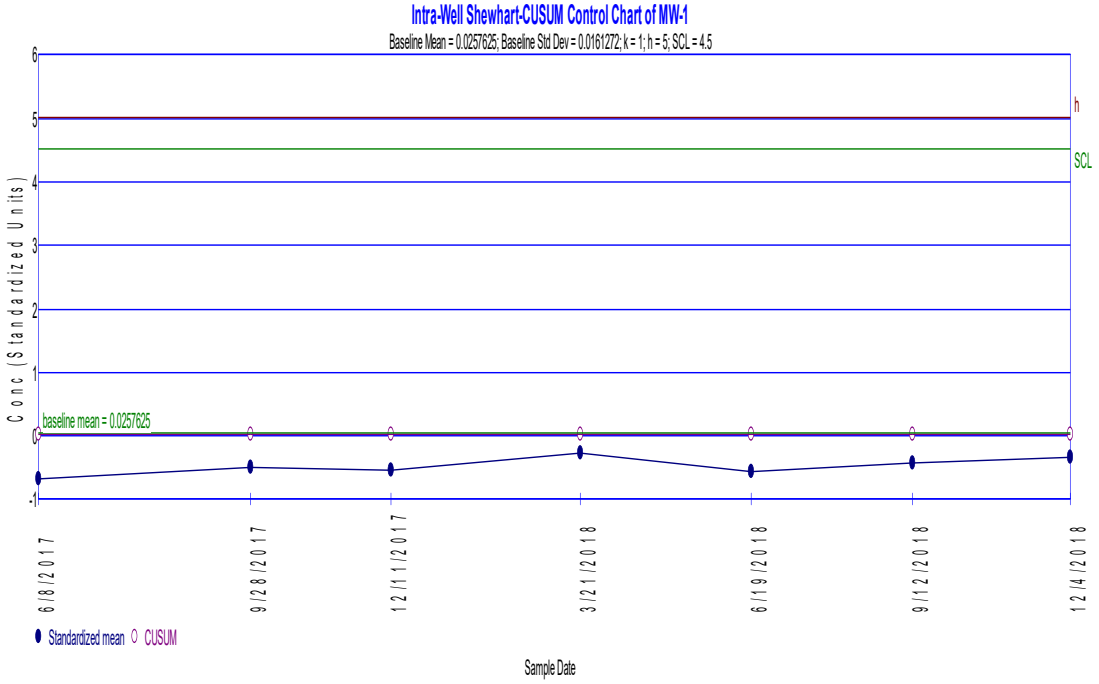
Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit

Total Percent Non-Detects = 40.9091%
Future Samples (k) = 1
Recent Dates = 1
Baseline Measurements (n) = 22
Maximum Baseline Concentration = 0.00319
Confidence Level = 95.7%
False Positive Rate = 4.3%

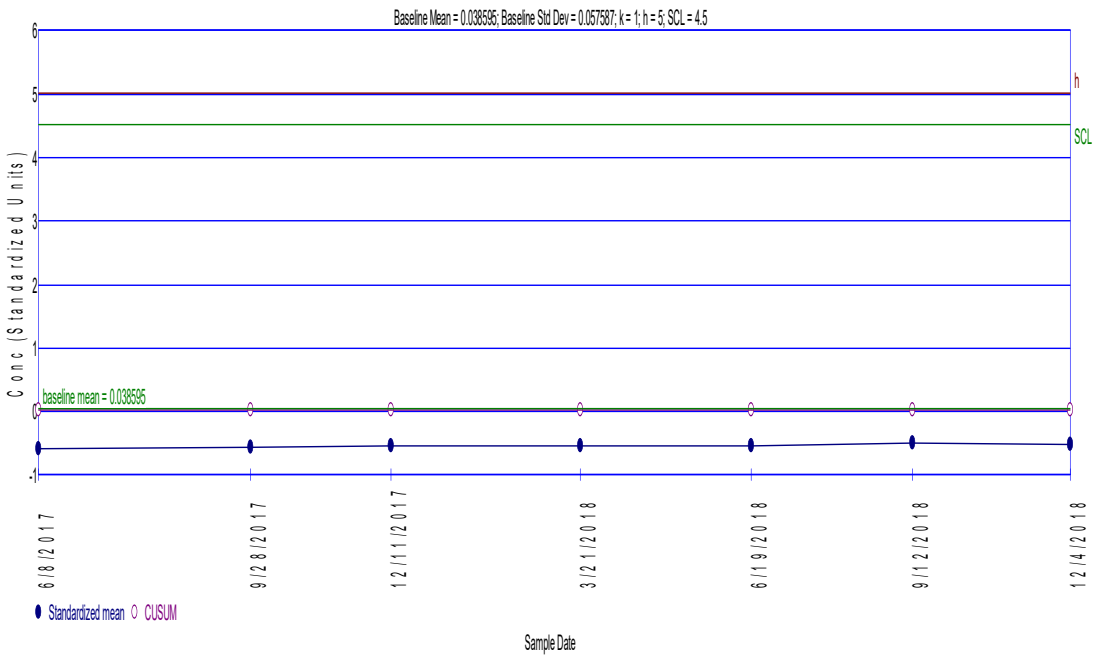
Baseline Measurem	Date	Value
	4/19/2008	ND<0.0002
	1/21/2009	0.00045
	4/9/2009	ND<0.0002
	5/19/2009	ND<0.0002
	7/16/2010	0.0005
	2/8/2011	0.00024
	2/17/2012	0.00083
	7/31/2012	0.00063
	3/27/2013	0.00028
	12/23/2013	0.00077
	6/26/2014	ND<0.0002
	11/21/2014	ND<0.0002
	5/28/2015	ND<0.0002
	11/11/2015	ND<0.0002
	5/9/2016	0.000858
	11/10/2016	ND<0.0002
	6/8/2017	0.000222
	9/28/2017	ND<0.0002
	12/11/2017	0.000473
	3/21/2018	0.000651
	6/19/2018	0.00319
	9/12/2018	0.000244

Date	Count	Mean	Significant
12/4/2018	1	0.00101	FALSE

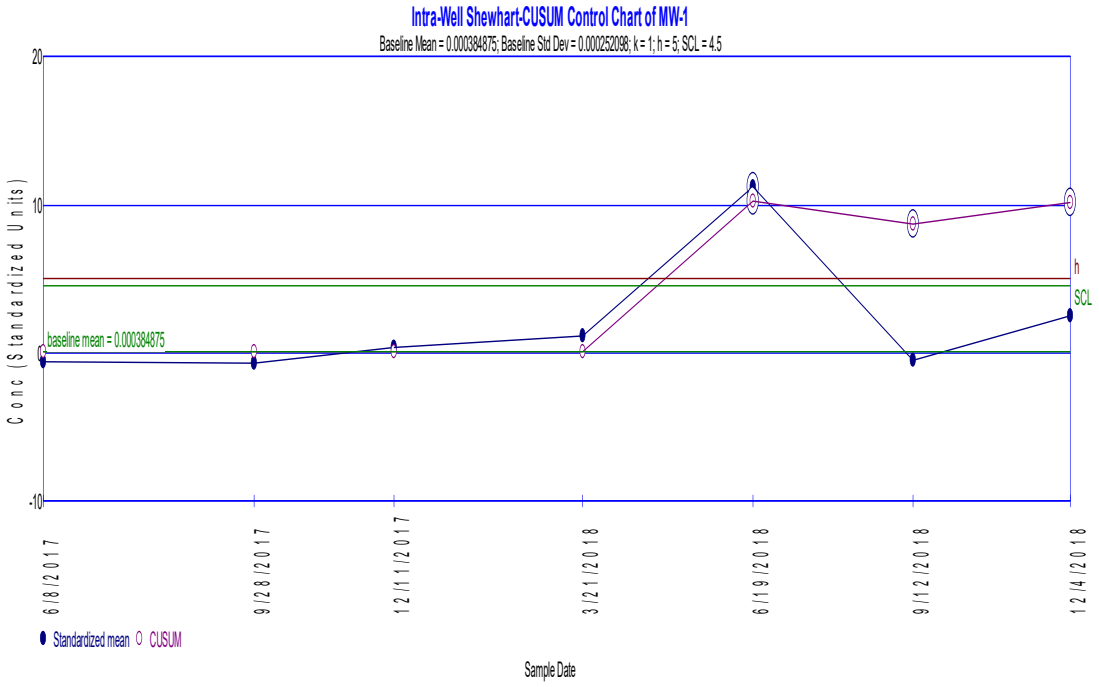
Barium



Nickel



Mercury


Intra-Well Shewhart-CUSUM Control Chart of MW-1
Baseline Mean = 0.000384875; Baseline Std Dev = 0.000252098; k = 1; h = 5; SCL = 4.5
20
10
0
-10
Conc (Standardized Units)
h
SCL
baseline mean = 0.000384875
6/8/2017
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
12/4/2018
Standardized mean
CUSUM
Sample Date

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 = 92

Data Set Standard Deviation = 1.47541
Numerator = 5864.23
Denominator = 16841.8
W Statistic = 0.348196 = 5864.23 / 16841.8

5% Critical value of 0.973 exceeds 0.348196
Evidence of non-normality at 95% level of significance

1% Critical value of 0.963 exceeds 0.348196
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Barium

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 93

Data Set Standard Deviation = 0.104653
Numerator = 41.7211
Denominator = 86.7036
W Statistic = 0.481192 = 41.7211 / 86.7036

5% Critical value of 0.973 exceeds 0.481192
Evidence of non-normality at 95% level of significance

1% Critical value of 0.963 exceeds 0.481192
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Total Cadmium

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 92

Data Set Standard Deviation = 0.0399708
Numerator = 2.26907
Denominator = 12.3608
W Statistic = 0.18357 = 2.26907 / 12.3608

5% Critical value of 0.973 exceeds 0.18357
Evidence of non-normality at 95% level of significance

1% Critical value of 0.963 exceeds 0.18357
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Chloride

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 103

Data Set Standard Deviation = 71.3973
Numerator = 2.74178e+007
Denominator = 4.98677e+007
W Statistic = 0.549811 = 2.74178e+007 / 4.98677e+007

5% Critical value of 0.976 exceeds 0.549811
Evidence of non-normality at 95% level of significance

1% Critical value of 0.967 exceeds 0.549811
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Chromium

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 92

Data Set Standard Deviation = 0.017429
Numerator = 0.666219
Denominator = 2.3502
W Statistic = 0.283473 = 0.666219 / 2.3502

5% Critical value of 0.973 exceeds 0.283473
Evidence of non-normality at 95% level of significance

1% Critical value of 0.963 exceeds 0.283473
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 = 92

Data Set Standard Deviation = 0.013807
Numerator = 1.1318
Denominator = 1.47488
W Statistic = 0.767385 = 1.1318 / 1.47488

5% Critical value of 0.973 exceeds 0.767385
Evidence of non-normality at 95% level of significance

1% Critical value of 0.963 exceeds 0.767385
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 = 91

Data Set Standard Deviation = 0.00282166
Numerator = 0.0233726
Denominator = 0.0603227
W Statistic = 0.38746 = 0.0233726 / 0.0603227

5% Critical value of 0.973 exceeds 0.38746
Evidence of non-normality at 95% level of significance

1% Critical value of 0.962 exceeds 0.38746
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 = 63

Data Set Standard Deviation = 0.0742679
Numerator = 6.35799
Denominator = 19.3111
W Statistic = 0.32924 = 6.35799 / 19.3111

5% Critical value of 0.964 exceeds 0.32924
Evidence of non-normality at 95% level of significance

1% Critical value of 0.947 exceeds 0.32924
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 = 94

Data Set Standard Deviation = 0.0322357
Numerator = 3.54068
Denominator = 8.39845
W Statistic = 0.421587 = 3.54068 / 8.39845

5% Critical value of 0.974 exceeds 0.421587
Evidence of non-normality at 95% level of significance

1% Critical value of 0.965 exceeds 0.421587
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 = 94

Data Set Standard Deviation = 0.273199
Numerator = 136.541
Denominator = 603.232
W Statistic = 0.226349 = 136.541 / 603.232

5% Critical value of 0.974 exceeds 0.226349
Evidence of non-normality at 95% level of significance

1% Critical value of 0.965 exceeds 0.226349
Evidence of non-normality at 99% level of significance

Shapiro-Francia Test of Normality

Parameter: Sulfate

All Locations

Normality Test of Parameter Concentrations

Original Data (Not Transformed)
Non-Detects Replaced with Detection Limit
Total Number of Measurements = 94

Data Set Standard Deviation = 60.1512
Numerator = 6.42652e+006
Denominator = 2.92424e+007
W Statistic = 0.219767 = 6.42652e+006 / 2.92424e+007

5% Critical value of 0.974 exceeds 0.219767
Evidence of non-normality at 95% level of significance

1% Critical value of 0.965 exceeds 0.219767
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 = 92

Data Set Standard Deviation = 1.34442
Numerator = 12511.5
Denominator = 13983.9
W Statistic = 0.894706 = 12511.5 / 13983.9

5% Critical value of 0.973 exceeds 0.894706
Evidence of non-normality at 95% level of significance

1% Critical value of 0.963 exceeds 0.894706
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 = 93

Data Set Standard Deviation = 1.01943
Numerator = 7911.87
Denominator = 8227.07
W Statistic = 0.961687 = 7911.87 / 8227.07

5% Critical value of 0.973 exceeds 0.961687
Evidence of non-normality at 95% level of significance

1% Critical value of 0.963 exceeds 0.961687
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 = 92

Data Set Standard Deviation = 1.32348
Numerator = 4711.18
Denominator = 13551.7
W Statistic = 0.347644 = 4711.18 / 13551.7

5% Critical value of 0.973 exceeds 0.347644
Evidence of non-normality at 95% level of significance

1% Critical value of 0.963 exceeds 0.347644
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 = 103

Data Set Standard Deviation = 1.40636
Numerator = 18934.2
Denominator = 19348.6
W Statistic = 0.978583 = 18934.2 / 19348.6

5% Critical value of 0.976 is less than 0.978583
Data is normally distributed at 95% level of significance

1% Critical value of 0.967 is less than 0.978583
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 = 92

Data Set Standard Deviation = 1.01728
Numerator = 6207.73
Denominator = 8006.54
W Statistic = 0.775333 = 6207.73 / 8006.54

5% Critical value of 0.973 exceeds 0.775333
Evidence of non-normality at 95% level of significance

1% Critical value of 0.963 exceeds 0.775333
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 = 92

Data Set Standard Deviation = 1.37413
Numerator = 12718.4
Denominator = 14608.7
W Statistic = 0.870601 = 12718.4 / 14608.7

5% Critical value of 0.973 exceeds 0.870601
Evidence of non-normality at 95% level of significance

1% Critical value of 0.963 exceeds 0.870601
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 = 91

Data Set Standard Deviation = 0.554202
Numerator = 1673.9
Denominator = 2327.06
W Statistic = 0.719319 = 1673.9 / 2327.06

5% Critical value of 0.973 exceeds 0.719319
Evidence of non-normality at 95% level of significance

1% Critical value of 0.962 exceeds 0.719319
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 = 63

Data Set Standard Deviation = 0.569505
Numerator = 485.468
Denominator = 1135.53
W Statistic = 0.427524 = 485.468 / 1135.53

5% Critical value of 0.964 exceeds 0.427524
Evidence of non-normality at 95% level of significance

1% Critical value of 0.947 exceeds 0.427524
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 = 94

Data Set Standard Deviation = 1.28479
Numerator = 11567.4
Denominator = 13340.9
W Statistic = 0.867059 = 11567.4 / 13340.9

5% Critical value of 0.974 exceeds 0.867059
Evidence of non-normality at 95% level of significance

1% Critical value of 0.965 exceeds 0.867059
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 = 94

Data Set Standard Deviation = 1.09418
Numerator = 5773.28
Denominator = 9676.06
W Statistic = 0.596656 = 5773.28 / 9676.06

5% Critical value of 0.974 exceeds 0.596656
Evidence of non-normality at 95% level of significance

1% Critical value of 0.965 exceeds 0.596656
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 = 94

Data Set Standard Deviation = 1.17634
Numerator = 7742.56
Denominator = 11183.9
W Statistic = 0.692296 = 7742.56 / 11183.9

5% Critical value of 0.974 exceeds 0.692296
Evidence of non-normality at 95% level of significance

1% Critical value of 0.965 exceeds 0.692296
Evidence of non-normality at 99% level of significance

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 = 24
Background Mean = 0.968237
Background Std Dev = 0.361184

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 = 24 (background observations) - 1
t(0.998333, 23) = 3.37203

Well MW-3

Date	Samples	Mean	Interval	Significant
12/4/2018	1	4.17439	[0, 2.21127]	TRUE

Well MW-4

Date	Samples	Mean	Interval	Significant
12/4/2018	1	1.94162	[0, 2.21127]	FALSE

Well MW-5

Date	Samples	Mean	Interval	Significant
12/4/2018	1	4.28359	[0, 2.21127]	TRUE

Well TMW-1

Date	Samples	Mean	Interval	Significant
12/4/2018	1	2.49321	[0, 2.21127]	TRUE

Well TMW-2

Date	Samples	Mean	Interval	Significant
12/4/2018	1	2.8094	[0, 2.21127]	TRUE

Well TMW-3

Date	Samples	Mean	Interval	Significant
12/4/2018	1	3.95508	[0, 2.21127]	TRUE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Chromium

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

Total Percent Non-Detects = 78.2609%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 23
Maximum Background Value = 0.12
Confidence Level = 79.3%
False Positive Rate = 20.7%

Location	Date	Count	Mean	Significant
MW-3	12/4/2018	1	0.00356	FALSE
MW-4	12/4/2018	1	0.00269	FALSE
MW-5	12/4/2018	1	0.00884	FALSE
TMW-1	12/4/2018	1	0.00224	FALSE
TMW-2	12/4/2018	1	0.00259	FALSE
TMW-3	12/4/2018	1	0.00211	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Cobalt

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

Total Percent Non-Detects = 57.6087%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 23
Maximum Background Value = 0.056
Confidence Level = 79.3%
False Positive Rate = 20.7%

Location	Date	Count	Mean	Significant
MW-3	12/4/2018	1	0.0219	FALSE
MW-4	12/4/2018	1	0.002	FALSE
MW-5	12/4/2018	1	0.00264	FALSE
TMW-1	12/4/2018	1	0.002	FALSE
TMW-2	12/4/2018	1	0.002	FALSE
TMW-3	12/4/2018	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 = 83.5165%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 23
Maximum Background Value = 0.028
Confidence Level = 79.3%
False Positive Rate = 20.7%

Location	Date	Count	Mean	Significant
MW-3	12/4/2018	1	0.0082	FALSE
MW-4	12/4/2018	1	0.005	FALSE
MW-5	12/4/2018	1	0.005	FALSE
TMW-1	12/4/2018	1	0.005	FALSE
TMW-2	12/4/2018	1	0.005	FALSE
TMW-3	12/4/2018	1	0.005	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) = 13
Maximum Background Value = 0.178
Confidence Level = 68.4%
False Positive Rate = 31.6%

Location	Date	Count	Mean	Significant
MW-3	**12/4/2018**	**1**	**0.4**	**TRUE**
MW-4	12/4/2018	1	0.1	FALSE
MW-5	12/4/2018	1	0.1	FALSE
TMW-1	12/4/2018	1	0.1	FALSE
TMW-2	12/4/2018	1	0.1	FALSE
TMW-3	12/4/2018	1	0.1	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

Parameter: Nickel

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

Total Percent Non-Detects = 62.766%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 23
Maximum Background Value = 0.2
Confidence Level = 79.3%
False Positive Rate = 20.7%

Location	Date	Count	Mean	Significant
MW-3	12/4/2018	1	0.0714	FALSE
MW-4	12/4/2018	1	0.002	FALSE
MW-5	12/4/2018	1	0.00902	FALSE
TMW-1	12/4/2018	1	0.002	FALSE
TMW-2	12/4/2018	1	0.002	FALSE
TMW-3	12/4/2018	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 = 61.7021%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 23
Maximum Background Value = 0.0281
Confidence Level = 79.3%
False Positive Rate = 20.7%

Location	Date	Count	Mean	Significant
MW-3	**12/4/2018**	**1**	**1.34**	**TRUE**
MW-4	12/4/2018	1	0.025	FALSE
MW-5	12/4/2018	1	0.025	FALSE
TMW-1	12/4/2018	1	0.025	FALSE
TMW-2	12/4/2018	1	0.025	FALSE
TMW-3	12/4/2018	1	0.025	FALSE

Non-Parametric Prediction Interval

Inter-Well Comparison

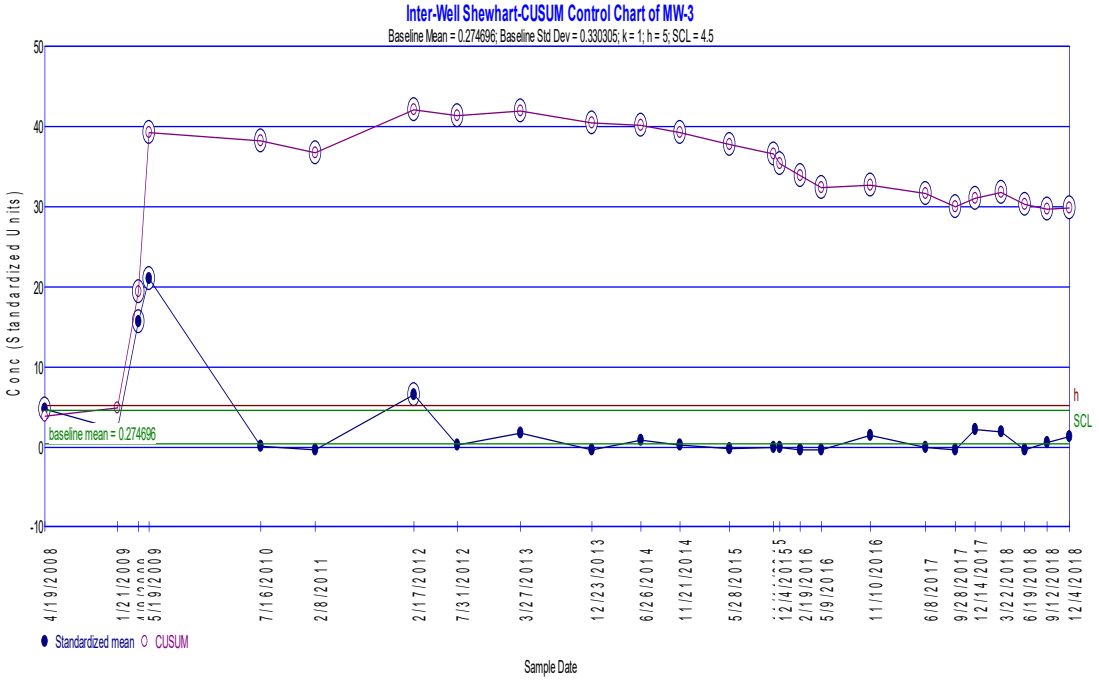
Parameter: Sulfate

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

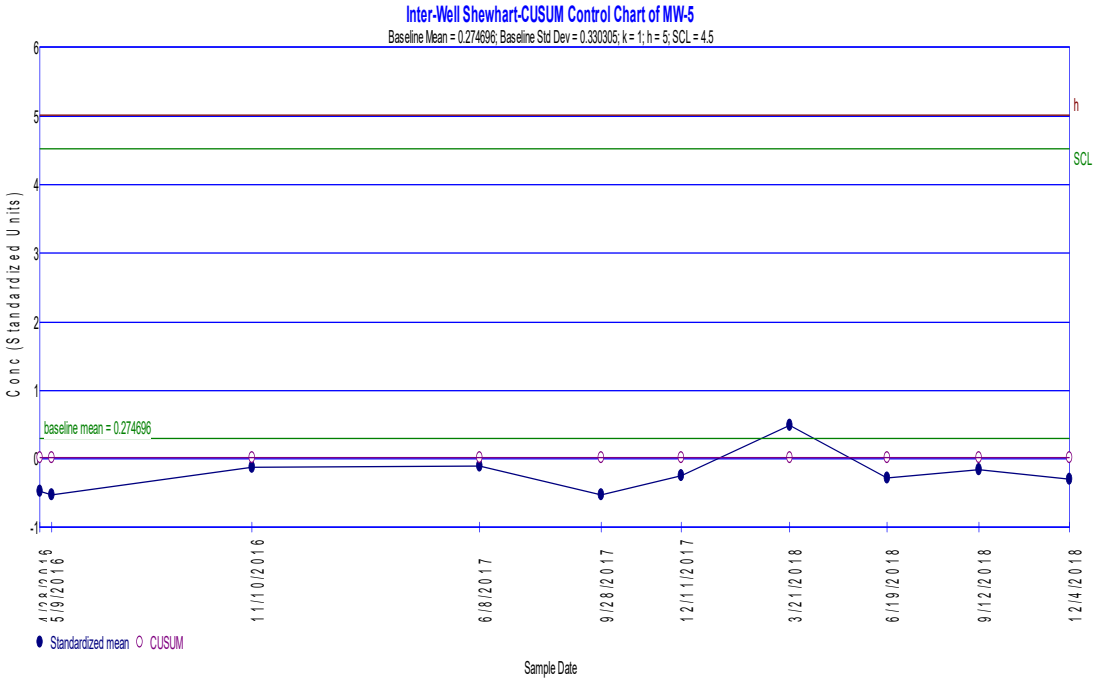
Total Percent Non-Detects = 61.7021%
Number of comparisons = 6
Future Samples (k) = 6
Recent Dates = 1
Background Measurements (n) = 22
Maximum Background Value = 18.8
Confidence Level = 78.6%
False Positive Rate = 21.4%

Location	Date	Count	Mean	Significant
MW-3	**12/4/2018**	**1**	**324**	**TRUE**
MW-4	12/4/2018	1	5	FALSE
MW-5	12/4/2018	1	5.93	FALSE
TMW-1	12/4/2018	1	5	FALSE
TMW-2	12/4/2018	1	5	FALSE
TMW-3	12/4/2018	1	5	FALSE

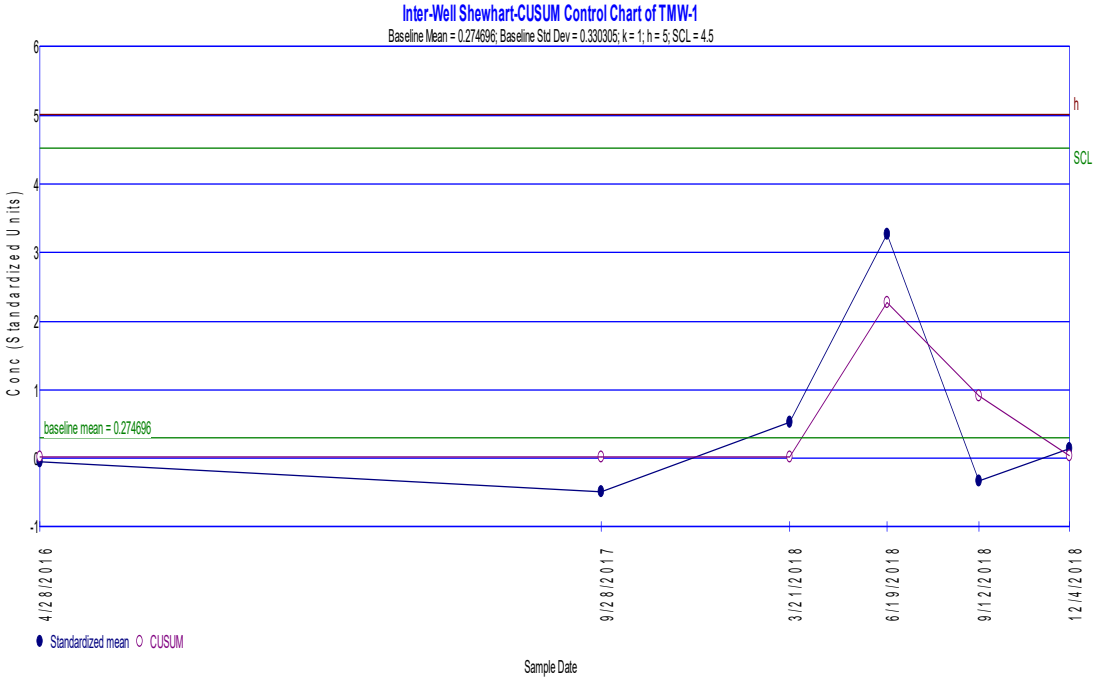
Aluminum



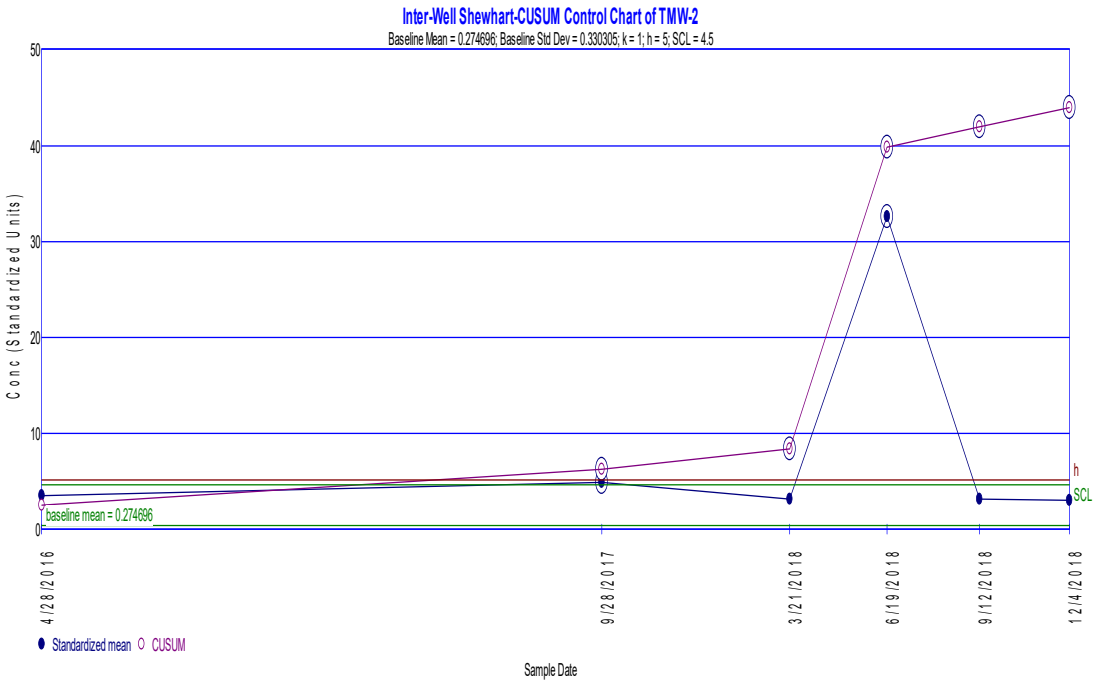
Aluminum



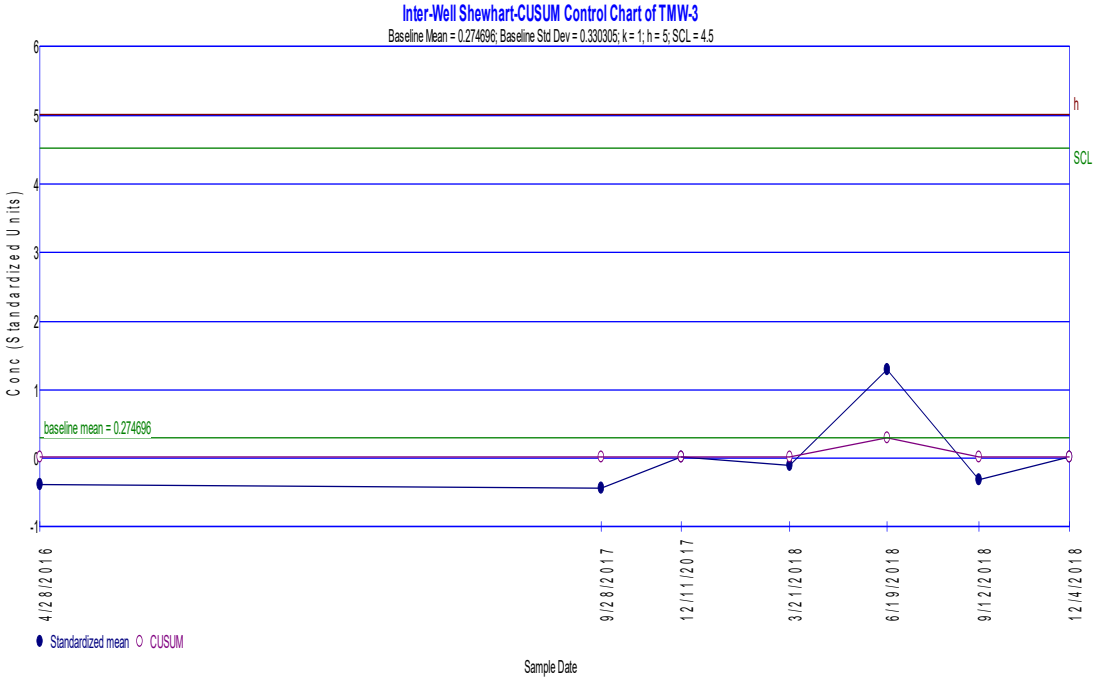
Aluminum



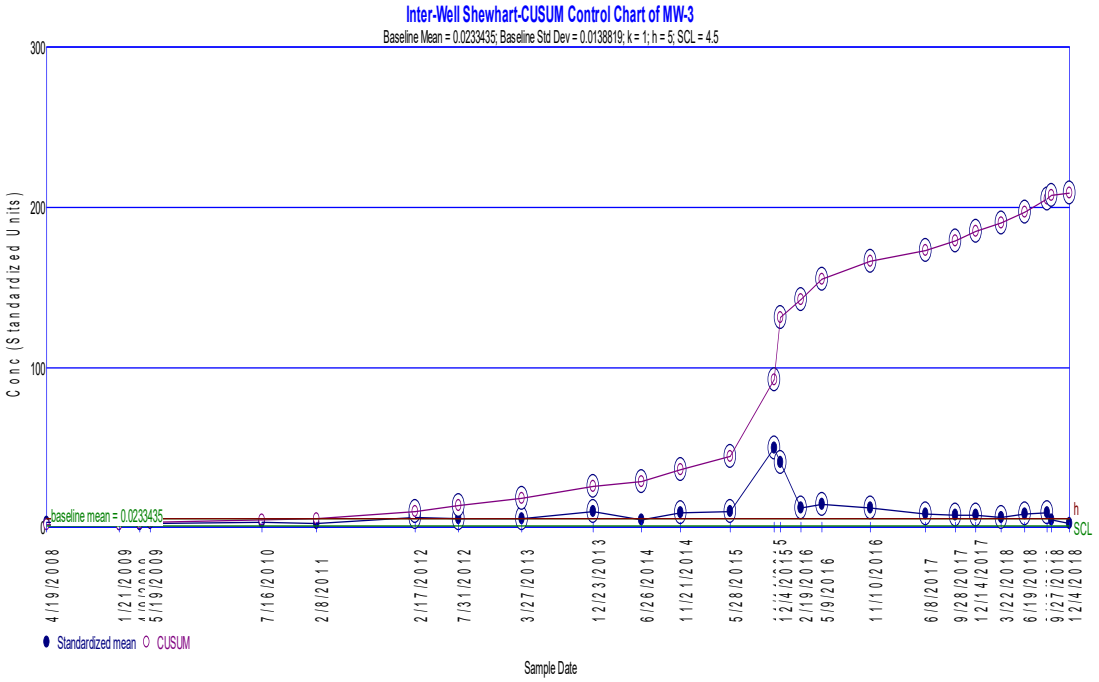
Aluminum



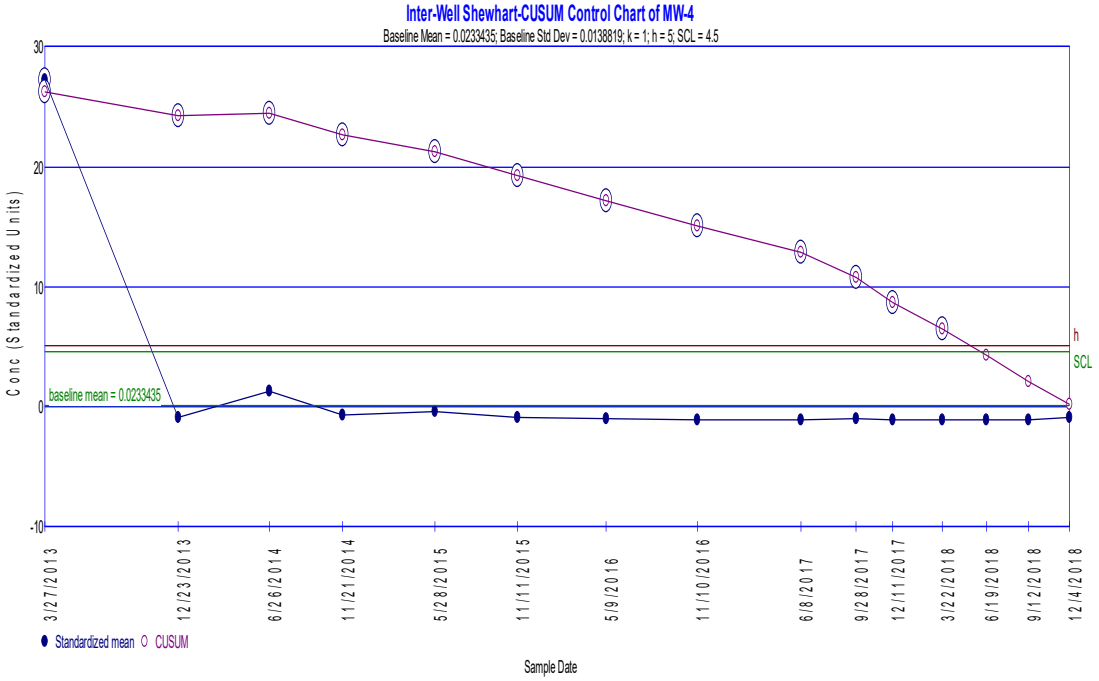
Aluminum



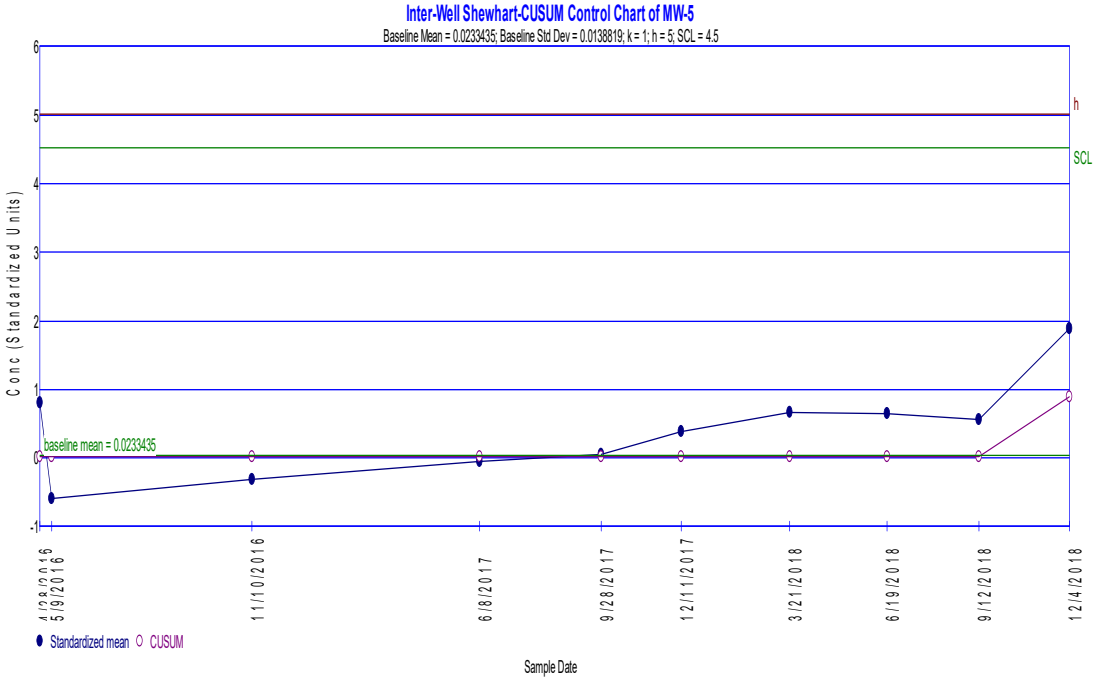
Barium



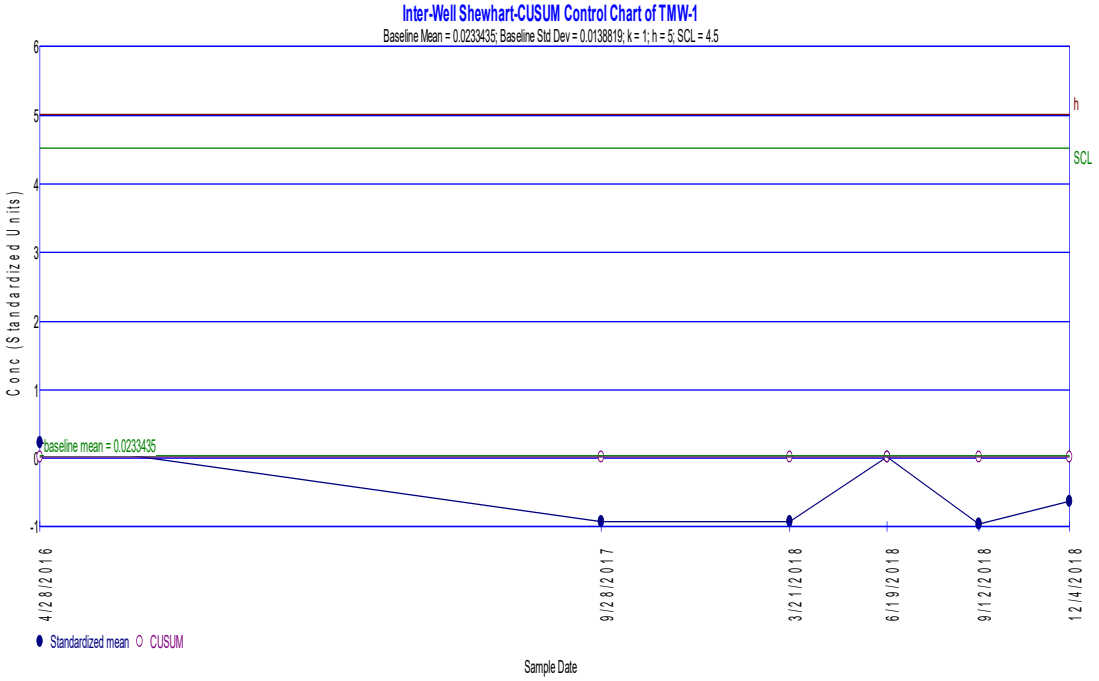
Barium



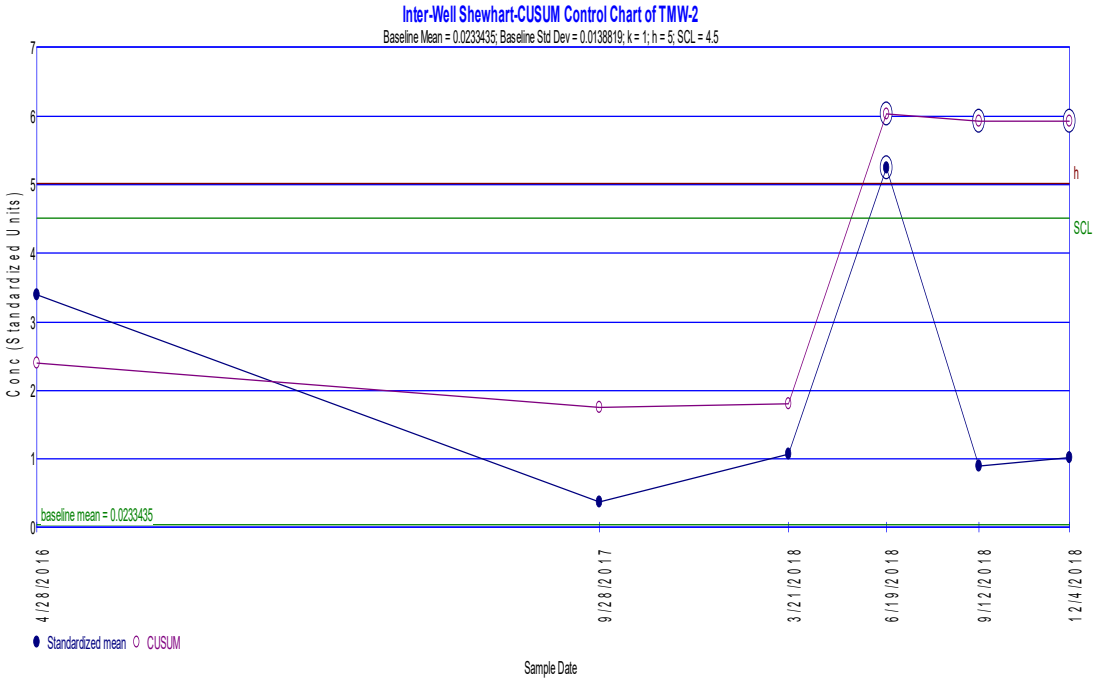
Barium



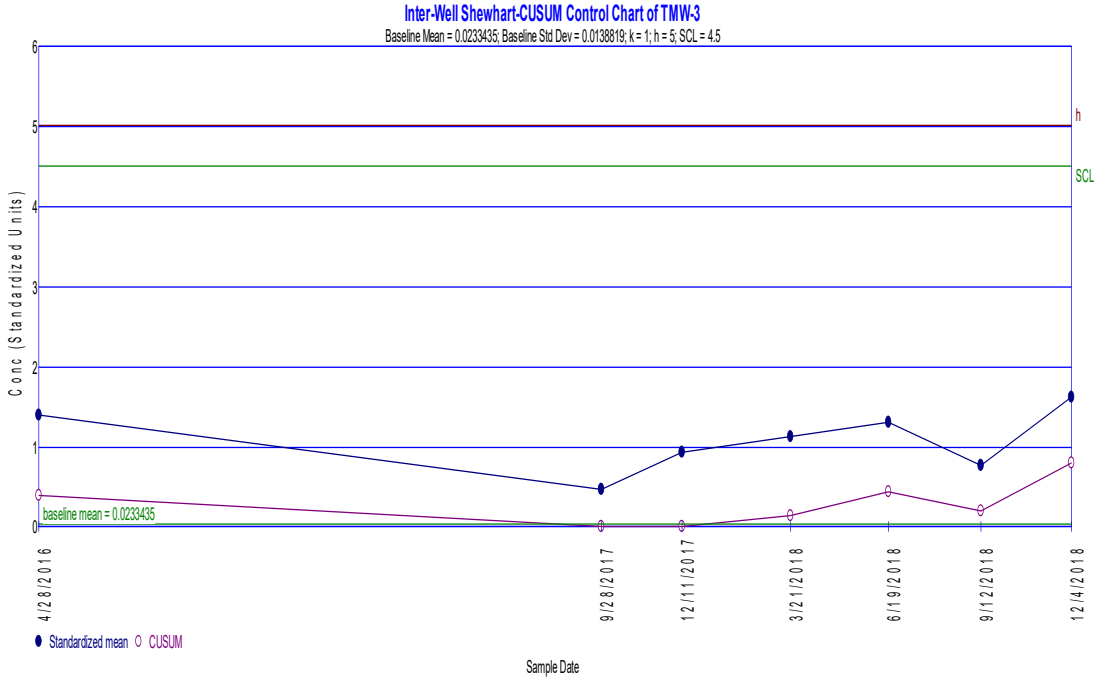
Barium



Barium



Barium


Inter-Well Shewhart-CUSUM Control Chart of TMW-3
Baseline Mean = 0.0233435; Baseline Std Dev = 0.0138819; k = 1; h = 5; SCL = 4.5
Conc (Standardized Units)
h
SCL
baseline mean = 0.0233435
4/28/2016
9/28/2017
12/11/2017
3/21/2018
6/19/2018
9/12/2018
12/4/2018
Standardized mean
CUSUM
Sample Date

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 37
Non detect rank is 19

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	ND<0.001	19
	1/21/2009	ND<0.001	19
	4/9/2009	ND<0.001	19
	5/19/2009	ND<0.001	19
	7/16/2010	ND<0.001	19
	2/8/2011	ND<0.001	19
	2/17/2012	ND<0.001	19
	7/31/2012	ND<0.001	19
	12/23/2013	ND<0.001	19
	6/26/2014	ND<0.001	19
	11/21/2014	ND<0.001	19
	5/28/2015	ND<0.001	19
	11/11/2015	ND<0.001	19
	5/9/2016	ND<0.001	19
	11/10/2016	ND<0.001	19
	6/8/2017	ND<0.001	19
	9/28/2017	ND<0.001	19
	12/11/2017	ND<0.001	19
	3/21/2018	ND<0.001	19
	6/19/2018	ND<0.001	19
	9/12/2018	ND<0.001	19
	12/4/2018	ND<0.001	19
MW-3	1/21/2009	ND<0.001	19
	4/9/2009	ND<0.001	19
	5/19/2009	ND<0.001	19
	7/16/2010	ND<0.001	19
	2/8/2011	ND<0.001	19
	2/17/2012	ND<0.001	19
	7/31/2012	ND<0.001	19
	12/23/2013	ND<0.001	19
	6/26/2014	ND<0.001	19
	11/21/2014	ND<0.001	19
	5/28/2015	ND<0.001	19
	11/11/2015	ND<0.001	19
	12/4/2015	ND<0.001	19
	2/19/2016	ND<0.001	19
	5/9/2016	ND<0.001	19
	11/10/2016	0.00177	38
	6/8/2017	0.0286	43
	8/8/2017	0.0113	42
	9/28/2017	0.00926	41
	12/14/2017	0.00659	39
	3/22/2018	0.00671	40
	6/19/2018	0.0312	44
	9/12/2018	0.297	47

	9/27/2018	0.204	46
	12/4/2018	0.144	45

The Wilcoxon Statistic is 385
The Expected value is is 275
The Standard Deviation is 46.9042
The Z Score is 2.33455
The Standard Deviation adjusted for ties is 33.5703
The Z Score adjusted for ties is 3.26181
2.33455 > 2.326 indicating statistical significance at 1% level
3.26181 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Fluoride

Location: MW-3

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

Total non detects is 16
Non detect rank is 8.5

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	ND<0.1	8.5
	1/21/2009	ND<0.1	8.5
	4/9/2009	ND<0.1	8.5
	5/19/2009	ND<0.1	8.5
	5/9/2016	ND<0.1	8.5
	11/10/2016	ND<0.1	8.5
	6/8/2017	0.178	19
	9/28/2017	ND<0.1	8.5
	12/11/2017	ND<0.1	8.5
	3/21/2018	ND<0.1	8.5
	6/19/2018	ND<0.1	8.5
	9/12/2018	ND<0.1	8.5
	12/4/2018	ND<0.1	8.5
MW-3	1/21/2009	ND<0.1	8.5
	4/9/2009	ND<0.1	8.5
	5/19/2009	ND<0.1	8.5
	5/9/2016	0.105	17
	11/10/2016	ND<0.1	8.5
	6/8/2017	0.208	20
	9/28/2017	0.226	21
	12/14/2017	0.149	18
	3/22/2018	0.274	23
	6/19/2018	0.248	22
	9/12/2018	0.543	25
	12/4/2018	0.4	24

The Wilcoxon Statistic is 126
The Expected value is is 78
The Standard Deviation is 18.3848
The Z Score is 2.58366
The Standard Deviation adjusted for ties is 15.7987
The Z Score adjusted for ties is 3.00657
2.58366 > 2.326 indicating statistical significance at 1% level
3.00657 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Zinc

Location: MW-3

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

Total non detects is 23
Non detect rank is 12

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	4/19/2008	0.011	24
	1/21/2009	0.015	31
	4/9/2009	0.011	25
	5/19/2009	0.021	37
	7/16/2010	0.011	26
	2/8/2011	0.016	34
	2/17/2012	ND<0.01	12
	7/31/2012	0.023	38
	3/27/2013	0.012	28
	12/23/2013	ND<0.01	12
	6/26/2014	ND<0.01	12
	11/21/2014	ND<0.025	12
	5/28/2015	ND<0.025	12
	11/11/2015	ND<0.025	12
	5/9/2016	0.0281	40
	11/10/2016	ND<0.025	12
	6/8/2017	ND<0.025	12
	9/28/2017	ND<0.025	12
	12/11/2017	ND<0.025	12
	3/21/2018	ND<0.025	12
	6/19/2018	ND<0.025	12
	9/12/2018	ND<0.025	12
	12/4/2018	ND<0.025	12
MW-3	4/19/2008	0.017	36
	1/21/2009	0.015	32
	4/9/2009	0.011	27
	5/19/2009	0.031	41
	7/16/2010	0.015	33
	2/8/2011	0.013	29
	2/17/2012	0.014	30
	7/31/2012	0.016	35
	3/27/2013	ND<0.01	12
	12/23/2013	ND<0.01	12
	6/26/2014	0.023	39
	11/21/2014	ND<0.025	12
	5/28/2015	ND<0.025	12
	11/11/2015	ND<0.025	12
	12/4/2015	ND<0.025	12
	2/19/2016	ND<0.025	12
	5/9/2016	ND<0.025	12
	11/10/2016	ND<0.025	12
	6/8/2017	0.0769	44
	9/28/2017	0.0439	42
	12/14/2017	0.159	46
	3/22/2018	0.0499	43

6/19/2018	0.109	45
9/12/2018	1.68	49
9/27/2018	1.58	48
12/4/2018	1.34	47

The Wilcoxon Statistic is 423
The Expected value is is 299
The Standard Deviation is 49.9166
The Z Score is 2.47413
The Standard Deviation adjusted for ties is 47.2691
The Z Score adjusted for ties is 2.6127
2.47413 > 2.326 indicating statistical significance at 1% level
2.6127 > 2.326 indicating statistical significance at 1% level when adjusted for ties

Wilcoxon Non-Parametric Analysis (Inter-Well)

Parameter: Sulfate

Location: MW-3

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

Total non detects is 13
Non detect rank is 7

Wilcoxon Ranks

Location	Date	Conc.	Rank
MW-1	5/19/2009	8.9	20
	7/16/2010	9.4	23
	2/8/2011	5.8	17
	9/14/2011	6.6	19
	2/17/2012	ND<5	7
	7/31/2012	ND<5	7
	3/27/2013	5.1	15
	12/23/2013	6.1	18
	6/26/2014	ND<5	7
	11/21/2014	9.1	22
	5/28/2015	ND<5	7
	11/11/2015	18.8	30
	5/9/2016	ND<5	7
	8/18/2016	3.51	14
	11/10/2016	16.5	29
	6/8/2017	ND<5	7
	9/28/2017	ND<5	7
	12/11/2017	ND<5	7
	3/21/2018	ND<5	7
	6/19/2018	ND<5	7
	9/12/2018	12.3	27
	12/4/2018	ND<5	7
MW-3	5/19/2009	ND<5	7
	7/16/2010	5.1	16
	2/8/2011	ND<5	7
	2/17/2012	22	31
	7/31/2012	23	35
	3/27/2013	16	28
	12/23/2013	12	26
	6/26/2014	9.7	24
	11/21/2014	11	25
	5/28/2015	9.09	21
	11/11/2015	29.3	37
	12/4/2015	29.1	36
	2/19/2016	22.2	32
	5/9/2016	22.3	33
	8/18/2016	95.7	43
	11/10/2016	34	39
	6/8/2017	93.7	42
	9/28/2017	46.2	40
	12/14/2017	46.2	41
	3/22/2018	22.3	34
	6/19/2018	30.1	38
	9/12/2018	484	45
	12/4/2018	324	44

The Wilcoxon Statistic is 448
The Expected value is is 253
The Standard Deviation is 44.0416
The Z Score is 4.41627
The Standard Deviation adjusted for ties is 43.5104
The Z Score adjusted for ties is 4.47019
4.41627 > 2.326 indicating statistical significance at 1% level
4.47019 > 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 = 108 - 188 = -80

Tied Group	Value	Members
1	0.1	3
2	0.2	2

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

There are 0 time periods with multiple data

A = 84
B = 0
C = 6
D = 0
E = 8
F = 0
a = 33000
b = 124200
c = 1200
Group Variance = 1828.67
Z-Score = -1.8474
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-1.8474| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Aluminum

Location: MW-4

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

95% Confidence Level

S Statistic = 8 - 19 = -11

Tied Group	Value	Members
1	0.1	13

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

There are 0 time periods with multiple data

A = 4836
B = 0
C = 1716
D = 0
E = 156
F = 0
a = 7350
b = 24570
c = 420
Group Variance = 139.667
Z-Score = -0.846162
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-0.846162| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Aluminum

Location: MW-5

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

95% Confidence Level

S Statistic = 25 - 19 = 6
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |6| is 0.664
0.664 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Aluminum

Location: TMW-1

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

95% Confidence Level

S Statistic = 9 - 6 = 3
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |3| is 0.72
0.72 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Aluminum

Location: TMW-2

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

95% Confidence Level

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

Mann-Kendall Trend Analysis

Parameter: Aluminum

Location: TMW-3

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

95% Confidence Level

S Statistic = 15 - 6 = 9
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |9| is 0.238
0.238 >= 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 - 114 = 97

Tied GrouValue	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

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 37050
b = 140400
c = 1300
Group Variance = 2058.33
Z-Score = 2.11599
Comparison Level at 95% confidence level = 1.65463 (upward trend)
2.11599 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Barium

Location: MW-4

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

95% Confidence Level

S Statistic = 21 - 84 = -63

Tied GrouValue	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

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 7350
b = 24570
c = 420
Group Variance = 408.333
Z-Score = -3.0682
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-3.0682 < -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 = 34 - 11 = 23
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |23| is 0.046
0.046 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Barium

Location: TMW-1

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

95% Confidence Level

S Statistic = 6 - 9 = -3
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |-3| is 0.72
0.72 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Barium

Location: TMW-2

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

95% Confidence Level

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

Mann-Kendall Trend Analysis

Parameter: Barium

Location: TMW-3

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

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 = 183 - 12 = 171

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

There are 0 time periods with multiple data

A = 7350
B = 0
C = 2730
D = 0
E = 210
F = 0
a = 33000
b = 124200
c = 1200
Group Variance = 1425
Z-Score = 4.50341
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.50341 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chloride

Location: MW-3

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

95% Confidence Level

S Statistic = 253 - 68 = 185

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
7/16/2010	1
2/8/2011	1
2/17/2012	1
8/1/2012	1
3/27/2013	1
12/23/2013	1
6/26/2014	1
11/21/2014	1
5/28/2015	1
11/11/2015	1
12/4/2015	1
2/19/2016	1
5/9/2016	1
8/18/2016	1
11/10/2016	1
6/8/2017	1
9/28/2017	1
12/14/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	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 = 4.06025
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.06025 > 1.65463 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chloride

Location: MW-4

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

95% Confidence Level

S Statistic = 45 - 75 = -30

Tied GrouValue	Members

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

There are 0 time periods with multiple data

A = 0
B = 0
C = 0
D = 0
E = 0
F = 0
a = 8880
b = 30240
c = 480
Group Variance = 493.333
Z-Score = -1.30565
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-1.30565| <= 1.97737 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chloride

Location: MW-5

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

95% Confidence Level

S Statistic = 42 - 3 = 39
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 39 is 5.8e-005
S > 0 and 5.8e-005 < 0.05 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: TMW-1

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

95% Confidence Level

S Statistic = 34 - 2 = 32
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 32 is 0.00012
S > 0 and 0.00012 < 0.05 indicating an upward trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: TMW-2

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

95% Confidence Level

S Statistic = 23 - 13 = 10
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |10| is 0.358
0.358 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chloride
Location: TMW-3

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

95% Confidence Level

S Statistic = 27 - 9 = 18
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |18| is 0.076
0.076 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chromium
Location: MW-3

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

95% Confidence Level

S Statistic = 36 - 138 = -102

Tied Grou	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

There are 0 time periods with multiple data

A = 8148
B = 0
C = 2940
D = 0
E = 252
F = 0
a = 33000
b = 124200
c = 1200
Group Variance = 1380.67
Z-Score = -2.71817
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-2.71817 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Chromium

Location: MW-4

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

95% Confidence Level

S Statistic = 8 - 54 = -46

Tied Grou	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
9/28/2017	1
12/11/2017	1
3/22/2018	1
6/19/2018	1
9/12/2018	1
12/4/2018	1

There are 0 time periods with multiple data

A = 1686
B = 0
C = 456
D = 0
E = 86
F = 0
a = 7350
b = 24570
c = 420
Group Variance = 314.667
Z-Score = -2.53681
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-2.53681 < -1.65463 indicating a downward trend

Mann-Kendall Trend Analysis

Parameter: Chromium

Location: MW-5

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

95% Confidence Level

S Statistic = 27 - 3 = 24
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |24| is 0.037
0.037 >= 0.025 indicating no evidence of a 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 = 7 - 2 = 5
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |5| is 0.47
0.47 >= 0.025 indicating no evidence of a trend

Mann-Kendall Trend Analysis

Parameter: Chromium

Location: TMW-2

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

95% Confidence Level

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

Mann-Kendall Trend Analysis

Parameter: Chromium
Location: TMW-3

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

95% Confidence Level

S Statistic = 10 - 1 = 9
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |9| is 0.238
0.238 >= 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 = 38 - 127 = -89

Tied Grou	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

There are 0 time periods with multiple data

A = 9390
B = 0
C = 3480
D = 0
E = 270
F = 0
a = 33000
b = 124200
c = 1200
Group Variance = 1311.67
Z-Score = -2.4298
Comparison Level at 95% confidence level = -1.65463 (downward trend)
-2.4298 < -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 = 20 - 24 = -4
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |-4| is 0.795
0.795 >= 0.025 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 = 137 - 63 = 74

Tied Grou	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

There are 0 time periods with multiple data

A = 4128
B = 0
C = 1380
D = 0
E = 152
F = 0
a = 29256
b = 109296
c = 1104
Group Variance = 1396
Z-Score = 1.9538
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|1.9538| <= 1.97737 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 = 55 - 5 = 50

Tied GrouValue		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

There are 0 time periods with multiple data

A = 156
B = 0
C = 24
D = 0
E = 12
F = 0
a = 3828
b = 11880
c = 264
Group Variance = 204
Z-Score = 3.43069
Comparison Level at 95% confidence level = 1.65463 (upward trend)
3.43069 > 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 = 87 - 163 = -76

Tied GrouValue		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

There are 0 time periods with multiple data

A = 4050
B = 0
C = 1350
D = 0
E = 150
F = 0
a = 37050
b = 140400
c = 1300
Group Variance = 1833.33
Z-Score = -1.75162
Comparison Level at 1.0 - (0.05 / 2) = 97.5% confidence level = 1.97737 (two-tailed)
|-1.75162| <= 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 = 32 - 13 = 19
Comparing at 1.0 - (0.05 / 2) = 97.5% confidence level (two-tailed)
Probability of obtaining S >= |19| is 0.108
0.108 >= 0.025 indicating no evidence of a 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 = 256 - 46 = 210

Tied Grou	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

There are 0 time periods with multiple data

A = 834
B = 0
C = 210
D = 0
E = 46
F = 0
a = 37050
b = 140400
c = 1300
Group Variance = 2012
Z-Score = 4.65942
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.65942 > 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 = 203 - 47 = 156

Tied Grou	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

There are 0 time periods with multiple data

A = 54
B = 0
C = 0
D = 0
E = 6
F = 0
a = 25806
b = 95634
c = 1012
Group Variance = 1430.67
Z-Score = 4.09791
Comparison Level at 95% confidence level = 1.65463 (upward trend)
4.09791 > 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 = 23 - 1 = 22
Comparing at 95% confidence level (upward trend)
Probability of obtaining S >= 22 is 0.0295
S > 0 and 0.0295 < 0.05 indicating an upward trend

APPENDIX C
LABORATORY ANALYTICAL REPORTS & FIELD INFORMATION LOGS

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

December 14, 2018

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1049906
Samples Received:	12/05/2018
Project Number:	171-873
Description:	EWS Camden Class 2 Landfill
Site:	CAMDEN, TN
Report To:	Philip Campbell 325 Seaboard Lane, Suite 170 Franklin, TN 37067

Entire Report Reviewed By:

Chris McCord
Project Manager

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

TABLE OF CONTENTS

MW-1 L1049906-01 GW

Collected by	Collected date/time	Received date/time
P.C./A.B.	12/04/18 10:50	12/05/18 08:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1208245	1	12/10/18 14:21	12/10/18 14:21	KK
Wet Chemistry by Method 2320 B-2011	WG1208329	1	12/11/18 18:56	12/11/18 18:56	GB
Wet Chemistry by Method 350.1	WG1208083	1	12/12/18 18:44	12/12/18 18:44	MCG
Wet Chemistry by Method 410.4	WG1206291	1	12/06/18 10:52	12/06/18 14:00	TH
Wet Chemistry by Method 9056A	WG1206170	1	12/05/18 20:02	12/05/18 20:02	ELN
Mercury by Method 7470A	WG1206137	1	12/05/18 18:29	12/06/18 14:42	TCT
Mercury by Method 7470A	WG1206141	1	12/05/18 18:14	12/06/18 13:33	TCT
Metals (ICP) by Method 6010B	WG1206203	1	12/06/18 11:15	12/07/18 04:15	CCE
Metals (ICP) by Method 6010B	WG1207254	1	12/07/18 15:22	12/08/18 10:12	TRB
Metals (ICPMS) by Method 6020A	WG1206004	1	12/06/18 12:05	12/07/18 13:18	JPD
Metals (ICPMS) by Method 6020A	WG1206204	1	12/06/18 14:25	12/07/18 19:03	JPD
Metals (ICPMS) by Method 6020A	WG1208518	1	12/10/18 21:58	12/11/18 14:55	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1207111	1	12/07/18 11:56	12/07/18 11:56	JCP
EDB / DBCP by Method 8011	WG1206335	1.01	12/06/18 08:17	12/06/18 17:15	KLM

MW-3 L1049906-02 GW

Collected by	Collected date/time	Received date/time
P.C./A.B.	12/04/18 13:09	12/05/18 08:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1208245	5	12/10/18 14:41	12/10/18 14:41	KK
Wet Chemistry by Method 2320 B-2011	WG1208329	1	12/11/18 19:04	12/11/18 19:04	GB
Wet Chemistry by Method 350.1	WG1208083	1	12/12/18 18:47	12/12/18 18:47	MCG
Wet Chemistry by Method 410.4	WG1206291	1	12/06/18 10:52	12/06/18 14:00	TH
Wet Chemistry by Method 9056A	WG1206170	1	12/05/18 20:24	12/05/18 20:24	ELN
Wet Chemistry by Method 9056A	WG1206170	5	12/05/18 20:35	12/05/18 20:35	ELN
Mercury by Method 7470A	WG1206137	1	12/05/18 18:29	12/06/18 14:44	TCT
Mercury by Method 7470A	WG1206141	1	12/05/18 18:14	12/06/18 13:41	TCT
Metals (ICP) by Method 6010B	WG1206203	1	12/06/18 11:15	12/07/18 04:18	CCE
Metals (ICP) by Method 6010B	WG1207254	1	12/07/18 15:22	12/08/18 10:14	TRB
Metals (ICPMS) by Method 6020A	WG1206004	1	12/06/18 12:05	12/07/18 13:22	JPD
Metals (ICPMS) by Method 6020A	WG1206204	1	12/06/18 14:25	12/07/18 19:07	JPD
Metals (ICPMS) by Method 6020A	WG1208518	1	12/10/18 21:58	12/11/18 15:00	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1207111	1	12/07/18 12:18	12/07/18 12:18	JCP
EDB / DBCP by Method 8011	WG1206335	1	12/06/18 08:17	12/06/18 17:28	KLM

MW-4 L1049906-03 GW

Collected by	Collected date/time	Received date/time
P.C./A.B.	12/04/18 12:35	12/05/18 08:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1208245	1	12/10/18 14:23	12/10/18 14:23	KK
Wet Chemistry by Method 2320 B-2011	WG1208329	1	12/11/18 19:11	12/11/18 19:11	GB
Wet Chemistry by Method 350.1	WG1208083	1	12/12/18 18:48	12/12/18 18:48	MCG
Wet Chemistry by Method 410.4	WG1206291	1	12/06/18 10:52	12/06/18 14:01	TH
Wet Chemistry by Method 9056A	WG1206170	1	12/05/18 20:45	12/05/18 20:45	ELN
Mercury by Method 7470A	WG1206137	1	12/05/18 18:29	12/06/18 14:47	TCT
Mercury by Method 7470A	WG1206141	1	12/05/18 18:14	12/06/18 13:43	TCT
Metals (ICP) by Method 6010B	WG1206203	1	12/06/18 11:15	12/07/18 04:21	CCE
Metals (ICP) by Method 6010B	WG1207254	1	12/07/18 15:22	12/08/18 10:17	TRB
Metals (ICPMS) by Method 6020A	WG1206004	1	12/06/18 12:05	12/07/18 13:27	JPD
Metals (ICPMS) by Method 6020A	WG1206204	1	12/06/18 14:25	12/07/18 20:11	JPD
Metals (ICPMS) by Method 6020A	WG1208518	1	12/10/18 21:58	12/11/18 15:04	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1207111	1	12/07/18 12:40	12/07/18 12:40	JCP
EDB / DBCP by Method 8011	WG1206335	1	12/06/18 08:17	12/06/18 17:39	KLM

MW-5 L1049906-04 GW

Collected by	Collected date/time	Received date/time
P.C./A.B.	12/04/18 11:40	12/05/18 08:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1208245	1	12/10/18 14:24	12/10/18 14:24	KK
Wet Chemistry by Method 2320 B-2011	WG1208329	1	12/11/18 19:18	12/11/18 19:18	GB
Wet Chemistry by Method 350.1	WG1208083	1	12/12/18 18:50	12/12/18 18:50	MCG
Wet Chemistry by Method 410.4	WG1206291	1	12/06/18 10:52	12/06/18 14:01	TH
Wet Chemistry by Method 9056A	WG1206170	1	12/05/18 21:18	12/05/18 21:18	ELN
Mercury by Method 7470A	WG1206137	1	12/05/18 18:29	12/06/18 14:49	TCT
Mercury by Method 7470A	WG1206141	1	12/05/18 18:14	12/06/18 13:45	TCT
Metals (ICP) by Method 6010B	WG1206203	1	12/06/18 11:15	12/07/18 04:23	CCE
Metals (ICP) by Method 6010B	WG1207254	1	12/07/18 15:22	12/08/18 18:32	ST
Metals (ICPMS) by Method 6020A	WG1206004	1	12/06/18 12:05	12/07/18 13:48	JPD
Metals (ICPMS) by Method 6020A	WG1206204	1	12/06/18 14:25	12/07/18 20:15	JPD
Metals (ICPMS) by Method 6020A	WG1208518	1	12/10/18 21:58	12/11/18 15:09	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1207111	1	12/07/18 13:02	12/07/18 13:02	JCP
EDB / DBCP by Method 8011	WG1206335	1	12/06/18 08:17	12/06/18 17:51	KLM

TMW-1 L1049906-05 GW

Collected by	Collected date/time	Received date/time
P.C./A.B.	12/04/18 11:25	12/05/18 08:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1208245	1	12/10/18 14:25	12/10/18 14:25	KK
Wet Chemistry by Method 2320 B-2011	WG1208329	1	12/11/18 19:25	12/11/18 19:25	GB
Wet Chemistry by Method 350.1	WG1208083	1	12/12/18 18:51	12/12/18 18:51	MCG
Wet Chemistry by Method 410.4	WG1206291	1	12/06/18 10:52	12/06/18 14:01	TH
Wet Chemistry by Method 9056A	WG1206170	1	12/05/18 21:29	12/05/18 21:29	ELN
Mercury by Method 7470A	WG1206137	1	12/05/18 18:29	12/06/18 14:56	TCT
Mercury by Method 7470A	WG1206141	1	12/05/18 18:14	12/06/18 13:48	TCT
Metals (ICP) by Method 6010B	WG1206203	1	12/06/18 11:15	12/07/18 04:26	CCE
Metals (ICP) by Method 6010B	WG1207254	1	12/07/18 15:22	12/08/18 18:35	ST
Metals (ICPMS) by Method 6020A	WG1206004	1	12/06/18 12:05	12/07/18 13:52	JPD
Metals (ICPMS) by Method 6020A	WG1206204	1	12/06/18 14:25	12/07/18 20:19	JPD
Metals (ICPMS) by Method 6020A	WG1208518	1	12/10/18 21:58	12/11/18 15:13	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1207111	1	12/07/18 13:24	12/07/18 13:24	JCP
EDB / DBCP by Method 8011	WG1206335	1	12/06/18 08:17	12/06/18 18:04	KLM

TMW-2 L1049906-06 GW

Collected by	Collected date/time	Received date/time
P.C./A.B.	12/04/18 13:00	12/05/18 08:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1208245	1	12/10/18 14:26	12/10/18 14:26	KK
Wet Chemistry by Method 2320 B-2011	WG1208329	1	12/11/18 19:43	12/11/18 19:43	GB
Wet Chemistry by Method 350.1	WG1208083	1	12/12/18 18:53	12/12/18 18:53	MCG
Wet Chemistry by Method 410.4	WG1206291	1	12/06/18 10:52	12/06/18 14:01	TH
Wet Chemistry by Method 9056A	WG1206170	1	12/05/18 21:40	12/05/18 21:40	ELN
Mercury by Method 7470A	WG1206137	1	12/05/18 18:29	12/06/18 14:59	TCT
Mercury by Method 7470A	WG1206141	1	12/05/18 18:14	12/06/18 13:58	TCT
Metals (ICP) by Method 6010B	WG1206203	1	12/06/18 11:15	12/07/18 04:35	CCE
Metals (ICP) by Method 6010B	WG1207254	1	12/07/18 15:22	12/08/18 18:38	ST
Metals (ICPMS) by Method 6020A	WG1206004	1	12/06/18 12:05	12/07/18 13:57	JPD
Metals (ICPMS) by Method 6020A	WG1206204	1	12/06/18 14:25	12/07/18 20:23	JPD
Metals (ICPMS) by Method 6020A	WG1208518	1	12/10/18 21:58	12/11/18 15:18	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1207111	1	12/07/18 13:46	12/07/18 13:46	JCP
EDB / DBCP by Method 8011	WG1206335	1	12/06/18 08:17	12/06/18 18:15	KLM

TMW-3 L1049906-07 GW

Collected by: P.C./A.B. | Collected date/time: 12/04/18 15:15 | Received date/time: 12/05/18 08:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1208245	1	12/10/18 14:26	12/10/18 14:26	KK
Wet Chemistry by Method 2320 B-2011	WG1208329	1	12/11/18 19:51	12/11/18 19:51	GB
Wet Chemistry by Method 350.1	WG1208083	1	12/12/18 18:55	12/12/18 18:55	MCG
Wet Chemistry by Method 410.4	WG1206291	1	12/06/18 10:52	12/06/18 14:02	TH
Wet Chemistry by Method 9056A	WG1206170	1	12/05/18 21:51	12/05/18 21:51	ELN
Mercury by Method 7470A	WG1206137	1	12/05/18 18:29	12/06/18 15:01	TCT
Mercury by Method 7470A	WG1206141	1	12/05/18 18:14	12/06/18 14:00	TCT
Metals (ICP) by Method 6010B	WG1206203	1	12/06/18 11:15	12/07/18 04:37	CCE
Metals (ICP) by Method 6010B	WG1207254	1	12/07/18 15:22	12/08/18 18:41	ST
Metals (ICPMS) by Method 6020A	WG1206004	1	12/06/18 12:05	12/07/18 14:01	JPD
Metals (ICPMS) by Method 6020A	WG1206204	1	12/06/18 14:25	12/07/18 20:27	JPD
Metals (ICPMS) by Method 6020A	WG1208518	1	12/10/18 21:58	12/11/18 15:23	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1207111	1	12/07/18 14:08	12/07/18 14:08	JCP
EDB / DBCP by Method 8011	WG1206335	1	12/06/18 08:17	12/06/18 18:28	KLM

DUPLICATE L1049906-08 GW

Collected by: P.C./A.B. | Collected date/time: 12/04/18 00:00 | Received date/time: 12/05/18 08:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1208245	1	12/10/18 14:27	12/10/18 14:27	KK
Wet Chemistry by Method 2320 B-2011	WG1208329	1	12/11/18 19:58	12/11/18 19:58	GB
Wet Chemistry by Method 350.1	WG1208083	1	12/12/18 19:01	12/12/18 19:01	MCG
Wet Chemistry by Method 410.4	WG1206291	1	12/06/18 10:52	12/06/18 14:02	TH
Wet Chemistry by Method 9056A	WG1206170	1	12/05/18 22:23	12/05/18 22:23	ELN
Wet Chemistry by Method 9056A	WG1206170	5	12/05/18 22:34	12/05/18 22:34	ELN
Mercury by Method 7470A	WG1206137	1	12/05/18 18:29	12/06/18 15:04	TCT
Mercury by Method 7470A	WG1206141	1	12/05/18 18:14	12/06/18 14:03	TCT
Metals (ICP) by Method 6010B	WG1206203	1	12/06/18 11:15	12/07/18 04:40	CCE
Metals (ICP) by Method 6010B	WG1207254	1	12/07/18 15:22	12/08/18 18:43	ST
Metals (ICPMS) by Method 6020A	WG1206004	1	12/06/18 12:05	12/07/18 14:06	JPD
Metals (ICPMS) by Method 6020A	WG1206204	1	12/06/18 14:25	12/07/18 20:31	JPD
Metals (ICPMS) by Method 6020A	WG1208518	1	12/10/18 21:58	12/11/18 15:27	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1207111	1	12/07/18 14:29	12/07/18 14:29	JCP
EDB / DBCP by Method 8011	WG1206335	1	12/06/18 08:17	12/06/18 18:40	KLM

FIELD BLANK L1049906-09 GW

Collected by: P.C./A.B. | Collected date/time: 12/04/18 14:30 | Received date/time: 12/05/18 08:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1208245	1	12/10/18 14:28	12/10/18 14:28	KK
Wet Chemistry by Method 2320 B-2011	WG1208329	1	12/11/18 20:05	12/11/18 20:05	GB
Wet Chemistry by Method 350.1	WG1208083	1	12/12/18 19:06	12/12/18 19:06	MCG
Wet Chemistry by Method 410.4	WG1206291	1	12/06/18 10:52	12/06/18 14:03	TH
Wet Chemistry by Method 9056A	WG1206170	1	12/05/18 22:45	12/05/18 22:45	ELN
Mercury by Method 7470A	WG1206137	1	12/05/18 18:29	12/06/18 15:06	TCT
Metals (ICP) by Method 6010B	WG1206203	1	12/06/18 11:15	12/07/18 04:43	CCE
Metals (ICPMS) by Method 6020A	WG1206204	1	12/06/18 14:25	12/07/18 20:35	JPD
Metals (ICPMS) by Method 6020A	WG1208518	1	12/10/18 21:58	12/11/18 15:32	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1207111	1	12/07/18 14:51	12/07/18 14:51	JCP
EDB / DBCP by Method 8011	WG1206335	1.01	12/06/18 08:17	12/06/18 19:16	KLM

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

TRIP BLANK L1049906-10 GW

			Collected by	Collected date/time	Received date/time
			P.C./A.B.	12/04/18 00:00	12/05/18 08:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1207111	1	12/07/18 11:34	12/07/18 11:34	JCP

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

Chris McCord
Project Manager

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	ND		30.0	1	12/10/2018 14:21	WG1208245

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	40.8		20.0	1	12/11/2018 18:56	WG1208329

Sample Narrative:

L1049906-01 WG1208329: Endpoint pH 4.5 headspace

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	12/12/2018 18:44	WG1208083

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	12/06/2018 14:00	WG1206291

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	12/05/2018 20:02	WG1206170
Chloride	1.67		1.00	1	12/05/2018 20:02	WG1206170
Fluoride	ND		0.100	1	12/05/2018 20:02	WG1206170
Nitrate	ND		0.100	1	12/05/2018 20:02	WG1206170
Sulfate	ND		5.00	1	12/05/2018 20:02	WG1206170

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	0.00101		0.000200	1	12/06/2018 14:42	WG1206137
Mercury,Dissolved	0.00115		0.000200	1	12/06/2018 13:33	WG1206141

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	12/07/2018 04:15	WG1206203
Boron,Dissolved	ND		0.200	1	12/08/2018 10:12	WG1207254

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	12/11/2018 14:55	WG1208518
Aluminum,Dissolved	ND		0.100	1	12/07/2018 13:18	WG1206004
Antimony	ND		0.00200	1	12/07/2018 19:03	WG1206204
Antimony,Dissolved	ND		0.00200	1	12/07/2018 13:18	WG1206004
Arsenic	0.0254		0.00200	1	12/07/2018 19:03	WG1206204
Arsenic,Dissolved	0.0271		0.00200	1	12/07/2018 13:18	WG1206004
Barium	0.0199		0.00500	1	12/07/2018 19:03	WG1206204
Barium,Dissolved	0.0181		0.00500	1	12/07/2018 13:18	WG1206004

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	12/07/2018 19:03	WG1206204
Beryllium,Dissolved	ND		0.00200	1	12/07/2018 13:18	WG1206004
Cadmium	ND		0.00100	1	12/07/2018 19:03	WG1206204
Cadmium,Dissolved	ND		0.00100	1	12/07/2018 13:18	WG1206004
Calcium	3.75		1.00	1	12/07/2018 19:03	WG1206204
Calcium,Dissolved	3.09		1.00	1	12/07/2018 13:18	WG1206004
Chromium	ND		0.00200	1	12/07/2018 19:03	WG1206204
Chromium,Dissolved	ND		0.00200	1	12/07/2018 13:18	WG1206004
Cobalt	0.0284		0.00200	1	12/07/2018 19:03	WG1206204
Cobalt,Dissolved	0.0283		0.00200	1	12/07/2018 13:18	WG1206004
Copper	0.00715		0.00500	1	12/07/2018 19:03	WG1206204
Copper,Dissolved	ND		0.00500	1	12/07/2018 13:18	WG1206004
Iron	12.6		0.100	1	12/07/2018 19:03	WG1206204
Iron,Dissolved	12.4		0.100	1	12/07/2018 13:18	WG1206004
Lead	ND		0.00200	1	12/07/2018 19:03	WG1206204
Lead,Dissolved	ND		0.00200	1	12/07/2018 13:18	WG1206004
Magnesium	2.51		1.00	1	12/07/2018 19:03	WG1206204
Magnesium,Dissolved	2.33		1.00	1	12/07/2018 13:18	WG1206004
Manganese	0.667		0.00500	1	12/07/2018 19:03	WG1206204
Manganese,Dissolved	0.625		0.00500	1	12/07/2018 13:18	WG1206004
Nickel	0.00744		0.00200	1	12/07/2018 19:03	WG1206204
Nickel,Dissolved	0.00687		0.00200	1	12/07/2018 13:18	WG1206004
Potassium	1.81		1.00	1	12/07/2018 19:03	WG1206204
Potassium,Dissolved	1.11		1.00	1	12/07/2018 13:18	WG1206004
Selenium	ND		0.00200	1	12/07/2018 19:03	WG1206204
Selenium,Dissolved	ND		0.00200	1	12/07/2018 13:18	WG1206004
Silver	ND		0.00200	1	12/07/2018 19:03	WG1206204
Silver,Dissolved	ND		0.00200	1	12/07/2018 13:18	WG1206004
Sodium	4.58		1.00	1	12/07/2018 19:03	WG1206204
Sodium,Dissolved	2.73	B	1.00	1	12/07/2018 13:18	WG1206004
Thallium	ND		0.00200	1	12/07/2018 19:03	WG1206204
Thallium,Dissolved	ND		0.00200	1	12/07/2018 13:18	WG1206004
Vanadium	ND		0.00500	1	12/07/2018 19:03	WG1206204
Vanadium,Dissolved	ND		0.00500	1	12/07/2018 13:18	WG1206004
Zinc	ND		0.0250	1	12/07/2018 19:03	WG1206204
Zinc,Dissolved	ND		0.0250	1	12/07/2018 13:18	WG1206004

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	12/07/2018 11:56	WG1207111
Acrylonitrile	ND		0.0100	1	12/07/2018 11:56	WG1207111
Benzene	ND		0.00100	1	12/07/2018 11:56	WG1207111
Bromochloromethane	ND		0.00100	1	12/07/2018 11:56	WG1207111
Bromodichloromethane	ND		0.00100	1	12/07/2018 11:56	WG1207111
Bromoform	ND		0.00100	1	12/07/2018 11:56	WG1207111
Bromomethane	ND		0.00500	1	12/07/2018 11:56	WG1207111
Carbon disulfide	ND		0.00100	1	12/07/2018 11:56	WG1207111
Carbon tetrachloride	ND		0.00100	1	12/07/2018 11:56	WG1207111
Chlorobenzene	ND		0.00100	1	12/07/2018 11:56	WG1207111
Chlorodibromomethane	ND		0.00100	1	12/07/2018 11:56	WG1207111
Chloroethane	ND		0.00500	1	12/07/2018 11:56	WG1207111
Chloroform	ND		0.00500	1	12/07/2018 11:56	WG1207111
Chloromethane	ND		0.00250	1	12/07/2018 11:56	WG1207111
Dibromomethane	ND		0.00100	1	12/07/2018 11:56	WG1207111
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/07/2018 11:56	WG1207111

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	12/07/2018 11:56	WG1207111
1,2-Dichlorobenzene	ND		0.00100	1	12/07/2018 11:56	WG1207111
1,4-Dichlorobenzene	ND		0.00100	1	12/07/2018 11:56	WG1207111
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/07/2018 11:56	WG1207111
1,1-Dichloroethane	ND		0.00100	1	12/07/2018 11:56	WG1207111
1,2-Dichloroethane	ND		0.00100	1	12/07/2018 11:56	WG1207111
1,1-Dichloroethene	ND		0.00100	1	12/07/2018 11:56	WG1207111
cis-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 11:56	WG1207111
trans-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 11:56	WG1207111
1,2-Dichloropropane	ND		0.00100	1	12/07/2018 11:56	WG1207111
cis-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 11:56	WG1207111
trans-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 11:56	WG1207111
Ethylbenzene	ND		0.00100	1	12/07/2018 11:56	WG1207111
2-Hexanone	ND		0.0100	1	12/07/2018 11:56	WG1207111
Iodomethane	ND		0.0100	1	12/07/2018 11:56	WG1207111
2-Butanone (MEK)	ND		0.0100	1	12/07/2018 11:56	WG1207111
Methylene Chloride	ND		0.00500	1	12/07/2018 11:56	WG1207111
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	12/07/2018 11:56	WG1207111
Styrene	ND		0.00100	1	12/07/2018 11:56	WG1207111
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 11:56	WG1207111
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 11:56	WG1207111
Tetrachloroethene	ND		0.00100	1	12/07/2018 11:56	WG1207111
Toluene	ND		0.00100	1	12/07/2018 11:56	WG1207111
1,1,1-Trichloroethane	ND		0.00100	1	12/07/2018 11:56	WG1207111
1,1,2-Trichloroethane	ND		0.00100	1	12/07/2018 11:56	WG1207111
Trichloroethene	ND		0.00100	1	12/07/2018 11:56	WG1207111
Trichlorofluoromethane	ND		0.00500	1	12/07/2018 11:56	WG1207111
1,2,3-Trichloropropane	ND		0.00250	1	12/07/2018 11:56	WG1207111
Vinyl acetate	ND		0.0100	1	12/07/2018 11:56	WG1207111
Vinyl chloride	ND		0.00100	1	12/07/2018 11:56	WG1207111
Xylenes, Total	ND		0.00300	1	12/07/2018 11:56	WG1207111
(S) Toluene-d8	*102*		*80.0-120*		*12/07/2018 11:56*	WG1207111
(S) Dibromofluoromethane	*111*		*75.0-120*		*12/07/2018 11:56*	WG1207111
(S) a,a,a-Trifluorotoluene	*109*		*80.0-120*		*12/07/2018 11:56*	WG1207111
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*12/07/2018 11:56*	WG1207111

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000101	1.01	12/06/2018 17:15	WG1206335
1,2-Dibromo-3-Chloropropane	ND		0.0000202	1.01	12/06/2018 17:15	WG1206335

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	417		150	5	12/10/2018 14:41	WG1208245

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	12/11/2018 19:04	WG1208329

Sample Narrative:
L1049906-02 WG1208329: Endpoint pH 4.5 headspace

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	12/12/2018 18:47	WG1208083

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	14.8		10.0	1	12/06/2018 14:00	WG1206291

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		5.00	5	12/05/2018 20:35	WG1206170
Chloride	65.0		1.00	1	12/05/2018 20:24	WG1206170
Fluoride	0.400		0.100	1	12/05/2018 20:24	WG1206170
Nitrate	1.49		0.100	1	12/05/2018 20:24	WG1206170
Sulfate	324		25.0	5	12/05/2018 20:35	WG1206170

Sample Narrative:
L1049906-02 WG1206170: report Br @ dilution due to matrix interference

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	12/06/2018 14:44	WG1206137
Mercury,Dissolved	ND		0.000200	1	12/06/2018 13:41	WG1206141

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	12/07/2018 04:18	WG1206203
Boron,Dissolved	ND		0.200	1	12/08/2018 10:14	WG1207254

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.638	B	0.100	1	12/11/2018 15:00	WG1208518
Aluminum,Dissolved	0.621		0.100	1	12/07/2018 13:22	WG1206004
Antimony	ND		0.00200	1	12/07/2018 19:07	WG1206204
Antimony,Dissolved	ND		0.00200	1	12/07/2018 13:22	WG1206004
Arsenic	ND		0.00200	1	12/07/2018 19:07	WG1206204

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		0.00200	1	12/07/2018 13:22	WG1206004
Barium	0.0485		0.00500	1	12/07/2018 19:07	WG1206204
Barium,Dissolved	0.0463		0.00500	1	12/07/2018 13:22	WG1206004
Beryllium	ND		0.00200	1	12/07/2018 19:07	WG1206204
Beryllium,Dissolved	ND		0.00200	1	12/07/2018 13:22	WG1206004
Cadmium	0.144		0.00100	1	12/07/2018 19:07	WG1206204
Cadmium,Dissolved	0.139		0.00100	1	12/07/2018 13:22	WG1206004
Calcium	82.7		1.00	1	12/07/2018 19:07	WG1206204
Calcium,Dissolved	78.5		1.00	1	12/07/2018 13:22	WG1206004
Chromium	0.00356		0.00200	1	12/07/2018 19:07	WG1206204
Chromium,Dissolved	0.00222	B	0.00200	1	12/07/2018 13:22	WG1206004
Cobalt	0.0219		0.00200	1	12/07/2018 19:07	WG1206204
Cobalt,Dissolved	0.0224		0.00200	1	12/07/2018 13:22	WG1206004
Copper	0.00820		0.00500	1	12/07/2018 19:07	WG1206204
Copper,Dissolved	ND		0.00500	1	12/07/2018 13:22	WG1206004
Iron	0.356		0.100	1	12/07/2018 19:07	WG1206204
Iron,Dissolved	0.382		0.100	1	12/07/2018 13:22	WG1206004
Lead	ND		0.00200	1	12/07/2018 19:07	WG1206204
Lead,Dissolved	ND		0.00200	1	12/07/2018 13:22	WG1206004
Magnesium	36.4		1.00	1	12/07/2018 19:07	WG1206204
Magnesium,Dissolved	34.6		1.00	1	12/07/2018 13:22	WG1206004
Manganese	2.38		0.00500	1	12/07/2018 19:07	WG1206204
Manganese,Dissolved	2.25		0.00500	1	12/07/2018 13:22	WG1206004
Nickel	0.0714		0.00200	1	12/07/2018 19:07	WG1206204
Nickel,Dissolved	0.0713		0.00200	1	12/07/2018 13:22	WG1206004
Potassium	11.0		1.00	1	12/07/2018 19:07	WG1206204
Potassium,Dissolved	9.57		1.00	1	12/07/2018 13:22	WG1206004
Selenium	ND		0.00200	1	12/07/2018 19:07	WG1206204
Selenium,Dissolved	ND		0.00200	1	12/07/2018 13:22	WG1206004
Silver	ND		0.00200	1	12/07/2018 19:07	WG1206204
Silver,Dissolved	ND		0.00200	1	12/07/2018 13:22	WG1206004
Sodium	18.9		1.00	1	12/07/2018 19:07	WG1206204
Sodium,Dissolved	17.1		1.00	1	12/07/2018 13:22	WG1206004
Thallium	ND		0.00200	1	12/07/2018 19:07	WG1206204
Thallium,Dissolved	ND		0.00200	1	12/07/2018 13:22	WG1206004
Vanadium	ND		0.00500	1	12/07/2018 19:07	WG1206204
Vanadium,Dissolved	ND		0.00500	1	12/07/2018 13:22	WG1206004
Zinc	1.34		0.0250	1	12/07/2018 19:07	WG1206204
Zinc,Dissolved	1.30		0.0250	1	12/07/2018 13:22	WG1206004

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	12/07/2018 12:18	WG1207111
Acrylonitrile	ND		0.0100	1	12/07/2018 12:18	WG1207111
Benzene	ND		0.00100	1	12/07/2018 12:18	WG1207111
Bromochloromethane	ND		0.00100	1	12/07/2018 12:18	WG1207111
Bromodichloromethane	ND		0.00100	1	12/07/2018 12:18	WG1207111
Bromoform	ND		0.00100	1	12/07/2018 12:18	WG1207111
Bromomethane	ND		0.00500	1	12/07/2018 12:18	WG1207111
Carbon disulfide	ND		0.00100	1	12/07/2018 12:18	WG1207111
Carbon tetrachloride	ND		0.00100	1	12/07/2018 12:18	WG1207111
Chlorobenzene	ND		0.00100	1	12/07/2018 12:18	WG1207111
Chlorodibromomethane	ND		0.00100	1	12/07/2018 12:18	WG1207111
Chloroethane	ND		0.00500	1	12/07/2018 12:18	WG1207111
Chloroform	ND		0.00500	1	12/07/2018 12:18	WG1207111

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloromethane	ND		0.00250	1	12/07/2018 12:18	WG1207111
Dibromomethane	ND		0.00100	1	12/07/2018 12:18	WG1207111
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/07/2018 12:18	WG1207111
1,2-Dibromoethane	ND		0.00100	1	12/07/2018 12:18	WG1207111
1,2-Dichlorobenzene	ND		0.00100	1	12/07/2018 12:18	WG1207111
1,4-Dichlorobenzene	ND		0.00100	1	12/07/2018 12:18	WG1207111
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/07/2018 12:18	WG1207111
1,1-Dichloroethane	ND		0.00100	1	12/07/2018 12:18	WG1207111
1,2-Dichloroethane	ND		0.00100	1	12/07/2018 12:18	WG1207111
1,1-Dichloroethene	ND		0.00100	1	12/07/2018 12:18	WG1207111
cis-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 12:18	WG1207111
trans-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 12:18	WG1207111
1,2-Dichloropropane	ND		0.00100	1	12/07/2018 12:18	WG1207111
cis-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 12:18	WG1207111
trans-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 12:18	WG1207111
Ethylbenzene	ND		0.00100	1	12/07/2018 12:18	WG1207111
2-Hexanone	ND		0.0100	1	12/07/2018 12:18	WG1207111
Iodomethane	ND		0.0100	1	12/07/2018 12:18	WG1207111
2-Butanone (MEK)	ND		0.0100	1	12/07/2018 12:18	WG1207111
Methylene Chloride	ND		0.00500	1	12/07/2018 12:18	WG1207111
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	12/07/2018 12:18	WG1207111
Styrene	ND		0.00100	1	12/07/2018 12:18	WG1207111
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 12:18	WG1207111
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 12:18	WG1207111
Tetrachloroethene	ND		0.00100	1	12/07/2018 12:18	WG1207111
Toluene	ND		0.00100	1	12/07/2018 12:18	WG1207111
1,1,1-Trichloroethane	ND		0.00100	1	12/07/2018 12:18	WG1207111
1,1,2-Trichloroethane	ND		0.00100	1	12/07/2018 12:18	WG1207111
Trichloroethene	ND		0.00100	1	12/07/2018 12:18	WG1207111
Trichlorofluoromethane	ND		0.00500	1	12/07/2018 12:18	WG1207111
1,2,3-Trichloropropane	ND		0.00250	1	12/07/2018 12:18	WG1207111
Vinyl acetate	ND		0.0100	1	12/07/2018 12:18	WG1207111
Vinyl chloride	ND		0.00100	1	12/07/2018 12:18	WG1207111
Xylenes, Total	ND		0.00300	1	12/07/2018 12:18	WG1207111
(S) Toluene-d8	*107*		*80.0-120*		*12/07/2018 12:18*	WG1207111
(S) Dibromofluoromethane	*106*		*75.0-120*		*12/07/2018 12:18*	WG1207111
(S) a,a,a-Trifluorotoluene	*113*		*80.0-120*		*12/07/2018 12:18*	WG1207111
(S) 4-Bromofluorobenzene	*100*		*77.0-126*		*12/07/2018 12:18*	WG1207111

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	12/06/2018 17:28	WG1206335
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	12/06/2018 17:28	WG1206335

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	ND		30.0	1	12/10/2018 14:23	WG1208245

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	12/11/2018 19:11	WG1208329

Sample Narrative:

L1049906-03 WG1208329: Endpoint pH 4.5 headspace

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	12/12/2018 18:48	WG1208083

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	12/06/2018 14:01	WG1206291

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	12/05/2018 20:45	WG1206170
Chloride	6.97		1.00	1	12/05/2018 20:45	WG1206170
Fluoride	ND		0.100	1	12/05/2018 20:45	WG1206170
Nitrate	0.236		0.100	1	12/05/2018 20:45	WG1206170
Sulfate	ND		5.00	1	12/05/2018 20:45	WG1206170

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	12/06/2018 14:47	WG1206137
Mercury,Dissolved	ND		0.000200	1	12/06/2018 13:43	WG1206141

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	12/07/2018 04:21	WG1206203
Boron,Dissolved	ND		0.200	1	12/08/2018 10:17	WG1207254

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	ND		0.100	1	12/11/2018 15:04	WG1208518
Aluminum,Dissolved	ND		0.100	1	12/07/2018 13:27	WG1206004
Antimony	ND		0.00200	1	12/07/2018 20:11	WG1206204
Antimony,Dissolved	ND		0.00200	1	12/07/2018 13:27	WG1206004
Arsenic	ND		0.00200	1	12/07/2018 20:11	WG1206204
Arsenic,Dissolved	ND		0.00200	1	12/07/2018 13:27	WG1206004
Barium	0.0101		0.00500	1	12/07/2018 20:11	WG1206204
Barium,Dissolved	0.00732		0.00500	1	12/07/2018 13:27	WG1206004

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	12/07/2018 20:11	WG1206204
Beryllium,Dissolved	ND		0.00200	1	12/07/2018 13:27	WG1206004
Cadmium	ND		0.00100	1	12/07/2018 20:11	WG1206204
Cadmium,Dissolved	ND		0.00100	1	12/07/2018 13:27	WG1206004
Calcium	4.76		1.00	1	12/07/2018 20:11	WG1206204
Calcium,Dissolved	4.48		1.00	1	12/07/2018 13:27	WG1206004
Chromium	0.00269		0.00200	1	12/07/2018 20:11	WG1206204
Chromium,Dissolved	ND		0.00200	1	12/07/2018 13:27	WG1206004
Cobalt	ND		0.00200	1	12/07/2018 20:11	WG1206204
Cobalt,Dissolved	ND		0.00200	1	12/07/2018 13:27	WG1206004
Copper	ND		0.00500	1	12/07/2018 20:11	WG1206204
Copper,Dissolved	ND		0.00500	1	12/07/2018 13:27	WG1206004
Iron	0.358		0.100	1	12/07/2018 20:11	WG1206204
Iron,Dissolved	ND		0.100	1	12/07/2018 13:27	WG1206004
Lead	ND		0.00200	1	12/07/2018 20:11	WG1206204
Lead,Dissolved	ND		0.00200	1	12/07/2018 13:27	WG1206004
Magnesium	2.59		1.00	1	12/07/2018 20:11	WG1206204
Magnesium,Dissolved	2.51		1.00	1	12/07/2018 13:27	WG1206004
Manganese	0.0290		0.00500	1	12/07/2018 20:11	WG1206204
Manganese,Dissolved	0.0297		0.00500	1	12/07/2018 13:27	WG1206004
Nickel	ND		0.00200	1	12/07/2018 20:11	WG1206204
Nickel,Dissolved	ND		0.00200	1	12/07/2018 13:27	WG1206004
Potassium	ND		1.00	1	12/07/2018 20:11	WG1206204
Potassium,Dissolved	ND		1.00	1	12/07/2018 13:27	WG1206004
Selenium	ND		0.00200	1	12/07/2018 20:11	WG1206204
Selenium,Dissolved	ND		0.00200	1	12/07/2018 13:27	WG1206004
Silver	ND		0.00200	1	12/07/2018 20:11	WG1206204
Silver,Dissolved	ND		0.00200	1	12/07/2018 13:27	WG1206004
Sodium	4.09		1.00	1	12/07/2018 20:11	WG1206204
Sodium,Dissolved	3.76	B	1.00	1	12/07/2018 13:27	WG1206004
Thallium	ND		0.00200	1	12/07/2018 20:11	WG1206204
Thallium,Dissolved	ND		0.00200	1	12/07/2018 13:27	WG1206004
Vanadium	ND		0.00500	1	12/07/2018 20:11	WG1206204
Vanadium,Dissolved	ND		0.00500	1	12/07/2018 13:27	WG1206004
Zinc	ND		0.0250	1	12/11/2018 15:04	WG1208518
Zinc,Dissolved	ND		0.0250	1	12/07/2018 13:27	WG1206004

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	12/07/2018 12:40	WG1207111
Acrylonitrile	ND		0.0100	1	12/07/2018 12:40	WG1207111
Benzene	ND		0.00100	1	12/07/2018 12:40	WG1207111
Bromochloromethane	ND		0.00100	1	12/07/2018 12:40	WG1207111
Bromodichloromethane	ND		0.00100	1	12/07/2018 12:40	WG1207111
Bromoform	ND		0.00100	1	12/07/2018 12:40	WG1207111
Bromomethane	ND		0.00500	1	12/07/2018 12:40	WG1207111
Carbon disulfide	ND		0.00100	1	12/07/2018 12:40	WG1207111
Carbon tetrachloride	ND		0.00100	1	12/07/2018 12:40	WG1207111
Chlorobenzene	ND		0.00100	1	12/07/2018 12:40	WG1207111
Chlorodibromomethane	ND		0.00100	1	12/07/2018 12:40	WG1207111
Chloroethane	ND		0.00500	1	12/07/2018 12:40	WG1207111
Chloroform	ND		0.00500	1	12/07/2018 12:40	WG1207111
Chloromethane	ND		0.00250	1	12/07/2018 12:40	WG1207111
Dibromomethane	ND		0.00100	1	12/07/2018 12:40	WG1207111
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/07/2018 12:40	WG1207111

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	12/07/2018 12:40	WG1207111
1,2-Dichlorobenzene	ND		0.00100	1	12/07/2018 12:40	WG1207111
1,4-Dichlorobenzene	ND		0.00100	1	12/07/2018 12:40	WG1207111
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/07/2018 12:40	WG1207111
1,1-Dichloroethane	ND		0.00100	1	12/07/2018 12:40	WG1207111
1,2-Dichloroethane	ND		0.00100	1	12/07/2018 12:40	WG1207111
1,1-Dichloroethene	ND		0.00100	1	12/07/2018 12:40	WG1207111
cis-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 12:40	WG1207111
trans-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 12:40	WG1207111
1,2-Dichloropropane	ND		0.00100	1	12/07/2018 12:40	WG1207111
cis-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 12:40	WG1207111
trans-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 12:40	WG1207111
Ethylbenzene	ND		0.00100	1	12/07/2018 12:40	WG1207111
2-Hexanone	ND		0.0100	1	12/07/2018 12:40	WG1207111
Iodomethane	ND		0.0100	1	12/07/2018 12:40	WG1207111
2-Butanone (MEK)	ND		0.0100	1	12/07/2018 12:40	WG1207111
Methylene Chloride	ND		0.00500	1	12/07/2018 12:40	WG1207111
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	12/07/2018 12:40	WG1207111
Styrene	ND		0.00100	1	12/07/2018 12:40	WG1207111
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 12:40	WG1207111
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 12:40	WG1207111
Tetrachloroethene	ND		0.00100	1	12/07/2018 12:40	WG1207111
Toluene	ND		0.00100	1	12/07/2018 12:40	WG1207111
1,1,1-Trichloroethane	ND		0.00100	1	12/07/2018 12:40	WG1207111
1,1,2-Trichloroethane	ND		0.00100	1	12/07/2018 12:40	WG1207111
Trichloroethene	ND		0.00100	1	12/07/2018 12:40	WG1207111
Trichlorofluoromethane	ND		0.00500	1	12/07/2018 12:40	WG1207111
1,2,3-Trichloropropane	ND		0.00250	1	12/07/2018 12:40	WG1207111
Vinyl acetate	ND		0.0100	1	12/07/2018 12:40	WG1207111
Vinyl chloride	ND		0.00100	1	12/07/2018 12:40	WG1207111
Xylenes, Total	ND		0.00300	1	12/07/2018 12:40	WG1207111
(S) Toluene-d8	*102*		*80.0-120*		*12/07/2018 12:40*	WG1207111
(S) Dibromofluoromethane	*106*		*75.0-120*		*12/07/2018 12:40*	WG1207111
(S) a,a,a-Trifluorotoluene	*111*		*80.0-120*		*12/07/2018 12:40*	WG1207111
(S) 4-Bromofluorobenzene	*98.5*		*77.0-126*		*12/07/2018 12:40*	WG1207111

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	12/06/2018 17:39	WG1206335
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	12/06/2018 17:39	WG1206335

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	89.4		30.0	1	12/10/2018 14:24	WG1208245

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	12/11/2018 19:18	WG1208329

Sample Narrative:
L1049906-04 WG1208329: Endpoint pH 4.5 headspace

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	12/12/2018 18:50	WG1208083

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	12/06/2018 14:01	WG1206291

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	12/05/2018 21:18	WG1206170
Chloride	72.5		1.00	1	12/05/2018 21:18	WG1206170
Fluoride	ND		0.100	1	12/05/2018 21:18	WG1206170
Nitrate	0.867		0.100	1	12/05/2018 21:18	WG1206170
Sulfate	5.93		5.00	1	12/05/2018 21:18	WG1206170

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	12/06/2018 14:49	WG1206137
Mercury,Dissolved	ND		0.000200	1	12/06/2018 13:45	WG1206141

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	12/07/2018 04:23	WG1206203
Boron,Dissolved	ND		0.200	1	12/08/2018 18:32	WG1207254

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.174	B	0.100	1	12/11/2018 15:09	WG1208518
Aluminum,Dissolved	ND		0.100	1	12/07/2018 13:48	WG1206004
Antimony	ND		0.00200	1	12/07/2018 20:15	WG1206204
Antimony,Dissolved	ND		0.00200	1	12/07/2018 13:48	WG1206004
Arsenic	ND		0.00200	1	12/07/2018 20:15	WG1206204
Arsenic,Dissolved	ND		0.00200	1	12/07/2018 13:48	WG1206004
Barium	0.0494		0.00500	1	12/07/2018 20:15	WG1206204
Barium,Dissolved	0.0372		0.00500	1	12/07/2018 13:48	WG1206004

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	12/07/2018 20:15	WG1206204
Beryllium,Dissolved	ND		0.00200	1	12/07/2018 13:48	WG1206004
Cadmium	ND		0.00100	1	12/07/2018 20:15	WG1206204
Cadmium,Dissolved	ND		0.00100	1	12/07/2018 13:48	WG1206004
Calcium	15.7		1.00	1	12/07/2018 20:15	WG1206204
Calcium,Dissolved	14.6		1.00	1	12/07/2018 13:48	WG1206004
Chromium	0.00884		0.00200	1	12/07/2018 20:15	WG1206204
Chromium,Dissolved	ND		0.00200	1	12/07/2018 13:48	WG1206004
Cobalt	0.00264		0.00200	1	12/07/2018 20:15	WG1206204
Cobalt,Dissolved	0.00235		0.00200	1	12/07/2018 13:48	WG1206004
Copper	ND		0.00500	1	12/07/2018 20:15	WG1206204
Copper,Dissolved	0.00507		0.00500	1	12/07/2018 13:48	WG1206004
Iron	0.896		0.100	1	12/07/2018 20:15	WG1206204
Iron,Dissolved	ND		0.100	1	12/07/2018 13:48	WG1206004
Lead	ND		0.00200	1	12/07/2018 20:15	WG1206204
Lead,Dissolved	ND		0.00200	1	12/07/2018 13:48	WG1206004
Magnesium	10.8		1.00	1	12/07/2018 20:15	WG1206204
Magnesium,Dissolved	10.0		1.00	1	12/07/2018 13:48	WG1206004
Manganese	0.139		0.00500	1	12/07/2018 20:15	WG1206204
Manganese,Dissolved	0.126		0.00500	1	12/07/2018 13:48	WG1206004
Nickel	0.00902		0.00200	1	12/07/2018 20:15	WG1206204
Nickel,Dissolved	0.00747		0.00200	1	12/07/2018 13:48	WG1206004
Potassium	1.60		1.00	1	12/07/2018 20:15	WG1206204
Potassium,Dissolved	1.33		1.00	1	12/07/2018 13:48	WG1206004
Selenium	ND		0.00200	1	12/07/2018 20:15	WG1206204
Selenium,Dissolved	ND		0.00200	1	12/07/2018 13:48	WG1206004
Silver	ND		0.00200	1	12/07/2018 20:15	WG1206204
Silver,Dissolved	ND		0.00200	1	12/07/2018 13:48	WG1206004
Sodium	19.1		1.00	1	12/07/2018 20:15	WG1206204
Sodium,Dissolved	18.0		1.00	1	12/07/2018 13:48	WG1206004
Thallium	ND		0.00200	1	12/07/2018 20:15	WG1206204
Thallium,Dissolved	ND		0.00200	1	12/07/2018 13:48	WG1206004
Vanadium	ND		0.00500	1	12/07/2018 20:15	WG1206204
Vanadium,Dissolved	ND		0.00500	1	12/07/2018 13:48	WG1206004
Zinc	ND		0.0250	1	12/11/2018 15:09	WG1208518
Zinc,Dissolved	ND		0.0250	1	12/07/2018 13:48	WG1206004

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	12/07/2018 13:02	WG1207111
Acrylonitrile	ND		0.0100	1	12/07/2018 13:02	WG1207111
Benzene	ND		0.00100	1	12/07/2018 13:02	WG1207111
Bromochloromethane	ND		0.00100	1	12/07/2018 13:02	WG1207111
Bromodichloromethane	ND		0.00100	1	12/07/2018 13:02	WG1207111
Bromoform	ND		0.00100	1	12/07/2018 13:02	WG1207111
Bromomethane	ND		0.00500	1	12/07/2018 13:02	WG1207111
Carbon disulfide	ND		0.00100	1	12/07/2018 13:02	WG1207111
Carbon tetrachloride	ND		0.00100	1	12/07/2018 13:02	WG1207111
Chlorobenzene	ND		0.00100	1	12/07/2018 13:02	WG1207111
Chlorodibromomethane	ND		0.00100	1	12/07/2018 13:02	WG1207111
Chloroethane	ND		0.00500	1	12/07/2018 13:02	WG1207111
Chloroform	ND		0.00500	1	12/07/2018 13:02	WG1207111
Chloromethane	ND		0.00250	1	12/07/2018 13:02	WG1207111
Dibromomethane	ND		0.00100	1	12/07/2018 13:02	WG1207111
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/07/2018 13:02	WG1207111

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	12/07/2018 13:02	WG1207111
1,2-Dichlorobenzene	ND		0.00100	1	12/07/2018 13:02	WG1207111
1,4-Dichlorobenzene	ND		0.00100	1	12/07/2018 13:02	WG1207111
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/07/2018 13:02	WG1207111
1,1-Dichloroethane	ND		0.00100	1	12/07/2018 13:02	WG1207111
1,2-Dichloroethane	ND		0.00100	1	12/07/2018 13:02	WG1207111
1,1-Dichloroethene	ND		0.00100	1	12/07/2018 13:02	WG1207111
cis-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 13:02	WG1207111
trans-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 13:02	WG1207111
1,2-Dichloropropane	ND		0.00100	1	12/07/2018 13:02	WG1207111
cis-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 13:02	WG1207111
trans-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 13:02	WG1207111
Ethylbenzene	ND		0.00100	1	12/07/2018 13:02	WG1207111
2-Hexanone	ND		0.0100	1	12/07/2018 13:02	WG1207111
Iodomethane	ND		0.0100	1	12/07/2018 13:02	WG1207111
2-Butanone (MEK)	ND		0.0100	1	12/07/2018 13:02	WG1207111
Methylene Chloride	ND		0.00500	1	12/07/2018 13:02	WG1207111
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	12/07/2018 13:02	WG1207111
Styrene	ND		0.00100	1	12/07/2018 13:02	WG1207111
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 13:02	WG1207111
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 13:02	WG1207111
Tetrachloroethene	ND		0.00100	1	12/07/2018 13:02	WG1207111
Toluene	ND		0.00100	1	12/07/2018 13:02	WG1207111
1,1,1-Trichloroethane	ND		0.00100	1	12/07/2018 13:02	WG1207111
1,1,2-Trichloroethane	ND		0.00100	1	12/07/2018 13:02	WG1207111
Trichloroethene	ND		0.00100	1	12/07/2018 13:02	WG1207111
Trichlorofluoromethane	ND		0.00500	1	12/07/2018 13:02	WG1207111
1,2,3-Trichloropropane	ND		0.00250	1	12/07/2018 13:02	WG1207111
Vinyl acetate	ND		0.0100	1	12/07/2018 13:02	WG1207111
Vinyl chloride	ND		0.00100	1	12/07/2018 13:02	WG1207111
Xylenes, Total	ND		0.00300	1	12/07/2018 13:02	WG1207111
(S) Toluene-d8	*101*		*80.0-120*		*12/07/2018 13:02*	WG1207111
(S) Dibromofluoromethane	*110*		*75.0-120*		*12/07/2018 13:02*	WG1207111
(S) a,a,a-Trifluorotoluene	*112*		*80.0-120*		*12/07/2018 13:02*	WG1207111
(S) 4-Bromofluorobenzene	*105*		*77.0-126*		*12/07/2018 13:02*	WG1207111

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	12/06/2018 17:51	WG1206335
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	12/06/2018 17:51	WG1206335

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	30.0	B	30.0	1	12/10/2018 14:25	WG1208245

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	12/11/2018 19:25	WG1208329

Sample Narrative:
L1049906-05 WG1208329: Endpoint pH 4.5 headspace

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	12/12/2018 18:51	WG1208083

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	12/06/2018 14:01	WG1206291

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	12/05/2018 21:29	WG1206170
Chloride	12.1		1.00	1	12/05/2018 21:29	WG1206170
Fluoride	ND		0.100	1	12/05/2018 21:29	WG1206170
Nitrate	0.905		0.100	1	12/05/2018 21:29	WG1206170
Sulfate	ND		5.00	1	12/05/2018 21:29	WG1206170

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	12/06/2018 14:56	WG1206137
Mercury,Dissolved	ND		0.000200	1	12/06/2018 13:48	WG1206141

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	12/07/2018 04:26	WG1206203
Boron,Dissolved	ND		0.200	1	12/08/2018 18:35	WG1207254

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.315	B	0.100	1	12/11/2018 15:13	WG1208518
Aluminum,Dissolved	ND		0.100	1	12/07/2018 13:52	WG1206004
Antimony	ND		0.00200	1	12/07/2018 20:19	WG1206204
Antimony,Dissolved	ND		0.00200	1	12/07/2018 13:52	WG1206004
Arsenic	ND		0.00200	1	12/07/2018 20:19	WG1206204
Arsenic,Dissolved	ND		0.00200	1	12/07/2018 13:52	WG1206004
Barium	0.0145		0.00500	1	12/07/2018 20:19	WG1206204
Barium,Dissolved	0.00692		0.00500	1	12/07/2018 13:52	WG1206004

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	12/07/2018 20:19	WG1206204
Beryllium,Dissolved	ND		0.00200	1	12/07/2018 13:52	WG1206004
Cadmium	ND		0.00100	1	12/07/2018 20:19	WG1206204
Cadmium,Dissolved	ND		0.00100	1	12/07/2018 13:52	WG1206004
Calcium	8.95		1.00	1	12/07/2018 20:19	WG1206204
Calcium,Dissolved	8.09		1.00	1	12/07/2018 13:52	WG1206004
Chromium	0.00224		0.00200	1	12/07/2018 20:19	WG1206204
Chromium,Dissolved	ND		0.00200	1	12/07/2018 13:52	WG1206004
Cobalt	ND		0.00200	1	12/07/2018 20:19	WG1206204
Cobalt,Dissolved	ND		0.00200	1	12/07/2018 13:52	WG1206004
Copper	ND		0.00500	1	12/07/2018 20:19	WG1206204
Copper,Dissolved	ND		0.00500	1	12/07/2018 13:52	WG1206004
Iron	0.769		0.100	1	12/07/2018 20:19	WG1206204
Iron,Dissolved	ND		0.100	1	12/07/2018 13:52	WG1206004
Lead	ND		0.00200	1	12/07/2018 20:19	WG1206204
Lead,Dissolved	ND		0.00200	1	12/07/2018 13:52	WG1206004
Magnesium	2.35		1.00	1	12/07/2018 20:19	WG1206204
Magnesium,Dissolved	2.10		1.00	1	12/07/2018 13:52	WG1206004
Manganese	0.0136		0.00500	1	12/07/2018 20:19	WG1206204
Manganese,Dissolved	ND		0.00500	1	12/07/2018 13:52	WG1206004
Nickel	ND		0.00200	1	12/07/2018 20:19	WG1206204
Nickel,Dissolved	ND		0.00200	1	12/07/2018 13:52	WG1206004
Potassium	1.11		1.00	1	12/07/2018 20:19	WG1206204
Potassium,Dissolved	ND		1.00	1	12/07/2018 13:52	WG1206004
Selenium	ND		0.00200	1	12/07/2018 20:19	WG1206204
Selenium,Dissolved	ND		0.00200	1	12/07/2018 13:52	WG1206004
Silver	ND		0.00200	1	12/07/2018 20:19	WG1206204
Silver,Dissolved	ND		0.00200	1	12/07/2018 13:52	WG1206004
Sodium	3.65		1.00	1	12/07/2018 20:19	WG1206204
Sodium,Dissolved	2.87	B	1.00	1	12/07/2018 13:52	WG1206004
Thallium	ND		0.00200	1	12/07/2018 20:19	WG1206204
Thallium,Dissolved	ND		0.00200	1	12/07/2018 13:52	WG1206004
Vanadium	ND		0.00500	1	12/07/2018 20:19	WG1206204
Vanadium,Dissolved	ND		0.00500	1	12/07/2018 13:52	WG1206004
Zinc	ND		0.0250	1	12/11/2018 15:13	WG1208518
Zinc,Dissolved	ND		0.0250	1	12/07/2018 13:52	WG1206004

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	12/07/2018 13:24	WG1207111
Acrylonitrile	ND		0.0100	1	12/07/2018 13:24	WG1207111
Benzene	ND		0.00100	1	12/07/2018 13:24	WG1207111
Bromochloromethane	ND		0.00100	1	12/07/2018 13:24	WG1207111
Bromodichloromethane	ND		0.00100	1	12/07/2018 13:24	WG1207111
Bromoform	ND		0.00100	1	12/07/2018 13:24	WG1207111
Bromomethane	ND		0.00500	1	12/07/2018 13:24	WG1207111
Carbon disulfide	ND		0.00100	1	12/07/2018 13:24	WG1207111
Carbon tetrachloride	ND		0.00100	1	12/07/2018 13:24	WG1207111
Chlorobenzene	ND		0.00100	1	12/07/2018 13:24	WG1207111
Chlorodibromomethane	ND		0.00100	1	12/07/2018 13:24	WG1207111
Chloroethane	ND		0.00500	1	12/07/2018 13:24	WG1207111
Chloroform	ND		0.00500	1	12/07/2018 13:24	WG1207111
Chloromethane	ND		0.00250	1	12/07/2018 13:24	WG1207111
Dibromomethane	ND		0.00100	1	12/07/2018 13:24	WG1207111
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/07/2018 13:24	WG1207111

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	12/07/2018 13:24	WG1207111
1,2-Dichlorobenzene	ND		0.00100	1	12/07/2018 13:24	WG1207111
1,4-Dichlorobenzene	ND		0.00100	1	12/07/2018 13:24	WG1207111
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/07/2018 13:24	WG1207111
1,1-Dichloroethane	ND		0.00100	1	12/07/2018 13:24	WG1207111
1,2-Dichloroethane	ND		0.00100	1	12/07/2018 13:24	WG1207111
1,1-Dichloroethene	ND		0.00100	1	12/07/2018 13:24	WG1207111
cis-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 13:24	WG1207111
trans-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 13:24	WG1207111
1,2-Dichloropropane	ND		0.00100	1	12/07/2018 13:24	WG1207111
cis-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 13:24	WG1207111
trans-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 13:24	WG1207111
Ethylbenzene	ND		0.00100	1	12/07/2018 13:24	WG1207111
2-Hexanone	ND		0.0100	1	12/07/2018 13:24	WG1207111
Iodomethane	ND		0.0100	1	12/07/2018 13:24	WG1207111
2-Butanone (MEK)	ND		0.0100	1	12/07/2018 13:24	WG1207111
Methylene Chloride	ND		0.00500	1	12/07/2018 13:24	WG1207111
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	12/07/2018 13:24	WG1207111
Styrene	ND		0.00100	1	12/07/2018 13:24	WG1207111
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 13:24	WG1207111
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 13:24	WG1207111
Tetrachloroethene	ND		0.00100	1	12/07/2018 13:24	WG1207111
Toluene	ND		0.00100	1	12/07/2018 13:24	WG1207111
1,1,1-Trichloroethane	ND		0.00100	1	12/07/2018 13:24	WG1207111
1,1,2-Trichloroethane	ND		0.00100	1	12/07/2018 13:24	WG1207111
Trichloroethene	ND		0.00100	1	12/07/2018 13:24	WG1207111
Trichlorofluoromethane	ND		0.00500	1	12/07/2018 13:24	WG1207111
1,2,3-Trichloropropane	ND		0.00250	1	12/07/2018 13:24	WG1207111
Vinyl acetate	ND		0.0100	1	12/07/2018 13:24	WG1207111
Vinyl chloride	ND		0.00100	1	12/07/2018 13:24	WG1207111
Xylenes, Total	ND		0.00300	1	12/07/2018 13:24	WG1207111
(S) Toluene-d8	*102*		*80.0-120*		*12/07/2018 13:24*	WG1207111
(S) Dibromofluoromethane	*109*		*75.0-120*		*12/07/2018 13:24*	WG1207111
(S) a,a,a-Trifluorotoluene	*107*		*80.0-120*		*12/07/2018 13:24*	WG1207111
(S) 4-Bromofluorobenzene	*103*		*77.0-126*		*12/07/2018 13:24*	WG1207111

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	12/06/2018 18:04	WG1206335
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	12/06/2018 18:04	WG1206335

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	ND		30.0	1	12/10/2018 14:26	WG1208245

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	12/11/2018 19:43	WG1208329

Sample Narrative:

L1049906-06 WG1208329: Endpoint pH 4.5 headspace

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	12/12/2018 18:53	WG1208083

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	12/06/2018 14:01	WG1206291

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	12/05/2018 21:40	WG1206170
Chloride	16.6		1.00	1	12/05/2018 21:40	WG1206170
Fluoride	ND		0.100	1	12/05/2018 21:40	WG1206170
Nitrate	0.399		0.100	1	12/05/2018 21:40	WG1206170
Sulfate	ND		5.00	1	12/05/2018 21:40	WG1206170

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	12/06/2018 14:59	WG1206137
Mercury,Dissolved	ND		0.000200	1	12/06/2018 13:58	WG1206141

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	12/07/2018 04:35	WG1206203
Boron,Dissolved	ND		0.200	1	12/08/2018 18:38	WG1207254

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	1.26		0.100	1	12/11/2018 15:18	WG1208518
Aluminum,Dissolved	0.731		0.100	1	12/07/2018 13:57	WG1206004
Antimony	ND		0.00200	1	12/07/2018 20:23	WG1206204
Antimony,Dissolved	ND		0.00200	1	12/07/2018 13:57	WG1206004
Arsenic	ND		0.00200	1	12/07/2018 20:23	WG1206204
Arsenic,Dissolved	ND		0.00200	1	12/07/2018 13:57	WG1206004
Barium	0.0373		0.00500	1	12/07/2018 20:23	WG1206204
Barium,Dissolved	0.0281		0.00500	1	12/07/2018 13:57	WG1206004

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	12/07/2018 20:23	WG1206204
Beryllium,Dissolved	ND		0.00200	1	12/07/2018 13:57	WG1206004
Cadmium	ND		0.00100	1	12/07/2018 20:23	WG1206204
Cadmium,Dissolved	ND		0.00100	1	12/07/2018 13:57	WG1206004
Calcium	8.06		1.00	1	12/07/2018 20:23	WG1206204
Calcium,Dissolved	7.03		1.00	1	12/07/2018 13:57	WG1206004
Chromium	0.00259		0.00200	1	12/07/2018 20:23	WG1206204
Chromium,Dissolved	ND		0.00200	1	12/07/2018 13:57	WG1206004
Cobalt	ND		0.00200	1	12/07/2018 20:23	WG1206204
Cobalt,Dissolved	ND		0.00200	1	12/07/2018 13:57	WG1206004
Copper	ND		0.00500	1	12/07/2018 20:23	WG1206204
Copper,Dissolved	ND		0.00500	1	12/07/2018 13:57	WG1206004
Iron	1.67		0.100	1	12/07/2018 20:23	WG1206204
Iron,Dissolved	0.817		0.100	1	12/07/2018 13:57	WG1206004
Lead	ND		0.00200	1	12/07/2018 20:23	WG1206204
Lead,Dissolved	ND		0.00200	1	12/07/2018 13:57	WG1206004
Magnesium	2.88		1.00	1	12/07/2018 20:23	WG1206204
Magnesium,Dissolved	2.58		1.00	1	12/07/2018 13:57	WG1206004
Manganese	0.0255		0.00500	1	12/07/2018 20:23	WG1206204
Manganese,Dissolved	0.0123		0.00500	1	12/07/2018 13:57	WG1206004
Nickel	ND		0.00200	1	12/07/2018 20:23	WG1206204
Nickel,Dissolved	ND		0.00200	1	12/07/2018 13:57	WG1206004
Potassium	1.19		1.00	1	12/07/2018 20:23	WG1206204
Potassium,Dissolved	1.01		1.00	1	12/07/2018 13:57	WG1206004
Selenium	ND		0.00200	1	12/07/2018 20:23	WG1206204
Selenium,Dissolved	ND		0.00200	1	12/07/2018 13:57	WG1206004
Silver	ND		0.00200	1	12/07/2018 20:23	WG1206204
Silver,Dissolved	ND		0.00200	1	12/07/2018 13:57	WG1206004
Sodium	4.09		1.00	1	12/07/2018 20:23	WG1206204
Sodium,Dissolved	3.76	B	1.00	1	12/07/2018 13:57	WG1206004
Thallium	ND		0.00200	1	12/07/2018 20:23	WG1206204
Thallium,Dissolved	ND		0.00200	1	12/07/2018 13:57	WG1206004
Vanadium	ND		0.00500	1	12/07/2018 20:23	WG1206204
Vanadium,Dissolved	ND		0.00500	1	12/07/2018 13:57	WG1206004
Zinc	ND		0.0250	1	12/11/2018 15:18	WG1208518
Zinc,Dissolved	ND		0.0250	1	12/07/2018 13:57	WG1206004

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	12/07/2018 13:46	WG1207111
Acrylonitrile	ND		0.0100	1	12/07/2018 13:46	WG1207111
Benzene	ND		0.00100	1	12/07/2018 13:46	WG1207111
Bromochloromethane	ND		0.00100	1	12/07/2018 13:46	WG1207111
Bromodichloromethane	ND		0.00100	1	12/07/2018 13:46	WG1207111
Bromoform	ND		0.00100	1	12/07/2018 13:46	WG1207111
Bromomethane	ND		0.00500	1	12/07/2018 13:46	WG1207111
Carbon disulfide	ND		0.00100	1	12/07/2018 13:46	WG1207111
Carbon tetrachloride	ND		0.00100	1	12/07/2018 13:46	WG1207111
Chlorobenzene	ND		0.00100	1	12/07/2018 13:46	WG1207111
Chlorodibromomethane	ND		0.00100	1	12/07/2018 13:46	WG1207111
Chloroethane	ND		0.00500	1	12/07/2018 13:46	WG1207111
Chloroform	ND		0.00500	1	12/07/2018 13:46	WG1207111
Chloromethane	ND		0.00250	1	12/07/2018 13:46	WG1207111
Dibromomethane	ND		0.00100	1	12/07/2018 13:46	WG1207111
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/07/2018 13:46	WG1207111

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	12/07/2018 13:46	WG1207111
1,2-Dichlorobenzene	ND		0.00100	1	12/07/2018 13:46	WG1207111
1,4-Dichlorobenzene	ND		0.00100	1	12/07/2018 13:46	WG1207111
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/07/2018 13:46	WG1207111
1,1-Dichloroethane	ND		0.00100	1	12/07/2018 13:46	WG1207111
1,2-Dichloroethane	ND		0.00100	1	12/07/2018 13:46	WG1207111
1,1-Dichloroethene	ND		0.00100	1	12/07/2018 13:46	WG1207111
cis-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 13:46	WG1207111
trans-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 13:46	WG1207111
1,2-Dichloropropane	ND		0.00100	1	12/07/2018 13:46	WG1207111
cis-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 13:46	WG1207111
trans-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 13:46	WG1207111
Ethylbenzene	ND		0.00100	1	12/07/2018 13:46	WG1207111
2-Hexanone	ND		0.0100	1	12/07/2018 13:46	WG1207111
Iodomethane	ND		0.0100	1	12/07/2018 13:46	WG1207111
2-Butanone (MEK)	ND		0.0100	1	12/07/2018 13:46	WG1207111
Methylene Chloride	ND		0.00500	1	12/07/2018 13:46	WG1207111
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	12/07/2018 13:46	WG1207111
Styrene	ND		0.00100	1	12/07/2018 13:46	WG1207111
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 13:46	WG1207111
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 13:46	WG1207111
Tetrachloroethene	ND		0.00100	1	12/07/2018 13:46	WG1207111
Toluene	ND		0.00100	1	12/07/2018 13:46	WG1207111
1,1,1-Trichloroethane	ND		0.00100	1	12/07/2018 13:46	WG1207111
1,1,2-Trichloroethane	ND		0.00100	1	12/07/2018 13:46	WG1207111
Trichloroethene	ND		0.00100	1	12/07/2018 13:46	WG1207111
Trichlorofluoromethane	ND		0.00500	1	12/07/2018 13:46	WG1207111
1,2,3-Trichloropropane	ND		0.00250	1	12/07/2018 13:46	WG1207111
Vinyl acetate	ND		0.0100	1	12/07/2018 13:46	WG1207111
Vinyl chloride	ND		0.00100	1	12/07/2018 13:46	WG1207111
Xylenes, Total	ND		0.00300	1	12/07/2018 13:46	WG1207111
(S) Toluene-d8	*101*		*80.0-120*		*12/07/2018 13:46*	WG1207111
(S) Dibromofluoromethane	*108*		*75.0-120*		*12/07/2018 13:46*	WG1207111
(S) a,a,a-Trifluorotoluene	*112*		*80.0-120*		*12/07/2018 13:46*	WG1207111
(S) 4-Bromofluorobenzene	*96.6*		*77.0-126*		*12/07/2018 13:46*	WG1207111

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	12/06/2018 18:15	WG1206335
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	12/06/2018 18:15	WG1206335

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	ND		30.0	1	12/10/2018 14:26	WG1208245

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	12/11/2018 19:51	WG1208329

Sample Narrative:

L1049906-07 WG1208329: Endpoint pH 4.5 headspace

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	12/12/2018 18:55	WG1208083

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	12/06/2018 14:02	WG1206291

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	12/05/2018 21:51	WG1206170
Chloride	52.2		1.00	1	12/05/2018 21:51	WG1206170
Fluoride	ND		0.100	1	12/05/2018 21:51	WG1206170
Nitrate	3.46	J3	0.100	1	12/05/2018 21:51	WG1206170
Sulfate	ND		5.00	1	12/05/2018 21:51	WG1206170

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	12/06/2018 15:01	WG1206137
Mercury,Dissolved	ND		0.000200	1	12/06/2018 14:00	WG1206141

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	12/07/2018 04:37	WG1206203
Boron,Dissolved	ND		0.200	1	12/08/2018 18:41	WG1207254

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.276	B	0.100	1	12/11/2018 15:23	WG1208518
Aluminum,Dissolved	0.142	B	0.100	1	12/07/2018 14:01	WG1206004
Antimony	ND		0.00200	1	12/07/2018 20:27	WG1206204
Antimony,Dissolved	ND		0.00200	1	12/07/2018 14:01	WG1206004
Arsenic	ND		0.00200	1	12/07/2018 20:27	WG1206204
Arsenic,Dissolved	ND		0.00200	1	12/07/2018 14:01	WG1206004
Barium	0.0457		0.00500	1	12/07/2018 20:27	WG1206204
Barium,Dissolved	0.0356		0.00500	1	12/07/2018 14:01	WG1206004

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Beryllium	ND		0.00200	1	12/07/2018 20:27	WG1206204
Beryllium,Dissolved	ND		0.00200	1	12/07/2018 14:01	WG1206004
Cadmium	ND		0.00100	1	12/07/2018 20:27	WG1206204
Cadmium,Dissolved	ND		0.00100	1	12/07/2018 14:01	WG1206004
Calcium	18.7		1.00	1	12/07/2018 20:27	WG1206204
Calcium,Dissolved	17.0		1.00	1	12/07/2018 14:01	WG1206004
Chromium	0.00211		0.00200	1	12/07/2018 20:27	WG1206204
Chromium,Dissolved	ND		0.00200	1	12/07/2018 14:01	WG1206004
Cobalt	ND		0.00200	1	12/07/2018 20:27	WG1206204
Cobalt,Dissolved	ND		0.00200	1	12/07/2018 14:01	WG1206004
Copper	ND		0.00500	1	12/07/2018 20:27	WG1206204
Copper,Dissolved	ND		0.00500	1	12/07/2018 14:01	WG1206004
Iron	1.17		0.100	1	12/07/2018 20:27	WG1206204
Iron,Dissolved	ND		0.100	1	12/07/2018 14:01	WG1206004
Lead	ND		0.00200	1	12/07/2018 20:27	WG1206204
Lead,Dissolved	ND		0.00200	1	12/07/2018 14:01	WG1206004
Magnesium	5.86		1.00	1	12/07/2018 20:27	WG1206204
Magnesium,Dissolved	5.36		1.00	1	12/07/2018 14:01	WG1206004
Manganese	0.0211		0.00500	1	12/07/2018 20:27	WG1206204
Manganese,Dissolved	0.0109		0.00500	1	12/07/2018 14:01	WG1206004
Nickel	ND		0.00200	1	12/07/2018 20:27	WG1206204
Nickel,Dissolved	ND		0.00200	1	12/07/2018 14:01	WG1206004
Potassium	1.88		1.00	1	12/07/2018 20:27	WG1206204
Potassium,Dissolved	1.52		1.00	1	12/07/2018 14:01	WG1206004
Selenium	ND		0.00200	1	12/07/2018 20:27	WG1206204
Selenium,Dissolved	ND		0.00200	1	12/07/2018 14:01	WG1206004
Silver	ND		0.00200	1	12/07/2018 20:27	WG1206204
Silver,Dissolved	ND		0.00200	1	12/07/2018 14:01	WG1206004
Sodium	11.0		1.00	1	12/07/2018 20:27	WG1206204
Sodium,Dissolved	9.79		1.00	1	12/07/2018 14:01	WG1206004
Thallium	ND		0.00200	1	12/07/2018 20:27	WG1206204
Thallium,Dissolved	ND		0.00200	1	12/07/2018 14:01	WG1206004
Vanadium	ND		0.00500	1	12/07/2018 20:27	WG1206204
Vanadium,Dissolved	ND		0.00500	1	12/07/2018 14:01	WG1206004
Zinc	ND		0.0250	1	12/11/2018 15:23	WG1208518
Zinc,Dissolved	ND		0.0250	1	12/07/2018 14:01	WG1206004

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	12/07/2018 14:08	WG1207111
Acrylonitrile	ND		0.0100	1	12/07/2018 14:08	WG1207111
Benzene	ND		0.00100	1	12/07/2018 14:08	WG1207111
Bromochloromethane	ND		0.00100	1	12/07/2018 14:08	WG1207111
Bromodichloromethane	ND		0.00100	1	12/07/2018 14:08	WG1207111
Bromoform	ND		0.00100	1	12/07/2018 14:08	WG1207111
Bromomethane	ND		0.00500	1	12/07/2018 14:08	WG1207111
Carbon disulfide	ND		0.00100	1	12/07/2018 14:08	WG1207111
Carbon tetrachloride	ND		0.00100	1	12/07/2018 14:08	WG1207111
Chlorobenzene	ND		0.00100	1	12/07/2018 14:08	WG1207111
Chlorodibromomethane	ND		0.00100	1	12/07/2018 14:08	WG1207111
Chloroethane	ND		0.00500	1	12/07/2018 14:08	WG1207111
Chloroform	ND		0.00500	1	12/07/2018 14:08	WG1207111
Chloromethane	ND		0.00250	1	12/07/2018 14:08	WG1207111
Dibromomethane	ND		0.00100	1	12/07/2018 14:08	WG1207111
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/07/2018 14:08	WG1207111

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	12/07/2018 14:08	WG1207111
1,2-Dichlorobenzene	ND		0.00100	1	12/07/2018 14:08	WG1207111
1,4-Dichlorobenzene	ND		0.00100	1	12/07/2018 14:08	WG1207111
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/07/2018 14:08	WG1207111
1,1-Dichloroethane	ND		0.00100	1	12/07/2018 14:08	WG1207111
1,2-Dichloroethane	ND		0.00100	1	12/07/2018 14:08	WG1207111
1,1-Dichloroethene	ND		0.00100	1	12/07/2018 14:08	WG1207111
cis-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 14:08	WG1207111
trans-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 14:08	WG1207111
1,2-Dichloropropane	ND		0.00100	1	12/07/2018 14:08	WG1207111
cis-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 14:08	WG1207111
trans-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 14:08	WG1207111
Ethylbenzene	ND		0.00100	1	12/07/2018 14:08	WG1207111
2-Hexanone	ND		0.0100	1	12/07/2018 14:08	WG1207111
Iodomethane	ND		0.0100	1	12/07/2018 14:08	WG1207111
2-Butanone (MEK)	ND		0.0100	1	12/07/2018 14:08	WG1207111
Methylene Chloride	ND		0.00500	1	12/07/2018 14:08	WG1207111
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	12/07/2018 14:08	WG1207111
Styrene	ND		0.00100	1	12/07/2018 14:08	WG1207111
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 14:08	WG1207111
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 14:08	WG1207111
Tetrachloroethene	ND		0.00100	1	12/07/2018 14:08	WG1207111
Toluene	ND		0.00100	1	12/07/2018 14:08	WG1207111
1,1,1-Trichloroethane	ND		0.00100	1	12/07/2018 14:08	WG1207111
1,1,2-Trichloroethane	ND		0.00100	1	12/07/2018 14:08	WG1207111
Trichloroethene	ND		0.00100	1	12/07/2018 14:08	WG1207111
Trichlorofluoromethane	ND		0.00500	1	12/07/2018 14:08	WG1207111
1,2,3-Trichloropropane	ND		0.00250	1	12/07/2018 14:08	WG1207111
Vinyl acetate	ND		0.0100	1	12/07/2018 14:08	WG1207111
Vinyl chloride	ND		0.00100	1	12/07/2018 14:08	WG1207111
Xylenes, Total	ND		0.00300	1	12/07/2018 14:08	WG1207111
(S) Toluene-d8	*101*		*80.0-120*		*12/07/2018 14:08*	WG1207111
(S) Dibromofluoromethane	*111*		*75.0-120*		*12/07/2018 14:08*	WG1207111
(S) a,a,a-Trifluorotoluene	*111*		*80.0-120*		*12/07/2018 14:08*	WG1207111
(S) 4-Bromofluorobenzene	*102*		*77.0-126*		*12/07/2018 14:08*	WG1207111

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	12/06/2018 18:28	WG1206335
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	12/06/2018 18:28	WG1206335

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	ND		30.0	1	12/10/2018 14:27	WG1208245

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	12/11/2018 19:58	WG1208329

Sample Narrative:

L1049906-08 WG1208329: Endpoint pH 4.5 headspace

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	12/12/2018 19:01	WG1208083

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	ND		10.0	1	12/06/2018 14:02	WG1206291

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		5.00	5	12/05/2018 22:34	WG1206170
Chloride	66.8		1.00	1	12/05/2018 22:23	WG1206170
Fluoride	0.404		0.100	1	12/05/2018 22:23	WG1206170
Nitrate	1.32		0.100	1	12/05/2018 22:23	WG1206170
Sulfate	325		25.0	5	12/05/2018 22:34	WG1206170

Sample Narrative:

L1049906-08 WG1206170: report Br @ dilution due to matrix interference

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	12/06/2018 15:04	WG1206137
Mercury,Dissolved	ND		0.000200	1	12/06/2018 14:03	WG1206141

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	12/07/2018 04:40	WG1206203
Boron,Dissolved	ND		0.200	1	12/08/2018 18:43	WG1207254

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.672		0.100	1	12/11/2018 15:27	WG1208518
Aluminum,Dissolved	0.588		0.100	1	12/07/2018 14:06	WG1206004
Antimony	ND		0.00200	1	12/07/2018 20:31	WG1206204
Antimony,Dissolved	ND		0.00200	1	12/07/2018 14:06	WG1206004
Arsenic	ND		0.00200	1	12/07/2018 20:31	WG1206204

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic,Dissolved	ND		0.00200	1	12/07/2018 14:06	WG1206004
Barium	0.0465		0.00500	1	12/07/2018 20:31	WG1206204
Barium,Dissolved	0.0447		0.00500	1	12/07/2018 14:06	WG1206004
Beryllium	ND		0.00200	1	12/07/2018 20:31	WG1206204
Beryllium,Dissolved	ND		0.00200	1	12/07/2018 14:06	WG1206004
Cadmium	0.137		0.00100	1	12/07/2018 20:31	WG1206204
Cadmium,Dissolved	0.133		0.00100	1	12/07/2018 14:06	WG1206004
Calcium	79.6		1.00	1	12/07/2018 20:31	WG1206204
Calcium,Dissolved	75.2		1.00	1	12/07/2018 14:06	WG1206004
Chromium	0.00325		0.00200	1	12/07/2018 20:31	WG1206204
Chromium,Dissolved	ND		0.00200	1	12/07/2018 14:06	WG1206004
Cobalt	0.0211		0.00200	1	12/07/2018 20:31	WG1206204
Cobalt,Dissolved	0.0210		0.00200	1	12/07/2018 14:06	WG1206004
Copper	ND		0.00500	1	12/07/2018 20:31	WG1206204
Copper,Dissolved	ND		0.00500	1	12/07/2018 14:06	WG1206004
Iron	0.393		0.100	1	12/07/2018 20:31	WG1206204
Iron,Dissolved	0.256	B	0.100	1	12/07/2018 14:06	WG1206004
Lead	ND		0.00200	1	12/07/2018 20:31	WG1206204
Lead,Dissolved	ND		0.00200	1	12/07/2018 14:06	WG1206004
Magnesium	35.2		1.00	1	12/07/2018 20:31	WG1206204
Magnesium,Dissolved	33.3		1.00	1	12/07/2018 14:06	WG1206004
Manganese	2.25		0.00500	1	12/07/2018 20:31	WG1206204
Manganese,Dissolved	2.17		0.00500	1	12/07/2018 14:06	WG1206004
Nickel	0.0699		0.00200	1	12/07/2018 20:31	WG1206204
Nickel,Dissolved	0.0663		0.00200	1	12/07/2018 14:06	WG1206004
Potassium	10.2		1.00	1	12/07/2018 20:31	WG1206204
Potassium,Dissolved	9.20		1.00	1	12/07/2018 14:06	WG1206004
Selenium	ND		0.00200	1	12/07/2018 20:31	WG1206204
Selenium,Dissolved	ND		0.00200	1	12/07/2018 14:06	WG1206004
Silver	ND		0.00200	1	12/07/2018 20:31	WG1206204
Silver,Dissolved	ND		0.00200	1	12/07/2018 14:06	WG1206004
Sodium	17.4		1.00	1	12/07/2018 20:31	WG1206204
Sodium,Dissolved	16.5		1.00	1	12/07/2018 14:06	WG1206004
Thallium	ND		0.00200	1	12/07/2018 20:31	WG1206204
Thallium,Dissolved	ND		0.00200	1	12/07/2018 14:06	WG1206004
Vanadium	ND		0.00500	1	12/07/2018 20:31	WG1206204
Vanadium,Dissolved	ND		0.00500	1	12/07/2018 14:06	WG1206004
Zinc	1.40		0.0250	1	12/11/2018 15:27	WG1208518
Zinc,Dissolved	1.24		0.0250	1	12/07/2018 14:06	WG1206004

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	12/07/2018 14:29	WG1207111
Acrylonitrile	ND		0.0100	1	12/07/2018 14:29	WG1207111
Benzene	ND		0.00100	1	12/07/2018 14:29	WG1207111
Bromochloromethane	ND		0.00100	1	12/07/2018 14:29	WG1207111
Bromodichloromethane	ND		0.00100	1	12/07/2018 14:29	WG1207111
Bromoform	ND		0.00100	1	12/07/2018 14:29	WG1207111
Bromomethane	ND		0.00500	1	12/07/2018 14:29	WG1207111
Carbon disulfide	ND		0.00100	1	12/07/2018 14:29	WG1207111
Carbon tetrachloride	ND		0.00100	1	12/07/2018 14:29	WG1207111
Chlorobenzene	ND		0.00100	1	12/07/2018 14:29	WG1207111
Chlorodibromomethane	ND		0.00100	1	12/07/2018 14:29	WG1207111
Chloroethane	ND		0.00500	1	12/07/2018 14:29	WG1207111
Chloroform	ND		0.00500	1	12/07/2018 14:29	WG1207111

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chloromethane	ND		0.00250	1	12/07/2018 14:29	WG1207111
Dibromomethane	ND		0.00100	1	12/07/2018 14:29	WG1207111
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/07/2018 14:29	WG1207111
1,2-Dibromoethane	ND		0.00100	1	12/07/2018 14:29	WG1207111
1,2-Dichlorobenzene	ND		0.00100	1	12/07/2018 14:29	WG1207111
1,4-Dichlorobenzene	ND		0.00100	1	12/07/2018 14:29	WG1207111
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/07/2018 14:29	WG1207111
1,1-Dichloroethane	ND		0.00100	1	12/07/2018 14:29	WG1207111
1,2-Dichloroethane	ND		0.00100	1	12/07/2018 14:29	WG1207111
1,1-Dichloroethene	ND		0.00100	1	12/07/2018 14:29	WG1207111
cis-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 14:29	WG1207111
trans-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 14:29	WG1207111
1,2-Dichloropropane	ND		0.00100	1	12/07/2018 14:29	WG1207111
cis-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 14:29	WG1207111
trans-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 14:29	WG1207111
Ethylbenzene	ND		0.00100	1	12/07/2018 14:29	WG1207111
2-Hexanone	ND		0.0100	1	12/07/2018 14:29	WG1207111
Iodomethane	ND		0.0100	1	12/07/2018 14:29	WG1207111
2-Butanone (MEK)	ND		0.0100	1	12/07/2018 14:29	WG1207111
Methylene Chloride	ND		0.00500	1	12/07/2018 14:29	WG1207111
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	12/07/2018 14:29	WG1207111
Styrene	ND		0.00100	1	12/07/2018 14:29	WG1207111
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 14:29	WG1207111
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 14:29	WG1207111
Tetrachloroethene	ND		0.00100	1	12/07/2018 14:29	WG1207111
Toluene	ND		0.00100	1	12/07/2018 14:29	WG1207111
1,1,1-Trichloroethane	ND		0.00100	1	12/07/2018 14:29	WG1207111
1,1,2-Trichloroethane	ND		0.00100	1	12/07/2018 14:29	WG1207111
Trichloroethene	ND		0.00100	1	12/07/2018 14:29	WG1207111
Trichlorofluoromethane	ND		0.00500	1	12/07/2018 14:29	WG1207111
1,2,3-Trichloropropane	ND		0.00250	1	12/07/2018 14:29	WG1207111
Vinyl acetate	ND		0.0100	1	12/07/2018 14:29	WG1207111
Vinyl chloride	ND		0.00100	1	12/07/2018 14:29	WG1207111
Xylenes, Total	ND		0.00300	1	12/07/2018 14:29	WG1207111
(S) Toluene-d8	*100*		*80.0-120*		*12/07/2018 14:29*	WG1207111
(S) Dibromofluoromethane	*112*		*75.0-120*		*12/07/2018 14:29*	WG1207111
(S) a,a,a-Trifluorotoluene	*112*		*80.0-120*		*12/07/2018 14:29*	WG1207111
(S) 4-Bromofluorobenzene	*98.3*		*77.0-126*		*12/07/2018 14:29*	WG1207111

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	12/06/2018 18:40	WG1206335
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	12/06/2018 18:40	WG1206335

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	ND		30.0	1	12/10/2018 14:28	WG1208245

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	ND		20.0	1	12/11/2018 20:05	WG1208329

Sample Narrative:

L1049906-09 WG1208329: Endpoint pH 4.5 headspace

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	12/12/2018 19:06	WG1208083

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	ND		10.0	1	12/06/2018 14:03	WG1206291

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	12/05/2018 22:45	WG1206170
Chloride	ND		1.00	1	12/05/2018 22:45	WG1206170
Fluoride	ND		0.100	1	12/05/2018 22:45	WG1206170
Nitrate	ND		0.100	1	12/05/2018 22:45	WG1206170
Sulfate	ND		5.00	1	12/05/2018 22:45	WG1206170

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	12/06/2018 15:06	WG1206137

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	12/07/2018 04:43	WG1206203

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		0.100	1	12/11/2018 15:32	WG1208518
Antimony	ND		0.00200	1	12/07/2018 20:35	WG1206204
Arsenic	ND		0.00200	1	12/07/2018 20:35	WG1206204
Barium	ND		0.00500	1	12/07/2018 20:35	WG1206204
Beryllium	ND		0.00200	1	12/07/2018 20:35	WG1206204
Cadmium	ND		0.00100	1	12/07/2018 20:35	WG1206204
Calcium	ND		1.00	1	12/07/2018 20:35	WG1206204
Chromium	ND		0.00200	1	12/07/2018 20:35	WG1206204
Cobalt	ND		0.00200	1	12/07/2018 20:35	WG1206204
Copper	ND		0.00500	1	12/07/2018 20:35	WG1206204

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	ND		0.100	1	12/07/2018 20:35	WG1206204
Lead	ND		0.00200	1	12/07/2018 20:35	WG1206204
Magnesium	ND		1.00	1	12/07/2018 20:35	WG1206204
Manganese	ND		0.00500	1	12/07/2018 20:35	WG1206204
Nickel	ND		0.00200	1	12/07/2018 20:35	WG1206204
Potassium	ND		1.00	1	12/07/2018 20:35	WG1206204
Selenium	ND		0.00200	1	12/07/2018 20:35	WG1206204
Silver	ND		0.00200	1	12/07/2018 20:35	WG1206204
Sodium	ND		1.00	1	12/07/2018 20:35	WG1206204
Thallium	ND		0.00200	1	12/07/2018 20:35	WG1206204
Vanadium	ND		0.00500	1	12/07/2018 20:35	WG1206204
Zinc	ND		0.0250	1	12/11/2018 15:32	WG1208518

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	12/07/2018 14:51	WG1207111
Acrylonitrile	ND		0.0100	1	12/07/2018 14:51	WG1207111
Benzene	ND		0.00100	1	12/07/2018 14:51	WG1207111
Bromochloromethane	ND		0.00100	1	12/07/2018 14:51	WG1207111
Bromodichloromethane	ND		0.00100	1	12/07/2018 14:51	WG1207111
Bromoform	ND		0.00100	1	12/07/2018 14:51	WG1207111
Bromomethane	ND		0.00500	1	12/07/2018 14:51	WG1207111
Carbon disulfide	ND		0.00100	1	12/07/2018 14:51	WG1207111
Carbon tetrachloride	ND		0.00100	1	12/07/2018 14:51	WG1207111
Chlorobenzene	ND		0.00100	1	12/07/2018 14:51	WG1207111
Chlorodibromomethane	ND		0.00100	1	12/07/2018 14:51	WG1207111
Chloroethane	ND		0.00500	1	12/07/2018 14:51	WG1207111
Chloroform	ND		0.00500	1	12/07/2018 14:51	WG1207111
Chloromethane	ND		0.00250	1	12/07/2018 14:51	WG1207111
Dibromomethane	ND		0.00100	1	12/07/2018 14:51	WG1207111
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/07/2018 14:51	WG1207111
1,2-Dibromoethane	ND		0.00100	1	12/07/2018 14:51	WG1207111
1,2-Dichlorobenzene	ND		0.00100	1	12/07/2018 14:51	WG1207111
1,4-Dichlorobenzene	ND		0.00100	1	12/07/2018 14:51	WG1207111
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/07/2018 14:51	WG1207111
1,1-Dichloroethane	ND		0.00100	1	12/07/2018 14:51	WG1207111
1,2-Dichloroethane	ND		0.00100	1	12/07/2018 14:51	WG1207111
1,1-Dichloroethene	ND		0.00100	1	12/07/2018 14:51	WG1207111
cis-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 14:51	WG1207111
trans-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 14:51	WG1207111
1,2-Dichloropropane	ND		0.00100	1	12/07/2018 14:51	WG1207111
cis-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 14:51	WG1207111
trans-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 14:51	WG1207111
Ethylbenzene	ND		0.00100	1	12/07/2018 14:51	WG1207111
2-Hexanone	ND		0.0100	1	12/07/2018 14:51	WG1207111
Iodomethane	ND		0.0100	1	12/07/2018 14:51	WG1207111
2-Butanone (MEK)	ND		0.0100	1	12/07/2018 14:51	WG1207111
Methylene Chloride	ND		0.00500	1	12/07/2018 14:51	WG1207111
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	12/07/2018 14:51	WG1207111
Styrene	ND		0.00100	1	12/07/2018 14:51	WG1207111
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 14:51	WG1207111
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 14:51	WG1207111
Tetrachloroethene	ND		0.00100	1	12/07/2018 14:51	WG1207111
Toluene	ND		0.00100	1	12/07/2018 14:51	WG1207111
1,1,1-Trichloroethane	ND		0.00100	1	12/07/2018 14:51	WG1207111

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

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,1,2-Trichloroethane	ND		0.00100	1	12/07/2018 14:51	WG1207111
Trichloroethene	ND		0.00100	1	12/07/2018 14:51	WG1207111
Trichlorofluoromethane	ND		0.00500	1	12/07/2018 14:51	WG1207111
1,2,3-Trichloropropane	ND		0.00250	1	12/07/2018 14:51	WG1207111
Vinyl acetate	ND		0.0100	1	12/07/2018 14:51	WG1207111
Vinyl chloride	ND		0.00100	1	12/07/2018 14:51	WG1207111
Xylenes, Total	ND		0.00300	1	12/07/2018 14:51	WG1207111
(S) Toluene-d8	*102*		*80.0-120*		*12/07/2018 14:51*	WG1207111
(S) Dibromofluoromethane	*110*		*75.0-120*		*12/07/2018 14:51*	WG1207111
(S) a,a,a-Trifluorotoluene	*114*		*80.0-120*		*12/07/2018 14:51*	WG1207111
(S) 4-Bromofluorobenzene	*100*		*77.0-126*		*12/07/2018 14:51*	WG1207111

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000101	1.01	12/06/2018 19:16	WG1206335
1,2-Dibromo-3-Chloropropane	ND		0.0000202	1.01	12/06/2018 19:16	WG1206335

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	12/07/2018 11:34	WG1207111
Acrylonitrile	ND		0.0100	1	12/07/2018 11:34	WG1207111
Benzene	ND		0.00100	1	12/07/2018 11:34	WG1207111
Bromochloromethane	ND		0.00100	1	12/07/2018 11:34	WG1207111
Bromodichloromethane	ND		0.00100	1	12/07/2018 11:34	WG1207111
Bromoform	ND		0.00100	1	12/07/2018 11:34	WG1207111
Bromomethane	ND		0.00500	1	12/07/2018 11:34	WG1207111
Carbon disulfide	ND		0.00100	1	12/07/2018 11:34	WG1207111
Carbon tetrachloride	ND		0.00100	1	12/07/2018 11:34	WG1207111
Chlorobenzene	ND		0.00100	1	12/07/2018 11:34	WG1207111
Chlorodibromomethane	ND		0.00100	1	12/07/2018 11:34	WG1207111
Chloroethane	ND		0.00500	1	12/07/2018 11:34	WG1207111
Chloroform	ND		0.00500	1	12/07/2018 11:34	WG1207111
Chloromethane	ND		0.00250	1	12/07/2018 11:34	WG1207111
Dibromomethane	ND		0.00100	1	12/07/2018 11:34	WG1207111
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/07/2018 11:34	WG1207111
1,2-Dibromoethane	ND		0.00100	1	12/07/2018 11:34	WG1207111
1,2-Dichlorobenzene	ND		0.00100	1	12/07/2018 11:34	WG1207111
1,4-Dichlorobenzene	ND		0.00100	1	12/07/2018 11:34	WG1207111
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/07/2018 11:34	WG1207111
1,1-Dichloroethane	ND		0.00100	1	12/07/2018 11:34	WG1207111
1,2-Dichloroethane	ND		0.00100	1	12/07/2018 11:34	WG1207111
1,1-Dichloroethene	ND		0.00100	1	12/07/2018 11:34	WG1207111
cis-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 11:34	WG1207111
trans-1,2-Dichloroethene	ND		0.00100	1	12/07/2018 11:34	WG1207111
1,2-Dichloropropane	ND		0.00100	1	12/07/2018 11:34	WG1207111
cis-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 11:34	WG1207111
trans-1,3-Dichloropropene	ND		0.00100	1	12/07/2018 11:34	WG1207111
Ethylbenzene	ND		0.00100	1	12/07/2018 11:34	WG1207111
2-Hexanone	ND		0.0100	1	12/07/2018 11:34	WG1207111
Iodomethane	ND		0.0100	1	12/07/2018 11:34	WG1207111
2-Butanone (MEK)	ND		0.0100	1	12/07/2018 11:34	WG1207111
Methylene Chloride	ND		0.00500	1	12/07/2018 11:34	WG1207111
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	12/07/2018 11:34	WG1207111
Styrene	ND		0.00100	1	12/07/2018 11:34	WG1207111
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 11:34	WG1207111
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/07/2018 11:34	WG1207111
Tetrachloroethene	ND		0.00100	1	12/07/2018 11:34	WG1207111
Toluene	ND		0.00100	1	12/07/2018 11:34	WG1207111
1,1,1-Trichloroethane	ND		0.00100	1	12/07/2018 11:34	WG1207111
1,1,2-Trichloroethane	ND		0.00100	1	12/07/2018 11:34	WG1207111
Trichloroethene	ND		0.00100	1	12/07/2018 11:34	WG1207111
Trichlorofluoromethane	ND		0.00500	1	12/07/2018 11:34	WG1207111
1,2,3-Trichloropropane	ND		0.00250	1	12/07/2018 11:34	WG1207111
Vinyl acetate	ND		0.0100	1	12/07/2018 11:34	WG1207111
Vinyl chloride	ND		0.00100	1	12/07/2018 11:34	WG1207111
Xylenes, Total	ND		0.00300	1	12/07/2018 11:34	WG1207111
(S) Toluene-d8	*101*		*80.0-120*		*12/07/2018 11:34*	WG1207111
(S) Dibromofluoromethane	*106*		*75.0-120*		*12/07/2018 11:34*	WG1207111
(S) a,a,a-Trifluorotoluene	*110*		*80.0-120*		*12/07/2018 11:34*	WG1207111
(S) 4-Bromofluorobenzene	*97.0*		*77.0-126*		*12/07/2018 11:34*	WG1207111

Method Blank (MB)

(MB) R3366810-1 12/10/18 14:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hardness (colorimetric) as CaCO3	5.92	J	1.43	30.0

L1050091-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1050091-02 12/10/18 14:34 • (DUP) R3366810-6 12/10/18 14:35

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	58.0	60.7	1	4.55		20

L1049701-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1049701-02 12/10/18 14:36 • (DUP) R3366810-7 12/10/18 14:37

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	236	272	5	14.2		20

Laboratory Control Sample (LCS)

(LCS) R3366810-2 12/10/18 14:05

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Hardness (colorimetric) as CaCO3	150	154	103	85.0-115	

L1050091-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1050091-01 12/10/18 14:31 • (MS) R3366810-4 12/10/18 14:32 • (MSD) R3366810-5 12/10/18 14:33

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	55.9	193	193	91.4	91.4	1	80.0-120			0.000	20

Method Blank (MB)

(MB) R3367452-1 12/11/18 18:13

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

Sample Narrative:

BLANK: Endpoint pH 4.5

L1049776-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1049776-04 12/11/18 18:20 • (DUP) R3367452-5 12/11/18 18:29

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	51.6	51.1	1	1.01		20

Sample Narrative:

OS: Endpoint pH 4.5 headspace

DUP: Endpoint pH 4.5

L1049949-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1049949-08 12/11/18 21:11 • (DUP) R3367452-8 12/11/18 21:18

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	99.9	99.9	1	0.0194		20

Sample Narrative:

OS: Endpoint pH 4.5 headspace

DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3367452-7 12/11/18 19:33

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100	96.3	96.3	85.0-115	

Sample Narrative:

LCS: Endpoint pH 4.5

Method Blank (MB)

(MB) R3367693-1 12/12/18 18:40

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ammonia Nitrogen	U		0.0317	0.100

L1049906-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1049906-01 12/12/18 18:44 • (DUP) R3367693-3 12/12/18 18:45

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	ND	0.0330	1	8.70	J	10

L1049939-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1049939-02 12/12/18 19:33 • (DUP) R3367693-6 12/12/18 19:35

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	ND	0.000	1	0.000		10

Laboratory Control Sample (LCS)

(LCS) R3367693-2 12/12/18 18:42

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Ammonia Nitrogen	7.50	7.86	105	90.0-110	

L1049906-08 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049906-08 12/12/18 19:01 • (MS) R3367693-4 12/12/18 19:03 • (MSD) R3367693-5 12/12/18 19:04

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	5.00	ND	5.21	5.13	103	101	1	90.0-110			1.53	10

L1049940-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1049940-01 12/12/18 19:36 • (MS) R3367693-7 12/12/18 19:38

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

Method Blank (MB)

(MB) R3365876-1 12/06/18 13:58

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

L1049430-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1049430-01 12/06/18 13:58 • (DUP) R3365876-3 12/06/18 13:58

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	109	96.6	1	12.4		20

L1049924-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1049924-01 12/06/18 14:03 • (DUP) R3365876-6 12/06/18 14:03

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	215	214	1	0.456		20

Laboratory Control Sample (LCS)

(LCS) R3365876-2 12/06/18 13:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
COD	222	216	97.1	90.0-110	

L1049906-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049906-01 12/06/18 14:00 • (MS) R3365876-4 12/06/18 14:00 • (MSD) R3365876-5 12/06/18 14:00

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
COD	400	ND	400	400	99.9	100	1	80.0-120			0.0925	20

Method Blank (MB)

(MB) R3365945-1 12/05/18 13:01

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Bromide	U		0.0790	1.00
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Nitrate	U		0.0227	0.100
Sulfate	U		0.0774	5.00

L1049906-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1049906-07 12/05/18 21:51 • (DUP) R3365945-3 12/05/18 22:01

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.000	1	0.000		15
Chloride	52.2	54.7	1	4.67		15
Fluoride	ND	0.000	1	0.000		15
Nitrate	3.46	4.91	1	34.7	J3	15
Sulfate	ND	0.327	1	4.08	J	15

L1049519-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1049519-01 12/06/18 00:23 • (DUP) R3365945-8 12/06/18 11:53

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	U	0.000	1	0.000		15
Chloride	2.50	2.49	1	0.618		15
Fluoride	U	0.000	1	0.000		15
Nitrate	U	0.000	1	0.000		15
Sulfate	37.7	36.0	1	4.38		15

Laboratory Control Sample (LCS)

(LCS) R3365945-2 12/05/18 13:12

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Bromide	40.0	39.7	99.3	80.0-120	
Chloride	40.0	39.2	97.9	80.0-120	
Fluoride	8.00	7.99	99.9	80.0-120	
Nitrate	8.00	8.27	103	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3365945-2 12/05/18 13:12

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	39.1	97.8	80.0-120	

L1049906-07 Original Sample (OS) • Matrix Spike (MS)

(OS) L1049906-07 12/05/18 21:51 • (MS) R3365945-4 12/05/18 22:12

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	ND	46.1	92.1	1	80.0-120	
Chloride	50.0	52.2	101	96.9	1	80.0-120	E
Fluoride	5.00	ND	4.80	96.0	1	80.0-120	
Nitrate	5.00	3.46	8.60	103	1	80.0-120	
Sulfate	50.0	ND	50.0	99.2	1	80.0-120	

L1049519-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049519-01 12/06/18 00:23 • (MS) R3365945-6 12/06/18 00:44 • (MSD) R3365945-7 12/06/18 00:55

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	U	41.6	48.9	83.2	97.9	1	80.0-120		J3	16.2	15
Chloride	50.0	2.50	51.1	54.2	97.2	103	1	80.0-120			5.78	15
Fluoride	5.00	U	4.67	5.23	93.4	105	1	80.0-120			11.3	15
Nitrate	5.00	U	4.16	5.19	83.2	104	1	80.0-120		J3	22.1	15
Sulfate	50.0	37.7	85.8	87.1	96.3	98.9	1	80.0-120			1.48	15

Method Blank (MB)

(MB) R3365998-1 12/06/18 14:05

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

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

(LCS) R3365998-2 12/06/18 14:07 • (LCSD) R3365998-3 12/06/18 14:10

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 %
Mercury	0.00300	0.00297	0.00350	99.0	117	80.0-120			16.4	20

L1049834-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049834-01 12/06/18 14:12 • (MS) R3365998-4 12/06/18 14:15 • (MSD) R3365998-5 12/06/18 14:17

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	U	0.00191	0.00181	63.5	60.2	1	75.0-125	J6	J6	5.43	20

Method Blank (MB)

(MB) R3365984-1 12/06/18 13:17

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

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

(LCS) R3365984-2 12/06/18 13:19 • (LCSD) R3365984-3 12/06/18 13:21

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 %
Mercury,Dissolved	0.00300	0.00337	0.00336	112	112	80.0-120			0.416	20

L1049906-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049906-01 12/06/18 13:33 • (MS) R3365984-4 12/06/18 13:36 • (MSD) R3365984-5 12/06/18 13:38

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 %
Mercury,Dissolved	0.00300	0.00115	0.00464	0.00481	117	122	1	75.0-125			3.61	20

Method Blank (MB)

(MB) R3366188-1 12/07/18 09:01

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

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

(LCS) R3366188-2 12/07/18 09:04 • (LCSD) R3366188-3 12/07/18 09:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron	1.00	0.969	0.981	96.9	98.1	80.0-120			1.23	20

L1049853-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049853-06 12/07/18 09:09 • (MS) R3366188-5 12/07/18 09:15 • (MSD) R3366188-6 12/07/18 09:18

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 %
Boron	1.00	0.818	1.83	1.81	101	98.9	1	75.0-125			1.19	20

Method Blank (MB)

(MB) R3366408-1 12/08/18 09:53

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

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

(LCS) R3366408-2 12/08/18 09:56 • (LCSD) R3366408-3 12/08/18 09:58

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	1.00	0.961	0.981	96.1	98.1	80.0-120			2.12	20

L1050694-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1050694-01 12/08/18 10:01 • (MS) R3366408-5 12/08/18 10:06 • (MSD) R3366408-6 12/08/18 10:09

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	1.00	ND	1.04	1.03	99.6	98.7	1	75.0-125			0.799	20

Method Blank (MB)

(MB) R3366167-1 12/06/18 20:23

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Cobalt,Dissolved	U		0.000260	0.00200

Method Blank (MB)

(MB) R3366271-1 12/07/18 11:28

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum,Dissolved	0.0311	J	0.00515	0.100
Antimony,Dissolved	U		0.000754	0.00200
Arsenic,Dissolved	U		0.000250	0.00200
Barium,Dissolved	0.000372	J	0.000360	0.00500
Beryllium,Dissolved	U		0.000120	0.00200
Cadmium,Dissolved	U		0.000160	0.00100
Calcium,Dissolved	0.153	J	0.0460	1.00
Chromium,Dissolved	0.000893	J	0.000540	0.00200
Copper,Dissolved	U		0.000520	0.00500
Iron,Dissolved	0.0294	J	0.0150	0.100
Lead,Dissolved	0.000651	J	0.000240	0.00200
Magnesium,Dissolved	U		0.100	1.00
Manganese,Dissolved	0.00104	J	0.000250	0.00500
Nickel,Dissolved	U		0.000350	0.00200
Potassium,Dissolved	0.0598	J	0.0370	1.00
Selenium,Dissolved	U		0.000380	0.00200
Silver,Dissolved	U		0.000310	0.00200
Sodium,Dissolved	0.568	J	0.110	1.00
Thallium,Dissolved	U		0.000190	0.00200
Vanadium,Dissolved	U		0.000180	0.00500
Zinc,Dissolved	U		0.00256	0.0250

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

(LCS) R3366167-2 12/06/18 20:28 • (LCSD) R3366167-3 12/06/18 20:32

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Cobalt,Dissolved	0.0500	0.0530	0.0525	106	105	80.0-120			0.958	20

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

(LCS) R3366271-2 12/07/18 11:32 • (LCSD) R3366271-3 12/07/18 11:37

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	5.00	4.64	4.64	92.8	92.9	80.0-120			0.141	20
Antimony,Dissolved	0.0500	0.0571	0.0583	114	117	80.0-120			2.04	20
Arsenic,Dissolved	0.0500	0.0471	0.0481	94.3	96.1	80.0-120			1.91	20
Barium,Dissolved	0.0500	0.0466	0.0478	93.1	95.5	80.0-120			2.56	20
Beryllium,Dissolved	0.0500	0.0464	0.0466	92.7	93.1	80.0-120			0.424	20
Cadmium,Dissolved	0.0500	0.0467	0.0463	93.5	92.6	80.0-120			0.928	20
Calcium,Dissolved	5.00	4.68	4.75	93.6	95.0	80.0-120			1.52	20
Chromium,Dissolved	0.0500	0.0483	0.0485	96.5	97.0	80.0-120			0.448	20
Copper,Dissolved	0.0500	0.0498	0.0491	99.7	98.2	80.0-120			1.50	20
Iron,Dissolved	5.00	4.75	4.78	94.9	95.6	80.0-120			0.735	20
Lead,Dissolved	0.0500	0.0468	0.0466	93.6	93.3	80.0-120			0.326	20
Magnesium,Dissolved	5.00	4.71	4.70	94.3	94.1	80.0-120			0.223	20
Manganese,Dissolved	0.0500	0.0466	0.0478	93.2	95.5	80.0-120			2.48	20
Nickel,Dissolved	0.0500	0.0492	0.0496	98.4	99.2	80.0-120			0.804	20
Potassium,Dissolved	5.00	4.70	4.65	94.0	92.9	80.0-120			1.15	20
Selenium,Dissolved	0.0500	0.0480	0.0500	95.9	100	80.0-120			4.14	20
Silver,Dissolved	0.0500	0.0488	0.0489	97.7	97.8	80.0-120			0.107	20
Sodium,Dissolved	5.00	4.89	4.84	97.8	96.8	80.0-120			0.973	20
Thallium,Dissolved	0.0500	0.0461	0.0469	92.2	93.8	80.0-120			1.62	20
Vanadium,Dissolved	0.0500	0.0473	0.0483	94.7	96.5	80.0-120			1.98	20
Zinc,Dissolved	0.0500	0.0513	0.0499	103	99.9	80.0-120			2.64	20

L1049516-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049516-01 12/06/18 20:36 • (MS) R3366167-5 12/06/18 20:45 • (MSD) R3366167-6 12/06/18 20:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Cobalt,Dissolved	0.0500	0.105	0.157	0.161	105	113	1	75.0-125			2.57	20

L1049516-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049516-01 12/07/18 11:41 • (MS) R3366271-6 12/07/18 11:55 • (MSD) R3366271-7 12/07/18 12:00

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	5.00	3.86	8.24	8.46	87.6	92.0	1	75.0-125			2.64	20
Antimony,Dissolved	0.0500	U	0.0569	0.0589	114	118	1	75.0-125			3.46	20
Arsenic,Dissolved	0.0500	0.00486	0.0505	0.0499	91.3	90.1	1	75.0-125			1.17	20
Barium,Dissolved	0.0500	0.0199	0.0679	0.0673	96.0	94.8	1	75.0-125			0.875	20
Beryllium,Dissolved	0.0500	0.00125	0.0457	0.0454	89.0	88.2	1	75.0-125			0.853	20

L1049516-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049516-01 12/07/18 11:41 • (MS) R3366271-6 12/07/18 11:55 • (MSD) R3366271-7 12/07/18 12:00

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Cadmium,Dissolved	0.0500	0.00243	0.0482	0.0496	91.5	94.4	1	75.0-125			2.98	20
Calcium,Dissolved	5.00	244	247	252	53.6	149	1	75.0-125	V	V	1.92	20
Chromium,Dissolved	0.0500	0.000623	0.0456	0.0441	89.9	87.0	1	75.0-125			3.25	20
Copper,Dissolved	0.0500	0.226	0.274	0.277	95.5	101	1	75.0-125			0.981	20
Potassium,Dissolved	5.00	24.8	28.9	29.5	82.3	93.4	1	75.0-125			1.90	20
Iron,Dissolved	5.00	149	152	152	72.8	73.0	1	75.0-125	E V	E V	0.00906	20
Lead,Dissolved	0.0500	0.00109	0.0475	0.0462	92.8	90.2	1	75.0-125			2.73	20
Magnesium,Dissolved	5.00	111	114	117	49.2	112	1	75.0-125	V		2.74	20
Manganese,Dissolved	0.0500	18.7	18.5	18.8	0.000	63.3	1	75.0-125	E V	E V	1.53	20
Nickel,Dissolved	0.0500	0.0237	0.0715	0.0696	95.6	91.8	1	75.0-125			2.68	20
Selenium,Dissolved	0.0500	0.00819	0.0541	0.0557	91.8	95.0	1	75.0-125			2.96	20
Silver,Dissolved	0.0500	U	0.0488	0.0482	97.6	96.4	1	75.0-125			1.29	20
Sodium,Dissolved	5.00	8.57	13.2	13.4	92.5	96.6	1	75.0-125			1.55	20
Thallium,Dissolved	0.0500	0.000446	0.0467	0.0459	92.4	91.0	1	75.0-125			1.55	20
Vanadium,Dissolved	0.0500	U	0.0441	0.0447	88.1	89.4	1	75.0-125			1.37	20
Zinc,Dissolved	0.0500	2.67	2.71	2.73	85.9	127	1	75.0-125		V	0.753	20

Method Blank (MB)

(MB) R3366402-1 12/07/18 17:25

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
Barium	0.000692	J	0.000360	0.00500
Beryllium	U		0.000120	0.00200
Cadmium	U		0.000160	0.00100
Calcium	0.211	J	0.0460	1.00
Chromium	U		0.000540	0.00200
Copper	U		0.000520	0.00500
Cobalt	U		0.000260	0.00200
Iron	U		0.0150	0.100
Lead	U		0.000240	0.00200
Magnesium	U		0.100	1.00
Manganese	U		0.000250	0.00500
Nickel	U		0.000350	0.00200
Potassium	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

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

(LCS) R3366402-2 12/07/18 17:29 • (LCSD) R3366402-3 12/07/18 17:33

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 %
Antimony	0.0500	0.0558	0.0543	112	109	80.0-120			2.65	20
Arsenic	0.0500	0.0463	0.0451	92.6	90.2	80.0-120			2.61	20
Barium	0.0500	0.0478	0.0463	95.6	92.6	80.0-120			3.21	20
Beryllium	0.0500	0.0465	0.0448	93.1	89.5	80.0-120			3.88	20
Cadmium	0.0500	0.0482	0.0459	96.5	91.8	80.0-120			4.93	20
Calcium	5.00	4.99	4.82	99.7	96.4	80.0-120			3.38	20
Chromium	0.0500	0.0470	0.0455	94.0	90.9	80.0-120			3.28	20
Copper	0.0500	0.0470	0.0463	94.0	92.6	80.0-120			1.42	20
Cobalt	0.0500	0.0484	0.0470	96.7	94.1	80.0-120			2.79	20
Iron	5.00	4.78	4.54	95.7	90.9	80.0-120			5.12	20
Lead	0.0500	0.0465	0.0457	92.9	91.5	80.0-120			1.58	20
Magnesium	5.00	4.74	4.53	94.7	90.5	80.0-120			4.54	20

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

(LCS) R3366402-2 12/07/18 17:29 • (LCSD) R3366402-3 12/07/18 17:33

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 %
Manganese	0.0500	0.0458	0.0454	91.6	90.8	80.0-120			0.844	20
Nickel	0.0500	0.0485	0.0470	97.0	94.0	80.0-120			3.13	20
Potassium	5.00	4.75	4.55	94.9	91.1	80.0-120			4.13	20
Selenium	0.0500	0.0455	0.0471	91.0	94.2	80.0-120			3.42	20
Silver	0.0500	0.0492	0.0474	98.4	94.8	80.0-120			3.78	20
Sodium	5.00	4.83	4.98	96.6	99.6	80.0-120			3.02	20
Thallium	0.0500	0.0474	0.0454	94.8	90.8	80.0-120			4.31	20
Vanadium	0.0500	0.0468	0.0452	93.6	90.4	80.0-120			3.45	20
Zinc	0.0500	0.0497	0.0487	99.4	97.3	80.0-120			2.12	20

L1049981-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049981-02 12/07/18 17:37 • (MS) R3366402-5 12/07/18 17:45 • (MSD) R3366402-6 12/07/18 17:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	U	0.0531	0.0517	106	103	1	75.0-125			2.61	20
Arsenic	0.0500	U	0.0454	0.0434	90.8	86.8	1	75.0-125			4.59	20
Barium	0.0500	0.0359	0.0781	0.0766	84.3	81.3	1	75.0-125			1.97	20
Beryllium	0.0500	0.000142	0.0453	0.0439	90.4	87.4	1	75.0-125			3.31	20
Cadmium	0.0500	U	0.0463	0.0460	92.6	92.0	1	75.0-125			0.690	20
Calcium	5.00	9.06	13.7	13.2	91.9	83.7	1	75.0-125			3.05	20
Chromium	0.0500	U	0.0452	0.0437	90.5	87.4	1	75.0-125			3.40	20
Copper	0.0500	0.000574	0.0460	0.0443	90.8	87.5	1	75.0-125			3.68	20
Cobalt	0.0500	0.0129	0.0598	0.0580	93.7	90.2	1	75.0-125			3.00	20
Potassium	5.00	3.52	8.28	8.00	95.1	89.6	1	75.0-125			3.38	20
Iron	5.00	0.0195	4.63	4.44	92.1	88.4	1	75.0-125			4.15	20
Lead	0.0500	0.000542	0.0465	0.0441	91.9	87.2	1	75.0-125			5.17	20
Magnesium	5.00	7.32	11.8	11.5	90.4	84.2	1	75.0-125			2.67	20
Manganese	0.0500	0.297	0.338	0.330	83.2	66.6	1	75.0-125		V	2.49	20
Nickel	0.0500	0.00816	0.0546	0.0537	92.9	91.1	1	75.0-125			1.68	20
Selenium	0.0500	U	0.0472	0.0440	94.4	87.9	1	75.0-125			7.12	20
Silver	0.0500	U	0.0478	0.0461	95.5	92.1	1	75.0-125			3.62	20
Sodium	5.00	6.31	10.8	10.7	90.4	86.8	1	75.0-125			1.68	20
Thallium	0.0500	U	0.0466	0.0443	93.2	88.6	1	75.0-125			5.03	20
Vanadium	0.0500	U	0.0453	0.0441	90.7	88.2	1	75.0-125			2.77	20
Zinc	0.0500	0.0242	0.0690	0.0693	89.4	90.0	1	75.0-125			0.430	20

Method Blank (MB)

(MB) R3367161-1 12/11/18 13:55

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.0671	J	0.00515	0.100
Zinc	U		0.00256	0.0250

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

(LCS) R3367161-2 12/11/18 13:59 • (LCSD) R3367161-3 12/11/18 14:04

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	4.64	4.64	92.8	92.8	80.0-120			0.0795	20
Zinc	0.0500	0.0489	0.0504	97.8	101	80.0-120			2.95	20

L1050898-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1050898-03 12/11/18 14:09 • (MS) R3367161-5 12/11/18 14:18 • (MSD) R3367161-6 12/11/18 14:22

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	0.495	5.00	5.03	90.0	90.8	1	75.0-125			0.721	20
Zinc	0.0500	0.00518	0.0526	0.0512	94.9	92.1	1	75.0-125			2.72	20

Method Blank (MB)

(MB) R3366885-3 12/07/18 10:30

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromochloromethane	U		0.000520	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
Carbon disulfide	U		0.000275	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
trans-1,4-Dichloro-2-butene	U		0.000866	0.00250
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100
trans-1,3-Dichloropropene	U		0.000419	0.00100
Ethylbenzene	U		0.000384	0.00100
2-Hexanone	U		0.00382	0.0100
Iodomethane	U		0.00171	0.0100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000412	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100

Method Blank (MB)

(MB) R3366885-3 12/07/18 10:30

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
Vinyl acetate	U		0.00163	0.0100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*102*			*80.0-120*
(S) Dibromofluoromethane	*106*			*75.0-120*
(S) a,a,a-Trifluorotoluene	*110*			*80.0-120*
(S) 4-Bromofluorobenzene	*101*			*77.0-126*

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

(LCS) R3366885-1 12/07/18 09:24 • (LCSD) R3366885-2 12/07/18 09:46

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.134	0.166	107	132	19.0-160			20.9	27
Acrylonitrile	0.125	0.143	0.155	114	124	55.0-149			8.11	20
Benzene	0.0250	0.0192	0.0206	76.9	82.4	70.0-123			6.91	20
Bromodichloromethane	0.0250	0.0229	0.0249	91.5	99.5	75.0-120			8.36	20
Bromochloromethane	0.0250	0.0219	0.0231	87.7	92.6	76.0-122			5.45	20
Bromoform	0.0250	0.0213	0.0251	85.1	101	68.0-132			16.6	20
Bromomethane	0.0250	0.0228	0.0237	91.3	94.6	10.0-160			3.61	25
Carbon disulfide	0.0250	0.0204	0.0221	81.4	88.4	61.0-128			8.18	20
Carbon tetrachloride	0.0250	0.0217	0.0254	86.9	102	68.0-126			15.6	20
Chlorobenzene	0.0250	0.0236	0.0255	94.5	102	80.0-121			7.74	20
Chlorodibromomethane	0.0250	0.0244	0.0256	97.6	102	77.0-125			4.92	20
Chloroethane	0.0250	0.0243	0.0262	97.3	105	47.0-150			7.50	20
Chloroform	0.0250	0.0222	0.0233	88.7	93.3	73.0-120			5.02	20
Chloromethane	0.0250	0.0240	0.0265	96.1	106	41.0-142			9.89	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0217	0.0243	86.9	97.0	58.0-134			11.0	20
1,2-Dibromoethane	0.0250	0.0224	0.0240	89.8	96.0	80.0-122			6.67	20
Dibromomethane	0.0250	0.0225	0.0242	89.9	96.9	80.0-120			7.48	20
1,2-Dichlorobenzene	0.0250	0.0223	0.0249	89.4	99.5	79.0-121			10.7	20
1,4-Dichlorobenzene	0.0250	0.0225	0.0249	90.0	99.5	79.0-120			9.99	20
trans-1,4-Dichloro-2-butene	0.0250	0.0223	0.0254	89.2	101	33.0-144			12.8	20
1,1-Dichloroethane	0.0250	0.0234	0.0247	93.5	98.7	70.0-126			5.45	20
1,2-Dichloroethane	0.0250	0.0271	0.0283	108	113	70.0-128			4.36	20

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

(LCS) R3366885-1 12/07/18 09:24 • (LCSD) R3366885-2 12/07/18 09:46

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,1-Dichloroethene	0.0250	0.0223	0.0242	89.1	97.0	71.0-124			8.44	20
cis-1,2-Dichloroethene	0.0250	0.0214	0.0230	85.5	91.9	73.0-120			7.18	20
trans-1,2-Dichloroethene	0.0250	0.0211	0.0223	84.3	89.4	73.0-120			5.89	20
1,2-Dichloropropane	0.0250	0.0248	0.0271	99.0	108	77.0-125			9.01	20
cis-1,3-Dichloropropene	0.0250	0.0241	0.0263	96.2	105	80.0-123			9.03	20
trans-1,3-Dichloropropene	0.0250	0.0244	0.0269	97.5	108	78.0-124			9.92	20
Ethylbenzene	0.0250	0.0228	0.0247	91.0	98.8	79.0-123			8.17	20
2-Hexanone	0.125	0.147	0.159	118	127	67.0-149			7.67	20
Iodomethane	0.125	0.106	0.114	84.6	90.9	33.0-147			7.17	26
2-Butanone (MEK)	0.125	0.129	0.146	103	117	44.0-160			12.6	20
Methylene Chloride	0.0250	0.0195	0.0209	78.1	83.4	67.0-120			6.54	20
4-Methyl-2-pentanone (MIBK)	0.125	0.143	0.154	114	124	68.0-142			7.97	20
Styrene	0.0250	0.0193	0.0227	77.0	90.9	73.0-130			16.5	20
1,1,1,2-Tetrachloroethane	0.0250	0.0257	0.0273	103	109	75.0-125			5.70	20
1,1,2,2-Tetrachloroethane	0.0250	0.0198	0.0230	79.2	92.0	65.0-130			14.9	20
Tetrachloroethene	0.0250	0.0241	0.0262	96.3	105	72.0-132			8.46	20
Toluene	0.0250	0.0220	0.0236	87.9	94.3	79.0-120			7.10	20
1,1,1-Trichloroethane	0.0250	0.0235	0.0253	94.2	101	73.0-124			7.03	20
1,1,2-Trichloroethane	0.0250	0.0222	0.0243	88.7	97.1	80.0-120			9.09	20
Trichloroethene	0.0250	0.0212	0.0233	84.8	93.2	78.0-124			9.54	20
Trichlorofluoromethane	0.0250	0.0270	0.0287	108	115	59.0-147			6.21	20
1,2,3-Trichloropropane	0.0250	0.0235	0.0268	94.0	107	73.0-130			13.3	20
Vinyl acetate	0.125	0.155	0.162	124	130	11.0-160			4.36	20
Vinyl chloride	0.0250	0.0256	0.0279	102	112	67.0-131			8.59	20
Xylenes, Total	0.0750	0.0720	0.0780	96.0	104	79.0-123			8.00	20
(S) Toluene-d8				*104*	*102*	*80.0-120*				
(S) Dibromofluoromethane				*101*	*97.9*	*75.0-120*				
(S) a,a,a-Trifluorotoluene				*103*	*105*	*80.0-120*				
(S) 4-Bromofluorobenzene				*96.9*	*102*	*77.0-126*				

Method Blank (MB)

(MB) R3366024-1 12/06/18 16:14

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

L1049865-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1049865-01 12/06/18 17:03 • (DUP) R3366024-3 12/06/18 16:50

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ethylene Dibromide	0.000144	0.000146	1	1.38		20
1,2-Dibromo-3-Chloropropane	ND	0.000	1	0.000		20

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

(LCS) R3366024-4 12/06/18 19:03 • (LCSD) R3366024-5 12/06/18 20:28

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethylene Dibromide	0.000250	0.000240	0.000232	96.0	92.8	60.0-140			3.39	20
1,2-Dibromo-3-Chloropropane	0.000250	0.000253	0.000259	101	104	60.0-140			2.34	20

L1049865-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1049865-02 12/06/18 16:39 • (MS) R3366024-2 12/06/18 16:26

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ethylene Dibromide	0.0000919	ND	0.000104	113	1	64.0-159	
1,2-Dibromo-3-Chloropropane	0.0000919	ND	0.0000984	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.

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

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

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

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

Civil & Environmental Consultants - TN

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 # 171-873

Lab Project # CEC-EWS CAMDEN LF

Collected by (print): P. Campbell / A. Van Baugh

Site/Facility ID # CAMDEN, TN

P.O. #

Collected by (signature): Philip Campbell

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___

Pres Chk

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	**WetChem** 250mlHDPE-NoPres	ALK 60mlAmb-NoPres	COD,NH3 250mlHDPE-H2SO4	Diss. Metals-FF 250mlHDPE-HNO3	SV8011 40mlClr-NaThio	Total Metals,HARD 250mlHDPE-HNO3	V8260AP1 40mlAmb-HCl	V8260AP1-Trip Blank 40mlAmb-HCl-Blk			Remarks	Sample # (lab only)
									<2	<2		<2						
MW-1	Grab	GW		12/4/18	1050	11	X	X	X	X	X	X	X					-01
MW-3		GW			1309	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			1125	11	X	X	X	X	X	X	X					-05
TMW-2		GW			1300	11	X	X	X	X	X	X	X					-06
TMW-3		GW			1515	11	X	X	X	X	X	X	X					-07
DUPLICATE		GW			/	11	X	X	X	X	X	X	X					-08
FIELD BLANK	↓	GW		↓	1430	10	X	X	X	~~X~~	X	X	X				No 2 SO4 MeOH 13	-09
~~EQUIPMENT BLANK~~		~~GW~~				11	X	X	X	X	X	X	X					

Chain of Custody Page ___ of ___

Pace Analytical® National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1049906

B126

Acctnum: CEC
Template: T133579
Prelogin: P681866
TSR: 526 - Chris McCord
PB: 11-23-18 MC
Shipped Via: Courier

* 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
M Mowery	12/5/18	1205	Wayne Shull	x2
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 4.7 °C Bottles Received: 99
Wayne Shull	12/5/18	1420		If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 12/5/18 Time: 1920

Hold: | Condition: NCF (OK)

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 # 171-873

Lab Project # CEC-EWS CAMDEN LF

Collected by (print): Philip Campbell / Aidan Campbell / Bangh

Site/Facility ID # CAMDEN, TN

P.O. #

Collected by (signature): Philip Campbell

Immediately Packed on Ice N ___ Y ✓

Rush? (Lab MUST Be Notified)
___ Same Day ___ 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	**WetChem** 250mlHDPE-NoPres	ALK 60mlAmb-NoPres	COD,NH3 250mlHDPE-H2SO4	Diss. Metals-FF 250mlHDPE-HNO3	SV8011 40mlClr-NaThio	Total Metals,HARD 250mlHDPE-HNO3	V8260AP1 40mlAmb-HCl	V8260AP1-Trip Blank 40mlAmb-HCl-Blk			Remarks	Sample # (lab only)
TRIP BLANK	/	GW	/	12/4/18	/	1								X				-10

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace Analytical® National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L #

Table #

Acctnum: CEC

Template: T133579

Prelogin: P681866

TSR: 526 - Chris McCord

PB: 11-23-18

Shipped Via: Courier

* 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	If preservation required by Login: Date/Time
NMowery	12/5/18	1205	Wayne Shull	x2	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 4.7 °C Bottles Received: 99	
Wayne Shull	12/5/18	1420	ED	Date: 12/5/18 Time: 1920	Hold: Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

December 14, 2018

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1049865
Samples Received:	12/05/2018
Project Number:	171-873
Description:	EWS Camden Class 2 Landfill
Site:	CAMDEN, TN
Report To:	Philip Campbell 325 Seaboard Lane, Suite 170 Franklin, TN 37067

Entire Report Reviewed By:

Chris McCord
Project Manager

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

TABLE OF CONTENTS

IWC-L L1049865-01 GW

Collected by: Adrian Baugh
Collected date/time: 12/04/18 14:55
Received date/time: 12/05/18 14:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1208245	500	12/10/18 14:38	12/10/18 14:38	KK
Wet Chemistry by Method 2320 B-2011	WG1208329	1	12/11/18 18:37	12/11/18 18:37	GB
Wet Chemistry by Method 350.1	WG1208082	500	12/12/18 18:12	12/12/18 18:12	MCG
Wet Chemistry by Method 410.4	WG1208140	20	12/10/18 10:30	12/10/18 15:22	BAM
Wet Chemistry by Method 9056A	WG1206170	1	12/06/18 02:33	12/06/18 02:33	ELN
Wet Chemistry by Method 9056A	WG1206170	100	12/06/18 12:58	12/06/18 12:58	ELN
Wet Chemistry by Method 9056A	WG1206170	1000	12/05/18 19:40	12/05/18 19:40	ELN
Mercury by Method 7470A	WG1206137	1	12/05/18 18:29	12/06/18 14:37	TCT
Metals (ICP) by Method 6010B	WG1206203	10	12/06/18 11:15	12/07/18 09:21	CCE
Metals (ICPMS) by Method 6020A	WG1206204	10	12/06/18 14:25	12/07/18 18:40	JPD
Metals (ICPMS) by Method 6020A	WG1206204	200	12/06/18 14:25	12/07/18 21:07	JPD
Metals (ICPMS) by Method 6020A	WG1208518	200	12/10/18 21:58	12/11/18 14:27	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1206447	1	12/06/18 16:39	12/06/18 16:39	JCP
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1207485	10	12/10/18 03:49	12/10/18 03:49	JAH
EDB / DBCP by Method 8011	WG1206335	1	12/06/18 08:17	12/06/18 17:03	KLM

APWC-L L1049865-02 GW

Collected by: Adrian Baugh
Collected date/time: 12/04/18 14:45
Received date/time: 12/05/18 14:20

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1208245	5	12/10/18 14:44	12/10/18 14:44	KK
Wet Chemistry by Method 2320 B-2011	WG1208329	5	12/11/18 18:46	12/11/18 18:46	GB
Wet Chemistry by Method 350.1	WG1208082	1000	12/12/18 17:45	12/12/18 17:45	MCG
Wet Chemistry by Method 410.4	WG1206747	50	12/07/18 08:43	12/07/18 12:13	MJA
Wet Chemistry by Method 9056A	WG1206170	20	12/06/18 02:44	12/06/18 02:44	ELN
Wet Chemistry by Method 9056A	WG1206170	5000	12/06/18 17:14	12/06/18 17:14	MAJ
Mercury by Method 7470A	WG1206137	1	12/05/18 18:29	12/06/18 14:39	TCT
Metals (ICP) by Method 6010B	WG1206203	1	12/06/18 11:15	12/07/18 09:24	CCE
Metals (ICPMS) by Method 6020A	WG1206204	100	12/06/18 14:25	12/07/18 21:11	JPD
Metals (ICPMS) by Method 6020A	WG1208518	100	12/10/18 21:58	12/11/18 14:32	JPD
Volatile Organic Compounds (GC/MS) by Method 8260B	WG1206447	1	12/06/18 16:58	12/06/18 16:58	JCP
EDB / DBCP by Method 8011	WG1206335	1	12/06/18 08:17	12/06/18 16:39	KLM

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

Chris McCord
Project Manager

Sample Handling and Receiving

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

Lab Sample ID	Project Sample ID	Method
L1049865-02	APWC-L	350.1

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	38700		15000	500	12/10/2018 14:38	WG1208245

Wet Chemistry by Method 2320 B-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Alkalinity	ND		20.0	1	12/11/2018 18:37	WG1208329

Sample Narrative:

L1049865-01 WG1208329: Endpoint pH 4.5 headspace

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	1270		50.0	500	12/12/2018 18:12	WG1208082

Wet Chemistry by Method 410.4

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
COD	6730		200	20	12/10/2018 15:22	WG1208140

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		100	100	12/06/2018 12:58	WG1206170
Chloride	82500		1000	1000	12/05/2018 19:40	WG1206170
Fluoride	85.8		10.0	100	12/06/2018 12:58	WG1206170
Nitrate	ND		0.100	1	12/06/2018 02:33	WG1206170
Sulfate	1320		500	100	12/06/2018 12:58	WG1206170

Sample Narrative:

L1049865-01 WG1206170: report Br @ dilution due to matrix interference

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	0.000804		0.000200	1	12/06/2018 14:37	WG1206137

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		2.00	10	12/07/2018 09:21	WG1206203

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	161		20.0	200	12/11/2018 14:27	WG1208518
Antimony	ND		0.0200	10	12/07/2018 18:40	WG1206204
Arsenic	0.217		0.0200	10	12/07/2018 18:40	WG1206204
Barium	2.46		0.0500	10	12/07/2018 18:40	WG1206204
Beryllium	0.0334		0.0200	10	12/07/2018 18:40	WG1206204
Cadmium	67.3		0.0100	10	12/07/2018 18:40	WG1206204
Calcium	9820		10.0	10	12/07/2018 18:40	WG1206204

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Chromium	ND		0.400	200	12/07/2018 21:07	WG1206204
Cobalt	0.474		0.0200	10	12/07/2018 18:40	WG1206204
Copper	5.55		0.0500	10	12/07/2018 18:40	WG1206204
Iron	339		1.00	10	12/07/2018 18:40	WG1206204
Lead	0.294		0.0200	10	12/07/2018 18:40	WG1206204
Magnesium	1070		10.0	10	12/07/2018 18:40	WG1206204
Manganese	132		1.00	200	12/07/2018 21:07	WG1206204
Nickel	0.505		0.0200	10	12/07/2018 18:40	WG1206204
Potassium	10900		200	200	12/07/2018 21:07	WG1206204
Selenium	0.431		0.0200	10	12/07/2018 18:40	WG1206204
Silver	ND		0.0200	10	12/07/2018 18:40	WG1206204
Sodium	16700		200	200	12/11/2018 14:27	WG1208518
Thallium	0.0231		0.0200	10	12/07/2018 18:40	WG1206204
Vanadium	ND		0.0500	10	12/07/2018 18:40	WG1206204
Zinc	659		5.00	200	12/11/2018 14:27	WG1208518

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	1.58		0.500	10	12/10/2018 03:49	WG1207485
Acrylonitrile	ND		0.0100	1	12/06/2018 16:39	WG1206447
Benzene	ND		0.00100	1	12/06/2018 16:39	WG1206447
Bromochloromethane	ND		0.00100	1	12/06/2018 16:39	WG1206447
Bromodichloromethane	ND		0.00100	1	12/06/2018 16:39	WG1206447
Bromoform	ND		0.00100	1	12/06/2018 16:39	WG1206447
Bromomethane	ND		0.00500	1	12/06/2018 16:39	WG1206447
Carbon disulfide	ND		0.00100	1	12/06/2018 16:39	WG1206447
Carbon tetrachloride	ND		0.00100	1	12/06/2018 16:39	WG1206447
Chlorobenzene	ND		0.00100	1	12/06/2018 16:39	WG1206447
Chlorodibromomethane	ND		0.00100	1	12/06/2018 16:39	WG1206447
Chloroethane	ND		0.00500	1	12/06/2018 16:39	WG1206447
Chloroform	ND		0.00500	1	12/06/2018 16:39	WG1206447
Chloromethane	ND		0.00250	1	12/06/2018 16:39	WG1206447
Dibromomethane	ND		0.00100	1	12/06/2018 16:39	WG1206447
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/06/2018 16:39	WG1206447
1,2-Dibromoethane	ND		0.00100	1	12/06/2018 16:39	WG1206447
1,2-Dichlorobenzene	ND		0.00100	1	12/06/2018 16:39	WG1206447
1,4-Dichlorobenzene	ND		0.00100	1	12/06/2018 16:39	WG1206447
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/06/2018 16:39	WG1206447
1,1-Dichloroethane	ND		0.00100	1	12/06/2018 16:39	WG1206447
1,2-Dichloroethane	ND		0.00100	1	12/06/2018 16:39	WG1206447
1,1-Dichloroethene	ND		0.00100	1	12/06/2018 16:39	WG1206447
cis-1,2-Dichloroethene	ND		0.00100	1	12/06/2018 16:39	WG1206447
trans-1,2-Dichloroethene	ND		0.00100	1	12/06/2018 16:39	WG1206447
1,2-Dichloropropane	ND		0.00100	1	12/06/2018 16:39	WG1206447
cis-1,3-Dichloropropene	ND		0.00100	1	12/06/2018 16:39	WG1206447
trans-1,3-Dichloropropene	ND		0.00100	1	12/06/2018 16:39	WG1206447
Ethylbenzene	ND		0.00100	1	12/06/2018 16:39	WG1206447
2-Hexanone	ND		0.0100	1	12/06/2018 16:39	WG1206447
Iodomethane	ND		0.0100	1	12/06/2018 16:39	WG1206447
2-Butanone (MEK)	0.267		0.0100	1	12/06/2018 16:39	WG1206447
Methylene Chloride	ND		0.00500	1	12/06/2018 16:39	WG1206447
4-Methyl-2-pentanone (MIBK)	0.0383		0.0100	1	12/06/2018 16:39	WG1206447
Styrene	ND		0.00100	1	12/06/2018 16:39	WG1206447
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/06/2018 16:39	WG1206447
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/06/2018 16:39	WG1206447

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Tetrachloroethene	ND		0.00100	1	12/06/2018 16:39	WG1206447
Toluene	0.00534		0.00100	1	12/06/2018 16:39	WG1206447
1,1,1-Trichloroethane	ND		0.00100	1	12/06/2018 16:39	WG1206447
1,1,2-Trichloroethane	ND		0.00100	1	12/06/2018 16:39	WG1206447
Trichloroethene	ND		0.00100	1	12/06/2018 16:39	WG1206447
Trichlorofluoromethane	ND		0.00500	1	12/06/2018 16:39	WG1206447
1,2,3-Trichloropropane	ND		0.00250	1	12/06/2018 16:39	WG1206447
Vinyl acetate	ND		0.0100	1	12/06/2018 16:39	WG1206447
Vinyl chloride	ND		0.00100	1	12/06/2018 16:39	WG1206447
Xylenes, Total	ND		0.00300	1	12/06/2018 16:39	WG1206447
(S) Toluene-d8	*93.9*		*80.0-120*		*12/06/2018 16:39*	WG1206447
(S) Toluene-d8	*105*		*80.0-120*		*12/10/2018 03:49*	WG1207485
(S) Dibromofluoromethane	*104*		*75.0-120*		*12/06/2018 16:39*	WG1206447
(S) Dibromofluoromethane	*104*		*75.0-120*		*12/10/2018 03:49*	WG1207485
(S) a,a,a-Trifluorotoluene	*97.7*		*80.0-120*		*12/06/2018 16:39*	WG1206447
(S) a,a,a-Trifluorotoluene	*99.4*		*80.0-120*		*12/10/2018 03:49*	WG1207485
(S) 4-Bromofluorobenzene	*100*		*77.0-126*		*12/06/2018 16:39*	WG1206447
(S) 4-Bromofluorobenzene	*101*		*77.0-126*		*12/10/2018 03:49*	WG1207485

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	0.000144		0.0000100	1	12/06/2018 17:03	WG1206335
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	12/06/2018 17:03	WG1206335

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 mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	251	B	150	5	12/10/2018 14:44	WG1208245

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	4760		100	5	12/11/2018 18:46	WG1208329

Sample Narrative:

L1049865-02 WG1208329: Endpoint pH 4.5 headspace

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	4100		100	1000	12/12/2018 17:45	WG1208082

Wet Chemistry by Method 410.4

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
COD	4490		500	50	12/07/2018 12:13	WG1206747

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	82.1		20.0	20	12/06/2018 02:44	WG1206170
Chloride	79800		5000	5000	12/06/2018 17:14	WG1206170
Fluoride	11.5		2.00	20	12/06/2018 02:44	WG1206170
Nitrate	31.9		2.00	20	12/06/2018 02:44	WG1206170
Sulfate	736		100	20	12/06/2018 02:44	WG1206170

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	12/06/2018 14:39	WG1206137

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	5.48		0.200	1	12/07/2018 09:24	WG1206203

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	ND		10.0	100	12/11/2018 14:32	WG1208518
Antimony	ND		0.200	100	12/07/2018 21:11	WG1206204
Arsenic	ND		0.200	100	12/07/2018 21:11	WG1206204
Barium	0.924		0.500	100	12/11/2018 14:32	WG1208518
Beryllium	ND		0.200	100	12/07/2018 21:11	WG1206204
Cadmium	ND		0.100	100	12/07/2018 21:11	WG1206204
Calcium	ND		100	100	12/07/2018 21:11	WG1206204
Chromium	ND		0.200	100	12/07/2018 21:11	WG1206204
Cobalt	ND		0.200	100	12/07/2018 21:11	WG1206204
Copper	13.9		0.500	100	12/07/2018 21:11	WG1206204

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Iron	ND		10.0	100	12/07/2018 21:11	WG1206204
Lead	ND		0.200	100	12/07/2018 21:11	WG1206204
Magnesium	ND		100	100	12/07/2018 21:11	WG1206204
Manganese	ND		0.500	100	12/07/2018 21:11	WG1206204
Nickel	ND		0.200	100	12/07/2018 21:11	WG1206204
Potassium	23000		100	100	12/07/2018 21:11	WG1206204
Selenium	ND		0.200	100	12/07/2018 21:11	WG1206204
Silver	ND		0.200	100	12/07/2018 21:11	WG1206204
Sodium	30700		100	100	12/11/2018 14:32	WG1208518
Thallium	ND		0.200	100	12/07/2018 21:11	WG1206204
Vanadium	ND		0.500	100	12/07/2018 21:11	WG1206204
Zinc	2.58		2.50	100	12/11/2018 14:32	WG1208518

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	0.702		0.0500	1	12/06/2018 16:58	WG1206447
Acrylonitrile	ND		0.0100	1	12/06/2018 16:58	WG1206447
Benzene	ND		0.00100	1	12/06/2018 16:58	WG1206447
Bromochloromethane	ND		0.00100	1	12/06/2018 16:58	WG1206447
Bromodichloromethane	ND		0.00100	1	12/06/2018 16:58	WG1206447
Bromoform	ND		0.00100	1	12/06/2018 16:58	WG1206447
Bromomethane	ND		0.00500	1	12/06/2018 16:58	WG1206447
Carbon disulfide	ND		0.00100	1	12/06/2018 16:58	WG1206447
Carbon tetrachloride	ND		0.00100	1	12/06/2018 16:58	WG1206447
Chlorobenzene	ND		0.00100	1	12/06/2018 16:58	WG1206447
Chlorodibromomethane	ND		0.00100	1	12/06/2018 16:58	WG1206447
Chloroethane	ND		0.00500	1	12/06/2018 16:58	WG1206447
Chloroform	ND		0.00500	1	12/06/2018 16:58	WG1206447
Chloromethane	ND		0.00250	1	12/06/2018 16:58	WG1206447
Dibromomethane	ND		0.00100	1	12/06/2018 16:58	WG1206447
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	12/06/2018 16:58	WG1206447
1,2-Dibromoethane	ND		0.00100	1	12/06/2018 16:58	WG1206447
1,2-Dichlorobenzene	ND		0.00100	1	12/06/2018 16:58	WG1206447
1,4-Dichlorobenzene	ND		0.00100	1	12/06/2018 16:58	WG1206447
trans-1,4-Dichloro-2-butene	ND		0.00250	1	12/06/2018 16:58	WG1206447
1,1-Dichloroethane	ND		0.00100	1	12/06/2018 16:58	WG1206447
1,2-Dichloroethane	ND		0.00100	1	12/06/2018 16:58	WG1206447
1,1-Dichloroethene	ND		0.00100	1	12/06/2018 16:58	WG1206447
cis-1,2-Dichloroethene	ND		0.00100	1	12/06/2018 16:58	WG1206447
trans-1,2-Dichloroethene	ND		0.00100	1	12/06/2018 16:58	WG1206447
1,2-Dichloropropane	ND		0.00100	1	12/06/2018 16:58	WG1206447
cis-1,3-Dichloropropene	ND		0.00100	1	12/06/2018 16:58	WG1206447
trans-1,3-Dichloropropene	ND		0.00100	1	12/06/2018 16:58	WG1206447
Ethylbenzene	ND		0.00100	1	12/06/2018 16:58	WG1206447
2-Hexanone	ND		0.0100	1	12/06/2018 16:58	WG1206447
Iodomethane	ND		0.0100	1	12/06/2018 16:58	WG1206447
2-Butanone (MEK)	0.0671		0.0100	1	12/06/2018 16:58	WG1206447
Methylene Chloride	ND		0.00500	1	12/06/2018 16:58	WG1206447
4-Methyl-2-pentanone (MIBK)	0.0117		0.0100	1	12/06/2018 16:58	WG1206447
Styrene	ND		0.00100	1	12/06/2018 16:58	WG1206447
1,1,1,2-Tetrachloroethane	ND		0.00100	1	12/06/2018 16:58	WG1206447
1,1,2,2-Tetrachloroethane	ND		0.00100	1	12/06/2018 16:58	WG1206447
Tetrachloroethene	ND		0.00100	1	12/06/2018 16:58	WG1206447
Toluene	ND		0.00100	1	12/06/2018 16:58	WG1206447
1,1,1-Trichloroethane	ND		0.00100	1	12/06/2018 16:58	WG1206447

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,1,2-Trichloroethane	ND		0.00100	1	12/06/2018 16:58	WG1206447
Trichloroethene	ND		0.00100	1	12/06/2018 16:58	WG1206447
Trichlorofluoromethane	ND		0.00500	1	12/06/2018 16:58	WG1206447
1,2,3-Trichloropropane	ND		0.00250	1	12/06/2018 16:58	WG1206447
Vinyl acetate	ND		0.0100	1	12/06/2018 16:58	WG1206447
Vinyl chloride	ND		0.00100	1	12/06/2018 16:58	WG1206447
Xylenes, Total	ND		0.00300	1	12/06/2018 16:58	WG1206447
(S) Toluene-d8	*92.5*		*80.0-120*		*12/06/2018 16:58*	WG1206447
(S) Dibromofluoromethane	*99.9*		*75.0-120*		*12/06/2018 16:58*	WG1206447
(S) a,a,a-Trifluorotoluene	*95.7*		*80.0-120*		*12/06/2018 16:58*	WG1206447
(S) 4-Bromofluorobenzene	*98.4*		*77.0-126*		*12/06/2018 16:58*	WG1206447

EDB / DBCP by Method 8011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ethylene Dibromide	ND		0.0000100	1	12/06/2018 16:39	WG1206335
1,2-Dibromo-3-Chloropropane	ND		0.0000200	1	12/06/2018 16:39	WG1206335

Method Blank (MB)

(MB) R3366810-1 12/10/18 14:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hardness (colorimetric) as CaCO3	5.92	J	1.43	30.0

L1050091-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1050091-02 12/10/18 14:34 • (DUP) R3366810-6 12/10/18 14:35

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	58.0	60.7	1	4.55		20

L1049701-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1049701-02 12/10/18 14:36 • (DUP) R3366810-7 12/10/18 14:37

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	236	272	5	14.2		20

Laboratory Control Sample (LCS)

(LCS) R3366810-2 12/10/18 14:05

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Hardness (colorimetric) as CaCO3	150	154	103	85.0-115	

L1050091-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1050091-01 12/10/18 14:31 • (MS) R3366810-4 12/10/18 14:32 • (MSD) R3366810-5 12/10/18 14:33

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	55.9	193	193	91.4	91.4	1	80.0-120			0.000	20

Method Blank (MB)

(MB) R3367452-1 12/11/18 18:13

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

Sample Narrative:

BLANK: Endpoint pH 4.5

L1049776-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1049776-04 12/11/18 18:20 • (DUP) R3367452-5 12/11/18 18:29

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	51.6	51.1	1	1.01		20

Sample Narrative:

OS: Endpoint pH 4.5 headspace

DUP: Endpoint pH 4.5

L1049949-08 Original Sample (OS) • Duplicate (DUP)

(OS) L1049949-08 12/11/18 21:11 • (DUP) R3367452-8 12/11/18 21:18

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	99.9	99.9	1	0.0194		20

Sample Narrative:

OS: Endpoint pH 4.5 headspace

DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3367452-7 12/11/18 19:33

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100	96.3	96.3	85.0-115	

Sample Narrative:

LCS: Endpoint pH 4.5

Method Blank (MB)

(MB) R3367692-1 12/12/18 17:20

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ammonia Nitrogen	U		0.0317	0.100

L1049904-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1049904-02 12/12/18 18:09 • (DUP) R3367692-7 12/12/18 18:10

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	ND	0.000	1	0.000		10

L1049865-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1049865-01 12/12/18 18:12 • (DUP) R3367692-8 12/12/18 18:13

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	1270	1280	500	0.407		10

Laboratory Control Sample (LCS)

(LCS) R3367692-2 12/12/18 17:21

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Ammonia Nitrogen	7.50	7.88	105	90.0-110	

L1049795-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049795-01 12/12/18 17:27 • (MS) R3367692-3 12/12/18 17:29 • (MSD) R3367692-4 12/12/18 17:31

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	5.00	0.378	5.43	5.56	101	104	1	90.0-110			2.38	10

L1049899-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1049899-02 12/12/18 18:05 • (MS) R3367692-6 12/12/18 18:07

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ammonia Nitrogen	5.00	ND	5.32	106	1	90.0-110	

Method Blank (MB)

(MB) R3366201-1 12/07/18 12:10

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

L1042196-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1042196-01 12/07/18 12:11 • (DUP) R3366201-3 12/07/18 12:11

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	13600	13600	20	0.0750		20

L1050214-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1050214-01 12/07/18 12:15 • (DUP) R3366201-4 12/07/18 12:15

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	125	126	1	0.660		20

Laboratory Control Sample (LCS)

(LCS) R3366201-2 12/07/18 12:11

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
COD	222	212	95.7	90.0-110	

L1050217-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1050217-01 12/07/18 12:16 • (MS) R3366201-5 12/07/18 12:16 • (MSD) R3366201-6 12/07/18 12:17

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
COD	400	33.3	440	437	102	101	1	80.0-120			0.853	20

Method Blank (MB)

(MB) R3366835-1 12/10/18 15:20

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

L1049865-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1049865-01 12/10/18 15:22 • (DUP) R3366835-3 12/10/18 15:22

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	6730	6660	20	1.07		20

L1051252-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1051252-02 12/10/18 15:28 • (DUP) R3366835-6 12/10/18 15:28

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
COD	12.9	11.2	1	13.9		20

Laboratory Control Sample (LCS)

(LCS) R3366835-2 12/10/18 15:21

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
COD	222	214	96.6	90.0-110	

L1050280-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1050280-01 12/10/18 15:24 • (MS) R3366835-4 12/10/18 15:25 • (MSD) R3366835-5 12/10/18 15:25

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
COD	400	815	1260	1270	112	114	1	80.0-120	E	E	0.616	20

Method Blank (MB)

(MB) R3365945-1 12/05/18 13:01

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Bromide	U		0.0790	1.00
Chloride	U		0.0519	1.00
Fluoride	U		0.00990	0.100
Nitrate	U		0.0227	0.100
Sulfate	U		0.0774	5.00

L1049906-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1049906-07 12/05/18 21:51 • (DUP) R3365945-3 12/05/18 22:01

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.000	1	0.000		15
Chloride	52.2	54.7	1	4.67		15
Fluoride	ND	0.000	1	0.000		15
Nitrate	3.46	4.91	1	34.7	J3	15
Sulfate	ND	0.327	1	4.08	J	15

L1049519-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1049519-01 12/06/18 00:23 • (DUP) R3365945-8 12/06/18 11:53

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	U	0.000	1	0.000		15
Chloride	2.50	2.49	1	0.618		15
Fluoride	U	0.000	1	0.000		15
Nitrate	U	0.000	1	0.000		15
Sulfate	37.7	36.0	1	4.38		15

Laboratory Control Sample (LCS)

(LCS) R3365945-2 12/05/18 13:12

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Bromide	40.0	39.7	99.3	80.0-120	
Chloride	40.0	39.2	97.9	80.0-120	
Fluoride	8.00	7.99	99.9	80.0-120	
Nitrate	8.00	8.27	103	80.0-120	

Laboratory Control Sample (LCS)

(LCS) R3365945-2 12/05/18 13:12

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Sulfate	40.0	39.1	97.8	80.0-120	

L1049906-07 Original Sample (OS) • Matrix Spike (MS)

(OS) L1049906-07 12/05/18 21:51 • (MS) R3365945-4 12/05/18 22:12

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	ND	46.1	92.1	1	80.0-120	
Chloride	50.0	52.2	101	96.9	1	80.0-120	E
Fluoride	5.00	ND	4.80	96.0	1	80.0-120	
Nitrate	5.00	3.46	8.60	103	1	80.0-120	
Sulfate	50.0	ND	50.0	99.2	1	80.0-120	

L1049519-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049519-01 12/06/18 00:23 • (MS) R3365945-6 12/06/18 00:44 • (MSD) R3365945-7 12/06/18 00:55

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Bromide	50.0	U	41.6	48.9	83.2	97.9	1	80.0-120		J3	16.2	15
Chloride	50.0	2.50	51.1	54.2	97.2	103	1	80.0-120			5.78	15
Fluoride	5.00	U	4.67	5.23	93.4	105	1	80.0-120			11.3	15
Nitrate	5.00	U	4.16	5.19	83.2	104	1	80.0-120		J3	22.1	15
Sulfate	50.0	37.7	85.8	87.1	96.3	98.9	1	80.0-120			1.48	15

Method Blank (MB)

(MB) R3365998-1 12/06/18 14:05

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

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

(LCS) R3365998-2 12/06/18 14:07 • (LCSD) R3365998-3 12/06/18 14:10

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 %
Mercury	0.00300	0.00297	0.00350	99.0	117	80.0-120			16.4	20

L1049834-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049834-01 12/06/18 14:12 • (MS) R3365998-4 12/06/18 14:15 • (MSD) R3365998-5 12/06/18 14:17

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	U	0.00191	0.00181	63.5	60.2	1	75.0-125	J6	J6	5.43	20

Method Blank (MB)

(MB) R3366188-1 12/07/18 09:01

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

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

(LCS) R3366188-2 12/07/18 09:04 • (LCSD) R3366188-3 12/07/18 09:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron	1.00	0.969	0.981	96.9	98.1	80.0-120			1.23	20

L1049853-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049853-06 12/07/18 09:09 • (MS) R3366188-5 12/07/18 09:15 • (MSD) R3366188-6 12/07/18 09:18

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 %
Boron	1.00	0.818	1.83	1.81	101	98.9	1	75.0-125			1.19	20

Method Blank (MB)

(MB) R3366402-1 12/07/18 17:25

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
Barium	0.000692	J	0.000360	0.00500
Beryllium	U		0.000120	0.00200
Cadmium	U		0.000160	0.00100
Calcium	0.211	J	0.0460	1.00
Chromium	U		0.000540	0.00200
Copper	U		0.000520	0.00500
Cobalt	U		0.000260	0.00200
Iron	U		0.0150	0.100
Lead	U		0.000240	0.00200
Magnesium	U		0.100	1.00
Manganese	U		0.000250	0.00500
Nickel	U		0.000350	0.00200
Potassium	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

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

(LCS) R3366402-2 12/07/18 17:29 • (LCSD) R3366402-3 12/07/18 17:33

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 %
Antimony	0.0500	0.0558	0.0543	112	109	80.0-120			2.65	20
Arsenic	0.0500	0.0463	0.0451	92.6	90.2	80.0-120			2.61	20
Barium	0.0500	0.0478	0.0463	95.6	92.6	80.0-120			3.21	20
Beryllium	0.0500	0.0465	0.0448	93.1	89.5	80.0-120			3.88	20
Cadmium	0.0500	0.0482	0.0459	96.5	91.8	80.0-120			4.93	20
Calcium	5.00	4.99	4.82	99.7	96.4	80.0-120			3.38	20
Chromium	0.0500	0.0470	0.0455	94.0	90.9	80.0-120			3.28	20
Copper	0.0500	0.0470	0.0463	94.0	92.6	80.0-120			1.42	20
Cobalt	0.0500	0.0484	0.0470	96.7	94.1	80.0-120			2.79	20
Iron	5.00	4.78	4.54	95.7	90.9	80.0-120			5.12	20
Lead	0.0500	0.0465	0.0457	92.9	91.5	80.0-120			1.58	20
Magnesium	5.00	4.74	4.53	94.7	90.5	80.0-120			4.54	20
Manganese	0.0500	0.0458	0.0454	91.6	90.8	80.0-120			0.844	20
Nickel	0.0500	0.0485	0.0470	97.0	94.0	80.0-120			3.13	20

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

(LCS) R3366402-2 12/07/18 17:29 • (LCSD) R3366402-3 12/07/18 17:33

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 %
Potassium	5.00	4.75	4.55	94.9	91.1	80.0-120			4.13	20
Selenium	0.0500	0.0455	0.0471	91.0	94.2	80.0-120			3.42	20
Silver	0.0500	0.0492	0.0474	98.4	94.8	80.0-120			3.78	20
Thallium	0.0500	0.0474	0.0454	94.8	90.8	80.0-120			4.31	20
Vanadium	0.0500	0.0468	0.0452	93.6	90.4	80.0-120			3.45	20

L1049981-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1049981-02 12/07/18 17:37 • (MS) R3366402-5 12/07/18 17:45 • (MSD) R3366402-6 12/07/18 17:49

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	0.0500	U	0.0531	0.0517	106	103	1	75.0-125			2.61	20
Arsenic	0.0500	U	0.0454	0.0434	90.8	86.8	1	75.0-125			4.59	20
Barium	0.0500	0.0359	0.0781	0.0766	84.3	81.3	1	75.0-125			1.97	20
Beryllium	0.0500	0.000142	0.0453	0.0439	90.4	87.4	1	75.0-125			3.31	20
Cadmium	0.0500	U	0.0463	0.0460	92.6	92.0	1	75.0-125			0.690	20
Calcium	5.00	9.06	13.7	13.2	91.9	83.7	1	75.0-125			3.05	20
Chromium	0.0500	U	0.0452	0.0437	90.5	87.4	1	75.0-125			3.40	20
Copper	0.0500	0.000574	0.0460	0.0443	90.8	87.5	1	75.0-125			3.68	20
Cobalt	0.0500	0.0129	0.0598	0.0580	93.7	90.2	1	75.0-125			3.00	20
Potassium	5.00	3.52	8.28	8.00	95.1	89.6	1	75.0-125			3.38	20
Iron	5.00	0.0195	4.63	4.44	92.1	88.4	1	75.0-125			4.15	20
Lead	0.0500	0.000542	0.0465	0.0441	91.9	87.2	1	75.0-125			5.17	20
Magnesium	5.00	7.32	11.8	11.5	90.4	84.2	1	75.0-125			2.67	20
Manganese	0.0500	0.297	0.338	0.330	83.2	66.6	1	75.0-125		V	2.49	20
Nickel	0.0500	0.00816	0.0546	0.0537	92.9	91.1	1	75.0-125			1.68	20
Selenium	0.0500	U	0.0472	0.0440	94.4	87.9	1	75.0-125			7.12	20
Silver	0.0500	U	0.0478	0.0461	95.5	92.1	1	75.0-125			3.62	20
Thallium	0.0500	U	0.0466	0.0443	93.2	88.6	1	75.0-125			5.03	20
Vanadium	0.0500	U	0.0453	0.0441	90.7	88.2	1	75.0-125			2.77	20

Method Blank (MB)

(MB) R3367161-1 12/11/18 13:55

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.0671	J	0.00515	0.100
Barium	U		0.000360	0.00500
Sodium	0.217	J	0.110	1.00
Zinc	U		0.00256	0.0250

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

(LCS) R3367161-2 12/11/18 13:59 • (LCSD) R3367161-3 12/11/18 14:04

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	4.64	4.64	92.8	92.8	80.0-120			0.0795	20
Barium	0.0500	0.0471	0.0466	94.2	93.2	80.0-120			1.09	20
Sodium	5.00	4.98	5.00	99.7	99.9	80.0-120			0.240	20
Zinc	0.0500	0.0489	0.0504	97.8	101	80.0-120			2.95	20

L1050898-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1050898-03 12/11/18 14:09 • (MS) R3367161-5 12/11/18 14:18 • (MSD) R3367161-6 12/11/18 14:22

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	0.495	5.00	5.03	90.0	90.8	1	75.0-125			0.721	20
Barium	0.0500	0.0220	0.0648	0.0661	85.5	88.2	1	75.0-125			2.00	20
Sodium	5.00	8.75	13.2	13.3	89.5	90.4	1	75.0-125			0.356	20
Zinc	0.0500	0.00518	0.0526	0.0512	94.9	92.1	1	75.0-125			2.72	20

Method Blank (MB)

(MB) R3366348-3 12/06/18 10:05

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 tetrachloride	U		0.000379	0.00100
Carbon disulfide	U		0.000275	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
2-Butanone (MEK)	U		0.00393	0.0100
Iodomethane	U		0.00171	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000412	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100

Method Blank (MB)

(MB) R3366348-3 12/06/18 10:05

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 chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
Vinyl acetate	U		0.00163	0.0100
(S) Toluene-d8	*94.7*			*80.0-120*
(S) Dibromofluoromethane	*105*			*75.0-120*
(S) a,a,a-Trifluorotoluene	*99.7*			*80.0-120*
(S) 4-Bromofluorobenzene	*98.6*			*77.0-126*

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

(LCS) R3366348-1 12/06/18 08:48 • (LCSD) R3366348-2 12/06/18 09:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.145	0.146	116	117	19.0-160			0.362	27
Acrylonitrile	0.125	0.139	0.139	111	111	55.0-149			0.385	20
Benzene	0.0250	0.0271	0.0271	109	109	70.0-123			0.0387	20
Bromodichloromethane	0.0250	0.0258	0.0272	103	109	75.0-120			5.34	20
Bromoform	0.0250	0.0257	0.0250	103	100	68.0-132			2.75	20
Bromomethane	0.0250	0.0226	0.0235	90.3	93.8	10.0-160			3.84	25
Carbon tetrachloride	0.0250	0.0282	0.0274	113	110	68.0-126			2.77	20
Chlorobenzene	0.0250	0.0270	0.0264	108	105	80.0-121			2.30	20
Chlorodibromomethane	0.0250	0.0267	0.0268	107	107	77.0-125			0.0282	20
Chloroethane	0.0250	0.0305	0.0294	122	118	47.0-150			3.54	20
Chloroform	0.0250	0.0242	0.0253	97.0	101	73.0-120			4.45	20
Chloromethane	0.0250	0.0166	0.0154	66.3	61.5	41.0-142			7.57	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0254	0.0243	101	97.2	58.0-134			4.33	20
1,2-Dibromoethane	0.0250	0.0265	0.0261	106	105	80.0-122			1.49	20
Bromochloromethane	0.0250	0.0261	0.0262	104	105	76.0-122			0.248	20
Dibromomethane	0.0250	0.0258	0.0275	103	110	80.0-120			6.32	20
1,2-Dichlorobenzene	0.0250	0.0269	0.0253	108	101	79.0-121			6.27	20
1,4-Dichlorobenzene	0.0250	0.0240	0.0237	96.1	94.9	79.0-120			1.25	20
Carbon disulfide	0.0250	0.0278	0.0272	111	109	61.0-128			2.38	20
1,1-Dichloroethane	0.0250	0.0275	0.0270	110	108	70.0-126			1.64	20
1,2-Dichloroethane	0.0250	0.0287	0.0287	115	115	70.0-128			0.289	20
1,1-Dichloroethene	0.0250	0.0274	0.0269	110	108	71.0-124			1.93	20

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

(LCS) R3366348-1 12/06/18 08:48 • (LCSD) R3366348-2 12/06/18 09:07

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
cis-1,2-Dichloroethene	0.0250	0.0261	0.0264	104	106	73.0-120			1.26	20
trans-1,2-Dichloroethene	0.0250	0.0268	0.0268	107	107	73.0-120			0.0190	20
1,2-Dichloropropane	0.0250	0.0271	0.0292	108	117	77.0-125			7.53	20
cis-1,3-Dichloropropene	0.0250	0.0276	0.0278	110	111	80.0-123			0.727	20
trans-1,3-Dichloropropene	0.0250	0.0281	0.0276	112	110	78.0-124			1.61	20
Ethylbenzene	0.0250	0.0266	0.0261	107	105	79.0-123			1.96	20
trans-1,4-Dichloro-2-butene	0.0250	0.0257	0.0250	103	100	33.0-144			2.61	20
2-Butanone (MEK)	0.125	0.148	0.147	118	118	44.0-160			0.673	20
Methylene Chloride	0.0250	0.0255	0.0253	102	101	67.0-120			0.771	20
4-Methyl-2-pentanone (MIBK)	0.125	0.142	0.140	113	112	68.0-142			1.04	20
Styrene	0.0250	0.0279	0.0269	112	108	73.0-130			3.75	20
1,1,1,2-Tetrachloroethane	0.0250	0.0264	0.0269	106	107	75.0-125			1.76	20
1,1,2,2-Tetrachloroethane	0.0250	0.0249	0.0241	99.5	96.5	65.0-130			3.04	20
2-Hexanone	0.125	0.127	0.125	102	100	67.0-149			1.22	20
Tetrachloroethene	0.0250	0.0274	0.0265	110	106	72.0-132			3.47	20
Iodomethane	0.125	0.101	0.122	80.7	97.4	33.0-147			18.8	26
Toluene	0.0250	0.0253	0.0241	101	96.6	79.0-120			4.65	20
1,1,1-Trichloroethane	0.0250	0.0282	0.0279	113	112	73.0-124			1.23	20
1,1,2-Trichloroethane	0.0250	0.0251	0.0246	101	98.4	80.0-120			2.19	20
Trichloroethene	0.0250	0.0276	0.0277	110	111	78.0-124			0.607	20
Trichlorofluoromethane	0.0250	0.0329	0.0308	132	123	59.0-147			6.65	20
1,2,3-Trichloropropane	0.0250	0.0265	0.0259	106	104	73.0-130			2.15	20
Vinyl chloride	0.0250	0.0282	0.0279	113	112	67.0-131			1.07	20
Xylenes, Total	0.0750	0.0781	0.0784	104	105	79.0-123			0.383	20
Vinyl acetate	0.125	0.155	0.152	124	121	11.0-160			1.94	20
(S) Toluene-d8				*97.1*	*95.1*	*80.0-120*				
(S) Dibromofluoromethane				*99.0*	*102*	*75.0-120*				
(S) a,a,a-Trifluorotoluene				*97.2*	*102*	*80.0-120*				
(S) 4-Bromofluorobenzene				*103*	*98.5*	*77.0-126*				

Method Blank (MB)

(MB) R3366654-3 12/09/18 22:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
(S) Toluene-d8	*109*			*80.0-120*
(S) Dibromofluoromethane	*104*			*75.0-120*
(S) a,a,a-Trifluorotoluene	*100*			*80.0-120*
(S) 4-Bromofluorobenzene	*98.9*			*77.0-126*

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

(LCS) R3366654-1 12/09/18 21:14 • (LCSD) R3366654-2 12/09/18 21:34

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.134	0.129	107	103	19.0-160			3.82	27
(S) Toluene-d8				*106*	*104*	*80.0-120*				
(S) Dibromofluoromethane				*105*	*104*	*75.0-120*				
(S) a,a,a-Trifluorotoluene				*100*	*99.7*	*80.0-120*				
(S) 4-Bromofluorobenzene				*105*	*103*	*77.0-126*				

Method Blank (MB)

(MB) R3366024-1 12/06/18 16:14

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

L1049865-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1049865-01 12/06/18 17:03 • (DUP) R3366024-3 12/06/18 16:50

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ethylene Dibromide	0.000144	0.000146	1	1.38		20
1,2-Dibromo-3-Chloropropane	ND	0.000	1	0.000		20

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

(LCS) R3366024-4 12/06/18 19:03 • (LCSD) R3366024-5 12/06/18 20:28

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Ethylene Dibromide	0.000250	0.000240	0.000232	96.0	92.8	60.0-140			3.39	20
1,2-Dibromo-3-Chloropropane	0.000250	0.000253	0.000259	101	104	60.0-140			2.34	20

L1049865-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1049865-02 12/06/18 16:39 • (MS) R3366024-2 12/06/18 16:26

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ethylene Dibromide	0.0000919	ND	0.000104	113	1	64.0-159	
1,2-Dibromo-3-Chloropropane	0.0000919	ND	0.0000984	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.

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

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

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

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

Civil & Environmental Consultants - TN

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: Camden, TN

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

Client Project # 171-873

Lab Project # CEC-EWS CAMDEN LF

Collected by (print): Adrian Baugh

Site/Facility ID # CAMDEN, TN

P.O. #

Collected by (signature): A. Baugh

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

Pres Chk

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	**WetChem** 250mlHDPE-NoPres	ALK 60mlAmb-NoPres	COD,NH3 250mlHDPE-H2SO4	~~Diss Metals-FF 250mlHDPE-HNO3~~	SV8011 40mlClr-NaThio	Total Metals,HARD 250mlHDPE-HNO3	V8260AP1 40mlAmb-HCl				Remarks	Sample # (lab only)
									<2			<2						
IWC-L	Grab	GW		12/4/18	1455	10	X	X	X	X	X	X	X				No Diss Metals	-01
APWC-L	↓	GW		12/4/18	1445	10	X	X	X	X	X	X	X				No Diss Metals	-02

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1049865
B125

Acctnum: CEC
Template: T133582
Prelogin: P681867
TSR: 526 - Chris McCord
PB: 11-23-18

Shipped Via: Courier

* 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 #

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)
[signature]	12/5/18	1205	Wayne Shull
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)
Wayne Shull	12/5/18	1420	[signature]

Trip Blank Received: Yes / No
HCl / MeoH
TBR

Temp: 2.5 °C Bottles Received: 20

Date: 12/5/18 Time: 1420

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

December 21, 2018

Civil & Environmental Consultants - TN

Sample Delivery Group:	L1052388
Samples Received:	12/12/2018
Project Number:	171-873
Description:	EWS Camden Class 2 Landfill
Site:	CAMDEN, TN
Report To:	Philip Campbell 325 Seaboard Lane, Suite 170 Franklin, TN 37067

Entire Report Reviewed By:

Chris McCord
Project Manager

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

CHARLIE CREEK US L1052388-01 GW

Collected by: CD/JW | Collected date/time: 12/12/18 10:35 | Received date/time: 12/12/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1213130	1	12/19/18 11:57	12/19/18 11:57	KK
Wet Chemistry by Method 350.1	WG1212790	1	12/19/18 18:50	12/19/18 18:50	JER
Wet Chemistry by Method 9056A	WG1213182	1	12/21/18 09:09	12/21/18 09:09	ELN
Mercury by Method 7470A	WG1210141	1	12/13/18 10:41	12/13/18 19:47	TCT
Mercury by Method 7470A	WG1210143	1	12/13/18 10:43	12/13/18 18:31	TCT
Metals (ICP) by Method 6010B	WG1210104	1	12/14/18 09:27	12/15/18 17:23	WBD
Metals (ICP) by Method 6010B	WG1210107	1	12/14/18 00:00	12/14/18 16:47	TRB
Metals (ICPMS) by Method 6020A	WG1210051	1	12/17/18 15:35	12/18/18 19:18	RDS
Metals (ICPMS) by Method 6020A	WG1210062	1	12/17/18 15:39	12/18/18 22:18	LD
Metals (ICPMS) by Method 6020A	WG1212959	1	12/19/18 07:29	12/19/18 13:30	JPD

CHARLIE CREEK MS L1052388-02 GW

Collected by: CD/JW | Collected date/time: 12/12/18 09:30 | Received date/time: 12/12/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1213130	1	12/19/18 11:57	12/19/18 11:57	KK
Wet Chemistry by Method 350.1	WG1212790	1	12/19/18 18:52	12/19/18 18:52	JER
Wet Chemistry by Method 9056A	WG1213182	1	12/21/18 09:55	12/21/18 09:55	ELN
Mercury by Method 7470A	WG1210141	1	12/13/18 10:41	12/13/18 19:49	TCT
Mercury by Method 7470A	WG1210143	1	12/13/18 10:43	12/13/18 18:34	TCT
Metals (ICP) by Method 6010B	WG1210104	1	12/14/18 09:27	12/15/18 17:26	WBD
Metals (ICP) by Method 6010B	WG1210107	1	12/14/18 00:00	12/14/18 16:50	TRB
Metals (ICPMS) by Method 6020A	WG1210051	1	12/17/18 15:35	12/18/18 19:23	RDS
Metals (ICPMS) by Method 6020A	WG1210062	1	12/17/18 15:39	12/18/18 22:23	LD
Metals (ICPMS) by Method 6020A	WG1212959	1	12/19/18 07:29	12/19/18 13:35	JPD
Metals (ICPMS) by Method 6020A	WG1212968	1	12/19/18 07:35	12/19/18 13:07	LAT

CANE CREEK US L1052388-03 GW

Collected by: CD/JW | Collected date/time: 12/12/18 10:15 | Received date/time: 12/12/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1213130	1	12/19/18 11:58	12/19/18 11:58	KK
Wet Chemistry by Method 350.1	WG1212790	1	12/19/18 18:53	12/19/18 18:53	JER
Wet Chemistry by Method 9056A	WG1213182	1	12/21/18 10:11	12/21/18 10:11	ELN
Mercury by Method 7470A	WG1210141	1	12/13/18 10:41	12/13/18 19:52	TCT
Mercury by Method 7470A	WG1210143	1	12/13/18 10:43	12/13/18 18:36	TCT
Metals (ICP) by Method 6010B	WG1210104	1	12/14/18 09:27	12/15/18 17:29	WBD
Metals (ICP) by Method 6010B	WG1210107	1	12/14/18 00:00	12/14/18 16:52	TRB
Metals (ICPMS) by Method 6020A	WG1210051	1	12/17/18 15:35	12/18/18 19:27	RDS
Metals (ICPMS) by Method 6020A	WG1210062	1	12/17/18 15:39	12/18/18 22:51	LD
Metals (ICPMS) by Method 6020A	WG1212959	1	12/19/18 07:29	12/19/18 13:39	JPD
Metals (ICPMS) by Method 6020A	WG1212968	1	12/19/18 07:35	12/19/18 13:11	LAT

CANE CREEK MS L1052388-04 GW

Collected by: CD/JW | Collected date/time: 12/12/18 09:10 | Received date/time: 12/12/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1213130	1	12/19/18 13:04	12/19/18 13:04	KK
Wet Chemistry by Method 350.1	WG1212790	1	12/19/18 18:55	12/19/18 18:55	JER
Wet Chemistry by Method 9056A	WG1213182	1	12/21/18 10:26	12/21/18 10:26	ELN
Mercury by Method 7470A	WG1210141	1	12/13/18 10:41	12/13/18 19:59	TCT
Mercury by Method 7470A	WG1210143	1	12/13/18 10:43	12/13/18 18:39	TCT
Metals (ICP) by Method 6010B	WG1210104	1	12/14/18 09:27	12/15/18 17:32	WBD

CANE CREEK MS L1052388-04 GW

Collected by: CD/JW | Collected date/time: 12/12/18 09:10 | Received date/time: 12/12/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Metals (ICP) by Method 6010B	WG1210107	1	12/14/18 00:00	12/14/18 16:55	TRB
Metals (ICPMS) by Method 6020A	WG1210051	1	12/17/18 15:35	12/18/18 20:08	RDS
Metals (ICPMS) by Method 6020A	WG1210062	1	12/17/18 15:39	12/18/18 22:56	LD
Metals (ICPMS) by Method 6020A	WG1212959	1	12/19/18 07:29	12/19/18 13:44	JPD
Metals (ICPMS) by Method 6020A	WG1212968	1	12/19/18 07:35	12/19/18 13:16	LAT

CANE CREEK DS-1 L1052388-05 GW

Collected by: CD/JW | Collected date/time: 12/12/18 08:45 | Received date/time: 12/12/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 130.1	WG1213130	1	12/19/18 13:05	12/19/18 13:05	KK
Wet Chemistry by Method 350.1	WG1212790	1	12/19/18 19:03	12/19/18 19:03	JER
Wet Chemistry by Method 9056A	WG1213182	1	12/21/18 10:42	12/21/18 10:42	ELN
Mercury by Method 7470A	WG1210141	1	12/13/18 10:41	12/13/18 20:02	TCT
Mercury by Method 7470A	WG1210143	1	12/13/18 10:43	12/13/18 18:41	TCT
Metals (ICP) by Method 6010B	WG1210104	1	12/14/18 09:27	12/15/18 17:34	WBD
Metals (ICP) by Method 6010B	WG1210107	1	12/14/18 00:00	12/14/18 16:58	TRB
Metals (ICPMS) by Method 6020A	WG1210051	1	12/17/18 15:35	12/18/18 20:12	RDS
Metals (ICPMS) by Method 6020A	WG1210062	1	12/17/18 15:39	12/18/18 23:00	LD
Metals (ICPMS) by Method 6020A	WG1212959	1	12/19/18 07:29	12/19/18 13:49	JPD
Metals (ICPMS) by Method 6020A	WG1212968	1	12/19/18 07:35	12/19/18 13:20	LAT

CHARLIE CREEK US L1052388-06 Solid

Collected by: CD/JW | Collected date/time: 12/12/18 10:35 | Received date/time: 12/12/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1210080	1	12/14/18 09:36	12/18/18 23:39	ELN
Mercury by Method 7471A	WG1210271	1	12/13/18 10:58	12/13/18 22:27	TCT
Metals (ICP) by Method 6010B	WG1210045	1	12/13/18 10:00	12/15/18 19:12	WBD

CHARLIE CREEK MS L1052388-07 Solid

Collected by: CD/JW | Collected date/time: 12/12/18 09:30 | Received date/time: 12/12/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1211633	1	12/18/18 17:00	12/19/18 21:56	ELN
Mercury by Method 7471A	WG1210271	1	12/13/18 10:58	12/13/18 22:29	TCT
Metals (ICP) by Method 6010B	WG1210045	1	12/13/18 10:00	12/15/18 19:15	WBD

CANE CREEK US L1052388-08 Solid

Collected by: CD/JW | Collected date/time: 12/12/18 10:15 | Received date/time: 12/12/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1211633	1	12/18/18 17:00	12/19/18 22:24	ELN
Mercury by Method 7471A	WG1210271	1	12/13/18 10:58	12/13/18 22:32	TCT
Metals (ICP) by Method 6010B	WG1210045	1	12/13/18 10:00	12/15/18 19:18	WBD

CANE CREEK MS L1052388-09 Solid

Collected by	Collected date/time	Received date/time
CD/JW	12/12/18 09:10	12/12/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1211633	1	12/18/18 17:00	12/19/18 22:52	ELN
Mercury by Method 7471A	WG1210271	1	12/13/18 10:58	12/13/18 22:34	TCT
Metals (ICP) by Method 6010B	WG1210045	1	12/13/18 10:00	12/15/18 19:20	WBD

CANE CREEK DS-1 L1052388-10 Solid

Collected by	Collected date/time	Received date/time
CD/JW	12/12/18 08:45	12/12/18 15:40

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Wet Chemistry by Method 9056A	WG1211633	1	12/18/18 17:00	12/19/18 23:20	ELN
Mercury by Method 7471A	WG1210271	1	12/13/18 10:58	12/13/18 22:37	TCT
Metals (ICP) by Method 6010B	WG1210045	1	12/13/18 10:00	12/15/18 19:23	WBD

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

Chris McCord
Project Manager

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	30.5		30.0	1	12/19/2018 11:57	WG1213130

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	12/19/2018 18:50	WG1212790

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	12/21/2018 09:09	WG1213182
Chloride	12.2		1.00	1	12/21/2018 09:09	WG1213182
Fluoride	0.169		0.100	1	12/21/2018 09:09	WG1213182

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	12/13/2018 19:47	WG1210141
Mercury,Dissolved	ND		0.000200	1	12/13/2018 18:31	WG1210143

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	12/15/2018 17:23	WG1210104
Boron,Dissolved	ND		0.200	1	12/14/2018 16:47	WG1210107

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.186		0.100	1	12/18/2018 19:18	WG1210051
Aluminum,Dissolved	ND		0.100	1	12/18/2018 22:18	WG1210062
Antimony	ND		0.00200	1	12/18/2018 19:18	WG1210051
Antimony,Dissolved	ND	J4	0.00200	1	12/18/2018 22:18	WG1210062
Arsenic	ND		0.00200	1	12/18/2018 19:18	WG1210051
Arsenic,Dissolved	ND		0.00200	1	12/18/2018 22:18	WG1210062
Barium	0.0352		0.00500	1	12/18/2018 19:18	WG1210051
Barium,Dissolved	0.0347		0.00500	1	12/18/2018 22:18	WG1210062
Beryllium	ND		0.00200	1	12/18/2018 19:18	WG1210051
Beryllium,Dissolved	ND		0.00200	1	12/18/2018 22:18	WG1210062
Cadmium	ND		0.00100	1	12/18/2018 19:18	WG1210051
Cadmium,Dissolved	ND		0.00100	1	12/18/2018 22:18	WG1210062
Calcium	10.5		1.00	1	12/18/2018 19:18	WG1210051
Calcium,Dissolved	9.79		1.00	1	12/18/2018 22:18	WG1210062
Chromium	ND		0.00200	1	12/18/2018 19:18	WG1210051
Chromium,Dissolved	ND		0.00200	1	12/18/2018 22:18	WG1210062
Cobalt	ND		0.00200	1	12/18/2018 19:18	WG1210051
Cobalt,Dissolved	ND		0.00200	1	12/18/2018 22:18	WG1210062
Copper	ND		0.00500	1	12/19/2018 13:30	WG1212959
Copper,Dissolved	ND		0.00500	1	12/18/2018 22:18	WG1210062
Iron	0.576		0.100	1	12/18/2018 19:18	WG1210051
Iron,Dissolved	0.206		0.100	1	12/18/2018 22:18	WG1210062
Lead	ND		0.00200	1	12/19/2018 13:30	WG1212959
Lead,Dissolved	ND		0.00200	1	12/18/2018 22:18	WG1210062

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

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	2.41		1.00	1	12/18/2018 19:18	WG1210051
Magnesium,Dissolved	2.22		1.00	1	12/18/2018 22:18	WG1210062
Manganese	0.177		0.00500	1	12/18/2018 19:18	WG1210051
Manganese,Dissolved	0.144		0.00500	1	12/18/2018 22:18	WG1210062
Nickel	0.00363		0.00200	1	12/18/2018 19:18	WG1210051
Nickel,Dissolved	0.00325		0.00200	1	12/18/2018 22:18	WG1210062
Potassium	1.27		1.00	1	12/18/2018 19:18	WG1210051
Potassium,Dissolved	1.37	B	1.00	1	12/18/2018 22:18	WG1210062
Selenium	ND		0.00200	1	12/18/2018 19:18	WG1210051
Selenium,Dissolved	ND		0.00200	1	12/18/2018 22:18	WG1210062
Silver	ND		0.00200	1	12/18/2018 19:18	WG1210051
Silver,Dissolved	ND		0.00200	1	12/18/2018 22:18	WG1210062
Sodium	6.02		1.00	1	12/18/2018 19:18	WG1210051
Sodium,Dissolved	5.84		1.00	1	12/18/2018 22:18	WG1210062
Thallium	ND		0.00200	1	12/18/2018 19:18	WG1210051
Thallium,Dissolved	ND		0.00200	1	12/18/2018 22:18	WG1210062
Vanadium	ND		0.00500	1	12/18/2018 19:18	WG1210051
Vanadium,Dissolved	ND		0.00500	1	12/18/2018 22:18	WG1210062
Zinc	ND		0.0250	1	12/18/2018 19:18	WG1210051
Zinc,Dissolved	ND		0.0250	1	12/18/2018 22:18	WG1210062

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	39.7		30.0	1	12/19/2018 11:57	WG1213130

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	12/19/2018 18:52	WG1212790

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	12/21/2018 09:55	WG1213182
Chloride	15.4		1.00	1	12/21/2018 09:55	WG1213182
Fluoride	0.205		0.100	1	12/21/2018 09:55	WG1213182

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	12/13/2018 19:49	WG1210141
Mercury,Dissolved	ND		0.000200	1	12/13/2018 18:34	WG1210143

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	12/15/2018 17:26	WG1210104
Boron,Dissolved	ND		0.200	1	12/14/2018 16:50	WG1210107

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.121		0.100	1	12/18/2018 19:23	WG1210051
Aluminum,Dissolved	ND		0.100	1	12/18/2018 22:23	WG1210062
Antimony	ND		0.00200	1	12/18/2018 19:23	WG1210051
Antimony,Dissolved	ND	J4	0.00200	1	12/18/2018 22:23	WG1210062
Arsenic	ND		0.00200	1	12/18/2018 19:23	WG1210051
Arsenic,Dissolved	ND		0.00200	1	12/18/2018 22:23	WG1210062
Barium	0.0384		0.00500	1	12/18/2018 19:23	WG1210051
Barium,Dissolved	0.0392		0.00500	1	12/18/2018 22:23	WG1210062
Beryllium	ND		0.00200	1	12/18/2018 19:23	WG1210051
Beryllium,Dissolved	ND		0.00200	1	12/18/2018 22:23	WG1210062
Cadmium	ND		0.00100	1	12/18/2018 19:23	WG1210051
Cadmium,Dissolved	ND		0.00100	1	12/18/2018 22:23	WG1210062
Calcium	13.2		1.00	1	12/18/2018 19:23	WG1210051
Calcium,Dissolved	12.2		1.00	1	12/18/2018 22:23	WG1210062
Chromium	ND		0.00200	1	12/18/2018 19:23	WG1210051
Chromium,Dissolved	ND		0.00200	1	12/18/2018 22:23	WG1210062
Cobalt	ND		0.00200	1	12/18/2018 19:23	WG1210051
Cobalt,Dissolved	ND		0.00200	1	12/18/2018 22:23	WG1210062
Copper	ND		0.00500	1	12/19/2018 13:35	WG1212959
Copper,Dissolved	ND		0.00500	1	12/18/2018 22:23	WG1210062
Iron	0.599		0.100	1	12/18/2018 19:23	WG1210051
Iron,Dissolved	0.211		0.100	1	12/18/2018 22:23	WG1210062
Lead	ND		0.00200	1	12/19/2018 13:35	WG1212959
Lead,Dissolved	ND		0.00200	1	12/19/2018 13:07	WG1212968

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	2.92		1.00	1	12/18/2018 19:23	WG1210051
Magnesium,Dissolved	2.76		1.00	1	12/18/2018 22:23	WG1210062
Manganese	0.293		0.00500	1	12/18/2018 19:23	WG1210051
Manganese,Dissolved	0.264		0.00500	1	12/18/2018 22:23	WG1210062
Nickel	0.00354		0.00200	1	12/18/2018 19:23	WG1210051
Nickel,Dissolved	0.00280		0.00200	1	12/18/2018 22:23	WG1210062
Potassium	1.47		1.00	1	12/18/2018 19:23	WG1210051
Potassium,Dissolved	1.58	B	1.00	1	12/18/2018 22:23	WG1210062
Selenium	ND		0.00200	1	12/18/2018 19:23	WG1210051
Selenium,Dissolved	ND		0.00200	1	12/18/2018 22:23	WG1210062
Silver	ND		0.00200	1	12/18/2018 19:23	WG1210051
Silver,Dissolved	ND		0.00200	1	12/18/2018 22:23	WG1210062
Sodium	6.72		1.00	1	12/18/2018 19:23	WG1210051
Sodium,Dissolved	6.57		1.00	1	12/18/2018 22:23	WG1210062
Thallium	ND		0.00200	1	12/18/2018 19:23	WG1210051
Thallium,Dissolved	ND		0.00200	1	12/18/2018 22:23	WG1210062
Vanadium	ND		0.00500	1	12/18/2018 19:23	WG1210051
Vanadium,Dissolved	ND		0.00500	1	12/18/2018 22:23	WG1210062
Zinc	ND		0.0250	1	12/18/2018 19:23	WG1210051
Zinc,Dissolved	ND		0.0250	1	12/18/2018 22:23	WG1210062

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	65.4		30.0	1	12/19/2018 11:58	WG1213130

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND		0.100	1	12/19/2018 18:53	WG1212790

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	12/21/2018 10:11	WG1213182
Chloride	14.2		1.00	1	12/21/2018 10:11	WG1213182
Fluoride	0.235		0.100	1	12/21/2018 10:11	WG1213182

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	12/13/2018 19:52	WG1210141
Mercury,Dissolved	ND		0.000200	1	12/13/2018 18:36	WG1210143

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	12/15/2018 17:29	WG1210104
Boron,Dissolved	ND		0.200	1	12/14/2018 16:52	WG1210107

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.224		0.100	1	12/18/2018 19:27	WG1210051
Aluminum,Dissolved	ND		0.100	1	12/18/2018 22:51	WG1210062
Antimony	ND		0.00200	1	12/18/2018 19:27	WG1210051
Antimony,Dissolved	ND	J4	0.00200	1	12/18/2018 22:51	WG1210062
Arsenic	ND		0.00200	1	12/18/2018 19:27	WG1210051
Arsenic,Dissolved	ND		0.00200	1	12/18/2018 22:51	WG1210062
Barium	0.0385		0.00500	1	12/18/2018 19:27	WG1210051
Barium,Dissolved	0.0371		0.00500	1	12/18/2018 22:51	WG1210062
Beryllium	ND		0.00200	1	12/18/2018 19:27	WG1210051
Beryllium,Dissolved	ND		0.00200	1	12/18/2018 22:51	WG1210062
Cadmium	ND		0.00100	1	12/18/2018 19:27	WG1210051
Cadmium,Dissolved	ND		0.00100	1	12/18/2018 22:51	WG1210062
Calcium	17.5		1.00	1	12/18/2018 19:27	WG1210051
Calcium,Dissolved	16.1		1.00	1	12/18/2018 22:51	WG1210062
Chromium	ND		0.00200	1	12/18/2018 19:27	WG1210051
Chromium,Dissolved	0.00218	B	0.00200	1	12/18/2018 22:51	WG1210062
Cobalt	0.00388		0.00200	1	12/18/2018 19:27	WG1210051
Cobalt,Dissolved	0.00272		0.00200	1	12/18/2018 22:51	WG1210062
Copper	ND		0.00500	1	12/19/2018 13:39	WG1212959
Copper,Dissolved	ND		0.00500	1	12/18/2018 22:51	WG1210062
Iron	1.43		0.100	1	12/18/2018 19:27	WG1210051
Iron,Dissolved	0.262		0.100	1	12/18/2018 22:51	WG1210062
Lead	ND		0.00200	1	12/19/2018 13:39	WG1212959
Lead,Dissolved	ND		0.00200	1	12/19/2018 13:11	WG1212968

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	6.58		1.00	1	12/18/2018 19:27	WG1210051
Magnesium,Dissolved	6.00		1.00	1	12/18/2018 22:51	WG1210062
Manganese	0.705		0.00500	1	12/18/2018 19:27	WG1210051
Manganese,Dissolved	0.631		0.00500	1	12/18/2018 22:51	WG1210062
Nickel	0.00847		0.00200	1	12/18/2018 19:27	WG1210051
Nickel,Dissolved	0.00663		0.00200	1	12/18/2018 22:51	WG1210062
Potassium	1.86		1.00	1	12/18/2018 19:27	WG1210051
Potassium,Dissolved	2.02		1.00	1	12/18/2018 22:51	WG1210062
Selenium	ND		0.00200	1	12/18/2018 19:27	WG1210051
Selenium,Dissolved	ND		0.00200	1	12/18/2018 22:51	WG1210062
Silver	ND		0.00200	1	12/18/2018 19:27	WG1210051
Silver,Dissolved	ND		0.00200	1	12/18/2018 22:51	WG1210062
Sodium	7.95		1.00	1	12/18/2018 19:27	WG1210051
Sodium,Dissolved	7.92		1.00	1	12/18/2018 22:51	WG1210062
Thallium	ND		0.00200	1	12/18/2018 19:27	WG1210051
Thallium,Dissolved	ND		0.00200	1	12/18/2018 22:51	WG1210062
Vanadium	ND		0.00500	1	12/18/2018 19:27	WG1210051
Vanadium,Dissolved	ND		0.00500	1	12/18/2018 22:51	WG1210062
Zinc	0.0267	B	0.0250	1	12/18/2018 19:27	WG1210051
Zinc,Dissolved	ND		0.0250	1	12/18/2018 22:51	WG1210062

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	64.9		30.0	1	12/19/2018 13:04	WG1213130

Wet Chemistry by Method 350.1

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Ammonia Nitrogen	ND		0.100	1	12/19/2018 18:55	WG1212790

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Bromide	ND		1.00	1	12/21/2018 10:26	WG1213182
Chloride	15.3		1.00	1	12/21/2018 10:26	WG1213182
Fluoride	0.210		0.100	1	12/21/2018 10:26	WG1213182

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	12/13/2018 19:59	WG1210141
Mercury,Dissolved	ND		0.000200	1	12/13/2018 18:39	WG1210143

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Boron	ND		0.200	1	12/15/2018 17:32	WG1210104
Boron,Dissolved	ND		0.200	1	12/14/2018 16:55	WG1210107

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.176		0.100	1	12/18/2018 20:08	WG1210051
Aluminum,Dissolved	ND		0.100	1	12/18/2018 22:56	WG1210062
Antimony	ND		0.00200	1	12/18/2018 20:08	WG1210051
Antimony,Dissolved	ND	J4	0.00200	1	12/18/2018 22:56	WG1210062
Arsenic	ND		0.00200	1	12/18/2018 20:08	WG1210051
Arsenic,Dissolved	ND		0.00200	1	12/18/2018 22:56	WG1210062
Barium	0.0384		0.00500	1	12/18/2018 20:08	WG1210051
Barium,Dissolved	0.0378		0.00500	1	12/18/2018 22:56	WG1210062
Beryllium	ND		0.00200	1	12/18/2018 20:08	WG1210051
Beryllium,Dissolved	ND		0.00200	1	12/18/2018 22:56	WG1210062
Cadmium	ND		0.00100	1	12/18/2018 20:08	WG1210051
Cadmium,Dissolved	ND		0.00100	1	12/18/2018 22:56	WG1210062
Calcium	16.9		1.00	1	12/18/2018 20:08	WG1210051
Calcium,Dissolved	15.6		1.00	1	12/18/2018 22:56	WG1210062
Chromium	ND		0.00200	1	12/18/2018 20:08	WG1210051
Chromium,Dissolved	ND		0.00200	1	12/18/2018 22:56	WG1210062
Cobalt	0.00297		0.00200	1	12/18/2018 20:08	WG1210051
Cobalt,Dissolved	ND		0.00200	1	12/18/2018 22:56	WG1210062
Copper	ND		0.00500	1	12/19/2018 13:44	WG1212959
Copper,Dissolved	ND		0.00500	1	12/18/2018 22:56	WG1210062
Iron	1.11		0.100	1	12/18/2018 20:08	WG1210051
Iron,Dissolved	0.228		0.100	1	12/18/2018 22:56	WG1210062
Lead	ND		0.00200	1	12/19/2018 13:44	WG1212959
Lead,Dissolved	ND		0.00200	1	12/19/2018 13:16	WG1212968

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	5.68		1.00	1	12/18/2018 20:08	WG1210051
Magnesium,Dissolved	5.19		1.00	1	12/18/2018 22:56	WG1210062
Manganese	0.606		0.00500	1	12/18/2018 20:08	WG1210051
Manganese,Dissolved	0.520		0.00500	1	12/18/2018 22:56	WG1210062
Nickel	0.00649		0.00200	1	12/18/2018 20:08	WG1210051
Nickel,Dissolved	0.00609		0.00200	1	12/18/2018 22:56	WG1210062
Potassium	1.90		1.00	1	12/18/2018 20:08	WG1210051
Potassium,Dissolved	1.97	B	1.00	1	12/18/2018 22:56	WG1210062
Selenium	ND		0.00200	1	12/18/2018 20:08	WG1210051
Selenium,Dissolved	ND		0.00200	1	12/18/2018 22:56	WG1210062
Silver	ND		0.00200	1	12/18/2018 20:08	WG1210051
Silver,Dissolved	ND		0.00200	1	12/18/2018 22:56	WG1210062
Sodium	7.57		1.00	1	12/18/2018 20:08	WG1210051
Sodium,Dissolved	7.29		1.00	1	12/18/2018 22:56	WG1210062
Thallium	ND		0.00200	1	12/18/2018 20:08	WG1210051
Thallium,Dissolved	ND		0.00200	1	12/18/2018 22:56	WG1210062
Vanadium	ND		0.00500	1	12/18/2018 20:08	WG1210051
Vanadium,Dissolved	ND		0.00500	1	12/18/2018 22:56	WG1210062
Zinc	ND		0.0250	1	12/18/2018 20:08	WG1210051
Zinc,Dissolved	ND		0.0250	1	12/18/2018 22:56	WG1210062

Wet Chemistry by Method 130.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Hardness (colorimetric) as CaCO3	62.1		30.0	1	12/19/2018 13:05	WG1213130

Wet Chemistry by Method 350.1

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Ammonia Nitrogen	ND	J6	0.100	1	12/19/2018 19:03	WG1212790

Wet Chemistry by Method 9056A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Bromide	ND		1.00	1	12/21/2018 10:42	WG1213182
Chloride	16.4		1.00	1	12/21/2018 10:42	WG1213182
Fluoride	0.197		0.100	1	12/21/2018 10:42	WG1213182

Mercury by Method 7470A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Mercury	ND		0.000200	1	12/13/2018 20:02	WG1210141
Mercury,Dissolved	ND		0.000200	1	12/13/2018 18:41	WG1210143

Metals (ICP) by Method 6010B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Boron	ND		0.200	1	12/15/2018 17:34	WG1210104
Boron,Dissolved	ND		0.200	1	12/14/2018 16:58	WG1210107

Metals (ICPMS) by Method 6020A

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Aluminum	0.191		0.100	1	12/18/2018 20:12	WG1210051
Aluminum,Dissolved	ND		0.100	1	12/18/2018 23:00	WG1210062
Antimony	ND		0.00200	1	12/18/2018 20:12	WG1210051
Antimony,Dissolved	ND	J4	0.00200	1	12/18/2018 23:00	WG1210062
Arsenic	ND		0.00200	1	12/18/2018 20:12	WG1210051
Arsenic,Dissolved	ND		0.00200	1	12/18/2018 23:00	WG1210062
Barium	0.0411		0.00500	1	12/18/2018 20:12	WG1210051
Barium,Dissolved	0.0394		0.00500	1	12/18/2018 23:00	WG1210062
Beryllium	ND		0.00200	1	12/18/2018 20:12	WG1210051
Beryllium,Dissolved	ND		0.00200	1	12/18/2018 23:00	WG1210062
Cadmium	ND		0.00100	1	12/18/2018 20:12	WG1210051
Cadmium,Dissolved	ND		0.00100	1	12/18/2018 23:00	WG1210062
Calcium	16.8		1.00	1	12/18/2018 20:12	WG1210051
Calcium,Dissolved	15.9		1.00	1	12/18/2018 23:00	WG1210062
Chromium	ND		0.00200	1	12/18/2018 20:12	WG1210051
Chromium,Dissolved	ND		0.00200	1	12/18/2018 23:00	WG1210062
Cobalt	0.00298		0.00200	1	12/18/2018 20:12	WG1210051
Cobalt,Dissolved	ND		0.00200	1	12/18/2018 23:00	WG1210062
Copper	ND		0.00500	1	12/19/2018 13:49	WG1212959
Copper,Dissolved	ND		0.00500	1	12/18/2018 23:00	WG1210062
Iron	1.18		0.100	1	12/18/2018 20:12	WG1210051
Iron,Dissolved	0.278		0.100	1	12/18/2018 23:00	WG1210062
Lead	ND		0.00200	1	12/19/2018 13:49	WG1212959
Lead,Dissolved	ND		0.00200	1	12/19/2018 13:20	WG1212968

Metals (ICPMS) by Method 6020A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Magnesium	5.71		1.00	1	12/18/2018 20:12	WG1210051
Magnesium,Dissolved	5.28		1.00	1	12/18/2018 23:00	WG1210062
Manganese	0.625		0.00500	1	12/18/2018 20:12	WG1210051
Manganese,Dissolved	0.549		0.00500	1	12/18/2018 23:00	WG1210062
Nickel	0.00645		0.00200	1	12/18/2018 20:12	WG1210051
Nickel,Dissolved	0.00556		0.00200	1	12/18/2018 23:00	WG1210062
Potassium	2.03		1.00	1	12/18/2018 20:12	WG1210051
Potassium,Dissolved	2.11		1.00	1	12/18/2018 23:00	WG1210062
Selenium	ND		0.00200	1	12/18/2018 20:12	WG1210051
Selenium,Dissolved	ND		0.00200	1	12/18/2018 23:00	WG1210062
Silver	ND		0.00200	1	12/18/2018 20:12	WG1210051
Silver,Dissolved	ND		0.00200	1	12/18/2018 23:00	WG1210062
Sodium	8.01		1.00	1	12/18/2018 20:12	WG1210051
Sodium,Dissolved	7.77		1.00	1	12/18/2018 23:00	WG1210062
Thallium	ND		0.00200	1	12/18/2018 20:12	WG1210051
Thallium,Dissolved	ND		0.00200	1	12/18/2018 23:00	WG1210062
Vanadium	ND		0.00500	1	12/18/2018 20:12	WG1210051
Vanadium,Dissolved	ND		0.00500	1	12/18/2018 23:00	WG1210062
Zinc	ND		0.0250	1	12/18/2018 20:12	WG1210051
Zinc,Dissolved	ND		0.0250	1	12/18/2018 23:00	WG1210062

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Bromide	ND		10.0	1	12/18/2018 23:39	WG1210080
Chloride	ND	P1	10.0	1	12/18/2018 23:39	WG1210080
Fluoride	ND	P1	1.00	1	12/18/2018 23:39	WG1210080

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	12/13/2018 22:27	WG1210271

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	804		10.0	1	12/15/2018 19:12	WG1210045
Antimony	ND		2.00	1	12/15/2018 19:12	WG1210045
Arsenic	ND		2.00	1	12/15/2018 19:12	WG1210045
Barium	11.0		0.500	1	12/15/2018 19:12	WG1210045
Beryllium	ND		0.200	1	12/15/2018 19:12	WG1210045
Boron	ND		10.0	1	12/15/2018 19:12	WG1210045
Cadmium	ND		0.500	1	12/15/2018 19:12	WG1210045
Calcium	ND		100	1	12/15/2018 19:12	WG1210045
Chromium	5.57		1.00	1	12/15/2018 19:12	WG1210045
Cobalt	1.37		1.00	1	12/15/2018 19:12	WG1210045
Copper	ND		2.00	1	12/15/2018 19:12	WG1210045
Iron	3530		10.0	1	12/15/2018 19:12	WG1210045
Lead	1.79		0.500	1	12/15/2018 19:12	WG1210045
Magnesium	ND		100	1	12/15/2018 19:12	WG1210045
Manganese	129		1.00	1	12/15/2018 19:12	WG1210045
Nickel	ND		2.00	1	12/15/2018 19:12	WG1210045
Potassium	ND		100	1	12/15/2018 19:12	WG1210045
Selenium	ND		2.00	1	12/15/2018 19:12	WG1210045
Silver	ND		1.00	1	12/15/2018 19:12	WG1210045
Sodium	ND		100	1	12/15/2018 19:12	WG1210045
Thallium	ND		2.00	1	12/15/2018 19:12	WG1210045
Vanadium	5.49		2.00	1	12/15/2018 19:12	WG1210045
Zinc	8.67		5.00	1	12/15/2018 19:12	WG1210045

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Bromide	ND		10.0	1	12/19/2018 21:56	WG1211633
Chloride	24.7		10.0	1	12/19/2018 21:56	WG1211633
Fluoride	ND		1.00	1	12/19/2018 21:56	WG1211633

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	12/13/2018 22:29	WG1210271

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	567		10.0	1	12/15/2018 19:15	WG1210045
Antimony	ND		2.00	1	12/15/2018 19:15	WG1210045
Arsenic	ND		2.00	1	12/15/2018 19:15	WG1210045
Barium	7.71		0.500	1	12/15/2018 19:15	WG1210045
Beryllium	ND		0.200	1	12/15/2018 19:15	WG1210045
Boron	ND		10.0	1	12/15/2018 19:15	WG1210045
Cadmium	ND		0.500	1	12/15/2018 19:15	WG1210045
Calcium	ND		100	1	12/15/2018 19:15	WG1210045
Chromium	2.62		1.00	1	12/15/2018 19:15	WG1210045
Cobalt	ND		1.00	1	12/15/2018 19:15	WG1210045
Copper	ND		2.00	1	12/15/2018 19:15	WG1210045
Iron	2160		10.0	1	12/15/2018 19:15	WG1210045
Lead	1.00		0.500	1	12/15/2018 19:15	WG1210045
Magnesium	ND		100	1	12/15/2018 19:15	WG1210045
Manganese	142		1.00	1	12/15/2018 19:15	WG1210045
Nickel	ND		2.00	1	12/15/2018 19:15	WG1210045
Potassium	ND		100	1	12/15/2018 19:15	WG1210045
Selenium	ND		2.00	1	12/15/2018 19:15	WG1210045
Silver	ND		1.00	1	12/15/2018 19:15	WG1210045
Sodium	ND		100	1	12/15/2018 19:15	WG1210045
Thallium	ND		2.00	1	12/15/2018 19:15	WG1210045
Vanadium	4.00		2.00	1	12/15/2018 19:15	WG1210045
Zinc	ND		5.00	1	12/15/2018 19:15	WG1210045

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Bromide	ND		10.0	1	12/19/2018 22:24	WG1211633
Chloride	ND		10.0	1	12/19/2018 22:24	WG1211633
Fluoride	ND		1.00	1	12/19/2018 22:24	WG1211633

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	12/13/2018 22:32	WG1210271

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	809		10.0	1	12/15/2018 19:18	WG1210045
Antimony	ND		2.00	1	12/15/2018 19:18	WG1210045
Arsenic	ND		2.00	1	12/15/2018 19:18	WG1210045
Barium	26.0		0.500	1	12/15/2018 19:18	WG1210045
Beryllium	ND		0.200	1	12/15/2018 19:18	WG1210045
Boron	ND		10.0	1	12/15/2018 19:18	WG1210045
Cadmium	ND		0.500	1	12/15/2018 19:18	WG1210045
Calcium	1410		100	1	12/15/2018 19:18	WG1210045
Chromium	4.40		1.00	1	12/15/2018 19:18	WG1210045
Cobalt	1.62		1.00	1	12/15/2018 19:18	WG1210045
Copper	ND		2.00	1	12/15/2018 19:18	WG1210045
Iron	3590		10.0	1	12/15/2018 19:18	WG1210045
Lead	3.71		0.500	1	12/15/2018 19:18	WG1210045
Magnesium	127		100	1	12/15/2018 19:18	WG1210045
Manganese	121		1.00	1	12/15/2018 19:18	WG1210045
Nickel	ND		2.00	1	12/15/2018 19:18	WG1210045
Potassium	117		100	1	12/15/2018 19:18	WG1210045
Selenium	ND		2.00	1	12/15/2018 19:18	WG1210045
Silver	ND		1.00	1	12/15/2018 19:18	WG1210045
Sodium	ND		100	1	12/15/2018 19:18	WG1210045
Thallium	ND		2.00	1	12/15/2018 19:18	WG1210045
Vanadium	4.52		2.00	1	12/15/2018 19:18	WG1210045
Zinc	10.3		5.00	1	12/15/2018 19:18	WG1210045

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Bromide	ND		10.0	1	12/19/2018 22:52	WG1211633
Chloride	11.5		10.0	1	12/19/2018 22:52	WG1211633
Fluoride	ND		1.00	1	12/19/2018 22:52	WG1211633

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	12/13/2018 22:34	WG1210271

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	1100		10.0	1	12/15/2018 19:20	WG1210045
Antimony	ND		2.00	1	12/15/2018 19:20	WG1210045
Arsenic	ND		2.00	1	12/15/2018 19:20	WG1210045
Barium	11.2		0.500	1	12/15/2018 19:20	WG1210045
Beryllium	ND		0.200	1	12/15/2018 19:20	WG1210045
Boron	ND		10.0	1	12/15/2018 19:20	WG1210045
Cadmium	0.566		0.500	1	12/15/2018 19:20	WG1210045
Calcium	174		100	1	12/15/2018 19:20	WG1210045
Chromium	4.18		1.00	1	12/15/2018 19:20	WG1210045
Cobalt	1.35		1.00	1	12/15/2018 19:20	WG1210045
Copper	ND		2.00	1	12/15/2018 19:20	WG1210045
Iron	3100		10.0	1	12/15/2018 19:20	WG1210045
Lead	2.72		0.500	1	12/15/2018 19:20	WG1210045
Magnesium	ND		100	1	12/15/2018 19:20	WG1210045
Manganese	167		1.00	1	12/15/2018 19:20	WG1210045
Nickel	ND		2.00	1	12/15/2018 19:20	WG1210045
Potassium	125		100	1	12/15/2018 19:20	WG1210045
Selenium	ND		2.00	1	12/15/2018 19:20	WG1210045
Silver	ND		1.00	1	12/15/2018 19:20	WG1210045
Sodium	ND		100	1	12/15/2018 19:20	WG1210045
Thallium	ND		2.00	1	12/15/2018 19:20	WG1210045
Vanadium	5.32		2.00	1	12/15/2018 19:20	WG1210045
Zinc	13.9		5.00	1	12/15/2018 19:20	WG1210045

Wet Chemistry by Method 9056A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Bromide	ND		10.0	1	12/19/2018 23:20	WG1211633
Chloride	ND		10.0	1	12/19/2018 23:20	WG1211633
Fluoride	ND		1.00	1	12/19/2018 23:20	WG1211633

Mercury by Method 7471A

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0200	1	12/13/2018 22:37	WG1210271

Metals (ICP) by Method 6010B

Analyte	Result mg/kg	Qualifier	RDL mg/kg	Dilution	Analysis date / time	Batch
Aluminum	853		10.0	1	12/15/2018 19:23	WG1210045
Antimony	ND		2.00	1	12/15/2018 19:23	WG1210045
Arsenic	ND		2.00	1	12/15/2018 19:23	WG1210045
Barium	8.98		0.500	1	12/15/2018 19:23	WG1210045
Beryllium	ND		0.200	1	12/15/2018 19:23	WG1210045
Boron	ND		10.0	1	12/15/2018 19:23	WG1210045
Cadmium	ND		0.500	1	12/15/2018 19:23	WG1210045
Calcium	111		100	1	12/15/2018 19:23	WG1210045
Chromium	4.11		1.00	1	12/15/2018 19:23	WG1210045
Cobalt	1.10		1.00	1	12/15/2018 19:23	WG1210045
Copper	ND		2.00	1	12/15/2018 19:23	WG1210045
Iron	3720		10.0	1	12/15/2018 19:23	WG1210045
Lead	3.06		0.500	1	12/15/2018 19:23	WG1210045
Magnesium	ND		100	1	12/15/2018 19:23	WG1210045
Manganese	127		1.00	1	12/15/2018 19:23	WG1210045
Nickel	ND		2.00	1	12/15/2018 19:23	WG1210045
Potassium	120		100	1	12/15/2018 19:23	WG1210045
Selenium	ND		2.00	1	12/15/2018 19:23	WG1210045
Silver	ND		1.00	1	12/15/2018 19:23	WG1210045
Sodium	ND		100	1	12/15/2018 19:23	WG1210045
Thallium	ND		2.00	1	12/15/2018 19:23	WG1210045
Vanadium	4.97		2.00	1	12/15/2018 19:23	WG1210045
Zinc	9.98		5.00	1	12/15/2018 19:23	WG1210045

Method Blank (MB)

(MB) R3369573-1 12/19/18 11:36

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hardness (colorimetric) as CaCO3	2.72	J	1.43	30.0

L1051511-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1051511-03 12/19/18 11:42 • (DUP) R3369573-3 12/19/18 11:43

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	160	155	1	3.17		20

L1051575-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1051575-01 12/19/18 13:06 • (DUP) R3369573-7 12/19/18 13:07

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	303	304	5	0.330		20

Laboratory Control Sample (LCS)

(LCS) R3369573-2 12/19/18 11:36

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Hardness (colorimetric) as CaCO3	150	149	99.3	85.0-115	

L1051568-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1051568-03 12/19/18 11:51 • (MS) R3369573-4 12/19/18 11:51 • (MSD) R3369573-5 12/19/18 11:52

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	177	239	205	41.3	18.7	1	80.0-120	E J6	E J6	15.3	20

Method Blank (MB)

(MB) R3369794-1 12/19/18 18:21

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Ammonia Nitrogen	U		0.0317	0.100

L1051508-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1051508-01 12/19/18 18:25 • (DUP) R3369794-3 12/19/18 18:26

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	5.02	5.05	1	0.576		10

L1052388-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1052388-04 12/19/18 18:55 • (DUP) R3369794-5 12/19/18 18:56

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Ammonia Nitrogen	ND	0.000	1	0.000		10

Laboratory Control Sample (LCS)

(LCS) R3369794-2 12/19/18 18:23

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Ammonia Nitrogen	7.50	7.11	94.8	90.0-110	

L1051508-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1051508-02 12/19/18 18:28 • (MS) R3369794-4 12/19/18 18:29

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Ammonia Nitrogen	5.00	5.30	9.69	87.9	1	90.0-110	J6

L1052388-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052388-05 12/19/18 19:03 • (MS) R3369794-6 12/19/18 19:04 • (MSD) R3369794-7 12/19/18 19:06

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Ammonia Nitrogen	5.00	ND	4.47	4.46	89.3	89.2	1	90.0-110	J6	J6	0.112	10

Method Blank (MB)

(MB) R3369456-1 12/18/18 17:02

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Bromide	U		0.133	10.0
Chloride	1.95	J	0.795	10.0
Fluoride	U		0.261	1.00

L1051960-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1051960-01 12/18/18 17:52 • (DUP) R3369456-3 12/18/18 18:07

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	70.2	1	200	P1	15
Chloride	326	252	1	25.6	P1	15
Fluoride	14.6	7.03	1	70.0	P1	15

L1052388-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1052388-06 12/18/18 23:39 • (DUP) R3369456-6 12/18/18 23:55

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	3.66	1	24.6	J P1	15
Fluoride	ND	0.442	1	43.4	J P1	15

Laboratory Control Sample (LCS)

(LCS) R3369456-2 12/18/18 17:19

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Bromide	200	199	99.3	80.0-120	
Chloride	200	204	102	80.0-120	
Fluoride	20.0	20.1	101	80.0-120	

L1052363-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052363-03 12/18/18 22:16 • (MS) R3369456-4 12/18/18 22:33 • (MSD) R3369456-5 12/18/18 22:49

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	624	U	587	604	94.1	96.8	1	80.0-120			2.80	15
Chloride	624	5.75	589	607	93.5	96.3	1	80.0-120			2.95	15
Fluoride	62.4	10.3	39.7	38.3	47.0	44.8	1	80.0-120	J6	J6	3.52	15

Method Blank (MB)

(MB) R3369910-1 12/19/18 13:28

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

L1052350-06 Original Sample (OS) • Duplicate (DUP)

(OS) L1052350-06 12/19/18 17:44 • (DUP) R3369910-2 12/19/18 19:08

Analyte	Original Result (dry) mg/kg	DUP Result (dry) mg/kg	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	U	0.000	1	0.000		15
Chloride	110	107	1	2.46		15
Fluoride	44.8	47.9	1	6.50		15

L1053726-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1053726-01 12/20/18 03:59 • (DUP) R3369910-5 12/20/18 04:27

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	119	106	1	10.9		15
Fluoride	7.04	6.28	1	11.4		15

Laboratory Control Sample (LCS)

(LCS) R3369910-6 12/20/18 09:02

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
Bromide	200	201	101	80.0-120	
Chloride	200	205	103	80.0-120	
Fluoride	20.0	20.5	103	80.0-120	

L1052350-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052350-09 12/19/18 20:32 • (MS) R3369910-3 12/19/18 21:00 • (MSD) R3369910-4 12/19/18 21:28

Analyte	Spike Amount (dry)	Original Result (dry)	MS Result (dry)	MSD Result (dry)	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
	mg/kg	mg/kg	mg/kg	mg/kg	%	%		%			%	%
Bromide	674	U	717	691	106	103	1	80.0-120			3.58	15
Chloride	674	167	713	691	81.0	77.7	1	80.0-120		J6	3.17	15
Fluoride	67.4	14.5	16.9	18.1	3.61	5.26	1	80.0-120	J6	J6	6.37	15

Method Blank (MB)

(MB) R3370465-1 12/21/18 02:28

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

L1052314-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1052314-02 12/21/18 03:15 • (DUP) R3370465-3 12/21/18 03:30

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	1.60	1.59	1	1.12		15
Chloride	53.7	53.5	1	0.361		15
Fluoride	0.262	0.249	1	5.12		15

L1052388-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1052388-01 12/21/18 09:09 • (DUP) R3370465-6 12/21/18 09:24

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Bromide	ND	0.000	1	0.000		15
Chloride	12.2	11.7	1	4.29		15
Fluoride	0.169	0.156	1	8.08		15

Laboratory Control Sample (LCS)

(LCS) R3370465-2 12/21/18 02:44

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Bromide	40.0	39.4	98.5	80.0-120	
Chloride	40.0	39.8	99.4	80.0-120	
Fluoride	8.00	8.36	104	80.0-120	

L1052314-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052314-02 12/21/18 03:15 • (MS) R3370465-4 12/21/18 03:45 • (MSD) R3370465-5 12/21/18 04:01

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	1.60	51.1	50.6	99.1	97.9	1	80.0-120			1.14	15
Chloride	50.0	53.7	103	102	98.5	96.5	1	80.0-120	E	E	0.949	15
Fluoride	5.00	0.262	5.66	5.53	108	105	1	80.0-120			2.28	15

L1052388-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1052388-01 12/21/18 09:09 • (MS) R3370465-7 12/21/18 09:40

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Bromide	50.0	ND	49.4	98.8	1	80.0-120	
Chloride	50.0	12.2	62.4	100	1	80.0-120	
Fluoride	5.00	0.169	5.44	105	1	80.0-120	

Method Blank (MB)

(MB) R3368123-1 12/13/18 19:01

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

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

(LCS) R3368123-2 12/13/18 19:03 • (LCSD) R3368123-3 12/13/18 19:05

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	0.00314	0.00307	105	102	80.0-120			2.18	20

L1052374-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052374-01 12/13/18 19:08 • (MS) R3368123-4 12/13/18 19:10 • (MSD) R3368123-5 12/13/18 19:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	ND	0.00223	0.00211	74.4	70.3	1	75.0-125	J6	J6	5.62	20

Method Blank (MB)

(MB) R3368122-5 12/13/18 18:04

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

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

(LCS) R3368122-1 12/13/18 17:45 • (LCSD) R3368122-2 12/13/18 17:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	0.00305	0.00338	102	113	80.0-120			10.0	20

L1052374-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052374-01 12/13/18 17:50 • (MS) R3368122-3 12/13/18 18:00 • (MSD) R3368122-4 12/13/18 18:02

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	ND	0.00219	0.00210	73.0	70.1	1	75.0-125	J6	J6	4.13	20

Method Blank (MB)

(MB) R3368116-1 12/13/18 21:21

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	0.00382	J	0.00280	0.0200

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

(LCS) R3368116-2 12/13/18 21:27 • (LCSD) R3368116-3 12/13/18 21:29

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.300	0.264	0.263	88.1	87.7	80.0-120			0.475	20

L1052150-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052150-05 12/13/18 21:32 • (MS) R3368116-4 12/13/18 21:34 • (MSD) R3368116-5 12/13/18 21:37

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 %
Mercury	0.300	0.0335	0.281	0.296	82.4	87.6	1	75.0-125			5.43	20

Method Blank (MB)

(MB) R3368585-1 12/15/18 18:00

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Aluminum	U		3.50	10.0
Antimony	U		0.750	2.00
Arsenic	0.532	J	0.460	2.00
Barium	U		0.170	0.500
Beryllium	U		0.0700	0.200
Boron	U		1.26	10.0
Cadmium	U		0.0700	0.500
Calcium	U		4.63	100
Chromium	U		0.140	1.00
Cobalt	U		0.230	1.00
Copper	U		0.530	2.00
Iron	U		1.41	10.0
Lead	U		0.190	0.500
Magnesium	1.73	J	1.11	100
Manganese	U		0.120	1.00
Nickel	U		0.490	2.00
Potassium	U		10.2	100
Selenium	0.643	J	0.620	2.00
Silver	U		0.120	1.00
Sodium	15.9	J	9.85	100
Thallium	U		0.650	2.00
Vanadium	U		0.240	2.00
Zinc	U		0.590	5.00

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

(LCS) R3368585-2 12/15/18 18:03 • (LCSD) R3368585-3 12/15/18 18:05

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	1010	1050	101	105	80.0-120			4.03	20
Antimony	100	97.0	99.2	97.0	99.2	80.0-120			2.22	20
Arsenic	100	95.1	98.5	95.1	98.5	80.0-120			3.54	20
Barium	100	100	104	100	104	80.0-120			3.62	20
Beryllium	100	99.2	102	99.2	102	80.0-120			3.26	20
Boron	100	98.9	102	98.9	102	80.0-120			2.93	20
Cadmium	100	97.7	101	97.7	101	80.0-120			3.45	20
Calcium	1000	981	1030	98.1	103	80.0-120			4.40	20
Chromium	100	100	103	100	103	80.0-120			3.03	20
Cobalt	100	101	105	101	105	80.0-120			3.27	20

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

(LCS) R3368585-2 12/15/18 18:03 • (LCSD) R3368585-3 12/15/18 18:05

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Copper	100	98.5	102	98.5	102	80.0-120			3.31	20
Iron	1000	989	1040	98.9	104	80.0-120			4.70	20
Lead	100	96.5	100	96.5	100	80.0-120			3.63	20
Magnesium	1000	983	1020	98.3	102	80.0-120			3.82	20
Manganese	100	96.3	102	96.3	102	80.0-120			5.61	20
Nickel	100	97.7	101	97.7	101	80.0-120			3.43	20
Potassium	1000	959	1020	95.9	102	80.0-120			5.83	20
Selenium	100	96.7	99.0	96.7	99.0	80.0-120			2.33	20
Silver	20.0	18.0	18.7	90.0	93.6	80.0-120			3.91	20
Sodium	1000	970	1020	97.0	102	80.0-120			5.48	20
Thallium	100	93.2	95.2	93.2	95.2	80.0-120			2.09	20
Vanadium	100	98.4	100	98.4	100	80.0-120			1.99	20
Zinc	100	95.4	99.5	95.4	99.5	80.0-120			4.21	20

L1052150-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052150-05 12/15/18 18:08 • (MS) R3368585-6 12/15/18 18:16 • (MSD) R3368585-7 12/15/18 18:19

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	1000	8570	10800	9550	223	98.3	1	75.0-125	V		12.3	20
Antimony	100	U	48.5	52.6	48.5	52.6	1	75.0-125	J6	J6	8.23	20
Arsenic	100	1.98	101	100	99.3	98.5	1	75.0-125			0.843	20
Barium	100	112	233	262	121	150	1	75.0-125		J5	11.9	20
Beryllium	100	0.501	102	102	101	102	1	75.0-125			0.619	20
Boron	100	U	95.2	92.8	95.2	92.8	1	75.0-125			2.55	20
Cadmium	100	0.369	102	102	102	102	1	75.0-125			0.104	20
Calcium	1000	2920	5440	4110	252	118	1	75.0-125	J5	J3	28.0	20
Chromium	100	5.98	109	108	103	102	1	75.0-125			1.43	20
Cobalt	100	4.48	114	114	110	109	1	75.0-125			0.441	20
Copper	100	45.7	175	166	130	120	1	75.0-125	J5		5.75	20
Iron	1000	13600	15400	18300	175	464	1	75.0-125	V	V	17.2	20
Lead	100	155	428	294	273	139	1	75.0-125	J5	J3 J5	37.1	20
Magnesium	1000	2680	3670	3170	99.2	49.2	1	75.0-125		J6	14.6	20
Manganese	100	741	1260	2070	521	1330	1	75.0-125	E V	E J3 V	48.4	20
Nickel	100	4.47	111	110	107	105	1	75.0-125			1.53	20
Potassium	1000	2490	3500	3100	101	61.7	1	75.0-125		J6	12.0	20
Selenium	100	U	98.4	100	98.4	100	1	75.0-125			1.84	20
Silver	20.0	0.855	20.0	19.4	95.7	92.6	1	75.0-125			3.20	20
Sodium	1000	72.2	1050	1060	98.2	98.9	1	75.0-125			0.676	20

L1052150-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052150-05 12/15/18 18:08 • (MS) R3368585-6 12/15/18 18:16 • (MSD) R3368585-7 12/15/18 18:19

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	U	94.5	94.4	94.5	94.4	1	75.0-125			0.105	20
Vanadium	100	15.2	115	115	100	99.3	1	75.0-125			0.721	20
Zinc	100	172	293	462	121	290	1	75.0-125		J3 J5	44.6	20

Method Blank (MB)

(MB) R3368558-1 12/15/18 16:18

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

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

(LCS) R3368558-2 12/15/18 16:20 • (LCSD) R3368558-3 12/15/18 16:23

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	0.937	0.952	93.7	95.2	80.0-120			1.67	20

L1052267-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052267-01 12/15/18 16:26 • (MS) R3368558-5 12/15/18 16:31 • (MSD) R3368558-6 12/15/18 16:33

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	0.226	1.19	1.18	95.9	95.7	1	75.0-125			0.184	20

Method Blank (MB)

(MB) R3368433-1 12/14/18 15:38

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Boron,Dissolved	0.0148	J	0.0126	0.200

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

(LCS) R3368433-2 12/14/18 15:40 • (LCSD) R3368433-3 12/14/18 15:43

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	1.00	1.00	1.00	100	100	80.0-120			0.0916	20

L1051760-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1051760-01 12/14/18 15:46 • (MS) R3368433-5 12/14/18 15:51 • (MSD) R3368433-6 12/14/18 15:53

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Boron,Dissolved	1.00	ND	1.14	1.14	101	101	1	75.0-125			0.150	20

Method Blank (MB)

(MB) R3369403-1 12/18/18 17:47

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
Cobalt	U		0.000260	0.00200
Iron	U		0.0150	0.100
Magnesium	U		0.100	1.00
Manganese	0.000379	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	0.00566	J	0.00256	0.0250

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

(LCS) R3369403-2 12/18/18 17:51 • (LCSD) R3369403-3 12/18/18 17:56

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	5.11	5.23	102	105	80.0-120			2.31	20
Antimony	0.0500	0.0518	0.0525	104	105	80.0-120			1.35	20
Arsenic	0.0500	0.0511	0.0524	102	105	80.0-120			2.56	20
Barium	0.0500	0.0493	0.0509	98.6	102	80.0-120			3.20	20
Beryllium	0.0500	0.0490	0.0489	97.9	97.7	80.0-120			0.218	20
Cadmium	0.0500	0.0518	0.0532	104	106	80.0-120			2.52	20
Calcium	5.00	5.13	5.28	103	106	80.0-120			2.97	20
Chromium	0.0500	0.0532	0.0529	106	106	80.0-120			0.532	20
Cobalt	0.0500	0.0541	0.0552	108	110	80.0-120			2.10	20
Iron	5.00	5.35	5.49	107	110	80.0-120			2.68	20
Magnesium	5.00	5.30	5.49	106	110	80.0-120			3.36	20
Manganese	0.0500	0.0519	0.0525	104	105	80.0-120			1.11	20
Nickel	0.0500	0.0538	0.0549	108	110	80.0-120			1.95	20

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

(LCS) R3369403-2 12/18/18 17:51 • (LCSD) R3369403-3 12/18/18 17:56

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Potassium	5.00	5.26	5.39	105	108	80.0-120			2.41	20
Selenium	0.0500	0.0508	0.0522	102	104	80.0-120			2.81	20
Silver	0.0500	0.0498	0.0509	99.5	102	80.0-120			2.26	20
Sodium	5.00	5.33	5.51	107	110	80.0-120			3.32	20
Thallium	0.0500	0.0519	0.0530	104	106	80.0-120			2.17	20
Vanadium	0.0500	0.0509	0.0524	102	105	80.0-120			2.87	20
Zinc	0.0500	0.0528	0.0600	106	120	80.0-120			12.6	20

L1052411-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052411-05 12/18/18 18:00 • (MS) R3369403-5 12/18/18 18:09 • (MSD) R3369403-6 12/18/18 18:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	5.00	ND	5.20	5.10	104	101	1	75.0-125			2.02	20
Antimony	0.0500	ND	0.0520	0.0518	104	104	1	75.0-125			0.465	20
Arsenic	0.0500	ND	0.0521	0.0512	104	102	1	75.0-125			1.75	20
Barium	0.0500	ND	0.0539	0.0555	97.8	101	1	75.0-125			2.99	20
Beryllium	0.0500	ND	0.0481	0.0485	96.2	97.0	1	75.0-125			0.825	20
Cadmium	0.0500	ND	0.0528	0.0530	106	106	1	75.0-125			0.401	20
Calcium	5.00	18.5	23.9	23.4	108	98.8	1	75.0-125			1.96	20
Chromium	0.0500	ND	0.0536	0.0528	106	104	1	75.0-125			1.52	20
Cobalt	0.0500	ND	0.0543	0.0538	109	108	1	75.0-125			0.985	20
Potassium	5.00	ND	5.55	5.43	108	105	1	75.0-125			2.31	20
Iron	5.00	ND	5.47	5.38	109	107	1	75.0-125			1.63	20
Magnesium	5.00	6.03	11.4	11.3	108	105	1	75.0-125			1.34	20
Manganese	0.0500	ND	0.0535	0.0541	101	103	1	75.0-125			1.19	20
Nickel	0.0500	ND	0.0547	0.0542	107	106	1	75.0-125			0.903	20
Selenium	0.0500	ND	0.0517	0.0512	103	102	1	75.0-125			0.852	20
Silver	0.0500	ND	0.0500	0.0505	100	101	1	75.0-125			1.05	20
Sodium	5.00	2.45	7.92	7.86	109	108	1	75.0-125			0.759	20
Thallium	0.0500	ND	0.0516	0.0527	103	105	1	75.0-125			2.22	20
Vanadium	0.0500	ND	0.0519	0.0506	104	101	1	75.0-125			2.59	20
Zinc	0.0500	0.0387	0.0823	0.0836	87.2	89.9	1	75.0-125			1.61	20

Method Blank (MB)

(MB) R3369397-7 12/18/18 22:46

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum,Dissolved	0.0118	J	0.00515	0.100
Antimony,Dissolved	0.00180	J	0.000754	0.00200
Arsenic,Dissolved	U		0.000250	0.00200
Barium,Dissolved	0.000372	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	0.000650	J	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	0.00457		0.000240	0.00200
Magnesium,Dissolved	U		0.100	1.00
Manganese,Dissolved	U		0.000250	0.00500
Nickel,Dissolved	U		0.000350	0.00200
Potassium,Dissolved	0.199	J	0.0370	1.00
Selenium,Dissolved	U		0.000380	0.00200
Silver,Dissolved	U		0.000310	0.00200
Sodium,Dissolved	0.315	J	0.110	1.00
Thallium,Dissolved	U		0.000190	0.00200
Vanadium,Dissolved	U		0.000180	0.00500
Zinc,Dissolved	U		0.00256	0.0250

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

(LCS) R3369397-2 12/18/18 20:56 • (LCSD) R3369397-3 12/18/18 21:01

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Aluminum,Dissolved	5.00	4.94	4.97	98.7	99.5	80.0-120			0.767	20
Antimony,Dissolved	0.0500	0.0734	0.0717	147	143	80.0-120	J4	J4	2.44	20
Arsenic,Dissolved	0.0500	0.0509	0.0515	102	103	80.0-120			1.19	20
Barium,Dissolved	0.0500	0.0503	0.0502	101	100	80.0-120			0.0927	20
Beryllium,Dissolved	0.0500	0.0481	0.0482	96.2	96.4	80.0-120			0.190	20
Cadmium,Dissolved	0.0500	0.0493	0.0500	98.6	100	80.0-120			1.49	20
Calcium,Dissolved	5.00	4.98	5.23	99.7	105	80.0-120			4.73	20
Chromium,Dissolved	0.0500	0.0516	0.0534	103	107	80.0-120			3.54	20
Copper,Dissolved	0.0500	0.0514	0.0537	103	107	80.0-120			4.31	20
Cobalt,Dissolved	0.0500	0.0525	0.0534	105	107	80.0-120			1.81	20
Iron,Dissolved	5.00	5.30	5.41	106	108	80.0-120			2.22	20

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

(LCS) R3369397-2 12/18/18 20:56 • (LCSD) R3369397-3 12/18/18 21:01

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Lead,Dissolved	0.0500	0.0568	0.0595	114	119	80.0-120			4.54	20
Magnesium,Dissolved	5.00	4.94	5.10	98.8	102	80.0-120			3.11	20
Manganese,Dissolved	0.0500	0.0514	0.0519	103	104	80.0-120			0.892	20
Nickel,Dissolved	0.0500	0.0521	0.0538	104	108	80.0-120			3.32	20
Potassium,Dissolved	5.00	5.22	5.29	104	106	80.0-120			1.35	20
Selenium,Dissolved	0.0500	0.0514	0.0525	103	105	80.0-120			2.17	20
Silver,Dissolved	0.0500	0.0536	0.0535	107	107	80.0-120			0.191	20
Sodium,Dissolved	5.00	5.55	5.59	111	112	80.0-120			0.687	20
Thallium,Dissolved	0.0500	0.0485	0.0496	97.1	99.3	80.0-120			2.28	20
Vanadium,Dissolved	0.0500	0.0509	0.0526	102	105	80.0-120			3.29	20
Zinc,Dissolved	0.0500	0.0525	0.0553	105	111	80.0-120			5.22	20

L1052411-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052411-05 12/18/18 21:05 • (MS) R3369397-5 12/18/18 21:14 • (MSD) R3369397-6 12/18/18 21:19

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 %
Aluminum,Dissolved	5.00	ND	4.90	4.93	97.5	98.2	1	75.0-125			0.740	20
Antimony,Dissolved	0.0500	ND	0.0708	0.0695	136	134	1	75.0-125	J5	J5	1.88	20
Arsenic,Dissolved	0.0500	ND	0.0495	0.0499	98.3	99.1	1	75.0-125			0.778	20
Barium,Dissolved	0.0500	0.00559	0.0538	0.0539	96.4	96.7	1	75.0-125			0.266	20
Beryllium,Dissolved	0.0500	ND	0.0493	0.0499	98.1	99.2	1	75.0-125			1.09	20
Cadmium,Dissolved	0.0500	ND	0.0489	0.0494	97.4	98.3	1	75.0-125			1.00	20
Calcium,Dissolved	5.00	17.4	22.0	22.2	93.0	96.4	1	75.0-125			0.778	20
Chromium,Dissolved	0.0500	ND	0.0502	0.0519	98.1	101	1	75.0-125			3.30	20
Copper,Dissolved	0.0500	0.0205	0.0654	0.0670	89.9	93.0	1	75.0-125			2.35	20
Cobalt,Dissolved	0.0500	ND	0.0508	0.0516	102	103	1	75.0-125			1.64	20
Potassium,Dissolved	5.00	ND	5.37	5.31	102	101	1	75.0-125			1.01	20
Iron,Dissolved	5.00	ND	5.10	5.17	102	103	1	75.0-125			1.30	20
Magnesium,Dissolved	5.00	5.57	10.5	10.5	98.4	99.0	1	75.0-125			0.283	20
Manganese,Dissolved	0.0500	ND	0.0524	0.0515	101	99.0	1	75.0-125			1.87	20
Nickel,Dissolved	0.0500	ND	0.0509	0.0520	99.3	102	1	75.0-125			2.23	20
Selenium,Dissolved	0.0500	ND	0.0538	0.0508	106	100	1	75.0-125			5.71	20
Silver,Dissolved	0.0500	ND	0.0533	0.0532	107	106	1	75.0-125			0.105	20
Sodium,Dissolved	5.00	2.31	7.82	7.72	110	108	1	75.0-125			1.30	20
Thallium,Dissolved	0.0500	ND	0.0483	0.0485	96.6	96.9	1	75.0-125			0.358	20
Vanadium,Dissolved	0.0500	ND	0.0498	0.0503	98.9	99.9	1	75.0-125			0.969	20
Zinc,Dissolved	0.0500	0.0332	0.0828	0.0834	99.2	100	1	75.0-125			0.748	20

Method Blank (MB)

(MB) R3369641-1 12/19/18 12:06

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Copper	U		0.000520	0.00500
Lead	0.000242	J	0.000240	0.00200

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

(LCS) R3369641-2 12/19/18 12:11 • (LCSD) R3369641-3 12/19/18 12:16

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 %
Copper	0.0500	0.0528	0.0525	106	105	80.0-120			0.427	20
Lead	0.0500	0.0502	0.0502	100	100	80.0-120			0.102	20

L1052411-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052411-04 12/19/18 12:20 • (MS) R3369641-5 12/19/18 12:29 • (MSD) R3369641-6 12/19/18 12:34

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Copper	0.0500	ND	0.0509	0.0500	96.3	94.6	1	75.0-125			1.67	20
Lead	0.0500	ND	0.0505	0.0501	100	99.2	1	75.0-125			0.801	20

Method Blank (MB)

(MB) R3369575-1 12/19/18 12:01

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Lead,Dissolved	U		0.000240	0.00200

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

(LCS) R3369575-2 12/19/18 12:05 • (LCSD) R3369575-3 12/19/18 12:10

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 %
Lead,Dissolved	0.0500	0.0505	0.0510	101	102	80.0-120			0.919	20

L1052374-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1052374-09 12/19/18 12:14 • (MS) R3369575-5 12/19/18 12:23 • (MSD) R3369575-6 12/19/18 12:27

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 %
Lead,Dissolved	0.0500	ND	0.0521	0.0520	101	101	1	75.0-125			0.104	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.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.
P1	RPD value not applicable for sample concentrations less than 5 times the reporting limit.
V	The sample concentration is too high to evaluate accurate spike recoveries.

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

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T 104704245-17-14
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

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

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 # 171-873

Lab Project # CEC-EWS CAMDEN LF

Collected by (print): Caleb Price JD Wilhide

Site/Facility ID # CAMDEN, TN

P.O. #

Collected by (signature): Immediately Packed on Ice N ___ Y X

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

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Anions(Br,Cl,Fl) 125mlHDPE-NoPres	Br, Cl, Fl 4ozClr-NoPres	Diss. Metals-LF 250mlHDPE-NoPres	NH3 125mlHDPE-H2SO4	Total Metals 2ozClr-NoPres	Total Metals,HARD 250mlHDPE-HNO3	Remarks	Sample # (lab only)
CHARLIE CREEK US	C	GW		12-12-18	1035	4	X		X	X		X		-01
CHARLIE CREEK MS	G	GW		12-12-18	09:30	4	X		X	X		X		02
CANE CREEK US	C	GW		12-12-18	10:15	4	X		X	X		X		03
CANE CREEK MS	C	GW		12-12-18	09:10	4	X		X	X		X		04
CANE CREEK DS-1	C	GW		12-12-18	08:45	4	X		X	X		X		05
CHARLIE CREEK US	G	SS		12-12-18	1035	2		X			X			06
CHARLIE CREEK MS	G	SS		12-12-18	09:30	2		X			X			07
CANE CREEK US	G	SS		12-12-18	10:15	2		X			X			08
CANE CREEK MS	G	SS		12-12-18	09:10	2		X			X			09
CANE CREEK DS-1	G	SS		12-12-18	08:45	2		X			X			10

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# 1052388
H230

Acctnum: CEC
Template: T133580
Prelogin: P681871
TSR: 526 - Chris McCord
PB: 11-23-18 mc
Shipped Via: Courier

* 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

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __ UPS __ FedEx __ Courier X

Tracking # N/A

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

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No (HCl / MeoH) TBR	
Caleb Price	12-12-18	1:30		1	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: A1 B °C	Bottles Received:
	12-12-18	15:40		1.4 1.0	30
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date:	Time:
			KCamell	12/12/18	1540

If preservation required by Login: Date/Time

Hold: Condition NCF / OK

EQUIPMENT CALIBRATION LOG

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

EQUIPMENT CALIBRATION FORM

NAME OF REPRESENTATIVE	A. Baugh
LOCATION	EWS Camden
DATE AND TIME	12/3/18
Equipment and Model # (ex. YSI Pro Plus 556)	YSI Pro Plus
Equipment Serial #	YSI #3

pH Calibration							
pH buffer Calibration Standard	Buffer solution exp. date	Pre-Cal Reading (S.U.)	ph mV Value	Accepted Range mV	Within Range? (Yes or No)	Post-Cal Reading (S.U.)	Calibrated? (yes/no)
4	9/22	4.02	161.9	160 to 180	Y	4.00	Y
7	3/20	7.00	-9.4	+/-50	Y	7.00	Y
10	12/19	10.11	-187.2	-160 to -180	N	10.11	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			
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)
1000	10/19	901	1000				

Hach Model 2100P Turbidimeter Calibration					
Calibration verification Test performed and passed?	NTU Standard	Within Range? (Yes/No)	Measured Value	Stored?	Final Verification test passed? (Yes/No)
(Yes)	20				
No	100				
Note: if verification passed, calibration not required	800				

GROUNDWATER MONITORING FIELD INFORMATION LOG

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

SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-1
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Cold flurries, ~35°F
DATE & TIME	12/04/18 0937	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	30.5	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	21.85	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	NO
WATER COLUMN (feet)	8.65	**FIELD BLANK COLLECTED?**	NO
PURGE VOLUME (gallons)	1.9	**EQUIPMENT BLANK COLLECTED?**	NO

PURGE INFORMATION

Gallons Purged	Time (00:00)	~~Minutes Purged~~ OTW	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0.1	1018	/	13.3	4.93	80.1	3.59	146.5	40.2
0.3	1022	/	14.8	5.17	41.4	2.02	116.6	32.4
0.5	1026	/	15.0	5.20	40.6	1.73	109.6	42.6
0.7	1030	/	14.9	5.23	40.4	1.59	100.7	41.2
0.9	1034	/	15.0	5.45	50.8	1.12	100.7	20.9
1.2	1038	/	15.1	5.62	65.0	0.81	98.1	11.8
1.5	1042	/	15.1	5.63	71.1	0.71	97.8	8.77
1.7	1046	/	~~SAMPLE DATA~~ 15.1	5.74	77.8	0.58	97.6	7.40

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
1.9	~~1035~~ 1050	/	15.0	5.75	80.4	0.56	97.9	6.44

Sample Charateristics (Odor, Color)	Clear, No odor	**Preservatives Used**	See COC
Number of Containers	11	**Sampler Signature**	

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-2
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Cloudy, ~35°F
DATE & TIME	12/04/18 1255	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	NA, parameters only	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	10	**SAMPLING EQUIPMENT**	YSI 600 pro plus
DEPTH TO WATER (feet)	5.13	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	NO
WATER COLUMN (feet)	4.87	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	/	**EQUIPMENT BLANK COLLECTED?**	NO

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
/	1302	/	14.1	6.19	325.2	1.52	125.9	4.08

Sample Charateristics (Odor, Color)	Clear, No Odor	**Preservatives Used**	/
Number of Containers	/	**Sampler Signature**	

WELL DATA

Number of Baffles	4	**Well Cap Dedicated/In Place?**	OK
Well Clear of Weeds/Accessible?	OK	**Fittings/Well Head Condition**	OK
Pad/Casing Quality	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.**	MW-3
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Cloudy, ~35°F
DATE & TIME	12/04/18 ~~1303~~ 1309	**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)	~~15.19~~ 15.17	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	Yes
WATER COLUMN (feet)	~~11.85~~ 11.83	**FIELD BLANK COLLECTED?**	NO
PURGE VOLUME (gallons)	1.3	**EQUIPMENT BLANK COLLECTED?**	NO

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0.1	1319		11.8	4.75	802	3.11	147.2	5.89
0.4	1323		11.5	5.07	711	1.57	138.0	3.14
.6	1327		11.3	5.07	708	1.28	136.9	29.9
.7	1331		11.2	5.06	703	1.03	135.4	147
0.8	1335		11.3	5.01	703	1.19	132.4	25.8
1.0	1339		11.0	5.02	700	1.17	131.5	13.0
1.2	1343		11.2	5.02	704	1.20	131.3	4.73

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
1.3	1345		11.1	5.00	704	1.23	131.2	4.77

Sample Charateristics (Odor, Color)	Clear, NO ODOR	**Preservatives Used**	See COC
Number of Containers	11 + 11	**Sampler Signature**	

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-4
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Cloudy, cold, ~35°F
DATE & TIME	12/04/18 1213	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	23.1	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	10.87	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	NO
WATER COLUMN (feet)	12.23	**FIELD BLANK COLLECTED?**	NO
PURGE VOLUME (gallons)		**EQUIPMENT BLANK COLLECTED?**	NO

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0.1	1219		13.2	5.99	63.0	3.04	128.7	83.8
0.2	1221		14.4	5.95	63.2	2.93	121.7	76.1
0.4	1225		14.5	5.96	62.6	2.69	117.3	20.0
0.6	1229		14.3	5.95	62.3	2.68	113.6	13.0
0.7	1233		14.4	5.95	62.2	2.69	110.9	5.42

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0.9	1235		14.4	5.95	62.1	2.68	110.7	4.52

Sample Charateristics (Odor, Color)	Clear, No odor	**Preservatives Used**	See COC
Number of Containers	11	**Sampler Signature**	

WELL DATA

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

GROUNDWATER MONITORING FIELD INFORMATION LOG

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SITE AND MONITORING WELL DATA

FACILITY NAME	EWS	**MONITORING WELL I.D.**	MW-5
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Cloudy, cold, ~35°F
DATE & TIME	12/04/18 1116	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	33.85	**SAMPLING EQUIPMENT**	Bailer
DEPTH TO WATER (feet)	8.78	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	2	**DUPLICATE COLLECTED?**	NO
WATER COLUMN (feet)	25.07	**FIELD BLANK COLLECTED?**	NO
PURGE VOLUME (gallons)		**EQUIPMENT BLANK COLLECTED?**	NO

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0.1	1121		15.0	5.46	253.2	1.69	137.6	7.89
0.2	1125		15.0	5.31	277.5	0.88	133.4	26.2
0.3	1129		15.1	5.31	283.1	0.69	129.2	26.1
0.4	1133		15.2	5.31	283.2	0.71	126.9	26.1
0.5	1137		14.9	5.31	279.6	0.66	124.3	26.4

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
0.6	1140	/	15.0	5.31	279.2	0.72	122.5	26.8

Sample Charateristics (Odor, Color)	Clear, No Odor	**Preservatives Used**	See COC
Number of Containers	11	**Sampler Signature**	

WELL DATA

Number of Baffles	4	**Well Cap Dedicated/In Place?**	OK
Well Clear of Weeds/Accessible?	OK	**Fittings/Well Head Condition**	OK
Pad/Casing Quality	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-1
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Cloudy, upper 30's
DATE & TIME	12-4-18/ 10:05	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump - Low Flow 3 volumes	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	32.5 0	**SAMPLING EQUIPMENT**	~~Bailer~~ Peristaltic
DEPTH TO WATER (feet)	@ 9:30 - 5.73	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	1	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	26.77	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	~~1 Vol = 0.40 gallons~~ 1 vol = 1.10 gallons 3 vol = 3.30 gallons	**EQUIPMENT BLANK COLLECTED?**	NA

PURGE INFORMATION

Gallons Purged	Time (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU	DTW
0	10:10	0	13.7	5.12	89.9	7.02	265.3	>1000	7.75
0.75	10:20	10	14.8	5.76	85.1	5.52	235.2	>1000	8.32
1.50	10:30	20	15.3	5.80	86.3	5.17	234.5	>1000	8.50
2.25	10:40	30	15.3	5.80	86.2	5.20	235.9	636	8.75
3.00	10:50	40	15.5	5.81	86.2	4.98	236.8	318	8.85
3.75	11:00	50	15.1	5.81	85.4	4.86	237.6	199	8.90
4.50	11:10	60	15.5	5.83	86.2	4.99	237.3	108	8.87
5.25	1120	70	15.1	5.83	85.3	4.71	237.9	73.9	8.70

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
5.25	1125	70	15.1	5.83	85.3	4.71	237.9	39.4*

Sample Charateristics (Odor, Color)	Clear, No odor	**Preservatives Used**	HCl, HNO3, H2SO4, Nothing, None
Number of Containers	11	**Sampler Signature**	Philip J. Campbell

@ metals

*NTU = 0.56 after field either Dissolved Metals.

WELL DATA

Number of Baffles	0 (Jersey Barrier)	**Well Cap Dedicated/In Place?**	Has rubber well cap / yes
Well Clear of Weeds/Accessible?	yes/yes	**Fittings/Well Head Condition**	PVC casing OK.
Pad/Casing Quality	No Pad / PVC casing OK	**Lock Condition**	OK will not prevent opening because well cap is only on PVC casing. comes off when tight to locked

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-2
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Cloudy, upper 30's
DATE & TIME	12-4-18 11:40	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump (Low Flow + 3 volumes)	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	27.5	**SAMPLING EQUIPMENT**	~~Bailer~~ Peristaltic pump
DEPTH TO WATER (feet)	@9:45 10.80	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	1"	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	17.50	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	1vol = 0.71 gallons 3vol = 2.15 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	11:45	0	15.5	5.93	91.6	6.95	235.8	213	13.85
0.5	11:55	10	14.3	5.78	96.6	5.81	240.6	>1000	13.30
1.0	12:05	20	14.8	5.80	88.3	5.81	243.0	>1000	13.50
1.40	12:15	30	15.1	5.81	88.4	5.54	244.4	>1000	13.58
1.80	12:25	40	15.3	5.80	88.6	5.38	247.2	398	13.68
2.25	12:35	50	14.8	5.80	87.8	5.30	249.1	219	13.68
2.75	12:45	60	15.4	5.79	88.6	5.75	250.8	155	13.75
3.25	12:55	70	15.3	5.80	89.0	5.15	252.1	88.1 63.2 (d)	13.80

metals NTU = 34.1 after filter

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
3.25	1300	70	15.3	5.80	89.0	5.15	252.1	63.2

Sample Charateristics (Odor, Color)	very slightly cloudy / No odor	**Preservatives Used**	H_2SO_4, HNO_3, HCl, Na thio, None
Number of Containers	11	**Sampler Signature**	Philip Campbell

WELL DATA

Number of Baffles	0 (Jersey Barrier)	**Well Cap Dedicated/In Place?**	well seal in place.
Well Clear of Weeds/Accessible?	yes/yes	**Fittings/Well Head Condition**	No Fittings/ pvc casing ok
Pad/Casing Quality	No pad/ PVC casing OK)	**Lock Condition**	Has lock on well seal. Can be removed from pvc 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.**	TMW-3
LOCATION	Camden, TN	**TEMPERATURE & WEATHER**	Cloudy, 39°F
DATE & TIME	12-4-18 14:00	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Peristaltic Pump - Low Flow 3 volumes	**FIELD REPRESENTATIVE**	Philip Campbell
TOTAL WELL DEPTH (feet)	28	**SAMPLING EQUIPMENT**	~~Bailer~~ Peristaltic
DEPTH TO WATER (feet)	8.38 @ time of purge	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	1"	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	19.62	**FIELD BLANK COLLECTED?**	Yes - 14:30
PURGE VOLUME (gallons)	1 vol ≈ 0.8 gallons, 3 vol ≈ 2.4 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	14:02	0	13.6	5.35	236.9	4.78	272.6	213	9.08
0.50	14:12	10	14.7	5.38	242.3	1.22	266.7	966	9.60
1.0	14:22	20	15.0	5.42	227.3	1.31	265.1	>1000	9.75
1.5	14:32	30	14.9	5.43	219.3	1.34	264.9	427	9.75
2.0	14:42	40	15.1	5.43	220.5	1.40	265.9	291	9.80
2.5	14:52	50	14.9	5.44	218.4	1.52	266.5	139	9.78
3.0	15:02	60	15.4	5.44	221.4	1.38	267.3	69.4	9.75
3.5	15:12	70	15.2	5.44	221.0	1.42	267.9		9.78

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
3.5	15:15	70	15.2	5.44	221.0	1.42	267.9	31.7

Sample Charateristics (Odor, Color)	Clear, No odor	**Preservatives Used**	~~HCl, HNO3, H2SO4, NaOH~~ None
Number of Contalners	11	**Sampler Signature**	Philip J. Campbell

NTU at Metals sample

NTU - 1.39 after filtering w/ 0.45 micron filter

WELL DATA

Number of Baffles	0 C Jersey barrier	**Well Cap Dedicated/In Place?**	well seal ~~cap~~ yes
Well Clear of Weeds/Accessible?	yes / yes	**Fittings/Well Head Condition**	No fittings / well seal OK
Pad/Casing Quality	No pad / PVC casing OK	**Lock Condition**	has lock & well seal will come out when locked even though tight at seal

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**	Cloudy, ~35°F
DATE & TIME	12/4/18 1455	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Grab	**FIELD REPRESENTATIVE**	C.Sliger / A.Baugh
TOTAL WELL DEPTH (feet)	NA	**SAMPLING EQUIPMENT**	Grab
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
-	1455	-	13.7	4.22	121423	3.64	293.5	14.3

Sample Charateristics (Odor, Color)	Clear, Ammonia Smell	**Preservatives Used**	See COC
Number of Containers	11	**Sampler Signature**	

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**	Cloudy, ~35°F
DATE & TIME	12/4/18 1445	**EVENT FREQUENCY**	Quarterly
PURGE METHOD	Grab	**FIELD REPRESENTATIVE**	A. Baugh / C. Slinger
TOTAL WELL DEPTH (feet)	NA	**SAMPLING EQUIPMENT**	Grab
DEPTH TO WATER (feet)	NA	**IS SAMPLE EQUIPMENT DEDICATED?**	No
CASING DIAMETER (inches)	NA	**DUPLICATE COLLECTED?**	No
WATER COLUMN (feet)	NA	**FIELD BLANK COLLECTED?**	No
PURGE VOLUME (gallons)	NA	**EQUIPMENT BLANK COLLECTED?**	No

SAMPLE DATA

Gallons Purged	Time Collected (00:00)	Minutes Purged	°C	pH	Conductivity (µs/cm)	DO (mg/L)	ORP	NTU
-	1445	-	6.3	9.99	132073	0.83	150.3	16.4

Sample Charateristics (Odor, Color)	Clear, Ammonia Smell	**Preservatives Used**	See COC
Number of Containers	11	**Sampler Signature**	

Seed Surface Water

EWS 12/12/18

Cane Creek DS-1 — photos: 1 — Time: 0845

pH.	7.1
DO.	13.69 mg/L
Cond.	109.8
ORP	90.3
Temp	4.8 C
Turb.	7.34

Cane Creek MS — 2 — 09:10

pH	7.07
DO	13.15
Cond	107.0
ORP	91.9
Temp	4.9 °C
Turb	7.52

3+4 — 09:30

Charlie Creek MS

pH	7.12
DO	13.45
Cond	78.1
ORP	88.8
Temp	5.3 °C
Turb	5:30

EWS 12/12/18

Cane creek U/S

pH	7.06
DO	14.30
Cond	115.20
ORP	90.5
Temp	5.0 C
Turb	[illegible]

Charlie Creek U/S

pH	7.07
DO	14.34
Cond	84.6
ORP	88.3
Temp	5.7 °C
Turb	6.94

face water

Sediment + surface water

EWS 12/12/18

		Photos	Time
Cane creek u/s		5+6	10:15
Time 0845	pH 7.06		
	DO 14.30		
	Cond 115.20		
	ORP 90.5		
	Temp 5.0°		
	Turb ~~[illegible]~~ 7.50		
Charlie creek u/s		7+8	10:35
09:10			
	pH 7.07		
	DO 14.34		
	Cond 84.6		
	ORP 88.3		
	Temp 5.7°C		
	Turb 6.94		
09:30			

APPENDIX D
CEC STANDARD OPERATING PROCEDURES

03-02-01 MONITORING WELLS USING CONVENTIONAL PURGING

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

II. PROJECT-SPECIFIC REQUIREMENTS

A. SAMPLE LOCATIONS AND NUMBERING SYSTEM:

B. ANALYTICAL PARAMETERS AND SAMPLE FREQUENCY:

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

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

E. FILTRATION:

F. PURGE CRITERION AND DISPOSAL OF PURGE WATER:

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

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

I. OTHER REQUIREMENTS:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

IV. PRECAUTIONS AND COMMON PROBLEMS

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

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

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

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

V. DOCUMENTATION

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

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

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

VII. REFERENCES

None

04-01-01 EQUIPMENT BLANKS

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

II. PROJECT-SPECIFIC REQUIREMENTS:

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

III. METHODOLOGY

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

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

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

D. Fill a complete set of sample bottles.

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

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

IV. PRECAUTIONS AND COMMON PROBLEMS

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

B. Include ALL sampling equipment in the rinsing procedure.

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

- ≅ Source of blank water
- ≅ Time and sequence within the sampling event when the blanks were prepared
- ≅ Description of the procedure for preparing the blanks
- ≅ Sample numbers assigned to blanks.

Incorporate this information into the Trip Report (SOP 07-02-04).

VI. REFERENCES

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

04-01-02 TRIP BLANKS

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

II. PROJECT-SPECIFIC REQUIREMENTS:

A. Frequency:

B. Other Criteria:

III. METHODOLOGY

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

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

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

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

IV. PRECAUTIONS AND COMMON PROBLEMS: None.

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

VI. REFERENCES

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

04-02-01 LIQUID DUPLICATES

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

II. PROJECT-SPECIFIC REQUIREMENTS:

NUMBER/FREQUENCY OF DUPLICATE SAMPLING:

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

III. METHODOLOGY

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

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

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

D. Preserve the sample and duplicate identically.

IV. PRECAUTIONS AND COMMON PROBLEMS

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

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

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

VI. REFERENCES: None.

05-03-05 BAILER

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

II. INSPECTION AND CALIBRATION

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

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

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

III. USE

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

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

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

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

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

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

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

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

V. TROUBLESHOOTING

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

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

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

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

II. PROJECT-SPECIFIC REQUIREMENTS

A. REQUIRED READINGS:

B. APPLICABLE METHODS:

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

A. CHALKED-TAPE METHOD

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

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

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

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

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

B. SOUNDING

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

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

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

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

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

C. ELECTRIC-WATER LEVEL METER (Solinst)

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

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

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

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

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

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

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

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

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

IV. PRECAUTIONS AND COMMON PROBLEMS:

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

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

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

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

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

V. DOCUMENTATION

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

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

VI. REFERENCES: None

07-01-01 MAINTAINING SAMPLE CHAIN OF CUSTODY

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

II. PROJECT-SPECIFIC REQUIREMENTS: None.

III. METHODOLOGY

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

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

B. CUSTODY RECORD

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

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

IV. PRECAUTIONS AND COMMON PROBLEMS

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

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

V. DOCUMENTATION

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

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

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

VI. REFERENCES

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

07-02-01 GROUNDWATER MONITORING DATA SHEET

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

II. PROJECT-SPECIFIC REQUIREMENTS: None.

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

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

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

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

VI. REFERENCES: None.